



देण्दयाल पोत अथोरिटी
DEENDAYAL PORT AUTHORITY

DEENDAYAL PORT AUTHORITY **(Erstwhile: DEENDAYAL PORT TRUST)**

Administrative Office Building
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www.deendayalport.gov.in

EG/WK/4660(EC) Part -V/ 149

Date: 19/07/2022

To,
The Regional Officer
Ministry of Environment, Forest & Climate Change
Integrated Regional Office,
Gandhinagar, A wing-407 & 409
Aranya Bhavan Near CH-3 Circle
Sector 10A, Gandhinagar - 382010
Email : ecomplaine-guj@gov.in

Sub: "Construction of 13th to 16th Cargo Berths at Kandla" by M/s Deendayal Port Authority (Erstwhile Deendayal Port Trust) – Compliance Report of conditions stipulated in **Environmental & CRZ Clearance and Monitoring Report in Data Sheet req.**

Ref.: 1) EC & CRZ Clearance granted vide MoEF F.No. 11-70/2006-IA-III dated 1/10/2008.
2) KPT letter no.EG/WK/4660 (EC)/654 dated 6/10/2010,
3) KPT letter no.EG/WK/4660 (EC)/ 112 dated 4/2/2012.
4) KPT letter no. EG/WK/4660(EC)/223 dated 4/9/2012.
5) KPT letter no. EG/WK/4660(EC)/144 dated 16 (17) /5/2013.
6) KPT letter no. EG/WK/4660 (EC)/Part 111/1087 dated 9/12/2013.
7) KPT letter no. EG/WK/4660 (EC)/Part 111/250 dated 17/05/2014.
8) KPT letter no. EG/WK/4660 (EC)/Part 111/198 dated 14/11/2014.
9) KPT letter no. EG/WK/4660 (EC)/Part 111/256 dated 11/05/2015.
10) KPT letter no. EG/WK/4660 (EC)/Part 111/162 dated 15/10/2015.
11) KPT letter no. EG/WK/4660 (EC)/Part 111/133 dated 09/05/2016.
12) KPT letter no. EG/WK/4660 (EC)/Part IV/167 dated 26/12/2016.
13) DPT letter no. EG/WK/4660 (EC)/Part IV/325 dated 26/06/2018.
14) DPT letter no. EG/WK/4660 (EC)/Part V/53 dated 14(16)/2/2019.
15) DPT letter no. EG/WK/4660(EC)/PartV/205 dated 30(6)/11 (12)/2019.
16) DPT letter no. EG/WK/4660 (EC)/Part V dated 15/01/2021.
17) DPT letter no. EG/WK/4660 (EC)/Part V/92 dated 30(07)/9(10)/2021.
18) DPT letter no. EG/WK/4660 (EC)/Part V dated 28/03/2022

Sir,

It is requested to kindly refer above cited references for the said subject.

In this connection, it is to state that, as directed under above referred letter dated 5/8/2009 of MoEF, Regional Office, Bhopal, Deendayal Port Authority (Erstwhile Deendayal Port Trust) vide above referred letters had submitted compliance report of stipulated conditions and Monitoring report in Data Sheet, in connection with subject project.

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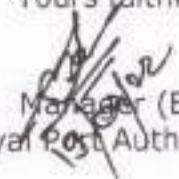
Now, as directed in above referred letter dated 5/8/2009 of MoEF, GoI, please find enclosed herewith point wise compliance to various stipulation in Environmental & CRZ Clearance granted by MoEF, GoI vide letter 11-70/2006- IA.III dated Sept, 2008 (**Annexure 1**) & Monitoring Report in Data Sheet (**Annexure 2**), for the period December 2021 to May, 2022 for kind information and record please.

Further, as per the MoEF&CC, Notification S.O.5845 (E) dated 26.11.2018, stated that **"In the said notification, in paragraph 10, in sub-paragraph (ii), for the words "hard and soft copies" the words "soft copy" shall be substituted"**. Accordingly, we are submitting herewith soft copy of the same via e-mail ID rowz.bpl-mef@nic.in & ecompliance-guj@gov.in.

This has the approval of the Chief Engineer, Deendayal Port Authority.

Thanking You.

Yours faithfully,


Manager (Env.)
Deendayal Port Authority

Copy along with point wise compliance of stipulated conditions, to:

1) Shri.Amardeep Raju, MoEF&CC,GoI and Member Secretary (EAC-Infra.1), Indira Paryavaran Bhavan, Ministry of Environment, Forest and Climate Change Jor Bagh Road, Aliganj, New Delhi-110003.
Email: ad.raju@nic.in

3) Smt. Urvashi Upadhyay, Environment Engineer, Unit Head, Kachchh, Gujarat Pollution Control Board, Paryavaran Bhavan, Sector 10A, Gandhinagar- 382 010.
Email-kut-uh-gpcb@gujarat.gov.in

2) Shri Prasoon Gargav, Scientist E & Regional Director, Central Pollution Control Board, Parivesh Bhawan, Opp. VMC Ward Office No.10, Subhanpura, Vadodara - 390 023.
Email: prasoon.cpcb@nic.in

4) The Regional Officer, Gujarat Pollution Control Board, Regional Office (East Kutch), Administrative Office Building, Deendayal Port Trust, Gandhidham.
Email Id. ro-gpcb-kute@gujarat.gov.in

Annexure -1

Annexure 1

Compliance Report for the Period Up to May, 2022.

Subject: - Compliance of stipulations made by the Ministry of Environment & Forests, GoI in Environmental & CRZ Clearance granted for "Construction of 13th to 16th Cargo Berths at DeendayalPort Authority (Erstwhile: DeendayalPort Trust)".

- The MoEF, GoI granted Environmental & CRZ Clearance for the subject project vide no. F.No. 11-70/2006-IA-III dated Sep 2008.
- 7/2/2014 – The MoEF&CC, GoI extended the validity period of Environmental & CRZ Clearance for a further period of 5 years i.e. up to 30/9/2018.

STATUS OF Berths:

13th Cargo Berth: Under operation since 18/2/2013.

15th Cargo Berth: Under Operation since 16/11/2013.

14th Cargo Berth: Under Operation since 8/4/2019.

16th Cargo Berth: Under Operation since 10/3/2019.

CONSENT TO OPERATE:

Consolidated Consent & Authorization (CC&A) issued by the GPCB (Consent Order no-AWH-110594 dated of issue-8/12/2020, with a validity period upto 21/7/2025)– Detailed Order issued by the GPCB vide outward no. 581914 dated 22/1/2021 & subsequently, issued Correction in CC&A order vide letter no. PC/CCA-KUTCH-812(5)/GPCB ID 28494/588116 dated 9/4/2021.

Sr. No.	Conditions	Remarks
A	Specific Condition	
1	All measures indicated in the letter dated 4/8/2008 shall be strictly complied with.	Compliance Report of stipulated conditions mentioned in the CRZ recommendation granted by Forest & Environment Department, GoG on 14/02/2008 is placed at Annexure A .
2	Necessary clearances from the Gujarat State Pollution Control Board shall be obtained before initiating the project.	GPCB granted No Objection Certificate to the said project vide order no. PCC/CCA-BHUJ-179(3)/575 dated 9/1/2009. All 4 berths are under operation. The Copy of detailed Consent to Operate (renewal) issued dated 22/1/2021 by the GPCB is enclosed herewith as Annexure B .
3	The project proponent shall not undertake any destruction of mangroves during construction and operation of project.	All the 4 berths are under operation. As a part of mangrove conservation, DPA has undertaken Mangrove Plantation in an area of 1500 Hectares at various locations (Annexure C1) till date under the directions of the GCZMA and MoEF&CC, GoI. Further, DPA is carrying out additional mangrove plantation of 100 ha. With consultation of Gujarat Ecology Commission vide Work Order No. DD/WK/3050/Pt-I/GIM/PC-44 dated 02/06/2022 (Annexure C2). It is also relevant to mention here that, as per the direction of the Gujarat Coastal Zone Management Authority, DPA has already prepared & submitted a report on mangrove conservation and management plan formulated by Gujarat Institute of Desert Ecology during the study period of Jan-April, 2015 (Report already submitted along with earlier compliance reports submitted). For regular monitoring, DPA vide work order dated 3/5/2021 (Annexure D) has assigned work to M/s GUIDE, Bhuj for Monitoring of mangrove plantation carried out by DPA (Period from 24/5/2021 to 23/5/2022). The final report submitted by M/s GUIDE is attached herewith as Annexure E .
4	Sewage arising in the Port area shall be treated to conform to the standards stipulated by Gujarat State Pollution Control Board and shall be utilized/ recycled or gardening, plantation and irrigation.	Generated effluent in the port area is treated in the existing STP (1.5 MLD capacity) of DPA. In addition to that, it also has septic tanks at places where STP is inaccessible. The treated sewage is already being used for gardening and plantation purposes.

		Thus, it is assured that the generated sewage is treated to conform to the standards stipulated by Gujarat State Pollution Control Board and is already being recycled/utilized for various aforementioned activities.
5	Project proponent shall prepare Disaster Management Plan covering emergency evacuation mechanisms etc.deal with natural disaster events and regularly update from time to time.	DPA is already having a Disaster Management Plan (Annexure F).
6	There shall be no withdrawal of ground water in COASTAL REGULATION ZONE area, for this project. The proponent shall ensure that as a result of the proposed constructions, ingress of saline water into ground water does not take place. Piezometers shall be installed for regular monitoring for this purpose at appropriate locations on the project site.	All the 4 berths are currently under operation.
7	The facilities to be constructed in theCOASTAL REGULATION ZONE area as part of this project shall be strictly in conformity with the provisions of the COASTAL REGULATION ZONE Notification, 1991 as amended subsequently.	All the 4 berths are currently under operation.
8	Green belt area shall be developed along the project and budget earmarked.	DPA had entrusted the work to Forest Department, Gujarat for developing green belt in and around Port area at a cost of Rs. 352 lakhs in an area of about 32 hectares and the work already completed. Further, DPA has appointed Gujarat Institute of Desert Ecology (GUIDE) for "Green belt development in Deendayal Port Authority and its Surrounding Areas, Charcoal site' (Phase-I)" vide Work Order No.EG/WK/4757/Part [Greenbelt GUIDE], dated 31 st May, 2022 (Annexure G).

9	No product other than those permissible in the COASTAL REGULATION ZONE Notification, 1991 shall be stored in the COASTAL REGULATION ZONE area.	Point Noted. Cargo is being stored at back-up area of berths viz. 13 th to 16 th CB, as per the EC & CRZ Clearance accorded by the MoEF, GoI.
B General Conditions		
I	Construction of the proposed structures shall be undertaken meticulously conforming to the existing Central/Local rules and regulations including COASTAL REGULATION ZONE Notification, 1991 & its amendments. All the construction design/drawings relating to the proposed construction activities must have approvals of the concerned State Government Department/Agencies.	Currently, all the 4 berths are under operation.
II	Adequate provisions for infrastructure facilities such as water supply, fuel, sanitation etc. shall be ensured for construction workers during the construction phase of the project so as to avoid felling of trees / mangroves and pollution of water and surroundings.	All the 4 berths are currently under operation.
iii	The project authorities must make necessary arrangement for disposal of solid wastes and for the treatment of Effluents by providing a proper wastewater treatment plant outside the COASTAL REGULATION ZONE area. The quality of treated effluents, solid wastes and noise level etc. must conform to the standards laid down by the competent authorities including the Central/State Pollution Control Board and the Union Ministry of Environment and Forests under the Environment (Protection) Act, 1986, whichever are more stringent.	Necessary arrangements are made with GPCB authorized recycler for recycling of the generated solid waste. Generated effluent is treated in the existing STP (1.5 MLD capacity) of DPA. In addition to that, it also has septic tanks at places where STP is inaccessible. DPA appointed M/s Detox Corporation (NABL Accredited laboratory), Surat for monitoring of Environmental parameters viz. Air, Water, Noise etc. since the year 2016 and reports are being submitted from time to time to the Regional Office as well as to the MoEF&CC, GoI, New Delhi. The monitoring reports are attached herewith as Annexure H .
Iv	The proponents shall provide for a regular monitoring mechanism as to ensure that the treated effluents conform to the prescribed	For regular monitoring of treated effluents, DPA appointed M/s Detox Corporation, Surat (NABL Accredited laboratory) since the year 2016. The work is in progress & DPA

	standards. The records of analysis reports must be properly maintained and made available for inspection to the concerned State/Central officials during their visits.	submitted monitoring data regularly to all the concerned authorities along with compliance reports submitted. The report is enclosed at Annexure H .
V	In order to carry out the environmental monitoring during the operational phase of the project, the project authorities shall provide an environmental laboratory well equipped with standard equipment and facilities and qualified manpower to carry out the testing of various environmental parameters.	DPA appointed M/s Detox Corporation, Surat (NABL Accredited laboratory) for regular Monitoring of environmental parameters since the year 2016. The work is in progress & DPA submitted monitoring data regularly to all the concerned authorities along with compliance reports submitted. DPA appointed M/s Detox corporation for monitoring of Environmental parameters. For the purpose, well equipped laboratory has already been established by M/s Detox Corporation at DPA (Annexure H).
vi	The sand dunes if any on the site shallnot be disturbed in any way.	No sand dunes at project site prevail.
Vii	A copy of the clearance letter will be remarked to the concerned Panchayat/local NGO, if any from whom anysuggestion/representation has been received while processing the proposal.	No suggestion/ representation has been received while processing the proposal.
Viii	The Gujarat Pollution Control Board shall display a copy of the clearance letter at the Regional Office, District Industries Centre and Controller's Office/Tehsildar's Office for 30 days.	-----
ix	The funds earmarked for environment protection measures shall be maintained, in a separate account and there shall be no diversion of these funds for any other purpose. A year-wise expenditure on environmental safeguards shall be reported to this Ministry's Regional Office at Bhopal and the State Pollution Control Board.	Point noted. The allocation made under the scheme of "Environmental Services & Clearancethereof other related Expenditure" during BE 2021-22 is Rs. 266 Lakhs & BE 2022-23 is Rs. 345 Lakhs. The expenditure made under the scheme of "Environmental Services & Clearance thereof other related Expenditure" is Rs. 168.78 lakhs for period of Jan 2021 to May 2022. The year wise expenditure on environmental safeguards is regularly submitted in the monitoring datasheet to Ministry's Regional Office at Bhopal.

X	Full support shall be extended to the officers of this Ministry's Regional Office at Bhopal and the officers of the central and State Pollution Control Board by the project proponents during their inspection for monitoring purpose, by furnishing full details and action plans including the action taken reports in respect of mitigate measures and other environment protection activities.	DPA had given required support to the officer of Ministry's Regional Office, Bhopal during site inspection carried out on 29/12/2016 for the purpose of certifying EC Conditions. DPA has also given required support to the officials of Gujarat Pollution Control Board during their visits to DPA for inspection etc. Further, it is also assured that DPA shall extend full support in future also to the officials of Ministry's Regional Office at Bhopal and the officers of the central and State Pollution Control Board during their inspection.
xi	In case of deviation of alteration in the project including the implementing agency, a fresh reference shall be made to this Ministry for modification in the clearance conditions or imposition of new ones for ensuring environment protection.	Point Noted.
Xii	This ministry reserves the right to revoke this clearance, if any of the conditions stipulated are not complied with to satisfaction of this ministry.	Point Noted.
Xiii	This Ministry or any other competent authority may stipulate any other additional conditions subsequently, if deemed necessary, for environment protection, which shall be complied with.	Point Noted.
Xiv	<p>The project proponent shall advertise in at least two local newspapers widely circulated in the region around the project, one of which shall be in the vernacular language of the locality Concerned, informing that the project has been accrued environment clearance and copies of clearance letters are available with the State Pollution Control Board and may also be seen at website of the Ministry of Environment & Forests at http://www.envfornic.in.</p> <p>The advertisement shall be made within 7 days from the date of issue</p>	Advertisement had already been made in Kutch Mitra on 21/10/2008 and Kutch Uday on 22/10/2008. Further, Newspaper cuttings had already been sent to Regional office, MoEF Bhopal vide DPA letter No.: EG/WK/4660(EC)/01 dated 31/10/2008.

	of the clearance letter and a copy of the same shall be forwarded to the Regional office of this Ministry at Bangalore.	
xv	The project proponent shall inform the Regional office at Bhopal as well as the Ministry the date of financial closer and final approval of the Project by the concerned authorities and the date of Start of Land Development work.	The necessary details have already been provided by the DPA from time to time along with the earlier compliance reports submitted. Now, all the 4 berths are under operation.
10	<p>The above-mentioned stipulations will be enforced among others under the water (Prevention and Control of Pollution) Act, 1974, the Air (Prevention and Control of Pollution) Act, 1981, the Environment (Protection) Act 1986, the Hazardous Chemicals (Manufactures, storage and Import) Rules, 1989, the Coastal Regulation Zone Notification, 1991 and its subsequent amendments and the Public Liability Insurance Act, 1991 and the Rules made there under from time to time.</p> <p>The project proponents shall also ensure that the proposal complies with the provisions of the approved Coastal Zone Management Plan of Gujarat State.</p>	<p>DPA has obtained consolidated consent and authorization vide GPCB (Consent Order no-AWH-110594 dated of issue-8/12/2020, with a validity period upto 21/7/2025)– Detailed Order issued by the GPCB vide outward no. 581914 dated 22/1/2021 & subsequently, issued Correction in CC&A order vide letter no. PC/CCA-KUTCH-812(5)/GPCB ID 28494/588116 dated 9/4/2021.</p> <p>Moreover, DPA retained M/s Detox Corporation for regular environmental monitoring and the report is enclosed at Annexure H.</p> <p>Public Liability Insurance is renewed time to time as required. The Public Liability Insurance was last renewed on 22/07/2021 and is valid till 22/07/2022. The same is attached herewith as Annexure I.</p> <p>Deendayal Port Authority had already obtained Coastal Regulation Zone Recommendations dated 14/02/2008 from State Forest & Environment Department, Government of Gujarat for the project.</p> <p>All the 4 berths are under operation.</p>

Site Observations made during the inspection carried out on 29/12/2016:

Observation	Compliance
During the site visit, it is noted that KPT had signed Concession Agreement with M/s RAS Infraport Pvt. Ltd. for 13 th CB and with M/s	The Concession Agreement signed with 13 th Cargo Berth (M/s RAS InfraPort Pvt. Ltd.) & 15 th Cargo Berth (M/s JRE Infra. Pvt. Ltd.) both stand terminated on 29/9/2017. The BOT

JRE Infra.Pvt. Ltd. for 15th CB.

While visiting the 13th CB it has been observed that the plantation around the boundary line of 13th CB was scanty. It has been instructed to BOT Operator that they have to develop a greenbelt around the boundary within their campus. Further, it has been observed that the stocking of coal and iron ore were being carried out in the CB No.13. Storm water drainage system is found to be inadequate and coal & iron ore fines runoff with storm water cannot be ruled out during monsoon season. Adequate control measures shall be put in place to prevent run-off contaminated with coal/iron ore fines. Septic tanks were observed in every check post and admin building at 13th CB. Further, continuous sprinkling were suggested at the coal stack yard.

Again at 15th CB, there were scanty plantation were observed and instruction has been given to BOT operator that they have to develop a greenbelt around the boundary within their campus. BOT operator of 15th CB is found handling dray cargo (wind mill machinery).

operators of 13th& 15th CB handed over the possession of the 13th & 15th berths & DPA started operation on the same.

GREEN BELT: DPA has already developed sufficient greenbelt area for 13th to 16th CB. Further, Deendayal Port Authority had taken up massive greenbelt development activities in and around Kandla, Residential colony, Administrative building etc.

DPA had entrusted the work to Forest Department, Gujarat for developing green belt in and around Port area at a cost of Rs. 352 lakhs in an area of about 32 hectares and the work is completed.

Further, DPA has appointed Gujarat Institute of Desert Ecology (GUIDE) for "Green belt development in Deendayal Port Authority and its Surrounding Areas, Charcoal site' (Phase-I)" vide Work Order No.EG/WK/4757/Part [Greenbelt GUIDE], dated 31st May, 2022 (Annexure G).

Storm Water Drainage: As far as storm water drainage system is concerned, necessary improvement measures have already been taken by DPA to prevent runoff contaminated with coal/iron ore fines. Pre monsoon cleaning of SWD 13th CB was carried out. The necessary action has already been taken for development of Basic amenities/facilities including SWD network in the back up area of the 13th to 16th CB.

SPRINKLING SYSTEM: It is also to informed that, DPA has already installed continuous sprinkling system in coal stack yard in DPA (40 ha. area) for to prevent dust pollution. Further, to control dust pollution in other area, regular sprinkling through tankers on roads and other staking yards is being done. Regular sweeping of spilled cargo from roads is done by parties on regular basis.

Although Environmental Management cell is in place for monitoring of berths under the control of KPT, the same is not available in respect of the BOT operators. Further, the EMC headed by Superintending Engineer (Design) having environmental qualifications is found to be in place, the other members of EMC are hired on contractual basis for a short period. This inadequacy of regular staff with environmental expertise in EMC is reflected in a number of shortcomings in the implementation of EC conditions. A dedicated Environmental Management Cell with dedicated and regular manpower with environmental expertise shall be put in place for better management of environment in the Kandla Port Area within 6 months period and an action taken report shall be submitted to MoEF&CC, RO Bhopal. The EMC shall be made responsible for the strict compliance of each and every EC condition stipulated by MoEF&CC/SEIAA.

As per the Government guidelines/norms, there is no new recruitment will be permitted in the Government Organization. Hence, DPA appointed consultants (accredited with NABET/QCI) from time to time under Environmental Management Cell with expertise in the field of Environment.

DPA is already having Environment Management cell. Further, DPA has also appointed expert agency for providing Environmental Experts from time to time. DPA appointed M/s Precitech Laboratories, Vapi for providing Environmental Experts vide work order dated 5/2/2021 (**Copy of work order & scope of work attached as Annexure J**).

In addition, it is relevant to submit here that, DPA has appointed Manager (Environment) on contractual basis for the period of 3 years and further extendable to 2 years. A copy of office order is attached herewith as **Annexure K**.

Annexure –A

**CRZ Compliance
Report (Letter No.
ENV-IO-2006-138-P
dated 14/02/2008)**



DEENDAYAL PORT AUTHORITY
(Erstwhile: DEENDAYAL PORT TRUST)

Administrative Office Building
Post Box NO. 50
GANDHIDHAM (Kutch),
Gujarat: 370 201.
Fax: (02836) 220050
Ph.: (02836) 220038

www.deendayalport.gov.in

EG/WK/4660 (EC)/ Part V /150

Dated: 07/07/2022

To,
The Additional Secretary & Director (Environment),
Govt. of Gujarat,
Forest & Environment Department,
Block No.14, 8th floor, Sachivalaya,
Gandhinagar - 382 010.

Sub: Construction of 13th to 16th Cargo Berth at Deendayal Port - **Point wise Compliance to the stipulations in CRZ Recommendations reg.**

- Ref.:**
- 1) Director (Env)'s letter no.ENV-10-2006-138- P dated 14/2/2008
 - 2) KPT letter no. EG/WK/4660 (EC)/Part III/1088 dated 9/12/2013
 - 3) KPT letter no. EG/WK/4660 (EC)/Part III/252 dated 19/5/2014
 - 4) KPT letter no. EG/WK/4660 (EC)/Part III/199 dated 14/11/2014
 - 5) KPT letter no. EG/WK/4660 (EC)/Part III/255 dated 11/05/2015
 - 6) KPT letter no. EG/WK/4660 (EC)/Part III/163 dated 15/10/2015
 - 7) KPT letter no. EG/WK/4660 (EC)/Part III/132 dated 09/05/2016
 - 8) KPT letter no. EG/WK/4660(EC)/Part IV/168 dated 26/12/2016
 - 9) DPT letter no. EG/WK/4660(EC)/Part V/324 dated 26/06/2018
 - 10) DPT letter no. EG/WK/4660(EC)/Part V/54 dated 14(16)/02/2019
 - 11) DPT letter no. EG/WK/4660(EC)/Part V/206 dated 30(6)/11(12)/2019
 - 12) DPT letter no. EG/WK/4660(EC)/Part V/108 dated 15/01/2021
 - 13) DPT letter no. EG/WK/4660(EC)/Part V/91 dated 07/10/2021
 - 14) DPA letter no. EG/WK/4660 (EC)/Part V dated 28/03/2022

Sir,

It is requested to kindly refer the above cited references for the said subject.

In this connection, it is to state, that Director (Environment), Forest & Environment Department, GoG vide above referred letter dated 14/2/2008 had granted CRZ Recommendations for the subject proposal. Accordingly, Deendayal Port Authority (Erstwhile Deendayal Port Trust) had regularly submitted point wise compliance report to the stipulated conditions in CRZ Recommendations.

In this regard, as requested under General condition no. 21 in the above referred letter dated 14/2/2008 i.e. A six-monthly report on compliance of the

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Now, please find enclosed herewith compliance report of conditions stipulated in CTE Order (**Upto May, 2022**) of Deendayal Port Authority along with necessary annexure (**Annexure 1**), for kind information & record please.

Further, as per the MoEF&CC, Notification S.O.5845 (E) dated 26.11.2018, stated that "**In the said notification, in paragraph 10, in sub-paragraph (ii), for the words "hard and soft copies" the words "soft copy" shall be substituted**". Accordingly, we are submitting herewith soft copy of the same via e-mail ID kut-uh-gpcb@gujarat.gov.in.

This has the approval of the Chief Engineer, Deendayal Port Authority.

Thanking You.

Encl.: As above

Yours faithfully,


Manager (Env.)
Deendayal Port Authority

Copy to: Regional Officer, (Kutch East)
Gujarat Pollution Control Board,
Regional Office,
Room No. 215 - 217,
A.O Building,
Deendayal Port Trust,
Gandhidham - 370 201
Email Id. ro-gpcb-kute@gujarat.gov.in

Annexure -1

Compliance Report For the Period upto May, 2022.

Name of Work: Construction of 13th to 16th Cargo Berth at Kandla, District Kachchh.

CRZ Recommendations: Letter No. ENV-I0-2006-138-P dated 14/02/2008 of Director (Environment), Forest & Environment Department, GoG. Further, Ministry of Environment & Forest–New Delhi, Govt. of India accorded the Environmental/ CRZ clearance vide letter no. 11-70/2006-IA.III dated Sep 2008 & the validity of the same had been extended by MoEF, GoI vide letter No.F.NO.11–70/2006–IA.III dated 7th February, 2014 for a further period of 5 years.

STATUS OF Berths:

13th Cargo Berth: Under operation since 18/2/2013.

15th Cargo Berth: Under Operation since 16/11/2013.

14th Cargo Berth: Under Operation since 8/4/2019.

16th Cargo Berth: Under Operation since 10/3/2019.

CONSENT TO OPERATE:

Consolidated Consent & Authorization (CC&A) issued by the GPCB (Consent Order no-AWH-110594 dated of issue-8/12/2020, with a validity period upto 21/7/2025)– Detailed Order issued by the GPCB vide outward no. 581914 dated 22/1/2021 & subsequently, issued Correction in CC&A order vide letter no. PC/CCA-KUTCH-812(5)/GPCB ID 28494/588116 dated 9/4/2021.

Sr. No.	Conditions in CRZ Recommendation Letter	Compliance
Specific Conditions		
1	The provisions of the CRZ notification of 1991 and subsequent amendments issued from time to time shall be strictly adhered to by the KPT. No activity in contradiction to the Provisions of the CRZ Notification shall be carried out by the KPT.	All the 4 berths are under operation. The provisions of the CRZ notification of 1991 and subsequent amendments issued from time to time are being strictly followed by Deendayal Port Authority (erstwhile Deendayal Port Trust).
2	The KPT shall participate financially for installing and operating the Vessel Traffic Management System in the Gulf of Kachchh and shall also take lead in preparing and operationalizing and updating regularly after getting it vetted by the Indian Coast Guard.	As informed earlier also, DPA had already contributed an amount of Rs. 41.25 Crores i.e. 25% of the total project cost of 165 crores for installing and operating the VTMS in Gulf of Kachchh. VTMS has been handed over to Directorate General of Lighthouse and Lightships, Ministry of Shipping, GoI for operating and updating regularly to statutory authorities.
3	The KPT shall strictly ensure that no creeks or rivers are blocked due to any activity at Kandla.	All the four berths are under operation
4	Mangrove plantation in an area of 1000 ha. Shall be carried out by the KPT within 5 years in time bound manner on Gujarat coastline either within or outside the Kandla port Trust area at an appropriate place in consultation with the Forest and Environment Department. A six-monthly compliance report along with the satellite images shall be submitted to the Ministry of Environment and Forest as well as to this Department without fail.	As per the directions of the GCZMA and MoEF&CC, GoI, till date, DPA has undertaken Mangrove Plantation in an area of 1500 Hectares since the year 2005. A statement showing details of mangrove plantation with cost incurred is placed at Annexure A1 . Further, DPA is carrying out additional mangrove plantation of 100 Ha. With consultation of Gujarat Ecology Commission vide Work Order No. DD/WK/3050/Pt-I/GIM/PC-44 dated 02/06/2022 (Annexure A2). It is also relevant to submit here that, as per the direction of the Gujarat Coastal Zone Management Authority, DPA had already prepared & submitted a report on mangrove conservation and management plan formulated by Gujarat Institute of Desert Ecology during the study period of Jan-April, 2015 (Report already submitted along with earlier compliance reports submitted). For regular monitoring, DPA vide work order dated 3/5/2021 (Annexure III) has assigned work to M/s GUIDE, Bhuj for Monitoring of mangrove plantation carried out by DPA (Period from 24/5/2021 to 23/5/2022) (Report attached as

		Annexure B).
5	No activities other than those permitted by the competent authority under the CRZ Notification shall be carried out in the CRZ area.	All the four berths are under operation.
6	No ground water shall be tapped for any purpose during the proposed expansion modernization activities.	All the four berths are under operation.
7	All necessary permissions from different Government Departments / agencies shall be obtained by the KPT before commencing the expansion activities.	DPA obtained Consolidated Consent & Authorization (CC&A) from the GPCB vide Consent Order no-AWH-110594 dated of issue-8/12/2020, with a validity period upto 21/7/2025- Detailed Order issued by the GPCB vide outward no. 581914 dated 22/1/2021 & subsequently, issued Correction in CC&A order vide letter no. PC/CCA-KUTCH-812(5)/GPCB ID 28494/588116 dated 9/4/2021(Annexure C).
8	No effluent or sewage shall be discharged into the sea/creek or in the CRZ area and It shall be treated to conform to the Norms prescribed by Gujarat Pollution Control Board and would be reused/recycled within the plant premises to the extent possible.	Generated effluent is treated in the existing STP (1.5 MLD capacity) of DPA. In addition to that, it also has septic tanks at places where STP is inaccessible. The treated sewage is being used for gardening and plantation purposes. Thus, it is assured that due care is taken to not release any effluent or sewage into the CRZ area or into the sea/creek.
9	All the recommendations and suggestion given by the NIOT in their Comprehensive Environment Impact Assessment report for conservation / protection and betterment of environment shall be implemented strictly by the KPT.	Currently, all the four berths are under operation. It is also relevant to mention here that, as a part of environment conservation and betterment, DPA has already undertaken Mangrove Plantation in an area of 1500 Ha. till date since the year 2005. A statement showing details of mangrove plantation with cost incurred is placed at Annexure A1 . Further, DPA is carrying out additional mangrove plantation of 100 ha. With consultation of Gujarat Ecology Commission vide Work Order No. DD/WK/3050/Pt-I/GIM/PC-44 dated 02/06/2022 (Annexure A2). As per the EC dated 19/12/2016 for Development of 7 Integrated facilities, DPA assigned work to M/s GUIDE, Bhuj for analysis of dredged material (Period from 2018-2021 & period from 2021 to 2024). A copy of work order issued to M/s GUIDE, Bhuj dated 18/9/2021 (For period 2021- 2024) and the inception report is attached herewith as Annexure D . DPA appointed M/s Detox Corporation,

		<p>Surat for monitoring of Environmental parameters viz. Air, Water, Noise etc. since the year 2016 and reports are being submitted from time to time to the Regional Office as well as to the MoEF&CC, GoI, New Delhi. The monitoring reports are attached herewith as Annexure E.</p> <p>DPA issued work order vide no. EG/WK/4751/Part (EC- Shoreline study) Dated: 12/10/2021 to NCSCM, Chennai for Shoreline Change Study for Deendayal Port Trust, Kandla, Kachchh District, Gujarat, to Study the Effect of Dumping, if any reg. The study is completed and the final report is attached herewith as Annexure F.</p>
10	The construction activities and dredging shall be carried out only under the constant supervision and guidelines of the NIOT.	All the four berths are currently under operation.
11	The KPT shall contribute financially for any common study or project that may be proposed by this Department for environmental management / conservation / improvement for the Gulf of Kachchh.	It is assured that, DPA will contribute financially for any common study or project that may be proposed by the Department for environmental management / conservation / improvement for the Gulf of Kachchh.
12	The construction debris and / or any other of waste shall not be disposed of into the sea, creek or the CRZ areas. The debris shall be removed from the construction site immediately after the construction is over.	All the 4 berths are currently under operation.
	General Conditions	
13	The construction camps shall be located outside the CRZ area and the construction labour shall be provided with the necessary amenities, including sanitation, water supply and fuel and it shall be ensured that the environmental conditions are not deteriorated by the construction labours.	All the 4 berths are currently under operation.
14	The KPT shall bear the cost of the external agency that may be appointed by this Department for supervision / monitoring of proposed activities and the environmental impacts of the proposed activities.	All the four berths are under operation.
15	The KPT shall take up massive greenbelt development activities in and around Kandla and also within	Deendayal Port Authority had taken up massive greenbelt development activities in and around Kandla, Residential colony,

	the KPT limits.	<p>administrative building etc.</p> <p>DPA had entrusted the work to Forest Department, Gujarat during August, 2019 for developing green belt in and around Port area at a cost of Rs. 352 lakhs in an area of about 32 hectares and the work is completed.</p> <p>Further, DPA has appointed Gujarat Institute of Desert Ecology (GUIDE) for "Green belt development in Deendayal Port Authority and its Surrounding Areas, Charcoal site' (Phase-I)" vide Work Order No.EG/WK/4757/Part [Greenbelt GUIDE], dated 31st May, 2022 (Annexure G).</p>
16	The KPT shall have to contribute financially for talking up the socio-economic upliftment activities in this region in construction with the Forest and Environment Department and the District Collector / District Development Officer.	<p>CSR activities are being attended by DPA. Copy of the activities undertaken by DPA as a part of CSR is enclosed as Annexure H.</p>
17	A separate budget shall be earmarked for environmental management and socioeconomic activities and details there of shall be furnished to this Department as well as the MoEF, GOI. The details with respect to the expenditure from this budget head shall also be furnished.	<p>The allocation made under the scheme of "Environmental Services & Clearance thereof other related Expenditure" during BE 2021-22 is Rs. 266 Lakhs & BE 2022-23 is Rs. 345 Lakhs.</p> <p>The expenditure made under the scheme of "Environmental Services & Clearance thereof other related Expenditure" is Rs. 168.78 lakhs for period of Jan 2021 to May 2022.</p>
18	A separate environmental management cell with qualified personnel shall be created for environmental monitoring and management during construction and operational phases of the project.	<p>DPA is already having Environment Management cell. Further, DPA has also appointed expert agency for providing Environmental Experts from time to time. Recently, DPA appointed M/s Precitech Laboratories, Vapi for providing Environmental Experts vide work order dated 5/2/2021 (Copy of work order & scope of work attached as Annexure I).</p> <p>In addition, it is relevant to submit here that, DPA has appointed Manager (Environment) on contractual basis for the period of 3 years and further extendable to 2 years. A copy of office</p>

		order is attached herewith as Annexure J.
19	An Environmental report indicating the changes, if any, with respect to the baseline environmental quality in the coastal and marine environment shall be submitted every year by the KPT to this Department as well as to the MoEF, GOI.	DPA appointed M/s DETOX Corporation, Surat for regular monitoring of Environmental parameters (Copy of monitoring report – Annexure D).
20	The KPT shall have to contribute financially to support the National Green Corps Scheme being implemented in Gujarat by the GEER Foundation, Gandhinagar, in construction with Forests and Environment Department	It is assured that, Deendayal Port Authority will contribute financially to support the National Green Corps Scheme being implemented in Gujarat by the GEER Foundation, Gandhinagar, in construction with Forests and Environment Department.
21	Six monthly reports on compliance of the conditions mentioned in this letter shall have to be furnished by the KPT on regular basis to this department/ MoEF, GOI.	DPA has regularly submitted the compliance reports to GCZMA, Gandhinagar and MoEF&CC, GOI.
22	Any other condition that may be stipulated by this department from time to time for environmental protection/management purpose shall also have to be complied with by the KPT.	It is assured that, Deendayal Port Authority shall also comply with any other condition that may be stipulated by statutory authorities from time to time for environmental protection/management purpose.

Annexure -A1

DEENDAYAL PORT TRUST

DETAILS OF MANGROVE PLANTATION ALREDY CARRIED OUT & Proposed To be Carried Out :

Sr. No	Name of the Organization	Total Mangrove Plantation carried out in Hectares till date and place of plantation and agency	Cost incurred
(A) <u>MANGROVE PLANTATION ALREDY CARRIED OUT</u>			
1	<p>DEENDAYAL PORT TRUST</p> <p>(CRZ Recommendation 13th to 16th CB issued by the GCZMA)</p> <p>(Total 1000 ha.)</p>	<p>20 Hectares – 2005-06 Satsida Bet, Kandla, by GUIDE, Bhuj</p> <p>50 Hectares – 2008-09 Nakti Creek, Kandla by Patel Construction</p> <p>100 Hectares – 2010-11 Nakti Creek ,Kandla by GEC. (Board 29/1/2010)</p> <p>200 Hectares – 2011-12 by Forest Department, GoG at Satsaida Bet</p> <p>300 Hectares – 2012-13 by Forest Department, GoG at Satsaida Bet</p> <p>330 Hectares – 2013-14 by Forest Department, GoG at Satsaida Bet</p> <p>TOTAL 1000 HA.</p>	<p>Rs. 8.8 lakhs</p> <p>Rs. 27.4 lakhs</p> <p>Rs.24.5 lakhs</p> <p>Rs. 66.5 lakhs</p> <p>Rs. 157.5 lakhs (total 630 hectares)</p>
2	<p>Creation of Berthing & allied Facilities off- tekra near Tuna (Outside Kandla Creek) – EC & CRZ Clearance.</p> <p>(Total 500 ha. – 250Ha. by DPT & 250 ha by Adani (concessionaire))</p> <p>MOU signed with GEC during Vibrant Gujarat Summit 2015 for 300 Ha.</p>	<p>300 Hectares – 2015-17 by GEC at Kantiyajal, Bharuch District</p>	<p>Rs. 90.0 lakhs</p>
3.	<p>EC & CRZ Clearance dated 19/12/2016 for Developing 7 integrated facilities (Condition 100 Ha)</p>	<p>100 Ha. –2018- 20 by GEC</p>	<p>Rs. 45 lakhs</p>
<p>TOTAL MANGROVE Plantation till date by DPT 1400 Ha. – Total 419.7 lakhs</p>			

(B) Proposed Mangrove Plantation

1.	Development of Integrated facilities (Stage-II) within the existing Deendayal Port Trust (Erstwhile Kandla Port Trust) at District Kutch, Gujarat. (1. Setting up of Oil Jetty No.7 ; 2. Setting up of Barge jetty at Jafarwadi ; 3. Setting up of Barge port at Veera; 4. Administrative office building at Tuna Tekra; 5. Road connecting from Veera barge jetty to Tuna gate by M/s Deendayal Port Trust (Erstwhile : Kandla Port Trust) - <u>Environmental & CRZ Clearance accorded by the MoEF&CC,Gol dated 19/12/2020.</u>	<u>50 Ha. as per CRZ Recommendation issued by the GCZMA dated 29/6/2016.</u>	Rs. 45 lakhs
2.	Development of 3 Remaining Integrated Facilities (stage I) within the existing Deendayal Port Trust (Erstwhile : Kandla Port Trust) at Gandhidham, Kutch, Gujarat - <u>Environmental & CRZ Clearance accorded by the MoEF&CC,Gol dated 18/2/2020.</u>	<u>50 Ha. as per CRZ Recommendation issued by the GCZMA dated 29/6/2016. .</u>	

Annexure -A2



DEENDAYAL PORT AUTHORITY

(Erstwhile Deendayal Port Trust)

Ministry of Ports, Shipping & Waterways, Govt. of India

Mech. Engg. Deptt.



Tel: (02836)220636 / 270184
FAX: (02836) 270184 / 270475
Email :- cmedpt@gmail.com
cme@deendayalport.gov.in

Office of the Chief Mechanical Engineer,
Port & Customs Building,
New Kandla (Kutch), Gujarat-370210

No. DD/WK/3050/Pt-I/Gim/PC-44

Date: 02.06.2022

Sir,

To,
Gujarat Ecology Commission
Forest & Environment Department
Block No. 18, First Floor, Udhog Bhavan,
Gandhinagar, Gujarat

Sub: Work Order to carry out Mangrove Plantation-req.

The Competent Authority, Deendayal Port Authority has been pleased to approve:

1. To carry out mangrove plantation in 100 Ha. area with consultation of concern Gujarat Ecology Commission and at tentative estimated cost amounting to Rs. 50,00,000/- (excluding GST) for the said mangrove Plantation to be carried out in an area of 100 Ha. as per the stages mentioned by them in the MoU as follows:

Sr. No.	Terms and Condition	Rs. (in lakhs)
1	50% of the project cost of 100 Ha. Mangrove Plantation after signing the MoU.	Rs. 25.00
2	40% of the project cost of 100 Ha Mangrove Plantation after nursery preparation.	Rs. 20.00
3	10% of the project cost of 100 Ha Mangrove Plantation after plantation and submission of First year progress report.	Rs. 5.00
	Total	50.00

2. To sign MoU with the Gujarat Ecology Commission, Government of Gujarat during the ensuing Vibrant Gujarat Summit 2022, regarding proposed Mangrove Plantation to be carried out in an area of 100 Hectares through the Gujarat Ecology Commission.
3. To authorize Dy. CME & CME (I/c) to sign MoU with the Gujarat Ecology Commission, Government of Gujarat during upcoming Vibrant Gujarat Summit 2022 for proposed Mangrove Plantation in an area of 100 Hectares through GEC.

The Expenditure shall be chargeable under Code 841/587/9744 WC-13001

Authority: Approved by Board vide Resolution No. 30 in the board meeting held on 27.05.2022


Chief Mechanical Engineer(I/c)
Deendayal Port Authority

Copy to:

- 1) SE(M)
- 2) A.O. (Works Audit)

Annexure -B

**Regular Monitoring of Mangrove Plantation (1400 ha) carried out by
Deendayal Port Authority, Kandla**

DPA Work Order No: WK/EG/4751/Part/ (Marine Ecology Monitoring)/10

Dt.03/05/2021

Submitted to



**Deendayal Port Authority
Administrative office building**

Post box no. 50

Gandhidham (Kachchh)

Gujarat-370201

Submitted by



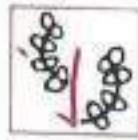
Gujarat Institute of Desert Ecology

P.B. No. 83, Mundra road

Opp. Changleshwar Temple

Bhuj-Kachchh, Gujarat-370001

MAY 2022



Certificate

This is to state that this Final report of the work entitled, “**Regular Monitoring of Mangrove Plantation (1400 Ha) carried out by Deendayal Port Authority (Statutory Requirement)**” has been prepared in the line with the work order issued by DPA vide No. EG/WK/4751/Part (Marine Ecology Monitoring)/10. Dt. 03.05.2021.

This report covers the study conducted during the period between May'2021 and May'2022.

Authorized Signatory



Institute Seal

PROJECT TEAM

Project Co-ordinator: Dr. V. Vijay Kumar, Director

Name of the Staff	Designation	Role
Dr. M. Jaikumar	Senior Scientist	Principal Investigator
Dr. Durga Prasad Behera	Project Scientist	Team Member
Dr. R. Ravinesh	Project Scientist	Team Member
Dr. Dhara Dixit	Project Scientist	Team Member
Dr. Kapilkumar. N. Ingle	Project Scientist	Team Member
Dr. L. Prabhadevi	Advisor	Team Member
Mr. Dayesh Parmar	Project Officer (RS&GIS)	Team Member
Mr. Sai Vineeth Perla	Senior Research Fellow	Team Member
Ms. Bhagavati Kannad	Junior Research Fellow	Team Member
Ms. Pallavi Joshi	Junior Research Fellow	Team Member

Snapshot of the Project, “Regular Monitoring of Mangrove Plantation (1400 Ha) carried out by Deendayal Port Authority (Statutory requirement)”

S. No	Components of the Study	Remarks
1	Deendayal Port's letter sanctioning the project	EG/ WK/4751/Part/ (Marine Ecology Monitoring)/10 dated 3/5/2021
2	Duration of the project	One year from 24.05.2021 to 23.05.2022
3	Period of the survey carried out for various components	July-2021 – April 2022
4	Survey area within the port limit	Sat Saida Bet, Nakti creek and Kantiyajal mangrove plantation sites
5	No of locations sampled within the port limits	05 blocks in Sat Saida Bet, 02 blocks in Nakti creek and 3 block at Kantiyajal
6	Components of the report	
6a	Mangrove density	<u>Sat Saida Bet:</u> Density of <i>A. marina</i> varied from 1300 to 3500 and individuals/ha and tree height ranging from 70 - 260cm <u>Nakti creek:</u> Density of <i>A. marina</i> varied from 900 – 3400 individuals/ha and tree height ranges from 72 - 280 cm. <u>Kantiyajal:</u> Density of <i>A. marina</i> varied from 1200 - 5200 individuals/ha tree height ranges from 13-220 cm. The density of <i>R. mucronata</i> at Kantiyajal was 1800 to 3500 individuals/ha and height ranges from 13 to 210 cm.
6b	Mangrove survival	The highest survival rate for <i>A. marina</i> plantation in 150 ha area at Kantiyajal was 75%, followed by 50ha area at Sat Saida bet (62.7%) and Nakti (54%).
6c	Assessment of below ground Carbon stock	The below ground Total Biomass Carbon of <i>A. marina</i> plantation varied from 42.36t/ha to 79.5t/ha. The highest below ground carbon stock potential was at Sat Saida Island.
6d	Assessment of above ground carbon	The above ground biomass was maximum 210.0 gm at Sat Saida Bet while at Nakti it was 161.0gm and at Kantiyajal 164.60gm.
7d	Management	The restoration efforts to be done to improve the sparse mangrove patches with multi-species plantation initiatives along with promotion of natural regeneration through long term efforts.
8	Status of 2017-2018 plantation	Sat Saida Bet

		<p>Average density of <i>A. marina</i> plants 2031 - 5387 individuals/ha with average height ranging from 39 - 113 cm.</p> <p>Nakti creek</p> <p>Plant density (<i>A. marina</i>) varied from 2340 – 2370 individuals/ha with average height from 53 - 84 cm. Very few <i>R. mucronata</i> and <i>C. tagal</i> plants survived.</p> <p>Kantiyajal</p> <p><i>A. marina</i> average density between 1460 and 2220 individuals/ha with an average height between 32 -37 cm. Average density of <i>R. mucronata</i> was 1280 individuals/ha with an average height of 30 cm and <i>R. mucronata</i> as frontline vegetation along the fringes of the block.</p> <p>Highest survival rate (88.8%) for <i>A. marina</i> plantation in 150 ha at Kantiyajal followed by <i>A. marina</i> plantation in 20 ha at Sat Saida bet (81.6%) during 2017-2018. The Total Biomass Carbon of <i>A. marina</i> plantation varied from 0.041 to 0.202 Mg/ha. The highest Carbon sequestration potential was of Nakti creek during 2017-2018.</p>
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1 Introduction

Mangrove forests make up one of the most productive and biologically diverse ecosystems on the planet. They grow in a variety of depths of salt water with breathing roots or Pneumatophores providing habitat for different macro and micro faunal species. The ability of mangroves to absorb up to four times more carbon dioxide by area than other terrestrial forests recognize their importance in global warming (Donato *et. al.*, 2011). The mangroves are economically important by supporting fisheries, ecotourism and carbon sequestration (Baig *et. al.*, 2015). Over the years, the global scientific community has widely realized the ecological role of mangroves and the services they provide. Despite the benefits it provides, mangroves are being overexploited and deteriorated for various reasons and area under mangrove cover decreased at an alarming rate and poorly restored (UNEP, 2014). Thus, researchers eventually tried to restore mangrove through plantation/conservation to retain the ecological and economic values, and as a result the rate of loss has been decreased and stabilized during the period of 1980 to 2000 compared to the terrestrial forest loss (Duraiappah *et. al.*, 2005). India has a total of 7516.6 km coastline distributed among nine maritime states and four Union Territories (Anon, 2001), of which Gujarat possesses the longest coastline extending to 1650 km. A total of 46 true mangrove species belonging to 14 families and 22 genera are found in Indian mangrove habitats (Ragavan *et. al.*, 2016). Around 3 % of the earth's total mangrove vegetation is found in India (FSI, 2021). Gujarat has the country's second-largest mangrove cover (1175Km²).

Mangrove being the woody habitats forms the vital carbon sinks in the coastal regions. Deendayal Port Authority (hereafter DPA) has been involved in the mangrove plantation activity as per the specifications by the Ministry of Environment Forests and Climate Change, Govt. of India, (hereafter MoEFCC) in the port premises and the adjoining creek environments in order to mitigate the environmental impacts due to the Port's regular activities in the coastal waters and the land. The coastal water itself can absorb the atmospheric carbon dioxide, and the microscopic phytoplankton tends to remove a huge amount of it through photosynthesis and diffusing oxygen into the water. The monitoring of the mangrove plantation carried out by the DPA has been undertaken by Gujarat Institute of Desert Ecology (hereafter GUIDE) regularly as per the specification in the work order (EG/WK/4751/part Marine Ecology Monitoring)/10 dated 03.05.21. This report describes the monitoring results of the mangrove plantation managed by the DPA at Nakti creek, Kantiyajal and Sat Saida Bet during the period of 2021 to 2022.

2 Objectives of the study

This study aims to assess the growth and survival rate of mangrove plantations, factors affecting the health of the mangrove and suggest appropriate remedial measures and techniques for conserving them.

The specific objectives are:

- i. To evaluate 1400 Ha of mangrove plantation at Sat Saida Bet, Nakti creek in Kachchh coast, and Kantiyajal in Bharuch district carried out by the Gujarat Ecology Commission (GEC), and the Department of Forest, Govt. of Gujarat.
- ii. To assess the extent of the plantation, health status, survival of the sapling, mortality rate and growth of the planted mangroves.
- iii. To provide a comprehensive overview of both the composition and distribution of the planted mangroves.
- iv. To assess the potential below ground carbon stock of the mangrove plantation in view of climate change.

3 Mangroves as blue-carbon stock

Mangrove ecosystems are large and dynamic carbon reservoirs, involved in the global carbon cycle and a potential sink of atmospheric carbon dioxide (Clark, 2001; Matsui *et al.*, 2010). Currently, the world's mangroves store carbon equivalent to over 21 gigatons of CO₂. Destruction of mangrove ecosystems releases this carbon into the atmosphere, accelerating the rate of climate change. (Lovelock *et al.*, 2022). It has been estimated that mangroves prevent more than \$65 billion in property damages and reduce flood risk to some 15 million people every year (Spalding *et al.*, 2021). In the face of accelerating climate change, mangroves are significant contributors to ecosystem-based adaptation, with a robust capacity to support lives and livelihoods, even in the expected future changes predicted by most of the general circulation models (IPCC 2013). A salient feature of mangrove forests is converting carbon dioxide to organic carbon at higher rates than almost any other existing habitat on earth (Ezcurra *et al.*, 2016). This 'blue carbon' is stored both in the living plants and their thick muddy soils, where it can remain fixed for centuries.

Although the area covered by mangrove forests represents only a tiny fraction of the tropical forests, their position at the terrestrial-ocean interface and possible exchange with coastal ocean

waters make a unique contribution to the total carbon cycle in the coastal ocean (Twilley, 1992). The contribution of coastal and marine ecosystems to mitigate climate change through carbon sequestration and storage is much more compared to their terrestrial counterparts (Steven *et. al.*, 2008; Yee. 2010). Blue carbon sinks include open oceans, kelp forests, salt marshes, sea grass beds, coral reefs and mangroves. Management of these blue carbon sinks is currently not being accounted for in most of the climate change policies and is excluded from national carbon inventories and international carbon payment schemes (Lasco, 2004). There are two different mangrove biomass estimation methods well established viz. field measurement and remote sensing & GIS-based approach. Amongst them, the field measurement has been considered to be precise and accurate (Petrokofsky *et al.*, 2012). Further, field-based data is also required for validation in remote sensing and GIS-based approach. Hence, in recent years, field measurements have been conducted to support and collate satellite data for meaningful estimations. Approximation of the global carbon cycle done through, scaling- up of successful protection and restoration measures (Lovelock *et. al.*, 2022). And additionally, these coastal ecosystems provide numerous benefits and services that are essential for climate change adaptation, including coastal protection and food security for many communities globally (IUCN 2017). On an implementation global level, carbon stores in different level viz., mangroves, salt marshes and seagrasses can be included in national accounting, according to the Intergovernmental Panel on Climate Change (IPCC 2013). Although there was no record of sea grass in the DPA area (GUIDE 2018).

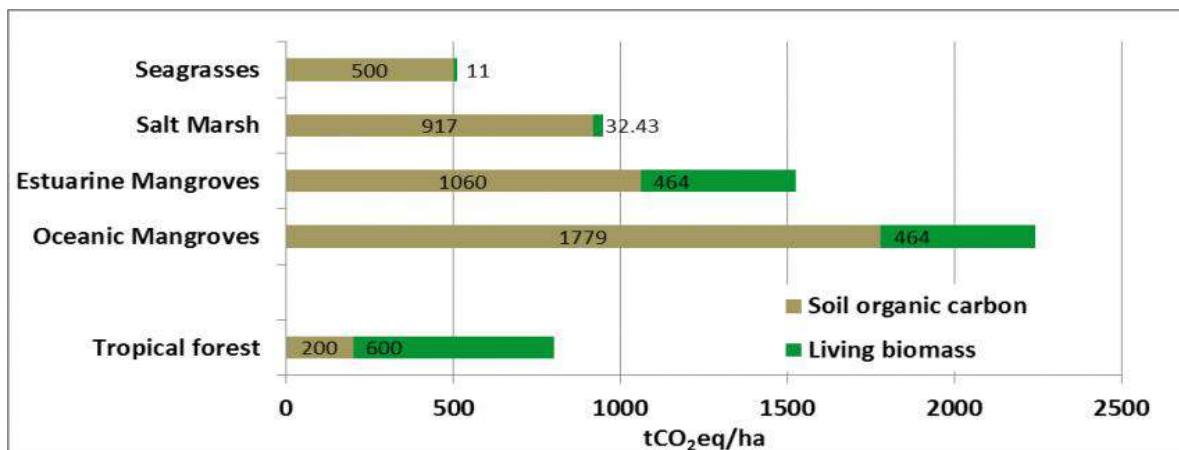


Figure 1. Different level of Carbon Storage
 (Source-IPCC, 2013 Supplement to the 2006 Guidelines for National Greenhouse Gas Inventories: Wetlands).

4 Rationale

DPA is one of the largest ports in India, having one of the largest coastal habitats, with mangroves (24328.7ha) and mudflats (31089.06 ha) around its jurisdiction. The Port Authority has been very keen and dedicated in restoring the environmental quality of both the shore line and the coastal zone by implementing reliable modern technologies with the participation of the state and central government departments and the local people. Besides the legal mandates, the port authority itself has been implementing projects, time to time towards the conservation of the mangrove and other plants and protecting their coastal habitats and measures been taken to conserve and preserve mangroves within the DPA area, to retain the ecosystem services of mangroves. Accordingly, DPA has carried out mangrove plantation in 1400 ha between 2005 and 2019 through various implementing agencies at Sat Saida Bet and Nakti creek in Kandla and Kantiyajal in Bharuch district. The DPA has entrusted the task of evaluating the status of 1400 ha of mangrove plantation in these locations to the GUIDE, Bhuj. The detailed report on the mangrove plantation evaluation is submitted to the DPA time to time.

5 Study Area

5.1 Deendayal Port Environment

Deendayal Port in Kachchh District of Gujarat State (formerly Kandla Port Trust), operated by Deendayal Port Authority (DPA), is a gateway Port to the hinterland in the western and northern states of India. It is one of the 11 major Ports of India situated at 22°59'39.77" N latitude and; 70°13'20.14" E longitude on Kandla creek at Gulf of Kachchh. The inclusion of Karachi Port in Pakistan after India's partition and heavy traffic congestion at the then Bombay Port gave impetus for promoting Deendayal Port during the 1950s. In 1955, Deendayal Port acquired the status of a major Port in India. Because of its proximity to the Gulf countries. Large quantities of crude petroleum and other assorted cargo are imported through Deendayal Port.

The Port presently has 14 jetties, six oil terminals, and several allied facilities for handling dry and liquid cargo. Regular expansion/developmental activities such as the addition of jetties, allied Special Economic Zones (SEZ hereafter), industrial parks and ship bunkering facilities are underway to cope with the increasing cargo handling demands. Shri Mansukh Mandaviya, Minister of State for Ports, Shipping and Waterways (I/C) appreciated the efforts taken by Deendayal Port and added that it is indeed the major achievements in the challenging COVID

times and it is significant indication that economy is bouncing back to achieve pre-COVID times. Major commodities handled by the Deendayal Port are Crude Oil, Petroleum product, Coal, Salt, Edible Oil, Fertilizer, Sugar, Timber, Soya bean, Wheat. This major achievement can be attributed to the user-friendly approach of port with the Shipping fraternity / stakeholders and constant consultations with them to improve Ease of Doing Business. An assortment of liquid and dry cargo is being handled at Deendayal Port. The dry cargo includes fertilizers, iron scrap, steel, food grain, metal products, ores, cement, coal, machinery, sugar, wooden logs, salt extractions, etc. The liquid cargo includes edible oil, crude oil and other petroleum products. DPA created a new record by handling 127.10 million metric tonnes of cargo during FY 2021-22 compared to 117.566 MMT in FY 2020-21, with a growth of 8.11%. Incidentally, DPA is the only major Indian Port to handle more than 127 MMT cargo throughput, and it has also registered as the highest cargo throughput in its history. The Port has handled 3151 vessels during FY 2021-22 compared to 3095 vessels in FY 2019-20. While the Port has flagged off several projects related to infrastructure creation, DPA has successfully awarded the work of augmentation of Liquid cargo handling capacity by revamping the existing pipeline network at the oil jetty area in September 2021.

Deendayal Port is a natural harbour located on the eastern bank of North-South trending Kandla creek at an aerial distance of 145 km from the Gulf's mouth. Being located at the inner end of the Gulf of Kachchh (GoK), Deendayal Port has a fragile marine ecosystem with a vast expanse of mangroves, mudflats, creek systems and allied biota. The Port location is marked by a network of major and minor mangrove-lined creek systems with a vast extent of mudflats. The coastal belt in and around the Port has an irregular and dissected configuration. Due to its location, the tidal amplitude varies, experiencing 6.66 m during Mean High-Water Spring (MHWS) and 0.78 m during Mean Low Water Spring (MLWS) with an MSL of 3.88 m. Commensurate with the increasing tidal amplitude, vast intertidal expanses are present in and around the Port environment. This, along with the occurrence of mudflats, enables mangrove formations at the intertidal belts. Annual rainfall during 2021 was 466 mm, which is often irregular (GWRDC, 2021). There are no perennial or seasonal rivers in Gandhidham taluka. Total rainy days during the monsoon season is limited to only 15-20 days and used to be erratic. Freshwater input into the near coastal waters is relatively meagre and appears to have less influence on the ambient coastal water quality except during monsoon months, during which freshwater through flash floods get discharged in the near coastal waters. The annual average humidity is 60%, which increases to 80% during the southwest monsoon (June to September)

and decreases to 50% during November-December. The average wind speed is 4.65 m/s, with a maximum wind speed of 10.61 m/s during June. The drought phenomenon is common with two drought years in a cycle of 5 years. The annual mean maximum and minimum temperatures are 42.8°C and 21.3°C, respectively (Table 1).

The coastal belt in and around the Kandla region is characterized by a network of creek systems and mudflats covered by sparse halophytic vegetation, creek water and salt-encrusted land mass, which forms the major land forms. The surrounding environment in a radius of 10 km from the Port is mostly built-up areas consisting of salt works, human habitations and Port related structures on the west and north, creek system, mangrove formations and mudflats on the east and south. The Deendayal Port and its surroundings have mangroves, mudflats and creek systems as major ecological entities. Various ecosystem services provided by the mangrove ecosystem is depicted in Fig-2 (IUCN-2017).

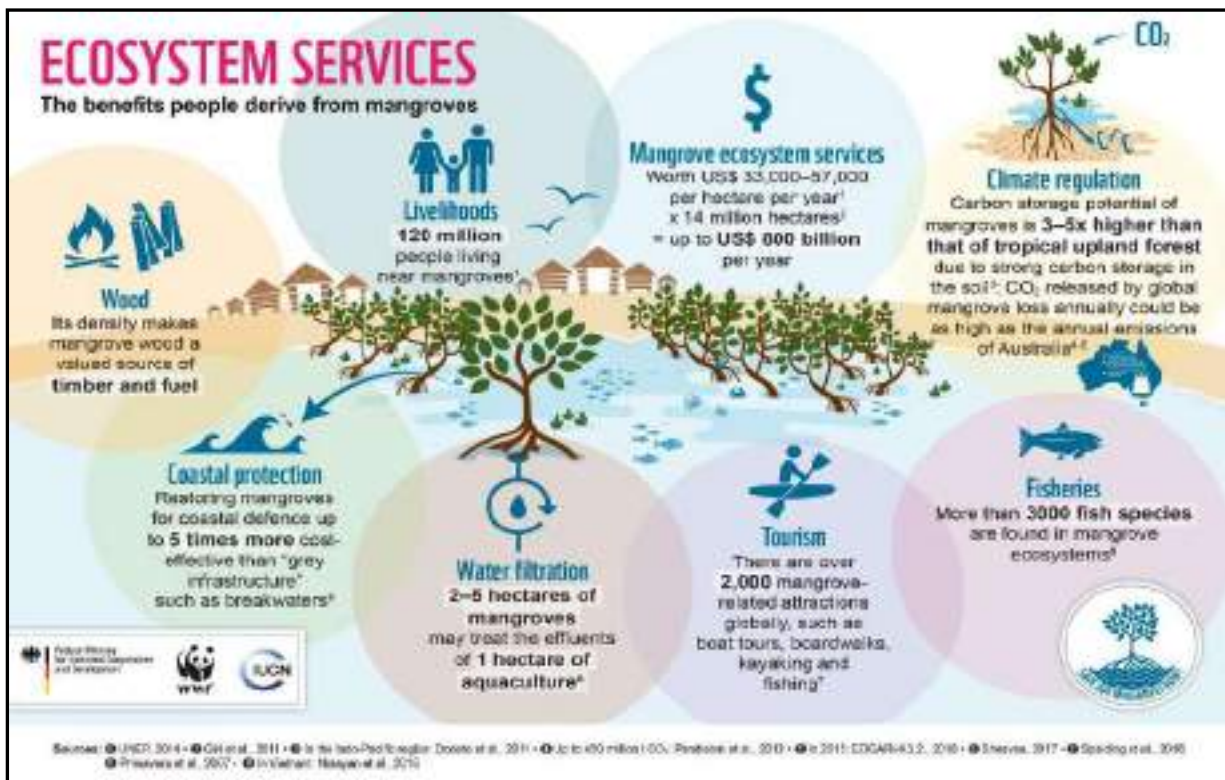


Figure 2. Schematic diagram of Ecosystem services of Mangroves (IUCN, 2017)

Table 1. Environmental setting of the Deendayal Port region

Sl. No.	Particulars	Details
1	Deendayal Port Co-ordinates	22° 59'39.77" N, 70°13'20.14" E
2	Elevation above Mean Sea level	~20 ft
3	Climatic Conditions	As per Meteorological Station, Deendayal Port Annual Mean Max Temp: 42.8°C Annual Mean Min Temp: 21.3°C Rainfall: 466 mm (Annual mean 2021)
4	Land Use of nearby areas	Comparatively flat marshy land with stunted and dense mangrove formation, mudflats, creek systems, coastal halophytes, saltpans and salt swamps
5	Nearest Highway	National Highway 8A
6	Nearest Railway Station	Gandhidham RS
7	Nearest major airport	Bhuj (~60 km, NW)
8	Nearest Village habitation	Tuna (~12 km, North)
9	Nearest Major Town	Gandhidham (12 km, Northwest)
10	Reserved Forest	Nil
11	Historically Important Places	Nil
12	Rivers/streams around the project environs	Nil
13	Major Dams and barrages	Nil
14	Survey of India Topo sheet covering the proposed site and surroundings	41J1 and 41I4
15	Seismic Zone	Zone –V

5.2 Details of plantation sites

The present study focused on the assessment of the present status of the mangrove at Sat Saida bet and Nakti creek in the Kandla (Kachchh) and Kantiyajal in the Bharuch district vicinity covering eight blocks occupying an area of 1300 ha, where plantation activities have been conducted during the period between 2005 and 2017. However, the present study (2021-2022) will also cover the additional 100 ha plantations carried out at Sat Saida bet (50 ha), and Kantiyajal (50 ha) during 2018 and 2019 with a total coverage area of 1400ha. The primary goal of this study is to assess the survival rate of mangrove plantations and the carbon sequestration potential of planted mangroves and suggest achievable conservation measures. The details of the mangrove plantation work carried out in a phased manner by the DPA is presented in Fig -3 & 4 and Table 2, 3 & 4.

Table 2. Details of the implemented mangrove plantation activities by DPA

Location	Year of Plantation	Area (ha)	Species planted	Implementing Agency
Sat Saida Bet, Kachchh district	2005-2006	20	<i>A. marina</i>	Gujarat Institute of Desert Ecology, Bhuj
	2011-2012	200	<i>A. marina</i>	Forest Department, GoG
	2012-2013	300	<i>A. marina</i>	Forest Department, GoG
	2013-2014	330	<i>A. marina</i>	Forest Department, GoG
	2018-2019	50	<i>A. marina</i>	Gujarat Ecology Commission
Nakti Creek, Kachchh district	2008-2009	50	<i>A. marina</i>	M/s. Patel Construction Co, Gandhidham
	2010-2011	100	<i>A. marina</i> <i>R. mucronata</i> <i>C. tagal</i>	Gujarat Ecology Commission
Kantiyajal, Bharuch District	2015-2016	150	<i>A. marina</i>	Gujarat Ecology Commission
	2016-2017	150	<i>A. marina</i> <i>R. mucronata</i>	Gujarat Ecology Commission
	2018-2019	50	<i>A. marina</i>	Gujarat Ecology Commission
Total		1400		

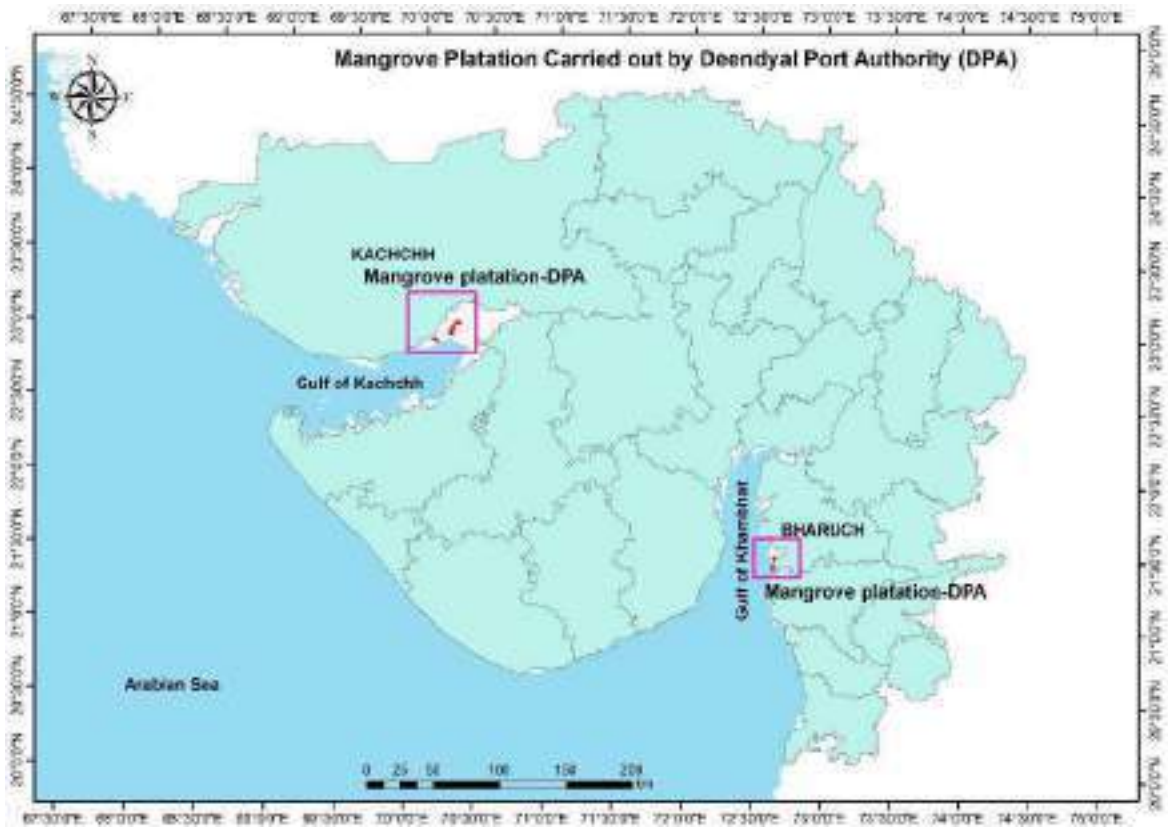


Figure 3. Mangrove plantation carried out by DPA at Kantiyajal and in the Gulf of Kachchh

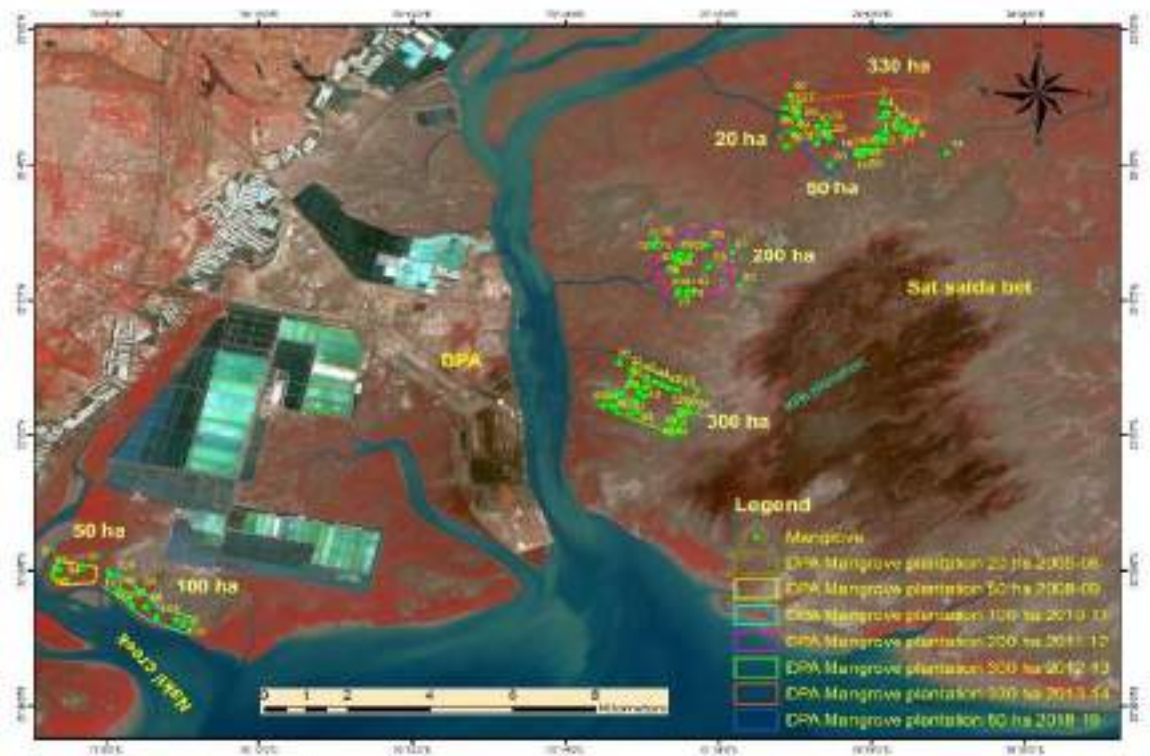


Figure 4. Location of Mangrove Plantation sites at Sat Saida Bet and Natki creek

5.3 Regular mapping through GIS & RS

Mangrove plantations in 1400 ha was regularly monitored and mapped using RS and GIS facilities as part of the conservation and management efforts. The difference in mangrove density was assessed through ArcGIS (version 9.3) and ERDAS (version 9.3) and areas having restoration priority was identified for plantation activity.

5.4 Land use/ Land cover

From April, 2017 to March, 2022 within the span of 5 years the overall mangrove area increased from 19319 ha to 24328 ha (43.7%) (Table-5). Most of the mudflat area converted to Mangrove area, and hence a decreasing trend of the mudflat is clearly observed. Good monsoon and favorable environmental conditions have positively impacted the mangroves to flourish (Saravanakumar *et. al.*, 2008, Das *et. al* 2019). The Figure -5 and 6 clearly depicts the year wise increase in mangrove area in the DPA vicinity and at present 24% of the total area is covered by mangroves.

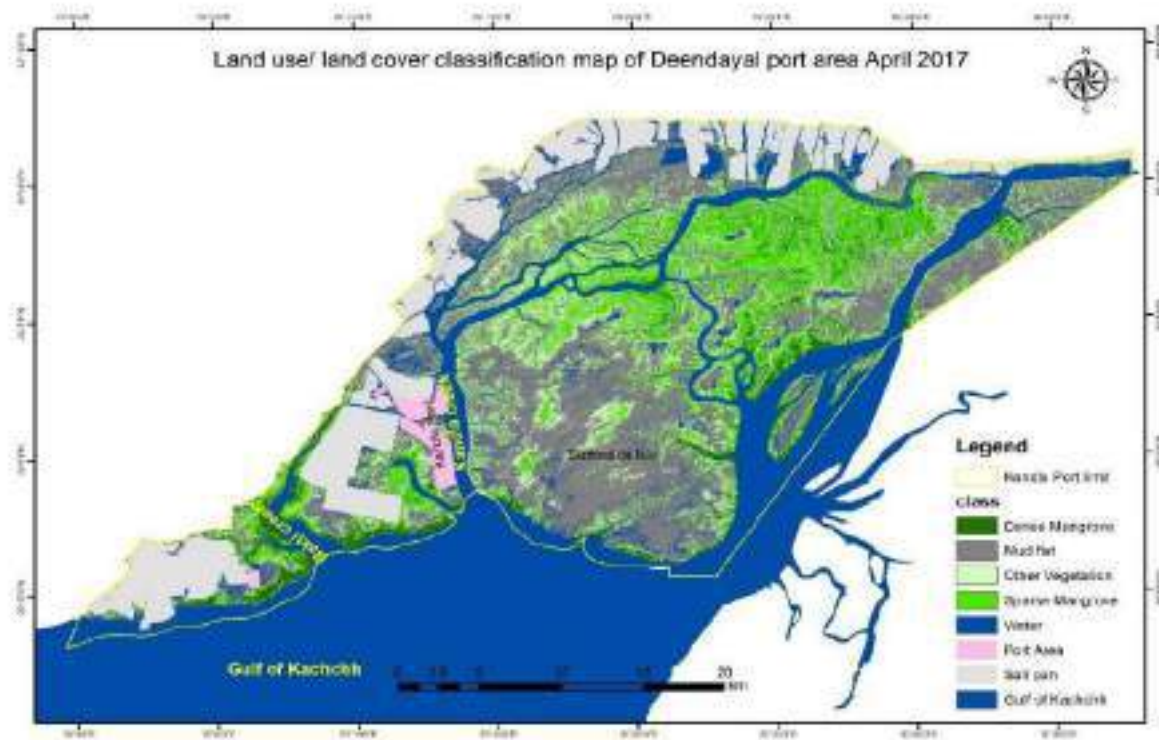


Figure 5. Land use/Land cover classification in Deendayal port area – (April 2017)



Figure 6. Land use/ land cover classification map of DPA (March-2022)

Table 3. Land use /land cover statistics in the DPA area for April-2017 and March-2022

Class name	Area (ha) in 2017	Area(ha) in 2022	Area (ha) difference in 5 years	Percentage (%)
Mangrove	19319.71	24328.7	+5009	+43.7
Mudflat	31293.43	31089.06	-204.37	-1.8
Other vegetation	12438.8	11561.2	-877.6	-7.7
Port Area	1243.67	1436.75	+193.08	+1.7
Salt pan	15016.1	15545.7	+529.6	+4.6
Water bodies	20674.3	16024.6	-4649.7	-40.6
Total	99986.01	99986.01	11463.35	100

5.5 Mangrove plantation at Nakti creek (150 ha)

A total of 150 ha of mangrove plantation was carried out in Nakti creek with two blocks with an area of 100 ha and 50 ha, by two agencies; M/s. Patel Construction Co, Gandhidham (2008-09) (Fig.6,7 & Table 4) and Gujarat Ecology Commission (2010-11), respectively. The plantation was carried out using three different techniques like transplantation of nursery raised saplings, *otla* bed, and direct seed dibbling methods. For the 50ha block in Nakti creek, *A. marina* was planted (Table 6). In the second block (other side of Nakti creek) *Ceriops tagal* was also sown. In the third block, located on the eastern side of the second block, seeds of *A. marina* were sown. The fourth block plantation was done alongside the minor creek system along the bund and road, where propagules of *Rhizophora mucronata* and *Ceriops tagal* were planted in the 100ha (Table 5). The mangrove plant density at the 100 Ha and 50 Ha plot was found increased from 2007 as deduced from the imageries as shown in Figure 8 and 11.

Table 4. Sampling location of Nakti Creek (150 ha)

Block Area covered	Quadrat no.	Latitude	Longitude
100ha	1	22°58'8.09"	70°7.' 22.34"
	2	22°57'53.06"	70°7.' 18.92"
	3	22°58'0.58"	70°7.' 22.43"
	4	22°57'51.90"	70°7.' 27.09"
	5	22°58'3.87"	70°7.' 42.02"
	6	22°57'27.48"	70°8.' 30.93"
	7	22°57'35.06"	70°8.' 18.55"
	8	22°57'42.10"	70°8.' 10.82"
	9	22°57'40.82"	70°8.' 26.84"
	10	22°57'11.00"	70°8.' 59.69"
50ha	1	22°57'39.35"	70°8.' 8.05"
	2	22°57'28.36"	70°8.' 20.38"
	3	22°57'15.00"	70°8.' 54.57"
	4	22°57'56.23"	70°8.' 4.12"
	5	22°57'17.46"	70°8.' 39.60"

Table 5. *A marina* plantation (2010-2011) in 100 ha at Nakti creek

S. No.	Sampling Location		Density (Ha)	Height (cm)	St. Dev
Q1	22° 57 50.0 N	70° 09 40.8 E	1200	55.3	14.7
Q2	22 °57 47.8 N	70° 09 42.4 E	2000	67.1	21.04
Q3	22 °57 46.1N	70 °09 42.8E	1200	70.1	29.3
Q4	22° 57 42.4N	70 °09 44.3E	2000	80.1	41.4
Q5	22° 57 41.6N	70° 09 46.2E	3200	90.9	28.3
Q6	22°57 31.1N	70° 09 49.6E	2700	90.9	23.4
Q7	22°57 39.8 N	70° 09 48.8E	3400	82.8	19.9
Q8	22°57 38.6 N	70 °09 51.2E	3500	88.9	20.6
Q9	22°57 38.2N	70 09 54.5 E	2500	115.9	28.2
Q10	22°57 37.5 N	70 09 52.9 E	2000	99.5	17.8
Average			2370	84	--



Figure 7. Mangrove plantation 100 ha at Nakti creek during 2017-2018

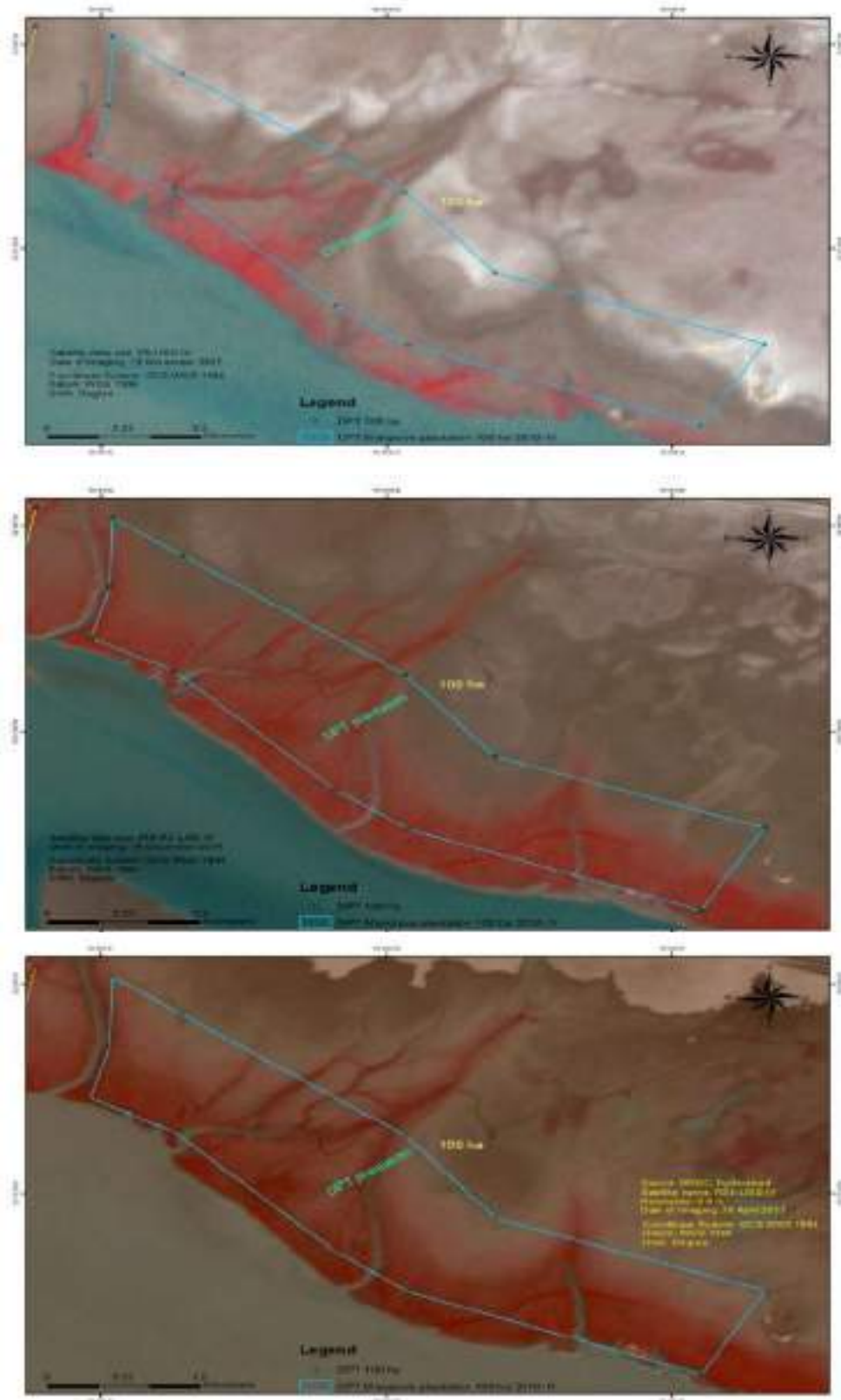


Figure 8. Satellite images of mangrove plantation at Nakti creek (2007,2014 & 2018).

Table 6. *A marina* plantation (2008-2009) in 50 ha at Nakti creek

Sl. No.	Sampling Location		Density (Ha)	Height (cm)	St. Dev
Q1	22° 57' 12.9N	70° 09' 04.9 E	3000	53.8	19.6
Q2	22°57' 11.6 N	70° 09'04.5 E	3000	64.8	18.4
Q3	22°57'10.9 N	70°09' 04.7 E	2400	70.5	24.0
Q4	22°57'10.3 N	70°09' 05.4 E	2800	65.8	19.2
Q5	22°57'09.6 N	70°09'06.2 E	2500	63.0	15.9
Q6	22°57'09.1 N	70°09'07.2 E	2700	60.2	15.2
Q7	22°57'09.1 N	70°09'08.2 E	2500	40.9	15.6
Q8	22°57'09.2 N	70°09'08.4 E	0	0.0	0.0
Q9	22°57'08.1 N	70°09'10.0 E	2700	54.1	15.6
Q10	22°57'07.7 N	70°09'10.3 E	1800	60.9	24.6
Average			2340	53	--

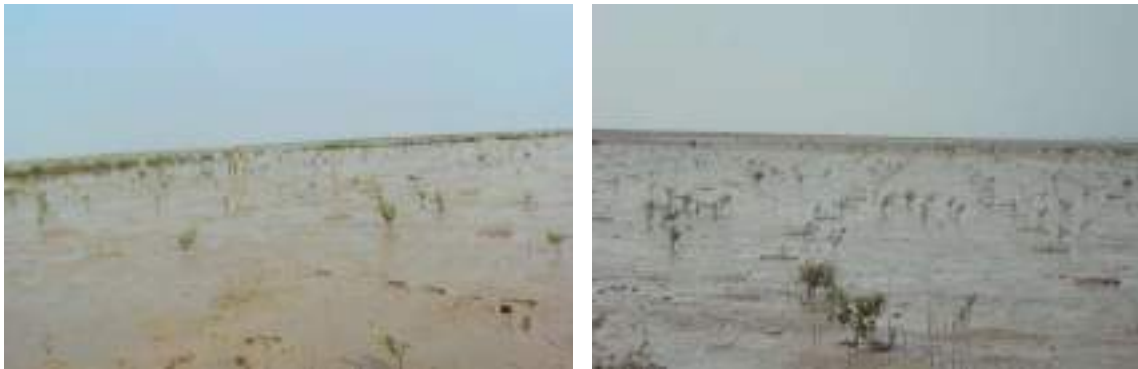


Figure 9. Mangrove plantation 50 ha at Nakti creek during 2008-2009



Figure 10. Mangrove plantation 50 ha at Nakti creek during 2017-2018

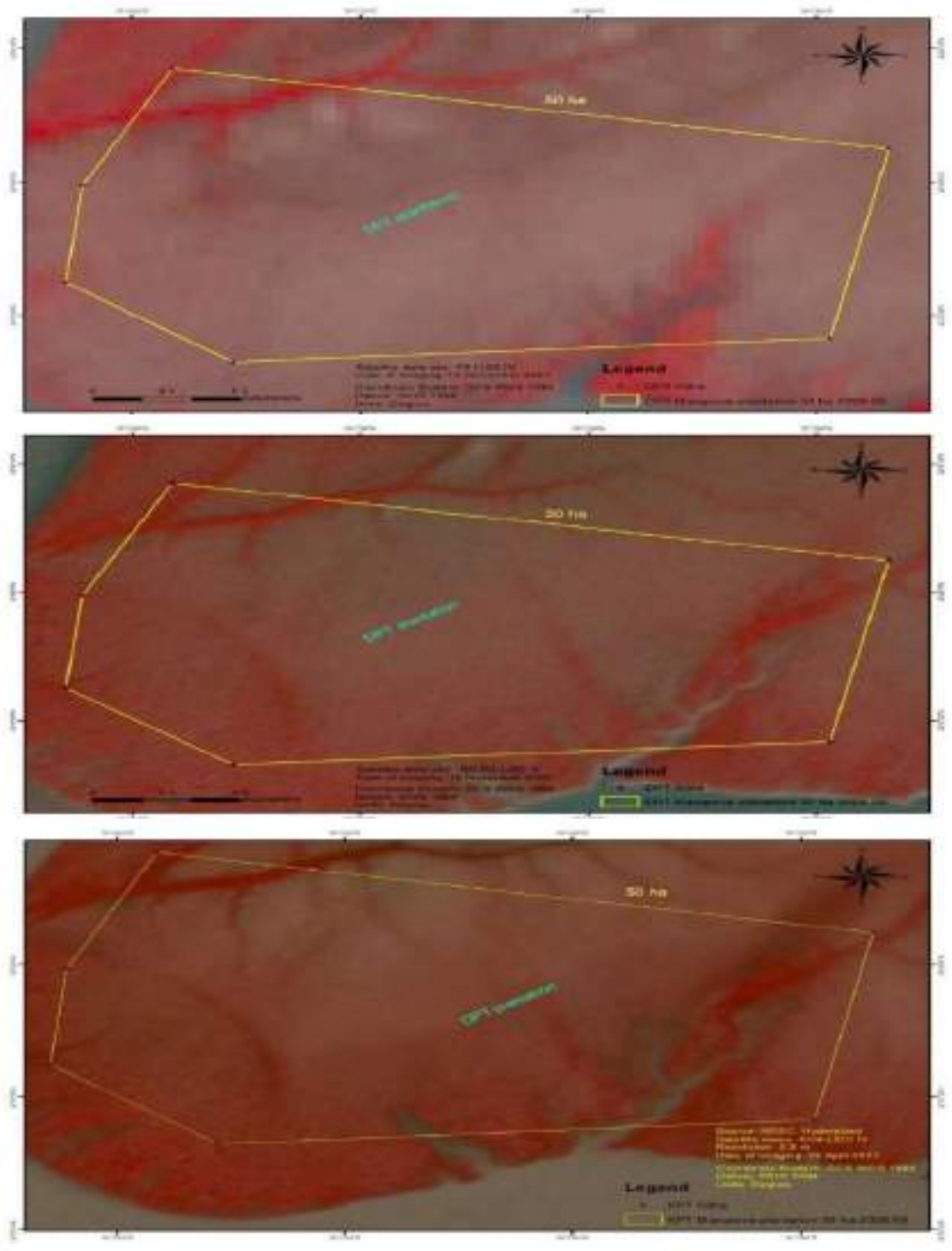


Figure 11 Satellite images of 50 ha mangrove plantation at Nakti creek during the years 2007,2014 & 2018.

5.6 Plantation at Kantiyajal (350 ha)

The plantation site at Kantiyajal has naturally growing *A. marina* extending from the lower littoral to the mid-littoral zone. The plantation site is located near (N 21°27'01.1'', to 21°26'54.24'' and E 72°40'36.04, to 72°38'58.22'') to this luxuriantly growing mangrove patch. The site is behind the naturally growing plants away from the waterline; however, everyday tidal flushing keeps this site relatively healthy. The total 350 ha mangrove plantation was conducted in separate blocks, like 150 ha each during 2015-2016 and 2016-2017 and 50ha during 2018-2019 at Kantiyajal (Fig-12,15 & 16). Of the total 150 ha, 70 ha plantation activities were carried out following nursery raised saplings and the remaining 80 ha area by *Otla* beds of 1 x 1 x 1 m prepared to improve mangrove density. *A. marina* saplings were transplanted at a distance of 2.5 x 2 m. In total, 32,000 such beds were prepared in the 80 ha (Table 7,8 & 9). All plantation activities were taken care of by Gujarat Ecology Commission. *A. marina* was the preferred species for plantation in both blocks. The Figures 15 and 16 explains the sparse distribution of the plants as well as their stunted growth on the monitored plots.

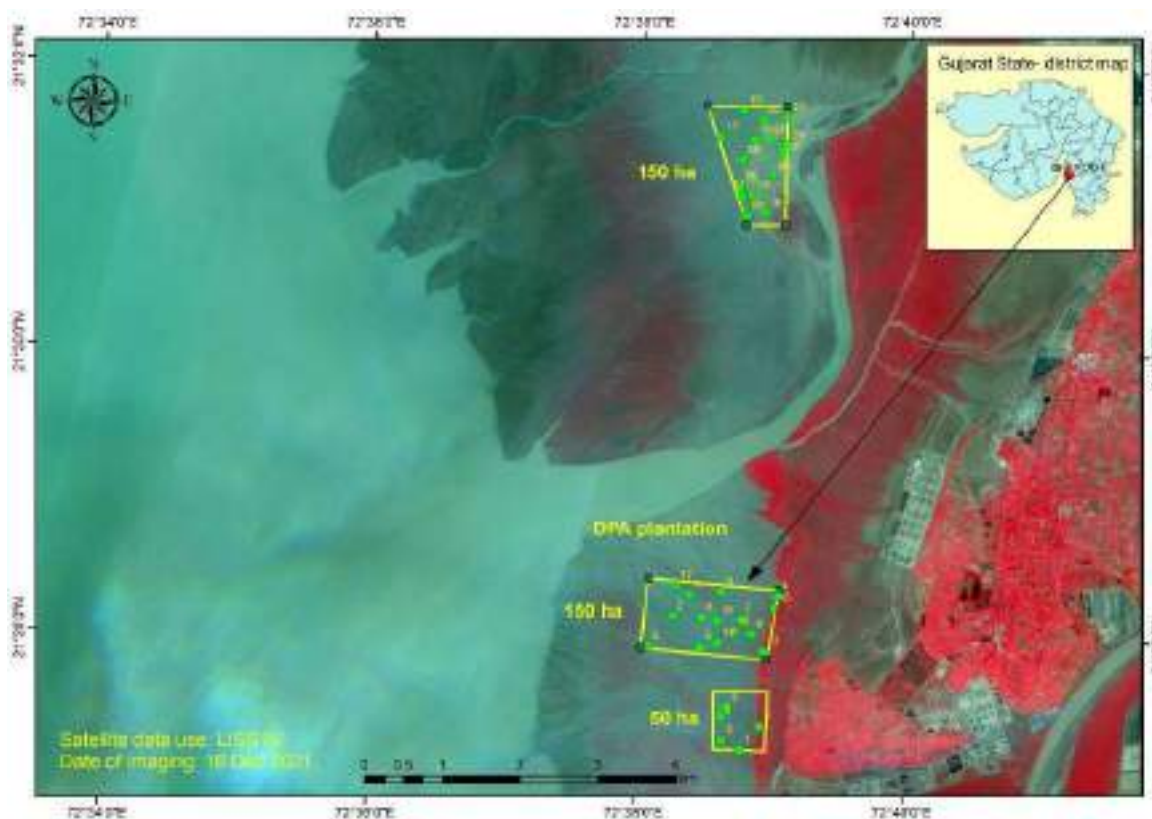


Figure 12. Mangrove plantation at Kantiyajal (350 ha)

Table 7. Sampling location of Kantiyajal (350 ha)

Block area covered	Quadrat no.	Latitude	Longitude
150ha	1	21°28'17.76"	72°38'24.00"
	2	21°28'9.12"	72°38'16.08"
	3	21°27'56.16"	72°38'5.64"
	4	21°28'17.76"	72°39'3.24"
	5	21°27'56.16"	72°38'28.68"
	6	21°28'8.76"	72°38'29.40"
	7	21°28'8.04"	72°38'46.68"
	8	21°28'1.56"	72°38'51.72"
	9	21°28'19.20"	72°38'38.04"
	10	21°28'3.00"	72°38'43.80"
	11	21°28'7.32"	72°38'36.24"
	12	21°28'21.72"	72°38'17.88"
	13	21°27'54.72"	72°38'56.76"
	14	27'57.96"	72°38'36.60"
	15	21°28'12.72"	72°39'1.44"
Block area covered	Quadrat no.	Latitude	Longitude
150 ha	1	21°30'58.68"	72°38'55.32"
	2	21°31'30.00"	72°38'35.16"
	3	21°31'29.64"	72°38'49.92"
	4	21°31'41.88"	72°38'45.24"
	5	21°31'37.56"	72°38'53.52"
	6	21°31'29.64"	72°38'56.40"
	7	21°31'5.88"	72°38'44.52"
	8	21°30'57.60"	72°38'46.68"
	9	21°31'5.88"	72°38'49.56"
	10	21°31'9.12"	72°38'43.80"
	11	21°31'14.52"	72°38'58.92"
	12	21°31'24.96"	72°39'2.52"
	13	21°31'20.64"	72°38'44.88"
	14	21°31'27.12"	72°39'4.32"
	15	21°31'39.00"	72°39'4.32"
Block area covered	Quadrat no.	Latitude	Longitude
50ha	1	21°27'13.32"	72°38'47.04"
	2	21°27'27.36"	72°38'38.40"
	3	21°27'30.60"	72°38'40.92"
	4	21°27'22.68"	72°38'56.04"
	5	21°27'16.92"	72°38'39.12"

Table 8 Mangrove plantation (2015-2016) in 150 ha at Kantiyajal

<i>A. marina</i>					
Sl. No.	Sampling Location		Density (Ha)	Height (cm)	St. Dev
Q1	21° 28' 5.2" N	72° 38' 57.0" E	2000	29.8	9.0
Q2	21° 28' 22.19" N	72° 38' 12. 43"	2200	42.4	10.9
Q3	21 °28'14.73"N	72°38'52. 97"	1900	41.1	13.9
Q4	21°28'05.00"N	72° 38' 58. 66"	1000	38.1	7.1
Q5	21°28'56.68"N	72° 38' 50.88"	0	0.0	0.0
Q6	21°28'59. 18" N	72°38'28.70"	1600	40.9	11.6
Q7	21°28'15.05"N	72°38'32.30"	1900	36.0	11.3
Q8	21°28'17.86"N	72°38'39. 86"	0	0.0	0.0
Q9	21°28'18.73"N	72°38'50.30"	2200	44.2	12.0
Q10	21°28'00.43"N	72°38' 08.02"	1800	45.8	9.7
Average			1460	32	--
<i>R. mucronate</i>					
Sl. No.	Sampling Location		Density (Ha)	Height (cm)	St. Dev
Q1	21° 28' 20.93" N	72° 38' 22.20"E	1700	32.5	7.4
Q2	21° 28'16.56" N	72° 38'27.88"E	1400	41.4	4.5
Q3	21° 28'19.69" N	72° 38'11.96"E	0	0.0	0.0
Q4	21° 28'9.32" N	72° 38'7.73" E	700	39.4	7.4
Q5	21° 28'19.73" N	72° 38'57.43"E	0	0.0	0.0
Q6	21° 28'11.18" N	72° 38'5.68"E	400	36.0	2.0
Q7	21° 28'5.26" N	72° 38'4.07"E	300	26.0	1.8
Q8	21° 28'8.12" N	72° 38'57.79"E	0	0.0	0.0
Q9	21° 28'23.34" N	72° 38'48.32"E	800	45.6	8.6
Q10	21° 28'17.6" N	72° 38'40.84"E	800	48.4	13.0
Q11	21°31'7.25"N	72°38'44.82"E	2800	40.6	11.5
Q12	21°31'6.76"N	72°38'52.51"E	2300	43.4	10.4
Q13	21°31'3.83"N	72°38'49.30"E	0	0.0	0.0
Q14	21°31'0.54"N	72°38'45.11"E	2200	35.9	6.8
Q15	21°31'0.58"N	72°38'39.17"E	2600	42.4	8.7
Q16	21°31'1.28"N	72°38'33.98"E	0	0.0	0.0
Q17	21°31'5.42"N	72°38'33.96"E	2300	44.9	9.8
Q18	21°31'7.28"N	72°38'38.40"E	2800	39.4	11.5
Q19	21°31'7.10"N	72°38'42.80"E	2400	42.7	12.7
Q20	21°31'3.75"N	72°38'44.30"E	2100	44.8	12.9
Average			1280.0	30	--

Table 9. *A marina* (2016-2017) in 150 ha at Kantiyajal

Sl. No.	Sampling Location		Density (Ha)	Height (cm)	St. Dev
Q1	21° 30 58.13" N	72° 38 59.38" E	2600	44.4	13.9
Q2	21° 31 0.49" N	72° 38 48.24" E	2200	41.9	12.7
Q3	21° 31 11.8" N	72° 38 41.61" E	2300	42.9	14.7
Q4	21° 31 15.00" N	72° 38 49.07" E	3000	44.0	9.2
Q5	21° 31 26.22" N	72° 38 46.59" E	2800	37.3	11.8
Q6	21° 31 25.92" N	72° 38 53.85" E	0	0.0	0.0
Q7	21° 31 35.09" N	72° 38 5.04" E	2100	42.1	12.2
Q8	21° 31 13.63" N	72° 38 58.43" E	2400	40.5	12.0
Q9	21° 31 5.94" N	72° 38 53.41" E	2500	41.2	10.4
Q10	21° 31 41.71" N	72° 38 34.34" E	2300	40.0	10.9
Average			2220.0	37	--



Figure 13. Mangrove plantation 150 ha at Kantiyajal-Block 1 during 2018



Figure 14. Mangrove plantation 150 ha at Kantiyajal-Block 2 during 2018

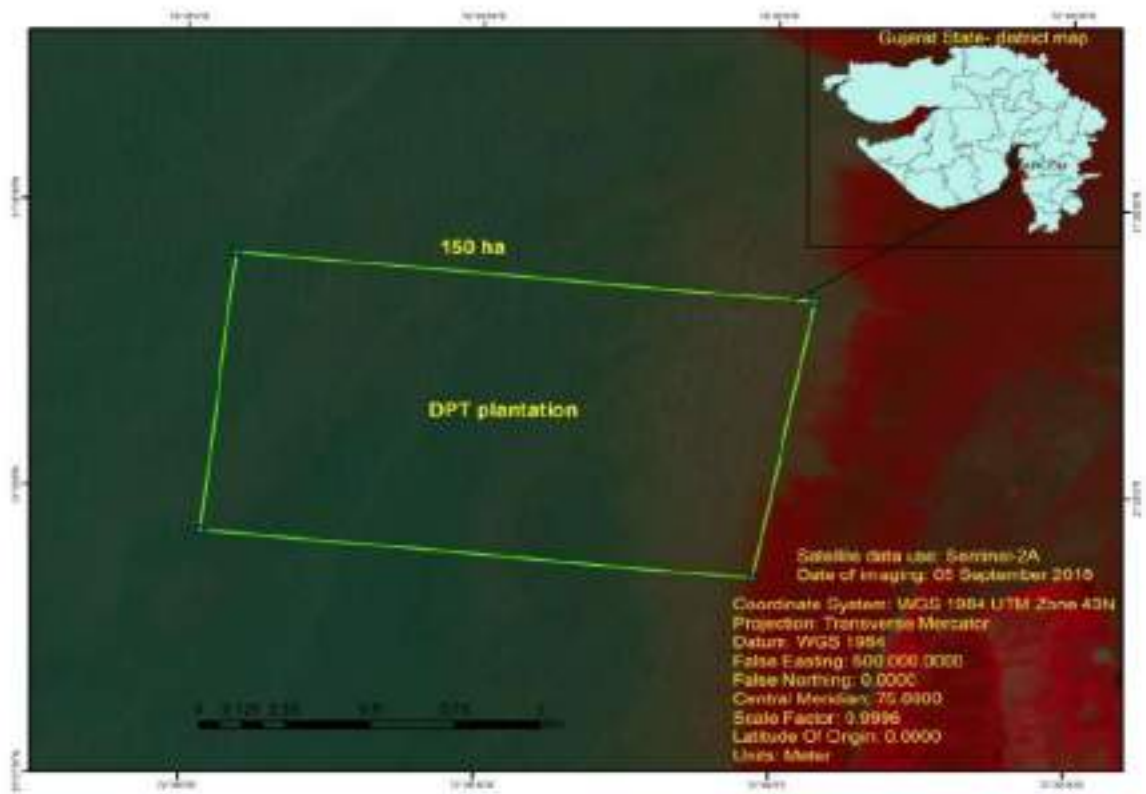


Figure 15. Satellite imageries of the plantation at Kantiyajal-block 1 (2018)

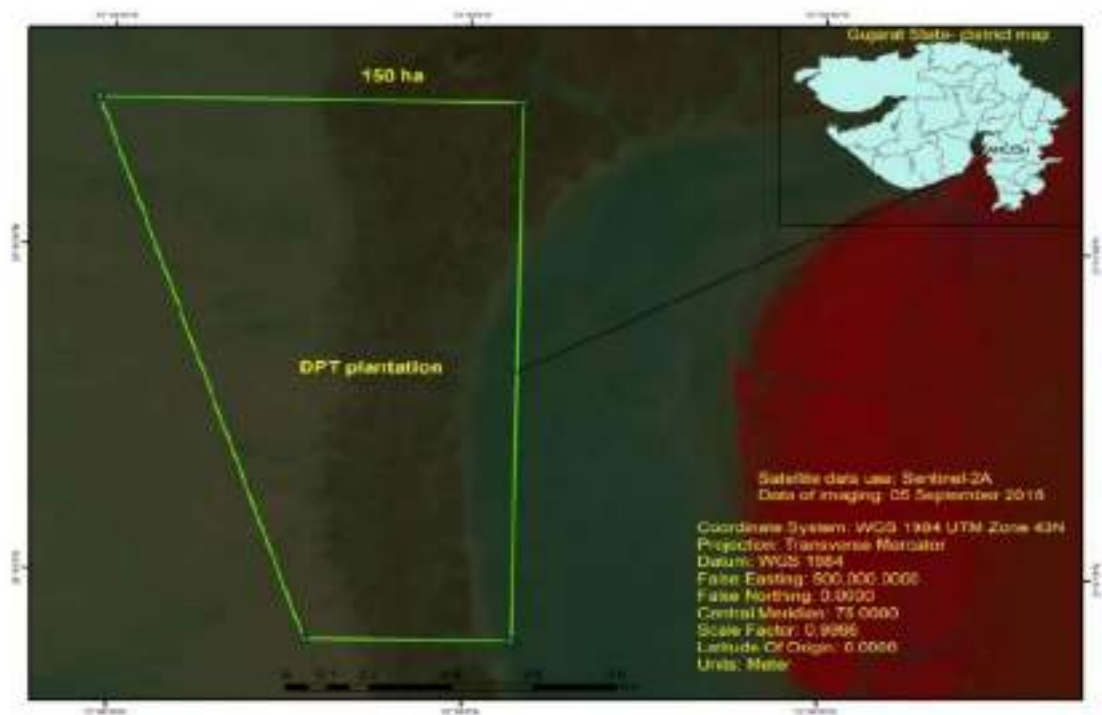


Figure 16. Satellite imageries of the plantation at Kantiyajal-block 2 (2018)

5.7 Plantation at Sat Saida bet (900 ha)

A total of 900 ha of mangrove assessment were carried out in Sat Saida bet with five blocks mentioned in Table 10 and 11 with an area of 330ha, 300 ha, 200 ha, 20 ha and 50ha by Gujarat institute of desert ecology (2005-2006), Department of Forest, Government of Gujarat (2011-2014), and Gujarat Ecology Commission during (2018-2019) the period between 2005 and 2019 respectively. Sat Saida bet is situated on the eastern bank of Kandla creek of Gulf of Kachchh, the unique Island of 253.8 km² area is located opposite to Deendayal port, having sparse mangroves, dense mangroves, mudflats and halophytic vegetation. Surrounded by Kandla creek and its branches in the west, Navlakhi creek and its branches on the east and Sara and Phang creek on its north, Sat Saida bet is a highly potential site for mangrove plantation with its vast mudflat. Many major, medium and minor creek systems of Kandla and Navlakhi creeks ramify into this Island in varying length and dimension, supplying tidal water to the interior regions. Southern border of the Island represents the innermost end of Gulf of Kachchh with very few minor creek systems (Fig. 18,20,22 & 24). It is known that mudflats experiencing favourable tidal amplitude are suitable for mangrove plantation. Therefore, Sat Saida Bet area was chosen by DPA to carry out the mangrove plantation and restoration activities. The details showing five years (2017-2022) change in the land cover area is given in Table 12,13,14 & 15. The present study was conducted to evaluate the plantation success including the percentage of survival rate, growth, and tree density. The baseline density was fixed at the rate of 4000/ha of *A. marina* was considered for calculating survival percentage as per GEC (2015-2017). The year wise analysis of the imageries of the sites at Sat Saida Bet clearly shows the increase in the plant density at 20 Ha, 300 Ha and 330 Ha, though the survival and height of the plants are comparatively less. Whereas, at 200 Ha plantation site, the plant density has been decreased than the previous monitoring period (2018).

Table 10. Sampling locations at Sat Saida Bet (630 ha)

Block Area covered	Quadrat no.	Latitude	Longitude	Block Area covered	Quadrat no.	Latitude	Longitude
330 ha.	1	23°4'25"	70°18'4"	300 ha.	1	23°0'44"	70°15'16"
	2	23°4'41"	70°18'6"		2	23°0'42"	70°15'20"
	3	23°4'55"	70°18'8"		3	23° 1'3"	70°14'42"
	4	23°4'46"	70°18'10"		4	23° 0'57"	70°14'52"
	5	23°4'40"	70°18'19"		5	23° 0'47"	70°14'50"
	6	23°4'36"	70°18'18"		6	23° 0'42"	70°14'56"
	7	23°4'32"	70°18'24"		7	23° 0'51"	70°15'3"
	8	23°4'30"	70°18'33"		8	23° 0'38"	70°14'57"
	9	23°4'29"	70°18'28"		9	23° 0'41"	70°15'3"
	10	23°4'32"	70°18'19"		10	23° 0'34"	70°15'1"
	11	23°4'29"	70°18'10"		11	23° 0'46"	70°15'10"
	12	23°4'21"	70°18'9"		12	23° 0'41"	70°15'20"
	13	23°4'13"	70°18'4"		13	23° 0'39"	70°15'28"
	14	23°4'10"	70°18'58"		14	23° 0'10"	70°15'32"
	15	23°4'12"	70°17'49"		15	23° 0'5"	70°15'28"
	16	23°4'11"	70°17'48"		16	23° 0'0"	70°15'22"
	17	23°4'8"	70°17'49"		17	23° 0'4"	70°15'17"
	18	23°4'7"	70°17'51"		18	23° 0'13"	70°15'24"
	19	23°4'8"	70°17'52"		19	23° 0'22"	70°15'30"
	20	23°4'9"	70°17'54"		20	23° 0'21"	70°15'35"
	21	23°4'11"	70°17'57"		21	23° 0'19"	70°15'40"
	22	23°4'11"	70°17'59"		22	23° 0'20"	70°14'55"
	23	23°4'12"	70°17'59"		23	23° 0'30"	70°14'54"
	24	23°4'13"	70°17'57"		24	23° 0'37"	70°14'57"
	25	23°4'14"	70°17'54"		25	23° 0'36"	70°14'43"
	26	23°4'13"	70°17'52"		26	23° 0'33"	70°14'36"
	27	23° 4'53"	70°17'2"		27	23° 0'26"	70°14'29"
	28	23° 4'43"	70°17'1"		28	23° 0'26"	70°14'36"
	29	23° 4'38"	70°17'3"		29	23° 0'18"	70°14'40"
	30	23° 4'33"	70°17'16"		30	23° 0'18"	70°14'49"
	31	23° 4'28"	70°17'22"				
	32	23° 4'23"	70°17'26"				
	33	23° 4'35"	70°17'24"				

Table 11. Sampling location of Sat Saida Bet (270 ha)

Block Area covered	Quad rate no.	Latitude	Longitude	Block Area covered	Quadrate no.	Latitude	Longitude
200 ha.	1	23°2'42"	70°16'10"	50 ha.	1	23° 4'41.24"	70°16'52.19"
	2	23°2'35"	70°15'28"		2	23° 4'50.78"	70°16'51.53"
	3	23°2'36"	70°15'26"		3	23° 5'1.73"	70°16'55.65"
	4	23°2'39"	70°15'29"		4	23° 4'19.15"	70°17'16.46"
	5	23° 2'25.36"	70°15'26.37"		5	23° 3'59.06"	70°17'27.14"
	6	23°2'41"	70°15'30"				
	7	23° 2'39.21"	70°15'37.25"	20 ha.	1	23° 4'27.43"	70°16'58.03"
	8	23°2'48"	70°15'8"		2	23° 4'16.41"	70°16'53.03"
	9	23°2'48"	70°15'9"				
	10	23° 2'29.30"	70°15'52.53"				
	11	23°2'51"	70°15'9"				
	12	23°2'50"	70°15'8"				
	13	23°2'52"	70°15'11"				
	14	23°2'5"	70°15'28"				
	15	23° 2'48.85"	70°15'50.81"				
	16	23°2'4"	70°15'35"				
	17	23° 2'7.74"	70°15'28.60"				
	18	23°2'7"	70°15'36"				
	19	23°2'8"	70°15'40"				
	20	23°2'12"	70°16'16"				

Table 12. *Avicennia marina* plantation (2005-2006) in 20 ha at Sat Saida bet

Sl. No.	Sampling Location		Density (Ha)	Height (cm)	St. Dev
Q1	23° 04'' 43.38N	70° 16''47.88E	4400	109	28.34
Q2	23° 04'' 48.18N	70° 16''48.18E	4900	115	24.7
Q3	23° 04'' 43.77N	70° 16''48.41E	5600	110	26.2
Q4	23° 04'' 44.38N	70° 16''47.99E	5700	110	27.7
Q5	23° 04'' 44.10N	70° 16''48.18E	5100	124	29.2
Q6	23° 04'' 48.17N	70° 16''48.17E	4900	135	30.7
Q7	23° 04'' 44.37N	70° 16''48.99E	5300	103	32.2
Q8	23° 04'' 43.49N	70° 16''48.69E	5300	100	34.44
Q9	23° 04'' 44.14N	70° 16''48.93E	6100	121	35.2
Q10	23° 04'' 44.99N	70° 16''47.63E	5200	104	36.7
Q11	23° 04'' 43.07N	70° 16''49.06E	4900	136	29.2
Q12	23° 04'' 43.85N	70° 16''49.88E	5200	105	28.22
Q13	23° 04'' 44.61N	70° 16''48.75E	6100	102	32.15
Q14	23° 04'' 43.53N	70° 16''49.25E	6300	110	33.22
Q15	23° 04'' 44.04N	70° 16''50.02E	5800	110	31.2
Average			5387	113	--



Figure 17. Mangrove plantation at Sat Saida bet 20 ha during 2005-2006

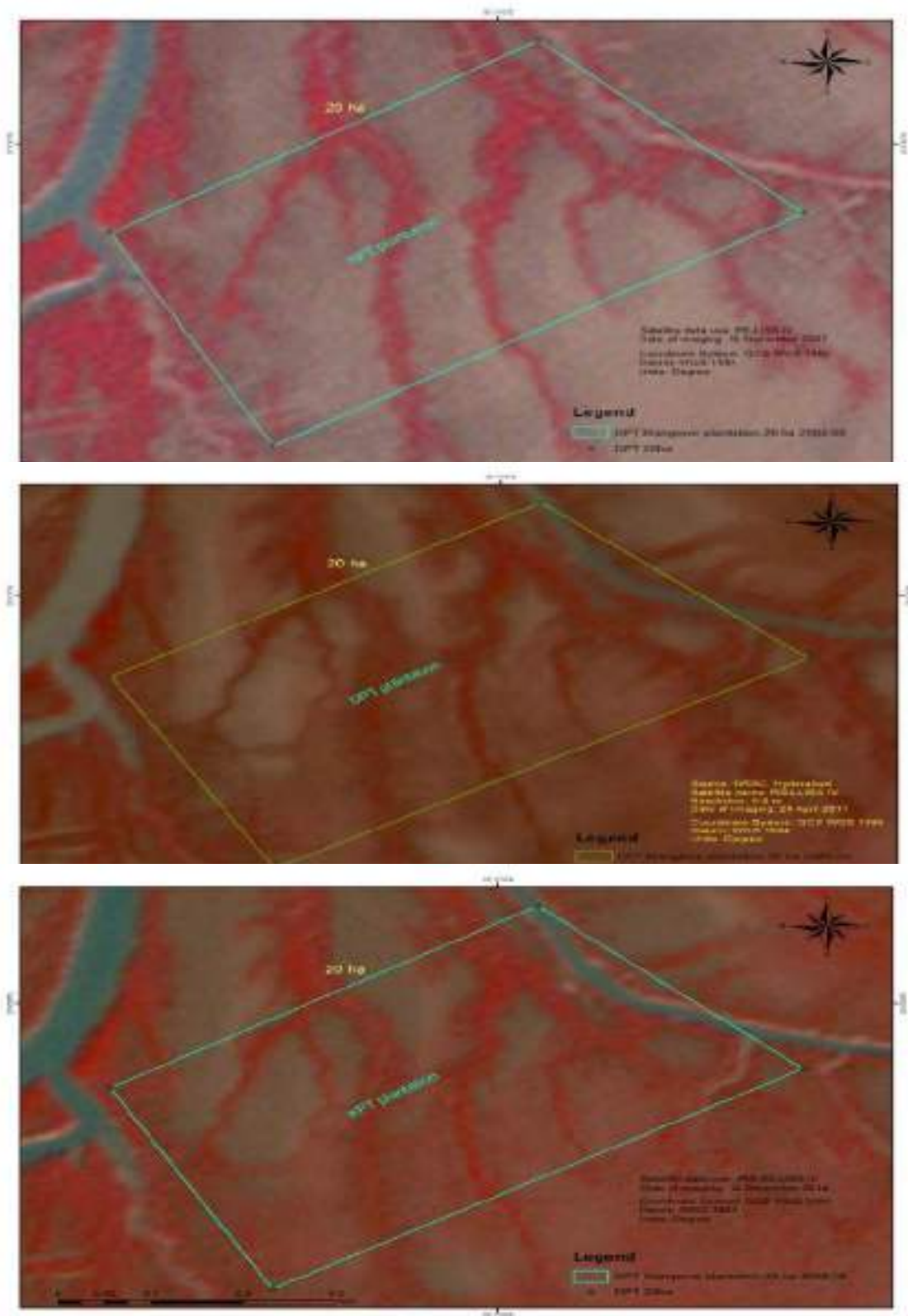


Figure 18. Satellite imageries of the plantation at Sat Saida Bet (2005-2006, 2014 & 2018)

Table 13. *Avicennia marina* plantation (2011-2012) in 200 ha at Sat Saida bet

Sl. No.	Sampling Location		Density (Ha)	Height (cm)	St. Dev
Q1	23° 00" 48.4N	70° 15" 49.5E	3000	33.6	9.6
Q2	23° 00" 50.5° N	70° 15" 50.0 E	0	0	0
Q3	23° 00 "53.1° N	70°15" 49.2 E	2700	55.9	9.5
Q4	23° 00 "50.9° N	70° 15" 47.2 E	3300	31.8	14.9
Q5	23° 00 "50.1° N	70°15" 45.4 E	3500	43.7	14
Q6	23° 00 "49° N	70°15" 43.5 E	3500	53.5	16.6
Q7	23° 00" 49.3° N	70°15" 41.3 E	3500	58.8	26.5
Q8	23° 00" 51.4° N	70°15" 42E	1700	47.9	18.7
Q9	23° 00" 76.9° N	70°13" .50 E	4000	52.7	18.9
Q10	23° 00 "52.2° N	70°15" 37.9E	4600	53.6	24
Q11	23° 00" 51.7° N	70°15" 35.6E	2100	69.9	22.1
Q12	23° 00 "52.4N	70°15" 34.4E	2600	52.7	19.6
Q13	23° 00 "53.2° N	70°15" 33.3E	3500	63.4	19.2
Q14	23° 00" 55.1° N	70°15" 32.4 E	4000	57.6	18.9
Q15	23° 00" 57.2° N	70°15" 33.4 E	2500	40.8	15.7
Q16	23° 00 "57.9° N	70°15 "35.6 E	0	0	0
Q17	23° 00" 3.6° N	70°15" 35.6 E	500	46.6	14.9
Average			2647	45	--



Figure 19. Mangrove plantation 200 ha at Sat Saida bet during 2017-2018

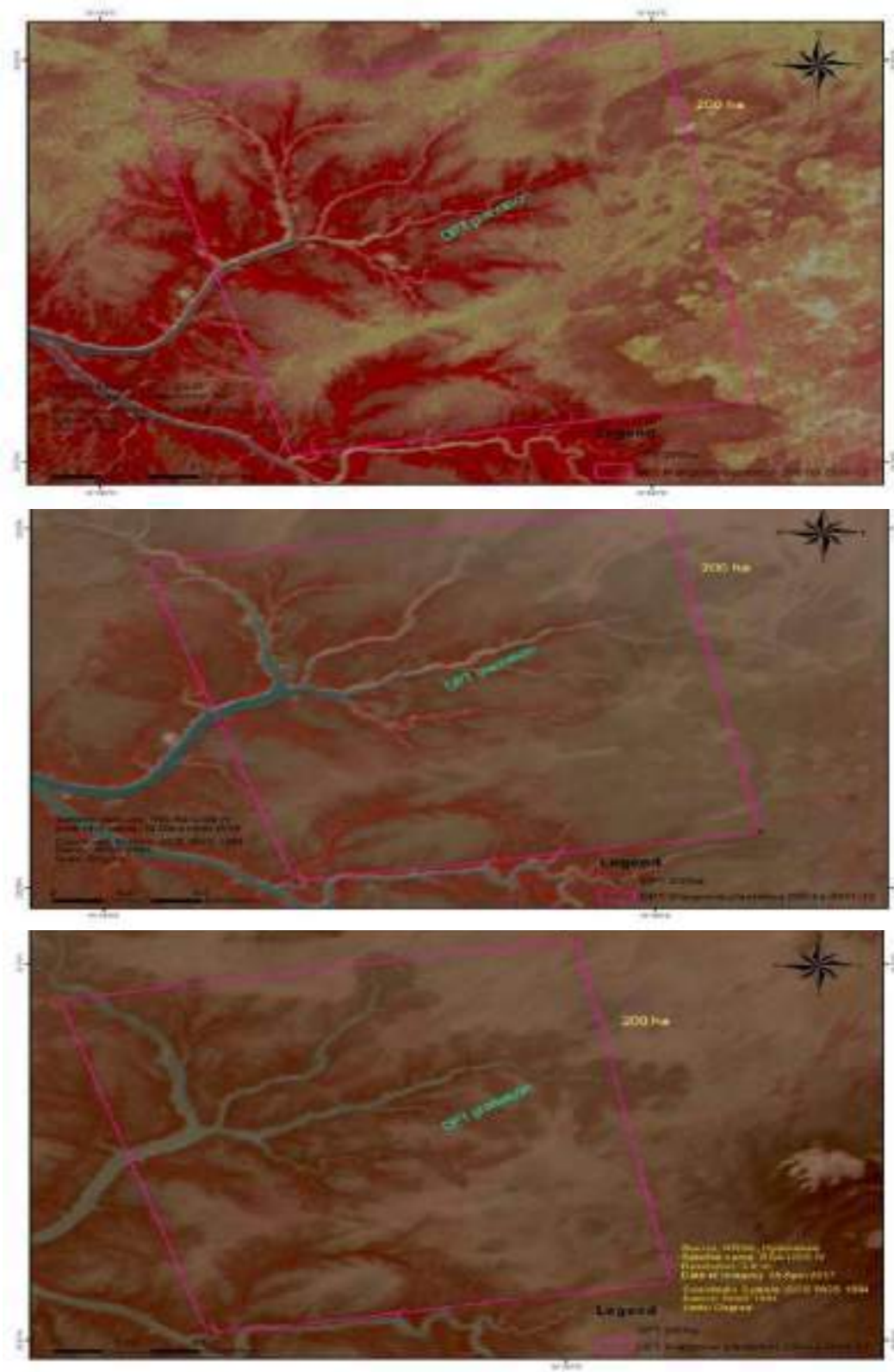


Figure 20 . Satellite imageries of the plantation at Sat Saida Bet (2007, 2014 & 2018)

Table 14. *Avicennia marina* plantation (2012-2013) in 300 ha at Sat Saida bet

Sl. No.	Sampling Location		Density (Ha)	Height (cm)	St. Dev
Q1	23°02.06604 N	70° 13.25285 E	3600	68.1	25.9
Q2	23°01.93788 N	70°13.244884 E	3700	46.1	19.7
Q3	23° 1.507972 N	70°13 23.2248E	1500	40.9	10.8
Q4	23° 14.5986N	70°15.2648E	1100	35.5	15.6
Q5	23°15.948N	70°15.28626 E	0	0	0
Q6	23°17.128 N	70°15. 30816 E	0	0	0
Q7	23°19.636 N	70°15. 29886 E	0	0	0
Q8	23°18.814N	70°15. 27636 E	1000	31.4	13.4
Q9	23°18.838N	70°15.27648 E	4200	44.5	20.5
Q10	23°19.768N	70°15. 26198 E	1400	31.6	13.8
Q11	23°11.3704N	70°15.231 E	2800	59	20.3
Q12	23°1 1.3644N	70°15. 231 E	3600	56	22.1
Q13	23°11.7004N	70°15.2334 E	2500	70.2	23.5
Q14	23°16.61N	70°15.25192 E	2900	59.4	21
Q15	23°1 1.4514 N	70°15.27484 E	500	22.2	6.4
Q16	23°1 1.4418 N	70°15.27336 E	3700	57.2	22.7
Average			2031	39	--



Figure 21. Mangrove plantation 300 ha at Sat Saida bet during 2017-2018

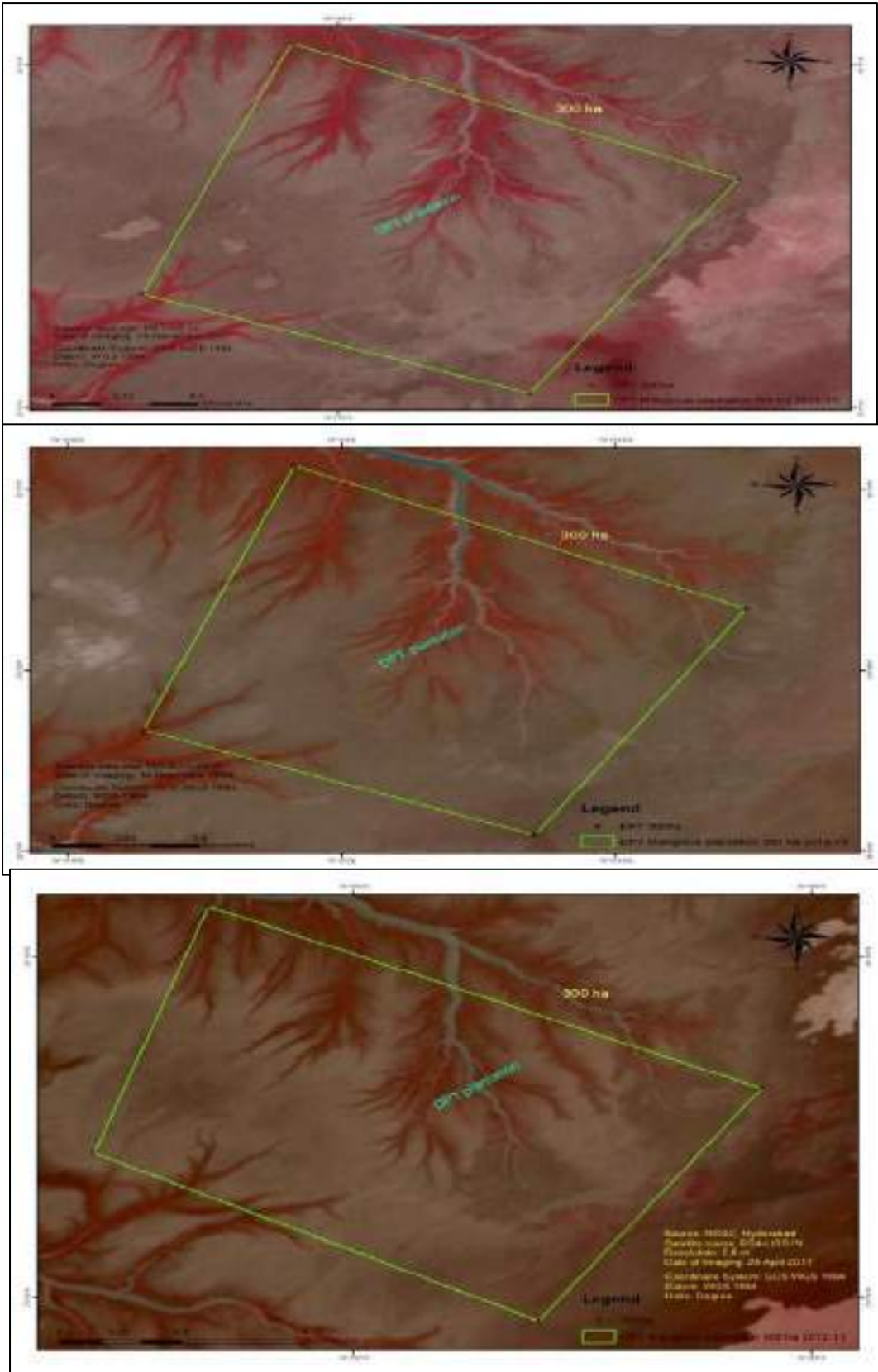


Figure 22. Satellite imageries of the plantation at Sat Saida Bet (2007, 2012-13 & 2014)

Table 15. *Avicennia marina* plantation (2013-2014) in 330 ha at Sat Saida bet

S. No.	Sampling Locations		Density (Ha)	Height (cm)	St. Dev
Q1	23°04'48.34" N	70° 17' 10.05" E	4400	109	28.34
Q2	23°04'46.55" N	70° 17' 13.94" E	4900	115	24.7
Q3	23°04'45.14" N	70° 17' 18.65" E	4100	110	26.2
Q4	23°04'41.97" N	70° 17' 16.66" E	5600	110	27.7
Q5	23°04'50.58" N	70° 17' 16.68" E	2900	124	29.2
Q6	23°04'44.43" N	70° 17' 16.54" E	4900	135	30.7
Q7	23°04'49.39" N	70° 17' 15.54" E	2800	103	32.2
Q8	23°04'45.35" N	70° 17' 06.79" E	5300	100	34.44
Q9	23°04'42.94" N	70° 17' 09.32" E	5200	121	35.2
Q10	23°04'40.49" N	70° 17' 13.53" E	2900	86	36.7
Q11	23°04'46.46" N	70° 17' 12.37" E	4900	73	29.2
Q12	23°04'44.26" N	70° 17' 15.86" E	5200	105	28.22
Q13	23°04'48.25" N	70° 17' 12.93" E	6100	102	32.15
Q14	23°04'44.174" N	70° 17' 16.32" E	6300	70	33.22
Q15	23°04'38.25" N	70° 17' 10.33" E	5800	110	31.2
Q16	23°04'40.41" N	70° 17' 12.07" E	3500	62	16.1
Q17	23°04'40.76" N	70° 17' 12.89" E	2600	51	14.7
Q18	23°04'38.16" N	70° 17' 20.60" E	3600	43	12.2
Q19	23°04'38.76" N	70° 17' 10.60" E	3300	45	11.1
Q20	23°04'40.69" N	70° 17' 06.48" E	2300	66	23.7
Q21	23°04'49.68" N	70° 17' 14.62" E	3600	72	9.3
Q22	23°04'47.10" N	70° 17' 03.65" E	3100	78	17.6
Q23	23°04'49.42" N	70° 17' 07.81" E	3300	85	19.2
Q24	23°04'49.87" N	70° 17' 10.23" E	2600	64	17.2
Average			4133	89	--



Figure 23. Mangrove plantation 330 ha at Sat Saida bet during 2013-2014

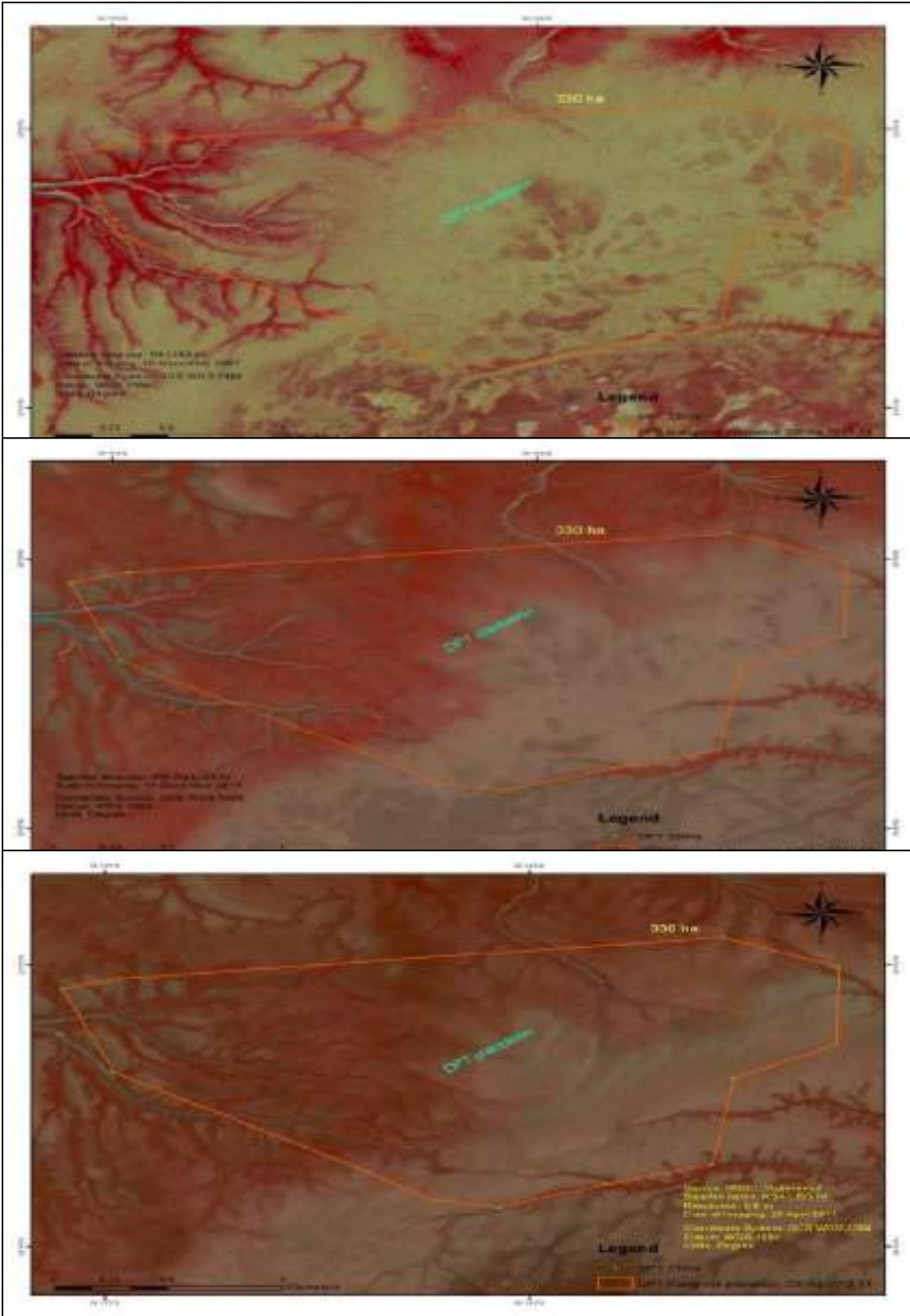


Figure 24. Satellite imageries of the plantation at Sat Saida Bet (2007, 2014 & 2018)

6 Results

The mangrove monitoring study results of the three sites, Nakti creek Kantiyajal and Sat Saida bet are presented below.

6.1 Mangrove plantation evaluation at Nakti creek

6.1.1 Evaluation of *Avicennia marina* Plantation at Nakti creek (2021-2022) 100 ha

In total, ten quadrats were laid at Nakti creek block to assess the *A. marina* survival percentage. The survival rate was recorded to be 40%, lower than the survival rate of recorded in Nakti creek within 50 ha plot. The plantation density ranged from 900 individuals/ha to 3400 individuals/ha, with an average density of 1600 individuals/ha (Table 16). In this block, the height of the plants ranged between 70- 280 cm, with an average height of 118.9 cm was recorded. The GBH in this plantation varied from 6 to 12 cm, with an average value of 6.8 cm. The minimum and maximum canopy cover in this plantation stand ranged from 0.30 to 1.5 m² with a mean value of 0.8 m². Even though the plantation activities were carried out near the creek system, the poor survival of planted mangroves could be due to mixed plantation techniques. *R. mucronata* saplings were recorded outside the quadrats with heights varying from 50-60 cm. Around ten individuals were seen during the entire survey. Thus, it was apparent that the plantation of *R. mucronata* showed poor survival rate as this species needs 20-25 days of tidal flushing in a month and can tolerate only moderate salinity.

Table 16. Details of mangrove plantation at Nakti creek (100 ha)

S. No	Density (Plants/Ha)	Height (cm)			GBH (cm)			Canopy cover (m ²)		
		Min	Max	Average	Min	Max	Average	Min	Max	Average
1	2200	70	170	120	7	9	8	0.42	1.25	0.8
2	1700	100	280	190	6	11	8.5	0.42	1.5	0.96
3	2300	100	235	167.5	7	12	9.5	1.32	1.5	1.4
4	1700	70	170	120	7	11	9	0.3	0.85	0.6
5	0	0	0	0	0	0	0	0	0	0
6	3400	70	180	125	7	8	7.5	1.32	0.75	1.03
7	2900	100	190	145	8	7	7.5	1.56	1.1	1.3
8	900	80	210	145	7	10	8.5	0.56	1.25	0.9
9	900	100	252	176	7	12	9.5	0.72	1.5	1.1
10	0	0	0	0	0	0	0	0	0	0
Overall average Density (plants/ha) 1600.0		69.0	168.7	118.9	5.6	8.0	6.8	0.7	1.0	0.8

6.1.2 Mangrove evaluation at Nakti creek (2021-2022) 50ha

Two mangrove plantation sites with an area of 50 ha and 100 ha were developed at the north-eastern bank of Nakti creek, one of the major creek systems of Kandla. The main creek and its branches are getting inundated by 3-4 m of tidal water during the high tide period. The two mangrove plantation sites developed is adjacent to each other with a good tidal flooding area. The findings based on-site visits and subsequent data are given in Table in 17.

To evaluate the *A. marina* plantation success at Nakti creek i.e., survival percentage and growth rate, an initial plantation density of 4000 saplings/ha as a baseline density was considered. Therefore, in the present study, six quadrates of 10×10m each were laid to evaluate the growth and survival of *A. marina*. The results revealed that the survival rate of *A. marina* in this block was 55 percent. The density ranged from 900 individuals/ha as high as 2800 individuals/ha, with an average density of 2200 individuals /ha. Similarly, the plant height ranged between 70 cm and 210 cm, with an average of 129.2 cm. The canopy cover ranged between 0.3 m² to 1.5 m² with an average of 0.8 m². The Girth at base (here after GB) values are ranged from 7 cm to 46 cm, with an average of 20.4 cm. The larger values of GB indicate the presence of multiple stems. It is known that direct dibbling and plantation of nursery raised trees are superior to the *Otla* bed technique. Moderate survival (55%) of the planted *A. marina* could be attributed to mixed plantation techniques as more than two species, namely *Rhizophora mucronata* and *Ceriops tagal* were also planted at this site.

Table 17. Details of mangrove plantation at Nakti creek (50 ha)

S. No	Density (Plants/Ha)	Height (cm)			GBH (cm)			Canopy cover (m ²)		
		Min	Max	Average	Min	Max	Average	Min	Max	Average
1	2400	100	175	137.5	7	37	22	0.42	1.2	0.8
2	2300	100	185	142.5	7	37	22	0.3	1.35	0.8
3	2800	100	210	155	7	46	26.5	0.3	1.5	0.9
4	2300	100	160	130	7	26	16.5	0.3	1.1	0.7
5	2500	80	120	100	7	34	20.5	0.56	0.75	0.7
6	900	70	150	110	8	22	15	1	0.8	0.9
Avg	2200.0	91.7	166.7	129.2	7.2	33.7	20.4	0.5	1.1	0.8

During the field surveys, it was recorded that the saplings were invaded by the alga *Enteromorpha* sp. and regular tidal flushing was lacking. Due to all these factors a variation of mortality of different tree species was recorded along the Nakti creek.

6.2 Kantiyajal mangrove plantation (350 ha)

The 350 ha mangrove plantation was carried out at the coastal stretch of Katpor village near Kantiyajal in Bharuch district. This plantation was carried out in two blocks of 150 ha each during the year 2015-16 and 2016-17 and 50 ha during the year 2019-20. The Gujarat Ecology Commission (GEC), Gandhinagar executed this plantation with the help of community participation by Samity at the Katpor village.

6.2.1 *Avicennia marina* and *Rhizophora mucronata* plantation (2015-2016) 150 ha

Sixteen quadrats were laid in this block for assessing mangrove species survival success. As per the earlier report by GEC (2015-2017), at this site, it was evident that this block had *R. mucronata* saplings in addition to *A. marina* (Table 18, 19 & 20). An overall average density of 3000 individuals/ha was recorded for *A. marina*. The tree density varied from 1200 to 5200 individuals/ha. The height of the plants ranged from 0.90 m to 2.20 m, with an average of 1.5 m. The GB of the plants ranged from 7.0 to 25 cm with an average of 14.2 cm. The canopy cover of the mangrove plants varied between 0.56 m² and 2.4 m² with an average of 1.3 m².



Plate 1. *Ceriops tagal* stands at Nakti creek Plantation site



Plate 2. *Rhizophora mucronata* stands at Nakti creek Plantation site

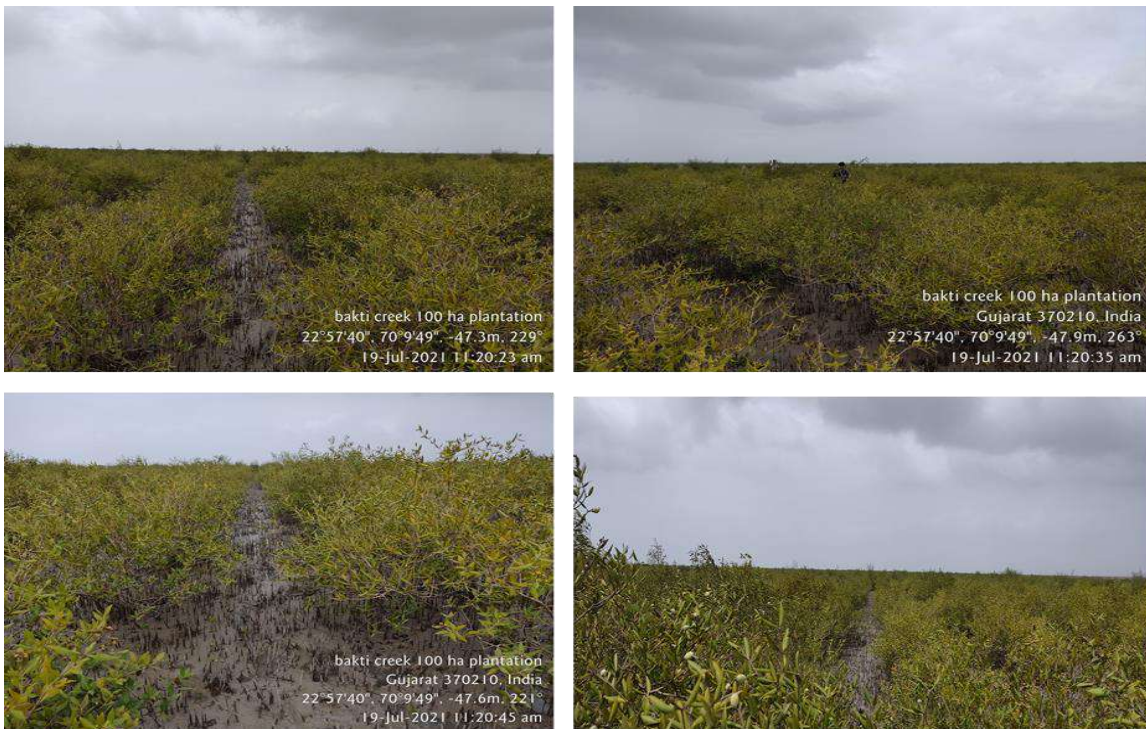


Plate 3. *Avicennia marina* (100 ha) plantation at Nakti creek

Table 18. Details of *A. marina* & *R. mucronata* plantation at Kantiyajal (150 ha)

Quadrat	Density	Height (m)			GBH (cm)			Canopy cover (m ²)		
		Min	Max	Average	Min	Max	Average	Min	Max	Average
Q1	5200	1	1.9	1.45	7	20	13.5	0.56	1.82	1.19
Q2	3600	1.2	2	1.6	11	25	18	1.1	2.1	1.6
Q3	4000	0.9	1.9	1.4	8	16	12	0.9	1.56	1.23
Q4	3600	1.25	1.9	1.575	9	25	17	0.72	2.4	1.56
Q5	3600	1.1	1.75	1.425	9	22	15.5	0.72	1.1	0.91
Q6	3200	1	2.1	1.55	7	20	13.5	0.72	1.82	1.27
Q7	2800	1.2	2.1	1.65	12	23	17.5	1.2	2.4	1.8
Q8	1200	1.1	1.6	1.35	7	13	10	1.1	1.2	1.15
Q9	1600	1.2	2.2	1.7	8.5	18	13.25	0.72	2.1	1.41
Q10	1200	1	1.2	1.1	8	15	11.5	0.72	1.1	0.91
Overall average	3000	1.1	1.9	1.5	8.7	19.7	14.2	0.85	1.76	1.3

6.2.2 *Rhizophora mucronata* plantation (2016-2017) 150 ha

The assessment of the *R. mucronata* plantation at this site showed an overall density of 2520 individuals/ha (Table 19). The average height of *R. mucronata* plants was 129.5 cm, and the average canopy cover was 0.9 m² in this block. *R. mucronata* being a frontline mangrove, its plantation was carried out towards the lower intertidal region. Continuous tidal flushing following appropriate zonation patterns during plantation could be attributed to a higher survival percentage of *R. mucronata*. The survival and growth of the mangrove plantation at this site was (63%) comparatively good because of continuous water inundation and availability of extensive intertidal mudflats.

Table 19. Details of mangrove plantation of *Rhizophora mucronata* at Kantiyajal (150 ha)

Quadrat	Density	Height (cm)			GBH (cm)			Canopy cover (m ²)		
		Min	Max	Average	Min	Max	Average	Min	Max	Average
Q1	3500	85	175	130	5	9	22	0.52	1	0.76
Q2	2500	100	185	142.5	7	11	22	0.65	1.5	1.075
Q3	2800	110	210	160	8	12.5	26.5	1.1	1.3	1.2
Q4	2000	70	160	115	5	8	16.5	0.3	1.1	0.7
Q5	1800	80	120	100	3	5	20.5	0.6	0.75	0.675
Overall average	2520.0	89.0	170.0	129.5	5.6	9.1	21.5	0.6	1.1	0.9

6.2.3 *Avicennia marina* plantation (2018-2019) 50 ha

During the field surveys at this site saplings of both *A. marina* and *R. mucronata* saplings were also noticed (Table 20). An average density of 2480 individuals/ha was recorded for *A. marina*. The plant density varied between of 2100 individuals/ha, to 2800 individuals/ha. The height of the plants ranged from 13 cm to 97 cm, with an average of 57.28 cm. The survival and growth of the mangrove plantation at this site (62%) was comparatively high because of continuous water inundation on the extended intertidal mudflats.

Table 20. Evaluation of *A. marina* plantation at Kantiyajal (50 ha) during 2018-2019

Quadrat	Density	Height (cm)		
		Min	Max	Average
Q1	2700	37	52	44.5
Q2	2100	57	93	75
Q3	2200	62	97	79.5
Q4	2600	55	73	64
Q5	2800	13	34	23.4
Average	2480	44.8	69.8	57.28



Plate 4. *Avicennia marina* plantation at Kantiyajal coast



Plate 5. *Rhizophora mucronata* plantation at Kantiyajal coast

6.3 Monitoring of mangrove plantation at Sat-Saida Bet

6.3.1 Monitoring of *Avicennia marina* at Sat-Saida Bet (2021-2022) 20 ha

During 2005-2006, the mangrove plantation at Sat Saida Bet was carried out at Dharkadia creek banks in 20 ha. The two sites on both the banks of Dharkadia creek were planted with *A. marina* by Gujarat Institute of Desert Ecology through transplanting nursery-grown seedlings and direct seed sowing for gap filling.

In total, 2 quadrats were laid at this site to assess the survival percentage of the *A. marina*. The results of the growth of these plantations are presented in Table 21. The *A. marina* plants in the 20 ha area showed tree density varying from 2100/ha to a maximum 2500/ha, and the overall average was 2300 /ha. The overall average plant height of this site was 175cm. and the survival rate was 57.5 %. The GB ranged from 7 cm to 15 cm, with an average of 10.5 cm, while the average canopy cover was 1.89 m². The area was moderately dense, with *A. marina* being predominant species (Plate-16).

Additionally, the area being slightly cooler due to frequent tidal exposures and is inhabited by snakes. As the area remains moist due to the tidal influx, assessment of the area becomes

difficult. This area also supports avifauna like Oriental darter (*Anhinga melanogaster*), Painted stork (*Mycteria leucocephala*), crab plovers (*Dromas ardeola*) etc.

Table 21. Evaluation of *A. marina* plantation at Sat Saida Bet (20 ha)

Quadrat	Density	Height (cm)			Girth (cm)			Canopy (m ²)		
		Min	Max	Average	Min	Max	Average	Min	Max	Average
Q-1	2100	180	200	190	8	15	11.5	1.14	3.21	2.175
Q-2	2500	110	160	160	7	12	9.5	1.1	2.1	1.6
Average	2300	180	180	175	7.5	13.5	10.5	1.12	2.66	1.89



Plate 6. Sat Saida Bet *Avicennia marina* plantation

6.3.2 Monitoring of *Avicennia marina* plantation at Sat Saida bet (2021-2022) 200 ha.

Mangrove plantation in 200 ha was initiated by Forest Department, Kachchh circle during 2011-2012 on DPA's request. Forest Department (Anjar circle) initiated the plantation activities at Sat Saida Bet during the rainy season of June 2011. The plantation site is opposite to Deendayal port oil jetty and is around 2 km from the bank of Sat Saida bet. A buffer zone of

nearly 2 km was allowed between the waterfront from the banks of Sat Saida bet and the plantation site. The seeds of *A. marina* were used for plantation activities due to the prevailing high salinity in the area. Raised bed method (*Otla*) was followed as the plantation technique, and *A. marina* seeds were collected from Kandla mangroves for plantation work.

In total, 20 quadrats were laid at this site to assess the survival percentage of the *A. marina*. The growth of these plantations was assessed, and the results were presented in Tables 22. The *A. marina* plants in the 200-ha area showed tree density varying from 1800/ha to a maximum 2800/ha, and the overall average was 2250 /ha. The overall average plant height of this site was 117.8 cm and the survival rate was 56.25 %. The GBH ranges from 7 cm to 11 cm with an average of 8.3 cm, while the average canopy cover was 1.1 m².

Additionally, the area supported the luxuriant growth of halophytes like *Salicornia brachiata*, *Sesuvium sp.* and *Salvadora persica*. The area becomes dry during low tides and gets converted to a hard surface, making it accessible. Interestingly, despite the dryness of the area, snakes were recorded. It was observed that they take shelter under the canopy cover and camouflage themselves by intertwining with the stem of mangroves.

6.3.3 Monitoring of *Avicennia marina* plantation (2021-2022) 300 ha.

The *A. marina* mangrove plantation carried out during 2012-2013 in 300 ha by the Range office of the Forest Department at Anjar. Initially, raised bed method was followed for mangrove plantations but was eventually replaced by direct seed sowing. In a few places, direct seed dibbling was also done.

In total, 30 quadrates were laid at this site to assess the survival percentage of the *A. marina*. The growth of these plantations was assessed, and the results are presented in Table 23. The *A. marina* plants in the 300ha area showed tree density varying from 1300/ha to a maximum 3500/ha, and the overall average was 2247/ha. The overall average plant height of this site was 125.3cm, and the survival rate was 56.17 %. The GB ranges from 0.63 cm to 19 cm with an average of 9.16 cm, while the average canopy cover was 1.44 m².

Table 22. Details of mangrove plantation of *A. marina* at Sat Saida Bet (200 Ha)

Quadrat	Density	Height (cm)			Girth (cm)			Canopy cover (m ²)		
		Min	Max	Average	Min	Max	Average	Min	Max	Average
Q-1	2200	110	140	125	7	10	8.5	0.34	1.24	0.79
Q-2	1800	120	110	115	7	9	8	1	1.57	1.285
Q-3	2500	100	130	115	9	11	10	1	1.34	1.17
Q-4	1800	100	110	105	7	9	8	0.59	1.24	0.915
Q-5	2400	130	140	135	7	11	9	0.89	1.95	1.42
Q-6	2200	110	120	115	7	9	8	0.98	1.4	1.19
Q-7	2400	120	130	125	7	10	8.5	1	1.49	1.245
Q-8	1800	100	120	110	7	10	8.5	0.48	0.67	0.575
Q-9	2200	100	110	105	7	8	7.5	0.34	0.59	0.465
Q-10	1800	130	140	135	7	9	8	1	1.77	1.385
Q-11	2700	120	130	125	7	10	8.5	1	1.8	1.4
Q-12	2200	80	100	90	7	9	8	0.23	1.67	0.95
Q-13	1900	120	150	135	7	8	7.5	1.29	1.78	1.535
Q-14	2800	110	120	115	7	8	7.5	1	1.3	1.15
Q-15	2200	90	110	100	8	9	8.5	1.07	1.29	1.18
Q-16	2400	110	140	125	8	11	9.5	1.2	1.5	1.35
Q-17	2200	120	140	130	8	10	9	1	1.64	1.32
Q-18	2500	80	120	100	5	8	6.5	1.04	1.34	1.19
Q-19	2200	110	130	120	7	8	7.5	0.54	0.76	0.65
Q-20	2800	120	140	130	8	11	9.5	0.72	0.9	0.81
Average	2250	109	126.5	117.8	7.2	9.4	8.3	0.8	1.4	1.1

Table 23. Details of mangroves plantation of *A. marina* at Sat Saida Bet (300 Ha)

Quadrat No	Density	Height(cm)			Girth(cm)			Canopy cover (m ²)		
		Min	Max	Avg	Min	Max	Avg	Min	Max	Average
Q-1	2200	120	160	140	9	19	14	1.32	2.7	2.01
Q-2	1500	100	120	110	11	12	11.5	1.56	1.75	1.65
Q-3	2500	90	130	110	0.99	10	5.5	0.96	1.69	1.325
Q-4	1900	120	140	130	9	12	10.5	1	1.39	1.195
Q-5	2600	90	180	135	7	18	12.5	1	1.69	1.345
Q-6	2100	90	140	115	8	9	8.5	1	2.19	1.595
Q-7	2500	100	130	115	7	11	9	1	2.56	1.78
Q-8	2500	90	120	105	0	9	4.5	0.47	1.39	0.93
Q-9	1900	100	120	110	7	12	9.5	1	1.22	1.11
Q-10	2600	110	190	150	10	16	13	1	1.38	1.19
Q-11	2100	110	190	150	12	20	16	1	2.79	1.895
Q-12	2500	120	270	195	9	24	16.5	2	4.46	3.23
Q-13	2200	130	260	195	11	21	16	3	4.39	3.695
Q-14	2200	90	120	105	5	10	7.5	0.39	2.35	1.37
Q-15	2100	130	170	150	11	13	12	0.56	1.67	1.115
Q-16	1800	90	140	115	6	10	8	0.76	1.36	1.06
Q-17	1800	120	130	125	7	9	8	1.2	1.32	1.26
Q-18	2200	80	100	90	5	7	6	0.65	1.02	0.835
Q-19	2200	90	120	105	6	7	6.5	0.89	1.29	1.09
Q-20	1300	130	140	135	7	9	8	0.9	1.34	1.12
Q-21	2200	100	120	110	6	9	7.5	0.79	1.1	0.945
Q-22	1500	80	130	105	6	10	8	0.63	1.35	0.99
Q-23	2200	110	140	125	7	9	8	1	1.45	1.225
Q-24	2800	100	110	105	5	7	6	0.56	1.06	0.81
Q-25	2900	105	130	117.5	7	11	9	1.38	2	1.69
Q-26	3500	120	150	135	9	13	11	1	2	1.5
Q-27	2200	110	130	120	0	9	4.5	1.02	1.89	1.455
Q-28	2400	100	140	120	0	9	4.5	1	1.68	1.34
Q-29	2800	110	150	130	0	10	5	0.64	1.83	1.235
Q-30	2200	70	140	105	0.63	16	8.315	1	1.45	1.225
Average	2247	103.5	147	125.25	6.29	12.03	9.16	1.02	1.86	1.44

6.3.4 Monitoring of *Avicennia marina* plantation (2021-2022) 330 ha.

During 2013-14, these sites were planted with *A. marina*, plants with nursery raised saplings and direct dibbling methods, respectively. In total, 33 quadrates were laid at this site to assess the survival percentage of the *A. marina*. The growth of these plantations was assessed, and the results are presented in Table 24. The *A. marina* plants in the 330 ha area showed the tree density varying from 1800/ha to a maximum of 3200/ha, and the overall average was 2509/ha. The overall average plant height of this site was 132.3cm, and the survival rate was 62.7 %. The girth at base ranges from 5 cm to 24 cm with an average of 9.61 cm, while the average canopy cover was 1.35 m².



Plate 7. Monitoring of *A. marina* on field

Table 24. Details of mangroves plantation of *A. marina* at Sat Saida Bet (300 ha)

Quadrat	Density	Height (cm)			Girth (cm)				Canopy cover(m ²)	
		Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
1	2400	70	90	80	5	6	5.5	0.4	1.2	0.8
2	3200	110	120	115	7	8	7.5	0.28	1.62	0.95
3	2200	90	110	100	7	8	7.5	0.36	1.23	0.795
4	2600	80	100	90	5	6	5.5	1.2	2.2	1.7
5	3200	100	120	110	6	8	7	0.38	1.36	0.87
6	2200	80	90	85	5	7	6	0.7	1.9	1.3
7	3000	100	110	105	4	6	5	0.5	0.9	0.7
8	2500	110	125	117.5	6	9	7.5	0.42	1.23	0.825
9	1900	110	130	120	7	10	8.5	1.08	1.23	1.155
10	2600	110	120	115	7	9	8	0.89	1.26	1.075
11	2100	120	180	150	8	12	10	0.78	1.47	1.125
12	2500	105	150	127.5	7	14	10.5	0.42	1.68	1.05
13	2700	150	190	170	10	16	13	0.8	1.59	1.195
14	2200	110	170	140	7	18	12.5	0.89	2.38	1.635
15	2900	110	180	145	7	17	12	0.54	2.1	1.32
16	3500	110	130	120	6	10	8	0.9	1.2	1.05
17	2200	130	150	140	7	15	11	1.08	2.24	1.66
18	2400	110	140	125	7	12	9.5	0.9	2.36	1.63
19	2200	120	170	145	9	15	12	1.39	2.49	1.94
20	2400	120	140	130	7	12	9.5	1.17	2.35	1.76
21	1800	90	110	100	6	9	7.5	0.89	1.02	0.955
22	2500	100	120	110	9	10	9.5	0.64	0.98	0.81
23	3200	140	170	155	9	13	11	0.9	1.39	1.145
24	2500	80	120	100	6	8	7	0.38	0.76	0.57
25	2500	110	130	120	7	8	7.5	0.34	1.24	0.79
26	1900	110	130	120	7	9	8	0.79	1.1	0.945
27	2600	100	150	125	7	10	8.5	0.88	2.89	1.885
28	2200	100	110	105	7	10	8.5	0.54	1.96	1.25
29	2100	150	250	200	10	22	16	2.34	3.5	2.92
30	2400	160	210	185	1	18	9.5	1.78	2.7	2.24
31	2500	210	260	235	16	24	20	1.98	3.86	2.92
32	2500	150	240	195	11	19	15	2.28	2.46	2.37
33	3200	160	210	185	10	16	13	0.72	1.67	1.195
Average	2509	115	149	132	7.3	12	9.61	0.90	1.80	1.35

6.3.5 Monitoring of *Avicennia marina* plantation (2021-2022) 50ha.

During 2018-19, this site was planted with *A. marina*, plants with nursery raised saplings and direct dibbling methods, respectively by Gujarat Ecology Commission. In total, five quadrates were laid at this site to assess the survival percentage of the *A. marina*. The growth of these plantations was assessed, and the results are presented in Table 25. The *A. marina* plants in the 50 ha area showed tree density varying from 1600/ha to a maximum of 2500/ha, and the overall average was 2060/ha. The overall average plant height of this site was 141.6cm, and the survival rate was 51.5 %. The girth ranges from 8 cm to 19 cm with an average of 12.2 cm, while the average canopy cover was 1.45 m².

Table 25. Details of mangroves plantation of *A. marina* at Sat Saida Bet (50 Ha)

Quadrat No	Density	Height(cm)			Girth(cm)			Canopy(m ²)		
		Max	Min	Avg	Max	Min	Average	Max	Min	Average
Q-1	1900	180	140	160	18	11	14.5	2.98	0.9	1.94
Q-2	2200	160	136	148	15	12	13.5	2.57	0.48	1.525
Q-3	2500	150	110	130	12	9	10.5	1.82	0.59	1.205
Q-4	2100	190	110	150	19	8	13.5	2.36	1.04	1.7
Q-5	1600	130	110	120	10	8	9	1.34	0.46	0.9
Avg	2060	162	121	141.6	14.8	9.6	12.2	2.214	0.69	1.45

7 Regeneration and recruitment class

The regeneration class and recruitment class density were recorded in Sat Saida bet. The overall average density of the regeneration class (saplings with a height of <50 cm) of mangroves in the sampling site recorded was 43,658 plants/ha. The highest regeneration class (62,121 plants/ha) was recorded at 330 ha block, indicating the suitability of the site for germination and survival of young plants (Fig-25, 26). The lowest density of the regeneration class (25,667 plants/ha) was recorded at the 300 Ha block. In the case of recruitment class plants, the overall average density recorded was 5071 plants/ha. The maximum recorded at 330 Ha block (6061 plants/ha), and the minimum at 300 ha block. These results indicate that the 300 Ha block is not conducive for the growth of mangroves.

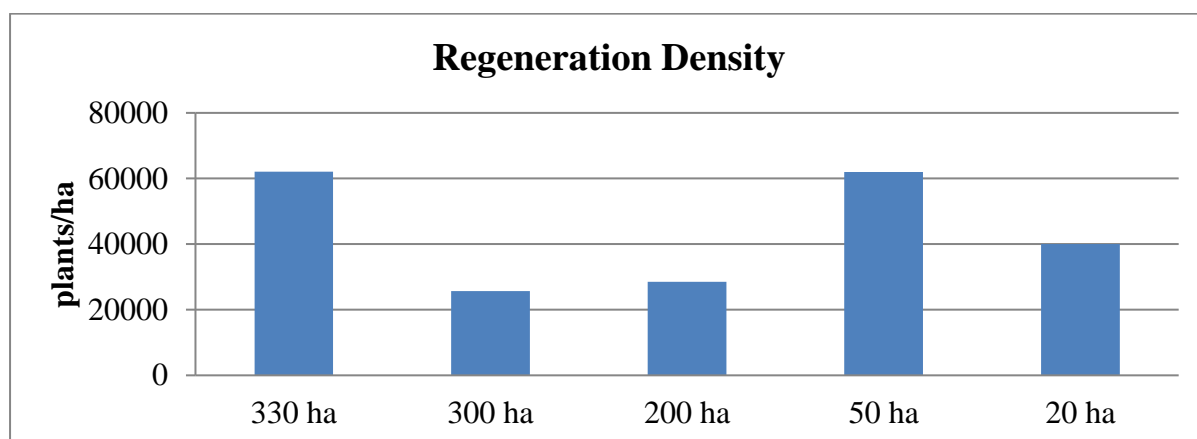


Figure 25. Regeneration class density at Sat Saida Bet

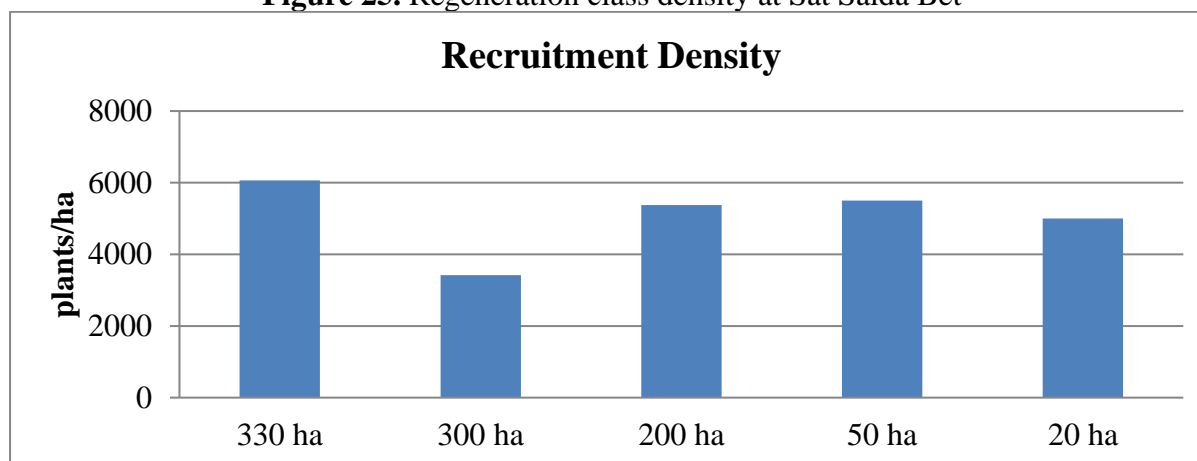


Figure 26. Recruitment class density at Sat Saida Bet

The regeneration class density was highest in 330 ha block followed by 50 ha, 20 ha, 200 ha and lowest in 300 ha. The recruitment class density was highest in 330 ha followed by 50 ha, 200 ha, 20 ha and lowest in 300 ha.

Table 26. Assessment of plant characteristics (Mean) at the plantation sites during 2017-2018

Site	Parameters	150 ha	150ha
Kantiyajal	Plant density (No/ha)	2220 (<i>A. marina</i>)	1460 (<i>A. marina</i>) 1280 (<i>R. mucronata</i>)
	Height(cm)	37	32 (<i>A. marina</i>) 30 (<i>R. mucronata</i>)
	Survival rate (%)	88.8	58.4 (<i>A. marina</i>) 64.0 (<i>R. mucronata</i>)
Nakti creek	Plant density (No/ha)	2370	-
	Height (cm)	53 – 84	-
	Survival rate	35.9	-
Sat Saida Bet	Plant density (No/ha)	4133	2031 to 5387
	Height (cm)	89	39 – 113
	Survival rate (%)	62.6%	81.6

8 Soil Biomass Carbon

8.1 Soil biomass carbon stock potential at Nakti creek mangrove site

At Nakti creek, the below ground soil carbon stock of the *A. marina* plantation was 51.76 t/ha and 62.74t/ha at 50 ha and 100ha respectively. At the 100 ha mangrove plantation area, the soil biomass carbon stock ranged from 42.36 to 84.32 t/ha with an average of 62.74 t/ha. Among the two locations, 100 ha plantation site at Nakti creek showed the higher soil Total Biomass Carbon stock (Table 27, 28).

Table 27. Soil Carbon stock in Nakti mangrove plantation site- 100 ha

Sampling Blocks	Depths	TOC (%)	Total carbon (%)	Bulk Density (g/ cm ³)	Carbon stock (%)	Carbon stock in 1 m (t/ha)
NC 1	25 cm	0.34	0.18	1.28	5.83	84.315
	50 cm	0.37	0.20	1.30	12.85	
	75 cm	0.43	0.23	1.25	21.56	
	100 cm	0.61	0.33	1.35	44.08	
NC 2	25 cm	0.43	0.23	1.33	7.66	58.63
	50 cm	0.4	0.21	1.25	13.37	
	75 cm	0.34	0.18	1.32	17.94	
	100 cm	0.28	0.15	1.31	19.65	
NC 3	25 cm	0.24	0.13	1.32	4.22	45.27
	50 cm	0.27	0.14	1.27	9.14	
	75 cm	0.21	0.11	1.28	10.80	
	100 cm	0.3	0.16	1.32	21.11	
Average Carbon stock (%)						62.74

Table 28. Soil Carbon stock in Nakti mangrove plantation site - 50 ha

Sampling Blocks	Different depths	TOC%	Total carbon (%)	Bulk Density (g/m ³)	Carbon stock (%)	Carbon in 1 m stock (t/ha)
NC 1	25 cm	0.21	0.11	1.41	3.95	42.364
	50 cm	0.24	0.13	1.25	8.02	
	75 cm	0.24	0.13	1.28	12.34	
	100 cm	0.27	0.14	1.25	18.05	
NC 2	25 cm	0.33	0.18	1.37	6.04	59.12
	50 cm	0.24	0.13	1.33	8.56	
	75 cm	0.3	0.16	1.39	16.71	
	100 cm	0.39	0.21	1.33	27.81	
NC 3	25 cm	0.51	0.27	1.28	8.74	53.79
	50 cm	0.33	0.18	1.32	11.61	
	75 cm	0.27	0.14	1.33	14.44	
	100 cm	0.27	0.14	1.32	19.00	
Average of Carbon stock (%)						51.6

Table 29. Average Carbon Stock at Nakti Creek

Plantation (ha)	Avg. Carbon stock 1 m depth (%)
100	62.74
50	51.6
Avg	57.17

8.2 Soil biomass carbon stock potential at Kantiyajal mangrove site

At Kantiyajal creek, the average soil biomass carbon of the *A. marina* plantation was 53.13t/ha (150ha) and it ranged from 46.4 to 59.7 t/ha. Among the three locations, 150 ha *A. marina* plantation site showed the highest soil biomass carbon stock potential at Kantiyajal (Table 30,31,32 & 33). The overall average 1 meter depth soil carbon stock was 53.35t/ha.

Table 30. Soil Carbon stock in Kantiyajal mangrove plantation site- 150 ha (*A. marina*)

Sampling Blocks	Different depths	TOC%	Total carbon (%)	Bulk Density (g/ m ³)	Carbon stock (%)	Carbon stock in 1 m(t/ha)
KC-1	25 cm	0.30	0.15	1.27	4.8	54.7
	50 cm	0.42	0.21	1.20	12.6	
	75 cm	0.34	0.17	1.19	15.2	
	100 cm	0.52	0.26	1.22	22.2	
KC- 2	25 cm	0.34	0.17	1.21	5.1	54.0
	50 cm	0.40	0.20	1.18	11.8	
	75 cm	0.38	0.19	1.20	17.1	
	100 cm	0.46	0.23	1.24	20.0	
Average Carbon stock (%)						54.4

Table 31. Soil Carbon stock in Kantiyajal mangrove plantation site- 150 ha (*R. mucronata*)

Sampling Blocks	Different depths	TOC %	Total carbon (%)	Bulk Density (g/ m ³)	Carbon stock (%)	Carbon stock in 1 m(t/ha)
KC-1	25 cm	0.38	0.19	1.09	5.2	47.7
	50 cm	0.29	0.145	1.22	8.8	
	75 cm	0.39	0.195	1.16	17.0	
	100 cm	0.49	0.145	1.21	20.8	
KC- 2	25 cm	0.36	0.18	1.26	5.7	59.7
	50 cm	0.37	0.185	1.23	11.4	
	75 cm	0.62	0.31	1.19	27.7	
	100 cm	0.37	0.185	1.16	15.0	
Average Carbon stock (%)						53.69

Table 32. Soil Carbon stock in Kantiyajal mangrove plantation site- 50 ha (*A.marina*)

Sampling Blocks	Different depths	% of TOC	Total carbon (%)	Bulk Density (g/ m ³)	Carbon stock (%)	Carbon stock in 1 m(t/ha)
KC- 1	25 cm	0.29	0.145	1.24	4.5	57.5
	50 cm	0.36	0.18	1.25	11.3	
	75 cm	0.39	0.195	1.23	18.0	
	100 cm	0.54	0.27	1.26	23.8	
KC- 2	25 cm	0.32	0.16	1.24	5.0	46.4
	50 cm	0.38	0.19	1.09	10.4	
	75 cm	0.37	0.185	1.24	17.2	
	100 cm	0.32	0.16	1.24	13.9	
Average of Carbon stock (%)						51.97

Table 33. Average Carbon Stock at Kantiyajal Creek

Plantation (ha)	Avg. Carbon stock 1 m depth (%)
150	54.4
150	53.69
50	51.97
Avg	53.35

8.3 Soil carbon stock potential at Sat Saida bet at mangrove site

At Sat Saida bet the overall average soil biomass carbon of *A. marina* plantation site was 68.17 t/ha. Whereas, at the five blocks of mangrove plantation area, the soil biomass carbon ranged from 54.5 t/ha (50ha) to 79.5 t/ha (200ha). The soil carbon sequestration potential was highest in 200 ha plot followed by 300, 20, 330 and 50 ha plantation blocks (Table 34-39).

Table 34. Soil Carbon stock in Sat Saida bet mangrove plantation site- 300 ha

Sampling Blocks	Different depths	% of TOC	Total carbon (%)	Bulk Density (g/cm ³)	Carbon stock (%)	Carbon stock in 1 m (t/ha)
Sample-1	25 cm	0.37	0.185	1.30	6	69.3
	50 cm	0.40	0.2	1.29	12.9	
	75 cm	0.37	0.185	1.26	17.5	
	100 cm	0.53	0.265	1.24	32.9	
Sample- 2	25 cm	0.35	0.175	1.23	5.4	73.9
	50 cm	0.48	0.24	1.30	15.6	
	75 cm	0.39	0.195	1.22	17.8	
	100 cm	0.58	0.29	1.21	53.1	
Average of Carbon stock (%)						71.5

Table 35. Soil Carbon stock in Sat-Saida bet mangrove plantation site- 200 ha

Sampling Blocks	Different depths	% of TOC	Total carbon (%)	Bulk Density (g/cm ³)	Carbon stock (%)	Carbon stock in 1 m (t/ha)
Sample-1	25 cm	0.39	0.195	1.23	6.0	78.1
	50 cm	0.36	0.18	1.22	11.0	
	75 cm	0.67	0.335	1.13	28.4	
	100 cm	0.59	0.295	1.24	32.7	
Sample- 2	25 cm	0.42	0.21	1.21	11.6	80.9
	50 cm	0.35	0.175	1.26	11.0	
	75 cm	0.58	0.29	1.27	27.6	
	100 cm	0.52	0.26	1.18	30.7	
Average of Carbon stock (%)						79.5

Table 36. Soil Carbon stock in Sat Saida bet mangrove plantation site- 330 ha

Sampling Blocks	Different depths	% of TOC	Total carbon (%)	Bulk Density (g/cm ³)	Carbon stock (%)	Carbon stock in 1 m (t/ha)
Sample-1	25 cm	0.42	0.21	1.09	5.7	64.8
	50 cm	0.32	0.16	1.29	10.3	
	75 cm	0.37	0.185	1.24	17.2	
	100 cm	0.53	0.25	1.23	31.5	
Sample- 2	25 cm	0.48	0.24	1.13	6.8	55.9
	50 cm	0.34	0.17	1.24	10.5	
	75 cm	0.30	0.15	1.30	14.6	
	100 cm	0.42	0.21	1.14	23.9	
Average of Carbon stock (%)						60.3

Table 37. Soil Carbon stock in Sat Saida bet mangrove plantation site- 50 ha

Sampling Blocks	Different depths	% of TOC	Total carbon (%)	Bulk Density (g/cm ³)	Carbon stock (%)	Carbon stock in 1 m (t/ha)
Sample-1	25 cm	0.31	0.155	1.26	4.9	62.8
	50 cm	0.36	0.18	1.30	11.7	
	75 cm	0.39	0.195	1.06	15.5	
	100 cm	0.50	0.25	1.23	30.8	
Sample- 2	25 cm	0.32	0.16	1.13	5.0	54.2
	50 cm	0.33	0.165	1.24	10.8	
	75 cm	0.38	0.19	1.30	17.8	
	100 cm	0.34	0.17	1.14	20.6	
Average of Carbon stock (%)						58.5

Table 38 Soil Carbon stock in Sat Saida Bet mangrove plantation site- 20 ha

Sampling Blocks	Different depths	% of TOC	Total carbon (%)	Bulk Density (g/cm ³)	Carbon stock (%)	Carbon stock in 1 m (t/ha)
Sample-1	25 cm	0.35	0.175	1.32	5.8	74.5
	50 cm	0.37	0.185	1.18	10.9	
	75 cm	0.39	0.22	1.32	21.8	
	100 cm	0.55	0.275	1.31	36	
Sample- 2	25 cm	0.35	0.175	1.19	5.2	67.6
	50 cm	0.175	0.195	1.34	13.1	
	75 cm	0.29	0.27	1.32	26.7	
	100 cm	0.26	0.19	1.19	22.6	
Average of Carbon stock (%)						71.0

Table 39. Average Carbon Stock of all the sites at Sat Saida Bet

Plantation (ha)	Avg. Carbon stock 1 m depth (%)
300 ha	71.5
200 ha	79.5
330 ha	60.3
50 ha	58.5
20 ha	71.0
Avg	68.18

8.4 Details of carbon Sequestration at the plantation sites

The above ground biomass varied 113.30 to 210.0gm at Sat Saida Bet while at Kantiyajal it was minimum 121.74 to 164.60 gm/ha. At Nakti creek site it was minimum 133.86 and maximum 161.02 gm/ha during the present investigation (Table 40,41 & 42). The below ground biomass was comparatively less than the above ground values. At Sat Saida Bet it ranged from 22.70 to 62.80gm and that from Kantiyajal were 21.96 to 38.23gm. The below ground biomass at Nakti varied between 29.83 and 42.30gm. The Total Biomass Carbon calculated in the different plantation sites at Sat Saida varied from 112.10kg/ha to 232.74 kg/ha. The values of carbon biomass at Kantiyajal varied from 123.69 to 178.86kg/ha whereas at Nakti it varied between 142.02 and 173.46 kg/ha.

Table 40. Details of Carbon stock at Sat Saida during 2022

Carbon Sequestration - Dry weight basis (gm)										
50ha										
Sample	Root	Leaves	Stem	Plant Biomass Below ground	Plant Biomass Above Ground	Total Biomass	Total Biomass Carbon	Total Biomass Carbon (mg/ha)	Total Biomass Carbon (kg/ha)	Carbon equivalent (%)
sample-1	39.80	108.90	48.60	39.80	157.50	197.30	82.87	168325.71	168.33	617.76
sample-2	32.90	80.90	29.60	32.90	110.50	143.40	60.23	122341.14	122.34	448.99
20ha										
sample-1	29.40	80.10	37.70	29.40	117.80	147.20	61.82	125583.09	125.58	460.89
sample-2	24.60	86.40	26.90	24.60	113.30	137.90	57.92	117648.83	117.65	431.77
200ha										
sample-1	22.70	69.30	34.40	22.70	57.10	79.80	33.52	68081.05	68.08	249.86
sample-2	36.10	90.10	43.70	36.10	79.80	115.90	48.68	98879.62	98.88	362.89
300ha										
sample-1	62.80	140.30	69.70	62.80	210.00	272.80	114.58	232738.23	232.74	854.15
sample-2	39.50	93.50	32.90	39.50	126.40	165.90	69.68	141536.92	141.54	519.44
330ha										
sample-1	37.10	64.90	29.40	37.10	94.30	131.40	55.19	112103.38	112.10	411.42
sample-2	34.40	94.60	45.20	34.40	139.80	174.20	73.16	148618.03	148.62	545.43

Table 41. Details of Carbon stock at Kantiyajal during 2022

Dry weight (Gram)				Carbon Sequestration						
150ha										
Sample	Root	leaves	stem	Plant Biomass Below ground	Plant Biomass Above Ground	Total Biomass	Total Biomass Carbon	Total Biomass Carbon (mg/ha)	Total Biomass Carbon (mg/ha)	Carbon equivalent (%)
sample-1	34.29	112.30	52.30	34.29	164.60	198.89	83.53	169682.21	169.68	622.73
sample-3	38.23	124.12	47.30	38.23	171.42	209.65	88.05	178862.06	178.86	656.42
150ha										
sample-1	32.86	115.80	43.70	32.86	159.50	192.36	80.79	164111.16	164.11	602.29
sample-2	35.12	108.30	39.42	35.12	147.72	182.84	76.79	155989.21	155.99	572.48
50ha										
sample-1	21.96	84.62	38.40	21.96	123.02	144.98	60.89	123689.11	123.69	453.94
sample-2	24.30	92.14	29.60	24.30	121.74	146.04	61.34	124593.44	124.59	457.26

Table 42. Details of Carbon stock at Nakti creek during 2022

Dry weight (Gram)				Carbon Sequestration						
50 ha										
Sample	Root	leaves	Stem	Below ground	Above Ground Biomass	Total Biomass	Total Biomass Carbon	Total Biomass Carbon (mg/ha)	Total Biomass Carbon (kg/ha)	Carbon equivalent (%)
Sample-1	37.50	112.96	34.60	37.50	147.56	185.06	77.73	157883.20	157.88	579.43
Sample-2	32.90	98.63	36.94	32.90	135.57	168.47	70.76	143729.51	143.73	527.49
Sample-3	35.64	126.23	28.72	35.64	154.95	190.59	80.05	162601.10	162.60	596.75
100 ha										
Sample-1	32.61	94.35	39.51	32.61	133.86	166.47	69.92	142023.21	142.02	521.23
Sample-2	29.83	103.42	34.26	29.83	137.68	167.51	70.35	142910.49	142.91	524.48
Sample-3	42.30	129.18	31.84	42.30	161.02	203.32	85.39	173461.64	173.46	636.60

9 Phyto-sociological observation

9.1 Halophytes

Halophytes are classified based on their growth conditions as obligate halophytes, facultative halophytes, and habitat-indifferent halophytes. In the present study, four major halophytes were recorded within the selected DPA sites during the survey, viz: *Salicornia brachiata*, *Aeluropus lagopoides*, *Salvadora persica* and *Sesuvium portulacastrum*. Among the halophyte species, *Salicornia brachiata* & *Sesuvium portulacastrum* was found to be equally distributed in Sat Saida bet.

At the plantation site, mangroves associated plants such as *Salvadora* spp and *Ipomea* spp, were found at the high tide level; the halophytes, *Suaeda* spp, *Sesuvium* have also occurred in many sites. During the field visit, several mangroves associated fauna such as mudskippers, bivalves, crabs, gastropods and other fishes were found inside the plantation sites.



Plate 8. Mangrove associated Halophytes

10 Discussion

In the present study, the overall percentage survival of the plants on Sat Saida bet in 5 different blocks was observed between 51.5% to 62.7% at different plot size and in different geophysical condition. This indicates that *A marina* species is capable of adapting to a wide range of salinity variations and substratum types. For germination success, matured seeds should be collected and transported with proper moisture content for plantation. (Clarke and Allaway, 1993; McKee, 1995; McGuinness, 1997; Clarke *et. al.*, 2001). The recruitment and growth of established mangrove seedlings and their survival to the sapling stage are mainly determined by the availability of light and nutrients (Smith, 1987; Ellison and Farnsworth, 1993) and the influence of physicochemical factors (McKee, 1995, Koch and Snedaker 1997) at Nakti creek, survival rate ranges from 40% to 54% at 100 ha and 50ha, respectively. At Kantiyajal creek, *A. marina* plantation survival rate varies from 62% to 75% within 50 ha and 150ha respectively. The survival rate of *R.mucronata* is 63% at 150 ha plantation site. This clearly indicates that *A. marina* tolerates wide ranges of temperature and salinity to withstand in extreme environmental conditions (Das *et al.*, 2019).

The results of the 1400 ha plantation study at Kantiyajal, shows higher survival rate than the Sat saida bet and Nakti creek, this is because of site to site variations in temperature, salinity and rainfall (Das *et. al.* 2019. In the plantation sites, higher survival was reported for *A. marina*, whereas the high rates of survival, for stilt-rooted *Rhizophora* species were planted as propagules as influenced by plant spacing (Kodikara *et. al.*, 2017). The results of the present study are in conformity with the findings that several abiotic and biotic factors, including the local climatic conditions, determine the survival and growth of recruitment classes. It is to be highlighted that the aftercare by the local people and the management is very much important above all for achieving high survival rates of mangrove plantation efforts. The mangrove survival rates are dependent on factors like

- **Biological factors** – mangrove species and infestation of pests (e.g. algae, barnacles, insect larvae)
- **Physical factors** – tidal level and inundation, substrate, waves/typhoons, sedimentation.
- **Human factors** – harvesting of materials for fodder, grazing, fishing gear, management and enforcement.

Well-planned and executed mangrove planting efforts also results in poor survival rate because of a lack of participation by local communities, cultural barriers and adequate after-care (e.g., watering and removal of objects that are entangled with planted individuals) needed for long-term success (Blum and Herr, 2017). In most of the mangrove plantation, poor survival rate, due to restoration projects is often related to the high susceptibility of propagules, seedlings and saplings to wind and wave erosion, flooding and desiccation. The low survival of the recruitment class can be attributed by both the biotic (competition with native and planted vegetation) and abiotic factors (like erratic change in salinity, temperature wave energy and rainfall), site suitability (like high or low inundation, plantation area).

Effective coordination of multiple stakeholders in a given mangrove project was seen to have provided long-term positive impacts for both mangroves and dependent communities. Implementing agencies and community organizers could also contribute to greater success rates if well-trained and equipped by the appropriate environmental specialists (Flint *et al.*, 2018).

Mangrove rehabilitation and restoration are considered one of the most effective management options globally for dealing with lost or damaged mangrove forests (Ellison *et al.*, 2020). Although planting mangroves for restoration and afforestation has been conducted in some regions in Bangladesh (1993) and Vietnam (Hong *et al.*, 1996) are not always successful. Many biotic and abiotic influences, including predation, seed recruitment, soil characteristics, colonization rates, salinity and temperate, can reduce the survival of the mangroves, in both early (e.g., nursery) and late stages of the planting process (Lewis, 2005). Instead, mangrove restoration projects tend to use specific success criteria; for example, mangrove restoration efforts with an 85-90% survival rate after a defined number of years of monitoring are described as successful projects (Walters *et al.*, 2008; Locatelli *et al.*, 2014).

11 Summary

Mangrove formations in the Kachchh coast are predominated by a single species, *i.e.* *A. marina*, with the sporadic occurrence of *R. mucronata* and *C. tagal*. The present study was carried out at Sat Saida bet and Nakti creek in Kandla and at the vicinity of Kantiyajal covering ten blocks to evaluate mangrove plantations carried out in 1400 ha during the period between 2005 to 2019. The major goal of this study was to assess the mangrove plantation survival percentage to assess the carbon sequestration potential of planted mangroves, to understand the ecological issues related to plantation success, and suggest conservation measures. The mangrove plantation was carried out in temporally from 2005 onwards. The plantation work in Sat Saida started from 2005-2006 (20 ha), followed by 200 ha in 2011-2012, 300 ha in 2012-2013, and 330 ha during the 2013-2014. The plantation work in Nakti creek was initiated in year 2008-2009 (50 ha) followed by 100 ha during 2010-2011. In Kantiyajal the plantation work initiated from 2015-2016 (150 ha) followed by 150 ha during 2016-2017 and 100 ha during 2018-2019. Due to the prevalence of high salinity in the region, *A. marina* was the preferred species for plantation. Although, *R. mucronata* and *C. tagal* were also planted in small pockets at Nakti creek, and *R. mucronata* was attempted at Kantiyajal along with *A. marina*. Among the different plantation areas, maximum density and height of plants were observed at Kantiyanjal. However, the survival rate was highest (75%) for *A. marina* plantation in 150 ha planted during 2016-2017 followed by *R. mucronata* plantation at 150 ha in Kantiyanjal (2016-2017), 330 ha of *A. marina* at Sat Saida bet (62.7%) planted during 2013-2014. The lowest survival rate was observed in Nakti creek (40%) within 100 ha area carried out during 2010-2011. In this site, especially multi species plantation activity was carried out using *R. mucronata*, *Ceriops tagal* and *A. marina*. In rest of the blocks, the survival percentage did not reach the minimum expected (67%) despite of the mangrove species planted. Based on the field monitoring and evaluation data, it is advised to prefer nursery bed and direct seed sowing methods to the *Otla* method, since mangrove areas raised through the *Otla* method undergo high mortality rates even when initial survival rates are high.

The soil Total Biomass Carbon of *A. marina* plantation was lowest (42.36t/ha) in Nakti creek 100 ha plot and highest in 200 ha plot of Sat Saida bet (68.17t/ha). Among the three locations, *i.e.* Sat Saida bet, Nakti creek and Kantiyajal, the highest carbon sequestration potential was recorded at Sat Saida Bet.

12 Suggestions and recommendations

The Global Mangrove Alliance (GMA), a coalition of international nature conservation Organizations, has set the ambitious target of restoring 20% of mangroves over the current extent by 2030 (Quarto, 2013; Bayraktarov *et al.*, 2016; Wylie *et al.*, 2016; Kodikara *et al.*, 2017). Based on the data collected during the present and previous field survey, the following recommendations are suggested for current and future plantation activities.

12.1 Management approach

The present study indicates that ten blocks are the most suitable sites for further promoting mangrove plantation activities in Sat Saida Bet, as they have already shown survival success and there was space available for gap filling. The following conservation measures are suggested for the planted mangroves in order to improve their survival and make them a mature mangrove formation over the period of time:

- Appropriate site selection needs to be done.
- Both field observation and high-resolution mapping need to be used as a part of mangrove monitoring, conservation and management efforts.
- Site specific appropriate plantation techniques to be opted considering the hydro-geological features to avoid high mortality among mangrove plant species.
- Watering the nursery bed at some regular intervals with freshwater is required.
- Regular tidal flushing and inundation are to be ensured at the selected mangrove sites.
- Manual removal of algal entanglement and barnacle infestation on mangrove to be done periodically.
- Monitoring of existing mangrove plantation to control human interventions to avoid grazing by livestock.
- Mangrove plantation to be carried out using seed source from nearest area possible
- Restoration of mangroves, where it already exists, to be done instead of creating new plantation sites.
- Appropriate restoration efforts are needed such as deepening and de-silting and widening of canals.

- Normal tidal hydrology should not be disrupted and the availability of water-borne dispersal of seeds should be allowed.
- Awareness and outreach programmes for DPA staff and other stakeholders would strengthen the plantation efforts.
- Multispecies plantation is to be preferred while planning
- Involvement of stakeholder communities from the nearby villages to be initiated.

The most relevant suggestive measures for successful mangrove restoration efforts are described below:

12.2 Identification of suitable sites

By far, site selection within the broader landscape for a plantation is the most important criterion that determines the plantation' success. For successful plantation, it is essential that the existing bio-physical conditions of the coastal landscape in a broader and general manner are to be thoroughly understood.

12.3 Identification of stress factors

It is important that in any conservation efforts, stressors acting on the mangroves are to be identified and removed in order to maintain the ecosystem balance. Mangrove environment will continue to be stable and balanced if there are no external stressors such as change in hydrology, soil, water salinity, pH, soil texture and wave energy. In addition, anthropogenic stress factors such as collection of fodder and other resources, tree felling and other habitat modification activities will severely affect the ecosystem. It would be necessary to find the factors causing stand degradation and scientifically addressing it to remove the stressors allowing mangroves to flourish.

12.4 Bio-physical management

Mostly, micro-topography controls the distribution and wellbeing of mangroves, and physical processes play a dominant role in the formation and functioning of mangrove ecosystem. A list of bio-physical parameters such as the gradient of the intertidal belt, soil nature, number of days of tidal flushing, presence/absence of natural mangroves in the vicinity and availability of adequate intertidal extent are to be considered, and grades should be assigned in a scale of 1 to 10. Duration of tidal flushing, which is influenced by the gradient of the intertidal extent is very essential.

12.5 Community-based management

Involving local people and fishermen living nearby and use their traditional knowledge will render the site selection easier since they are well versed with the local conditions, especially tidal flushing rate. In addition, short term and small-scale feasibility trials could be conducted in order to ascertain the suitability of the site.

To encourage both motivation and engagement, the needs of the community need to be assessed and addressed towards their socioeconomic development for the direct benefit of community members (Flint *et al.*, 2018). Ideally, mangroves within the DPA jurisdiction should be subjected to intense management regime to protect them. It was proven in many instances that involving the stakeholder communities in the surrounding villagers will yield better results in mangrove plantation and restoration activities. Effective coordination of multiple stakeholders in a given mangrove project or programme has provided long-term positive impacts for both mangroves and dependent communities. Though the population in the port surroundings has different livelihood activities, fishermen community could be targeted to involve them in community-based mangrove restoration and management. The community-based organization *i.e.*, Samithi roles and responsibilities with reference to mangrove conservation in their vicinity should be well defined and that would play a vital role in conserving these mangrove patches.

12.6 Physical protection

Physical protection of natural stand is often the best conservation measure that will fetch positive results. Employees of Deendayal port need to be made aware with the environmental and ecological significance of mangroves and other coastal resources within the port limits. Licenses for salt works and other Port allied industries are awarded by port authorities without understanding the ecological and environmental rules and regulations governing them which often lead to legal and environmental bottleneck at a later stage. Short-term awareness programs in a continuous basis to port employees could be conducted by seasoned marine/mangrove ecologists.

13 Future considerations

In all future plantation activities along with *A. marina*, other compatible species like *R. mucronata*, *C. tagal* and *A. corniculatum* which are available at Sat Saida Bet shall be chosen where ever suitable environmental parameters are available during post monsoon season. Further, such efforts would serve to create a seed bank in due course of time which would eventually convert single species stand of *A. marina* into multi-species assemblages. It is suggested that in future plantation activities, nursery raised saplings along with direct dibbling of seeds and propagules should be preferred rather than following the raised bed (*Otla*) method in order to have high survival rate of the plants. Raised bed plantation are to be conducted only on the suitable sites and not everywhere, for which surveys should be conducted before the initiation of plantation activities. Mangrove restoration is possible by enhancing the natural recruitment of propagules and seeds of the species for which the hydrologic manipulation of the mangrove plantation site is to be done so as to retain them in the bottom sediment and germinate. It is necessary to make sure that tidal water inundation is sufficient for the survival of the seedlings. Through appropriate restoration measures, the existing sparse mangroves could be converted into dense patches by regular gap filling and replantation in the already established blocks. The large plants will provide a protective shield for the newly planted or emerging young plants from water currents during the tidal water movements. Thus, it is suggested to carry out restoration activities along with direct plantation to improve mangrove vegetation cover in DPA. Based on the present monitoring results, it is inferred that Sat Saida Bet could be an ideal site for all future mangrove restoration activities with bio-physical amendments such as de-silting existing creeks, joining all the existing minor creeks with one another through modified creek systems. Increased tidal flooding and hydro-period will extend the mangrove formation in this location along with converting sparse mangrove vegetation into dense mangroves over a period of time. Earlier mangrove vegetation analysis studies at Kandla and Tuna mangroves (GUIDE, 2012 and 2015) have clearly indicated that density and addition of younger classes is good enough to become mature trees. To sum up, through sustainable long-term management practices, the mangroves can be made into a fully grown and functional ecosystem with enhanced ecosystem services.

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Annexure -C



GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN

Sector-10-A, Gandhinagar-382 010

Phone : (079) 23226295

Fax : (079) 23232156

Website : www.gpcb.gov.in

By R.P.A.D

In exercise of the power conferred under section-25 of the Water (Prevention and Control of Pollution) Act-1974, under section-21 of the Air (Prevention and Control of Pollution)-1981 and Authorization under rule 6(2) of the Hazardous and Other Waste (Management and Trans boundary) Rules, 2016 framed under the Environmental (Protection) Act-1986.

And whereas Board has received consolidated consent application inward No.176457 dated 22/09/2020 for the Renewal of Consolidated Consent and Authorization (CC&A) of this Board under the provisions / rules of the aforesaid Acts. Consents & Authorization are hereby granted as under:

CONSENTS AND AUTHORISATION:

(Under the provisions /rules of the aforesaid environmental acts)

To,
M/s. Doendayal Port Trust, (New name) (ID-28494)
M/s. Kandla Port Trust, (Old name),
Kandla, A.O Building Gandhidham,
Tal: Gandhidham, Dist: Kutch - 370201

1. Consent Order No. AWH-110594 Date of issue: 08/12/2020.
2. The consents shall be valid upto 21/07/2025 for the use of outlet for the discharge of trade effluent and emission due to operation of industrial plant for manufacturing of the following items/ products:-

Sr. No	Product/Services	Quantity
1	Dry Cargo Handling	26,54,00,000 MT/Month
2.	Liquid Cargo Handling	54,84,00,000 MT/Month
3.	Loading and unloading operation at 13 th Berth	2 MMTPA
4.	Loading and unloading operation at 15 th Berth	2 MMTPA

Subject to specific condition:

1. Unit shall strictly adhere to compliance ministry in its Clearance letter file no. 11-82/2011-IA-III, dated 19/12/2016.
2. Unit shall also strictly adhere to all conditions of Environment and CRZ Clearance issued by MoEF vide letter no F no. 11-70/2006-IA-III dated 01/10/2008.
3. Applicant shall comply with Manufacture, Storage and Import of Hazardous Chemicals Rules-1989 (MSIHC) as amended time to time.
4. Applicant shall ensure that all storage terminal located within DPT area shall strictly comply with MSIHC Rules including site notification & submit details periodically to board with relevant details.
5. Applicant shall renew Public Liability Insurance time to time & submit a copy to this Board.

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ISO - 9001 - 2008 & ISO - 14001 - 2004 Certified Organisation

6. Unit shall notify site under MSIHC Rule-1989 from competent authority as mentioned in schedule-5 of MSIHC Notifications
 7. Industry shall not withdraw groundwater without prior NOC from CGWA as per Hon National Green Tribunal order.
 8. Industry shall manage Solid Wastes generated from industrial activities as per Solid Waste Management Rules-2016 (solid waste as defined in Rule-3(46)).
 9. Industry shall comply with Plastic Waste Management Rules- 2016 and amendments made therein.
 10. Industry shall strictly comply with coal handling guideline of this board
 11. Industry shall provide dedicated storage facility for dry cargos & ensure to take adequate measures to prevent dusting.
 12. Applicant shall ensure that there shall be no damage to the existing mangrove patches near site and also ensure the free flow of water to avoid damage to the mangroves
 - 13 Applicant shall ensure as per EC condition that no creeks or rivers are blocked due to any activities at the site and free flow of water is maintained.
 - 14 Applicant shall provide proper system for collection, storage & treatment & disposal of waste water generated by vessel as per MARPOL & maintain records
 - 15 Applicant shall install storm drainage catch basin to avoid directly discharge into surface water
 - 16 Waste effluent accumulated with port activities including storm water & sewage from port operation including sewage ballast water, bilge water & clean waste water from ships shall be as per MARPOL norms
 17. Applicant shall make separate records regarding generation, collection, transportation & disposal of waste generation from ship & maintain its records
 18. Applicant shall made necessary arrangement for the plastic Waste, Solid Waste or other waste generation due to port activities & for facilitation of reception facilities under MARPOL & Environment (Protection) Act-1986 rules etc.
 19. Ports shall obtain approval of their oil spill contingency plan (OSCP) as required under national oil spill disaster contingency plan (NOS-DCP) of coast guard, ministry of defence, govt. of India.
 - 20 Best environmental practices by ports maybe uploaded on "Indian ports Association" as well as the same maybe linked to websites of CPCB and respective SPCBs.
 - 21 Manually handling of cargo should be converted into mechanized system, in time bound manner.
- 3. Conditions under the Water act-1974:**
- 3.1 Source of Water: - GWIL.
 - 3.2 There shall be no industrial water consumption and waste water generation from manufacturing process and other ancillary operations
 - 3.3 The quantity of the fresh water consumption for domestic purpose shall not exceed 1300 KLD
 - 3.4 The quantity of domestic waste water shall not exceed 800 KLD





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- 3.5 Domestic effluent shall be treated in existing STP & treated effluent conforming to following norms shall be discharged on land within premises strictly for gardening and plantation purpose & no sewage shall be disposed outside premises in any manner

PARAMETERS	PRESCRIBED LIMITS
pH	6.5 to 8.5
BOD (3 days at 27° C)	30 mg/L
Suspended Solid	100 mg/L
Fecal Coli form	< 1000 MPN/ 100 ml

- 3.6 Treated domestic effluent conforming to above norms shall be discharge on land only for gardening & plantation within premises.
- 3.7 Unit shall provide flow meter at inlet & outlet of STP & maintain its record.
- 3.8 Disposal system for storm water shall be provided separately. In no case storm water & sewage from port facility shall not be discharge into surface water.

4. Conditions under the Air Act-1981:

- 4.1 The following shall be used as a fuel in D G. Sets'

Sr. No.	Utility	Fuel	Quantity
1	D G Sets	HSD	500 Lit/Hr

- 4.2 The applicant shall install & operate air pollution control system efficiently in order to achieve prescribed norms.
- 4.3. The flue gas emission through stack attached to D.G. Sets shall conform to the following standards

Sr. No.	Stack attached to	Stack height in Meter	APCM	Parameter	Permissible Limit
1 & 2	DG sets (2 nos.) (1010 KVA)	15 each	--	PM SO ₂ NO _x	150 mg/NM ³ 100 ppm 50 ppm

- 4.4 There shall be no process gas emission from manufacturing process and other ancillary operations.
- 4.5 The concentration of the following parameters in the ambient air within the premises of the industry and a distance of 10meters from the source) other than the stack/vent) shall not exceed the following levels.

Sr. No.	Pollutant	Time Weighted Average	Concentration in Ambient air in µg/M ³
1	Sulphur Dioxide (SO ₂)	Annual 24 Hours	50 80
2	Nitrogen Dioxide (NO ₂)	Annual 24 Hours	40 80
3.	Particulate Matter (Size less than 10 µm) or PM ₁₀	Annual 24 Hours	60 100
4.	Particulate Matter (Size less than 2.5 µm) or PM _{2.5}	Annual 24 Hours	40 60

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- 4.6. The applicant shall provide portholes, ladder, platform etc at chimney(s) for monitoring the air emissions and the same shall be open for inspection to/and for use of Board's staff. The chimney(s) vents attached to various sources of emission shall be designed by numbers such as S-1, S-2, etc. and these shall be painted/displayed to facilitate identification.
- 4.7. The industry shall take adequate measures for control of noise levels from its own sources within the premises so as to maintain ambient air quality standards in respect of noise to less than 75dB(A) during day time and 70 dB (A) during night time. Daytime is reckoned in between 6a.m. and 10 p.m. and nighttime is reckoned between 10 p.m. and 6 a.m.

5. AUTHORIZATION as per HAZARDOUS AND OTHER WASTE (MANAGEMENT AND TRANSBOUNDARY) RULES, 2016 Form-2 [See rule 6 (2)]

Form for grant of authorization for occupier or operator handling Hazardous waste

5.1 Authorization order no:- **AWH-110594** Date of issue: 08/12/2020.

5.2 **Mrs. Kandla Port Trust** is hereby granted an authorization to operate facility for following hazardous wastes on the premises situated at Kandla, A.O Building Gandhidham, Tal Gandhidham, Dist : Kutch

Sr. No.	Waste	Quantity/ Year	Schedule & Category	Facility
1	Used Spent Oil	1125 MT	I-5.1	Collection, Storage, Transportation and disposal by selling to authorized recycler.
2	Waste Residue Containing Oil	3344.43 MT	I-5.2	Collection, Storage, Transportation and disposal by selling to authorized recycler.

5.3 The authorization shall be valid up to **21/07/2025**.

5.4 The authorization is subject to the conditions stated below and such other conditions as may be specified in the rules from time to time under the Environment (Protection) Act-1986

5.5 The authorization is granted to operate a facility for collection, storage within factory premises transportation and ultimate disposal of Hazardous wastes as per condition no 5.2 to the industry having valid CCA of this Board.

5.6 TERMS AND CONDITIONS OF AUTHORISATION

1. The applicant shall comply with the provisions of the Environment (Protection) Act-1986 and the rules made there under
2. The authorization or its renewal shall be produced for inspection at the request of an officer authorized by the Gujarat Pollution Control Board
3. The persons authorized shall not rent, lend, sell, and transfer or otherwise transport the hazardous wastes without obtaining prior permission of the Gujarat Pollution Control Board



Outward No. AWH-110594/2020



GUJARAT POLLUTION CONTROL BOARD

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4. Any unauthorized change in personnel, equipment or working conditions as mentioned in the authorization order by the persons authorized shall constitute a breach of this authorization
5. The person authorized shall implement Emergency Response Procedure (ERP) for which this authorization is being granted considering all site specific possible scenarios such as spillages, leakages, fire etc and their possible impacts and also carry out mock drill in this regard at regular interval of time.
6. The person authorized shall comply with the provisions outlined in the Central Pollution Control Board guidelines on "Implementing Liabilities for Environmental Damages due to Handling and Disposal of Hazardous Wastes and Penalty"
7. It is the duty of the authorized person to take prior permission of the Gujarat Pollution Control Board to close down the facility.
8. An application for the renewal of an authorization shall be made as laid down in rules 6(2) under Hazardous and Other Waste Rules, 2016.
9. The imported hazardous and other wastes shall be fully insured for transit as well as for any accidental occurrence and its clean-up operation
10. The record of consumption and fate of the imported hazardous and other wastes shall be maintained
11. The hazardous and other wastes which gets generated during recycling or reuse or recovery or pre-processing or utilization of imported hazardous or other wastes shall be treated and disposed of as per specific conditions of authorization.
12. The importer or exporter shall bear the cost of import or export and mitigation of damages if any.
13. Any other conditions for compliance as per the Guidelines issued by the Ministry of Environment, Forest and Climate Change or Central Pollution Control Board from time to time.
14. The waste generator shall be totally responsible for (i.e. collection, storage, transportation and ultimate disposal) the wastes generated.
15. Records of waste generation, its management and annual return shall be submitted to Gujarat Pollution Control Board in Form-4 by 30th day of June of every year for the preceding period April to March
16. In case of any accident, details of the same shall be submitted on Form-11 to Gujarat Pollution Control Board
17. As per "Public Liability Insurance Act-91" company shall get Insurance Policy, if applicable.
18. Empty drums and containers of toxic and hazard material shall be treated as per guideline published for "Management & Handling of discarded containers". Records of the same shall be maintained and forwarded to Gujarat Pollution Control Board regularly.
19. In case of transport of hazardous wastes to a facility for (i.e. treatment, storage and disposal) existing in a State other than the State where hazardous wastes are generated, the occupier shall obtain 'No Objection Certificate' from the State Pollution Control Board or Committee of the concerned State or Union Territory Administration where the facility exists.
20. Unit shall take all concrete measures to show tangible results in waste generation, reduction, avoidance, reuse and recycle. Actions taken in this regard shall be submitted within three months and also along with Form-4

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21. Industry shall have to display the relevant information with regards to hazardous waste as indicated in the Hon. Supreme Court's Order in W.P. No.657 of 1995 dated 14th October 2003.
22. Industry shall have to display on-line data outside the main factory gate with regard to quantity and nature of hazardous chemicals being handled in the plant, including wastewater and air emissions and solid hazardous wastes generated within the factory premises.

6. **SPECIFIC CONDITIONS:-**

- 6.1 The authorized actual user of hazardous and other wastes shall maintain records of hazardous and other wastes purchased in a passbook issued by the State Pollution Control Board along with the authorization.
- 6.2 Handling over of the hazardous and other wastes to the authorized actual user shall be only after making the entry in the passbook of the actual user.
- 6.3 In case of renewal of authorization, a self-certified compliance report in respect of effluent, emission standards and the conditions specified in the authorization for hazardous and other wastes shall be submitted to SPCB.
- 6.4 The occupier of the facility shall comply Standard operating procedure/guidelines published by MOEF&CC or CPCB or GPCB from time to time.
- 6.5 Unit shall comply provisions of E-Waste Management Rules-2016.
- 6.6 The disposal of Hazardous Waste shall be carried out as per the waste Management hierarchy.
- 6.7 The occupiers of facilities shall not store the hazardous and other wastes for a period not exceeding ninety days. Prior permission of the Board shall be obtained for extension of the storage period.
- 6.8 The occupier shall maintain the records of generation, sale, storage, transport, recycling, co processing and disposal of hazardous waste and make available during the inspection.
- 6.9 The transportation of the hazardous waste shall be carried out in GPS mounted dedicated vehicles.

7. **GENERAL CONDITIONS:-**

- 7.1 Any change in personnel, equipment or working conditions as mentioned in the consents form/order should immediately be intimated to this Board.
- 7.2 Applicant shall also comply with the general conditions given in annexure I.
- 7.3 Whenever due to accident or other unforeseen act or event, such emissions occur or is apprehended to occur in excess of standards laid down such information shall be forthwith reported to Board, concerned Police Station Office of Directorate of Health Service, Department of Explosives, Inspectorate of Factories and local body.
- 7.4 In case of failure of pollution control equipments, the production process connected to it shall be stopped. Remedial actions/measures shall be implemented immediately to bring entire situation normal.





GUJARAT POLLUTION CONTROL BOARD

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- 7.5 The Environmental Management Unit/Cell shall be setup to ensure implementation on and monitoring of environmental safeguards and other conditions stipulated by statutory authorities. The Environmental Management Cell/Unit shall directly report to the Chief Executive of the organization and shall work as a focal point for internalizing environmental issues. These cells/units also coordinate the exercise of environmental audit and preparation of environmental statements.
- 7.6 The Environmental audit shall be carried out yearly and the environmental statements pertaining to the previous year shall be submitting to this State Board latest by 30th September every year.
- 7.7 The Board reserves the right to review and/or revoke the consent and/or make variations in the conditions, which the Board deems, fit in accordance with Section 27 of the Act.
- 7.8 In case of change of ownership/management the name and address of the new owners/ partners/directors/proprietor should immediately be intimated to the Board
- 7.9 Industry shall have to display the relevant information with regard to hazardous waste as indicated in the Hon. Supreme order in w.p. no. 857 of 1995 dated 14th October 2003.

For and on behalf of
GUJARAT POLLUTION CONTROL BOARD

(Smt. U.K. Upadhyay)
Environment Engineer

NO: GPCB/CCA-Kutch-812(S/ID-28494/
Issued to:
M/s. Deendayal Port Trust, (New name),
M/s. Kandla Port Trust, (Old name),
Kandla, A.O Building Gandhidham,
Tal: Gandhidham, Dist: Kutch - 370 201

Date:-

Outward No:581914,22/01/2021

Clean Gujarat Green Gujarat



GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN

Sector-10-A, Gandhinagar-382 010

Phone : (079) 23226295

Fax : (079) 23232156

Website : www.gpcb.gov.in

By R.P.A.D.

NO: PC/ CCA- KUTCH-812(5)/ GPCB ID: 28494/

Date: -

Correction in Consolidated Consent & Authorization order no AWH-110594 date of issue 22/01/2021 (Under the provisions/rules of Environmental acts)

To,

M/s. Deendayal Port Trust, (New name)

M/s. Kandla Port Trust, (old name),

Kandla, A.O Building Gandhidham,

Tal:-Gandhidham,

Dist: Kutch – 370 201.

Subject : Correction of Consolidated Consent and Authorization (CC&A) of this Board

Reference : 1) CCA issued vide order no. PC/ CCA- KUTCH-812(5)/ GPCB ID: 28494/ 581914 dated 22/01/2021.

2) Your letter dated 25/01/2021.

In exercise of the power conferred under section-27 of the Water (Prevention and Control of Pollution) Act-1974, under section-21 of the Air (Prevention and Control of Pollution)-1981 and Authorization under rule 6(2) of the Hazardous & Other Waste (Management & Transboundary Movement) Rules-2016 & as amended framed under the Environmental (Protection) Act-1986 and without reducing your responsibility under the said Acts/Rules in anyway. The Board had granted CCA vide order no. AWH-110594 dated 22/01/2021

ANDWHEREAS the Board is empowered to amend CCA conditions. Accordingly, considering your request for corrected & after care full consideration, the CCA order no AWH-110594 is hereby corrected/ amended as below;

- 1 The condition no 2 of the said CCA order shall be corrected as below;
- 2 The consent shall be valid upto 21/07/2025 for the use of outlet for the discharge of trade effluent and emission due to operation of industrial plant for manufacturing of the following items/ products:

Sr No.	Product	Quantity
1.	Dry Cargo Handling	26,54,00,000 MT/Month
2.	Liquid Cargo Handling	54,64,00,000 MT/Month
3.	Loading and unloading operation of 13 th and 15 th berth	2 MMTPA(Each)
4.	Loading and unloading operation of 14 th and 16 th berth	4.5 MMTPA (Each)

2. All other terms and condition mentioned in AWH – 110594 issued vide CCA letter PC/ CCA- KUTCH-812(5)/ GPCB ID: 28494/581914 dated 22/01/2021 shall remain unchanged.

For and on behalf of
Gujarat Pollution Control Board

(Smt. U. K. Upadhyay)
Environment Engineer

Clean Gujarat Green Gujarat

Annexure -D

INCEPTION REPORT

for the Project entitled

“Studies on Dredged Materials for the presence of Contaminants”

(As per EC & CRZ Clearance accorded by the MoEF & CC,
Gol dated 19/12/2016- specific condition no. vii)

DPT Work order No. EG/WK/4751/Part (EC&CRZ-1)/84. Dt.18.09.2021

Submitted by

Gujarat Institute of Desert Ecology
P.B. No. 83, Mundra Road
Opp. Changleshwar temple
Bhuj - Kachchh, Gujarat – 370001, India

Submitted to

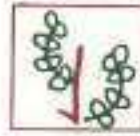
Deendayal Port Trust
Administrative Office Building
Post Box No. 50
Gandhidham (Kachchh)
Gujarat - 370201

Project Team

Project Co-ordinator : Dr. V. Vijay Kumar, Director

S. No	Name & Designation	Role	Background
Scientific Personnel			
1.	Dr. K. Karthikeyan Senior Scientist & Lab Head	Principal Investigator	Ph.D. in Environmental Sciences; 15 years of Research experience in water and soil studies.
2.	Dr. G. Jayanthi Scientist	Co- Investigator	Ph.D in Botany; 9 years of research experience including Post-doctorate
3	Dr. Durga Prasad Behera Project Scientist	Co- Investigator	Ph.D in Marine Biology; 14 years of work experience in Aquaculture, Planktonology studies.
4.	Dr. L. Prabhadevi Advisor	Co- Investigator	Ph.D in Marine Biology; 30 years of experience in Planktonology, Benthic faunal studies.
5.	Dr. Krushnakant Baxi Scientific Officer	Co- Investigator	Ph.D in Zoology; 5 years of research experience in Planktonology and benthic faunal studies
Technical Staff			
6.	Mr. T. Dhananjayan Scientific Assistant	Team Member	M.Sc. in Environmental Sciences; Analytical experience in soil, water analysis
7.	Mr. Hirji Dangar Jr. Scientific Assistant	Team Member	M.Sc. in Environmental Sciences; Experience in soil and water analysis.
8.	Ms. Dipti Parmar Jr. Scientific Assistant	Team member	M.Sc. in Environmental Sciences; Experience in soil and water analysis.

Dr. V. Vijay Kumar
Director



Gujarat Institute
of Desert Ecology

Certificate

This is to state that the **Inception report** of the work entitled, "**Studies on Dredged Material for the presence of contaminants**" has been prepared in line with the Work order issued by DPT vide No. EG/WK/4751/Part (EC & CRZ-1) / 84. Dt.18.09.2021 as per the EC & CRZ Clearance accorded by the MoEF & CC, Govt dated 19/12/2016; Specific Condition No. vii. This work order is for a period of Three years from 2021 – 2024 for the above mentioned study.

This Inception report is for the project period from November 2021 - January 2022.

A handwritten signature in blue ink, appearing to be 'V. Vijay Kumar', written over a circular stamp.

Authorized Signatory

Institute Seal

P. O. Box No. # 83, Opp. Changleshwar Temple, Mundra Road, Bhuj (Kachchh) - 370 001, Gujarat (India)

Tel : 02832 - 235025 Tele / Fax : 235027

www.gujaratdesertecology.com, E-mail : desert_ecology@yahoo.com

1.0. Background

Deendayal Port Trust located in 23° 02' 29.92" N; 70° 13' 08.99" E, Erstwhile called as Kandla Port is one of the largest creek based Ports in India. The port is located in the northwest coast of India in the state of Gujarat and is among the twelve major ports of India is situated at the tail end of Gulf of Kachchh, the western part of Gujarat. The biggest advantage of the location is high semi-diurnal tidal range of 6 to 7 m, which gives adequate draft in the dredged channels of the Port. DPT since its establishment undergoing incessant development and expansion especially in recent times.

The port caters the maritime trade requirement of many hinterland states and is well connected by the network of rail and road and serves as a gate way port for export and import of northern and western Indian states of Jammu & Kashmir, Delhi, Punjab, Himachal Pradesh, Haryana, Rajasthan, Gujarat and parts of Madhya Pradesh, Uttaranchal and Uttar Pradesh. About 35% of the country's total export takes place through the ports of Gujarat in which the contribution by Deendayal port is considerable. The port handled a total cargo of **105 MMTPA during 2016-17, 110 MMTPA during 2017-18, 115 MMTPA during 2018-19, 122.5 MMTPA during 2019-2020 and 117.5 MMTPA during 2020-21**. Further, a regular expansion of infrastructure and port facilities is under way to cater future logistic requirements.

DPT has taken up Development of 7 Integrated facilities, and the Ministry of Environment, Forest and Climate Change (MoEF & CC), has put up some conditions while according Environmental and CRZ clearance. One of the conditions is to carry out the "*Study on Dredged Material for presence of contaminants*" as accorded by the MoEF&CC, GoI dated 19/12/2016 - Specific condition no. vii)" which states that "***Dredged materials should be analyzed for presence of contaminants and also to decide the disposal options. Monitoring of dredging activities should be conducted and the findings should be shared with the Gujarat SPCB and Regional Office of the Ministry***".

1.0. Need of the study

GUIDE has opined that since multi-purpose terminal project at Tuna Tekra and oil jetty bunkering projects are yet to be initiated which involve considerable dredging and further, in addition to this, maintenance dredging which is a continuous process at Deendayal port creek systems given the heavy sedimentation at this part of Gulf of Kachchh. Considering these

factors and the arid nature of Kachchh, the study is conducted since November 2017 by Gujarat Institute of Desert Ecology (GUIDE), Bhuj to understand the contaminant load.

This study on evaluation of dredging contamination will be carried out Three times in a year at Three specified locations by employing the methodical investigation of evaluating physical, chemical and biological characteristics of the dredged materials with special reference to pollutants, nutrients and other factors. Further, the study will envisage the evaluation of physico-chemical constituents in the dredged materials in the dumped locations in the study area. GUIDE has received the Work order for this Dredging project with project time period being Three years (01.11.2021 – 31.10.2024).

This Inception report is prepared considering the 3 months of work activity in the project (01.11.2021 – 31.01.2022). The present project is designed considering the scope of work given in the EC conditions with the specific objectives as detailed below:

2.0.Scope of Study

1. To monitor the three locations where dredged materials are dumped will be conducted.
2. Dredged materials in the area will be analyzed for the presence of contaminants in three different locations.
3. Detailed assessment of the dredged materials for physical, chemical and biological characteristics will be studied.
4. Suggesting suitable options for the management of dredged material will be elaborated in the Final report.

Table 1: Locations of earlier sampling (2020-21)

Station	Latitude (N)	Longitude (E)
Location 1 (Offshore)	22° 51' 00" N	70° 10' 00" E
Location 2 (Phang creek)	23° 04' 28" N	70°13' 28" E
Location 3 (Cargo jetty)	22°56' 31" N	70 13' 00" E
Only during Season 3		

Figure 1: Map showing locations of earlier sampling (2020-21)



C

3.0. Findings of the study conducted during last year (2020-21)

The study is being conducted since 2017 and it was continuing upto 2021. From the recent study conducted in 2020-21, it is understood that the concentration of Total Organic Carbon and Petroleum hydrocarbon was recorded lower than the previously reported values in 2018-2019 and the concentration of some of the heavy metals such as Nickel, Lead, Cadmium, and Copper was registered at a moderate concentrations whereas the toxic metal Chromium was observed at a lower concentration when compared with the data of the previous years, *i.e.* 2018-19 & 2019-20.

When the macrobenthic faunal species of the sediment samples are concerned, it was observed that there is No significant variation in terms of benthic faunal distribution and population density, whereas comparing the previous studies conducted elsewhere the distribution and diversity of macrobenthic fauna in DPT port are quite low with the grade of low to moderate level.

When the bottom water samples collected from the disposal areas are concerned, especially with reference to planktonic community structure, it was found that the phytoplankton density in all the control location is quite satisfactory in comparison to the dumping locations and that might be attributed due to the effect of high suspended load of the dumping grounds. Similarly, the zooplankton density and composition in these three seasonal study indicated the zooplankton faunal distribution and diversity was moderate distribution during the year 2020-21. The recent study conducted in 2020-21 clearly indicates that salinity, turbidity and total suspended solids are the limiting factors to influence the abundance and distribution of plankton in the offshore and creek systems of Kandla region.

Hence, considering the data obtained in the previous years, especially the recent data obtained in 2021, it is evident that the moderate level biological community structure of the water and sediment was observed during this study similar to previous years. Hence regular monitoring of the sediment matrix and water column of these dumping locations is much essential to understand the health of this systems and also to derive suitable management plans to alleviate the health of this environment from the dredging impacts.

4.0. Selection of sampling locations for 2021-22 study

The study on the presence of contaminants in the dredged materials for the year 2021-22 was planned by considering the location details as provided to DPT by Hydraulic & Dredging Division regarding location of dumping ground and the details has been shared to GUIDE by DPT in the e-mail dated 24 October 2018.

Table 2: Locations of proposed sampling (2021-2022)

Station	Latitude (N)	Longitude (E)
Location 1 (Offshore)	22° 51' 00" N	70° 10' 00" E
Location 2 (Phang creek)	23° 04' 28" N	70° 13' 28" E
Location 3 (Cargo jetty)	22° 56' 31" N	70 13' 00" E

5.0. Details of work planned for the 1st Quarter (November 2021 to January 2022)

6.1. General work

In this Phase I of the study, *i.e.*, 1st Quarter, the project team will be involved in collection of review of literatures from reputed sources including the technical reports to ensure the technical aspects are covered of the work. Further, based on the objectives of the study, the team will be involved in procurement of consumables related to the sampling part of the project and also for the analytical work.

In order to collect the samples from the pre-designated sites, the team will approach the Authorities of The Customs Office, Central Industrial Security Force Unit of DPT, Kandla and the Marine Police of Kandla through proper channel for according permission regarding sampling for the entire team. Based on the permission accorded by the authorities, the field work will be conducted and the sampling will be undertaken as per the standard procedures.

Table 3: Timeline - Organization of Work Elements

Project Activities	Period			
	Nov'21 – Jan'22	Feb'22 – Apr'22	May'22 – July'22	Aug'22 – Oct'22
<ul style="list-style-type: none"> • Review of scientific literature related to work • Permission related to field work • Purchase of consumables and miscellaneous related to the project • Planning and orientation of objectives • Conducting 1st season sampling (winter) 				
<ul style="list-style-type: none"> • Processing and analysis of samples • Submission of 1st season report • Conducting 2nd season sampling (summer) 				
<ul style="list-style-type: none"> • Processing and analysis of samples • Submission of 2nd season report • Conducting 3rd season sampling (monsoon) • Processing and analysis of samples 				
<ul style="list-style-type: none"> • Submission of 3rd season report • Submission of Draft report • Submission of Final report 				

Figure 2: Locations of the proposed sampling as per the information provided by DPT

TCE-10343A-CV-280-GCC-01-R5	<p style="text-align: center;">TATA CONSULTING ENGINEERS LIMITED</p> <p style="text-align: center;">FINAL TENDER DOCUMENT FOR DREDGING AT</p> <p style="text-align: center;">KANDLA PORT TRUST</p>	SHEET 129 OF 210
<p>6.15 <u>Monitoring of the Dredging Process</u></p> <p>The Contractor shall for the purpose of ensuring that the Work is executed as per schedule and with a view to control and verification of operations, ensure continuous monitoring and recording of the dredging process. The Contractor shall provide at its own expense, the electronic dredger positioning and control systems including necessary instrumentation, sensors, calibration, data storage and displays and shall ensure the continuous operations thereof. The Contractor shall daily make available to the Engineer the data collected by the Contractor fully decoded and processed, and the same shall at all times be open for inspection by the Engineer or his representatives. The Contractor shall allow the Engineer or his representative to check the data/ dredging process onboard on request/ whenever required.</p> <p>The Contractor shall provide/submit the DLM prints, track charts to the engineer everyday showing the areas where dredging operations are carried out including the areas where dredged material is disposed off. All data and evaluation thereof made available by the Contractor to the Employer shall remain in the custody of the Employer.</p> <p>6.16 <u>Deposition of Dredged Soil</u></p> <p>All the soil and other dredged material excavated by the Contractor under this Contract shall be deemed to be the property of the Employer and deemed to belong to the Employer and shall be disposed off only in such manner as directed by the Employer. The dredged material from the proposed dredging work shall be disposed at the specified disposal grounds as explained below:</p> <ol style="list-style-type: none"> (a) The dredged material from the maintenance dredging of Navigational channel shall be disposed off within 1 km radius of the location at Latitude 22° 51' 00" N and Longitude 70° 10' 00" E (b) The dredged material from the Capital dredging of Oil Jetty no. 1 (if any) and Oil Jetty no. 7 shall be disposed off within 150 m radius of the location at Latitude 23° 04' 28" N and Longitude 70° 13' 28" E (c) The dredged material from the Maintenance dredging of Oil Jetty no. 1 (if any) and Oil Jetty no. 7 shall be disposed off within 150 m radius of the location at Latitude 22° 51' 00" N and Longitude 70° 10' 00" E (d) The dredged material from the dredging at Cargo Jetties and Kandla Creek shall be disposed off within 150 m radius of the location at Latitude 22° 56' 31" N and Longitude 70° 13' 00" E (in the inshore channel) <p>The position of the dumping ground is indicative in nature and subject to variation as per physical conditions and morphological changes. Therefore the Employer/Engineer reserves the right to relocate the dumping grounds at any other places approximately within the haulage distances involved in the dumping ground indicated above. Any change in the location of the dumping Site shall not entitle the Contractor to make any claim against the employer either for extra time or money. The Contractor shall ensure that no soil is dumped beyond or outside the dumping areas. In the event it is noticed by or brought to the notice of the Engineer or Engineer-in-charge or Engineer's Representatives that the contractor is dumping</p>		



6.2. Technical work (sampling and analysis)

The entire duration of the project will focus on collecting marine water and bottom sediment samples from three pre-designated locations on a seasonal basis covering winter, summer and monsoon in a year. A total of 18 bottom sediment samples and 18 Surface water and 18 bottom water samples from three locations, *i.e.* two Offshore locations and one from the creek system will be collected. In each site, one sediment sample and two water samples (Surface and bottom) will be collected using standard methodical procedures.

The water samples collected will be stored in a sterile, polythene bottles and ziplock bags in an icebox to maintain suitable conditions till it is brought to the Laboratory and the water samples will be stored at 4°C. The bottom water samples will be collected using Niskin sub-surface sampler. As per the standard protocol, the fixatives and preservatives will be added to the samples in case of parameters (Table 4) such as Dissolved Oxygen, Chemical Oxygen Demand and preservation using nitric acid for heavy metals. In case of biological characteristics, the marine water samples for planktonic analysis will be preserved using formalin.

When sediment sample collection is concerned, the same will be collected in prefixed stations using a Van-Veen type of grab sampler and the samples will be preserved with Rose Bengal and formalin to avoid decomposition of samples. Further, the sediment samples will be air dried and used for further analysis for the parameters (Table 5). In general, the planning and orientation of the objectives of the project will be made during this period (1st Quarter).

Table 4: Physico-chemical and biological characteristics of marine water samples

S. No	Parameters
1	Temperature
2	pH
3	Salinity
4	Total Dissolved Solids
5	Turbidity
6	Dissolved Oxygen
7	Bio-Chemical Oxygen Demand
8	Phenolic Compounds
9	Petroleum Hydrocarbons
10	Oil and grease
11	Cadmium
12	Lead
13	Mercury
14	Chromium
15	Copper
16	Cobalt
17	Nickel
18	Zinc
19	Magnesium
20	Manganese
21	Chlorophyll
22	Phaeophytin
23	Phytoplankton (Phytoplankton cell counts (no/L); Total Genera (no.); Major Genera
24	Zooplankton (Biomass (ml/100m ³); Population (no/100m ³); Total Group (no.) Major Groups

6.3. Methodology for water sample analysis

6.3.1. pH and Temperature

A Thermo fisher pH / EC / Temperature meter was used for pH and Temperature measurements. The instrument was calibrated with standard buffers just before use.

6.3.2. Salinity

A suitable volume of the sample was titrated against silver nitrate (20 g/l) with potassium chromate as an indicator. The chlorinity is estimated and from that salinity values were derived using formula.

6.3.3. Total Dissolved Solids (TDS)

The samples were subjected for gravimetric procedure for confirmation of the readings obtained from the hand held meter. About 100 ml of the water sample was taken in a beaker and filtered which was then dried totally in a Hot Air Oven (105°C). TDS values were calculated using the difference in the initial and final weight.

6.3.4. Turbidity

The sample tube (Nephelometric cuvette) was filled with distilled water and placed in the sample holder. The lid of the sample compartment was closed. By adjusting the 'SET ZERO' knob, the meter reading was adjusted to read zero. The sample tube with distilled water was removed and the 40 NTU standard solution was filled in the tube and the meter reading was set to read 100. Other standards were also run. The turbidity of the marine water sample was then found out by filling the sample tube with the sample, and the reading was noted.

6.3.5. Dissolved Oxygen (DO) and Biochemical Oxygen Demand (BOD)

Dissolved Oxygen was determined by Winkler's method. For the determination of BOD, direct unseeded method was employed. The sample was filled in a BOD bottle in the field and incubated in the laboratory for 3 days after which DO was again determined and the difference was calculated.

6.3.6. Phenolic compounds

Phenols in water (500 ml) were converted to an orange coloured antipyrine complex by adding 4-aminoantipyrine. The complex was extracted in chloroform (25 ml) and the absorbance was measured at 460 nm using phenol as a standard.

6.3.7. Petroleum Hydrocarbons (PHc)

Water sample (1 l) was extracted with hexane and the organic layer was separated, dried over anhydrous sulphate and reduced to 10 ml at 30°C under low pressure. Fluorescence of the extract was measured at 360 nm (excitation at 310 nm) with Saudi Arabian crude residue as a standard. The residue was obtained by evaporating lighter fractions of the crude oil at 120°C.

6.3.8. Oil and Grease

About 500 ml of sample was transferred to the separating funnel and sample bottle was carefully rinsed with 30ml of trichlorotrifluoroethane and add the solvent washings was added to the separating funnel. To this, 5ml of 1:1 HCL was added and shaken vigorously for about 2 minutes If soluble emulsion was formed, then the sample container was shaken for 5 to 10 minutes. Then the layers were allowed to separate and the lower layer (organic layer) was discarded from separating funnel. Then the solvent layer was drained through a funnel containing solvent moistened filter paper into a clean pre weight distillation flask. Then solvent was distilled from distillation flask over a water bath at 70 °C. Then the residue was transferred using minimum quantity of solvent into a clean pre weighed dried beaker and the beaker was placed on water bath for 15 minutes at 70 °C and evaporate off all the solvent and it was cooled in desiccators for 30 minutes and weight was taken.

6.3.9. Heavy metals

Heavy metals are of concern especially as it relates to the environment are Cadmium (Cd), Lead (Pb), Mercury (Hg), Chromium (Cr), Arsenic (As), Copper (Cu), Cobalt (Co), Nickel (Ni), Zinc (Zn), Magnesium (Mg) etc. For the release of mineral elements from soil and sediments, wet oxidation of samples are generally performed. Wet oxidation employs oxidizing acids (Tri / Di-acid mixtures).

Soil sample will be weighed to 0.5 gm and taken in 100ml beaker covered with a watch glass and 12 ml of Aqua regia in (1: 3 HNO₃ : HCl) will be added and the beaker will be kept in

digestion for 3 hours at 100°C on a hot plate using sand bath and the samples will be evaporated to near dryness and the samples will be kept cool for 5 mins and then 20 ml of 2% nitric acid will be added and kept for 15 minutes in hot plate for digestion and remove from hot plate and cooled and filtered using Whatmann No. 42 mm filter paper and then the final make up to 50 ml with 2 % nitric acid will be made. The extracted sample will be then aspirated to an AAS.

6.3.10. Estimation of Chlorophyll and Phaeophytin

Phytoplankton (Chlorophyll a) pigment which is responsible for synthesizing the energy for metabolic activities of phytoplankton through the process of photosynthesis in CO₂ is used and O₂ is released is an essential part to understand the consequence of pollutants due to release in the system. To estimate this, known volume of water (500 ml) was filtered through a 0.45 µm Millipore Glass filter paper and the pigments retained on the filter paper were extracted in 90% acetone. For the estimation of chlorophyll a and phaeophytin the fluorescence of the acetone extract was measured using Fluorometer (Turner Design) before and after treatment with dilute acid (0.1N HCL).

6.3.11. Phytoplankton sampling and analysis

Phytoplankton samples were collected in the ten prefixed sampling sites using standard plankton net with a mesh size of 51 µm. Plankton nets are with a square mouth covering an area of 0.900 cm² (30cm square mouth) fitted with a flow meter (Hydrobios). Nets were towed from a moving boat for 10 minutes and the plankton adhering to the net was concentrated in the net bucket. Plankton soup from the net bucket was transferred to a pre-cleaned and rinsed container and preserved with 5% neutralized formaldehyde. The containers were appropriately labelled. The initial and final flow meter reading was noted down for calculating the amount of water filtered to estimate plankton density. As per flow meter reading, a total amount of 165 m³ of water was filtered by the net. One liter of water was separately collected for density estimation to counter check density estimation obtained by the flow meter reading. Quantitative analysis of phytoplankton (cell count) was carried out using a sedge wick-Rafter counting chamber. One ml of soup added to a Sedgwick counting chamber was observed under an inverted compound microscope. The number of cells present in individual cells of the counting chambers (1/1000) was noted and identified up to a generic

level. Several observations were fixed to represent the entire quantity of the soup (generally more than 30 times) and the recorded data were used to calculate the density (No/l) using the formula, $N = n \times v / V$ (where N is the total no/l; n is an average number of cells in 1 ml; v is the volume of concentrate; V is the total volume of water filtered). The phytoplankton diversity richness and evenness were past software.

6.3.12. Zooplankton sampling and analysis

The present investigation was carried out in the three sampling locations such as offshore dredging, cargo jetty and Phang creek dumping site during December 2020 to August 2021 for three sampling seasons. In each location five replicate samples and one control samples were collected. Zooplankton samples were collected using a standard zooplankton net with a mouth area of 0.25 m² fitted with a flow meter. The net was towed from a boat for 5 min with a constant boat speed of 2 nautical miles per hour. The initial and final reading in the flow meter was noted down and the soup collected in the plankton bucket was transferred to appropriately labeled container and preserved with 5% neutralized formaldehyde. To counter-check the zooplankton density values obtained, water samples of 100 L were collected and preserved, which was later analysed for zooplankton density. One ml of the zooplankton soup was added to a Sedgwick counting chamber and was observed under a compound microscope. The group/taxa were identified using standard identification keys and their number was counted. Random cells in the counting chamber were taken for consideration and the number of zooplankton was noted down along with their binomial name. This was repeated for five 1 ml samples and the average value was considered for the final calculation. For greater accuracy, the final density values were counter-checked and compared with the data collected by the settlement method. Univariate measures [Shannon-Wiener diversity index (H'), Margalef's species richness (d), and Pielou's evenness (J'), Simpson dominance (D)] were determined using past software.

Table 5: Physico-chemical and biological characteristics of sediment samples

S. No	Parameters
1	pH (1: 10 suspension)
2	Salinity
3	Petroleum Hydrocarbon
4	Cadmium
5	Lead
6	Mercury
7	Chromium
8	Copper
9	Cobalt
10	Nickel
11	Zinc
12	Magnesium
13	Manganese
14	Sand (%)
	Silt (%)
	Clay (%)
15	Total organic carbon
16	Organic matter
17	Sulphur
18	Macrobenthos Biomass (g/m ² , wet wt) Population (no/m ²) Total Group (no.) Major Groups

The detailed methodology of the mentioned parameters is described as follows:

6.4. Methodology for sediment analysis

6.4.1. pH / Salinity (1: 10 suspension)

pH of the soil is the measure of H⁺ ion activity of the soil water system. It indicates whether the soil is acidic, neutral or alkaline in nature. Since ions are the carrier of electricity, the electrical conductivity (EC) of the soil water system rises according to the content of soluble salts. The measurement of EC can be directly related to soluble salts concentration of the soil at any particular temperature. Ten gram of the finely sieved soil will be dissolved in 100ml of water to prepare a leachate. This will be subjected to vigorous shaking using a rotator shaker for 1 hour to facilitate proper homogenization of the suspension. The suspension will be allowed to settle for two 2 hours and the supernatant after filtration will be used for the analysis of pH and salinity using the pH and EC meter (Make: Systronics 361) and Refractometer (Make: Atago). Each sample will be analyzed in triplicates and the mean values will be taken into consideration.

6.4.2 Textural analysis (Sand/Silt/Clay)

Sediments will be collected using Van Veen grab whereas intertidal sediments will be collected using a handheld shovel. After collection, the scooped samples will be transferred to polythene bags, labeled and stored under refrigerated conditions. The sediment samples will be thawed, oven dried at 40C and ground to a fine powder before analyses.

For texture analysis, specified unit of sediment samples will be sieved using sieves of different mesh size as per Unified Soil Classification System (USCS). Cumulative weight retained in each sieve will be calculated starting from the largest sieve size and adding subsequent sediment weights from the smaller size sieves. The percent retained will be calculated from the weight retained and the total weight of the sample. The cumulative percent will be calculated by sequentially subtracting percent retained from 100%.

6.4.3. Total organic carbon

Total organic carbon is the carbon stored in soil organic matter which enters the soil through the decomposition of plant and animal residues, root exudates, living and dead microorganisms, soil biota etc. Total Organic carbon in the soil is oxidized with potassium dichromate in the presence of concentrated sulphuric acid. Potassium dichromate produces

nascent oxygen, which combines with the carbon of organic matter to produce CO₂. The excess volume of K₂Cr₂O₇ is titrated against the standard solution of ferrous ammonium Sulphate in presence of H₃PO₄ using Ferroin indicator to detect the first appearance of unoxidised ferrous iron and thus volume of K₂Cr₂O₇ can be found out which is actually required to oxidize organic carbon.

Procedure

Percentage of Total organic carbon in the soil/sediment will be determined by oxidizing organic matter in the soil samples by chromic acid and estimating excess chromic acid by titrating it against ferrous ammonium sulphate with ferroin as an indicator. The detailed step-by-step procedure is as follows:

One gm of 0.5 mm sieved soil will be weighed and put into 500 ml conical flask and to which 10 ml of K₂Cr₂O₇ will be added with pipette and swirled. Immediately using a burette, 20 ml Conc. H₂SO₄ will be added and mixed gently until soil and reagents are mixed. The reaction will be allowed to proceed for 30 min in a marble stone to avoid the damage caused due to release of intense heat due to reaction of sulphuric acid. Further, 200 ml of distilled water will be added slowly and 10 ml of concentrated Orthophosphoric acid and about 0.2 gm NaF will be added and allowed the sample and reagent mixture to stand for 1.5 hrs because the titration end point is better visible in a cooled solution. One ml of ferroin indicator will be added into the conical flask just before the titration and then titrated the excess K₂Cr₂O with 0.5 N Ferrous Ammonium Sulphate till the color flashes from yellowish green to greenish and finally brownish red at the end point. Simultaneously a blank test will be also run without soil sample.

Calculation

% Organic carbon = $(B - S) \times N \times 0.003 \times 100 / \text{weight of soil}$

Where,

- B = ml of std. 0.5 N ferrous ammonium sulphate required for blank.
- S = ml of std. 0.5 N ferrous ammonium sulphate required for soil sample.
- N = Normality of std. ferrous ammonium sulphate (0.5N).

6.4.4. Heavy metals

Heavy metals are of concern especially as it relates to the environment are Cadmium (Cd), Lead (Pb), Mercury (Hg), Chromium (Cr), Nickel (Ni), Cobalt (Co), Arsenic (As), Copper (Cu), Zinc (Zn), Manganese (Mn) etc. For the release of mineral elements from soil and sediments, wet oxidation of samples are generally performed. Wet oxidation employs oxidizing acids (Tri / Di-acid mixtures).

Soil sample will be weighed to 0.5 gm and taken in 100ml beaker covered with a watch glass and 12 ml of Aqua regia in (1: 3 HNO₃ : HCl) will be added and the beaker will be kept in digestion for 3 hours at 100°C on a hot plate using sand bath and the samples will be evaporated to near dryness and the samples will be kept cool for 5 mins and then 20 ml of 2% nitric acid will be added and kept for 15 minutes in hot plate for digestion and remove from hot plate and cooled and filtered using Whatmann No. 42 mm filter paper and then the final make up to 50 ml with 2 % nitric acid will be made. The extracted sample will be then aspirated to an AAS

Calculation

$$\text{Heavy metals (mg/Kg)} = \frac{\text{Concentration (ppm)} \times \text{total volume of extraction}}{\text{Weight of soil (gm)}}$$

6.4.5. Petroleum Hydrocarbons

Sediment after refluxing with KOH-methanol mixture will be extracted with hexane. After removal of excess hexane, the residue will be subjected to clean-up procedure by silica gel column chromatography. The hydrocarbon content will be then estimated by measuring the fluorescence as per standard method.

6.4.6. Sulphur

Sulphur in the sediment extract was estimated turbidimetrically using a spectrophotometer. The standards of sulphur was prepared in series such as 2, 4, 6, 8 and 10 ppm working solution from stock solution. In this, 25ml of solution was added in the volumetric flask separately to each flask and 2.5 ml of conditioning reagent solution was also added followed by 5 ml of extraction solution was added. To this mixture, 0.2-0.3 gm of barium chloride was also added

and shaken well and made up to 25 ml with distilled water and the readings were taken at 340nm spectrophotometer.

The sample was analyzed by taking 5g of marine sediment into a 100ml conical flask, to which, 25 ml of 0.15 % CaCl₂ solution was added and shaken for 30 minutes. Then this was filtered through Whatman no. 42 filter paper and then 5 ml of sample aliquot was taken in a 25 volumetric flask, to which 2.5 ml of conditioning reagent and 0.2 to 0.3 g of barium chloride powder was added and made up to 25 ml distilled water and shaken well for 2 minutes and the absorbance was read in the same manner as standard solutions.

6.4.7. Biological characteristics (Macrobenthos)

The collected sediment sample will be sieved through a 0.5 mm mesh and retained animals will be preserved in 5% buffered formaldehyde Rose Bengal. Prior to sorting (identification), wet weight of each sample will be determined using a mono-pan electronic balance. The biomass (wet weight) will be estimated and expressed as gm m². The macrobenthic organisms will be separated in to different taxonomic groups for further identification. All the taxa will be identified to their specific, generic or other higher levels to the extent possible with the help of standard taxonomic references (Polychaeta - Fauvel, 1953; Day, 1967; Decapoda: Alcock, 1985; FAO Species Catalogue, 1991; Sethuramalingam and Ajmal Khan, 1992; Jayabaskaran, et al., 1999). Mollusca species will be identified through the following references (Satyamurty, 1952; 1956; Cernohorsky, 1967, 1972a & 1972b, Abbott and Dance, 1982; Oliver, 1984; Subba Rao *et al.*, 1991 & 1992; Apte, 1998).

Annexure -E

ENVIRONMENT MONITORING REPORT OF DEENDAYAL PORT AUTHORITY

(Annual Report)

(March 2021 to February 2022)

(Report No-DCPL/DPA (19-22)/AMR/21-22/02)



Submitted to



Deendayal Port Authority



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1. Introduction

The environmental Monitoring plan is the key document in the environmental management system and sets out the detailed targets, objectives and procedures that will be adopted in order to achieve the goals set out in the environmental policy. EMP document is a collation of background information relevant to the Kandla Port Environmental Management and Monitoring Plan (EMMP).

1.1 The Environment (Protection) Act, 1986

The EPA 1986 came into force in all of India in November of 1986, under an official notification. The Act contains 26 sections divided into 4 chapters. The Act has its genesis in Indian Constitution's Article 48(A) and Article 51 (A)g. The Act is a part of Article 253 of the Indian Constitution.

The rules of Environment protection came into force on 19th November 1986 and these rules provide for the following:

- The standards of quality of air, soil and water for various areas and purposes of environment.
- The standard set up to know about the limits of the environmental pollutants.
- Rules include the procedure and safeguards needed to handle the hazardous substance.
- Restrictions and some prohibitions on handling the hazardous substances in different areas and premise
- The procedures and safeguards required for the prevention of accidents which may cause environmental pollution and also the remedies for it.
- The prohibition and restrictions possessed on the location of industries in different areas.

1.2 EIA and CRZ Notification

The Ministry of Environment, Forests & Climate Change (MoEF & CC), Government of India, exercising the powers conferred upon it under the provisions of the Environment (Protection) Act, 1986, issued the Environment Impact Assessment Notification, 2006 and its subsequent amendments.

1.2.1 EIA Notification

The basic objective of the Environment Impact Assessment is to identify, predict, mitigate and communicate the possible impacts due to the proposed project to the Government authority and people likely to be affected and incorporate the conditions for construction, operation, maintenance and waste disposal phases of the project to mitigate the negative (adverse) impacts and enhance the positive impacts for the sustainable development of the region.

Environmental Impact Notification S.O.1533 (E), dtd.14th September 2006 as amended 2009, issued under Environment (Protection) Act 1986, has made it mandatory to obtain prior environmental clearance (EC) for scheduled development projects. The notification has classified projects under two categories A & B. Category A projects (including expansion and modernization of existing projects) require clearance from The Ministry of Environment, Forests & Climate Change (MoEF & CC), Govt. of India (Gol) and for category B from State Environmental Impact Assessment Authority (SEIAA), constituted by Govt. of India.

Some important features of the said Notification are:

- I. Prior Environmental Clearance (EC) is required by all new projects or activities listed in the Schedule of the EIA Notification 2006 and subsequent amendments thereafter. EC are required before Commencement of any construction work or preparation of land by the project management.
- II. Prior EC is also required by the existing projects or activities if its capacity is likely to exceed the threshold limit mentioned in the said Schedule.
- III. All category B projects where general condition does not apply, the project proponents are required to apply to the SEAC who will hear the case according to the procedure laid down in the EIA notification and

based on whose recommendation, EC may be granted or rejected by the SEIAA.

IV. For all category A projects and also category B projects where general condition applies, the project proponents are required to apply directly to The Ministry of Environment, Forests & Climate Change (MoEF & CC), Government of India, who would consider the project for grant or rejection of the EC based on the recommendation of the Expert Appraisal Committee at the central level.

V. If projects attract CRZ clearance, then clearance under CRZ rules is also required.

1.2.2. Coastal Regulation Zone (CRZ)

The Union Cabinet approved the Coastal Regulation Zone (CRZ) Notification, 2018 which were last reviewed and issued in 2011. The notification was released after a series of representations received by the Ministry of Environment, Forest & Climate Change (MoEF&CC) from various Coastal States/UTs for a comprehensive review of the provisions of the CRZ Notification, 2011.

1.2.2.1. Classification of CRZ

For the purpose of conserving and protecting the coastal areas and marine waters, the CRZ area shall be classified as follows, namely:-

CRZ-I A

CRZ-I A shall constitute the ecologically sensitive areas (ESAs) and the geomorphologic features which play a role in maintaining the integrity of the coast viz.: Mangroves, corals, biologically active mudflats, Marine national parks, turtle nesting grounds etc.

CRZ-I B

The intertidal zone i.e. the area between Low Tide Line and High Tide Line shall constitute the CRZ-IB.

CRZ-II

CRZ-II shall constitute the developed land areas up to or close to the shoreline, within the existing municipal limits or in other existing legally designated urban areas, which are substantially built-up with a ratio of built-up plots to that of total plots being more than 50 per cent and have been provided with drainage and approach roads and other infrastructural facilities, such as water supply, sewerage mains, etc.

CRZ-III

Land areas that are relatively undisturbed (viz. rural areas, etc.) and those which do not fall under CRZ-II, shall constitute CRZ-III, and CRZ-III shall be further classified into following categories:-

CRZ-III A

Such densely populated CRZ-III areas, where the population density is more than 2161 per square kilometer as per 2011 census base, shall be designated as CRZ-III A and in CRZ-III A, area up to 50 meters from the HTL on the landward side shall be earmarked as the "No Development Zone (NDZ)", provided the CZMP as per this notification, framed with due consultative process, have been approved, failing which, a NDZ of 200 meters shall continue to apply.

CRZ-III B

All other CRZ-III areas with population density of less than 2161 per square kilometer, as per 2011 census base, shall be designated as CRZ-III B and in CRZ-III B, the area up to 200 meters from the HTL on the landward side shall be earmarked as the "No Development Zone (NDZ)".

Land area up to 50 meters from the HTL, or width of the creek whichever is less, along the tidal influenced water bodies in the CRZ III, shall also be earmarked as the NDZ in CRZ III.

CRZ-IV

The CRZ-IV shall constitute the water area and shall be further classified as under:

CRZ-IV A

The water area and the sea bed area between the Low Tide Line up to twelve nautical miles on the seaward side shall constitute CRZ-IV A.

CRZ-IV B

CRZ-IV B areas shall include the water area and the bed area between LTL at the bank of the tidal influenced water body to the LTL on the opposite side of the bank, extending from the mouth of the water body at the sea up to the influence of tide, i.e., salinity of five parts per thousand (ppt) during the driest season of the year.

1.2.3. EMMP Plan

As per the guidelines of Ministry of Environment Forests and Climate Change and also as per the environment management plans submitted by various agencies during their EIA studies, DPA has appointed M/s. Detox Corporation Pvt. Ltd. For the work of “Preparing and Monitoring of Environmental Management Plan for Deendayal Port Authority at Kandla vide Work Order No.EG/WK/EMC/11023/2011/IV/213Dated-07/12/2019.

As part of this assignment, M/s. Detox Corporation Pvt. Ltd. prepared an Environmental Management and Monitoring Plan (EMMP) and submitted this EMMP prior to commencement of the Environment Monitoring of Deendayal Port in February2020.The EMMP summarized the background information as are source to develop Environment Monitoring Plan, based on the results of the EIA studies carried out at Deendayal Port by several agencies.

This environmental Management and Monitoring Plan (EMMP) plan submitted in February2020 was the key document in the environmental management system and set out the detailed targets, objectives and procedures that are adopted in order to achieve the goals to efficiently manage the environmental policy of Deendayal Port Authority.

2. DEENDAYAL PORT Authority

Deendayal Port is one of the most important ports of India. This port is situated at Latitude23°01’N and Longitude70°13’E on the shores of the Kandla Creek. The Deendayal Port came into existence in the year 1931 with a single Pier construction. Later on with the loss of Karachi port to Pakistan during partition, after independence the Government of India chose Kandla as an ideal sea outlet. Thus the Deendayal Port was developed and since then Deendayal Port has played a pivotal role in enhancing country`’s maritime trade.

The Port of Kandla was declared a major port in 1955. The Deendayal Port Authority was created by law in 1963 to manage the new port. In 1978, The Deendayal Port had commissioned the off-shore Oil Terminal facilities at Vadinar jointly with Indian Oil Corporation, by providing Single Buoy Mooring (SBM) system, having a capacity of 54 MMTPA, which was first of its kind in India. Further, significant quantum of infrastructure up-gradation has been effected, excellent maritime infrastructure has been created having capacity of 32 MMTPA by M/s Essar Oil Refinery in Jamnagar district.

The port governed by Deendayal Port Authority (DPA) is a gateway port to the hinterland in western and northern states of Jammu & Kashmir, Delhi, Punjab, Himachal Pradesh, Haryana, Rajasthan, Gujarat and parts of Madhya Pradesh, Uttaranchal and Uttar Pradesh. It is in the district of Kutch and is located on the west bank of Kandla creek which runs into the Gulf of Kutch at a distance of 90 nautical miles from the Arabian Sea. The Port is well connected by the network of rail and road and is a gateway port for export and import of goods for northern states (Map1). The width of the channel varies from 200 meters to 1,000 meters. The contour depth along the shipping channel is around 10 meters. The total length of the Deendayal Port approach Channel is around 23kms. Presently, the Port has sixteen cargo berths for handling dry cargo traffic,

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six oil jetties for handling Petroleum Oil products and other liquid cargo traffic at Kandla Creek and 3 Single Buoy Mooring (SBM) at Vadinar for handling crude oil and two product jetties for handling petroleum products.

2.1. Environment Management Policy of Deendayal Port Authority

In 2013, the DPA achieved certification of its Environmental Management System to ISO 14001. In 2019, DPA obtained ISO 14001:2015 certifications. One of the key requirements of the ISO 14001 series is that the systems, plans and controls are under the operational control of the entity committed to managing the activity. The DPA also manages environmental risk to land and marine areas under its control arising from third party industrial activities. While these parties and the associated risks are covered in the risk register, the controls are managed by standalone EMP,s of the third party in accordance with the DPA development Approval Process and /or through direct state or central Government requirements as part of an:

- Environmental Clearance, CRZ Clearance, in the case of a new project; and
- Consent to Establish /NOC for an establishment, and Consent to Operate/NOC for operation of the projects.

2.1.1 The Key Objectives of Deendayal Port Authority

- To provide our Clientele, efficient and economical Port services. To render value for money and value added services to our Customers to their utmost satisfaction.
- To create facilities of international standards, and facilitate quicker turnaround of vessels.To maintain peaceful industrial relations by recognizing our work force as an asset and develop them to adopt to the changing Port scenario.
- To participate in social development by contributing our mite to the society at large.
- To be Environment friendly.

2.2. QHSE Policy of Deendayal Port

Quality, Occupational health, Safety and Environmental Policy (QHSE) of Deendayal Port Authority is the statement of its intentions, principles & commitment in relation to its overall QHSE performance, which provides a frame work for the action and for the setting of QHSE objectives & targets. QHSE policy has been developed through initial status review of quality, Occupational health, Safety and Environment Management comprising of following key areas namely;

- Legislative, regulatory and other requirements
- Identification of equipment and services supporting quality of final services.
- Identification of significant OH&S risks and Environmental aspects.
- Examination of all existing environmental & Occupational health and safety management practices and procedures.
- Evaluation and feedback from the investigation of previous incidents and accidents.

The QHSE policy of Deendayal Port Authority has been communicated at all levels through display in all the relevant places. The policy has also been communicated to external parties by way of displaying it at the main gate of Deendayal Port Authority in Hindi/English/local (vernacular) language.

Management representative of Deendayal Port Authority has established, implemented and maintaining the QHSE management system and continually improves its effectiveness by regular monitoring in accordance with the requirements of this international standard. MR has identified the various processes needed for the QHSE management system and their application throughout the organization.

The sequence and interrelation of these processes are determined to control the effectiveness of these processes & operations. The criteria & methods are determined necessary resources & information/details are made available at the point of use so that operations & processes can be monitored. (Ref: Department Operational Manual and their Process Flow Chart).

Measurement of these processes are timely analyzed and the relevant actions are implemented to achieve planned results & for continual improvement.

2.3. The Physical Environment

Deendayal Port (23°02'29.92"N, 70°13'08.99"E) is located at the tail end of Gulf of Kachchh (GoK), an east west oriented Gulf system in the western part of Gujarat. It is about 90 nautical miles from the open waters of Arabian Sea. Kandla creek harboring the Deendayal Port is one of the major creeks of the inner Gulf of Kachchh. Gulf of Kachchh (GoK) is 75 km wide at its mouth and after running about 170 km away from the Arabian sea towards east, narrows down into a constriction at 70° 20" E at *Sat Saida* Bet and then bifurcates into many creek systems (Map1). The Little Ran at the tail end of GoK has a network of many small and large creeks, intermingling with marshy tidal flats rich in fine clays. Kandla creek is one of the major tributaries of this creek system, which empties into the inner GoK. All these creeks bring water from the Little Ran into Kandla creek, which has a fairly good depth and stable banks.

Coastal and inland environmental setting of Kandla, similar to other parts of Kachchh, has marked climatological peculiarities like aridity, geomorphology and coastal and terrestrial ecosystems. Annual rainfall in Kachchh district was 458 mm during 2001- 10 whereas it was 443 mm at Gandhidham taluka during the same period which is often irregular. Rain during monsoon is confined to only 15-20 days and occurs as an instant downpour. The mean rainfall in year 2019 was 194mm.

On the terrestrial side there are no major rivers or rivulets or fresh water streams. Winter and summer temperatures range from 7°- 47°C with a yearly average humidity of 60% which increases to 80% during southwest monsoon and decreases to 50% during November-December. Average wind speed is 4.65 m/s with a maximum of 10.61 m/s during June. Drought is a common phenomenon in Kachchh with 2 drought year in a cycle of 5years. Annual temperature fluctuation in the district is extreme, ranging from 4°C to 47.5°C.

2.4. Biophysical Environment

a. Creek system

The creek system consists of 3 main creeks the Nakti, the Kandla and the Hansthal, and the Little Gulf of Kutch interconnecting through many other big and small creeks, all along the coast. Very few rivers drain into the Gulf and they carry only a small quantity of freshwater, except during the brief monsoon. They are broad-valleyed and their river bed is mostly composed of coarse sand and gravel. The Gulf is uniquely characterized by numerous hydrographic features like pinnacles, as much as 10 m high. The southern shore has numerous islands and inlets covered with mangroves and surrounded by coral reefs. The northern shore is predominantly sandy or muddy confronted by numerous shoals.

The Marine water of Gulf of Kutch and its creeks like Kandla creek, Nakti creek and Khori creek are providing the suitable habitat for marine vegetation. The Gulf abounds in marine wealth and is considered as one of the biologically rich marine habitat along the west coast of India. The marine vegetation is highly varied, which includes sand dune vegetation, mangroves, sea grasses, macrophytes and phytoplankton. The dominant species of sand dune flora are *Euphorbia caudicifolia*, *E. nerifolia*, *Aloeverasp*, *Ephedrafoliata*, *Urochodrasetus*, *Sporobolus maderaspatenus*, *Eragrostis uniolooides*, *Calotropis procera*, *Fimbristylis* sp, *Indigofera* sp and *Ipomoea pescaprae*. The common sea grasses found growing on the mud flats are *Halophila*

ovate and *H.beccarii*.

b. Mangroves

Deendayal Port Authority (DPA) is one of the largest ports of India in terms of volume of cargo handled. Among Indian ports, this port also has the largest coastal habitats such as mangroves (193.1km²) and mudflats (312.9 km²). DPA has implemented mangrove plantation in 1500 Ha during 2005 - 2017 through various implementing agencies at Sat Saida Bet, Nakti creek and Kantiyajal. The Deendayal Port Authority has entrusted the task of evaluating 1500 ha of mangrove plantation in these three locations to Gujarat Institute of Desert Ecology (GUIDE), Bhuj.

Coastal belt in and around Kandla region is characterized by a network of creek systems and mudflats which are covered by sparse halophytic vegetation like scrubby to dense mangroves, creek water and salt encrusted land mass which forms the major land component. The surrounding environment in a radius of 10 km from the Port is mostly built up areas consisting salt works, human habitations and Port related structures on west and north, creek system, mangrove formations and mudflats in the east and south. Deendayal Port and its surroundings have mangroves, mud flats and creek systems as major ecological entities.

Mangrove plantation activity by DPA was initiated in 2005 as mandated by the Ministry of Environment, Forests & Climate Change (MoEF&CC). Subsequently, 1300 ha of mangrove plantation has been completed till the end of 2017 in different years in order to meet the legal mandate of Ministry of Environment, Forests and Climate Change (MoEF & CC). The mangrove plantation activities were carried out at Sat Saida Bet, Nakti creek and Kantiyajal of Bharuch district in South Gujarat. At Sat Saida Bet, Plantation activities were carried out in phased manner i.e. 20 ha during 2005-2006, 200 ha during 2011-2012, 300 ha during 2012-2013, and 330 ha during 2013-2014 (Plate 1). At Nakti creek plantation was carried out during 2008-2009 and 2010-2011 in 50 ha and 100 ha, respectively (GUIDE, 2018). In 2015-17 300 ha by GEC at Kantiyajal, Bharuch District and 2018- 20 by GEC (At Satsaida bet : 50 Ha. And 300 ha at Kantiyajal 50 Ha Taluka : Hansot, District : Bharuch). In 2020-2021 -100 ha GEC, Gandhinagar.

A. marina was the preferred species for plantation activities in all the three locations due to prevailing high salinity and high success rate of this species. At Nakti creek *Rhizophora mucronata* and *Ceriops tagal* were also planted in small numbers along with *A. marina*. Likewise, at Kantiyajal attempts were made for planting *R.mucronata* along with *A.marina*.

c. Marine Fauna

In the marine environment of Deendayal Port, there are eleven species of mollusca, seven species of shrimps (Prawn) and seven species of annelids. Besides these, there are twelve groups of phytoplankton, 7 groups of zooplanktons. The density of meio-fauna ranged from 382 to 670 nos/10cm². The density of benthic macro fauna ranged from 952 to 1092 no/m². The dominant macro-faunal group was porifera (Mantec, 2014).

d. Terrestrial Biodiversity

Sensitive ecological habitats like forest, grassland, agricultural land, wetlands are absent within and in the proximity of the Deendayal Port due to its highly built-up nature. The species richness and abundance of aquatic birds and terrestrial fauna (reptiles, mammals) in the port environ and its surrounding was low with least conservation significance.

There are 11 species of herpetofauna (reptiles and amphibians), 53 species of terrestrial birds, 49 species of aquatic birds in the Port Environs. Due to absence of forest habitat in the immediate vicinity of Deendayal Port, only nine species of mammals were recorded with very low abundance.

3.0 Environment Management Plan

Port activities can often affect the quality of air, noise and marine water in the surrounding areas due to the wide range of port operation activities. For the determination of environment quality, need for identification of sources, control and disposal of waste from various point and non-point sources and for prediction of various parameters of sound environmental quality, regular monitoring and assessment are required.

The Environment management plan is the key document in the environmental management system and sets out the detailed targets, objectives and procedures that will be adopted in order to achieve the goals set out in the environmental policy.

It is extremely essential that port and harbour projects should have an environmental management plan (EMP), which also incorporates monitoring of air, noise, soil and marine water quality along with the collection of meteorological data.

Deendayal Port Authority targets the achievement of high environmental standards and strives to ensure that activities within the Port are environmentally and ecologically sustainable and have minimal impact on the natural environment.

Several developmental projects have been initiated and EIAs have been carried out for the said projects. These EIA studies have also submitted the suggestions on the environmental management of the project area and Deendayal Port in general. These suggestions and mitigation measures have also been considered in framing the current environment management plan.

The present Environment Management Plan summarizes the suggestions of the ECs received from the Ministry of Environment, Forests & Climate Change (MoEF & CC), and consents granted by Gujarat Pollution Control Board(GPCB).

The projects for which ECs were granted and which formed the frame work of the present EMP are as below;

- EC and CRZ Clearance for Construction of 13th to 16th Cargo berth at Kandla in year 2008
- EC & CRZ clearance for development of plots for construction of liquid storage tank farms at Kandla, district Kutch in year 2009
- Environmental and CRZ Clearance to DPA for development of plots for construction of warehouses/Godowns (stage II) in year 2012.
- Environmental and CRZ clearance for Single Point Mooring (SPM) and Allied facilities off Veera in the Gulf of Kachchh for handling Crude Oil on BOT basis in year 2013.
- Developing seven integrated facilities within the Existing Kandla port at Kandla, Gujarat–December 2016
- Proposed Smart Industrial Port City (SIPC) at green Field Site 1 (Adipur side– Northeast of Antarjaal, South of Tagore Road, 580 Acres), Gandhidham, Kutch-Gujarat”-October 2017
- Proposed Smart Industrial Port City (SIPC) at Green Field Site 2 (DPA Complex, 849.96 Acres), Gandhidham, Kutch –Gujarat.–October 2017.
- Construction of Interchange cum road over bridged (SIA/GJ/NCP/19832/2017)
- Creation of water front facilities of oil jetties of 8,9,10 & 11 & development of land (1432 areas) (IA/GI/MIS/61679/2017)
- Development of plots for constructing of warehouse/ godowns ad measuring 11,50,000 m2 area at outside west gate no 1 on national highway no 8A at Kandla (SIA/GJ/MIS/122861/2019)

- Up gradation of Barge handling facility at Sunder Basin at Kandla
- Multipurpose Cargo Terminal at Tekra off Tuna on BOT basis
- Construction of Rail Over Bridge at NH-8A near Nakti Bridge (crossing of NH 8A)
- Strengthening of oil jetty no. 1
- Modification and strengthening of Cargo Berth no. 6 at Kandla Port Trust
- Container terminal Tuna Tekra (Capacity 2.19 Million TEUs)
- Railway line (NH 8A to Tuna 11 km)
- Construction of port craft jetty & SNA section
- Development of integrated facility stage II (IA/GJ/MIS/27227/2015)
- Setting up 7th oil jetty at old Kandla
- Setting up Barge jetty at Veera
- Setting up Barge jetty at JafraWadi
- One administrative building at Tuna Tekra
- Construction of 15.5 km long road from Veera Barge Jetty to Tuna Gate
- Single point Mooring and allied facilities off Veera in Gulf of Kutch for handling crude oil on BOT basis in the state of Gujarat (IA/GJ/MIS/178779/2020)

Table: 1 Yearly Monitoring schedule

Yearly Monitoring schedule				
Sr. No	Sampling Activity Description	Locations	Monthly Monitoring	Yearly Monitoring
1	Ambient Air	6 locations (Kandla)	8	96
		2 locations (Vadinar)	8	96
2	Drinking Water	18 locations (Kandla)	1	12
		2 locations (Vadinar)	1	12
3	Waste water	2 locations (Gopalpuri Township & Kandla)	4	48
		1 location (Vadinar)	4	48
4	Soil	4 locations (Kandla)	1	12
		2 locations (Vadinar)	1	12
5	Noise	10 locations (Kandla)	1	12
		2 locations (Vadinar)	1	12
6	Marine Water sampling for Physico - Chemical Parameters, Biological parameters and sediments (Twice a month)	8 Locations (6- Kandla & 2- Vadinar)	2	24

4. Environment Monitoring Plan

Environment Monitoring Plan is very important for monitoring the environmental status of the port for sustainable development. The EMP mainly consists of monitoring of the Air quality, Marine water quality, Ecological and Biological quality and Noise quality of the Deendayal Port area. The monitoring program is also required to suggest suitable mitigation measures for the deviation found in the results of the monitoring, so as to keep the pollution level with in control.

The list of main elements for which Environmental monitoring is carried out is mentioned below.

- Air Quality Monitoring
- Drinking Water Monitoring
- Noise Monitoring
- Marine Water Monitoring
- Soil Monitoring
- Sewage Treatment Plant Monitoring
- Meteorological Monitoring

M/s Detox Corporation Pvt. Ltd. appointed by Deendayal Port Authority will carry out monitoring of the various environmental aspects of the port with following objectives;

- To review the locations of ambient air and marine water quality monitoring stations within the impacted region in and around DPA establishment, in view of the developmental projects.
- To assess the ambient air quality and marine water quality at selected stations in terms of gases and particulate matter, physical, chemical and biological parameters for the assignment period.
- To assess the marine water quality in terms of aquatic flora and fauna and sediment quality in terms of benthic flora and fauna.
- To assess the trends of air and water quality by comparing the data collected over a specified time period.
- To assess the trends of water quality in terms of marine ecology by comparing the data collected over a specified time period.
- To review the results and to check compliance with environmental quality standards.
- To suggest mitigation measures, if necessary, based on the findings of this study.
- To recommend future action plans on air and marine water quality monitoring programmed based on the findings of this study.
- Drinking Water samples at twenty stations will also be monitored for various physical, chemical and biological parameters viz., color, odor, turbidity, conductivity, pH, EC, total dissolved solids, chlorides, total hardness, iron, sulfate, NH₃N, PO₄, Turbidity, salinity, BOD, Hardness, Calcium, Magnesium, Sodium, Potassium, metals and bacterial count on a monthly basis.
- Every week a sample (inlet and outlet) of the Sewage Treatment Plant (STP) shall be analyzed to see the water quality being discharged by DPA. However, the results will be submitted every month. If in a particular month any deviation is observed, the same shall be submitted immediately to the Employer.
- Noise monitoring will be carried out twice a day at the representative stations for a period of 24 hours. A report of the same will be submitted to DPA.
- Meteorological parameters are very important from air pollution point of view and precise and continuous

data collection is of utmost importance. The data collected is analyzed as per the standards. Meteorological data on wind speed, wind direction, temperature, relative humidity, solar radiation and rainfall will be collected from one permanent station at DPA and one permanent station at Vadinar.

- All Locations & Monitoring parameters are tentative and subject to change as per GPCB/CPCB/MoEF &CC Guideline.

4.1 Selection of Sampling Locations

Sampling locations have been selected by Deendayal Port Authority considering various activities of Deendayal Port Authority and its environs and various Environment Impact Assessment Studies carried out in Deendayal Port. The sampling locations of various air, water and marine water surveys will be reviewed periodically and may be altered if required as per the suggestions/discussions with the Deendayal Port Authority and Environmental consultants engaged by the Deendayal Port Authority.

The major components of the monitoring are:

4.1.1. Air Quality Monitoring

Air Monitoring is done at eight fixed locations in port area. The description of stations is depicted in Table1. The monitoring cycle at all eight monitoring stations is twice in a week.

Method of Monitoring

Sampling and analysis will be carried out as per CPCB guidelines for Ambient Air Quality monitoring. The monitoring is carried-out for air quality parameters mentioned in the National Ambient Air Quality Standards (NAAQS), CPCB Notification published in 2019. Sampling for Particulate Matter PM₁₀, PM_{2.5} and Total Suspended Particulate Matter (TSPM) is done for a twenty four hour period.

Frequency of AAQ Monitoring

The monitoring cycle at all eight monitoring Stations is twice in a week. Sampling for Particulate matter (PM₁₀, PM_{2.5}) and total suspended particulate matter is done for a twenty four hour period. Sampling for gaseous samples like SO_x, NO_x will be done for a twenty four hour period with sample collection at every eight hour. Table 2 gives description of Ambient Air Monitoring Stations.

Table 2: Ambient Air Monitoring Stations

Sr. No.	Location	Station Description	Location Codes
1	6 Stations at Kandla	Marine Bhavan	AL-1
2		Oil Jetty	AL-2
3		Kandla Port Colony	AL-3
4		Gopalpuri Hospital	AL-4
5		Coal Storage Area	AL-5
6		Tuna Port	AL-6
7	2 Stations at Vadinar	Signal Building	AL-7
8		Vadinar Colony	AL-8

4.1.2. Monitoring of Drinking Water Quality Method of monitoring

The sampling and analysis will be done as per standard methods IS 10500:2012. The water samples will be analyzed for various parameters via; Color, Odor, Turbidity, Conductivity, pH, Chlorides, TDS, Total hardness, Iron, Sulphate, Salinity, Biological Oxygen Demand (BOD), Chlorides, Sodium(Na), Potassium(asK+), Calcium(asCa), Magnesium(Mg), Fluorides (F), Nitrate (NO₃), Nitrite (NO₂), Manganese (Mn), Iron (Fe), Chromium(Cr₆₊), Copper(asCu), Cadmium(Cd), Arsenic(As), Mercury(Hg), Lead (Pb), Zinc (Zn), CFU, & bacterial count. The method will be manual at all monitoring stations.

- Frequency of Drinking Water Monitoring:**

The monitoring at all twenty drinking water stations will be done monthly once.

- Drinking Water Monitoring Stations**

A list of locations for collecting the drinking water samples is depicted in Table 3.

Table 3: Monitoring locations for Drinking Water

Sr. No	Monitoring Locations	Location Code	Sr. No	Monitoring Locations	Location Code
Location at Kandla			11	Hospital Kandla	DW-11
1	Nirman Building1	DW-1	12	A.O. Building	DW-12
2	P& C Building	DW-2	13	School Gopalpuri	DW-13
3	Main Gate(North)	DW-3	14	Guest House	DW-14
4	Canteen	DW-4	15	E-Type quarter	DW-15
5	West gatel	DW-5	16	F-type quarter	DW-16
6	Wharf area	DW-6	17	Hospital Gopalpuri	DW-17
7	Sewasadan-3	DW-7	18	Tuna Port	DW-18
8	Workshop	DW-8	Locations at Vadinar		
9	Custom building	DW-9	19	Nr. Vadinar Jetty	DW-19
10	Port Colony Kandla	DW-10	20	Port colony	DW-20

4.1.3. Monitoring of Marine Water Quality and Biological Parameters Methodology for Physico-chemical Monitoring

Water samples will be collected for analyzing physico-chemical and biochemical parameters viz. pH, Temperature, Colour, Odour, Salinity, Turbidity, SS, TDS, TS, DO, COD, BOD, Silicate, PO₄, SO₄, NO₃, NO₂, Ca, Mg, Na, K, Iron (as Fe), Chromium (as Cr), Copper (As Cu), Arsenic (as As), Cadmium (as Cd), Mercury (Hg), Lead (as Pb), Zinc (as Zn), petroleum hydro carbons, trace metals total coliform & fecal coliform.

Methodology for Biological Monitoring

Sampling will be conducted from sub surface layer in high tide period and low tide period of the tide from all sampling stations during consecutive spring tide and neap tide.

Net sampling for qualitative evaluation of mixed plankton will be conducted only once during between maximum high water and slack water and maximum low water and Slack water.

Sediment sampling for qualitative and quantitative evaluation of benthic organisms will be conducted only once during one tidal cycle during maximum low water and slack water.

The collected samples will be first collected in a clean bucket to reduce the heterogeneity. From the collected water sample 1 liter of water sample will be taken in an opaque plastic bottle for chlorophyll estimation. Quantitative plankton samples will be collected by filtering rest of the water sample using plankton net of 20µm mesh size.

Methodology adopted for Plankton sampling

Mixed plankton sample for qualitative evaluation will be obtained from the sub surface layer, at each sampling locations by towing the net horizontally with the weight during highest high tide and slack period and lowest low tide and slack period. After the tow of about 15-20 minutes at speed of 1- 1.5 m/s. For quantitative evaluation 50 L sample will be collected from the sub surface during high tide and low tide period will be filtered through 20 µm mesh size net assembly.

Methodology adopted for benthic fauna sampling

Van veen sampler (0.1 m²) will be used for sampling bottom sediments during lowest low tide. The fixation of benthic fauna will be normally done by bulk fixation of the sediment sample. The bulk fixation will be done by using 10% formalin (buffered with borate) with Rose Bengal as stain. The organisms will be preserved with sea water as diluting agent.

Frequency

Phytoplankton (Qualitative & Quantitative) Zooplankton (Qualitative & Quantitative) & Benthos (Qualitative & Quantitative) samples will be collected during high tide and low tide during each spring and neap tides of the month.

Sampling Stations

The monitoring of marine environment for the study of biological and ecological parameters will be carried out in harbour regions of DPA (Table3) during Spring tide period of full moon phase of Lunar Cycle.

Table 4: Sampling Locations for Marine Monitoring

Sr.No	Monitoring locations	Location Code
Locations at Kandla		
1	Near passenger Jetty One	ML-1
2	Near Berth No.8&9	ML-2
3	Kandla Creek Near KPT colony	ML-3
4	Near13 th &14 th Berth	ML-4
5	Nakti Creek Near Tuna Port	ML-5
6	Nakti Creek Near NH-8A Bridge	ML-6
Locations at Vadinar		
7	Nr.SBM 2	ML-7
8	Nr. Vadinar Jetty	ML-8

4.1.4. Noise Monitoring

Noise sources in port operations include cargo handling, vehicular traffic, and loading / unloading of cargo to/from ships. Noise Monitoring will be done at 10-stations at Kandla, and three locations in Vadinar.

Method and Frequency of monitoring

Sampling will be done at all stations for 24 hour period once in month. Data will be recorded using automated sound level meter. The intensity of sound will be measured in sound pressure level (SPL) and common unit of measurement is decibel (dB).

Sampling Stations

The sampling locations for noise monitoring as listed in table 5.

Table 5: Locations for Noise Monitoring

Sr. No	Name of locations	Location Code	Sr. No	Name of locations	Location Code
Locations at Kandla			8	Nirman Building 1	NL-8
1	West Gate no 1	NL-1	9	Tuna Port	NL-9
2	Main gate(North)	NL-2	10	Port & customs office	NL-10
3	Wharf area/Jetty Area	NL-3	Location at Vadinar		
4	Main road/Central Road	NL-4	11	Nr. Port Gate-Vadinar	NL-11
5	Canteen Area	NL-5	12	Nr. Vadinar Jetty	NL-12
6	ATM building	NL-6	13	Port colony Vadinar	NL-13
7	Marine Bhavan	NL-7			

4.1.5. Soil Quality Monitoring

Soil quality monitoring is important for evaluating the effects of environment management practices of a region/area.

Method of Monitoring

The soil samples will be collected from four locations in Kandla and two locations in Vadinar Port. The soil samples will be filled in polythene bags, labeled in the field with number and site name and taken to the laboratory for analysis (as per IS 2720). Physical and chemical properties of soil at selected locations will be studied.

Frequency of monitoring

Sampling will be done at all stations in Kandla and Vadinar once in a month.

Soil Quality Monitoring Stations

List of the locations for collecting the soil samples are as per Table 6.

Table 6: List of sampling locations for Soil Quality Monitoring

Sr. No	Name of locations	Location Code
Locations at Kandla		
1	Tuna Port	SL-1
2	IFFCO Plant	SL-2
3	Khori Creek	SL-3
4	Nakti creek bridge at NH-8A	SL-4
Location at Vadinar		
5	Nr. Vadinar Port Office	SL-5
6	Nr. Vadinar Colony	SL-6

4.1.6. Monitoring of performance of the Sewage Treatment Plant (STP) at Gopalpuri Township, Deendayal Port & Vadinar

The principal objective of waste water treatment is generally to allow human and industrial effluents to be disposed off without danger to human health or unacceptable damage to the natural environment.

Method of Monitoring

The parameters monitored will be pH, BOD, COD, residual chlorine, MLSS, MLVSS and TSS. The data collected will be analyzed as per the standards. The performance of the Sewage Treatment plant will be studied by collecting samples of the aeration tank and effluent tank.

Frequency of monitoring

Sampling will be done at all stations from inlet, aeration tank and outlet of an STP once in week.

Monitoring Stations:

Lists of the location for collecting the STP samples are as per table 7.

Table 7: List of sampling locations for STP

Sr. No	Sampling location
1	STP at Kandla
2	STP at Gopalpuri
3	STP at Vadinar

5. Monitoring Results

Based on the EMMP submitted, M/s Detox Corporation Pvt. Ltd. carried out monitoring of the following environmental aspects of the port for the period of March 2021 to February 2022.

5.1 Ambient Air

The monitoring was carried out twice a week. The results obtained from the sampling and analysis is submitted to Deendayal Port authority on monthly basis. The monthly averaged and annual results for the ambient air monitoring are given in the sections followed.

I. Total Suspended Particulate Matter (TSPM)

The frequency of sampling was twice a week for every sampling station.

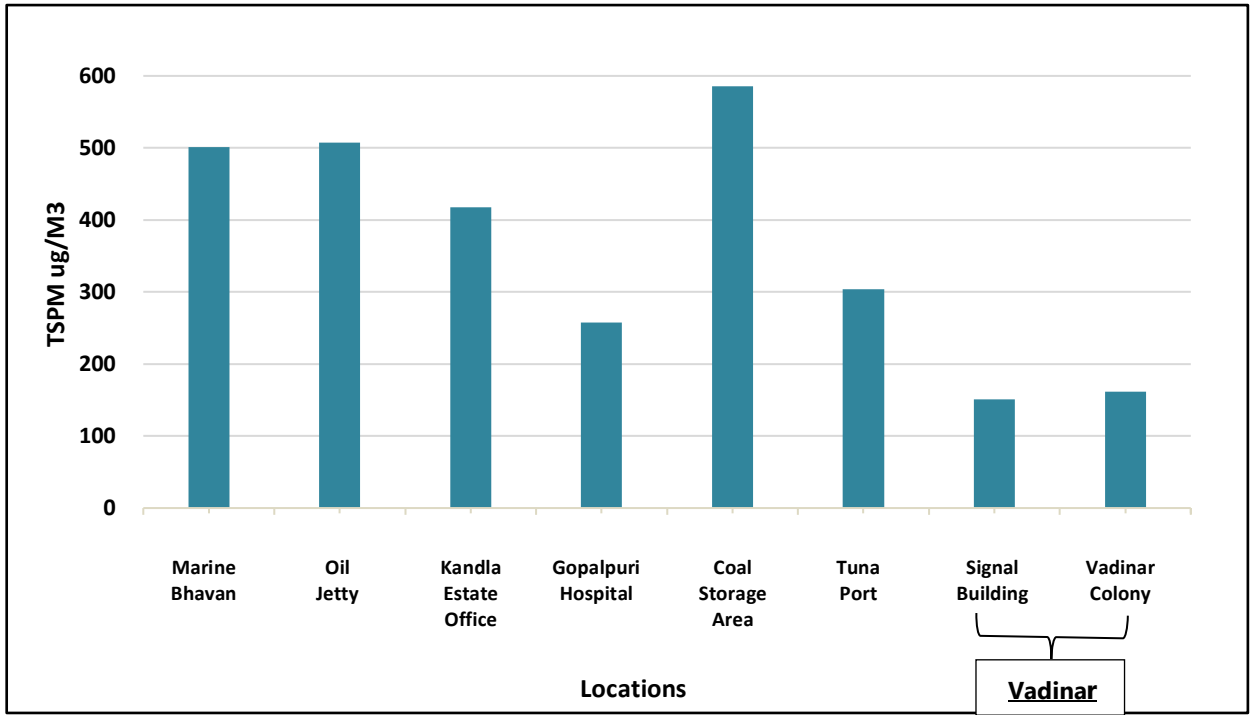
Table 8. TSPM (in $\mu\text{g}/\text{m}^3$) values at monitoring locations in Kandla and Vadinar Port

Months	Marine Bhavan	Oil Jetty	Kandla Estate Office	Gopalpuri Hospital	Coal Storage Area	Tuna Port	Signal Building	Vadinar colony
Mar-21	530	447	328	266	435	165	147	157
Apr-21	642	617	449	198	779	385	152	171
May-21	966	752	570	352	1341	273	134	161
Jun-21	374	312	267	173	596	125	59	60
Jul-21	467	578	463	307	354	372	105	146
Aug-21	495	520	488	229	548	347	155	138
Sep-21	449	554	341	194	324	238	164	169
Oct-21	364	465	402	274	527	362	157	211
Nov-21	460	489	487	357	598	387	219	205
Dec-21	442	480	427	251	518	362	176	183
Jan-22	417	480	417	251	484	348	164	164
Feb-22	412	393	371	243	523	284	171	186
Annual Mean	502	507	418	258	586	304	150	163

The mean TSPM values were highest at Coal Storage location and Marine Bhavan, followed by Oil Jetty. TSPM values were least at both the locations of Vadinar Port. The major cause of TSPM values at Coal Storage and Marine Bhavan is large amount of coal is handled at Berth No. 6, 7, 8 and use of grabs for unloading of coal directly in the truck cause coal to spread in air as well as coal dust to fall on ground. This settled coal dust again mixes with the air during trucks movement through hit.

Also, the coal laden trucks are not always covered with tarpaulin sheets and these results in spillage of coal from trucks/dumpers during its transit from vessel to yard or storage site.

Fig 1. Observed values (annual mean) of TSPM at all eight monitoring stations



Interpretation of Results

- Maximum TSPM of 1341.0 $\mu\text{g}/\text{m}^3$ was recorded in the month of May '21 at Coal storage site and the minimum value was recorded in the month of June, '21 at Tuna Port 125.0 $\mu\text{g}/\text{m}^3$.
- At Vadinar, maximum TSPM of 219 $\mu\text{g}/\text{m}^3$ was recorded in the month of November at Vadinar Signal Building site and the minimum value was recorded in the month of June '21 at Vadinar Signal Building (59 $\mu\text{g}/\text{m}^3$).

II. Particulate Matter (PM₁₀)

PM₁₀ is particulate matters which are 10 micrometers or less in diameter. The frequency of sampling was twice a week for every sampling station.

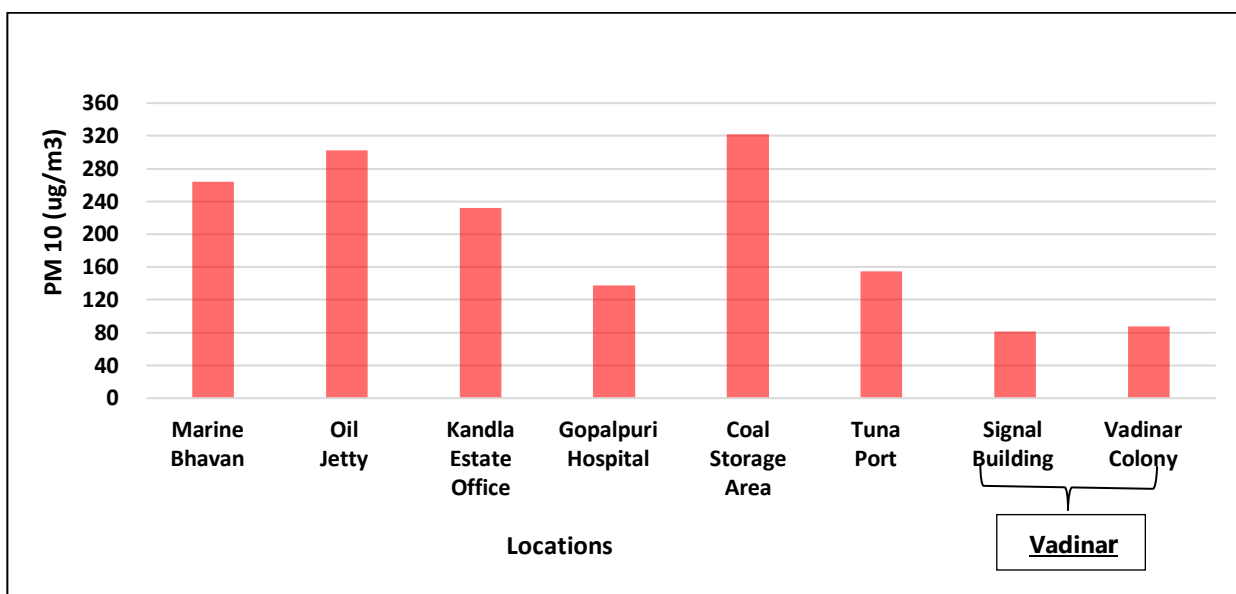
Table 9. PM₁₀ (in µg/m³) values at monitoring locations in Kandla and Vadinar Port

Months	Marine Bhavan	Oil Jetty	Kandla Estate Office	Gopalpuri Hospital	Coal Storage Area	Tuna Port	Signal Building	Vadinar colony
Mar-21	130	103	90	98	163	68	73	79
Apr-21	239	225	99	89	327	76	53	66
May-21	607	611	559	176	1149	160	73	99
Jun-21	130	82	69	52	140	59	33	33
Jul-21	373	496	366	230	206	250	75	81
Aug-21	262	322	276	133	327	217	98	77
Sep-21	333	442	211	123	200	126	97	95
Oct-21	190	246	219	140	203	163	82	116
Nov-21	193	190	217	187	292	195	115	108
Dec-21	245	263	243	142	295	194	88	98
Jan-22	227	437	217	142	264	184	93	97
Feb-22	237	213	215	139	300	161	98	104
Annual Mean	264	303	232	138	322	154	82	88

The mean PM₁₀ Values were highest at Coal Storage location and Marine Bhavan, followed by Oil Jetty. PM₁₀ values were least at both the locations of Vadinar Port. Higher PM₁₀ values at Coal Storage and Marine Bhavan is a result of large amount of coal handling and its inappropriate transportation methods.

Coal laden trucks are seldom covered with tarpaulin sheets and these results in spillage of coal from trucks/dumpers resulting into higher PM₁₀ values.

Fig 2. Observed values (annual mean) of PM₁₀at all eight monitoring stations



Interpretation of Results

- Maximum value of PM₁₀ of 1149 µg/m³ was recorded in the month of May²¹ at Coal storage site and the minimum value was recorded in the month of June 2021 at Tuna Port 59.0µg/m³.
- In Vadinar, maximum value of PM₁₀ of 116 µg/m³ was recorded in the month of October 2021 at Vadinar Colony and the minimum value was recorded in the month of June- 2021atVadinarColony & Signal Building (33.0 µg/m³).

III. Particulate Matter (PM_{2.5})

PM_{2.5} particles are air pollutants with a diameter of 2.5 micrometers or less, small enough to invade even the smallest airways. PM_{2.5} was also monitored twice a week for every sampling station.

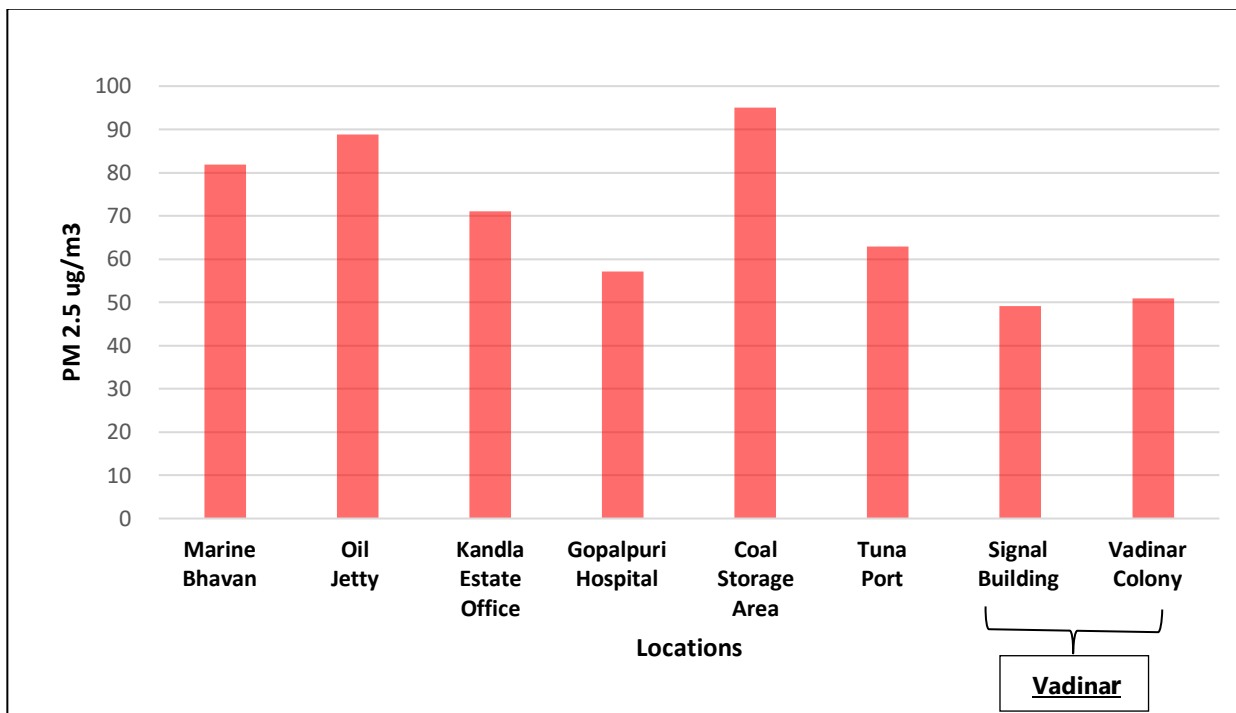
Table 10. PM_{2.5} (in µg/m³) values at monitoring locations in Kandla and Vadinar Port

Months	Marine Bhavan	Oil Jetty	Kandla Estate Office	Gopalpuri Hospital	Coal Storage Area	Tuna Port	Signal Building	Vadinar colony
Mar-21	56	50	34	29	67	24	21	41
Apr-21	73	52	44	15	101	18	35	17
May-21	41	37	40	27	102	23	33	36
Jun-21	108	113	61	33	138	33	38	22
Jul-21	89	47	56	63	40	58	40	44
Aug-21	71	73	71	51	80	63	39	45
Sep-21	81	83	60	46	80	55	44	42
Oct-21	82	89	90	79	105	96	49	70
Nov-21	90	97	97	87	104	98	84	82
Dec-21	104	102	98	87	101	93	71	75
Jan-22	95	232	99	87	111	79	66	60
Feb-22	92	90	102	82	112	114	69	76
Annual Mean	82	89	71	57	95	63	49	51

Average PM_{2.5} values were highest at Oil Jetty location (mean=232.0 µg/m³) followed by Coal Storage Area

(mean =138.0 $\mu\text{g}/\text{m}^3$) and Gopalpuri Hospital (mean=57.0 $\mu\text{g}/\text{m}^3$). $\text{PM}_{2.5}$ values At Vadinar Port the $\text{PM}_{2.5}$ values were significantly lower.

Fig 3. Observed values (annual mean) of $\text{PM}_{2.5}$ at all eight monitoring stations

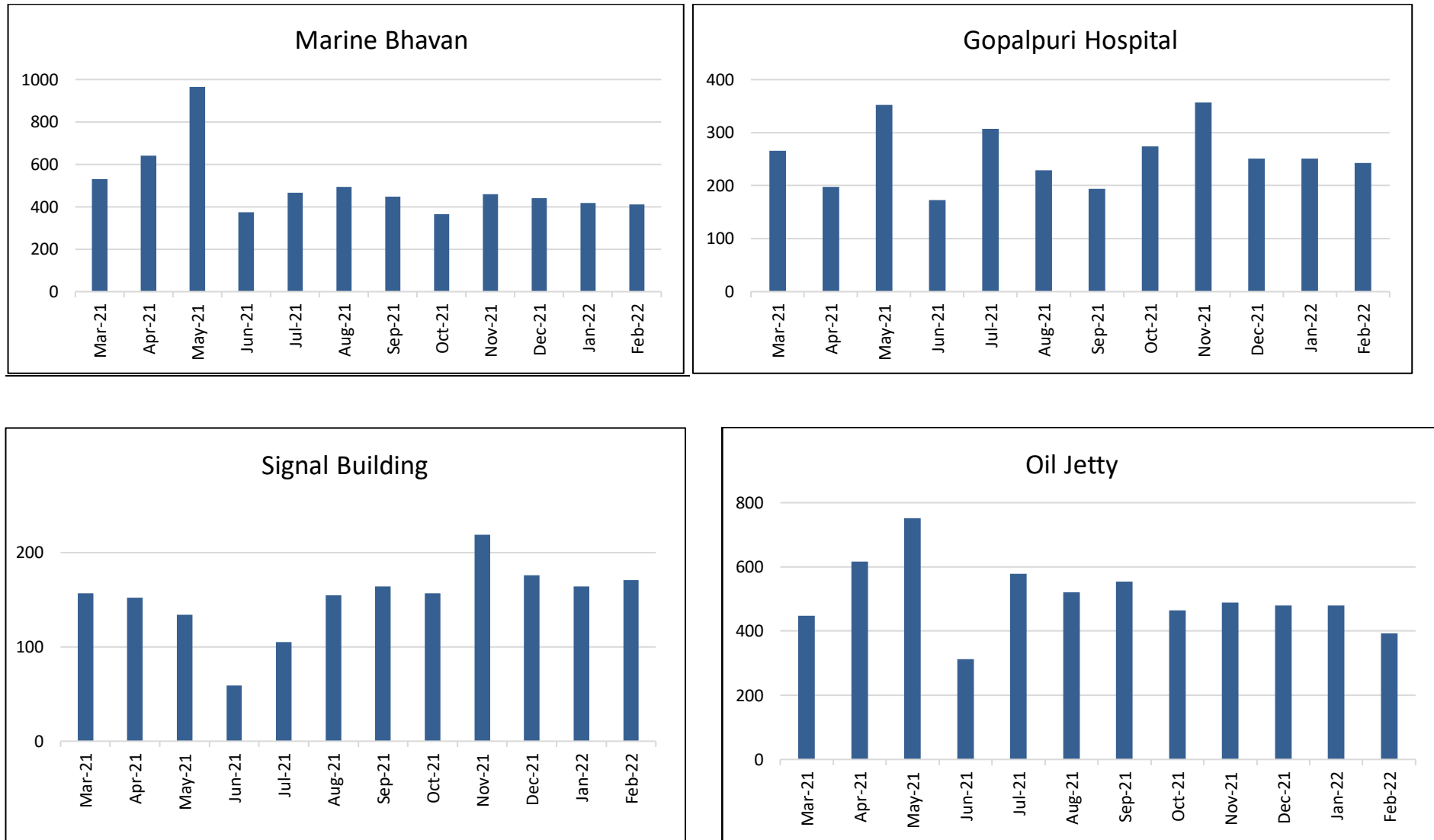


Interpretation of Results

- Maximum value of $\text{PM}_{2.5}$ (232.0 $\mu\text{g}/\text{m}^3$) was recorded in the month of January 2022 at Oil Jetty site and the minimum value was recorded in the month of May 2021 at Gopalpuri Hospital (27.0 $\mu\text{g}/\text{m}^3$).
- Annual mean values of $\text{PM}_{2.5}$ were highest at Coal Storage Area (95.0 $\mu\text{g}/\text{m}^3$).
- In Vadinar, maximum value of $\text{PM}_{2.5}$ of 84.0 $\mu\text{g}/\text{m}^3$ was recorded in the month of November 21 at Signal building site and the minimum value was recorded in the month of April at Vadinar Port colony (17.0 $\mu\text{g}/\text{m}^3$).

Location wise graphs depicting trends in TSPM, PM_{10} and $\text{PM}_{2.5}$ in all locations of Kandla and Vadinar Port are depicted in 1 to 3.

Fig 4. Trend in TSPM values of various AAQ Monitoring Locations



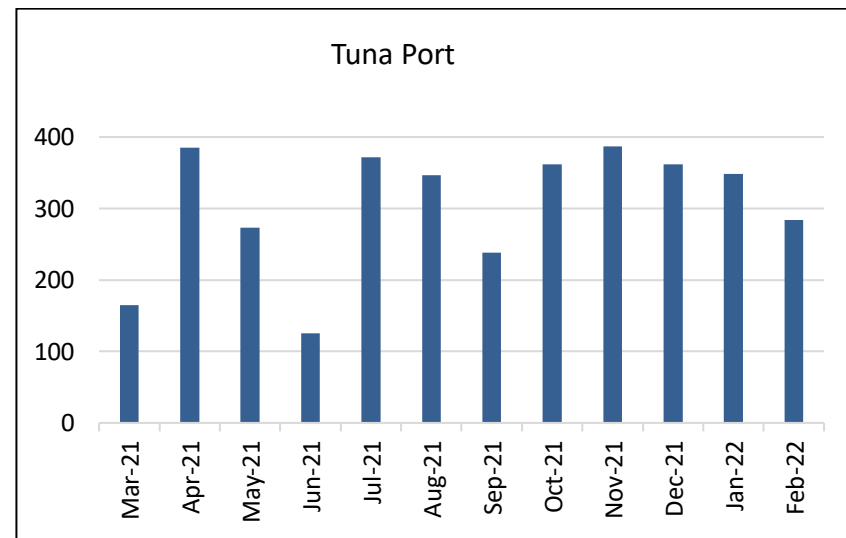
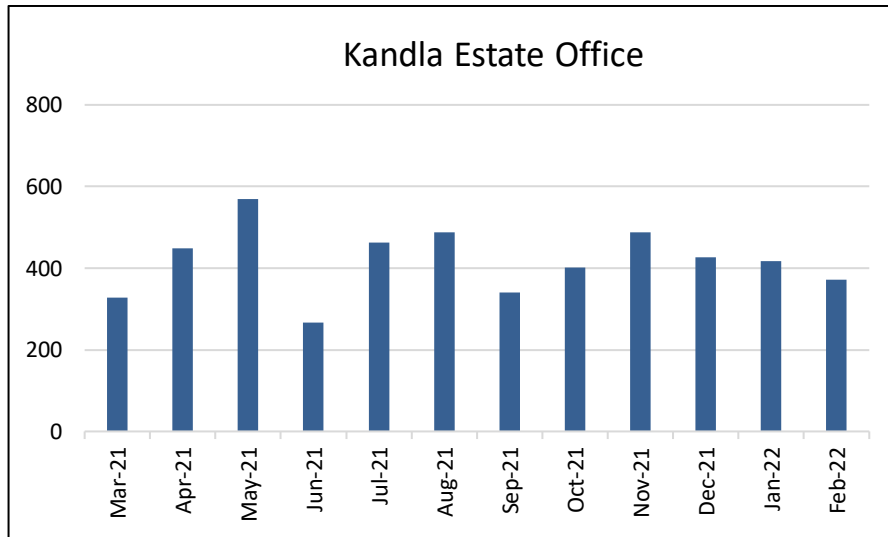
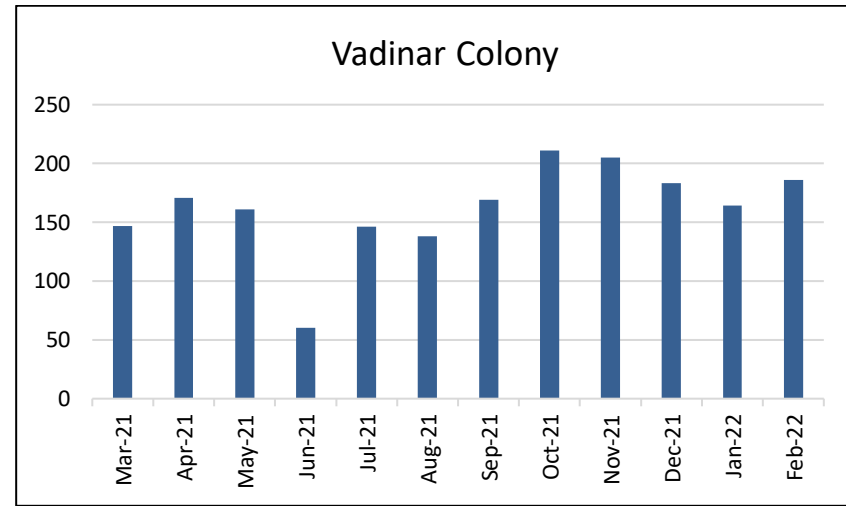
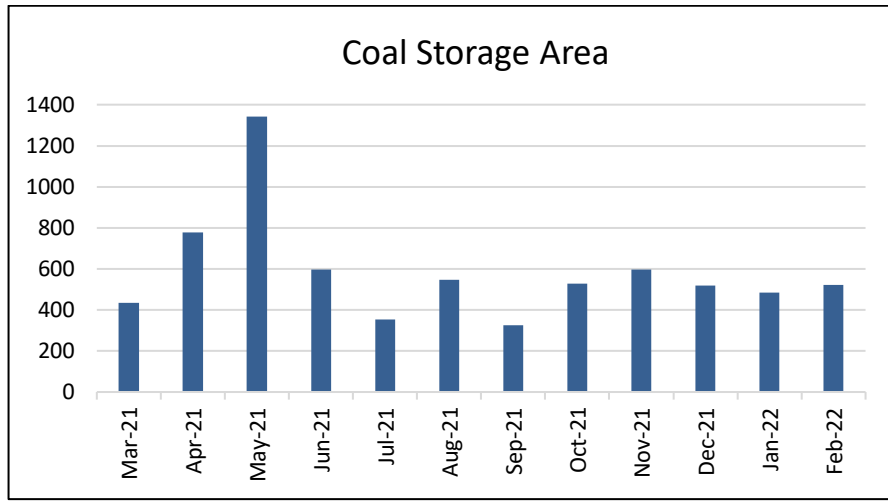
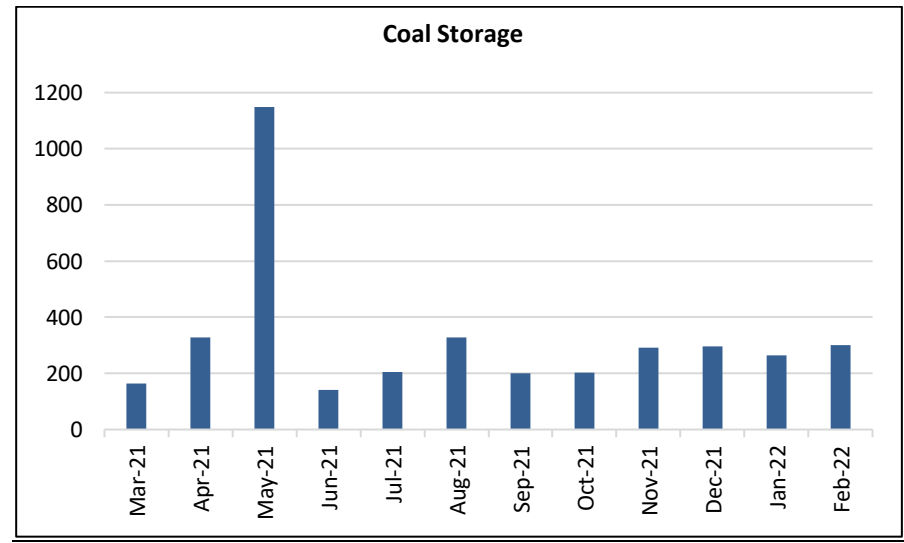
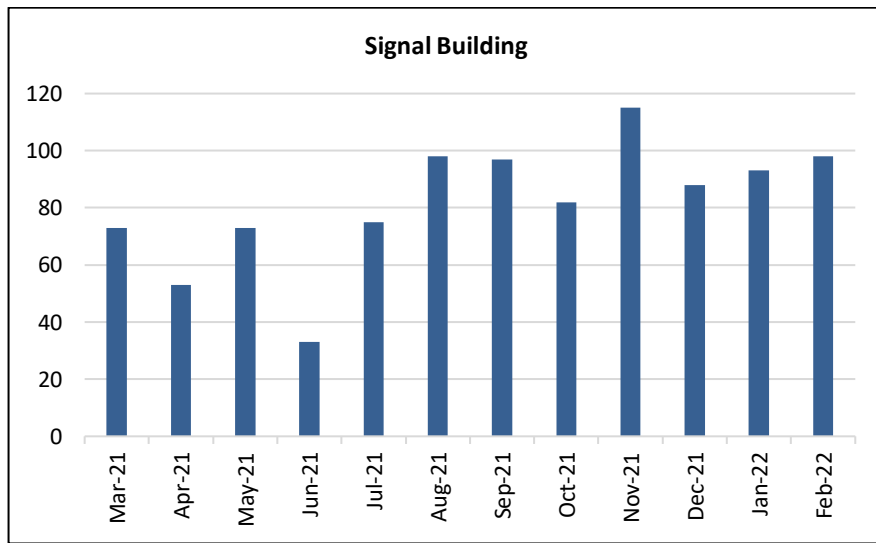
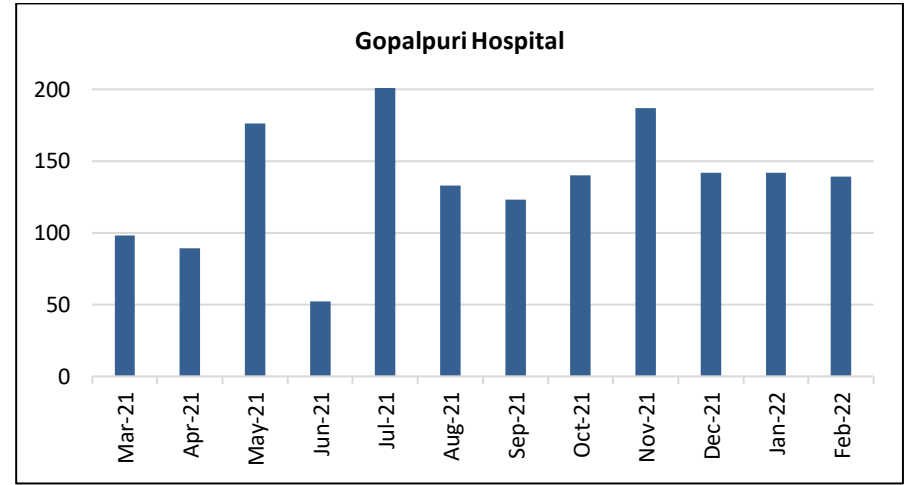
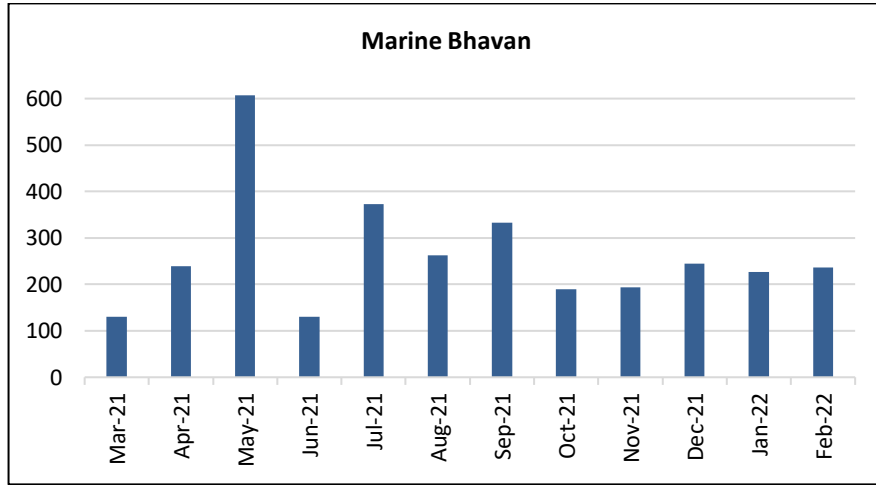


Fig 5. Trend in PM10 values of various AAQ Monitoring Locations



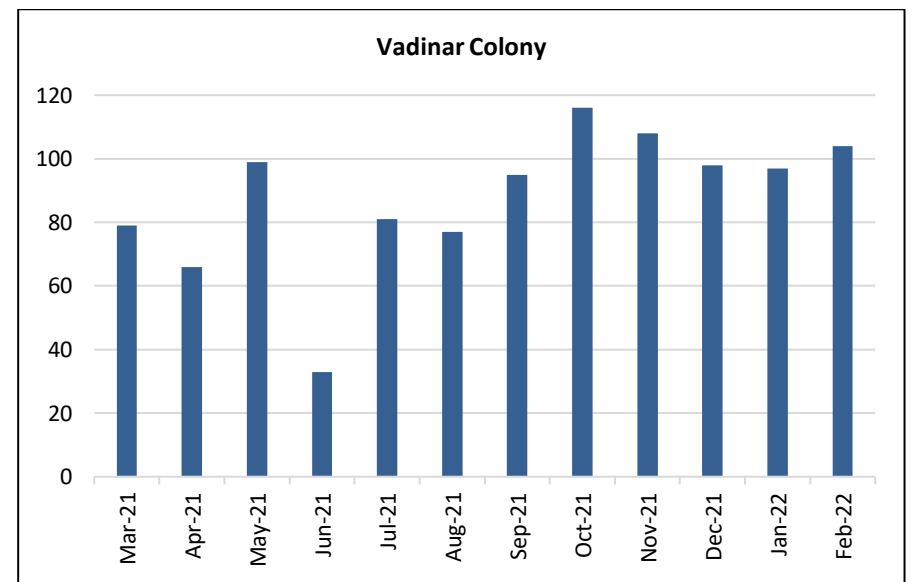
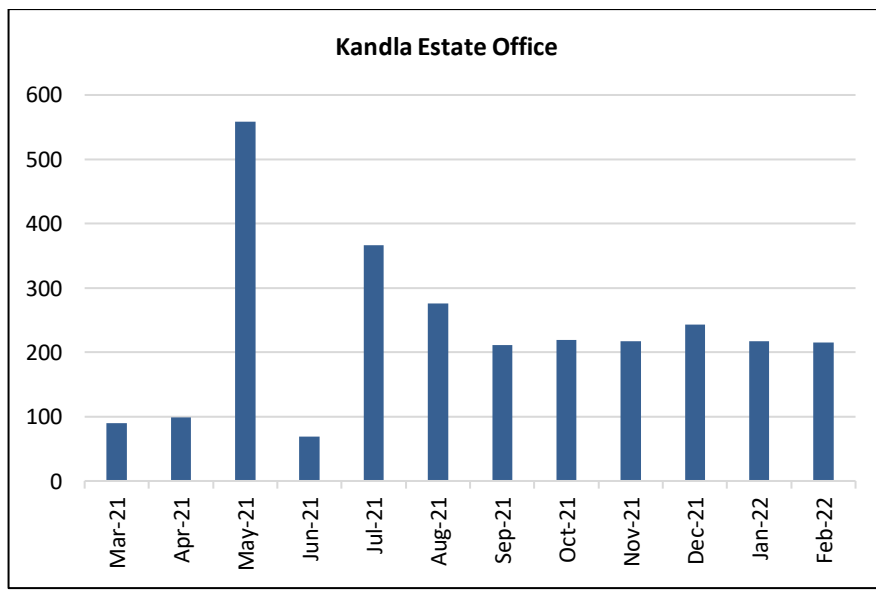
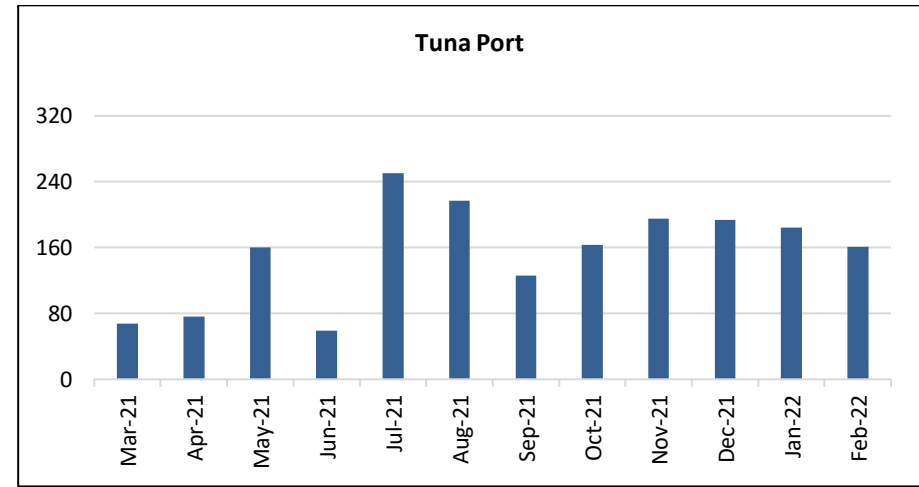
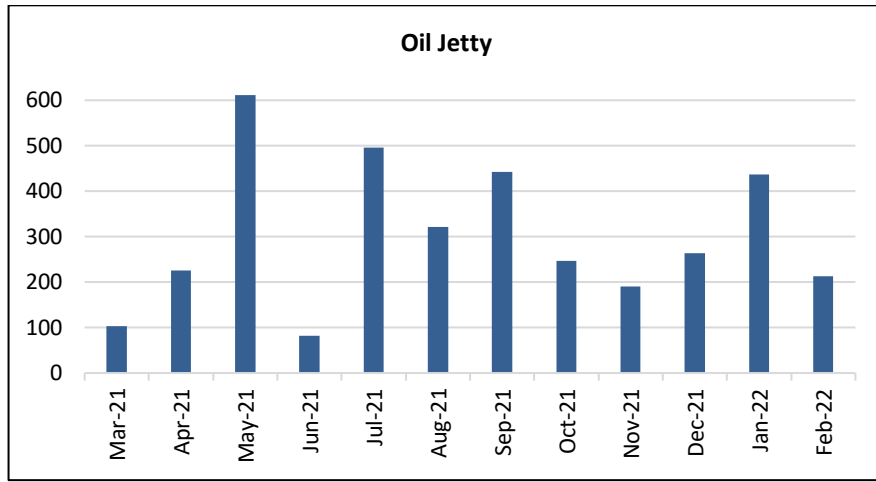
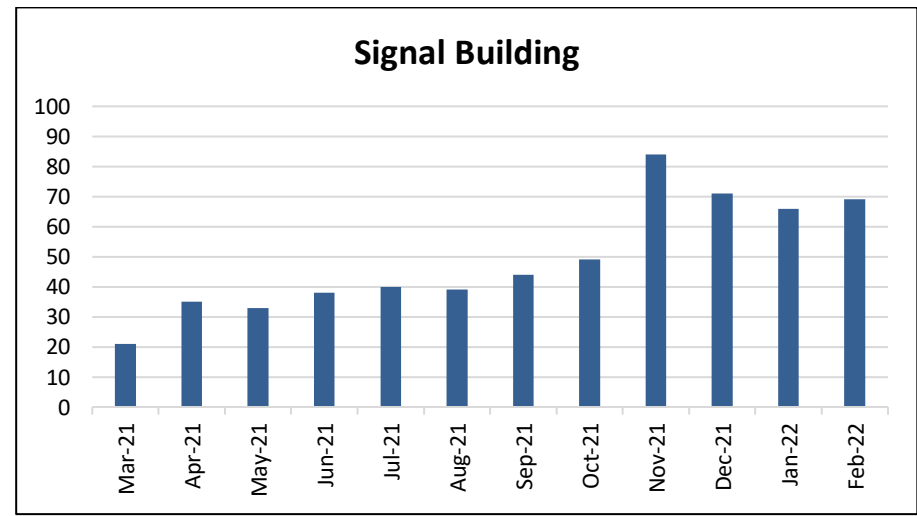
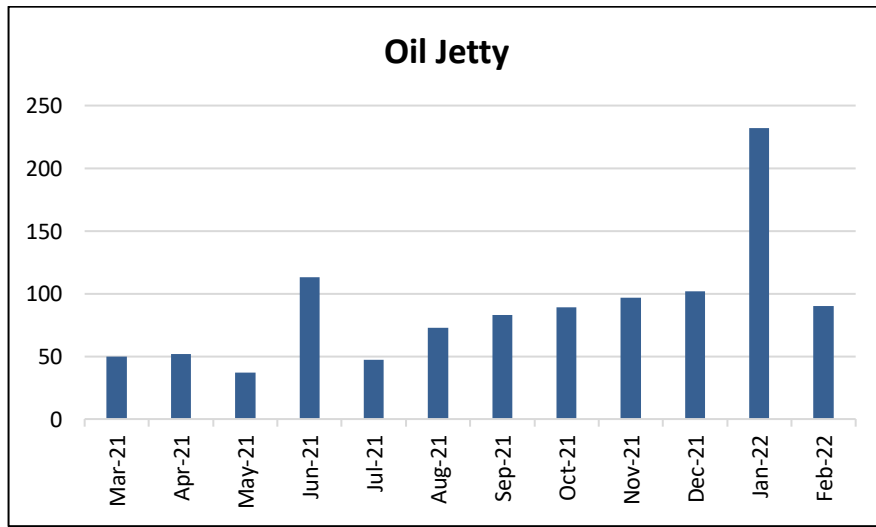
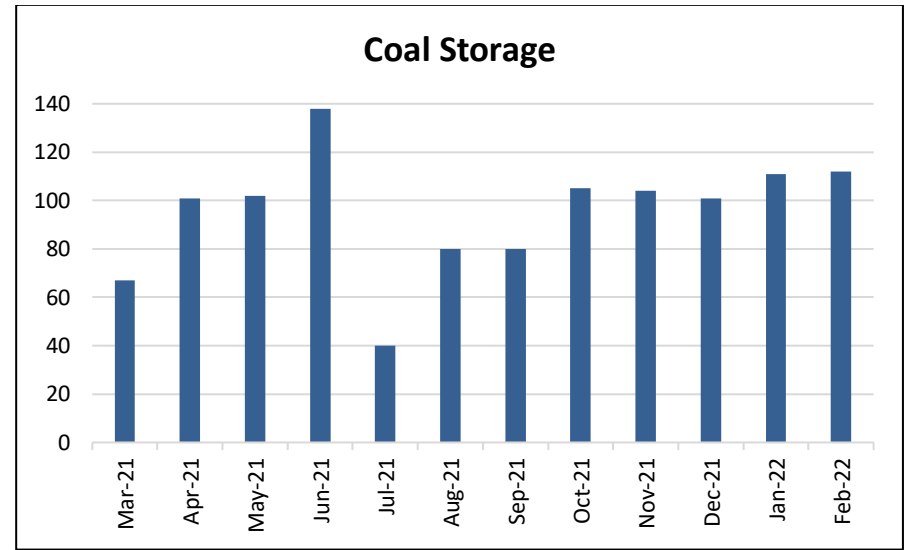
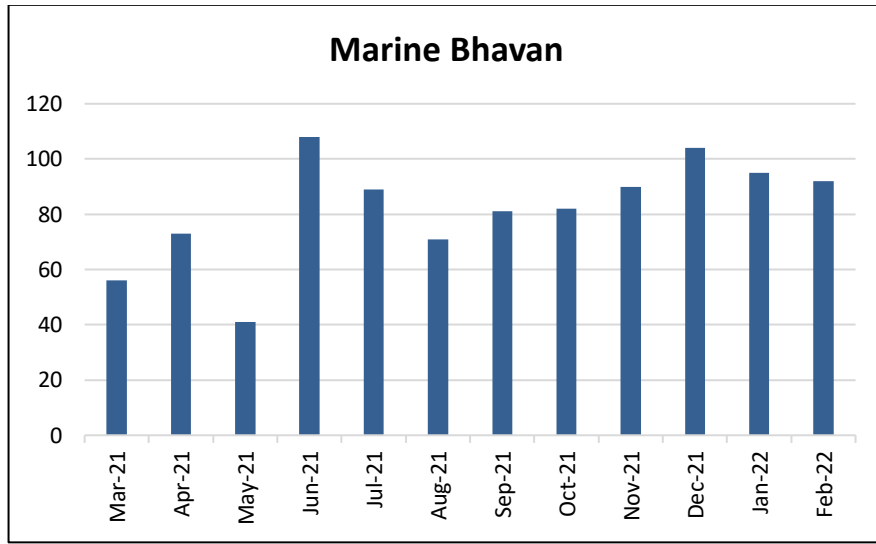
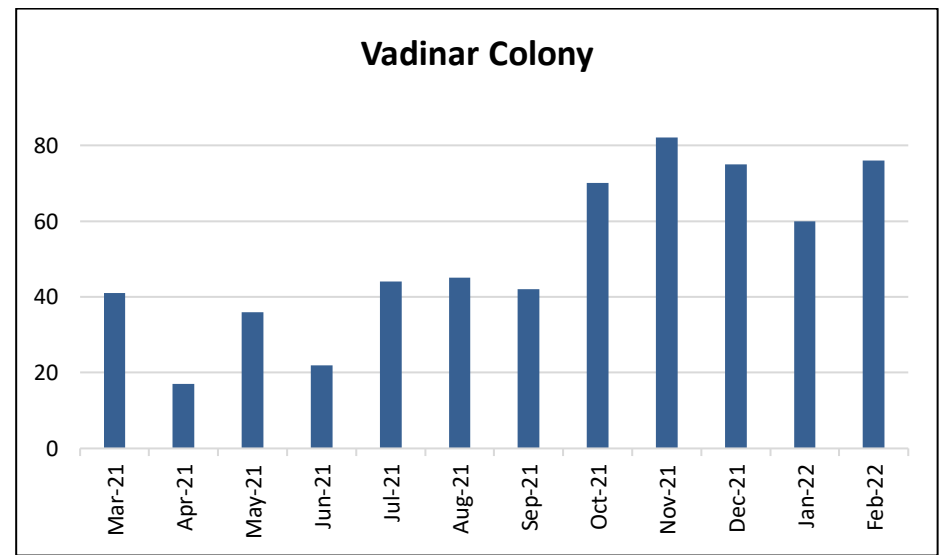
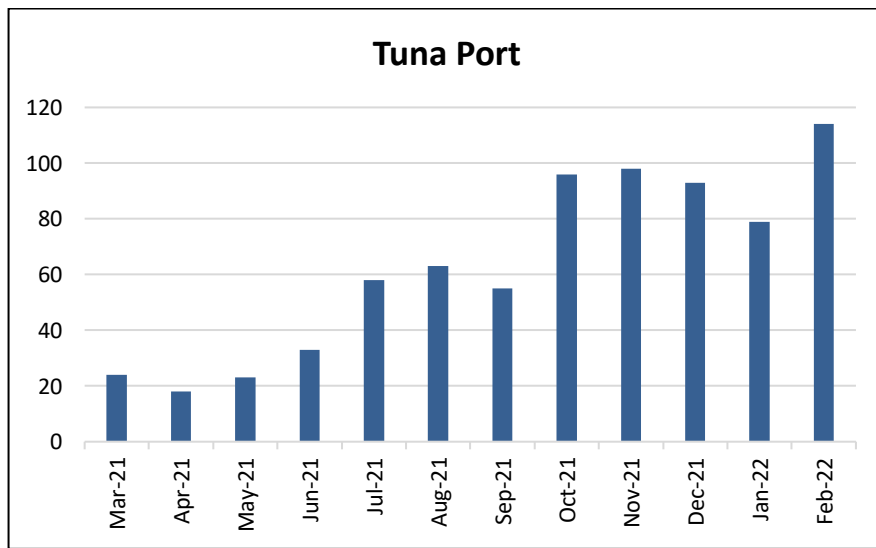
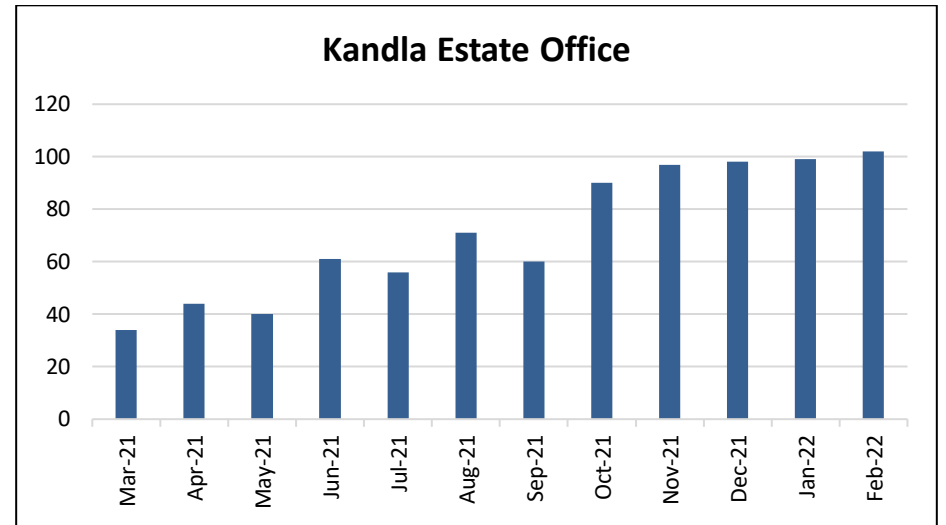
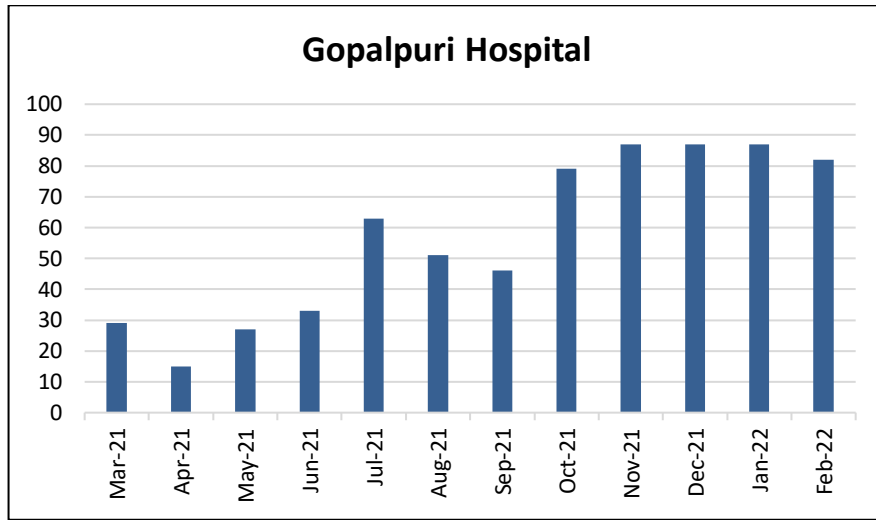


Fig 6. Trend in PM2.5 values of various AAQ Monitoring Locations





5.2 Drinking Water Quality Monitoring

Drinking Water Quality Monitoring was carried out at twenty stations at Kandla, Vadinar & Town ship Area of Deendayal Port.

Drinking water samples are collected from 20 locations (18 locations in Kandla and 2 locations in Vadinar). Samples for physico-chemical analysis are collected and analysed in laboratory for various parameters, viz. Color, Odor, Turbidity, Conductivity, pH, Chlorides, TDS, Total Hardness, Iron, Sulphate, Salinity, DO, BOD, Na, K, Ca, Mg, F, NO₃, NO₂, Mn, Cu, Cd, As, Hg, Pb, Zn, Bacterial Count (CFU).

Monitoring Results

Mean values of drinking water of Deendayal Port Locations are given in table 6.4. The values shown are the annual average of all the locations of Deendayal Port Colony, Port and Harbor area as well as Deendayal Port Authority office buildings.

Table 11 : Annual average values of Drinking water at Deendayal Port Authority

Sr. No	Parameter	Unit	1 st	2 nd	3 rd	4 th	Value	Acceptable Limits	Permissible Limits
			Quarter Mean	Quarter Mean	Quarter Mean	Quarter Mean	(Annual Avg.)		
1	pH	pH Unit	7.38	7.41	7.46	7.38	7.41	6.5 to 8.5	6.5 to 8.5
2	Total Dissolved Solids	mg/L	1114.30	1083.67	1265.93	1155.75	1154.91	500	2000
3	Turbidity	NTU	0.53	0.48	0.47	0.45	0.48	1	5
4	Odor	-	Odorless	Odorless	Odorless	Odorless	Odorless	Agreeable	Agreeable
5	Color	Hazen Units	Colorless	Colorless	Colorless	Colorless	Colorless	5	15
6	Conductivity	µs/cm	2253.97	2064.35	2448.83	2108.38	2218.88	NS*	NS*
7	Bio.Oxygen Demand	mg/L	<2	<2	<2	<2	<2	NS*	NS*
8	Chloride as Cl	mg/L	651.10	579.99	484.50	539.53	563.78	250	1000
9	Ca as Ca	mg/L	74.21	59.34	62.83	61.72	64.53	75	200
10	Mg as Mg	mg/L	62.90	68.23	71.90	65.22	67.07	30	100
11	Total Hardness	mg/L	443.03	415.20	403.03	436.67	424.48	200	600
12	Iron as Fe	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	0.3	1
13	Fluorides as F	mg/L	0.45	0.69	0.55	0.64	0.58	1	1.5
14	Sulphate as SO ₄	mg/L	211.96	193.41	229.75	220.67	213.95	200	400
15	Nitrite as NO ₂	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	NS*	NS*
16	Nitrate as NO ₃	mg/L	5.29	10.23	9.92	10.04	8.87	45	100
17	Salinity	%	1.26	1.05	0.88	0.97	1.04	NS*	NS*
18	Sodium as Na	mg/L	329.18	228.77	219.20	268.63	261.45	NS*	NS*
19	Potassium as K	mg/L	4.13	2.94	3.80	4.43	3.82	NS*	NS*
20	Manganese	mg/L	<0.04	<0.04	<0.04	<0.04	<0.04	0.1	0.3
21	Hexavalent Chromium	mg/L	<0.04	<0.04	<0.04	<0.04	<0.04	NS*	NS*
22	Copper	mg/L	<0.04	<0.04	<0.04	<0.04	<0.04	0.05	1.5
23	Cadmium	mg/L	<0.04	<0.04	<0.04	<0.04	<0.04	0.003	0.003
24	Arsenic	mg/L	<0.04	<0.04	<0.04	<0.04	<0.04	0.01	0.05
25	Mercury	mg/L	<0.04	<0.04	<0.04	<0.04	<0.04	0.001	0.001
26	Lead	mg/L	<0.04	<0.04	<0.04	<0.04	<0.04	0.01	0.01
27	Zinc	mg/L	<0.04	<0.04	<0.04	<0.04	<0.04	5	15
28	Bacterial Count	CFU/100 ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent

NS= Not specified, ND=Not detected

Discussion

The colour of all drinking water samples was colourless unit and odour of the samples was also agreeable. The values of turbidity, Iron as Fe and Ammonia as NH₃-N were observed to be below detection limits of measurement i.e. <0.1NT, <0.03mg/L and <0.1mg/L respectively. Apparently these parameters were not at alarming levels. Some important parameters for drinking water are discussed below in detail;

pH

pH value in the studied area varied from 7.37 to 7.47 pH unit during the first year of monitoring. The limit of pH value for drinking water is specified as 6.5 to 8.5. All the sampling points showed pH values within the prescribed limit by Indian Standards.

Total Dissolved Solids (TDS)

TDS values in the studied area varied between 1073.73-1201.26 mg/L. The mean TDS value was 1154.9 mg/L. None of the sampling points showed higher TDS values than the prescribed limit by Indian standards which are 500-2000mg/L.

Conductivity

Conductivity is used to measure the concentration of dissolved solids which have been ionized in a polar solution such as water. The conductivity in the samples collected during the month of June ranged from 2149.36-2320.63 µs/cm. Electrical conductivity standards do not appear in BIS standards for drinking water.

Chlorides

Chloride values in drinking water for the present year varied between 507.6 -647.63 mg/L. Excessive chloride concentration increase rates of corrosion of metals in the distribution system. This can lead to increased concentration of metals in the supply.

Calcium

Calcium value in drinking water for the present year the studied area varied between 62.32 – 68.91 mg/L. The mean Ca was observed to be 64.52 mg/L. If calcium is present beyond the maximum acceptable limit, it causes incrustation of pipes.

Magnesium

Magnesium value in the studied area for the present year varied from 65.80mg/L to 68.26 mg/L. All the locations had Magnesium within the prescribed limits of 30-100mg/L.

Total Hardness

Total Hardness value in the studied area for the present year varied between 389.03-447.43 mg/L. The prescribed limit by Indian Standards is 200-600mg/L.

Fluoride

Fluoride value in the studied area varied between 0.48 – 0.65 mg/L. The permissible limit as per Indian Standards is 1.0-1.5mg/L. Moderate amount of fluoride in water lead to dental effects, but long-term ingestion of large amounts can lead to potentially severe skeletal problems.

Sulphates

Sulphate value in the studied area varied between 195.75–225.46 mg/L. All the sampling points showed Sulphates values within the prescribed limits by Indian Standards (200-400 mg/L). Sulphate occurs naturally in water as are sult of leaching from gypsum and other common minerals. Sulphate content in drinking water exceeding the 400 mg/L imparts bitter taste.

Nitrites (NO₂)

Nitrite values in all the water samples were observed to be <0.01 mg/L. There are no specified standard values for Nitrites in drinking water. Ground water contains nitrate due to leaching of nitrate with the percolating water and by sewage and other wastes rich in nitrates.

Salinity

Salinity in drinking water in the present samples collected ranged from 0.92to 1.23 %. There are no prescribed Indian standards for salinity in Drinking water.

Heavy Metals in Drinking Water

In the present study period drinking water samples were analyzed for Mn, Cr, Cu, Cd, As, Hg, Pb and Zn. All these heavy metals were well below/ the permissible limits of the Indian Standards for drinking water.

Bacteriological Study

Analysis of the bacteriological parameter at all location shows that total Coliform values is observed to be 0.1 to cfu/100 ml. total Coliform and E-Coli values showed that all the drinking water samples were safe from any bacteriological contamination.

Conclusion

The results are compared with acceptable limits as well as Permissible Limits as prescribed in IS10500:2012 – Drinking Water Specification. It was observed from the data analysis that during the Third year (March 2021 to February 2022) the drinking water was safe for human consumption as per tested parameters only at all drinking water monitoring stations.

5.3 Marine Water Monitoring

Marine Water Monitoring was carried out at six stations at Deendayal Port and two locations at Vadinar Port.

Water samples were analyzed for physico-chemical and Biochemical parameters. Besides these, Phytoplankton (Qualitative & Quantitative) Zooplankton (Qualitative & Quantitative) & Benthos (Qualitative & Quantitative) samples were collected during spring tide and neap tide from all the eight fixed monitoring stations.

Results

The annual average values of monitored parameters for marine waters of DPA are given as per table 12.

Table 12. Annual average values of various physico-chemical parameters at Deendayal Port during neap tide. (Marine Sampling Station at Gulf of Kutch).

Sr. No.	Parameters	Unit	1st	2nd	3rd	4th
			Quarter Mean	Quarter Mean	Quarter Mean	Quarter Mean
1	pH	-	7.30	7.35	7.36	7.39
2	Color	-	Colorless	Colorless	Colorless	Colorless
3	Odor	-	Odourless	Odourless	Odourless	Odourless
4	Salinity	ppt	32.51	32.24	31.82	31.80
5	Turbidity	NTU	26.56	35.05	36.78	35.71
6	Total Dissolved Solids	mg/L	40307.26	39446.10	39151.25	34126.11
7	Total Suspended Solids	mg/L	468.54	393.35	503.95	630.73
8	Total Solids	mg/L	43192.33	41383.94	39672.71	34818.14
9	DO	mg/L	5.11	4.57	4.82	4.45
10	COD	mg/L	79.05	83.13	84.56	85.60
11	BOD	mg/L	0.00	0.00	0.00	0.00
12	Silica	mg/L	0.57	0.56	0.67	0.78
13	Phosphate	mg/L	0.29	0.25	0.19	0.20
14	Sulphate	mg/L	3499.62	2586.77	2451.53	2493.91
15	Nitrate	mg/L	4.15	3.23	3.80	3.97
16	Nitrite	mg/L	0.01	0.00	0.00	0.00
17	Calcium	mg/L	518.97	557.01	522.61	578.93
18	Magnesium	mg/L	1588.81	1739.01	1150.32	1680.46
19	Sodium	mg/L	9976.72	10571.44	10635.22	10265.40
20	Potassium	mg/L	314.39	367.85	324.11	343.54
21	Iron	mg/L	1.81	1.67	1.61	0.81
22	Chromium	mg/L	0.14	0.15	0.13	0.04
23	Copper	mg/L	0.07	0.10	0.04	0.00
24	Arsenic	mg/L	0.00	0.00	0.00	0.00
25	Cadmium	mg/L	0.06	0.07	0.06	0.02
26	Mercury	mg/L	0.00	0.00	0.00	0.00
27	Lead	mg/L	0.16	0.17	0.12	0.02
28	Zinc	mg/L	0.06	0.06	0.04	0.11

Discussion

Coastal ecosystems are characterized by daily fluctuations, driven by tidal amplitude, wind direction and also on the anthropogenic activities carried out on the coasts. Marine water parameters at Kandla Harbor and creek waters also showed an high array of fluctuations in several of its parameters such as TDS, TSS, salinity and salts. Some of the important parameters are explained below;

pH

The pH of all marine water samples collected from Deendayal Port varied from 7.3 to 7.39. The mean pH of all samples was 7.64 pH unit.

Salinity

Salinity in the DPA marine water ranged from 31.8 ppt to 32.51 ppt. The mean salinity at was recorded to be 32.09 ppt.

Turbidity

Turbidity in the DPA marine water ranged from 26.56 – 36.78 NTU. The mean turbidity of all the locations of Deendayal Port was 33.52 NTU. Turbidity at Vadinar port was <1.0 NTU.

Total Dissolved Solids (TDS)

TDS values varied from 34126.11 to 40307.26 mg/L at all locations of Deendayal Port. Mean TDS values at Deendayal Port was 38257.68 mg/L.

Dissolved Oxygen (DO)

DO value in the studied area varied between 4.45-5.11 mg/L. The mean DO values of Kandla Marine waters were 4.7 mg/L.

Nitrates (NO₃)

The mean Nitrate values in all the marine water samples were of Deendayal Port was 3.78 mg/L at DPA waters. Nitrite was rarely detected from marine waters of Vadinar.

Sodium (Na)

Sodium value in the Deendayal Port marine waters varied between 9976.72-10635.22 mg/L. The mean Na recorded at DPA waters was 11448.78 mg/L.

Trace Metals

In the present study period water samples were analyzed for Mn, Cr, Cu, Cd, As, Hg, Pb and Zn. All these heavy metals reported below trace levels.

Bacteriological Study

Analysis of the bacteriological parameter at all location shows that total Coli form values is observed to be 0.1 to cfu/100ml.

5.4 Productivity Study

Chlorophyll-A

Water Samples for the chlorophyll estimation collected from sub surface layer during high tide and low tide period of the tidal cycle for each sampling locations and analysed for Chlorophyll -a and after acidification for Pheophytin –a.

In the sub surface water chlorophyll-a was varying from 0.204 to 1.923 mg/m³ in harbour region of DPA during sampling done in from March 2021 to February 2022. In the nearby creeks chlorophyll-a was varying from 0.153.93 to 1.923mg/m³.

In the sub surface water chlorophyll-a was varying from 0.392 – 1.356mg/m³ at Vadinar jetty and 0.392 mg/m³ to 1.365 mg/m³ near SPM during sampling done spring tide period and during Neap tide.

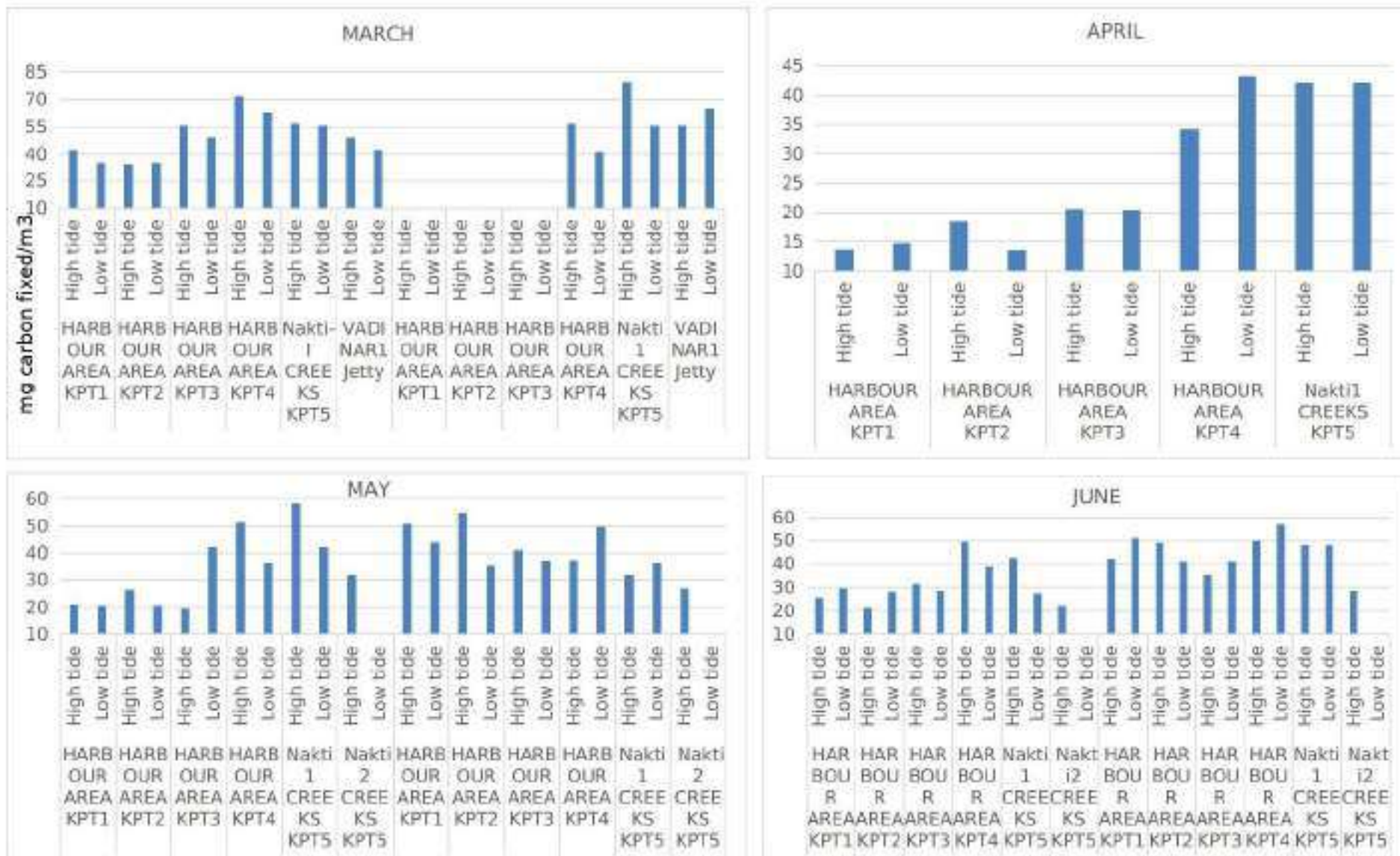
Algal Biomass

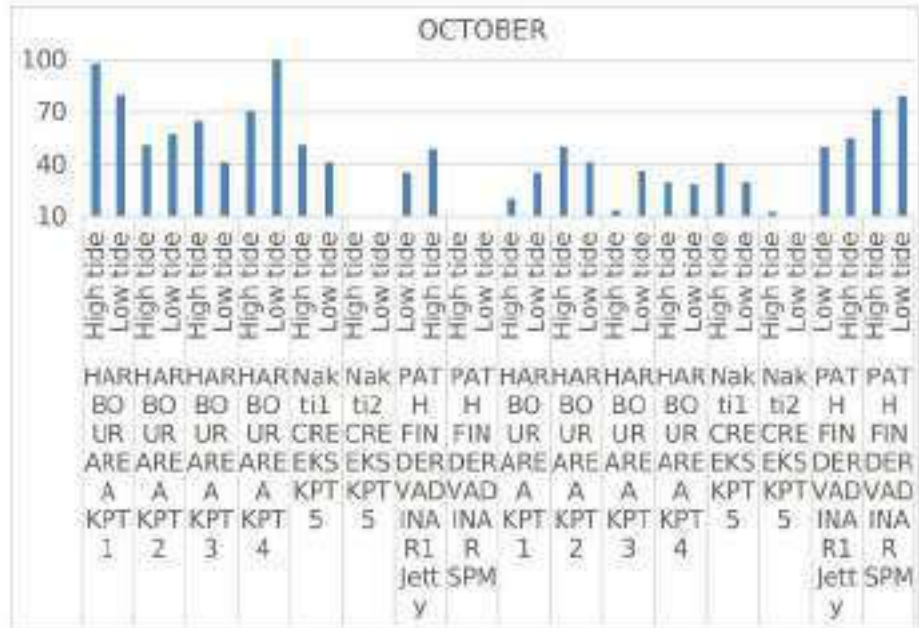
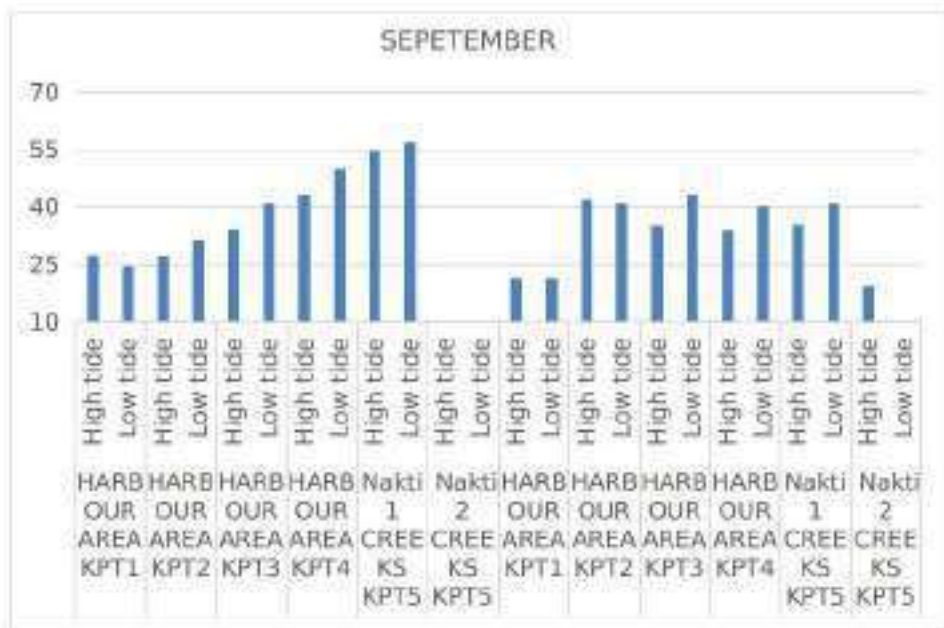
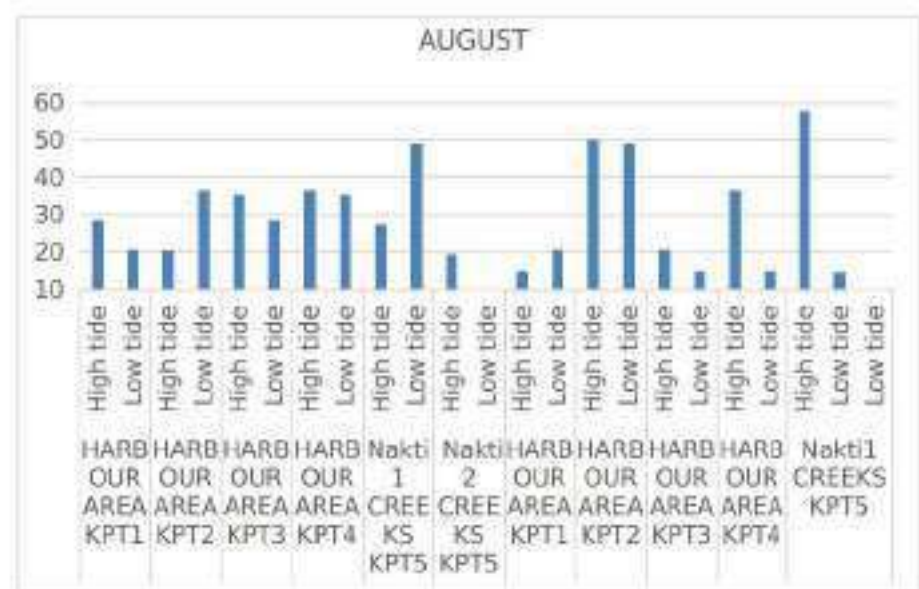
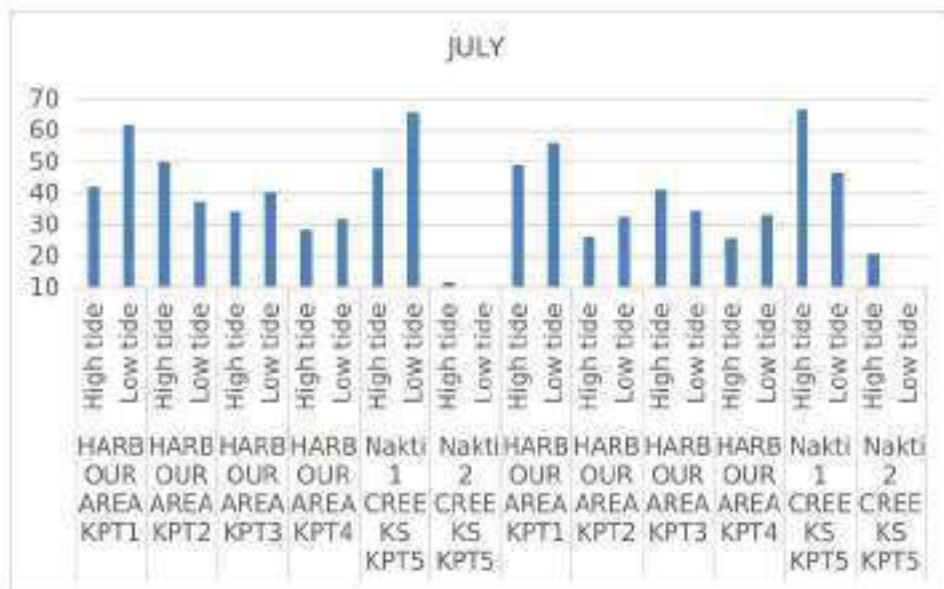
Chlorophyll-a value was used as algal biomass indicator (APHA 23rd Edition). Algal biomass was estimated by converting Chlorophyll value.

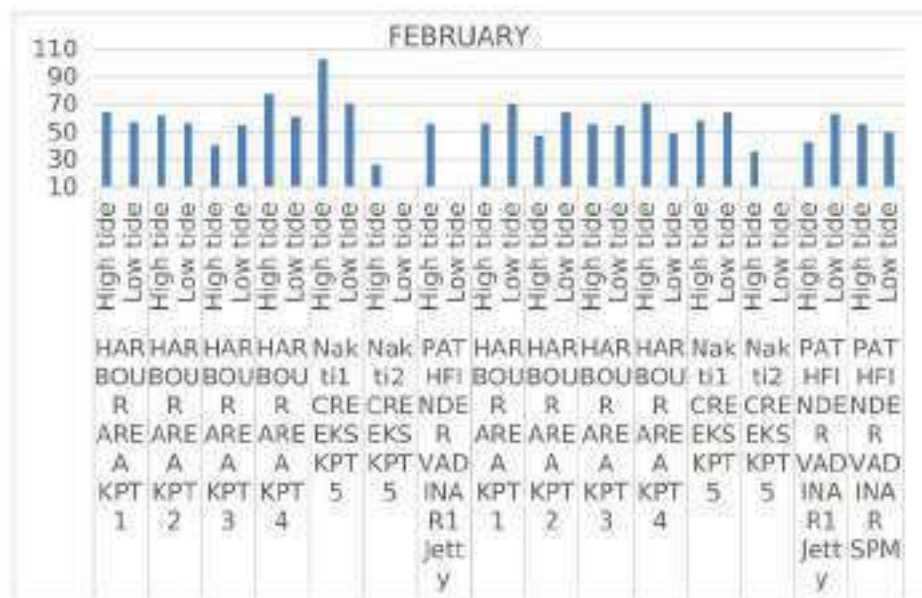
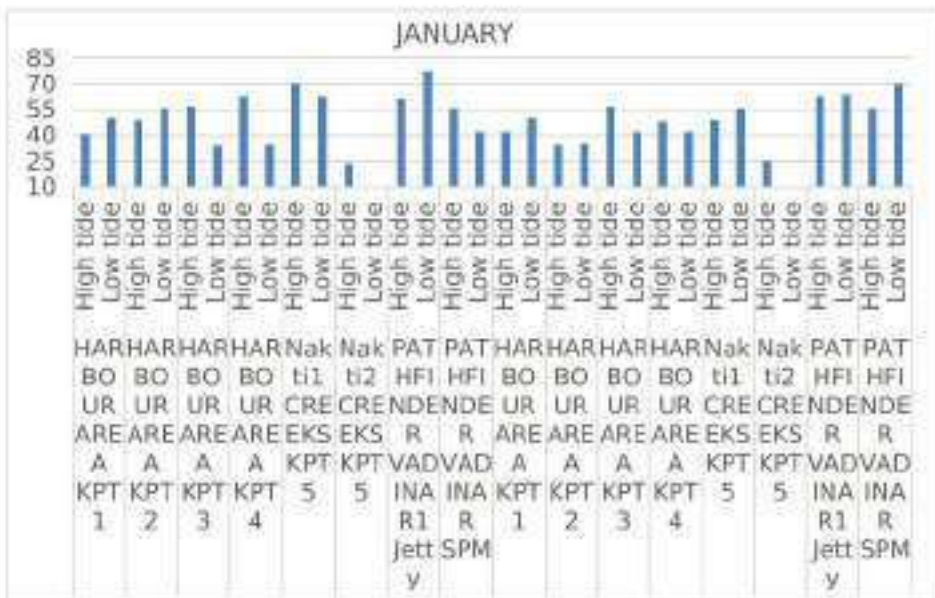
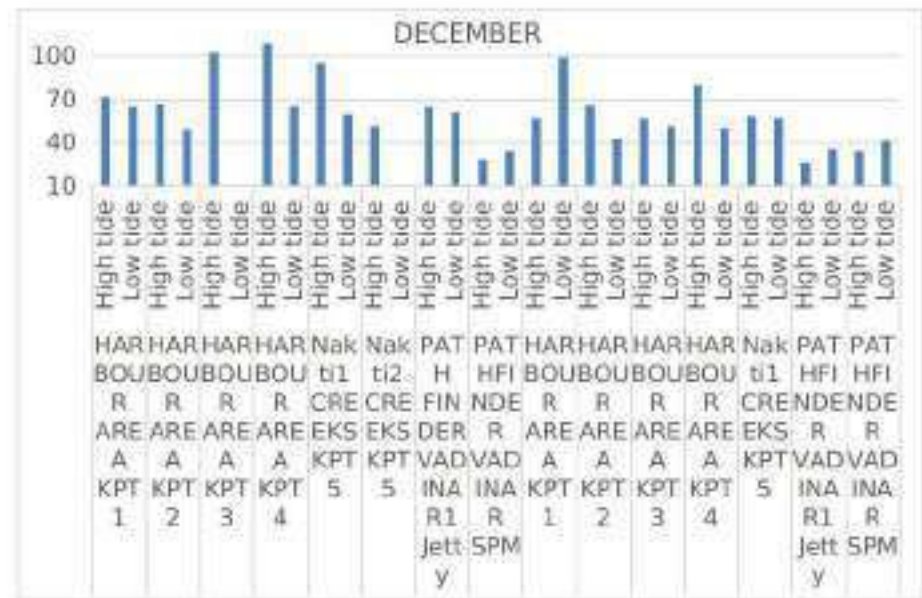
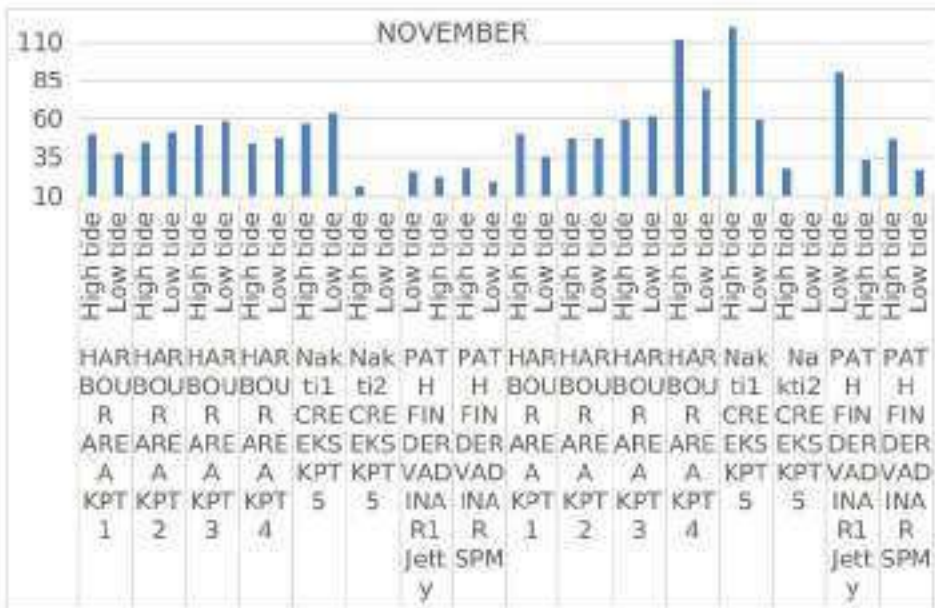
In the sub surface water algal biomass was varying from 13.66 to 128.84mg/m³ in harbour region of DPA during sampling done in from March 2021 to February 2022. In the nearby creeks Algal Biomass was varying from 10.24 to 128.84mg/m³.

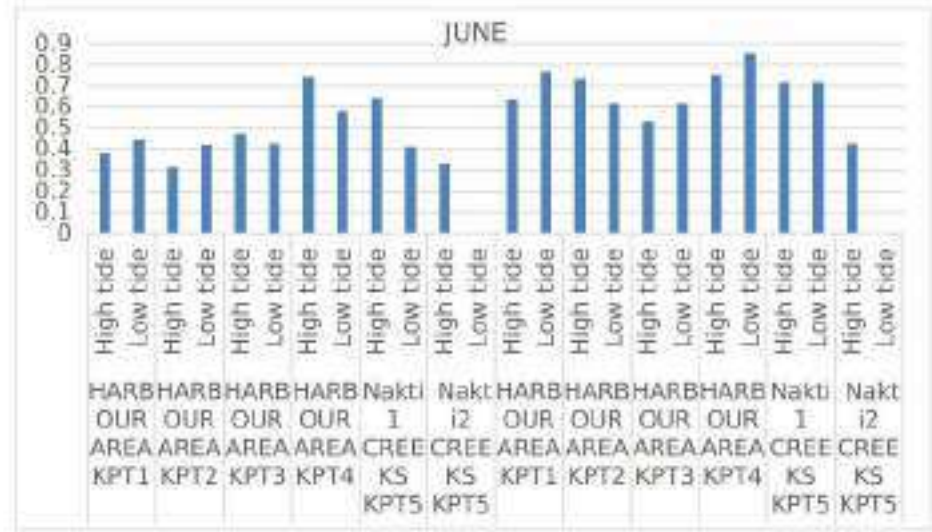
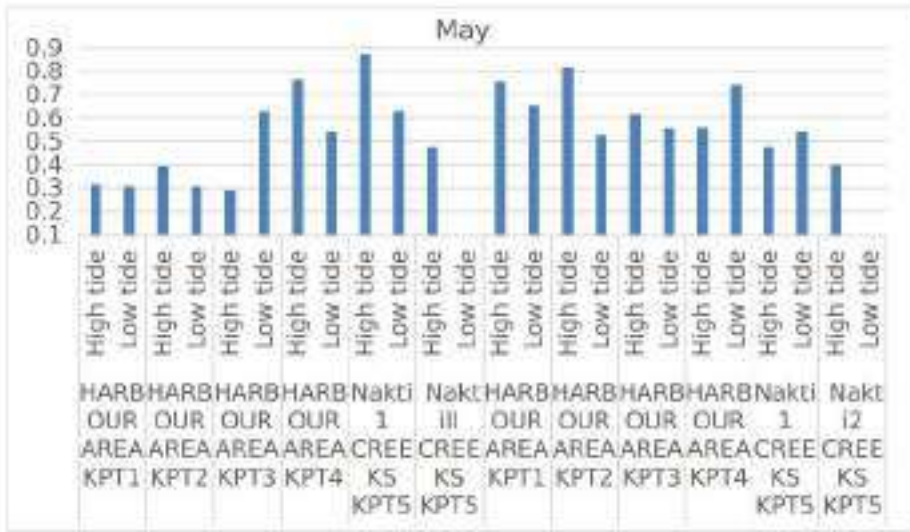
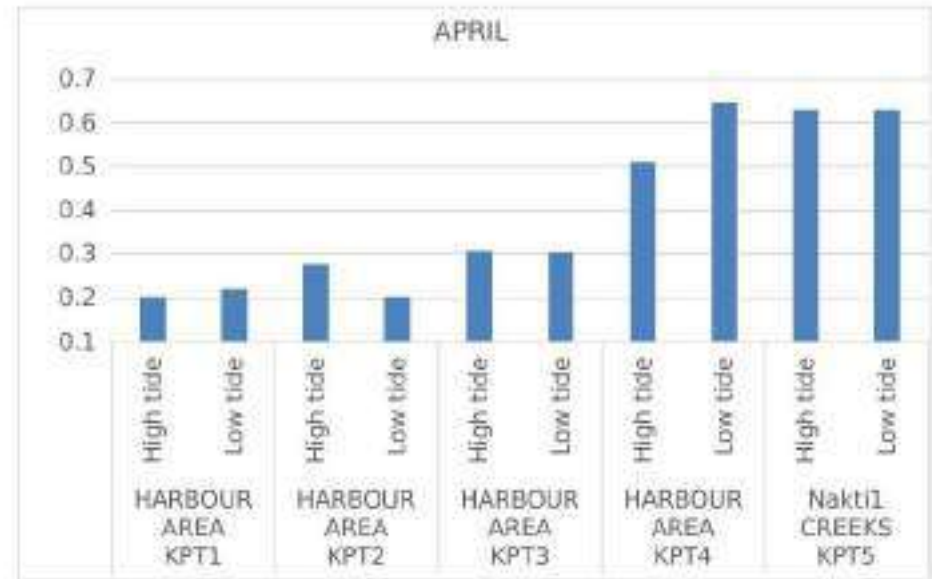
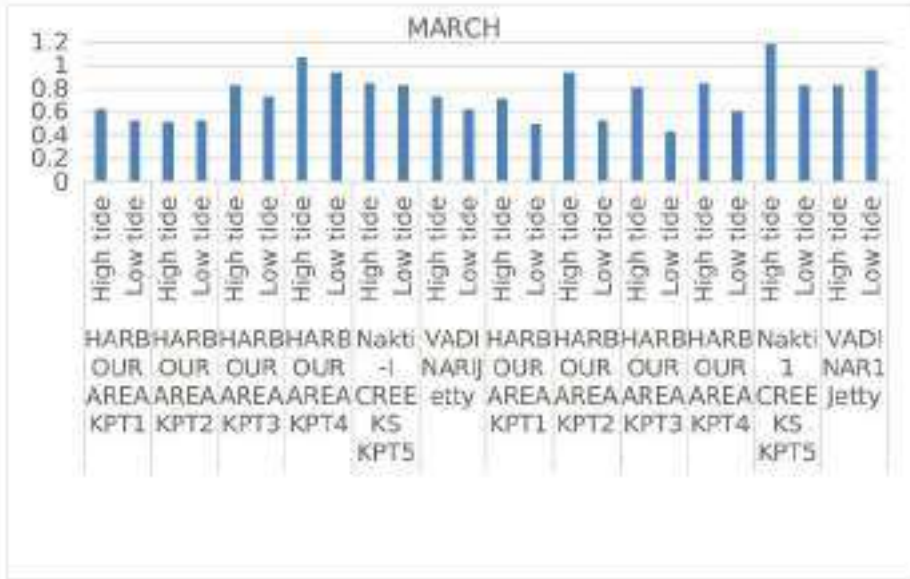
In the sub surface water algal biomass was varying from 26.26 – 90.85mg/m³ at Vadinar jetty and SPM during sampling done spring tide period and during Neap tide.

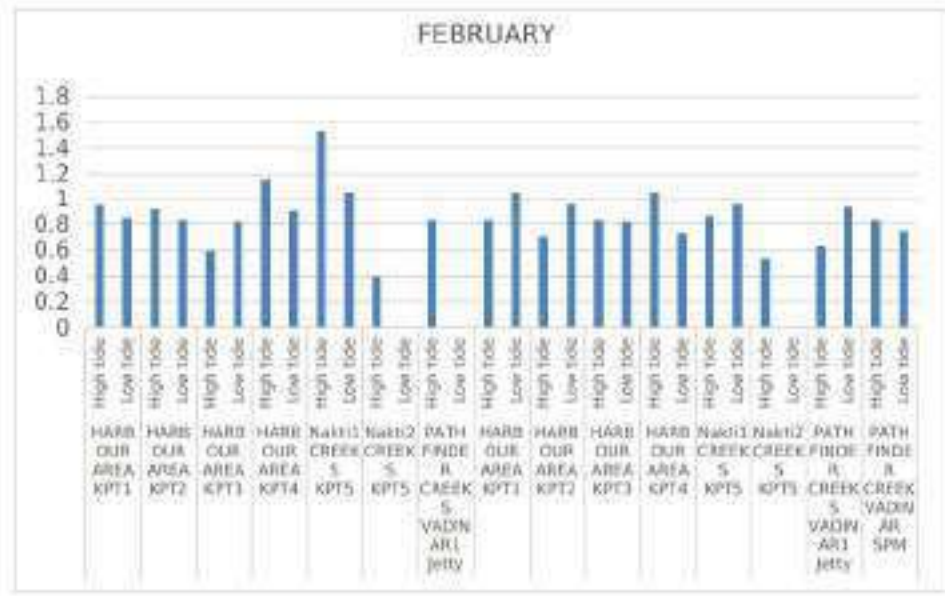
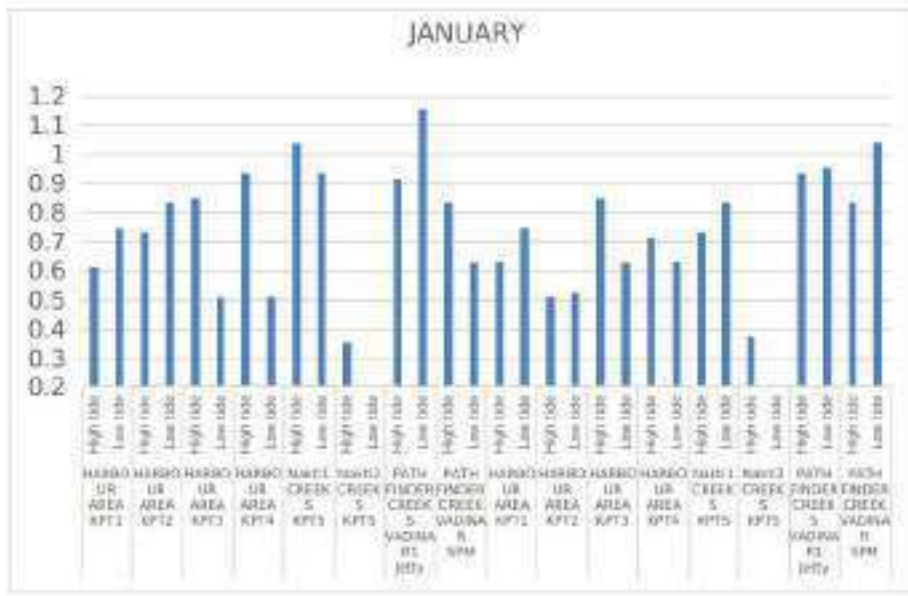
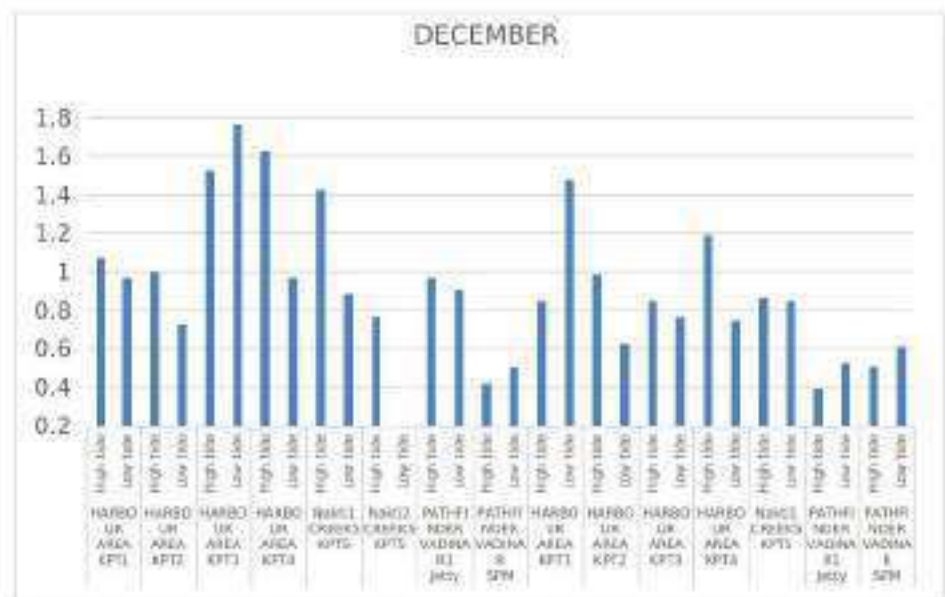
Fig 7. Monthly values of Algal Biomass in harbor waters of DPA











5.5 Phytoplankton and Zooplankton

The phytoplankton community of the sub surface water in the harbour and nearby creeks was represented by Blue green algae and diatoms during spring tide period and neap tide period. Diatoms were represented by 13 genera belonging to 3 classes, 9 orders and 12 families.

The Zooplankton community of the sub surface water in the harbour and nearby creeks is comparatively low and represented by mainly four groups Tintinids, Copepods, Foramiferans, and larval forms of Crustaceans.

However, Vadinar waters were observed to be rich in terms of diversity and abundance of phytoplankton and zooplanktons.

5.6 Noise Monitoring

Noise monitoring is carried out as per “Noise Pollution” (Regulation and Control) Rules, 2000. The results of noise monitoring results are annual mean of each location of Kandla and Vadinar Port (Table 13).

Table 13. Annual avg. of noise level at locations of Kandla (10 locations) and Vadinar (3locations) Port

Sr. No.	Locations	Day Time Average Noise Level(SPL) in dB(A)	Night Time Average Noise Level(SPL) in dB(A)
		6 A.M.. And 10 P.M.	10 P.M. To 6 A.M.
1	Marine Bhavan	62.35	55.14
2	Nirman Building 1	58.41	53.72
3	Tuna Port	55.51	48.87
4	Main Gate North	62.58	57.54
5	West Gate I	66.68	60.97
6	Canteen Area	59.64	51.94
7	Main Road	65.06	56.39
8	ATM Building	67.37	58.00
9	Wharf /Jetty Area	69.50	64.12
10	Port & Custom Office	58.51	48.77
Vadinar Port			
11	Nr. Vadinar Port Gate	59.25	52.99
12	Port Colony Vadinar	57.42	54.11
13	Nr. Vadinar Jetty	63.58	59.08

Observations:

- The Day Time Average Noise Level in all ten locations at Deendayal Port ranged from 55.51dB to 69.50dB
- The noise levels were within the day time limits (75 dB (A)) of industrial area.
- The Night Time Average Noise Level in all ten locations of Deendayal Port ranged from 48.77 dB to 64.12 dB and it was within the permissible limits of 70 dB A for the industrial area for the night time.
- The mean day time noise levels at Vadinar were 60.08dB and the mean noise levels at night hours was 55.39dB.

5.7 Soil Monitoring

Sampling and analysis of soil samples was under taken at six locations with in the study area (Deendayal Port and Vadinar Port). The soil monitoring locations are coastal soils and exhibits saline soil characteristics, typical of a muddy shore.

The texture of soil of all locations was Sandy Loam. The soil at all the locations is saline in nature. The mean pH of the soil at all the locations of Kandla was 8.08 pH unit suggesting it to be slightly to medium alkaline.

Electrical conductivity of the soil was high with low moisture and organic carbon indicating less productivity of the soil and its unsuitability for any agriculture activities.

Other metals like copper, nickel and lead were detected in traces or within permissible limits. The overall surrounding soils were found to be less in essential nutrients, hence less suitable for plant growth.

Table 14. Tuna port Soil Analysis Result

Sr.No	Month		March.21	April.21	May.21	June.21	July.21	Aug.21	Sept.21	Oct.21	Nov.21	Dec.21	Jan.22	Feb.22
	Parameter	Unit	Result											
1	Texture		Sandy Loam											
2	pH	-	8.71	9.02	8.38	7.3	8.56	8.6	8.58	8.62	8.42	8.2	8.2	8.59
3	Electrical conductivity	µs/cm	10600	8650	29500	33400	26800	23400	18400	16200	14070	10805	10805	2839
4	Moisture	%	21.72	22.9	14	21.45	23.66	20.42	21	17	18.17	6.06	6.06	22
5	Total Organic Carbon	%	1.62	2.25	0.94	0.31	0.16	0.18	0.48	0.52	0.2	0.49	0.49	0.96
6	Alkalinity	mg/kg	40.04	80.08	80.08	100.1	140.14	60.06	72.07	60.06	80.08	70.07	70.07	40.04
7	Total Nitrogen	%	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	BQL	BQL	BQL	BQL
8	Chloride	mg/kg	1244	2605.8	7896.2	6228.7	3908.6	4010	1506.6	1620	1956.8	709	709	3545
9	Sulphate	mg/kg	102	107.82	2502.08	2056.4	203	188	202	230	212	778.5	778.5	3891.18
10	Phosphorus	mg/kg	31.44	39.86	0.76	0.97	0.97	0.9	0.89	0.9	2.2	9.21	9.21	50.87
11	Potassium	mg/kg	1178	1028	1128	1161	779.4	786	386	396	539	143	143	192.3
12	Calcium	mg/kg	4843	228.4	320.64	641.3	2241	2341	1585	1620	5752	1315.7	1315.7	2466.12
13	Sodium	mg/kg	501	12092.4	11092.4	10821.6	144.29	160	228.46	230.32	200.4	152.3	152.3	284.57
14	Copper as Cu	mg/kg	52.2	62.2	10.2	11.21	42.6	32.2	52.2	17.4	14.9	35.9	35.9	26.2
15	Lead as Pb	mg/kg	5	4.8	5.4	3.1	4.2	3.8	4.9	6.4	5.8	13.4	13.4	7.5
16	Nickel as Ni	mg/kg	33.3	32.86	16.7	20.71	36.2	37.2	46.2	33.5	35.3	54.5	54.5	39.1
17	Zinc as Zn	mg/kg	56.2	58.26	22.6	32.26	58.6	59.36	66.2	55.9	40.6	89.7	89.7	58.2
18	Cadmium as Cd	mg/kg	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL

Table15. IFFCO Plant Soil Analysis Result

Sr.No	Month		March.21	April.21	May.21	June.21	July.21	Aug.21	Sept.21	Oct.21	Nov.21	Dec.21	Jan.22	Feb.22
	Parameter	Unit	Result											
1	Texture		Sandy Loam											
2	pH	-	7.98	8.78	8.25	8.16	8.11	8.1	8.16	8.1	7.92	7.77	7.77	8.6
3	Electrical conductivity	µs/cm	28900	36200	44400	48500	23800	20420	25620	26820	16210	22960	22960	1442
4	Moisture	%	23.97	22.1	20.91	13.94	22.09	21.16	22.2	18.2	9.01	6.4	6.4	28.37
5	Total Organic Carbon	%	6.29	1.4	1.52	0.19	0.24	0.18	1.24	1.02	0.49	0.69	0.69	0.71
6	Alkalinity	mg/kg	40.04	60.06	60.06	140.14	140.14	140.04	36.04	80.44	120.12	26.03	26.03	40.04
7	Total Nitrogen	%	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	BQL	BQL	BQL	BQL
8	Chloride	mg/kg	2487	4510	6866.3	6032.5	4309.5	4324	6381	5380	4112.2	4325.9	4325.9	2481.5
9	Sulphate	mg/kg	204	311.7	804.5	75.86	177.9	179.2	196	198	279	3359.5	3359.5	1650.89
10	Phosphorus	mg/kg	21.25	52.7	2.45	1.41	0.8	0.86	0.92	0.82	1.89	10.56	10.56	5.33
11	Potassium	mg/kg	1715	747	762	592.2	644.4	656	820	810	327.4	199.8	199.8	155.01
12	Calcium	mg/kg	4710	468.9	661.32	561.12	3556.8	3618	3386	3400	4061.6	1116.4	1116.4	1500.32
13	Sodium	mg/kg	601	4840.2	5832.2	2992.8	128.22	130	741.5	722.2	488.98	360.72	360.72	432.86
14	Copper as Cu	mg/kg	60.8	52.5	26.2	27.22	61.2	58.2	78.2	38.8	29.5	29.9	29.9	35.6
15	Lead as Pb	mg/kg	1	1.52	8.5	6.2	3.2	3.8	5.6	7.9	6.4	9.3	9.3	10.8
16	Nickel as Ni	mg/kg	27.52	22.62	2020	1823	31.6	32.4	28	13.9	16.6	30.8	30.8	42.9
17	Zinc as Zn	mg/kg	43.2	59.2	89.1	72.62	39.25	38.32	41.6	91.9	104.8	153.2	153.2	102.7
18	Cadmium as Cd	mg/kg	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL

Table 16. Khori Creek Soil Analysis Result

Sr.No	Month	Unit	March.21	April.21	May.21	June.21	July.21	Aug.21	Sept.21	Oct.21	Nov.21	Dec.21	Jan.22	Feb.22
	Parameter		Result											
1	Texture		Sandy Loam											
2	pH	-	8.75	8.82	8.13	8.36	8.38	8.42	8.46	8.75	8.44	8.53	8.53	8.68
3	Electrical conductivity	µs/cm	8500	16380	39900	21800	23700	23700	17880	16252	13680	22260	22260	1950
4	Moisture	%	19.04	21.2	28.1	18.82	24.41	23.22	24.1	19.1	21.39	9.02	9.02	21
5	Total Organic Carbon	%	1.46	2.2	1.7	0.26	0.32	0.25	0.48	0.62	0.2	0.61	0.61	0.98
6	Alkalinity	mg/kg	60.06	60.06	70.05	80.08	100.1	140.04	190.19	140.2	60.06	52.05	52.05	40.04
7	Total Nitrogen	%	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	BQL	BQL	BQL	BQL
8	Chloride	mg/kg	1144	3658.1	7160.6	2550.3	6114	5982	1701	1820	1800.9	3970.4	3970.4	2836
9	Sulphate	mg/kg	120	129.05	356.6	292	113.8	110	112	120	93.3	315.3	315.3	1292.27
10	Phosphorus	mg/kg	17.74	34.55	7.79	0.79	1.24	1.04	1.05	0.96	1.41	6.92	6.92	8.87
11	Potassium	mg/kg	903	698.4	578.4	700.2	1135.8	1162	345	366	409.2	139	139	160.36
12	Calcium	mg/kg	4235	284.6	460.92	701.4	3981.6	4220	2303	2122	3954	1234.8	1234.8	1839.79
13	Sodium	mg/kg	200	7437.6	6336.6	3164.4	168.3	170	248.5	252	252	144.29	144.29	232.46
14	Copper as Cu	mg/kg	40.6	38.6	29.4	28.2	38.2	42.2	46.2	21.2	9.8	30.8	30.8	31.8
15	Lead as Pb	mg/kg	4.2	3.62	31	23	3.6	3.6	3.2	29.1	3.5	11.1	11.1	5.4
16	Nickel as Ni	mg/kg	31.62	29.62	9	7.8	39.4	41.2	33.2	34.5	23.5	44.1	44.1	42
17	Zinc as Zn	mg/kg	46	42.62	95.8	65.9	52.4	53.4	68	77.9	25.4	76.8	76.8	76.7
18	Cadmium as Cd	mg/kg	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL

Table 17. Nakti Creek Soil Analysis Result

Sr.No	Month		March.21	April.21	May.21	June.21	July.21	Aug.21	Sept.21	Oct.21	Nov.21	Dec.21	Jan.22	Feb.22
	Parameter	Unit	Result											
1	Texture		Sandy Loam											
2	pH	-	8.39	8.68	7.91	8.26	8.33	8.3	8.26	8.33	8.23	8.02	8.02	8.47
3	Electrical conductivity	µs/cm	13340	4790	38200	37200	16260	17200	16520	17520	9240	14090	14090	2848
4	Moisture	%	22.65	4.13	26.2	14.26	23.65	20.12	18.8	20.22	21.08	23.84	23.84	24.88
5	Total Organic Carbon	%	1.61	0.7	1.58	0.24	0.1	0.11	3.93	3.1	0.72	0.87	0.87	0.84
6	Alkalinity	mg/kg	40.04	80.08	70.05	140.14	80.08	60.06	90.09	80.44	100.1	44.04	44.04	40.04
7	Total Nitrogen	%	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	BQL	BQL	BQL	BQL
8	Chloride	mg/kg	1386	4359.7	9416.7	7160.6	3959	4001	1878.9	2078	514.7	3048.7	3048.7	3190.5
9	Sulphate	mg/kg	214	299.4	3966.5	87.84	93.8	100	112	118	165.1	574.7	574.7	4950.89
10	Phosphorus	mg/kg	35.87	50.04	1.66	1.59	1.77	1.62	1.1	1.02	2.15	4.76	4.76	8.5
11	Potassium	mg/kg	743	865.8	755.8	765	766.8	780	422	460	667.6	121.9	121.9	178.48
12	Calcium	mg/kg	3453	493	821.64	661.32	3038.4	3122	1990	2012	1477	1426.3	1426.3	2450.29
13	Sodium	mg/kg	501	7165.8	6355.8	3736.8	224.4	220	468.94	470.42	470.42	192.38	192.38	492.9
14	Copper as Cu	mg/kg	21.2	19.2	33.7	31.78	22.6	23.4	33.8	35.1	27.6	25.8	25.8	25
15	Lead as Pb	mg/kg	6.8	2.8	15.3	11.4	3.8	4.1	4.8	7.6	8.2	10.5	10.5	7.6
16	Nickel as Ni	mg/kg	22.02	19.22	25.4	15.1	22.6	24.5	26.1	13.2	37.7	39.6	39.6	31.9
17	Zinc as Zn	mg/kg	62	59.8	87.3	77.21	46.6	48.5	49.55	81.9	55.2	59.1	59.1	48.1
18	Cadmium as Cd	mg/kg	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL

Table 18. Vadinar DPA Admin Site Soil Analysis Result

Sr.No	Month		March.21	April.21	May.21	June.21	July.21	Aug.21	Sept.21	Oct.21	Nov.21	Dec.21	Jan.22	Feb.22
	Parameter	Unit	Result											
1	Texture		Sandy Loam											
2	pH	-	8.46	8.86	8.76	7.27	8.12	8.09	8.02	8.1	7.79	8.07	8.07	7.64
3	Electrical conductivity	µs/cm	585	439	260	511	509	510	523	560	387	1994	1994	1417
4	Moisture	%	7.16	4.62	7.26	6.28	9.44	9.04	8.66	7.26	3.46	4.22	4.22	8.49
5	Total Organic Carbon	%	2.53	0.87	1.16	0.15	0.2	0.21	0.18	0.12	0.85	1.16	1.16	0.32
6	Alkalinity	mg/kg	60.06	40.04	60.06	60.06	100.1	100.1	60.06	60.06	60.06	42.04	42.04	60.06
7	Total Nitrogen	%	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	BQL	BQL	BQL	BQL
8	Chloride	mg/kg	280	90.2	29.43	68.66	39.3	42.2	52	62	21.7	567.2	567.2	141.8
9	Sulphate	mg/kg	330	268	23.2	14.37	13.4	14	12	16	44.7	52.7	52.7	250.38
10	Phosphorus	mg/kg	2.83	5.85	8.5	0.97	0.8	0.78	0.78	0.8	BQL	15.06	15.06	1..88
11	Potassium	mg/kg	131	212.8	302.8	626.4	129.6	130	110	120	70.4	73	73	30.01
12	Calcium	mg/kg	56	244.5	1703.4	124.2	1220	1224	990	910	72.8	65.1	65.1	153.5
13	Sodium	mg/kg	1303	236	246	2116.8	104.2	110	118	110	436.87	460.92	460.92	837.67
14	Copper as Cu	mg/kg	16.6	14.5	80.5	82.66	16.2	17.4	18.6	16.6	88.4	54	54	18.3
15	Lead as Pb	mg/kg	BQL	BQL	BQL	BQL	BQL	BQL	3.2	4.8	BQL	BQL	BQL	BQL
16	Nickel as Ni	mg/kg	26.42	18.26	35.3	25.46	18.3	19.3	18.2	13.2	33.8	42.1	42.1	60.2
17	Zinc as Zn	mg/kg	40	38.3	33.2	23.46	46.8	49.2	24	28	66	51	51	84.6
18	Cadmium as Cd	mg/kg	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL

Table 19. Vadinar DPA Colony Soil Analysis Result

Sr.No	Month	Unit	March.21	April.21	May.21	June.21	July.21	Aug.21	Sept.21	Oct.21	Nov.21	Dec.21	Jan.22	Feb.22
	Parameter		Result											
1	Texture		Sandy Loam											
2	pH	-	8.82	8.49	8.85	7.82	8.42	8.32	8.56	8.22	8.43	7.84	7.84	7.11
3	Electrical conductivity	µs/cm	875	634	513	464	419	400	420	480	314	490	490	299.6
4	Moisture	%	9.67	6.51	6.35	4.56	7.59	8.22	9.02	8.22	3.95	2.86	2.86	3.96
5	Total Organic Carbon	%	2.42	1.04	1.71	0.11	0.12	0.16	0.21	0.2	0.43	1.24	1.24	0.67
6	Alkalinity	mg/kg	60.06	60.06	70.05	100.1	60.06	80.04	100.1	80.44	80.08	40.04	40.04	40.04
7	Total Nitrogen	%	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	BQL	BQL	BQL	BQL
8	Chloride	mg/kg	290	120.3	40.09	78.47	68.7	67.8	67.8	77	113.4	283.6	283.6	70.9
9	Sulphate	mg/kg	210	424	4.02	13.58	15.5	16.2	18	20	27.7	14.7	14.7	BQL
10	Phosphorus	mg/kg	3.36	7.79	7.35	0.97	0.97	0.88	0.86	0.72	1.74	7.06	7.06	BQL
11	Potassium	mg/kg	103	140	152	876.4	180	182	172	160	62	17	17	28.87
12	Calcium	mg/kg	94	196.4	1463	172.3	1445.4	1400	810	888	65.9	15.9	15.9	20.32
13	Sodium	mg/kg	501	126	166	2565	56.11	68	72	82	256.51	328.66	328.66	472.94
14	Copper as Cu	mg/kg	17.4	18.2	71.6	72.42	23	23	28	17	48.4	77	77	62.3
15	Lead as Pb	mg/kg	BQL	BQL	BQL	BQL	BQL	BQL	1.1	2	4.2	6.7	6.7	BQL
16	Nickel as Ni	mg/kg	22.1	21.22	31.8	27.73	21.2	20.4	16.2	12.2	27.3	36.7	36.7	33.3
17	Zinc as Zn	mg/kg	36	35.36	33.5	43.2	38.2	40.4	38.5	36.22	30.5	98.9	98.9	44
18	Cadmium as Cd	mg/kg	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL	BQL

pH

The pH was found at tuna port from 7.3 to 9.02, at IFFCO plant from 7.77 to 8.78, at Khori creek from 8.13 to 8.82, at Nakti creek from 7.91 to 6.68, at Vadinar DPA admin site from 7.7 to 8.86 and 7.11 to 8.85 at Vadinar DPA colony.

Moisture

The moisture was found at tuna port 6.06 to 23.66%, at IFFCO plant 6.4 to 28.37%, at Khori creek 9.02 to 28.1%, at Nakti creek 4.13 to 26.2%, at Vadinar DPA admin site 3.46 to 9.44%, and 2.86 to 9.67% at Vadinar DPA colony.

Electrical conductivity

The Electrical Conductivity was found at tuna port 2839 to 33400 $\mu\text{s}/\text{cm}$, at IFFCO plant 1442 to 48500 $\mu\text{s}/\text{cm}$, at Khori creek 1950 to 39900 $\mu\text{s}/\text{cm}$, at Nakti creek 2848 to 38200 $\mu\text{s}/\text{cm}$, at Vadinar DPA admin site 260 to 1994 $\mu\text{s}/\text{cm}$, and 299.6 to 875 $\mu\text{s}/\text{cm}$ at Vadinar DPA colony.

Total Organic Carbon

The total organic Carbon was found at tuna port 0.16 to 2.25%, at IFFCO plant 0.18 to 6.29%, at Khori creek 0.2 to 2.2%, at Nakti creek 0.1 to 3.93%, at Vadinar DPA admin site 0.12 to 2.53%, and 0.11 to 2.42% at Vadinar DPA colony.

Texture

The texture was found sandy loam for all location.

Cadmium as Cd

The Cadmium was found below quantification limit for all location.

Zinc as Zn

The zinc as Zn was found at tuna port 22.6 to 89.7 mg/kg, at IFFCO plant 38.32 to 153.2 mg/kg, at Khori creek 25.4 to 95.8 mg/kg, at Nakti creek 46.6 to 87.3 mg/kg, at Vadinar DPA admin site 23.46 to 84.6 mg/kg, and 30.5 to 98.9 mg/kg at Vadinar DPA colony.

5.8 Sewage Treatment Monitoring

This involve safe collection of waste water (spent/used water) from wash areas, bathroom, cargo operational units, etc., waste from toilets of various buildings and its conveyance to the treatment plant and final disposal in conformity with the requirement and guide lines of State Pollution Control Board and other statutory bodies.

The waste water is let into sewer network (network of pipes and manholes) and let by gravity and intermittent pumping stations to the main Sewage Treatment Plant (STP).

The Sewage Treatment Monitoring is carried out at Deendayal Port Colony (Gopalpuri), Vadinar Port and Deendayal Port.

STP at Gopalpuri Port Colony

Gopalpuri STP is working properly and overall performance of the existing STP was found satisfactory. The removal efficiency of BOD, TSS was in order. The individual units were also performing well and their removal efficiency is satisfactory. Thus with the sample tested in laboratory the plant is working satisfactory and the individual units are also working well.

STP at Kandla Port

STP with improved capacity of 1.5 MLD at Deendayal Port is operational. The newly installed sewage treatment plant has 1500 cum/day fluidized media reactor based STP to treat domestic waste water generated from the campus and treated water will be utilized for gardening and plantation purpose.

Table 20. Gopalpuri STP Outlet Annual Results

Sr. No.	Parameter	Unit	1st	2nd	3rd	Value	GPCB Prescribed Limit
			Quarter Mean	Quarter Mean	Quarter Mean	(Annual Avg.)	
1	pH	-	7.21	7.36	7.32	7.30	6.5 - 8.5
2	Total Suspended Solids	mg/l	42.94	83.3	105.41	77.22	100
3	Residual Chlorine	mg/l	<0.5	<0.5	<0.5	<0.5	No Limit
4	Chemical Oxygen Demand	mg/l	85.19	96.43	111.01	97.54	100
5	Biochemical Oxygen Demand	mg/l	19.69	25.56	32.87	26.04	30

Table 21. KPT STP Outlet Annual Results

Sr. No.	Parameter	Unit	1st	2nd	3rd	Value	GPCB Prescribed Limit
			Quarter Mean	Quarter Mean	Quarter Mean	(Annual Avg.)	
1	pH	-	7.15	7.37	7.40	7.31	6.5 - 8.5
2	Total Suspended Solids	mg/l	50.21	81.04	100.72	77.32	100
3	Residual Chlorine	mg/l	<0.5	<0.5	<0.5	<0.5	No Limit
4	Chemical Oxygen Demand	mg/l	62.58	90.53	110.26	87.79	100
5	Biochemical Oxygen Demand	mg/l	15.87	24.68	27.25	22.60	30

Table 22. Vadinar STP Outlet Annual Results

Sr. No.	Parameter	Unit	1st	2nd	3rd	Value	GPCB Prescribed Limit
			Quarter Mean	Quarter Mean	Quarter Mean	(Annual Avg.)	
1	pH	-	STP not Working	7.25	7.34	7.30	6.5 - 8.5
2	Total Suspended Solids	mg/l		46.68	55.44	51.06	100
3	Residual Chlorine	mg/l		<0.5	<0.5	<0.5	No Limit
4	Chemical Oxygen Demand	mg/l		62.56	81.72	72.14	100
5	Biochemical Oxygen Demand	mg/l		16.62	22.37	19.5	30

The GPCB specification for pH, TSS, Residual Chlorine , COD and BOD for STP outlet are 6.5 to 8.5 , 100 mg/l, 0.5 mg/l, 100 mg/l and 30 mg/l respectively. The average values for pH at all locations from 7.30 to 7.31, The average values for Total Suspended Solids at all locations from 51.06 to 77.32 mg/l , The average values for COD at all locations from 72.14 to 97.54 mg/l, The average values for BOD at all locations from 19.5 to 26.04 mg/l, Residual Chlorine were found below detectable limit. All parameters for STP outlet are within limit.

5.9 Weather

The data collected from Automatic weather station have been installed and other secondary sources to represent the metrological conditions of the project area has been reviewed and presented below for various attributes such as Temperature, Wind velocity, Relative Humidity, solar radiation, wind direction, Air pressure and Heat index.

Table 23. Weather Results

MONTH		Temperature (°C)	Solar Radiation (w/m ²)	Relative Humidity (%)	Wind Velocity (m/s)	Wind Direction	Air pressure (hpa)	Heat index (°C)
March.21	MIN	28.4	166.7	24.7	1.9	North West	1013.2	29.0
	MAX	36.2	292.3	93.0	10.6		1017.3	43.0
April.21	MIN	31.5	134.4	57.0	1.9	South East	1009.0	24.2
	MAX	42.4	576.6	94.0	9.9		1014.1	48.0
May.21	MIN	32.7	157.7	60.2	2.0	South East	1005.3	38.1
	MAX	37.3	383.3	89.0	8.1		1010.6	47.0
June.21	MIN	29.8	208.3	66.0	2.7	South West	1004.9	35.2
	MAX	34.1	654.8	84.0	13.0		1008.9	44.0
July.21	MIN	28.5	158.4	71.2	2.7	South West	1002.4	36.1
	MAX	32.1	751.7	89.0	13.0		1004.1	43.0
Aug.21	MIN	34.1	232.4	73.0	3.0	South West	1001.2	34.7
	MAX	26.1	682.8	90.0	9.7		1008.3	42.0
Sept.21	MIN	26.7	136.0	83.5	1.9	South West	1002.3	33.5
	MAX	36.2	808.9	98.0	12.0		1010.1	49.0
Oct.21	MIN	26.5	252.2	60.0	1.3	South North	1009.3	33.8
	MAX	38.6	746.6	94.0	8.1		1016.5	55.0
Nov.21	MIN	26.5	252.2	60.0	1.3	South North	1009.3	33.8
	MAX	38.6	746.6	94.0	8.1		1016.5	55.0
Dec.21	MIN	10.5	109.9	39.0	1.7	North West	1018.0	27.0
	MAX	31.8	534.3	93.0	4.4		1021.2	30.0
Jan.22	MIN	12.6	115.3	47.2	1.2	North West	1015.9	27.2
	MAX	30.8	530.7	96.0	5.8		1021.9	32.0
Feb.22	MIN	12.6	119.2	45.6	1.3	North West	1006.3	27.8
	MAX	29.2	530.7	98.0	9.6		1022.0	33.0

Temperature

The min temperature for Deendayal Port was 10.5 °C on December. The maximum temperature was recorded 42.4°C on April.

Solar Radiation

The min Solar Radiation was recorded 109.9 w/m² on December . The maximum solar radiation recorded in the September was 808.9 w/m².

Relative Humidity

The min Relative humidity was recorded 24.7 % on March and maximum Relative humidity recorded was 98.0 % on February.

Wind Velocity and Wind Direction

The min wind velocity was recorded 1.2 m/s on January. Maximum wind velocity recorded was 13 m/s on June. The wind direction was mostly North West and south west throughout the year.

Air pressure

The min Air pressure was recorded 1001.2 hpa in August. Maximum Air pressure recorded was 1022 hpa on February.

Heat index

The min heat index was recorded 24.22 °C in April. Maximum heat index recorded was 55 °C on November.

6.0 Conclusion

A. Ambient Air

Ambient Air Quality monitoring results for the Second year shows TSPM, PM₁₀ and PM_{2.5} concentrations of the ambient air were above the permissible limits as per the National Ambient Air Quality Standards (NAAQS2019). The concentration of PM₁₀ and PM_{2.5} was above the permissible limit at Coal Storage Area, Marine Bhavan and occasionally at Oil Jetty Area and ,Kandla Estate Office, Gopalpuri Hospital Tuna Port area at some occasions.

The concentration of PM₁₀ was within the permissible limit at Vadinar locations except Signal Building in November and Vadinar Colony in October & November above the permissible limit.

Deendayal Port has handled 117.5 MMT to 127 MMT of dry cargo in 2021-22. This huge volume of dry cargo handled at DPA along with high winds in coastal areas causes slight rise in the Ambient Air Quality near coal berth.

Very high volume of dry cargo is being handled (especially coal) at berth no. 7, 8 and 9. Besides handling of coal, thousands of vehicles laded with coal and other dry cargo criss-cross the port/harbor roads causing the rise in suspended particles in the air.

B. Drinking Water Quality

The results of the current year monitoring suggest that, the drinking water parameters of all the locations (18 at Kandla and 2 at Vadinar Port) were found within the permissible limits as per the BIS 10500 (2012) drinking water specification.

C. Noise Quality

The day and night time noise quality was found within the permissible limits of the Noise Pollution (regulation and control) rules, 2000. The Day Time and Night Time Average Noise Level (SPL) in all ten locations at Deendayal

Port were within the permissible limits of 75 dB A (for day time) and 70 dB A (for the night time) for an industrial area.

D. Marine Water Quality

The marine water samples were collected from the harbour area and the creek area and were monitored for 28 different parameters. The mean DO levels of DPA waters ranged from 4.9 mg/L to 6.0 mg/L (mean = 5.6 mg/L), which is normal for marine waters of ports and harbors.

Evaluation of the Phytoplankton and Zooplankton population in DPA harbour area and within the immediate surroundings of the port suggests that the Kandla waters harbours low to moderate diversity and abundance of phytoplankton and zooplanktons.

E. Soil

The soil samples were collected from six locations. The 4 locations of Kandla (Tuna port, Khori Creek, Nakti creek, IFFCO plant) and 2 locations of Vadinar (Vadinar DPA Admin site and Vadinar DPA

colony). Soil samples were collected for monitored 18 different parameter.

The pH was found at tuna port from 7.11 to 9.02 Vadinar DPT colony and Tuna Port. Cadmium was found at all soil sample is BQL. (Below quantification limit).

F. Sewage Treatment Plant

Gopalpuri STP is working properly and overall performance of the existing STP was found satisfactory.

A new STP with improved capacity of 1.5 MLD at Deendayal Port is operational which is working as per the standards of CPCB/GPCB.

At Vadinar Port, a new STP was operational which is working as per the standards of CPCB/GPCB.

6.1. Steps taken by Deendayal Port to improve Environment

- “Safety Week” is being celebrated in Kandla Port by demonstrating mock drill, fire fighting, emergency preparedness, health checkup program etc.
- Regular Safety training and mock drill are being carried out and awareness is being created by lectures among the workers of the Port.
- Personal Protective Equipments (PPE like ear plugs, helmets, safety suits, etc are being used during Port Operational work.
- Sewage generated at Port Area as well as in Port colonies is being properly treated through Sewage Treatment Plants at outside Port area at Kandla and Port colony at Gopalpuri. However, DPA is planning to construct a new STP with the latest technology as the existing one is very old.
- Deendayal Port Authority have planted about one lakhs trees in road side dividers, colony areas at Kandla and Gopalpuri, in green belt area of Gandhidham & Adipur Township, Sewage Treatment Plants at Gopalpuri & Kandla and some green belt development plans initiated at different locations in Township areas.
- Deendayal Port Authority also carries out Environmental Audit through recognized till 2016 from environmental auditor (Schedule) of Gujarat Pollution Control Board from the year 2010 .Three Audit Reports for the year 2010, 2011 and 2012 were already submitted to GPCB as per the norms.
- DPA planted Mangroves in an area of 1500 hectares from 2005 to 2021: Mangrove Plantation Plan carried out in following phases;

1)	Year2005-06–20 hectares
2)	Year2008-09-50 hectares
3)	Year2010-11–100 hectares
4)	Year2011-12–200 hectares
5)	Year2012-13–300 hectares
6)	Year2013-14-330 hectares
7)	Year2015-17-300 hectares
8)	Year 2018- 20 - 100 hectares
9)	Year2020- 21-100 hectares
Total	1500hectares

- Water sprinkling on coal is regularly done to prevent coal dust pollution in the port area.

- To control the dust from bulk cargo like fertilizer, coal, sulphur, etc, the Port-users are encouraged to use hopper during discharge from vessels.
- Annual maintenance contracts have been awarded for garbage collection, cleaning of buildings and roads.
- Deendayal Port Authority is maintaining the records for collection and disposal of Solid Wastes generated from Port area, Residential area and Office Buildings.
- Deendayal Port Authority is regularly submitting the Hazardous Waste Statement in Form – IV and Form V in environment sheet every financial year to the Gujarat Pollution Control Board, Gandhinagar.
- Are port on collection and disposal of the wastes from ships is submitted it to GPCB recognized body on regular basis.
- All trucks before leaving the storage yards are covered with tarpaulin and not over loaded as well as there is no spillage during transportation.
- Sewage generated at Port area and Port colonies is being properly treated through Sewage Treatment Plants outside Port area at Kandla and Port Colony at Gopalpuri.
- Deendayal Port has engaged CPCB/GPCB authorized agencies for the disposal of Hazardous waste (spent / used oil from ships) as per the Hazardous Wastes (Management and Handling) Rules.
- Pollution under Control (PUC) Certificate is mandatory for vehicles and equipments operating in the Port.
- Deendayal Port has awarded several projects to M/s Gujarat Institute of Desert Ecology(GUIDE) ,Bhuj relating to monitoring of Marine environment viz;
 - Regular Monitoring of Marine Ecology of Kandla Port Area since 2017-18
 - Creek Bathymetry
 - Analysis of dredging contaminants
 - Strategic Regional Impact Assessment Studies
 - Assessment and Monitoring of Mangrove Plantation in 1500 Ha area.
 - Biodiversity Action Plan for DPA and its surrounding areas

6.1.1 ISO 14001:2015 - Environmental Management System of Deendayal Port Authority

Deendayal port has appointed QMS India Ltd. As for Continual Improvement of ISO 14001:2015 - Environmental Management System with following scope;

- Review of environmental aspect-impacts,
- Review and monitoring of legal requirement
- Review and monitoring of emergency preparedness
- Management review by every six months
- Training of internal auditors and EMC members
- Active participation during external audit.

6.1.2 Green Ports Initiative

Deendayal Port is committed to sustainable development and adequate measures are being taken to maintain the Environmental well-being of the Port and its surrounding environs. Weighing in the environmental perspective for sustained growth, the Ministry of Shipping had started “Project Green Ports” which will help in making the Major Ports across India cleaner and greener. ‘Project Green Ports’ will have two verticals-one is “Green Ports Initiatives” related to environmental issues and second is “Swachh Bharat Abhiyaan.”

The Green Port Initiatives include twelve initiatives such as preparation and monitoring plan, acquiring equipments required for monitoring environmental pollution, acquiring dust suppression system, setting up of sewage/waste water treatment plants/ garbage disposal plant, setting up Green Cover area, projects for energy generation from renewable energy sources, completion of shortfalls of Oil Spill Response (OSR) facilities (Tier-I), prohibition of disposal of almost all kind of garbage at sea, improving the quality of harbor wastes etc.

Deendayal port has also appointed GEMI as an Advisor for “Making Deendayal Port a Green Port- Intended Sustainable Development under the Green Port Initiatives.

- Deendayal Port has also signed MoU with Gujarat Forest Department in August 2019 for Green Belt Development in an area of 31.942 Ha of land owned by Deendayal Port Authority. The plantation is being carried out by the Social Forestry division of Kachchh.

7. Suggestions

7.1 Ambient Air Quality

PM₁₀ values at Coal storage area, Marine Bhavan, Oil Jetty and Tuna Port were occasionally found above the permissible standards and PM_{2.5} was occasionally found above permissible limits at Coal storage area. (100µg/m³ for PM₁₀& 60 µg/m³ for PM_{2.5}). The principle reason for higher PM₁₀ values at Coal Storage and Marine Bhavan are bulk handling of coal, other dry cargo and heavy traffic of transport vehicles.

7.1.1 Sprinkling

- Heavy duty Water sprinklers should be used inside port where large scale dry cargo is handled.
- Mobile air Sprinklers should also be procured, which suppresses the fine dust from blowing during handling of dry cargo.

7.1.2 Enclosed conveyors

- Port users should be motivated to use enclosed conveyors which prevents secondary dust emissions due to wind in the port area.

7.1.3 Mechanized handling systems

- This involves using screw type un loaders which results in much less spillage and loss of material as compared to bucket un loaders. Mechanized systems can also use pre-packed containers for ease and pollution free loading unloading. Diligent use of various systems can keep the pollution due to ports at minimum level.
- Besides these prevention measures, Gujarat Pollution Control Board (GPCB) has also issued guidelines for handling of Coal. Guidelines for Coal Transport, Storage and Handling given below should be strictly followed; (<https://gpcb.gujarat.gov.in/uploads/coal-handling-guidelines1.pdf>)

7.2 GPCB Guidelines for Coal handling units:

(A) Location criteria

- In case of coal handling activities at the ports and jetties or extension thereof, the distance and land use criteria may be relaxed and compensated by advanced/sophisticated pollution control measures and mechanization & thick plantation, however all such ports and jetties, where coal handling is

carried out, shall provide closed conveyor belt and mechanization for handling of coal.

(B) Storage and handling criteria

- Coal handling unit/Agency shall store coal in such a way that coal heap should not be higher than 5 meter and clear distance between two adjoining heaps at G.L. should be 5 meters, so that in case of fire, approach is available.
- There should be mechanized loading/unloading system from the loading /unloading area to the stacking yards and in to the vehicles.
- Coal handling unit/Agency shall take all corrective steps to resolve the issue of air pollution at permitted coal storage/handling area where coal is being stored.

(C) Transport criteria

- Coal handling unit/Agency shall ensure that all trucks before leaving the storage yard shall be showered with water with adequate system, Shall be covered with tarpaulin or any other effective measure/device completely and also that trucks are not overloaded as well as there is no spillage during transportation.
- The vehicle carrying the coal should not be overloaded by raising the height of carriage. Weigh scale shall be provided within the loading area only and port/coal park authority shall ensure that no over loading is done.
- The top of the vehicle should be covered with fixed cover to avoid spillage or dusting of coal.

(D) Pollution prevention criteria

- Coal handling unit/Agency shall provide paved approach with adequate traffic carrying capacity
- Coal handling unit/Agency shall construct compound wall all along periphery of the premises with minimum 9 meters height
- Continuous water sprinkling shall be carried out on the top of the heap at regular intervals to prevent dusting, fire & smoke. To prevent fugitive emission during loading/unloading, fixed pipe network with sufficient water storage and pump shall be installed. Water sprinkling shall be carried out at each and every stage of handling to avoid generation of coal dust or other dust within premises
- Coal handling unit/Agency shall ensure regular sweeping of coal dust from internal and main road and also ensure that there is adequate space for free movement of vehicles.
- The following adequate Air Pollution Control Measures shall be installed and to be operated efficiently.
- Construction of effective wind breaking wall suitable to local condition to prevent the suspension of particles from the heaps.
- Construction of metal road & RCC Pucca flooring in the plot area/godown etc.
- System for regular cleaning and wetting of the floor area within the premises.
- Entire coal storage area/godown should be covered with permanent weather shed roofing and side walls i.e., in closed shed, in case of crushing/sieving/grading activity is carried out (i.e. G. I. Sheet) along with adequate additional APCM should be installed. Coal handling unit/Agency shall carryout three rows plantation with tall growing tress all along the periphery of the coal handling premises, inside & outside of the premises along with road.

- Proper drainage system shall be provided in all coal storage area so that water drained from sprinkling & runoff is collected at a common tank and can be reused after screening through the coal slit or any other effective treatment system.
- All the engineering control measures and state of art technology including covered conveyer belts, mechanized loading and unloading, provision of silo etc. shall be provided in addition to the measures commended in the environmental guidelines for curbing the pollution.

(E) Safety requirement

- Coal handling unit/Agency shall provide adequate fire-fighting measure to avoid any fire or related hazards including adequate water storage facility, and the premises shall be exclusively used for storage of the coal.
- An onsite emergency plan shall be prepared and implemented by coal handling unit.

(F) Legal criteria

- Necessary permission from all the applicable regulatory authorities and adequate steps under the provisions of applicable environmental acts/rules shall be taken.
- Coal handling unit/Agency shall prepare EMP (Environment Management Plan) and implement the same in true spirit and thus maintain overall environment of that area.
- Coal handling unit/Agency shall not carry out the operation of loading/unloading of coal/coal dust at any place, till adequate air pollution control equipment for dust control/suppression are installed and efficiently operated and the consent under the provisions of Air (Prevention & Control of Pollution) Act, 1981 is obtained by the coal yard owners/Coal handling unit/Agency/coal importers.
- Coal handling unit/Agency shall operate continuous Ambient Air Quality Monitoring Stations as per CPCB guideline.
- In case of port which provides the facility to individual developers an agreement/MoU shall be made between port authority and developer for curtailment of pollution. Port authority shall be responsible for supervising and controlling the pollution control related activities and implementation of the environmental guidelines.

7.3 Sewage Treatment Plant at Vadinar

- At Vadinar, the sewage waste water from the colony is connected in to new STP. Is commissioned and fully operational to handle the Sewage Waste Water.

**8.0 ANNEXURE I-A
Ambient Air Quality Standards (NAAQS)**

Pollutants	Time weighted average	Concentration in Ambient air µg/m ³		
		Industrial Areas	Residential /Rural & Other areas	Sensitive Areas
Sulphur Dioxide (SO ₂)	Annual	50	50	20
	24hours**	80	80	80
Respirable Particulate Matter(size>10um) (RPM) PM ₁₀	Annual	60	60	60
	24hours**	100	100	100
Particulate Matter(size>2.5um) PM _{2.5}	Annual	40	40	40
	24hours**	60	60	60
Nitrogen Dioxide (NO ₂)	Annual	40	40	30
	24hours**	80	80	80

- Annual arithmetic mean of minimum of 104 measurements in a year taken twice a week. 24 hourly at uniform interval
- 24 hourly / 8 hourly values should be met 98% of the time in a year. However, 2% of the time, it may exceed but not on two consecutive days

Note:

- National Ambient Air Quality Standard: The levels of air quality with an adequate margin of safety, to protect the public health, vegetation and property.
- Wherever and whenever two consecutive values exceeds the limit specified above for the respective category, it would be considered adequate reason to institute regular/continuous monitoring and further investigations.
- The State Government/State Board shall notify the sensitive and other areas in the respective states within a period of six months from the date of Notification of National Ambient Air Quality Standards. [S.O.384 (E), Air (Prevention & Cont. of Pollution) Act,1981 dated April 11,1994]

ANNEXURE I-B

Drinking Water Standards (BIS)

Sr. No.	Parameter	Unit	Acceptable Limits	Permissible Limits
1	pH	-	6.5 to 8.5	6.5 to 8.5
2	Total Dissolved Solids	mg/L	500	2000
3	Turbidity	NTU	1	5
4	Odor	-	Agreeable	Agreeable
5	Color	Hazen Units	5	15
6	Conductivity	µs/cm	NS*	NS*
7	Bio.Oxygen Demand	mg/L	NS*	NS*
8	Chloride as Cl	mg/L	250	1000
9	Ca as Ca	mg/L	75	200
10	Mg as Mg	mg/L	30	100
11	Total Hardness	mg/L	200	600
12	Iron as Fe	mg/L	0.3	NS*
13	Fluorides as F	mg/L	1	1.5
14	Sulphate as SO ₄	mg/L	200	400
15	Nitrite as NO ₂	mg/L	NS*	NS*
16	Nitrate as NO ₃	mg/L	45	NS*
17	Salinity	%	NS*	NS*
18	Sodium as Na	mg/L	NS*	NS*
19	Potassium as K	mg/L	NS*	NS*
20	Manganese	mg/L	0.1	0.3
21	Hexavalent Chromium	mg/L	NS*	NS*
22	Copper	mg/L	0.05	1.5
23	Cadmium	mg/L	0.003	NS*
24	Arsenic	mg/L	0.01	0.05
25	Mercury	mg/L	0.001	NS*
26	Lead	mg/L	0.01	NS*
27	Zinc	mg/L	5	15
28	Bacterial Count	CFU/100ml	Absent	Absent

*Not specified in IS10500:2012

Bacteriological Standards (for Drinking water)

	Organisms	Requirements
All water intended for drinking		
	(a)E.coliorthermo-tolerant Coli form bacteria	Shall not be detectable in any 100 ml sample
Treated water entering the distribution system		
	a)E.coliorthermo-tolerant Coliformbacteria	Shall not be detectable in any 100 ml sample
	b)Total Coli form bacteria	Shall not be detectable in any 100 ml sample
Treated water in the distribution system		
	a)E.coliorthermo-tolerant Coli form bacteria	Shall not be detectable in any 100 ml sample
	b)TotalColiformbacteria	Shall not be detectable in any 100 ml sample

(BIS specifications (IS10500-2012))

ANNEXURE -I-C

Noise Quality Standards

Area Code	Category of Area	Limits in dB(A) Leq	
		Day Time	Night Time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

- Day Time is recorded in between 6.00 A.M. and 10.00 P.M.
- Night time is recorded in between 10.00 P.M. to 6.00 A.M.
- Silence zone is defined as areas up to 100 meters around such premises as hospitals, educational institutions and courts. The silence zones are to be declared by the Competent Authority.
- Use of vehicular horns, loud speakers and bursting of crackers shall be banned in these zones.
- Mixed categories of areas should be declared as one of the four above mentioned categories by the Competent Authority and the corresponding standards shall apply.

[Source: EPA Notification [G.S.R.1063 (E) dt.26.12.1989 published in the Gazette No.643 dt.26.12.1989.]

Annexure -F

SHORELINE CHANGE STUDY

(DURING THE PERIOD 2009–2021)

**FOR DEENDAYAL PORT AUTHORITY, KANDLA,
KACHCHH DISTRICT, GUJARAT.**

Submitted to

Deendayal Port Authority,
Kandla, Kachchh District, Gujarat.



National Centre for Sustainable Coastal Management
Ministry of Environment, Forest and Climate Change
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1 Introduction

Deendayal port authority also known as Kandla port is in Gandhidham, Kachchh district, Gujarat was constructed in 1950s is the chief seaport for serving western India. This being the first export processing zone and largest port in India has handled million tonnes of cargo. It is India's hub for exporting petroleum, chemicals, Iron and steel, grains and oil in the country. The study area is located at 23° 01" N latitude, 70° 13" E longitude situated in the Kandla creek and is 90 kms from the mouth of Gulf of Kachchh. Due to the development of various facilities in the port, dredging of dumping materials is proposed for maintenance of the port. Thus, Deendayal port has proposed 3 dumping sites, designated at i) 70° 10' 00" E, 22° 51' 00" N ii) 70° 13' 28" E, 23° 04' 28" N – Phang creek iii) 70° 13' 00" E, 22° 56' 31" N – shore channel. Any alteration in these study sites would change the shoreline morphology of the coast. This may eventually lead to coastal erosion and accretion at several sites. Therefore, it is necessary to study site specific short term shoreline change rate which will be estimated using satellite images for the year 2009-2021.

2 Data used and Methodology

Short-term shoreline change for the study is based on the analysis of five satellite images for the period between 2009 to 2021 respectively shown in **Table 1**.

Table 1: Data source for extraction of shoreline

Year of Pass	Satellite	Resolution
2009	Worldview/GeoEye/ Cartosat PAN	2 m 2.5 m
2012	Aerial photo	9 cm GSD
2016	LISS IV	5 m
2019	WorldView3 / Sentinel	2 m 10 m
2021	Cartosat 2 series/3 MX LISS IV	2 m 5 m

The following figure 1 describes the flow diagram of shoreline change analysis.

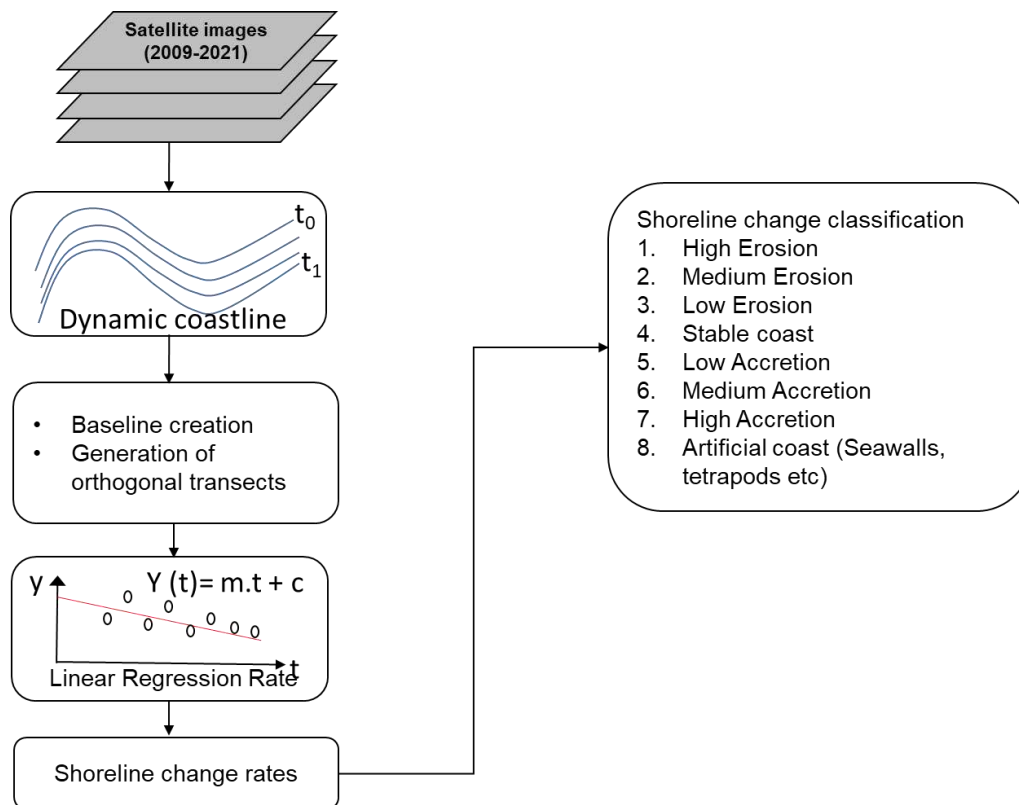


Figure 1: Workflow diagram for Shoreline change rate analysis

3 Pre-processing of Satellite Images

Extraction of shoreline positions from these data sources involves georeferencing of satellite images using aerial photos and subsequently digital image classification of shoreline positions. Rigorous geometric correction of the satellite images is done for the following systematic and non-systematic errors. Systematic errors are corrected through analysis of system characteristics and ephemeris such as scan skew, mirror-scan velocity variance, panoramic distortion, platform velocity, and earth rotation. Non-systematic errors are mainly corrected for variation in altitude and sensor platform attitude using Ground Control Points (GCPs) (Jensen, 1996). Rectification of Satellite images involves georeferencing process i.e. process of assigning map coordinates to image data. In this study image-to-image, registration was applied to rectify satellite images using orthophotos as reference image in ERDAS Imagine software. Georeferencing of all satellite images using orthophotos i.e to a common coordinate system is necessary in order to compare the historical images for analyzing the shoreline change rates of the entire Indian coast. The following steps were adopted for georeferencing the satellite images using orthophotos.

- Acquisition of images and preprocessing of metadata
- Acquisition of Ground Control Points (GCPs) in Image coordinates and map coordinates i.e for X, Y pairs.

- Computation of unknown parameters of mathematical functions used for the geometric correction model for the set of satellite images.
- Resampling technique used for image rectification.

4 Shoreline Extraction

The next step is to extract shoreline position from these georeferenced satellite images. Shoreline indicators were used to identify the morphological features and non-morphological features using satellite images for the years 2009, 2012, 2016, 2019 and 2021.

4.1 Shoreline Indicator

Because of its dynamic nature of the idealized shoreline boundary, practically shoreline indicators are adopted in defining the boundary. A shoreline indicator is a feature used as a proxy (fig.1) to represent the true shoreline position (Boak et al, 2005). In this study different shoreline indicators were adopted based on morphological and non-morphological features: i) Morphological features include vegetation line, berm crest, and cliff toe ii) non-morphological features include wet/dry line, high water line and iii) Man-made Structures such as seawalls. These are selected based on location, data source, and scientific preference used to analyse the shoreline change, (Hapke et al, 2010). Extraction of shoreline indicators have been processed through various image processing techniques.

4.2 Shoreline Proxies

Visual image interpretation technique for delineating shoreline was adopted manually for identifying the feature. Image interpretation is carried out using elements of visual interpretation techniques such as tone, size, shape, texture, pattern, colour and association. Using these elements, identified features like berm line, dune vegetation line, swash line, base of bluff/cliff, high water line, seawall and salt pan on the satellite images were mapped.

- Berm crest:** This is the nearly horizontal portion of the beach or backshore formed by the deposit of materials by wave action at the time of high tide. Some beaches have no berms; others have one or several. In the case of multiple berms, the most landward crest of the berm was chosen in the case of wide sandy beaches.
- Beach cusp:** The beach cusp is a crescent-shaped followed by accumulation of sand surrounding a semicircular depression on a beach. They are formed by swash action and the spacing of the cusps is related to the horizontal

extent of the swash motion. Coarser sediments are found on the steep-gradient, seaward pointing 'cusp horns'.

- c) **Dune Vegetation line:** Coastal sand dunes are ridges or a series of ridges that form at the rear of the beach. The toe of the foreshore face of the dune is considered as shoreline.
- d) **High water line:** High water line (HWL) is considered as the best shoreline indicator by many researchers, because they mark the effective shoreline and is equivalent to "wet/dry line". HWL is the previous tide which is clearly identifiable from all images and is found most appropriate to analyse the shoreline changes.
- e) **Onshore structures:** Visual image interpretation technique is used to identify Coastal engineering structures such as seawalls, embankments, fence line were identified from high resolution satellite images and aerial photos. Seawall towards landward was consider for shoreline mapping, so that major significant change in long and short term rates was computed.

5 Digital Shoreline System Analysis (DSAS) model

Multiple shorelines extracted from satellite images were used to calculate shoreline change rates using Digital Shoreline Analysis System (DSAS) model developed by United States Geological Survey (USGS) in an ArcGIS environment (Thieler and other, 2009). DSAS employs the single-transect method (ST) to calculate change rates and rate uncertainties at regularly spaced transects (measurement locations) alongshore. ST uses various methods (for example, end point rate, least squares, weighted least squares) to fit a trend line to the time series of historical shoreline positions at a transect. ST is the most commonly utilized method for calculating shoreline change (for example, see Fletcher and others, 2003; Morton and others, 2004; Morton and Miller, 2005; Hapke and others, 2006; Hapke and Reid, 2007).

To calculate the rate of change, statistical baselines were constructed on the landward side at a distance of ~100 m adjacent to the series of shoreline positions. Transects were spaced approximately at 100m intervals alongshore, roughly perpendicular to the trend of the shoreline. Rates of short-term (12 years) shoreline change were calculated using the linear regression method included in the Digital Shoreline Analysis

6 Computation Rates of erosion/ accretion using Linear Regression Rate (m/yr)

In this study, Linear Regression Rate (LRR) will be used for expressing the rate of change since it includes all the available time-series shorelines. A linear regression rate-of-change statistic was determined by fitting a least-squares regression line to all shoreline points for a particular transects. The regression line is placed so that the sum of the squared residuals (determined by squaring the offset distance of each data point from the regression line and adding the squared residuals together) is minimized. The linear regression rate is the slope of the line. The method of linear regression includes these features: 1) All the data are used, regardless of changes in trend or accuracy, 2) The method is purely computational, 3) The calculation is based on accepted statistical concepts, and 4) The method is easy to employ. Shorelines were not delineated nor change rates calculated for ports, breakwaters, groynes, seawalls, river deltas because of the high natural variability and complexity of these shoreline reaches.

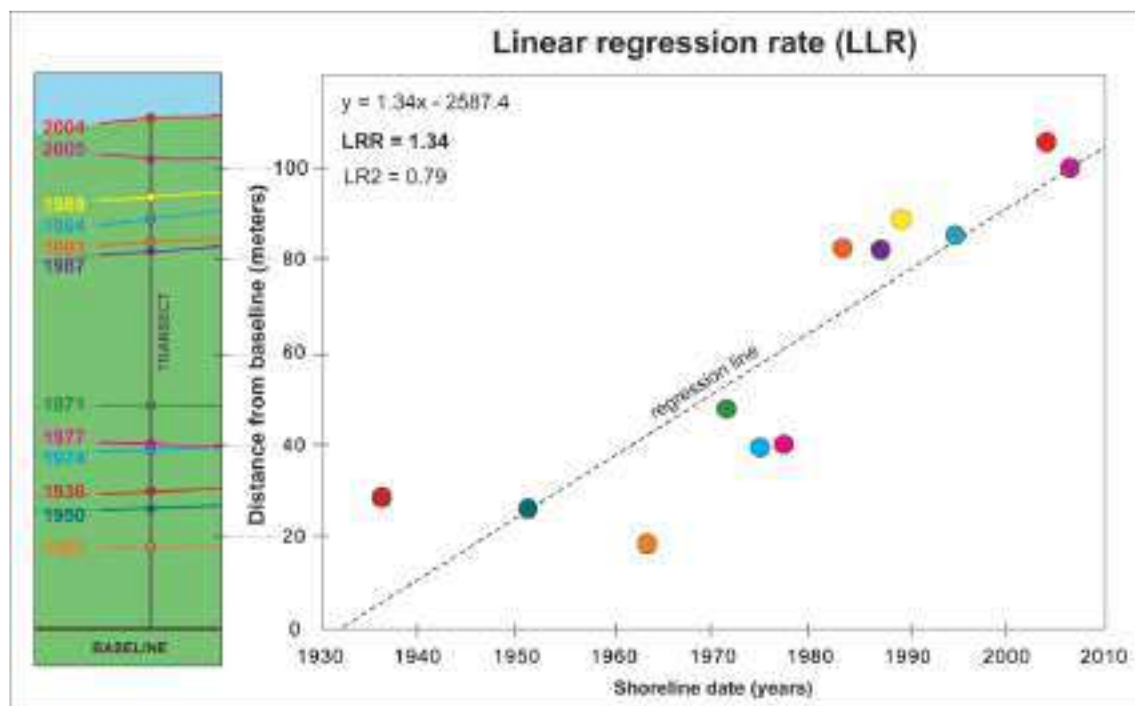


Figure 2: Shoreline position graph plot of the Linear Regression Rate transect
(Source: Himmelstoss et al., 2018)

These shoreline change rates have been categorized into eight classes as erosion (high, medium and low erosion) and accretion (high, medium and low accretion), stable and artificial coast as shown in **Table 2**.

Table 2: Classification of Shoreline Change Rates

Categories	Rate of Erosion/Accretion (m/yr)
High Erosion	≥ -5
Medium Erosion	-2 to -5
Low Erosion	-0.5 to -2
Stable Coast	-0.5 to 0.5
Low Accretion	0.5 to 2
Medium Accretion	2 to 5
High Accretion	≥ 5
Artificial coast	<i>Presence of boulders, tetrapods, and other shore protection structures along the coast</i>

7 Results

The shoreline change analyzed for Deendayal port authority is about 150km in length. The high resolution satellite images reveal that the coast is now dominated by accretion. The coast experiences 20% erosion, 34% stable coast and remaining 46% accretion. Based on LRR calculations the coast is classified into 7 categories and out of 150 km, high erosion is occupied by 12 km (7.6%), medium erosion by 7 km (5%), low erosion by 10 km (7%). Almost 51 km of the coast showed no change. While, 50 km of the coast has high accretion, 11 km has medium accretion and 8 km has low accretion shown in **Table 3**.

Figure 3 depicts that i) the western region of the study is predominantly accreting while southern side of the Tuna jetty has high erosion. ii) mouth of Nakti creek has erosion for a stretch of about 5 km may be due to the river mouth dynamics. iii) about 4.4 km of the coast has erosion at the mouth of Kandla creek while the coast inside the creek and near Deendayal port has accretion and stable. iv) south of Hansthal creek has erosion for about 5 km. Thus the coast is less affected by erosion due to natural activities.

Table 3: Shoreline change statistics for Deendayal port (2009-2021)

Shoreline Classification	Length (km)	% of Erosion and Accretion	Cumulative % of Erosion and Accretion
Length of Coastline (km)	149.80		
High Erosion	12.37	8.26	
Medium Erosion	7.17	4.78	
Low Erosion Zone	10.28	6.86	19.91
Stable Coast	50.92	33.99	33.99

Shoreline Classification	Length (km)	% of Erosion and Accretion	Cumulative % of Erosion and Accretion
High Accretion	49.80	33.25	
Medium Accretion	11.48	7.66	
Low Accretion	7.77	5.19	46.10

The shoreline of this region is divided into 3 regions:

- Region1: Chela Nadi to South of Nakti Creek
- Region2: North of Nakti creek to South of Kandla creek
- Region3: North of Kandla creek to South of Hansthal creek

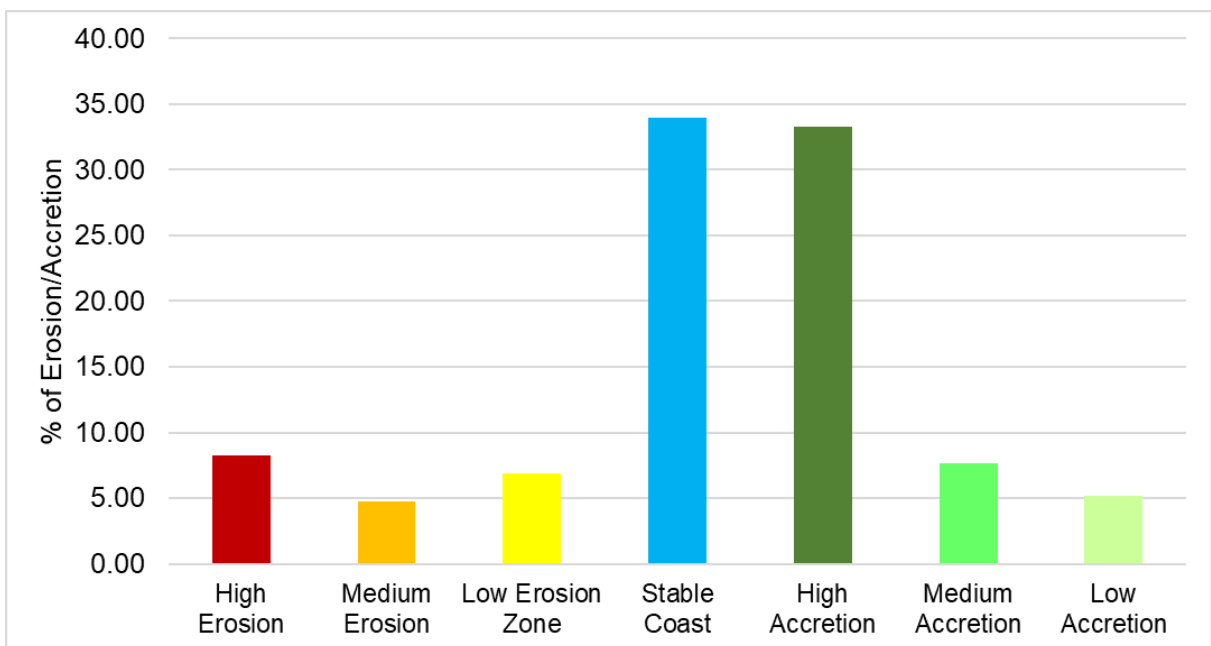


Figure 3: Percentage of erosion/accretion for the study area

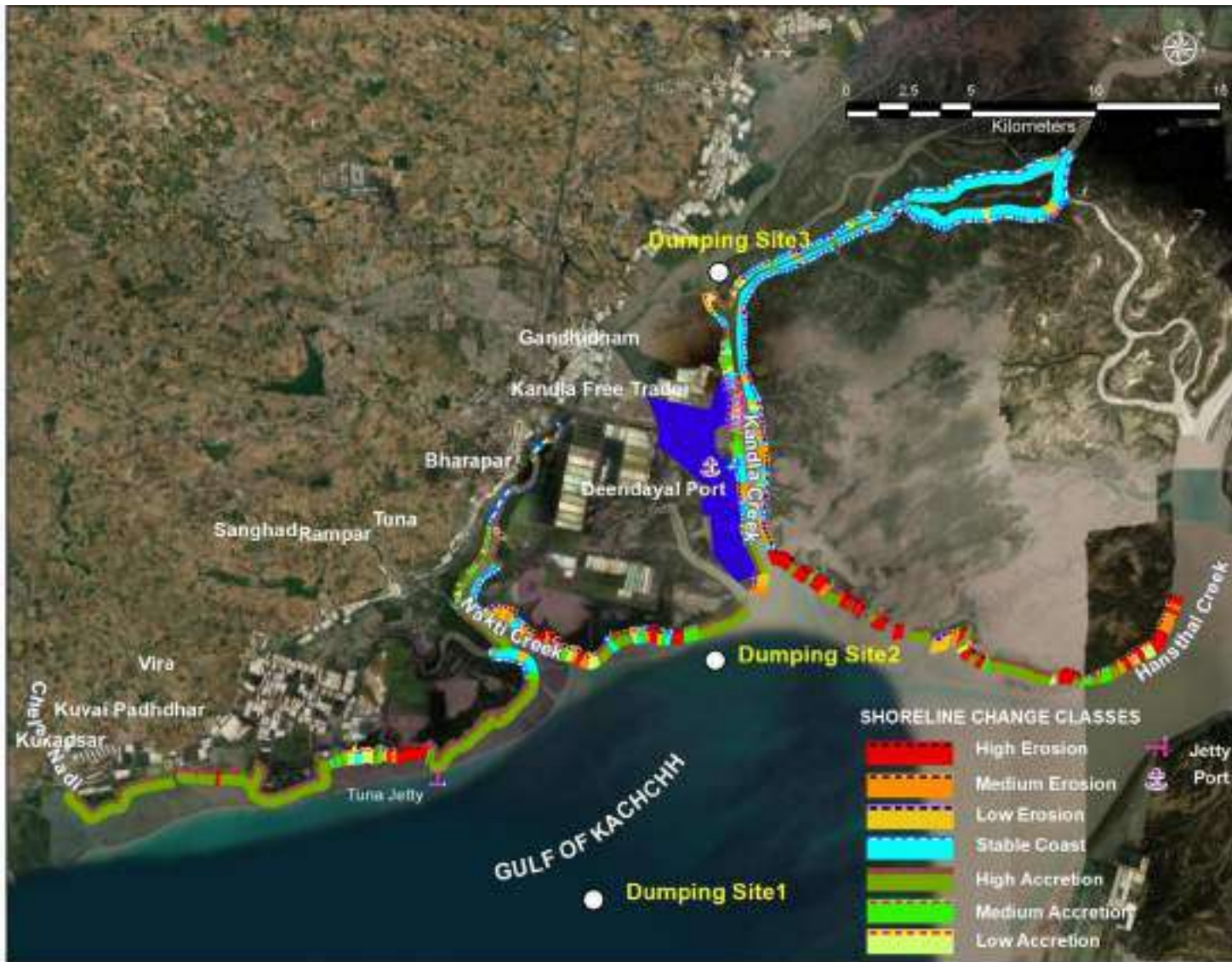


Figure 4: Shoreline change map in and around Deendayal Port Authority

I) From Chela Nadi to South of Nakti Creek:

This region has a shoreline length of about 45 km bounded by salt pan, mangroves and creeks. This area is dominated by accretion and has an average rate of 24 m/yr. Around 67% has high accretion, 11% medium accretion, 4% low accretion, 12% stable coast, 1% low erosion and 4% high erosion. Small patches of high erosion for a length of 2.5 km is found in the southern side of Tuna Jetty shown in Figure. And the rate of change were generally high along this region (ranges from -15 m/yr to -5 m/yr). This may be due to the construction of jetty that has deprived the sediment movement in the southern portion of jetty that has caused erosion in the southern side.

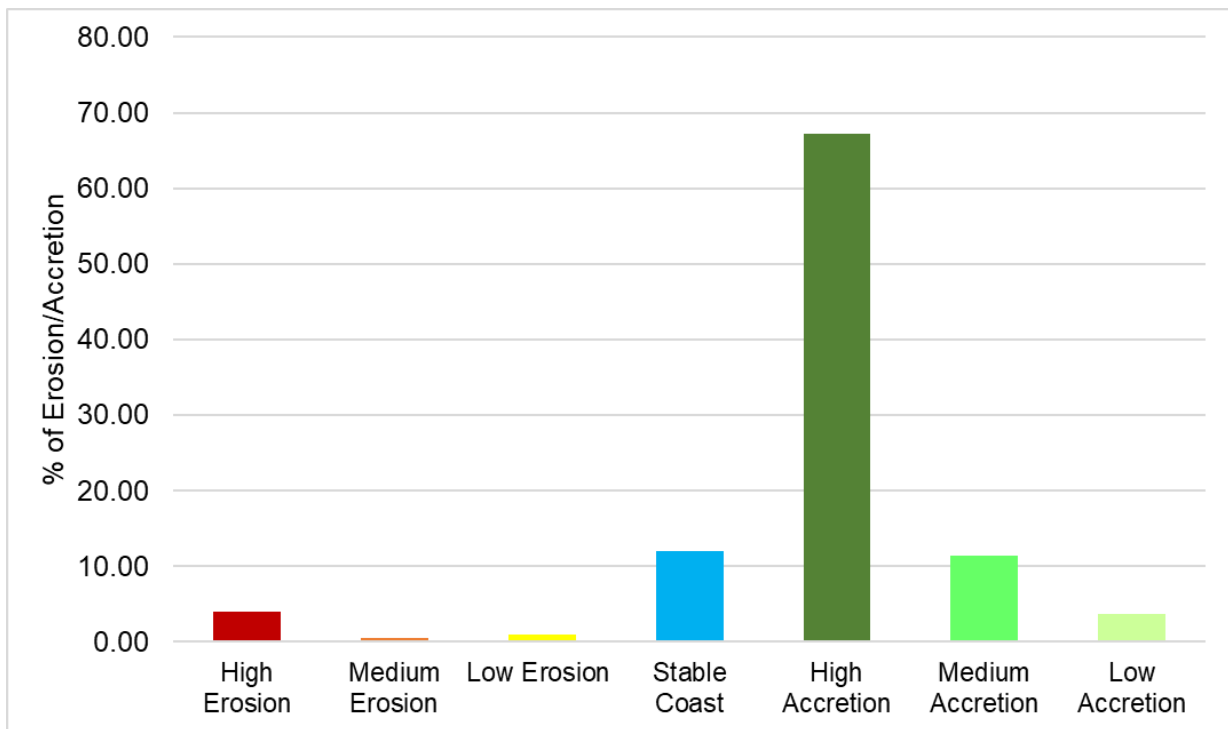


Figure 5: Percentage of erosion/accretion for the study area



Figure 6: Zone1: Shoreline change map from Chela Nadi to Nakti creek

II) North of Nakti Creek to South of Kandla creek:

This region has shoreline length of about 56 km and average accretion rate of 3.35 m/yr. Percentage of shoreline change shows 22% of high accretion, 9% medium and low accretion, 7% medium erosion, 6% low erosion and 4% high erosion. In this portion northern side of the Kandla creek shows patches of erosion due to inadequate supply of sediment from the creek towards the northern direction. High erosion is especially noticed in the mouth of the creek because of the high natural variability of these shoreline reaches. Rate of high erosion along the creek ranges from -10 m/yr to -5 m/yr that is associated with the migration of inlets

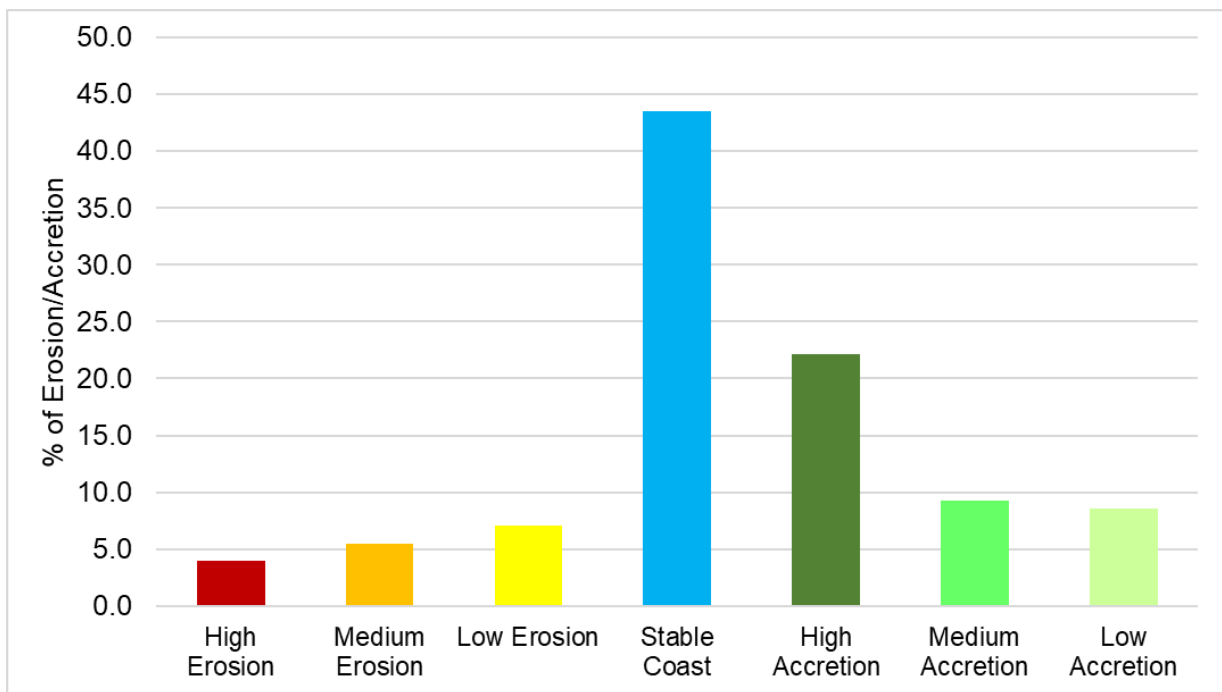


Figure 7: Percentage of erosion/accretion for the study area



Figure 8: Zone 2 - Shoreline change map from Nakti creek to Kandla creek

III) North of Kandla creek to South of Hansthal creek:

This stretch of coast has a length of about 49 km and average erosion rate of -1.06 m/yr. This shoreline has 16% high accretion, 3% medium and low accretion, 43% stable coast, 12% low erosion, 8% medium erosion and 15% high erosion. This region is more erosion compared to other two zones and the rate of change varies significantly from -30 m/yr to -5 m/yr. Moreover, geomorphology of the coast is characterized by mudflat and there are only sparse mangrove patches found in this region. Hence this may be attributed to the natural effect of sediment variability along the river mouth and also due to tidal effect that are detrimental to the growth of the mangrove canopy.

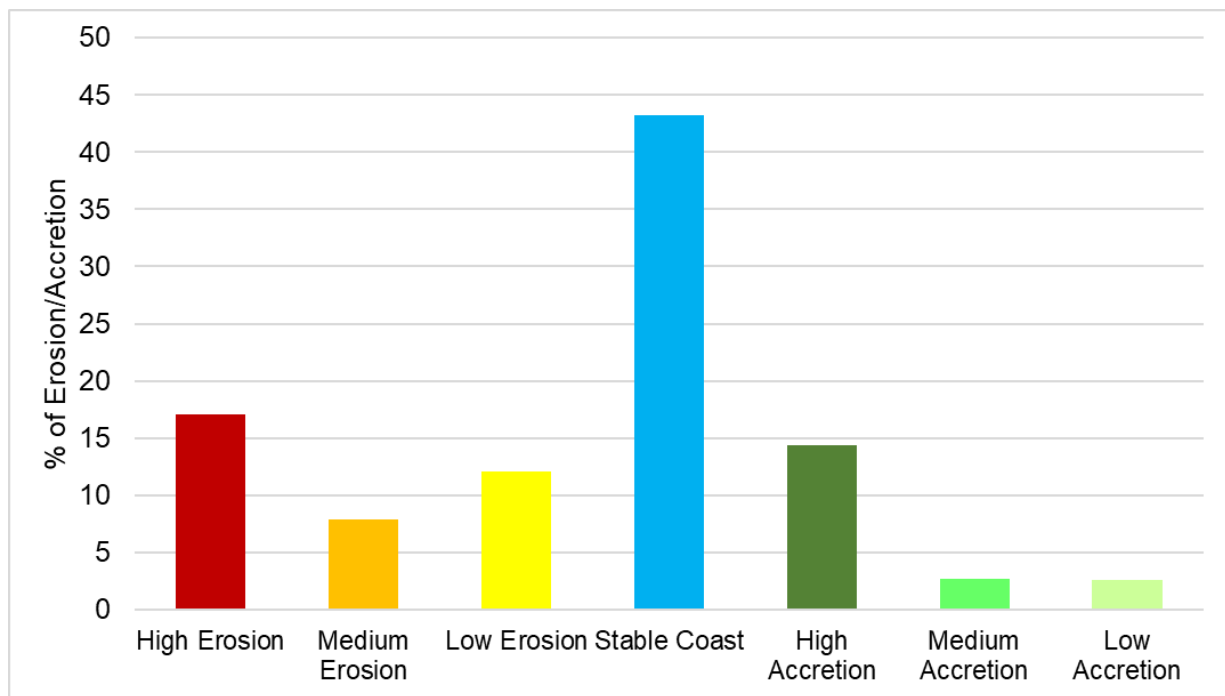


Figure 9: Percentage of erosion/accretion for the study area

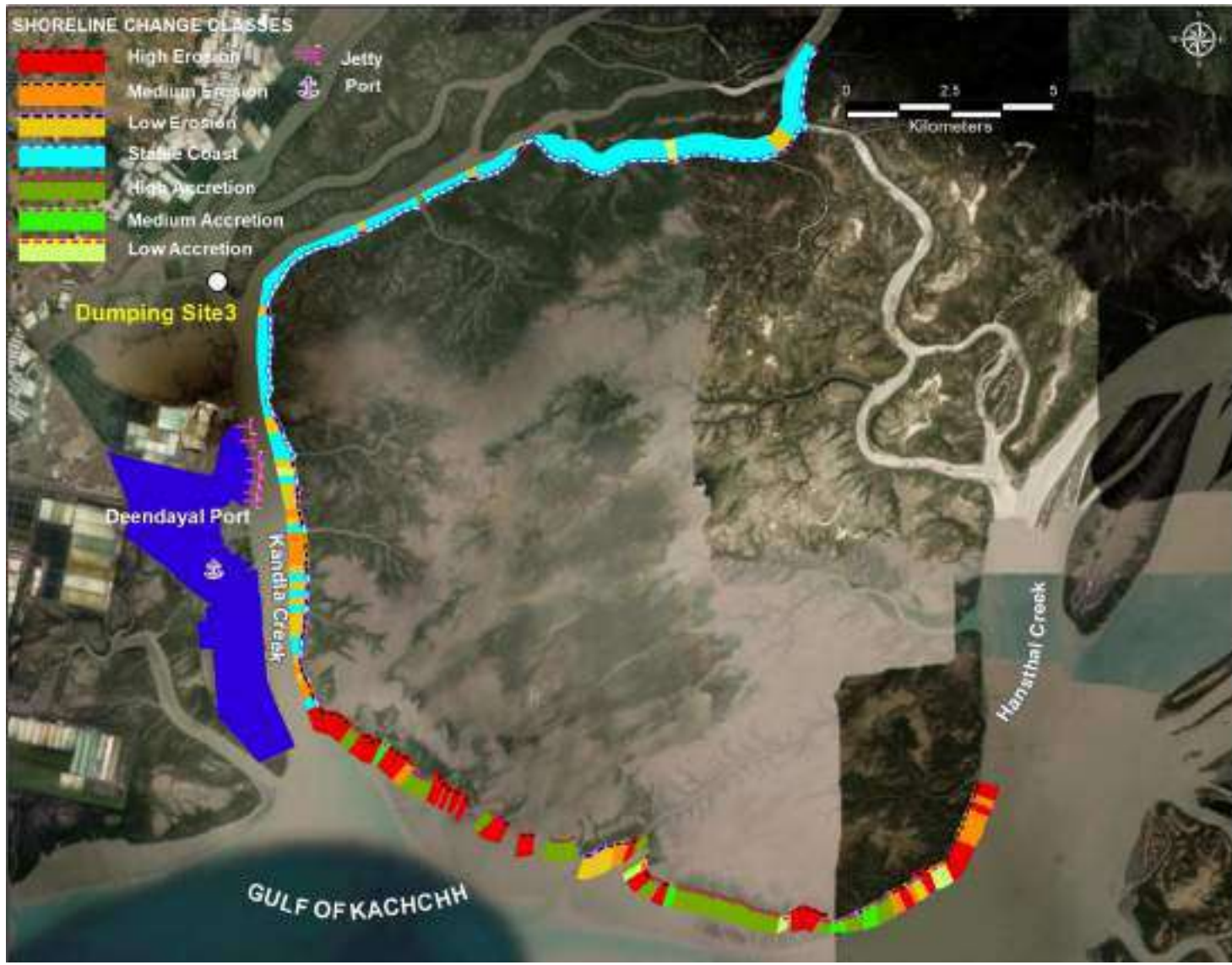


Figure 10: Zone 3 - Shoreline change map from Kandla creek to Hansthal creek

8 References

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Annexure -G

DEENDAYAL PORT AUTHORITY



Administrative Office Building
Post Box NO. 50
GANDHIDHAM (Kutch)
Gujarat: 370 201.
Fax: (02836) 220050
Ph.: (02836) 220038

www.deendayalport.gov.in

NO.EG/WK/4751/Part (Greenbelt-GUIDE) 196

Dated : 31/5/2022

✓
M/S Gujarat Institute of Desert Ecology,
P.O. Box No. 83,
Opp. Changleshwar Temple, Mundra Road,
Bhuj (Kachchh)- 370 001, Gujarat (India).
Tel.: 02832-329408, 235025.
Tele/Fax: 02832-235027
Email: desert_ecology@yahoo.com

Kind Attn.: Dr.V.Vijay Kumar, Director, M/s GUIDE, Bhuj.

Sub: Greenbelt Development in Deendayal Port Authority and its Surrounding Areas Charcoal site (Phase-I).

Ref.: M/s GUIDE, Bhuj offer vide letter no. M/s GUIDE, Bhuj vide communication no. GUIDE/DPA/GRN/080/2022-23 dated 24/5/2022.

Sir,

Your offer for the subject work submitted vide above referred letter dated 24/5/2022 amounting to Rs. 38,22,900.00 + applicable GST (Rupees Thirty-Eight Lakhs Twenty-Two Thousand and Nine Hundred Only Plus Eighteen Percent GST), with all terms & conditions mentioned in the offer letter, has been accepted (**Copy of offer letter M/s GUIDE attached**).

2. Scope of work:

Development of Greenbelt in Charcoal site – Kandla, DPA and its surrounding areas. The activities under the Greenbelt Development include; inventory of suitable sites for greenbelt development in DPA, soil & Moisture conservation and management at Plantation sites, selection of suitable species of Plants for plantation, Procurement and plantation of plant saplings and seeds (5000 plants), along with management and monitoring of plantation, including drip/tanker water supply for a period 1 year.

.....Cont.....

3. Obligation of Deendayal Port Authority :

- Assistance regarding the statutory clearance from authorities concerned to be rendered by DPA for field visits/plantation activities.

4. The Terms of Payment:


1. 50% of the project budget to be paid to GUIDE within 15 days from the date of acceptance of Work order by GUIDE.
2. 20% of the project budget to be paid to GUIDE within 15 days from the date of completion of plantation works.
3. 20% of the project budget to be paid to GUIDE within 15 days from the date of submission Progress Report (December 2022).
4. 10% of the project budget to be paid to GUIDE within 15 days from the date of submission of Final Completion Report (May 2023).

5. Time Period : One year (from 5/6/2022 to 4/6/2023).

6. Kindly send the acceptance of this work order & start the work w.e.f. 5/6/2022 .

Thanking you.

Yours faithfully,


Superintending Engineer (PL) & EMC (I/c)
Deendayal Port Authority

Copy To :1) A.O.(W/A) - The proposal has been approved by the Board in its meeting held on 27/5/2022.

The expenditure shall be charged to the scheme Environmental Services & Clearance thereof (Allocation: 841/587/9744 WC - 5-13001).

- 2) TPA to CE for kind information of the Chief Engineer, please.
- 3) DA (PL) for further necessary action.
- 4) M/s Precitech Laboratorie ,Vapi, Environmental Management Cell to coordinate with M/s GUIDE,Bhuj.
- 5) RAO, DPA

Annexure -H

CSR Activities at Decendaryal Post T.Eng

Details of CSR

Sr. No	Year	Board Resolution For Budget Provision	Board Approved Budget Provision	Board Resolution for approval of the CSR activities	Board Approved Amount For CSR Activities	Actual exp. upto Nov'20 (Rs. In Lakhs)	Net balance (Rs. In Lakhs)	Remarks
1	2	3	4	5	6	7	6-7	
1	2011-2012	369 of 28.03.2012	3.00 Cr					
2	2012-2013	17 of 31.05.2012	4.00 Cr					
3	2013-2014	99 of 30.09.2013	6.43 Cr	61 of 30.08.2012	564.00 Lakh	564.00	Nil	Works completed
4	2014-2015	322 of 21.11.2014	1.07 Cr	20 of 16.04.2015	236.22 Lakh	188.18	8.04	Works in progress
5	2015-2016	151 of 12.02.2016	1.50 Cr	48 of 12.08.2016	28.00 Lakh	5.00	23.00	Works in progress
6	2016-2017	138 of 06.01.2017	2.60 Cr	52 of 2.8.2017	140.301 lakh	146.00	-5.70	Works completed
7	2017-2018	41 of 2.08.2017	7.02 Cr	15 of 04.05.2018	155.10 Lakh	115.37	39.73	Works in progress
8	2018-19	51 of 07.08.2019	6.70 Cr	111 of 4.12.2018	154.90 Lakh	50.50	104.40	Works in progress
					1278.52 Lakh	1069.05	209.47	
9	2019-20	58 of 10.10.2019	5.49 Cr	92 of 06.12.2019	1838.57 Lakh	Nil		MoS approval is awarded
		Total	37.81 Cr		3117.09 Lakh			

Spent in PM Fund for COVID-19-800 Lakhs

Year-wise details of CSR works undertaken by DPT during 2012 – 13 to 2019 – 20 are given in Tables 7.3a, 7.3b, 7.3c, 7.3d, 7.3e, 7.3f and 7.3g.

Table 7.3a: CSR Works Undertaken by DPT during 2011-12 and 2012 – 13

Sl. No.	Name of Work	Cost (Rs. In lakhs)
1	Repair of road from Dr. Baba Saheb Ambedkar Circle to NH 8A (via Ganesh Nagar)	518
2	Repair of road from S.T. Bus Stand to Sunderpuri Cross Road via Collector Road	
3	Repair of road from NH 8A Railway Crossing to Maninagar (along railway track)	
4	Repair of road from Khanna Market Road (Collector Road) to Green Palace Hotel	
5	Construction of internal roads at "Shri Ram" Harijan Co-operative Housing Society (near Kidana)	
6	Construction of cremation ground and graveyard with other facilities at Vadinar	19.44
7	Providing cement concrete internal roads in Village Vadinar Stage - I	16.16
8	Approach road provided for developing tourism at Village Veera near Harsidhi Mata Temple	4.65
9	Water tank along with R.O. provided near developing tourism area	0.30
10	Creating facilities of flooring and steps surrounding lake to stop soil erosion and attract tourists at Village Veera.	4.80
	TOTAL	563.35

Table 7.3b: CSR Works Undertaken by DPT during 2014-15

Sl. No.	Name of Work	Cost (Rs. In lakhs)
1	Construction of community hall – cum – school at Maheshwari Nagar, Gandhidham	51.90
2	Renovation of "Muktidham" (cremation ground) at Kandla	10.65
3	Sunderpuri – 1 Valmiki Community Hall	5.00
4	Sunderpuri – 2 Valmiki Community Hall	5.00
5	Ganeshnagar Community Hall	10.00
6	Jagjivan Maheshwari Community Hall	10.00
7	Various works of road at Sapnanagar	99.19
8	Construction of compound wall in the dam of Jogninar Village	14.48
	TOTAL	206.22

Table 7.3c: CSR Works Undertaken by DPT during 2015-16

Sl. No.	Name of Work	Cost (Rs. In lakhs)
1	Construction of Bus Stand at Vadinar Village	10.00
2	Providing drainage system at Vadinar Village	6.00
3	Providing and laying of water supply lines in Vadinar Village	6.00
4	Road from Gandhidham Post Office to Merchantile Marine Department Office along with toilet facilities	60.00
5	Construction of toilets for girls / women at Khari Rohar, Village	3.00
6	Construction of toilets for girls at Mathak Primary School, Mathak, Village	3.00
	TOTAL	88.00

Table 7.3d: CSR Works Approved by DPT Board for 2016-17

Sl. No.	Name of Work	Cost (Rs. In lakhs)
1	RCC community hall at Harsidhi Mata Temple, Village Veera, Anjar Taluka	19.00
2	Fabricated Community Hall at Sanghad Village, Anjar Taluka	21.00
3	CSR Works for Shri Maheshwari Meghvad Samaj, Gandhidham at graveyard behind Redison Hotel	8.00
4	CSR Works for Shri Dhanraj Matiyadev Mukti Dham, Sector 14, Rotary Nagar, Gandhidham	30.50
5	CSR Works for Nirvasit Harijan Co-operative Housing Society, Gandhidham Health Cum Education Centre	41.00
6	CSR Works for Shri Rotary Nagar Primary School, Gandhidham	2.80
7	CSR Works at NU-4, NU-10(B) Sapnanagar & Saktinagar, Golden Jubilee Park at Gandhidham	18.00
	TOTAL	140.30

Table 7.3e: CSR Works Approved for 2017-18

Sl. No.	Name of Work	Proposal Received from / / Name of Organization / N.G.O	Cost (Rs. In lakhs)
1	CSR Works at Shri Ganesh Nagar High School, Gandhidham	Principal, Shri Ganesh Nagar Govt High School, Gandhidham	38.30 Lakhs
2	CSR Works for MOLANA AZAD Primary School, Kandla	Shri M L Bellani, Trustee, DPT, Shri Kandla Port Education Society, New Kandla	7.00 Lakhs
3	Grant financial contribution for facility of Army Cantonment for 50 nos. air coolers at Kutch Border Area	Shri Vinod L Chavda, MP	15 Lakhs
4	40% of the estimated cost of providing drainage lines at Tuna and Vandi villages under Swachh Bharat Abhiyan.	Shri Sarpanch, Tuna Village & Vandi village & Shri M L Bellani, Trustee, DPT	Rs. 39.80 Lakhs <i>Approx. estimated Cost Rs.99.50 Lakhs, of which 40% to be contributed by DPT.</i>
5	CSR works for S.H.N. Academy English School (managed by Indian Inst. Of Sindhology – Bharati Sindhu Vidyapeeth), Adipur	Director, S.H.N Academy English School	40 Lakhs
6	Construction of internal roads at Bhaktinagar Society, Kidana	Smt Maltiben Maheshwari, MLA	15 Lakh
		TOTAL	155.10

Table 7.3f: CSR Works Approved for 2018-19

Sl. No.	Name of Work	Proposal Received from / / Name of Organization / N.G.O	Cost (Rs. In lakhs)
1	CSR work to Donate 100 Nos of Computers to Daughters of Martyred Soldiers in the country under the "BETI BACHAO BETI PADHAO" program by Atharva Foundation, Mumbai	Chairman, Atharva Foundation, Mumbai	24.00
2	CSR work to Donate ONE (40 Seater) School Bus for Deaf Children Students for the Institute of Mata Lachmi Rotary Society, Adipur	Mata Lachmi Rotary Society, Adipur	18.00
3	CSR work to Providing One R.O Plant with Cooler at PanchyatPrathmikSala, Gadpadar Village for the ANARDE Foundation, Kandla&Gandhidham Center.	Dist. Rural Development Officer, Annarde Foundation-Kandla & Gandhidham	1.50
4	CSR work for Providing Drainage Line at MeghparBorichi village, AnjarTaluka	Shri Vasambhai Ahir, MLA, Gujarat Govt	25.00
5	CSR work for Construction of Health Centre at Kidana Village	Shri Vinod L Chavda, MP	13.00
6	CSR work to provide 4 Nos. of Big Dust Bin for MithiRoharJuth Gram Panchayat.	Shri Sarpanch, Mithi RoharJuth Gram Panchayat	3.40

Sl. No.	Name of Work	Proposal Received from // Name of Organization / N.G.O	Cost (Rs. In lakhs)
7	CSR work for Renovation & construction of shed at CharanSamaj, Gandhidham –Adipur.	Shri Vinod L Chavda, MP	10.00
8	CSR Work for Renovation/Repairing of Ceiling of School Building at A. P Vidhyalay, Kandla.	Smt Maltiben K. Maheshwary, MP, Gandhidham.	10.00
9	CSR work for Construction of Over Head Tank & Providing 10 Nos of Computers (for students) of NavjivanViklangSevashray, Bhachau, Kutch	Shri Jitendra Joshi, Founder Secretary, Shri Navjivan Viklang Sevashray, Bhachau, Kutch	9.50
10	CSR work to Provide Books & Tuition fees for Educational facilities to weaker section children of ValmikiSamaj, Kutch.	Shri Manohar Jala, Chairman of "National Commission of Safai Karamcharis"	2.00
11	CSR work to provide Water Purifier & Cooler for the ST. Joseph's Hospital, Gandhidham	Smt. Maltiben K Mahewari, MLA, Gandhidham	1.50
12	CSR work for Construction of Second Floor (Phase – I) for Training Centre of "GarbhSanskran Kendra" "Samarth Bharat Abhiyan" of Kutch Kalyan Sangh, Gandhidham	Shri Vinod L Chavda, MP, Kutch	37.00
TOTAL			154.90

Table 7.3g: CSR works approved for the year 2019-20 (approval from Ministry of Shipping still awaited)

Sl. No.	Name of Work	Proposal Received from // Name of Organization / N.G.O	Cost (Rs. In lakhs)
1	CSR activities for Providing Drainage line at Nani Nagalpar village.	Sarpanch of Village:-Nani Nagalpar, Taluk: Anjar.	3.00
2	CSR activities for Development of ANGANWADI Building at School no- 12 at Ward no 3 & 6 at Anjar.	Shri Vasanhbai Ahir, MLA	7.00
3	CSR activities for Improving the facilities of Garden at Sapna Nagar(NU-4)& (NU-10 B),Gandhidham.	Shri K P Maheshwari, Resident Sapnanagar, Gandhidham	18.00
4	CSR activities for Providing of Plastic Shredding Machine to Mirror Charitable Trust, Gandhidham.	Mirror Charitable Trust, Gandhidham	4.75
5	CSR activities for development of School premises of Shri Guru Nanak Edu. Society, Gim.	Shri Guru Nanak Education Society, Gandhidham.	30.00
6	CSR activities for the improvement of the facilities at St. Joseph Hospital & Shantisadan at Gandhidham	St. Joseph Hospital Trust, Gandhidham	20.00
7	CSR activities for the improvement of the facilities at SVP (SardarValabhbai Patel) Multipurpose Hall at Gandhidham	Request from MarwadiYuva Munch & UNION Gandhidham	500.00
8	Consideration of Expenditure for running of St Ann's High School at Vadinar of last 5 years 2014 to 2019 under CSR.	Proposal from COM, OOT Vadinar, DPT	825.00
9	CSR activities for development of school premises of Shri Adipur Group Kanya Sala no-1 at Adipur	Principal, Shri Adipur Group KanyaSala, Adipur	6.50
10	CSR activities for development of school premises of Shri Jagjivan Nagar Panchyat Prathmiksala, Gandhidham.	Principal, Shri Jagjivan Nagar Panchyat Prathmiksala, Gandhidham.	16.50
11	CSR activities for development of school premises of Ganeshnagar Government high school, Gandhidham.	Shri Vinod L Chavda, MP, Kutch	9.00
12	CSR activities for improving greenery, increase carbon sequestration and beat Pollution at Kandla, DPT reg.	Work awarded to Forest Department, Bhuj	352.32
13	CSR activities for providing infrastructures facilities at "Bhiratna Sarmas Kanya Chhatralaya" under the Trust of Samaj Nav- Nirman at Mirjapur highway, Ta Bhuj.	SamajNav- Nirman at Mirjapur highway, Ta Bhuj.	46.50
TOTAL			1838.57

List of CSR applications received from various NGOs , Organizations , Village Sharpnchs etc for the FY 2021-22 .

Sr.No	Name of Scheme	Proposal Received from / Name of Organization / N.G.O	Brief Details
1	CSR activities for the development of gardening at Sector -5 , Gim	Shri Sarvodaya Co-Operative Housing Society Ltd	<p>Appx Cost – Rs 25.00 Lakhs</p> <p>Cost for – Comp wall, Benches, Plantation, walkway, other facilities</p> <p>(Land is reserved for Garden development only since from 50 years)</p>
2	CSR activities for providing various facilities in SHRI GANESHNAGAR GOVT HIGHSCHOOL, GANDHIDHAM	Principal of School	<p>Appx cost –Rs 20.00 Lakhs</p> <p>(Two times CSR works carried out at school by DPT)</p>
3	CSR activities for the VadhiyarVankarSamajvaadi, NaviSunderpuriGim	SmtMaltiben K Maheswari, MLA	<p>Appx Cost Rs 6.00 Lakhs</p> <p>Cost for Const. of Comp Wall</p>
4	CSR activities for Construction work of Cabin at Oslo Area- Gim	SmtMaltiben& Shri VinadChavda	Cost not mentioned.
5	CSR activities & Land requirement forAkhil Kutch SamastaMeghvanshiGurjarmeghwal Charitable Trust ,Gim.	Shri Akhil Kutch SamastaMeghvanshiGurjarmeghwal Charitable Trust. Shri Dharmendra R Gohil	<p>Cost Not mentioned.</p> <p>(demand of Land for development of SAMAJ VADI in Gandhidham)</p>
6	CSR Activities for providing Water supply pipe line, Play ground and sports equipment, electric facilities, drinking water facilities for poor people & Fishermen at VANDI Village.	Shri R RKhambhra, PRO , Collector Office, Bhuj.	<p>Appx Cost Rs 51.00 Lakhs</p> <p>(Last year also applied by village Sarpanch) &</p> <p>Recommended by Shri VASANBHAI AHIR, MLA, Shri V L Chavda, MP)</p>
7	CSR activities for the Tuna village,	Sarpanch, Tuna village	<p>Appx Cost Rs. 25 Lakhs</p> <p>Cost for :-</p>

List of CSR applications received from various NGOs , Organizations , Village Sharpnchs etc for the FY 2021-22 .

Sr.No	Name of Scheme	Proposal Received from / Name of Organization / N.G.O	Brief Details
	Ta -Gim		2 No Fab shed 20'x20'x1250= 10 Lakh 2 Nos of Agnawadi =10 Lakh Fab shed for school=5 Lakh
8	CSR activities for the Global Vision India Foundation, Gim	Global vision India Foundation, G'dham	Requirement of Land –OR- Old building at Gandhidham for foundation of welfare activities.
9	CSR activities for the UNITED ORPHANAGE FOR THE DISABLED, TAMIL NADU	UNITED ORPHANAGE FOR THE DISABLED, TAMIL NADU	Cost Rs 25,000.00 (Winter sweaters for children)
10	CSR activities for the Garden Development on already bounded area with Compound wall near Plot no 448 Sector-1/A, Gandhidham.	Residents, near Plot no 448, Sector-1/A, Gim.	AppxCost Rs 20.00 Lakhs (Requirement to provide benches, drinking water facility, plantation, lightings & walkways in side bounded area)
11	CSR activities for donation of Land for the Shri SUNDARPUI Govt Primary School, Gim	SmtMalti ben Maheshwari, MLA	(request for Land Requirement)
12	CSR activities for Extension of Adarsh Primary School building, Adipur	GandhidhamMatri Mandal, English Medium School, Adipur	Appx Cost Rs. 40.00 Lakhs (Construction for 4 Rooms extension) (Trust registered under Societies Registration Act XXI -1860, Reg No F-42 dtd 23.9.1965. Land belong to Trust)
13	CSR Activities for providing HD projector for KANYA MAHA VIDYALAYA, Adipur	Principal, KANYA MAHA VIDYALAYA, Adipur	Cost Rs 1.50 Lakhs (School Managed by G'dhamMaitry Mandal, Adipur)

List of CSR applications received from various NGOs , Organizations , Village Sharpnchs etc for the FY 2021-22 .

Sr.No	Name of Scheme	Proposal Received from / Name of Organization / N.G.O	Brief Details
14	CSR activities for DONATION various Medical Equipment for the Hospital of Gandhidham Jain SevaSamiti, Adipur	Gandhidham Jain SevaSamiti, Adipur	Cost for :- 1) Fresenius Haemodialysis Machine Rs 38.00 Lakh 2) Maltislice Helical CT Scanner- Rs 52.00 Lakhs 3) Others Rs 54.00 Lakhs (Total Appx Cost Rs 144 Lakhs)
15	CSR activities for SHRI VIDHI JUTH GRAM PANCHAYAT, Vidi, Anjar	Sarpanch, Vidi Gram	Appx Cost Rs 30.00 Lakhs Cost for- Drainage , Garbage vehicle, and Cattle shed (Already applied earlier at Sr-5/12)
16	CSR activities for SOS CHILDREN'S VILLAGES INDIA, Madhapar, Bhuj	Director, SOS Children's Village of India-Bhuj	Appx Cost Rs 31.00 Lakhs (request for Financial support towards parentless and abandoned Children Education support located at Bhuj) & support to women working in SOS.
17	Gujarat Biodiversity Board, Gandhinagar invites to involved National & Global endeavour of conservation of biodiversity by creating financial partnership with GBB under CSR programme of expenditure to be incurred 187 Lakh.	GUJARAT BIODIVERSITY BOARD, GANDHINAGAR	Requirement- Financial Support from DPT for AppxRs 1.88 Cr. (Cost for various meetings, collection of primary data from villagers , processing of documentation, printing , TA DA of Technical support & Miscexp for 150 Peoples Biodiversity Register (PBR).

List of CSR applications received from various NGOs , Organizations , Village Sharpnchs etc for the FY 2021-22 .

Sr.No	Name of Scheme	Proposal Received from / Name of Organization / N.G.O	Brief Details
18	CSR activities for providing furniture & Home appliances for ROJAVANAM TRUST at Madurai.	Shri Arul Kannan, Director	Appx Cost Rs 30 Lakhs (seeking help to provide facilities to Aged & Homeless people living in Trust and Purchasing of New Ambulance)
19	CSR activities for providing Dialysis Machine for treatment of Kidney patients at "ST JOSEPH'S HOSPITAL TRUST" at Gandhidham.	Sr. Franciline, Administrator of Hospital.	Appx Cost Rs 31.36 Lakhs (Cost of 5 Nos of Dialysis Machines for treatment of kidney patients)
20	CSR activities for providing facilities in Girls Hostel of Gasturba Gandhi BalikaVidhyalay, Gandhidham.	Shri Vinod L Chavda, MP	Appx cost Rs 30 Lakhs. (Cost of Comp Wall, Entrance gate, Girls toilets etc)
21	CSR works for providing Oxygen Generator Plant and 45 KV Silent Generator for COVID HOSPITAL at Swami LilashahKutia, Adipur.	Secretary, BHARAT VIKAS PARISHAD, Gandhidham	Appx Cost Rs 80.00 Lakhs (Facilities for 100 Beds of COVID patient which it to be extend upto 240 Beds)
22	CSR works for providing Two Numbers of Oxygen Concentrator and others medical equipment for the Trust ,Antarjal, Gim.	President SHRI SARV JEEV KALYAN TRUST, ANTARJAL, Gandhidham	Appx Cost Rs21.50 Lakhs (Facilities to be provided for the treatment of CORONA PATIENTS at their trust.)
23	CSR works for providing Fabricated Shed , Construction of Compound Wall and Land levelling for the Cattle of GauSevaSamiti-Tappar at Gram-Tappar, Ta Anjar.	Shri Vinod Chavda, MP & Presedent , GauSevaSamiti, village Tappar, Ta-Anjar	Appx Cost Rs84 Lakhs (Facilities to be provided for Cattle shelters at Village.) (Land belongs to Gram-panchayat)
24	CSR works for Construction of Auditorium Hall at RSETI (Rural Self Employment Training Institute) at	Shri Vinod Chavda, MP & Director of RSETI, Bhuj	Cost not mentioned. (Facilities to be provided

List of CSR applications received from various NGOs , Organizations , Village Sharpnchs etc for the FY 2021-22 .

Sr.No	Name of Scheme	Proposal Received from / Name of Organization / N.G.O	Brief Details
	Bhujodi-Bhuj.		for the people needs Self-employment activities.)
25	CSR works for Providing of Furniture for the School "SHRI GALPADAR PANCHAYAT PRATHMIC KUMAR GROUP SALA " atGalpadar Village Ta Gim.	Principal, SHRI GALPADAR PANCHAYAT PRATHMIC KUMAR GROUP SALA " atGalpadar Village Ta Gim.	Cost not mentioned. (Facilities to be provided for the Students of Workers & poor village people who study in the school.)
26	Construction of Shed, hall and Gate for the DADA Bhagwandas Charitable Trust, Adipur. (Sr no -4)	Shri Vinod Chavda, MP & DADA BHAGWANDAS CharitableTrust, Gandhidham	<u>As per CSR Guideline-</u> <ul style="list-style-type: none"> ➤ Promoting gender equality and empowering women ➤ Eradicating extreme hunger and poverty (Considered shed and hall) Fab Shelter Shed - 30'x100' x 1250=37.00 Lakh & RCC Hall – 20'x100'x1500=30.00 Lakh (Appx Cost Rs67.00 Lakhs) Land authority belongs to Trust given by GDA and NOC given by SRC.Doc submitted.
27	CSR work for reconstruction of the Internal Roads of the Sector-9B-C and Sector-10 area in Gandhidham.	President, Shri TejaKangad, The Gandhidham Chamber of Commerce and Industry, Gandhidham.	Cost not mentioned.

List of CSR applications received from various NGOs , Organizations , Village Sharpanchsetc for the FY 2021-22 .

Sr.No	Name of Scheme	Proposal Received from / Name of Organization / N.G.O	Brief Details
	<u>CSR Applications kept pending in last year Agenda:-</u>		
27	CSR Activities for providing Water supply pipe line, Play ground and sports equipment, electric facilities, drinking water facilities for poor people & Fishermen at VANDI Village. (Sr no-3)	Sarpanch ,Village-VANDI , Ta- Anjar (Recommd. By Shri VASANBHAI AHIR, MLA, Shri V L Chavda, MP)	<u>As per CSR Guideline-</u> ➤ Env Sustainability ➤ Eradicating extreme hunger and poverty (to be Consider for health Center ,Drainage line, Water sump etc activities) (Appx Cost - 51.00 Lakhs) (Land authorization of Gram Panchayat)
28	Construction of Shed, hall and Gate for the DADA Bhagwandas Charitable Trust, Adipur. (Sr no -4)	DADA BHAGWANDAS CharitableTrust, Gandhidham (Recommd. By Shri V L Chavda, MP)	<u>As per CSR Guideline-</u> ➤ Promoting gender equality and empowering women ➤ Eradicating extreme hunger and poverty (Considered shed and hall) Fab Shed - 30'x100' x 1250=37.00 Lakh & RCC Hall – 20'x100'x1500=30.00 Lakh (Appx Cost Rs 67.00 Lakhs) Land authority belongs to Trust given by GDA and NOC given by SRC. Doc submitted.
29	10 Nos of Computers required for ShirMaheswarinagar Panchayat Girls Primary School, Gandhidham& Boys Group School, Gandhidham. (Sr no-8)	Maheswarinagar Panchayat Primary Kanya Sala, Gandhidham (Contact no 9913903686)	AppxRs 5.00 Lakhs <u>As per CSR Guideline-</u> ➤ Promotion of Education (to be consider for 20 Computers)

List of CSR applications received from various NGOs , Organizations , Village Sharpanchsetc for the FY 2021-22 .

Sr.No	Name of Scheme	Proposal Received from / Name of Organization / N.G.O	Brief Details
			Visited the site. Land belongs to MahewariMeghwadSamaj given by SRC for school purpose, doc are awaited.
30	Construction of Shed and Roof at JeparMatiyadev, shamsanbhumi at Kidana village & Maheswari Community Hall at JuniSundarpuri ,Gandhidham. (Sr no-10)	Shri VINOD CHAVDA, MP	AppxRs 15.00 Lakhs (Land authorization not mentioned)
31	Drainage, road, Dust bins, & shed for Cattle shelters at VIDI Village, Ta –Anjar. (Sr no- 12)	Village- VIDI, Ta: Anjar	AppxRs 30.00 Lakhs <u>As per CSR Guideline-</u> ➤ Env Sustainability ➤ Eradicating extreme hunger and poverty (Consider for Garbage vehicle & Drainage Cost)
32	Education, Women empowerment and Primary health care services at Kutch area. (Sr no-13)	Light of Life Trust, Mumbai.	Cost not mentioned.
33	Request for Help Divyang persons to employment by providing machineries. (Sr no-14)	Kutch DivyangSangthan, Gandhidham.	Cost not mentioned
34	Construction of 2 nd Floor of Shri MaheswariMeghwadSamaj, Gandhidham. (Sr no-20)	Shri MaheswariMeghwadSamaj, Gandhidham	AppxRs. 15.00 Lakhs (Visited the site and Land ownership documents awaited) (Name plate of DPT fixed at the Asset)

List of CSR applications received from various NGOs , Organizations , Village Sharpanchsetc for the FY 2021-22 .

Sr.No	Name of Scheme	Proposal Received from / Name of Organization / N.G.O	Brief Details
35	Installation of Mini Science Center at Anjar and Gandhidham. (Sr no-21)	STEM Learning Pvt Ltd, Mumbai.	Cost not mentioned.
36	CSR work for Shri Rampar Gram Panchayat. ➤ Wall Plastering for Cattles -7 Lakhs ➤ Shed for Cattel's-15 Lakhs (Sr no-25)	Shri Sarpanch, Rampar Village.	AppxRs 22.00 Lakhs (Land authorization of Gram Panchayat and under taking submitted by applicant)
37	CSR activities for the 45,000 Patients over the period of 3 years by "SMILE FOUNDATION", Mumbai. 1. Concept for Nutrition covering 3 years 2. Concept for Mobile Health Unit reaching beneficiaries for 3 years 3. Concept for Vocational Training with NGO (Sr no-29)	Proposal from "SMILE FOUNDATION " Mumbai.	Appx Cost- Rs 539 Lakhs for 3 years
38	Development of Park in Public utility plot in between Block "C" & "D" of Sapna Nagar (NU-4) , Gandhidham (Sr no -31)	Shri RAVI MAHESHWARI, DPT	Land belongs to DPT earmarked for recreational purpose. (Total Cost – Rs88.75 Lakhs)
39	CSR works for NariJanshsktiVikas Foundation at Gandhidham near Shakti Nagar. (Sr no-33)	NariJanshsktiVikas Foundation, Ahmedabad	➤ Promoting gender equality and empowering women ➤ Env Sustainability ➤ Under promotion of education (Consider for Computers with printers, Sewing machine & RO plant Cost Rs 48 Lakhs)

Annexure -I

DEENDAYAL PORT TRUST



Administrative Office Building
Post Box NO. 50
GANDHIDHAM (Kutch).
Gujarat: 370 201.
Fax: (02836) 220050
Ph.: (02836) 220038

www.deendayalport.gov.in

NO.EG/WK/4783/V/131

Dated : 05/02/2021

To,
M/s Precitech Laboratories Pvt Ltd,
1st Floor, Bhanujyot Complex,
Plot No C5/27, B/h Panchratna Complex,
Nr. GIDC Char Rasta,
VAPI-396195.

Sub: Work order for "STRENGTHENING OF EXISTING ENVIRONMENTAL MANAGEMENT CELL AT DEENDAYAL PORT TRUST: Appointment of environment experts for two years further extendable for one year"-**reg.**

Ref: 1) Tender dated 21.06.2019 submitted by M/s Precitech Laboratories Pvt.Ltd, Vapi.
2) Letter of Acceptance vide no-EG/WK/4783/V/100 dtd 01(04).01.2021
3) Letter from DPT no E/WK/4783/V/103 dtd 06.01.2021
4) Performance Guarantee submitted by M/s Precitech Laboratories Pvt Ltd in the form of Bank Guarantee of Rs. 3,60,000.00 vide Bank Guarantee no. 1102921BG0000016 dated 19.01.2021 issued by State Bank of India, Vapi.

Sir,

Kindly refer above cited Letter of Acceptance dtd 01(04).01.2021.

- 2) You shall have to provide Key Experts as per tender requirement during the entire contract period. Accordingly, you shall have to submit the qualification and experience certificates of the Key experts to be appointed at DPT, as per tender conditions for verification & approval.
- 3) Please submit the Agreement of contract as per tender conditions no 1.29.
- 4) Kindly commence the work on or before 15.02.2021.

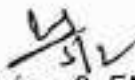
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- 2 -

Please note that the time period for providing Consultancy services for the subject work will be initially for two years and further extendable for one year on mutual consent as per tender conditions.

Thanking you.

Yours faithfully,


Superintending Engineer (Design & EMC (i/c))
Deendayal Port Trust

Annexure -J

DEENDAYAL PORT TRUST

ISO 9001 : 2008 : ISO 14001 : 2004

Ph. : 02836-220167

Fax: 02836-233172

website: deendayalport.gov.in

e-mail : secretary@deendayalportgov.in



General Administration Deptt,
Administrative Office Building,
Post Box No. 50,
Gandhidham (Kutch) 370 201

By Speed Post / E-mail

No. GA/PS/4292/HE(PF)/2017/ 304

Dated, 17 January, 2022

OFFER OF CONTRACTUAL ENGAGEMENT AS MANAGER(ENVIRONMENT), IN DEENDAYAL PORT TRUST.

With Reference to your application for contractual engagement as Manager - Environment, in response to the advertisement, inviting applications for the subject position, on assessment and interview before the Services Selection Committee on 06.01.2022, the Competent authority has been pleased to offer the contractual engagement as Manager (Environment) in Deendayal Port Trust, purely on contractual basis, subject to the following terms and conditions :

a) Roles & Responsibilities

- Develop, implement and manage long term port environmental programmes such as the Green Marine Programme, sustainability plan, air strategies, tenant environment plan and tenant lease management.
- Represent the Port in local, state and federal agency meetings.
- Assist in the development and updating of the Port's comprehensive scheme of Harbour improvements and strategic plan.
- Monitor and conduct regular mock drills to train the employees at different levels.

b) Remuneration :-

Your consolidated remuneration per month will be Rs.1,00,000/- (Rupees One Lakh Only). Suitable increase depending upon the performance and variation in the AICP index may be given after successful completion of yearly service. Applicable taxes will be deducted at the time of payment.

c) Period of Contract :

The contract will be for a period of 3 years, extendable by another two years, subject to satisfactory performance.

d) Duty Hours :

You may be posted at/under any department/authority of Deendayal Port Trust, as per requirement, Duty Hours are from 10.00 AM to 06.00 PM or as may be decided by the Administration from time to time. In case of requirement, you may have to work beyond the normal duty hours, for which no other compensation, monetary or otherwise will be considered.

.....
(Mukkannawar Utkarsh Suresh)

Contd....

You will normally be entitled to a weekly off on Sunday. If situation warrants, the weekly day of rest may be changed with prior intimation. For work on any weekly day off / declared national holiday in exigencies of work, a compensatory day of rest as per the convenience of the Administration, in lieu thereof, will be granted and for which no other compensation, monetary or otherwise will be considered.

Failure to report for duty will entail deduction of wages on pro-rata basis.

- e) Medical facility : Only Outdoor Medical treatment facility for self and your spouse will be provided in the Port Trust Hospital. No other medical facilities will be provided to you/ your family.
- f) Leave entitlement : 10 days leave in a year and National Holidays will be given. No other leave will be admissible and for any absence beyond the said leave, pro-rata deduction will be made from the consolidated remuneration.
- g) Accommodation : Suitable accommodation, if available, may be provided, subject to recovery of charges under FR-45A, and the element of HRA excluded from the lumpsum remuneration.
- h) Your engagement on contractual basis is subject to strict adherence to the norms and conduct.
- i) The engagement can be terminated by giving one month's notice in writing from either side. However, in case of unsatisfactory performance or for any act considered derogatory/ detrimental to the interest of Deendayal Port Trust, this contractual engagement will be terminated forthwith.
- j) If you leave without notice or without acceptance of notice of termination, the amount due i.e., consolidated remuneration payable will be forfeited.
- k) You shall not claim any right/title/interest on par with the regular employees of the Port or otherwise.
- l) You shall not have any claim/right whatsoever for regular appointment / absorption in Deendayal Port Trust under any circumstances.
- m) Your contractual engagement is subject to verification of antecedents by the police. If any adverse report is received from the Police, your contractual services are liable to be terminated forthwith.
- n) You will not be permitted to take any other assignment during the period of contract with Deendayal Port Trust.

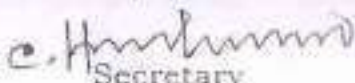
.....
(Mukkannawar Utkarsh Suresh)

Contd....

- l) On official tour outside Head Quarters, you will be entitled to TA/DA as admissible under the rules.
- m) The terms and conditions shall be amended / modified depending upon the requirement of the Port. Any dispute(s)/difference(s) shall be decided solely by the Chairman, Deendayal Port Trust, which shall be final and binding.
- n) You are required to submit discharge letter / relieving letter from your present employer at the time of joining Deendayal Port Trust, without you may not be allowed to join.
- o) The contractual engagement is subject to your being found medically fit as per the requirements of Deendayal Port Trust.

2. You have to report for medical examination before the Medical Board of DPT at Gopalpuri Hospital on any working day between 10.00 hrs to 12.00 hrs.

3. If you agree to the above terms and conditions, you may convey acceptance by signing the duplicate of the letter in token of your acceptance and submit the same to this office and call at this office with all certificates and two copies of passport size photographs latest by 27th January, 2022 failing which the offer of contractual engagement stands automatically cancelled.


Secretary
Deendayal Port Trust

To
Shri. Mukkanawar Utkarsh Suresh,
21/1, Madhukunj Housing Society,
Near Canara Bank, Panchavati,
Pashan, Pune, Maharashtra - 411008.
Email : utkaish@gmail.com

I accept the above terms and conditions and will report for duty on _____.

Name :

Date :

Copy to: CMO - for conducting Medical Examination.

Annexure –B

**Consent to Operate (renewal)
issued by the GPCB dated
22/1/2021 (already placed at
Annexure C of CRZ
compliance report)**

Annexure –C1

**Mangrove Plantation details
with cost incurred [already
placed at Annexure A1 of CRZ
compliance report (Annexure
A)]**

Annexure –C2

**Mangrove Plantation (100 ha.) vide
Work Order No. DD/WK/3050/Pt-
I/GIM/PC-44 dated 02/06/2022
[already placed at Annexure A2 of CRZ
compliance report (Annexure A)]**

Annexure –D

**Work Order of Regular monitoring of
Mangrove Plantation dated 03/05/2021**

DEENDAYAL PORT TRUST



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Gujarat: 370 201.
Fax: (02836) 220050
Ph.: (02836) 220038

www.deendayalport.gov.in

NO.EG/WK/4751/Part (Marine Ecology Monitoring)

Dated : 03/05/2021

✓ M/S Gujarat Institute of Desert Ecology,
P.O.Box No. 83,
Opp. Changleshwar Temple, Mundra Road,
Bhuj (Kachchh)- 370 001, Gujarat (India).
Tel.: 02832-329408, 235025.
Tele/Fax: 02832-235027

Email: desert_ecology@yahoo.com

Kind Attn.: Dr.V.Vijay Kumar, Director, M/s GUIDE, Bhuj.

Sub: Regular Monitoring of Mangrove Plantation (1400 Ha.) carried out by Deendayal Port Trust (Statutory Requirement) reg.

Ref.:1) DPT request vide email dated 10/4/2021.

2) M/s GUIDE, Bhuj offer vide letter no. GUIDE/DPT/Offer/Mangrove Monit./19 /2021-22 dated 16/4/2021.

Sir,

Your offer for the subject work submitted vide above referred letter dated 16/4/2021 amounting to Rs. 28,00,000.00 + 18% GST (Rupees Twenty Eight lakhs only plus eighteen percent GST) with all terms & conditions mentioned in the offer letter, has been accepted.

2. The terms of payment :

- 1) 50 % of the project budget should be paid within 15 days from the date of Submission of Inception Report by GUIDE, Bhuj.
- 2) 25% of the project budget should be paid within 15 days from the date of submission of Draft report by GUIDE, Bhuj.
- 3) 25% of the project budget should be paid within 15 days from the date of submission of Final report by GUIDE, Bhuj.

Cont.....

3. Scope of work :

Regular Monitoring of Mangrove Plantation (1400 Ha) carried out by DPT on yearly basis. The monitoring study will cover components such as density, diversity and abundance. Other variables such as canopy cover, GBH, height, along with the recruitment and regeneration classes will also be investigated. Additionally, carbon sequestration potential of the plantation will also be studied in view of Climate Change mitigation measures.

4. Obligation of KPT :

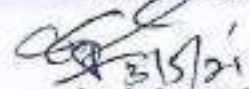
- Assistance regarding the statutory clearance from authorities concerned to be rendered by DPT for field visits.
- Study area Map along with GPS Co-ordinates to be provided by the DPT.

5. Time Period : One year (One time monitoring in a year).

6. Kindly send the acknowledgement of this work order & start the work w.e.f. 24/05/2021.

Thanking you.

Yours faithfully,



Superintending Engineer (PL) & EMC (I/c)
Deendayal Port Trust

Annexure –E

Final Report on “Monitoring of Mangrove Plantation carried out by DPA” by M/s GUIDE (2021-2022) [already placed at Annexure B of CRZ compliance report (Annexure A)]

Annexure –F

Disaster Management Plan

Disaster Management Plan (UPDATED MAY 2019)

for

DEENDAYAL PORT TRUST

ISO 9001:2008 & ISO 14001:2004 Certified Port

Post Box No: 50

Gandhidham (Kutch) – 370201



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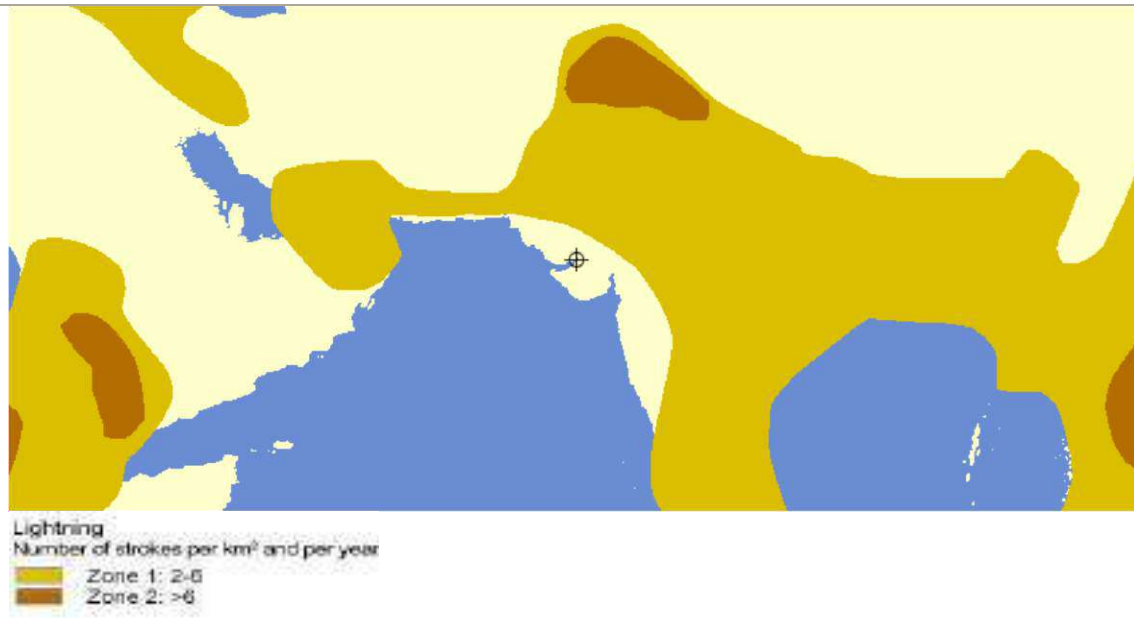
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2

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1 PREFACE

The Disaster Management Plan (DMP) for Kandla Port has been developed to provide procedures for the implementation and continual development of the Internal Action Plan.

The Internal Action Plan is an interactive document which will be continuously refined and updated every year.

This plan has been formulated to fulfil the requirements of the relevant standards and guidelines set forth by the National Disaster Plan 2016.

It should be noted that the findings and recommendations of the study are based on the data provided and discussions held during the site visit with the port personnel at the time of the site visit on 18th & 19th August 2010 and updated in the Month of July 2016. FOLLOWED BY MAY 2019

National Disaster Management Plan, 2016. A publication of the National Disaster Management Authority, Government of India. May 2016, New Delhi

Documents provided by DEENDAYAL PORT TRUST for reference are:-

1. DEENDAYAL PORT TRUST– Internal action plan up dated July 2018.
2. DMP – DEENDAYAL PORT TRUST– Originally Prepared by Tata AIG Risk Management in the year 1999. Updated by A R Jadeja, Signal Supdt. KPT 2016
3. Copies of DMP of chemical / POL Terminals on Kandla Port Property.
 - a) JRE tank terminal (P) Ltd.
 - b) CRL
 - c) BPCL

- d) United storage and tank terminals Ltd – Liquid Terminal
 - e) United storage and tank terminals Ltd – Liquefied Gas Storage and handling terminals.
 - f) Indo Nippon chemical Company Ltd.
 - g) Rishi Kiran Logistics (P) Ltd,
 - h) INEOS ABS (India) Ltd
 - i) Friends oil and chemical terminals (P) Ltd
 - j) Indian oil (LPG)
 - k) Indian Oil
 - l) IOC Marketing Division
 - m) HPCL
 - n) Friends salt works and allied industries
 - o) IFFCO
4. Layout Map of DEENDAYAL PORT TRUST– DRG. NO: KPH/09
 5. Layout of Fire fighting line at DEENDAYAL PORT TRUST
 6. Layout of proposed oil pipe line at oil jetty DEENDAYAL PORT TRUST

We have exercised all reasonable skill, care and diligence in carrying out the study. This report / document is

not deemed to be any undertaking, warranty or certificate.

2 INTRODUCTION

The important aspect in emergency management is to prevent by Technical & Organizational measures, the unintentional escape of hazardous materials out of the facility and minimize accidents and losses.

Emergency planning also demonstrates the organizations commitment to the safety of employees and public and increases the organizations safety awareness.

The format and contents of the Disaster Management Plan (DMP) have been developed taking into consideration the guidelines of National Disaster Management Authority & Plan, and other accepted industry good practice principles formulated as a result of lessons learned in actual emergencies requiring extensive emergency response.

This master document is to be studied in advance and used for training purpose also. This master document will be upgraded once in every three years by reviewed annually.

2.1 Objectives of DMP

The objective of DMP is to describe the facility emergency response organization, the resources available and response actions applicable to deal with various types of emergencies that could occur at the facility with the response organization structure being developed in the shortest time possible during an emergency. Thus, the objectives of emergency response plan can be summarized

- ③ Rapid control and containment of the hazardous situation.
- ③ Minimizing the risk and impact of event / accident.
- ③ Effective rehabilitation of the affected persons and preventing of damage to property.

In order to effectively achieve the objectives of the emergency planning, the critical elements that form the backbone of the DMP are

- ③ Reliable and early detection of an emergency and careful planning.
- ③ The command co – ordination and response organization structure along with efficient trained personnel.
- ③ The availability of resources for handling emergencies.
- ③ Appropriate emergency response actions.
- ③ Effective notification and communication facilities ③ Regular review and updating of the DMP ③ Proper training of the concerned personnel.

FOREWORD

"The document On-site Disaster Management Plan is prepared with the objective of defining the functions and responsibilities of all concerned managerial, operational and supporting services department personnel with respect to detection and effective implementation of action plan. The ultimate goal is the effective containment of the emergency situation by proper mitigative action at the place of occurrence, cautioning people in adjoining affected locations, prompt rescue and medical aid to affected persons and communication to civil authorities for rushing in help from outside. All concerned are hereby requested to carefully study and thoroughly familiarize themselves with it in order to ensure its effectiveness in times of emergency"

Chairman

DEENDAYAL PORT TRUST

Date: ___/___/2019

2.2 Responsibility Nodal officer

Responsibility for establishing and maintaining a state of emergency preparedness belongs to the DC. He is responsible for maintaining distribution control of the plan, and for ensuring that the plan and applicable implementing procedures are reviewed annually. The Fire Safety In charge is responsible for the training of personnel to ensure that adequate emergency response capabilities are maintained in accordance with the plan. He is also responsible for ensuring the adequacy of the conduct of drills, as outlined in the On-site Disaster Management Plan. All employees of various departments are responsible for carrying out their responsibilities, as defined in this Plan.

Contact details of Deputy Conservator as a NODAL OFFICER for any port related contingencies/ incidents are as under

Name Capt T Srinivas

Phone : 02836-233585

Fax : 02836-233585

Cell : 9825232982

E mails : dyconservator@deendayalport.gov.in , srini_takes@yahoo.com , signalkpt@gmail.com

3 FACILITY DESCRIPTION PORT PROFILE

3.1 Introduction

3.1.1 Unique Location

The Major Port of Kandla situated about 90 km off the mouth of Gulf of Kachchh in the Kandla Creek at Latitude 23 degree 1minute North and Longitude 70 degree 13 minutes east, is the lone Major Port on the Gujarat coast line along the West Coast of the country. Amongst the 12 Major Ports in the country, Kandla occupies an enviable position, both in terms of international maritime trade tonnage handled and financial stability and self-sufficiency attained year after year. A gateway to the north-western part of India consisting of a vast hinterland of 1 million sq. km stretched throughout 9 states from Gujarat to Jammu & Kashmir, the Port has a unique location advantage. The Port's hinterland is well connected with infrastructural network of broad gauge and railway system as well as State and National Highways

3.1.2 The Evolution

January 20, 1952, Pandit Jawaharlal Nehru, the then Prime Minister of India, laid the foundation stone at Kandla for the new port on the western coast of India. It was declared as a Major Port on April 8, 1955 by Late Lal Bahadur Shastri, the then Union Minister for Transport. The DEENDAYAL PORT TRUST was constituted in 1964 under the Major Port Trusts Act, 1963. Since then, this Major Port of Kandla has come a long way in becoming the 'Port of the New Millennium'.

3.1.3 The Strengths to Anchor On

Excellent infrastructural facilities, well-connectivity with the rest of the country by road and rail networks, all-round services provided with efficiency and transparency, lowest port tariff and the envious cost-effectiveness are the major strengths of Kandla Port.

3.1.4 Vision

"To be Asia's Supreme Global Logistic Hub"

3.1.5 Mission

To transform the Port of Kandla into a most globally competitive logistics hub with international excellence leaving imprints in the international maritime arena by exploring its fathomless growth potentialities.

HAZARD RISK VULERNABILITIES

3.2 Business Horizon

As the portal to the West and North India and due to its unique location advantage, a vast hinterland of 1 million sq. km can be assured for from Kandla.

The hinterland of the Kandla Port consists of the states of J &K, Punjab, Himachal Pradesh, Haryana, Rajasthan, Delhi, Gujarat and parts of Madhya Pradesh, Uttaranchal and Uttar Pradesh.

Kandla Port is the gateway port for the vast granaries of Punjab and Haryana and the rich industrial belt of West and North India.



3.2.1 Advantage Deendayal Port



ISO 9001 – 2008& ISO 14001:2004 Certified Port.



All weather port – 365 days, 24 hours.



Protected and safe harbor.



16 berths stretching 2.55 km in a straight line



Facilities for liquid cargo, POL products, chemicals and edible oil.



Storage facility for LPG to the tune of 30,000 cu.m.



Port with highest liquid storage capacity in the country.

Excellent road and rail connectivity.

High capacity cranes for dry cargo.


Transparent and notified tariff.


13 meter draught.

Security by CISF. ISPS Compliant

3.3 Port Logistics


3.3.1 Navigation Facilities

-  Round-the-clock navigation.


-  Permissible draught 13 meters.

Ships with 330 meters length overall and 75,000 DWT are accommodated presently.

-  Safe, protected and vast anchorage at outer harbour for waiting and lighter age purpose.

-  22 lighted navigational buoys with solar lights, as per IALA system, are provided in the navigational channel.

-  VTS PMS & Pilot Personal Unit as an aid for night navigation.

-  Fully equipped signal stations operational round-the-clock. With VTS GOK Port Monitoring Stations

3.3.2 Flotilla

10 Harbor tugs of various sizes. (inclusive Vadinar

2 high speed pilot launches.

One state of the art fully computerized survey launch

FRP mooring launches.

Four general service launches.

One heave up barge for maintenance of navigational aids.

3.4 Strategic & Climatic Advantage

- ✚ All-weather port.
- ✚ Tropical and dry climatic conditions to handle any type of cargo throughout the year.
- ✚ Temperature varying from 25 degree Celsius to 47 degree Celsius.
- ✚ Scanty rainfall facilitates round-the-year operations.
- ✚ Uninterrupted and smooth port operations on 365 days a year.
- ✚ No adverse wave effect, being a protected and sheltered harbour situated in the Creek.
- ✚ The only Indian Major Port nearest to the Middle East and Europe.

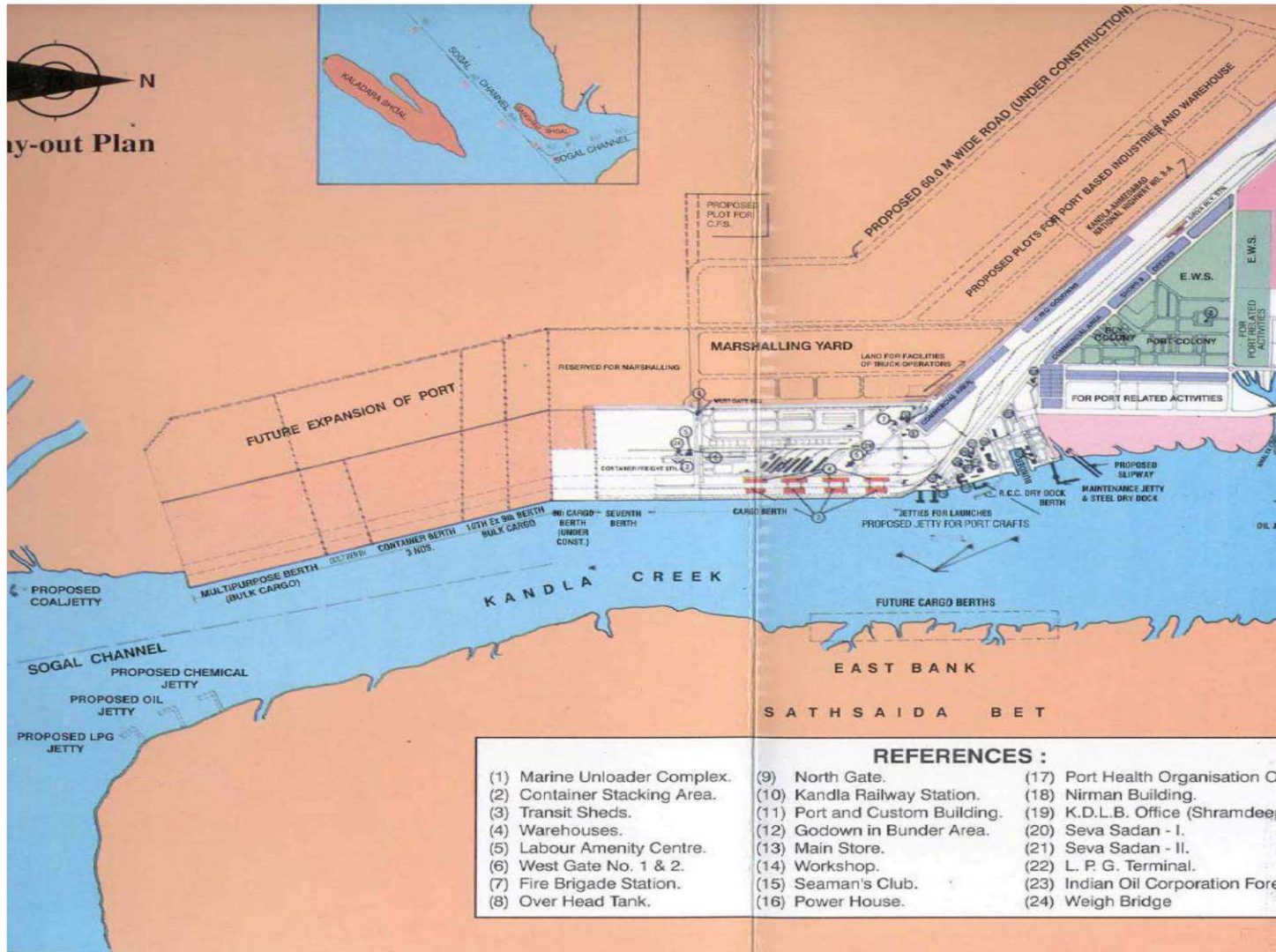
3.5 Port Location

- ✚ Latitude: 23°01"N
- ✚ Longitude: 70°13"E

Kandla Port is situated in the Kandla Creek and is 90km from the mouth of the Gulf of Kutch.

3.5.1 Location - Latitude : 23° 1' N, Longitude : 70° 13' E




Figure 1 – Over view of DEENDAYAL PORT TRUST



3.6 Future Vision of KPT as per Business Plan




3.7 Steel Floating Dry Dock

The existing steel floating dry dock caters to the need of Port crafts as well as outside organizations and has capacity to accommodate vessels of following parameters.

-  LOA maximum up to 95 meters.
-  Breadth maximum up to 20 meters.
-  Draught maximum up to 4.5 meters.

Lift displacement maximum up to 2700 tones.

3.8 Infrastructure Advantages at Kandla Port







-  16 dry cargo berths are available, with quay length of 2532 meter.
-  Six oil jetties.
-  Total custom bonded port area inside the custom fencing is 253 hectares.

THREE cargo moorings in the inner harbor area for stream handling.

3.8.1 Chemical & Liquid handling Complex



 Total storage capacity : 21.89 Lakh KL

- Private sector storage terminals – 9.81 Lakh KL.
- Public sector and cooperative undertaking – 12.08 Lakh KL.



-  Loading arms for simultaneous loading and unloading.
-  Near zero waiting period for vessels.
-  Capacity utilization at international levels ensuring demurrage free handling.
-  Excellent discharge rates and faster turnaround.
-  Lowest vessel related charges and wharfage charges.
-  Suitable for A, B, C, LG, NH, EO classes of liquid and chemicals.

Chemical storage tank farms in the vicinity of liquid jetties.

Tanks for storage of all categories of liquid cargoes like chemicals LPG, cryogenic cargoes, ammonia, acids, petroleum products, edible oils. Etc.

-  Efficient handling ensuring minimum losses.
-  Sophisticated pipeline network (including stainless steel pipes) Sufficient parking space inside and outside the storage facilities.

3.9 Road Network

-  Four lane National Highway No: 8-A extended right up to the Ports main gates.
-  Fully developed road network, both in and around the Port area to facilitate faster movement of cargo.
 - Inside Cargo Jetty Area – 30 km. ○ Outside Cargo Jetty Area – 31 km. ○ Railway Inside Cargo Jetty Area – 13 km.

3.10 Storage Facilities

Kandla Port offers excellent and vast dry cargo storage facilities inside the custom bonded area for storage of import and export cargoes.

The existing storage facilities at the dry cargo jetty area are:

Sr No	Description	No	Area (Sq MTRS)	Capacity in (Tones)
01	Warehouses	35	2.03 Lakhs	6.47 Lakh
02	Open storage space	67	16.63 Lakhs	36.27 Lakh

3.10.1 Private Sector Liquid Storage Facilities

Sr No	Name of the Terminal Operator	No of Tanks	Capacity in (KL)
-------	-------------------------------	-------------	------------------

01	CRL (Chemicals & Resins Ltd)	112	247000
02	FSWAI (Friend Salt Works & Allied Industries)	132	271650
03	Kesar Enterprise	44	90081
04	N P Patel Pvt Ltd	09	38497
05	FOCT (Friend Oil & Chemicals Terminal	21	39263
06	USTTL – Liquid Terminal	22	63038
07	Agencies & Cargo Care Limited	27	50000
08	J K Synthetics	14	25176
09	IMC Limited	04	25288
10	J R Enterprises	15	25320
11	Indo Nippon Chemicals Ltd	10	17200
12	Liberty Investment	06	16016
13	Bayer ABS Ltd	11	13310
14	Deepak Estate Agency	09	13212
15	Tejmalbhai & Company	08	12577
16	Avean International Care Ltd	11	12160
17	USTTL Gas Terminal	04	5720
18	Parker Agrochem Export Ltd	06	15000
Total Capacity		465	980508

3.10.2 Public Sector Liquid Storage Facilities

Sr No	Name of the Terminal Operator	No of Tanks	Capacity in (KL)
01	Indian Oil Corporation	38	575838
02	Bharat Petroleum Corporation	21	230000
03	Hindustan Petroleum Corporation	28	204000
04	IOC – LPG	02	30000
05	IFFCO	11	110000
06	NDDB	09	58530
Total Capacity		109	1208360

3.11 Container Handling Facilities HAS BEEN AWARDED TO KANDLA INTERNATIONAL CONTAINER TERMINAL : OPERATIONAL

Fully operational Container Terminal Operated by KICT

3.12 Port Equipments

3.12.1 Wharf Cranes

✚ 12 wharf cranes of the following capacities:

- Two of 12 tones.
- Four of 16 tones.
- Six of 25 tones.

- 2 MOBILE CRANES OF 63 TONNES EACH
- ✚ The rated capacity of the 16 ton crane is 400 tones / hour.
- ✚ The rated capacity of the 25 ton crane is 400 tones / hour.

3.12.2 Weighbridges

- ✚ Nine weighbridges inside the port, which includes:
 - Two Weighbridge of 40 MT capacities.
 - One Weighbridge of 50 MT capacity
 - Two Weighbridge of 60 MT capacity
 - Two Weighbridge of 80 MT capacity
 - Three Weighbridge of 100 MT capacities.

3.12.3 Other Support Equipment

- ✚ Easy availability of other support loading equipments such as Forklifts, Tractor - Trailers, Pay-loaders of various capacities.
- ✚ Private handling, equipments like Mobile Cranes, Top lifters, pay-loaders, Forklifts, Heavy-duty Trailers etc. available on hire at competitive rates.

3.13 Berths at Kandla Port

3.13.1 Details of Draught

Sr No	Name of Berth	Draught (in Meters)	DWT (In Metric Tons)
1	Cargo Berth No.1	10.0	45000

2	Cargo Berth No.2	9.80	45000
3	Cargo Berth No.3	9.80	45000
4	Cargo Berth No.4	9.80	45000
5	Cargo Berth No.5	10.0	35000
6	Cargo Berth No.6	12.0	35000
7	Cargo Berth No.7	12.00	55000
8	Cargo Berth No.8	12.00	55000
9	Cargo Berth No.9	12.00	55000
10	Cargo Berth No.10	12.00	55000
11	Cargo Berth No.11	13.00	65000
12	Cargo Berth No.12	13.0	65000
13	Cargo Berth No.13	13.0	75000
14	Cargo Berth No. 14	13.0	75000
15	Cargo Berth No.15	13.0	75000
16	Cargo Berth No. 16	13	75000
15	Oil Jetty No. 1 (Nehru Jetty)	10.0	40000
16	Oil Jetty No. 2 (Shastri Jetty)	09.00	52000
17	Oil Jetty No. 3 (Indira Jetty)	09.80	40000
18	Oil Jetty No. 4 (Rajiv Jetty)	10.70	56000
19	Oil Jetty No. 5 (IFFCO)	10.10	45000
18	Oil Jetty No. 6 (IOCL)	10.10	45000

3.13.2 Details of Berths

No of Berth	No of Bollard		No of Panels	Length of Each Panel	Length of Berth (m)	Draught (in Meters)	DWT (In Metric Tons)
1	1 to 8	08	08	22.866	182.93	9.80	45000
2	8 to 16	08	08	22.866	182.93	9.80	45000
3	17 to 24	08	08	22.866	182.93	9.80	45000
4	25 to 32	08	08	22.866	182.93	9.80	45000
5	33 to 41	09	09	22.866	205.79	9.10	35000
6	42 to 50	09	09	22.866	205.79	9.10	35000
7	51 to 58	08	08	(30.440 x 7) + 22.56 + (3.00)	238.64	12.00	55000
8	59 to 68	10	06	(45.72 x 3) + 30.44 + 27.44 + (18.00)	213.04	12.00	55000
9	69 to 76	08	05	(45.72 x 3) + 25.72 + (18.05)	182.93	12.00	55000
10	77 to 85	09	05	(59.10 x 2) + (43.20 x 2) + (4.81)	209.41	12.00	55000
11	86 to 98	13	05	(59.00 x 4) + (45.00)	281.00	12.50	65000
12	-----	---	---		264.00	12.50	65000
13						13.0	75000
14						13.0	75000
15						13.0	75000
16						13.0	75000





3.13.3 Details of Existing Godown

Sr No	Godown No	Size of Godown (in M)	Area in Sq Meters	Capacity in (Tons)
1	Godown – 1 (WH-A)	152.44 x 36.59	5578	9817
2	Godown – 2 (WH-B)	152.44 x 36.59	5578	10500
3	Godown – 3 (W.H -C)	152.44 x 36.59	5578	10500
4	Godown – 4 (W.H.D)	152.44 x 36.59	5578	10500
5	Godown – 6 (C.F.S. - II)	90.00 x 36.00	3240	12400
6	Godown – 7 (C.F.S. – I)	90.00 x 36.00	3240	12400
7	Godown – 8 (F.B.S.S)	236.00 x 30.00	7080	13300
8	Godown – 9 (Bagging Plant)	287.00 x 19.20	5510	10400
9	Godown – 10	132.00 x 22.50	2970	11400
10	Godown – 11	186.00 x 22.50	4185	7900
11	Godown – 12	170.00 x 22.50	3825	7200
12	Godown – 13	162.00 x 22.50	3645	6900
13	Godown – 14	192.00 x 22.50	4320	8100
14	Godown – 15	162.00 x 22.50	3645	6900
15	Godown – 16	192.00 x 22.50	4320	9100
16	Godown – 17	174.00 x 22.50	3915	15000
17	Godown – 18	138.00 x 45.00	6210	23800
18	Godown – 19	192.00 x 22.50	4320	8100
19	Godown – 20	192.00 x 22.50	4320	8100
20	Godown – 21	192.00 x 22.50	4320	8100

21	Godown – 22	192.00 x 22.50	4320	8100
22	Godown – 23	174.00 x 22.50	3915	7400
23	Godown – 24	156.00 x 45.00	7020	26900
24	Godown – 25	132.00 x 22.50	2970	5600
25	Godown – 26	99.06 x 36.55	3621	13900
26	Godown – 27		1943	6995
27	Godown – 28	173.88 x 30.50	5503	19092
28	Godown – 29	137.55 x 50.00	6888	24797
29	Godown – 30	126.00 x 49.00	6174	22226
30	Godown – 31	140.00 x 50.00	7000	25200
31	Godown – 32	307.45 x 40.00	12298	44273
32	Godown – 33	133.00 x 40.00	5320	19152
	Total Available Presently		158349	434052

3.14 Various Private Terminal Storages at Kandla & the chemicals POL products handled.

3.14.1 Bharat Petroleum Corporation Ltd

-  Motor Spirit (MS)
-  HSD – High Speed Diesel
-  SKO – Superior Kerosene Oil
-  Ethanol (Ethyl Alcohol)




Naphtha

LDO – Light Diesel Oil

3.14.2 CRL

-  Benzene
-  Toluene
-  Aniline
-  Butanol (Butyl Alcohol)
-  H Phenol
-  CTC – Carbon Tetra Chloride
-  Caster Oil
-  CPS
-  Phenol
-  De Alcohol (Denatured Alcohol)
-  IPA – Iso Propyl Alcohol
-  Butyl Acetate
-  MEK (Methyl Ethyl Ketone)
-  Methyl Alcohol / Methanol
-  Hexane
-  Vinyl Acetate
-  MIBK
-  BAM
-  Propylene
-  Cyclo Hexane
-  Caustic Soda (Sodium Hydroxide)
-  Acetic Acid
-  Nonene
-  EDC (Ethylene Di Chloride)








3.14.3 United Storage & Tank Terminals Ltd

-  LPG – Liquefied Gas Storage & Handling terminal
-  1:3 Butadiene
-  Crude C 4 Mix
- Butane – 1

3.14.4 Indo Nippon Chemicals Co Ltd




-  ISO Butanol
-  A – Olefin
-  Waksol (Parafin)
-  VAM – Vinyl Acetate Monomer
-  MDC – (Methyle Metacrylate)
-  Toluene
- Naphtha
- IPA

3.14.5 Rishi Kiran Logistics (P) Ltd




















-  Butyl Cellsolve
-  Chloroform
-  DO Wanol
-  HNP
-  N – Parafin
-  Methanol
-  Polyether Polyol
- Papi 27 Polymeric
- Tri chloric ethylene Vinyl
chloride monomer.

3.14.6 Ineos ABS (India) Ltd

Chemicals Stored

-  Styrene
-  ACN
-  Chloroform
- Parafin

Chemicals Proposed

-  Methyl Ethyl Ketone (MEK)
-  Benzene
-  Methanol
-  HNP
-  Acetone
-  Butyl Acrylate
-  Butanol
-  1 – Butanol
-  CTC (Carbon Tetra Chloride)
-  Cyclo Hexanol
-  Cyclo Hexanone
-  Cumene
-  Di Octylphthalate
-  Ethanol – IPA (Mix)
-  Ethanol
-  Ethyl Hexanol
-  Ethyl Benzene
-  Hexane
-  Heptane
- Iso Propanol

P – Xylene

Propylene Trimer

C – 9 – Hydrocarbons

Toluene










Vinyl Acetate

Mixed xylene

N – Tetra Decane

Polvoal




3.14.7 Friends Oil & Chemical Terminal (P) Ltd

-  Furnace Oil
-  Styrene
-  C – Palm Oil
-  Mix – HSD & Naphtha
-  CPO (NEG) – Crude Palm Oil
-  Acrylate Bam
-  Butyle Glycol
-  Mosstanoll
-  Butyl Glycol
- Cubutol
- Methyl Methacr
- ISO Nanano
- CDSBO

3.14.8 Indian Oil (LPG)






-  LPG

3.14.9 Indian Oil FST












-  Motor Spirit (MS)
-  High Speed Diesel (HSD)
-  SKO (Superior Kerosene Oil)

LAN

3.14.10 Hindustan Petroleum Company Limited

-  Furnace Oil (FO)
-  High Speed Diesel (HSD)
-  Light Diesel Oil (LDO)
-  SKO (Superior Kerosene Oil)
-  Motor Spirit (MS)

3.14.11 Friends Salt Works & Allied Industries

-  Naptha
-  Toluene
-  N – Proanol
-  HNP
-  Mixed Parafin
-  Solvent – CS
-  Iso Propyl Alcohol (IPA)
-  Methenol
-  N – Parafin C9 – C
-  M – xylene
-  High Speed Diesel (HSD)

Mosstanol

Methylene Chloride

Ethyl Acetate

Vinyl Acetate

HA – 100

MEK

Acetone

Crude Benzene

Heavy Aromatics

Butyl Acrylate

Shell Sarasol – 4

Carbon Tetra Chloride (CTC)

HA – 170

MBK

De Natured Spirit

Nonene


Condensate


Caradol SC- 56 – 0

N – Parafin


Butyl Acetate

 LAB

 Naptha

 Hexane

 ISO – Decyl Alcohol

 Sodium Hydroxide (Caustic Soda)

 Methyl Met

 Butyl Arylate







 MIBK

DHSO – But

Crude PEG

CPKO Crude
PNEG

3.14.12 IFFCO

-  Anhydrous Liquid Ammonia
-  Phosphoric Acid
-  Potash
-  Urea
-  Hydrochloric Acid
-  Sulphuric Acid
- LSHS Furnace Oil

3.14.13 IOC (Marketing)

No list of chemicals is provided

3.14.14 JRE Tank Terminal (P) Ltd (Liquid Storage Terminal)

No list of chemicals is provided

3.14.15 United Storage & Tank Terminals Ltd (Liquid Terminal)

No list of chemicals is provided

3.15 Offshore Oil Terminal (OOT) Vadinar

KPT had commissioned off shore oil terminal facilities at Vadinar in 1978, jointly with Indian Oil Corporation, by providing single bouy mooring (SBM) system having capacity of 54 MMTPA, which was the first of its kind in India. A significant quantum of infrastructural up gradation has since been effected and excellent maritime infrastructure created for the 32 MMTPA Essar Oil Refinery at Vadinar.

- ✚ A draught of up to 33 meters at SBMs and lighterage point operations (LPO) Three SBMs available.
- ✚ 2 Oil Handling Berths of 1,00,000 DWT draft of 20 mtrs
- ✚ Handling VLCCs of 300000 DWT and more.

Providing crude oil for the refineries of Koyali (Gujarat), Mathura (UttarPradesh), Panipat (Haryana) and Essar Refinery, Jamnagar (Gujarat) ✚ 2nd SBM was commissioned in the year 1998.

- ✚ 3rd SBM at Vadinar is for importing crude for the oil refinery of Essar Oil.
- ✚ Simultaneous handling of three VLCCs possible at the SBMs. 3 SBMs interconnected by sub-sea pipeline
- ✚ Vast crude tankage facility.

Two 35 tone and four 50 tone state of art BP SRP pull back tugs are available for smooth and simultaneous shipping operations on the SBMs and product jetty.

- ✚ Excellent infrastructure and tranquil waters facilitate transshipment operations even during the monsoon.

4 IDENTIFICATION OF EMERGENCIES

4.1 Overall Methodology

In order to undertake this study DPT has used ALOHA (Aerial Locations of Hazardous Atmospheres) a computer program designed especially for use by people responding to chemical releases, as well as for emergency planning and training. ALOHA models key hazards — toxicity, flammability, thermal radiation (heat), and overpressure (explosion blast force) — related to chemical releases that result in toxic gas dispersions, fires, and /or explosions.

4.1.1 Dispersion Modeling

ALOHA air dispersion model is intended to be used to estimate the areas near a short-duration chemical release where key hazards—toxicity, flammability, thermal radiation, or overpressure—may exceed user-specified Levels of Concern (LOCs).

(Note: If the released chemical is not flammable, toxicity is the only air dispersion hazard modeled in ALOHA.)

ALOHA is not intended for use with radioactive chemical releases, nor is ALOHA intended to be used for permitting of stack gas or modeling chronic, low-level ("fugitive") emissions. Other models are designed to address larger scale and/or air quality issues (Turner and Bender 1986). Since most first responders do not have dispersion modeling backgrounds, ALOHA has been designed to require input data that are either easily obtained or estimated at the scene of an accident. ALOHA's on-screen help can assist you in choosing inputs.

4.1.1.1 What is Dispersion

Dispersion is a term used by modelers to include advection (moving) and diffusion (spreading). A dispersing vapor cloud will generally move (advent) in a downwind direction and spread (diffuse) in a crosswind and vertical direction (crosswind is the direction perpendicular to the wind). A cloud of gas that is denser or heavier than air (called a heavy gas) can also spread upwind to a small extent.

ALOHA can model the dispersion of a cloud of pollutant gas in the atmosphere and display a diagram that shows an overhead view of the regions, or threat zones, in which it predicts that key hazard levels (LOCs) will be exceeded. This diagram is called a threat zone plot. To obtain a threat zone estimate, you must first choose at least one LOC. (ALOHA will suggest default LOCs, and you may keep those or choose up to three other LOCs.) For toxic gas dispersion scenarios, an LOC is a threshold concentration of the gas at ground level—usually the concentration above which a hazard is believed to exist. The type of LOC will depend on the scenario. For each LOC you choose, ALOHA estimates a threat zone where the hazard is predicted to exceed that LOC at some time after a release begins. These zones are displayed on a single threat zone plot. If three LOCs are chosen, ALOHA will display the threat zones in red, orange, and yellow. When you

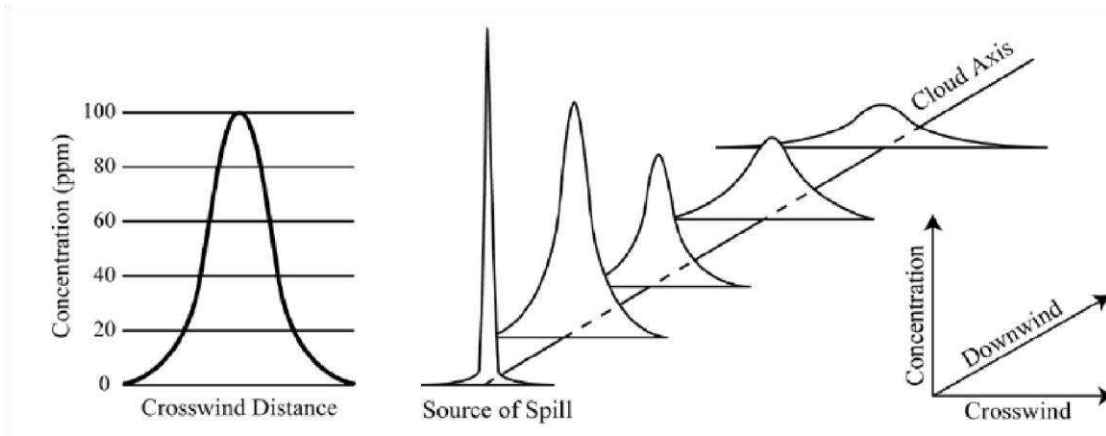
use ALOHA's default LOCs, the red zone represents the worst hazard.

There are two separate dispersion models in ALOHA: Gaussian & Heavy Gas.

4.1.1.2 Gaussian Model:

ALOHA uses the Gaussian model to predict how gases that are about as buoyant as air will disperse in the atmosphere. Such neutrally buoyant gases have about the same density as air. According to this model, wind and atmospheric turbulence are the forces that move the molecules of a released gas through the air, so as an escaped cloud is blown downwind, "turbulent mixing" causes it to spread out in the crosswind and upward directions. According to the Gaussian model, a graph of gas concentration within any crosswind slice of a moving pollutant cloud looks like a bell-shaped curve, high in the center (where concentration is highest) and lower on the sides (where concentration is lower). At the point of a release, the pollutant gas concentration is very high, and the gas has not diffused very far in the crosswind and upward directions, so a graph of concentration in a crosswind slice of the cloud close to the source looks like a spike. As the pollutant cloud drifts farther downwind, it spreads out and the "bell shape" becomes wider and flatter.

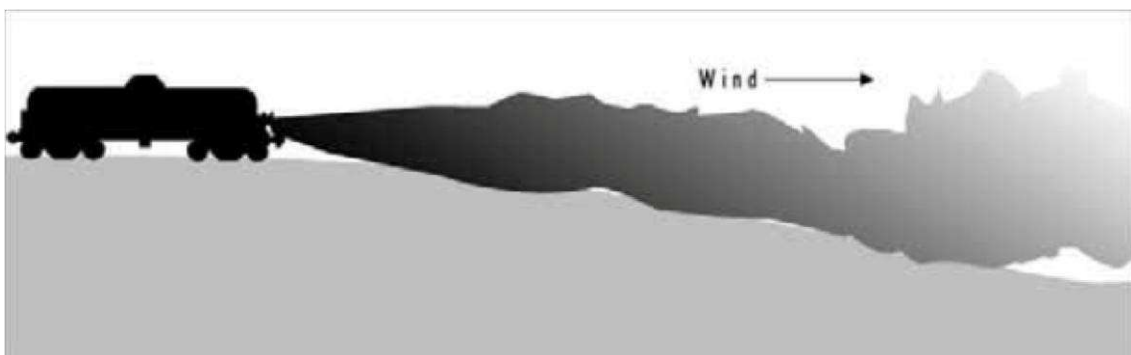
Gaussian distribution (left) & Gaussian Spread (right)



4.1.1.3 Heavy gases:

When a gas that is heavier than air is released, it initially behaves very differently from a neutrally buoyant gas. The heavy gas will first "slump," or sink, because it is heavier than the surrounding air. As the gas cloud moves downwind, gravity makes it spread; this can cause some of the vapor to travel upwind of its release point. Farther downwind, as the cloud becomes more diluted and its density approaches that of air, it begins behaving like a neutrally buoyant gas. This takes place when the concentration of heavy gas in the surrounding air drops below about 1 percent (10,000 parts per million). For many small releases, this will occur in the first few yards (meters). For large releases, this may happen much further downwind.

Cloud spread as a result of gravity.



The heavy gas dispersion calculations that are used in ALOHA are based on those used in the DEGADIS model (Spicer and Havens 1989), one of several well-known heavy gas models. This model was selected because of its general acceptance and the extensive testing that was carried out by its authors.

4.1.1.4 Classification of Heavy Gases:

A gas that has a molecular weight greater than that of air (the average molecular weight of air is about 29 kilograms per kilomole) will form a heavy gas cloud if enough gas is released. Gases that are lighter than air at room temperature, but that are stored in a cryogenic (low temperature) state, can also form heavy gas clouds. If the density of a gas cloud is substantially greater than the density of the air (the density of air is about 1.1 kilograms per cubic meter), ALOHA considers the gas to be heavy.

4.1.2 Fires & Explosions

ALOHA version 5.4, can model fire and explosion scenarios as well as toxic gas dispersion scenarios. This section provides information about fires and explosions, and then explains how to model fires and explosions in ALOHA.

ALOHA allows to model chemical releases from four types of sources: Direct, Puddle, Tank, and Gas Pipeline.

- ③ Direct: chemical release directly into the atmosphere (bypassing ALOHA's source calculations).

- ③ Puddle: chemical has formed a liquid pool.

- ③ Tank: chemical is escaping from a storage tank.

- ③ Gas Pipeline: chemical is escaping from a ruptured gas pipeline.

ALOHA Sources & Scenarios

Source	Toxic Scenarios	Fire Scenarios	Explosion Scenarios
Direct			
Direct Release	Toxic Vapor Cloud	Flammable Area (Flash Fire)	Vapor Cloud Explosion
Puddle			
Evaporating	Toxic Vapor Cloud	Flammable Area (Flash Fire)	Vapor Cloud Explosion
Burning (Pool Fire)		Pool Fire	
Tank			
Not Burning	Toxic Vapor Cloud	Flammable Area (Flash Fire)	Vapor Cloud Explosion
Burning		Jet Fire or Pool Fire	
BLEVE		BLEVE (Fireball and Pool Fire)	
Gas Pipeline			
Not Burning	Toxic Vapor Cloud	Flammable Area (Flash Fire)	Vapor Cloud Explosion
Burning (Jet Fire)		Jet Fire	

4.1.2.1 Fire

A fire is a complex chain reaction where a fuel combines with oxygen to generate heat, smoke, and light. Most chemical fires will be triggered by one of the following ignition sources: sparks, static electricity, heat, or flames from another fire. Additionally, if a chemical is above its auto ignition temperature it will spontaneously catch on fire without an external ignition source.

There are several properties that measure how readily—that is, how easily—a chemical will catch on fire. Here we'll discuss three of these properties: volatility, flash point, and flammability limits. Volatility is a measure of how easily a chemical evaporates. A flammable liquid must begin to evaporate—forming a vapor above the liquid—before it can burn. The more volatile a chemical, the faster it evaporates and the quicker a flammable vapor cloud is formed. The flash point is the lowest temperature where a flammable liquid will evaporate enough to catch on fire if an ignition source is present. The lower the flash point, the easier it is for a fire to start. Flammability limits, called the Lower Explosive Limit (LEL) and the Upper Explosive Limit (UEL), are the boundaries of the flammable region of a vapor cloud. These limits are percentages that represent the concentration of the fuel—that is, the chemical—vapor in the air. If the chemical vapor comes into contact with an ignition source, it will burn only if its fuel-air concentration is between the LEL and the UEL. To some extent, these properties are interrelated—chemicals that are highly volatile and have a low flash point will usually also have a low LEL.

Once the chemical catches on fire, three things need to be present to keep the fire going: fuel (the chemical), oxygen, and heat. This is often referred to as the fuel triangle. If any one of those components is eliminated, then the fire will stop burning.

Like other reactions, a fire can also generate byproducts—smoke, soot, ash, and new chemicals formed in the reaction. Some of these reaction byproducts can be hazardous themselves. While ALOHA cannot model all the complex processes that happen in a fire (like the generation and distribution of byproducts), it can predict the area where the heat radiated by the fire—called thermal radiation—could be harmful.

Thermal radiation is the primary hazard associated with fires. However, it is also important to consider the hazards associated with any secondary fires and explosions that may occur.

4.1.2.2 Thermal Radiation Levels of Concern:

A Thermal Radiation Level of Concern (LOC) is a threshold level of thermal radiation, usually the level above which a hazard may exist. When you run a fire scenario, ALOHA will suggest three default LOC values. ALOHA uses three threshold values (measured in kilowatts per square meter and denoted as kW/m²) to create the default threat zones:

- ③ Red: 10 kW/m² (potentially lethal within 60 sec);

- ③ Orange: 5 kW/m² (second-degree burns within 60 sec); and

- ③ Yellow: 2 kW/m² (pain within 60 sec).

The thermal radiation effects that people experience depend upon the length of time they are exposed to a specific thermal radiation level. Longer exposure durations, even at a lower thermal radiation level, can produce serious physiological effects. The threat zones displayed by ALOHA represent thermal radiation levels; the accompanying text indicates the effects on people who are exposed to those thermal radiation levels but are able to seek shelter within one minute.

ALOHA's default thermal radiation values are based on a review of several widely accepted sources for this topic (e.g., American Institute of Chemical Engineers 1994, Federal Emergency Management Agency et al. 1988, and Lees 2001).

Thermal Radiation Burn Injury Criteria.

Radiation (kW/m ²)	Intensity	Time for Severe Pain (S)	Time for 2 nd Degree Burns (S)
1		115	663
2		45	187
3		27	92
4		18	57
5		13	40
6		11	30
8		7	20
10		5	14
12		4	11

Note: The durations that correspond to effects like pain or second-degree burns can vary considerably, depending on circumstances. The effects above were observed on bare skin that was exposed directly to the thermal radiation. Some types of clothing can serve as a protective barrier against thermal radiation and can affect the exposure duration. However, exposure duration should be kept to a minimum, even at low levels of thermal radiation.

4.1.3 Overpressure

A major hazard associated with any explosion is overpressure. Overpressure, also called a blast wave, refers to the sudden onset of a pressure wave after an explosion. This pressure wave is caused by the energy released in the initial explosion—the bigger the initial explosion, the more damaging the pressure wave. Pressure waves are nearly instantaneous, traveling at the speed of sound.

Although a pressure wave may sound less dangerous than a fire or hazardous fragments, it can be just as damaging and just as deadly. The pressure wave radiates outward like a giant burst of air, crashing into anything in its path (generating hazardous fragments). If the pressure wave has enough power behind it, it can lift people off the ground and throw them up against nearby buildings or trees. Additionally, blast waves can damage buildings or even knock them flat— often injuring or killing the people inside them. The sudden change in pressure can also affect pressure-sensitive organs like the ears and lungs. The damaging effects of the overpressure will be greatest near the source of the explosion and lessen as you move farther from the source.

ALOHA predicts an explosion's effects, assess the surroundings at the explosion site as you interpret ALOHA's threat zone plot. Large objects (like trees and buildings) in the path of the pressure wave can affect its strength and direction of travel. For example, if many buildings surround the explosion site, expect the actual overpressure threat zone to be somewhat smaller than ALOHA predicts. But at the same time, more hazardous fragments could be generated as the blast causes structural damage to those buildings.

4.1.3.1 Overpressure Levels of Concern

An Overpressure Level of Concern (LOC) is a threshold level of pressure from a blast wave, usually the pressure above which a hazard may exist. When you run a vapor cloud explosion scenario, ALOHA will suggest three default LOC values. ALOHA uses three threshold values to create the default threat zones:

- ③ Red: 8.0 psi (destruction of buildings);

- ③ Orange: 3.5 psi (serious injury likely); and

- ③ Yellow: 1.0 psi (shatters glass).

ALOHA's default overpressure values are based on a review of several widely accepted sources for this topic (e.g., American Institute of Chemical Engineers 1994, Federal Emergency Management Agency et al. 1988, and Lees 2001).

Explosion Overpressure Damage Estimates

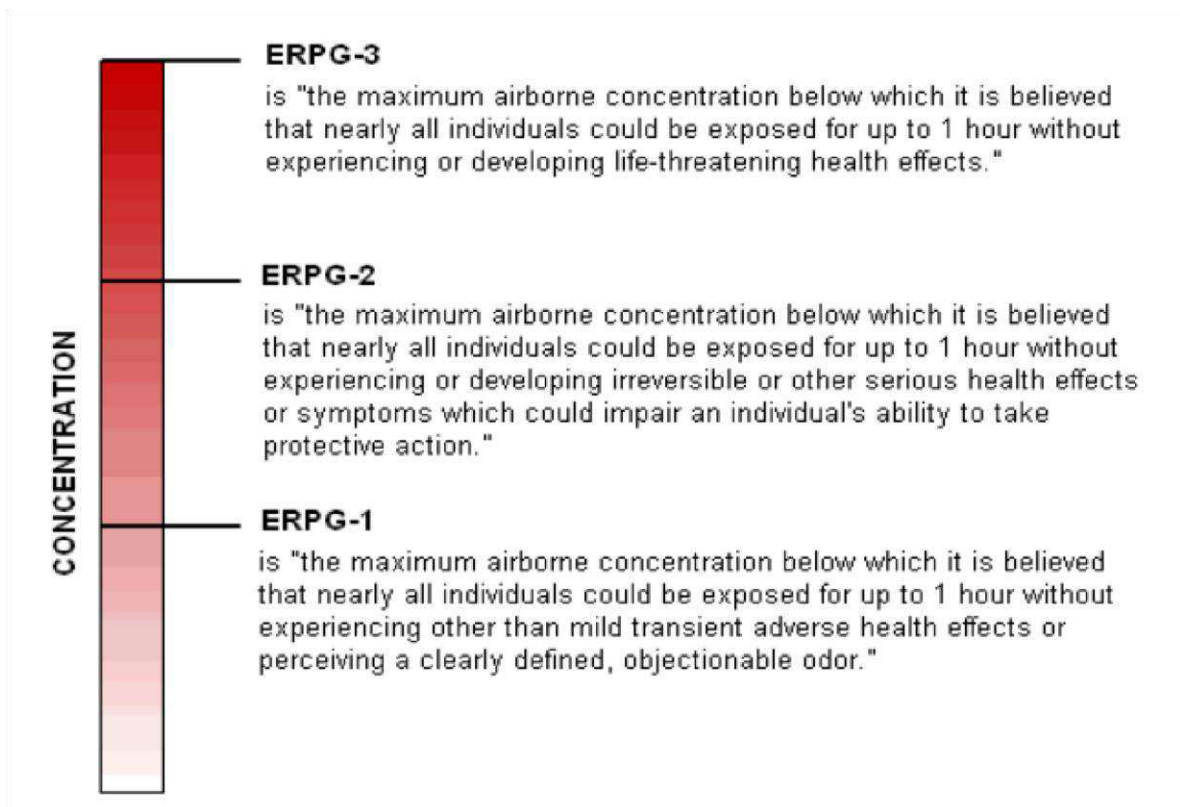
Overpressure* (psig)	Expected Damage
0.04	Loud noise (143 dB); sonic boom glass failure.
0.15	Typical pressure for glass failure.
0.40	Limited minor structural damage.
0.50-1.0	Windows usually shattered; some window frame damage.
0.70	Minor damage to house structures.
1.0	Partial demolition of houses; made uninhabitable.
1.0-2.0	Corrugated metal panels fail and buckle. Housing wood panels blown in.
1.0-8.0	Range for slight to serious laceration injuries from flying glass and other missiles.
2.0	Partial collapse of walls and roofs of houses.
2.0-3.0	Non-reinforced concrete or cinder block walls shattered.
2.4-12.2	Range for 1-90% eardrum rupture among exposed populations.
2.5	50% destruction of home brickwork.
3.0	Steel frame building distorted and pulled away from foundation.
5.0	Wooden utility poles snapped.
5.0-7.0	Nearly complete destruction of houses.
7.0	Loaded train cars overturned.
9.0	Loaded train box cars demolished.
10.0	Probable total building destruction.
14.5-29.0	Range for the 1-99% fatalities among exposed populations due to direct blast effects.
* These are peak pressures formed in excess of normal atmospheric pressure by blast and shock waves.	

4.2 Effect at different Heat Radiations & Overpressure

4.2.1 Emergency Response Planning Guidelines (ERPGs)

ERPGs were developed as planning guidelines, to anticipate human adverse health effects caused by exposure to toxic chemicals.

The ERPGs are three-tiered guidelines with one common denominator: a 1-hour exposure period. The tiers are defined as follows:



Interpreting ERPG:

The ERPG guidelines do not protect everyone. Hypersensitive individuals would suffer adverse reactions to concentrations far below those suggested in the guidelines.

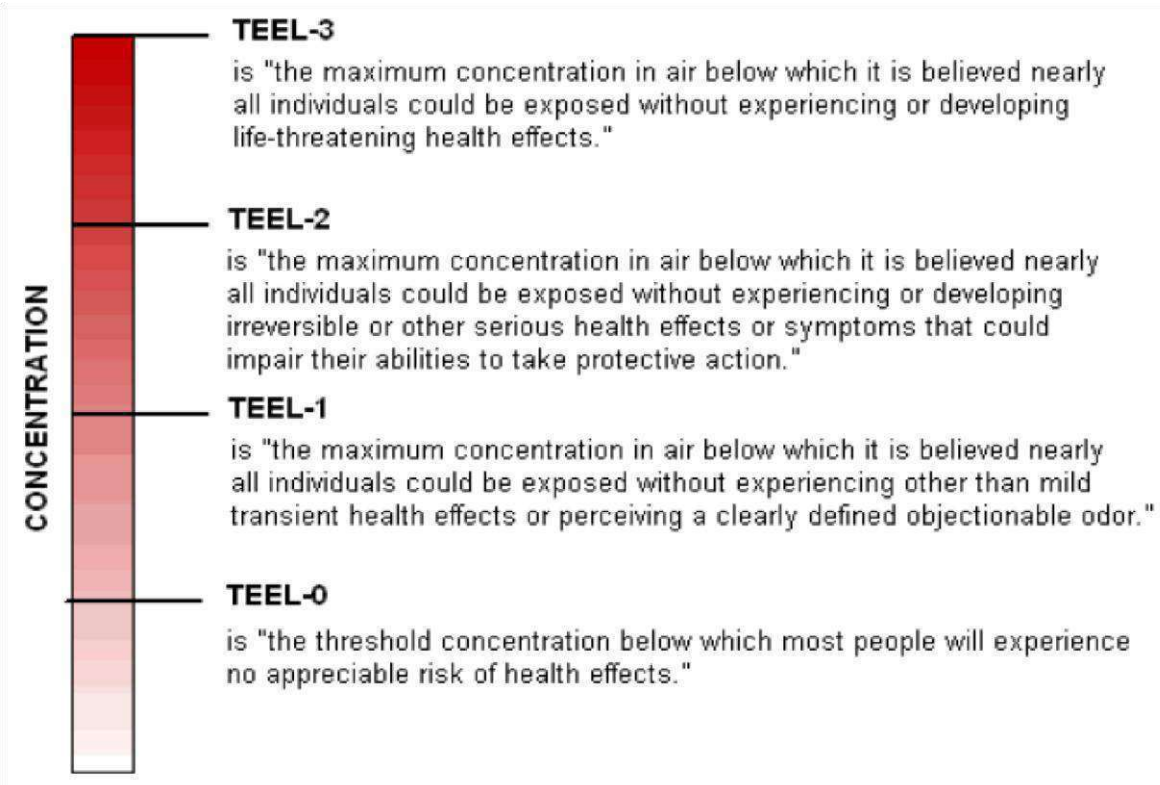
The guidelines are focused on one period of time: 1 hour. Exposure in the field may be longer or shorter. However, the ERPG committee strongly advises against trying to extrapolate ERPG values to longer periods of time.

ERPGs do not contain safety factors usually incorporated into exposure guidelines such as the TLV. Rather, they estimate how the general public would react to chemical exposure. Just below the ERPG-1, for example, most people would detect the chemical and may experience temporary mild effects. Just below the ERPG-3, on the other hand, it is estimated that the effects would be severe, although not lifethreatening. The TLV, on the other hand, incorporates a safety factor to prevent ill effects to exposed workers.







4.2.2 Temporary Emergency Exposure Limit (TEEL)

TEELs are temporary levels of concern designed to be used as toxic exposure limits for chemicals for which Acute Exposure Guideline Levels (AEGs) or Emergency Response Planning Guidelines (ERPGs) have not yet been defined. Like AEGs and ERPGs, they are designed to represent the predicted response of members of the general public to different concentrations of a chemical during an incident.

Each TEEL includes four tiers, defined as follows:



4.3 Various emergencies that may be expected at the port area

-  Leak / Spill and fire and explosion at the chemical jetties of hazardous chemicals. Fire at Berth/Storage area/warehouse/goodowns
-  Medical Injury
-  Terrorism/Sabotage
-  Civil disturbance
-  Hostage situation
-  Severe Weather
- Earthquake
- Tsunami
- Ships Accidents in the channel.

4.4 Leak / Spill and Fire & Explosion of Hazardous Chemicals at the Jetties

✚ Consequence analysis of impact distances for selected maximum credible loss scenarios of some selected chemicals handled at the chemical berths. ✚ The distance worked are indicative and to be used as a guide line.

4.5 Important assumptions considered for the Study

1. Representative chemicals have been chosen at each jetty. The distance shown in the table / map are applicable to any jetty (1 to 6) where the same chemical could be handled.

If the port is ready to handle the indicated distances for the chosen chemicals, then it can handle any other chemical emergency also under any weather conditions except storm / cyclone etc.

2. Wind speed 10m/sec from SW at 3 meter height.
3. Ground roughness – Open / Concrete
4. Cloud cover – Partial (5 Tenths)
5. Ambient Temperature – 40 degree C Average
6. Atmospheric stability Class “C”
7. Relative Humidity – 50%
8. Leak of 1000 litres of chemical
9. State of chemical at the time of leak – Liquid
10. Source: Direct Source
11. Source: Evaporating Puddle
 - Downwind toxic effects
 - Vapour cloud flash fire
 - Overpressure from vapour cloud explosion
12. Source: Burning Puddle
 - Thermal Radiation

13. Puddle diameter Average – 10 M

14. Puddle volume 1000 Litres.

4.6 Maximum Credible Loss Scenarios

The Maximum Credible Loss Scenarios (MCLS) give the possible failure scenarios, which takes into account the maximum inventory that can get released at the time of such a failure considering the intervention time based on safety systems provided at the facility.

The most hazardous chemicals taken into consideration for the study are:

Berth No: 1 – LPG & Toluene

Berth No: 2 – Benzene, ACN & Aniline

Berth No: 3 – Methanol, 1,3 Butadiene & Acetone

Berth No: 4 – VCM & Propylene

Berth No: 5 – Ammonia & HSD

Berth No: 6 – Motor Spirit & SKO

4.7 Impact Distances for MCLS under study

4.7.1 Jetty No – 1 Instantaneous Release / Evaporation Puddle / Burning Puddle for LPG

Chemical		Dispersion Distances			LEL Distances		Overpressure Distances			Pool Fire Heat Radiation Distance for		
		TEEL - 3 33000 ppm	TEEL - 2 17000 ppm	TEEL - 1 5500 ppm	60%	10%	8 psi	3.5 psi	1.0 psi	10.0kW/m ²	5.0kW/m ²	2.0kW/m ²
		m	m	m	m	m	m	m	m	m	m	m
Jetty One	LPG (Instantaneous Release)	31	46	88	68	204	LOC not exceeded	48	61	-----	-----	-----
	LPG (Evaporation Puddle)	13	24	54	35	130	LOC not exceeded	21	42	-----	-----	-----
	LPG (Burning Puddle)	-----	-----	-----	-----	-----	-----	-----	-----	34	42	57

Jet ty On e	TOLUENE (Instantaneous Release)	208	395	1.0Km	71	233	LOC not exceeded	52	72	----	-----	----
	TOLUENE (Evaporation Puddle)	< 10	21	73	< 10	< 10	No part of the cloud was above the LEL	No part of the cloud was above the LEL	No part of the cloud was above the LEL	----	-----	----
	TOLUENE (Burning Puddle)	----	-----	----	----	-----	----	----	-----	29	35	47

- All emergency equipment should be placed more than 72 meters away from the source of leak.
- Fire fighting should be carried out from a distance of more than 47 meter unless fire suits / fire proximity suits are worn by the fire fighting personnel.
- All persons not directly connected with the emergency operation should be moved more than 1 km away from the source of leak.
- All other fire fighting precautions should be adhered to.

4.7.3 ACRYLONITRILE (ACN)

Chemical		Dispersion Distances			LEL Distances		Overpressure Distances			Pool Fire Heat Radiation Distance For		
		ERPG - 3 75 ppm	ERPG - 2 35 ppm	ERPG - 1 10 ppm	60%	10%	8 psi	3.5 psi	1.0 psi	10.0kW/m ²	5.0kW/m ²	2.0kW/m ²
		m	m	m	m	m	m	m	m	m	m	m
Jet ty Two	ACN (Instantaneous Release)	1.0 Km	1.5 Km	2.8 Km	62	211	LOC not exceeded	41	61	----	-----	-----
	ACN (Evaporation Puddle)	49	76	148	< 10	< 10	No part of the cloud was above the LEL	No part of the cloud was above the LEL	No part of the cloud was above the LEL	----	-----	-----
	ACN (Burning Puddle)	-----	-----	-----	-----	-----	-----	-----	-----	19	23	30

- In case of an emergency involving Acrylonitrile in the form of a major leak with or without a fire, all fire fighters handling the emergency must wear Breathing apparatus, in addition to the usual fire suits.
- All persons not connected with the emergency operation should move beyond 2.8Km distance.

- All supporting personnel must be ready with BA sets.
- The nearby shanty should be evacuated.
- All security staff must have respiratory protection.
- All persons handling the emergency should be sent to the Kandla Port Hospital for checking for CAN poisoning.

4.7.4 ANILINE

		Dispersion Distances			LEL Distances		Overpressure Distances			Pool Fire Heat Radiation Distance For		
		TEEL	TEEL	TEEL	60%	10%	8 psi	3.5 psi	1.0 psi	10.0kW/m ²	5.0kW/m ²	2.0kW/m ²
		- 3 20 ppm m	- 2 12 ppm m	- 1 8 ppm m	m	m	m	m	m	m	m	m
Jet ty Two	ANILINE (Instantaneous Release)	1.8 Km	2.3 Km	2.7 Km	72	237	LOC not exceeded	53	73	-----	-----	-----
	ANILINE (Evaporation Puddle)	12	20	29	< 10	< 10	No part of the cloud was above the LEL	No part of the cloud was above the	No part of the cloud was above the	-----	-----	-----

							LEL	LEL			
ANILINE (Burning Puddle)	-----	-----	-----	-----	-----	-----	-----	-----	20	23	31

- All persons handling the emergency must wear full protection suits to avoid skin contact. BA should be worn by the persons handling the emergency.
- The adjoining shanty should be evacuated.
- Persons handling the emergency should check up if their nails, lips, earlobes have turned blue. If so, immediately move them to Kandla Port hospital.

4.7.5 BENZENE

Chemical	Dispersion Distances	LEL Distances	Overpressure Distances	Pool Fire Heat Radiation Distance For
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		ERPG - 3 1000 ppm m	ERPG - 2 150 ppm m	ERPG -1 50 ppm m	60% m	10% m	8 psi m	3.5 psi m	1.0 psi m	10.0kW/m ² m	5.0kW/m ² m	2.0kW/m ² m
Jet ty Tw o	BENZENE (Instantaneous Release)	228	625	1.1 Km	80	265	LOC not exceeded	61	76	-----	-----	-----
	BENZENE (Evaporation Puddle)	23	81	145	< 10	20	No part of the cloud was above the LEL	No part of the cloud was above the LEL	No part of the cloud was above the LEL	-----	-----	-----
	BENZENE (Burning Puddle)	-----	-----	-----	-----	-----	-----	-----	-----	29	35	47

- A Benzene fire gives out dense black smoke which could reduce the visibility. All fire fighters must wear a chemical protection suit while handling the emergency, wear BA.

- All those not connected with the emergency handling should move beyond 1.1 km up wind.
- Initial fire fighting should be from a distance of 47 meter, unless fire suits, proximity suits are worn. All security staff must have respiratory protection.
- All persons handling the emergency should be sent to the Kandla Port hospital for urine test to check for Benzene poisoning.

4.7.6 1:3, BUTADIENE

Chemical		Dispersion Distances			LEL Distances		Overpressure Distances			Pool Fire Heat Radiation Distance For		
		ERPG - 3 5000 ppm	ERPG - 2 200 ppm	ERPG - 1 10 ppm	60%	10%	8 psi	3.5 psi	1.0 psi	10.0kW/m ²	5.0kW/m ²	2.0kW/m ²
		m	m	m	m	m	m	m	m	m	m	m
Jet ty Th re e	1:3, BUTADIENE (Instantaneous Release)	92	524	2.4 Km	62	206	LOC not exceeded	48	63	-----	-----	-----

1:3, BUTADIENE (Evaporation Puddle)	22	157	736	13	53	LOC not exceeded	< 10	21	----	-----	----
1:3, BUTADIENE (Burning Puddle)	-----	-----	-----	-----	-----	-----	-----	-----	34	42	57

- Initial fire fighting should be from a distance of more than 57 meters. The fire fighters should wear BA sets and chemical protection suits.
- The shanty should be evacuated beyond 2.4 Km distance.

4.7.7 ACETONE

Chemical		Dispersion Distances			LEL Distances		Overpressure Distances			Pool Fire Heat Radiation Distance For		
		TEEL - 3	TEEL - 2	TEEL - 1	60%	10%	8 psi	3.5 psi	1.0 psi	10.0kW/m ²	5.0kW/m ²	2.0kW/m ²
		5700 ppm	3200 ppm	200 ppm	m	m	m	m	m	m	m	m
Jet ty Th re e	ACETONE (Instantaneous Release)	97	134	591	56	190	LOC not exceeded	40	56	-----	-----	-----
	ACETONE (Evaporation Puddle)	10	17	111	< 10	22	No part of the cloud was above the LEL	No part of the cloud was above the LEL	No part of the cloud was above the LEL	-----	-----	-----

		m	m	m	m	m	m	m	m	m	m	m
Jet ty Th re e	METHANOL (Instantaneous Release)	178	431	1.0 Km	49	190	LOC not exceeded	LOC not exceeded	33	----	-----	----
	METHANOL (Evaporation Puddle)	< 10	33	89	< 10	< 10	No part of the cloud was above the LEL	No part of the cloud was above the LEL	No part of the cloud was above the LEL	----	-----	----
	METHANOL (Burning Puddle)	----	-----	----	----	-----	----	----	-----	11	12	15

- Fire fighters should note that acetone and methanol fires are non luminescent and there could be a tendency to go nearer to the puddle /pool on fire. This should be done by fire fighters fully equipped with fire suits / proximity suits. Acetone / Methanol are water soluble, which is advantageous for fire fighting.

4.7.9 Jetty No – 4 Instantaneous Release / Ev PROPYLENE

Chemical		Dispersion Distances			LEL Distances		Overpressure Distances			Pool Fire Heat Radiation Distance For		
		TEEL	TEEL-	TEEL	60%	10%	8 psi	3.5 psi	1.0 psi	10.0kW/m ²	5.0kW/m ²	2.0kW/m ²
		- 3 20000 ppm m	2 10000 ppm m	-1 1500 ppm m	m	m	m	m	m	m	m	m
Jetty Four	PROPYLENE (Instantaneous Release)	51	80	233	74	253	LOC not exceeded	52	66	-----	-----	-----
	PROPYLENE (Evaporation Puddle)	30	53	163	51	194	LOC not exceeded	29	52	-----	-----	-----
	PROPYLENE (Burning)	-----	-----	-----	-----	-----	-----	-----	-----	33	41	55

Puddle)												
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- All emergency handling should be from a distance of more than 66 meters unless full fire suits / proximity suit is worn.
- **All personnel not directly connected with the emergency should be moved beyond 233 meters from the leak area.**

4.7.10 Jetty No – 4 Instantaneous Release / Ev VINYL CHLORIDE (VCM)

Chemical		Dispersion Distances			LEL Distances		Overpressure Distances			Pool Fire Heat Radiation Distance		
		ERPG - 3	ERPG - 2	ERPG - 1	60%	10%	8 psi	3.5 psi	1.0 psi	10.0kW/m ²	5.0kW/m ²	2.0kW/m ²
		5000 ppm	1000 ppm	200 ppm								
		m	m	m	m	m	m	m	m	m	m	m
Jetty Four	VCM (Instantaneous Release)	47	108	376	45	152	LOC not exceeded	30	48	-----	-----	-----
	VCM (Evaporation Puddle)	< 10	15	52	< 10	23	No part of the cloud was above the LEL	No part of the cloud was above the LEL	No part of the cloud was above the LEL	-----	-----	-----

		m	m	m	m	m	m	m	m	m	m	m
Jet ty Fiv e	AMMONIA (Instantaneous Release)	219	589	1.4 Km	33	80	LOC not exceeded	LOC not exceeded	26	-----	-----	-----
	AMMONIA (Evaporation Puddle)	96	260	617	< 10	16	No part of the cloud was above the LEL	No part of the cloud was above the LEL	No part of the cloud was above the LEL	-----	-----	-----
	AMMONIA (Burning Puddle)	-----	-----	-----	-----	-----	-----	-----	-----	< 10	11	13

- Emergencies involving Ammonia will be mostly leakage / spillage.
- Ammonia is flammable with difficulty.
- Ammonia emergencies should be handled by wearing BA sets.
- Ammonia is soluble in water, which will make it easier to handle the emergency.
- Do not direct water jet onto the liquid ammonia puddle, this could cause spurting of the liquid. Let the ammonia vapours come into the water spray / fog.

AEGLs represent threshold exposure limits for the general public and are applicable to emergency exposure periods ranging from 10 minutes to 8 hours. AEGL-2 and AEGL-3, and AEGL-1 values as appropriate will be developed for each of five exposure periods (10 and 30 minutes, 1 hour, 4 hours, and 8 hours) and will be distinguished by varying degrees of severity of toxic effects. It is believed that the recommended exposure levels are applicable to the general population including infants and children, and other individuals who may be susceptible.

The three AEGLs have been defined as follows:

AEGL-1 is the airborne concentration, expressed as parts per million or milligrams per cubic meter (ppm or mg/m³) of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic nonsensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure.

AEGL-2 is the airborne concentration (expressed as ppm or mg/m³) of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.

AEGL-3 is the airborne concentration (expressed as ppm or mg/m³) of a substance above which it is predicted that the general population, including susceptible individuals, could experience life-threatening health effects or death.

Airborne concentrations below the AEGL-1 represent exposure levels that can produce mild and progressively increasing but transient and nondisabling odor, taste, and sensory irritation or certain asymptomatic, nonsensory effects. With increasing airborne concentrations above each AEGL, there is a progressive increase in the likelihood of occurrence and the severity of effects described for each corresponding AEGL. Although the AEGL values represent threshold levels for the general public, including susceptible subpopulations, such as infants, children, the elderly, persons with asthma, and those with other illnesses, it is recognized that individuals, subject to unique or idiosyncratic responses, could experience the effects described at concentrations below the corresponding AEGL.

4.7.12 Jetty No – 5 Instantaneous Release / Evaporation Puddle / Burning Puddle for HSD

		Dispersion Distances			LEL Distances		Overpressure Distances			Pool Fire Heat Radiation Distance For		
		TEEL 8600 ppm	TEEL 3300 ppm	TEEL 400 ppm	60%	10%	8 psi	3.5 psi	1.0 psi	10.0kW/m ²	5.0kW/m ²	2.0kW/m ²
		3	2	1								
		m	m	m	m	m	m	m	m	m	m	m
Jetty Five	HSD (Instantaneous Release)	59	112	370	73	240	LOC not exceeded	53	71	-----	-----	-----
	HSD (Evaporation Puddle)	<10	15	85	14	48	LOC not exceeded	10	19	-----	-----	-----

HSD (Burning Puddle)	-----	-----	-----	-----	-----	-----	-----	-----	35	42	58
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- High Speed Diesel fires should be handled with care, by wearing fire suits / proximity suits.
- Foam should be used for fire fighting.

4.7.13 Jetty No – 6 Instantaneous Release / Evaporation Puddle / Burning Puddle for MOTOR SPIRIT

Chemical	Dispersion Distances	LEL Distances	Overpressure Distances	Pool Fire Heat Radiation Distance
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		TEEL - 3 1500 ppm m	TEEL - 2 610 ppm m	TEEL - 1 610 ppm m	60% m	10% m	8 psi m	3.5 psi m	1.0 psi m	10.0kW/m ² m	5.0kW/m ² m	2.0kW/m ² m
Jet ty Six	MOTOR SPIRIT (Instantaneous Release)	159	258	258	68	227	LOC not exceeded	51	66	----	-----	----
	MOTOR SPIRIT (Evaporation Puddle)	51	85	85	16	70	LOC not exceeded	11	24	----	-----	----
	MOTOR SPIRIT (Burning Puddle)	-----	-----	-----	-----	-----	-----	-----	-----	37	45	61

- Motor spirit fires should be handled with care, by wearing fire suits / proximity suits.
- Foam should be used for fire fighting.

Jet ty Six	SKO (Instantaneous Release)	141	159	209	74	239	LOC not exceeded	54	73	-----	-----	-----
	SKO (Evaporation Puddle)	< 10	< 10	< 10	< 10	< 10	No part of the cloud was above the LEL	No part of the cloud was above the LEL	No part of the cloud was above the LEL	-----	-----	-----
	SKO (Burning Puddle)	-----	-----	-----	-----	-----	-----	-----	-----	28	35	48

- SKO fires should be handled with care, by wearing fire suits / proximity suits.
- Foam should be used for fire fighting.

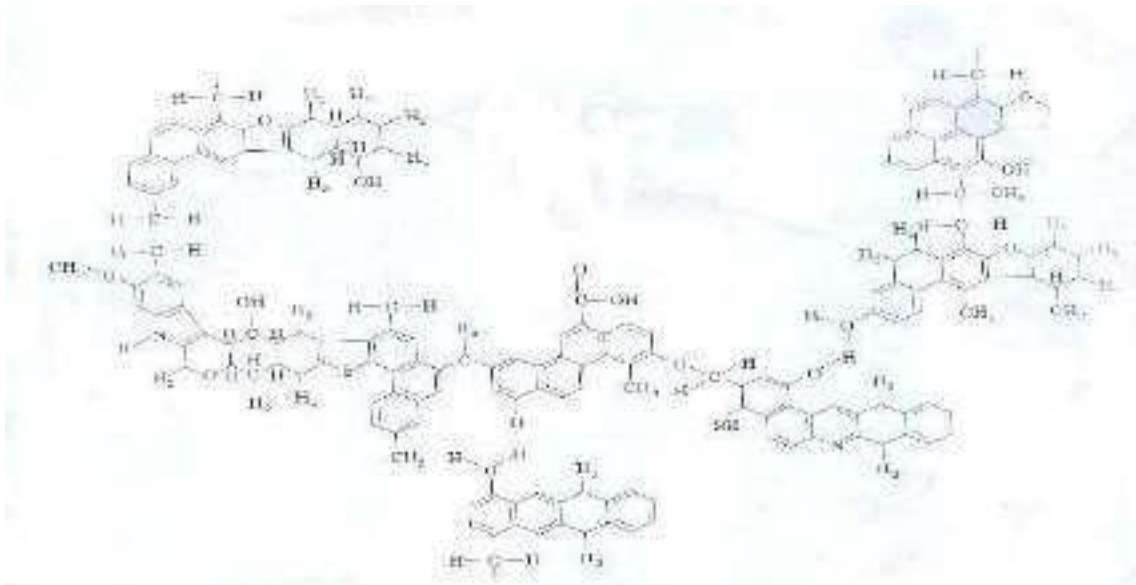
4.8 Coal Storage at Open Yard

4.8.1 General Characteristics of Coal

Coal is a fossil fuel extracted from the ground by underground mining or open pit mining. It is a readily combustible, black or brownish – black sedimentary rock. It is composed primarily of carbon along with assorted other elements.

Carbon forms more than 50% by weight and more than 70% by volume of coal.

Coal usually contains a considerable amount of incidental moisture, which is the water trapped within the coal in between the coal particles. The structure of a coal molecule is represented as follows:



Methane gas is another component of coal. Methane in coal is dangerous as it can cause explosion and may cause the coal to spontaneously combust.

4.8.2 Effects of Coal Burning

Combustion of coal, like any other compound containing carbon, produces CO_2 , along with minor amount of SO_2 .

Coal can be set on fire by spontaneous combustion

4.8.3 Spontaneous Combustion in Coal

The risk from fire exists where significant amounts of coal are in use or storage. Coal is a combustible material, making it susceptible to a variety of ignition scenarios. One of the most frequent and serious causes of coal fires is spontaneous combustion, which has been responsible for a number of incidents within the department in recent years.

Preventing spontaneous combustion coal fires involves attention to many different factors. Among the most critical are the type, age and composition of coal, how it is stored and how it is used. Given the right kind of coal, oxygen, and a certain temperature and moisture content, coal will burn by itself.

Spontaneous combustion has long been recognized as a fire hazard in stored coal. Spontaneous combustion fires usually begin as “hot spots” deep within the reserve of coal. The hot spots appear when coal absorbs oxygen from the air. Heat generated by the oxidation can initiate the fire.

Such fires can be very stubborn to extinguish because of the amount of coal involved (often hundreds of tons) and the difficulty of getting to the seat of the problem. Moreover, coal in either the smouldering or flaming stage may produce copious amounts of methane and carbon monoxide gases. In addition to their toxicity, these gases are highly explosive in certain concentrations, and can further complicate efforts to fight this type of coal fire.

Even the most universal fire fighting substance, water, cannot be used indiscriminately, because of the remote possibility of a steam explosion; it is advisable that water be applied carefully and from a safe distance. Certain chemicals such as carbon dioxide or nitrogen may mitigate fire effects, but their use has had mixed success from a DOE (Department of Energy) perspective. The above information suggests that coal fires require awareness and prior planning to extinguish efficiently, completely, and safely.

4.8.4 Causes of Spontaneous Coal Fires

The following general factors have been mentioned as contributing causes:

- ③ Coal handling procedures allowed for long-time retention of coal, which increases the possibility of heating

- ③ New coal added on top of old coal created segregation of particle sizes, which is a major cause of heating
- ③ Too few temperature probes installed in the coal bunker resulted in an excessive period of time before the fire was detected.
- ③ Failure of equipment needed to fight the fire
- ③ Ineffective capability and use of carbon dioxide fire suppression system
- ③ Delay in the application of water

4.8.4.1 Preventing Spontaneous Combustion in Stored Coal

High quantities of coal are stored in bunkers, silos, hoppers and open air stockpiles. How susceptible such stocks of coal are to fire from spontaneous combustion depends on a number of factors, from how new the coal is to how it is piled.

4.8.5 Recommendations for Coal Storage

- ③ Storing coal with low sulphur content is helpful. Sulphur compounds in coal liberate considerable heat as they oxidize.
- ③ Air circulating within a coal pile should be restricted as it contributes to heating; compacting helps seal air out.
- ③ Moisture in coal contributes to spontaneous heating because it assists the oxidation process. Moisture content should be limited to 3 %; sulphur content should be limited to 1 %, “as mined.” Coal having high moisture content should be segregated and used as quickly as possible. Efforts should be made to keep stored coal from being exposed to moisture.
- ③ Following the “First in, First out” rule of using stock reduces the chance for hot spots by helping preclude heat build up for portions of stock which remain undisturbed for a long term. The design of coal storage bins is important in this regard.

- ③ A high ambient temperature aids the spontaneous heating process. Remove coal as quickly as possible. The longer large coal piles are allowed to sit, the more time the spontaneous process has, to work.

- ③ The shape and composition of open stock piles can help prevent fires. Dumping coal into a big pile can lead to problems. Rather, coal should be packed in horizontal layers (opinions range from 1 ½' to 3' high) which are then levelled by scraping and compacted by rolling. This method helps distribute the coal evenly and thus avoids breakage and segregation of fine coal. Segregation of coal particles by size should be avoided, as it may allow more air to enter the pile and subsequent heating of finer sizes.

- ③ The height of the coal pile/stock is also important; limit un - layered, un - compacted high grade coal to a height of 15' maximum height.

- ③ Properly inspect, test and maintain installed fire protection equipment.

- ③ Maintain an updated pre-fire plan and encourage regular visits to coal facilities by the site or local emergency response force.

4.8.6 Roll Packing

Roll packing helps to exclude O₂ and thus to prevent fires by discouraging spontaneous combustion. Coal is distributed by a grab bucket or by other means in a uniform layer. The layer is then levelled by scraping and compacted by rolling. Distributing the coal evenly avoids breakage and segregation of the coal. The firm packing helps shed water.

4.8.7 Checking Temperature

Steam rising from a pile or the odour of burning coal is an indication of spontaneous heating, but an earlier or more reliable indication is obtained by checking the temperature/ hot spots/CO detection.

Rise of temperature can be noted by use of thermocouples. Hot spots can be detected by use of IR coal fire monitors. CO detectors can indicate that coal combustion has started.

4.9 Risk Analysis for Coal Fires in Storage Yard Berth 14

Data used for calculation of impact distance for coal fires. Type of coal – Bituminous (Medium Volatile)

Emissivity Constant (ϵ)	=	0.9 for Bituminous Coal
Stefan Boatmen constant	=	$5.6 \times 10^{-8} \text{ kW/m}^2 \text{ K}^4$

FQ 47K 4.9.1 Formula used for Calculation of Impact Distance (D) ✓ /

Where D	=	Distance from flame centre to receiving point.
Where F	=	Fraction of heat radiation = 0.15 (Conservative)
Where Q	=	Total Heat Generated /Emitted by Coal
Where K	=	Thermal Radiation level

Maximum temperature attained by flame of Coal $T_f = 900\text{DegC} = 1173\text{K}$

Ambient surrounding temperature $T_a = 27\text{DegC}$ to $35\text{DegC} = 300\text{K} - 308\text{K}$

$$Q = \sigma A \epsilon (T_f^4 - T_a^4)$$

$$\sigma = 5.68 \times 10^{-8} \text{ kW/m}^2 \text{ K}^4$$

$$T_f^4 = (1173)^4 \text{ K}$$

$$T_a^4 = (300)^4 \text{ K}$$

For active coal burning area = 10m^2

$$Q = 5.6 \times 10^{-8} \times 0.9 \times 10 (1173^4 - 300^4)$$

$$Q = 950 \text{ kW}$$

For Heat radiation 4 kW/m^2 impact distance D

$$D = \sqrt{(950 \times 0.15) / (4 \times 3.14 \times 4)} = 1.68 = 1.7\text{m}$$

For Heat radiation 12.5 kW/m^2 impact distance D

$$D = \sqrt{(950 \times 0.15) / (4 \times 3.14 \times 12.5)} = 0.9527 = 1 \text{ m}$$

For Heat radiation 37.5 kW/m^2 impact distance D

$$D = \sqrt{(950 \times 0.15) / (4 \times 3.14 \times 37.5)} = 0.55\text{m}$$

For active coal burning area – 100 m^2

$$Q = 5.6 \times 10^{-8} \times 0.9 \times 100 (1173^4 - 300^4)$$

$$= 9500 \text{ kW/m}^2$$

For Heat radiation 4 kW/m^2 impact distance D

$$D = \sqrt{(9500 \times 0.15) / (4 \times 3.14 \times 4)} = 5.32 \text{ m}$$

For Heat radiation 12.5 KW/m^2 impact distance D

$$D = \sqrt{(9500 \times 0.15) / (4 \times 3.14 \times 12.5)} = 3.012 \text{ m}$$

For Heat radiations 37.5 KW/m² impact distance D

$$D = \sqrt{(9500 \times 0.15) / (4 \times 3.14 \times 37.5)} = 1.74 \text{ m}$$

The Damage Effects Due to Thermal Radiation of Varying Intensity

Incident Radiation Intensity (kW/m ²)	Type of Damage
37.5	Sufficient to cause damage to process equipment unless the equipment is fully thermally fire protected (Insulation, fire proofing, sprinkler protection etc)
12.5	Minimum energy required for piloted ignition of wood, melting plastic tubing, etc.
4.5	Sufficient to cause pain to personnel if unable to reach within 20 seconds, blistering of skin (1st degree burns) is likely.

4.9.2 Summary:

Heat Radiation Impact distance for	Active Burning Coal Area	
	10 m ²	100 m ²
4 kW/m ²	1.7 m	5.3 m
12.5 kW/m ²	1.0 m	3.0 m

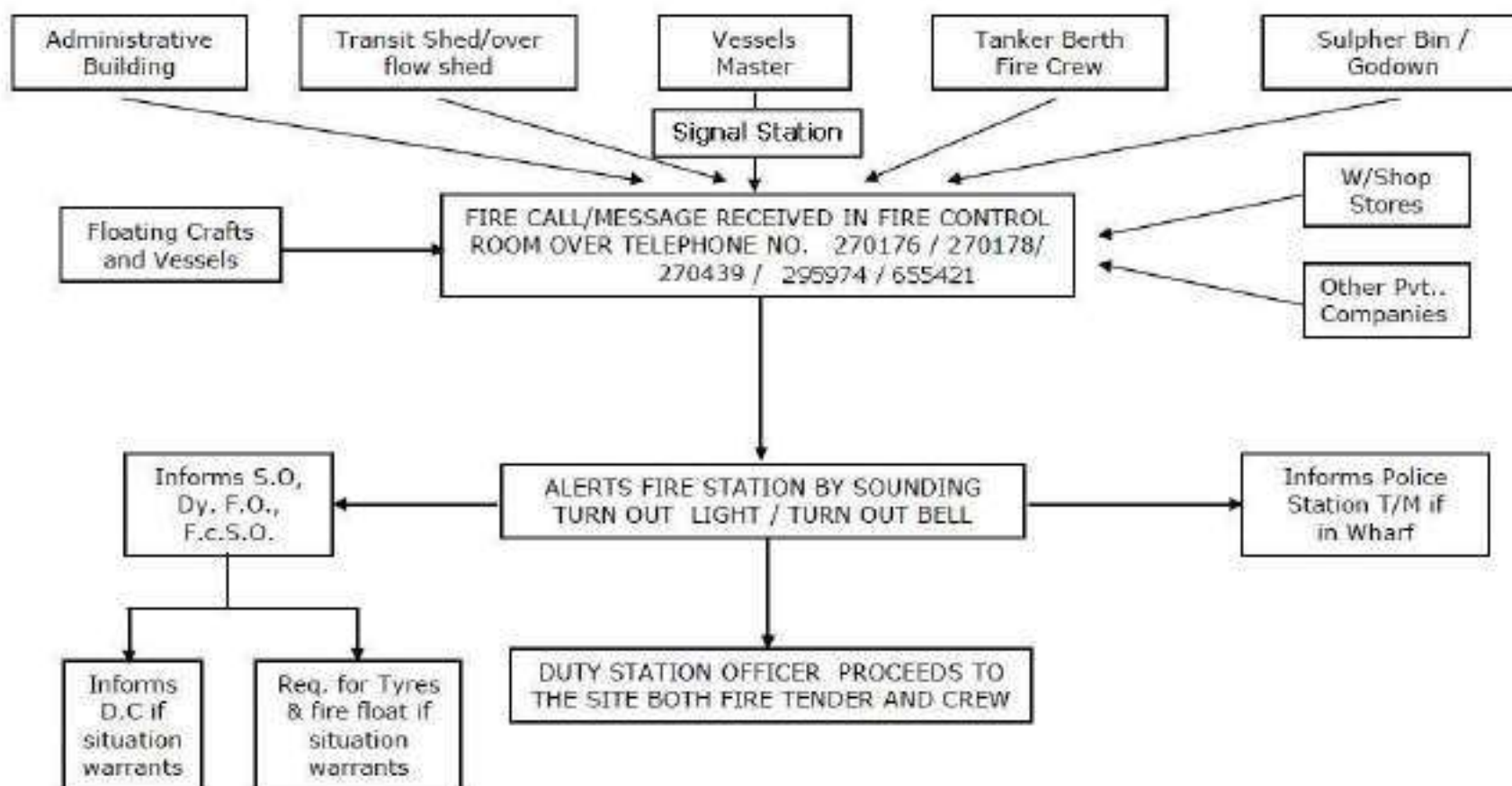
37.5 kW/m ²	0.5 m	1.74 m

Assuming that 100m² surface area of the coal stack is smouldering no person should approach the stock within 6 m distance.

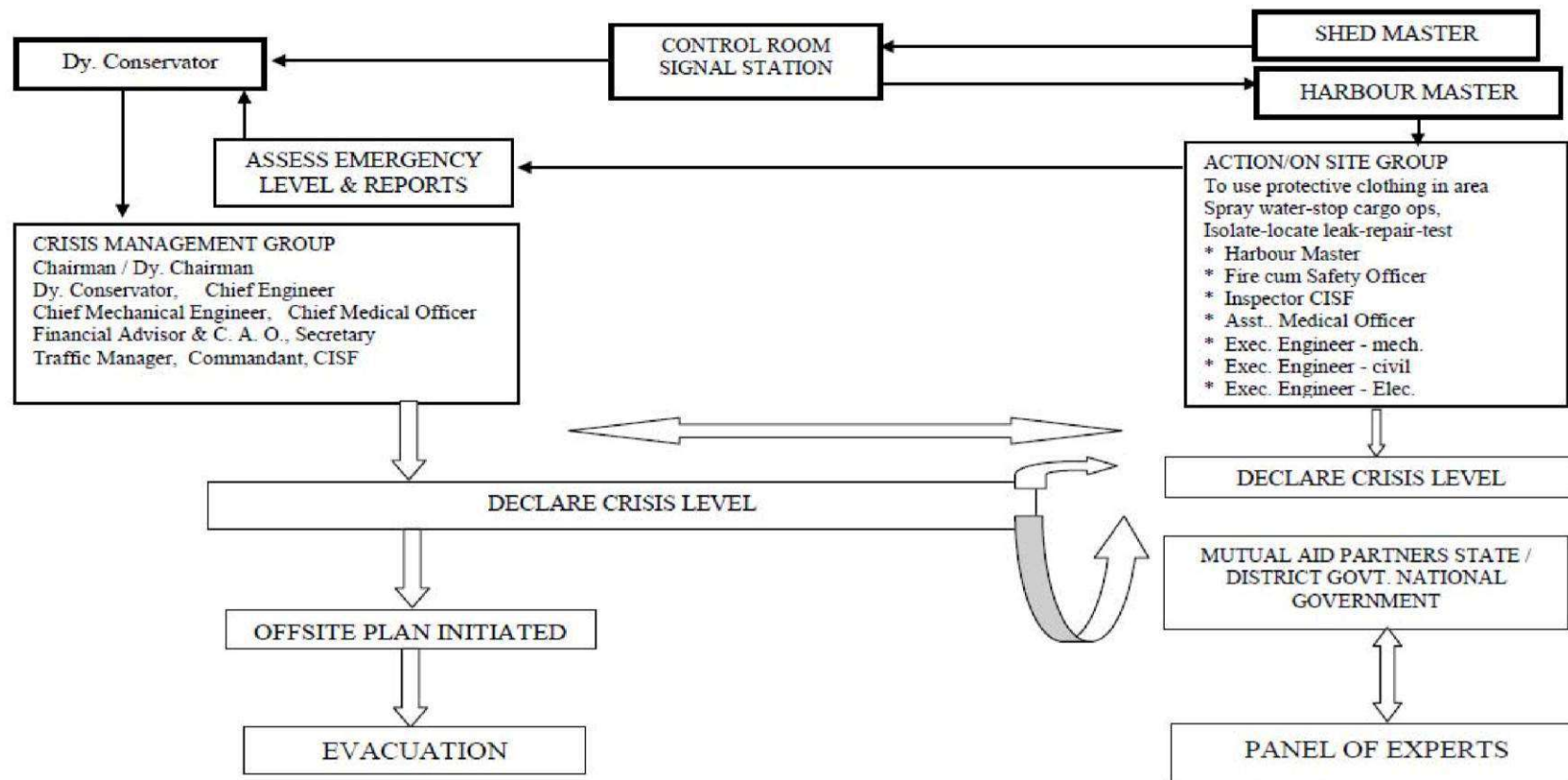
All fire fighting should be done from more than 5.3 m away from the affected coal stack unless the fire fighter is fully clothed with fire protective clothing and respiratory protection

Please note that CO could also be emitted during a coal fire due to incomplete combustion. Hence adequate respiratory protection should be used like canister gas mask or Self Contained Breathing Apparatus –SCBA

4.10 Fire & Explosion Response Plan



4.11 Fire & Toxic Leakage



PROCESS

- | | |
|--|--|
| (1) Master or informer raises alarm | (2) Informs control room at the Fire Station |
| (3) Advises D.C. and H.M and Action Group | (4) Action group commences to use protective clothing in area
-Spray water-stop cargoes/Isolate – locate leak-repair test |
| (5) Declare crisis level | (6) Crisis level endorsement by crisis management group |
| (7) If crisis level declared is greater | (8) Mutual aid partners contacted and district emergency plan initiated |
| (9) If necessary evacuation commenced partial or full. | |

4.12 Details of Fire Fighting Equipment available at Kandla Port

4.12.1 Fire Water Tender – 6 Nos

Water Tank Capacity: 6000 liters. (Discharge Capacity 2250 liters/PER MIN at 7.5kg/cm² & 300 liters at 40kg/cm²).

Fire Monitor Discharge capacity 2750 lpm at 7kg/cm² with effective throw/Jet of minimum 45 meters.

Fire Fighting Equipments:

- RRL Hose 15mtrs X 63mm (ID)
- Foam AFFF 3%
- Various type of Branches
- Hose Fittings
- Small Gears
- Personnel Protective equipment (PPE)
- Additional Foam Fighting System
- Communication System
- Public Address system
- Extension Ladder

4.12.2 Foam Fire Tender – 3 Nos

Water Tank Capacity: 5000 liters. (Discharge Capacity 2250 liters at 7.5kg/cm² & 300 liters at 3.5kg/cm²).

Foam Tank Capacity: 1000 liters.

Fire Monitor Discharge capacity 2750 lpm at 7kg/cm² with effective throw/Jet of minimum 45 meters.

Additional CO₂ Extinguishing System.

Fire Fighting Equipments:

- RRL Hose 15mtrs X 63mm (ID)
- Foam AFFF 3%
- Various type of Branches
- Hose Fittings
- Small Gears
- Personnel Protective equipment (PPE)
- Additional Foam Fighting System
- Communication System
- Public Address system
- Extension Ladder

4.12.3 Multi Purpose Fire Tender – 1 No

Water Tank Capacity: 5000 liters. (Discharge Capacity 2000 liters at 10kg/cm² & 300 liters at 3.5kg/cm²).

Foam Tank Capacity: 1000 liters.

Fire Monitor Discharge capacity 2750 lpm at 7kg/cm² with effective throw /Jet of minimum 45 meters.

Additional CO₂ Extinguishing System.

Additional Dry Chemical Powder Extinguishing System.

Fire Equipments:

- RRL Hose 15mtrs X 63mm (ID)
- Foam AFFF 3%
- Various type Branches
- Hose Fittings
- Small Gears
- Personnel Protective equipment (PPE)
- Addition Foam Fighting System
- Communication System
- Public Address system
- Extension Ladder

4.12.4 SURVEYED OFF NEW PROCUREMENT IN PROCESS

4.12.5 Tank Lorry - 01 No.

- Tank Capacity 12,000 liters.
- Anti Pollution Scheme.

4.12.6 Fire Jeep – 01 No.

Pump Discharge Capacity 1800 liters at 7kg/cm².

Fire Fighting Equipments:

- RRL Hose 15mtrs X 63mm (ID)
- Various type of Branches
- Hose Fittings
- Small Gears
- Personnel Protective equipment (PPE)
- Communication System
- Public Address system
- Extension Ladder

4.12.7 Safety Jeep – 01 No.

For proper Coordination, Inspection, in around the Port (Oil & Chemical Tank Farm & Administrative Works).

Fire Fighting Equipments:

- Small Gears
- Personnel Protective equipment (PPE)
- Communication System
- Public Address system

4.12.8 Ambulance – 01 No.

For Transportation of Injured Ship Official, Ship Crews and Victims.

4.13 Station wise Manpower Break Up (Manned Round The Clock)

4.13.1 Emergency Response Centre / Old Kandla Fire Station (Liquid Cargo Jetty)

- Fire cum Safety Officer – 01
- Deputy Fire Officer – 01
- Station Officers – 02 Nos
- Leading Fireman– 02 Nos
- Pump Operator cum Driver – 03 Nos
- Fireman – 08 Nos

Oil Jetty No. 1 (LPG Jetty)

- Leading Fireman – 01
- Pump Operator cum Driver – 01
- Fireman– 04 Nos

Oil Jetty No. 2

- Leading Fireman– 01
- Fireman– 04 Nos
- Pump Operator cum Driver – 01

Oil Jetty No. 3

- Leading Fireman – 01
- Fireman– 04 Nos

Oil Jetty No. 4

- Leading Fireman – 01

- Pump Operator cum Driver – 01
- Fireman– 04 Nos

Oil Jetty No. 5 (IFFCO Jetty)

- Leading Fireman – 01
- Pump Operator cum Driver – 01
- Fireman– 04 Nos

While LPG Tanker is discharging the LPG at Oil Jetty No.1, a Station Officer shall be in charge till the unberthing of LPG Vessel.

Above Fire Crews will be posted at Oil Jetties depending upon the Nature of Risk Cargo Handled.

4.13.2 Tilak Fire Station (Dry Cargo Jetty).

- Station Officers– 01 No
- Leading Fireman– 01 No
- Pump Operator cum Driver– 02 Nos
- Fireman – 04 Nos

For Running & Maintenance of First Aid, Fire Equipments installed at various work places of Kandla Port.

- Leading Fireman– 01 No
- Fireman – 02 Nos

4.13.3 Azad Fire Station (Dry Cargo Jetty).

- Station Officers– 01 Nos

- Leading Fireman– 01 No
- Pump Operator cum Driver– 02 Nos
- Fireman – 04 Nos

4.14 Fire fighting facility at Chemical / Oil Handling Berths

4.14.1 Oil Jetty No: 1

Fixed 2 nos water/foam monitors mounted on towers at each end of each berth.

There are three vertical turbine pumps each of 500m³/hr capacity. One each of Electrical Fire Water Pumps, Diesel Engine Fire water pumps, Electrical flushing pumps.

Jetty one LPG side – 12 DCP – 5Kg Fire Extinguishers, 2 DCP – 150 Kg Trolley mounted fire extinguishers.

4 Fire suits, 2 BA sets with 2 spare respirable air cylinders.

Fire equipment Room:

- Foam / DCP – 15 Nos fire extinguishers
- Helmets – 6 Nos
- Hose length (15 meters) 10 Nos
- Manual Siren – 1No
- Gum Boots – 6 Pairs
- Ropes
- Foam compound 1000 Liters
- Hose fittings
- Branch Pipes
- Fire Axe

- Safety shower – 1 No
- Water curtains
- Fire suits – 2 Nos
- Canister gas mask – 1 No
- Telephone
- Mobile foam trolley – 100 Liters

4.14.2 Oil Jetty No: 2

Fixed foam / water remote controlled monitors mounted on towers at each end of each berth.

There are two vertical turbine pumps each of 800m³/hr capacity, two jockey pumps of 25m³/hr capacity, two foam pumps each of 22m³/hr capacity, two foam /water remote controlled tower monitors, and six jumbo curtains installed at the jetty face.

Fire equipment Room:

- Foam /DCP – 10 Nos each fire extinguishers
- Helmets – 6 Nos
- Fire Hoses - 10 Nos
- BA set – 1No
- Gum Boots – 6 Pairs
- Foam making branch pipes – 2 Nos
- Female coupling –8 Nos
- Jet branch pipes –5 Nos
- Fire suits -2 Nos
- Foam compound - 50 x 30 Liters
- Chemical Suits- 2 Nos
- Fire Axe- 1No
- DCP Fire extinguishers – 10 Nos

- Foam Fire extinguishers – 10 Nos
- Fire Buckets – 10 Nos
- Oil Dispersant – 10 x 20 Liters
- Rubber hand gloves – 6 Nos
- Hose length – 15 meters (10 Nos)

4.14.3 Oil Jetty No: 3, 4 & 5

In Oil Jetty No: 3, there are two foam pumps, with foam tank, 2 remote controlled tower monitors for foam / water spray, 2 sets of jumbo curtains at jetty face, one flame detection system, one 50KW DG set and control console.

Oil Jetty No: 4, there are three vertical turbine pumps each of 500m³/hr capacity, 2 foam pumps with foam tank, 2 remote control tower monitors of capacity 3000 liters per minute of water, 3 jumbo curtains at jetty face, 50 KW DG set and control console.

Oil Jetty No: 5, there are two fire water pumps each of 270m³/hr capacity, (One electrical driven pump, and one diesel engine pump each).

Fire equipment Room:

- Fire buckets – 8 Nos
- Manual Fire Sirens – 1 No
- Foam branch pipes – 4 Nos
- Mechanical foam generator – 2Nos
- Foam compound – 1000 Liters
- BA set – 1 No
- Gum Boots – 6 Pairs
- Helmets – 6 Nos
- Hose length (15 Meters) – 10 Nos
- DCP fire extinguishers – 10 Nos

- Foam fire extinguishers – 5 Nos
- Fire suits – 2 Nos
- Dispersant chemicals - 6 x 20 Lets
- Double female couplings – 8 Nos
- Male coupling – 2 Nos
- Diffuser – 2 Nos
- Water Curtain – 1 No
- Jet Branch Pipe – 2Nos
- Canister Gas Masks – 1 No
- Portable foam / water monitor – 1 No
- Mobile foam generator
- Safety Shower – 1No

4.14.4 Oil Jetty No: 6

- 2 – Nos Diesel engine fire water pumps 820m³/hour each.
- 1 – HP Jockey pump electrical 80m³/hour
- Fire blankets (water jel)
- Smoke detectors in fire pump house
- Hand tool set
- Water curtains nozzles – 2 Nos • AFFF foam
- DCP fire extinguishers – 6 Nos
- Trolley mounted DCP fire extinguishers – 4 Nos
- CO₂ fire extinguishers – 6 Nos
- Foam fire extinguishers – 6 Nos

4.15 General Fire fighting guidelines at the Oil Jetty

1. Stop all loading / unloading operations and close valves.
2. All fire fighters will be apprised of the chemicals and POL products normally handled at the jetties. A set of MSDS is available at the fire station.
3. As a general rule all fire fighting will be carried out from a distance of 60 meter (Average heat radiation experience of $2\text{kw}/\text{m}^2$). If the fire fighters are required to go closer to the fire then fire suits / close proximity suit must be worn. If necessary, water cover could be provided to the fire fighters going closer to the fire.
4. The water curtain along the edge of the berth will be activated for fire / leak / spill emergency at the berth.

and any available tug should be immediately put on s/by.
5. All emergency equipment should be placed beyond the over pressure distance of about 60 meters (Average overpressure distance for 1.0 psi experience) to avoid damage to them.
6. The remote water / foam monitor should be operated to control the fire at the jetty. If properly used the fire will be immediately controlled.
7. All persons not connected with handling the emergency should be moved beyond the TEEL – 1 / ERPG – 1 level distance which is an average distance of 1 Km. But if toxic chemical release takes place then the people from the shanty should be moved beyond 3 Km distance of the fire.
8. All security staff (CISF) should also have access to respiratory protection as they may not be able to leave their post.
9. External help should be obtained as soon as it is felt that the emergency is grave.

10. CISF guards will keep note of all incoming aid equipment.
11. After the emergency is over the Deputy Conservator / Harbour Master will assign a senior management team to verify that there is no longer a threat of further fire / leak / spill, to assess damage and initiate repairs

as needed.
12. Any emergency at the chemical jetties or at the dry cargo berths will be informed to the Deputy Conservator / Harbour Master, who will activate the DMP if necessary.

4.16 General guidelines in case of Toxic Chemical spill / leak

1. Stop all loading / unloading operations and close valves.
2. All emergency operation should be carried out from up wind direction. This may always not be possible. All persons handling a chemical leak / spill should wear chemical protection suit and respiratory protection like gas mask / BA sets.
3. any available tug should be put on alert or pressed into operation.
4. Deputy Conservator / Harbour Master should be informed of a chemical spill however small it may be.
5. CISF should have access to respiratory protection as they may not be able to leave their post.
6. In case of a major chemical leak / spill the neighbouring shanty should be evacuated especially if chemicals like, Acrylonitrile, Benzene, Aniline, 1:3 Butadiene, Vinyl Chloride, Styrene has spilled.
7. Attempts could be made to salvage the spilled chemical or dispersant could be applied to the spill.

8. The chief fire officer should be kept informed of the chemicals being loaded / unloaded at the port chemical berths on a daily basis.

Important fire fighting methods and spill handling methods of the concerned chemicals should be then informed to the fire fighters. They should also be apprised of the health effects and water solubility of the concerned chemicals.

IDENTIFICATION OF EMERGENCIES AT THE OIL & CHEMICAL FACILITIES AROUND THE KANDLA PORT

5.1 Impact Distances

Under the Risk Assessment Study for the DEENDAYAL PORT TRUST carried out by Tata AIG Risk Management Services Ltd in the year 1999, various failure scenarios have been identified for different facilities around the port and these have been simulated using Phast / Safeti software. These failure scenarios have been categorized into Maximum Credible Loss Scenarios (MCLS) and Worst Case Scenarios (WCS).

These failures can be due to number of reasons like material failure, human error. The failures could also be on account of natural disasters like earthquake, flood etc or they could be due to external factors like missile attack or terrorist attack. On failure due to any account mentioned above and depending on the extent of damage, there can be partial or total loss of confinement of hazardous materials handled in the port.

5.2 Maximum Credible Loss Scenarios (MCLS) considered for the study

5.2.1 Scenario 1 – Butadiene Sphere of United Storage and Tank Terminals Ltd.

There are 4 Butadiene Spheres in the terminal. We have considered the 1000 M.T. sphere for the study. Butadiene is stored at 3 to 4 Degree C and pressure in the sphere is maintained at 0.8 bar. The temperature of Butadiene is controlled by brine chillers cooled by Freon refrigeration system. The probability of BLEVE is very remote, considering there are two compressors and DG set is provided to take care of full power load of terminal in case of power failure. However, for Consequence Analysis study, we have considered BLEVE of 1000 M.T. Butadiene Sphere. It is assumed that the catastrophic rupture of the sphere takes place at a pressure of 25 bar.

Initial temperature (K) : 395. Initial pressure (bar (g))
 : 25.0

5.2.1.1 Radiation Effects: Bleeve / Fire Ball

Sr. No.	Radiation levels (Kw/sq m)	Distance in meters	
		5m/s C	2m/s D
1.	4	1558	1558
2.	12.5	919	919
3.	37.5	526	526

5.2.1.2 Explosion Effects

Sr. No.	Over pressure		Distance in meters	
	BAR(g)	PSI (g)	5.0m/s;C	2.0m/s; D
1.	0.0207	0.3	3246	3246
2.	0.1379	2	841	841
3.	0.2068	3	650	650

Comments:

1. In case of BLEVE a radius of 526 m. could be subjected to heat radiation, intensity of 37.5 kw/m². This would affect the facilities of Synthetics and chemicals, Indo Nippon, Kesar Enterprises, Bayer ABS & Chemicals and Resins. A portion of IFFCO facility (boundary) would also be subject to 37.5 KW per m² radiation intensity. This could cause fires in the neighbouring areas and this is likely to lead to domino effect. Employees within a radius of 1.5 km. from the sphere would suffer burn injuries.
2. Structural damage is likely within a radius of 650 m. from the sphere. This would damage nearby tanks, buildings and is likely to lead to domino effect which could aggravate the emergency. Upto a distance of 3.2 k.m there would be window glass breakage.

3. The possibility of BLEVE is less likely as the Horton spheres are maintained at low temperatures and at low temperature. There is also a standby DG set to take care of 100% electrical load of the terminal. The spheres are protected by water spray ring system along with a hydrant system.

5.2.2 Scenario 2 - Phenol storage of United Storage and Tank Terminals Ltd.

In the United storage terminal there is a phenol storage tank. In the event of bottom nozzle rupture or a large overflow from the tank, phenol would spill out and the contents would be within the dyke.

5.2.2.1 Dispersion Distance for PHe nol

Sr. No.	Concentration of interest ppm	Dispersion Distance in meters	
		5.0m/s;C	2.0m/s; D
1.	100	103	90

5.2.2.2 Radiation Effects – Pool Fire

Sr. No.	Radiation levels (Kw/sq m)	Distance in meters	
		5.0m/s;C	2.0m/s; D
1.	4	32	32
2.	12.5	25	22
3.	37.5	12	12

Comments:

Phenol has IDLH of 100 ppm concentration and the vapours are toxic. Toxic vapour of 100 ppm. Concentration would disperse upto 90 to 103 meters in the downward direction. This scenario may have a moderate off site implication due to toxic vapours.

5.2.3 Scenario 3 - Toluene storage of United Storage and Tank Terminals Ltd.

It is assumed that the tank has a diameter of 15 m. and dyke dia of 30 meters. In case of bottom nozzle failure of large overflow toluene would accumulate in the dyke. In case, the pool encounters the source of ignition, a pool fire would result.

5.2.3.1 Dispersion Distance for Toluene

Sr. No.	Concentration of interest Vol %	Distance in meters	
		5.0m/s;C	2.0m/s; D
1.	1.2 (LEL)	63	72

5.2.3.2 Radiation Effects – Pool Fire

Sr. No.	Radiation levels (Kw/sq m)	Distance in meters	
		5.0m/s;C	2.0m/s; D
1.	4	59	44
2.	12.5	25	22
3.	37.5	20	19

5.2.3.3 Flash Fire

Sr. No.	Distance (m)	Distance in meters (1/2 LEL Distance)	
		5.0m/s;C	2.0m/s; D

1.	Furthest extent (m) for flash fire	111	121
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Comments:

In case of a pool fire, the radiation effect is likely to be contained within the site. A flash fire distance is approximately 120 m. This means that a flammable cloud could cause a flash fire due to source of ignition within 120 m. in the downward direction. The flash fire would result in a pool fire.

The terminal has its own independent fire protection and fire fighting system which can reduce the affected distance by immediate actions like spray of foam compound over the pool formed in the dyke to prevent ignition and reduce the rate of evaporation.

5.2.4 Scenario 4 – Acrylonitrile storage of Bayer ABS

Acrylonitrile polymerises in the presence of light and at high temperature. If polymerization takes place in the tank, it could explode resulting in large release of Acrylonitrile. Acrylonitrile could also be released in the event of bottom nozzle failure of tank or overflow into the dyke.

5.2.4.1 Dispersion Distance for Acrylonitrile

Sr. No.	Concentration of interest ppm	Dispersion distance in meters	
		5.0m/s;C	2.0m/s; D
1.	4 (IDLH)	4026	12000

5.2.4.2 Radiation Effects – Pool Fire

Sr. No.	Radiation levels (kW/sq m)	Distance in meters	
		5.0m/s;C	2.0m/s; D
1.	4	80	85

2.	12.5	57	53
3.	37.5	42	32

5.2.4.3 Flash Fire

Sr. No.	Distance (m)	Distance in meters (1/2 LEL Distance)	
		5.0m/s; C	2.0m/s; D
1.	Furthest extent (m) for flash fire	118	125

Comments:

1. Acrylonitrile has boiling point of 77Degree C and IDLH 4 ppm concentration. However, it should be noted that on polymerization and in fire condition, Acrylonitrile would decompose to release hydrogen cyanide and NOx.
2. The dispersion distance for 4 ppm concentration of Acrylonitrile vapours could be 12 kms if the wind speed is 2 m/sec and atmospheric stability D. However, this distance could be reduced if timely action is taken.
3. Bayer ABS maintains a good safety code of practice. They have conducted various safety studies and have a good maintenance system. Moreover the emergency management plan is well prepared and rehearsed in house. The standard of housekeeping in the terminal is good. The personnel working in the terminal have a good knowledge of the actions to be taken in the event of an emergency.

5.2.5 Scenario 5 - Styrene storage of Bayer ABS

Bayer ABS has a 1210 KL styrene tank. Styrene can undergo violent polymerization above 65 degree C, which could be explosive. It is assumed that the tank diameter is 12.5 m. and bund is 22.5 x 22.5 m². In case of bottom nozzle failure, overflow, shell rupture, the material would accumulate in the dyke and if it would encounter the source of ignition, a pool fire would result.

5.2.5.1 Radiation Effects

Sr. No.	Radiation levels (Kw/sq m)	Distance in meters	
		5.0m/s;C	2.0m/s; D
1.	4	52	43
2.	12.5	26	21
3.	37.5	23	17

Comments:

1. The radiation effect would be restricted to the site and is not likely to have off site implication. However, on polymerization and fire condition, styrene generates enormous quantity of soot and splinter could fly off. This could affect neighboring areas.
2. The high safety standards maintained and observed at site would go a long way in preventing catastrophic scenarios.

5.2.6 Scenario 6 - Benzene storage of Indo Nippon

In Indo Nippon terminal Benzene is stored in an 1800 KL tank. Pool fire scenario has been considered for the tank assuming tank diameter as 12 m. and dyke dia as 25 m.

5.2.6.1 Dispersion Distance for Benzene

Sr. No.	Concentration of interest Vol%	Dispersion Distance in meters	
		5.0m/s;C	2.0m/s; D
1.	1.3	119	120

5.2.6.2 Radiation Effects: Pool Fire

Sr. No.	Radiation levels (Kw/sq m)	Distance in meters	
		5.0m/s;C	2.0m/s; D

1.	4	55	42
2.	12.5	23	20
3.	37.5	20	16

5.2.6.3 Flash Fire

Sr. No.	Distance (m)	Distance in meters	
		5.0m/s;C	2.0m/s; D
1.	Furthest extent (m) for flash fire	175	175

Comments

In case of pool fire radiation effect would be restricted to site.

5.2.7 Scenario 7 - Methanol storage of Indo Nippon

Methanol is stored in 2500 KL tank, dyke dia is assumed as 30 m. And tank dia as 15 m.

5.2.7.1 Dispersion Distance for Methanol

Sr. No.	Concentration of interest Vol%	Distance in meters	
		5.0m/s;C	2.0m/s; D
1.	6	36	47

5.2.7.2 Radiation Effects: Pool Fire

Sr. No.	Radiation levels (Kw/sq m)	Distance in meters	
		5.0m/s;C	2.0m/s; D
1.	4	66	73

2.	12.5	48	48
3.	37.5	37	34

5.2.7.3 Flash Fire

Sr. No.	Dispersion (m)	Dispersion Distance in meters	
		5.0m/s;C	2.0m/s; D
1.	Furthest extent (m) for flash fire	172	83

5.2.7.4 Explosion Effects – Late Ignition

Sr. No.	Over pressure		Distance in meters	
	BAR(g)	PSI (g)	5.0m/s;C	2.0m/s; D
1.	0.0207	0.3	110	137
2.	0.1379	2	80	95
3.	0.2068	3	78	91

Comments:

1. In case of pool fire, the radiation effect would be restricted to the site.
2. Methanol has a low boiling point i.e. (65oC.), hence if timely action is not taken, a large amount of Methanol would vaporize and unconfined vapour cloud would be formed which if it encounters a source of ignition would explode.
3. In case of unconfined vapour cloud explosion there may be a moderate implication on the surrounding facilities (Synthetics & chemicals and J R Enterprises).

5.2.8 Scenario 8 - Refrigerated Butadiene storage tank of Synthetics and chemicals

There are two atmospheric storage tanks of Butadiene having capacity of 2000 MT each. The storage temperature is maintained at minimum 8oC. Ammonia is used as refrigerant. The tank is double walled

tank, catastrophic rupture of the tank is improbable. It is assumed that if the roof of the tank fails and a pool fire has taken place whose diameter equals the diameter of the tank.

5.2.8.1 Radiation Effects: Pool Fire

Sr. No.	Radiation levels (Kw/sq m)	Distance in meters	
		5.0m/s;C	2.0m/s; D
1.	4	46	74
2.	12.5	41	41
3.	37.5	33	19

5.2.8.2 Flash Fire

Sr. No.	Distance (m)	Distance in meters	
		5.0m/s;C	2.0m/s; D
1.	Furthest extent (m) for flash fire	97	4

Comments:

The radiation distance would be contained within the site.

5.2.9 Scenario 9 - IFFCO Ammonia Sphere

IFFCO has refrigerant ammonia storage tanks. There are two 1500 m/tons Horton Spheres. In case of external fire, the sphere would be heated up. The external fire would cause the shell above the liquid level to get weakened.

5.2.9.1 Dispersion Distance for Ammonia

Sr. No.	Concentration of interest ppm	Distance in meters	
		5.0m/s;C	2.0m/s; D

1.	500 (IDLH)	10440	9908
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Comments:

1. A toxic ammonia cloud of IDLH concentration (500 ppm) would disperse up to 10 km. in the downward direction.
2. Considering that ammonia is highly soluble in water and it is a light gas, the severity of the scenario could be greatly reduced by timely action. I.e. application of water spray to ammonia cloud.
3. The ammonia storages are well protected. The company has its own fire and safety department with fire engines and fire fighting personnel on duty round the clock. The company has a good preventive maintenance programme. Safety training is given to all employees.

5.2.10 Scenario 10- Phenol storage of Kesar Enterprises

Kesar Enterprises terminal phenol is stored in a 566 KL steam jacketed tank. In case of overflow or bottom nozzle failure, phenol would accumulate in the dyke.

5.2.10.1 Dispersion Distance for Phenol

Sr. No.	Concentration of interest ppm.	Distance in meters	
		5.0m/s;C	2.0m/s; D
1.	100 (IDLH)	103	90

5.2.10.2 Radiation Effects: Pool Fire

Sr. No.	Radiation levels (kW/sq m)	Distance in meters	
		5.0m/s;C	2.0m/s; D
1.	4	32	32
2.	12.5	25	22
3.	37.5	12	12

Comments:

1. Phenol vapour of IDLH 100 ppm would disburse upto 131 to 197 m. in downward direction. This may have a moderate off-site implication.

5.2.11 Scenario 11 - Acrylonitrile storage of Kesar enterprises.

In Kesar terminal, Acrylonitrile is stored in a 2526 KL tank. Acrylonitrile polymerises in the presence of light and at high temperature. In case of polymerization, the distances affected could be as follows.

5.2.11.1 Dispersion Distance for Acrylonitrile

Sr. No.	Concentration of interest ppm	Distance in meters	
		5.0m/s;C	2.0m/s; D
1.	4	4075	12150

5.2.11.2 Radiation Effects: Pool Fire

Sr. No.	Radiation levels (kW/sq m)	Distance in me ters	
		5.0m/s;C	2.0m/s; D
1.	4	91	96
2.	12.5	65	58
3.	37.5	46	35

5.2.11.3 Flash Fire

Sr. No.	Distance (m)	Distance in meters	
		5.0m/s;C	2.0m/s; D
1.	Furthest extent (m) for flash fire	119	126

Comments

1. The dispersion distance for Acrylonitrile for a cloud of 4 ppm concentration is approximately 12 km in the downwind direction, if the wind speed is 2 m/s at atmospheric stability is D. However, this would be greatly reduced if timely action is taken.
2. The polymerization products include Hydrogen Cyanide and Nox.

5.2.12 Scenario 12 - Aniline storage - JK Synthetics Terminal

Aniline is stored in the JK Terminal. The tank diameter is considered 12m and dyke diameter as 25m.

5.2.12.1 Dispersion Distance for Aniline

Sr. No.	Concentration of interest ppm	Distance in meters	
		5.0m/s;C	2.0m/s; D
1.	100	92	177

Comments:

1. In case of overflow of tank or bottom nozzle rupture aniline would accumulate in the dyke.
2. Aniline has an IDLH value of 100 ppm. Toxic vapour of aniline would disperse upto 177 m. in the downwind direction, if the wind speed is 2m/sec.
an atmospheric stability D.
3. The rate of evaporation could be reduced by blanketing with water.

5.2.13 Scenario 13 - BLEVE of LPG road tanker

LPG Road Tankers are filled up at the IOCL terminal. In case of over pressurization of the bullets a BLEVE could take place. Over pressurization could take place because of external fire. In case of an accident of the road tanker on the road, LPG would spill out and could result in an unconfined vapour cloud explosion. One 10 ton LPG road tanker has been considered for the study.

5.2.13.1 Radiation Effects – Bleeve / Fireball

Sr. No.	Radiation levels (Kw/sq m)	Distance in meters	
		5m/sC	2m/s D
1.	4	345	345
2.	12.5	196	196
3.	37.5	108	108

5.2.13.2 Explosion Effects

Sr. No.	Over pressure		Distance in meters	
	BAR(g)	PSI (g)	5.0m/s;C	2.0m/s; D
1.	0.0207	0.3	707	707
2.	0.1379	2	183	183
3.	0.2068	3	141	141

5.2.14 Scenario 14 - Naphtha storage of BPCL

In case of a dyke fire or tank roof fire of a naphtha storage tank in BPCL terminal the damage distances would be as follows.

Sr No	Commodity	Scenario	Wind Speed (M/S)	Damage Distance for Pool fire(Meters)		
				4 kW/m ²	12.5 kW/m ²	37.5 kW/m ²
1.	Naphtha	Dyke fire	3	205	71	31
2.	Naphtha	Tank Roof	3	188	65	29

		Fire				
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5.2.15 Scenario 15 - Catastrophic rupture of 15000 MT cryogenic LPG tank of IOCL

The possibility of catastrophic rupture of the cryogenic LPG tank is very remote. However in case of such a scenario the damage distances would be as follows.

5.2.15.1 Explosion Effects

Sr. No.	Over pressure		Distance in meters	
	BAR(g)	PSI (g)	5.0m/s;C	2.0m/s; D
1.	0.0207	0.3	316	302
2.	0.1379	2	169	176
3.	0.2068	3	157	166

5.2.16 Scenario 16 - Catastrophic rupture of ammonia road tanker

In case of catastrophic rupture of ammonia road tanker the damage distances would be as follows.

5.2.16.1 Dispersion Distance for Ammonia

Sr. No.	Concentration of interest ppm	Dispersion Distance in meters	
		5.0m/s;C	2.0m/s; D
1.	500	1866	1592

5.2.17 Scenario 17 - Leak from Acrylonitrile road tanker

In case of leak from one compartment (Capacity 3 tons) from an Acrylonitrile road tanker, the affected distances would be as follows.

5.2.17.1 Dispersion Distance for Acrylonitrile

Sr. No.	Concentration of interest ppm	Dispersion Distance in meters	
		5.0m/s;C	2.0m/s; D
1.	400	574	1508

6 TOXIC HAZARD RANKING FOR HAZARDOUS CHEMICALS HANDLED AT PORT PREMISES

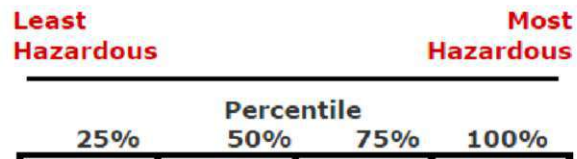
6.1 Hazard Ranking

6.1.1 Propane

CHEMICAL PROFILES | Hazard Rankings

Chemical: [PROPANE](#)

CAS Number: 74-98-6



Human Health Rankings

[Toxicity and exposure potential](#)

[Worker Exposure Hazard Score \(IRCH\)](#)



Ecological Health Rankings

[Toxicity and persistence](#)

[Environmental Hazard Value Score \(IRCH\)](#)



Integrated Environmental Rankings

[Combined human and ecological scores](#)

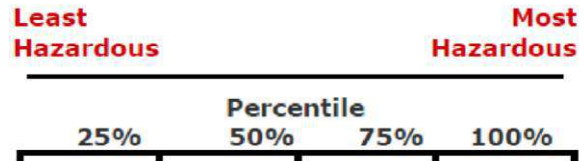
[Total Hazard Value Score \(IRCH\)](#)



6.1.2 Butane

CHEMICAL PROFILES | Hazard Rankings

Chemical: [BUTANE](#)
CAS Number: 106-97-8



Human Health Rankings

[Toxicity and exposure potential](#)

[Worker Exposure Hazard Score \(IRCH\)](#)



Ecological Health Rankings

[Toxicity and persistence](#)

[Environmental Hazard Value Score \(IRCH\)](#)



Integrated Environmental Rankings

[Combined human and ecological scores](#)

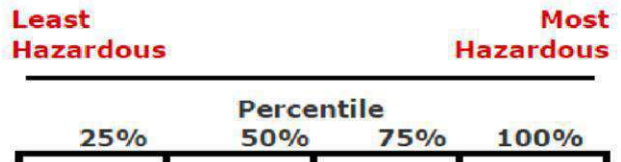
[Total Hazard Value Score \(IRCH\)](#)



6.1.3 Toluene

CHEMICAL PROFILES | Hazard Rankings

Chemical: [TOLUENE](#)
CAS Number: 108-88-3



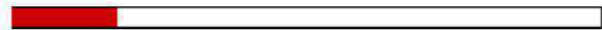
Human Health Rankings

Toxicity only

[Ingestion Toxicity Weight \(RSEI\)](#)



[Inhalation Toxicity Weight \(RSEI\)](#)



[Human Health Effects Score \(UTN\)](#)



Toxicity and exposure potential

[Noncancer Risk Score - Air Releases \(EDF\)](#)



[Noncancer Risk Score - Water Releases \(EDF\)](#)



[Worker Exposure Hazard Score \(IRCH\)](#)



Ecological Health Rankings

Toxicity only

[Ecological Effects Score \(UTN\)](#)



Toxicity and persistence

[Environmental Hazard Value Score \(IRCH\)](#)



Integrated Environmental Rankings

Combined human and ecological scores

[Total Hazard Value Score \(IRCH\)](#)



[Total Hazard Value Score \(UTN\)](#)

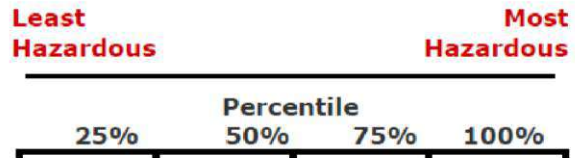


6.1.4 Acrylonitrile

CHEMICAL PROFILES | Hazard Rankings

Chemical: [ACRYLONITRILE](#)

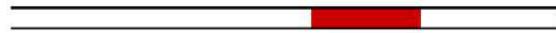
CAS Number: 107-13-1



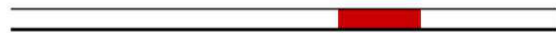
Human Health Rankings

Toxicity only

[Ingestion Toxicity Weight \(RSEI\)](#)



[Inhalation Toxicity Weight \(RSEI\)](#)



[Human Health Effects Score \(UTN\)](#)



Toxicity and exposure potential

[Cancer Risk Score - Air Releases \(EDF\)](#)



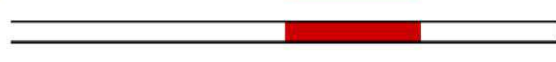
[Cancer Risk Score - Water Releases \(EDF\)](#)



[Noncancer Risk Score - Air Releases \(EDF\)](#)



[Noncancer Risk Score - Water Releases \(EDF\)](#)



[Worker Exposure Hazard Score \(IRCH\)](#)



Ecological Health Rankings

Toxicity only

[Ecological Effects Score \(UTN\)](#)



Toxicity and persistence

[Environmental Hazard Value Score \(IRCH\)](#)



Integrated Environmental Rankings

Combined human and ecological scores

[Total Hazard Value Score \(IRCH\)](#)

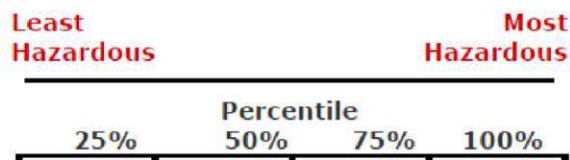


[Total Hazard Value Score \(UTN\)](#)



CHEMICAL PROFILES | Hazard Rankings

Chemical: [ANILINE](#)
 CAS Number: 62-53-3



Human Health Rankings

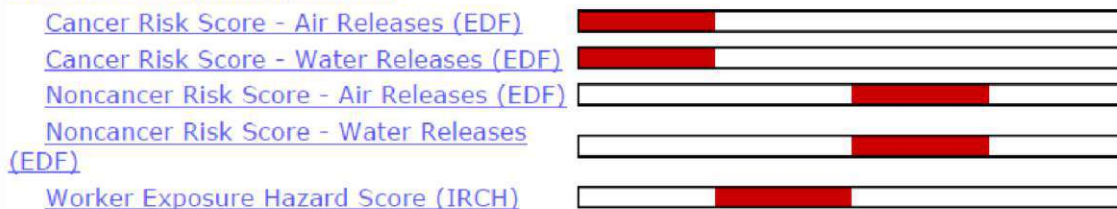
Toxicity only



Toxicity and persistence



Toxicity and exposure potential



Ecological Health Rankings

Toxicity only

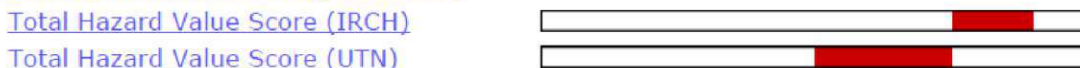


Toxicity and persistence



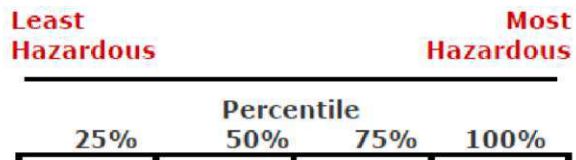
Integrated Environmental Rankings

Combined human and ecological scores



CHEMICAL PROFILES|Hazard Rankings

Chemical: [BENZENE](#)
 CAS Number: 71-43-2



Human Health Rankings

Toxicity only



Toxicity and persistence



Toxicity and exposure potential



Ecological Health Rankings

Toxicity only



Toxicity and persistence



Integrated Environmental Rankings

Combined human and ecological scores

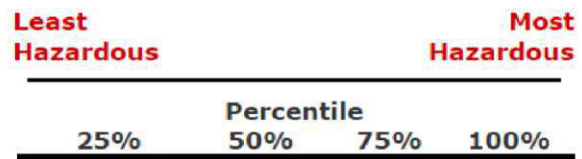


6.1.7 1: 3, Butadiene

CHEMICAL PROFILES | Hazard Rankings

Chemical: [1,3-BUTADIENE](#)

CAS Number: 106-99-0



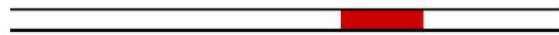
Human Health Rankings

Toxicity only

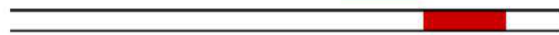
[Ingestion Toxicity Weight \(RSEI\)](#)



[Inhalation Toxicity Weight \(RSEI\)](#)



[Human Health Effects Score \(UTN\)](#)



Toxicity and exposure potential

[Cancer Risk Score - Air Releases \(EDF\)](#)



[Cancer Risk Score - Water Releases \(EDF\)](#)



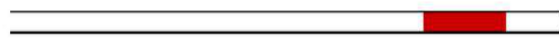
[Noncancer Risk Score - Air Releases \(EDF\)](#)



[Noncancer Risk Score - Water Releases \(EDF\)](#)



[Worker Exposure Hazard Score \(IRCH\)](#)



Ecological Health Rankings

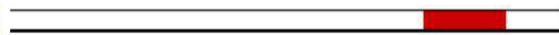
Toxicity only

[Ecological Effects Score \(UTN\)](#)



Toxicity and persistence

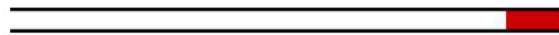
[Environmental Hazard Value Score \(IRCH\)](#)



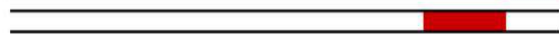
Integrated Environmental Rankings

Combined human and ecological scores

[Total Hazard Value Score \(IRCH\)](#)



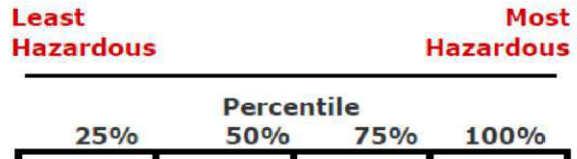
[Total Hazard Value Score \(UTN\)](#)



CHEMICAL PROFILES | Hazard Rankings

Chemical: [ACETONE](#)

CAS Number: 67-64-1



Human Health Rankings

Toxicity only

[Human Health Effects Score \(UTN\)](#)



Toxicity and persistence

[Human Health Risk Screening Score \(WMPT\)](#)



Toxicity and exposure potential

[Noncancer Risk Score - Air Releases \(EDF\)](#)



[Noncancer Risk Score - Water Releases \(EDF\)](#)



[Worker Exposure Hazard Score \(IRCH\)](#)



Ecological Health Rankings

Toxicity only

[Ecological Effects Score \(UTN\)](#)



Toxicity and persistence

[Environmental Hazard Value Score \(IRCH\)](#)



[Ecological Risk Screening Score \(WMPT\)](#)



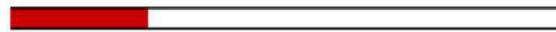
Integrated Environmental Rankings

Combined human and ecological scores

[Total Hazard Value Score \(IRCH\)](#)



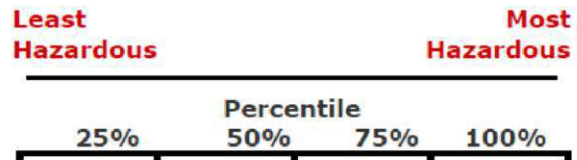
[Total Hazard Value Score \(UTN\)](#)



CHEMICAL PROFILES | Hazard Rankings

Chemical: [METHANOL](#)

CAS Number: 67-56-1

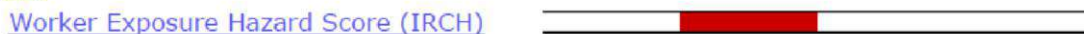


Human Health Rankings

Toxicity only



Toxicity and exposure potential



Ecological Health Rankings

Toxicity only

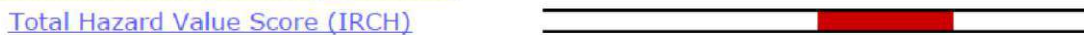


Toxicity and persistence



Integrated Environmental Rankings

Combined human and ecological scores

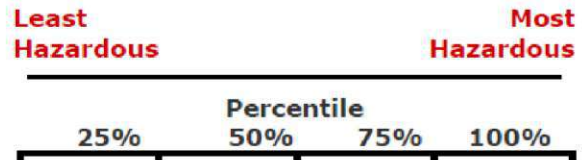


6.1.10 Propylene

CHEMICAL PROFILES | Hazard Rankings

Chemical: [PROPYLENE](#)

CAS Number: 115-07-1



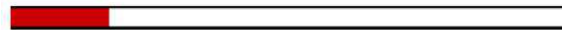
Human Health Rankings

Toxicity only

[Ingestion Toxicity Weight \(RSEI\)](#)



[Inhalation Toxicity Weight \(RSEI\)](#)



[Human Health Effects Score \(UTN\)](#)



Toxicity and exposure potential

[Noncancer Risk Score - Air Releases \(EDF\)](#)



[Noncancer Risk Score - Water Releases \(EDF\)](#)



[Worker Exposure Hazard Score \(IRCH\)](#)



Ecological Health Rankings

Toxicity only

[Ecological Effects Score \(UTN\)](#)



Toxicity and persistence

[Environmental Hazard Value Score \(IRCH\)](#)



Integrated Environmental Rankings

Combined human and ecological scores

[Total Hazard Value Score \(IRCH\)](#)



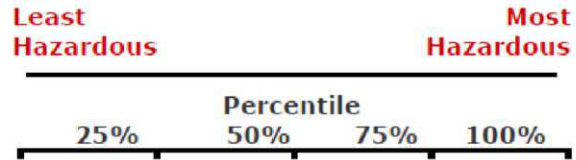
[Total Hazard Value Score \(UTN\)](#)



6.1.11 Vinyl Chloride

CHEMICAL PROFILES | Hazard Rankings

Chemical: [VINYL CHLORIDE](#)
CAS Number: 75-01-4



Human Health Rankings

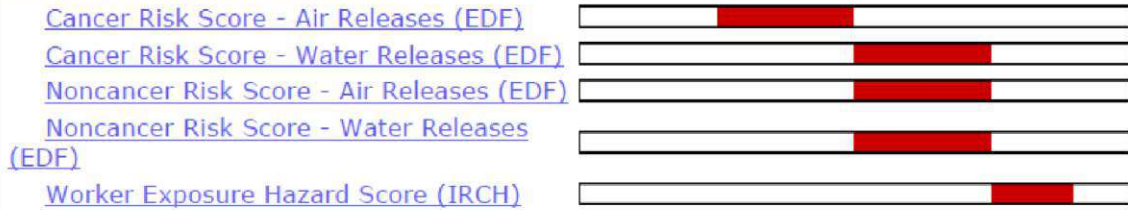
Toxicity only



Toxicity and persistence



Toxicity and exposure potential



Ecological Health Rankings

Toxicity only



Toxicity and persistence



Integrated Environmental Rankings

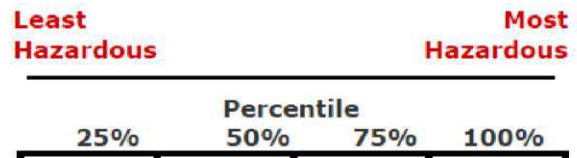
Combined human and ecological scores



6.1.12 Ammonia

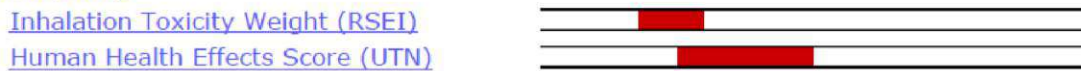
CHEMICAL PROFILES | Hazard Rankings

Chemical: [AMMONIA](#)
CAS Number: 7664-41-7

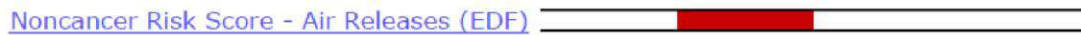


Human Health Rankings

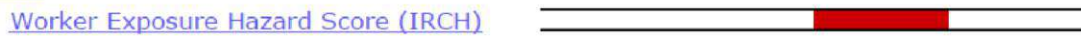
Toxicity only



Toxicity and exposure potential

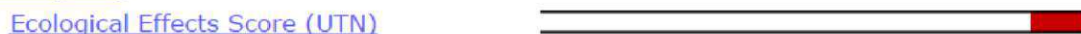


Noncancer Risk Score - Water Releases (EDF)



Ecological Health Rankings

Toxicity only



Toxicity and persistence



Integrated Environmental Rankings

Combined human and ecological scores

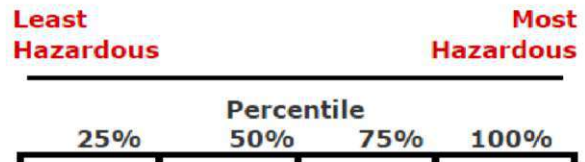


6.1.13 Ethanol

CHEMICAL PROFILES | Hazard Rankings

Chemical: [ETHANOL](#)

CAS Number: 64-17-5



Human Health Rankings

[Toxicity and exposure potential](#)

[Worker Exposure Hazard Score \(IRCH\)](#)



Ecological Health Rankings

[Toxicity and persistence](#)

[Environmental Hazard Value Score \(IRCH\)](#)



[Ecological Risk Screening Score \(WMPT\)](#)



Integrated Environmental Rankings

[Combined human and ecological scores](#)

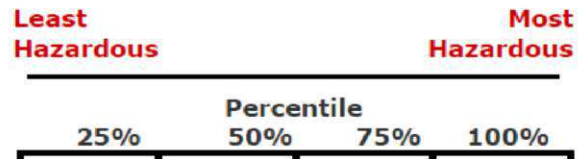
[Total Hazard Value Score \(IRCH\)](#)



6.1.14 Phenol

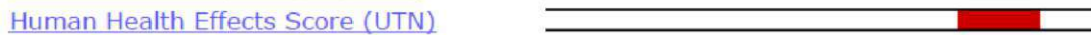
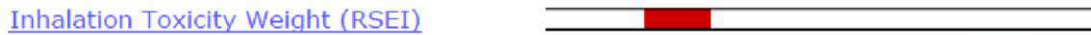
CHEMICAL PROFILES | Hazard Rankings

Chemical: [PHENOL](#)
CAS Number: 108-95-2



Human Health Rankings

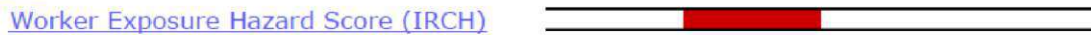
Toxicity only



Toxicity and persistence

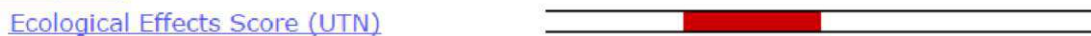


Toxicity and exposure potential

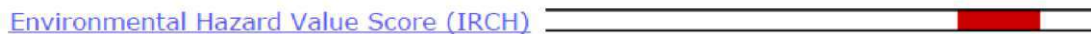


Ecological Health Rankings

Toxicity only

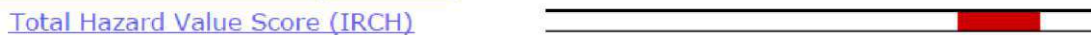


Toxicity and persistence



Integrated Environmental Rankings

Combined human and ecological scores

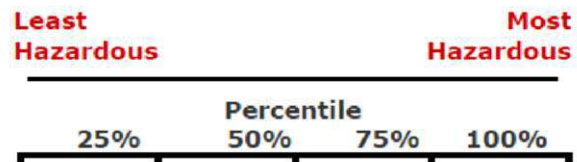


6.1.15 Methyl Ethyl Ketone

CHEMICAL PROFILES | Hazard Rankings

Chemical: [METHYL ETHYL KETONE](#)

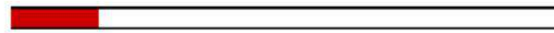
CAS Number: 78-93-3



Human Health Rankings

Toxicity only

[Ingestion Toxicity Weight \(RSEI\)](#)



[Inhalation Toxicity Weight \(RSEI\)](#)



[Human Health Effects Score \(UTN\)](#)



Toxicity and exposure potential

[Noncancer Risk Score - Air Releases \(EDF\)](#)



[Noncancer Risk Score - Water Releases \(EDF\)](#)



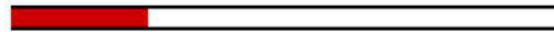
[Worker Exposure Hazard Score \(IRCH\)](#)



Ecological Health Rankings

Toxicity only

[Ecological Effects Score \(UTN\)](#)



Toxicity and persistence

[Environmental Hazard Value Score \(IRCH\)](#)



Integrated Environmental Rankings

Combined human and ecological scores

[Total Hazard Value Score \(IRCH\)](#)



[Total Hazard Value Score \(UTN\)](#)

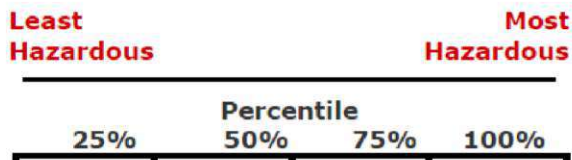


6.1.16 Vinyl Acetate

CHEMICAL PROFILES | Hazard Rankings

Chemical: [VINYL ACETATE](#)

CAS Number: 108-05-4



Human Health Rankings

Toxicity only



Toxicity and exposure potential



Ecological Health Rankings

Toxicity only



Toxicity and persistence



Integrated Environmental Rankings

Combined human and ecological scores

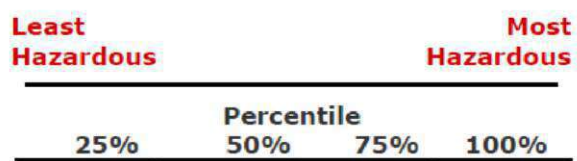


6.1.17 Caustic Soda

CHEMICAL PROFILES | Hazard Rankings

Chemical: [CAUSTIC SODA](#)

CAS Number: 1310-73-2



Human Health Rankings

[Toxicity and exposure potential](#)

[Worker Exposure Hazard Score \(IRCH\)](#)



Ecological Health Rankings

[Toxicity and persistence](#)

[Environmental Hazard Value Score \(IRCH\)](#)



Integrated Environmental Rankings

[Combined human and ecological scores](#)

[Total Hazard Value Score \(IRCH\)](#)

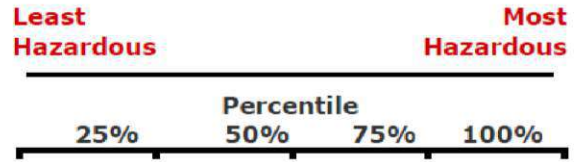


6.1.18 Acetic Acid

CHEMICAL PROFILES|Hazard Rankings

Chemical: [ACETIC ACID](#)

CAS Number: 64-19-7



Human Health Rankings

[Toxicity and exposure potential](#)

[Worker Exposure Hazard Score \(IRCH\)](#)



Ecological Health Rankings

[Toxicity and persistence](#)

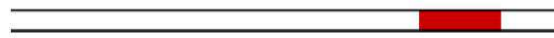
[Environmental Hazard Value Score \(IRCH\)](#)



Integrated Environmental Rankings

[Combined human and ecological scores](#)

[Total Hazard Value Score \(IRCH\)](#)

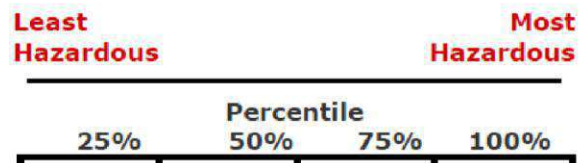


6.1.19 Nonene

CHEMICAL PROFILES|Hazard Rankings

Chemical: [NONENE](#)

CAS Number: 27215-95-8



Ecological Health Rankings

[Toxicity and persistence](#)

[Ecological Risk Screening Score \(WMPT\)](#)

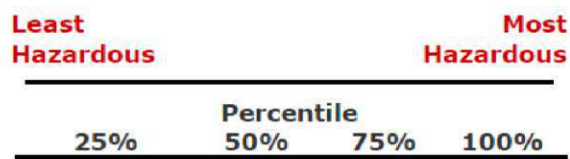


6.1.20 Ethyl Di Chloride (EDC)

CHEMICAL PROFILES | Hazard Rankings

Chemical: [1,2-DICHLOROETHANE](#)

CAS Number: 107-06-2



Human Health Rankings

Toxicity only

[Ingestion Toxicity Weight \(RSEI\)](#)



[Inhalation Toxicity Weight \(RSEI\)](#)



[Human Health Effects Score \(UTN\)](#)



Toxicity and persistence

[Human Health Risk Screening Score \(WMPT\)](#)



Toxicity and exposure potential

[Cancer Risk Score - Air Releases \(EDF\)](#)



[Cancer Risk Score - Water Releases \(EDF\)](#)



[Noncancer Risk Score - Air Releases \(EDF\)](#)



[Noncancer Risk Score - Water Releases \(EDF\)](#)



[Worker Exposure Hazard Score \(IRCH\)](#)



Ecological Health Rankings

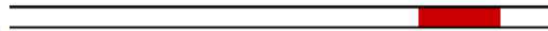
Toxicity only

[Ecological Effects Score \(UTN\)](#)



Toxicity and persistence

[Environmental Hazard Value Score \(IRCH\)](#)



[Ecological Risk Screening Score \(WMPT\)](#)



Integrated Environmental Rankings

Combined human and ecological scores

[Total Hazard Value Score \(IRCH\)](#)



[Total Hazard Value Score \(UTN\)](#)



7 SABOTAGE & CIVIL DISTURBANCE

Access to the Kandla Port is controlled by walls / fence. The entrances are manned by CISF guards.

If a civil disturbance or sabotage threatens or actually damages the port property – the Harbour Master will communicate with local civil authorities or will request immediate assistance from police, coast guard, navy / air force.

7.1 Bomb Emergency Management

In the event of receiving a bomb threat by telephone call, the following should be asked and noted for relaying it to the army/air force/navy:

In view of the high priority given to Ports, they have high risk of becoming targets of the terrorist groups. Therefore the possibility of receiving bomb threats cannot be ruled out. The golden rule is consider all bomb threats as genuine and act accordingly keeping in mind the safety of the people in the Port and the property.

The objective is:

- a) To avoid/minimize any loss or damage to lives and property
- b) To eliminate panic and build up confidence.
- c) To be prepared for proper handling of any critical situation.

7.2 Immediate actions:

- a) Bomb threats may be received in writing email, SMS or may be received on phone.
- b) When the call is received on phone, keep the caller on the line as long as possible. Request him to repeat the message, listen carefully as every word spoken by the person has to be recorded mentally and penned down.

- c) If the caller does not indicate the location of the bomb or the time of possible detonation, it is advisable to try to ask him for this information.
- d) Inform the caller that the port area is occupied and the detonation of a bomb would result in death or serious injury to many innocent persons.
- e) Pay particular attention to peculiar background noises such as motors running, background music and any other noise which may give a clue as to from where the call is being made.
- f) Listen closely to the voice (male, female), voice quality (calm, excited), accents and speech impediments. Immediately after the caller hangs up report should be made to the security officer on duty about all the above details.
- g) Fill up the bomb threat call details in the format as given below.
- h) Call all identified personnel (As indicated for any emergency)
- i) As soon as an emergency is envisaged /occurs the Emergency chief or his alternate shall promptly communicate the information by a telephone or any other quickest mode of communication to the Inspector of Police, highest administrative officer, fire brigade and the nearby installations. The

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information should include the location of the installation and the degree of emergency (anticipated, eminent or actual).

7.3 Bomb Threat Report Form

7.3.1 Actions on Receiving Bomb Threat Call

1. Do not put down receiver or cut off caller
2. Put on tape-recorder /USE CELL PHONE RECORDING
3. Alert nearest colleague
4. Keep Form and pen ready to fill
5. Note time and duration correctly
6. Obtain as much information as possible
7. Keep caller engaged in conversation as long as possible

(Apologise for bad line, ask him to speak up etc.)

Time of call..... Date..... Exact words of caller.....

Was any one called for by name or designation () Yes () No. If so, who?

7.3.2 Questions to Ask Caller

1. Who is calling from where?
2. When is the bomb set to go off?
3. Where is the bomb placed?
4. What kind of bomb is it?
5. How does it look like?
6. Why are you doing this?
7. Whom do you represent?
8. How do you know so much about the bomb?
9. How can we get rid of the bomb?
10. Do you know that the bomb will kill innocent people?

7.3.3 Details of Caller

- Sex: () Male () Female Approximate age:years.
- Origin of call: () inside plant, () outside local, () outside long distance.
- Voice characteristic: () fast, () slow, () stutter, () distinct, () disguised, () educated, () uneducated, () loud, () soft.
- Language used, accent, manner: ()calm, ()angry, ()emotional, ()laughing, ()deliberate, ()normal, ()abnormal, ()other
- Is voice familiar? () yes, () no.
- Background sound: ()street, ()telephone booth, ()airport, () railway station, ()residence, ()cannot identify, ()others

CISF Commandant/Officer informed at: Name of the person receiving call signature.....

(Keep these forms with all Telephone Operators/All designations having direct line?)

7.4 Responsibility of the CISF Commandant / Officer of Kandla port

- a) Advise the Emergency chief (Chairman/Dy. Chairman/Dy. Conservator/Harbour Master) and keep him apprised of the actions being taken.
- b) Immediately make elaborate preparations near the threatened area for
 - ③ Fire fighting
 - ③ Casualty handling
 - ③ Rescue operations
 - ③ Search operations
- c) Prepare for partial/total evacuation if required. Emergency chief or his alternate will authorize these activities.
- d) Designate the team for bomb search. Initiate search operations with Fire and safety/security officers if time is available.

7.5 Action Plan

Two situations are possible.

- a) When no time limit is given.
- b) When bomb threat call has time limit specified.

As soon as the call is received the concerned area-in-charge will make fire fighting/first aid preparations immediately.

1. In the first case if there is no time limit specified for bomb explosion, as soon as the Emergency chief gives a clearance the following action should be initiated.
 - ③ Emergency shutdown of the Port sections likely to be affected.
 - ③ Evacuation of the employees and visitors to safer locations.
 - ③ Bomb search taking all the precautions.

7.5.1 Action plan when time limit is specified:

In such case the concerned officers should search the area along with safety and security officers.

7.5.2 Search procedures:

- Search must be conducted by employees of the concerned department since they are familiar with the area and would be in a better position to notice a foreign object faster.
- Two teams could be formed to search various parts of the area. Stand quietly for some moments to listen for any clockwork device before starting the search.
- As far as practical do not cause any disturbance in the environment till the search is over.
- Do not go into dark rooms and turn on lights. Use a flashlight instead.
- If any foreign or suspicious object is located, do not move or touch it. The removal/disarming of a bomb must be left to professionals. Report the location and description of the object immediately to the emergency control centre/Security gate.
- If possible place sand bags or mattresses around the bomb. Do not cover it.
- Identify the danger area and block it off with clear zone of at least 100 meter.

7.6 Important Telephone Nos of Police Authorities

Name and Designation of Officer	Fax	Telephone Nos. (Office)	Telephone Nos. (Residence)
District Collector, Bhuj. 9978406212	250430	(02832) 250020	02832- 250350
Resident Add. Collector, Bhuj Mob.9978405099	250430	250650	
Parixita Rathore (IPS) S. P.-(East),9978405690		280233	
Mr. Dy. SP (Anjar)9825304239	243254		
Mr. Dy. SP(HQ)9825225071			
Mr.) Dy. SP.9824543004	0837- 224040		
Control Room(DC-5)Purab	280287		

Mr. Vinod Chawda, M.P.,Kachchh		(m)	
Dy.Collector, Anjar Mob. 9825228049		243345	243363
Mamlatdar, Anjar Mob. 9879278174		242588	243362
Mamlatdar, Gandhidham 7567003975		250475 250270	222875 250475
Collector, Jamnagar		2555869	2554059
Collector's Control Room, Bhuj.		2252347 2231733	-
Dy. Mamlatdar, Gandhidham		250475 250270	9427719800
Civil Defence, Gandhidham		220221	
PGVCL, Gandhidham		221728 222809	
GW&SB, Gandhidham		220975	
GSRTC, Gandhidham		220198	
Duty Officer, All India Radio, Bhuj		221412	
State Information Dept. (Shri Sony) (m) 9879012714		224859 250954	253034 252855
Air Force,Duty Officer, Bhuj		252501 252502	
Air Force, Bhuj		223450	
Air Port, Bhuj		254550	
Aerodrome Officer, Kandla		238370	223247
Indian Navy, Jamnagar		550263 to 5	550825
Airforce, Jamnagar		550245 to 7	550247

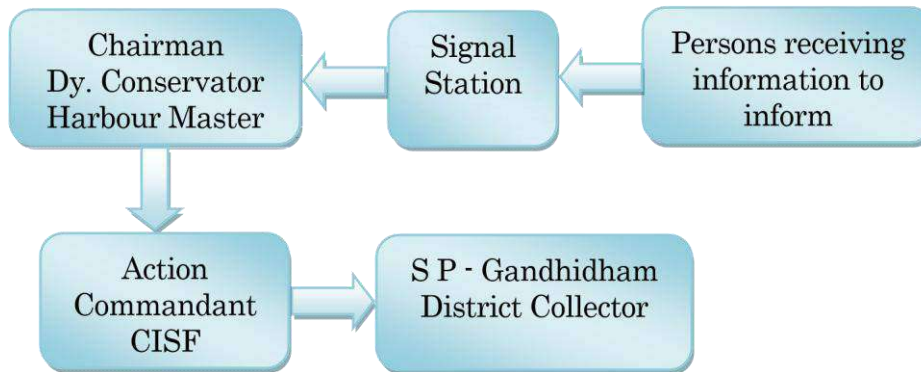
S. No	Designation	Present incumbent	Contact Telephone Numbers
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			Office	Res	Mobile
01	CISF Commandant		271037	229140	9825227282
02	CISF Dy. Commandant		271036	220192	9825227045
03	Asst. Commandant		270440	271041	8000954482
04	Control Room		271040		
05	North Gate		270440		
06.	West Gate – I		271039		
07.	West Gate II		270876		

7.6 Contact Telephone Nos of Bomb Detection & Disposal Squad

Sr. No	Area	Telephone
01	GNADHIDHAM	9979928800
02	Rajkot	0281 – 245777
03	Ahmadabad	079 – 2210019

8 HOSTAGE SITUATION



8.1 Commandant CISF Responsibilities

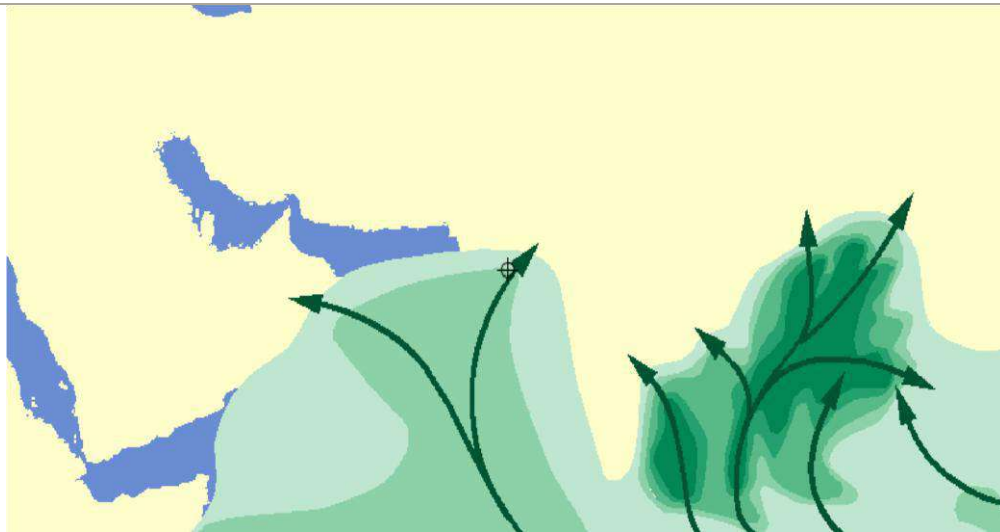
- Apprise - Chairman, Deputy Chairman, Deputy Conservator, Harbour Master of contemplated action.
- Prepare threatened area for fire fighting, casualty handling, search and rescue operations
- Inform Police and requisition help with regard to negotiators/snipers, etc.
- CISF to cordon off area and deny access to persons hampering operations especially media and onlookers.
- Buy time for negotiators to arrive or for formalizing proper plan of action.
- Police/CISF shall assess the situation and based on the assessment, Chairman may permit operation deemed fit to free hostages.

9 SEVERE WEATHER SITUATION

9.1 Act of God Perils (Cyclones Tsunami)


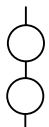



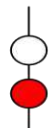

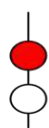
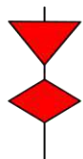
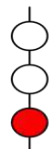
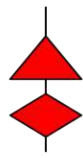


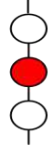
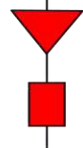
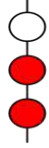
9.1.1 Storms / Cyclone

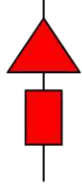
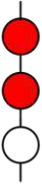
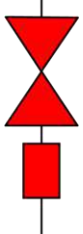



Even though Kandla is within the cyclone area of storms originating in the Arabian Sea and those that enter across the Indian Peninsula from the Bay of Bengal, cyclones are not as severe or frequent as in the Bay of Bengal. Historically, there has been major cyclone in the region in the year 1998. Hence the exposure to this peril is High.





9.1.1.1

Signal No.	Symbol Day	Symbol Night	Type of Warning	Description

I			Cautionary	There is a region of squally weather in which a storm may be forming.
II			Warning	A storm has formed.
III			Cautionary	Port is threatened by squally weather.
IV			Warning	The Port is threatened by storm, but it does not appear that the danger is as yet sufficiently great justifying extreme measures of precautions.
V			Danger	The Port will experience severe weather from a storm of slight or moderate intensity that is expected to cross the coast to the south of the port.
VI			Danger	The Port will experience severe weather from a storm of slight or moderate intensity that is expected to cross the coast to the north of the port.
VII			Danger	The Port will experience severe weather from a storm of slight or moderate intensity that is expected to cross over or near to the port.
VIII			Great danger	The Port will experience severe weather from a storm of great intensity that is expected to cross to the south of the port.

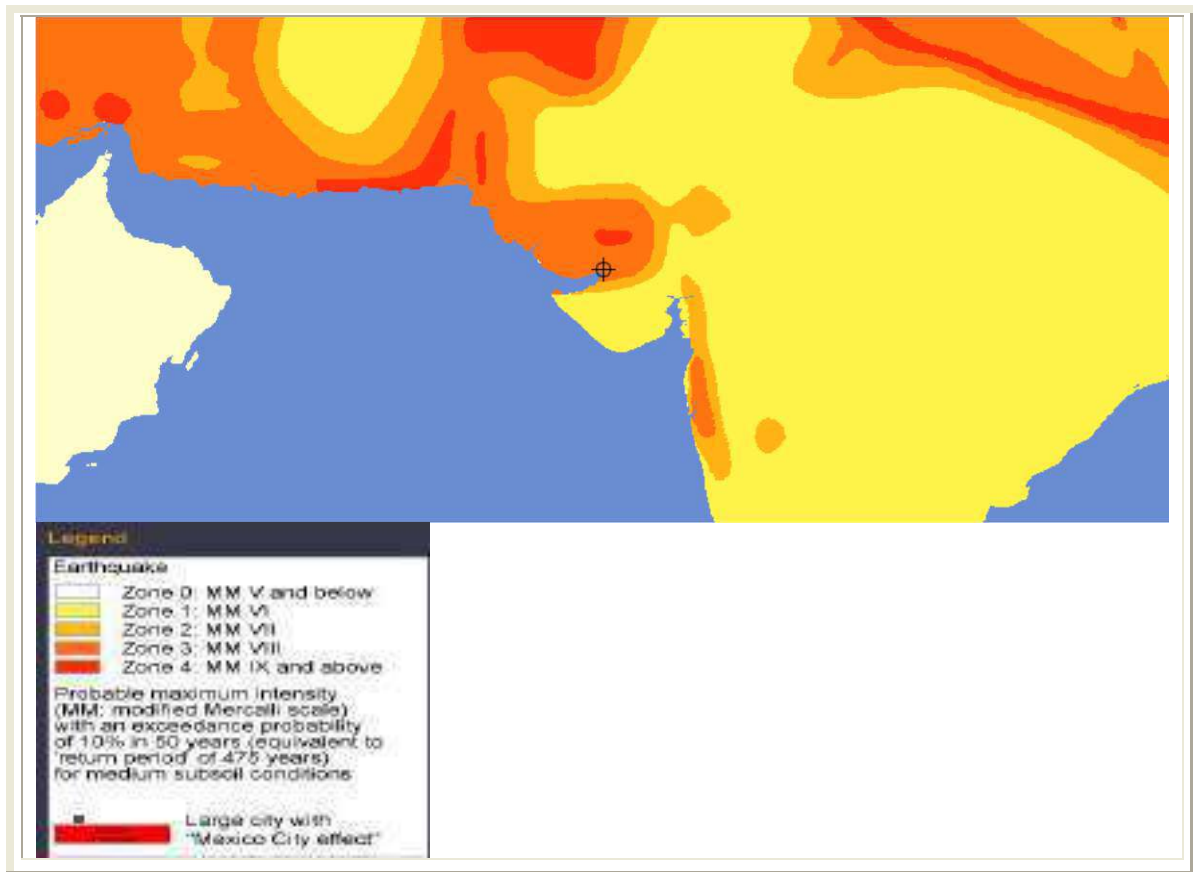
IX			Great danger	The Port will experience severe weather from a storm of great intensity that is expected to cross the coast to the north of the port.
X			Great danger	The Port will experience severe weather from a storm of great intensity that is expected to cross over or near to the port.
XI			Failure of communication	Failure of Communication with Meteorological head quarters has broken down and the local officer considers that there is danger of bad weather.

 Red Light,
 White Light

9.1.2 Earthquake

As per Munich Re world map for Natural hazards the Gandhidham region comes under the Zone III of the earthquake classification as per Indian Standards which is relatively high. However, seismic experts have opined that the Indian land mass is being constantly compressed between the sea and Himalayas and thus the developed stresses are being released in the form of earthquakes in the least expected areas.

Thus taking the dynamic seismic scenario in to consideration risk exposure can be considered as High.

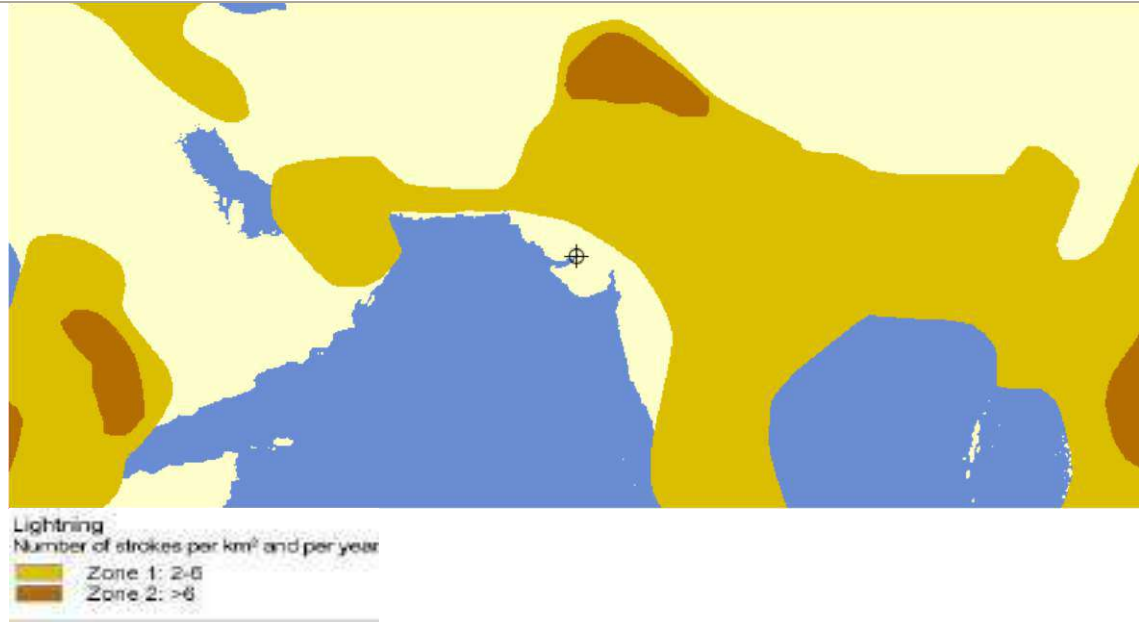


9.1.3 Lightning

As per Munich Re World Map for Natural hazards, Gandhidham region is in Zone – I which means on an average there are 2 - 6 lightning strikes per km area per year which signifies moderate risk exposure.

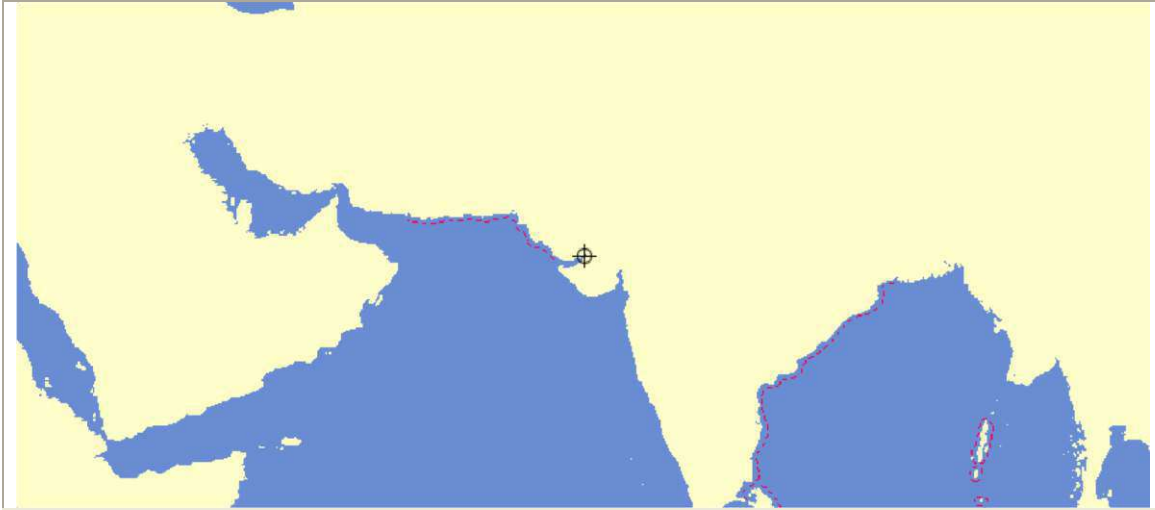
2

Thus risk exposure can be considered as moderate.



Tsunami is large submarine earthquake or large submarine landslides, which are often triggered by earthquakes, and volcanic eruption in the sea or on the coast. The waves spread out in all directions and at great speed, which increases with the depth of water. In great ocean basins the average speed is about 700km/h.

Thus risk exposure can be considered as moderate.



Gujarat is prone to tsunami risk due to its long coastline and probability of occurrence of near and offshore submarine earthquakes in the Arabian Sea. Makran Subduction Zone (MSZ) - South West of Karachi is an active fault area which may cause a high magnitude earthquake under the sea leading to a tsunami. In past, Kandla coast was hit by a Tsunami of 12 mtrs height in 1945, due to an earthquake in the Makran fault line. Tsunami prone areas in the State include coastal villages of Kutch, Jamnagar, Rajkot, Porbandar, Bhavnagar, Anand, Ahmedabad, Bharuch, Surat, Navsari and Valsad districts.

When severe weather is predicated or threatened preparation is made by site personnel.

The most probable severe weather events at the Kandla Port will involve High winds, Heavy rains, Cyclone, Storm, Tsunami, and Lightning & Earthquake.

There is a possibility of surface water accumulation and ingress into buildings and equipment. In addition the above severe hazard conditions can create significant personnel hazards loss of power.

PREPAREDNESS & RESPONSE

9.2 Internal Action Plan in case of Cyclone / Flood & Any other Natural Calamity

As soon as the message on anticipated cyclone/flood/natural calamity is received from the State Government Authority/Indian Meteorological Department/Cyclone Warning Centre/Indian Navy, etc. by any official of the Port Trust, the same shall immediately be informed to the Deputy Conservator (Nodal Officer), who in turn shall get such message confirmed from the above sources and apprise the Chairman and Dy. Chairman accordingly. On approval of Chairman, the Action Plan as stipulated hereunder shall be put into operation for which the Deputy Conservator shall inform all the officers-in-charge of the Control Rooms as well as the Heads of Departments, including Chief Operation Manager, OOT, and Vadinar about the decision of the Chairman as per Point No: 9.2.1.

9.2.1 Particulars of the Action Plan Committee Members

Sl No	Name	Designation	Telephone Nos.			
			Office	Residence.	Fax	Mobile
1	Mr. SANJAY MEHTA, IFS	Chairman	02836-233001 234601	02836-233002	235982	
2	Mr.	Dy. Chairman	234121 236323	234218 236346	236323	

3	Capt. T Srinivas	Deputy Conservator	233585 220235	232806	233585	9825232982
4	Mr. A Krishnan	Deputy FA&CAO	220214	223854		9825227036
5	Mr. Ajay Gupta	Sr. DD(EDP)	239623	234116		9825227095
6	Mr Bimal Kumar Jha	Secretary	220167	231939	233172	8141084794
7	Mr. Suresh Balan	Sr.Dy. Secy (G)	221375	236086		9825227044
8	Mr. Rajendra Singh	Dy. Secy	220033			9422056830
9	Mr. Deepak Rane	Sr. Asst. Secy	221679	234691		8238057380
10	Mr. N M Parmar	SE(C-I)		252624		9825227046
11	Mr. Y K Singh	PO.	223828	228584		9825227079
12	Mr.	Traffic Manager	270625 270246	263006	270475	
13	Mr. Krupananda Swami	Sr. Dy Traffic Manager	270270	235100		9825227049
14	Mr. D N Sondhi	FA&CAO	233174		220047	9825214726
15	Capt. S K Pathak	Harbour Master I/C	270201	231310		9825503499
16	Mr	Dy.Hydl. Engr	270277	225389		9825227201
17	Mr. Sunil Kumar	Flotilla Supdt.	270280	226121		7874627756
18	Mr. K Varughese	FCSO	270176 270178	227512	270176	9825227041

19	Mr. SSP PATIL	Chief Engineer	233192	228777	220050	9825227243
20	Mr. MANOJ MISHRA	Dy. CE	233569			7420027171
21	Mr. K J Todarmal	Exe Eng (R)	236165	220670		8980049099
22	Mr. N M Parmar	SE (PL)	222535	252624		9825227046
23	Mr. V R Reddy	DY.CE (G)	270429	228869		9825227038
24	Mr.B. Rajendra Prasad	Exe Eng (D), ENVIRONMENT	220038	232880		9725338260
25	Mr.	CME	270632 270184	231043	270184	9825226944
26	Shri S C NAHAK	Dy CME	270426	226067		9825235196
27	Mr. P Srinivasu	SE (E)	271010			9825204316
28	Mr. B J Solanki	SE (M)	270352			9726188222
29	Dr. Kalindi Gandhi	CMO	225767 220072	234598		9825505795
30	Dr CHELLANI	Sr Dy CMO	236346	220558		9825505796
31	Dr S B Suryavanshi	AMO	220072	233099		9687606995
32	Dr. Mahesh Bapat	A.M.O	220072	228167		9687607528
33	Mr.	Comdt. CISF	271037	229140		9825227282

Based on the past experience, after detailed discussions and experience sharing process, the actions suggested in the plan have to be taken immediately by the concerned staff members/officials as shown against their names/Designations as soon as the warning of cyclone or any other natural calamity is issued. All staff members/officials should know that they shall come into action on their own as soon as the warning is issued, without waiting for any further instructions. Failure on the part of any employees/officials to carry out the earmarked action plan shall attract severe consequences, which all must note.

9.3 Control Room

There shall be three control rooms, one at Kandla at Signal Station Seva-Sadan-III, and second one at AO Building, Gandhidham and third at A O Building Off Shore Oil Terminal, and Vadinar. The Control Room at Kandla shall be under the direct supervision Harbour Master, whereas Dy. Secy. (G) will be the overall in charge of the control room at A O Building, Gandhidham. XEN (M&E) will be the overall in charge of control room at Vadinar. They shall rush to the respective control rooms as soon as the action plan is put into force. The officials named in the duty roster of various departments elsewhere in this Action Plan shall also report to the respective HODs for coordination and to perform duties as may be assigned by the higher authorities. The overall in charge should draw up roster of the said employees and assign duties for the coming five days. The staff should report to the respective control rooms. The Radio Radar Technician will remain in control room to attend all communication equipments.

9.3.1 Duty Roster for Staff of General Administrative Department

01	Mr. Kamalesh S Bajaj, Senior Clerk	220416		
02	Assistant	220010		
03	Assistant	220010		
04	Senior Clerk	220010		
05	Sr. Clerk	220010		
06	Junior Clerk	220010		
07	Messenger	220010		
08	. Junior Clerk	220010		
09	, LWA	270872		

List of Duty Roster of Marine Department (Ministerial Staff)

Sr No	Name	Office	Residence / Mobile
01	PA to DC	220235	9428032483
02	Mr. AR Jadeja, Signal Supdt	270549	9825427400
03	Office Supdt.	221971	
04	Assistant	221971	
05	Sr. Clerk	221971	
06	Messenger	221971	

9.3.2 Pilots

Sr No	Name	Residence	Mobile
01	Shri. S. K. Pathak	231310	9825803499
02	Capt V Tyagi		7065965924
03	Capt. A K Sharma	238154	9879603642
04	Capt. Vipul M. Madaan	221478	9879603643

9.3.3 List of Telephone Nos & Address of DC, HM & Pilots

Sr No	Name of Officer / Pilots	Address of Gandhidham Res	Tel Nos: Cell / Landline

01	Capt T Srinivas DC	A – 7, Gopalpuri	9825232982 232806
02	Shri S K Pathak HM	C – 32, Gopalpuri	9825803499 231310
03	Capt S K Pathak Pilot		
04	Capt D C Bhatt. Pilot	C – 38, Gopalpuri	9879603641 235653
05	Capt A K Sharma Pilot	C – 40, Gopalpuri	9879603642 238154
06	Capt V Madaan, Pilot	C – 31, Gopalpuri	9879603643 221478
07	AVAILABLE CONTRACT PILOTS WILL BE CONTACTED BY THE SIGNAL STATION.		
08			
09			
10			

9.3.4 Contract / Empanelled Pilots

Sr No	Name	Mobile
01	AVAILABLE CONTRACT PILOTS WILL BE CONTACTED BY SIGNAL STATION	

9.3.5 List of Duty Roster of Mechanical Engineering Department

Designation	Office
CME	270632

Addl. CME	270426
PA to CME	270184
SE(Electrical)	270209
SE (M)	270354
Dy M M	234114
XEN(E)	270469
XEN(DD) I/C	270285
AXEN(M)	270285
Asstt. Engr (M)	234199
AXEN	270165
AXEN (E)	
AE(E)	270322
Office Supdt	270245
Div. Accountant	270245
Div. Accountant	270342
Steno	270184
Junior Clerk	270245
AE(E)	270469
AE(E)	270458
AE(M)	270010
AE(M)	270370
JE(M)	270127
Head Clerk	270342
Head Clerk	270498

Div. Accountant	270498
Head Clerk	270484
Div. Accountant	270484

9.3.6 List of Duty Roster of Civil Engineering Department

Designation	Office	Mobile
Chief Engr	233192	9825227243
Supdt. Engr.(P)	233569	9825325390
Supdt. Engr.(C)	270787	9825227038
Supdt. Engineer (Const)	270419	9825227203
PA To CE (T)	220016	--
P.A. To CE	220050	9426737553
Supdt Engineer (Harbour)	270429	9825227046
Exe. Engr (R)	236165	9825706255
Exe. Engineer (Design)	220038	9725338260
Ex.Engr (TD)	223912	9427205610
Dy.Secretary(E)	221758	9825227044

Asst.Estate Manager	221598	
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9.4Kandla Control Room

Designation	Office	Residence	Fax No	Mobile
Harbour Master	270201	231310	270624	9825232982
Signal Supdt	270549, 270194	232551	270624	9825427400
Signalman at Signal Station	270549, 270194		270624	9825227246

9.5 A.O. Building, Control Room (Gandhidham)

Designation	Office	Residence	Fax No	Mobile
Dy. Secretary (G)	221375	236990	-----	9825505969
Accounts Officer	220908	226199	-----	-----
DMM	231362			

9.4 Vadinar Control Room

Designation	Office	Residence	Fax No	Mobile
Signalman	0288- 2573026			9825212359
Exe. Engineer	0288-			

(E&M)	2573005			
A. F. S.	0288			9712824782
Pilot in Station				

The overall in charge of the Control Rooms shall ensure the presence of the staff, to which various duties have been assigned. They should attend the meetings as and when called. In case of absence of the staff, the matter should be informed to the disciplinary authority, who shall take disciplinary action against the erring employees.

9.5 The Control Room shall have the following Facilities

Control Room	Telephone Nos	Fax No	VHF
Kandla	02836 – 270549/270194, Cell 9825227246	02836- 270624	8,10,12,16
Gandhidham	02836 – 238055/239055	02836- 239055	-----
Vadinar	0288-2573026, 9825212359		12, 16, 8, 10

The above facilities will remain as permanent assets of the Control Rooms. The overall in charge for setting up of Control Room at Kandla will be Dy. Conservator and Secretary for A. O. Building, Gandhidham. They should ensure setting up the Control Rooms at the respective places within two hours of warning and the matter reported to Chairman/Deputy Chairman.

Commandant, CISF to remain in contact with In charge of Control Room at Kandla regarding the positions of the Cyclone.

9.6 Functions of the Control Room

1. It shall remain in touch with the Indian Meteorological Department (Telephone numbers given at Point No: 11.8.1) and also offices and officials as at Point No: 9.8.2, 9.8.3, 9.8.4, 9.8.5 & 9.8.6 on need basis.

9.8.1 Important Telephone Numbers of Indian Meteorological Department

Designation	Address	Office	Resi.	Fax
Director (ACWC)	-do-	022- 22150405	022- 22150452	
Director (I/c)	Met Center Ahmadabad	07922865012 22865165		07922865449 22865012 22861413
Met I/C	MET Centre, Ahmadabad	22861413		
Duty Officer		22865012		
Meteorologist	Ahmadabad	22861413		

Websites

www.imd.gov.in

9.8.2 The Telephone Numbers of Some of the VIP S

Sr. No.	Name and Designation	Fax	Telephone (Office)	Telephone (Resi)
1	District Collector, Bhuj	02832-250430	250020	250350
2	Dy. Collector, Mob. Bhuj 9825300729	02832-252704	250650	
3	Add. Collector, Bhuj Mob. 9825049360	02832-252704	252704	251348
4	Superintendent Police, of Gandhidham,	9978405690	227934	
5	Asstt. Supdt. Of Police		253405	250850
6	Dy. Collector, Anjar		243345	243363
7	Dy. S. P., Anjar		243254	242596
8	Mamlatdar, Gandhidham	9879278174	242588	243362
9	Mamlatdar, Gandhidham		250475 250270	222875 250475
10	Port Co-coordinator, OCC		234313	232808
11	Terminal Manager, IOC	234396	231871	236442
12	Air Force Commander, Jamnagar		2550245	-
13	Collector, Jamnagar		555869	554059
14	Station Commander, Air Force, Bhuj		244005 to 244010	
15	Commandant, Gandhidham	B	223845	

9.8.6 Gujarat State Disaster Management Authority Telephone Numbers of Senior Officials

24 hrs 079- 23251900 - 20

Sr.No	Name of Officers	Designation	Contact No
1	Anuradha Mall, IAS	CEO	079-23259502
2	Shri L.G.Ambujakshan	PS to CEO	079-23259276
3	Shri G. C. Brahmhatt, IAS	Addl. CEO	079-23259451
4	Shri P.B.Thakar, IAS	Addl. CEO	079-23259292
5	Shri G B Mungalpura, GAS	Director (Admin)	079-23259292
6	Shri J. J. Shelat	Director Finance	079-23259278
7	Shri H.K.Chauhan	Controller of Account	079-23259219
8	Shri Nisarg Dave	Deputy Director	079-23259501
9	Shri Sumedh Patil	Deputy Director	079-23259279
10	Shri Piyush Ramteke	Sector Manager	079-23259283
11	Shri Santosh Kumar	Sector Manager	079-23259220
12	Shri Ankit Jaiswal	Sector Manager	079-23259246
13	Shri Anil Kumar	Sector Manager	079-23259220
14	Ms. Akanksha Jain	Sector Manager	079-23259306
15	Ms. Ambika Dabral	Sector Manager	079-23259246
16	Mr. Bhushan Rauisinghani	Sector Manager	079-23259283
17	Ms. Disha Dwivedi	Sector Manager	079-23259283
18	Shri Nehal Desai	Asst. Manager (Admin)& Asst. Director- H & L (i/c)	079-23259286

2. Information from the above Offices/Officers will be collected and transmitted to the overall in charge of Control Rooms/ Dy. Conservator/Harbour Master/ Traffic Manager/Senior Commandant, CISF/Chief Mechanical Engineer on hourly basis. The information should also be passed on to Secretary/Dy. Chairman/Chairman on every 03 hours.
3. Two telephones should be kept in the Control Rooms, one for receiving and the other for outward calls.

4. Each control room will enter messages in Log Books continuously and simultaneously report to the overall in charge after every one-hour. The information shall be passed on to Chairman/Deputy Chairman directly depending upon the importance. It shall be the responsibility of the Control Room Staff to ensure that timely information is passed on and timely proper monitoring done.

9.9 Continuous Monitoring Process

Immediately after the initial signal for Cyclone storm is received, the following officials shall continuously monitor the movement of Cyclone on hourly basis.

Sr. No.	Designation	Office	Mobile
1	Dy. Conservator	233585 / 220235	9825232982
2	Harbour Master	270201	9825803499
3	Pilot	270549	
4	Signal Supdt	270194, 9825227246	9825427400

These officials shall obtain the information from the following sources and The Telephone Numbers of I.M.D. is given in (Point No: 9.8.1)

1. State Meteorological Control Room, Ahmadabad,.
2. Meteorological Control Room, Delhi.

The information so collected shall be maintained by making hourly log entry in a register.

9.10 Monitoring Through Internet

1. As soon as the cyclone warning Signal No. 5 or above is hoisted, the HM nd Pilot should monitor it through internet and give two hourly print out to Dy. Conservator, Secretary, Chief Engineer, FA & CAO, Dy. Chairman and Chairman. Dy. Director (EDP) along with Junior Engineer (PMC) and Mr. B. Rajendra Prasad Exe. Engineer (Design) will monitor the website in the A. O. Building, Gandhidham.

The following are the website codes, through which the required information regarding the position of the Cyclone can be ascertained:

1. www.imd.gov.in

9.11 Inmarsat Mini – M – Terminal Kandla - 00873762092789

9.11.1 Control Room, Gandhidham

1	IDS No	762092789	-	VOICE
		762092790	-	FAX
		762092791	-	DATA

9.11.2 Control Room, Vadinar

1	IDS No	762092777	-	VOICE
		762092778	-	FAX
		762092779	-	DATA

9.12 Plotting of Information on Map

The following officers shall be deputed in the Control Room immediately on starting of the control room with relevant charts.

Sr. No.	Designation	Office	Residence	Mobile
1	Harbour Master	270201	231310	9825803499
2	Pilot			
4	Signal Supdt.	270549 / 270194	232551	9825427400 / 9825227246

The above persons shall immediately reach the Control Room and stay there till the emergency is called off. They shall plot the movement of cyclone on hourly basis and bring the position to the notice of Traffic Manager, Chief Mechanical Engineer, Dy. Conservator and Dy. Chairman/Chairman.

After scrutinizing the movement of Cyclone on the Charts, Dy. Conservator shall, in consultation with Chairman / Dy. Chairman, if required, take a decision for evacuation of ships immediately as soon as the Cyclone is in close proximity to the danger line as defined above.

All pilots should remain stand by as soon as the warning of Cyclone No. 5 level and above is received. All pilots shall be stationed at Kandla and shall not leave the port without prior permission.

Dy. Conservator shall station himself at Control Room at Kandla and remain continuously in touch with the pilots. The pilots should be in a position to mobilize themselves for evacuation of vessels and securing all Port crafts at shortest possible time.

All Class-I & Class-II Officers, the Technical Staff, the essential staff and other persons assigned with specific functions under this plan who want to avail leave in the month of May, June and July should invariably submit their leave program in April every year. Secretary shall issue a circular in the first week of April every year to all the Class-I and Class-II Officers and ascertain the period for which officers would like to proceed on leave during the months of May, June and July of that year.

9.13.2 Immediate stopping of operations at the Port

All the Pilots of the Port should reach Kandla immediately in case of emergency. Any Pilot not traceable in emergency shall be liable for disciplinary action.

Dy. Conservator/Harbour Master/Pilots should be available at Kandla during emergency. (i) Removal of vessels whenever the Cyclone is located in close proximity to the danger line plotted between 65 degree E Longitude 18.2 degree N Longitude and 73 degree E Longitude 18.2 degree N Longitude. Map showing the above position is given at (Annexure XXX (to be inserted by KPT)).

- i. Under such a situation, the ships shall be removed during the first/next available tide. It will be the duty of Harbour Master and Dy. Conservator to ensure that the ships are removed during the first/next available tide as soon as the storm approaches in the close proximity to the danger line as defined above without seeking any further instructions from higher authorities. This action shall be taken automatically and suo-motto without any confusion and for this purpose Traffic Manager shall stop all loading and unloading operations immediately upon instructions from Dy. Conservator so as to enable him to remove the vessels in time. The removal shall be done with the help of all the available pilots plus all contract/empanelled pilots together at one go in the shortest possible time so as to ensure that all the vessels cross the bar before

the tide restriction sets in.
- ii. Dy. Conservator shall ensure that all ships are moved out of the Harbour at the earliest. All pilots shall immediately report at Kandla and stay there till the Action Plan is in operation. Dy. Conservator/Harbour Master shall immediately plan removal of vessels to the OTB as soon as the Action Plan is put into operation irrespective of the signal number, which must be hoisted. If it is impossible to remove them, then all other steps should be taken to ensure safety of the vessels at the Port, as also it would not cause any damage to the Port.
- iii. S E (M) shall enlist the Engine side staff of the Floating crafts to be kept stand by for shifting of crafts to safer places. He will be the in charge of manning these crafts as per the requirement.

For shipping tugs, Marine Engineer / Engineer In charge (Tugs) / will be the in charge for manning the engine side staff for operation of the shipping tugs as per the requirement. Assistant Engineer (DT) and, Assistant Executive Engineer (FC) shall co-ordinate with Marine Engineer / Engineer In charge (Tugs).

- iv. After the Cyclone warning Signal No. 5 or above is hoisted at the Port Traffic Manager shall ensure that the loading/unloading operations at the Port are stopped immediately, hatches closed, ships' derricks properly secured and all labourers evacuated from the port area. Public address system shall be installed at the cargo jetty area, which shall be under the charge of TM. He shall use it for necessary arrangements relating to the evacuation. Senior Commandant, CISF shall ensure that Public Address System is fitted on jeeps provided to CISF.

Traffic Manager should ensure that responsible persons make announcements in a proper way so as not to create any misunderstanding / panic.

9.14 Securing of Cranes

Chief Mechanical Engineer shall ensure that immediately the cranes are secured and properly locked after closing of loading and unloading operations from ships as per procedure and report submitted to Chairman/Dy. Chairman after the operation of this action plan.

The following officers shall constantly monitor the safety of Cranes:

Sr. No.	Designation	Office	Residence	Mobile
1	S E (M)	270354	222771	9825227255
2	S E (E)	271010	229038	9427205563

The above officials and, Assistant Engineer (Elec.) shall arrange to secure all the cranes and keep them properly locked as per the procedure and send a report to the Chief Mechanical Engineer.

Executive Engineer (Dry Dock) and, AE (Mech) shall arrange to secure the cranes at maintenance Jetty as well as Bunder Area.

9.14.1 Securing of all Crafts

Dy. Conservator/Harbour Master shall immediately arrange for securing all the Port Crafts at safer places so that there is no loss to the port and send a report to the Chairman/Dy. Chairman as early as possible after operation of this action plan. Flotilla Superintendent shall be overall in charge of each craft for ensuring their safety.

For parking of crafts in emergency, there places are mainly identified, viz. Bunder Basin, Launch Jetty and maintenance Jetty (As per):

1. Maximum number of crafts such as Mooring Launches, G. S. Launches, and Pilot Launches will be placed in Bunder Basin.
2. In the inner side of Passenger Jetty, one Pilot Launch and one G.S. Launch will be kept.
3. Three Tugs will be kept in the inner side of Maintenance Jetty.

Priority will be given to the Port Crafts for parking in the Bunder Basin and other areas. Rest of the places available in the northern side of Bunder basin area will be allotted to the self propelled barges and private crafts. Dumb barges will be allowed on the beach between maintenance jetty and oil jetty area.

Berthing Supervisor will render all possible assistance to FS, being the overall in charge of the crafts. The following flotilla staff will take care of;

1	Mr. T. Sunil Kumar	F.S
2	Mr JAYDEEPSINH GOHIL	B.S
3	Mr. R B Chauhan	AFS
4	Mr. KENIYA	AFS

9.15 Private Barges / Crafts

The parties who have been given license by the Dy. Conservator to keep their barges and crafts inside the Port limit are given below:

9.15.1 **ALL** HARBOUR CRAFT License Holders to keep their Crafts inside the Port Area

Necessary instructions shall be issued to all those people have valid license immediately. The work of informing these parties will be carried out by Office Superintendent of Dy. Conservator's Office and will personally ensure that the instructions are carried out and report to HM within two hours of the Action Plan coming into operation. The representatives of the above parties shall reach Kandla at once, failing which Dy. Conservator shall cancel the license granted to them and take over the barges/crafts of the party who violate the instructions.

9.16 Evacuation of People from Kandla Area during Emergency – Action Plan

In Kandla Area, there is Residential Habitation in the following areas:

9.16.1 Places of Habitation

9.16.1.1 Saltpan Units

Considerable numbers of Salt Workers are engaged in the following Salt Manufacturing Units.

1. Kutch Salt Works.
2. New Kandla Salt Works.
3. Vijay Salt Works.
4. Friends Salt Works.

5. United Salt Works on KPT Land.
6. United Salt Works on State Government Land.
7. Small Salt Works of State Government, Near Nakti Creek.

The approximate number of Salt Workers that are being engaged/ residing in these Salt Works will be around 2575.

9.16.1.2 Sirva Labour Camp

Plots in Shirva Labour Camps (Near Mosque) have been allotted by DEENDAYAL PORT TRUST on L&L Basis. Population: 450 (approx). There are also some un-authorized hutments in the area.

9.16.1.3 Sirva Railway Hutments

The Shirva Railway Hutments (alongside Main Road) is a cluster of un-authorized Hutments erected on the Railway Land: Population 700 (approx).

9.16.1.4 G – Type Quarters & Housing Societies

The G-Type Quarters are constructed by DEENDAYAL PORT TRUST in early 1950s and were allotted to some persons who were engaged in Port related activities in those days.

DEENDAYAL PORT TRUST has allotted land to Two Housing Societies known as Kandla Port Workers Co-operative Society and Dr. Jaynat Khatri Co-operative Housing Society in Kandla area. Population: 1000 (approx).

9.16.1.5 New Kandla Port Colony P & T & Customs Colonies

The KPT employees, Customs employees etc are residing in these areas.

9.16.1.6 Hutments in the Land of PGVCL

There is a cluster of unauthorized Hutments to the Northern side of wahiya creek and southern side of M/s ABS Bayers Limited and this land belongs to PGVCL. Population: 100 (approx).

9.16.1.7 Banna Fishermen Hutments

There are unauthorized Fisherman hutments situated on the Bank of Kandla Creek towards Southern side of NDDDB Colony. Population: 800 (approx).

9.16.1.8 Hutments near IFFCO Plant

There is a cluster of unauthorized hutments near IFFCO Plant. Population: 500 (approx).

9.17 Population of Kandla

The population of Kandla Area is basically a mixture of people from various places and they can be generally divided in the following three groups;

People belonging to nearby villages like (i) Tuna (ii) Kharirohar (iii) Mithirohar (iv) Chirai and (v) Gandhidham City.

People belonging to other States like (i) Andhra Pradesh (ii) Rajasthan (iii) Uttar Pradesh and (iv) Bihar.

People working in Government establishments residing in the colonies of their organizations.

Most of the people residing in Shirva Labour Camp, Shirva Railway Hutments and Thermal Hutments etc are engaged as Private Labours in the Port and Port related ancillary activities and petty business.

9.17.1 People of Nearby Villages

People of the Port and nearby lease areas belonging to nearby villages like (i) Tuna (ii) Kharirohar (iii) Mithirohar (iv) Chirai and (v) Gandhidham City will have to be sent back to their respective village by providing them Trucks and/or ST Bus facilities in consultation with State Govt. Agencies.

9.17.2 People of Other States

People belonging to other States like (i) Andhra Pradesh (ii) Rajasthan (iii) Uttar Pradesh and (iv) Bihar may not have any relatives or other accommodations facilities in the nearby places like Gandhidham, Adipur.

Hence, they will have to be provided Temporary Shelter in the Schools/community centres as may declared as Temporary Rehabilitation Centre/ Temporary shelters by the State Govt. Authorities.

9.17.3 Action Plan for Evacuation of People from Kandla

On Hoisting of No. 5 Signal or above in Kandla Port, immediately action shall have to be initiated for evacuation of people in the following areas by the persons responsible as mentioned hereunder:-

The evacuation of the inhabitants of the following areas at Kandla is to be done as these areas are sensitive and prone to natural calamities like cyclone, high-tide and other disaster like Gas Leak, etc.

OSD(Estate) and Mr. Bhatia, Asst. Engineer (C) shall ring up all salt lease holders directing them to evacuate their people from their Kandla sites and a report thereof submitted to the Chairman/ Dy Chairman. The Dy Secretary (Estate) will be overall in-charge of the proposed action.

9.17.3.1 List of Salt Lessees

Sr. No	Name of Salt Works	Contact Person	Tel. No. Office	Tel. No. Residence
1	Asstt. Salt Commissioner, Gandhidham	Mr. Jagdish Tripathi	233670	263690
2	M/s. Kanoria Chemicals and Ind. Ltd., Plot No.220, Sector -4, Gandhidham	Mr. B. N. Singh, Mr. J. Singh Factory -	229470	283325 9825225841
3	Shree Krishna Salt Industries, Central Bank	Mr. Kantibhai Thakkar Mr. Vikash Patel	234727 233990	235315 234089

	Compound, Gandhidham	Mb: 9825206214		
4	M/s. Chirai Salt Works, DBZ-S-46, Jawahar Chock, Gandhidham.	Mr.Sureshbhai Mr.Parasbhai Mb: 9825225181 Mr.Mayajar	221109 221267 9826214709	234386 233081
5	M/s. Bhuvneshwari Salt Works, TCX-S-62, Gandhidham	Mr.Sreechandji Jain 9825222269	237114 235203	233605 236860
6	M/s. Dungershee Salt Works, Shop No. D-93, P.B.No.9, Gandhidham	Mr.Hiralal Parekh Mb: 9825019661 Mr. R.B.Agrawal Mb: 9825019662 Mr. Bhikhabhai (Salt Area)	222765 223440 9825225667	232767
7	M/s. Shree Laxmi Salt Allied Ind., "Shree Sadan", 207 / 12-B, Gandhidham	Mr. Rajubhai Rathi Mr. Rameshbhai Rathi Mob.: 9824214901	232167	232167 235482
8	M/s. Jyoti Salt Industries, "Sukh Sadan", Opp. Hotel President, Gandhidham	Mr.Acharya Sukhdevbhai Mr. Sukhdevbhai Acharya Mb: 9825226075	223776 221082 221089 223094	221876

9	M/s. New Kandla Salt and Chemical Co., "Maitri Bhavan", Plot No.18, Sector 8, Gandhidham	Mr. Babulalji Sanghvi 9825226091 Mr. Sukhrajbhai 98252 26011	232227 231588 234087	234325 231814 232122
10	M/s. Kutch Salt Works, New Kandla	Mr. Mitenbhai Mb: 9825225990 Mr. S.P.Giria, Works Manager, Mb: 9825228085	234659 02222040561 22041598 270371	238633

11	M/s. Vijay Salt Works and Allied Industries, "Friends House", P.No. 50, Sector -1A, P.B.No.106, Gandhidham	Mr. Harishbhai Chaturani Mb: 9825064241 Mr. Babulal Nahata	231119 252247 223743	234856 9825228398
12	M/s. Rajesh Salt Works, "Chandan Chambers" National Highway, Plot No.18, 12/A, Gandhidham.	Mr. Kishorbhai Thakkar Mob: 9825177081 Mr. Rameshbhai Mb: 9825226026	220586 221048 222301	234387
13	M/s. Western Chemical, DBZ-S-151, Gandhidham	Mr. Naranbhai Mb: 9825226092	233185 230913	230141
14	M/s. Urvakunj Nicotine Ltd., Central Bank Compound, Plot No.31, Sector No.9, Gandhidham	Mr. Mahendrabhai Patel 9825206214	234727	234480

		Mr. Vikash Patel Mb: 9825226214		
15	M/. Friends Salt Works, "Maitri Bhavan", Plot No.18, Sector No.8, Gandhidham	Mr. Babulalji Mb: 9825226015 Mr. Ashokbhai Mb: 9825226091 Mr. Sukhrajbhai Mb: 9825226011	232227 231588 234087	231646 231814
16	Smt. Savitri H.Pandya, DBZ-N-21/A, GIM	Mr. Jagdihbhai	220212 238112	255612
17	Smt. Vimlaben.H. Pandya, DBZ-N-21/A, Gandhidham	Mr. Jadishbhai Mr.Amritlal Pandya Mb: 9825225212	220212/238 112 238212 255612	- / /
18	M/s. Rajendra Salt Works, D-125, Jawahar Chowk, Gandhidham	Mr. Tarachand	-	-
19	Mr. Natwarlal Agrawal, TCX-S-75, Gandhidham	Mr. Natwarlal Mb: 9825393555	222672	231564
20	Mr. Indrumal Khubchand, C/o Gulab Salt Works, D-125, Jawahar Chowk, Gandhidham.	Mr. Tarachand	233041 234388	234937
21	Mr. Virji Khimji C/o Ajit Salt works, D-75, Gandhidham	Mr. Kirtibhai	220310	-

22	Mr. Girdharilal.S. Agrawal, Plot No.126, Ward – 12/B, Gandhidham	Mr. Girdharilal	232862	234755
23	Mr. Vijay Kumar.D. Palan & Mri Jagdish Kumar.D.	Mr. Navrotambhai Palan	220310	-
24	M/s. Satya Salt Works, DBZ-S-183, Gandhidham	Mr. Candubhai Mb: 9825225911	224055 221445	234739 234469
25	Shri Premji Gangji Soni, DBZ-S-183, Gandhidham	Mr. Mahes Soni	221263	-
26	Smt. Geetadevi Chaturani Plot No.13, Sector 1, Gandhidham	Mr. Romesh / Ashwin Mr. Dayalbhai Chaturani, Mb:9825064245	221048 256713 220586 256706 Fax: 222930	-
27	Shri Rashmin A.Pandya DBZ-N-21/A, Gandhidham	Mr. Jagdish Pandya	220212 238112 238212	-
28	M/s. Neelkant Enterprise, DBZ-S-60, Gandhidham	Mr. Shamjibhai Mb: 9825 25711	220421 220103 Fax: 223560	231485
29	Dayalal G.Chaturani Shop No.1 to 4, "Chandan Chamber" Plot No.18, Ward No.12, Gandhidham	Mr. Dayal	221048 220588	-

30	Shri Punamchand, DBZ-N-197, Gandhidham	Chaganla	Mr. Chaganlal	220545	-
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Safety Officer & Librarian shall inform the Public/Private Sector Tank Farms in Kandla about the situation and advise them to shift their people out of the respective areas to safe places.

9.17.3.2 List of Private / Public Tank Farm Owners

Sr. No.	Tank Farm Owners	Persons to be contacted in case of emergency		
		Name and Position	Telephone No.	Mobile No.
1	Kesar Enterprises Ltd., Near Oil Jetty, Old Kandla (Kutch)- 370210	Mr. R.K. Gupta Gen. Manager	270435 (O) 295676 (R)	9375349181
2	Kessar Enterprises Ltd, Terminal II, Plot No. 5 &6 Old Kandla	Mr. R.K. Gupta G.M	270435 (O) 270177 (O)	9375349181

3	Chemical & Resins Pvt. Ltd Terminal –I, Near Oil Jetty, Old Kandla, Kutch Terminal – II, Near West Gate, New Kandla – Kutch	Lt. Col. Pramod Kumar (Retd), GM,	270505(O) 236831(R) 270916 (O)	9825225676
4	Indo-Nippon Co. Ltd., Plot No.2, K.K.Road, Old Kandla,	Mr. R.N. Pathak Asst. Terminal Manager	270795(O) 235818(R) 270295(O)	9879571295
5	J. R. Enterprise, Plot No.3, Old Kandla,	Mr. Devendra Dadhich, Terminal In-charge	653528 (O) 257152 ®	9898238380
6	Friends Oil & Chemical Terminals Pvt. Ltd., Near Booster Pump Station, Old Kandla, Kutch	Mr.S.Ramakrishnan Terminal Manager	270987 (O) 257249 ®	9879572107

7	<p>Indian Oil Corporation Ltd.,</p> <p>Main Terminal, GIM</p> <p>Foreshore Terminal, Kandla</p> <p>KBPL</p> <p>LPG Import Plant</p>	<p>Mr. AK. Khanna</p> <p>Sr. Term. Manager</p> <p>Mr. KS Rao, Sr.TM</p> <p>Mr. PS Negi</p> <p>Plant Manager</p>	<p>233274</p> <p>(O)</p> <p>229002 (R)</p> <p>270394</p> <p>(O)</p> <p>270628</p> <p>(O)</p> <p>270477</p> <p>(O)</p> <p>233359[®]</p> <p>270978</p> <p>(O)</p> <p>236944</p>	<p>9427216637</p> <p>9426416108</p> <p>9426725342</p>
8	<p>United Storage & Tank Ltd</p> <p>Near IOC Foreshore Terminals, New Kandla</p> <p>Gas Terminal, Plot No. 4</p> <p>Old Kandla</p>	<p>Mr. Manoj Gor</p> <p>Terminal Manager</p> <p>Mr. G. Chudasama</p>	<p>270609</p> <p>(O)</p> <p>653525</p> <p>(O)</p> <p>651238[®]</p> <p>653529</p> <p>(O)</p>	<p>989850029</p> <p>9904366855</p>
9	<p>IFFCO Kandla Unit, Kandla, Kutch</p>	<p>Mr. L. Murugappan,</p> <p>G.M.(NPK-I)</p> <p>Mr. Brahmbatt</p> <p>Manager (F & S)</p>	<p>270711</p> <p>270352(O)</p> <p>270381</p> <p>(O)</p>	<p>982506922</p> <p>9099019861</p>

10	BPCL, KK Road, GIM	Mr. RG. Dekate Sr. Manager Operations	234313 (O) 223235 (R)	9099929634
11	HPCL KK Road, GIM	Mr. Murthy Manager (Installation)	230936 (O) 220084 (O) 233078 Ext	
12	INEOS ABS (I) Ltd Plot No. 8 Old Kandla	Mr. Vineeth Nair Dy. Manager	270087 (O) 234409 (R)	9825237029

13	Liberty Investments Pvt. Ltd., Plot No. 1 & 2, Block 'H', New Kandla	Mr. Jitendra Vaidya Terminal Manager	270151 (O) 270464 (O) 270468 (R)	9825025645
14	Avean International Pvt. Ltd., Liquid Storage Tank Terminal, Plot No. B-1, New Kandla	Mr. Bharat Rathod Terminal Manager	270537 (O)	9375310260

15	Rishi Kiran Logistics Pvt Limited, Plot No. 7, Link Road Old Kandla	Mr. RH. Pandya GM (Terminal)	270223 (O) 270443 (O)	9879104556
16	N.P.P. Pvt. Ltd., Old Kandla	Mr. MD.Nagvekar	270347 (O) 257807 ®	9825227649
17	Friends Salt Works and Allied Industries, KK Road, Old Kandla	Mr. NJ.Zinduwadia Sr. Manager Mr. HA. Mehta,S.M	270814 (O) 262698 (R) 271260 (O)	9825506361 9825506360
18	IMC Ltd, Cargo Jetty New Kandla	Mr. Anil Brahmbhat	270369(O) 653524 (O) 296079 (R)	9898126243
19	Agencies & Cargo Care Ltd., Plot No.3, New Kandla.	Mr.Shivkumar Menon, Terminal Manager	270714 (O)	9825226765

20	Dipak Estate Agency Plot No. 5-6, Block – A New Kandla	Mr. Narendra Thacker	270375 (O)	9879611243
21	Parker Agrochem Exports Ltd, Plot No. 3 –4,Block- H New Kandla	Mr. Bharat Thacker	270486 (O) 270528 (O) 231876 (R)	9825238260
22	Tejmalbhai & Co New Kandla	Mr. Ankitbhai Chandan	271330 (O) 230090 (R)	9825225101
23	Parker Agrochem Product Pvt. Ltd, Plot 7-9/A,N.Kandla	Mr. Raja Babu Dy Manager	270528 (O) 231876 (R)	9979158543
24	Mother Dairy Fruit & Vegetable Pvt. Ltd, Near Oil Jetty, Old Kandla	Mr. Saju Therattu	270654 (O) 270655 (O) 230979(R)	9974022681

Traffic Manager/ Additional Traffic Manager shall arrange to inform all the Stevedores / Agents and other Stakeholders to remove their workers from the operational areas at Kandla.

9.17.3.3 List of Stevedores in the Port

Sr. No.	Name	Address	Fax No.	Telephone Nos.	
				Office	Resi.

1	M/s. Cargo Movers	"Cargo House" BBZS-32A, Gandhidham	231687	220453 231365	261280
2	M/s. DBC & Sons (P) Ltd.	Seva Sadan-II, Room No. 303 / 304, New Kandla	270631	270503 270263 270348	-
3	M/s. A.V.Joshi & Co.	Plot No. 18, Sector-8, Maitry Bhavan, Nr. Post Office, Gandhidham – Kutch	233924	231070 232227 231588	234909
4	M/s. ACT Shipping P. Ltd	Seva Sadan-II, Room No. 206/207, New Kandla	232175	270111 270112 270015 229967	261308 231416
5	M/s. Cargo Carriers	214/215, Rishab Corner, Plot 93, Sector- 8, GIM	230030	220816 231649 230030	231694
6	M/s. Cargo Clearing Agency (Gujarat)	Plot No. 271, Ward 12- B, Gandhidham	233034	221721 220655	231452
7	M/s. Chotalal Premji Stevedores Pvt. Ltd	C-8, Shaktinagar, GIM	231509	270009	-
8	M/s. Hiralal Maganlal & Co.	C-11, GIDC Area, Gandhidham – Kutch	223914	223914 231832	223878 232430

9	M/s. New Dholera Shipping Company	Goyal Commerce Centre Building - 1, Plot No.259, Ward 12B, Gandhidham - Kutch	-	222637 232267	237284
10	M/s. J.M. Baxi & Co.	Seva Sadan – II, Room No. 301 / 306, New Kandla	270646	270630 270550 270448	260427
11	M/s. Pestonjee Bhicajee (Kutch)	Seva Sadan-II, 203, New Kandla	270650 270556	270257 270367	262914
12	M/s. OTA Kandla Pvt. Ltd.	BBZ-N-324, Gandhidham	223241	220145 270560	223241
13	M/s. Purshotamdas Jeramdas & Co.	5, Vaswani Chamber, 16, Sector-8, GIM	222850	238242 222598	220598
14	M/s. R. Tulsidas & Co.	Ahit Building , Plot No.323, Gandhidham - Kutch	232308	222717 221943	-
15	Rishi Shipping	Plot 50, Sector 1/A GIM	238943	229830 229831	
16	M/s. Vinsons	BBZ-S-25, Gandhidham - Kutch	231948	220466	222395 239460
17	Sical Logistics Ltd	403, 4th Floor, Madhuban Compex, OSLO, GIM	234416	234646 234194	

18	Parekh Marine Agency	C-8, Shaktinagar GIM	231509	229297 221158	
19	Krishna Shipping and Allied Services	Transport Nagar, NH GIM	233135	230501 223814 229085	
20	Kevar Handling & Transport	Carrier & Shop 24, Tolani Chamber, Sector -8, GIM	228298	228298	
21	Trinity Shipping & Allied Industries	Trinity House, Plot 46 Sec 1/A, GIM	232060	230911 230910	
22	Velji P & Sons(P)Ltd	2nd Floor, Deepak Complex, 315, 12/B GIM	236168	231545 231546 225466	
23	Asean Marine Services	Ashit Bldg, Plot 33 Sector 1/A, GIM	232308	222717 221943 222145	
24	Rishikiran Roadlines	Kiran House, Plot 8 Sector 8, GIM	231422	231894 234108	
25	Universal Shipping Services	Hotel Sea Bird, Plot 173, Sector 1/A, GIM	235251	230663 226050 226037	
26	Seaways Shipping (P) Ltd	2nd Floor, Plot 351 Ward 12/B, GIM		226183 237147	

27	Seacrest Shipping Services Pvt. Ltd	216, 2nd Floor Om Corner, Plot 336 Ward 12/B, GIM	227028	233325	
28	Shree Maruti Shipping Services	18/21, Swaminarayan Bldg, Sector 9, GIM	234107 250690	233245 237247 250690	
29	Liladhar Pasoo Forwarders P.Ltd	Plot 4, Sector -1 KASEZ, GIM	252383 253506	252286 252297 252612	
30	Shree Radhey Shipping Company	14-16/C, GF Green Park, GIM	232967	222919 228919 238883	
31	Pearl Shipping	220, Rishab Corner, Plot 93, Sector 8 GIM	235570	225283 225284	
32	Patel Shipping Agency	Patel Avenue, Floor 2, Plot 170, Sector 1/A, GIM	231143	224024	
33	Ashirvad Shipping	18-21, Swaminarayan Bldg, Sector- 9, GIM	250690	233245 237247 222822	
34	M/s. Swaminarayan Vijay Trade	1st Floor, H-6, Op. Tejas Society, Ghatlodia,	079- 231983	231981, 231982	

	Carriar	Ahmadabad			
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9.17.3.4 List of Liner & Steamer Agents at Kandla Port

Sr. No.	Name	Fax No.	Tele. No.	Mobile
01	M/s ACT Shipping Ltd Mr. Harshad Gandhi	232175/ 270597	270111 270115-6 229967 231734	9825226141
02	M/s Admiral Shipping Ltd	233596	230552 232823	
03	M/s Areadia Shipping Ltd	232542	234254 223486	
04	M/s Ambica Maritime Ltd Mr. Amit Vyas	252447	252479 252349	9825225210
05	M/s APL (India) Pvt Ltd., Mr. Murli Krishnan	236361	224601/2 236357 236355	9825225753
06	M/s Arebee Star Maritime Agencies Pvt Ltd. Mr. Anil Talwar	235831	220465 235832	9824229109
07	M/s Ashit Shipping Ser. Pvt Ltd. Mr. Sanjay Thakkar	232308	221943 222717 222145	9825225698
08	M/s Atlantic Shipping Pvt Ltd	223372	230552	
09	M/s Asia Shipping Services. Mr. Mohan Karia239326	231285	234526 230954	

10	M/s Bayland Freight Systems Pvt Ltd., Mr. Danendran Gopalan	239326	225522/ 23	9825230880
11	M/s B D Vithlani Shipping Services Pvt Ltd.	234104	232220 221081	
12	M/s Cargo Conveyors Mr. Shekhar Ayachi Mob. 9825226102	233034	221460 220655	
13	M/s CCA Shipping Services Mr. K C Varghese	233034	221721 220655	9825225217
14	M/s Chowgule Brothers Mr. C R Soman	229227	278521 225051 232365	9825361782
15	M/s Coastline Services (India) Pvt Ltd.	221137	232095 222853	
16	M/s Container Marine Agency Pvt Ltd	234541	230026 220416	
17	M/s Conftreight Shipping Agency (India) Pvt Ltd. Mr. K T R Nair	-	233615 236157	
18	M/s Cresent Shipping Agency (India) Pvt Ltd Mr. Sanjay Salve.	224506	221290 221957	9825227311
19	M/s DBC Freight International	230832	230832 230639	

20	M/s DBC Sons (Gujarat) Pvt Ltd. Mr. R C Vazirani	270631	270263 270503	
21	M/s Depe Global Shipping Agency Pvt Ltd. Mr. Jaydeep Roy	232079	231528 233608 234582	9825228121

22	M/s Evershine Shipping Services. Mr. Kishan Motwani	234083	221588 237408	
23	M/s Forbes Gokak Ltd	231464	222634 235004	
24	M/s Freight Connection (India) Pvt Ltd	231357 270726	222247 222545 270727	
25	M/s GAC Shipping (India) Pvt Ltd. Mr. V C Rao	231429	231427 237244	9825225136
26	M/s Ganges Liners Pvt Ltd	233437	231608 233436	
27	M/s German Exp. Shipping Agency Pvt Ltd	236040	223269 236040	
28	M/s Goodrich Maritime Pvt Ltd	222875	222882 222883	
29	M/s G P Dave & Sons (Shipping)	234382	234288 234382	
30	M/s Greenways Shipping Agencies Pvt Ltd	232079	233608 234585	
31	M/s K. Shipping Services Pvt Ltd	233632	231933	
32	M/s Halar Ship & Freight Forwarders. Mr. Tejas Shrma	270224	270192 270568	9825212646
33	M/s Hind Shipping Agencies. Mr. Mahesh Vyas	234795	232710 235375	
34	M/s Hindustan Shipping Services. Mr. M D Sorathiya	239110	239110 222821	9824214994

35	M/s Interocean Shipping India Pvt Ltd. Mr. Suresh Tripathy	232579	235201 230589	9825225583
36	M/s Intra Trade Pvt Ltd. Mr. B P Vasavda	233295	233313 231255	9825226129
37	M/s Trades Shipping Pvt Ltd	231463	235572 233606	
38	M/s James Mackintosh Marine (A) Pvt Ltd. Mr. Satish Nair	270793	270792 270846	9825226077

39	M/s J MBaxi & Co. Mr. D P Mitra	270646	270630 270635 270525	9825225107
40	M/s Kutch Shipping Agency Pvt Ltd. Mr. Azad Khan	233339	221148 250226/ 7/8	
41	M/s Liladhar Passop Forwarders Pvt Ltd. Mr. S. Chakraborty	252383	252297 252402 252288	9825020523
42	M/s Maersk (India) Ltd. Mr. Dinesh Joshi	231388	231387 236192 233963	9825270419
43	M/s Maheshwari Handling Agency Pvt Ltd. Mr. Chaggan Maheshwary	230575 234633	223228 230393	9825227111
44	M/s Maltrans Shipping Agencies India Pv Ltd.	230606	220147 230336 235022	
45	M/s Mathurdas N. & Sons Forwarders Ltd.	252221	252224 252350	

46	M/s Meridian Shipping Agency Pvt Ltd	230212	220305 230220	
47	M/s Mitsutor Shipping Agency Pvt Ltd	230411	220110	
48	M/s M M Shipping Services	235255	231385 238385	
49	M/s Modest Shipping Agency Pvt Ltd	-	230576	
50	M/s NLS Agency India Pvt Ltd. Mr. Sanjay Salve	232413	231318 220305	9825237311
51	M/s Orient Express Lines Ltd	230359	232186 232805	
52	M/s Orient Ship Agency Pvt Ltd. Mr. H G Digrani	233518	223430 223487	9824214801
53	M/s Oscar Shipping Agencies.	231812	226959/6 0 232123	
54	M/s Parekh Marine Agencies Pvt Ltd. Mr. Mitesh Dharamshi	231509	221409 235341	9825226557
55	M/s Patel Handling Agency (Capt. Kalra)- 9825062912	231143	224024 231004 221718	
56	M/s Patvolk (Mr. Shreekumar Nair)	231464	222624 235004	

57	M/s Pearl Shipping Agency. Capt. Kalra	231143	224024 221718	9825062912
58	M/s Penguin Shipping Agencies Pvt Ltd.	230606	230336 220147	

59	M/s Pestonjee Bhieajee (Kutch) Mr. R K Kewalramani	270650 270556	270221 270257 270367	9825226962
60	M/s Prudential Shipping Agencies Pvt Ltd. Mr. Siddharth Mishra	232911	230479 233982	9825226477
61	M/s P&R Nedlloyed India Pvt Ltd	232207	224906/7 232128	
62	M/s R T Bhojwani & Sons Mr. Gopichand Bhijwani	232423	223831 220839	9825225639
63	M/s Sahasu Shipping Services Pvt Ltd	236358	225224 237854	
64	M/s Sai Shipping Co. (P) Ltd Mr. S T Hingorani	231972	221369 231739	9825228681
65	M/s Samrat Shipping Co Pvt Ltd	232890	231983 222939	
66	M/s Samsara Shipping Pvt Ltd. Mr. Pranesh Rathod	233165	228602	9825225755
67	M/s Scorpio Shipping Agency	-	223085	
68	M/s SDS Shipping Pvt Ltd	231542	221326 221087	
69	M/s Seanay Shipping Pvt Ltd	270026	270788	
70	M/s Seabridge Maritime Agencies Pvt Ltd	231509	221409 221158	
71	M/s Seafreight Pvt Ltd	222850	233530 222393	

72	M/s Sealand Agencies India Pvt Ltd	230584	231179 230584	
73	M/s Seamar Shipping India	255563	-	
74	M/s Seatrade Shipping	234171	233810	
75	M/s Sentrans Maritime Pvt Ltd	236129	230002 220702	
76	M/s South India Corporation (Agencies) Ltd Mr. Antony	234416	221276 234646 231494	9825226256
77	M/s Spoonbill Maritime Agencies Pvt Ltd	234167	221049 222058 234454	
78	M/s Star International	231395	233948 232402	
79	M/s Taipan Shipping Pvt Ltd	236040	223269 227010	
80	M/s Taurus Shipping Services. Mr. Sukhveersingh	231266	221334 223074	9825227325
81	M/s Oceanic Shipping Agency Pvt Ltd	270631	270263 270503	
82	M/s TICC Container Line (Kandla) Pvt Ltd	237854	237854	
83	M/s Total Transport Systems Pvt Ltd	231463	222634	
84	M/s Transocean Shipping Agency Pvt Ltd	-	230832	
85	M/s Transworld Shipping Services India Pvt Ltd Mr. Sandeep Rajvanshi	231913	229824 221290	9825225733
86	M/s Trinity Shipping & All. Services Pvt Ltd Mr. Soly	222060	230911 223703	9825225245

87	M/s Unimarine Agencies (Gujarat). Mr. Jaikumar Ramdasani	224633	224631/ 32 223113	9825225216
88	M/s Unique Shipping Services Pvt Ltd	-	232729 232730	
89	M/s United Liner Agencies of India Pvt Ltd Capt Rakesh Kumar	236040	227779 223269	9825225741
90	M/s Universal Freight Systems	252383	252288 252297	
91	M/s Universal Shipping Services Mr. Anil Pillai	235251	230663 231708	9824215168
92	M/s Velhi P. Sons (Agencies) Pvt Ltd	255328	255327 231545	
93	M/s Vibhuti Shipping Pvt Ltd Mr. Vinod	236219	236719 230035 232424	9825226536
94	M/s Worldwide Cargo Care Pvt Ltd	231913	221290 221479	

9.18 Core Team

Asstt. Commandant-CISF, OSD (Estate), Ex. Engineer (Roads)-KPT, Executive Magistrate of State Govt. of Gujarat i.e. the Mamlatdar, Gandhidham and Police Inspector, Kandla shall jointly ensure evacuation of people from Kandla areas. The persons entrusted with the evacuation programme as indicated here below will have to report the progress in evacuation to the Dy. Secretary (E) who shall appraise all developments in this regard to Chairman and Dy. Chairman, KPT over telephone from time to time.

The Evacuation of People from different areas at Kandla shall be looked after by the officers named below.

9.18.1 Banna Fishermen Hutments

ACTION BY, Junior Engineer, and CISF

9.18.2 Saltpans (Including Major & Minor)

ACTION BY: Asstt. Estate Manager, Mr. AB Pradhan, Labour Officer and CISF.

9.18.3 Sirva Camp & Sirva Railway Hutments

ACTION BY: OSD (Estate), Estate Inspector and CISF

9.18.4 G Type Quarters of DEENDAYAL PORT TRUST

ACTION BY: Assistant Engineer and CISF

9.18.5 New Kandla KPT Colonies, Customs & Hutments in PGVCL Land

ACTION BY: Assistant Engineer/InspectorVigilance with CISF

9.18.6 Hutments near IFFCO Plant

ACTION BY: Junior Engineer and CISF

9.18.7 Cargo Jetty & Oil Jetty Areas

ACTION BY: Traffic Manager – Private Workers/ Shore Workers

AAO, CHD - CHD Workers

HOD/Dos - The Employees of their respective deptt.

The Traffic Manager/ Commandant CISF shall ensure that the Cargo/ Oil Jetties are completely evacuated and there is no fresh entry into the operational areas.

9.19 Public Announcement

The Public Announcement for faster evacuation is to be made by (a) CISF on behalf of DEENDAYAL PORT TRUST and (b) Police Inspector, Kandla Police Station in consultation with KPT officials.

9.20 Temporary Shelters

The Temporary Evacuation Centres (TEC) will be set up in the Gandhidham area in places like Schools/ Community centres etc as may be decided in consultation with the State Govt. Officials.

Executive Engineer (TD) will have to ensure the following;

Opening cleaning and providing water facility in the Temporary Shelters at Gandhidham in premises coming under the administrative jurisdiction of Kandla Port that may be identified for the purpose by the Collector/Mamalatdar/concerned state govt. authority. The toilet blocks attached to these buildings are to be kept in usable condition.

Executive Engineer (Electrical) shall ensure providing of lights and continuous electric supply in the Temporary Shelters as mentioned above.

Mr. A B Pradhan, Labour Officer and the Head Master of BVM School will have to ensure opening of the School and shifting of school furniture as may be directed.

The requirement of amenities/ medical aid etc in the Temporary Evacuation Centres will be taken care of by the Executive Engineer(TD)/ (R), Senior Engineer (PL), updt Engineer (E) and Doctors of Medical Department.

9.21 Transport Facility

The Traffic Manager shall provide sufficient number of Trucks and Dumpers as may be requested by Dy. Secretary (E) for evacuation purpose.

The hired buses of KPT shall be deployed for evacuation. In case of additional requirement the Dy. Secretary (G) will co-ordinate with Mamlatdar, Gandhidham for obtaining sufficient number of ST Buses for evacuation purpose.

Secretary shall co-ordinate the above activities.

Ensuring the functioning of TELEPHONES

The name and telephone No. of the Officer Telephone Department to be contacted in case of any problem:

1. General Manager, Bhuj(O) 231201/231648 (R)

2. District Engineer, Bhuj(O) 525410

3. SDO (P), Gandhidham(O) 232453/229666 (R)

Dy. Secretary (Personnel) shall ensure that the telephone of all the Head of Departments and other responsible officers of different Departments are functioning properly by ringing personally. In case any of the telephones does not function or give satisfactory service, he shall take up the matter with the higher authorities immediately.

9.22 Traffic Movement

Commandant, CISF with the help of Police shall ensure that all incoming traffic to the Port is stopped except those which are coming for rescue operations and essential services at three places i.e. KASEZ Junction, Railway crossing and Kharirohar Road. He shall immediately erect two temporary tents and post sufficient number of personnel of CISF in coordination with Police, who shall identify which person has to be allowed. Commandant, CISF shall also ensure that those allowed do not cause any hindrance for those who are supposed to function as per the Internal Action Plan.

Staff Attendance

From experience it is observed that several times many officials do not turn up for work under one or the other pretext. This would be viewed very seriously. Immediately on operationalising this Action Plan, even if, it is a Public Holiday, the following staff shall report for duty.

All Operational Staff particularly those of Floating craft Section and Power Supply Section.

All Head of Departments and all Class-I & Class-II Officers shall be present in their office timings. Besides, a list of very essential officers, who will be required to be present even beyond the normal duty hours, as and when required, shall be prepared.

All P.A.s/Stenographers/Peons of Head of Departments and Deputies.

All Office Superintendents/Superintendents (Accounts)

All Head Clerks and Divisional Accountants.

The above officials shall be present in the office, unless otherwise directed.

The Staff attendance on days when the Action Plan is in the operation shall be collected from P.A. to HODs and compiled by Asstt. Secretary (G). The daily position will be reported to Chairman/Dy. Chairman every day with separate list of absentees. Assistant Secretary (G) should ensure presence of staff by following the required action.

All Head of Departments may hold a meeting with Class-I, & Class-II and staffs and explain their functions as per the provisions of Action Plan during the Natural Calamity and submit a Compliance Report to Chairman/Dy. Chairman on priority basis.

The following officers will ensure timely supply of Drinking Water/Food Packets to the staff during the operation of the Action PLAN:

Asstt. Executive Engineer- For the staff of Traffic/Mech./Civil

Engineering Department

AFS- For the Flotilla Staff /SIGNAL STATION

Company Commander, CISF- CISF

FcSO- For Fire Brigade Staff

The above officers shall be responsible for placing order for procurement of Food Packets. They should ensure that there is no shortage on this account. They shall come in to action on their own. They are also responsible for placing advance order, preparation of food packets, transportation, and distribution in time and report compliance to Secretary for the previous day.

9.24 Sanction of Advance

All Head of Departments would make a judicious assessment regarding the requirement of funds by them to meet the different exigencies, which they may have to handle on account of the Natural Calamity situation. The HoDs would inform the FA&CAO on telephone or in writing or through a messenger regarding their requirement of advances. The FA&CAO in turn would examine the advances sought by the Head of Departments and sanction the advances early without any delay. The FA&CAO would keep the Chairman and Dy. Chairman informed about the amount released by him and seeks approval.

9.25 Vehicle Pool

As soon as this Action Plan comes into force, the vehicle pool stands formed; the vehicle pool shall be controlled by Senior Engineer (Pipeline) and Senior Labour Officer. The following vehicles will be there in the Pool:

All Ambulances Under CMO

9.26 Private Vehicles Buses { To be arranged by Labour Section}

9.26.1

List of Civil, Electrical & Mechanical Contractors

Sr. No	Name & Address of Contractor			
		Office	Resi	
1	Mr. Dilip Bhandbe, M/ Mukund Ltd.	223412		
2	M/s. Maheshwari Const. Co., SDX-N-5, Gandhidham-Kutch Mr. Rameshbhai	232134		
3	M/s. Apex Engineers, Bajaj Chambers, 12/B, Gandhidham – Kutch (Mr. Vishal)	222002 222223	—	9898226666
4	M/s. Gadhvi Constructions, Plot No.524, Sector – 5, Gandhidham – Kutch	235772	—	9426215258
5	M/s. Advance Builders Contractors, B-23, Apanagar, Gandhidham – Kutch.		232864 234242	9825255934
6	M/s. Mohan Construction Co., 415, 2/B, Adipur (Mr. Mohan)	—	264140	9825174351
7	M/s. Star Decorators, 17, Plot No.5, 12/A, National Highway, Gandhidham – Kutch (Mr. Vinod Bajaj)	221450	—	—

8	M/s. Kamal P. Chellani, DBZ-S-81-A, GandhidhamKutch (Mr. Kamal)	_____	_____	9825221542
9	M/s. K.K.Construction, E-71, Gujarat Housing Society, Devi Krupa, Sector –5, Gandhidham (Mr. Milanbhai)			230064
10	M/s. Mepabhai Madan, Plot No. 21/22, Sector-9, Opp. KPT Office, Gandhidham Mr. Rajubhai	222209 222210		233627
11	M/s. S. B. Singh, B-110, Sapna Naga Gandhidham – Kutch	239351	_____	_____
12	M/s. Dipesh Construction Co., 11, Apurva Chambers, Ganga Gate, Anjar – Kutch. (Mr. Parth) (Mr. Sukhdevbhai)	242997	243319	9824294260 9825179040
13	M/s. Raj Construction Co., Deepak Complex, Plot No.315, Ward 12/B, Gandhidham-Kutch Mr. Rajesh Makhijani	220911		
14	M/s. M. V. Rajani,444, 2/B, Matruchhaya,Rambaugh Road, Adipur – Kutch (Mr. Narayan)	260800 262920	_____	9825225690

15	M/s. Bhimji Velji Sorathia, 21, Nilesh Park, Plot No.80, Sector – 8, Near New Court Building, Gandhidham – Kutch (Mr. Bhimji Velji)	231383	_____	9825225948
16	M/s. Sollone & Parco Engg. Co., CCX-165, Adipur – Kutch (Mr. Ravi Solanki)	261298 263248		9825222919
17	M/s. Mahesh Construction, Plot No. 415, 2/B, Adipur- Kutch (Mr. Mahesh)	_____	264140	9825091599
18	M/s. Patel Construction Co. Zanda Chowk, Gandhidham (Mr. Tejabhai Kangad)	220421	_____	9825227199
19	M/s. M. G. Bhavnani, Plot No.102, Sector 1/A, Gandhidham – Kutch	_____	_____	9825191636
20	M/s. Patel Engineering Works, Gandhidham	231832		
21	M/s. H.M.G. Gandhidham	235710 234609		
22	M/s. Mukund Limited Mumbai	022- 25347373		
23	M/s. Bajaj Electric Mumbai	022- 23724192		
24	M/s. Mishra Brothers Gandhidham			

		221172		
25	M/s. Sonu Electricals 18, K.P.Shopping Centre, Near Jivan Bharati School, Karelibaug, Vadodara-390018 Shri Jayendrasingh.B. Thakker	02652464108	2647886	
26	M/s. Ravi Electronics, "Prashant", 20, New Jagnath Rajkot – 360 001 Mr. G.K.Patel	465256 460 253		
27	M/s Megha Technicals, CCX - 165, Adipur - Kutch (Mr. Ravi Solanki)	261298 263248	—	9375320232
28	M/s Maruti Construction, Gandhidham – Kutch	—	—	9824893851
29	M/s Ramesh Meghji Sorathia, Anjar – Kutch	—	—	9825225948
30	M/s Mohit Construction, B-168, Shaktinagar, Gandhidham - Kutch	—	—	9825227072

Senior Engineer (Pipeline) should ensure the availability of the Drivers and the Vehicles and report to the Secretary. All Vehicles whether it is of KPT or hired should be parked in the location as decided by the Senior Engineer (PL) and Senior Labour Officer(PO), from where it can be taken for immediate use as soon as the people move into action. The list of travel agencies is given below:

9.26.2 The list of Travel Agencies

Sr. No.	Name of Agency	Phone No.	
01	M/s. Rathod Tours and Travels, Gandhidham	222444	222959
02	M/s. Gayatri Tourist, plot No. 720/721, Valmikinagar, Bharatnagar, Gandhidham.		231715 230252
03	M/s. Panch Tirth Tours, BBZ-S12, Gandhidham	232215 230760	9825234455
04	M/s. Maheshwari Travels, Plaza Centre, Shop No. 110, 1st floor, Plot No. 110, Sector No.8, Gandhidham	232211 234455	252120 253433
05	M/s. Titan Travels, Behind Shyam Electric Stores, Jhanda Chowk, Gandhidham	222832	236911
06	M/s. Rohit Enterprises, Plot No. 99, Sector No. 4, Near IOB, Gandhidham	228550 237538 237547	234140 9825225121
07	M/s. Jai Somnath Travels, Mr. Mishra		9727304414
08	M/s. Agrawal Tourists, Gandhidham	221311 220068	
09	M/s. Ashirwad Travels Gandhidham. Shri Laxma Singh	225608 225609	9825225608
10	M/s. Krishna Travels Gandhidham	220683 234838	
11	M/s. Shiv Tourists, Gandhidham	221454	

12	M/s. Thakker Gandhidham Travels,	225097	9825271072
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9.27 Contact with Railway & GSRTC

Secretary, Dy. Secretary (G) & Dy. Secretary (P) should ensure for the smooth movement of workers/employees for which he may get in touch with the following officers of Western Railway/GSRTC and apprise them about the situation so that the movement of Staff is not suffered.

Transport	Contact Person	Telephone Nos.	
		Office	Residence
Western Railway	Area Manager	221340	236237
	Control Room	232578	
	Enquiry	131/220011	
GSRTC, Anjar	Depot Manager	241192	243746
GSRTC, Bhuj	Depot Manager	220002/220102	
GSRTC, G'dham	Depot Manager	220198	

9.28 Generator Sets

Generators of following capacities have been installed at Kandla, Gandhidham, and Gopalpuri to supply power to various installations in case of power failure:

1. Cargo Jetty Area - 2 Nos of 1000 KVA EACH:

These Generators can cater power inside Cargo Jetty Area, Seva Sadan-III, Nirman Building, and Old C.D.C. Building restricted up to 2000 KVA.

2. Kandla Hospital - 25 KVA
3. A O Building- 200 KVA
4. Gopalpuri Hospital- 45 KVA
5. Guest House- 25 KVA
6. Old Kandla Fire Brigade- 5 KVA

In addition to above, if any additional Generator Sets are required at Kandla or Gopalpuri, the following officers shall be contacted who shall immediately hire/procure or provide in whatever manner the D.G. Sets giving preference to the operational area.

- (i) Deputy Chief Mechanical Engineer
- (ii) S E (Electrical)
- (iii) Executive Engineer (Mechanical)
- (iv) Asstt. Executive Engineer (Electrical) Shri AK Sharma

The above officers shall also be responsible for operation and maintenance of Generators provided at various locations and submits daily report to the Chief Mechanical Engineer about the working of Generators.

Additional requirement will be assessed by Dy CME/S.E (Electrical) and submitted to Chief Mechanical Engineer for approval. Necessary Fuel (POL) shall be procured and stored in advance by the concerned officials of Mechanical Engineering department.

9.29 Fire Dewatering Pumps

There are 10 Nos. of Dewatering Fire Pumps available with Fire-Cum-Safety Officer at various points. The details of which are as under:-

Dewatering Pump	Old Kandla Fire Station	Tilak Fire Station (West Gate-I)	Azad Fire Station (West Gate -II)
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Portable Fire Pump Capacity:270 LPM	04	01	01
Trailer Fire Pump Capacity:1800 LPM	-	01	01
Trailer Fire Pump Capacity:2250 LPM	02	-	-

The Portable Fire Pump single delivery having capacity of 270 litre per minute are useful for dewatering the congested places like ship holds, barges and other intricate areas.

All the above Fire Pumps will be operated by the Fire-Cum-Safety-Officer. The maintenance of major nature and breakdown will be attended by Executive Engineer (Mechanical).

Fire cum Safety Officer(O) 270176 Mob: 98252-27041

Dy. Fire Officer (O) 270176/270178 (R) 226478

9.30 Shipping Navigational Aid Section

Executive Engineer (Dry -dock) shall ensure that heave-up barge "Bhimsen" is shifted to Bunder area and secured properly; Assistant Engineer (Mechanical) shall attend the above work.

Steel Floating Dry Dock

Executive Engineer (Dry Dock) and AE(DD) shall ensure that the Steel Floating Dry Dock and the Electric Wharf Cranes at the maintenance jetty are properly secured as per procedure and compliance reported to Chief Mechanical Engineer and Dy. Chief Mechanical Engineer shall monitor the safety of the Steel Floating Dry Dock.

9.31 Periodical Reporting by all HODS

All Head of Departments shall have to send Action Taken Report to the Secretary / Control Rooms in writing by Fax or through telephone with regard to the action taken by them as per the Action Plan. If the report is not received from the Head of Departments, the Officer In-charge, Control Room shall obtain the

information, compile it and submit the same to the Chairman / Dy. Chairman on 12 hourly basis i.e. twice a day.

9.31.1 Chief Engineer

The Chief Engineer shall ensure through Superintending Engineers that all Road Blockades are not cleared as also he should ensure that blockades caused in Port quarters due to the falling of trees, walls, sheds, etc. are got removed immediately. He will ensure that the colonies are got cleared and wherever logging of water is found, the water is pumped out and disinfected. A report shall be submitted to the Chairman / Dy. Chairman every day.

9.31.2 Chief Mechanical Engineer

Chief Mechanical Engineer, Dy. CME/S.E (E) shall ensure that all Generator Sets are properly functioning at A.O. Building, Seva Sadan-III, P&C Building, Hospitals, and Guest House. They will ensure quick restoration of Power supply arrangements by keeping close liaison with the officials of Pachim Gujarat Vija Co. Ltd. They will report to the Chairman / Dy. Chairman every day.

9.31.3 Action Plan – Land Fire Station

The Port Fire Brigade has its Head Quarter at Old Kandla Oil Jetty area with two Sub- Stations at Dry Cargo Jetty at New Kandla.

The contact Numbers are as under:

Main Station (Emergency Response Centre) - 270176, 270178, 271377

Cargo Jetty – West Gate No. 1- 270439

Cargo Jetty – West Gate No. II - 295974

Fire cum Safety Officer - 270176 (O))/ 98252 27041(M)

Dy. FcSO- 270178(O) / 226478 (R)

9.31.4 Resources Available

Refer 4.12 to 4.14.4

In case of any fire, or other crisis an information is received through telephone - or VHF channel - Fire Station Control Room, the Duty telephone attendant raises the fire alarm bell and lights the vehicle indicating light (turn-out bell and Turn out light)

The Duty Station Officer proceeds to the scene of fire with fire Tenders and crew. Station Telephone Attendant should inform other officers like Fire-cum-Safety Officer, Dy. Conservator and Port Control. Telephone Attendant should inform hospital and if fire is in wharf should inform Traffic Manager. Fire cum Safety Officer after apprising the situation should inform Deputy Conservator directly or through the Telephone Attendant immediately.

9.31.5 Ensuring the Functioning of Telephones

The name and telephone No. of the Officer Telephone Department to be contacted in case of any problem:

1. General Manager, Bhuj(O) 231201/231648 (R)
2. District Engineer, Bhuj(O) 525410
3. SDO(P), Gandhidham(O) 232453/229666 (R)

Dy. Secretary (Personnel) shall ensure that the telephone of all the Head of Departments and other responsible officers of different Departments are functioning properly by ringing personally. In case any of the telephones does not function or give satisfactory service, he shall take up the matter with the higher authorities immediately.

9.32 Accidents in the Channel

9.32.1 Fire on Board Tanker / Anchor / OTB

The Ship Master - Pilot should raise & alarm and inform Kandla Tower/SIGNAL STATION on VHF Channel 8 or 16 about the intensity and location of fire.

Kandla Tower will inform the Dy. Conservator, Harbour Master and FCSO. & TM

Master should immediately ensure that the loading/discharging operation is suspended and all the connected valves are closed.

Master of the vessel should immediately gear up his firefighting equipment and post his staff for extinguishing the fire. CO₂ should be injected in the affected compartments.

Dy. Conservator after contacting the ship will inform Chairman and Dy. Chairman about the situation.

Harbour Master, will arrange for availability of chemical dispersant and its equipments and keep them in readiness in case of any oil spillage.

TUGS, with personnel and equipments should immediately start for tanker. Harbour Master on board Tug also to reach the tanker.

Dy. Conservator to remain in constant touch with the Master/Pilot of the Tanker to assess the situation.

In case no power is available on deck, the floating hoses connected on board can be disconnected by means of mechanical puller. Hose can be heated up slightly and the weight can be taken off. The Special Clamps on the flange can be removed. This operation takes about 20 Meters for each hose.

If it found necessary to safeguard jetty and the tanker is required to be removed from the jetty, one tug should remain near to tow the tanker and when given orders should pick up the fire spring and take the weight off the moorings. Master and the Pilot should take due precautions and safety measures and by using Fireman's suits to send the personnel to forward of the vessel for unmooring the tanker. Two lines to be

passed on to the Tug for towing to a safe anchorage. In case, the magnitude of fire is more and beyond the control, other agencies such as Indian Coast Guard, ONGC to be called for assistance.

9.32.2 Grounding of a Tanker

Master or Pilot of the vessel should immediately contact Kandla Tower on VHF Channel 8 or 16 and give the detailed information and the seriousness of grounding. Kandla Tower Signal Station will in turn inform Traffic Manager, Dy. Conservator and Harbour Master, Kandla Port Trust. Dy. Conservator will inform Chairman/Dy. Chairman.

Harbour Master will immediately proceed to site and will immediately board the vessel and after assessing the situation will inform Dy. Conservator about the seriousness of the crisis.

Dy. Conservator in the meantime will remain at Kandla Tower and will be in constant touch with the vessel and if required give necessary guidance to Master/Pilot.

Dy. Conservator to direct Sr. Hydrographic Surveyor to proceed to grounded vessel and check the exact position of the ship and also the grounding around.

Tugs and Launches available at Kandla should remain in readiness and wait for the order of action from Dy. Conservator /Harbour Master.

Fire-Cum-Safety-Officer along with staff and equipment salvage pumps etc to remain on board fire float.

Master of vessel to obtain soundings of all the tanks and to maintain a record of the same to ensure any leakage. He should also take hand lead surroundings around the ship and plot them on the chart.

Master should inform his Chief Engineer to change over to high sea suction for cooling water.

If found necessary, Dy. Conservator can decide and ask for a small tanker/salvage tug which can be brought alongside of the grounded ship and part of cargo can be discharged to this daughter ship. This will help to lighten the grounded ship.

Master should instruct his staff to prepare all her ropes including insurance wire for towing, pulling operation.

Tug to immediately to proceed to grounded vessel and take towlines and start pulling the vessel under the instruction of Harbour Master. If required, Dy. Conservator can decide and send more than one Tug also to the grounded ship for assistance. In case the vessel cannot be re-floated within a day, a navigational warning should be sent to the Chief Hydrographer, Dehradun and the same will be transmitted through Mumbai Radio and Navtex.

9.32.3 Breaking / Ground of a Ship outside Kandla Port Limit

Kandla Port has not had any major incident of grounding/sinking or breaking of a ship in recent past. However, minor incidence of grounding could be tackled by Port's own personnel and equipments.

If there is any major breaking or grounding of a ship outside the limits of Kandla Port, the Port can activate its own crisis management plan to deal with the situation. On receiving message from the Master of the Vessel/ or from Principal Officer, MMD or Coast Guard, Mumbai, Dy. Conservator/Harbour Master, KPT will immediately inform Chairman/Dy. Chairman, Kandla Port Trust.

Harbour Master will instruct Flotilla Superintendent/Tug Master, Fire-Cum-Safety Officer to keep the tugs, launches in readiness. Crafts with chemical dispersant spraying system at Kandla and Vadinar should rig the booms etc, Store enough stock of chemical dispersant and stay in readiness. In case, there is any major oil spillage port to activate its oil spill crisis management plan.

Port Signal Station to be made Control Room and to remain in constant touch with the Ship. Master should immediately send messages and inform nearest Port or Coast Guard about the latest situation of the Ship.

Port command team headed by Dy. Conservator will mobilize the resources available with Port to help the Ship.

Indian Coast Guard, to utilize the services of Helicopter and indicate the location and magnitude of the oil spill. They should keep the nearest port informed about the oil spill/sleek.

If the oil slick is dangerous/approaching the limits of Kandla Port Trust, the Harbour Master along with one Senior Pilot and Safety Inspector (antipollution Scheme) to proceed on chemical dispersant Spraying craft and to reach oil slick and under his guidance all available port crafts can spray chemical dispersant. They can go up & down and try to stop/minimize the oil slick danger to port, Harbour Master to keep Dy. Conservator informed about the situation.

Indian Coast Guard, IOC, ONGC and other agencies who have the system to recover the floating oil should be directed with oil recovery vessel to the area.

If it is necessary, Dy. Conservator can requisition a privately owned small tanker or tank barge, which can recover the oil, store it for eventual disposal ashore. If the oil slick is very large and beyond the control of the Port, the Chairman should inform the Ministry and seek their guidance for mobilizing equipments from outside Parties.

STRENGTHENING DISASTER RISK GOVERNANCE

9.33 Contingency plans in grave situation

Immediately on the occurrence of a crisis, the local Internal Action Plan under the Disaster Management Act, 2005 would be put into effect by the local/District and the state authorities. If the situation has wider ramifications and warrants response at the State/National level, the Chairman/ Deputy Chairman will contact the Nodal Ministry of the State / Central Government and seek the required help. The concerned authorities would activate its control room, call for a meeting of the Crisis Management Group and put into operation its contingency Plan.

9.33.1 First Information

As and when a critical crisis situation develops, the first information would be sent by the Chairman/Deputy Chairman to the State/Central Nodal Ministry through Wireless/Cellular Mobile Phone/Fax/e-mail or any other quickest possible means.

Security measures at Vital Installations are inspected by I.B. periodically. The Deputy Conservator and Traffic Manager shall implement the recommendations of I.B. with the help of CISF, made from time to time for beefing up/strengthening the security at important vital installations.

9.33.2 Authorities responsible for sending of First Information

Crisis	Authorities responsible for reporting	Remarks
Natural Disasters	District Magistrate or District Collector Indian Meteorological Department State/Central Water Commission	Information relating to forecasting/warning of the natural calamity will be sent by the IMD, State/Central Water Commission to the Relief Commissioner as laid down in the contingency Action Plan of the State/Central Ministry.
Chemical/Biological/RADIO ACTIVE Disasters	Chairman / Deputy Chairman	The Chief of the Public Sector/Undertakings would be equally responsible to send the first information through his channel to the Nodal Ministry.
Major Disaster having off-site implications	Chairman/Deputy Chairman	
Break-down in Power Generation/Supply	Chief Mechanical Engineer and Executive Engineer (Electrical) through Gujarat Electricity Board Authority.	

An Installation	Oil	Chief or In-charge of the Oil Installation through his channel to the Nodal Ministry.	
Hijack of an Indian Merchant ship or Indian Crew in a Foreign ship		Chairman/Deputy Chairman	Commandant of CISF, Traffic Manager, Deputy Conservator would inform to Chairman/Deputy Chairman immediately.

9.33.3 List of Members NDMA

Contact Details of NDMA Officers

Name	Office	Fax	Mob.	E.mail id
Shri R K Jain, IAS (Retd), Member	011-26701710	011-26701716		secretary@ndma.gov.in

Sh. S K Gulati, PPS	011-26701711,	011-26701716		
Mr. D S Butola PA	011-26701713			-
Lt Gen (Retd) N C Marwah, PVSM, AVSM, Member	011-26701775	011-26701783		marwahnc.ndma@nic.in
Smt Seetha Mahesh, PS to Member	011-26701721	011-26701783		seetham.ndma@nic.in
Shri Vijaya Kumaran, PA to Member	011-26701782	011-26701783		
Dr. D N Sharma, Member	011-26701738	011-26701767		dnsharma@ndma.gov.in
Smt. Shashi A Kumar PSO to Member	011-26701761	011-26701767		
Shri Kamal Kishore, Member	011-26701740	011-26701754	9818143429	kkishore@ndma.gov.in
Shri Harish Kumar Arora PPS to Member	011-26701751	011-26701754	9910226153	
Shri Basudev Rajbhar PA to Member	011-26701753		8285642447	

JOINT SECRETARIES

Name	Office	Fax	Mob.	E.mail id
Shri B Pradhan, IAS, JS (Admin & Capacity Building and Training)	011-26701780	011-26701795		jsadm@ndma.gov.in b.pradhan@nic.in
M.Mushtaq, PPS	011-26701876			
Shri A.K.Sanghi,ITS JS (Mitigation, IT& Comn)	011-26701718	011-26701864		mitigation@ndma.gov.in
Shri Munendar Kumar, PA	011-26701720			
Maj Gen Anurag Gupta, Advisor (Ops)	011-26701886	011-26701742	8527892258	advopscomn@ndma.gov.in

Ms Archana, PA	011-26701267			
Ms. Mamta Kundra, Joint Secretary (Policy & Plan)(Additional Charge)	011-26701777	011- 26701816	09599946299	jspp@ndma.gov.in
Ms Indira, PA	011-26701747			
M.Sanjay Singh, PA	011-26701816		9899403773	

FINANCIAL ADVISOR

Name	Office	Fax	Mob.	E.mail id
Smt. Aastha S Khatwani, FA,	011-26701709	011-26701715		fa@ndma.gov.in
Sh. Bharat Bhushan, PPS	011-26701712			

JOINT ADVISORS

Name	Office	Resi	Mob.	E.mail id
Lt Col Vikrant Lakhanpal, JA (IT & Comn)	011- 26701743			jaitcomn@ndma.gov.in , vikrant.lakhanpal@ndma.gov.in
Col Ranbir Singh, JA (CBT)	011- 26701823			ranbir@ndma.gov.in
Vinay Kajla, JA (RR & NDRF)	011- 26701815			vinay.kajla@ndma.gov.in ,
Dhirendra Singh Sindhu, JA (OPS)	011- 26701218			dssindhu@ndma.gov.in
Sachida Nand Singh, JA(MP & P)	011- 26701798			jampp@ndma.gov.in
Alice Kujur, DIR (PP)	011- 26701722			-
S K Singh, Dir (Finance)	011- 26701778			
Yogeshwar Lal,	011- 26701833			

DS (Admin)				
Bhupinder Singh, DS (PR & AG)	011-26701878			

NCRMP

Name	Office	Fax	Mob.	E.mail id
Ms. Mamta Kundra Project Director	011-26701777 011-26714321			pd.ncrmp@gov.in
Shri S.S. Jain Dy. Project Director	011-26701792			dpd.ncrmp@gov.in
Shri Ashok Kumar Sarkar, Project Accountant cum Admn. Officer	011-26701744			adm.ncrmp@gov.in

NDMA CONTROL ROOM

Name	Office	Fax	Mob.	E.mail id
Control Room	011-26701728 011-1078	011-26701729	9868891801 9868101885	controlroom@ndma.gov.in , ndmacontrolroom@gmail.com ,

Librarian shall ring up all the private/public sector companies of the area and inform them about their situation and tell them to evacuate their people and take necessary steps. List of private/public sector companies is as shown in Point No:

9.17.3.2

Senior Labour Officer, Labour Officer along with Executive Engineer (R) and Headmasters of BVM School shall ensure that temporary evacuation centers are established in the school/community center of Gandhidham-Kandla area.

11.1.1 List of Schools in Gandhidham – Kandla Complex

Sr. No.	Name of School	Contact Person	Telephone No.
1	Dr. C. G. High School	Principal	220271
2	SVP Gujarat Vidhyalaya	Principal	220242
3	M.P. Patel Kanya Vidhyalaya	Principal	220705
4	Adarsh Maha Vidhyalaya	Principal	234172
5	Adarsh Kanya Vidhyalaya	Principal	220175
6	Bhartiya Vidhya Mandir, Kandla Bhartiya Vidhya Mandir, Gopalpuri	Head Master Head Master	271049 233684
7	Central School, (IFFCO)	Principal	221288
8	Central School (Railway)	Principal	220657
9	Modern School	Principal	220284
10	Mount Carmel School	Principal	234262
11	Aum Vidhyalaya, IFFCO	Principal	221104
12	Saint Xavier's School, Adipur	Principal	260265
13	Maitri Maha Vidhyala, Adipur	Principal	260445
14	Maitri Kanya Vidhyalaya, Adipur	Principal	260612

15	Model Excelsior High School, Adipur	Principal	260707
16	Gujarat Vidhyalaya, Adipur	Principal	261312
17	Nagarpalika High School, Anjar	Principal	242510
18	Adarsh Nivasi School, Gandhidham	Principal	223246
19	P.N.Amersey School	Principal	223646
20	Shree Gurunanak English School	Principal	238421
21	Swaminarayan Gurukul	Principal	228098
22	Kairali English School	Principal	221050
23	Sarvodaya Pradhamic Shala Near Oslo Cinema, Gandhidham	Mr. Kangodia	227958
24	Ganeshnagar Pr.Shala, G'nagar	Mr. Kangodia	
25	Jagjivan Pra. Shala, Sapnanagar, Gandhidham	Mr. Kangodia	
26	Cargo Pra. Shala, Sapnanagar, Gandhidham	Mr. Kangodia	
27	Old & New Sunderpuri Schools	Mr. Srimali, HM	224867
28	G'dham Pr. Shala, Near Shivaji Park, Gandhidham	Mrs. Arunaben.	229255
29	Adipur Prathmic Shala, Adipur	Mr.C.M.Rami	264525 264181
30	Kandla Pr. Shala, Shirva Camp & Thermal Colony & United Salt Works	Mrs. Shantaben	253198

Dy. Secretary (P) shall ensure that the telephone of all the Head of Departments and other responsible officers of different Department are functioning properly by ringing personally. In case of any of the telephone does not function or gives satisfactory service; he shall take up the matter with the Higher Authority of Telephone Department.

The staff attendance on days when the Action Plan is in operation shall be collected from PA to HoDs and complied by Asstt. Secretary and reported to Chairman/Dy. Chairman every day with separate list of

absentees. Secretary will do the overall supervision of the work and report compliance to the Chairman/Dy. Chairman within two hours of the warning received.

Secretary will be the overall in charge for liaison work with central/state government officials/IMD, Ahmadabad/Pune Laboratory/ Delhi Laboratory in which he can take the help of Dy. Secretary (P) and Dy. Hydraulic Engineer and report the matter to the Chairman/Dy. Chairman immediately. They shall remain present in all the meetings relating to the Action Plan and report the proceedings of the meetings to the Chairman/Dy. Chairman. They shall also communicate the action to be taken to the concerned Head of Departments. List of IMD telephone numbers is shown below:

11.1.2 List of Important Telephone Nos of Indian Meteorological Department

Websites – www.imd.gov.in, <http://www.imdahm.gov.in/index.html>

All Head of Department shall have to send Action taken report to the Secretary/Control rooms in writing by fax or on telephone with regard to the action required of them as per the Action Plan. If the report is not received from any of the HoDs, the Officer In charge, Control Room shall obtain the information, compile it and submit the same to the Chairman/Dy. Chairman on 12 hourly bases i.e. twice a day.

11.2 Contacts of Officials of GAD following nodal officer will form a team

Sr. No.	Designation	Present incumbent	Contact Telephone Numbers		
	Mr Bimal Kumar Jha	Secretary	220167	231939	233172
01	Mr. Suresh Balan	Dy. Secy (G)	221375	236086	
02	Mr. DEEPAK RANE	Sr. Dy. Secy	220033	234730	

11.3 Duty Roster for Staff of General Administrative Department

AS ABOVE

11.4 Central Industrial Security Force (CIF)

The Sr. Commandant shall remain in contact with in charge of control room at Kandla (HARBOUR Master) regarding the position of the cyclone / calamity.

The Sr. Commandant shall ensure that Public Address System is fitted on Jeeps provided to CISF. He will make arrangements for announcements, with the coordination of police through Public Address System mounted on at least 03 vehicles. The CISF personnel will procure truck with the help of TM. The list of fleet owners and major lift operators are given below:

11.4.1 List of Major Heavy Lift Operators at KPT

Name of Party	Name of Contact Person	Phone Number
Swastik Heavy Lifters	Mr. Jigneshbhai Mr. Aslambhai	9825758151 9825228421
Kutch Carrier Transport Co	Mr. C. R. Thacker	9825225591
Agarwal Handling Agency	Mr. Rakesh Thacker	9426928728
Active Cargo Movers	Mr. Narendra	9825220411
Raghuvirsingh & Sons	Mr. Harcharan	9879104853
Thacker Brothers	Mr. Kamleshbhai	9825296107
Kiran Roadlines	Mr. Pankaj Gadvi	9879104552
Regal Shipping	Mr. Ashok Dudi	9825326328
Rathore Freight Carriers		220759/ 220380

11.4.1.1 Additional list of firms for pay loaders / cranes

M/s Mahalaxmi Transport Co., Plot No. 35, Sector No. 8, Behind Hotel Fun & Food, Gandhidham	Mr. H K Rathod	(O)222387 (R)233500
M/s Kandla Earth Mover, DBZ-S-151, Gandhidham	Mr. Sanjay Goyal	(O)221759 (R)222338 (M) 9825020550

Mr. Lalji Bhavanji Sathwara, Laljibhai Sathwara, Plot No. 27, Shop No.5, Sector9/A, Gandhidham	(O)234118 (R)232566 (M) 9825225957
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11.4.1.2 Equipments available with ABGKCTL TABE REMOVED

11.4.2 List of Fleet Owners at KPT

Sl. No.	Name of Company	Contact Person	Tel. Office	Tel. Resi.	Mobile
01	M/s A V Joshi & Company	Mr. Ramesh Singhvi Mr. Thacker MR. Harshandhu	231386 232605 233147	234176 221451 234325	98251 91325 98252 26105 98252 26013
02	M/s Rishi Shipping	Mr. B. K. Manshukhani Mr. Manoj Manshukhani	220843 229830 238943	234889 235587	98252 25170
03	M/s Maheshwari Handling Agency	Mr. C. P. Maheshwari Mr. Chandan Maheshwari	223228 230393	222339	98252 27111
04	M/s ABC	Mr. Latif Mr. Mithu Mr. Kasam	220483 221390 270190	234163 231477 251684	98252 26707
05	M/s Ganesh Transport	Mr. Hira Rabari Mr. Visa Rabari	223638 223915	260425	
06	M/s Kewar Carrier		220483 227553	234163	

07	M/s Krishna	Mr. K. M. Thakker	223814	220998	98250 19699
	Transport Service	Mr. Pankaj Thacker	224938	234988	98252 25228
08	M/s Gautam Freight Ltd	Mr. Ramesh Singhvi	220163	230328	98251 91325
			230345	234176	

11.5 Contact Nos of CISF Officials

S. No	Designation	Contact Telephone Numbers		
		Office	Res	Mobile
01	Commandant	271037	229140	9825227282
02	Dy. Commandant	271036	220192	9825227045
03	INSPECTORS			8500495813, 9045696584
04	Control Room	271040		
05	North Gate	270440		
06.	West Gate – I	271039		
07.	West Gate II	270876		

11.6 Finance Department

As soon as the Calamity/Cyclone warning Signal No. 5 is hoisted the Dy. Director (EDP) should monitor it through Internet and give two hourly printouts to Dy. Conservator, Secretary, Chief Engineer, FA&CAO, Dy. Chairman and Chairman. And Dy. Director (EDP) will monitor the website in the A O Building, Gandhidham.

All Head of Departments would make a judicious assessment regarding the requirement of funds by them to meet with the different exigencies, which they may have to handle on account of the Cyclone/Calamity situation. The Head of Departments would inform the FA&CAO on telephone or in writing or through a Messenger regarding the requirement of advances. The FA&CAO in turn would examine the advances

sought by the Head of Departments and sanction the advances early without any further delay. The FA&CAO would keep the Chairman and Dy. Chairman informed about the amount released by him and seeks approval.

11.7 Medical Department

Two Casualty Emergency Wards, one at Gopalpuri and other at Kandla Hospital shall start functioning as soon as warning of Cyclone is received. Chief Medical Officer will ensure that no Doctor is given leave during the emergency period. These casualty emergency wards will function round the clock with posting of Doctors and Staff round the clock. Chief Medical Officer will ensure the functioning of casualty emergency wards at Gopalpuri and Kandla. A Register shall be maintained at both the places where in the record of patients attended would be maintained. Adequate number of chlorine pills should be distributed after Cyclone to avoid epidemic from spreading. Chief Medical Officer shall submit a report every evening to Chairman/Dy. Chairman.

11.8 During Disaster

1. Maximum alertness of staff members for their safety.
2. Ambulances/vehicles with Drivers to be kept standby awaiting further orders.
3. Liaison with: - Control Room, Disaster Site/Spot, P.A.s to all HoDs, New Kandla Hospital.

(Action: P.A. to CMO)

11.9 Post Disaster Phase

11.9.1 Tackling of Patients

1. Use of ambulance will be purely on priority basis. The A.C. Ambulance can be used as an Emergency Mobile Van for carrying medicines along with a doctor and other essential Para-medical staff, to the site of crisis.

(Action: Dr. Sunil Suryavanshi)

2. Line of treatment to be decided by attending Doctors, such as Indoor/Outdoor/Under observation etc.

(Action: All Doctors)

3. Cases will be attended depending upon the gravity of injury/condition of case, i.e. very serious, stable. (Action: All Doctors)
4. To ensure supply of adequate medicines and any other items. (Action: AMO Stores / S P S K)
5. Dead bodies to be shifted to Govt. Hospital, Rambaug promptly for identification, disposal, and issue of death certificate etc.

(Action: Mamlatdar/PSI/Medical Supdt. Rambaug Hospital/PA to CMO)

6. If needed be, liaison with local Medical Practitioners, Local Hospitals, etc. (Action: P. A. to CMO.)
7. If need be, to arrange for outside ambulance, in consultation with FA&CAO to whom details have been submitted earlier.

(Action: P. A. to CMO.)

8. Transfer of serious patients to Govt. Hospital/Private hospitals , Bhuj/ Rajkot/ Jamnagar be made but such transfer to be restricted.

(Action: All Doctors on approval by CMO)

9. To mobilize additional nursing /Para-medical staff to cope with additional workload.

(Action: CMO PA to CMO)

10. Re-deployment of Manpower from Gopalpuri Port Hospital to Kandla Hospital and vice versa.

(Action: C.M.O.)

11.10 Prevention of Epidemics

1. Chlorination of drinking water at source. (Action: Sr. Engr. (P/L) & Estate office In-charge)
2. Mass Survey of residents of Port Colonies at Kandla and adjoining areas. (Action: Dr. Malik & Volunteers)

3. To get chlorine tablets from DHO-Bhuj and arrange for distribution thereof. (Action: Dr. S. B. Suryavanshi and Volunteers)

4. To educate residents/public to promote hygienic condition in and around their dwelling place, use boiled water

(Action: C.M.O. and Volunteers)

5. To shift cases afflicted by contagious or infectious diseases to Govt. Hospital / Private hospitals and notify such cases to the notice of State Authorities.

(Action: C.M.O.)

6. To ensure hygienic condition/cleanliness in both hospitals and colony in coordination with concerned staff of respective Estate Office.

(Action: Dr. Suryavanshi & Dr. Malik with in charges of respective Estate Officers)

7. In Rehabilitation Centre, Medical care will be looked after by Dr. Mahesh P Bapat & AMO besides supply of Chlorine Tablets.

8. To provide on the spot medical-aid at New/Old Kandla Port colonies. (Action: SMO In

9. Antidotes of all the poisonous gases to be kept ready. (M.O. (P)/Safety Officers/AMO)

10. Any further actions depending upon the conditions and restoration in the matter being decided by Administration.

11. Re-deployment on services as mentioned before.

12. In life threatening condition of Staff members - their evacuation.

11.11 Marine Department

As soon as warning of Cyclone Signal No. 5 or above is received, following measures shall be taken:

- Setting up of Control Room at Signal Station.
- Pilots and other Supervisory personnel in Flotilla Section should reach Kandla even if they are on leave, to tackle emergency, if any.
- Evacuation of Ships and securing all Port Crafts at Shortest possible time.
- Essential Staff (Fire Brigade) will not be given any kind of leave.
- The following personnel of Marine Department will not be granted any leave and they shall report for duty including holidays, during such time when Action Plan is put into operation.

⇒ All Operational Staff in Flotilla Section and Signal Station.

⇒ Ministerial Personnel at Point No: 11.11.1

11.11.1 Particulars of the Action Plan Committee Members

- For dewatering, if required, Fire-Cum-Safety-Officer will make arrangements by operating the dewatering Fire Pumps available with him.

11.12 Ships

- All the Pilots of the Port should reach Kandla immediately in case of emergency.
- Dy. Conservator/Harbour Master/Pilots should be available at Kandla during emergency.
- Removal of vessels whenever the cyclone is located in close proximity to the danger line plotted between 65 degree E longitude 18.2 degree N latitude and 73 degree E longitude 18.2 degree N latitude. Map showing the above position is given at Annexure-XXX.

Under such a situation the ships shall be removed during 1st/next available tide. It will be the duty of Harbour Master and DC to ensure that the ships are removed during 1st/next available tide as soon as the storm reaches to close proximity to the danger line as defined above without seeking any further instruction from the higher authorities. This action shall be taken automatically and suo-moto without any confusion and for which purpose Traffic Manager shall stop all loading and unloading operations immediately upon instructions from Dy. Conservator, so as to enable him to remove the vessels in time. The removal shall be done with the help of all the available Pilots plus all empanelled Pilots together at one go in the shortest possible time, so as to ensure that all the vessels cross the bar before the tide restriction sets in.

Dy. Conservator shall ensure that all ships are moved out of the Harbour at the earliest. All pilots shall immediately report at Kandla and stay there till the Action Plan is in operation. Dy. Conservator/Harbour Master shall immediately plan removal of vessels to the OTB as soon as the Action Plan is put into operation irrespective of the Single number, which must be hoisted. If, it is impossible to remove them, all other steps should be taken to ensure safety of the vessels at the Port as also it would not cause any damage to the Port. Dy. Conservator shall also ensure adequate stock of fuel for all crafts.

11.13 Securing of all Crafts

Dy. Conservator /Harbour Master shall immediately arrange for securing all the Port Crafts at safer places, so that there is no loss to the Port and send a report to the Chairman/Dy. Chairman as early as possible after operation of this Action Plan. Flotilla Supdt. (Mr. I. D. Bhagchandani) shall be overall in charge of each craft for ensuring their safety.

For parking of crafts in emergency, three places are mainly identified, viz. Bunder Basin, Launch Jetty and Maintenance Jetty as per:

11.13.1 Placement of Port Crafts on Cyclone Warning

(A)	Shipping Tugs	All 35 BP tugs and Hired tugs	Bunder Area
			Maintenance Jetty (West side)
(B)	Pilot Launches & Survey Launches	All Launches	Floating Crafts Jetty Inside area
			Bunder Basin
			Inside Bunder Area North

			Side.
(C)	G.S. Launches & Mooring Launches	M. L. Mrinal	Inside Bunder Area North Side on Pilot Launches
		M.L. Vaishali M L Alli M L Thamrai	Inner Side of Floating Craft Jetty
		M. L. Vijay M. L. Priyadashani PL Prahari, Rakshak	Inside Bunder Area North on G. S. and Pilot Launches.

Maximum number of crafts such as mooring launches, GS launches and pilot launches will be placed in Bunder Basin.

In the inner side of Passenger Jetty, one pilot launch and one G S launch will be kept.

Three tugs will be kept in the inner side of maintenance jetty.

Priority will be given to the Port crafts for parking in the bunder basin and other areas. Rest of the places available in the Northern side of bunder basin area will be allowed to the self propelled barges and private crafts. Dumb barges will be allowed on the beach between maintenance jetty and oil jetty area.

BS will render all possible assistance to FS, being the overall in charge of the crafts. The following flotilla staff will take care of the crafts.

11.13.2 Flotilla Staff Will be decided by FS as per available team with mooring crew

11.14 Private Barges / Crafts

The parties who have been Harbour Crafts License by the DC have to keep their barges and crafts inside the port limits being earmarked for the purpose.

Necessary instructions shall be issued to all these people having valid license immediately. The work of informing these parties will be carried out by the Office Supdt. of Dy. Conservator's office and will personally ensure that the instructions are carried out and reported to Harbour Master within two hours of the Action Plan coming into operation. The representatives of the above parties shall reach Kandla at once, failing which the Dy. Conservator will cancel the license granted to them and take over the barges/crafts of the party who violates the instructions.

The position shall be appraised to Chairman / Dy. Chairman within two hours of the receipt of warning and at frequent intervals.

11.14.1 List of Duty Roster of Marine Department (Ministerial Staff)

Sr No	Name	Office	Residence / Mobile
01	PA to DC	220235	9428032483
02	Mr. AR Jadeja, Signal Supdt	270549	9825427400
03	Office Supdt.	221971	
04	Assistant	221971	
05	Sr. Clerk	221971	
06	Messenger	221971	

11.14.2 List of Telephone Nos & Addresses of DC, HM & Pilots

Sr No	Name of Officer / Pilots	Address of Gandhidham Res	Tel Nos: Cell / Landline
01	Capt T Srinivas DC	A – 7, Gopalpuri	9825232982 232806
02	Shri S K Pathak HM	C – 32, Gopalpuri	9825803499 231310
04			
05	Capt A K Sharma Pilot	C – 40, Gopalpuri	9879603642 238154
06	Capt V Madaan, Pilot	C – 31, Gopalpuri	9879603643 221478
07	ALL AVAILABLE CONTRACT PILOTS WILL BE CONTACTED THROUGH SIGNAL STATION		
08			
09			
10			
11			
12			
13			
14			
15			
16			

11.14.3 Contract / Empanelled Pilots WILL BE CONTACTED BY SIGNAL STATION

11.14.4 Sections

1. Flotilla Section 270280

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Mr. Sunil Kumar	Flotilla Supdt.	270280	226121		7874627756
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2. Signal Station 270549/270194/9825227246 Fax 270624

3. Fire Station 270176/270178/270439/550421/271244/271377

In case of Natural Calamity, first start with rescue operations, restoration activities on war footing on the advice of Chairman/Dy. Chairman, Dy. Conservator/ Harbour Master/Fire-Cum-Safety-Officer/Flotilla Supdt as the case may be.

11.15 Traffic Department

After, the warning of Cyclone or any other Natural calamity is issued at the Port, Traffic Manager shall ensure that the loading/unloading operations at the Port are stopped immediately, hatches closed, ships derricks properly secured and all labourers evacuated from the Port Area. Public Address System shall be installed at the Cargo Jetty Area, which shall be under the charge of Traffic Manager. He shall use it for necessary arrangements relating to evacuation. Traffic Manager should also ensure that responsible persons make announcements in a proper way, so as not to create any misunderstanding/panic.

Notwithstanding above, Traffic Manager shall stop all loading and unloading operations immediately upon instructions from Dy. Conservator, so as to enable the latter to remove the vessels in time.

The responsibility of evacuating the Port Shore Workers and Private Shore Labourers rest with Traffic Manager. He along with, Dy. Traffic Manager, Mr. Gulrajani, Safety Officer and Dy. Commandant, CISF should ensure that the Port is completely evacuated and there is no fresh entry in the Custom bounded area. Dy. Traffic Manager should get in touch with the Main Contractors in the regard.

Traffic Manager shall render necessary help to procure requisite number of Trucks for Public Announcement and evacuation.

Traffic Manager shall inform all the Stevedores List given below:

11.15.1 List of Stevedores

Sr. No.	Name	Address	Fax No.	Telephone Nos.	
				Office	Resi.
1	M/s. Cargo Movers	"Cargo House" BBZS-32A, Gandhidham	231687	220453 231365	261280
2	M/s. DBC & Sons (P) Ltd.	Seva Sadan-II, Room No. 303 / 304, New Kandla	270631	270503 270263 270348	-
3	M/s. A.V.Joshi & Co.	Plot No. 18, Sector-8, Maitry Bhavan, Nr. Post Office, Gandhidham – Kutch	233924	231070 232227 231588	234909
4	M/s. Agarwal Handling Agencies	DBZ-N-47, Gandhidham – Kutch	232749	220282 233187	232749
5	M/s. ACT Shipping P. Ltd	Seva Sadan-II, Room No. 206/207, New	232175	270111 270112 270015 229967	261308 231416

		Kandla			
6	M/s. Cargo Carriers	214/215, Rishab Corner, Plot 93, Sector- 8, GIM	230030	220816 231649 230030	231694
7	M/s. Cargo Clearing Agency (Gujarat)	Plot No. 271, Ward 12-B, Gandhidham	233034	221721 220655	231452
8	M/s. Chotalal Premji Stevedores Pvt. Ltd	C-8, Shaktinagar, GIM	231509	270009	-
9	M/s. Hiralal Maganlal & Co.	C-11, GIDC Area, Gandhidham – Kutch	223914	223914 231832	223878 232430
10	M/s. New Dholera Shipping Company	Goyal Commerce Centre Building - 1, Plot No.259, Ward 12B, Gandhidham - Kutch	-	222637 232267	237284
11	M/s. J.M. Baxi & Co.	Seva Sadan – II, Room No. 301 / 306, New Kandla	270646	270630 270550 270448	260427
12	M/s. Pestonjee Bhicajee (Kutch)	Seva Sadan-II, 203, New Kandla	270650 270556	270257 270367	262914

13	M/s. OTA Kandla Pvt. Ltd.	BBZ-N-324, Gandhidham	223241	220145 270560	223241
14	M/s. Purshotam das Jeramdas & Co.	5, Vaswani Chamber, 16, Sector-8, GIM	222850	238242 222598	220598
15	M/s. R. Tulsidas & Co.	Ahit Building , Plot No.323, Gandhidham – Kutch	232308	222717 221943	-
16	M/s. Robinsons	101 / 102, Maritime House, Plot No.45, Sector – 9A, Gandhidham – Kutch	234394	221578 223836	231767
17	Rishi Shipping	Plot 50, Sector 1/A GIM	238943	229830 229831	
18	M/s. Vinsons	BBZ-S-25, Gandhidham – Kutch	231948	220466	222395 239460
19.	Sical Logistics Ltd	403, 4th Floor, Madhuban Compex, OSLO, GIM	234416	234646 234194	
20	Parekh Marine Agency	C-8, Shaktinagar GIM	231509	229297 221158	

21	Krishna Shipping and Allied Services	Transport Nagar, NH GIM	233135	230501 223814 229085	
22	Kevar Carrier Handling & Transport	Shop 24, Tolani Chamber, Sector -8, GIM	228298	228298	
23	Trinity Shipping & Allied Industries	Trinity House, Plot 46 Sec 1/A, GIM	232060	230911 230910	

24	Velji P & Sons(P) Ltd	2nd Floor, Deepak Complex, 315, 12/B GIM	236168	231545 231546 225466	
25	Asean Marine Services	Ashit Bldg, Plot 33 Sector 1/A, GIM	232308	222717 221943 222145	
26	Rishikiran Roadlines	Kiran House, Plot 8 Sector 8, GIM	231422	231894 234108	
27	Universal Shipping Services	Hotel Sea Bird, Plot 173, Sector 1/A, GIM	235251	230663 226050 226037	
28	R.T.Bhojwani & Sons	DBZ -S- 146, GIM	232423	222211 221831	
29	Logistic Enterprises (P) Ltd	C-8, Shaktinagar, GIM	231509	235341 230587	

30	Seaways Shipping (P) Ltd	2nd Floor, Plot 351 Ward 12/B, GIM		226183 237147	
31	Seacrest Shipping Services Pvt. Ltd	216, 2nd Floor Om Corner, Plot 336 Ward 12/B, GIM	227028	233325	
32	Shree Maruti Shipping Services	18/21, Swaminarayan Bldg, Sector 9, GIM	234107 250690	233245 237247 250690	
33	Liladhar Pasoo Forwarders P.Ltd	Plot 4, Sector -1 KASEZ, GIM	252383 253506	252286 252297 252612	
34	Shree Radhey Shipping Company	14-16/C, GF Green Park, GIM	232967	222919 228919 238883	
35	Pearl Shipping	220, Rishab Corner, Plot 93, Sector 8 GIM	235570	225283 225284	
36	Patel Shipping Agency	Patel Avenue, Floor 2, Plot 170, Sector 1/A, GIM	231143	224024	
37	Ashirvad Shipping	18-21, Swaminarayan Bldg, Sector- 9, GIM	250690	233245 237247 222822	

38.	M/s. Swaminara yan Vijay Trade Carriar	1st Floor, H-6, Op. Tejas Society, Ghatlodia, Ahmadabad	079- 231983	231981, 231982	
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11.16 Mechanical Engineering Department

- Marine Engineer/Engineer In charge should be available in emergency cell and remain in constant touch with Chief Mechanical Engineer/Signal Station and Assistant Engineers posted on Shipping Tugs.
- All Assistant Engineers (D/T &F/C) should be available on operational tugs irrespective of their duties. They should keep main engines and associated equipment in readiness all the times.
- Assistant Engineers posted in tugs should contact Superintending Engineer (Mech)/ Engineer In-charge for all technical & personal problems.
- Assistant Engineer (F/C) will be responsible for timely supply of food packets and drinking water to officers and staff of tugs.
- SE (Electrical) will be responsible for Securing Cranes at Cargo Jetty. He may, if need be inform about requirement of advance and to draw accordingly. He will be responsible to run 2 X 1000 KVA Generator Sets at Cargo Jetty Area in case of Power failure and also maintain additional Generator sets required at Kandla/Gopalpuri and Attending work of maintenance of major nature and breakdown.
- Asstt. Executive Engineer (Mech.) and JE (Mech) will be responsible for timely supply of Drinking Water/Food Packets to the staff of Mechanical Engineering Department during operation of the action plan.
- Assistant Engineer (Mech.) will be responsible to attend breakdown of Fire Fighting Pumps and DG Sets of 2 X 1000 KVA at Kandla.
- Steel Floating Dry Dock and one Electric Wharf Crane at maintenance jetty and one crane at bunder area are to be properly secured by Executive Engineer (Dry Dock) with help of his team mentioned below, as per prescribed procedure and concerned officers shall constantly monitor the safety of the

Steel Floating Dry Dock and Electric Wharf Cranes in side Bunder Area. He shall ensure all the required wedges, wire ropes, shackles etc.. and other fixtures as required to be kept ready so that the same can be fixed without loss of time & to check the site for the requirement, from time to time.

Action: XEN (DD) and Asstt. Engineer (FC) will lead the team of JE(Mech) and will be in contact with Executive Engineer (Mech) and Chief Mechanical Engineer/Deputy Chief Mechanical Engineer.

- All the V.H.F. and other Wireless Sets, and other required equipments of VHF Unit, including the sets kept at S.F.D.D. should be kept in perfectly working condition and the batteries are fully charged and to be kept in ready position and staff will remain in touch with control room till the emergency is called off to attend all communication equipments. It shall be responsibility of the Control Room Staff to ensure that timely information is passed on and timely and proper monitoring is done.

Action:, Assistant Engineer (DD) and R./R. Technician will render all possible assistance to Ex. Engineer(DD) during the course of calamity period.

- All the vehicles belonging to the Mechanical Engineering Department to be kept in perfectly working condition and sufficient stock of fuel and lubricant to be kept in ready position.

Action: Assistant Engineer (Mech.) with the help of Junior Engineer (Mech.) Garage

- During the course of calamity all the vehicles lying inside the premises of Auto Workshop should be kept in the parking ways meant for parking the individual vehicles and inside the shed. No vehicle is to be parked under any tree or under any such structure where there is possibility of falling such structure or tree over the vehicles. All the concerned drivers to be informed accordingly well advance to avoid such possible damage to vehicles and to remain present at duty place in consultation, Vehicle –in-charge of Pipeline Division.

Action: Assistant Engineer (Mech) with the help of Junior Engineer (Mech) Garage.

- Record of attendance of the employees during these periods to be kept ready and to be fed to the Control Room or any official responsible for such duties.

Action: Assistant Executive Engineer (Mech), Assistant Engineer (Mech) with the help of Head Clerk (Mechanical Division) and Divisional Accountant for all sections.

- Assistant Engineer (DD) to remain in Control Room at New Kandla to attend the communications with help of R/R Technician.

- Assistant Executive Engineer (Mech) and, Assistant Engineer (Mech) are to be associated with Executive Engineer (M) to constantly monitor the safety of the Port Crafts.
- The heave up water barge "BHIMSEN" is shifted to Bunder Area and secured properly in Naval Aid Salvage Section and Floating Craft. Absent/Present report of the above staff will be reported to the concerned section immediately on

starting of each shift and maintenance of major and breakdown etc... Action: Mr. Manohar Dana, Assistant Engineer (Mech)

- All the telephones and intercom telephones and their allied communication systems and equipments should be kept in perfect working condition to ensure that timely information is passed on and timely and proper monitoring done till the emergency is called off. He will ensure quick restoration of telephones by keeping close liaison with the concerned personnel. He will report to the Executive Engineer (Electrical) every day and to carry out all work assigned by the Executive Engineer (E) in case of emergency.

Action: Assistant Engineer (Instru).

- SE (E) and Executive Engineer (E) shall be responsible for liaison with the PGVCL for receiving power in case of power failure. In the event of disturbance in the distribution network necessary arrangements shall be made by them as per the requirement depending upon the situation.
- If any additional Generator Sets are required at Kandla or Gopalpuri, the following officers shall be contacted who shall immediately hire/procure or provide in whatever manner the DG Sets giving preference to the operational area.

1. Superintending Engineer(E)

2. Executive Engineer (Electrical)

3. Executive Engineer (Mechanical)

4. AXEN(E)

The above officers shall also be responsible for operation and maintenance of Generators provided at various locations and submits daily report to the Chief Mechanical Engineer about the working of Generators.

Additional requirements, if any, will be assessed by Dy. CME and the same shall be submitted to Chief Mechanical Engineer for hiring, well in advance so that XEN (E) can take necessary action for hiring, installation etc...

- After the warning of Cyclone or any other Natural Calamity is issued at the Port, Chief Mechanical Engineer shall ensure immediately that the cranes are secured and properly locked as per procedure and report submitted to the Chairman/Deputy Chairman after the operation of the Action Plan.

The following officers shall constantly monitor the safety of the cranes;

1. Executive Engineer (Electrical)

2. Executive Engineer (Mechanical)

The responsibility of evacuating all Mechanical/Electrical and Civil workers rests with Chief Mechanical Engineer with the assistance of respective Executive Engineers.

The maintenance of major nature and de-watering fire pumps operated by FireCum-Safety-Officer will be attended by Executive Engineer (Mech).

Executive Engineer (Dry Dock) and, AE(DD) shall ensure that the Steel Floating Dry Dock and Electric Wharf Cranes at the maintenance jetty are properly secured as per the procedure and compliance reported to the Chief Mechanical Engineer immediately. SE (Mech) shall monitor the safety of Steel Floating Dry Dock.

The following staffs have to report for duty even if it is a public holiday to actively participate in the Action Plan and they shall be responsible for record keeping of attendance, preparation, and submission of reports etc.

1. P A to CME

2. Office Superintendent

3. Superintendent Accounts

4. Sr. Clerk

5. Junior Clerk

11.16.1 List of Duty Roster of Mechanical Engineering Department As formed by CME on available officers

Name of Officer	Designation	Office	Resi.	Fax
Mr. SAROJ DAS	CME	270632 270184	231043	270184
Shri A Ramaswami	Dy CME	270426	226067	
Mr. P Srinivasu	SE (E)	271010		
Mr. B J Solanki	SE (M)	270352		
ABOVE OFFICERS WILL BE FORMULATING A TEAM				

11.17 Civil Department

Based on the practical experience and seriousness of the two Natural Calamities - the devastating Cyclone in 9th June 1998 and the Earthquake on 26th January 2001, the following Action Plan for Civil Engineering Department, is proposed to be implemented.

As soon as the message on anticipated Cyclone/Natural Calamity is received from concerned authorities, the same will be intimated to all the concerned under the Civil Engineering Department and will be instructed to be alert. All the staff members/officers should note that they will come into action on their

own as soon as the Warning is issued without waiting for any further instructions. Failure on the part of any employee/officer to carry out the earmarked Action Plan shall attract severe consequences.

Immediately after receiving the information on the Natural Calamity, nobody will be granted any kind of leave and the persons who are already on leave will be called back after canceling the leave.

Absent/Present report of the staff and the officers will be reported to the concerned Section immediately on starting of each shift for this purpose, Sectional Heads of all Divisions will be responsible to report the matter to P. A. to Chief Engineer for compilation of the information and onward transmission to General Administration Department.

The Engineering Department will assist in shifting of the persons to safe places in the event of such action is required.

Water Supply arrangements will be made to various colonies/sites of work/camps where the workers are shifted, etc. The Senior Engineer (Pipeline) will be the in charge for supply of water to various destinations.

Sufficient number of vehicles will be arranged for transportation workers/staff/officers. This arrangement will also be made by the Senior Engineer (Pipeline).

The Engineering Department will ensure that all Road blockades are got cleared as also blockades caused in Port Quarters due to failing of trees, walls, shed, etc. are got removed immediately. Further, it will be ensured that the colonies are got cleared and whatever logging of water is found is pumped out and disinfected. A report will also be submitted to Chairman/Dy. Chairman.

11.17.1 The following officers are to be contacted in the event of any such problems

Area	Designation	Office	Resi.	Mobile
New Kandla	XEN(R)	236165	222056	9913949700
Gopalpuri	XEN (TD)	223912	235683	9427205610
Old Kandla	Senior Engineer (Pipe Line)	220013	232880	9825225962

Cargo Jetty	Executive Engineer (Harbour)	270429	252624	9825227046
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11.17.2 List of Duty Roster of Civil Engineering Department CE will form a team as per

Mr. SSP PATIL	Chief Engineer	233192	228777	220050	9825227243
Mr. . V R Reddy	Dy. CE	270429	228869		9825227038
Mr. K J Todarmal	Exe Eng (R)	236165	220670		8980049099
Mr.	SE (PL)	220013	229164		9825225962
Mr	SE (H)				
Mr.B. Rajendra Prasad	Exe Eng (D)	220038	232880		9725338260

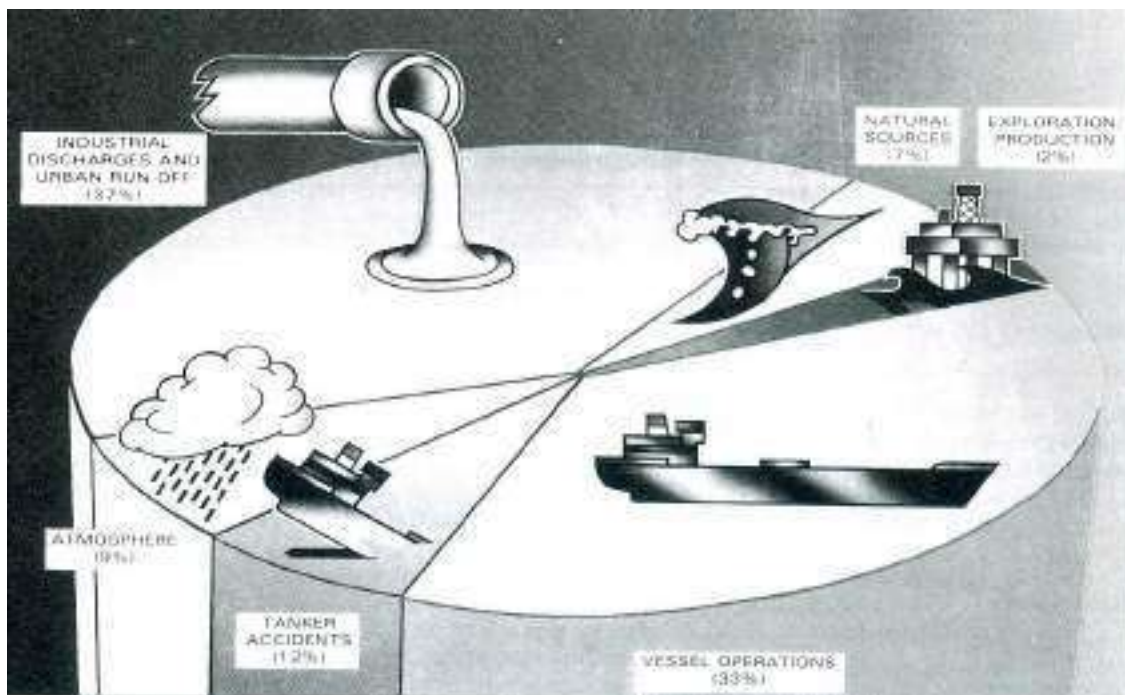
Periodical Meetings will be conducted with the Executive Engineer's/ DSOs/Staff Member to assess the progress made during the day and to instruct further course of action in the matter.

12 RESPONSE TO MARINE OIL SPILLS

12.1 Sources of Petroleum Hydrocarbons

The best estimate for the total input of petroleum to marine environment from all sources is some 3.2 million metric tons per year. By far the biggest contribution comes from terrestrial sources, mainly in the form of municipal and industrial wastes. Accidental spills from ships, together with offshore exploration and production activities, account for about 0.47 million metric tons which is a relatively small amount considering the world's current production of three million metric tons, half of which is transported by sea.

Major Inputs of Petroleum to the Marine Environment. (Figure)



12.1.1 Accident Spills from Tankers

Accidental spills from tankers contribute an estimated 4,000,000 tonnes annually. Analysis of tanker spills occurring throughout the world shows that the majority (some 75%) occur in port during routine ship operations such as loading, discharging and bunkering. Most of these spills are, however, relatively small: over 92% are less than 7 tonnes given in the table below and probably, in total, contribute less than 20,000 tonnes annually. In comparison, accidents such as collisions and groundings give rise to less than 10% of all spills from tankers, but a quarter of these are larger than 700 tonnes given in the table below. In fact, a few large accidents give rise to the majority of the oil spilled and hence there is considerable annual variation in this figure below:

Comparison of Incidence of World Oil Spills from Tankers, 1974 – 1985, resulting from Routine Operations & Major Accidents

	< 7 Tones)	7 – 700 (Tones)	> 700 (Tones)	Total
Loading / Discharging	2236 (90%)	227 (9%)	11 (1%)	2474 (100%)
Bunkering	442 (95%)	22 (5%)	-----	464 (100%)
Collision	39 (17%)	134 (59%)	54 (24%)	227 (100%)
Grounding	69 (25%)	134 (49%)	70 (26%)	273 (100%)
Total	2786 (81%)	517 (15%)	135 (4%)	3438 (100%)

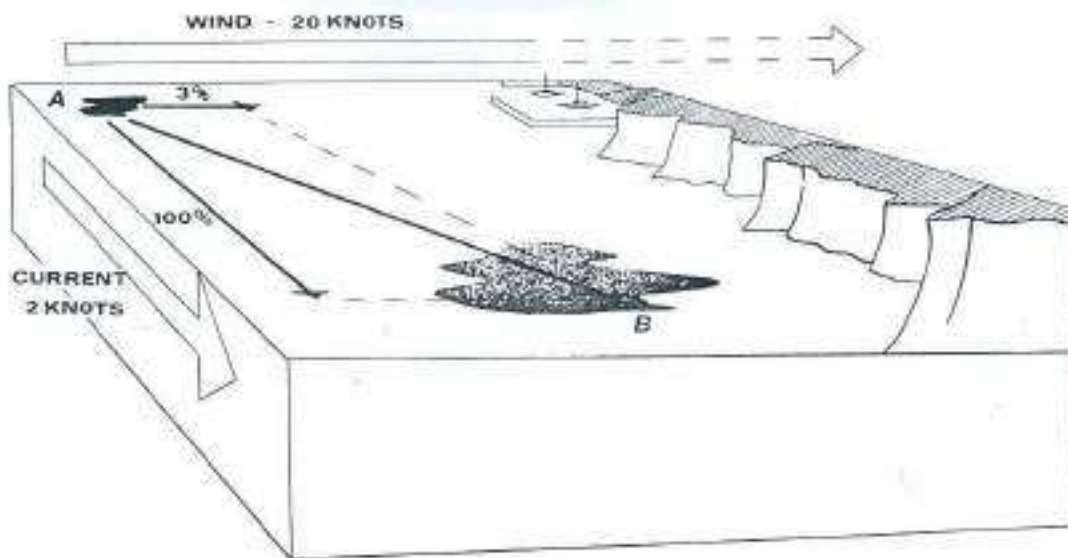
12.2 Forecasting Slick Movement

It is equally important to be able to forecast the probable movement of a slick as well as the likely changes in the properties of oil after it has been spilled. This allows sensitive resources in the path of the slick to be identified and, if appropriate, response measures to be put into effect. The task of forecasting the position of the oil can only be accomplished if data on winds and currents are available since both contribute to the movement of floating oil.

12.2.1 Effect of wind, Tidal currents

It has been found empirically that floating oil will move downwind at about 3% of the wind speed. In the presence of surface water currents, an additional movement of the oil equivalent to the current strength will be superimposed on any winddriven motion. Close to land, the strength and direction of any tidal currents must be taken into account but further out to sea their contribution is usually less significant because they are cyclic and so tend to cancel out over time. Thus, with knowledge of the prevailing winds and currents, it is possible to predict the rate and direction of movement of floating oil from a known position, as shown in Figure given below, overleaf.

The influence of 3% of the wind speed combined with 100% of the current speed results in the movement of oil from A to B



12.2.1.1 Computer Models

This simple calculation can be easily done by hand but becomes very timeconsuming if tidal currents have to be taken into account since it must be recalculated at regular intervals as currents change. Computers can be used to speed up such calculations by storing information on water movement and coastal outline for a specific geographic area. Wind data and the spill location are then the only additional information required at the time of a spill. The reliability of such models depends upon the accuracy of water movement and wind data. Often they are combined with mathematical models simulating weathering processes to provide a forecast of the overall fate of a spill.

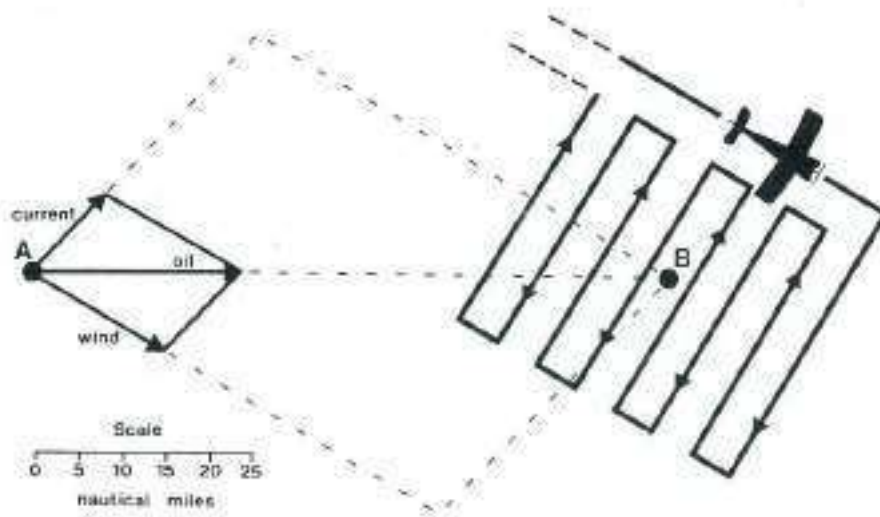
12.3 Aerial Surveillance at Sea

However reliable an oil spill model may be predictions of the fate and movement of oil slicks at sea should be verified through regular surveillance of the oil. This should be conducted from the air since observation from a vessel is highly inefficient.

12.3.1 Search Pattern

12.3.1.1 Ladder Search

A 'ladder search' is frequently the most economical method of surveying a large sea area. Since floating oil has a tendency to become aligned in long narrow windrows parallel to the direction of the wind, a ladder search across the wind will increase the chances of oil detection.



Movement of oil from A to position B three days later, predicted by combining 100% of the current speed and 3% of the wind speed as shown. The arrows from A represent current, wind and oil movement for one day. A cross-wind ladder search pattern is shown over position B.

12.4 Effect of Sunlight, Search Altitude

Haze and dazzle off the sea often affects visibility and the position of the sun may dictate the best direction to fly a search pattern. Sun glasses can give some relief from eye strain caused by strong light. Polarizing lenses can assist the detection of oil at sea under certain light conditions due to the differences in light reflected from oil and water. The search altitude is generally determined by the visibility. In clear weather 500 meters (1600 feet) frequently proves to be optimum for maximizing the scanning area without losing detail.

12.4.1 Navigation

However, it is necessary to drop to half this height or lower in order to confirm any sightings of floating oil or to examine its appearance. Over the open sea, away from any obvious reference points, it is easy to become disoriented. Ideally an observer will be able to consult the aircraft instrumentation for speed, direction and position, but it is worth ensuring beforehand that the instruments can be read without difficulty. In the absence of such aids, an observer with a suitable chart can keep track of course changes and positions by communicating with the pilot using the aircraft intercom.

12.5 Visual Quantification of Floating Oil

It is important that the port personnel estimate the amount of release for planning mitigating measures and allocating resources effectively. An accurate assessment of the quantity of floating oil is virtually impossible due to the difficulty of gauging its thickness. At best, the correct order of magnitude can be estimated by considering certain factors. Oil spreads rapidly and most liquid oils will soon reach an average thickness of about 0.1 mm, characterized by a black or dark brown appearance. Similarly, the color of sheen roughly indicates its thickness.

12.5.1 Appearance versus thickness, Cold water effects

A reliable estimate of water content in a 'mousse' is not possible without laboratory analysis but accepting that figures of 50% to 80% are typical, approximate calculations of oil quantities can be made, given that most typical floating 'mousses' are 1 mm or more thick. However, it should be emphasized that the thickness of 'mousse' and other viscous oils is particularly difficult to gauge because of their limited spreading. Indeed in cold waters some oils with high pour points will solidify into unpredictable shapes and the appearance of the floating portions will belie the total volume of oil present.

12.5.1.1 A Guide to the Relation between Appearance, Thickness and Volume of Floating Oil

Oil Type	Appearance	Approximate Thickness (mm)	Approximate Volume (m ³ /km ²)
Oil sheen	Silvery	0.0001	0.1
Oil sheen	Irridescent	0.0003	0.3
Crude and fuel oil	Black/dark brown	0.1	100
Water-in-oil emulsions ('mousse')	Brown/orange	>1	>1000

12.5.2 Surface area, Percentage cover

In order to estimate the amount of floating oil it is necessary not only to gauge thickness, but also to determine the percentage area of the sea surface covered by oil, water-in-oil emulsion and sheen. Again, accurate estimates are complicated by the patchy incidence of floating oil. To avoid distorted views, it is necessary to look vertically down on the oil when assessing its distribution. By estimating the percentage coverage of each form of oil, the area covered relative to the total sea area affected can be calculated from timed overflights at constant speed or from position fixing equipment.

12.6 Spill Control Management

12.6.1 Contingency Planning

12.6.1.1 Tankers

Plans covering areas where a wide range of oil types are handled or where tankers pass in transit, cannot anticipate the impact of a spill. It is therefore important that the type of oil spilled is established at the earliest opportunity so that its fate can be predicted and the appropriate clean-up techniques employed.

12.6.2 Fixed Installations

For oil terminals where a limited number of oil types are involved, an appreciation of the likely fate of potential spills is valuable when drawing up contingency plans. Information on the prevailing winds and currents throughout the year will indicate the resources where oil spill impact is most likely. Data on the types of oil handled can enable predictions to be made regarding the lifetime of slicks and the quantity and nature of the residue, which may require a clean-up response. It will also assist in the selection of appropriate clean-up equipment to be held in readiness for spills.

12.6.3 Priorities for protection, Sensitivity maps

Because of the difficult decisions that will be required during an oil spill in order to mitigate damage and to resolve conflicts of interest, much can be done at the contingency planning stage to identify sensitive areas and to determine priorities for protection. The mapping of sensitive areas can be a useful starting point. Detailed consideration should be given to the likely impact that a spill would have on each habitat or activity, taking into account any seasonal variability. Attention should then be given to identifying areas to be protected and their order of priority. This will never be easy since the value of each resource to the community will depend upon the weight given to environmental, recreational, economic and political considerations. This may require a wide range of data to be gathered and evaluated.

If properly conducted, such studies of the resources at risk in an area can also form a basis for quantifying any damage caused by a spill at risk in an area can also form a basis for quantifying any damage caused by a spill.

12.6.4 Response decisions

Having determined priorities for protection, attention can be given to designating appropriate clean-up measures. It is necessary to make a realistic assessment of the feasibility of employing various techniques since a recommendation to avoid the more ecologically damaging response options may result in the adoption of ineffective techniques and greater damage to other habitats or activities.

12.6.5 Containment

The containment of floating oil for subsequent recovery or its diversion away from sensitive areas calls for the use of some form of barrier. Many different types of oil barriers have been developed. These include commercially available floating booms, netting systems, sorbent booms, improvised booms and barriers, bubble barriers and chemical barriers. Selection of the most appropriate barrier will depend upon the particular conditions as well as availability. Since commercially available booms are the most common form of barrier used in oil spill control they are described in greatest detail in this section.

12.7 Commercially Available Booms

Design features

Designs vary considerably but all normally incorporate the following features:

1. Freeboard to prevent or reduce splash over;
2. Sub-surface portion (skirt) to prevent or reduce escape of oil under the boom;
3. Floatation by air or some buoyant material;
4. Longitudinal tension component (chain, wire or boom fabric itself) to withstand effects of winds, waves and currents.

Boom designs fall into two broad categories:

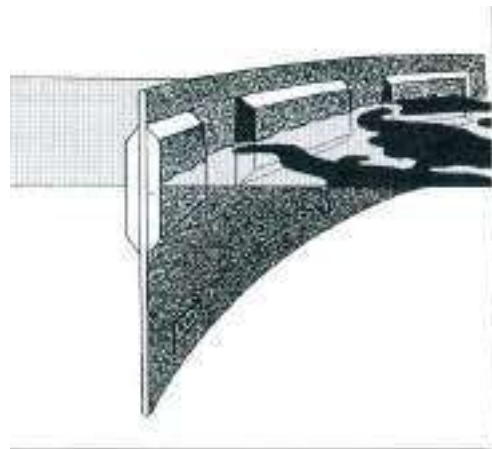
12.7.1 Curtain Booms

Curtain Booms provide a continuous sub-surface skirt or flexible screen supported by a solid or air floatation chamber usually of circular cross-section. Air floatation booms take up only a small storage area when deflated, whereas solid floatation booms, although more resistant to damage, are bulky in storage. Curtain booms generally have good wave-following capabilities, moderate escape velocities and are reasonably easy to clean.



12.7.2 Fence Booms

Fence Booms with a flatter cross-section are held vertically in the water by integral or external buoyancy. Solid floatation is most frequently used for fence booms but if external floats are used, turbulence may be generated leading to escape of oil at low water velocities. Such designs are bulky in storage and difficult to clean. In general, fence booms are more suitable for calmer waters where current velocities are low.



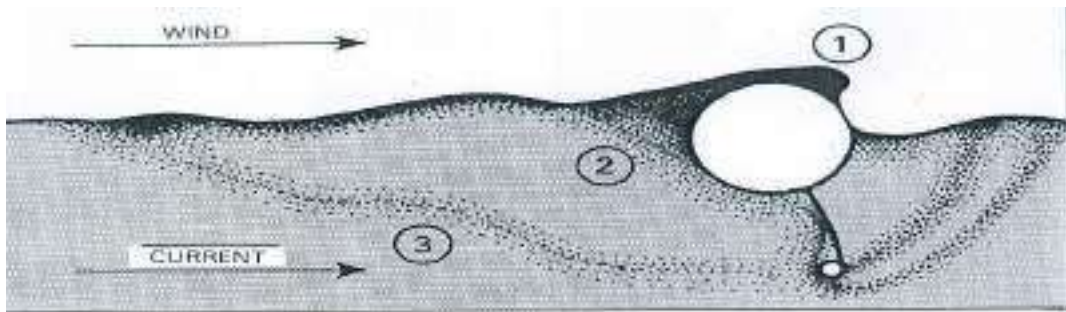
12.7.2.1 Common features

Many curtain and fence booms have similar features including bracing struts and/or integral ballast to keep them upright in the water, connectors for joining sections together as well as towing and anchoring points.

12.7.3 Performance/Limitations

12.7.3.1 Currents, Wind, Waves, Turbulence

The most important characteristic of a boom is its oil containment or deflection capability, determined by its behavior in relation to water movement. It should be flexible to conform to waves yet be sufficiently rigid to retain as much oil as possible. No boom can contain oil against water velocities much above 1 knot (0.5 meters per second) acting at right angles to it. The way in which oil escapes, and its relation with water velocity is as much a function of oil type as boom design. Low viscosity oils escape at lower velocities than more viscous materials. With the latter, the oil tends to accumulate at the boom face and to flow vertically down and under the skirt whereas low viscosity oils are carried under the boom as droplets sheared from the underside of the oil layer. Besides river and tidal currents, wind and waves can generate water velocities in excess of the escape velocity as well as causing splash over of contained oil. Oil escape can also result from turbulence along a boom and therefore a uniform profile without projections is desirable.



Escape of oil from a boom:

1. Splash over by wave action
2. Flow down the face of the boom
3. Droplets sheared from the underside of the contained slick

12.7.3.2 Boom size

The size and length of boom sections are also important considerations. The optimum size of a boom is largely related to the sea state in which it is to be used. As a general rule, the minimum freeboard to prevent oil splash over should be selected. The depth of skirt should be of similar dimensions to the freeboard. While short section lengths can make booms easier to handle and can protect the integrity of the boom as a whole should one section fail, these advantages must be weighed against the difficulty and time taken to connect sections effectively. Connections interrupt the boom profile and, wherever possible, should not coincide with the point of heaviest oil concentrations. The design of connectors should allow easy fastening and unfastening during deployment and whilst the boom is in the water.

12.7.3.3 Strength, Ease of deployment

Other important characteristics are strength, ease and speed of deployment, reliability, weight and cost. A boom must be sufficiently robust for its intended purpose and it must tolerate inexperienced handling, since

trained personnel are not always available. Structural strength and durability are required particularly to withstand the forces of water and wind on a boom when it is either towed or moored. Ease and speed of deployment combined with reliability are clearly very important in a rapidly changing situation and may strongly influence the choice made.

12.8 Netting Systems

12.8.1 Advantages

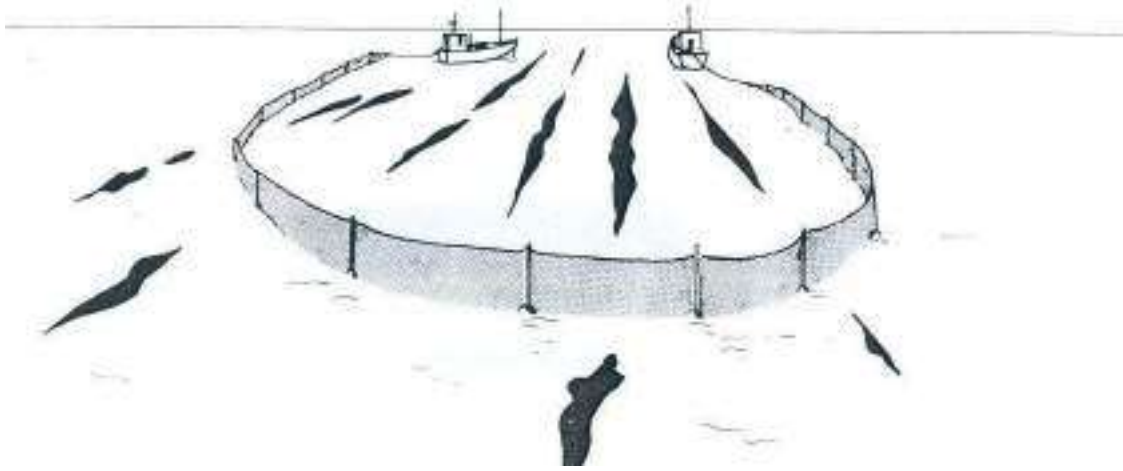
The use of nets to recover solid tar balls is an obvious application and the extension of their use to contain viscous oils theoretically presents a number of advantages over the use of conventional booms. In particular, the open structure should offer less resistance to water movement so that light but strong sections could be manufactured which might realistically be long enough to enclose oil scattered over a wide area of sea. As a result of the lower resistance of nets to movement through the water, it should also be possible to operate in faster currents or to sweep or trawl the sea surface at higher speeds than can be achieved with conventional booms.

12.8.2 Designs

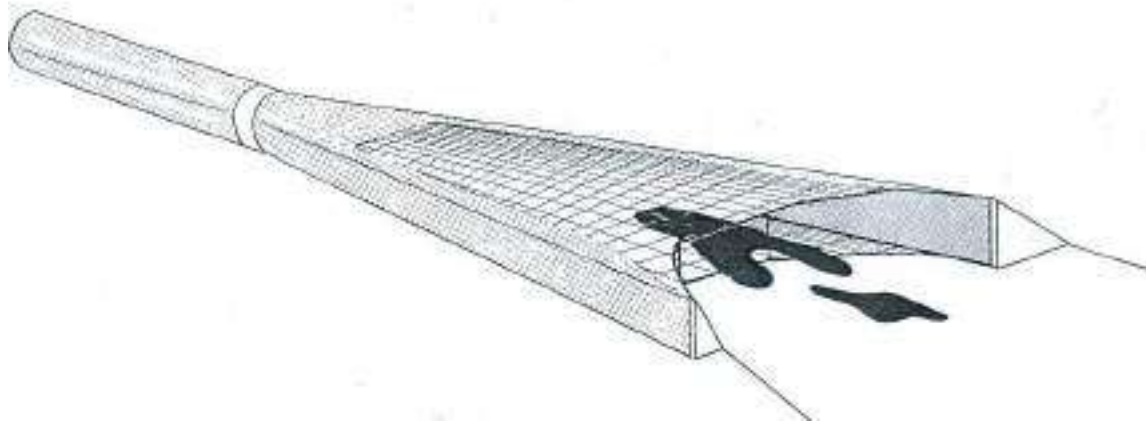
Two basic designs of net have so far been developed which draw on experience from the fishing industry a long double net based on the purse seine method of fishing which can be used to corral or collect floating oil or which can be moored to protect sensitive areas; and a trawl net with a detachable 'cod-end' which can be towed along the sea surface.

12.8.3 Experience

Although neither design has yet been fully evaluated during an actual oil spill, large scale field trials show some promise, especially in the case of the purse seine type when used to corral and retain floating oil. However, once oil has been adsorbed onto the net the mesh becomes blocked and the oil retention capabilities are similar to conventional booms.



Netting system of the purse seine type for oil containment and recovery using two vessels to corral floating oil.

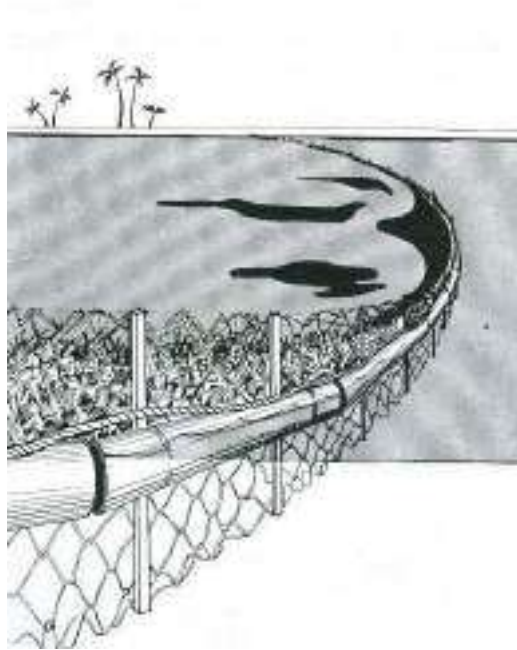


Oil trawl for collecting floating solid oil into a detachable cod-end.

12.9 Sorbent Booms

12.9.1 Construction, Uses

Sorbent booms usually consist of a tube of netting or some other fabric filled with a synthetic or natural sorbent material. Booms constructed of sorbent material have little inherent strength and, in some application, may require additional support. Some also need extra floatation to prevent them sinking when they become saturated with oil and water. They are normally only used in areas of low current velocity to collect thin films of oil, since their recovery efficiency decreases rapidly once the outer layers of the sorbent material become saturated with oil. The handling and disposal of oil-soaked sorbent booms can also cause considerable problems. The use of sorbents is further discussed in the section on Recovery.



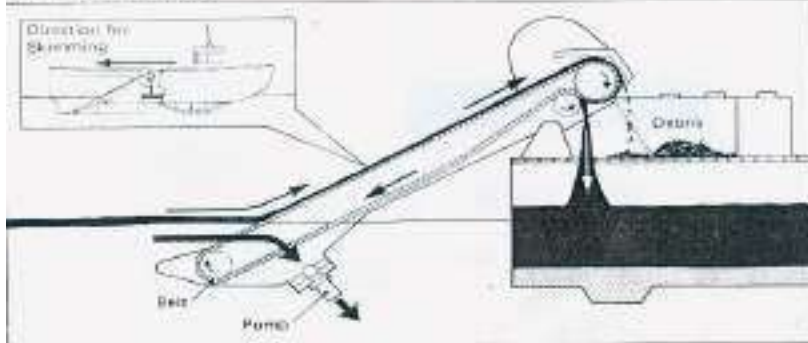
Fixed oil barrier constructed with straw bales and wire netting nailed to wooden stakes.

12.9.1.1 Recovery

The rapid recovery of contained oil is vital to prevent its escape and the contamination of other areas. Recovery can be achieved using skimmers, pumps, sorbents, manual techniques and non-specialized mechanical equipment, such as vacuum trucks.

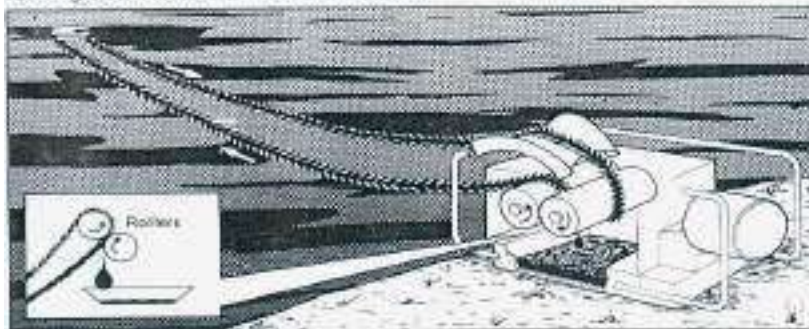
12.10 Skimmers

ADHESION DEVICES



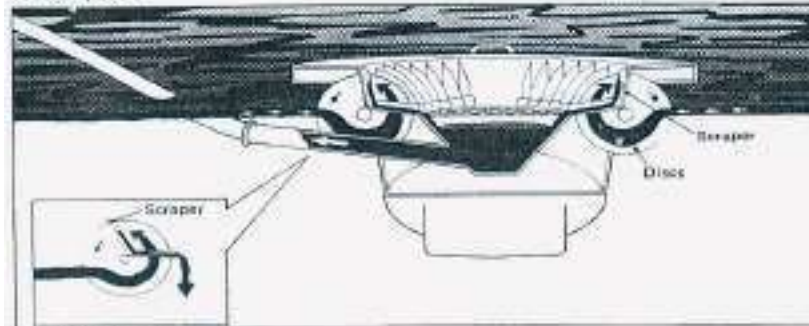
Belt skimmers

A belt conveys the oil from the water surface by adhesion. Upward rotating belts carry the oil to their top limit where it is scraped or squeezed off into a storage tank. Conversely, downward rotating belts first submerge the oil which then surfaces behind the belt, due to its buoyancy, into a defined area within the vessel. Operational limit – for upward rotating belts 0.5 knots, sea state 1; for downward rotating belts 2 knots, sea state 2. Preference – medium viscosity oils but upward rotating belts also tolerate heavier material.



Oleophilic rope skimmers

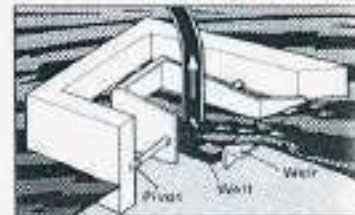
A central tension core rope, through which is interwoven oleophilic strands forming a long continuous mop. The floating mop is pulled by powered rollers around a return pulley. The rollers squeeze the oil into a storage tank. Operational limit – sea state 3. Sensitive to increasing viscosity. Preference medium viscosity oils.



Disc skimmers

Discs rotate through the oil/water interface. Oil adheres to the disc surface, is removed by scraper to a central collection point and is pumped to storage. Operational limit – sea state 2. Sensitive to emulsified oils, waves, debris. Preference – medium viscosity oils.

SUCTION DEVICES



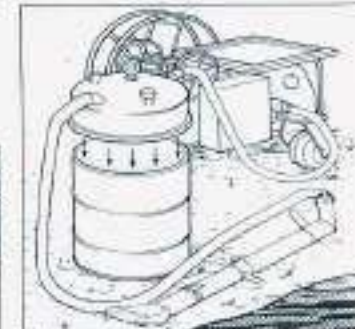
Weir skimmers

Oil flows over a self-leveling weir into the well of the skimmer and is pumped to storage. Operational limit – sea state 1. Sensitive to higher viscosity oils, emulsified oils, waves and debris. Preference – free-flowing oils.



Vortex skimmers

A vortex induced by an impeller causes the oil to concentrate at the centre of the vortex due to centrifugal effects. The collected oil is pumped from the top and the free water released from the bottom. Operational limit – sea state 2 and 0.5 kt water movement. Sensitive to debris. Preference – free-flowing oils.

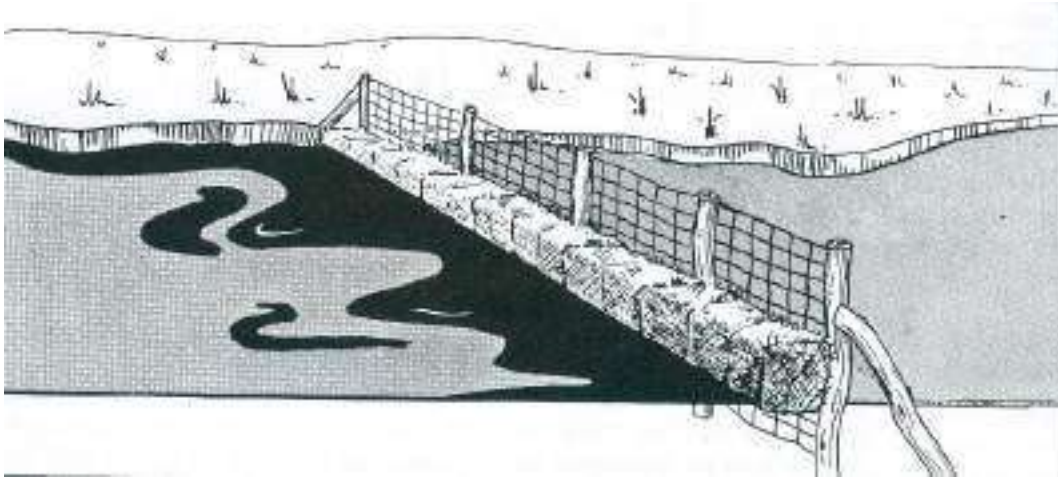


Air suction skimmers

Vacuum system or an air conveyor attached to a hose which may be fitted with specially designed skimmer heads. The pumping of more viscous materials is possible by increasing the water content. Operational limit – sea state 3. Vacuum systems more sensitive to debris. Preference – light to medium viscosity oils but air conveyors can tolerate high viscosity oils.

12.10.1 Design features

All skimmers incorporate an oil recovery element, some form of floatation or support arrangement and a pump to transfer collected material to storage. More complicated designs may be self-propelled and may have several recovery elements, integral storage tanks or oil/water separation facilities.



12.10.2 Suction skimmers

Two basic approaches can be recognized: SUCTION and ADHESION. The simplest concept is a suction device whereby oil is collected by a pump or air suction system from the water surface directly or via a weir. These designs tend to collect large volumes of water together with the oil. This can be an advantage when recovering viscous oils since the presence of excess water helps to maintain the flow of oils which would otherwise tend to block hoses and pipe work. Large storage is required to receive and separate the water which frequently represents more than 90% of the collected material. For oil spill control purposes, simple gravity separation in settling tanks is adequate.

12.10.3 Adhesion skimmers, Oil types

In contrast, skimmers which incorporate oleophilic materials into belts, drums, discs or synthetic ropes often achieve a higher ratio of recovered oil in relation to water. In general, they work best with medium viscosity oils between 100 and 2000 centistokes although skimmers with toothed discs or chain link belts have been designed specifically for the recovery of heavy oils. These high viscosity oils, such as heavy bunker oil, are extremely sticky and can prove difficult to remove from the adhesion surfaces, whereas, in contrast, viscous water-in-oil emulsions can be almost non-adhesive. Although low viscosity oils like diesel and kerosene can be collected, they do not accumulate on the oleophilic surfaces of skimmers in sufficiently thick layers for high recovery rates to be obtained.

12.10.4 Waves /swell, Currents

Skimmers are designed so that the oil recovery element is positioned at the oil/water interface. This is usually achieved by a self-levelling arrangement and although swell alone does not generally affect performance, none is effective in steep waves.

Small units are easily swamped and pitched around, whilst larger skimmers have greater inertia and cannot follow the wave profiles. The performance of skimmers is also adversely affected by currents in much the same way as for booms. This limitation is partly overcome in some self-propelled skimmers where a

sorbent mop array or belt is rotated so that its velocity relative to the floating oil effectively reduced when the vessel is underway.

12.10.5 Self-propelled skimmers

Other designs of self-propelled skimmers can be effective in the calmer waters of ports and harbours. Because they are comparatively expensive they often combine some secondary function such as debris or waste oil collection. Such vessels are often an integral part of response arrangements for oil terminals and refineries where the pollution risk is more predictable.

12.10.6 Power source

Skimmers require power for the recovery element or for transferring the collected oil to a storage tank. Many systems are designed with an integral power pack. Diesel power can be used directly or to drive electric, hydraulic or pneumatic systems. All except petrol engines can be built to conform with safety regulations imposed in refineries, tank farms and other restricted areas where there may be a risk of fire and explosion. When used in potentially dangerous atmospheres, regular tests should be carried out with explosion meters to ensure safe operating conditions, since spark sources can never be completely eliminated.

13 ROLE OF INDUSTRIAL TERMINALS ON KPT LAND

13.1 Roles & Responsibility

Sr. No.	Tank Farm Owners	Persons to be contacted in case of emergency		
		Name and Position	Telephone No.	Mobile No.
1	Kesar Enterprises Ltd., Near Oil Jetty, Old Kandla (Kutch)370210	Mr. R.K. Gupta Gen. Manager	270435 (O) 295676 (R)	9375349181
2	Kessar Enterprises Ltd, Terminal II, Plot No. 5 &6 Old Kandla	Mr. R.K. Gupta G.M	270435 (O) 270177 (O)	9375349181
3	Chemical & Resins Pvt.Ltd Terminal –I, Near Oil Jetty, Old Kandla, Kutch Terminal – II, Near West Gate, New Kandla – Kutch	Lt. Col. Pramod Kumar (Retd), GM,	270505(O) 236831(R) 270916 (O)	9825225676
4	Indo-Nippon Co. Ltd., Plot No.2, K.K.Road, Old Kandla,	Mr. R.N. Pathak Asst. Terminal Manager	270795(O) 235818(R) 270295(O)	9879571295
5	J. R. Enterprise, Plot No.3, Old	Mr. Devendra Dadhich,	653528 (O) 257152 ®	9898238380

	Kandla,	Terminal In-charge		
6	Friends Oil & Chemical Terminals Pvt. Ltd., Near Booster Pump Station, Kandla, Kutch	Mr.S.Ramakrishnan Terminal Manager	270987 (O) 257249 ®	9879572107

7	Indian Oil Corporation Ltd., Main Terminal, GIM	Mr. AK. Khanna Sr. Term. Manager Mr. KS Rao, Sr.TM	233274 (O) 229002 (R) 270394 (O)	9427216637 9426416108
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Upgraded Emergency Plan / DMP for Kandla Port Gandhidham (Kutch)

	Foreshore Terminal, Kandla KBPL LPG Import Plant	Mr. PS Negi Plant Manager	270628 (O) 270477 (O) 233359 ® 270978 (O) 236944 ®	9426725342
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8	United Storage & Tank Ltd Near IOC Foreshore Terminals, New Kandla	Mr. Manoj Gor Terminal Manager	270609 (O) 653525 (O) 651238 ®	989850029
	Gas Terminal, Plot No. 4 Old Kandla	Mr. G. Chudasama	653529 (O)	9904366855
9	IFFCO Kandla Unit, Kandla, Kutch	Mr. L. Murugappan, G.M.(NPK-I) Mr. Brahmbatt Manager (F & S)	270711 270352(O) 270381 (O)	982506922 9099019861
10	BPCL, KK Road, GIM	Mr. RG. Dekate Sr. Manager Operations	234313 (O) 223235 (R)	9099929634
11	HPCL KK Road, GIM	Mr. Murthy Manager (Installation)	230936 (O) 220084 (O) 233078 Ext	
12	INEOS ABS (I) Ltd Plot No. 8 Old Kandla	Mr. Vineeth Nair Dy. Manager	270087 (O) 234409 (R)	9825237029
13	Liberty Investments Pvt. Ltd., Plot No. 1 & 2, Block 'H', New Kandla	Mr. Jitendra Vaidya Terminal Manager	270151 (O) 270464 (O) 270468 (R)	9825025645

14	Avean International Pvt. Ltd., Liquid Storage Tank Terminal, Plot No. B-1, New Kandla	Mr. Bharat Rathod Terminal Manager	270537 (O)	9375310260
15	Rishi Kiran Logistics Pvt Limited, Plot No. 7, Link Road Old Kandla	Mr. RH. Pandya GM (Terminal)	270223 (O) 270443 (O)	9879104556
16	N.P.P. Pvt. Ltd., Old Kandla	Mr. MD.Nagvekar	270347 (O) 257807 ®	9825227649
17	Friends Salt Works and Allied Industries, KK Road, Old Kandla	Mr. NJ.Zinduwadia Sr. Manager Mr. HA. Mehta,S.M	270814 (O) 262698 (R) 271260 (O)	9825506361 9825506360
18	IMC Ltd, Cargo Jetty New Kandla	Mr. Anil Brahmbhat	270369(O) 653524 (O) 296079 (R)	9898126243
19	Agencies & Cargo Care Ltd., Plot No.3, New Kandla.	Mr.Shivkumar Menon, Terminal Manager	270714 (O)	9825226765
20	Dipak Estate Agency Plot No. 5-6, Block – A New Kandla	Mr. Narendra Thacker	270375 (O)	9879611243

21	Parker Agrochem Exports Ltd, Plot No. 3 –4,Block- H New Kandla	Mr. Bharat Thacker	270486 (O) 270528 (O) 231876 (R)	9825238260
22	Tejmalbhai & Co New Kandla	Mr. Ankitbhai Chandan	271330 (O) 230090 (R)	9825225101
23	Parker Agrochem Product Pvt. Ltd, Plot 7-9/A,N.Kandla	Mr. Raja Babu Dy Manager	270528 (O) 231876 (R)	9979158543
24	Mother Dairy Fruit & Vegetable Pvt. Ltd, Near Oil Jetty, Old Kandla	Mr. Saju Therattu	270654 (O) 270655 (O) 230979(R)	9974022681

The individual terminal will have to ensure the following in the event of emergencies arising out of:

- a) Natural disaster
- b) Toxic release
- c) Flammable vapour release
- d) Road tanker / Rail tank truck transportation accident
- e) Fire
- f) Flooding

13.1.1 Natural Disasters

- Ensure that adequate staff are posted at the terminal to meet any eventuality
- Ensure all operations are shut down
- If possible, ensure disconnecting pipelines
- Provide 48 hours food supply as well as portable water supply at the terminal

13.1.2 Toxic Release

- Ensure that the staff is evacuated in the direction opposite or as far as possible at 90 degree to the direction of the wind
- The staff located at the site to ensure safe operation, should be provided with gas masks
- Do's and Don'ts should be posted outside the control room to ensure minimum loss to life

13.1.3 Flammable Vapour Release

- It should be ensured that all possible help is rendered to the affected site / terminal
- The fire and safety officer at Kandla Port fire station should be informed
- Information pertaining to fire should be relayed to Main Emergency Control room at Gandhidham
- Information regarding fire incident should also be relayed to Kandla Free Trade Zone fire station
- Security personnel of the individual terminals should also be on standby to assist in fire fighting if the need be
- Mutual Aid Agreement should be signed between all the terminals as well as the KPT
- IOC LPG terminal should assist the affected terminal by way of sharing their experience in terms of plugging a chemical/gas leak
- The terminal Manager of the terminal next to the affected terminal should also inform the CISF

13.1.4 Road Tanker / Rail Tank truck transportation accident

- The dispatch terminal to whom the cargo belongs is responsible for attending to the mishap
- The dispatcher has to inform the exact location of the accident to the Main Emergency Control Centre as well as to the local emergency control room at Kandla
- CISF Commandant has to be informed by the dispatcher of the site of accident
- The Fire and Safety Officer stationed at Kandla Port should also be informed with specific name of the chemical
- In case the road tanker involved happens to be containing POL products then HPCL, BPCL and IOCL should be contacted immediately
- Accident involving rail tank truck i.e. LPG should be informed to the IOCL LPG Terminal Manager immediately
- In case of any leakage reported from LPG road tanker or rail tank truck the same should be arrested by the IOCL team

13.1.5 Fire

- Inform the Kandla Port Fire and Safety Officer
- Ensure that information pertaining to the Chemical involved in fire is passed to the Main Emergency Control Centre at Gandhidham as well as Kandla
- Information should be relayed to CISF regarding the fire
- In case it is a fire related to POL product then the oil majors i.e. HPCL, BPCL and IOCL should be contacted
- In the event of chemical fire it would be the collective responsibility of the DEENDAYAL PORT TRUST as well as the dispatcher to ensure that the spill is controlled and collected

13.1.6 Flooding

- Terminal should have trolley mounted pumps preferably of flame proof type to ensure dewatering of the site
- Gum boots should be supplied to the staff at the terminal
- The electricity supply to the terminals should be shut off to avoid short circuit
- The trolley mounted pump should have DC supply in order to ensure continuous operation
- It should be ensured that all the drains should be cemented and free of any debris which could hamper the flow of water

The following occupiers shall be a part of the emergency team for rendering expert advice. (This composition may be changed once in three years on rotation basis.)

13.2 Toxic Team

- IFFCO
- Chemical & Resins Ltd.
- United Storage & Tank Terminals Ltd.
- Bayer ABS

13.3 Fire Team

- Kesar Terminal I
- Indo Nippon

- Friends Oil & Chemicals Ltd. (FOCL)
- Friends Salt Works & Allied Industries Ltd. (FSWAI)

13.4 Transportation Team

- IOCL POL TERMINAL
- HPCL
- BPCL

13.5 Natural Disaster Team

- J. R. Enterprise
- J. K. Synthetics
- Synthetic Chemicals

Individual terminals shall be responsible for ensuring that safe shut down has been affected aftermath of a disaster in the neighborhood.

In case of dry docks KPT shall assume the charge of the emergency controller along with P&O to ensure that all the staff is evacuated from the area barring the security and the emergency team.

The emergency team would be drawn essentially from CISF and Marine Department i.e. at the behest of Harbour Master as well as P&O. In the event of an impending natural disaster like cyclone only CISF personnel to be stationed at the wharf. For the ships berth at the dock please refer to the cyclone disaster plan as annexed.

The emergency team should have the following:

- a) Chemical data sheet
- b) Protective clothing
- c) Breathing Apparatus
- d) Safety Harness

- e) General tools and flash light
- f) Leak plugging equipment like wood plugs
- g) Analytical equipment like explosivemeter
- h) Flood light with generator
- i) First Aid kit
- j) Portable diesel operated fire water pump

The responsibility of the various teams mentioned above would be to follow the following procedure:

- a) Keep people away
- b) Inform incident Controller i.e. at Main Control Room
- c) Contain the chemicals
- d) Avoid igniting the chemicals by ensuring muffler on the exhaust
- e) Obtain chemical data sheet

The communication parameters which need to be relayed to the Emergency Control Centre

- a) Place and time of the incident
- b) Chemicals involved
- c) Condition of the container
- d) Injuries or deaths
- e) Area surrounding (open country, town)
- f) Weather conditions
- g) Assistance available (police, fire services)
- h) Means of maintaining contact

Logistic Team

The function of Logistic Team is to ensure necessary supplies are available to Response Team during the emergency. In addition to above mentioned, the function is also responsible for organising and maintaining the staging area where emergency material and equipment is to be temporarily stored and assembled

before rapid deployment. The Logistic Coordinator will be reporting to the Emergency Chief Incident Controller and keep him updated on the availability of supplies and equipment or of any anticipated need.

Typical list of emergency equipment and material is given below:

- Fire extinguishers
- Fire fighting agents
- Fire hoses and nozzles
- Personal protection apparatus like fire suit (proximity suit)
- Chemical resistance protective clothing
- Self contained breathing apparatus
- Respirators
- Emergency lights
- Power generators
- Portable radios and cellular mobile phones
- Spill control agents for decontamination of toxic spills
- Plastic containers and lining material for diking and damming
- Earth moving machinery
- Fuel and gasoline for operation of vehicles and machinery

14 LINKS BETWEEN THE ARMY, COAST GUARD & AIR FORCE

Aftermath of any disaster the recovery and relief operations are conducted on a war footing.

The task involved usually demands rough and tough and dedicated personnel who are trained professionals to meet any challenge be it evacuating people marooned due to flood or making shelters or transporting relief to inaccessible areas. It is for this purpose that the army, air force and the coast guard would be required to assist the Kandla Port Administration.

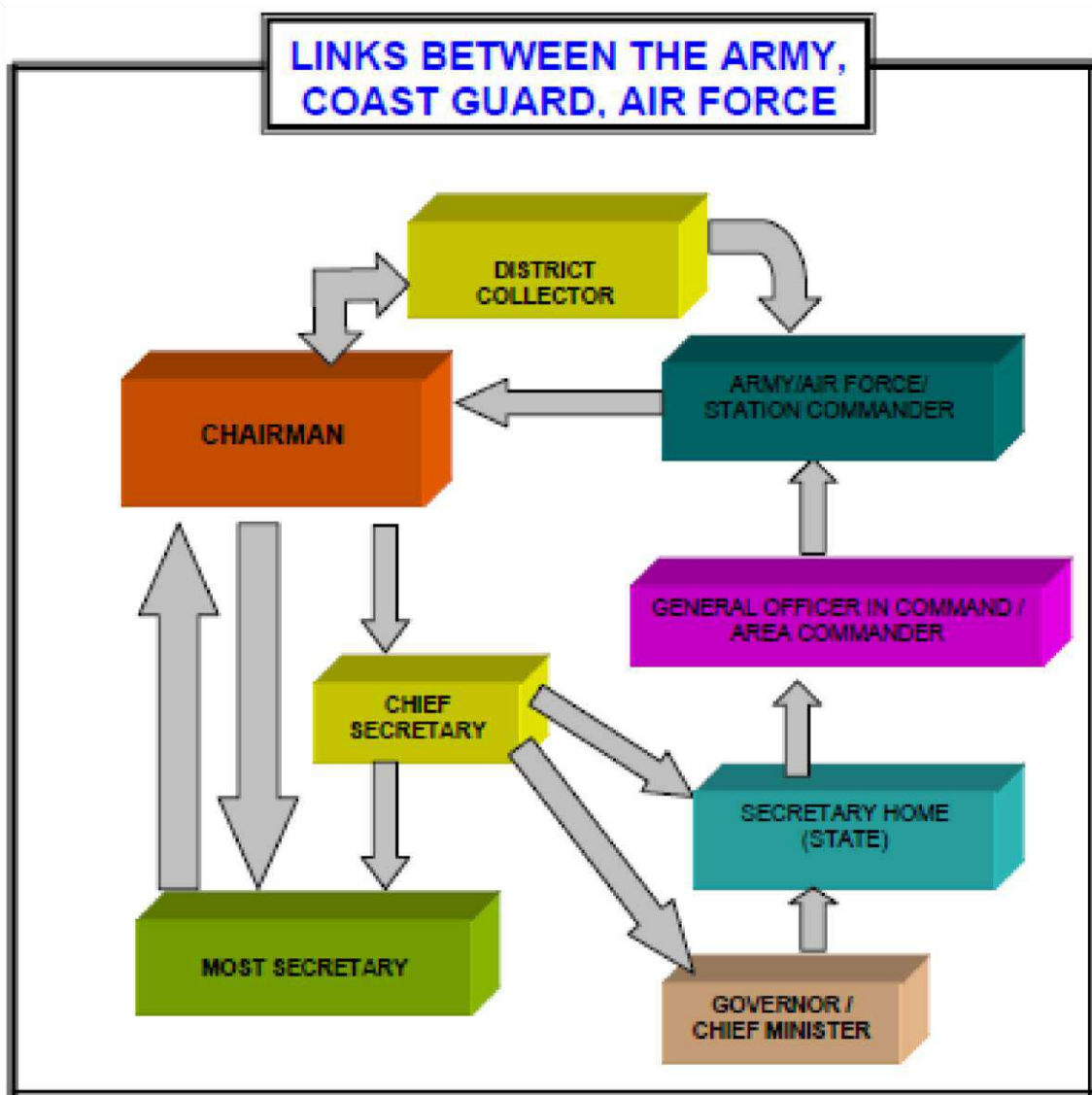
The Chairman / Deputy Chairman would be the coordinating officials for liaising with the Station Commander (army, navy as well as air force) after consulting the District Administration.

While seeking assistance from the army, air force or the coast guard the following documents should be kept ready for reference:

- ③ Overall plot plan of the Kandla Port
- ③ Clear demarcation of the affected area on the plot plan
- ③ VHF link frequency for establishing contacts with the signal room as well as CISF commandant.
- ③ List of all the important telephone numbers.
- ③ In the event of Cyclone, keep the task force updated on the weather condition.
- ③ Ensure that the emergency team is extending their full co-ordination to the task force.
- ③ For ready reference the Secretary should nominate a person who should be made responsible to taking notes on what is happening and what sequence.
- ③ The areas, which could be used as temporary shelters should be indicated to them.
- ③ Open space which can be used as staging area should be indicated to them.
- ③ All the medical staff should be kept on standby and they should be asked to act after consulting the Army or the Air force teams.
- ③ In the event of air evacuation requirement it should be ensured that the people being evacuated are listed and the number of sorties required is noted.
- ③ In the event of a cyclone and an resultant Ammonia Gas leak it should be noted that the Army and the Air force should be provided with gas mask (if the need be).
- ③ Data pertaining to the number people in the affected areas (an approximate) should be made available to the Army / Air force.

The flow of information for co-ordination:

Chairman - District Collector Chief Secretary Secretary - Ministry of Surface Transport Governor / Chief Minister of the state ARMY/AIRFORCE.



15 PROCEDURE FOR CO-ORDINATION

The overall responsibility of the Emergency management lies with the Chairman, Kandla Port. He assumes the responsibility of Chief Site Controller on receipt of the information of an emergency or an impending emergency.

Some of the critical functions are:

- ③ Activation of the emergency response organization
- ③ An ongoing emergency assessment, including upgrading or downgrading of the emergency alarm level
- ③ Notification of outside governmental agencies
- ③ The decision to ask for outside help and resources
- ③ The decision to evacuate the people
- ③ Decisions involving the safety of off-site vulnerable points (e.g. recommendations to evacuate or take shelter, in the case of a toxic vapour release).
- ③ Decisions to shut down/restart the Port.

The Chairman i.e. the Chief Site Controller shall be responsible for designating the Incident Controller, the Field Controller as well as the Liaison Officer as well as Public Relations Officer.

Functions like

- ③ Communication
- ③ Fire, Safety and Rescue
- ③ Special hazard
- ③ Utilities
- ③ Engineering / technical function
- ③ Medical function
- ③ Logistic function
- ③ Security function

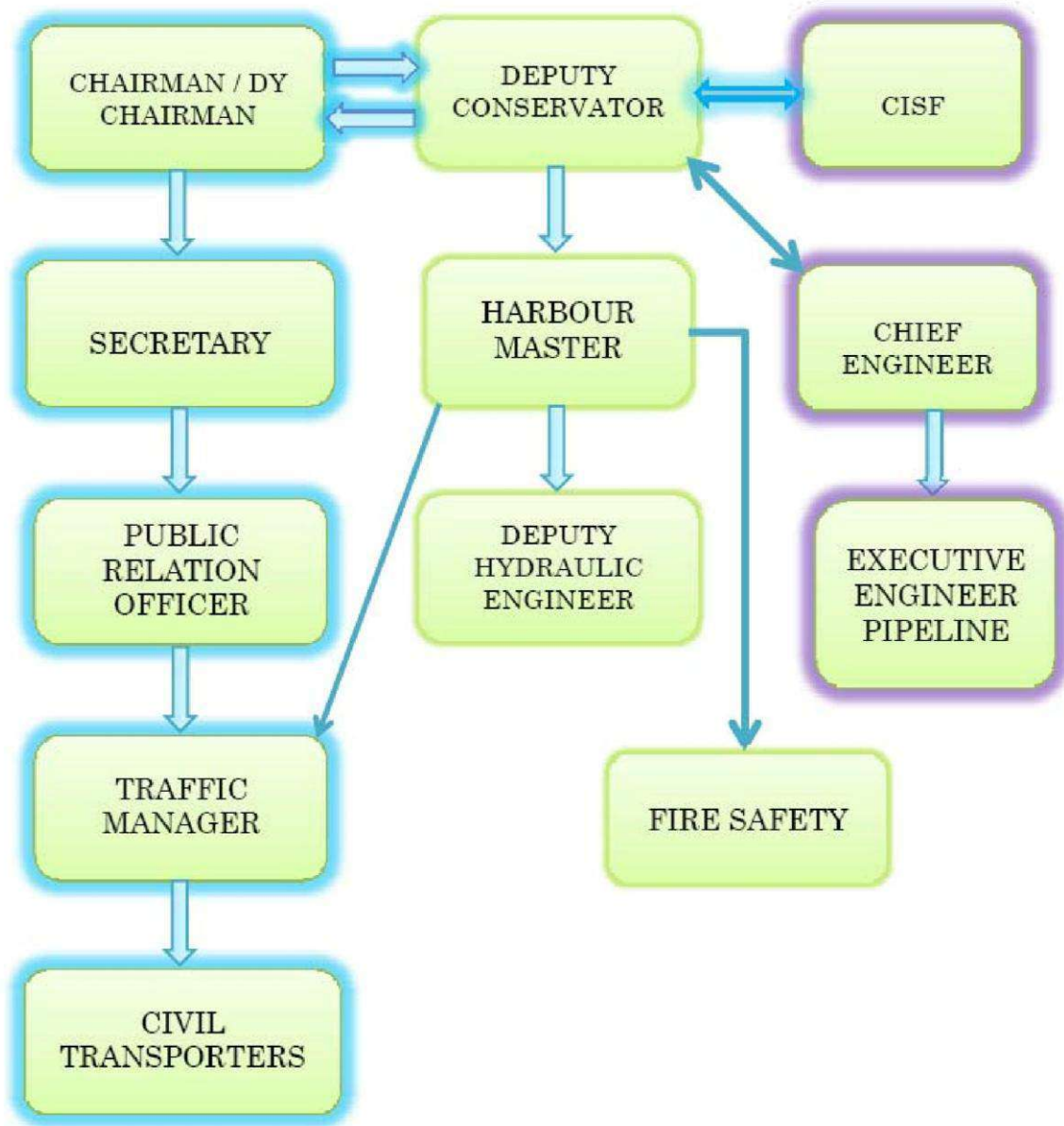
③ Administrative function

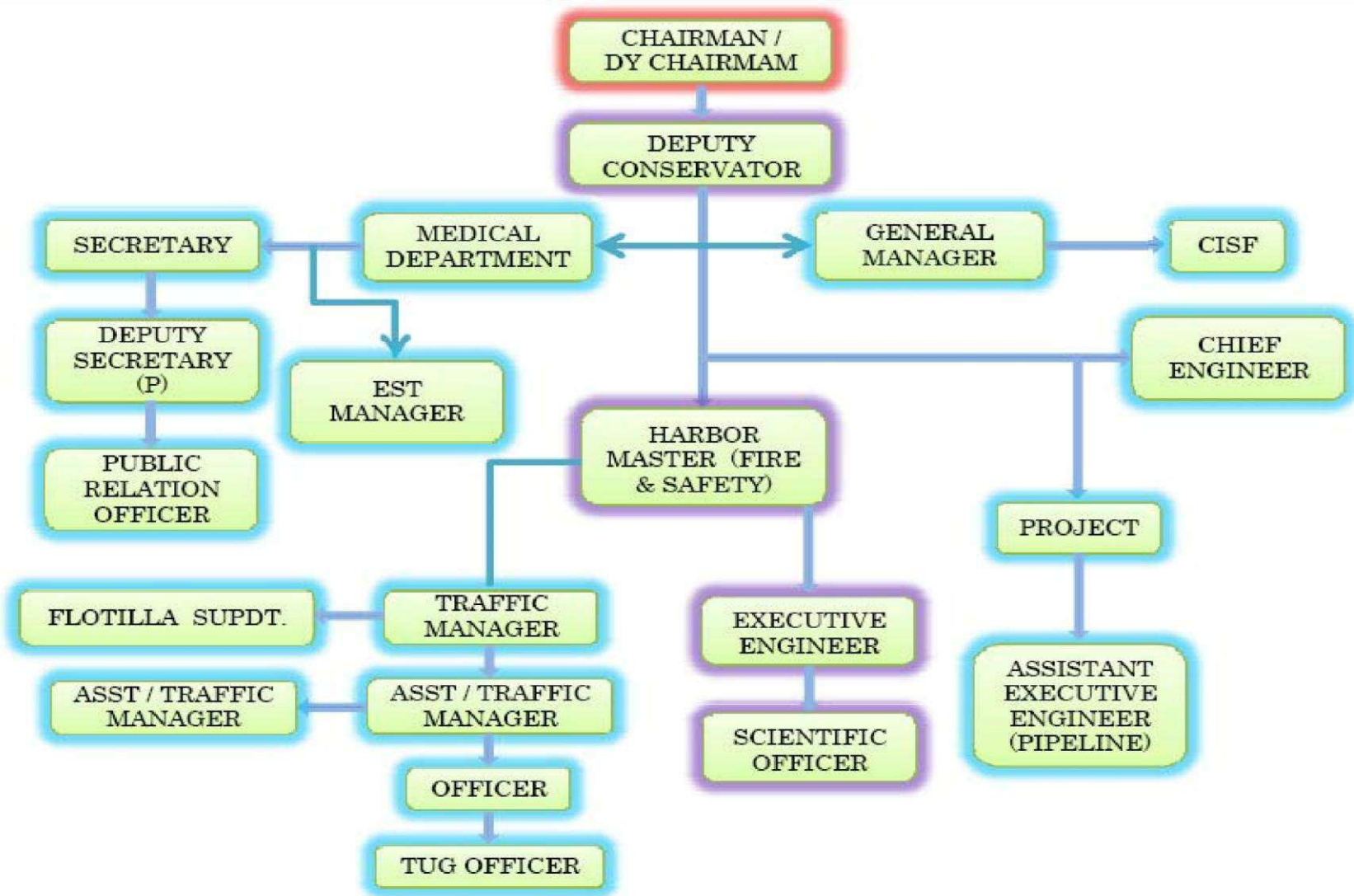
EMERGENCY NOTIFICATION SHEET	
1.	Plant / Location Name _____ Unit _____ Address of Plant / Site _____
2.	Date _____ Time of Call _____
3.	Caller's Name _____ Caller's Position _____ Caller's Telephone Number _____
4.	Time (or Anticipated Time) of Accident / Emission _____ Projected Duration of Accident / Emission _____

5.	Type of Accident / Emission _____
6.	Emergency Alert Level (EAL) : Check One ALERT <input type="checkbox"/> SITE EMERGENCY <input type="checkbox"/> GENERAL EMERGENCY <input type="checkbox"/>
7.	In case of Toxic Release :
	Chemical Name of Substance Released _____ Amount and/or Rate of Release _____ Estimated Duration of Release _____ Type of Release (Gas, Liquid or Solid) _____ Toxicity / Flammability _____ Potential Impact on Offsite Area _____ Estimated Area Affected by the Release _____



8.	Weather Condition _____ Wind Speed _____
9.	Casualties / Damages _____
10.	Brief Description of the Accident _____ _____ _____
11.	Assistance Requested _____ _____ _____ _____
12.	Signature _____ Date _____ Time _____

15.1 Procedure for Co – ordination





16 ASSEMBLY POINTS & ESCAPE ROUTES

1. There are two main escape routes from the port side i.e. by land:
 -  Kharirohar road.
 -  Main NH 8 i.e. leading to Gandhidham.
 2. The sea route would be the Kandla creek and other creeks i.e. Phang creek, Sara Creek or Rohar Creek or Nakti Creek connecting the same.
 3. Air evacuation can be undertaken by Helicopter or from Kandla Aerodrome.
 4. KPT to prepare list of all the personnel in their port colony and have it posted at the assembly area.
 5. The assembly points in the Cargo Dock for the workers in the area between the North Gate and the plot number five would be the area in front of the Railway Station.
 6. The assembly point for the port township could be between block E&D and at the intersection of Block 'B'.
 7. The assembly point for each of the adjoining berth would be on the road i.e. used for moving between the warehouse A,B,C,D and the berthing area.
 8. However for the workers working in the warehouses as mentioned above the assembly point would be the central road between the two streams of warehouses.
 9. The workers working in the bins i.e. open storage the assembly point would be the area in front of the West Gate # 2.
 10. For bins closer to the West Gate #2 fire brigade station the staging area for the fire station would be used as assembly point.
-

11. Computer should be installed in the rooms next to the assembly point connected to the time office for a list of people inside the port and the same should be made available at the railway station.
12. Railway station should have emergency evacuation counter all the personnel being evacuated from the area should be asked to check-in at the counter before they board the train.
13. The PA system at the assembly area should be used to announce “do not carry any luggage or belongings just carry as much as is bare essential in clothing”.
14. The point of departure from the Dry cargo area would be West Gate 1 & 2 as well as North Gate and in an extreme case one would have to use the jetty being used by the pilots for evacuation by sea.

RECOVERY AND BUILDING BACK

17 RECOVERY FACILITY RE-ENTRY RESTORATION OF SERVICES

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The recovery and re-entry phase will begin after the declaration of termination of emergency situation. This determination would be made by the Chief Incident Controller. The recovery plan would be flexible enough to adapt to existing conditions. All of the conditions that may be encountered in an emergency situation cannot be anticipated in advance. Detailed plans and procedures for recovery operations would be prepared at the time they are needed.

Re-entry operations would be performed by the Re-entry Team, which would be same as that of green team under the leadership of the Chief Incident Controller.

The team shall consist of personnel knowledgeable in procedures and facility layout. In the Re-entry planning process, the team will gather available information on the nature of the emergency and its present status by methods such as discussions with the operations personnel on-shift. Necessary protective clothing and equipment would be available for the team before re-entry is authorized.

Specific procedures for recovering from an emergency and re-entering the facility can hardly be provided, since they will have to be determined on a case by case basis, depending on the type of accident and the severity of the damage suffered. However, provision would be made for the following:

- Organising a re-entry team
- Inspecting the damaged area
- Declaring the emergency concluded and making the "all clear" known to the facility employees and the community
- Deciding which employees would report to work and notifying them
- Beginning an investigation into the causes of the emergency
- Assessing the damage to the facility
- Transferring necessary operations to alternative locations
- Decontaminating the damaged area
- Restoring services to the damaged area
- Clearing up the debris
- Salvaging material and equipment affected by the emergency
- Restoring the parts of the facility affected by the emergency
- Determining responsibilities and instituting possible insurance and damage claims

In case of an aftermath of a toxic release, it should be ensured that Chief Incident Controller and the party carrying out the re-entries to ascertain the termination of emergency, should be carrying self-contained breathing apparatus as well respiratory masks.

Please note in the event of a natural disaster the recovery team would involve the usage of ARMY or other paramilitary forces the same would be under the control of the station commander and the overall Controller shall be the District Collector.

CAPACITY DEVELOPMENT

18 MAINTAINING

CAPABILITIES

EMERGENCY

RESPONSE

In order to ensure a prompt and professional emergency response capability, port personnel are required to be knowledgeable of the possibility of various emergencies and emergency actions. General safety training should be provided to all employees to familiarize them with alarms, evacuation routes, safe assembly points, etc. In addition, personnel who are a part of the Emergency Response Organization are required to have additional training and should participate in periodic drills and exercises.

18.1 Training & Education

Regular training should be provided to all personnel who have a role in planning and operational response to an emergency. The main goal of training for emergencies is to enable the participants to understand their roles in the response organization, the tasks associated with each position and the procedures for maintaining effective communications with other response functions and individuals.

The training objectives are:

1. To familiarize personnel with the contents and manner of implementation of the Plan and its procedures.
2. To train personnel in the performance of the specific duties assigned to them in the plan and in the applicable implementing procedures.
3. To keep personnel informed of any changes in the plan and the implementing procedures.
4. To maintain a high degree of preparedness at all levels of the Emergency Response Organization.
5. Train new personnel who may have moved within the organization.

6. Test the validity, effectiveness, timing and content of the plan.

7. Update and modify the plan on the basis of experience acquired through exercises and drills.

Selected port personnel should receive instruction in the use of the fire fighting and emergency equipment available at the site. All personnel working at the site should receive instructions in fire prevention and in basic fire fighting techniques. Periodic refresher training should be provided and supplemented by fire drills.

Crews of tugs, which can be used for fire fighting, should receive instruction and training in fighting petroleum fires in co-operation with land based fire-fighting services. In order to utilize fully the tugs firefighting equipment and capability during an emergency, it may be necessary to supplement the crew with trained shore personnel. Opportunities should be provided at frequent intervals for combined practices involving the tugs and shore fire fighting services. Opportunities may arise whereby a combined fire practice or conference can be arranged between shore personnel and crew members of tanker at berth without imposing an operational delay on either the berth or the tanker. This should help make the tanker personnel familiar with the firefighting equipment ashore. Shore personnel should also have the opportunity of becoming familiar with the types and locations of firefighting equipment on and of being instructed in any design features on tankers which may require special attention in case of fire.

18.2 Drills & Exercises

Emergency drills and integrated exercises have the following objectives. These constitute another important component of emergency preparedness. They refer to the re-enactment, under the assumption of a mock scenario, of the implementation of response actions to be taken during an emergency.

1. To test the adequacy of the effectiveness, timing, and content of the plan and implementing procedures.
2. To ensure that the emergency organization personnel are familiar with their duties and responsibilities by demonstration.
3. Provide hands-on experience with the procedures to be implemented during emergency.
4. Maintain emergency preparedness.

The frequency of the drills should vary depending on the severity of the hazard. However, drills should be conducted once in a year. Scenarios may be developed in such a manner as to accomplish more than one event objective.

Drills and exercises will be conducted as realistically as is reasonably practicable.

Planning for drills and exercises should include:

- ③ The basic objectives
- ③ The dates, times and places
- ③ The participating organizations
- ③ The events to be simulated
- ③ An approximate schedule of event
- ③ Arrangements for qualified observers
- ③ An appropriate critique of drills/exercises with participants

Evaluation of drills and exercises should be carried out which should include comments from the participants and observers. Discrepancies noted by the drill observers during the drill shall be pointed out during the drill. A written evaluation of the drill or exercise should be prepared by the individual responsible for conducting the drill or exercise. The evaluation should include assessments and recommendations on:

- ③ Areas that require immediate correction.
- ③ Areas where additional training is needed.
- ③ Suggested modifications to the plan or procedures.
- ③ Deficiencies in equipment, training, and facilities.

The evaluation of a drill or exercise shall be submitted to the Main Controller for review and acceptance who shall then determine the corrective actions to be taken and assign the responsibility to appropriate personnel.

The Chief Fire Officer should track all approved drill and exercise corrective actions as a means of assuring that corrections are made in a reasonable amount of time, and shall advise Main Controller of the status of implementation of corrective actions.

Records of drills, exercises, evaluations, and corrective actions should be duly maintained.

18.3 Review of the plan

The Plan and associated implementing procedures should be reviewed to ensure compliance with relevant regulations and applicable state and local emergency plans and written agreements with mutual aid companies also.

The plan should be reviewed under the direction of the Chairman who should encompass the plan, response procedures, equipment, training, drills and interfaces with local emergency management agencies. The need for changes is based upon the following aspects:

- ③ Written evaluations of drills and exercises which identify deficiencies or more desirable methods, procedures, or organizations.

- ③ Changes in key personnel involved in the organization.

- ③ Changes in the facility organization structure.

- ③ Changes in state regulations.

- ③ Modifications to the facility which could affect emergency planning.

- ③ Recommendations received from other organizations and state agencies.

18.4 Emergency Control Center

The Emergency Control Centre is located in the Board Room of Administrative Office Annexure Building at First Floor.

This room will have seating arrangements for all members of Disaster Management Group.

It will have the following:

1. Adequate number of telephones. One of these telephones shall be used for outgoing telephone calls only.
2. Internal telephones, telex, fax.
3. VHF transceiver having marine band capable of being operated by mains or battery.
4. Hot line linking deputy commissioner of the district.
5. Internal and external telephone directories.
6. Emergency manuals.
7. Emergency light.
8. Wind direction and speed indicator.
9. Plan of the port showing:
 - ③ Berths/Areas where hazardous materials are handled
 - ③ Sources of safety equipment's
 - ③ Personal protective equipment such as aprons, gloves, gum boots, etc. ③ The fire fighting system
 - ③ Stocks of other fire-extinguishing materials
 - ③ Site entrance and roadways, updated at the time of the emergency to indicate roads which are to be used and which are not to be used.
 - ③ Assembly points and routing ③ Medical centers.
 - ③ Layout of pipelines in the Port area

③ Lorry parks and rail sidings

③ Port location in relation to the surrounding community (5 km map)

19 DEENDAYAL PORT TRUST OFF SHORE OIL TERMINAL – VADINAR PORT

19.1 Vadinar Port Information

Vadinar Port is an important port in DEENDAYAL PORT TRUST Group of ports under the control of Kandla Port Trust, Kandla. The port is just 55 Kms from Jamnagar city.

Latitude: 22 Degree 26'25' North

Longitude: 69 Degree 40' 15' East

Charts – Gulf of Kutch Chart No: 203

19.1.1 Metrological Data

1. Temperature: Summer Maximum 38 Degree C, Minimum 19 Degree C
2. Temperature: Winter Maximum 36 Degree C, Minimum 14 Degree C
3. Annual rainfall: Average 241.2 mm
4. Average Wave Height: 30 Centimeter (Summer)
5. Average Wave Height: 25 Centimeter (Winter)
6. Maximum Wave Height: 45 Centimeter
7. Maximum Tide – 6.12 Meter
8. Minimum Tide – 0.02 Meter
9. Wind Speed – Average Wind Speed – 16 knots/hour
 - Summer – 25 knots / hour
 - Winter – 18 knots /hour

10. Anchorage: Anchorage areas are about 4.5 miles from shore.

19.1.2 Off Shore Oil Terminal (O O T) Vadinar

The DEENDAYAL PORT TRUST has commissioned the off shore oil terminal facilities in 1978 jointly with Indian Oil Corporation by providing Single Buoy Mooring (SBM) system having a capacity of 10MMTPA was first of its kind in India. The following are the salient features of the operations at OOT Vadinar.

- A draft of upto 30 meters at SBMs and Lighterage Point Operations (LPO) • The Single Buoy Moorings can handle vessels having length of 335 meters. 2 NOS OF OIL BERTHS OF NAYRA(EX ESSAR)
- Handling VLCCs upto 3,00,000 DWT
- Providing crude oil intake for the refineries of M/s. IOCL at Koyali (Gujarat), Mathura (UttraPradesh), and Panipat (Haryana). & VADINAR OIL REFINERY OF NAYRA (EX ESSAR)
- Commissioned the first SBM on 27th August 1978.
- M/s. IOCL Commissioned the second SBM on 25th October 1997.
- Commissioned the third SBM (Essar) on 29th December 2006.
- Simultaneous handling of 3 vessels at three of SBMs
- Vast crude tankage facility of M/s. IOCL having capacity of 11, 44,000 KL.
- 4 High powered Tug of 50 Ton BP.
- Two Tugs of 35 ton BP &
- Two 50 Ton BP tugs for smooth operation is being acquired.

19.1.3 Export Jetty (Essar)

- One Ro - Ro / Lo - Lo Jetty for handling of project cargo / construction material / spare parts.
- Product Jetties (Private Berths at the Port)
- Essar Jetties are used for tankers Loading of POL product cargo by alongside.
- The Jetty No 1 – commissioned on 6th December 2006.
- The Jetty No 2 – commissioned on 29th December 2009.

19.2 Control Room –Vadinar Port

There is one control room at A.O. Building, Vadinar Jetty under the direct supervision of Pilot, stationed at Vadinar. In absence of Pilot, the other Pilot posted at Vadinar and XEN (M&E) shall be responsible for the direct supervision of the Control room at Vadinar, in association with Marine Engineers Grade - II. They shall rush to the Control room as soon as the Action plan is put into force. Two persons viz. one Assistant, Flotilla Supervisor and one Signaller shall report for duty to the In-Charge of Control Room immediately, as soon as the Control room comes into operation. The In-Charge should draw-up rosters of the said employees shift-wise and assign duties to them. The In-Charge shall ensure the presence of the staff as to whom various duties have been assigned. They should attend the meetings as and when called. In case of absence of the staff, the matter should be informed to the C.O.M. (OOT), who shall take disciplinary action against the erring employees.

The Control room has the following assets

Telephone	Fax	VHF Signal
0288-2573026		Marine Channel 12,16,8,10
Mobile Phone Nos. 9825212359 / 9825212360 /		
Xerox Machine / STD telephone		

Inmarsat Mini M. Terminal and / or V.Sat Terminal Antenna are required to be set up and installed at Vadinar.

Manning at Vadinar Control Room Jetty

Any one of the AVAILABLE Contract Pilots is available at Vadinar

Designation
XEN(M&E)
M.E. Grade-II
Office Supdt
A.F.S

A.F.S
Signalman
Signalman
Signalman
Signalman

19.2.1 Obtain Information from following Sources

1. State Meteorological Control Room, Ahmadabad
2. Control Room, KPT, Kandla / Gandhidham 9. Meteorological Section, New Kandla,
3. signal station, New Kandla.

The information so collected shall be maintained by making hourly log entry in a register.

19.2.3 Control Room Assets

1. Xerox machine
2. STD telephone
3. Fax machine
4. Inmarsat Mini M. Terminal / and or V. Sat Terminal antenna, are required to be set up at Vadinar jetty

The In-Charge of Control room should ensure setting up of the Control room at Vadinar jetty immediately on receiving warning and matter be reported to C.O.M. who in turn apprise the Dy. Chairman and Chairman, KPT.

The control room shall remain in touch with various authorities / agencies like State Govt. / Distt. Authorities / and local authorities. Besides, Naval Authority OkhaPorbandar should also be contacted on VHF/UHF frequency, round the clock. In the prevailing set up of CISF Security control staff at Vadinar, Officer-in-charge of C.I.S.F. Unit of KPT Vadinar along with his entire CISF Security Personnel will remain in contact with In-charge of Control Room for posting of CISF Security Personnel at various locations as per the requirements and they will carry out the duties and responsibilities as required & assigned under this Action Plan.

In case the Marine Signal No.8 is issued, the Vadinar jetty area will be evacuated including the Control Room, which shall be shifted to Room No.5 of Port Guest house at Vadinar colony. In this regard, XEN (E&M) shall pre-plan installation of VHF Antenna and drawing extension line of there available Telephone Nos. (02833)-256533 / 256714 at Port Guest House at Colony and ensure laying of cable with suitable connectors with the Wireless Sets duly tested and thereafter to be set up there at Guest House.

19.3 Functions of Control Room –Vadinar Port

Control room shall remain in touch with State level / District level Meteorological Department / Masters of ships at Vadinar, Navy / Coast Guard at Porbandar / Vadinar and also with the Control Room of KPT at Kandla/Gandhidham.

Telephone numbers of concerned contact persons are as under:

STD code: Jamnagar (0288), Vadinar (0288)

Sr. No	Name of Organization / Contact person	Office	Residence
01	Chairman, Mutual Aid District Collector, Jamnagar	2555869	2554059
02	Joint Chair Person, Mutual Aid Commissioner, JMC, Jamnagar	Fax No.2554454 2552321	2552372
03	Distt. Supdt. of Police, Jamnagar	2554203	2555868
04	Police Control Room, Jamnagar	2550200	
05	Police Control Room, Sikka	2344249	
06	The Dy. Chief Controller, Civil Defense, Jamnagar	2540371 2674758	2671828
07	Control Room, Collector Office Jamnagar	2553404	
08	Port Officer, GMB, Jamnagar.	2712815 Mobile:9426239289	2554942

09	Commandant, Home Guard, Jamnagar	2553862	
10	Mamlatdar, Khambhalia	234788	234736
11	Dy. Collector, Khambhalia	234577	
12	Police Station, Khambhalia	234735	
13	Fire Officer, Fire Station, Jamnagar	2662690 Mobile:9879531101	2550340
14	DEAN, Irwin Group Hospital, Jamnagar (Now Guru Gobind Singh Hospital)	2553515	2553676
15	Indian Air Force, Jamnagar Extension: 222/257 Wing Commander	2720003 to 009 2720004-2720005	
16	Duty Officer, INS, Valsura Jamnagar	2550263-222 extn.	
17	CISF, Coast Guard, Vadinar		
18	DGM, IOC, Vadinar	02833-256527	02833- 256567
19	Chief Operation Manager, IOC, Vadinar	02833-256984	02833- 256559
20	Dy. Manager (operation), IOC, Vadinar	02833-256545	02833- 256530
21	Fire Brigade, IOC, Vadinar	02833-256542	02833- 256559
22	Main Board of M/s Essar Oil Limited, Vadinar	02833-241444	
23	Security Control Room, Essar, Vadinar.	02833-241917	02833- 241191

24	Vice President, (P&Admr ESSAR Vadinar Refinery.	02833-241107 02833-241167	028332550976 028332662856
25	M/s. Reliance Petro. Ltd., Moti Khavdi	0288-6610101	

Information from the above officers will be collected and transmitted to the C.O.M. (OOT) on hourly basis between 0800 to 2000 hours & 2000 hours to 0800 hours respectively. The said information shall be passed on to Dy. Chairman / Chairman on three hourly basis.

The Vadinar control room shall maintain logbook of messages received from and to Control Room at Gandhidham continuously and report to the COM (OOT) every hour. The information shall be passed on to Dy. Chairman / Chairman depending upon the importance. It shall be the responsibility of the Control Room staff to ensure that the information is passed on timely and proper monitoring is done.

The following are the Website addresses through which the required information regarding the position of the Cyclone can be ascertained.

<http://www.imd.gov.in/> <http://www.supertyphoon.com/indian.html>

<http://www.npmoc.navy.mil/products>

<http://www.solar.ifa.hawaii.edu/tropical/tropical.html>

<http://www.wunderground.com/tropical>

19.4 Stopping of Port Operations

In case of emergency situation, local port authorities like COM (OOT) will decide about the stoppage of the port operations which will be stopped after consulting DGM, IOC / Essar, and ordered by Dy. Chairman / Chairman. In case COM (OOT) is not available in the emergency situation, senior most Executive Engineer is authorized to take such decisions in consultation with Gandhidham officials. Under such situation COM (OOT) in co-ordination with officials of Indian Oil Corporation Ltd. and M/s. Essar, shall get the operation at all three SBMs stopped and also get the hoses dis-connected from the tanker berthed at SBMs and un-berth tanker from Product jetty of Essar. Pilot of KPT on board the tankers will immediately take action to castoff the tanker from SBMs/Product berths and tankers will be directed to go to suitable safer place in that situation. All the ships waiting at own anchorage or working at anchorage will be asked by Vadinar control to go off in open sea at least 5 Nautical miles away from SBM. The tankers carrying out transshipment operation at LPO (Lighterage point), will be asked to stop the operation immediately and be on their own power to be away from other ships in the vicinity.

19.5 Securing of Ships / Crafts / Tugs etc

Pilot / M.E. Grade-II / both the AFS, should be available at Vadinar in case of Action Plan is in operation and situation like emergency. Immediate action for stopping the shipping operation should be taken by informing concerned agencies like IOC, ESSAR, and Shipping Agencies and also to KPT Tug / Craft working for the shipping operations at SBMs / LPO point and Product berth of Essar at Vadinar.

Both the AFS and AXEN (Mech.) should ensure that all the big crafts are moved out of Pathfinder Creek and all Port crafts & small crafts of private parties are placed at inner and outer side of the Vadinar Berthing Jetty or any other suitable location pre-decided and notified. If it is impossible to remove them, then all other steps should be taken to ensure safety of vessel / crafts at the Vadinar port, as also it would not cause any damage to the port. For the purpose of securing of ships / all crafts, pilots assisted by Marine Engineers Grade-II and XEN (E&M) will jointly assess the situation and get the crafts/tugs secured accordingly. The Pull Back tugs shall be secured safely at the Berthing Jetty and Crafts/dumb barge of outside agencies will be placed at safer places in this area. Both AFSs, will ensure while directing all the flotilla staff to take care of the safety of Floatilla. They will look after Pull back tugs and all other Masters will look after the Port flotilla with the help of team of Lascars, Serangs, Quarter Masters and Engine staff. The private Tugs & dump barges engaged by M/s. Essar and M/s. IOC and placed at approach jetty or RO-RO LO-LO jetty shall be ensured to secure at a place decided well in advance by XEN (E&M) and AFS after consulting authority of M/s. Essar and M/s. IOC. A compliance report of securing all crafts at safe places should be furnished to Control Room immediately on issuance of Cyclone Signal No.5.

Both the AFS should ensure the sufficient stock of mooring ropes and heaving lines, etc. to meet operational requirements during the emergent situation and sufficient number of life buoy, life jackets, etc. kept in easily accessible places in each crafts and at various other places on shore too.

19.6 Communication

XEN(E&M) and XEN (Civil-II) shall ensure on hourly basis by ringing personally that the telephones of signal station, AO Building, Estate Office, Hospital, Electric and Water supply are functioning, failing which they shall take up the matter with concerned BSNL authorities. In case of any difficulty in communication system, COM (OOT) should be contacted.

The satellite phone or V-Sat communication network should be established and put into operation at the earliest, by the following Signalmen:

1. Shri P.C. Kothari.
2. Shri Krishna Prajapati.

They will ensure the charging of walkie-talkie, Mobile telephones, as well as satellite phone available at the Signal Station, Vadinar.

The staff at Jamnagar Liaison office shall remain present on 12 hourly shift basis round the clock; to carry out the liaison work during the Action Plan is in operation and any other work as may be assigned during the period of Calamity. S/Shri V.M. Mehta, Assistant shall communicate with the Gandhidham/Kandla officials in case Vadinar communication is cut off from that of Gandhidham/Kandla

Traffic Movement & Security

XEN(C-II) and In-charge of CISF (KPT) Vadinar unit shall ensure that all incoming traffic to the Port jetty of Vadinar is stopped except those which are coming for rescue operations and essential services. They shall ensure posting of adequate security personnel, at various security points in co-ordination with the local police authority. XEN (Civil-II) and S.I. (W&W) should ensure safety of essential service premises like water overhead tanks / Main Store / Electric Station at colony. In addition, the in-charge of CISF Unit (KPT) Vadinar in co-ordination with XEN (Civil-II) shall ensure the posting of Security personnel with arms at all strategic locations, such as Control Station room at Jetty & Port Colony, Water supply tower, etc.

Medical Aid at Vadinar Port Health Center

Medical Officer (O.O.T.) being Officer in-charge at Health Center, Vadinar & other complete Health Center staff will remain in state of readiness to deal with any casualty by setting up a Casualty Emergency Room at the Health center, Port Colony, Vadinar. The Casualty Emergency Room shall start functioning as soon as Action Plan is put in operation and warning of the calamity is received. No staff of the Health center will be given leave during the period and Casualty Emergency room will function round the clock with posting of Doctor and staff round the clock. Medical Officer shall remain present and, apart from attending the patients, will allocate various duties to the available medical & Para-medical staff, such as maintaining records of patients attended and preparing a report thereof. Adequate number of chlorine pills should be distributed after the calamity is over, to avoid epidemic from spreading. M.O. (OOT), being Officer in-charge shall pre-plan for assessment & urgent requirements of all kind of the medicines to meet with the situation which may arise in case of any Natural Calamity. He should arrange to obtain the advance approval for immediate procuring of such medicines and the same should be procured & stocked readily available in advance.

Action to be taken by Pilots

In case of receiving cyclonic weather warning i.e. on declaration Weather Warning signal No.5 at Port, Pilot on the Board at SBM should un-moor the tankers and direct the Master of vessel to move the vessels to safer places i.e. away from the SBM. While returning to the Jetty by the Port craft, the Pilot should ensure that all the Port crafts are secured properly and safely at both inner and outer sides of the jetty. He should also ensure that ropes are doubled up and the tugs are manned at all times and engines are kept in readiness to move out in case of emergency.

Meanwhile, till the time the Pilot returns to the Jetty, the AFS on duty will not waste time and initiate action to secure the smaller crafts, which will further be inspected by the Pilots. Masters of all the smaller crafts should also be directed to ensure proper fendering arrangements are provided and if required extra fendering to the crafts may be provided. AFS shall ensure that the proper fendering arrangements are provided to all crafts before on set of inclement weather. Port crafts will get the priority over the private crafts to come alongside jetty. If any space is available, the private crafts can be allowed to come alongside the jetty.

After observing/monitoring weather conditions, intensity, speed and direction of propagation of Cyclone, necessary arrangement for abandoning the crafts may be made and on declaration of weather warning Signal No.8, the Vadinar jetty area will be evacuated including jetty Control Room, which shall be shifted to Room No.5 at Port Guest House at Vadinar Colony. In the month of April every year, Signalmen under guidance of XEN (M&E), shall inspect & ensure working of all the equipments meant for Control Room of Jetty as also readiness of all the electric connections / charging points at the above alternate location of Control Room at Colony.

Generator Set

Wherever Generator sets are required due to power failure at Port Jetty and colony, AXEN (Electrical), JE (Electrical) shall be contacted who shall immediately arrange to provide the DG set already procured & available with Electrical section, giving preference to the operational area. However COM (OOT) shall be free to hire additionally required DG sets for a suitable period, if the same is not found adequate available in store.

AXEN (E), JE (Elect.) shall prepare a roster of staff of Electrical section for putting the D.G. sets installed & commissioned at the following destinations in operation and attending faults, if any occurs, during the operation of Action Plan and ensure readiness for meeting with emergency situation in case of power failure. Diesel oil drums, connecting cables with lugs etc. and any other such materials are to be kept readily available/accessible for use.

1. Jetty
2. Colony
3. Guest House
4. Health Center
5. Water supply complex at colony

Provision of sufficient emergency spares and cables, terminals, portable lights (Handle torch, emergency lights), tools, tackles, etc. should be ensured well in advance in planned manner to combat the situation. All precautionary measures should be taken to protect the D.G. sets from detrimental effect of thunderstorm, heavy rain showers and such cyclonic conditions. Sufficient stock of waterproof spread sheets, tarpaulins, canvas, etc. to protect the electrical gear from water showers/moistures, etc. should be planned, procured and kept at easily accessible place for instant use.

Power supply staff should be well equipped with jigs and fixtures, such as portable tower ladders, insulated axe, gumboots, hand gloves, shockproof accessories. All the above urgent items should be got procured & kept readily available, well in advance in association with Assistant Executive Engineer (Mech), to cater for emergent situations. XEN (E&M) shall take advance action for procurement of one No. DeWatering Pump (Diesel Driven) and the same should be kept stand-by along with its suction & discharge hoses connected for use

Vehicle Pool

As soon as the Action plan comes into force, the vehicle pool shall be formed and vehicles as allocated as per ([List of Vehicles available with Chief Operations Manager \(OOT\) Vadinar](#)) shall remain stationed at the said places along with operating staff. The pool shall be controlled by Assistant Executive Engineer (M) / AXEN (E) to be assisted by Junior Engineer (Mech) / (Elect), and following staff will render their services for posting of drivers and allocating of vehicles as per ([List of Vehicles available with Chief Operations Manager \(OOT\) Vadinar](#))

Apart from the above, XEN (E&M) / XEN (Civil-II), shall hire vehicles, if needed for emergency work, from the private vehicle contractors. The list of private vehicles contractors is shown as Annexure – VII. Assistant Executive Engineer (M) / AXEN (E) should ensure the availability of drivers and vehicles and submit compliance report to the COM (OOT). All hired vehicles should be stationed at the location as decided by XEN (E&M) / AXEN (M), from where it can be taken for immediate use at the required places.

Temporary Evacuation Centre

The temporary evacuation center shall be looked after by XEN (Civil-II) and Assistant Executive Engineer (Civil) who will be assisted by the Principal of St. Ann's School & his staff and the following KPT staff members assisted by the volunteer's employees as mentioned in the Annexure-III, for setting up temporary evacuation centers and rendering required services for the same. They shall ensure that temporary evacuation centers are established immediately, in the school and staff club of Vadinar Port colony. Port vehicles such as Trucks, Buses, Ambulances, etc. will be put into operation for immediate evacuation of people from Port Jetty as well as colony, as the need be.

1. Sr. Clerk
2. Assistant
3. Junior Clerk
4. Junior Engineer (Civil)
5. Junior Engineer (Civil)
6. Junior Engineer (Civil)
7. Junior Engineer (Civil)

Assistant Engineer (Water Supply sub division, Vadinar) shall ensure for providing adequate quantity of water supply at all the temporary evacuation centers.

Medical Officer (O.O.T) with the help of internees and staff of Health Centre shall ensure to provide necessary medicines / medical assistance to affected persons and ensure about the hygienic conditions at the temporary evacuation centers.

XEN(Civil-II) being Officer-in-Charge of Temporary Evacuation Centre, with the assistance of following staff members and volunteers employees mentioned in the Annexure-III, shall take care of the requirements of food/water etc. and supply the same for the evacuees in the temporary evacuation centers.

1. Senior Clerk.
2. Electrician.
3. Junior Clerk.

4. Lascar.
5. Chowkidar.

The Officer-in-charge of C.I.S.F. Unit of O.O.T. Vadinar and SI(W/W) should arrange to make announcements regarding cyclone warnings with the co-ordination of local police, by vehicles mounted with public address systems and also should arrange for requisitioning and providing trucks for shifting peoples, as soon as Internal Action Plan comes in action.

Spray of Dis-infecticides / BHC powder etc will be looked after by Assistant Engineer (Civil) Building Sub. Division along with staff of Estate office i.e. Jr. Engineers and other staff.

19.13 Press & Media Management

There will be a Press cell headed by C.O.M. (OOT). The following officers/employees shall remain in the Press cell.

1	XEN (M&E), as Officer-in-Charge
2	PA to COM
	Signalman

The press cell shall come into operation in the chamber of COM (OOT). The press cell shall issue daily press note with the knowledge and approval of Chairman / Dy. Chairman. If needed, a photographer be engaged, who will take photograph / video shooting everyday, which will depict the situation as well as the relief work undertaken by the officers. All media people of press, journalist etc. shall be taken care of by XEN (Civil-II).

As regards to their transportation, lodging / boarding and other hospitality, he shall take required advance amount from Accounts Officer (O.O.T.) and submit the bills thereof subsequently. Accounts Officer (O.O.T.) along with Superintendent of Accounts / D.A. will be the custodian of cash drawn and kept in their custody for the disbursement for various emergency payments to the designated Officers and the record of such advances to such individual Officers.

XEN (Civil-II), Vadinar and Pilot posted at Vadinar, shall remain present in all KPT meetings relating to the Action Plan. XEN (Civil-II) and Pilot in-charge shall remain in touch with State Governments / District Authority and Mutual aid scheme members, on daily basis, for sorting out the difficulty / problems of cyclone/calamity relief work in consultation with COM (OOT).

19.14 Action to be taken by Accounts Officer (OOT)

As soon as the Cyclonic Weather warning Signal No. 5 is declared, Accounts Officer (OOT) shall arrange for the cash amount to be disbursed as advances to various officers. All Officers-in-charge, should make a judicious assessment regarding requirement of funds by them to meet with different exigencies which they may have to handle on account of the situation arises due to Cyclone / natural calamity. A.O. (OOT) in turn, would examine the advances sought by the officers and disburse the advances immediately without delay and intimate C.O.M (OOT) and F.A & C.A.O about amount released by him and obtain sanction thereof.

19.15 Advance Planning

19.15.1 For stocking required equipments / machinery / material & medicines

Assistant Engineer (Civil) in association with Store Keeper, should ensure the advance stocking of Diesel, Petrol, Kerosene, Lubricant Oil, Emergency lights as well as Torches & Cell, required tools & tackles, jigs and fixtures etc. in sufficient quantity to meet with the emergency requirements of Vehicles, Generators as stipulated under action at Sr. No.8 & 10 above and all such other services. All the Officers-in-Charge, must list out the materials required well in advance, to facilitate procurement & stocking in, sufficient quantity of the same by Assistant Engineer

(Civil).

19.15.2 For securing of ships / crafts / tugs etc

A safe place to secure ships/crafts/tugs etc. on issuance of Cyclone Signal No. 5, should be decided & notified well in advance (By April end) by XEN (E&M), in association with both Assistant Flotilla Supervisors. The sequences of operations for shifting of all crafts shall be planned in advance by all the Masters along with related Marine staff, under the guidance & instructions of above officials.

19.15.3 Post Calamity Operations

19.15.3.1.1 Marine Operations

Immediately after the Calamity subsides, Marine Engineers Grade-II along with both the Assistant Flotilla Supervisors & related Marine staff shall carry out the inspection of all the Floating Crafts and check if the crafts can be put into operation for checking the condition of SBMs and hoses. Accordingly, a report to that effect, shall be submitted by both Marine Engineers Grade-II, to the Control Room at Vadinar, who in turn, after taking approval of C.O.M., will transmit the same to the Dy. Chairman/Chairman at Gandhidham/Kandla. C.O.M. shall co-ordinate with officials of M/s. IOC/Essar Vadinar, for their all Okey reports or otherwise, as regard to SBMs/Product Berth, Pipelines and their clearance for resumption of shipping operation & project works at Vadinar.

19.15.3.1.2 Other than Marine Operations

XEN (Civil-II), after taking the stock of situations, arrange for all relief/restoration measures for the damages caused during the Calamity. An advance planning of work-force (Work team/Volunteers by name), list of materials required and the arrangement of effecting the relief/restoration, shall be checked out & notified to all the connected persons in this operations.

For coping up with the immediate restoration work in Post-calamity period, an advance approval of Chairman, KPT, shall be obtained by XEN (Civil-II) by processing the case file, for authorizing the Chief Operations Manager (OOT) to engage Daily rated labour of various discipline in Un-Skilled, Semi-Skilled and Skilled category, at the fixed daily wage for each category personnel.

Further, to hire equipments such as Vehicles/Mobile cranes / Dumpers / JCBs / Pay Loaders etc. for immediate relief/restoration work at the required places at Vadinar, XEN (Civil-II) shall also process case file in advance, for obtaining approval of Chairman, KPT, to hire such equipments, for immediate restoration work in PostCalamity period at Vadinar.

19.16 Action Plan – Land Fire Station

In case of any fire, the Control Room shall immediately establish a communication with C.I.S.F., Fire Brigade of M/s. IOCL and M/s. Essar Oil Ltd., Vadinar and immediately summon CISF In-charge of OOT to directly reach the site of the fire along with his Security Personnel & co-ordinate with fire fighters, for cordoning the site of fire and take actions to provide rescue and containment of fire.

CISF In-charge of KPT (OOT) Dept., Vadinar should keep informing the Control Room and C.O.M (OOT) from time to time about the gravity of situation and extent of control over the situation.

19.16.1 List of all the officers in charge & designated officers & employees covered

Sr. No.	Name & Designation	Tele. No. at Office	Tele. No. Residence
1.	C.O.M.	0288-2573001 0288-2573031 FAX	
2.	, XEN(M&E)	0288-2573005	
3.			
4.	XEN(Civil)	0288-257006	
5.	AXEN(E)	0288-2573011	
6.	Shri NAYAK, M.E. Gr.II	0288-2573007	
7.	A.O.(OOT)	0288-257008	
8.	Dr Medical Officer.	256313 (Vadinar)	
9.	AXEN (Civil)		
10.	A.E.©		
11.	A.E.©		-----
12.	Shri A.XEN.(Mech)		2915231 (Jamnagar)
13.	PA to COM		
14.	O.Supt.		256483 (Vadinar)

15.	Supdt. A/cs.		
16.	(Store Keeper)		
17.	A.F.S.		256517 (Vadinar)
18.	, AFS		256817 (Vadinar)
19.	Signalman		
20.			
21.	Signalman		
22.	Signalman		
23.	J.E.©		
24.	J.E. © Gr-1.		
25.	J.E.©		
26.	KPT Guest House at colony.		
27.	Shed Master		
28.	Assistant, KPT Liaison office at Jamnagar		
29.	Time Keeper		
30.	(Clerkcum-Time keeper).		
31.	, Maistry		

19.16.2 List of Press Reporters & News Services at Jamnagar

Sr.No	News Service	Name and address	Telephone nos.
01	District Information Officer, Jamnagar.	Shri K. A. Karamata, District Information Center, Jamnagar.	2556827 2672939
02	Times of India, PTI	Shri Darshan Thakar, Journalist society, Jamnagar	2555731 9824232632
03	Indian Express, Jansatta & Financial Express	Shri Bipin Sukhpariya Limda lane, Jamnagar	2553717
04	Phulchaab	Shri Dinesh Vora, Nr. Old Railway station, Jamnagar	2550320
05	Sandesh	Smt. Bhavnaben Soni, Opp. Apsara Talkies, Jamnagar	2553106 9825280456
06	Jay Hind	Shri Bharatbhai Raval, Nr. Old Railway station, Jamnagar	2557447
07	Sanj Samachar	Shri Mukeshbhai Joiser, Near Old Rly. Station, Jamnagar	2554109 9824219999
08	Bhoomi	Shri Dolarbhai Raval, Limda lane, Jamnagar	2679080
09	Nobat	Shri Pradeep Madhwani, Pancheshwar tower road, Jamnagar	2555924 2670924 2553752 (Fax)

10	Gujarat Samachar	Shri Vipul Hindocha Opp. Madras hotel, Teen batti Jamnagar	2670634
11	Ajkal	Shri Praful Tankaria, City Point, Near Town Hall, Jamnagar	2665602 2665603
12	Lokvat	Shri Jay C. Chauhan, New Super Market, Jamnagar	3092114
13	Sahara Samay	Shri Darshan Thakar, Journalist Society, Jamnagar	2555731
14.	Divya Bhaskar	Shri Mukesh Joiser, Near Old Rly. station, Jamnagar	9824219999

19.16.3 List of School & Buildings available at Vadinar for Shelter purpose

1. St. Ann's School, Vadinar Port colony Telephone No. 256568 / 256514
2. Staff club, Vadinar Port Colony.

19.16.4 List of volunteers employees at Vadinar (Dist Jamnagar) To be formed by COM

19.16.5 List of Vehicles available with Chief Operations Manager (OOT) Vadinar : To be arranged by XEN (M&E) as per availability

Name of Driver (Motor) & their Residence Telephone No : To be arranged by XEN (M&E) as per availability

19.16.6 Names of local contractors working at OOT Vadinar

1. Rajlaxmi Construction, P.O. Vadinar. Phone No. 02833-256789/256505 - Contact person: Shri C.R. Jadeja.
2. Shree Shakti Construction, P.O. Meghpar (Padana) Ph. No. 246314 / 246411 Contact Person: Shri Pradumansinh G. Zala.
3. M/s Jai Chamunda Enterprises, Vadinar 361010 Contact person: Ranmal Vira, Ph. No. 02833-256719
4. Shri Kama Mala, Vadinar 361010.
5. Shri M. B. Jadeja, Vadinar 361010.
6. Shri Ganesh Construction, Village-Kajurda, Tal. Khambhalia Contact person: Shri Kherajbhai
7. Shri Hira Punja Rathod, Vadinar 361010
8. M/s. Shiraji Construction, Vadinar.
9. Shree Ashapura & Co Vadinar 361010 Ph No. 02833-256711
10. M/s. Bariya & Co., Near KPT colony, Vadinar.


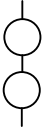
19.16.7 Important Telephone Nos of IMD <http://www.imdahm.gov.in/index.html>


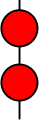
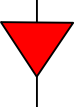
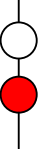
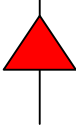

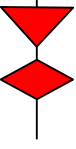

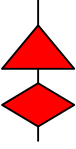
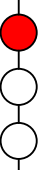
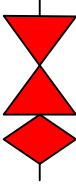

19.16.8 List of Vehicle Hire / Transport Travel Contractors at Jamnagar

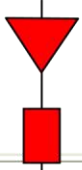
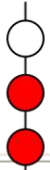
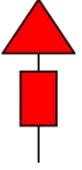
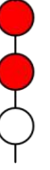
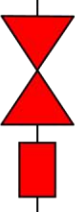



Sr.No	Name and address of Transport / traveler	Telephone
1	Pavan Travels, Pancheshwar tower, Jamnagar	2552002
2	Patel Travels, Pancheshwar tower. Jamnagar	2552419 /



		2660243
3	Ashwamegh Travels, Jamnagar	2670613
4	Sheenath Travels, Jamnagar	2663315 / 2662215
5	Royal Travels, Opp. Town Hall, Jamnagar	2553333 / 2553636
6	Pruthvi Travels, Sikka Patia, SIKKA (Jamnagar.)	244466
7	Shree Divya Travels, Jamnagar	2677601
8	Payal Travels, Jamnagar	2551514 / 2551415
9	Gujarat Travels, Jamnagar	2664315
10	Abhishek Travels, Jamnagar	2564380
11	Shiv Shakti Travels, Jamnagar	2566611
12	Sapan Travels, Jamnagar	2558558
13	Tulshi Travels, Jamnagar	2541054
14	Samay Travels, Jamnagar	2551925

19.16.9 Chart of Weather Warnings

Signal No.	Symbol Day	Symbol Night	Type of Warning	Description
I			Cautionary	There is a region of squally weather in which a storm may be forming.

II			Warning	A storm has formed.
III			Cautionary	Port is threatened by squally weather.
IV			Warning	The Port is threatened by storm, but it does not appear that the danger is as yet sufficiently great justifying extreme measures of precautions.
V			Danger	The Port will experience severe weather from a storm of slight or moderate intensity that is expected to cross the coast to the south of the port.
VI			Danger	The Port will experience severe weather from a storm of slight or moderate intensity that is expected to cross the coast to the north of the port.
VII			Danger	The Port will experience severe weather from a storm of slight or moderate intensity that is expected to cross over or near to the port.

VIII			Great danger	The Port will experience severe weather from a storm of great intensity that is expected to cross to the south of the port.
IX			Great danger	The Port will experience severe weather from a storm of great intensity that is expected to cross the coast to the north of the port.
X			Great danger	The Port will experience severe weather from a storm of great intensity that is expected to cross over or near to the port.
XI			Failure of communication	Failure of Communication with Meteorological head quarters has broken down and the local officer considers that there is danger of bad weather.

 Red Light,
 White Light

19.17 Vadinar Oil Terminal Limited (VOTL) of Essar

19.17.1 Facility Description

Vadinar Oil Terminal Limited (VOTL) is a wholly owned subsidiary of Essar Shipping & Logistics (ESLL) with a focus on investment in crude and product terminals. VOTL has set up a 32 Million tone terminal with crude reception and crude and product storage facility at Vadinar, Gujarat, India.

The VOTL facilities serve the following functions:

- Receiving crude oil from tankers at an SPM located in the Gulf of Kutch, with transfer of crude oil via pipeline to the VOTL crude storage facility, located within the fence – line of the EOL refinery;

- Receiving product from the refinery into a product tank farm, also located inside the Refinery fence-line for loading into tankers at the marine terminal jetty;
- Receiving seawater from the intake well that is pumped via pipeline to the EOL refinery, and then discharging seawater via the seawater outfall located near the location of the SPM.

The crude oil tank and product tank farms, which are located inside the fence - line of the EOL refinery, while owned by VOTL, are actually operated and maintained by the Refinery, and were not covered by this HAZID or the ERA. (These tanks farms have been risk assessed separately).

The areas where the Marine Terminal and the SPM are located in the Gulf of Kutch are part of a designated and controlled marine park and represent a sensitive marine environment. The on-land pipelines pass through low lying areas which consist of some farming land and are adjacent to several villages.

The VOTL marine terminal facility consists of the following systems for supporting the aforementioned functions:

- A Single Point Mooring (SPM) and Subsea Line for loading crude:

The SPM buoy is the gateway for crude oil input to the EOL refinery. The SPM is anchored to the seabed in the Gulf of Kutch, in around 35 m of water. Tankers are secured to the buoy via mooring hawsers. The tanker is held off the SPM by a pull-back tug. The offloaded crude oil is pumped by the crude tanker pumps through the floating hose(s), through the SPM, and then via flexible catenary hoses into the 48" rigid subsea pipeline, through a PLEM and then flows directly to the crude oil tank farm located within the EOL refinery. The SPM is located roughly 4Km from the Marine Terminal and 8Km from the crude oil pipeline landfall.

- Seawater Intake Unit and Outfall system:

Seawater is pumped from the seawater intake facility (located at pathfinder Creek, adjacent to the jetty) and delivered to meet the water needs of the refinery. Seawater flows through two filter packages in the seawater intake well and is then pumped to a seawater storage reservoir located in the Refinery via a 48" GRP pipeline. Chlorine is added to the seawater downstream of the pumps at the intake facility for prevention of marine growth in the pipeline and the Refinery seawater reservoir.

The seawater outfall dispose of waste brine (high salinity water) generated from different Refinery units through a diffuser located on the seabed close to the location of SPM. The seawater outfall flow is pumped from a seawater return reservoir at the Refinery through an on-land 48" GRP pipeline and then via an 8Km subsea pipeline.

- A jetty including three (3) Loading Arms:

The jetty is located at the inlet to pathfinder Creek, and is situated between two coral reefs which are part of a declared "Marine National Park". The jetty is used for shipping of refined white and black products to vessels. The jetty is connected with the refinery through 3 x 32" diameter pipelines which bifurcate into 7 x 24" lines on the trestle and finally culminate into three (3) loading arms. Each of the 7 x 24" lines are allocated to each of the seven (7) products handled at the jetty, namely: ATF (aviation turbine fuel), kerosene, MS 87 (motor spirit), MS 95 (motor spirit), naphtha, diesel and VGO / FO (vacuum gas oil and fuel oil). Tanker at the jetty is located via pipelines connected through three sets of loading arms with Quick Connector Disconnecting Coupling.

- A pig station with three (3) Pig Receivers / Launchers and Terminal Area Slop Tank:

Pigging is carried out for clearing any previous pipeline content, separation of cargoes, cleaning inside pipeline coating and assessing any leak- buckle or damage- deformation in the internal section of pipelines (intelligent pigging). Products for export are pumped from the refinery to the jetty through 3 x 32" diameter cross- country pipelines. There are two (2) pipelines for white products (naphtha, MS, ATF, Kerosene, and diesel), and other is for black products (VGO / FO). To enable the flexibility of these pipelines to carry different products, pigging is carried out between the Refinery and the Marine Terminal Pigging station, where each line has its own pig receiving and launching facilities (total of 3 pig receivers / Launchers).

A slop tank is also provided for the pig stations to contain / collect liquid product drained from the pig station, and it is also used for transfer of products drained into the jetty Slop Tank (which are transferred by pump). Products drained into the slop tank are removed as required by an educator truck and taken back to the EOL Refinery where they are reprocessed.

- Pipelines between Terminal and Refinery (including crude oil and seawater lines) include the following:
 - 3x 32" diameter cross- country pipelines (two (2) pipelines for white products, and one for black products) between refinery and marine terminal (around 18 km in length)
 - Crude oil pipeline (48") between refinery and landfall (13 Km), and then a further 8Km of 48" subsea pipeline to the PLEM on the seabed below the SPM
 - Seawater intake (48") between marine terminal and refinery (17Km), and seawater outfall (48") between refinery and landfall (13 Km) plus 8Km of subsea line to the outfall diffuser.

All pipelines are buried on land within an earthen berm. Steel lines are wrapped and cathodic protected (crude / product lines). The seawater lines are GRP. There are no flanges or connections on crude / product lines on –land (other than at marine terminal for product), and only air vents are provided along the seawater lines. The subsea crude oil pipeline is concrete encased, with the only flanges at the point of landfall and at the subsea PLEM.

- Buildings including the Main Terminal Control Building (MTCB) and two substations (main substation located near the seawater intake station, and jetty substation).

The response strategy for the VOTL plan has been developed taking into account the spill risks, and possible sources of spillage associated with Marine Terminal operations including those at the SPM and Jetty berths and facilities within the Port.

The geographical area of operations is bound by, but not limited to, one mile either side of the line joining following coordinates.

SPM	:	690 39' 35'' E
		220 30' 14''N
LFP	:	690 43' 26''E
		220 27' 59''N
Berth B (North End)	:	690 40' 10.26''E
		220 27' 15.25''N
Berth A (South End)	:	690 40' 11''E
		220 26' 54''N
Sea Water Intake	:	690 40' 32''E
		220 26' 11'' N

19.17.2 Oil Spill Risks

19.17.2.1 Identification of activities and risks

Oil spills will be categorized in accordance with the internationally recognized three tier classification system

Tier One	100 - 700 T
Operational spillages which can be dealt with using the resources immediately available	
Tier Two	700 – 10000 T
Medium size spillages which exceed VOTL resources and which require District and/or Regional assistance	
Tier Three	10000 > T
Large spillages which exceed the full resources of the District/Region and which may require National assistance and/or the implementation of the NOS - DCP	

19.17.2.2 Types of Oil likely to be spilled

No.	Oil Type	Strategy Figure	Specific Gravity	Genre	Characteristics	Examples
1	Light Oil	5.1	< 0.84	White oils	Non-persistent, Volatile	Aviation fuel, Kerosene, Motor spirit, Naphtha, HSD
2	Crude Oil	5.2	> 0.84	Black oils	Persistent, Viscous, Emulsion. Fresh oil amenable to dispersants	Arabian Light, Arabian Heavy, etc.
3	Heavy Oil	5.3	> 0.95	Black oils	Persistent, Viscous, Emulsion. Generally not amenable to dispersants	Fuel Oils, LSWR

Probable fate of spilled Oil

19.17.3 Preliminary Assessment

The ICG Coordinator will make a preliminary assessment of the incident by contacting the person reporting the spill, governmental officials, and the responsible party.

- Evaluating the magnitude and impact of the discharge or threat of discharge on the public health, welfare, and the environment;
- Determining in which jurisdiction the incident occurred;
- Determining or confirming the responsible party;
- Determining or confirming the source of the spill;
- Determining whether the spill has been stopped or is ongoing, and if ongoing, how quickly it can be controlled;
- Assessing the need for state assistance; and
- Assessing the feasibility of removal and determining the equipment needed to remove the oil.

19.17.4 Containment & Control

Clean-up actions must begin as soon as possible to minimize the effect on natural and economic resources. These actions may include locating the source of the discharge and preventing any further spillage, placement of containment boom to control the spread of oil and to protect sensitive areas, measuring and sampling, physical removal of the oil from water and land, the use of chemicals to herd or disperse the oil, and in situ burning.

19.17.5 Development of Oil Spill scenarios

VOTL is operating 02 Nos. Berths (A & B) for product evacuation & 01 No SPM for crude intake.

The VOTL is capable of accepting vessels ranging from 25000 to 100,000 DWT each at berth A & B and Vessels ranging from 87,000 to 325,000 DWT at SPM.

The Marine Terminal is located within an area which has been declared as a Marine National Park / Marine Sanctuary.

The mean tidal range is approximate 6 meters and current speed in excess of 2 knots may be experienced alongside jetty.

19.17.6 Port Operations

19.17.6.1 Pilotage

Pilotage is compulsory for all vessels. Pilotage and auxiliary support craft services are provided by Kandla Port Trust (KTP).

19.17.6.2 Main Approach Channel

The least depth in the main approach channel to the tanker jetty is 13 meters; the maximum acceptable draft alongside jetty berths is 15 meters. A minimum under keel clearance of 6% of vessel's maximum sea going draft plus 0.60 meters is applied to all vessels under way.

While the risk of grounding is low, it cannot be wholly eliminated. The most likely cause is steering or propulsion system failure which could result in grounding on the channel margins with consequent damage to the bottom and/of the mid body plating. The potential spill quantities depend upon the size / type of tanker and the area of impact damage.

The vessels calling the product terminal, in bound and out bound will be escorted by minimum two tugs in fair weather condition. This considerably reduces the risk of the vessel running aground in the channel.

19.17.6.3 Approach to SPM Berth

Tankers bound for SPM will follow the deep water route. Berthing and un-berthing of the Tankers on the SPM will be done by KPT Pilots. Charted depth at SPM location is 34.5 meters. Grounding of Tankers in the SPM area is considered as very remote.

19.17.7 Oil Spill scenarios

19.17.7.1 Collision between Vessels Underway

The control which will be imposed on ship movements within terminal are designed to ensure that any risk or collision is minimized. For example, inward / outward bound ships will have sole occupancy of the approach channel to the jetty berth; additionally all departing vessels will remain under Pilotage up to the western limit of the terminal area. It is thus considered that the likelihood of collision between vessels underway within the terminal is remote. There is perhaps a greater risk of collision between vessels maneuvering to the SPM and the jetty anchorage position without Pilotage assistance.

19.17.7.2 Berthing incident (Jetty)

Oil spills can occur as a result of hull contact with the corners of breasting dolphins during ship berthing or un-berthing maneuvers. Such incidents are generally due to failure of a vessel's main propulsion or steering systems, loss of control onboard an attendant tug or pilot error or misjudgment. The potential spill quantities involved depend on the vessel type and the location and extent of the impact damage.

19.17.7.3 Tug impact

There are well documented incidents where cargo or bunker oil has been released as a result of hull impact damage by tugs. This can occur when tugs are approaching a vessel underway prior to berthing, or when coming alongside a moored vessel prior to un-berthing. The potential spill quantities again depend on the location and the extent of the impact.

Adequate fenders shall reduce the level of risk.

19.17.7.4 Cargo Transfer Operations (SPM Berth)

This section considers the potential sources of oil spills during the discharge of crude oil cargoes and is based on oil industry data and ITOPF statistics. It should be noted that the ITOPF statistics demonstrate that most oil spill incidents occur during routine cargo handling operations and that some 91% of these incidents resulted in spillages of less than 7 tones.

19.17.7.5 Connection of Floating Hose String

After the floating hoses have been lifted on board, blank flanges are unbolted from the ends of the hoses prior to connecting them to the ship's presentation flanges. Small spillages frequently occur during the removal of the blank flanges; these are caused by surging of the line contents as the floating hose sections

follow the wave pattern. While in most cases such spillages are contained within the ship's manifold drip tray, there are recorded incidents where oil has escaped overboard via scuppers, which have not been effectively plugged. Spillages of this nature should not exceed 1 m3.

19.17.7.6 Snapping of 24'' diameter Floating Hose

Spillage of crude oil due to snapping of a floating hose, during crude oil unloading operations @ 10000 m3/hr. estimated time taken for response is two minutes. Snapping of hose may occur due to accidental drifting of tanker, collision with SPM, the hose getting entangled due to movement of a tug boat very near to the SPM / Tanker, due to rough weather condition. Theoretically the quantity spilled would be 142 tons. Chances of a full bore snapping of the hose are classified as a rare phenomenon.

19.17.7.7 Sea and Overboard Discharge Valves

Oil can escape to the sea via sea or overboard discharge valves which are directly connected to the cargo pipeline system due to either incorrect line setting or defective valves. The likelihood of this occurring is considerably less on SBT vessels.

19.17.7.8 Slop Tank Overflow

Crude Oil Washing (COW) of cargo tanks will be undertaken during bulk cargo discharge; this operation entails the transfer of tank bottoms and washing oil back to back to the vessel's slop tank(s). The overflow of slop tanks as a result of instrumentation failure or operator error during this process is not uncommon. Checks on the system and operation, pre, during and post COW will considerably lower the associated risk.

19.17.7.9 Vessel Breakout

Other than a sudden and catastrophic failure of the mooring hawser leading to rupture of the floating hose string, it can be reasonably assumed that cargo discharge will have been suspended in weather conditions which approach the established environmental limits. It would also be normal practice to station a crewmember on the forecastle head to maintain a mooring watch. Under most circumstances, therefore, early warning of a potential breakout situation can be anticipated.

In any event, an emergency stop button for the main cargo pumps will be located at the ship's manifold and the deck watch keeper would initiate an ESD immediately the hose string parts.

A vessel breakout and loss of integrity of the floating hose string could result in a spill quantity of some 142 m³. This quantity is based on the following assumptions:

- Bulk flow rate
- Reaction time
- ESD activation time
- Hose contents

In case of undue stresses experienced by the floating hose string, the breakaway couplings will get activated. These are designed to seal both ends on activation.

19.17.7.10 Hull Failure

The incidence of oil pollution due to hull failure is low and some 84% of the incidents attributed to this cause by ITOPF involved spill quantities of less than 7 tones; these spills were caused mainly by minor hull fractures and weld failures. The potential for more serious incidents with spill quantities in excess of 700 tones must, however, be acknowledged.

19.17.7.11 Fire and Explosion

Fires and explosions onboard ship represent a safety hazard with the risk of oil pollution as a secondary impact. All tankers engaged for trading to the SPM facility will be equipped with inert gas systems; gives the control which will be imposed and enforced by VOTL in respect of the oxygen content of cargo tanks, the risk of fire and / or explosion in the cargo spaces must be regarded as minimal.

Strict monitoring and control of the main cargo pump room atmosphere will minimize the fire and explosion risks associated with this space.

Fires resulting from uncontrolled smoking in the accommodation, organization hot work such as welding and engine room fires can spread rapidly if not dealt with swiftly and give rise to incidents of a very serious nature.

While the likelihood of fire or explosion occurring onboard vessels berthed at the SPMs is low, the risk is nevertheless acknowledged. Such an incident could give rise to a spillage of 700 tons or more.

19.17.7.12 Spillages of Fuel Oil

Fuel oil bunkers will not be supplied to tankers moored to the SPM. It may, therefore, be necessary for vessels to undertake the internal transfer of fuel oil for trim or other operational reasons. A bunker tank overflow during such operations could result in spillages of < 1 ton.

Cargo Transfer Operation (Jetty Berth)

19.17.7.13 Ballast Discharge

Only fully SBT (Segregated Ballast Tank) vessels shall be chartered for trading to the Marine terminal; those ships which load refined products will also discharge their segregated ballast water concurrent with the loading operation.

Under fair weather and operational conditions, tankers at SPM will not engage in de-ballasting activity.

On some older designs of SBT tankers, the ballast pipelines pass through the cargo tanks and vice versa, any loss of ballast line integrity can result in the entrainment of cargo oil in the ballast water discharge. Industry records indicate that the spill quantity from this cause on board product carriers should not exceed 25 tones.

19.17.7.14 Loading Arms

The operation of loading arms can lead to minor releases of oil. Common sources are vent valves, swivel joints and hydraulic lines. Loading lines are equipped with PERC (Powered Emergency Release Coupling) and with DDV (Double Disk Valve)

19.17.7.15 Cargo Tank Overflow

Cargo tank overflows can occur on board loading vessels; spills of this nature can be due to instrumentation failure or human error. The spill quantity is a function of the flow rate and also the number of tanks being loaded at the time of the incident. Some of the oil will be retained on deck but in a worst case scenario, some oil could go overboard.

19.17.7.16 Hull Failure - Fire and Explosion

The risks of hull failure - fire and explosion are also similar to those for SPM vessels with the attendant spill quantities being proportional to the tanker size.

19.17.7.17 Effluent Discharges

Treated effluent from the refinery is discharged into the sea area. The discharge consent levels are set and monitored by the State Pollution Control Board and VOTL regularly tests for effluent quality.

Instrumentation malfunction, failure of in-line samplers or operator error can result in the entrainment of oil in the final discharge to harbor waters. Most spillages of this nature are not substantial, and based on industry experience elsewhere, are unlikely to exceed 5m³ in volume.

19.17.7.18 Special Equipment which may be used

- Workboats
- Trucks / cars (four wheel drive)
- Radio transmitter / receivers
- Workshop / repair facilities
- Bulldozers, mechanical scrapers and similar earthmoving equipment
- Vacuum trucks
- Tank trailers
- Life vests
- Explosive meters

19.18 Fire Fighting Facilities at Vadinar Oil Terminal Limited (VOTL) of Essar

19.18.1 Fire water supply pumps at Sea Water Intake

Fire pumps are vertical turbine type as per IS 1710

Dedicated fire pumps are provided for:

1. Fire Tower monitor system
2. Fire Hydrant System (There is no interconnection between two header)

19.18.2 Fire water Pump for Tower Monitor – 4 Nos

- a. Main Motor Driven Pump – 1 No (Discharge capacity 792m³/hr at 15 kg/cm²).
- b. Engine driven – 1 No (Discharge capacity 822m³/hr (standby)).
- c. Jockey Pump (Discharge capacity 33m³/hr at 10.5 kg/cm²).

19.18.3 Fire water Pump for Hydrant System – 4 Nos

- a. Main Motor Driven Pump – 1 No (Discharge capacity 792m³/hr at 15 kg/cm²).
- b. Engine driven – 1 No (Discharge capacity 822m³/hr (standby)).
- c. Jockey Pump (Discharge capacity 33m³/hr at 10.5 kg/cm²).

19.18.4 Fire Hydrant & Jumbo Curtain

Fire Hydrants is located at different section of premises to be protected depending upon nature of fire hazard, fire hydrants are double outlet type.

Each outlet capacity is 900 lpm at 7.5 kg/cm²

The flow rate of hydrant is 1800 lpm at 7.5 kg/cm²

19.18.5 Fire Hydrant Point – 31 Nos

- a. Berth A - 4 Nos
- b. Berth B – 4 Nos
- c. Pig area / cross country / MTCB – 16 Nos
- d. SWI – 03 Nos
- e. Between Berth A & B – 4 Nos

19.18.6 Jumbo Curtain at Berth A

The Jumbo curtains nozzle shall have discharge capacity of 3000 lpm of sea water at 7.5 kg/cm².

Total – 6 Nos of Jumbo Water Curtain

The nozzle shall be able to produce 14 meters. Vertical plane & 20 meters horizontal radius dense water curtain through 160 degree angle – 04Nos at jetty to protect loading arms and – 2 Nos one each at the breasting dolphin to protect tower monitors from the radiant heat in case of fire on tankers.

19.18.7 Jumbo Curtain at Berth B

The Jumbo curtains nozzle shall have discharge capacity of 3000 lpm of sea water at 7.5 kg/cm².

Total – 02 Nos of Jumbo Water Curtain

The nozzle shall be able to produce 13.5 meters. Vertical plane & 22 meters horizontal radius dense water curtain through 180 degree angle – 02Nos at jetty to protect loading arms.

19.18.8 Water / Foam Tower Monitor at Berth A

The monitor shall be suitable for both sea water and foam, each monitor shall be capable of discharging 6000 lpm of sea water and 36000 lpm of expanded foam at 10 Kg.cm² over a range of 100 meters in horizontal direction and 40 meters range in vertical direction. The monitor shall be capable of producing good quality of finished foam.

Horizontal range with water – 100 meters
Horizontal range with foam - 90 meters

The monitor shall be capable of 360 degree rotation in either direction in horizontal plane and 60 degree elevation 70 degree depressions in vertical plane. The monitors shall be achieved by remote control from control room.

Two nos of positive displacement pump have been provided. At a time one pump will be running and other will be acting as stand by. The Capacity of each pump 21.6 m³/hr at 16kg/cm²

19.18.9 Foam Compound Induction

Foam compound induction system is in line with balanced pressure proportioning type to ensure proper mixing of foam concentrate and right proportion and supply the same to the monitor line depending upon the water flow rate necessary automatic valve, spool valve and duplex pressure gauge have been provided to ensure 0 to 6% of foam compound induction.

Induction rate is set at 3% foam compound induction.

19.18.10 Water / Foam Tower Monitor at Berth B

The monitor shall be suitable for both sea water and foam, each monitor shall be capable of discharging 6000 lpm of sea water and 36000 lpm of expanded foam at 7 Kg.cm² over a range of 75 meters in horizontal direction and 35 meters range in vertical direction. The monitor shall be capable of producing good quality of finished foam.

Horizontal range of monitor – 75 meters

The monitor shall be capable of 360 degree rotation in either direction in horizontal plane Elevation – (+) 85 and (-) 45. The monitors shall be achieved by remote control panel near pantry in open area.

19.18.11 Foam supply system at Berth B

Foam supply system shall be operated by manually, located near Foam Tank, Foam supply system located at approximately 50 meters away from Berth B central platform. Since the pipeline will always be under pressure for throwing water / foam through the monitor:

One No foam solution storage tank is provided at south side of berth B with capacity of 16KL.

Foam pumps – 2 Nos (01 No stand by)
Each pump discharge capacity is – 37m³/hr

Two nos of positive displacement pump have been provided. At a time one pump will be running and other will be acting as stand by. The Capacity of each pump 37 m³/hr at 16kg/cm²

19.18.12 Foam Compound Induction

Foam compound induction system is in line with balanced pressure proportioning type to ensure proper mixing of foam concentrate and right proportion and supply the same to the monitor line depending upon the water flow rate necessary automatic valve, spool valve and duplex pressure gauge have been provided to ensure 0 to 6% of foam compound induction.

Induction rate is set at 3% foam compound induction.

19.18.13 Foam Trolley

Foam trolley is firefighting equipment ready to use initial level in case of fire, oil spillage in dyke.

Foam trolley capacity – 200 liters Discharge capacity – 225 lpm

Total – 8Nos of foam trolley available in field.

- Berth A – 2 Nos
- Berth B – 2 Nos
- Pig Area – 3 Nos
- SWI - 1 No

19.18.14 Ground Fixed Water cum Foam Monitors

Fixed foam monitors are ready for instant use in case of emergency and are able to discharge dense foam from orifice type foam nozzle. The discharge capacity of monitor is 2850 lpm

Monitor having facility to discharge water for cooling purpose, all fixed foam monitors are having 200 liters foam drum ready to use by monitor pick up tube.

Total – 4 Nos

- Pig Area – 2 Nos
- Berth B – 2 Nos

19.18.15 Fire Extinguisher

Portable Fire Extinguishers are the first aid of fire fighting equipments. All fire extinguishers installed in the jetty premises are clearly visible and accessible.

At Berth A

- DCP 75 Kg –4 Nos • DCP 50 Kg –2 Nos • DCP 10 Kg –6 Nos

At Berth B

- DCP 75 Kg –4 Nos
- DCP 10 Kg –6 Nos
- CO2 6.5 Kg –2 Nos

Other jetty area locations are also equipped with fire extinguishers

19.18.16 Innergen Total Flooding System

Innergen Total Flooding System has been designed for protection of MTCB floor underneath cabling and DCS instrument panels. It is automatic fire extinguishing flooding system. The contents of gas are (52% nitrogen gas, 40% argon gas, 8% CO₂ gas)

The system is kept in both auto / manual mode operation. There are 12 Innergen gas cylinders which are pressurized to 200 bar at 20 Degree Centigrade for fire protection system.

Innergen Total Flooding system is divided in five different Zones.

Zone 01 & 02: is instrumentation room, Ground Floor MTCB (There are 6 Nos discharge nozzle of Innergen System)

Zone 3: is panel room right side (There is 1 No discharge nozzle of Innergen System)

Zone 4: is panel room left side (There is 1 No discharge nozzle of Innergen System)

Zone 5: is Battery Room Ground Floor MTCB (There is 1 No discharge nozzle of Innergen System)

The system has been put in manual mode.

19.18.17 Manual Call Point (MCP)

MCPs have been installed in premises in different accessible & visible locations like:

- Berth A
- Pig Station
- Around MTCB Building
- SIW & Berth
- All MCP are indentified with Zebra cross red and yellow

In case of Emergency Alarm to be raised MCP glass should be used.

Total 69 Nos of MCPs are in premises connected to DCS panel. On activation of any one MCP alarm will be blow on DCS

- Berth A – 13 Nos
- Berth B – 6 Nos
- Pig Area – 7 Nos
- MTCB – 6 Nos
- SWI / SS – 12 Nos
- Road / Tresle / KPT – 25 Nos

19.18.18 Smoke Detectors

Smoke detectors have been provided inside building (MTCB) cable cellar room, electrical panel room, instrument panel room.

Due to availability smoke particles detector will get activated. Fed Red Becon & hooter will start and on DCS alarm will be sounded repeatedly.

Total No of Smoke Detectors – 68 Nos

19.18.19 Fixed Gas Detectors

Fixed gas detectors have been installed in the jetty premises where most critical hazardous zone is identified.

Fixed hydrocarbon detector detects the hydrocarbon vapours available in the atmosphere and it gives pre explosion alarm. The alarm is set at 10% of LEL.

Total No of Gas detectors – 25 Nos

- Berth A – 6 Nos
- Berth B – 6 Nos
- Pig Area – 5 Nos
- SWI / (H₂) / MTCB – 8 Nos

19.18.20 Life Saving Appliances

1. Life Buoy Ring – Life buoy ring with 30 meters 8 Inch Nylon rope have been installed in entire jetty premises. Total No of Life Buoy – 29 Nos
2. Life Work Vest – Life work vest have been installed in emergency almirah at berth A and Berth B and also installed at central platform of berth and SWI. Total No of Life Work Vest – 18 Nos
3. Life Jacket – Life jacket is available with the terminal whenever persons go to the SPM / Sea shore side life jacket has to be worn. Total No of Life jacket – 12 Nos

19.18.21 Emergency Escape Breathing Device (EEBD)

Emergency Escape Breathing Device is used to escape from place where emergency arises and it is difficult to reach a muster point / safe place, same shall be used in such emergency.

EEBD is ready to use for 15 minutes to see the person can be reached to safest place with normal breath.

Total Nos of EEBD – 5 Nos

- Berth A – 1 No
- Berth B – 1 No
- Pig Area – 1 No
- SWI – 1 No
- Store – 1 No

19.18.22 Breathing Apparatus Set (BA Set)

B A set is to be used in such emergency where it is difficult to breath during rescue operation. Fire Fighting, Toxic gas release, and Flammable gas in atmosphere.

B A set has been installed in jetty premises where it is most hazardous so it can be used immediately whenever necessary.

Total No of B A set – 6 Nos & 2 Nos Spare Air Cylinder

Emergency Almirah Berth A – 2 Nos

- SWI – 2 Nos
- MTCB – 1 No
- Store – 1 No

19.18.23 First Aid Box

First Aid Box is distinctively marked with a red cross on a white background. First aid box is kept in prominent place. Custodians of the first aid boxes are qualified first abiders only.

The names of the first aiders are displayed at the notice board of the control room.

The first aiders are available in each shift.

First aid box available at site – 8 Nos

First box location available in jetty premises and their locations are:

- MTCB – 1 No
- Berth A – 1 No
- Berth B – 2 Nos
- SWI – 1 No
- Security Gate – 1 No
- 70 – 1 – 1 No • 76 – 2 – 1 No

19.18.24 Portable Safety Instrument

1. Area Monitor – Area monitor is available in control room. It is used for continuous monitoring of hydrocarbon vapors in atmosphere. The area monitor lowest alarm is set at 5% of LEL on reaching this range area monitor will be sounding with high volume.

Area monitor is used in hot work area where the most critical hazardous area are identified such as Berth A / Berth B

2. Portable Multi Gas Detector – Multi gas detector is always available in control room and in the field with the fire men. Whenever any hot work permit is issued by SIC, Safety team checks the area and residual hazardous of concerned location and ensures that no hydrocarbon vapor is in the atmosphere. Stand by fire man continuously monitors and makes sure that the LEL always is 0%.
3. Chlorine Meter – The device is widely used for check the work environment before entering the chlorination room / area.
4. H₂S Meter – Very useful device for working crew for confined space work. I.e. Vessel, Tank & nearby hazardous area for continuous monitoring work environment.
5. Oxygen Resuscitator – It is a medical equipment and to give oxygen to casualty by trained person.

19.18.25 Chlorination System at SWI

Chlorine gas is most toxic and corrosive gas. In case of leak and in coming in contact with the skin irritation starts, inhalation is most dangerous if more than 15ppm it will be IDLH (Immediate Danger Life & Health)

Chlorine tonners have been laid down at chlorination system for chlorine injection in sea water line which is going to refinery.

3 Nos of fixed chlorine detectors have been provided at three different locations.

1 No Caustic Soda Tank capacity 8000 Liters with blower and hood

Hood provided on running cylinder, the detector laid would sense 0.5ppm in case of a leak. The blower starts automatically.

Chlorine containment kit & 2 Nos BA set is available in the SWI store.

19.18.26 Chlorine Kit

It is used for containment of chlorine gas in case chlorine leakage from the tonner valve assembly, plug or from body.

Work Permit System

Any routine work, testing of equipment, inspection, schedule maintenance, concern has to take work permit for particular job. SIC will make sure that before issuing work permit receiver must have completed TBRA & TBEA and also tool box talk.

- Hot work permit
- Cold work permit
- Electrical Isolation & restoration
- Confined space entry permit
- Vehicle entry check sheet
- Photography permit check sheet
- Isolation of fire fighting network
- Radiography check sheet.

19.19 Off Shore DMP of Indian Oil Corporation (Vadinar)

19.19.1 Introduction of Facility

Indian Oil Corporation (IOC) Ltd (Pipelines Division) owns and operates two offshore oil terminals in the Gulf of Kutch at Vadinar. The terminals are intended to handle the combined throughput requirement of its three refineries at Koyali, Mathura and Panipat. The oil terminal facilities comprise of two nos. Single Point Mooring (SPM) systems for moorings of tankers, off-shore /on-shore pipelines, the shore terminal comprising of 13 nos. of floating roof tanks with the total storage capacity of about one million tone and originating pumping station through which crude is pumped to the refineries at Koyali, Mathura and Panipat through the Salaya -Viramgam, Viramgam - Koyali, Viramgam-Chaksu, Chaksu-Mathura and Chaksu-Panipat pipeline system.

The offshore oil facilities are connected to the shore tanks by means of 1067 mm (42") dia. submarine pipeline of about 5.3 KM for SPM-I and 6.3 Km for SPM-II followed by twin 1067 mm (42") dia. onshore pipelines of 5.7 KM length each. Another 2.1 Km loop line of 1067 mm (42") dia. is also laid to interconnect the Pipe Line End Manifolds (PLEM) of both SPMs to facilitate shore based pigging operation of both offshore and onshore pipeline. A sketch showing the above is enclosed as Annexure-I. For operational flexibility, sub-sea isolation valves are provided at suitable locations. The tankers berthed at SPMs discharge the crude oil through two strings of floating hoses connected between the tanker manifold and SPMs, and two strings of submarine hoses connected between SPMs and the PLEM located at the end of the submarine pipeline at the seabed.

This off shore oil terminal in Gulf of Kutch near Vadinar together with its cross-country pipeline system to the refineries can be termed as a vital energy artery of the Western Region catering to the energy requirement of the entire Northwest region of the country.

19.19.2 Location of the SPM Terminal

The SPM facilities are situated within the territorial water of DEENDAYAL PORT TRUST(KPT). SPM-I is situated at Latitude 20o 30' 34" N and Longitude 69o 42' 04" E and SPM-II is situated at Latitude 22o 30' 14.36" N and longitude 69o 40' 53.60" E.

The drafts available at SPMs are 34.9 meters and 32.5 meters for SPM-I & SPM-II respectively. The KPT provides the infra structure as well as Pilotage facility for operating this terminal. The entry channel of approximately 126 km (70 Nautical miles) in the Gulf of Kutch is identified for the navigation of vessels by KPT.

A zone of 3.6 Km (2 nautical miles) around each SPM has been declared as the "No Anchorage Zone" and no vessel is allowed to anchor in this area to prevent fouling of their anchors with our SPM anchor chains or sub-sea hoses and the pipeline.

Hardware Details of SPM System at Vadinar

Sr No	Parameters	SPM - 1	SPM - 1
1	Capacity of Tankers to be handled	3,00,000 DWT	3,15,000 DWT
2	Mean Sea Level	34.9 MTR	32.5 MTR
3	Geographical Co - ordinates	LAT: 20° 30' 34 " N LONG: 69° 42' 04 " E	LAT: 22° 30' 14.36 " N LONG: 69° 40' 53.6 " E
4	Year of Commissioning	August - 1978	March - 1997
5	Off - Shore Line	5.3 KM	6.3 KM
	Loop Line Between SPM-I & SPM-II Is 2.1 Kms		
Hose Configuration			
(A) Floating Hose			
1	24" X 40' Half Float Hose	01 No in each String	01 No in each String
2	24" X 40' Decreasing Stiffness Hose	01 No in each String	01 No in each String
3	24" X 40' Standard Full Float Hose	21 Nos in STBD String & 22 Nos in Port String	20 Nos in STBD String & 21 Nos in Port String
4	Metallic Reducer	01 No in each String	01 No in each String
5	20" X 40' Full Float Hose	01 No in each String	01 No in each String
6	20"-16" X 40' Tapered Hose	01 No in each String	01 No in each String
7	16" X 35' Full Float Hose	02 Nos in each String	02 Nos in each String
8	16" X 30' Tanker Rail Hose	01 No in each String	01 No in each String

	Total Length in Meters in each string	Port STR: 331.83 STBD STR: 324.11	Port STR: 336.32 STBD STR: 324.13
(B) Submarine Hoses			
1	20" X 40' Carcass Double Submarine Hose	-----	04 Nos in each String
2	20" X 37.5' Carcass Double Submarine Hose	04 Nos in each String	-----
3	20" X 35' Carcass Double Submarine Hose	04 Nos in each String	04 Nos in each String
	Total Length in Meters in each String	OFF.SH : 44.20 ON. SH : 44.20	OFF.SH : 45.72 ON. SH : 45.72
	Type of Plem Valve Actuator	Rotary Vane	Spring Loaded

19.19.3 Tanker Operation

Tankers can be unloaded simultaneously from both the SPMs and any one SPM. The details of tanker operation are described below:

Pilots of KPT bring the tanker near SPM. There are two strings of floating hoses of 610 mm (24") dia for each SPM which are lifted by the crane of the tanker for connecting to tanker manifold. When the tankers are not there, these floating hoses are floating on sea and at the ends of the strings, butterfly valves are used to close/ blind the line and additionally blinds are fitted to avoid spillage of oil. Once the floating hose strings are connected to the tanker, the system is ready for discharge of cargo through SPM system.

Before commencement of discharge of the tankers, ullaging of the tanker is done and in the meanwhile shore tanks are also aligned and tank valves are operated for receipt of cargo into shore tanks. The inlet and outlet valves of the shore tanks are motor operated and can be closed within five minutes in case of any emergency or after the discharge of the tanker is over. KPT provides the tug for pull back operation to avoid tankers overriding the SPM buoy, under buoy hoses etc. to prevent damage to the buoy and oil pollution.

Further during the operation of the tanker, there is a constant watch on the SPM system and the hoses for any leakage or burst and the operating parameters are kept well within the designed limits besides observing all safety aspects for the safety of the tanker, buoy and its accessories. The work of connecting and disconnecting hoses and repair of lines has been given on contract. During discharge operations technical personnel from following agencies are always available:

- DEENDAYAL PORT TRUST
- IOC Salaya Mathura Pipeline (SMPL), Vadinar.

- M/S Underwater Services, Mumbai
- Crude Oil Tanker

There are isolating valves provided for isolation of the floating strings and under buoy hose strings for use in any emergency arising out of failure of hose or burst of hose during operation to prevent oil loss, pollution and to sustain operation through the other string. Thus by meticulously following the international marine standards of operations and maintenance the entire tanker discharge operation is kept totally spill proof.

Further the entire off-shore facilities are subjected to stringent inspection checks as per Oil Companies International Marine Forum (OCIMF) guidelines and rigorous preventive and schedule maintenance for the upkeep of the facilities/ equipment is done in order to avoid any unforeseen instances of hose burst, leaks or any other eventualities which may result in either small or large scale oil spills in the ocean.

19.19.4 Definition of Oil Spill Management

Accidental and unwanted discharge of crude oil in the sea during the operation of SPM system including accidental spillage, if any, from the oil tankers may be termed as an oil spill resulting into pollution of marine environment.

The oil spill may be minor, intermediate or major in nature depending upon the source and duration of the oil spill.

19.19.5 Oil Spill Classification

Oil spill can be broadly categorized into three categories depending upon the volume and area of oil spill, which has taken place. These three categories of oil spill are generally classified as Tier one, two and three and each Tier will require response strategies to suit its magnitude and manifestations as mentioned below:

TIER ONE

This would be a spill of a magnitude the local resources could respond to, successfully without assistance from other agencies.

TIER TWO

This would be a spill of a magnitude that would outstrip the local resources and would require assistance on a regional basis. This would either come from local/central Government or Local Industries Mutual Aid arrangement.

TIER THREE

This would be a spill of a magnitude that would surpass the capabilities of Tier one and Tier two. Additional resources would be required on a national and international level.

Clearly Tier one and Tier two levels of response equipment and manpower resources are governed by a number of criteria. These criteria are such as location, logistics for national and international assistance, nearby sensitivities and many others.

The following classification has been made as per OISD norms:

Tier Level	Volume
Tier –1	Up to 100 MT
Tier – 2	100 MT – 1000 MT
Tier – 3	More than 1000 MT

19.19.6 Risk Analysis & Causes of Spill

Accidental spill from tankers contribute an estimated 0.4 million tons annually globally. Analysis of tanker spills occurring throughout world shows that the majority occurs in port during routine ship operations such as loading, discharge and bunkering. The most of these spills are, however, relatively small. Over 92% are less than 7 tones and probably in total, contribute less than 20000 ton annually. In comparison, accidents, such as collisions and grounding give rise to less than 10% of oil spills from tankers, but a quarter of these are larger than 700 tons.

19.19.7 Spills Due to Collision

The statistical data shows that as a percentage of the total no. of incident, collision account for 5% of oil spill regardless of the quantity of oil released. The classification based on size of the spill shows more alarming statistics with 29% of all large spills (> 700 tons) being due to a collision. Almost 21% of the sizable spills involving the release of between 7 and 700 tons are due to collisions. Small spills of less than 50 barrel (7 tons) from a collision account for less than 2% of total.

19.19.8 Spills Due to Grounding

A similar analysis of statistical data shows that although as a percentage of the total incidence spills due to grounding are rather small, accounting for only 5.2 %. A different picture emerges when the quantities involved are scrutinized. Large spills of more than 700 tones caused by grounding account for 33% of all releases of that magnitude. Off the sizable spill between 7 - 700 tones about 18 % are a direct result of grounding. The small spills of up to 7 tones are fairly insignificant and are 2.7 % of the total spills in that category.

It is prudent to assume that in any collision or grounding, spill quantity may be more than 700 tones.

19.19.9 Most Likely Spills

The most likely maximum spill can result from a central compartment of a tanker being ruptured at the bottom of the hull releasing most of its contents. Quantities in the order of 7000 tones are therefore more probable due to the release of an assumed 90 % of the contents of a center tank of a typical 175,000 DWT single skin fully laden tanker ruptured due to grounding.

19.19.10 Collision with another Vessel

A collision with another vessel causing a tank to rupture will release only the contents of the tank above the water line. The ensuing spill caused by a gash in the tank resulting from a surface collision will release near about 1750 tones. Therefore the spill quantities in both the above scenarios pertaining to rupture due to collision and a bottom gash resulting from grounding are to be 1750 - 7000 tones when a single tank has been damaged.

19.19.11 Oil Spilled into Sea

Oil spilled into the sea undergoes a number of physical and chemical changes, some of which lead to its disappearances from the sea surface whilst others cause it to persist. The time taken depends primarily upon the physical and chemical characteristics of the oil, as well as the quantity involved, the prevailing climate and sea conditions and whether the oil remains at sea or is washed ashore.

In considering the fate of spilled oil at sea, a distinction is frequently made between nonpersistent oil, which tend to disappear rapidly from the sea surface, and persistent oil, which in contrast, dissipates more slowly and usually requires a clean-up response. Most crude oils and refined residual oils have varying degree of persistent depending upon their physical properties and size of the spill. The main physical properties, which affect the behavior of oil spilled at sea, are specific gravity, distillation characteristics, viscosity and pour point.

19.19.12 Most Small Oil Spills

Most spills will in fact be small, involving less than two tones and will occur mostly when the hose system failed at the terminal. This can usually be dealt with swiftly and efficiently by the terminal operator. Major spills are fortunately considered rare with estimated probabilities between one in 100 years to One in 220 years. In the event of such a large spill at the Gulf of Kutch efforts can be made either to contain and collect the oil using booms and skimmers, or to disperse it using chemical dispersant which are spread either from marine craft using side booms or aircraft (similar to crop spraying).

If oil is washed ashore on a hard sand beach, for instance, it can be quickly and effectively cleared by manual labour with the aid of trucks and bulldozers.

In some cases, bio-degradation method may be applied using bacteria to digest the oil which can halve the time that natural forces would take to achieve the same result. However, natural forces usually degrade any oil, which cannot be cleaned up, and such forces are exceptionally strong at the Gulf of Kutch and the effects of a pollution incident are rarely long term.

19.19.13 Impact of Second SPM at Vadinar

The second SPM was commissioned during March'97 at Vadinar location. Obviously this has an impact on the requirement for pollution preparedness.

It is felt that there will be an increase in the likelihood of a spill rather than the possible volume of oil spill. This position comes from the facts mentioned below:

Increase in vessel traffic.

Doubling of hoses, joints and other possible points of failure and Increases in connections and disconnection of hoses etc.

19.20 Responsibility during Emergency

The basic responsibility of combating oil spill disaster and marine pollution lies with the local port authority within its port jurisdiction and the defaulter companies/ organizations.

19.21 Chief Coordinator (Location Head, WRPL Vadinar)

- a. On getting information of oil spill, he will report to KPT authority and other resource agencies.
- b. He will co-ordinate all activities through Chief Operation Manager and Maintenance Manager (Marine).
- c. He will ensure that appropriate response and techniques are in action to clean up pollutants.
- d. He will ensure that all the resource agencies have been duly reported about incident.
- e. He will apprise Head of WRPL about the incident and actions undertaken.

- f. He will make arrangements for disposal of oil as per the directive of Regional Commander (West).
- g. He will be responsible for the resumption of Operations at SPM terminal.
- h. He will contact IOC (Shipping) and seek assistance required to meet the emergency.

19.22 Roles of IOC in Controlling Oil Spill Disaster

19.22.1 IOC Vadinar

- a. To assist KPT off shore oil terminal, and Coast Guard Vadinar action group, in implementation of local action plan.
- b. To assist KPT, Vadinar and Coast Guard Vadinar in obtaining additional available equipment and chemicals from identified resources if and when required.
- c. To assist in chartering/hiring of tankers to undertake transportation/ transshipment operation if so required by KPT.
- d. To arrange for storage of oil transshipped as above.
- e. To make assessment of the value of the oil transshipped.

19.22.2 IOC Shipping New Delhi

- a. To arrange for chartering tankers for Vadinar as required.

19.22.3 Indian Coast Guard – Central Coordinating Authority

- a. To receive the report of significant spillage of oil at sea.
- b. To keep the Ministry of Defense apprised of the development on receipt of information about oil spill.
- c. To decide upon the nature and extent of actions required and to advise the Regional Headquarters/Local Action Groups/authorities concerned regarding the action to be taken by the latter in consultation with Apex Committee on Control of Marine Pollution/Task Force on oil spills.

- d. To arrange for chartering of any tankers for oil transshipment operations, if required.
- e. If the resources available with the Regional Headquarters / Port authorities/other agencies, Local Action Group/authorities are inadequate, to mobilize all available and necessary resources and direct the same towards the concerned Regional Headquarters/Local Action Groups/authorities.

Regional Coast Guard Commanders (RCC)

- a. Receiving reports of oil pollution at sea.
- b. Coordinating the activities of RCC when activated.
- c. Keeping the Director General, Coast Guard apprised of developments.
- d. Processing and coordinating claims of the affected parties and participating agencies with a view to compilation for processing by Director General Shipping.
- e. Mobilizing Coast Guard resources to support On Scene Commander (OSC) action at spill area.
- f. Maintaining the Regional Contingency Plan (RCP) and forward revised plans to members as may be required by RCC.
- g. Receiving periodic reports from resource agencies on account of Pollution Equipment and material with a view to have an upto date inventory list in the Coast Guard western Region, Eastern Region and Andaman and Nicobar Region.
- h. Providing the administrative infrastructure to the RCC for conduct of routine and operational tasks.
- i. Providing additional sampling effort during spills when requested by OSC.
- j. Maintaining a list of national and international agencies that may be called upon to assist for pollution response at the discretion of RCC.
- k. Arranging for periodical exercise in pollution response.
- l. Providing sensor data to RCC/OSC as required.
- m. Pre-designating a Coast Guard OSC.

19.22.4 Responsibility of Port Authority

The port authorities will be responsible for response to accident / oil spill within Port Limits keeping the coast guard regional commander informed and request for any additional assistance through the Regional Communication/Operations Centers. The detailed responsibilities are as follows:

- a. To arrange for the preparation of a local contingency plan in consultation with Regional Head Quarter/Central Coordinating Authority.
- b. To identify a suitable sea going tug when required for operations
- c. To identify surface crafts
 - On which dispersant spraying equipment can be mounted and
 - Which can be used for rigging the booms
- d. To ensure that the purpose of part-XIII of Merchant Shipping Act, 1958, actions are taken by the various authorities under the overall legal receiver of the wrecks and dock concerned.
- e. To ensure that at least following minimum equipment is kept available locally at all time:

Inflatable booms

Dispersant spraying equipments capable of being mounted on surface craft.

Suitable dispersant chemicals of the nature and quantity estimated as requirement of Local Action Group as part of the local contingency plan.

Oil skimmer equipment

- a. Surface crafts on which above dispersant equipment can be mounted and which can be used for rigging booms etc.
- b. To arrange for training of personnel expected to be engaged in above operation.
- c. To arrange for periodic exercise under the guidance of the RCC to keep equipment and personnel on continuous readiness for oil spill response operation.
- d. To consult the Coast Guard or Director General Shipping or any other authority, when further advice/assistance is required.

- e. To keep the Coast Guard apprised of actions being taken.

19.22.5 Responsibility of Boarding Officer

- a. Inform Chief Crisis Coordinator / Alternate Chief Crisis Coordinator, Maintenance Manager (Marine), IOC Control room, Marine Department about the oil spill incident.
- b. Stop the cargo or slow down the cargo as may be the case and accordingly isolate the affected portion causing the oil spill.
- c. Instruct the O&M contractor to fight the oil spill & locate the source of oil spill and coordinate with various agencies for oil spill containment.
- d. To carry out the water flushing of the SPM system as per the requirement in coordination with IOC control room.

19.22.6 Reporting & Alerting Procedure

After knowing major oil spill, Chief Coordinator, IOCL is to report the same immediately to KPT authority who in turn will inform Commander Coast Guard Region (West). Besides informing KPT, Chief Coordinator, IOCL should inform DC, Jamnagar, Forest Department Jamnagar and Gujarat Pollution Control Board Jamnagar, Gandhinagar regarding the incident.

19.22.7 Handling SPM Emergency

In case of any burst or leakage in floating / under buoy hoses or in any system of SPM, is noticed by the master or Deputy Officer or Our Boarding officer or any other person, the above incident should be immediately brought to the notice of Master/ Deputy Officer of the Ship. On getting the information, the discharging operation should be immediately stopped and the IOC control room at Vadinar should be informed through VHF channel 12 and 07 (US) about the stoppage of oil discharge. The master of the ship/ IOC Boarding officer with the help of crew members of ship and supporting contract vessel of IOC should try to assess where the spill is coming from and try to contain the spill by means of deploying booms available with the ship/contract vessels of IOC. Procedure to be adopted in case of leakage from following is as detailed below:

19.22.8 Floating Hose

- Stop discharge.
- Close the butterfly valve near tanker manifold and isolation valve near SPM.
- Contain the leak
- Further operation can be done only after replacement of burst/leaked hose or hoses

19.22.9 Under Bouy Hose

- Stop discharge.
- Close the PLEM valve of the leaking line.
- Contain the leak
- Further operation can be done only after replacement of burst/leaked hose or hoses.

19.22.10 Central Swivel Leak

If the leak is not controllable then

- Cast-off the vessel.
- Contain the leak.
- Arrest the leak.
- Re-berth the vessel.
- Restart operation.

19.22.11 Central Swivel Leak

The officer on board of the vessel can decide in consultation with pilot/master of the vessel whether the ship can continue at berth. If necessary, arrangement should be made to replace the damaged mooring rope.

19.22.12 Damage to Buoy

It is due to overriding of tanker. The officer on board of the vessel can decide in consultation with the pilot/master of the vessel whether the ship can continue at berth.

19.22.13 Pollution Control near SPM

- a. The master of the vessel will be informed about the oil spillage by boarding officer. The master in turn will contact the port signal station, which is provided with VHF channels 16, 12, 10 and 07 (US) and give a detailed report of the incidence to KPT.
- b. The signal station in turn will inform the Chief Operation Manager (COM) Offshore Oil Terminal (OOT) KPT.
- c. Boarding officer will also inform IOC shore control room/ marine department through VHF and IOC control room in turn will inform the incident to CMNM / Chief Coordinator, IOCL, Vadinar.

- d. Upon receipt of information from port signal station, COM, KPT will direct all the crafts presently posted at Vadinar to combat the oil spill within port limit.
- e. The tug / launches of KPT should carry sufficient quantity of dispersant before leaving Vadinar jetty.
- f. Since the flow of underwater current around Vadinar coast is very high, usage of oil skimmer to recover oil from any leakage from SPM and other floating hoses is not much effective, hence the pollution control near SPM done presently is limited to spray of dispersant.

19.22.14 Typical Case of Oil Spill Combating at Vadinar

In case of any accidental oil spill in and around SPM following action plan is to be brought to effect immediately in line with the disaster plan in association with KPT.

1. Reporting:

- a. On getting any information about oil spill noticed by the Master or the Duty Officer of the vessel, or Boarding Officer of IOC on board, working SPM Maintenance Contractor, Coast Guard patrol party, KPT pilot or any other person, the above incident should be brought to the notice of the Master / Duty Officer of the ship. On getting any such information, the discharging operation should immediately be suspended and the IOC tank farm which is also available on VHF channel 12 and 07 (US) should be immediately informed about the stoppage of discharge.
- b. On getting such information from Boarding Officers, the shift in charge in IOC shore control room shall inform the incident to Chief Coordinator, IOCL, Vadinar and the necessary line isolation from ship to shore tank farm should be ensured by closing necessary valves.
- c. The master or the Boarding Officer of the vessel should contact the Port Signal Station which is provided with VHF channel 16,12,10 and 07 (US) and give a detailed first hand information report of the incident.
- d. The Signal Station, in turn, should inform the COM, KPT. COM, KPT may in turn pass on the information to their authorities and Coast Guard etc.
- e. IOC officer on board should also pass on the information to location head Vadinar through IOC control room on VHF channel and check back with COM, KPT for confirmation of the message receipt through Port Signal Station.
- f. Chief Coordinator, IOCL, Vadinar will immediately establish contact with ED WRPL Gauridad and pass on the first hand information report besides informing the incident to statutory bodies like Gujarat Pollution Control Board (GPCB) and Forest Department / National Marine Park authorities.

2. Alerting: 1

- a. COM, KPT will direct the crafts posted at Vadinar to proceed to SPM and during the passage rig-up the dispersant spraying booms.
- b. IOC, Vadinar should ask its maintenance contract vessel to be ready for deployment of spill combating facilities on board at short notice on demand from COM, KPT.
- c. Small tug available with SPM maintenance contractor should also be put on alert for deployment, if so demanded by KPT for replenishment of oil dispersant and other support services.

3. Operational Requirements:

- a. In view of the strong current experienced at Vadinar only dispersant may be sprayed by 3 tugs of KPT while the fourth craft would be busy in replenishing her stock of dispersant chemicals from the storage provided at Vadinar jetty.
- b. The Master of harbour tugs / launches should ensure that sufficient quantity of dispersant chemical is carried out on board prior to leaving the jetty.
- c. In view of the strong currents experienced at Vadinar and the location of the SPM, Commander TMS Hayes, Advisor on Marine Pollution, International Maritime Organization in his Mission Report has indicated that it will not be possible to contain the oil spill and use a skimmer to collect oil. He therefore has recommended that the KPT should equip at least three crafts with dispersant spraying units. Accordingly, the Port had provided only the dispersant spraying equipments for use at Vadinar.

4. Execution:

The craft should move downstream of the oil spill and then start streaming up against the current while carrying out spray of dispersant chemicals with a systematic run over the oil spill, till the total spill gets dispersed.

5. Support Services:

IOC shall assist KPT and Coast Guard in

- a. Implementing the local action plan.
- b. In obtaining additional equipments and chemicals from HQs of KPT and Coast Guard, if and when required.
- c. Chartering of tankers to undertake transportation / transshipment operation if so required by KPT.
- d. Arranging for the storage of oil transported at shore and
- e. Making assessment of the value of the oil transshipped.

6. Claims:

In case the oil spill in and around SPM terminal is due to any problem of tanker or any negligence from tanker operation crew, following steps should be taken for claim, which will be done by DC / COM, KPT.

COM, KPT should inform the Master of the Vessel holding him responsible for the spillage/pollution and also steps taken by the Port to combat the oil spill and for cleaning operations and the charges thereof as per rules.

Record of all expenditures towards the use of port craft / tugs / dispersant chemicals / port vehicles and any other material should be maintained by the DC / COM, KPT for subsequent recovery from the Master/Agent of the ship, prior to her departure.

7. Final Report :

The detailed report of the oil spill in chronological order supported with available data/records will be prepared by KPT and sent to respective Organizations including IOC. However necessary reports for informing IOC official should be prepared by Chief Coordinator, IOCL, and Vadinar. He will also submit necessary reports to statutory bodies like Gujarat Pollution Control Board, Forest Department/National Marine Park authorities.

19.22.15 Relationship with Coast Guard & Port Trust

The Indian Coast Guard and Port Trust along with IOC would be among the main organization involved in the more practical aspects of oil spill response at Vadinar terminal.

It has been therefore, the endeavor of KPT / IOCL / ESSAR / Indian coast Guard to ensure that good working relationship, understanding of individuals, operating procedure are developed and understood before the high pressure environment of spill response prevents the building of such ties.

All relationship with the Indian Coast Guard has been undertaken with the knowledge that in the National Disaster Plan it states that ICG is the controlling body for all oil spill response activities.

19.23 Oil Spill Equipment Available with IOCL Vadinar

Sr.No	Item Description	Qty
01	Inter Tidal Boom	600 mm
02	Coastal Boom	600 mm
03	Disc Skimmer	1No
04	Mop Skimmer	1No

05	Dispersant Spray Sets	2 Sets
06	On Shore Cleaning System	1 No
07	Floating Tank 25m ³	2 Nos
08	Floating Tank 12.5m ³	4 Nos
09	Off Loading Pump	1 No

19.24 Oil Spill Consumables Available with IOCL Vadinar

Sr.No	Item Description	Qty
01	Oil Spill Dispersant	9800 Liter
02	Oil absorbent pillow (1.5'x1'x5")	72 Nos
03	Oil absorbent boom (length-10'x dia-7")	120 Nos
04	Oil absorbent sheet (1.5'x1.5')	760 Nos

19.25 Imp Telephone Nos of Govt Officials related to Oil Spill Combating

Sr No	Description	Telephone No		Fax Number
		Office	Residence	
1	District Collector Jamnagar (0288)	2555869	2554059 09427306210	
2	Collector Office Jamnagar (0288)	2557601 – 5	-----	2555899
3	Superintendent of Police Jamnagar (0288)	2554203	2555868 09427305071	2556382
4	Municipal Fire Station Jamnagar (0288)	2550101	-----	-----
5	Regional Officer Gujarat Pollution Control Board Jamnagar (0288)	2752366	2540741	2753540
6	Conservator of Forest Jamnagar (0288)	2552077	2553327 09425049064	2679371

7	Police outpost Vadinar (02833)	256541	-----	-----
8	KPT Control Tower Vadinar (02833)		-----	-----
9	Deputy Superintendent of Police, Khambalia (02833)	234262	234726	234262
10	Deputy Collector, Khambalia (02833)	234577	234714	234577
11	Commander Coast Guard, Porbandar (0286)	2241794 /2240958	2244234	2244056
12	Gujarat Pollution Control Board, Gandhinagar, (079)	23222756 /23222095	-----	23232156
13	Chief Conservator of Forest Gandhinagar, (079)	23254123	-----	23229917
14	Director Environment, Govt. of Gujarat. Gandhinagar, (079)	23251062	-----	23252156
15	CG, Station Vadinar	256560 /256579	256534	256560
16	COM, KPT, Vadinar	256749	256522	256540
17	Head (Environment), RIL, (Mr. Kannan)	95288- 3012152		952833- 3012199
18	RPL, Port Operation Center			
19	Mundra (Port operation Center)	0283828820 1 to 288207, 0283822003 3		95288- 288270

19.26 Important Telephone Nos of VOTL Marine Operations

Sr No	NAME	DESIG	TEL (OFF)	MOBILE NO.
1.	Capt Deepak Sachdeva	Chief Operations Officer	02833-241777	9925153618
2.	Capt. Alok Kumar	Port Captain		9909908611
3.	Commandt. Raghuvanam	Head- Port Facility Security	02833-241780	9909021183
4.	V. Gopalakrishnan	Admin Officer	02833-241779	9979891335
5.	Control room	Shift -in charge	02833-241775	9979868460
6.	Control room fax		02833-241779	

19.27 Emergency Telephone Nos of outside agencies including District Authorities

19.27.1 Fire Station

SL No	Dept. Name / Officer's Name	Office	Resident
1	Inspector CISF (02833)	256542	-

2	Municipal Jamnagar (0288)	2550340	2550340
		2550101	
		2675091	
		101	

19.27.2 SHO (Police)

SL No	Dept. Name / Officer's Name	Office	Resident
1	District Superintendant of Police	2554203	2555868
2	Deputy Superintendant of Police	2552940	2542970
3	Police Control Room	100 2550200	-
4	Police Inspector, City 'A' Division	2550243	2676667
5	Police Inspector, City 'B' Division	2550244	2550315
6	Police Inspector, Panchkoshi 'A' Division	2550359	-
7	Police Inspector, Panchkoshi 'B' Division	2676556	-
8	Dhrol	02897- 222033	-
7	Dy. SP Khambhaliya Police Inspector Circle	234726	
8	Office, Khambhaliya	234744	

19.27.3 Collectorate

SL No	Dept. Name / Officer's Name	Office	Resident
1	Collector Shree & District Magistrate Shree	2555869	2554059
2	Additional Collector Shree	2550284	2672131
3	Resident Deputy Collector Shree	2553183	2556102

4	Sub divisional Magistrate Shree	2552130	2552807
5	Mamlatdar Shree (City)	2674575	2660950
6	Collector Control Room	2553404	-
7	Circuit House, Lal Bungalow	2550237-38	-
8	Deputy Collector, Khambhaliya	234577	

19.27.4 District Authority

SL No	Dept. Name / Officer's Name	Office	Resident
1	District Development Officer	2553901	2552402
2	Deputy District Development Officer	2550221	2755070
3	District Health Officer	2671097	2756252

19.27.5 Forest Department

SL No	Dept. Name / Officer's Name	Office	Resident
1	Conservator of Forest Marine National Park	2552077	2552327
2	Deputy Conservator of Forest Marine National Park	2552077	2679374
3	Deputy Conservator of Forest (Distribution)	2553664	2559787
4	Deputy Conservator of Forest (Common)	2553026	2554387

19.27.6 Port Department

SL No	Dept. Name / Officer's Name	Office	Resident
1	Port Officer - Bedi Port	2670207	2556106
2	Port Office - Okha	262001	262010

19.27.7 Railway Station

SL No	Dept. Name / Officer's Name	Office	Resident
1	Railway Inquiry - Jamnagar	2755222	-
2	Railway Inquiry - Hapa	2570410	-
3	Officer, Railway Station - Jamnagar	2755169	-
4	Officer, Railway Station - Hapa	2570410	-

19.27.8 Airport Office

SL No	Dept. Name / Officer's Name	Office	Resident
1	Airport Officer	2712187	2560252
		2712413	2560262
2	Indian Airlines - Jamnagar	2550211	2554768

19.27.9 Station Transport

SL No	Dept. Name / Officer's Name	Office	Resident
1	S.T.Inquiry	2550270	-
2	Manager, S.T.Depo	2676904	-
3	Divisional Director - Jamnagar	2570608	2570486

19.27.10 Hospitals, Ambulance Sevas, Blood Banks & NGO's

Sr No	Dept. Name / Officer's Name	Telephone No
-------	-----------------------------	--------------

		Office	Residence
Hospital			
1	Guru Govindsinh Hospital (Emergency)	2661087 2550204-06	-----
2	Samarpan Hospital	25566423 2712728	-----
3	Mental Hospital	2712728	-----
4	Dental Hospital	2750218	-----
5	Ayurvedic Hospital	2550368	-----
6	City Dispensary – Ranjit Road	2676456	-----
7	Oswal Hospital	2562705 2566833 2676521	-----
8	Adarsh Hospital	2665566	-----
9	Jivandep Healthcare Pvt Ltd	2558176 2558275	-----
10	KPT Primary Health Centre, Vadinar	256539	-----
Ambulance Seva			
1	Fire Branch, Jamnagar Mahan agar Palikir	102	-----
2	Aaryasamaj	2550220	-----
3	Guru Govindsinh Hospital	2541081	-----
4	Jilla Panchayat, Jamnagar	2550221	-----
5	Taxi Association, Jamnagar	2560547	-----
6	Mahavir Samaj Sevak Dal	2550225	-----
Blood Bank			
1	Guru Govindsinh Hospital	2550227	-----
2	J.H.M. Blood Bank	2550208	-----

3	Deepchand Gardy Memorial Blood Bank	2672529	-----
4	Omkar Charitable Trust Blood Bank	2673339	-----
NGO			
1	Aandabawa Seva Sanstha	2540155	-----
2	Kabir Ashram	2558049	-----
3	Shree Pranami Seva Sanstha	2551353	-----
4	Nawanagar Chamber of Commerce	2550250	-----
5	Youth Hostel Association of India	2558040	-----
6	Jamnagar Factory Owners Association	2560002	-----
7	Jamnagar Brass Foundry Association	2730271	-----
8	M.P.Shah Udyognagar Association	2550960	-----
9	Kasturba Stree Vikasgruh	2751730	-----
10	Indian Road Cross Society	2553583	-----
11	Rotary Club	2550348	-----
12	Lions Club	2673193	-----
13	Jamnagar Vepari Mahamandal	2533185	-----

19.28 Mutual Aid Members

Sr.No	Name of Mutal-Aid-Scheme Member	Telephone No. Office	Residence/ Mobile Nos.
1	Chairman - Collector	2555869 9978406210	2554059
2	Addl. Collector	2550284 99784 05182	2672131
3	Jt.Chairman Commissioner,JMC	2552321	2552372

4	MR Prajapati - Secretary, MAS, GSFC	2432216	2712768/ 9979853306
5	RN Shah - Treasurer-MAS, GSFC	2432242	9979862520

6	MAS OFFICE	2542764	
7	Office of Supdt. of Police	2554203	2555868
8	Police Control Room - Jamnagar	2550200	2344249(Sikka) 2846125(Padana)
9	District Disaster Control Room	2553404 / 2541485/ 1077 (Toll Free)	9426950783 (DDMO) Mr.Yaswant Sinh Parmar
10	PB Shah ,Asst. DISH - Jamnagar	2678206	9824583767
11	Mr. Desai -Home Guard Jamnagar	2553862	
12	Dr. Gosai RMO - GG Hospital	2550240 /2541081	2551689 / 9824258885
13	Control Room GMB - Jamnagar	2711805 / 2756909	
14	KK Bisnoi - JMC CFO	2550340/101 (2662691)	9879531101
15	Indian Coast Guard - Vadinar	02833 - 256579	1090 (Terror Helpline Toll free)
16	Sanjay Goyal -IOCL Vadinar	02833 - 256330	9909909016
17	P Palanivelu- Jt. Secretary MAS,EOL	02833 - 241892	9825210517
18	PK Prasad - IOCL Theba	2570712	9426911475
19	HS Modha - Fire Officer	2344116	9925214054
20	Chetansinh Jadeja - Fire	2344272 -75/	9099038083

	Officer, SDCC	2439322 (Fire)	
21	V.Koti, VP(Fire) RIL	6611193	9998972008
22	D K Thakur Jt. Secretary- MAS-TCL	02892 - 665247	9227676113
23	Mr. Dipak Roy, Mgr.(O&M) - K Kumar AM - GSPL	9925013159 9879599464	
24	MJ Sunaria - Digjam Ltd.	2712972/73/74	
25	PB Sakharkar -GAIL	6611437	9624089696
26	Indian Navy- Valsura	2550263-357	
27	Indian Air Force, Jamnagar	2720007, Extn.4222(fire)	2550245
28	PR Thatte, VP Bharat Oman Refinery	02833 -256450	9427206501
29	MU Khan - Cairn India		966253945
30	For any Emergency Ambulance / Fire		108

19.29 Details of Fire Fighting Equipment at Vadinar

Sr.No	Description of system	Quantity
1	Water Cum Foam Monitors	
	Fixed Monitors	05 Nos.
	(1200/1500/1800/2580/3840) LPM	2138 lpm (475 gpm)
	Portable Monitors	02 Nos. (Fire Station)
	(1200/1500/2580/3840) LPM	1000 gpm (4500 lpm)
	Foam trolley tank capacity and Qty of AFFF in it.	3 No. of trolleys with 200 liters each.
2	Hoses /Nozzles /Accessories	
	Hose	152 No.

	Type	Type B
	Nozzles	
	Universal (Triple purpose) nozzle	33 No. Diffuser branches
	Jet nozzle (Standard branch)	60 Nos. of Aluminium and 6 no. of Gunmetal
	Fog nozzle	11 Nos.
	Foam branch (FB-5X)	07 Nos.
	Water curtain nozzle	01, Good
	Hose Boxes	64 Nos.
	Foam Concentrate (AFFF)	28000Ltrs(Min)
FIRE SIREN		
	Hand operated	02 Nos
	Electrical	03 Nos.
	Sand buckets with cover	30 Nos.
	Manual fire call points	13 Nos.
3	Safety Equipment	
	Explosimeter (make)	02 Nos (ENDEE GP200L)
	Fire proximity suit	11 Nos.
	Water gel blanket (expiry date)	01 No. (Expiry date Feb. 2010)
	Safety torch	10 Nos.
	Safety goggles	30 Nos.
	Red and Green Flags for drill	01 No each
	Breathing Apparatus Set (Indicate make)	07 Nos make DRAGER
	Spare Breathing Apparatus cylinder	06 Nos
4	Fire Extinguishers	
	CO ₂ Type	66 Nos.
	2.0 Kg	28 Nos

	3.2Kg	10 Nos.
	4.5 Kg.	23 Nos.
	6.8 Kg.	05 Nos.
	DCP Type	148 Nos.
	5.0 Kg	28 Nos.
	10.0 Kg	116 Nos.
	75 Kg	04 Nos.
5	Fixed Fire Fighting Facilities	
	Fire water pond/tank (no. and capacity)	3 no. ponds 6000 KL each.
	Foam tender with accessories	3 Nos
6	Fire Fighting Engines	
	Engine driven FF pump a) 385KL/Hr @ 88m b) 350 KL/Hr @ 88m	4 Nos 2 Nos
	Motor Driven FF pump a) 385 KL/Hr @ 91m b) 350 KL/Hr @ 91m	1 No 2 Nos
	Jockey Pump 60 KL/Hr @ 120m	2 Nos

19.30 Details of Fire Fighting Equipment at Jamnagar

Sr.No	Description of system	Quantity
1	Water Cum Foam Monitors	
	Fixed Water Monitors	03 Nos.
	(1200/1500/1800/2580/3840) LPM	3500 lpm
	Fixed Water Cum Foam Monitors	03 Nos.
	(1200/1500/2580/3840) LPM	1200 lpm
2	Hoses /Nozzles /Accessories	

	Hose	15 Nos.
	Type	Type B
	NOZZLES	
	Universal (Triple purpose) nozzle	04 Nos. Diffuser branches
	Jet nozzle (Standard branch)	03 Nos.
	Fog nozzle	03 Nos.
	Foam branch (FB-5X)	03 Nos.
	Water curtain nozzle	02 Nos
	Hose Boxes	10 Nos.
	Foam Concentrate (AFFF)	5100 Liters
	Fire Siren	
	Hand operated	01 No.
	Electrical	01 No.
	Sand buckets with cover	24 No.
	Manual fire call points	06 Nos.
3	Safety Equipment	
	Explosimeter (make)	01 No. (ENDEE GP200L)
	Fire proximity suit	1 No.
	Water gel blanket (Expiry date)	01 No. (Expiry date Feb. 2010)
	Safety torch	02 Nos.
	Safety goggles	1 No.
	Red and Green Flags for drill	01 no. each
	Sand scoops	04 Nos.
	Stretcher	01 No.
	Breathing Apparatus Set (Indicate make)	01 No., make DRAGER
	Spare Breathing Apparatus cylinder	01 No.
4	Fire Extinguishers	

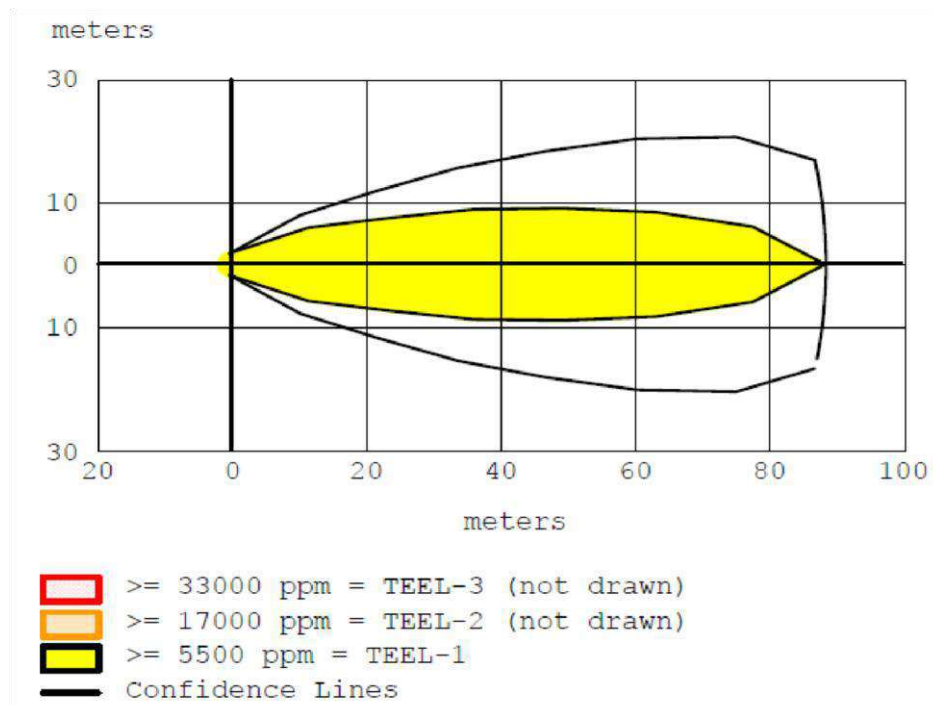
	CO ₂ Type	33 Nos.
	2.0 Kg	13 Nos.
	3.2Kg	Nil
	4.5 Kg.	15 Nos.
	6.8 Kg.	05 Nos.
	DCP Type	27 Nos.
	5 Kg	01 No
	10 Kg	20 Nos.
	75 Kg	06 Nos.
5	Fixed Fire Fighting Facilities	
	Fire Water Mains (size) and date of Pressure Testing	8" Dia tested on July'10
	Fire water pond/tank (no. and capacity)	2 nos above ground tanks of 700 KL each.
	Mainline pump shed fixed foam flooding system (Manual/auto)	Auto with UV/IR detectors
6	Fire Fighting Engines	
	Engine driven FF pumps (150 kl/hr @ 100M)	2 Nos
	Motor Driven FF pump (150 kl/hr @ 100M)	1 No
	Jockey Pump(10 kl/hr @ 100M)	1 No

20 ANNEXURES - GRAPHS

20.1 Graphs & Contours of various MCLS worked out at Jetty (Refer Chapter 4.7)

20.1.1 Jetty One – LPG

20.1.1.1 Instantaneous Release – Toxic Threat Zone (Graph)



20.1.1.2 Instantaneous Release – Toxic Threat Zone (Contour)



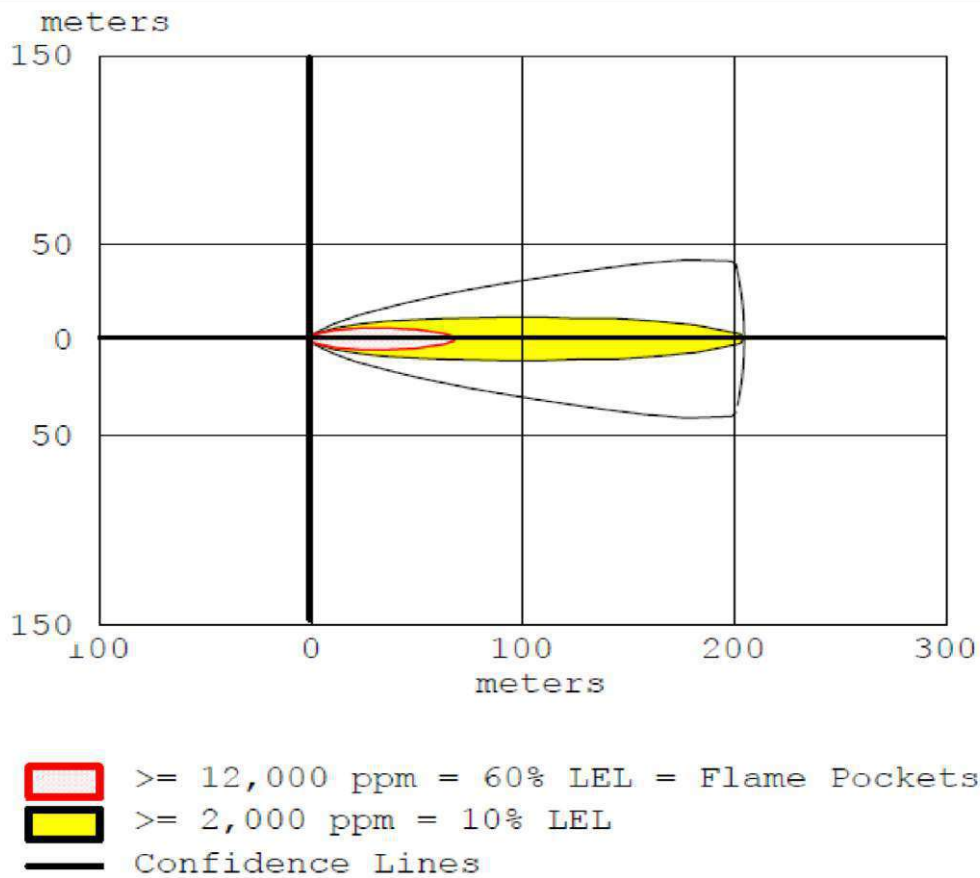
August 25, 2010
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Kandla Jetty Map

OIL JETTY

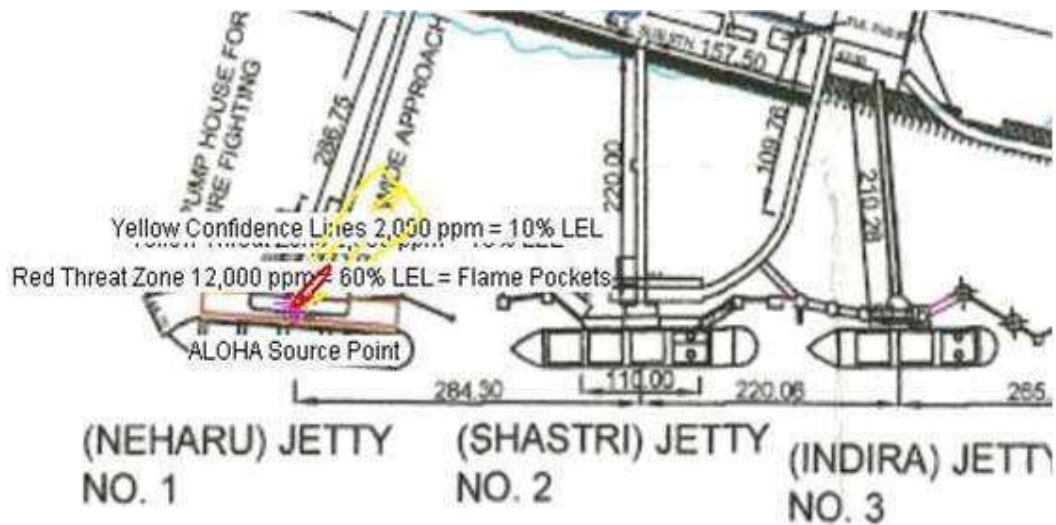
266

Upgraded Emergency Plan / DMP for Kandla Port Gandhidham (Kutch)

20.1.1.3 Instantaneous Release – Flammable Area of Vapor Cloud (Graph)



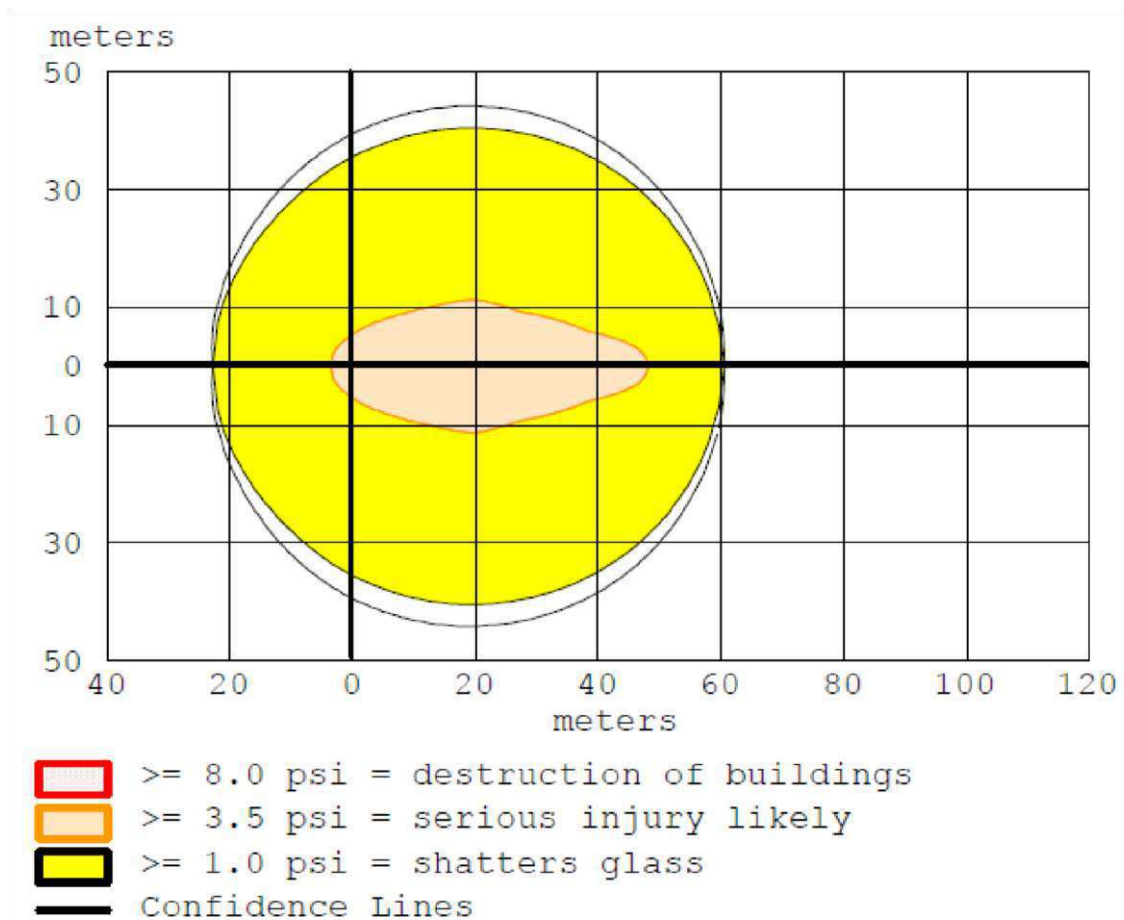
20.1.1.4 Instantaneous Release – Flammable Area of Vapor Cloud (Contour)



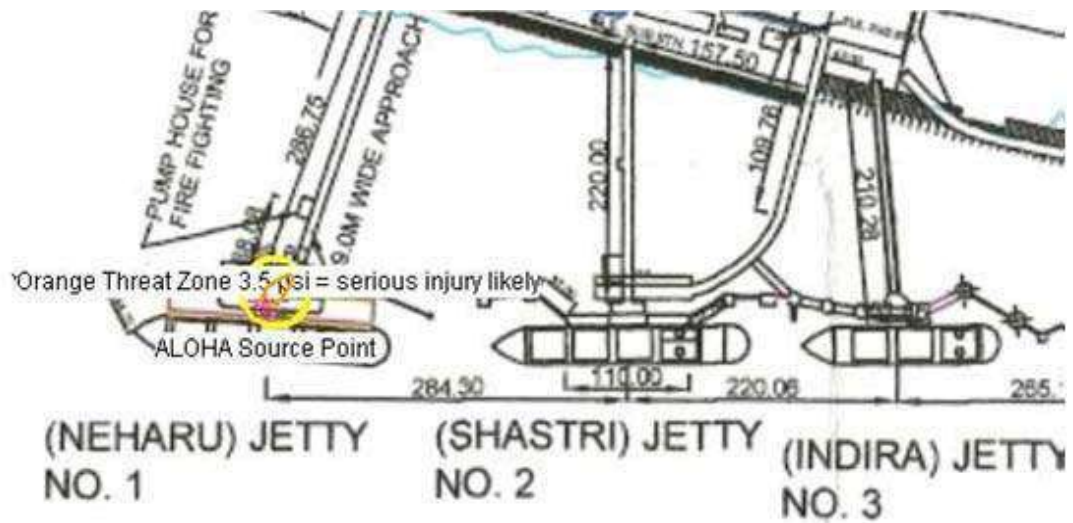
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 Kandla Jetty Map

OIL JETTY

20.1.1.5 Instantaneous Release – Overpressure (Graph)



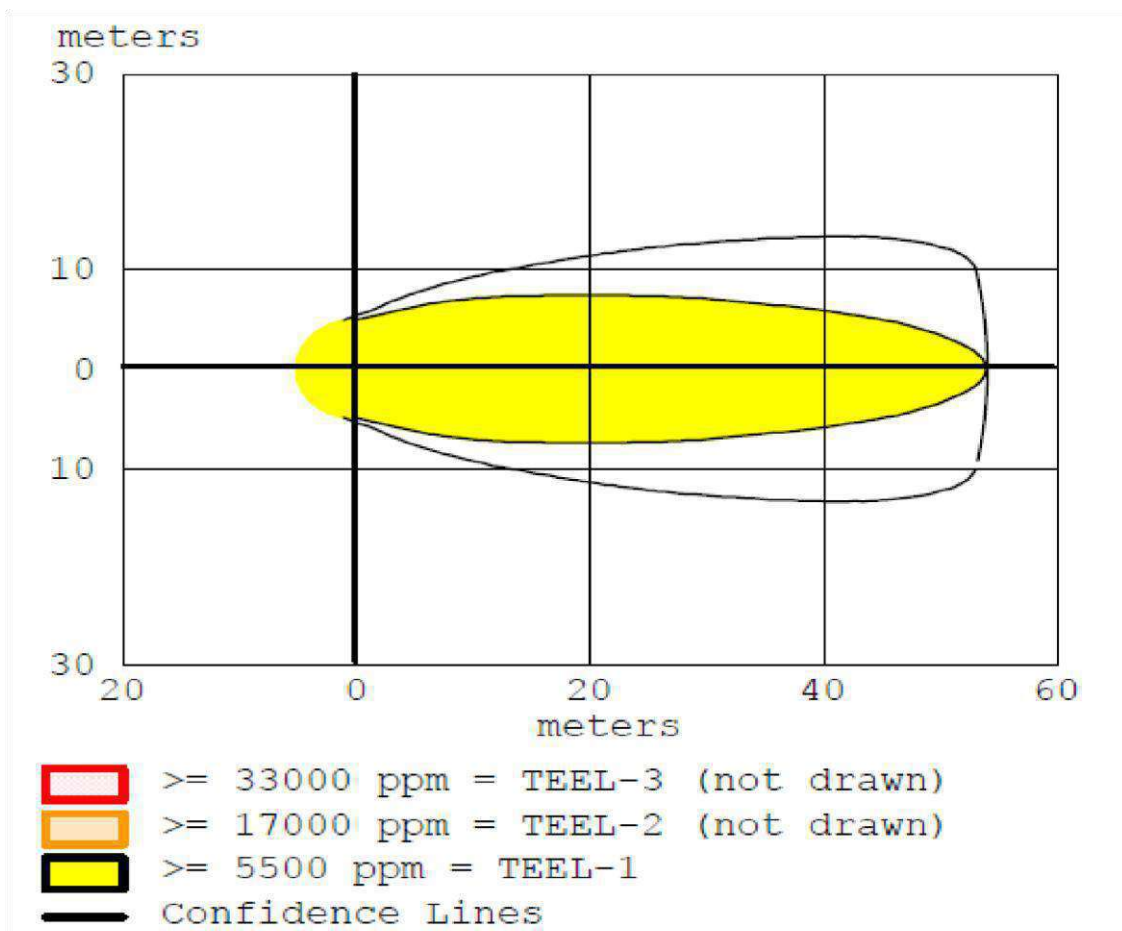
20.1.1.6 Instantaneous Release – Overpressure (Contour)



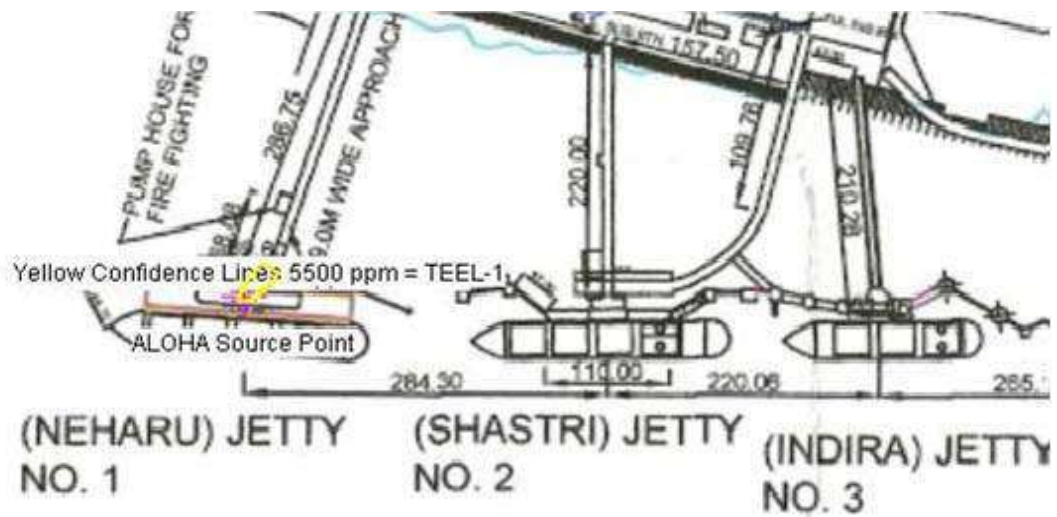
August 25, 2010
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Kandla Jetty Map

OIL JETTY

20.1.1.7 Evaporating Puddle – Toxic Threat Zone (Graph)



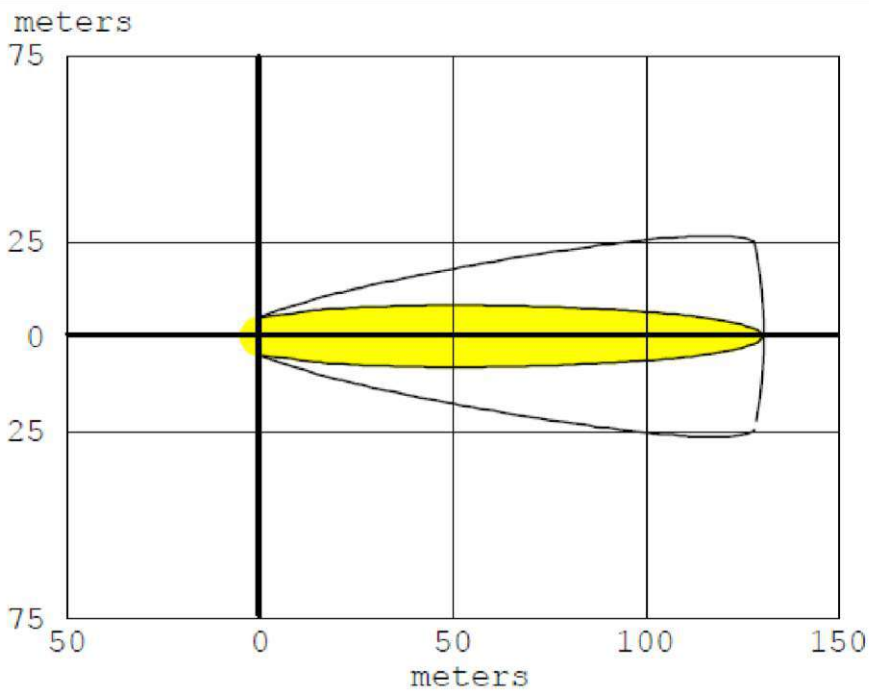
20.1.1.8 Evaporating Puddle – Toxic Threat Zone (Contour)



August 25, 2010
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Kandla Jetty Map

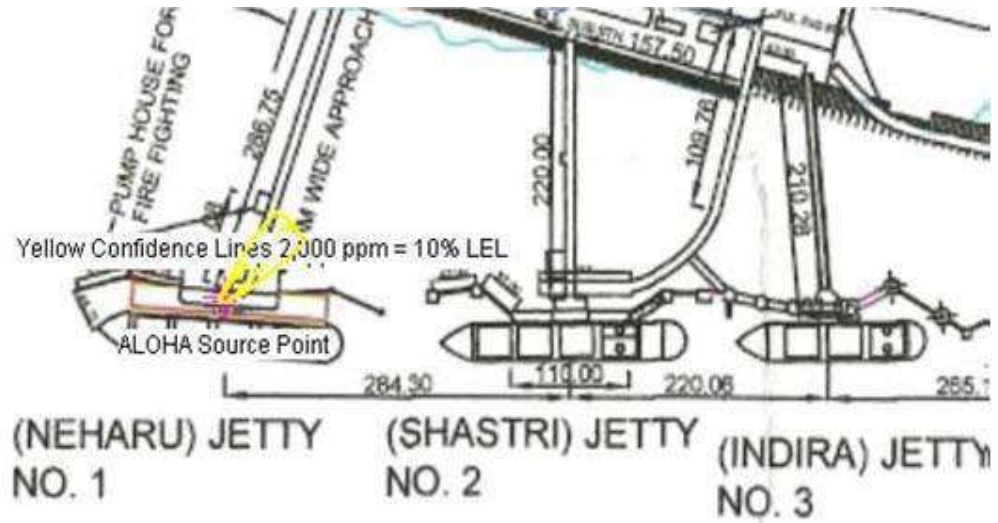
OIL JETTY

20.1.1.9 Evaporating Puddle – Flammable Area of Vapor Cloud (Graph)



- $\geq 12,000$ ppm = 60% LEL = Flame Pockets (not drawn)
- $\geq 2,000$ ppm = 10% LEL
- Confidence Lines

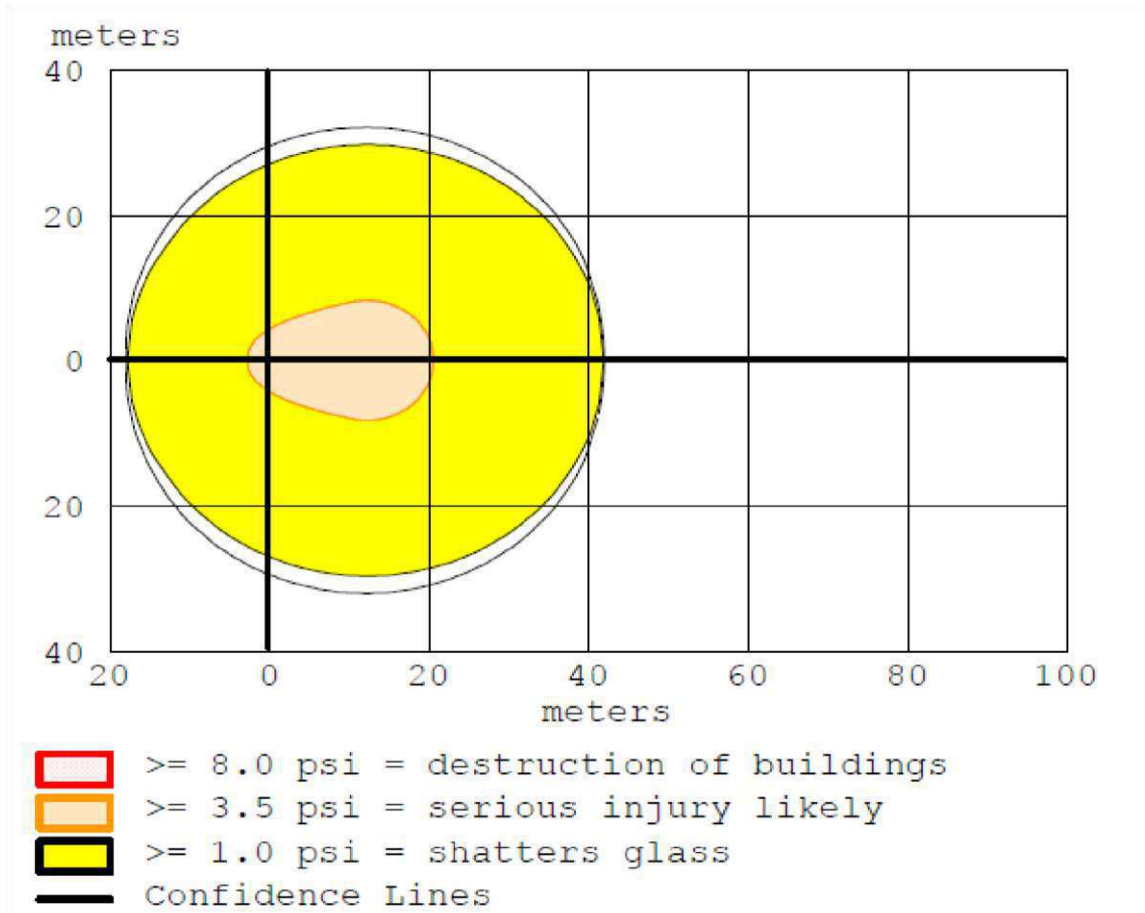
20.1.1.10 Evaporating Puddle – Flammable Area of Vapor Cloud (Contour)



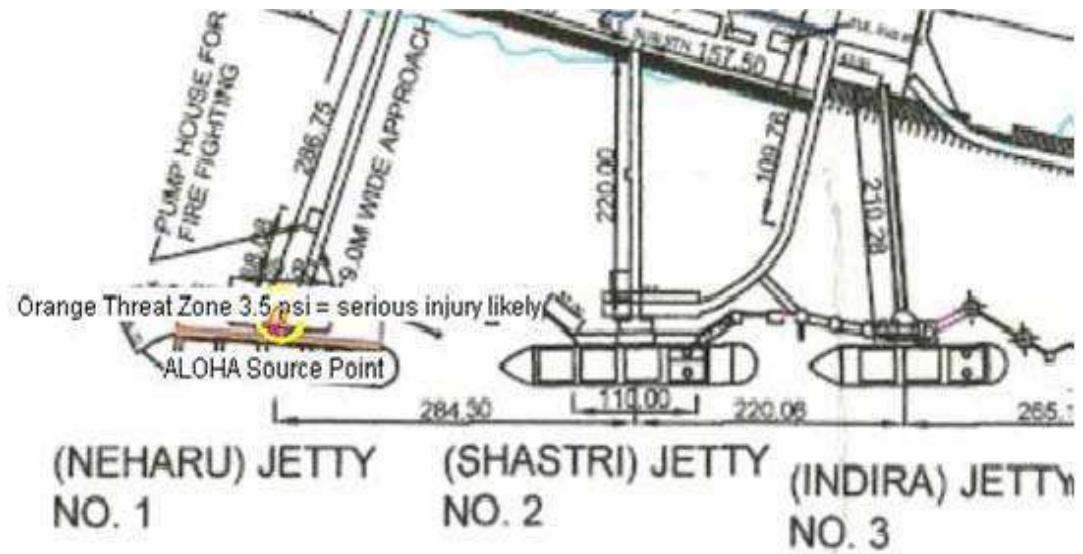
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Kandla Jetty Map

OIL JETTY

20.1.1.11 Evaporating Puddle – Overpressure (Graph)



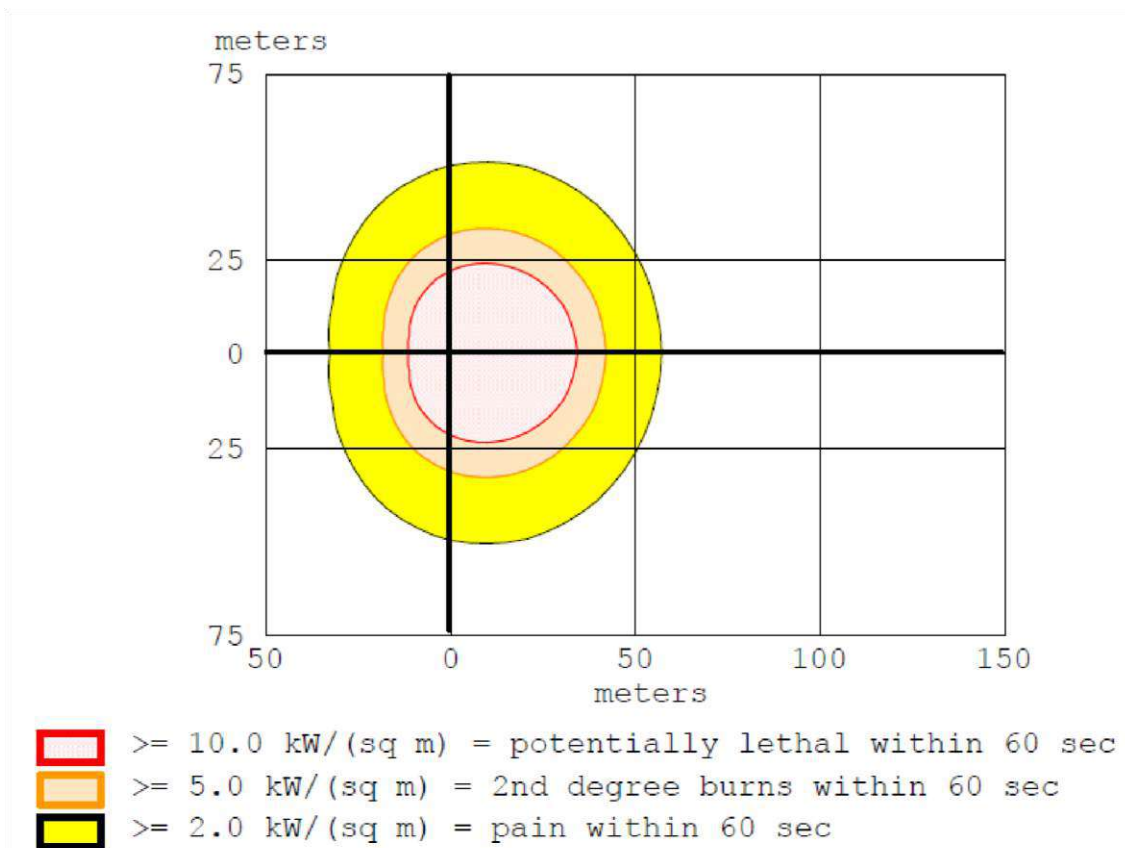
20.1.1.12 Evaporating Puddle – Overpressure (Contour)



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Kandla Jetty Map

OIL JETTY

20.1.1.13 Burning Puddle – Thermal Radiation (Graph)



20.1.1.14 Burning Puddle – Thermal Radiation (Contour)

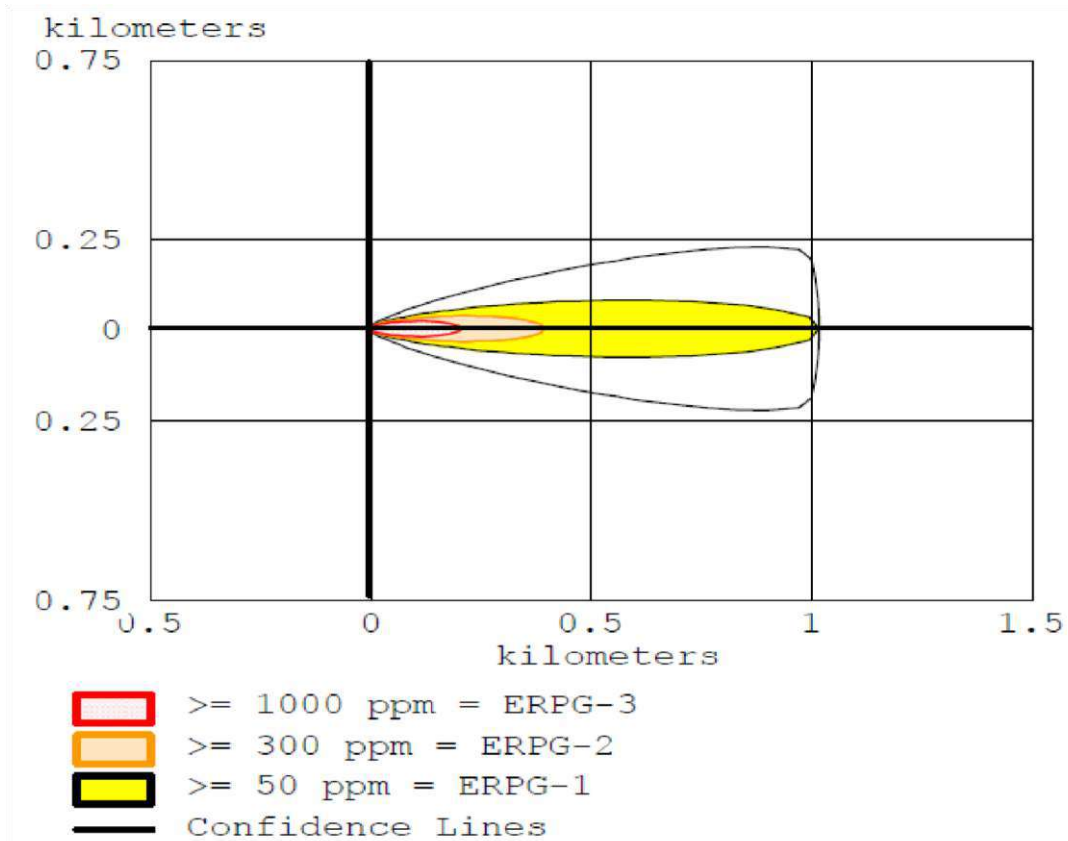


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Kandla Jetty Map

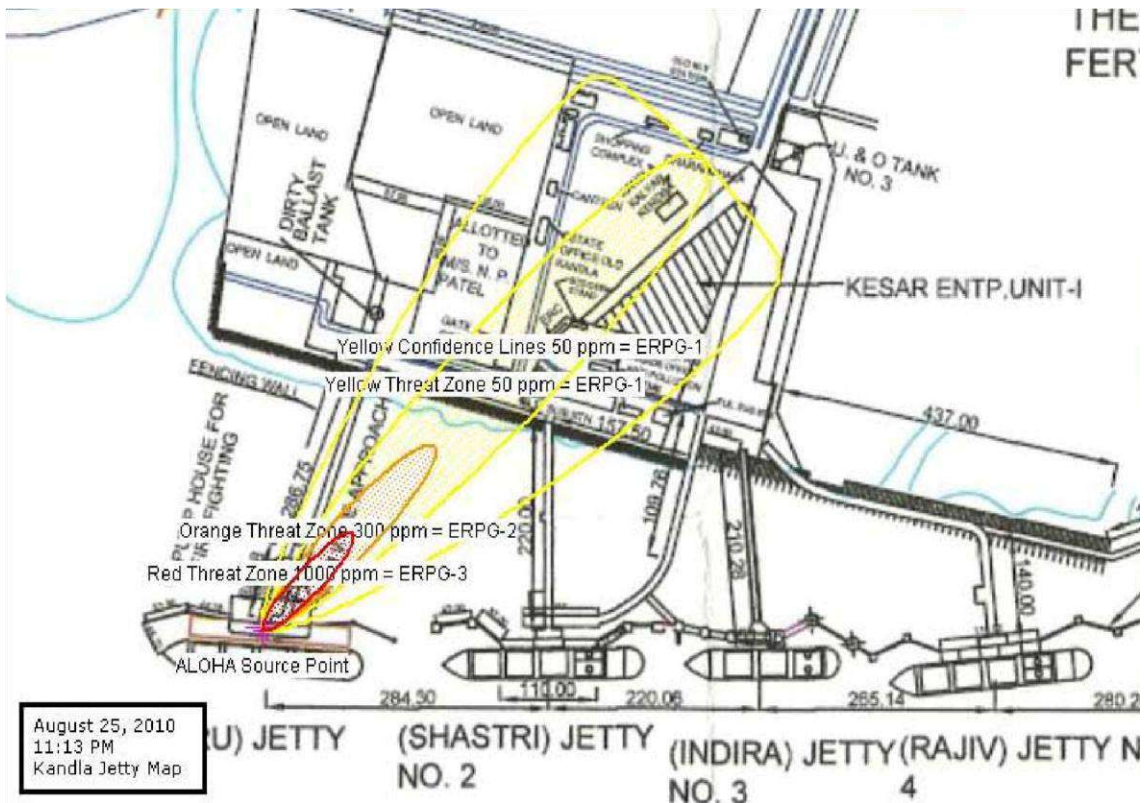
OIL JETTY

20.1.2 Jetty One – Toluene

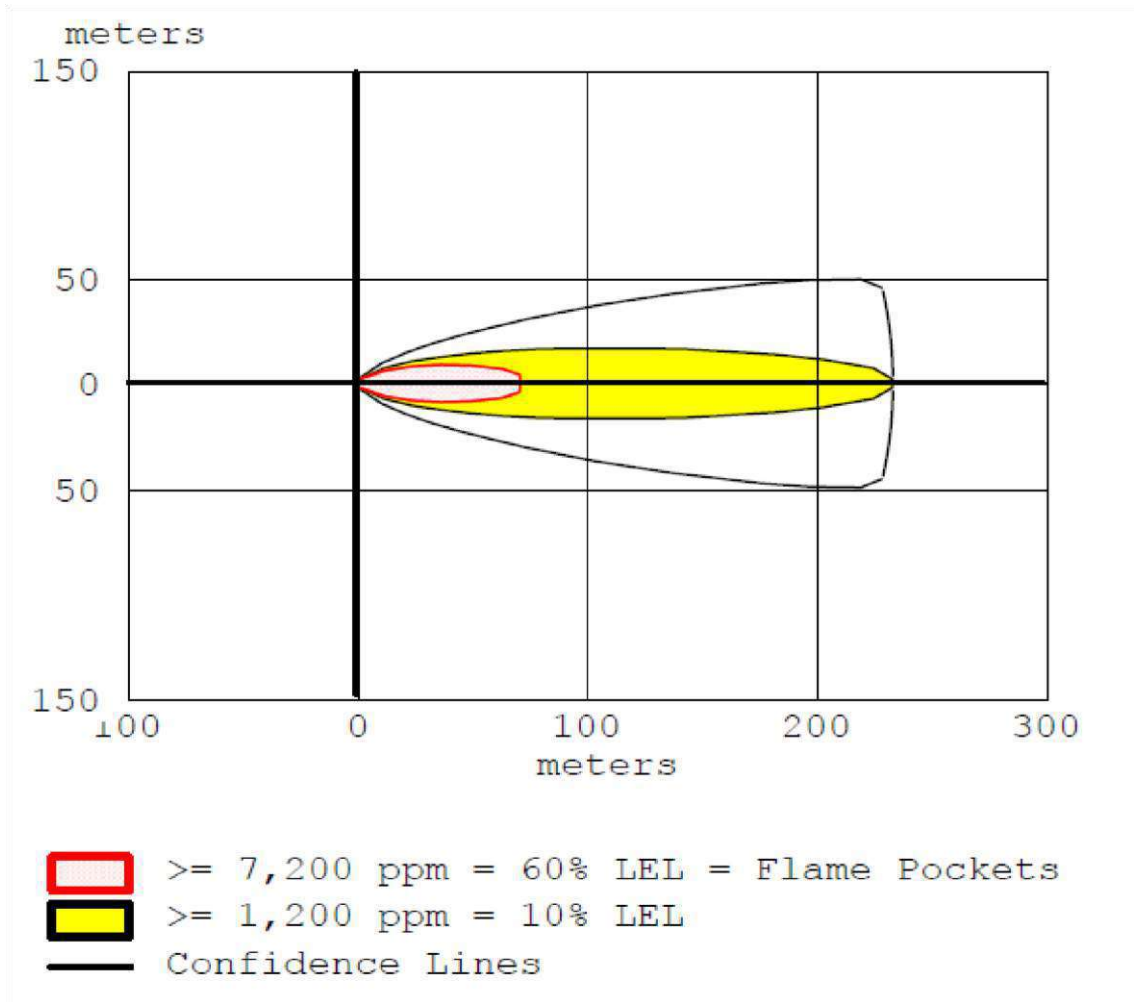
20.1.2.1 Instantaneous Release – Toxic Threat Zone (Graph)



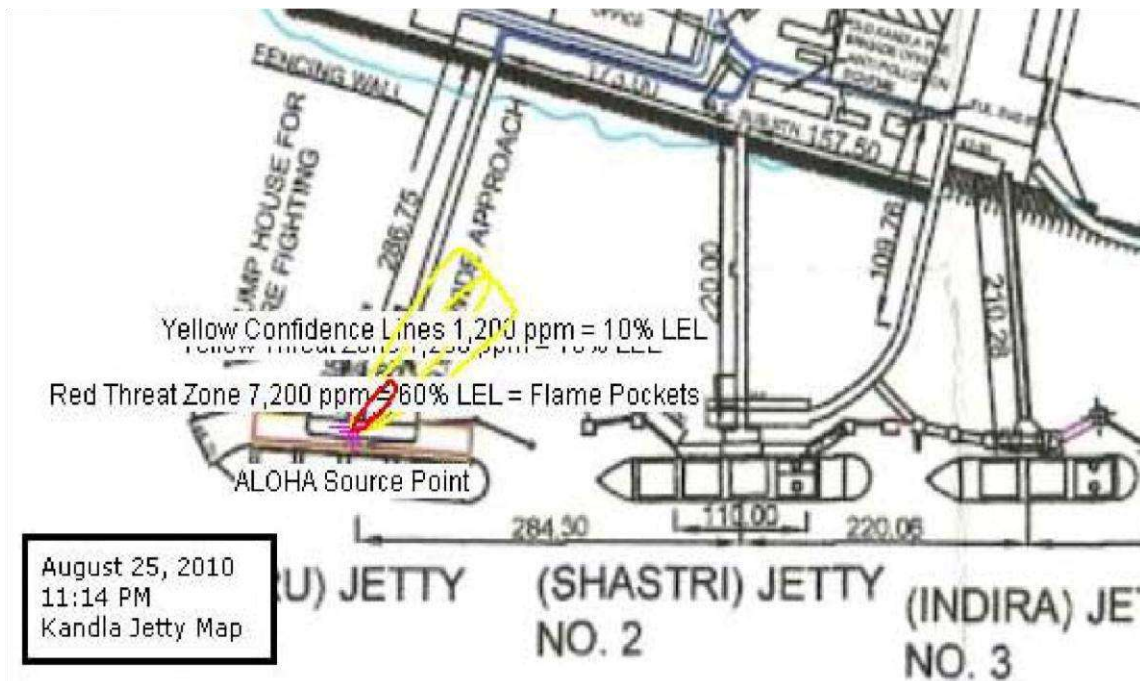
20.1.2.2 Instantaneous Release – Toxic Threat Zone (Contour)



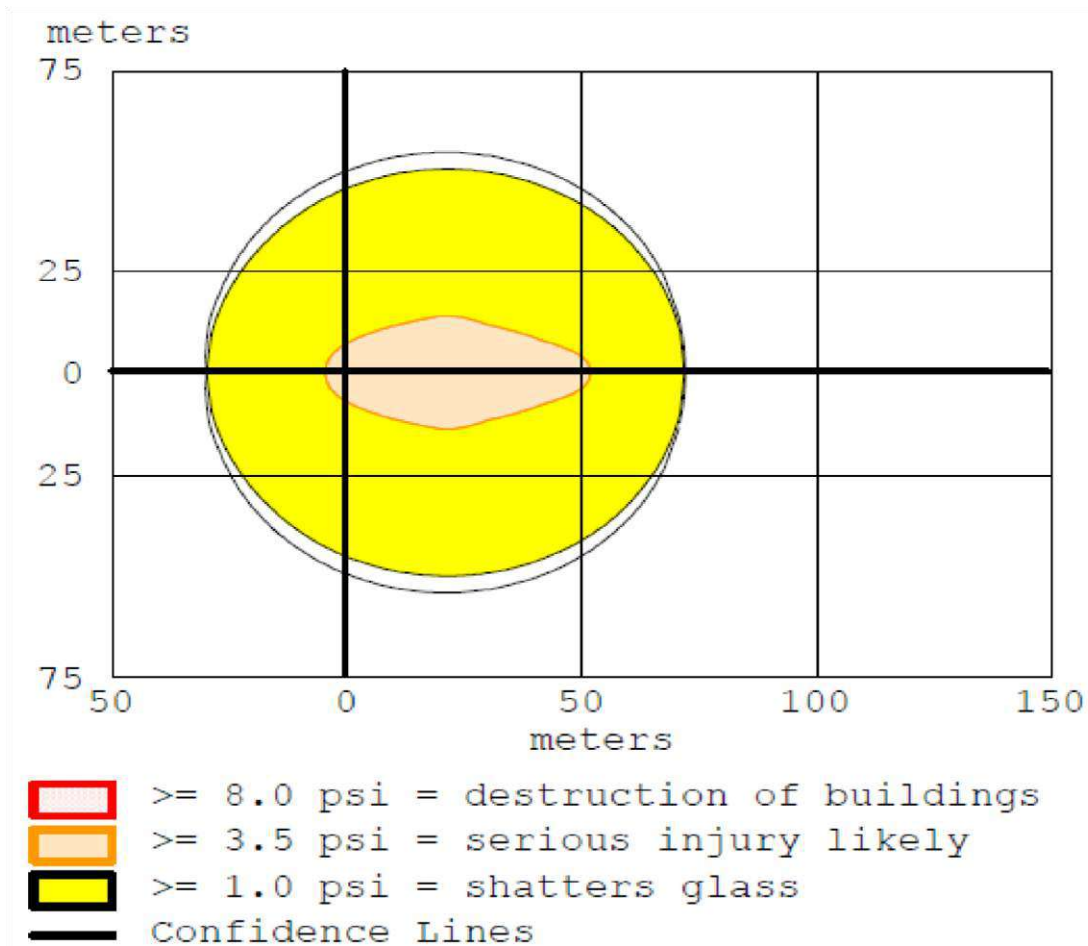
20.1.2.3 Instantaneous Release – Flammable Area of Vapor Cloud (Graph)



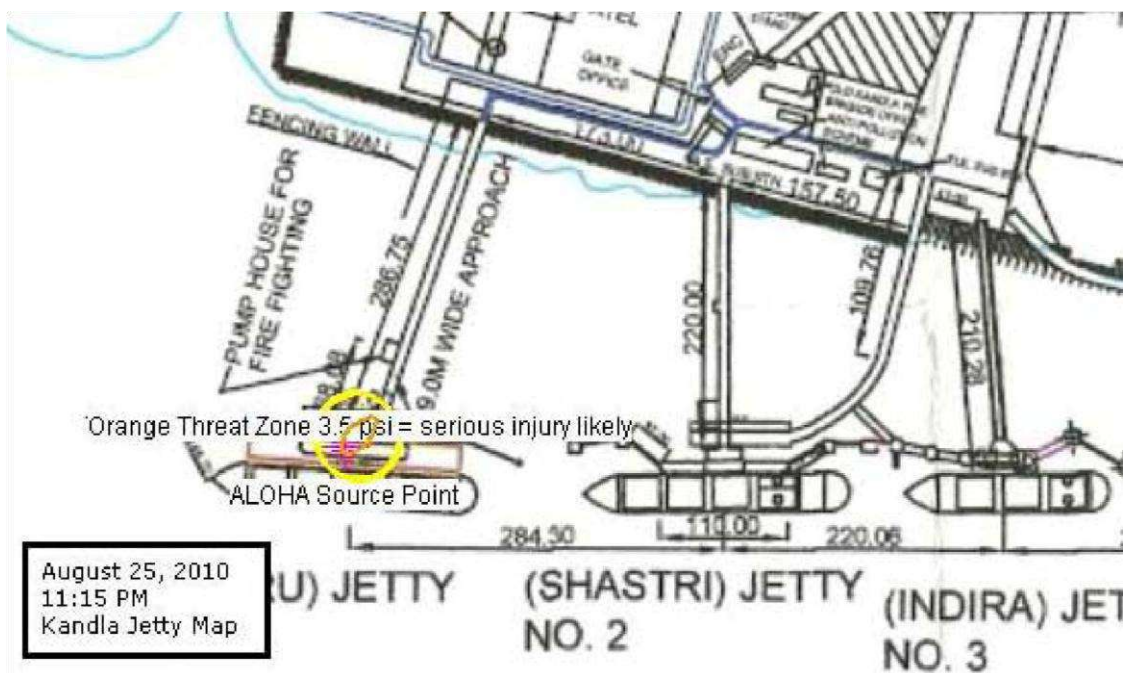
20.1.2.4 Instantaneous Release – Flammable Area of Vapor Cloud (Contour)



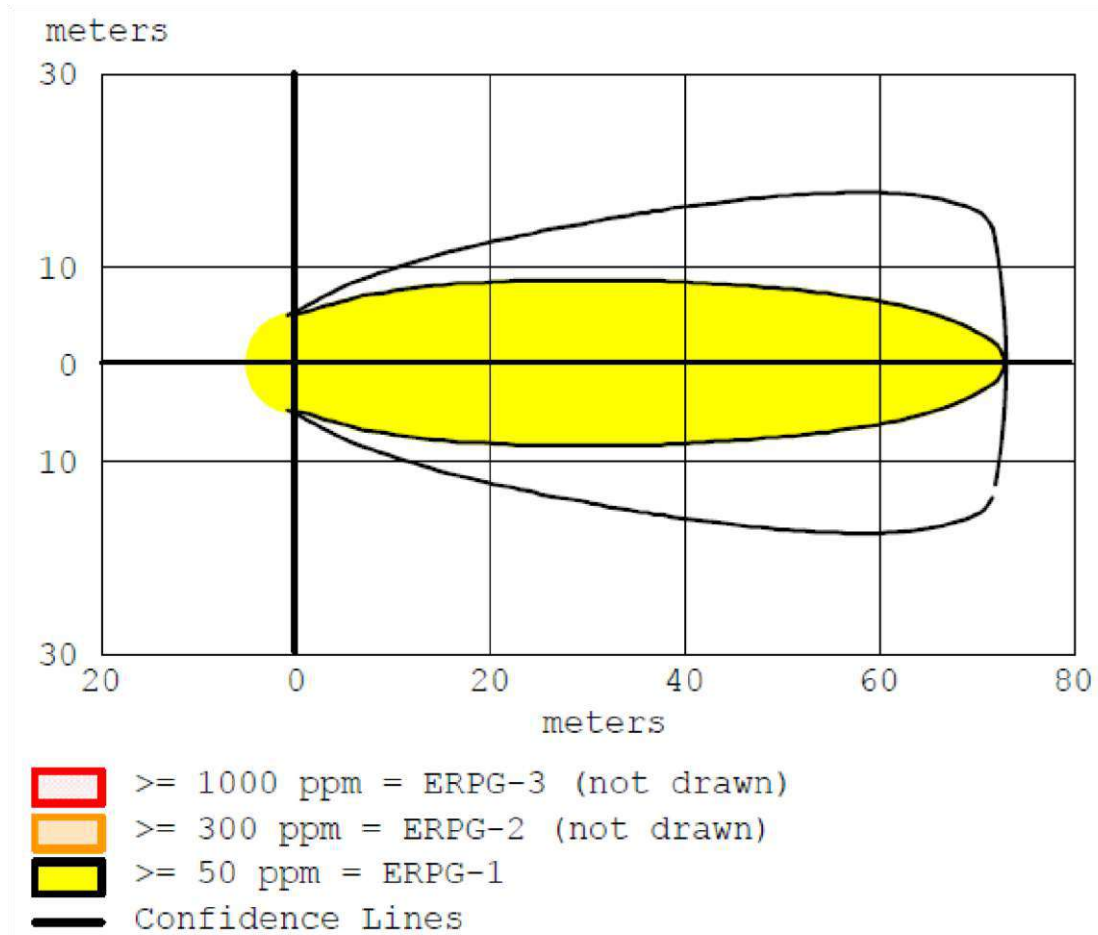
20.1.2.5 Instantaneous Release – Overpressure (Graph)



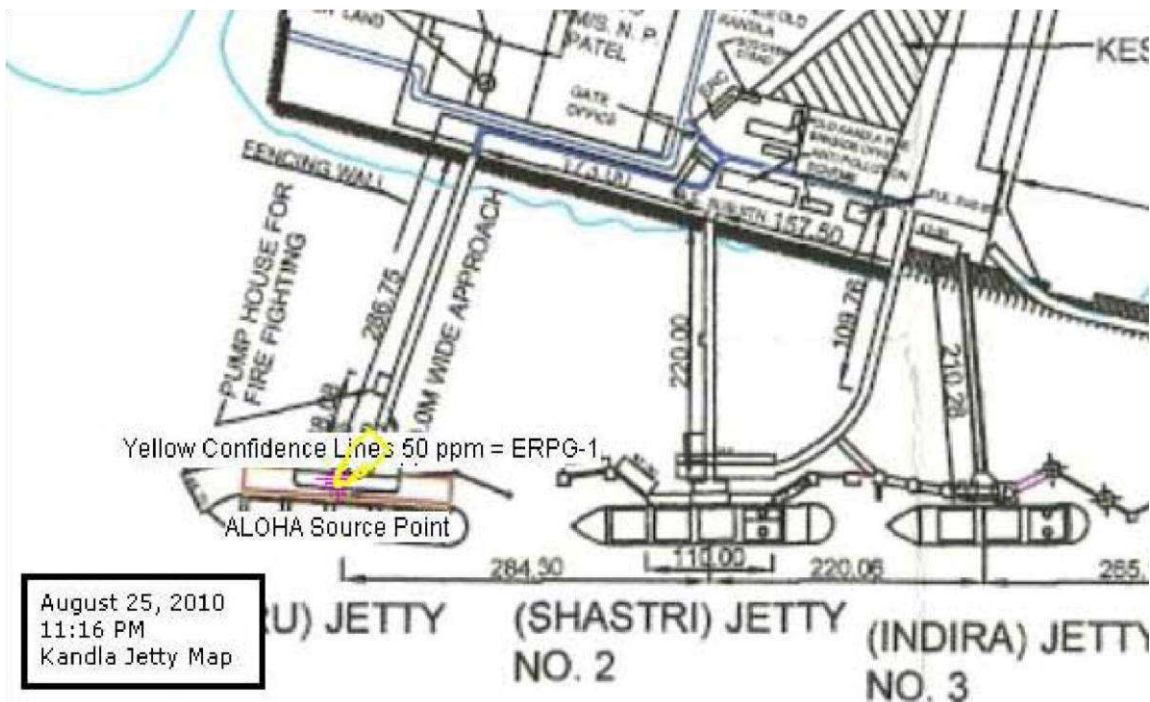
20.1.2.6 Instantaneous Release – Overpressure (Contour)



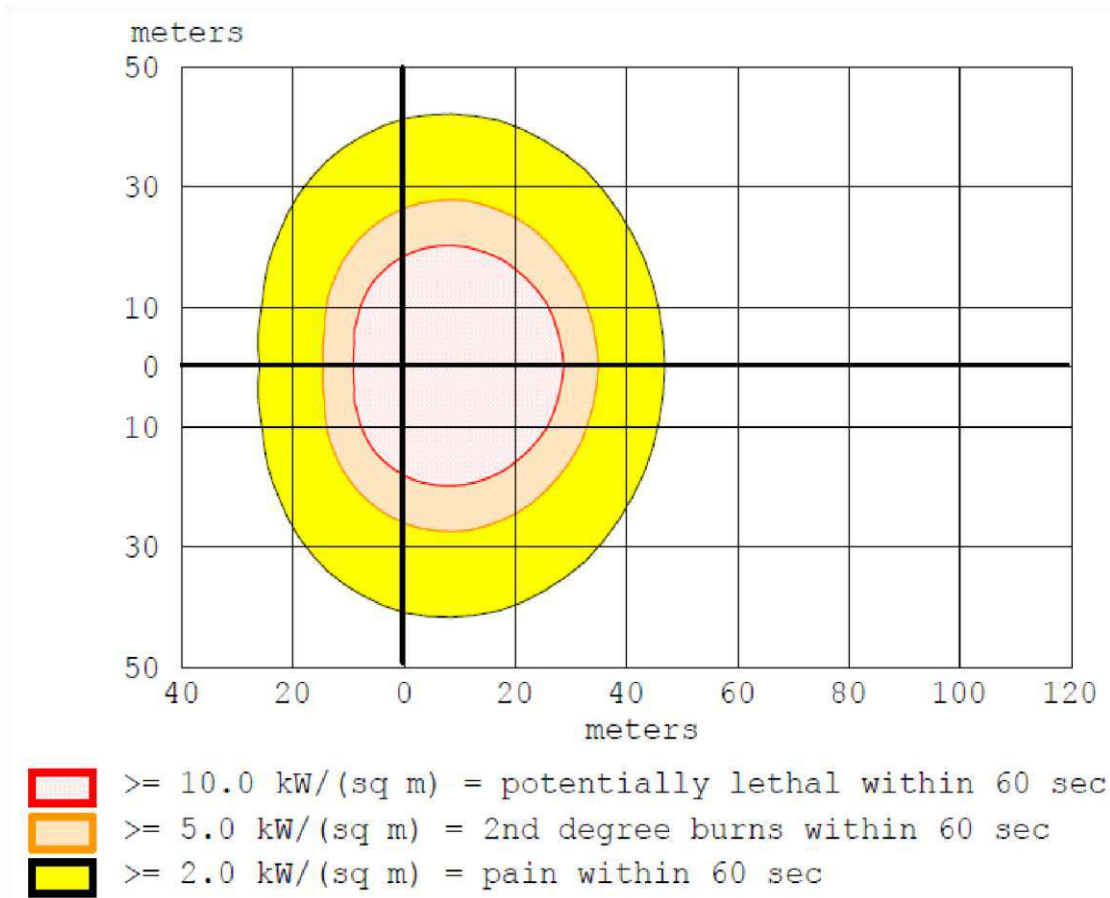
20.1.2.7 Evaporating Puddle – Toxic Threat Zone (Graph)



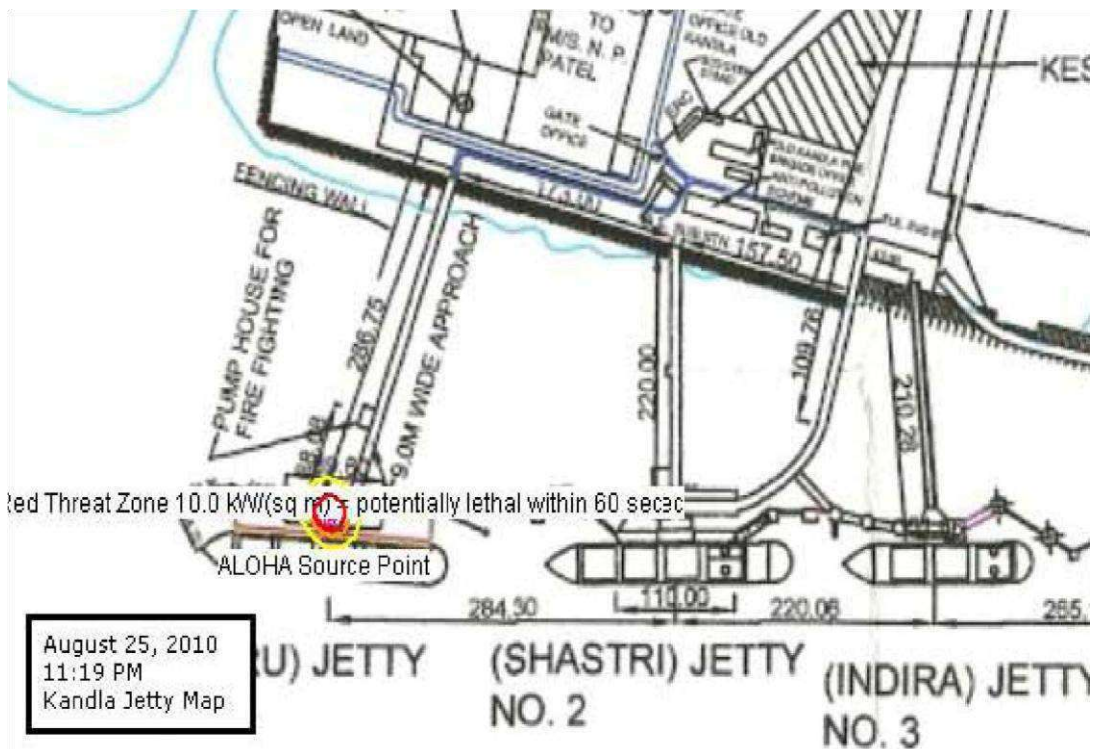
20.1.2.8 Evaporating Puddle – Toxic Threat Zone (Contour)



20.1.2.9 Burning Puddle – Thermal Radiation (Graph)

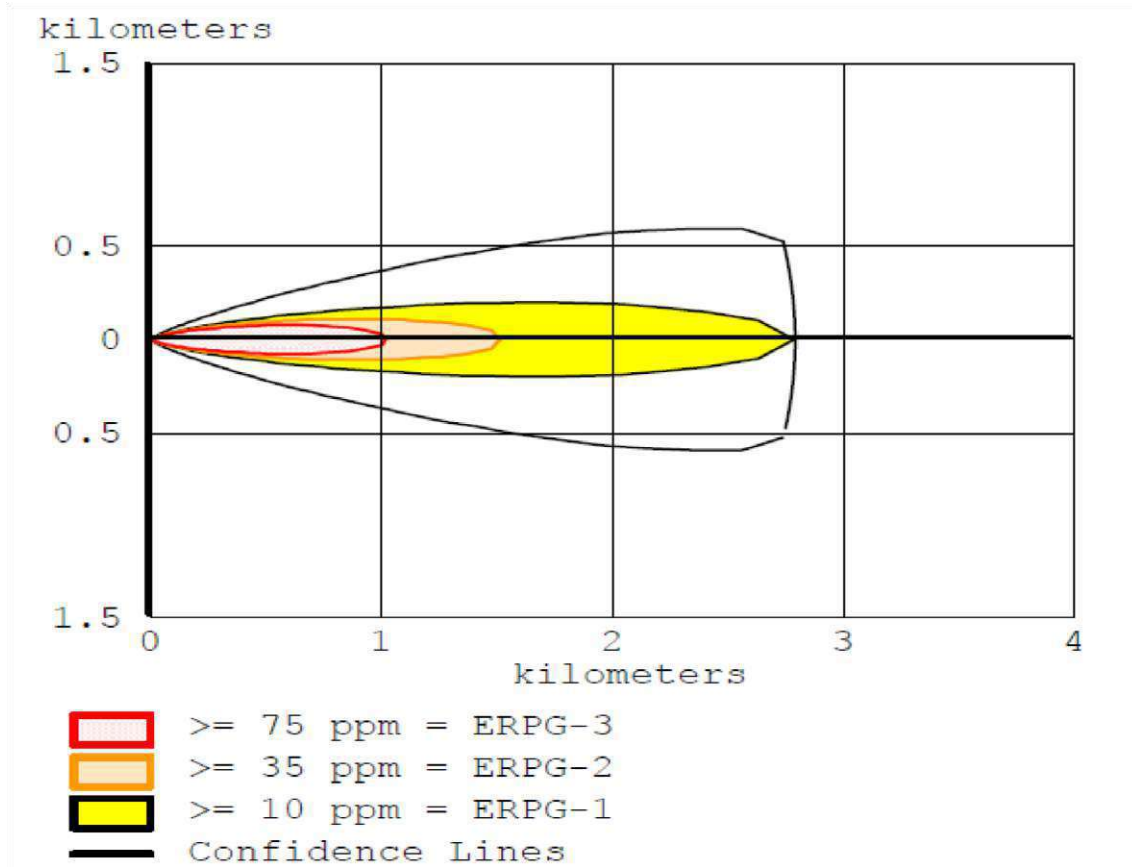


20.1.2.10 Burning Puddle – Thermal Radiation (Contour)

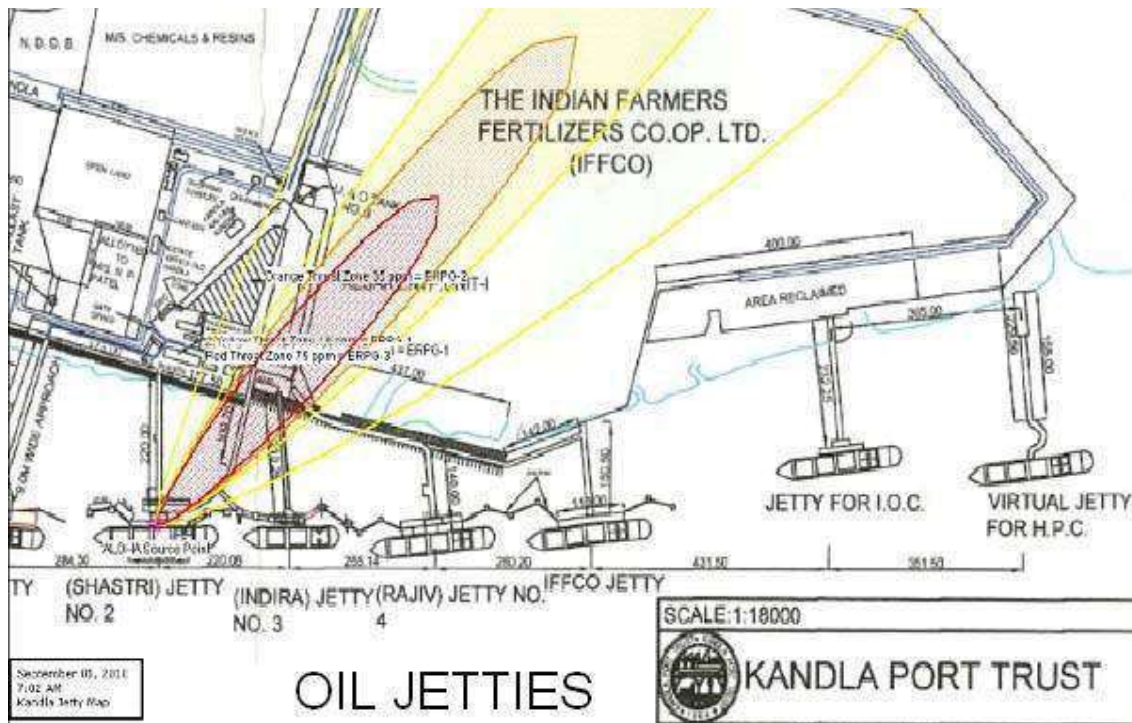


20.1.3 Jetty Two – Acrylonitrile

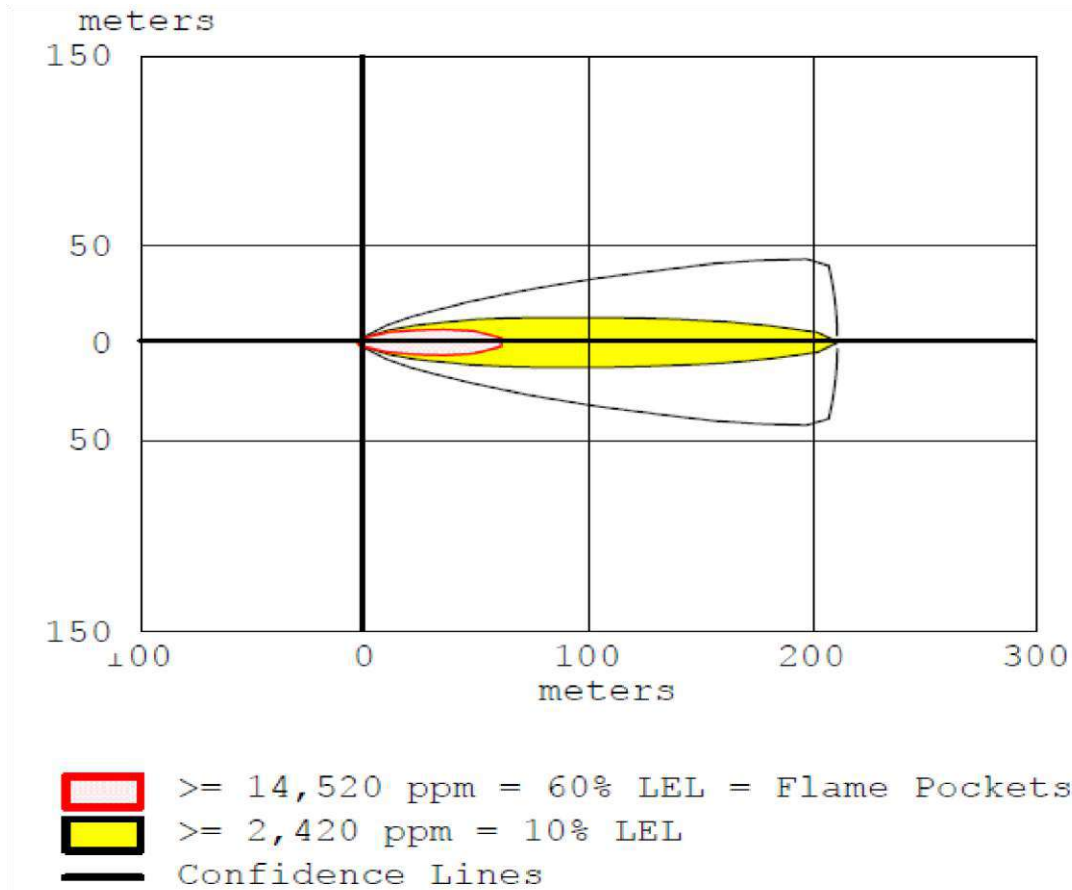
20.1.3.1 Instantaneous Release – Toxic Threat Zone (Graph)



20.1.3.2 Instantaneous Release – Toxic Threat Zone (Contour)



20.1.3.3 Instantaneous Release – Flammable Area of Vapor Cloud (Graph)



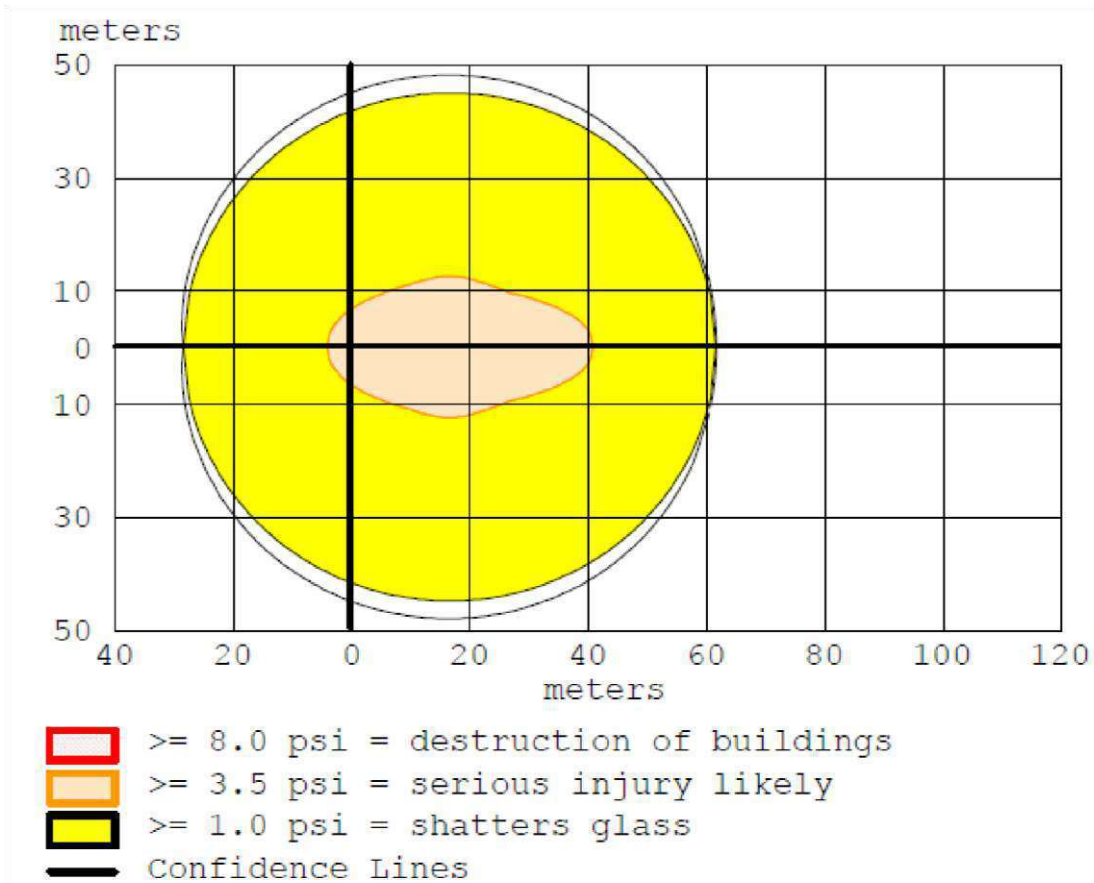
20.1.3.4 Instantaneous Release – Flammable Area of Vapor Cloud (Contour)



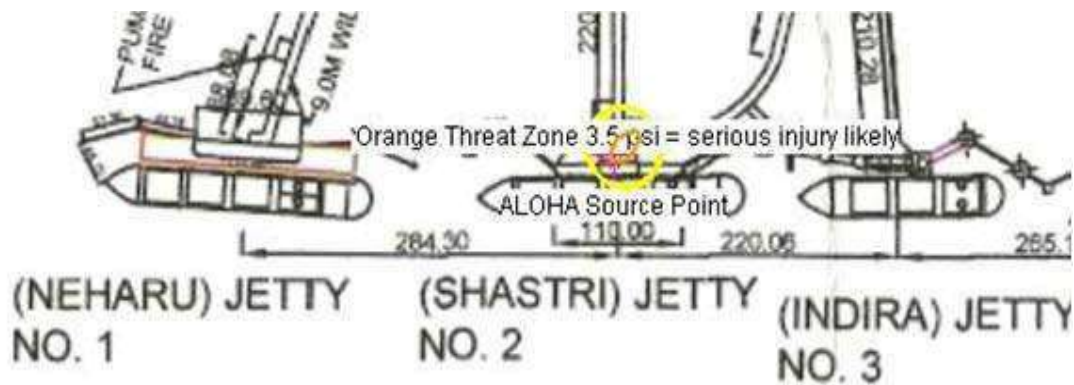
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 Kandla Jetty Map

OIL JETTIES

20.1.3.5 Instantaneous Release – Overpressure (Graph)



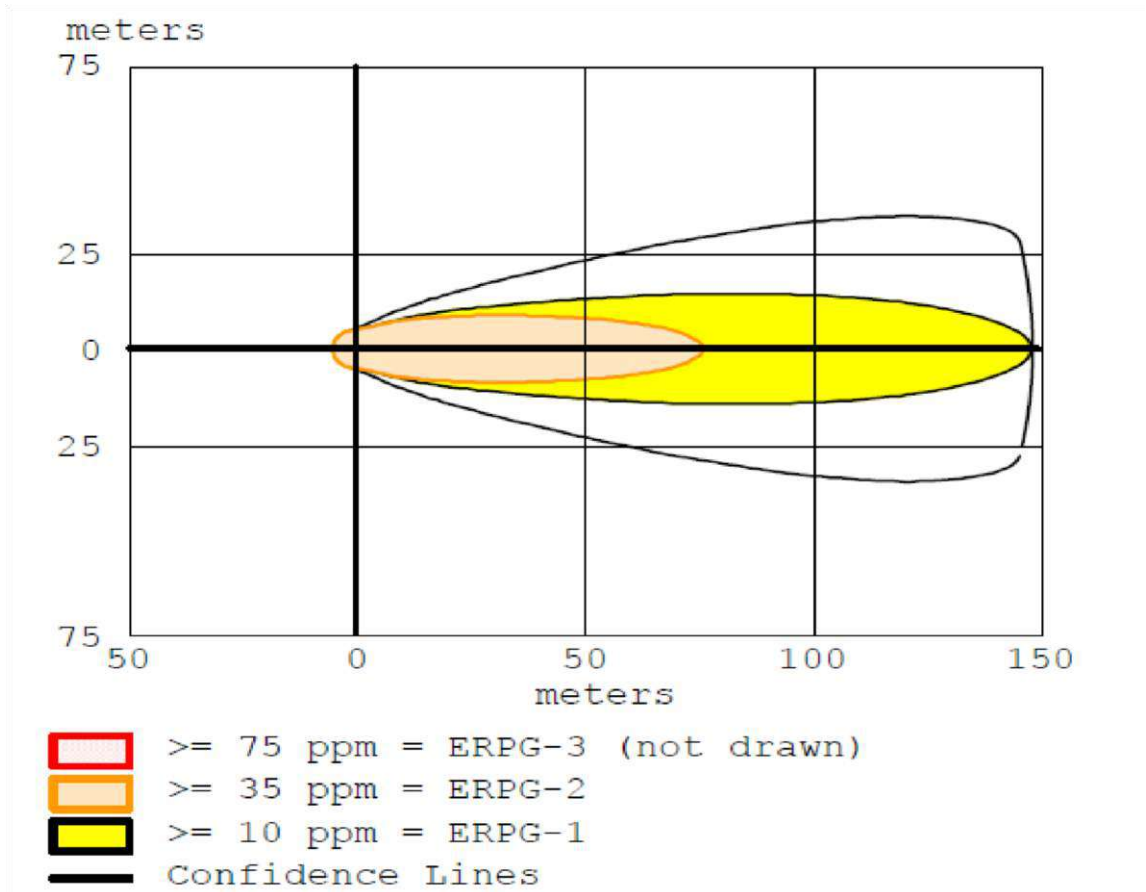
20.1.3.6 Instantaneous Release – Overpressure (Contour)



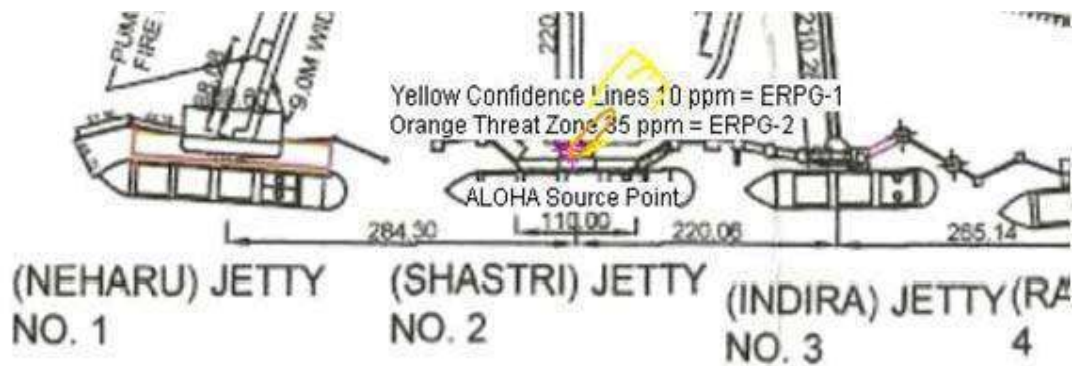
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Kandla Jetty Map

OIL JETTIES

20.1.3.7 Evaporating Puddle – Toxic Threat Zone (Graph)



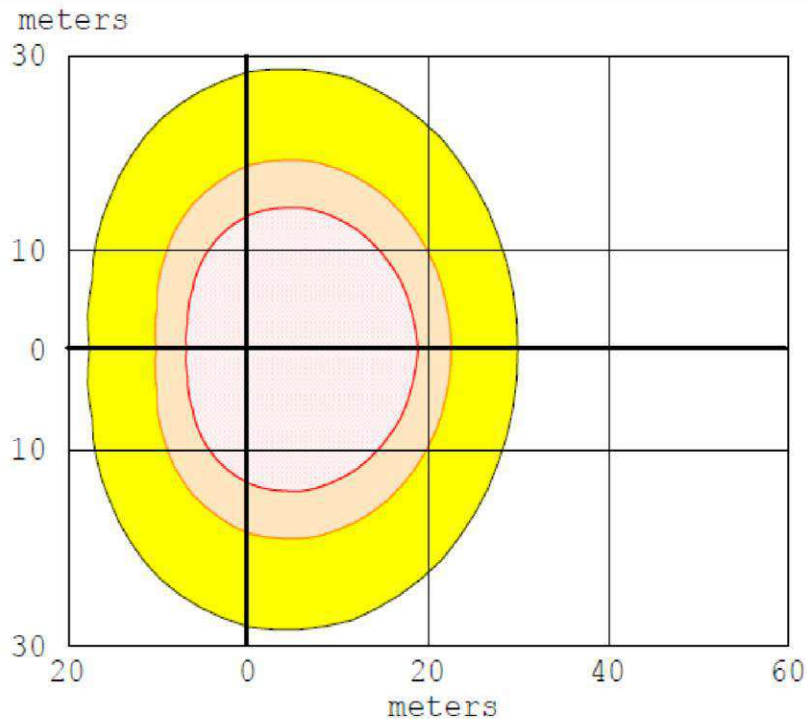
20.1.3.8 Evaporating Puddle – Toxic Threat Zone (Contour)



August 25, 2010
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Kandla Jetty Map

OIL JETTIES

20.1.3.9 Burning Puddle – Thermal Radiation (Graph)



- $\geq 10.0 \text{ kW}/(\text{sq m}) = \text{potentially lethal within 60 sec}$
- $\geq 5.0 \text{ kW}/(\text{sq m}) = \text{2nd degree burns within 60 sec}$
- $\geq 2.0 \text{ kW}/(\text{sq m}) = \text{pain within 60 sec}$

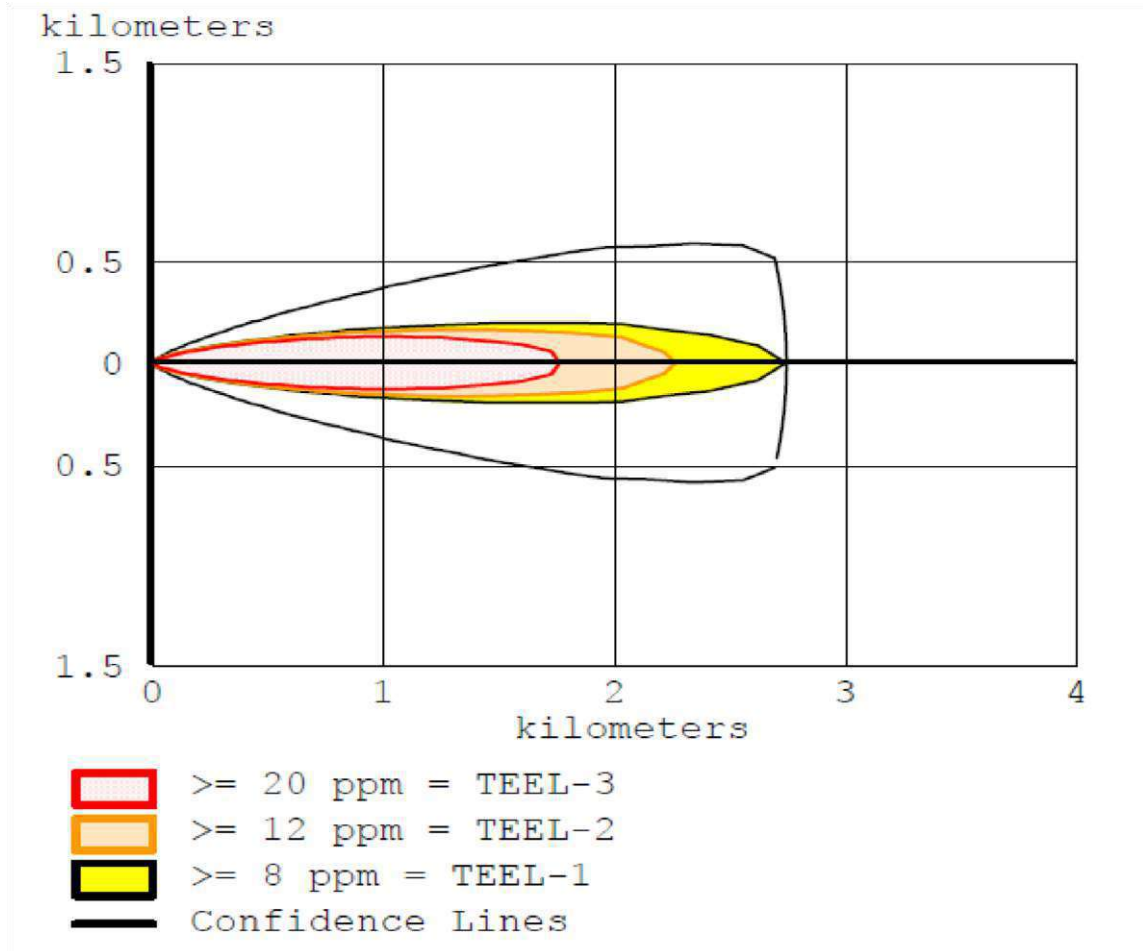
20.1.3.10 Burning Puddle – Thermal Radiation (Contour)



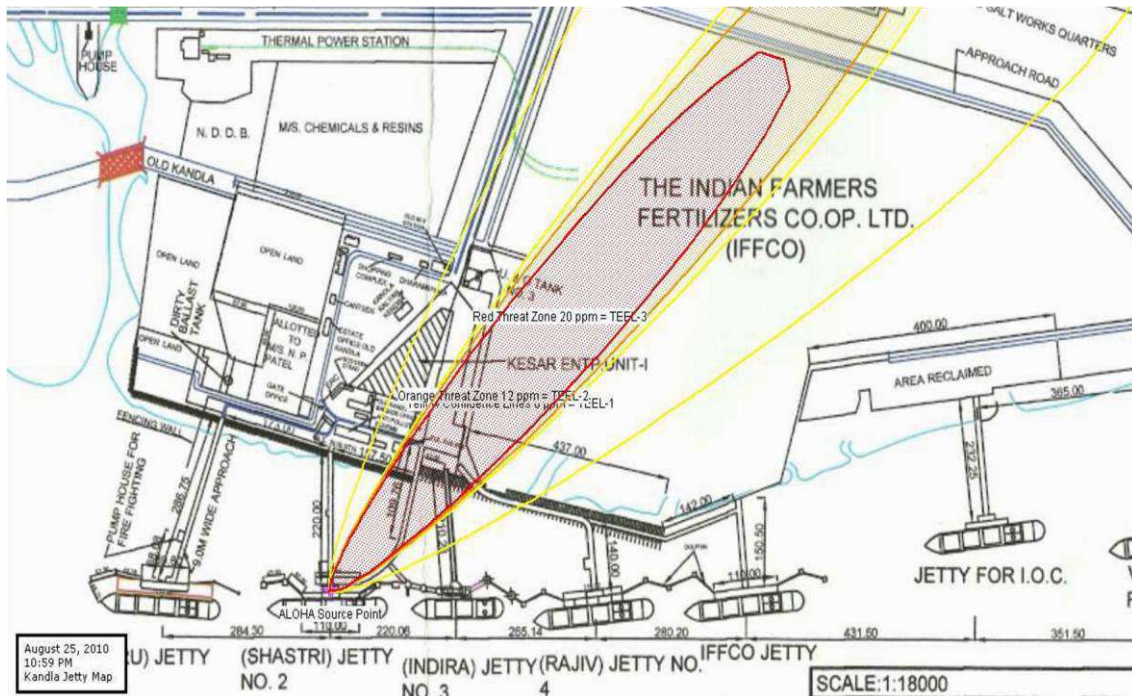
OIL JETTIES

August 25, 2010
2:51 PM
Kandla Jetty Map

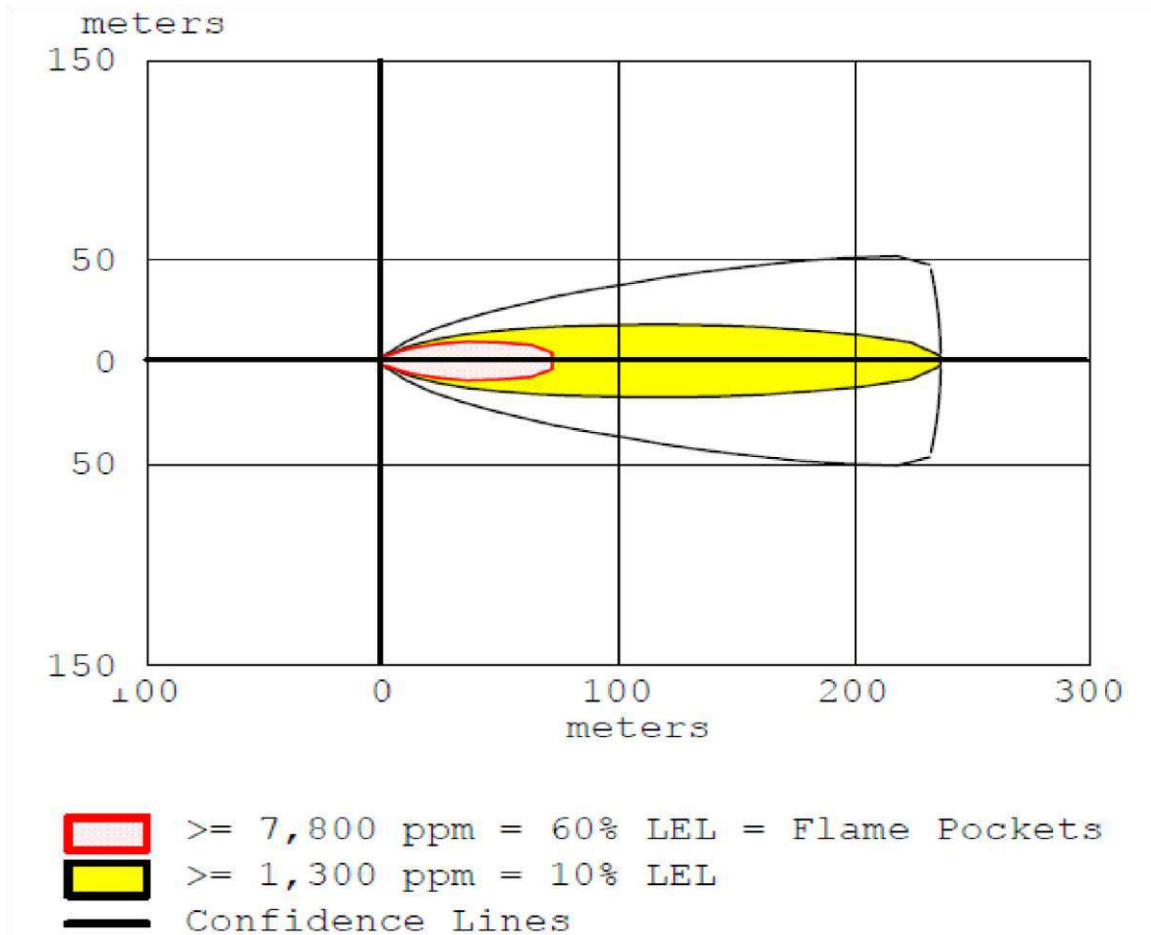
20.1.4.1 Instantaneous Release – Toxic Threat Zone (Graph)



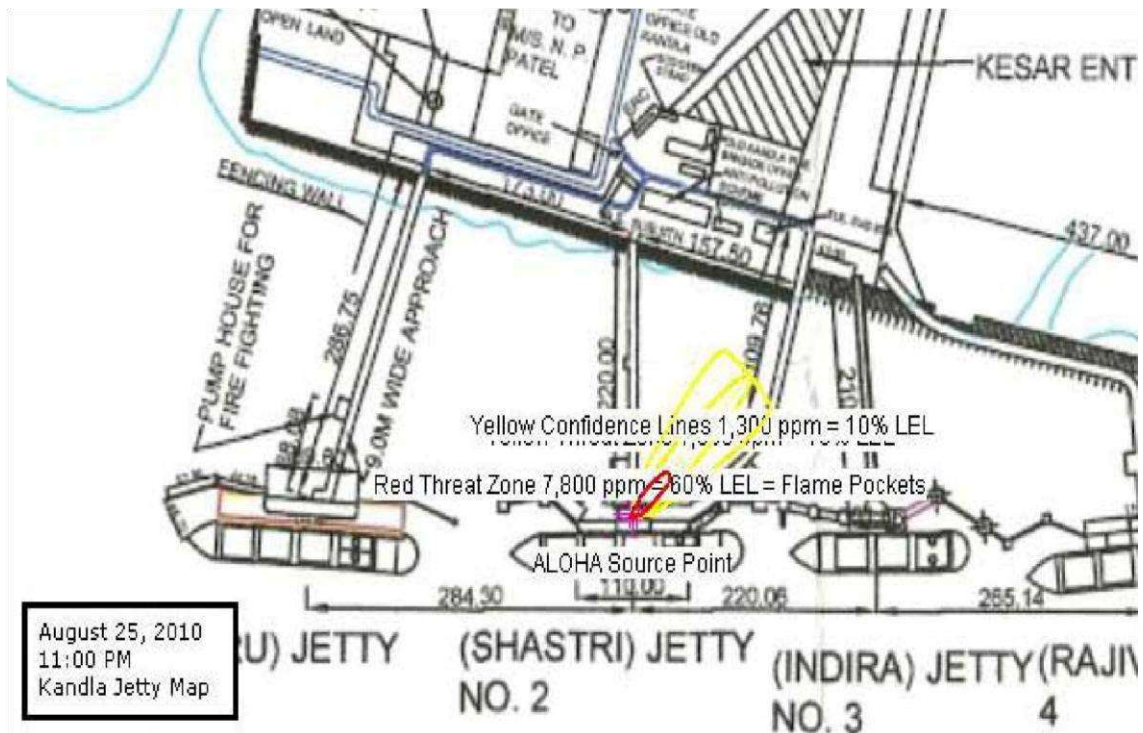
20.1.4.2 Instantaneous Release – Toxic Threat Zone (Contour)



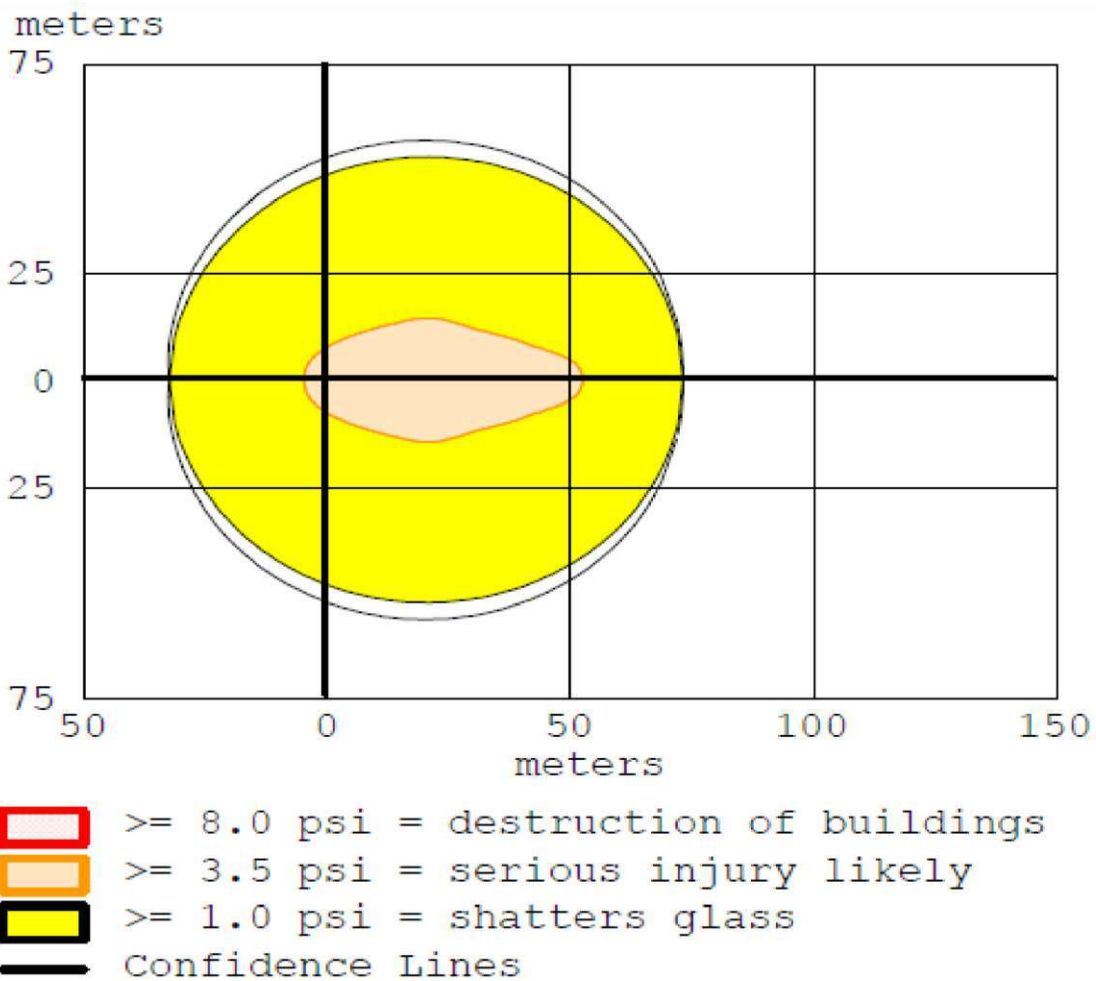
20.1.4.3 Instantaneous Release – Flammable Area of Vapor Cloud (Graph)



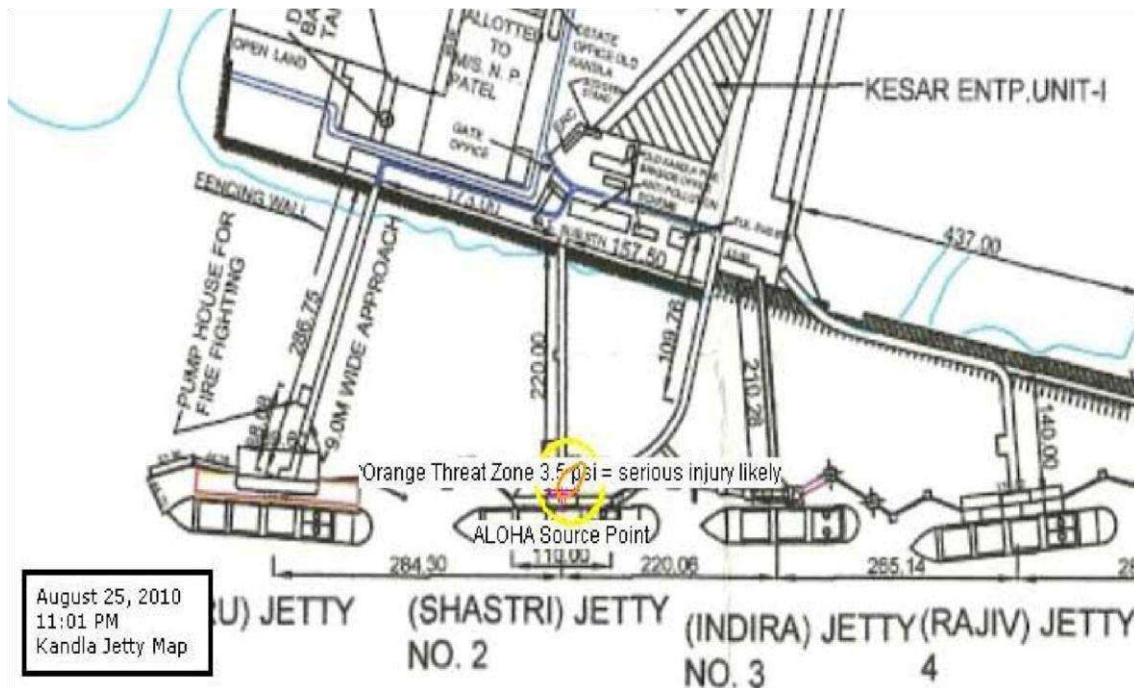
20.1.4.4 Instantaneous Release – Flammable Area of Vapor Cloud (Contour)



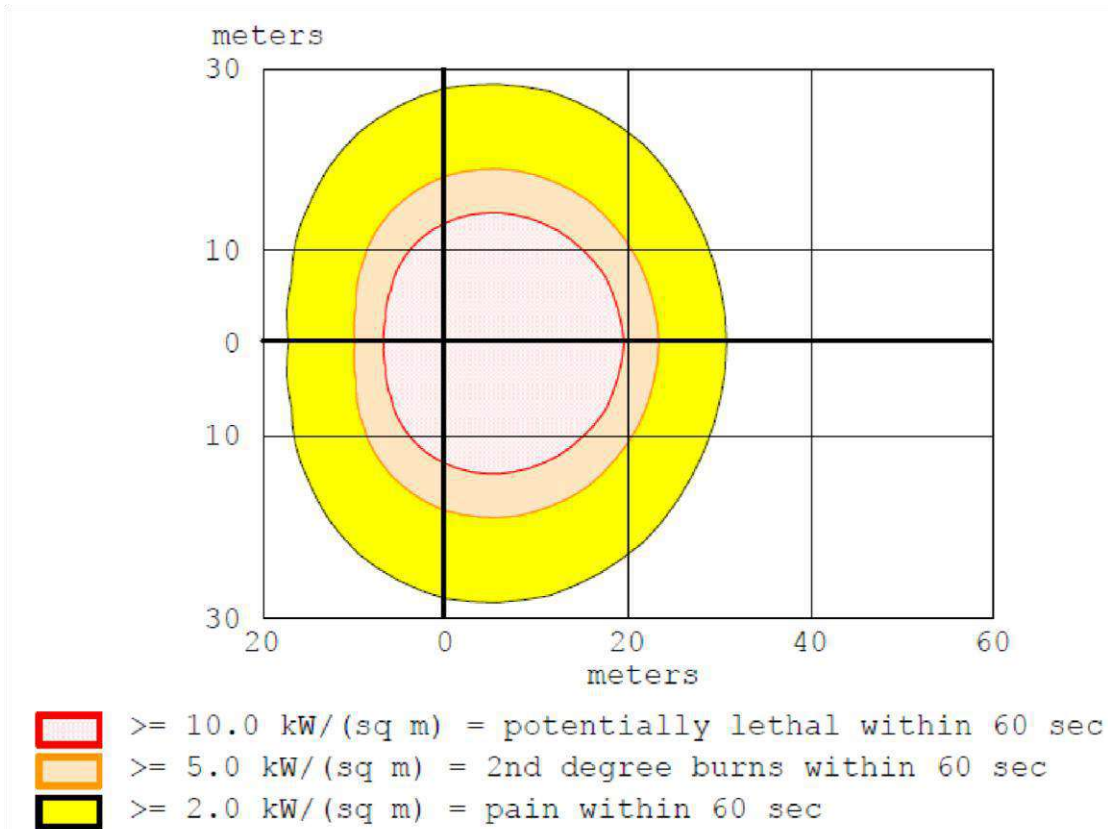
20.1.4.5 Instantaneous Release – Overpressure (Graph)



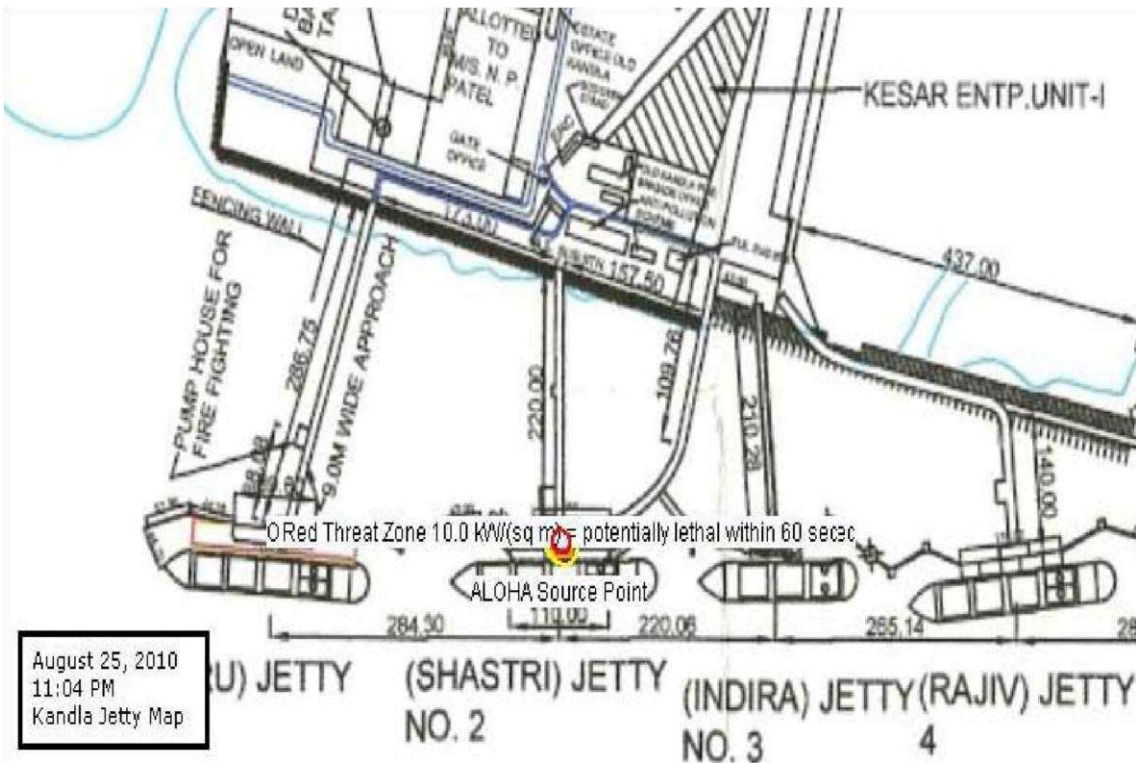
20.1.4.6 Instantaneous Release – Overpressure (Contour)



20.1.4.7 Burning Puddle – Thermal Radiation (Graph)

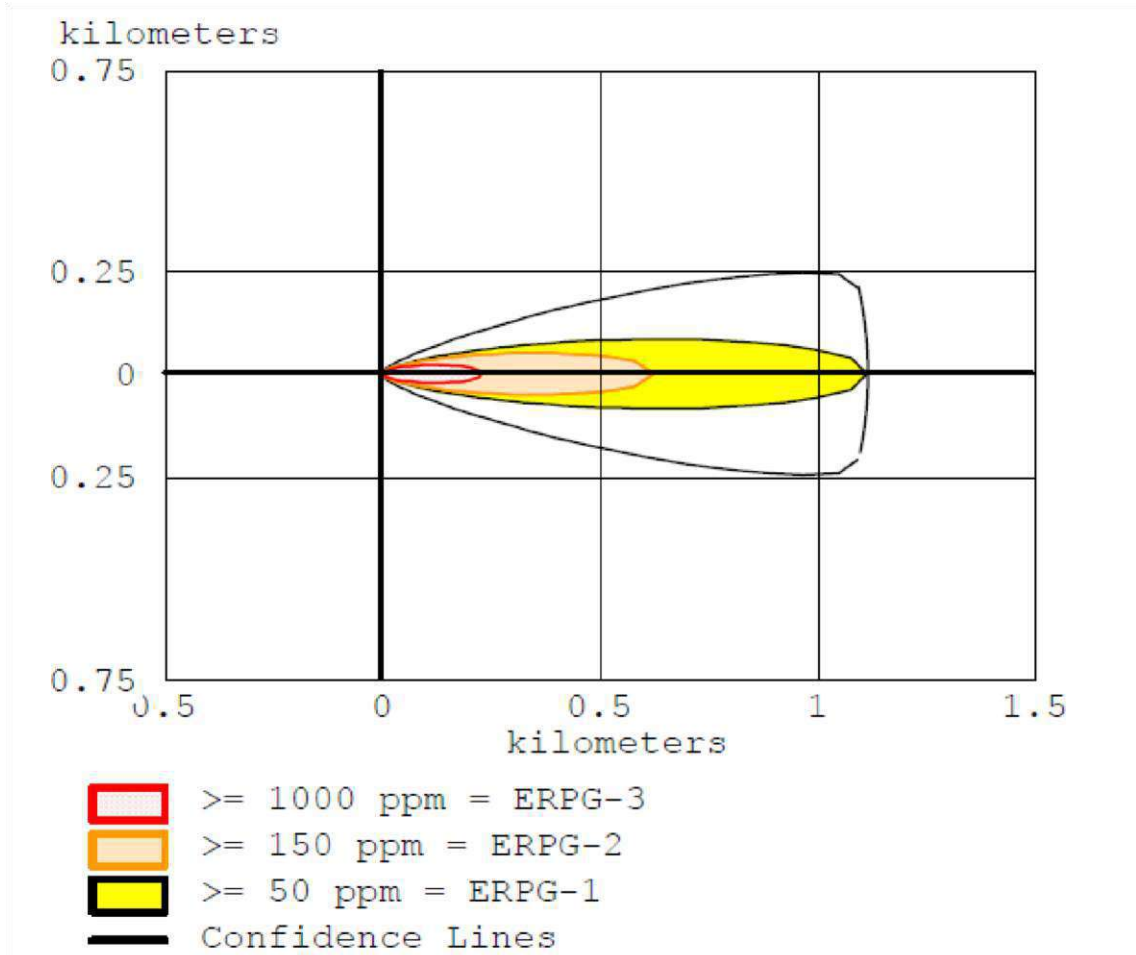


20.1.4.8 Burning Puddle – Thermal Radiation (Contour)

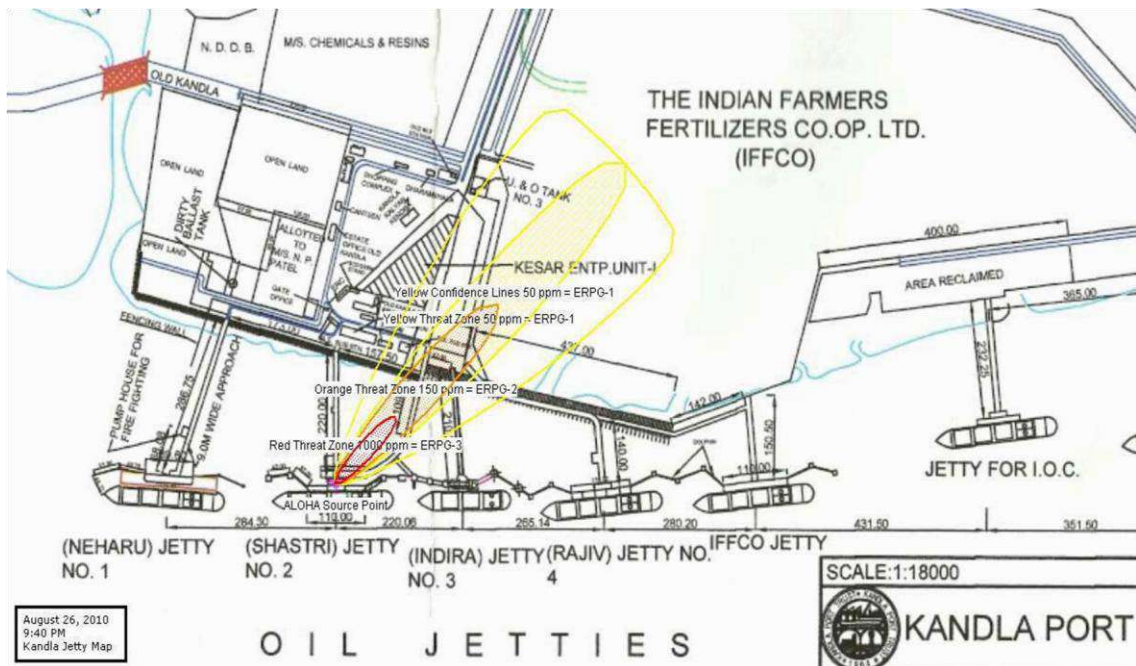


20.1.5 Jetty Two – Benzene

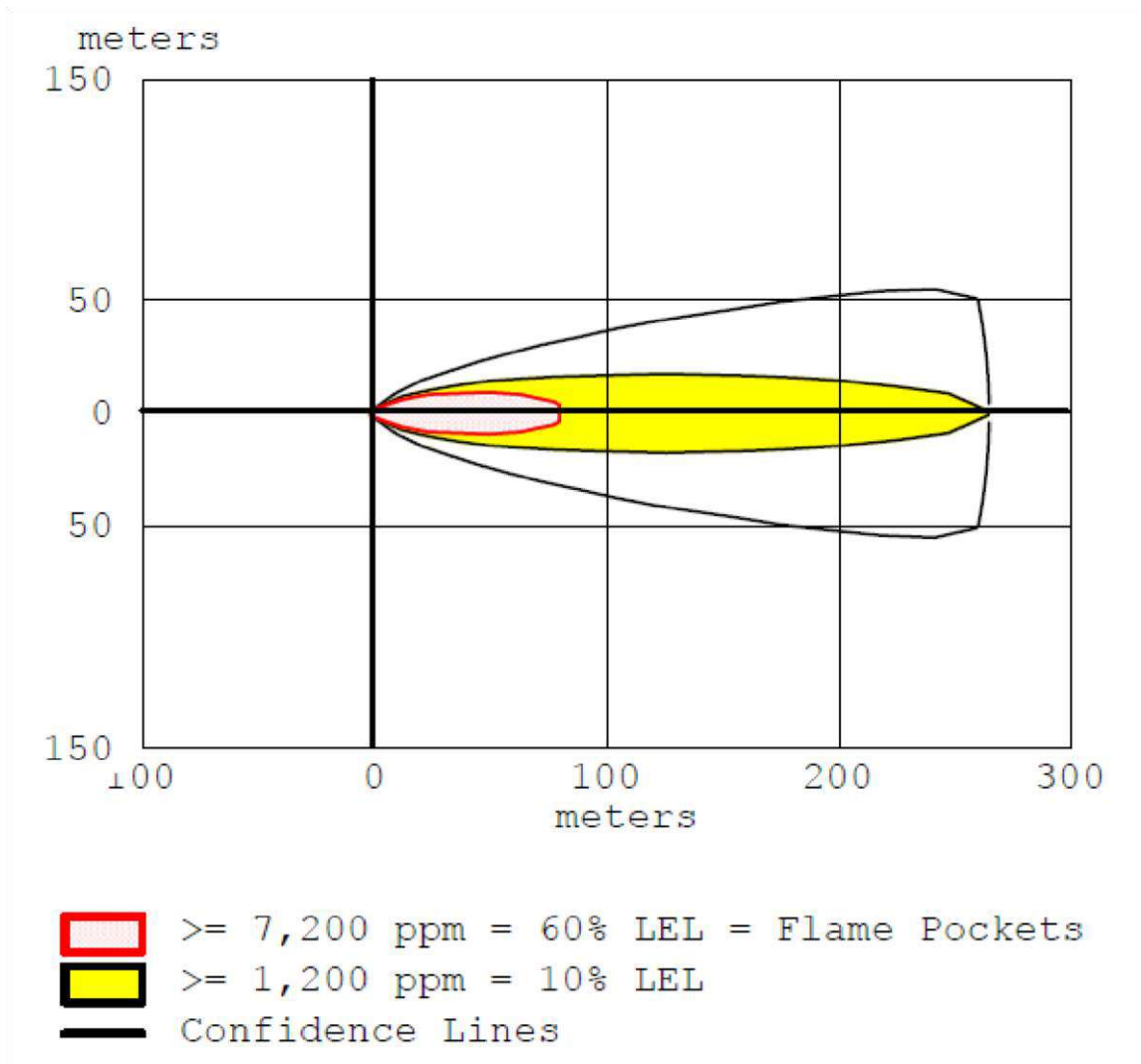
20.1.5.1 Instantaneous Release – Toxic Threat Zone (Graph)



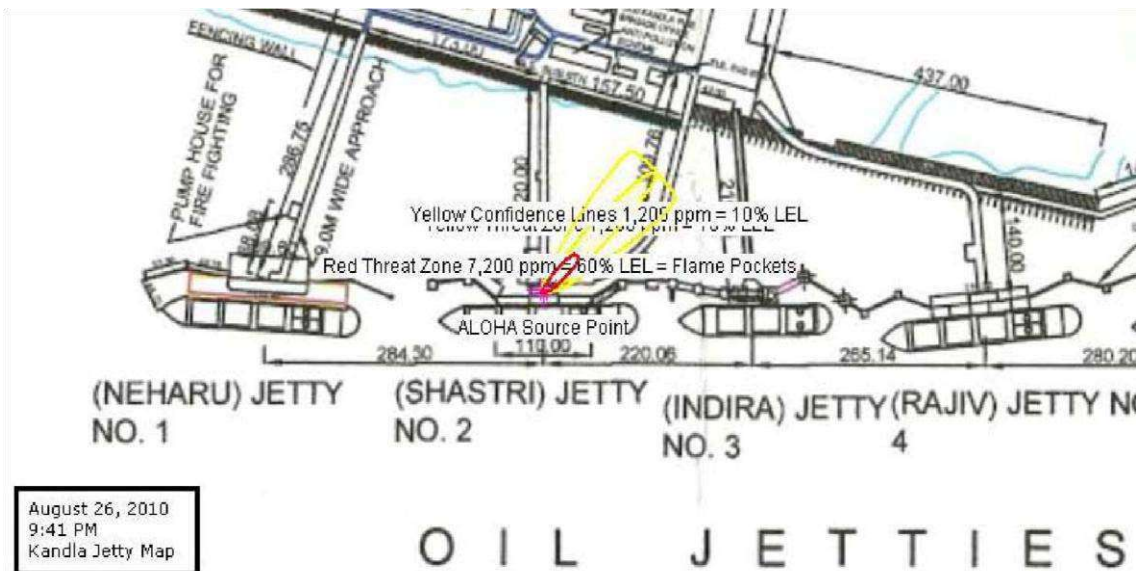
20.1.5.2 Instantaneous Release – Toxic Threat Zone (Contour)



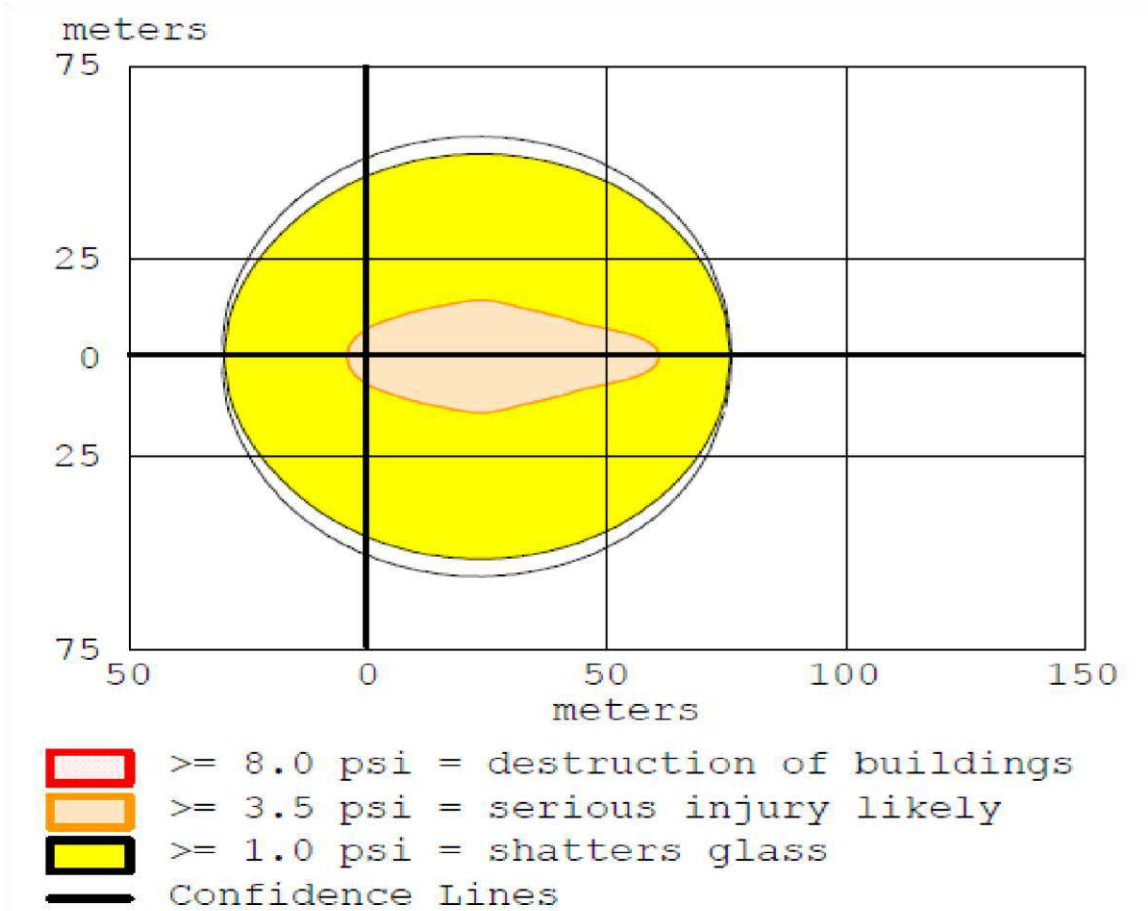
20.1.5.3 Instantaneous Release – Flammable Area of Vapor Cloud (Graph)



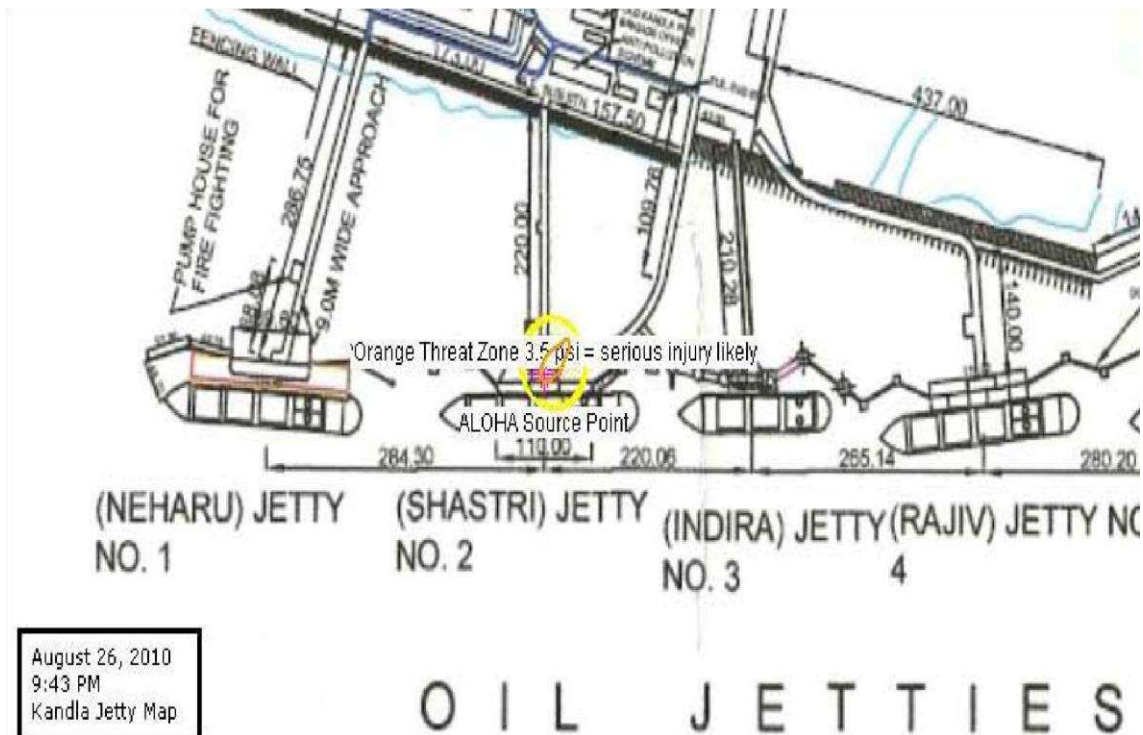
20.1.5.4 Instantaneous Release – Flammable Area of Vapor Cloud (Contour)



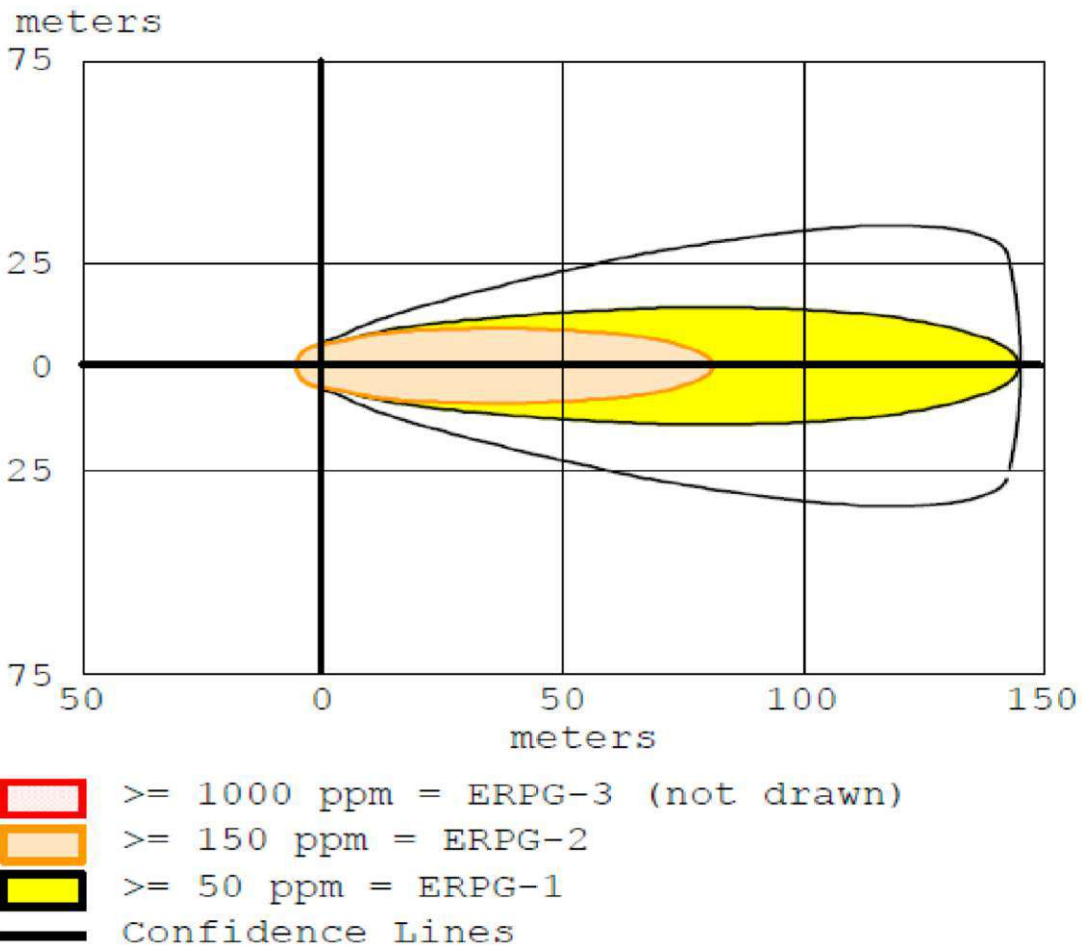
20.1.5.5 Instantaneous Release – Overpressure (Graph)



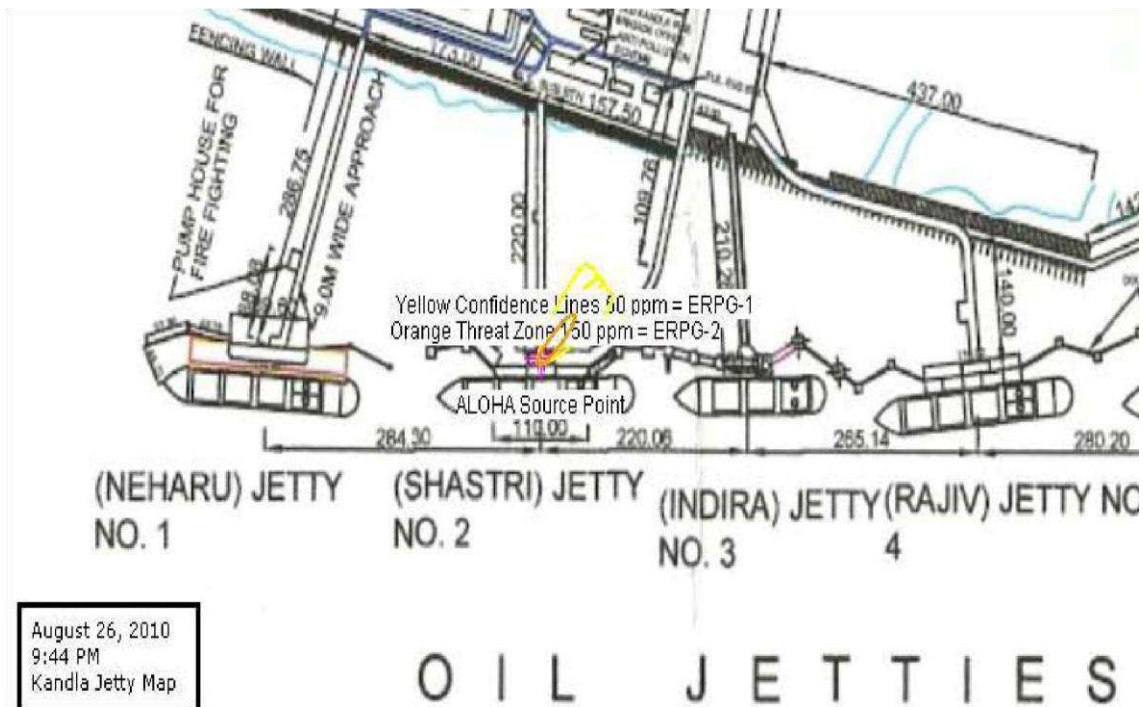
20.1.5.6 Instantaneous Release – Overpressure (Contour)



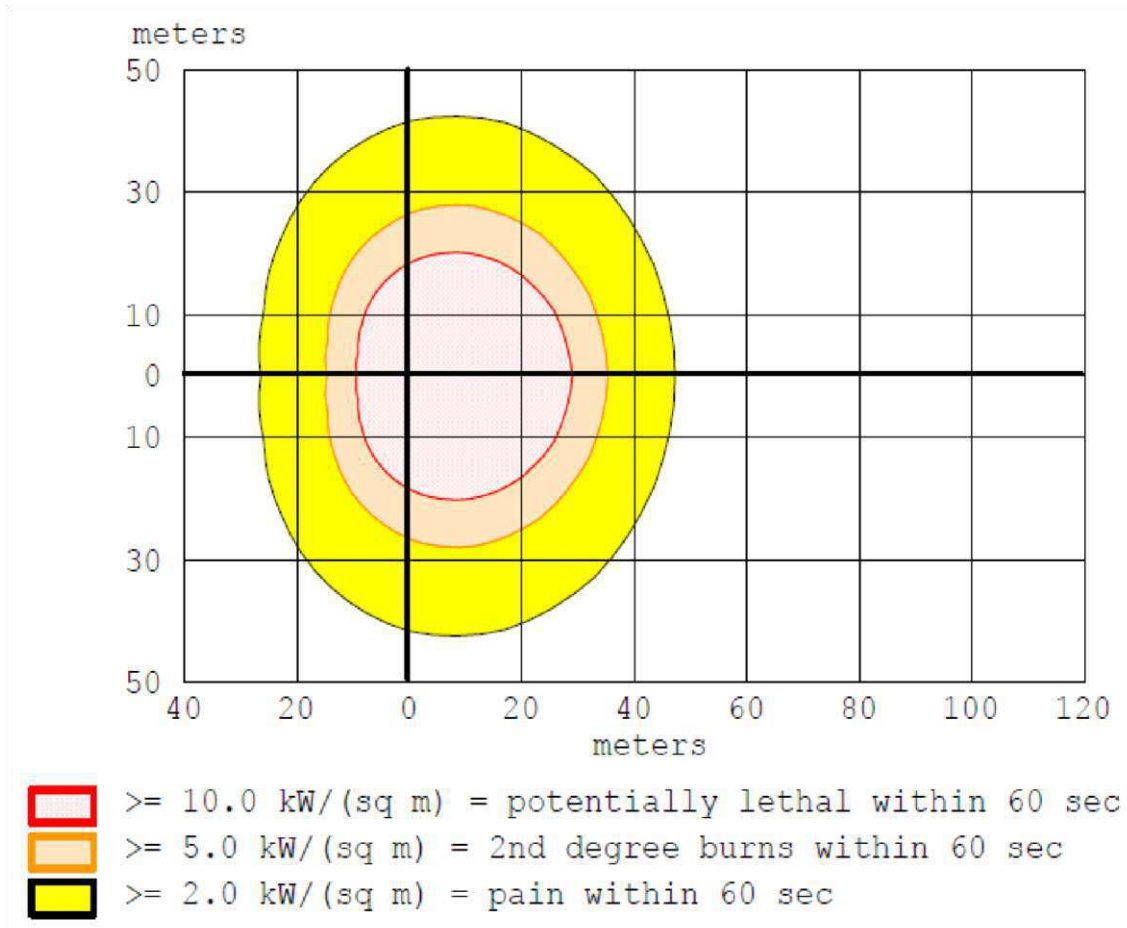
20.1.5.7 Evaporating Puddle – Toxic Threat Zone (Graph)



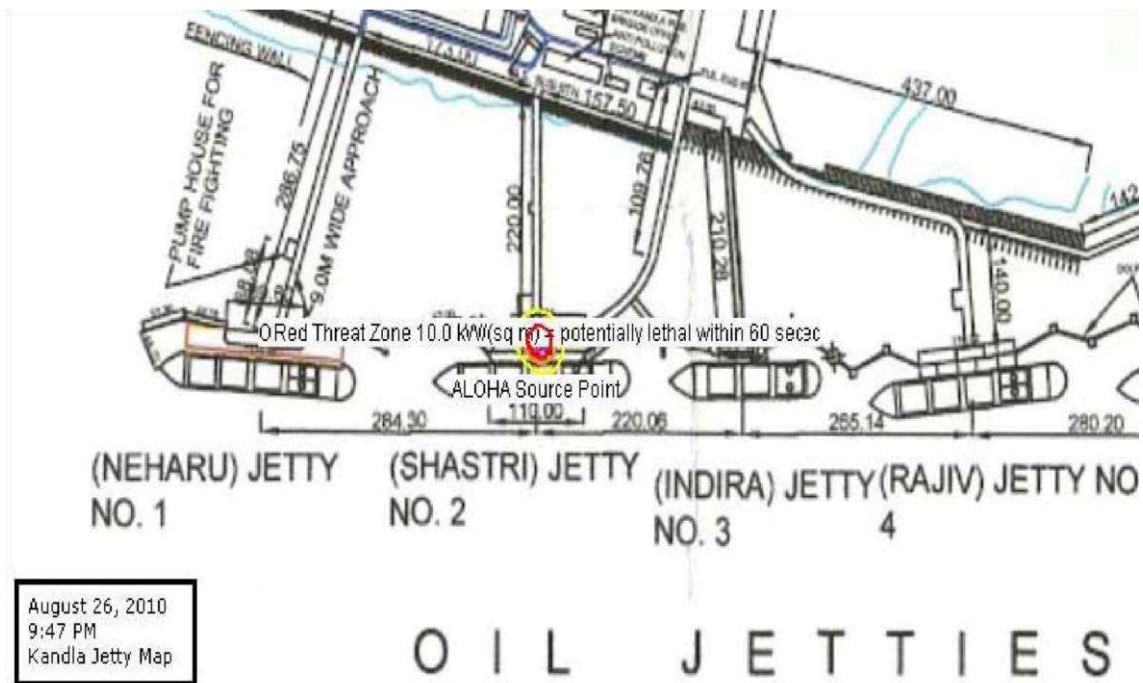
20.1.5.8 Evaporating Puddle – Toxic Threat Zone (Contour)



20.1.5.9 Burning Puddle – Thermal Radiation (Graph)

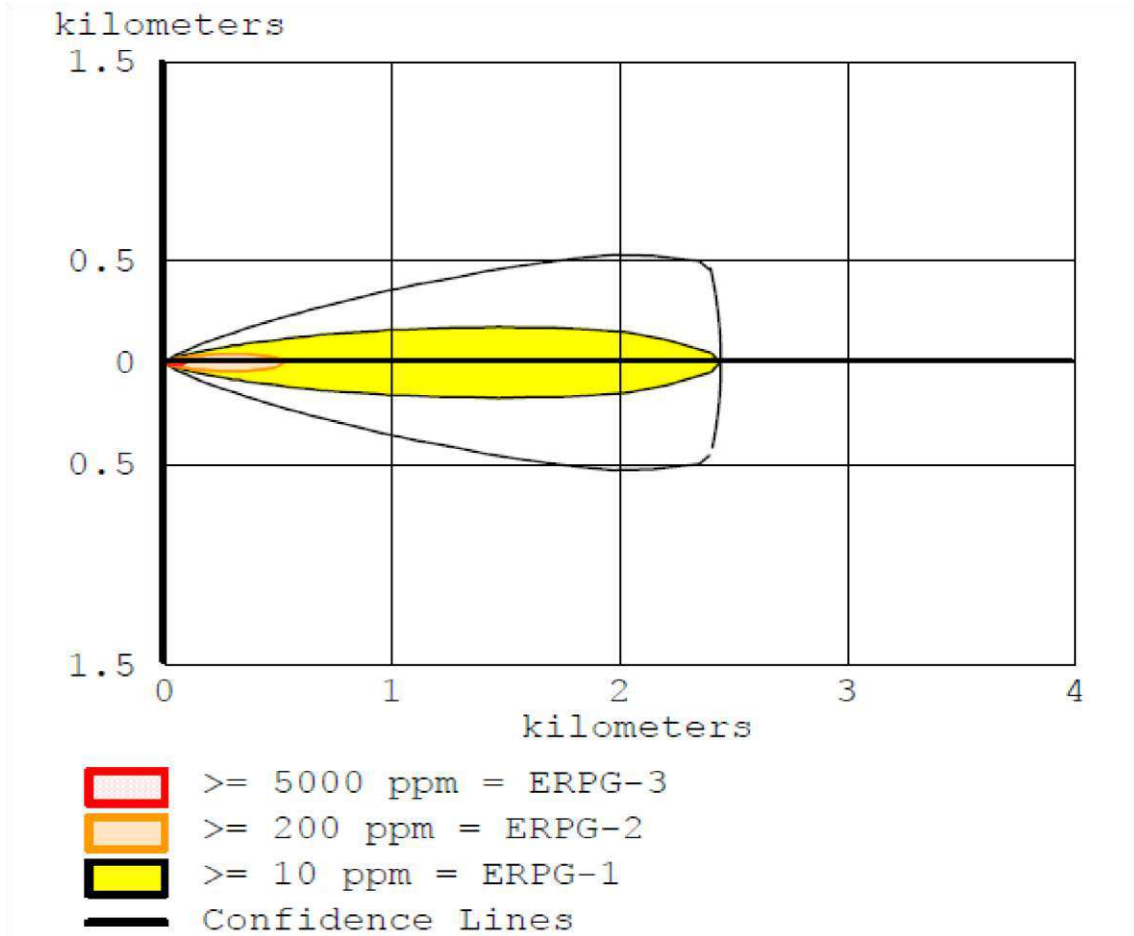


20.1.5.10 Burning Puddle – Thermal Radiation (Contour)

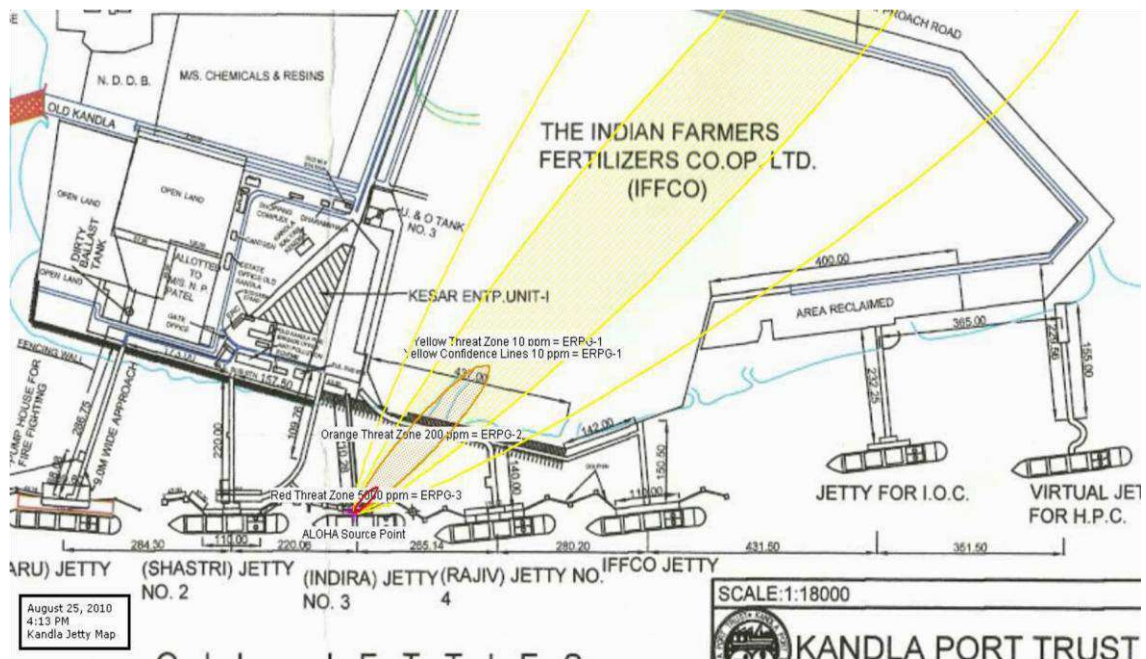


20.1.6 Jetty Three – 1:3, Butadiene

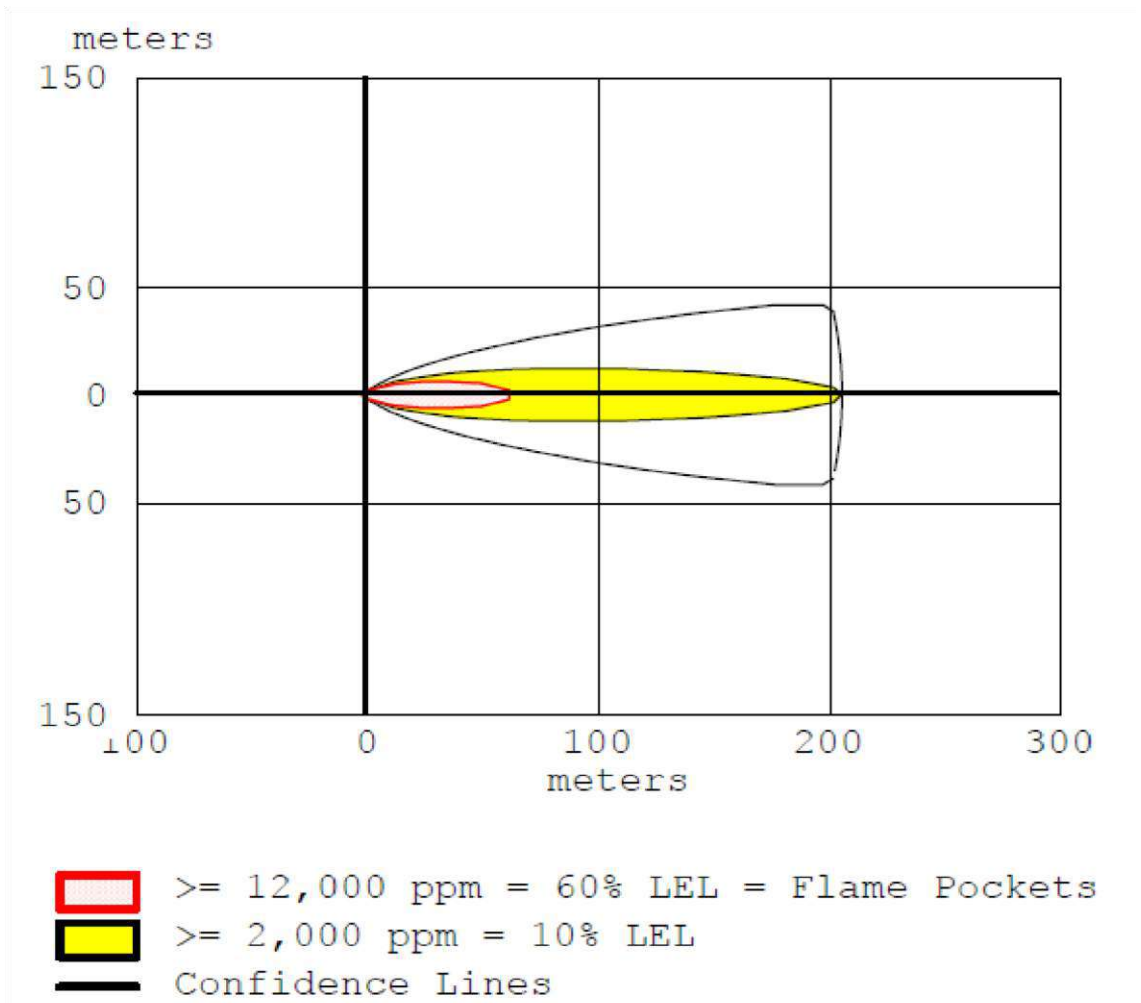
20.1.6.1 Instantaneous Release – Toxic Threat Zone (Graph)



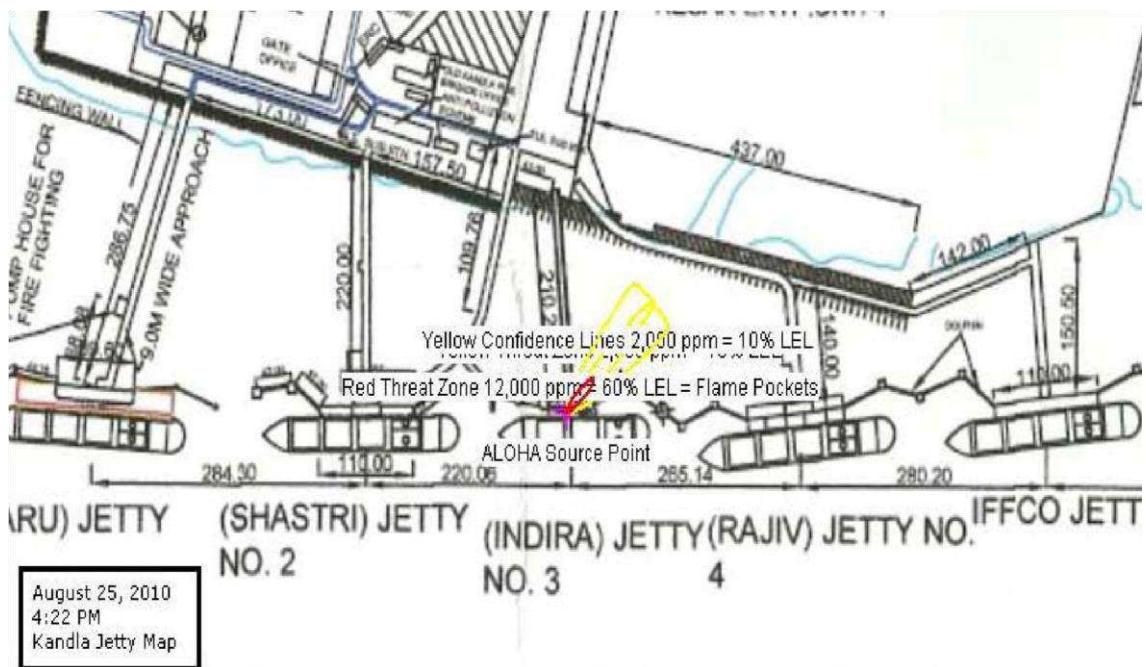
20.1.6.2 Instantaneous Release – Toxic Threat Zone (Contour)



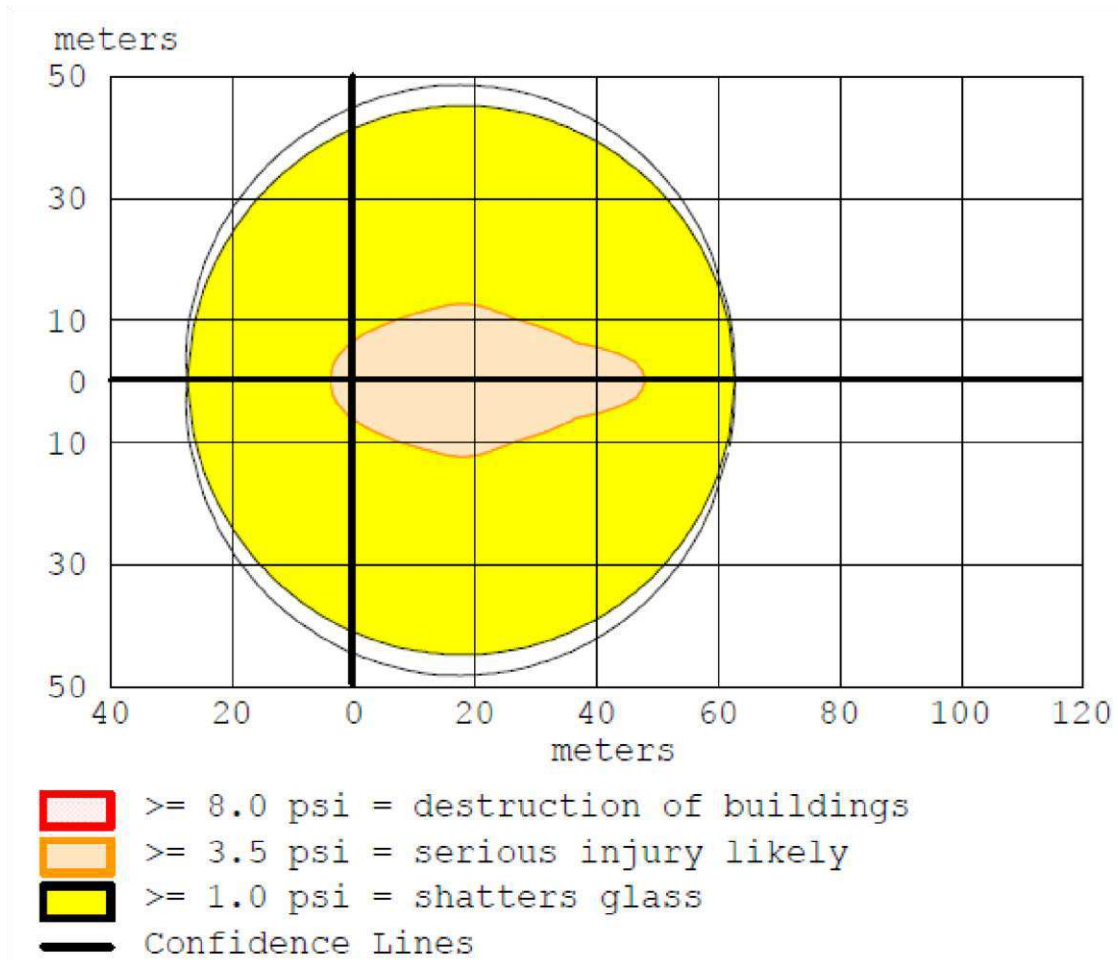
20.1.6.3 Instantaneous Release – Flammable Area of Vapor Cloud (Graph)



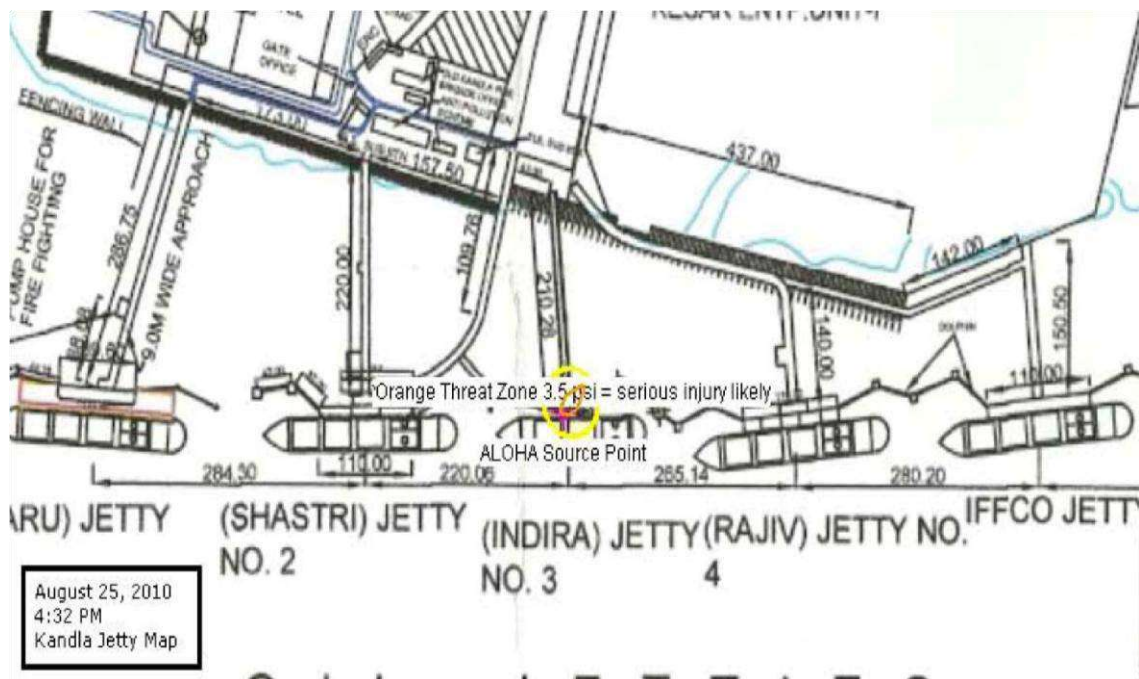
20.1.6.4 Instantaneous Release – Flammable Area of Vapor Cloud (Contour)



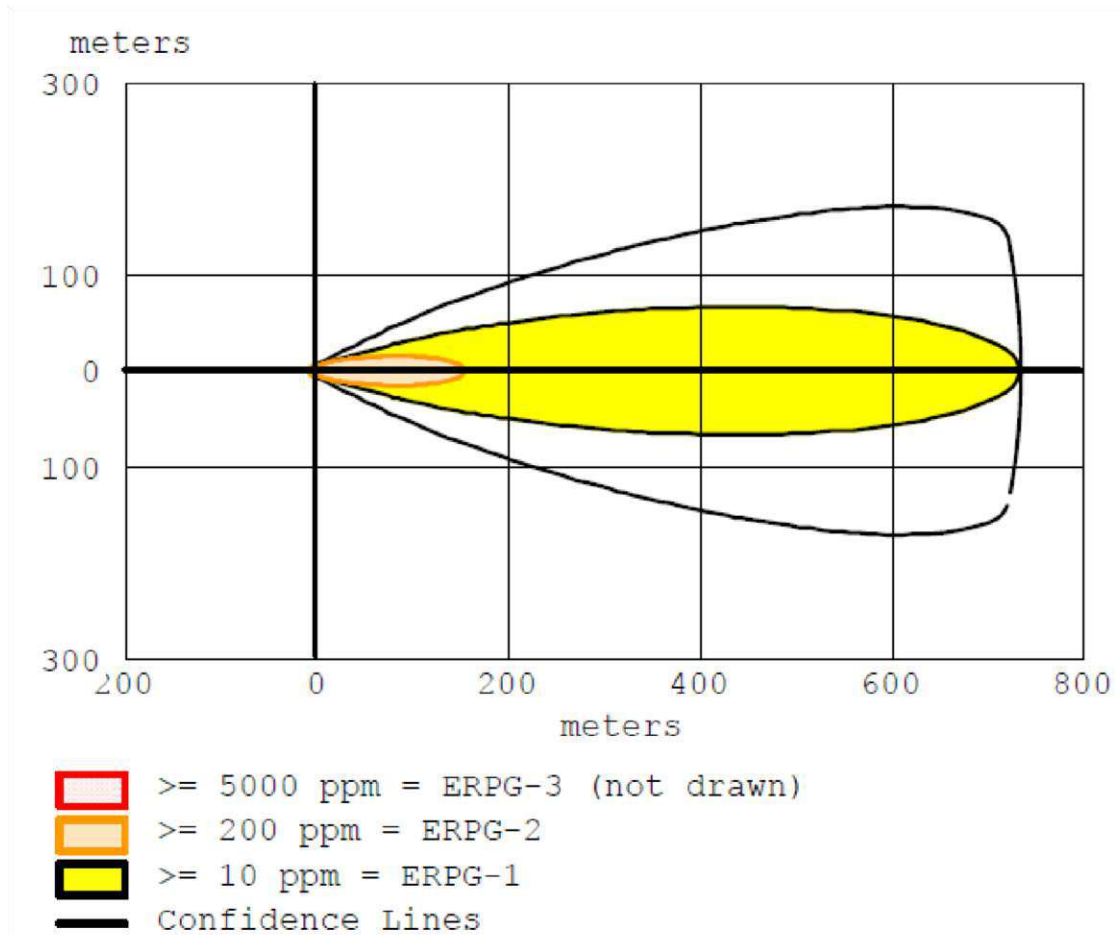
20.1.6.5 Instantaneous Release – Overpressure (Graph)



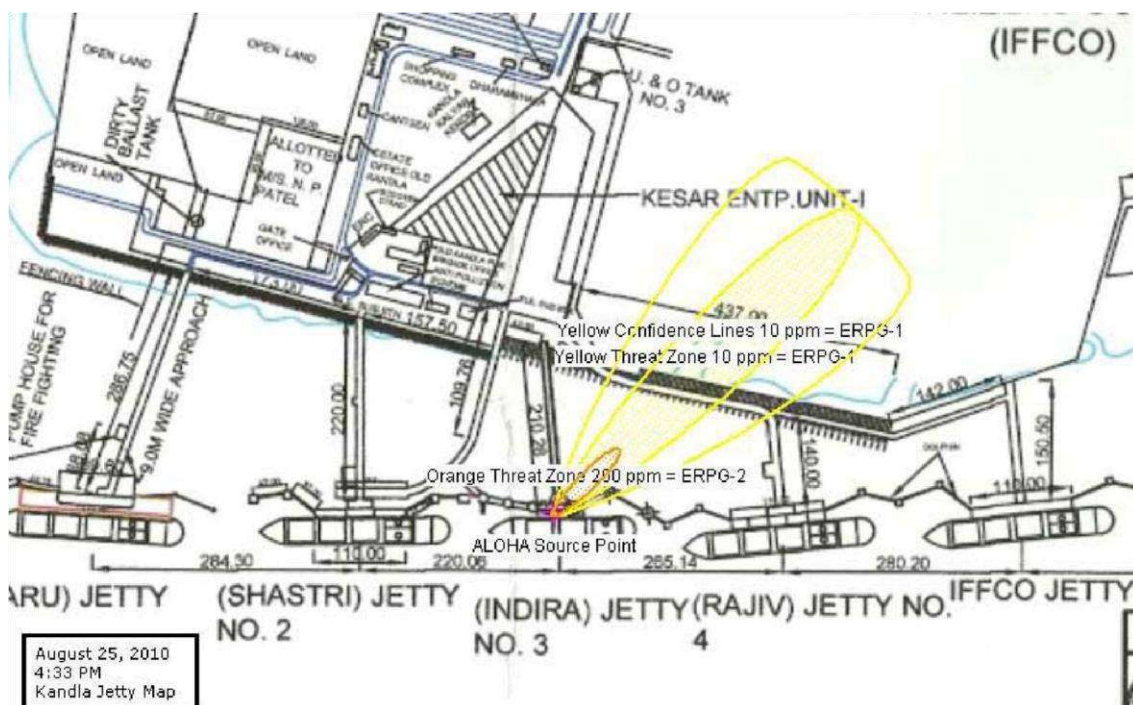
20.1.6.6 Instantaneous Release – Overpressure (Contour)



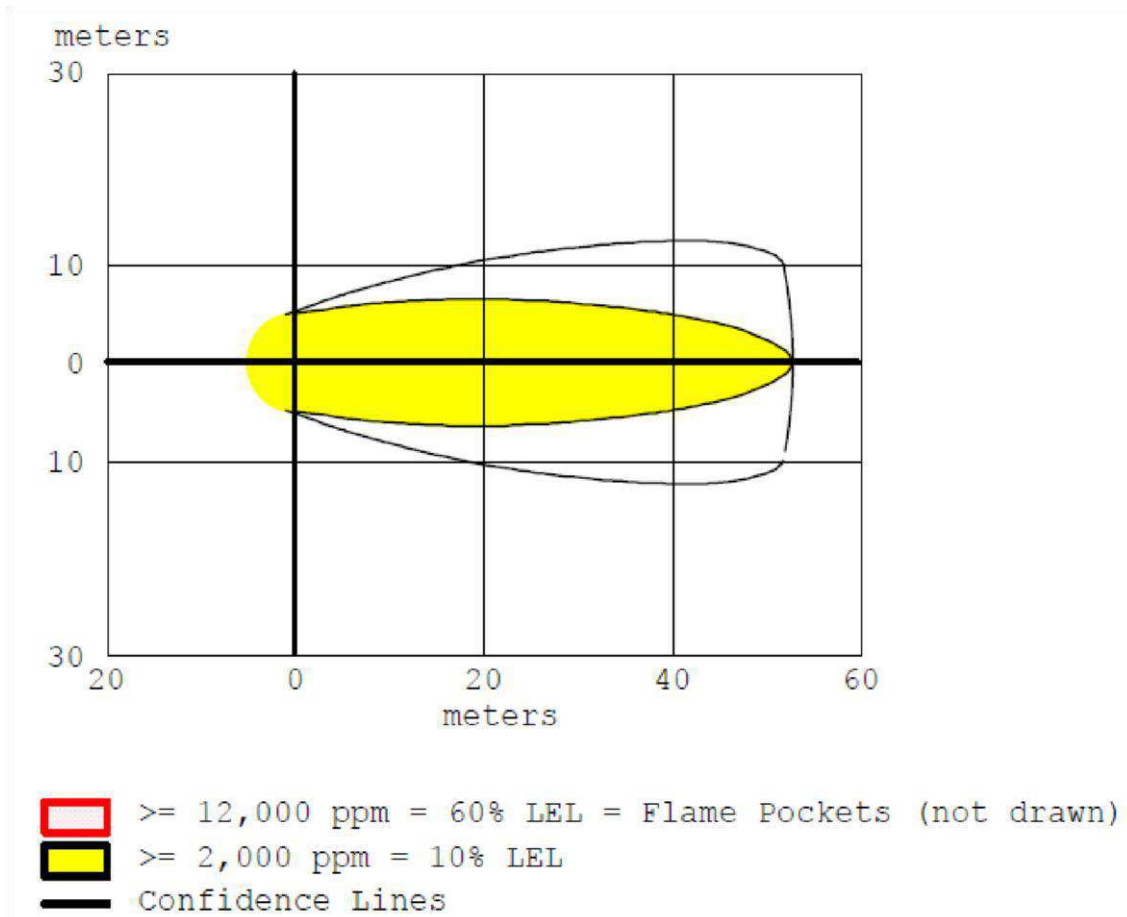
20.1.6.7 Evaporating Puddle – Toxic Threat Zone (Graph)



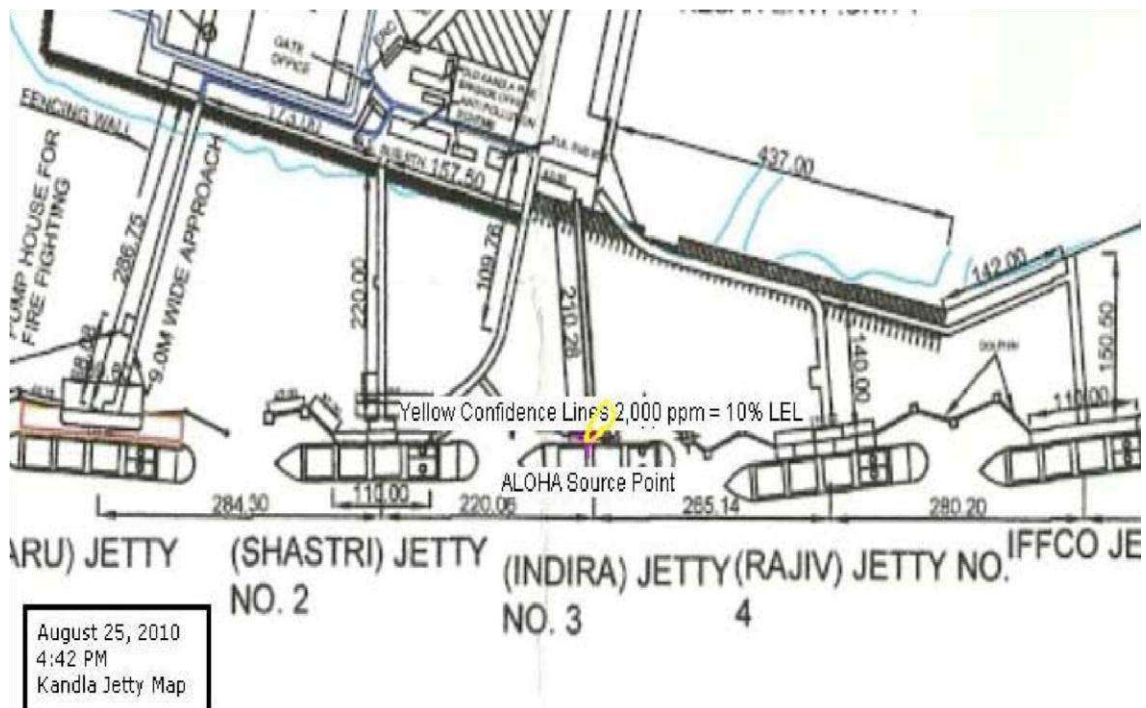
20.1.6.8 Evaporating Puddle – Toxic Threat Zone (Contour)



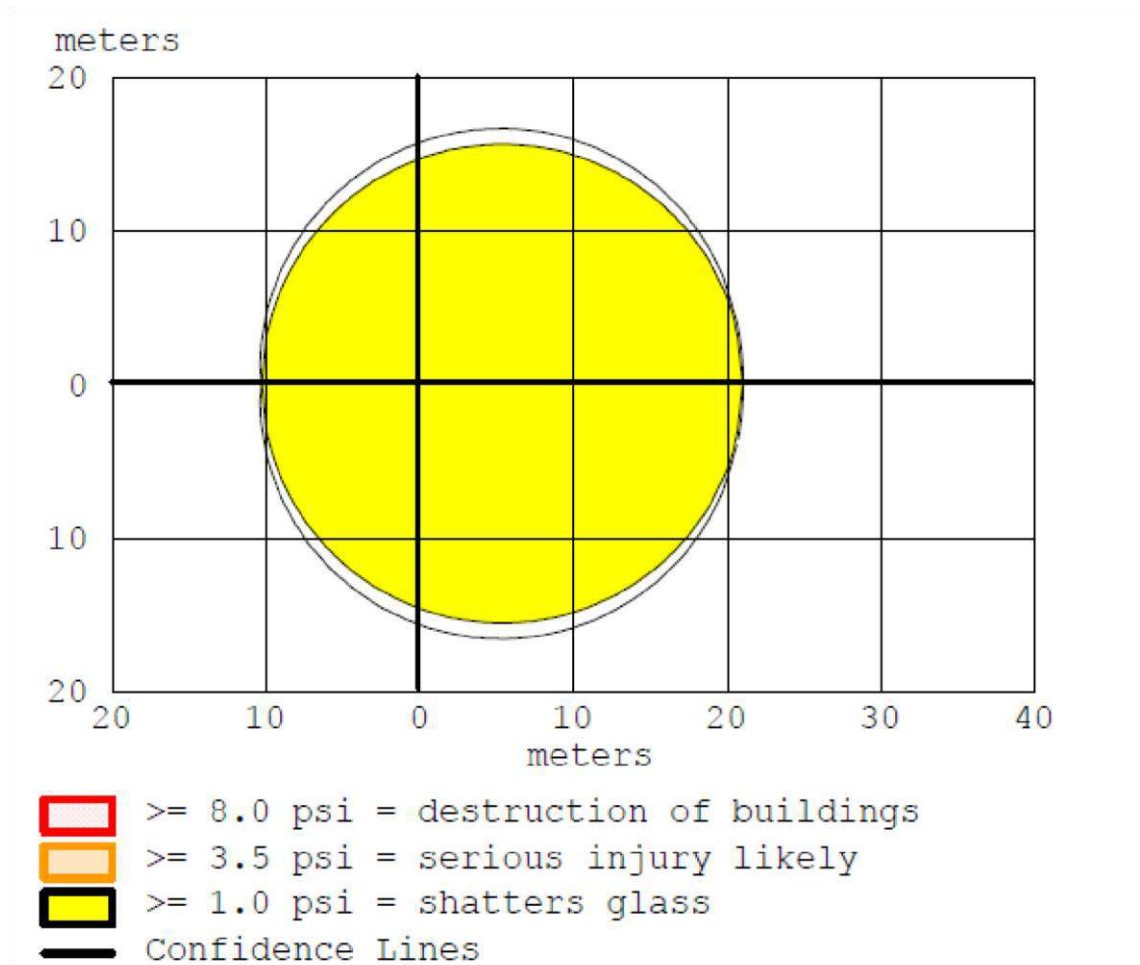
20.1.6.9 Evaporating Puddle – Flammable Area of Vapor Cloud (Graph)



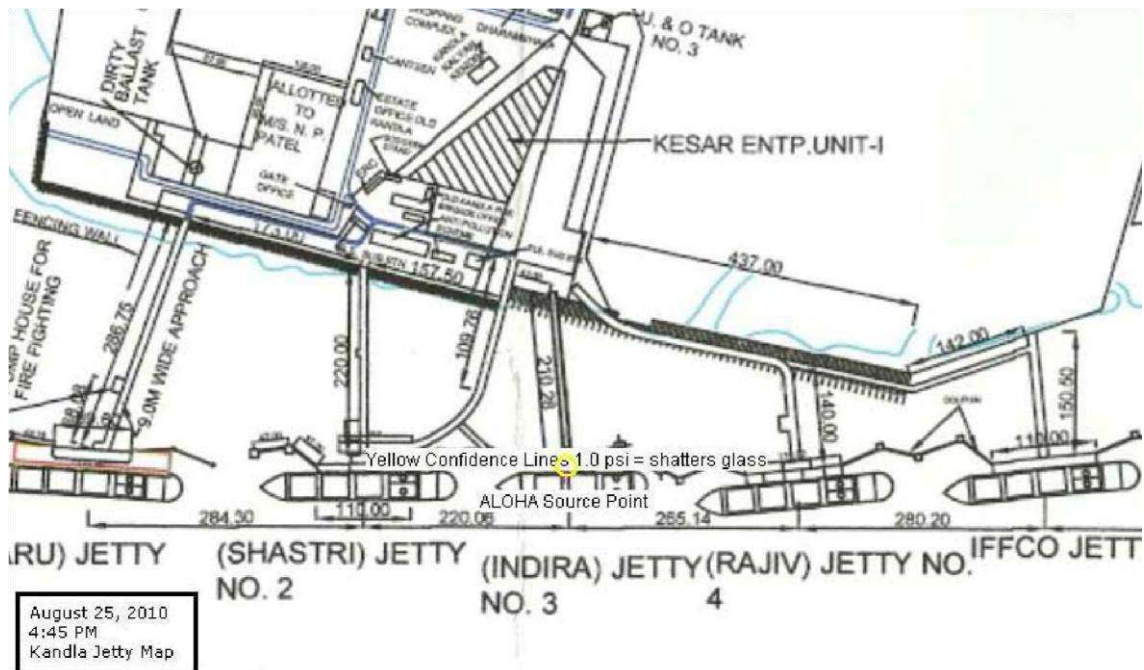
20.1.6.10 Evaporating Puddle – Flammable Area of Vapor Cloud (Contour)



20.1.6.11 Evaporating Puddle – Overpressure (Graph)

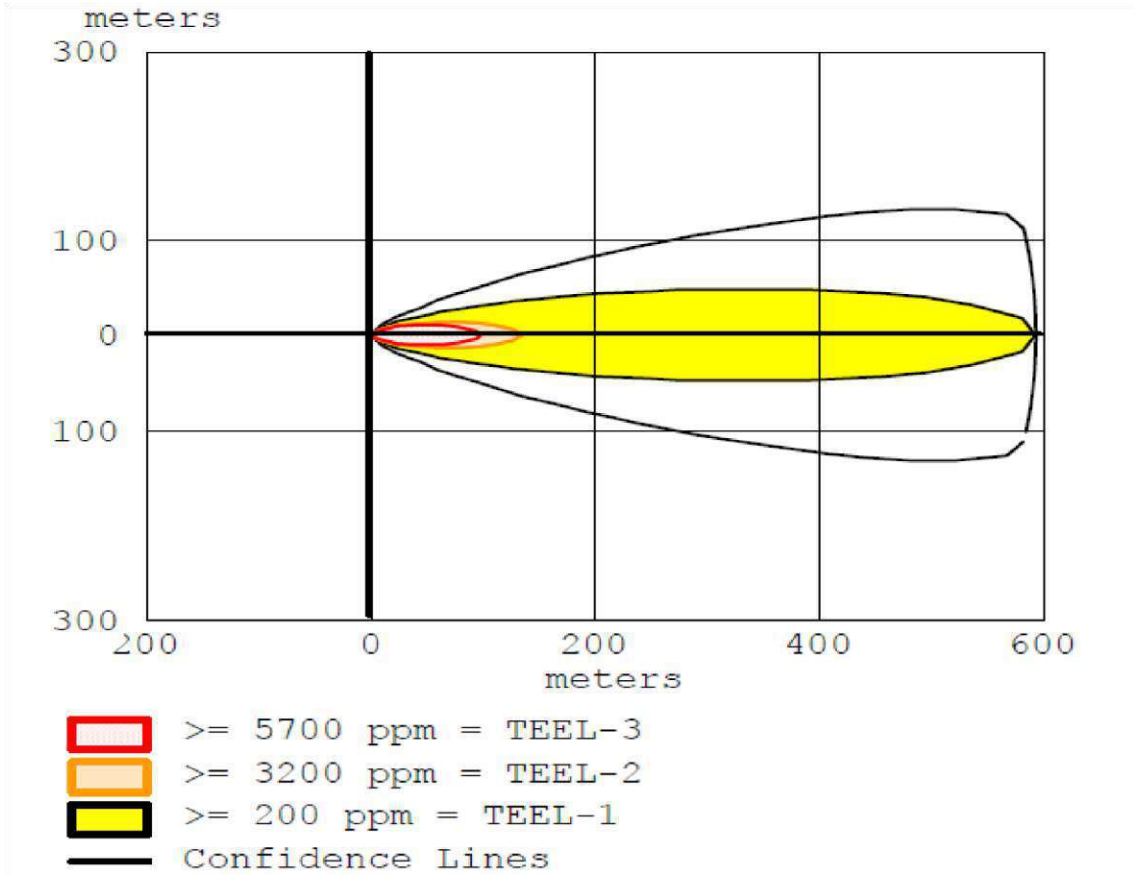


20.1.6.12 Evaporating Puddle – Overpressure (Contour)

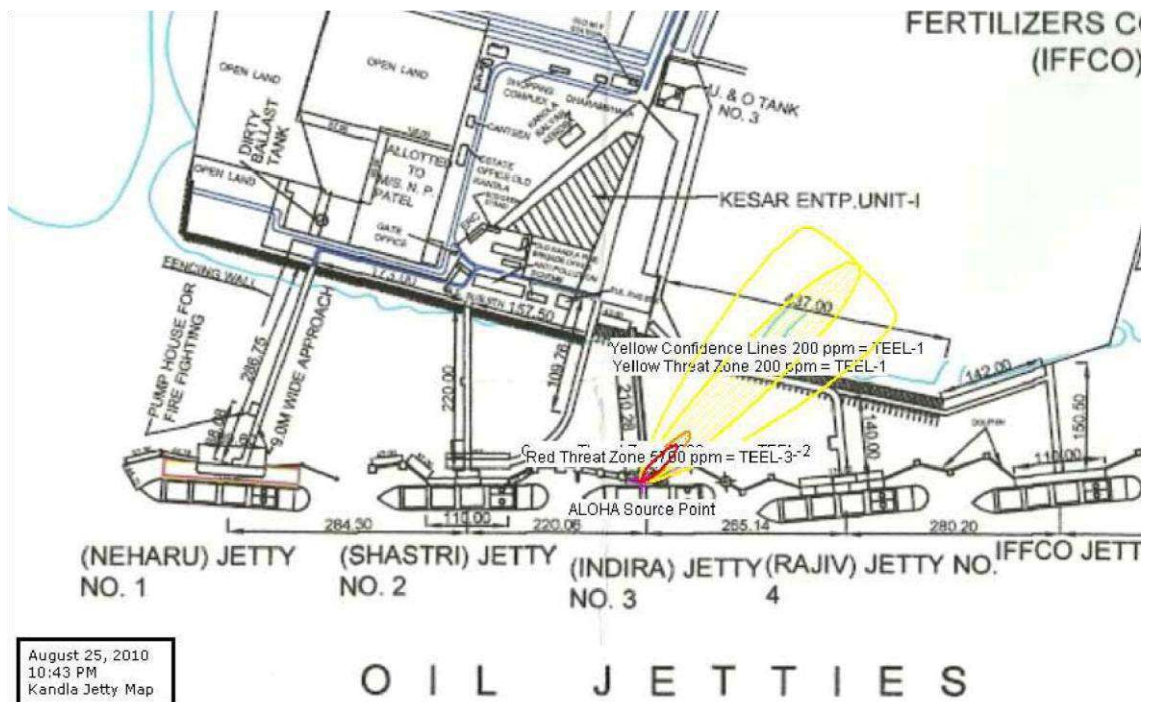


20.1.6.13 Burning Puddle – Thermal Radiation (Graph)

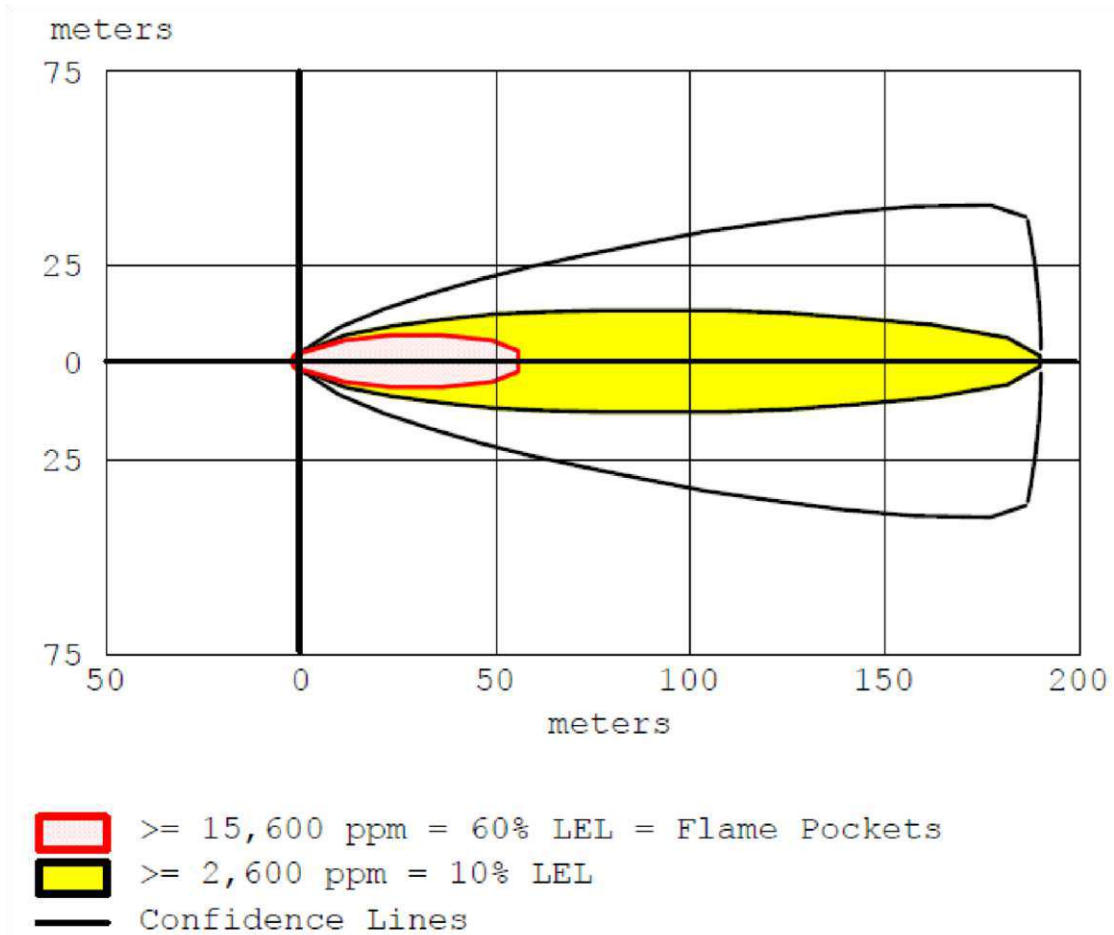
20.1.7.1 Instantaneous Release – Toxic Threat Zone (Graph)



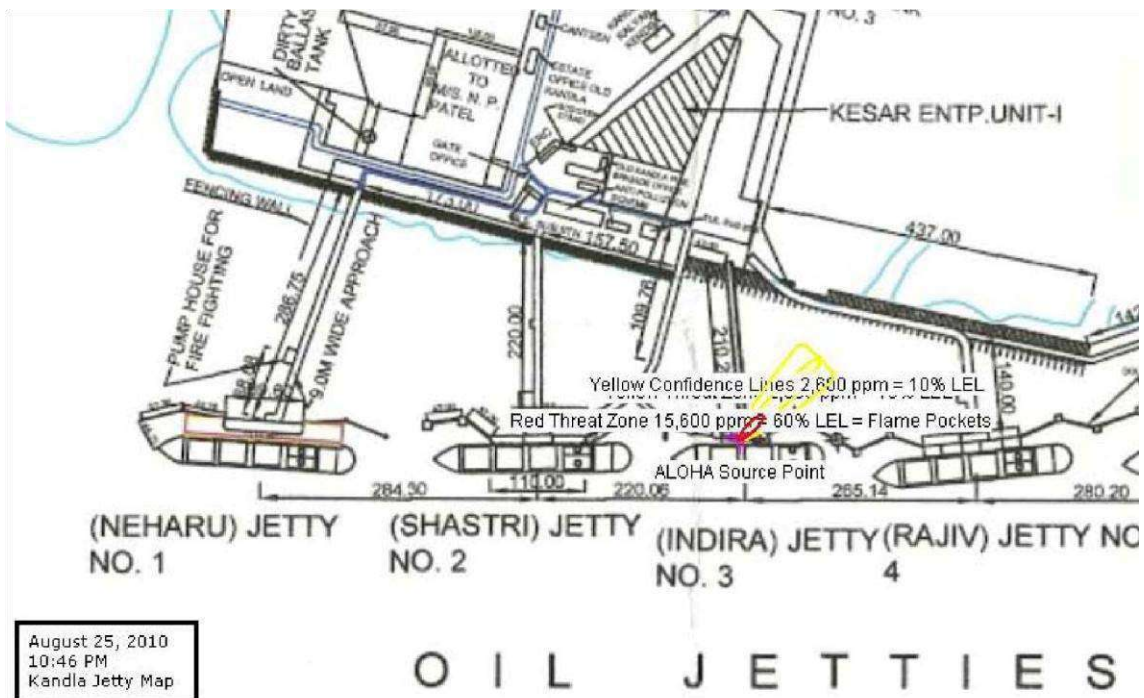
20.1.7.2 Instantaneous Release – Toxic Threat Zone (Contour)



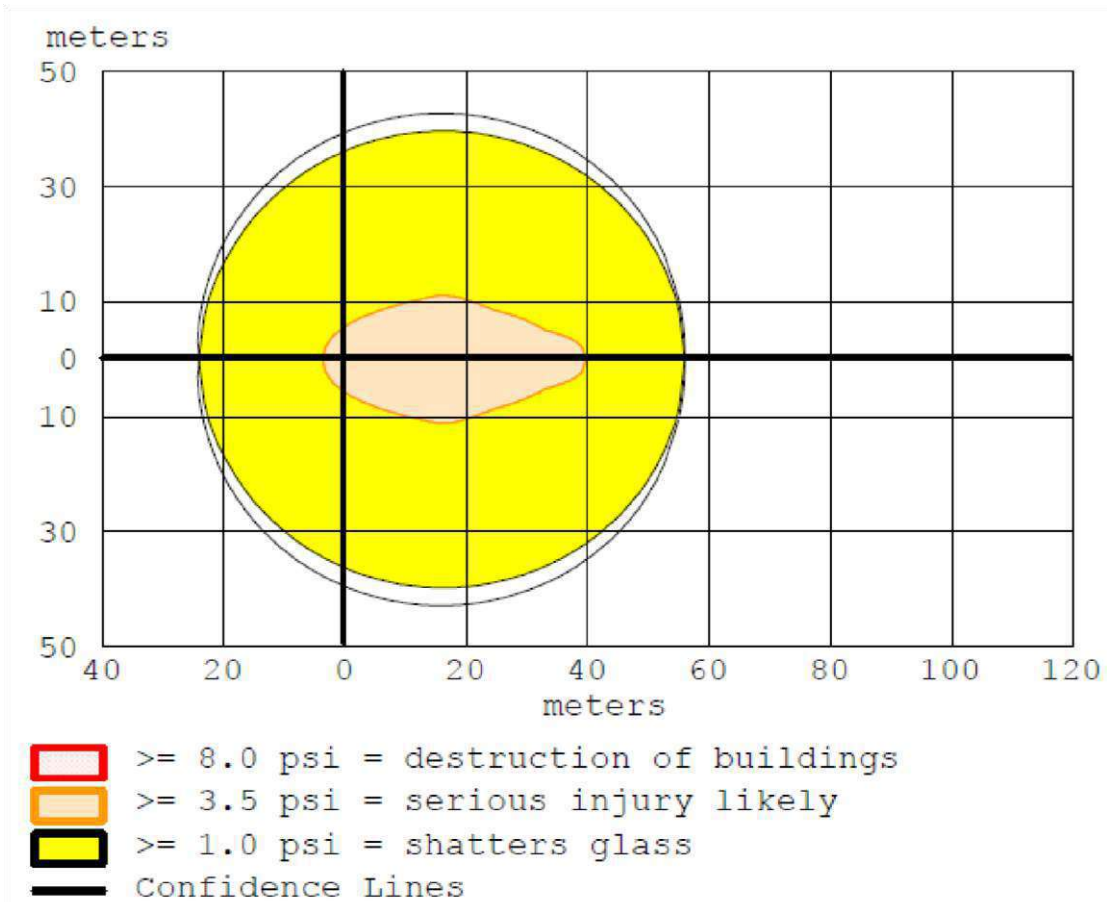
20.1.7.3 Instantaneous Release – Flammable Area of Vapor Cloud (Graph)



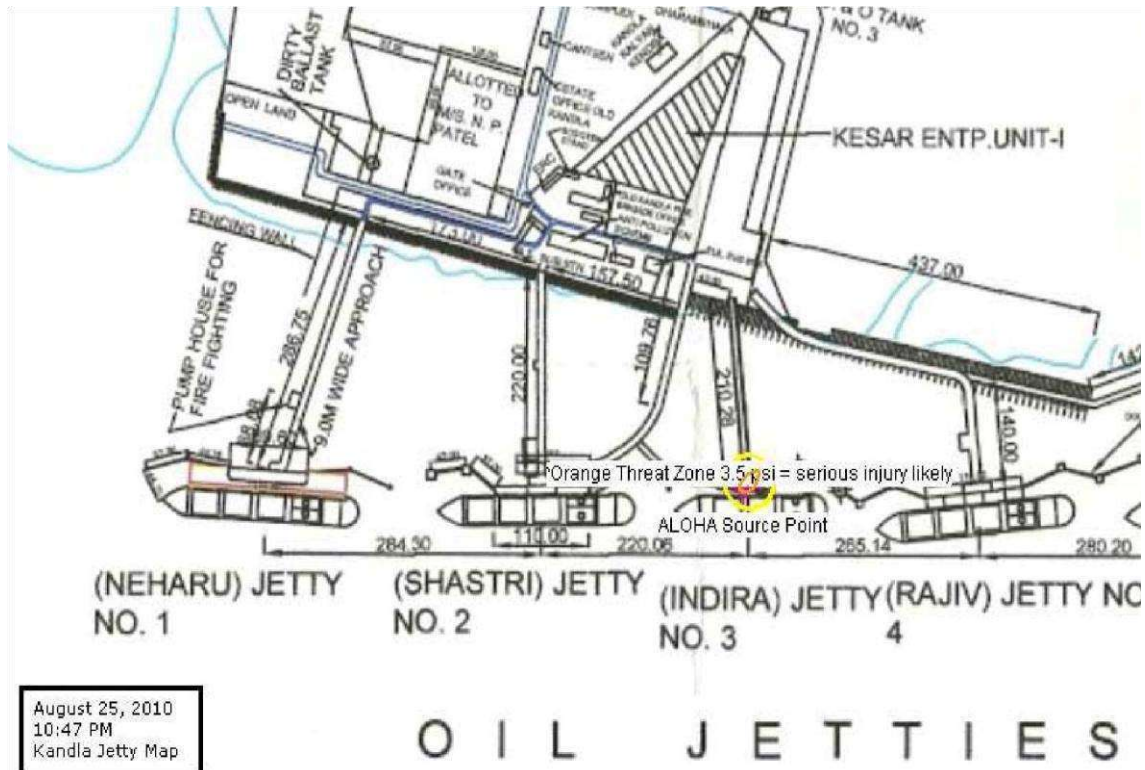
20.1.7.4 Instantaneous Release – Flammable Area of Vapor Cloud (Contour)



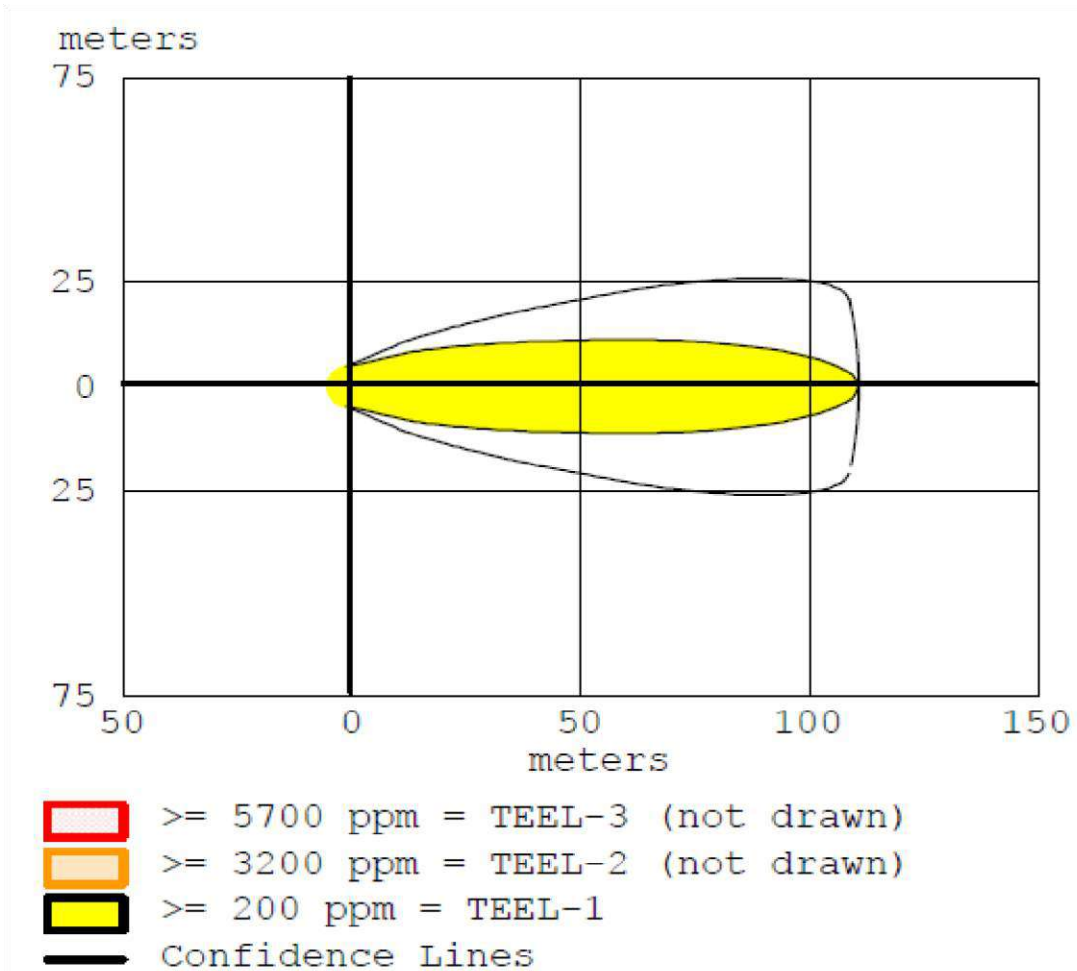
20.1.7.5 Instantaneous Release – Overpressure (Graph)



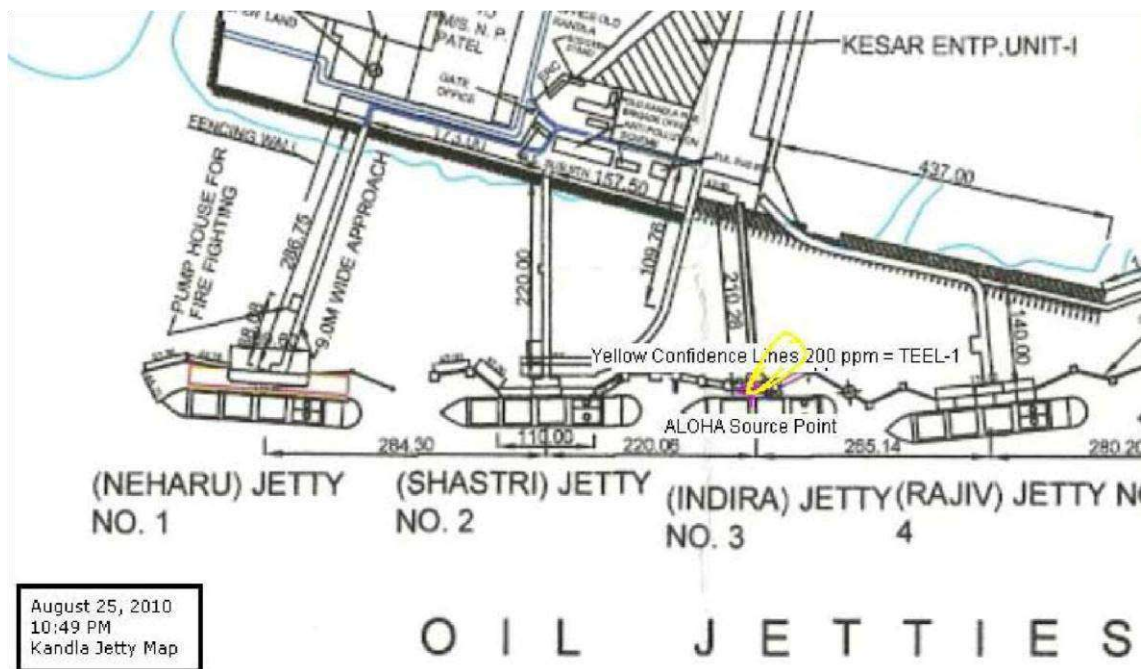
20.1.7.6 Instantaneous Release – Overpressure (Contour)



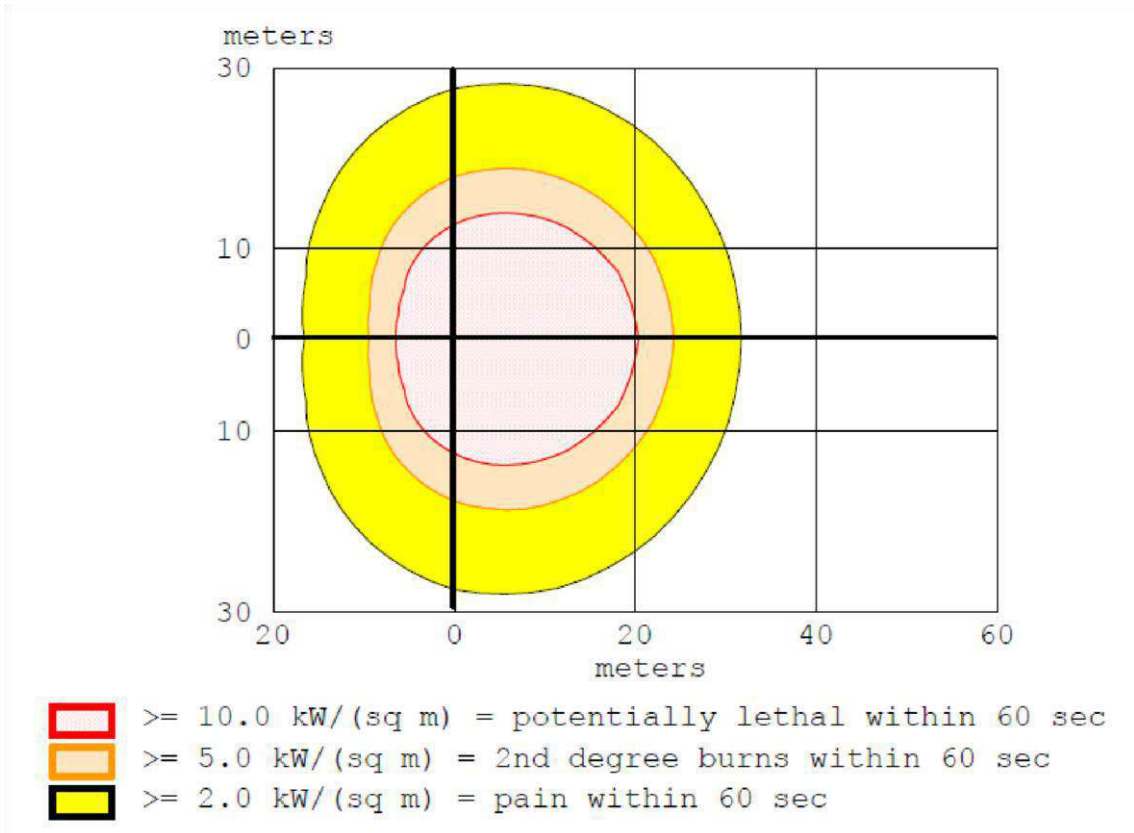
20.1.7.7 Evaporating Puddle – Toxic Threat Zone (Graph)



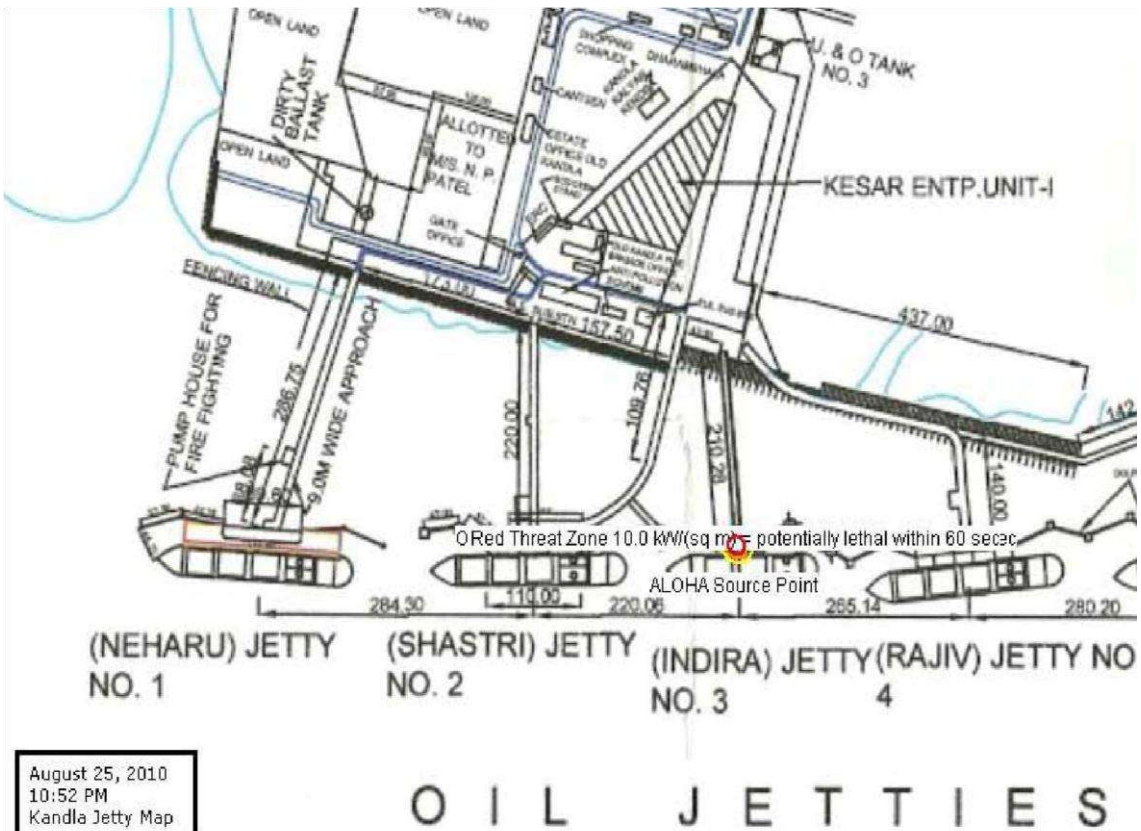
20.1.7.8 Evaporating Puddle – Toxic Threat Zone (Contour)



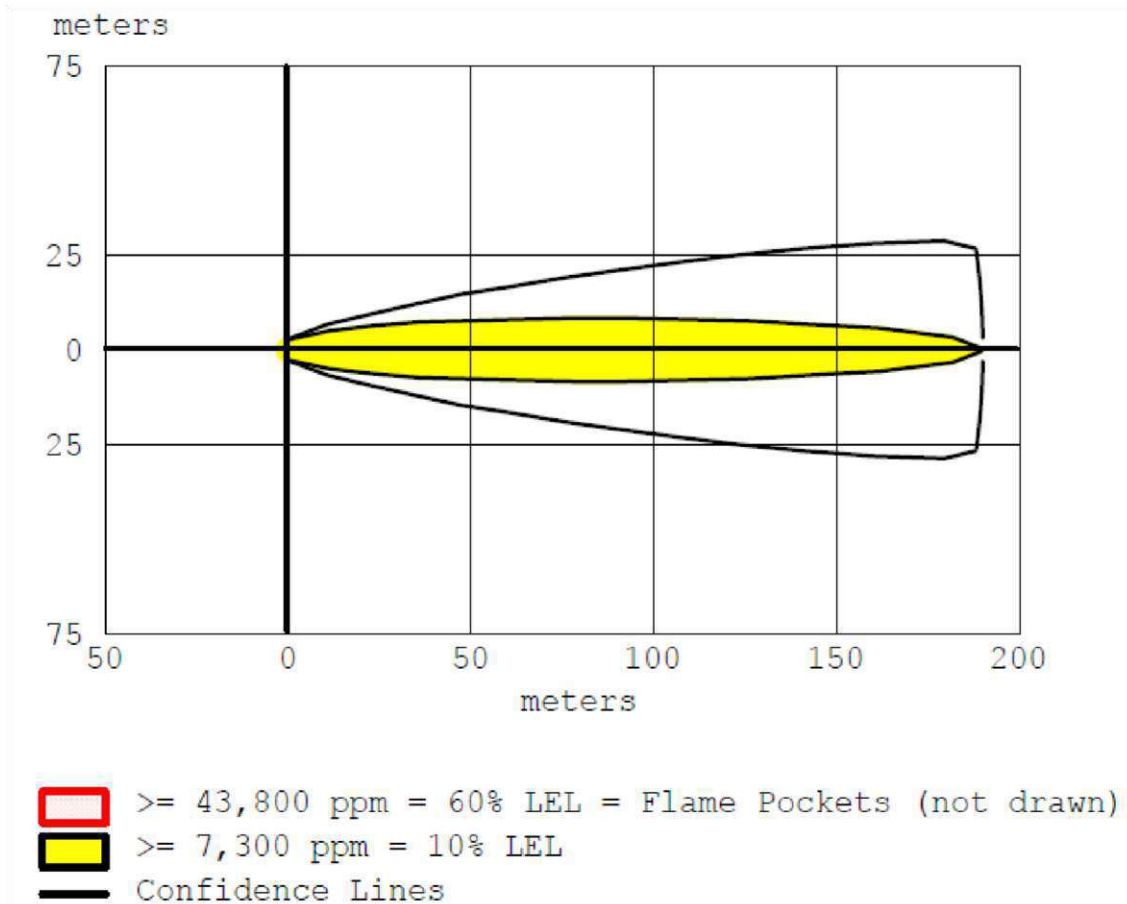
20.1.7.9 Burning Puddle – Thermal Radiation (Graph)



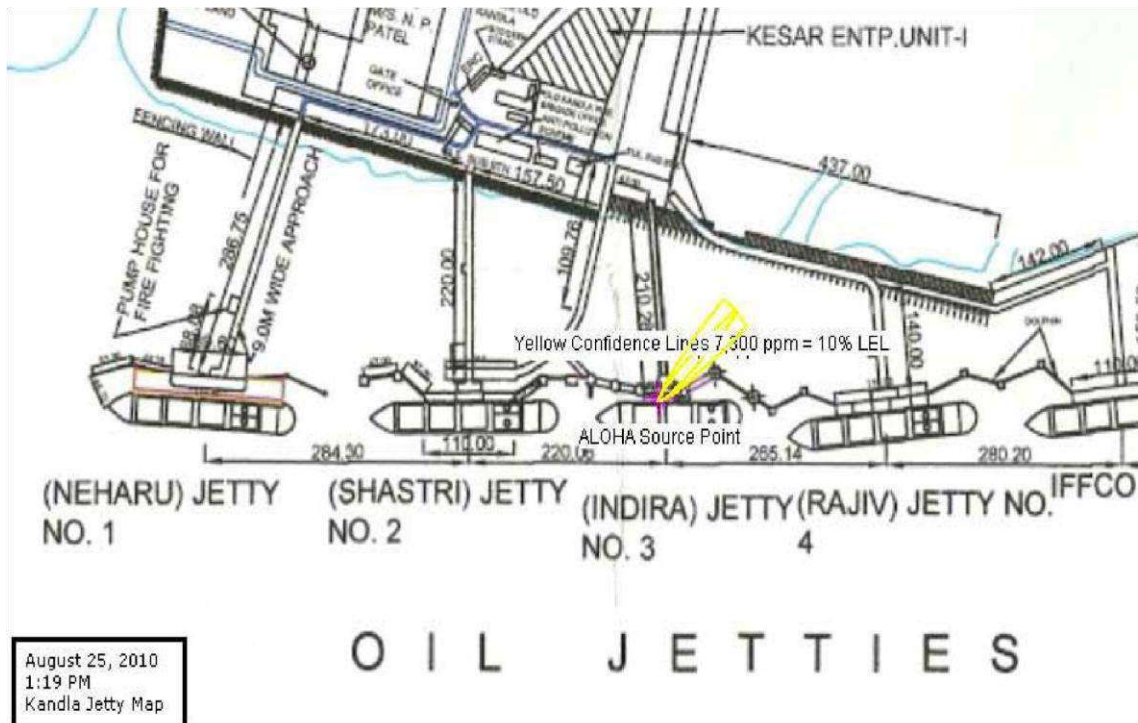
20.1.7.10 Burning Puddle – Thermal Radiation (Contour)



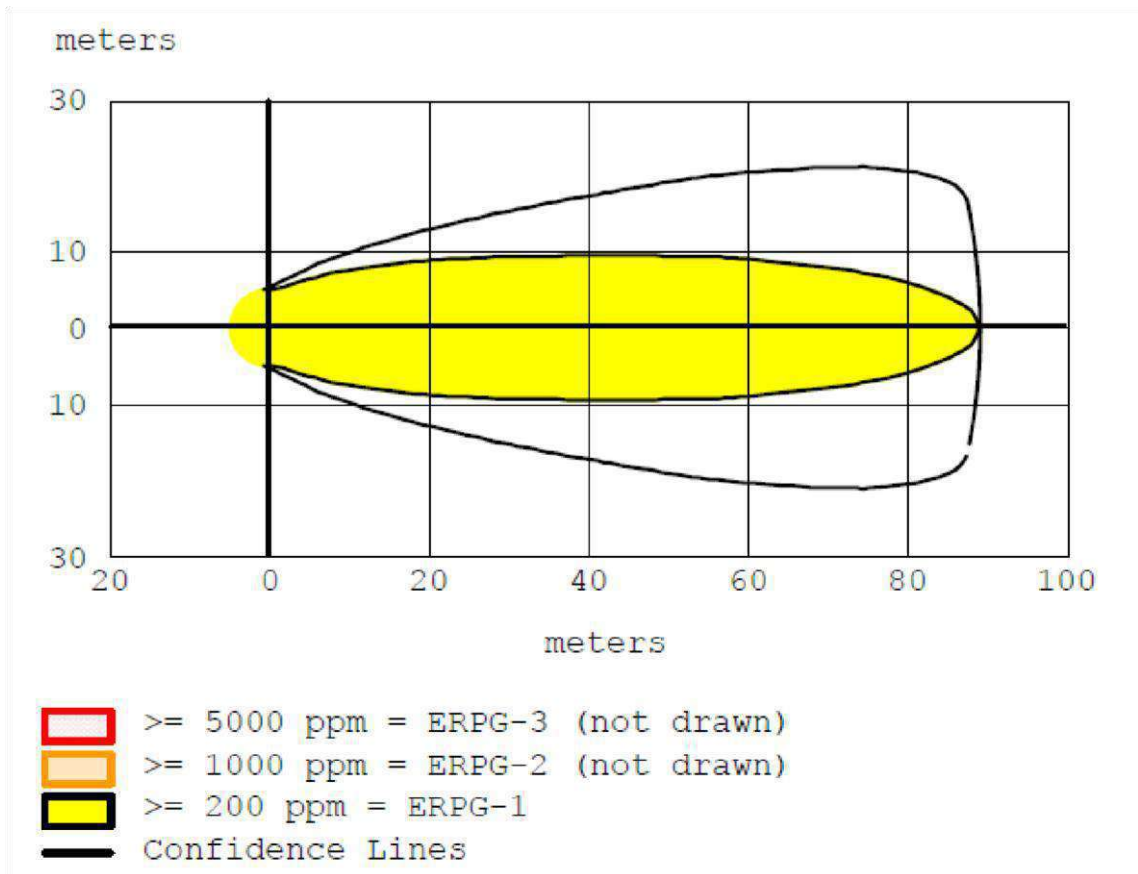
20.1.8 Jetty Three – Methanol



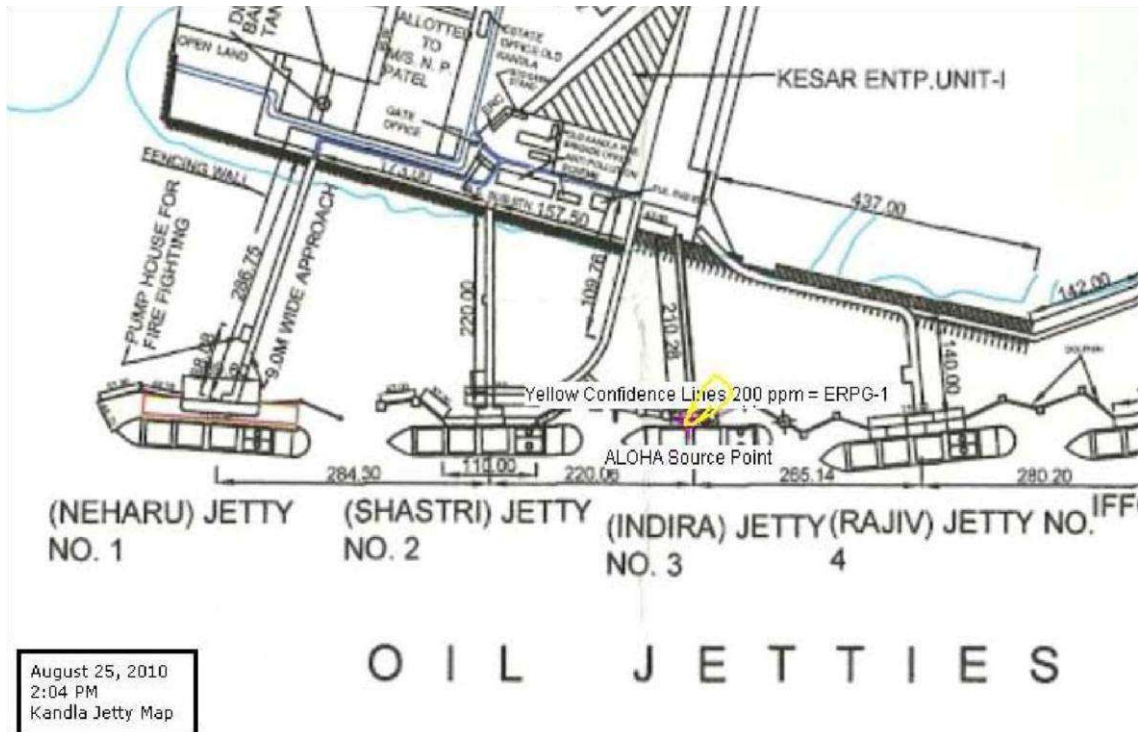
20.1.8.4 Instantaneous Release – Flammable Area of Vapor Cloud (Contour)



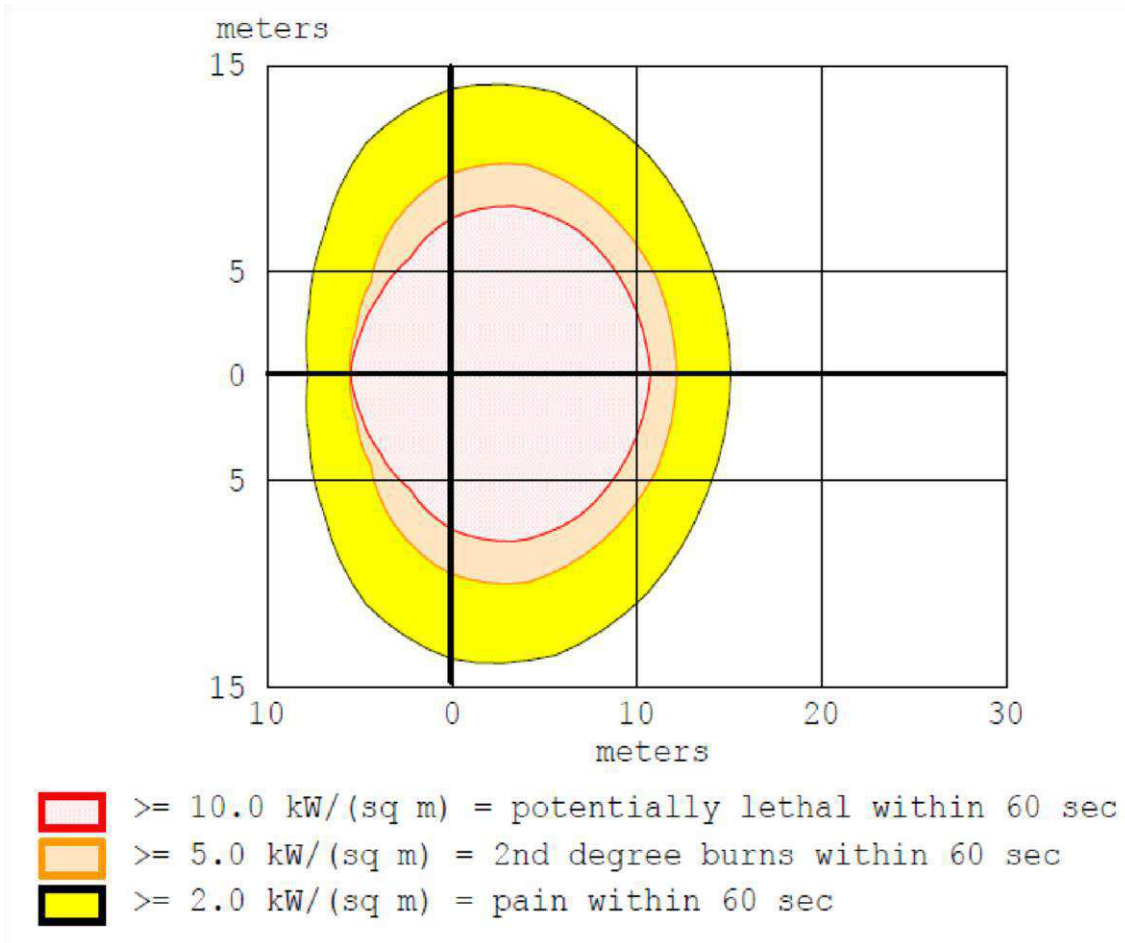
20.1.8.5 Instantaneous Release – Overpressure (Graph)



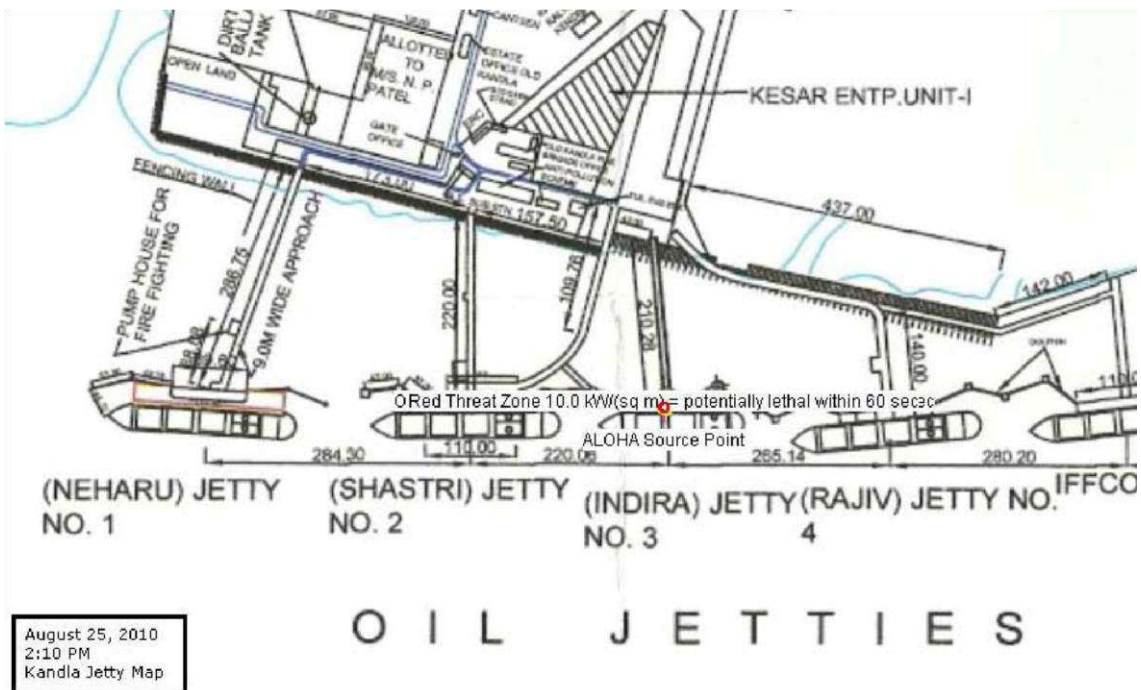
20.1.8.8 Evaporating Puddle – Toxic Threat Zone (Contour)



20.1.8.9 Burning Puddle – Thermal Radiation (Graph)

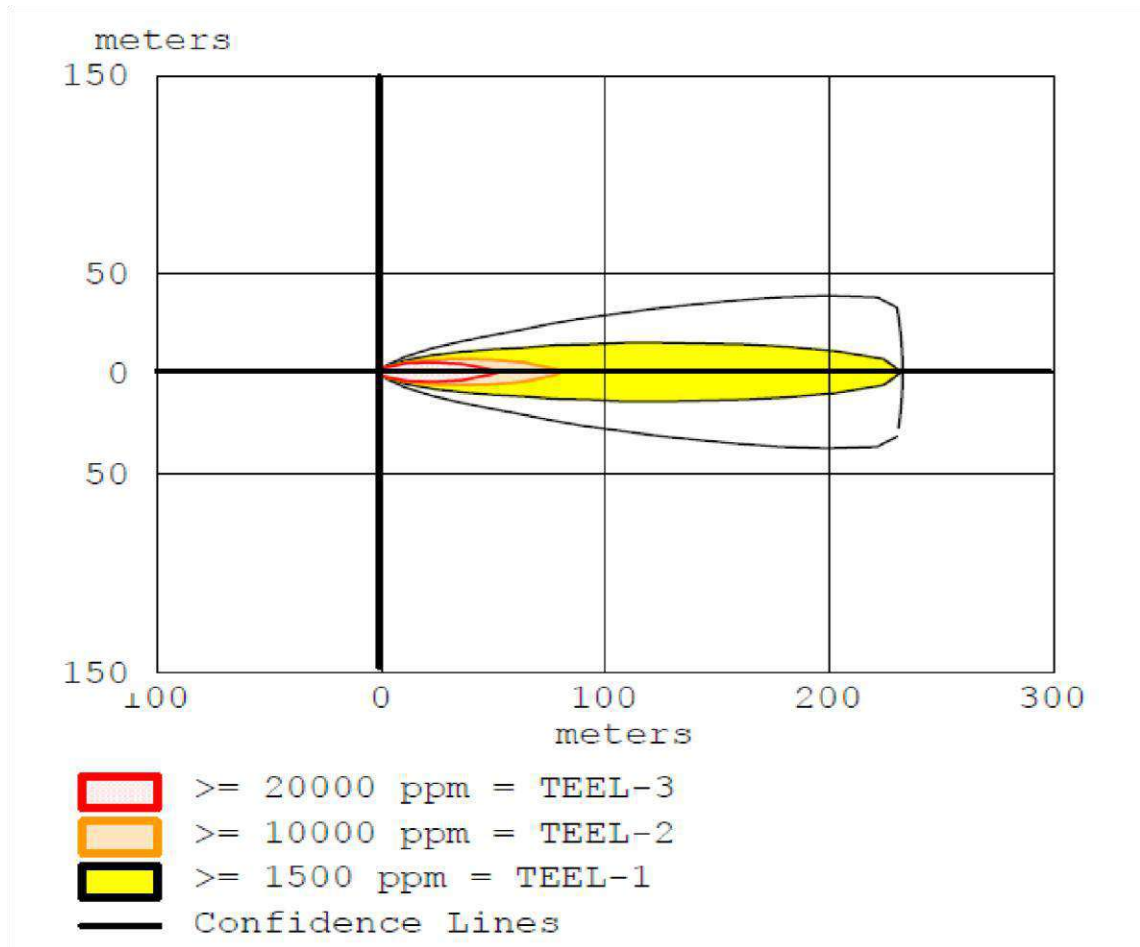


20.1.8.10 Burning Puddle – Thermal Radiation (Contour)

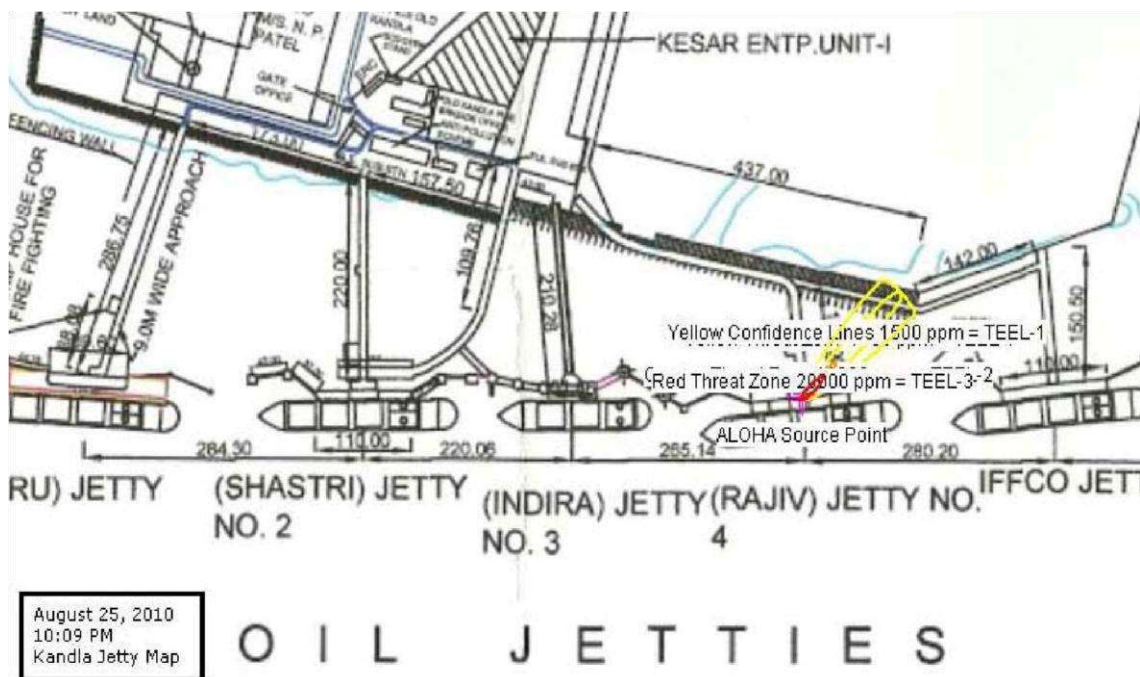


20.1.9 Jetty Four – Propylene

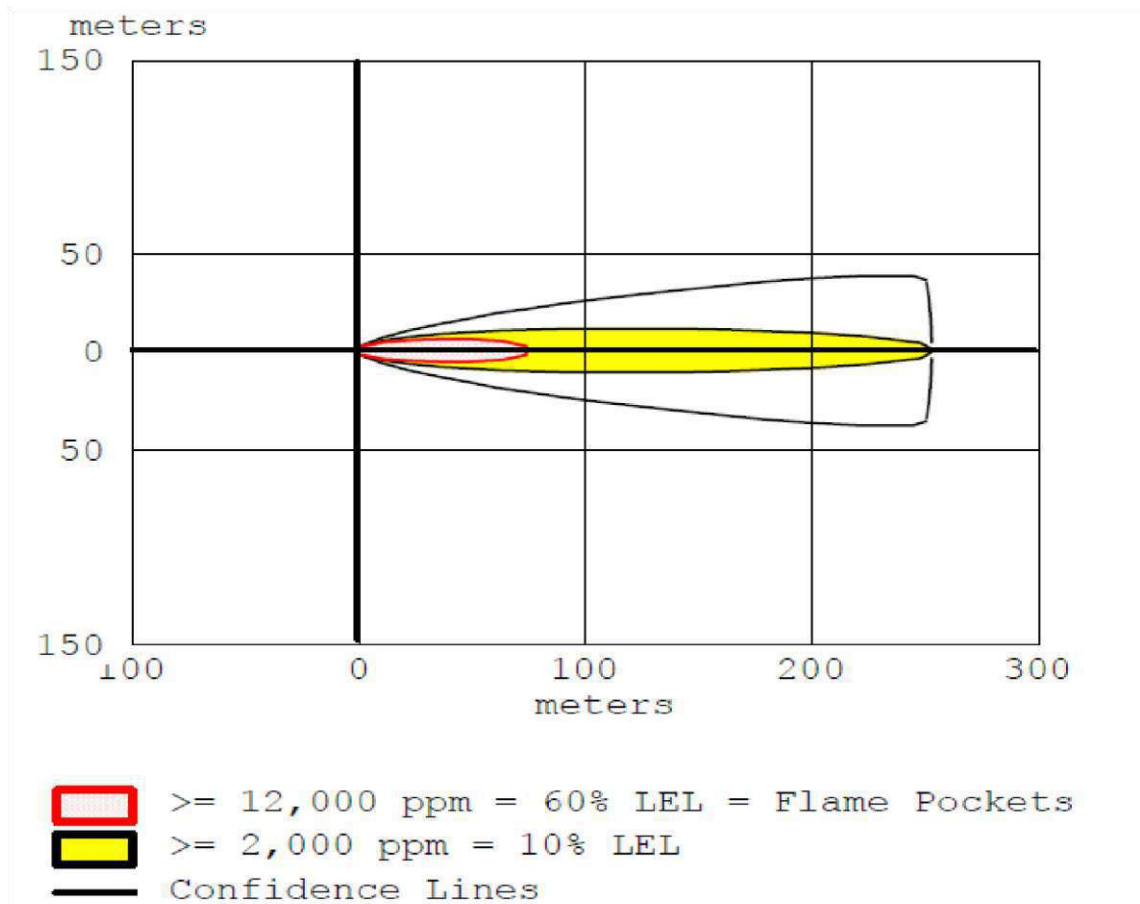
20.1.9.1 Instantaneous Release – Toxic Threat Zone (Graph)



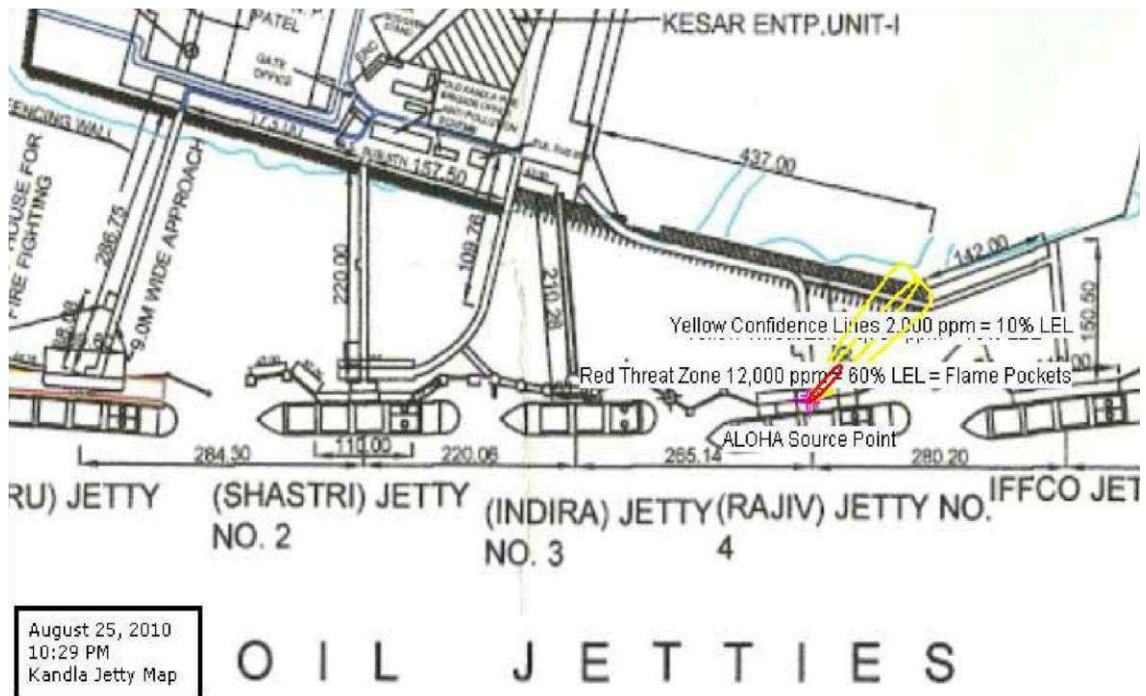
20.1.9.2 Instantaneous Release – Toxic Threat Zone (Contour)



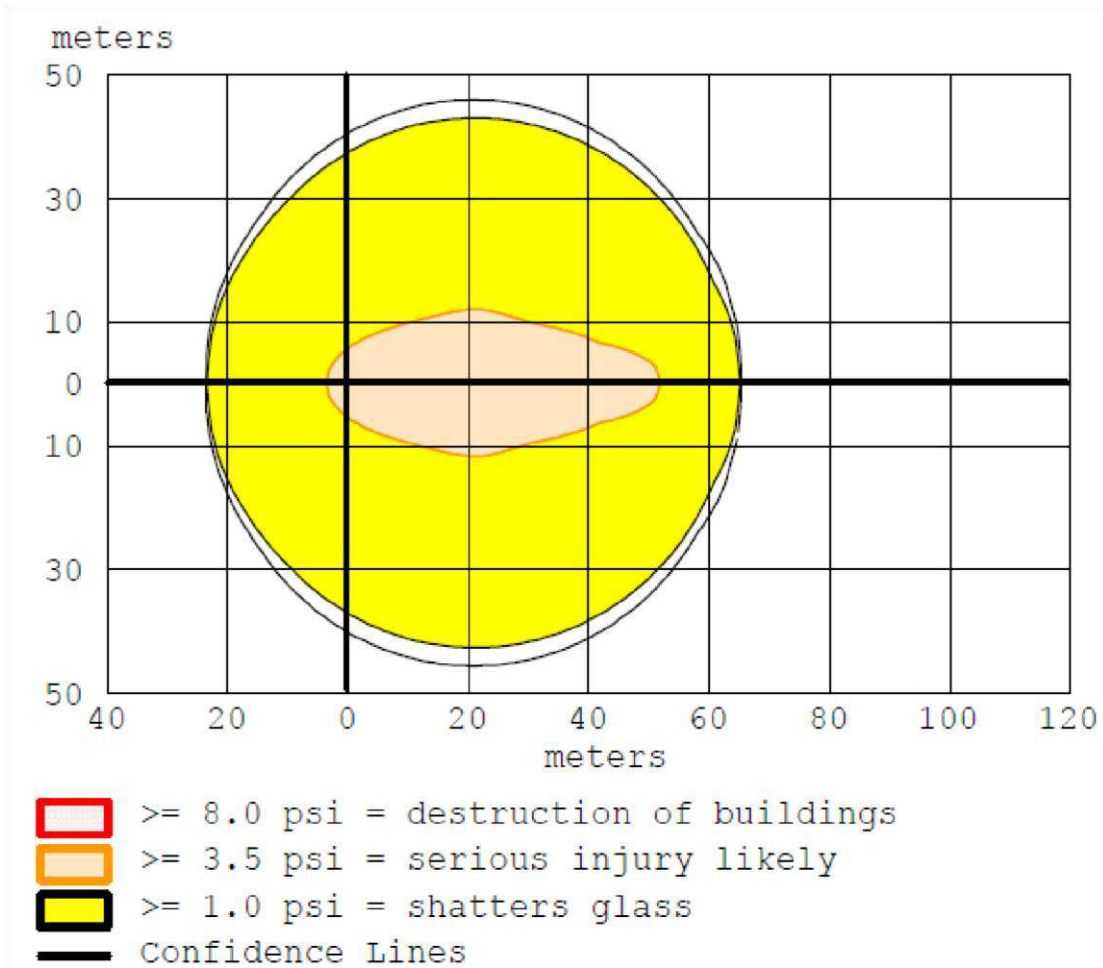
20.1.9.3 Instantaneous Release – Flammable Area of Vapor Cloud (Graph)



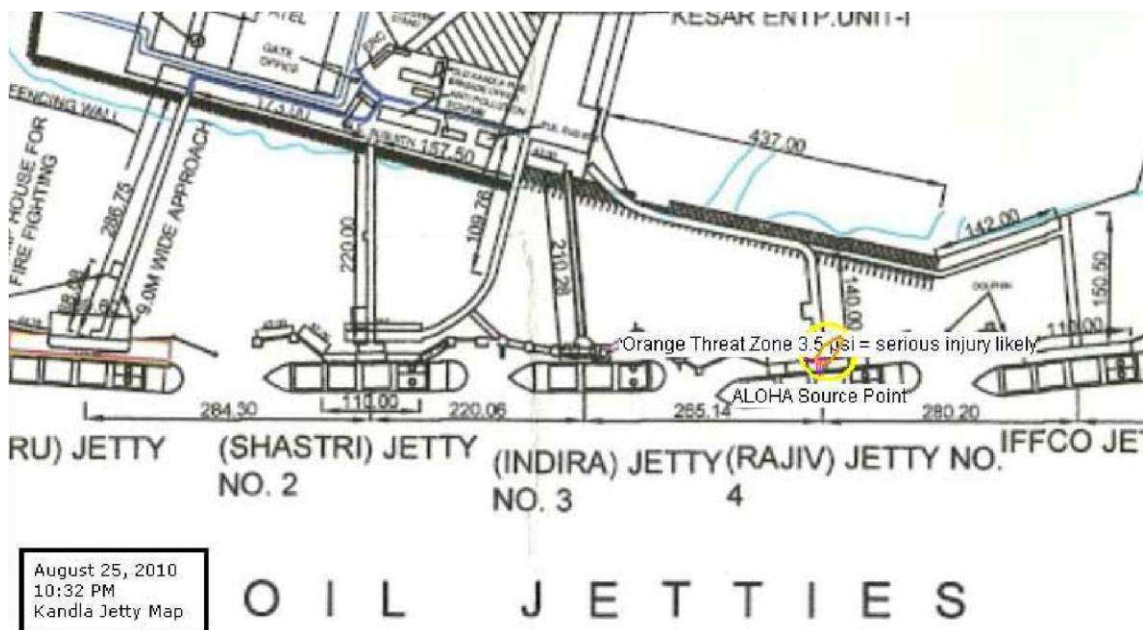
20.1.9.4 Instantaneous Release – Flammable Area of Vapor Cloud (Contour)



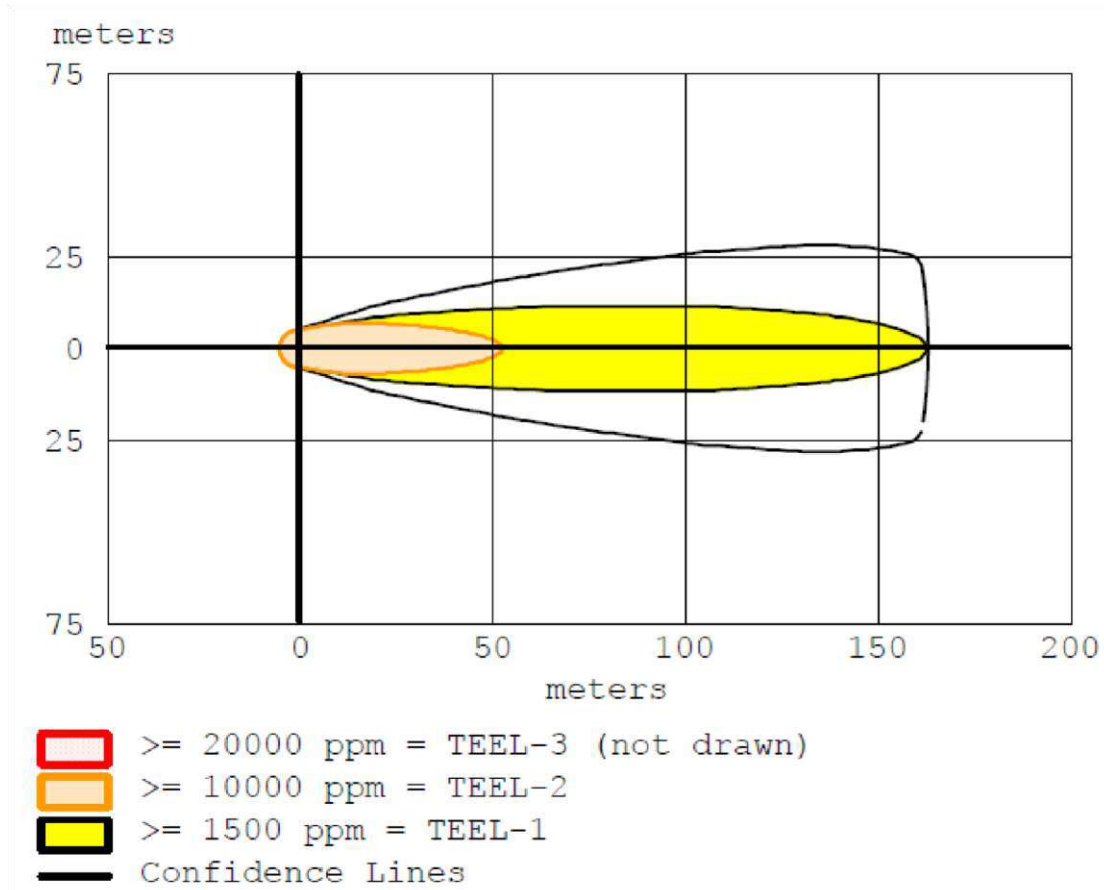
20.1.9.5 Instantaneous Release – Overpressure (Graph)



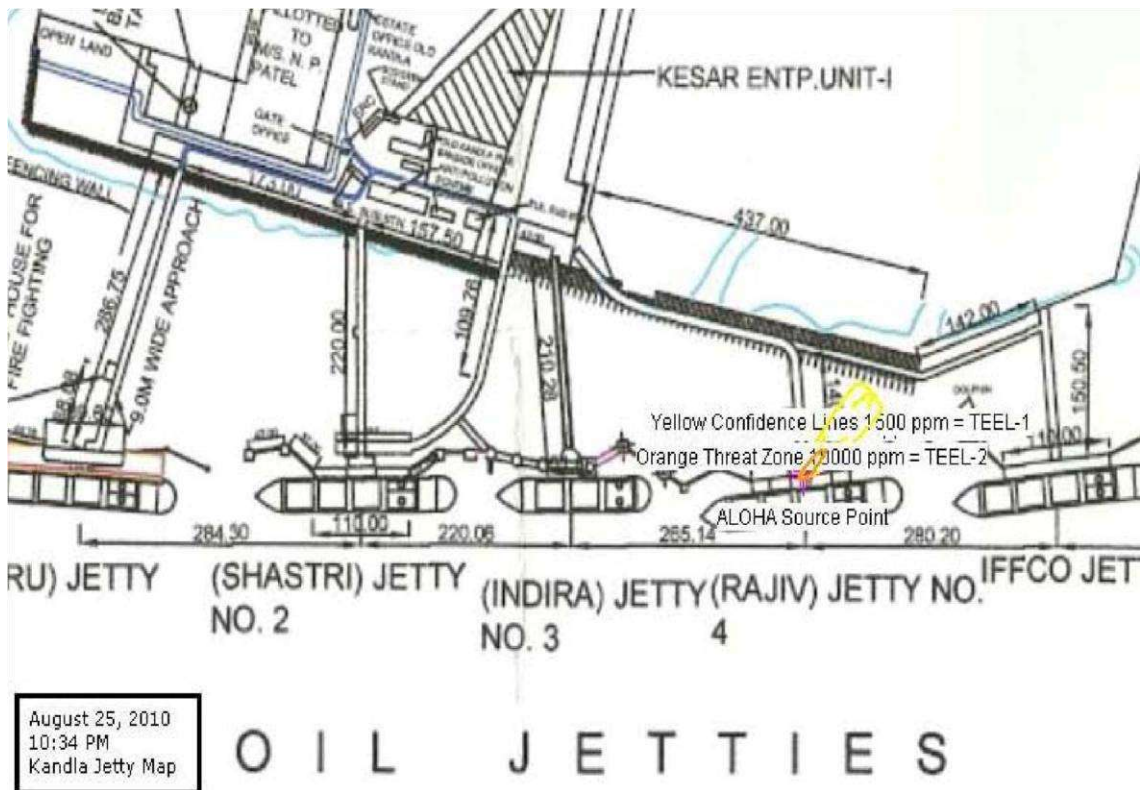
20.1.9.6 Instantaneous Release – Overpressure (Contour)



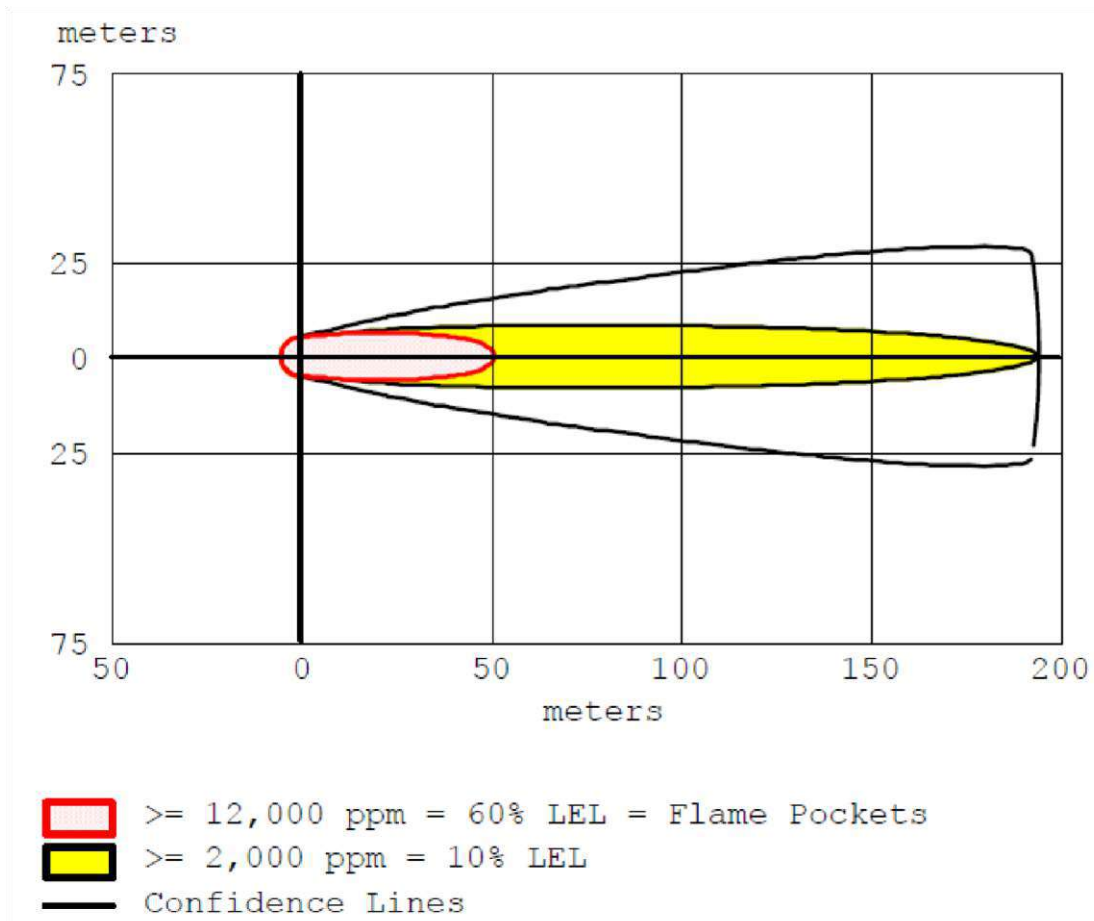
20.1.9.7 Evaporating Puddle – Toxic Threat Zone (Graph)



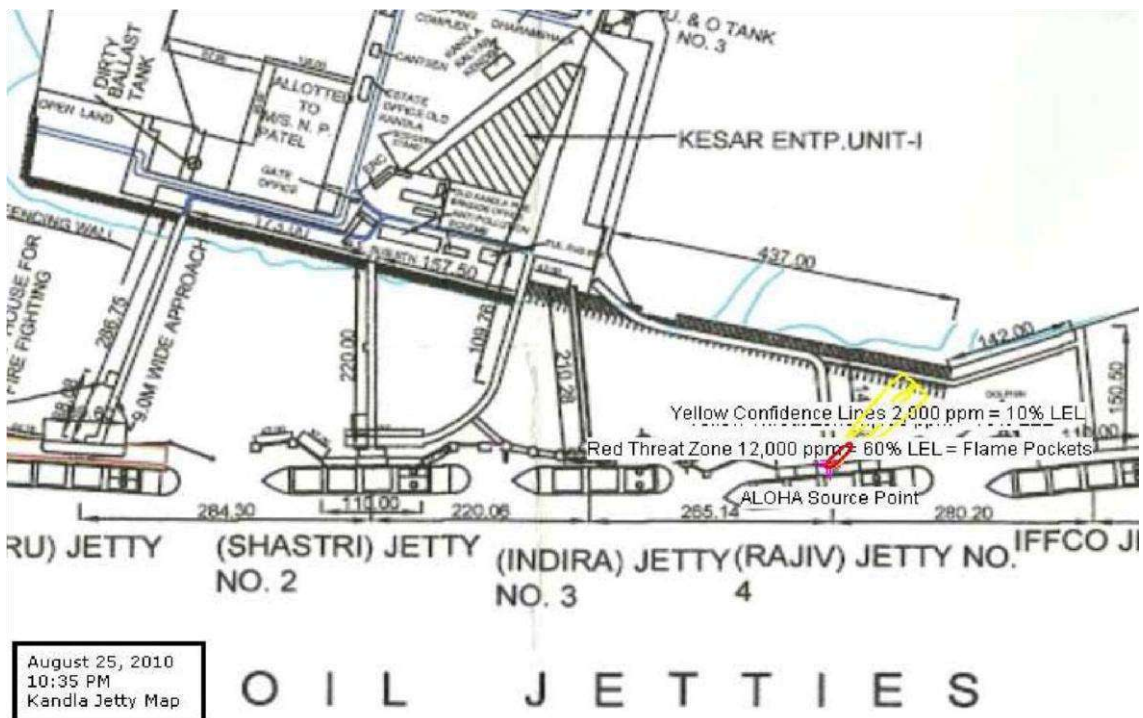
20.1.9.8 Evaporating Puddle – Toxic Threat Zone (Contour)



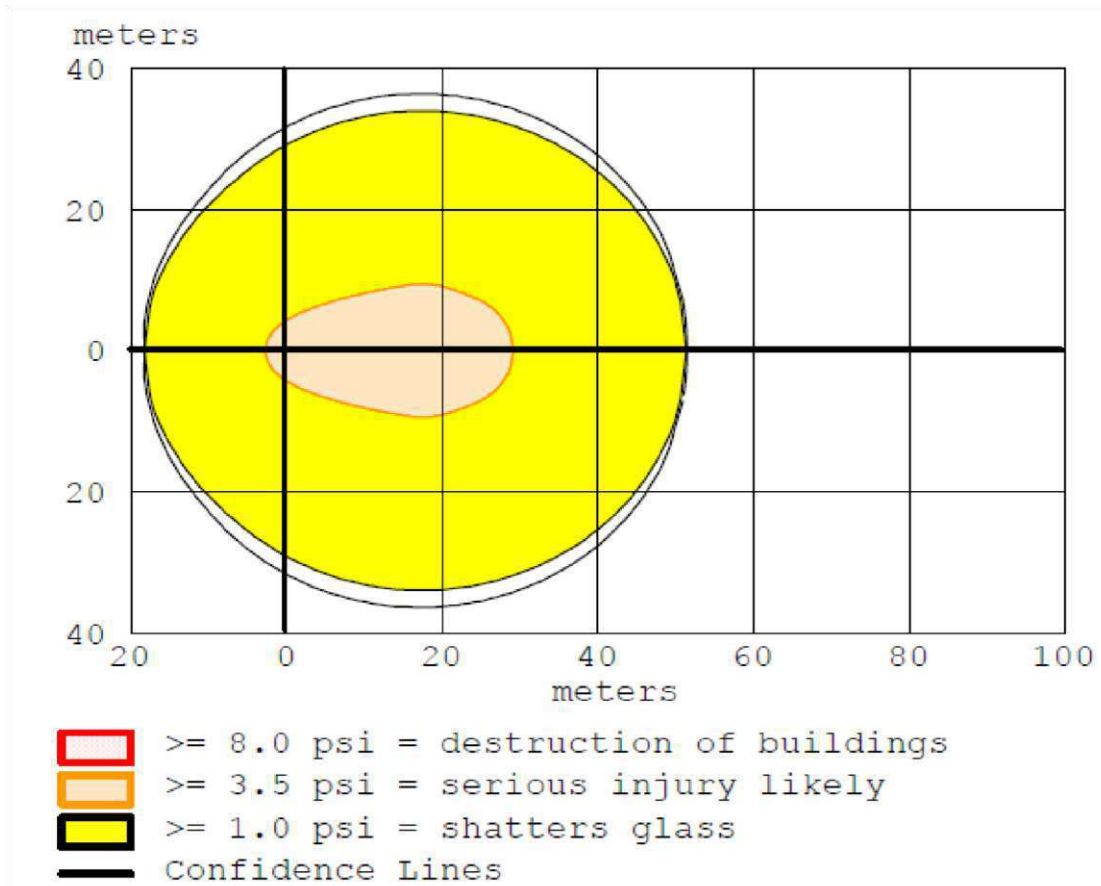
20.1.9.9 Evaporating Puddle – Flammable Area of Vapor Cloud (Graph)



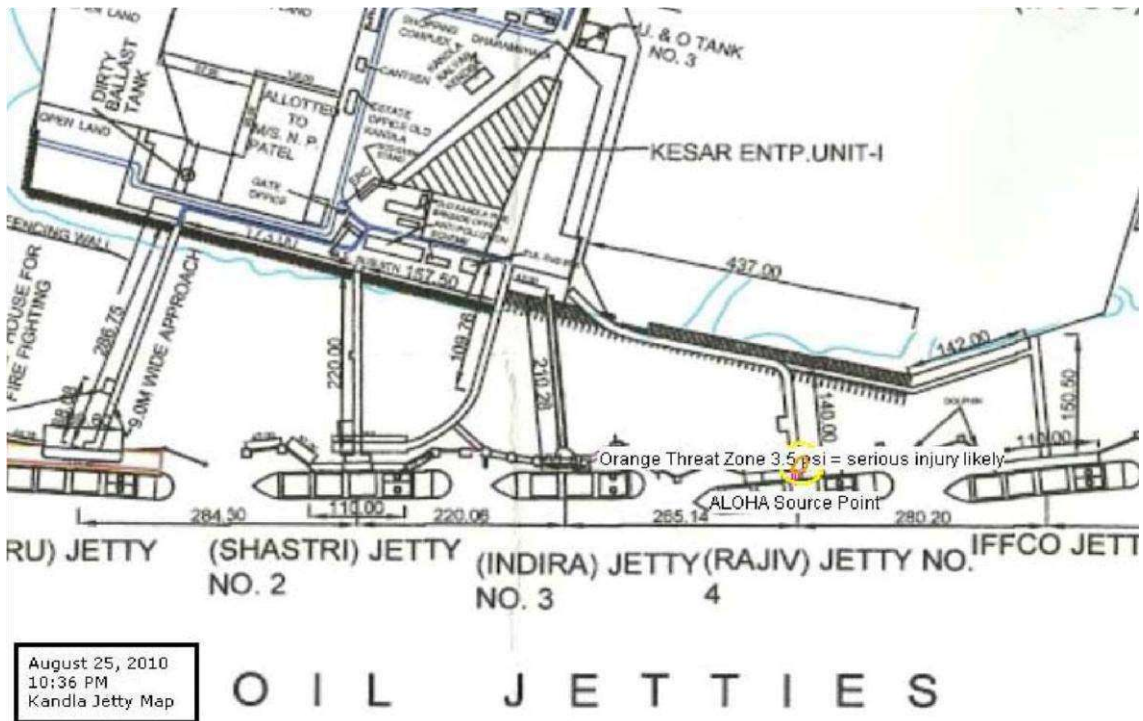
20.1.9.10 Evaporating Puddle – Flammable Area of Vapor Cloud (Contour)



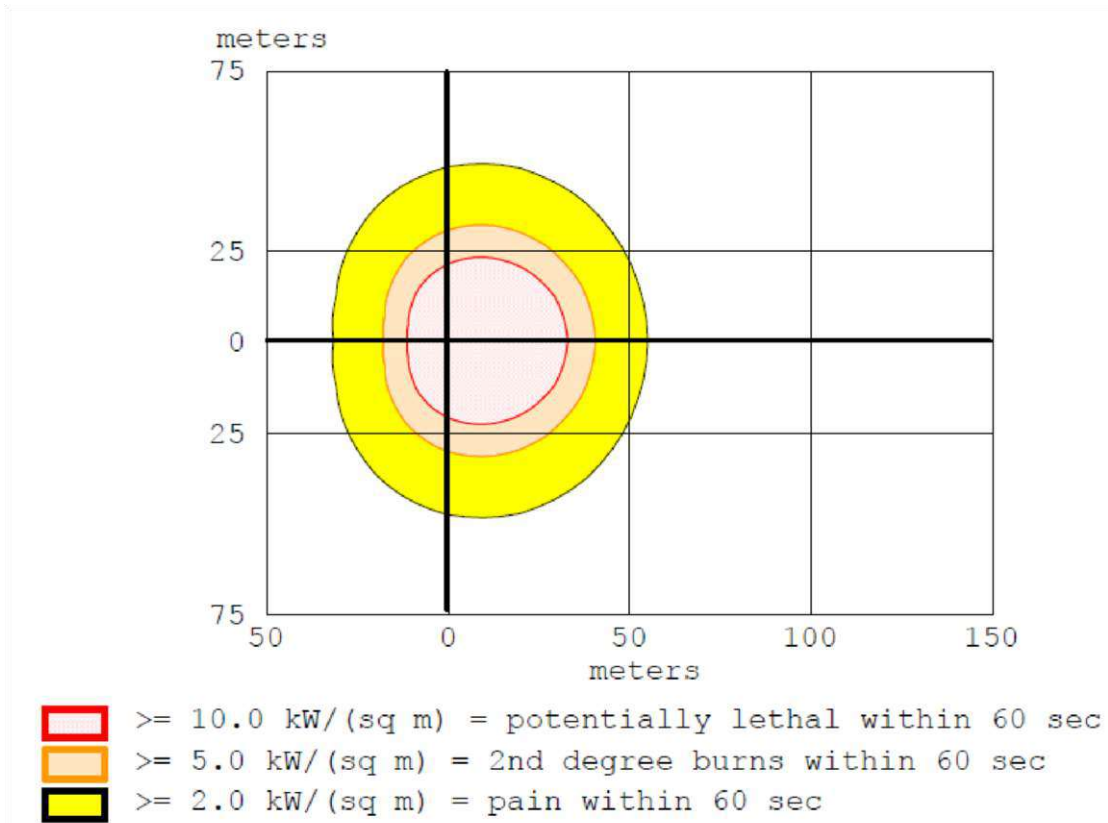
20.1.9.11 Evaporating Puddle – Overpressure (Graph)



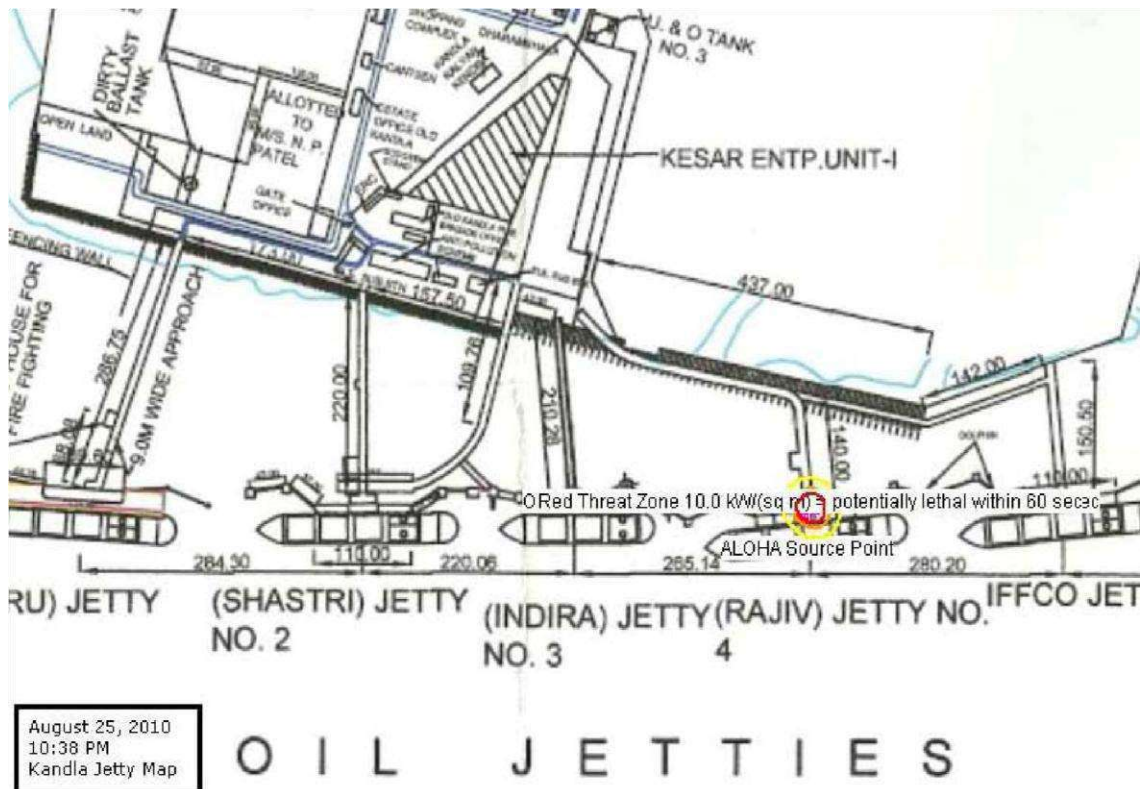
20.1.9.12 Evaporating Puddle – Overpressure (Contour)



20.1.9.13 Burning Puddle – Thermal Radiation (Graph)

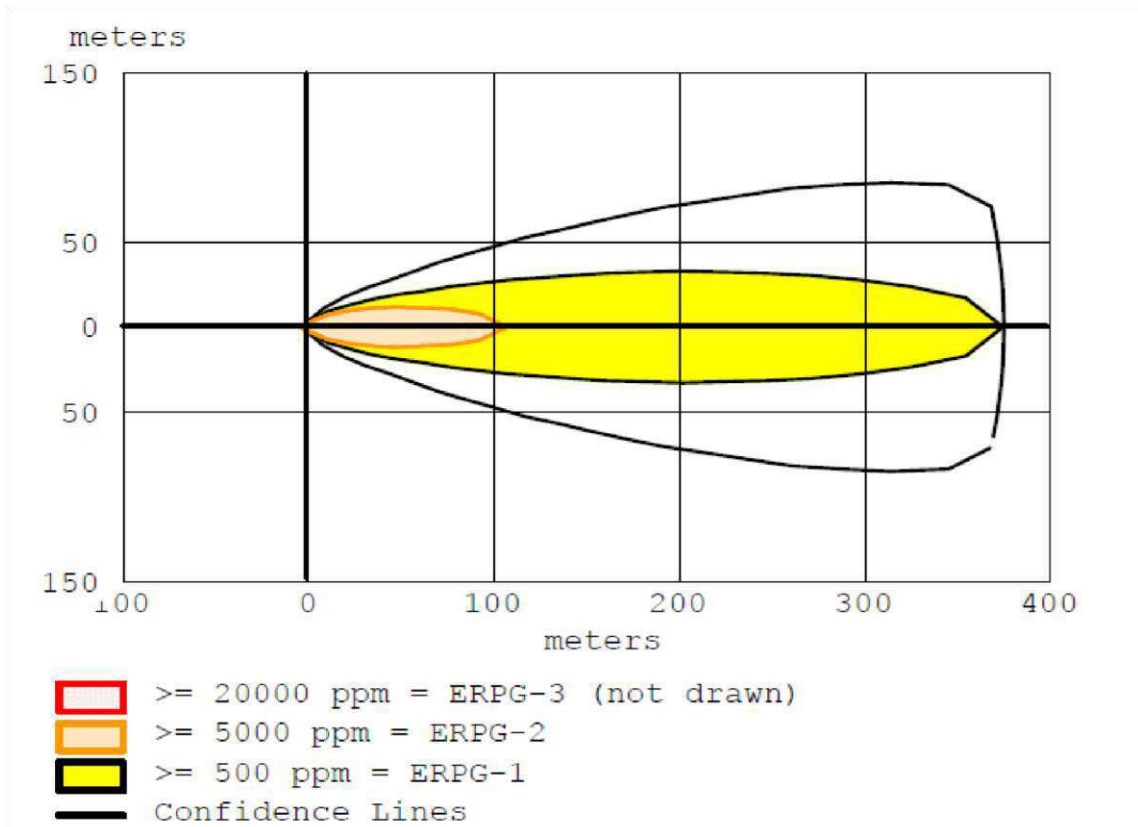


20.1.9.14 Burning Puddle – Thermal Radiation (Contour)

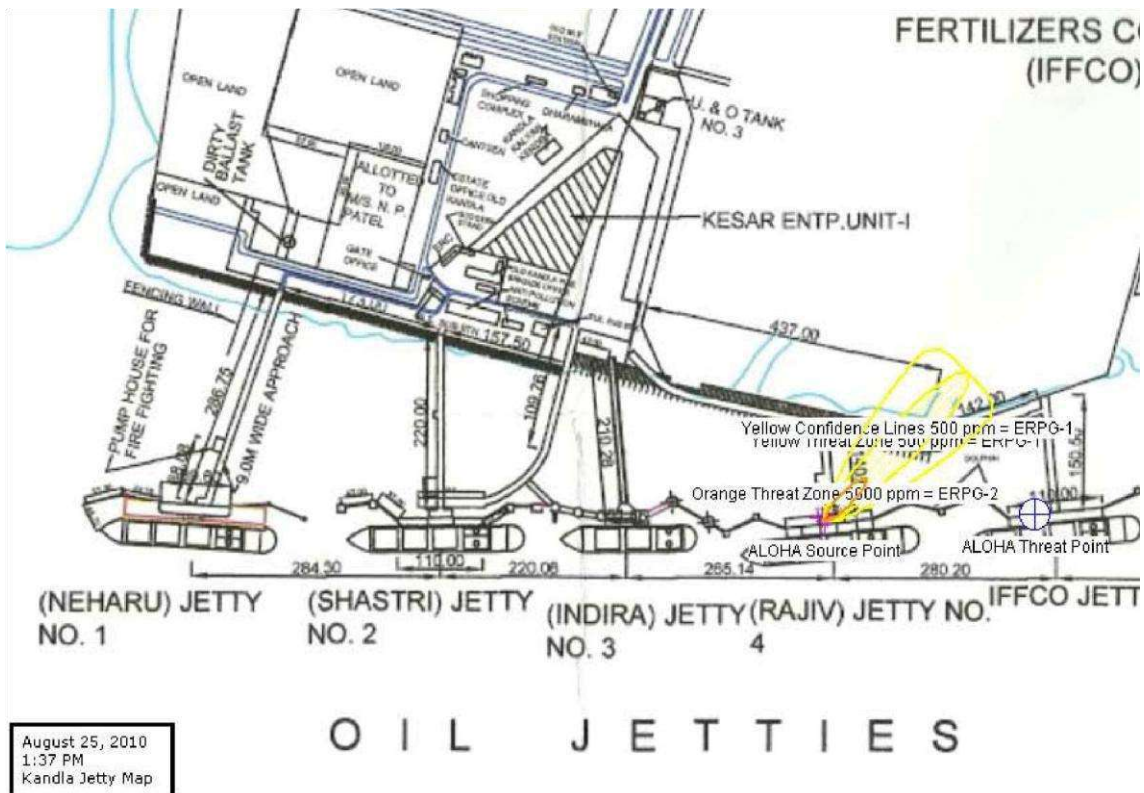


20.1.10 Jetty Four – Vinyl Chloride

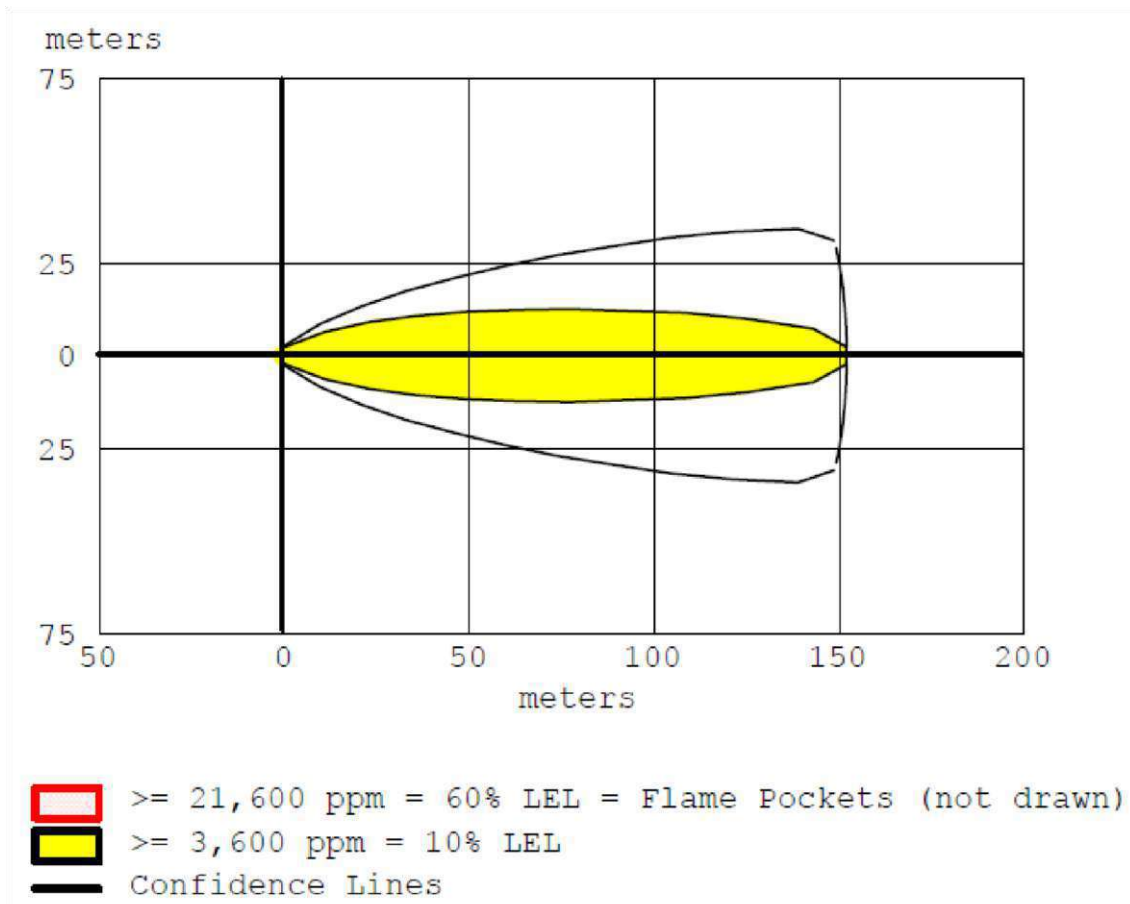
20.1.10.1 Instantaneous Release – Toxic Threat Zone (Graph)



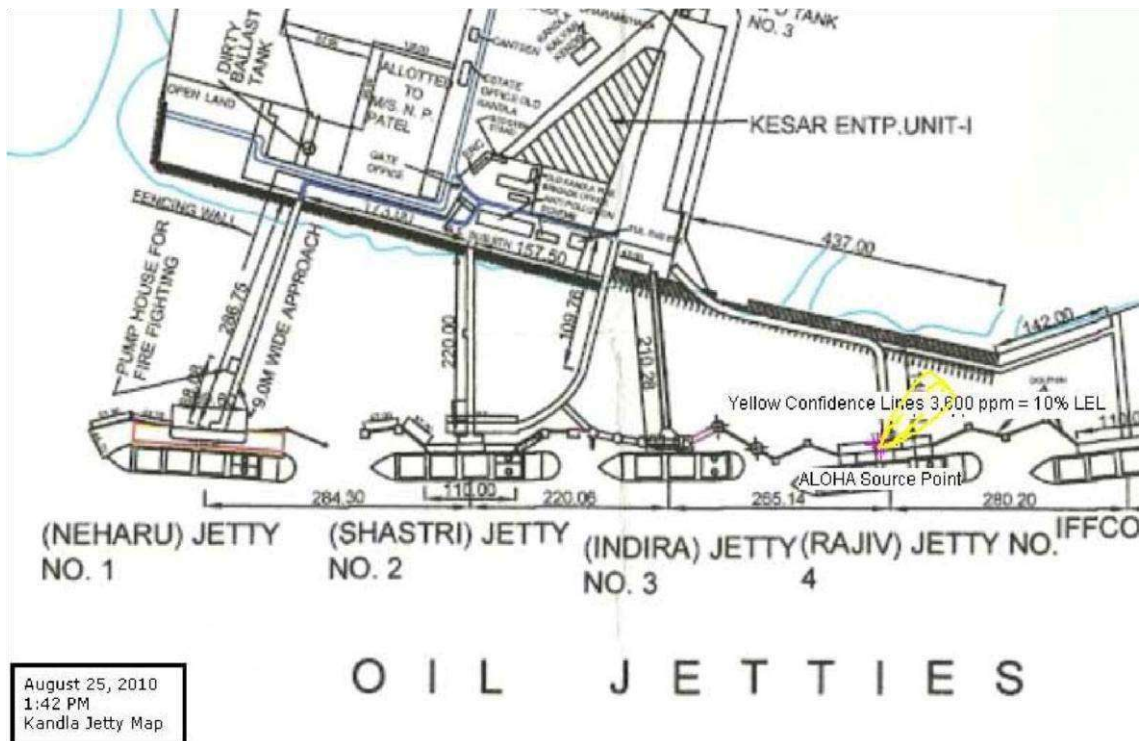
20.1.10.2 Instantaneous Release – Toxic Threat Zone (Contour)



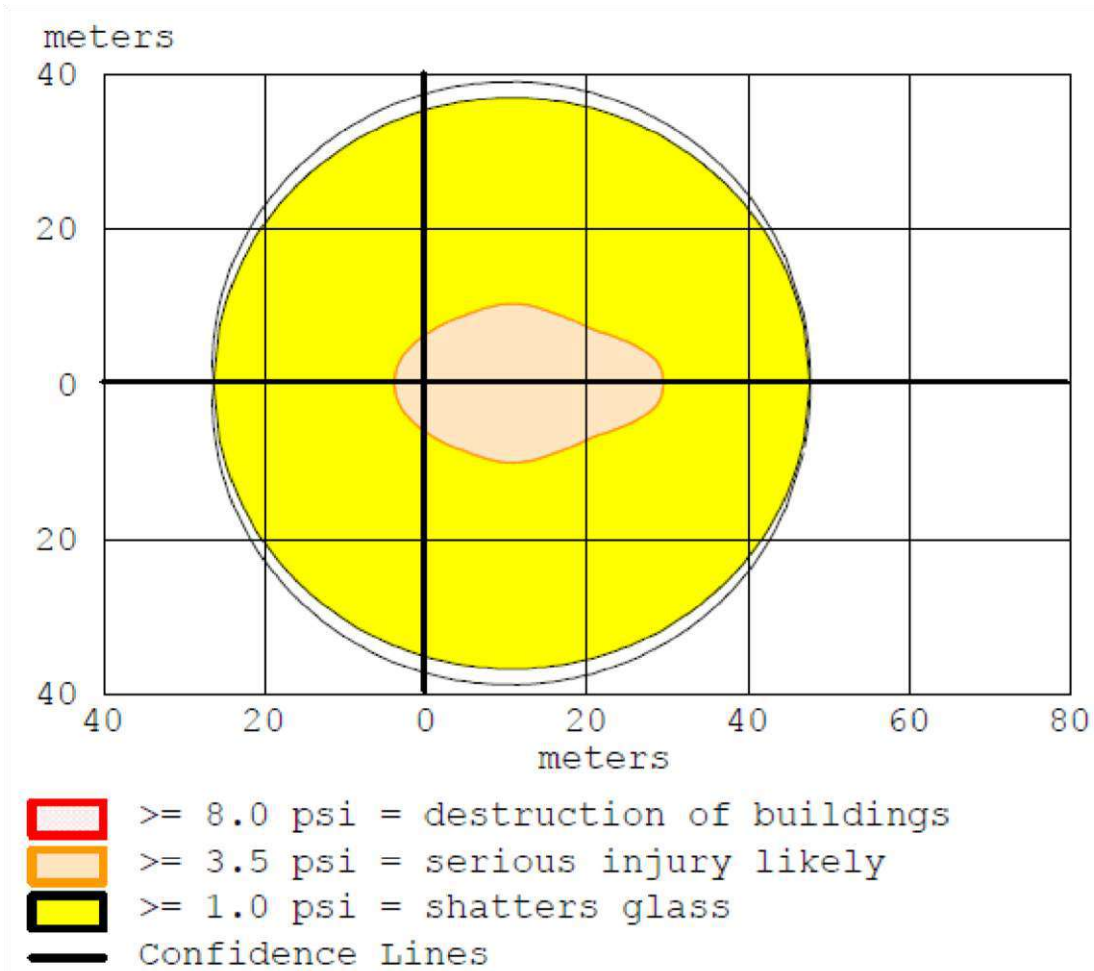
20.1.10.3 Instantaneous Release – Flammable Area of Vapor Cloud (Graph)



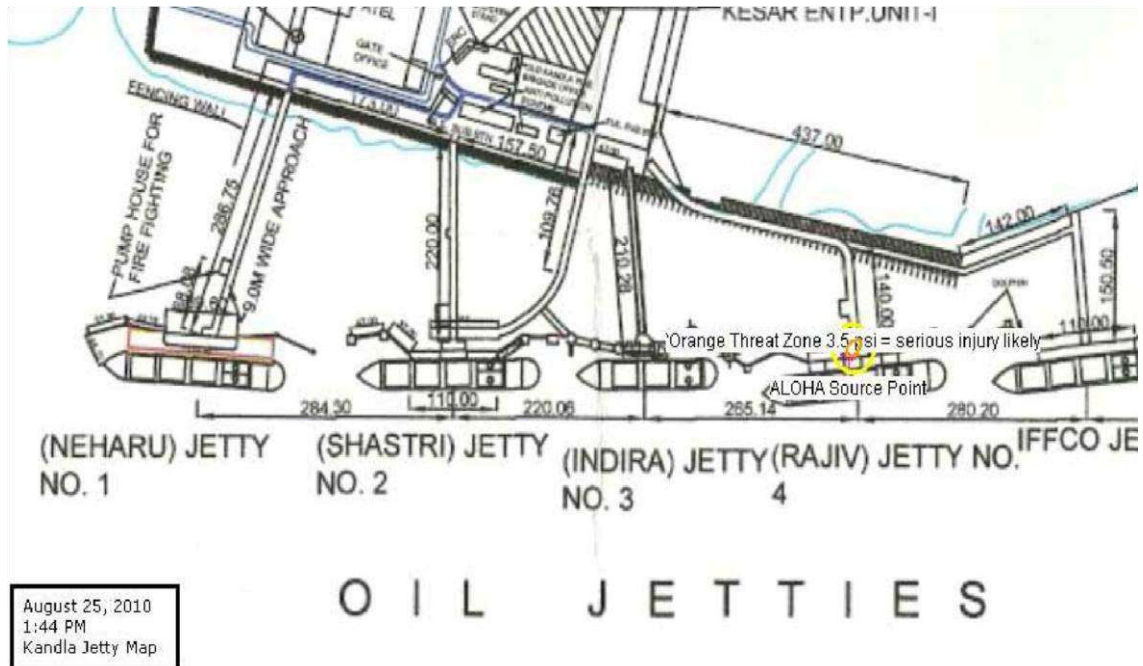
20.1.10.4 Instantaneous Release – Flammable Area of Vapor Cloud (Contour)



20.1.10.5 Instantaneous Release – Overpressure (Graph)

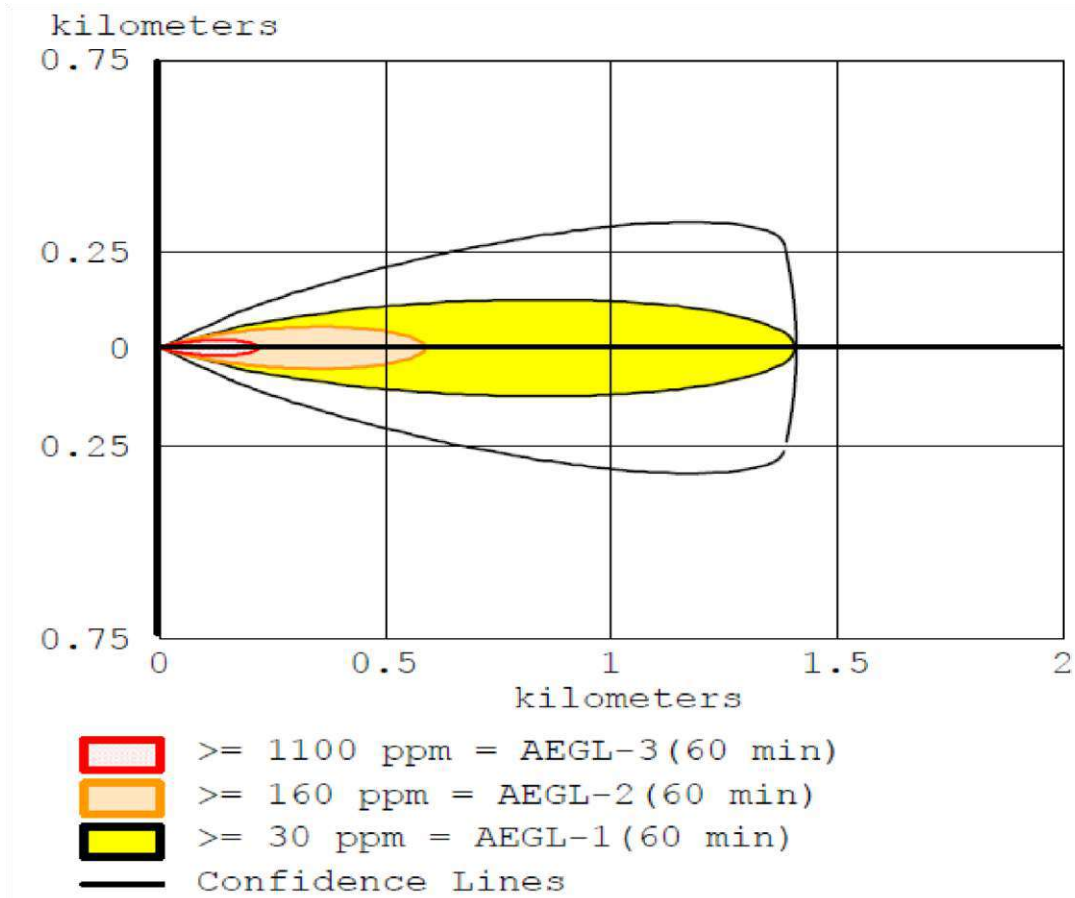


20.1.10.6 Instantaneous Release – Overpressure (Contour)

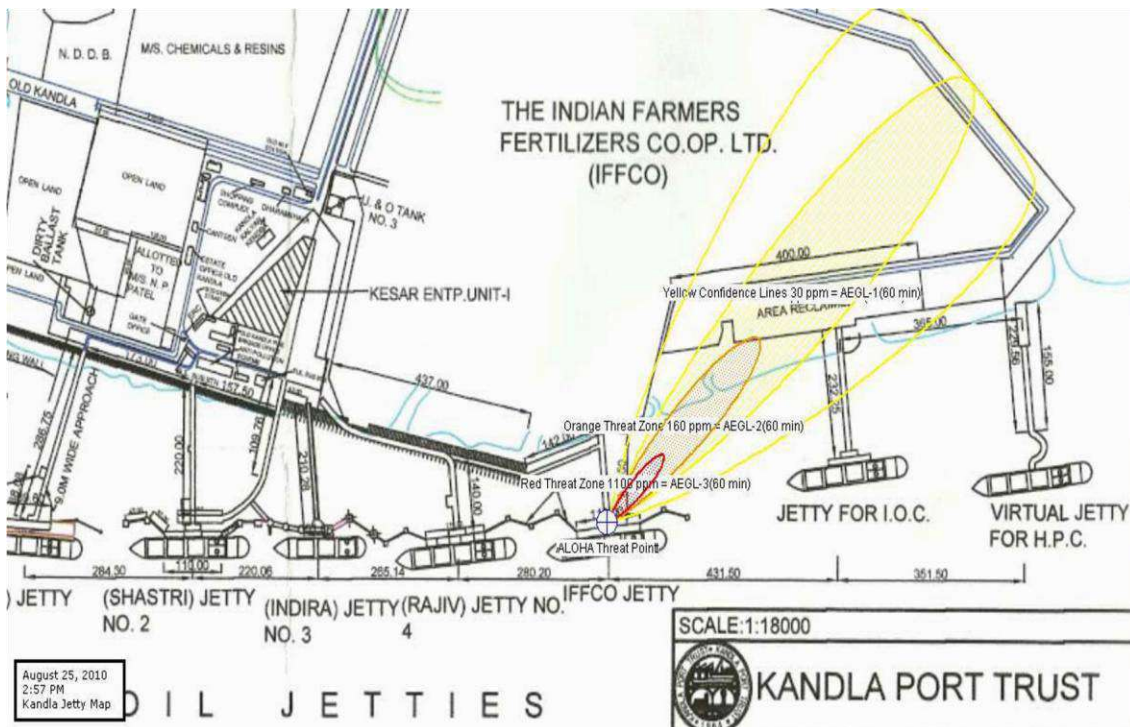


20.1.10.7 Evaporating Puddle – Toxic Threat Zone (Graph)

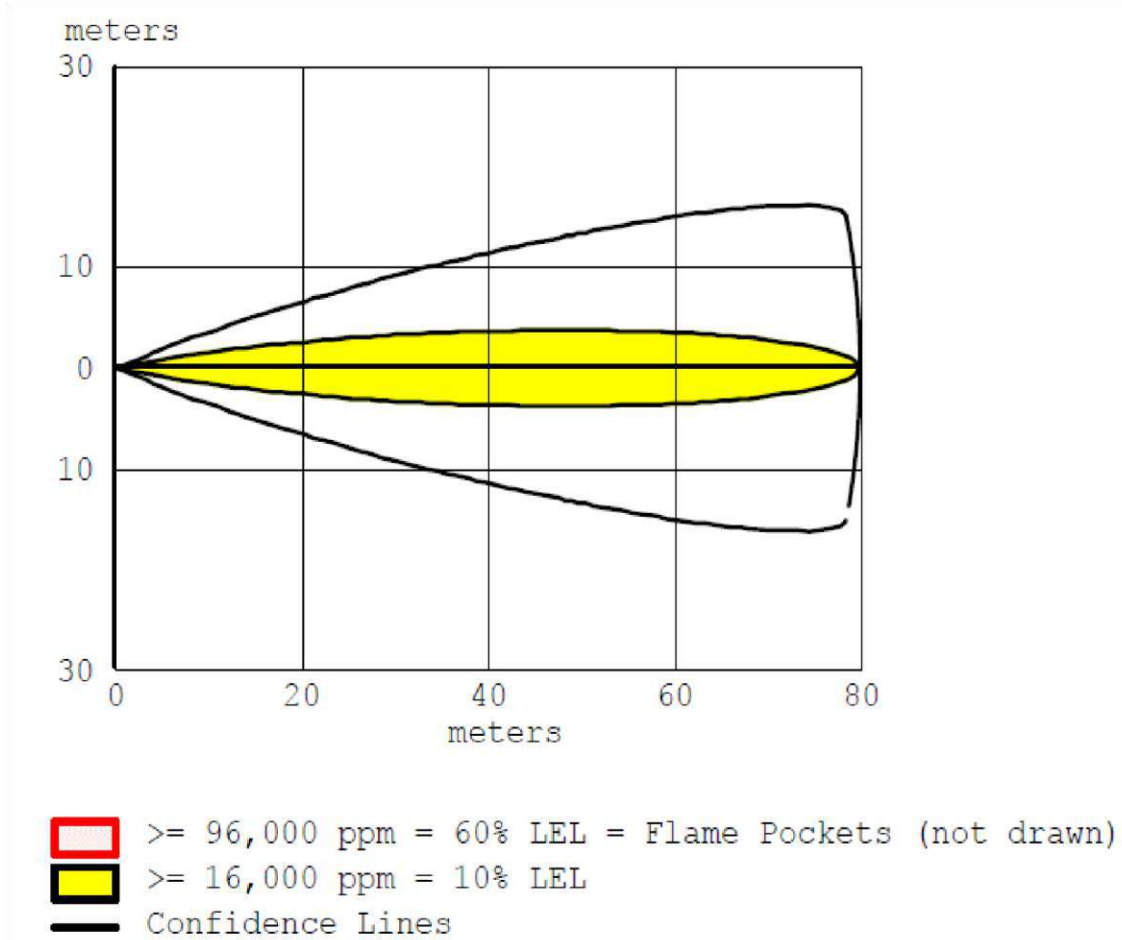
20.1.11.1 Instantaneous Release – Toxic Threat Zone (Graph)



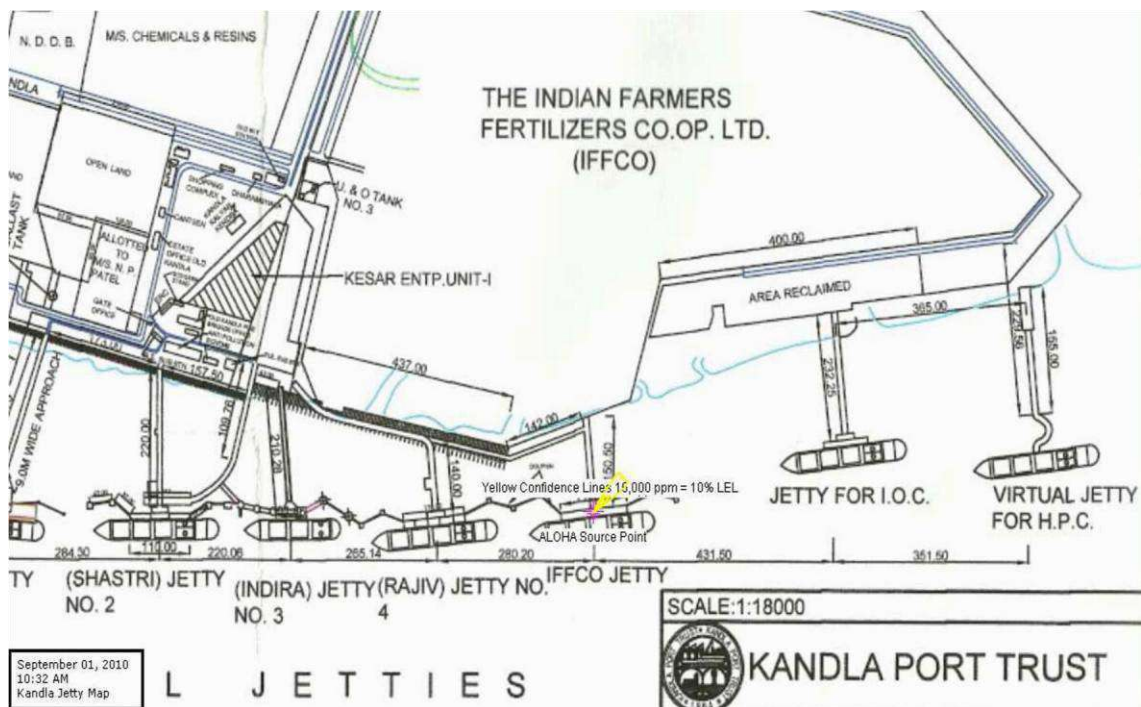
20.1.11.2 Instantaneous Release – Toxic Threat Zone (Contour)



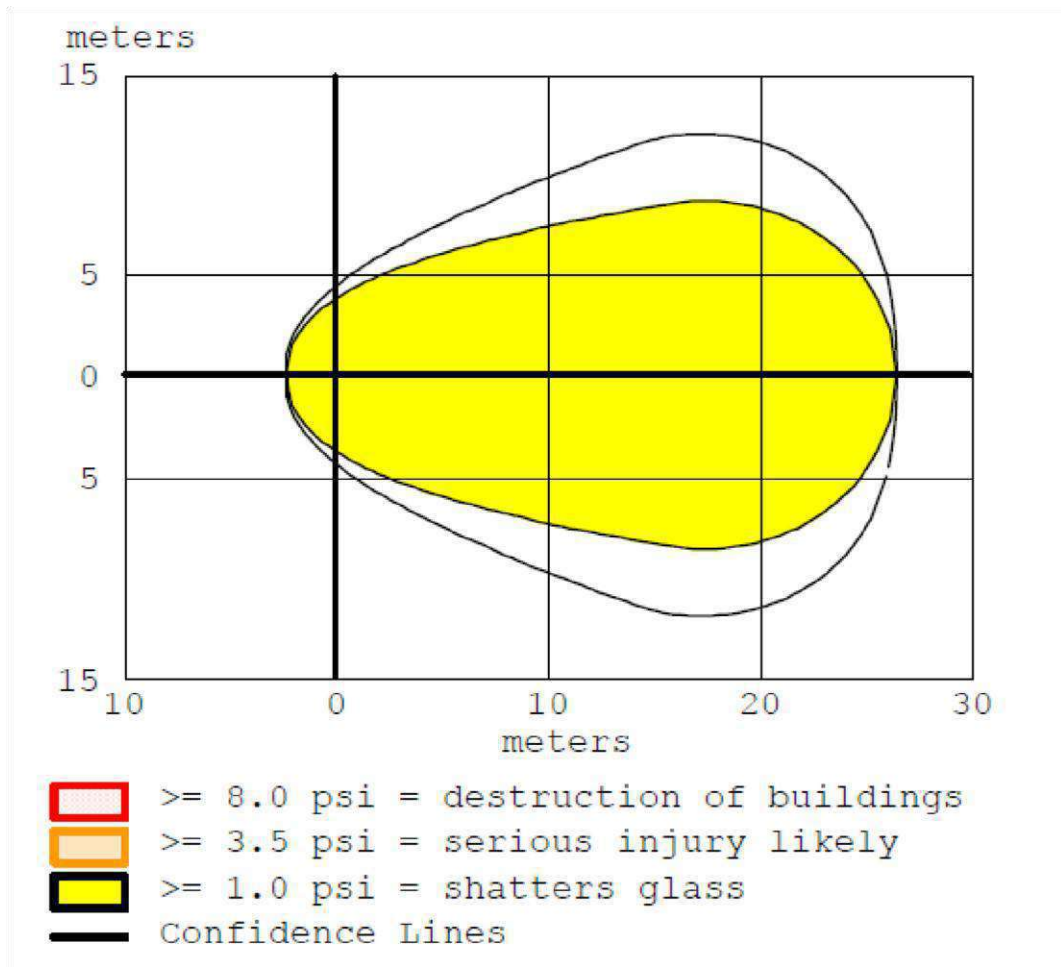
20.1.11.3 Instantaneous Release – Flammable Area of Vapor Cloud (Graph)



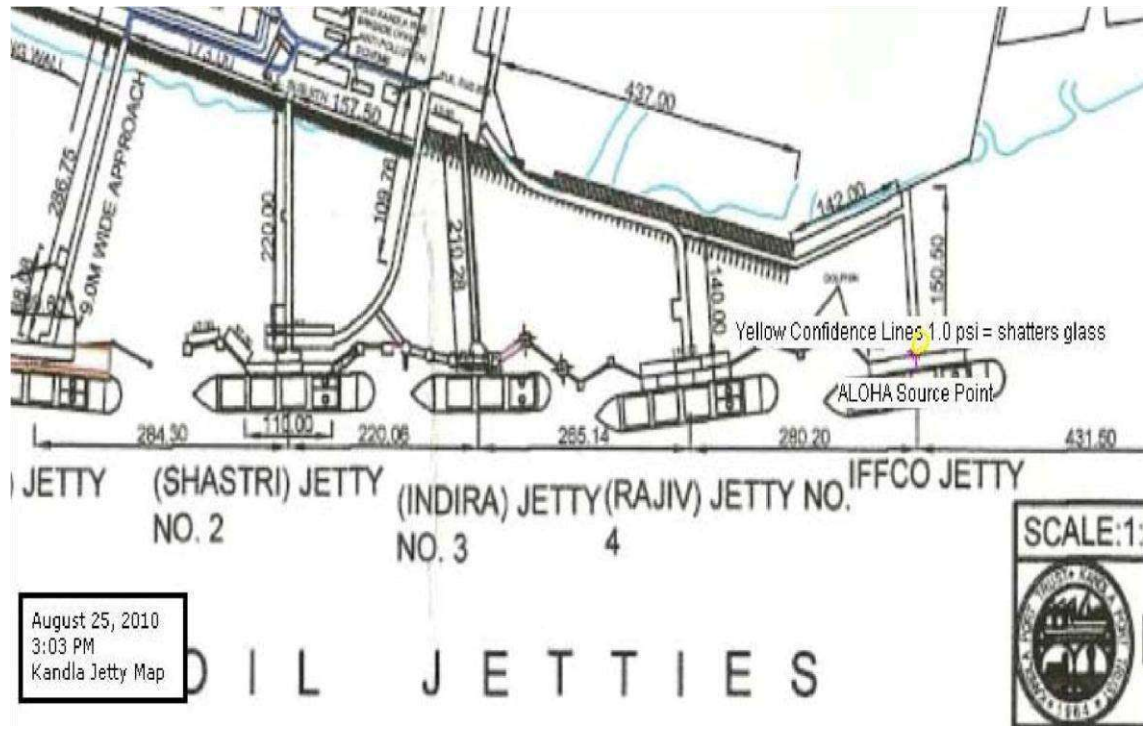
20.1.11.4 Instantaneous Release – Flammable Area of Vapor Cloud (Contour)



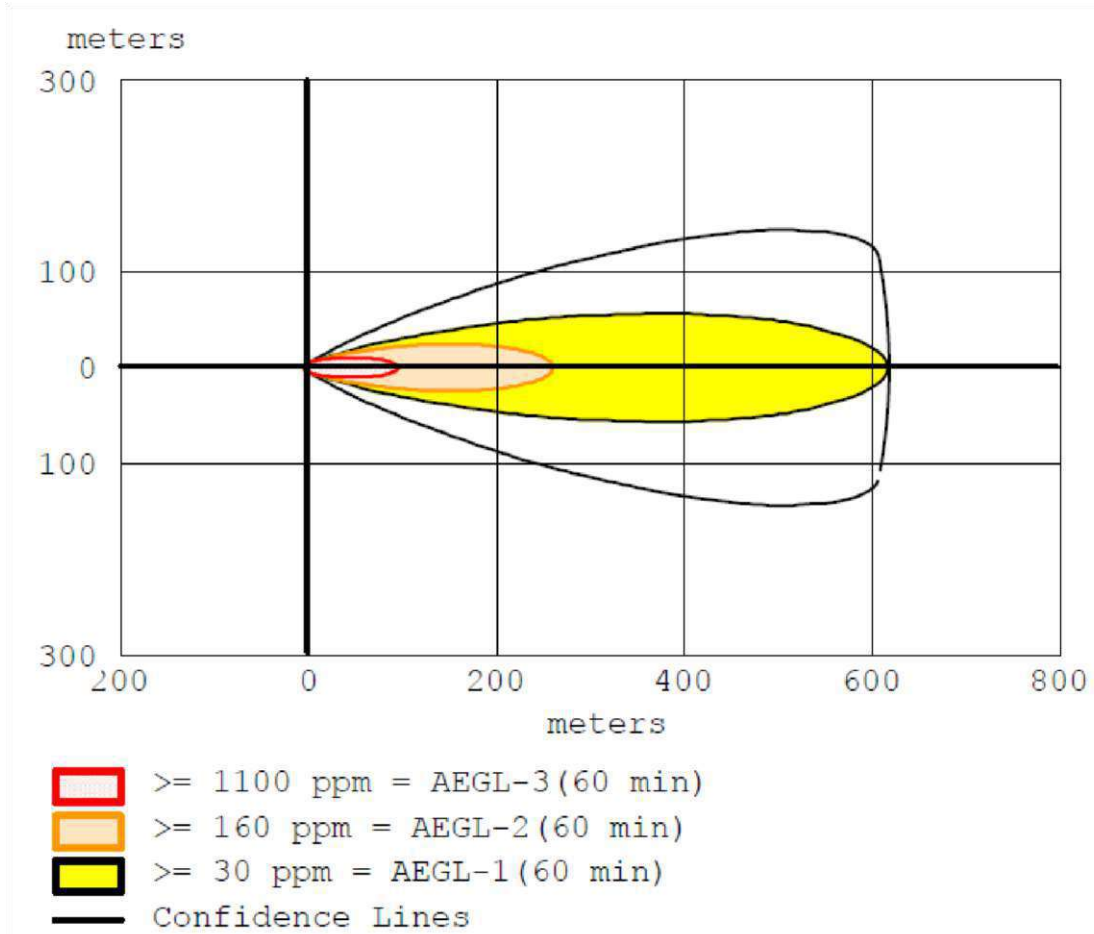
20.1.11.5 Instantaneous Release – Overpressure (Graph)



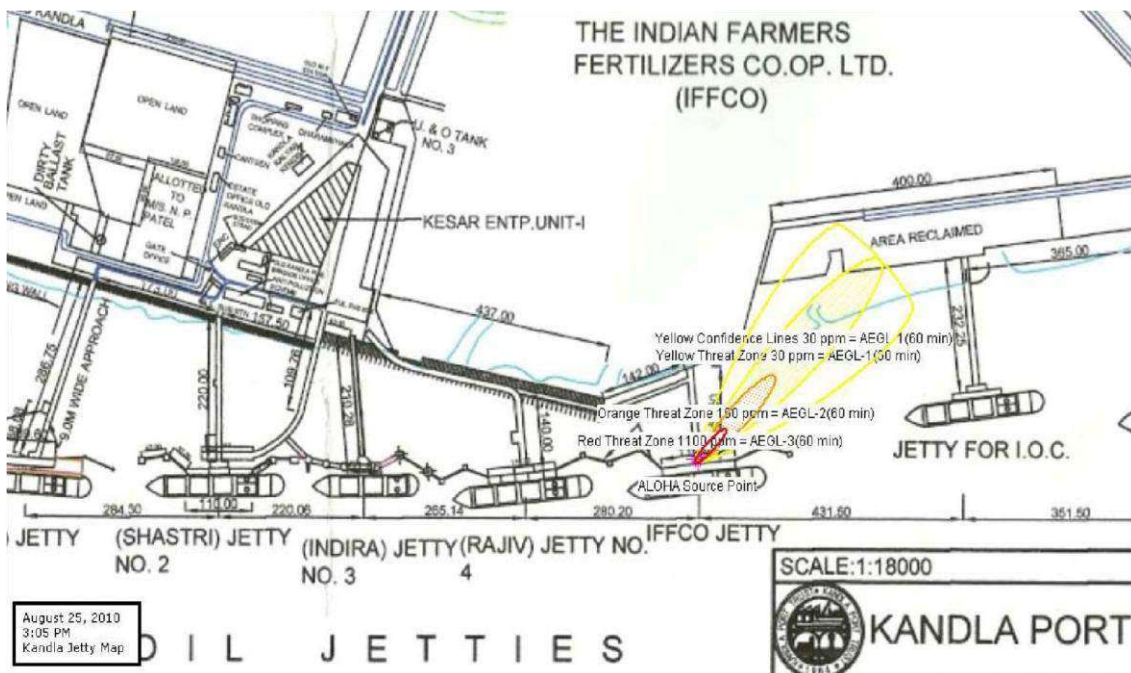
20.1.11.6 Instantaneous Release – Overpressure (Contour)



20.1.11.7 Evaporating Puddle – Toxic Threat Zone (Graph)

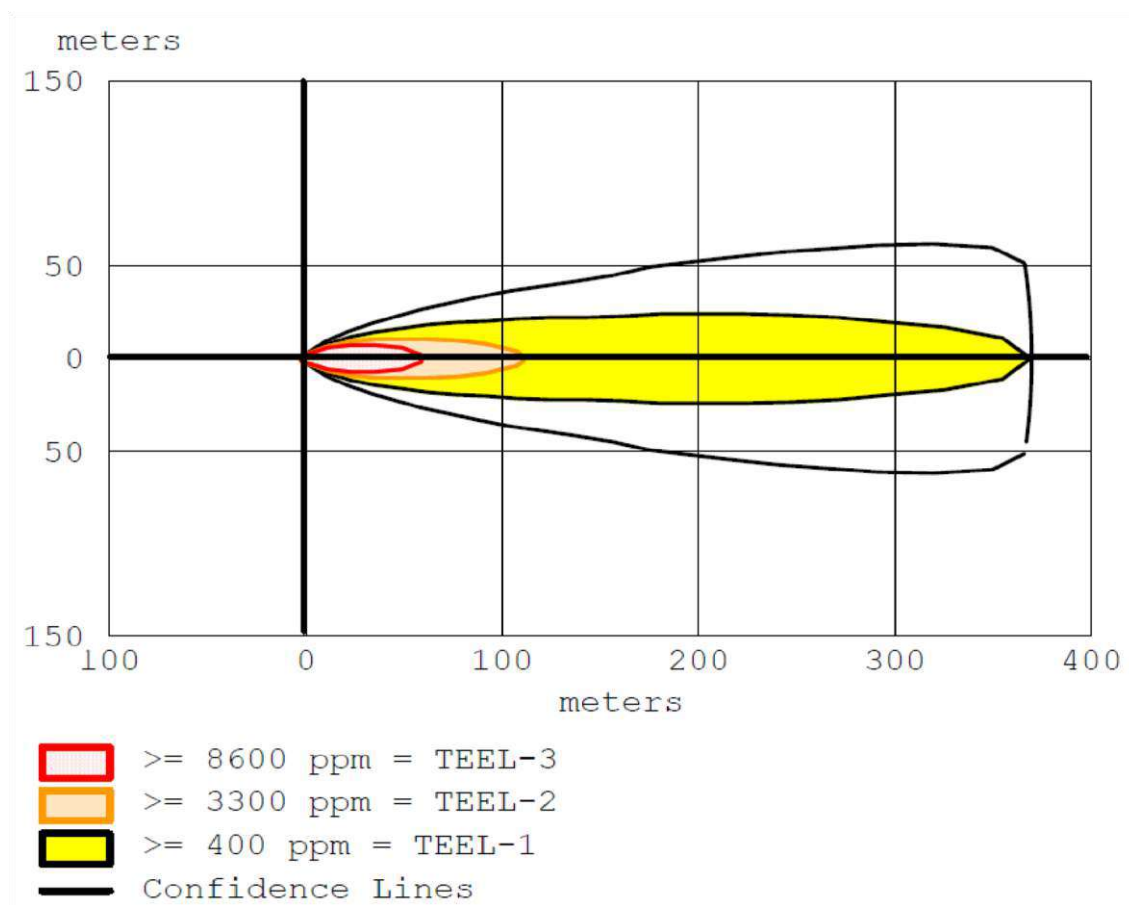


20.1.11.8 Evaporating Puddle – Toxic Threat Zone (Contour)

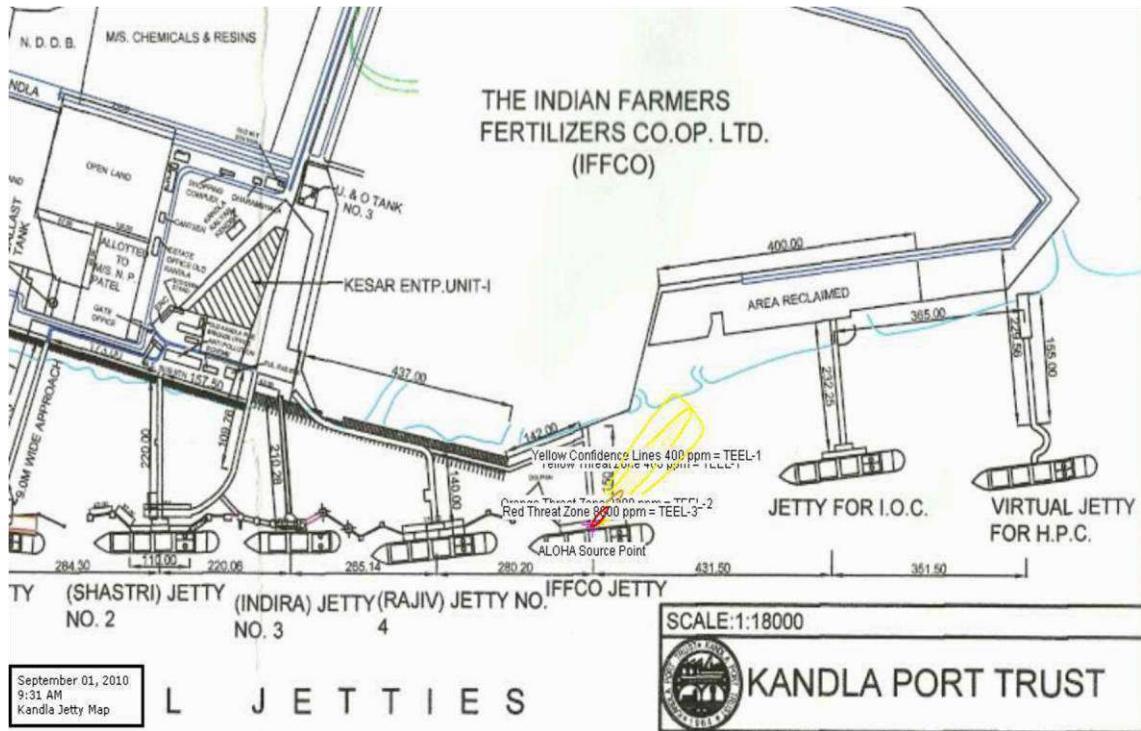


20.1.12 Jetty Five – HSD

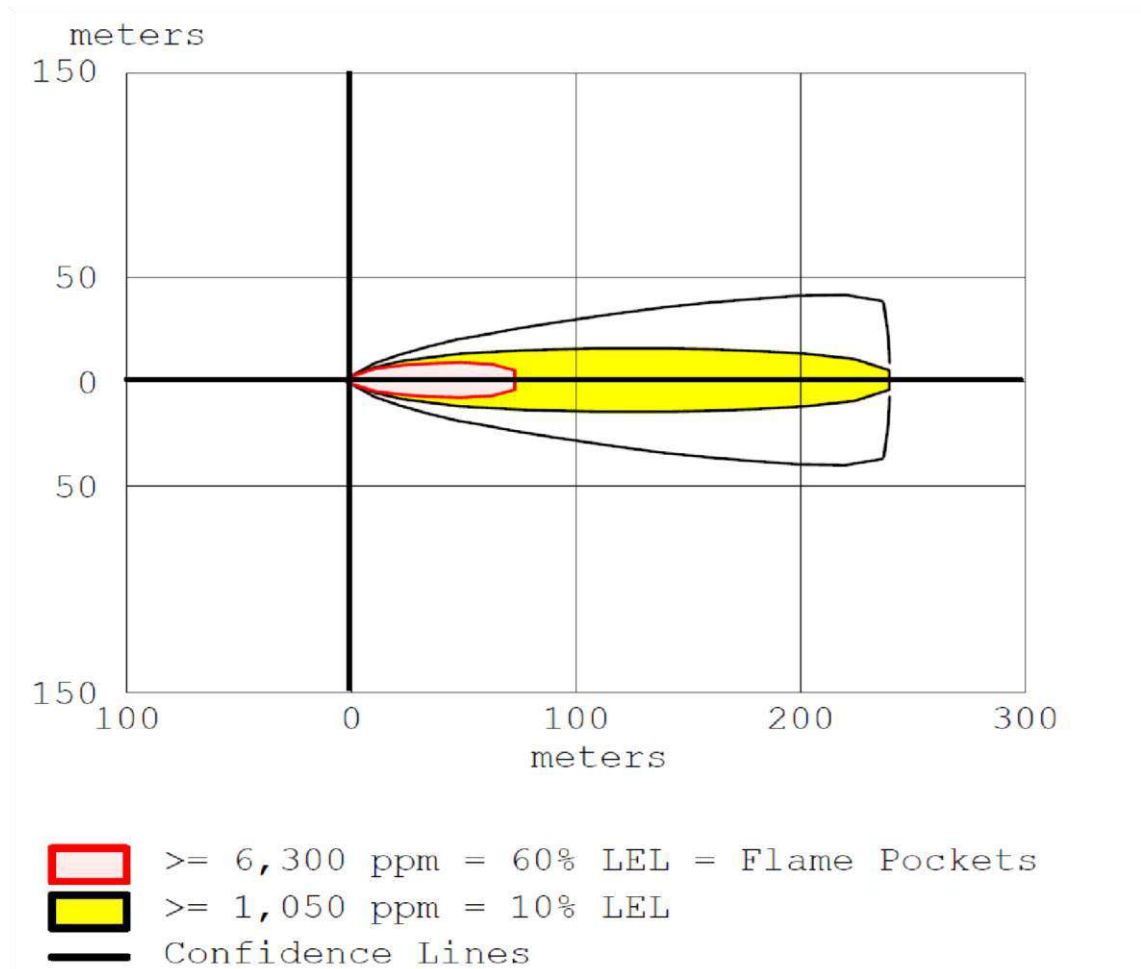
20.1.12.1 Instantaneous Release – Toxic Threat Zone (Graph)



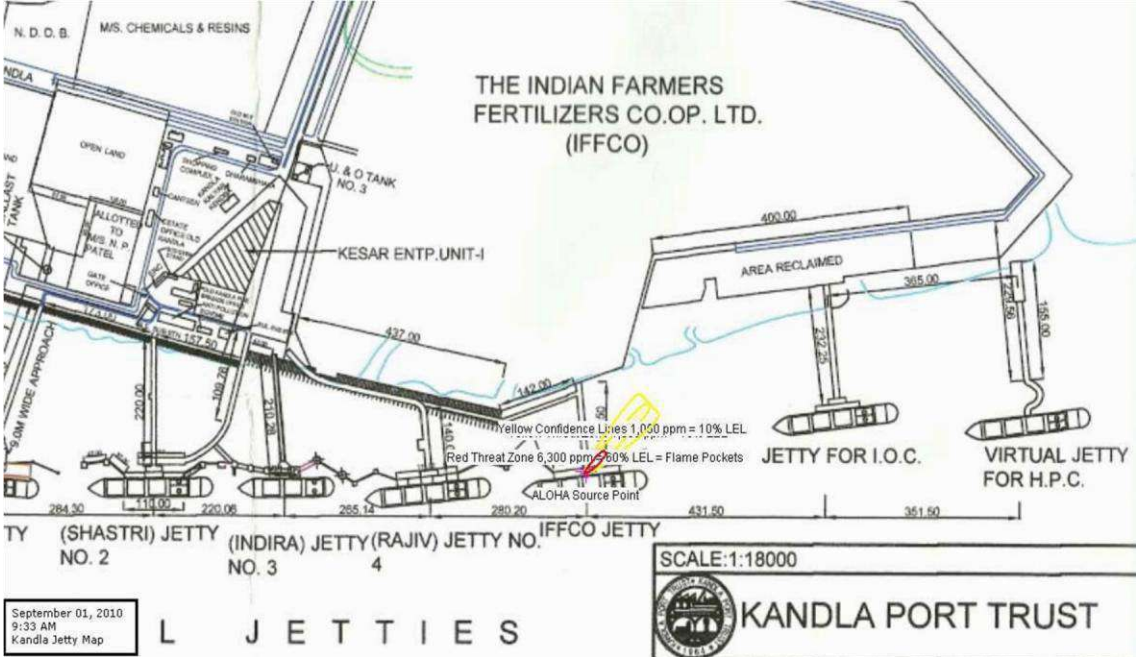
20.1.12.2 Instantaneous Release – Toxic Threat Zone (Contour)



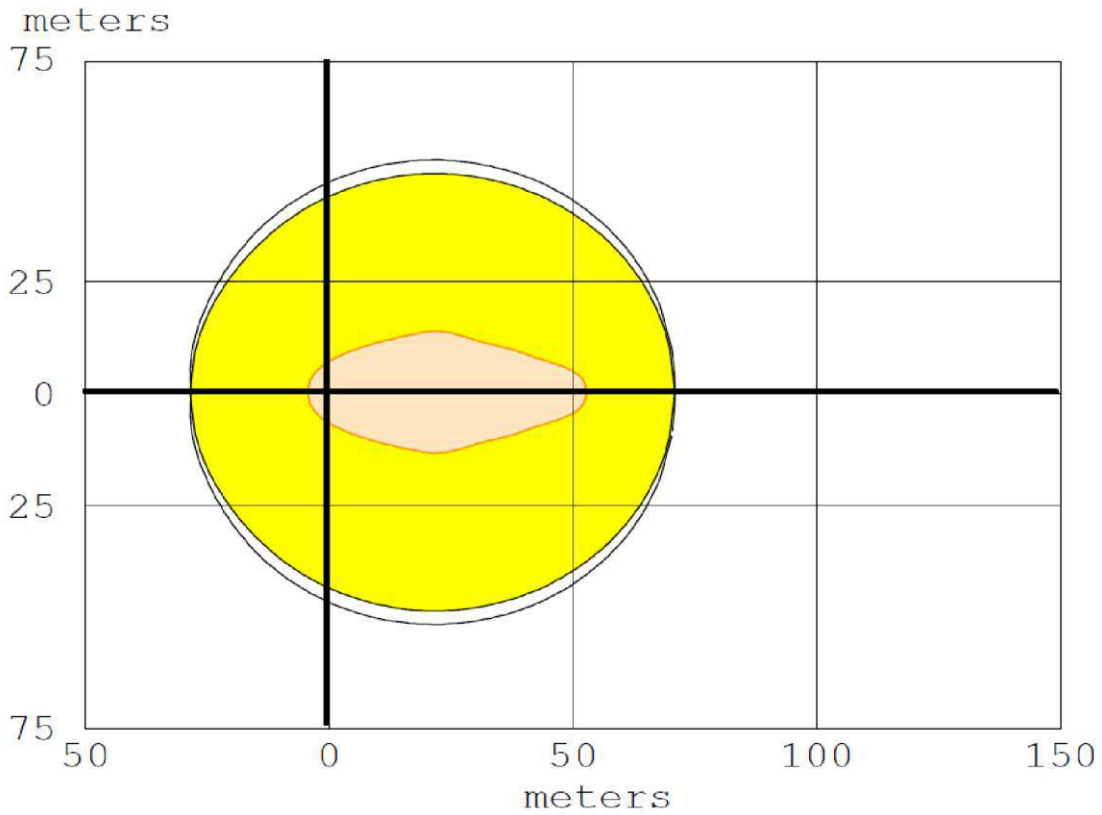
20.1.12.3 Instantaneous Release – Flammable Area of Vapor Cloud (Graph)



20.1.12.4 Instantaneous Release – Flammable Area of Vapor Cloud (Contour)

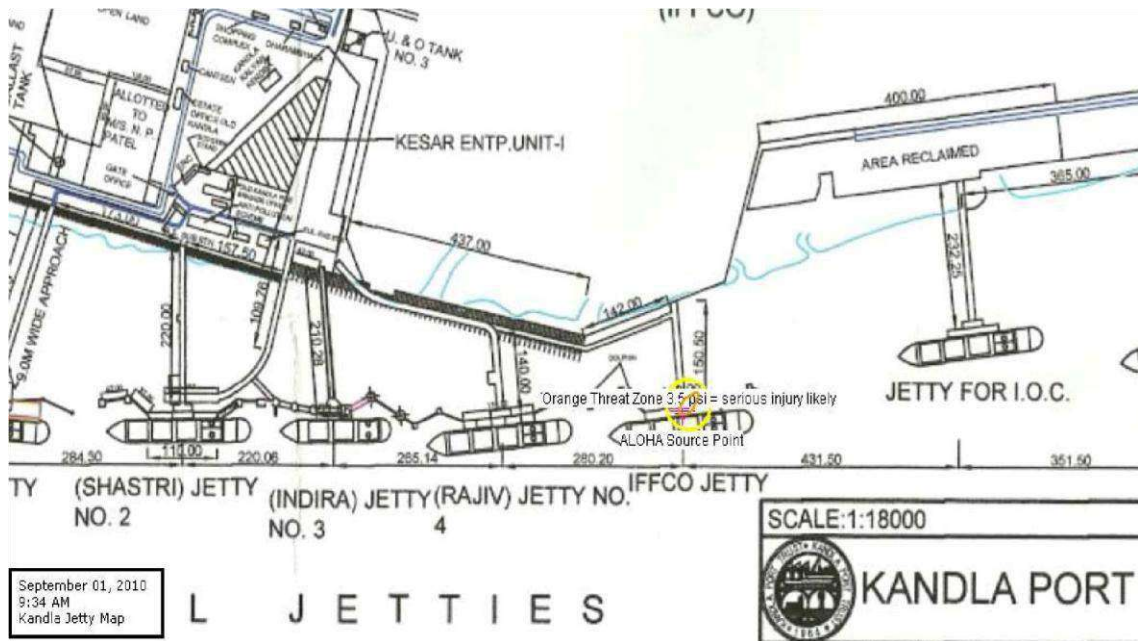


20.1.12.5 Instantaneous Release – Overpressure (Graph)

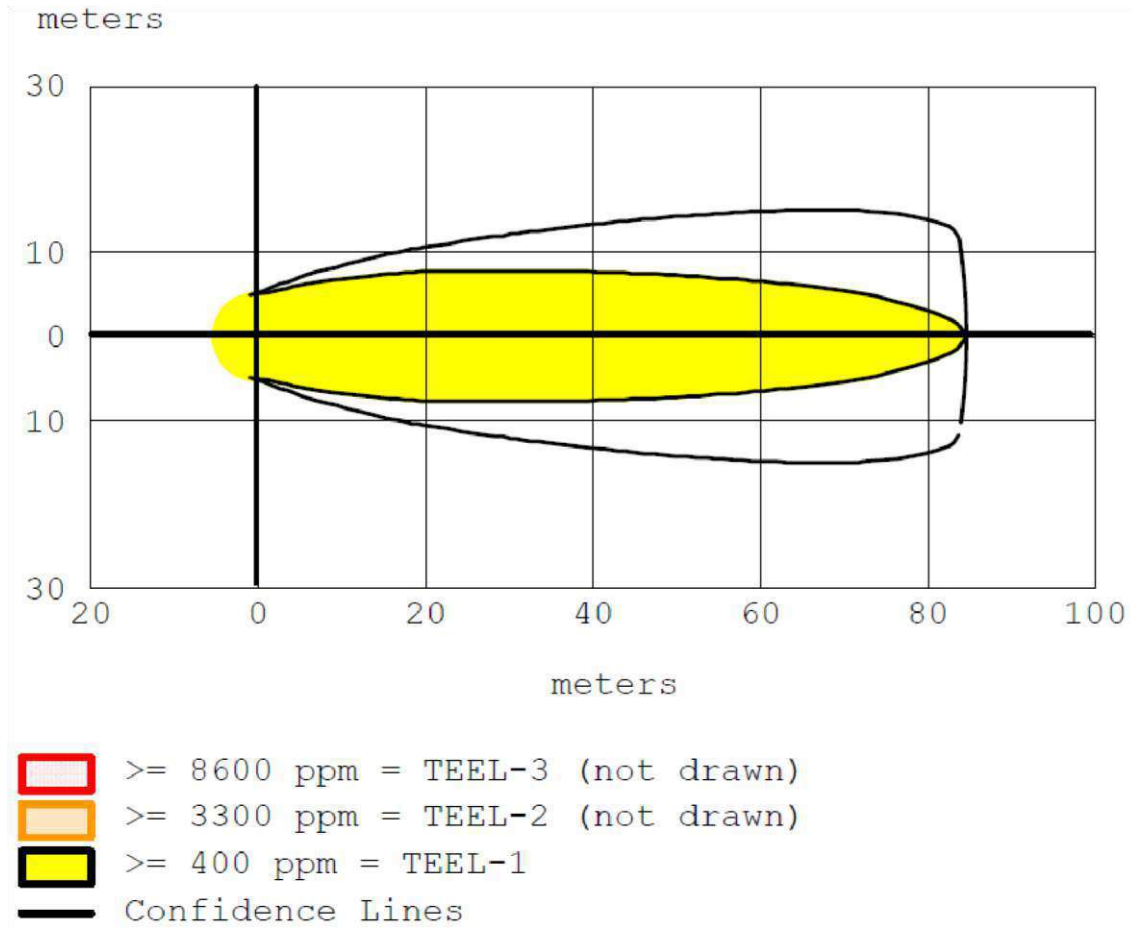


- ≥ 8.0 psi = destruction of buildings
- ≥ 3.5 psi = serious injury likely
- ≥ 1.0 psi = shatters glass
- Confidence Lines

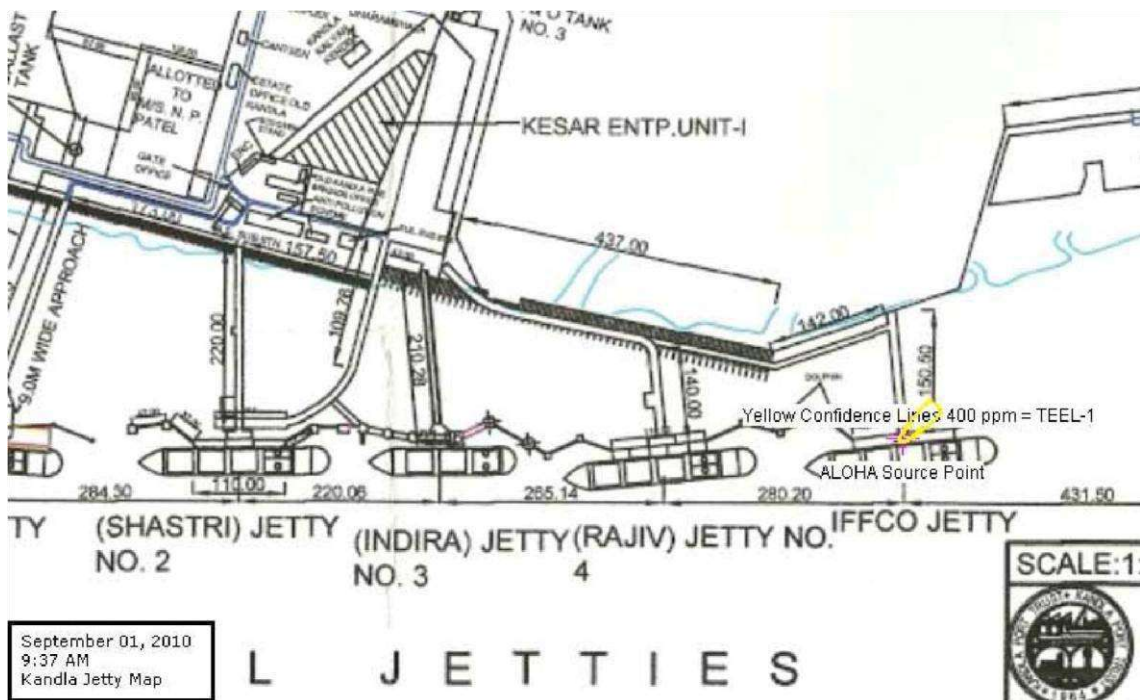
20.1.12.6 Instantaneous Release – Overpressure (Contour)



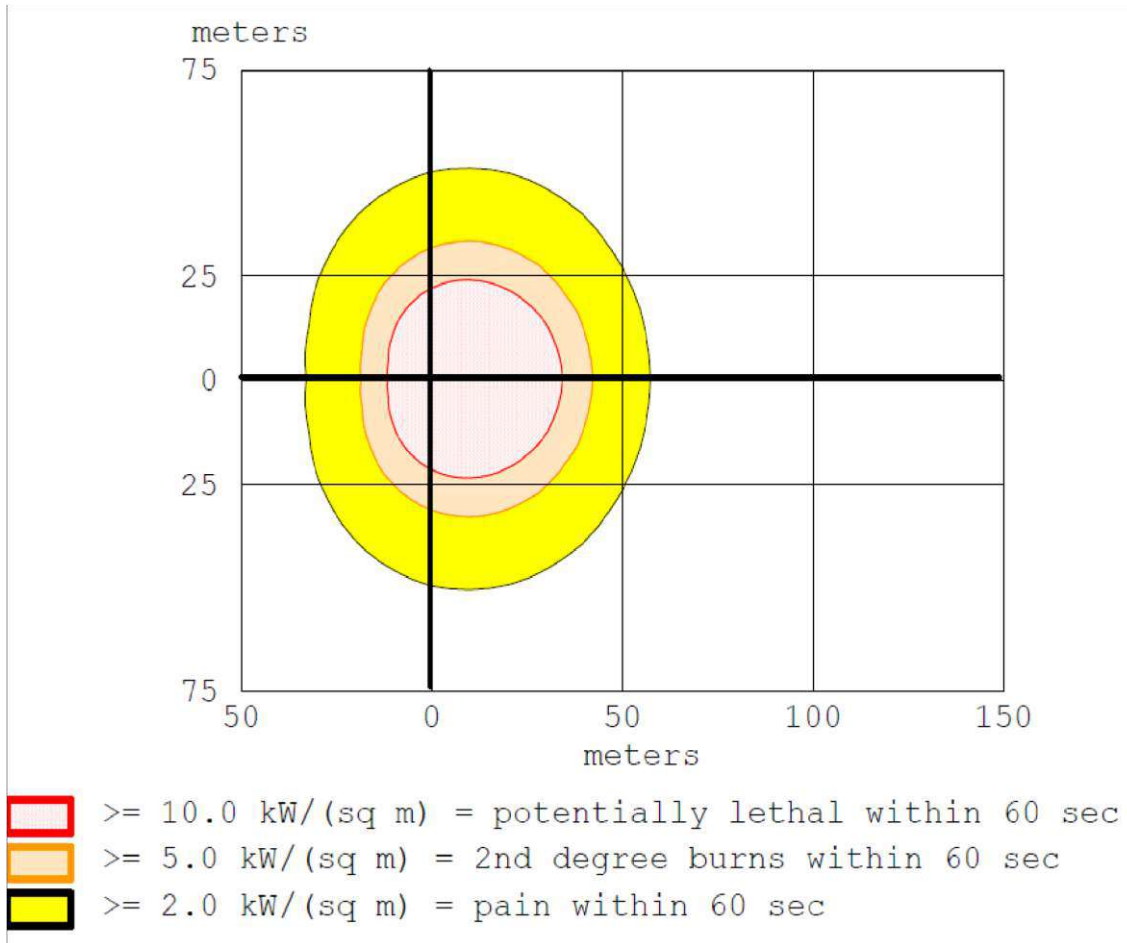
20.1.12.7 Evaporating Puddle – Toxic Threat Zone (Graph)



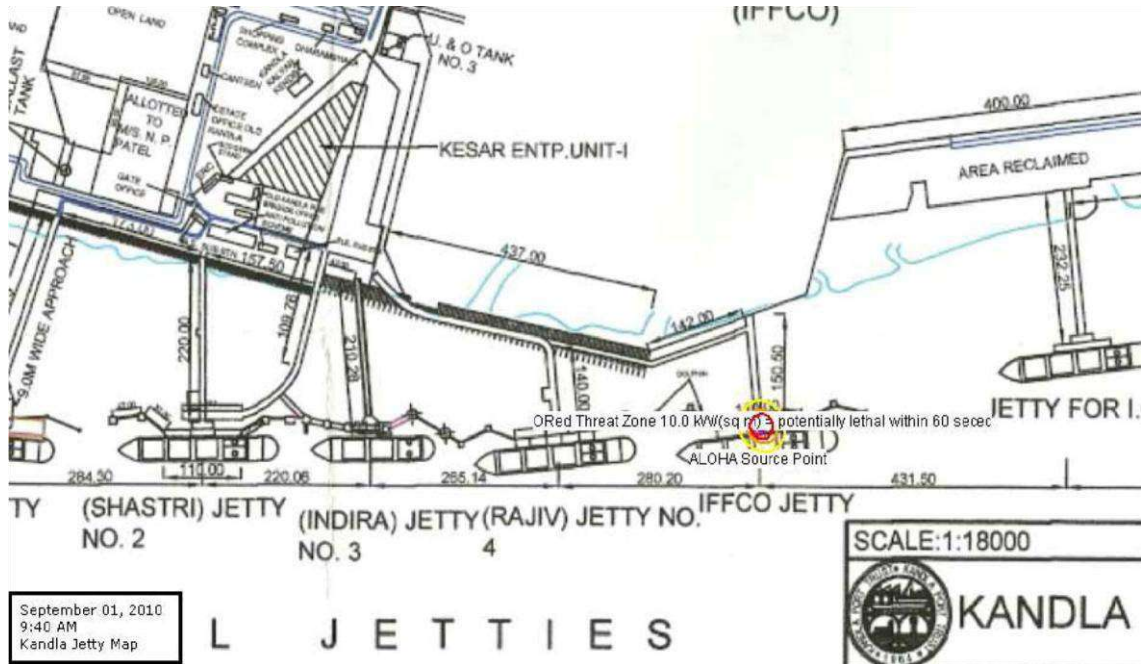
20.1.12.8 Evaporating Puddle – Toxic Threat Zone (Contour)



20.1.12.9 Evaporating Puddle – Overpressure (Graph)

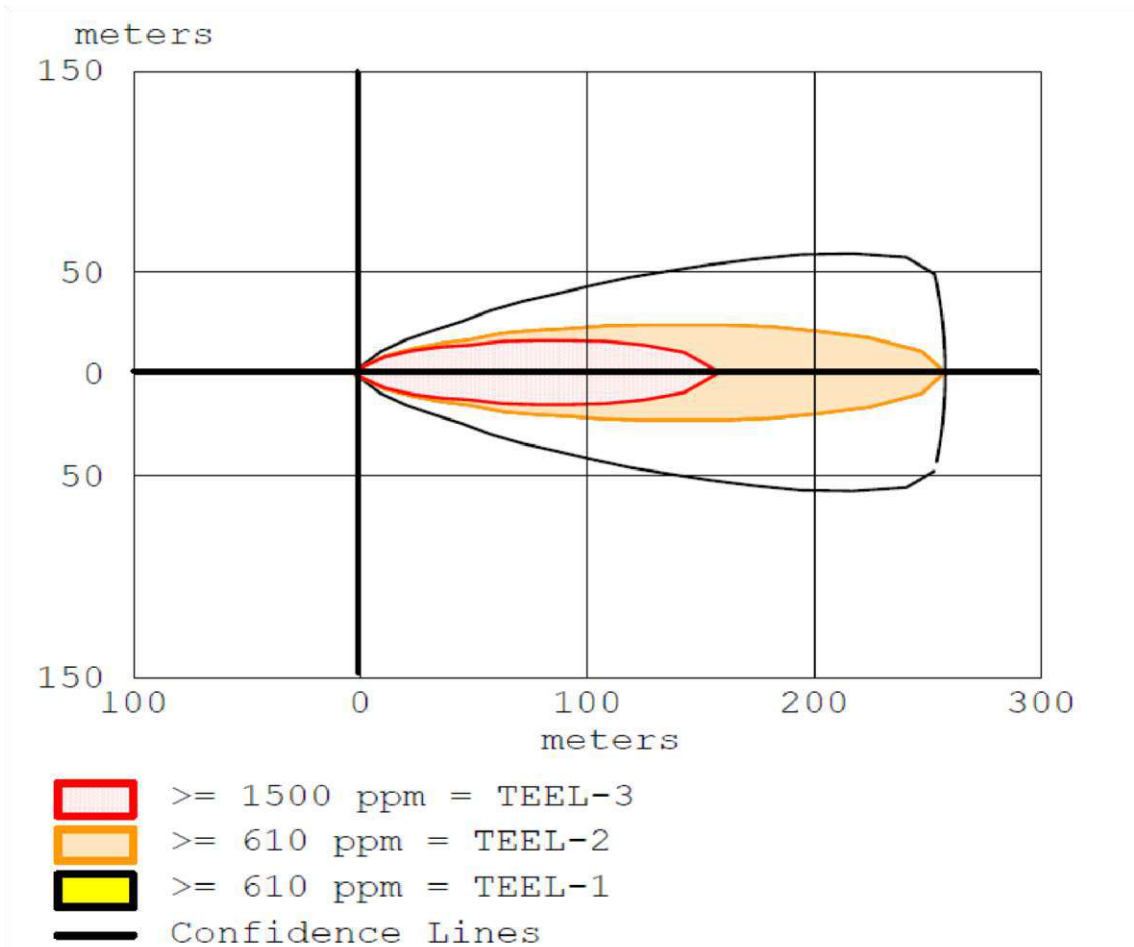


20.1.12.12 Burning Puddle – Thermal Radiation (Contour)

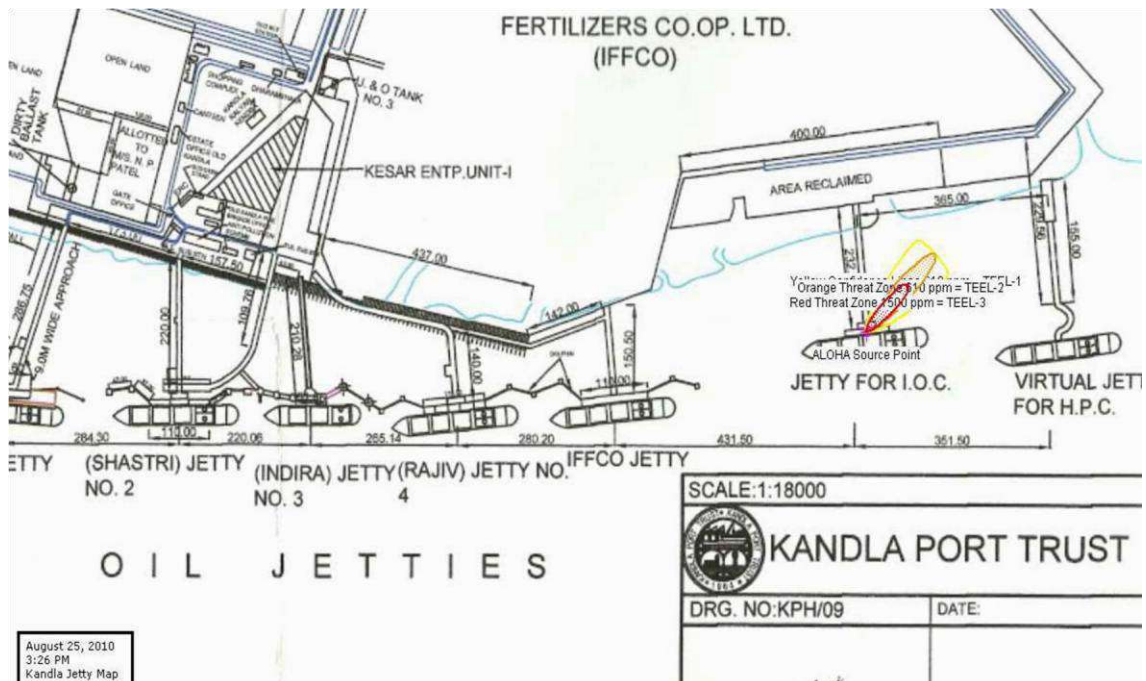


20.1.13 Jetty Six – Motor Spirit

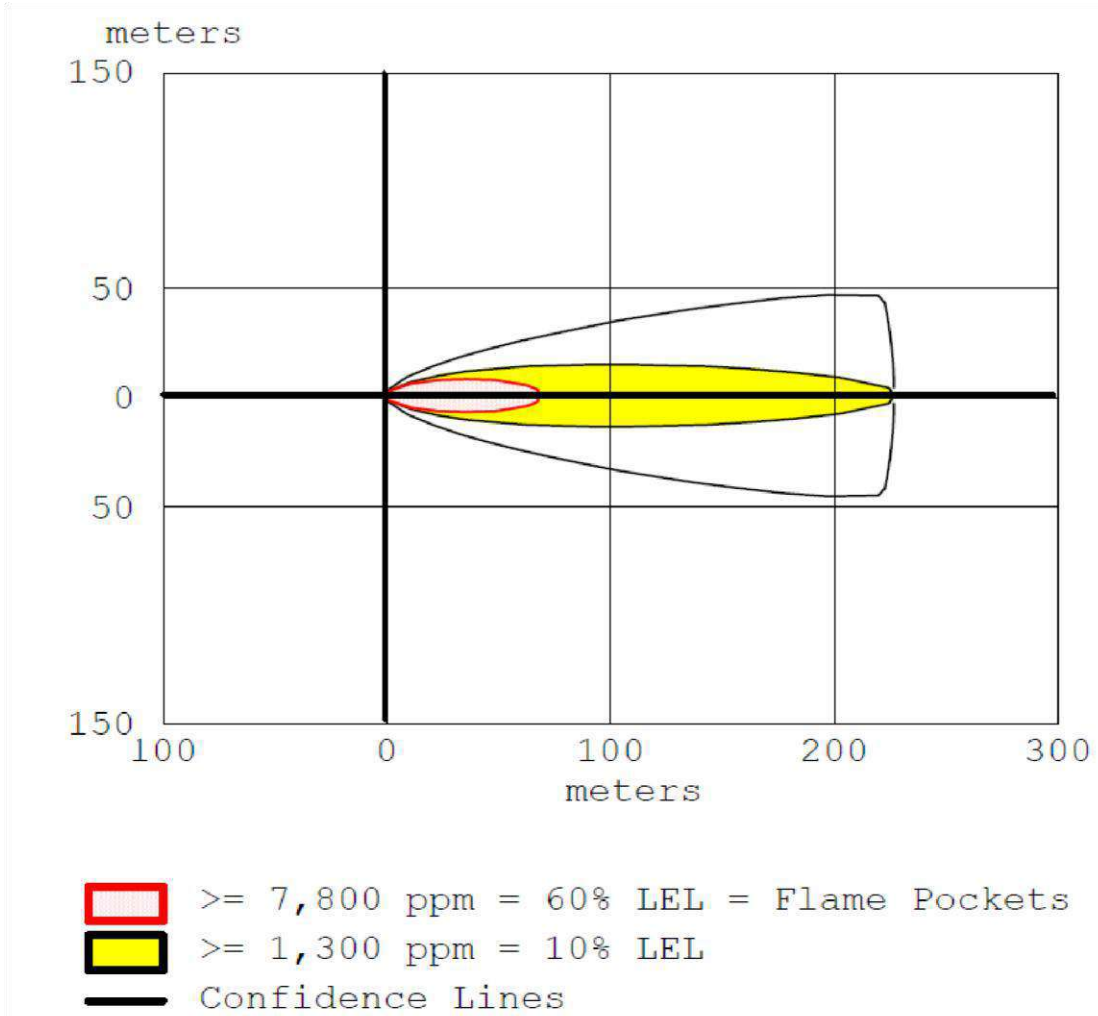
20.1.13.1 Instantaneous Release – Toxic Threat Zone (Graph)



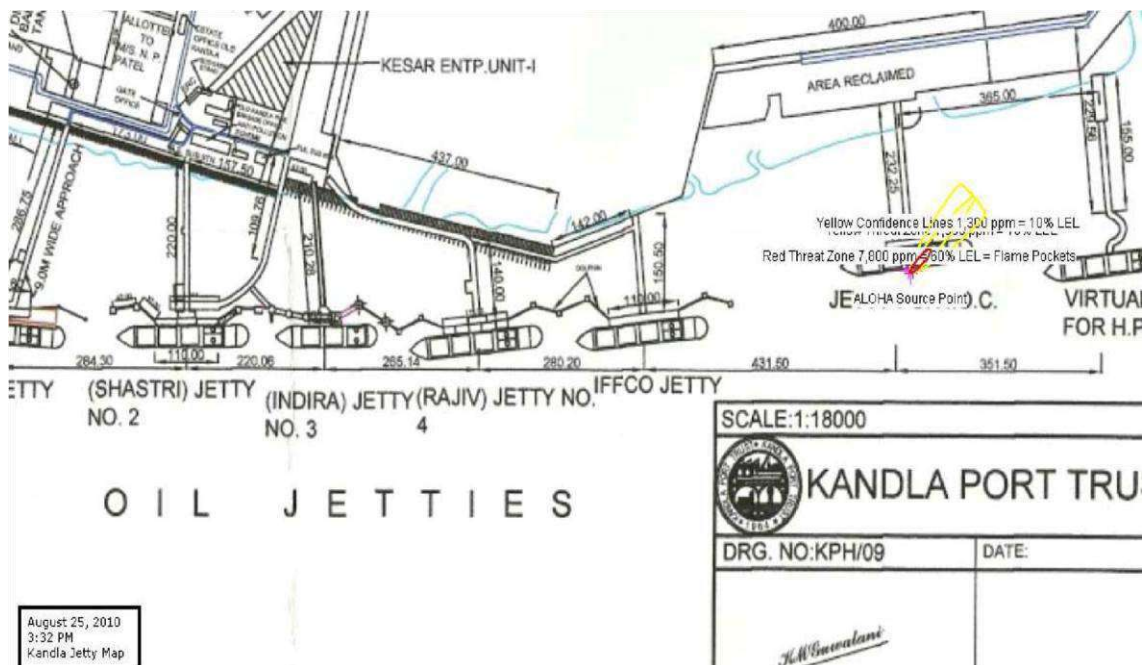
20.1.13.2 Instantaneous Release – Toxic Threat Zone (Contour)



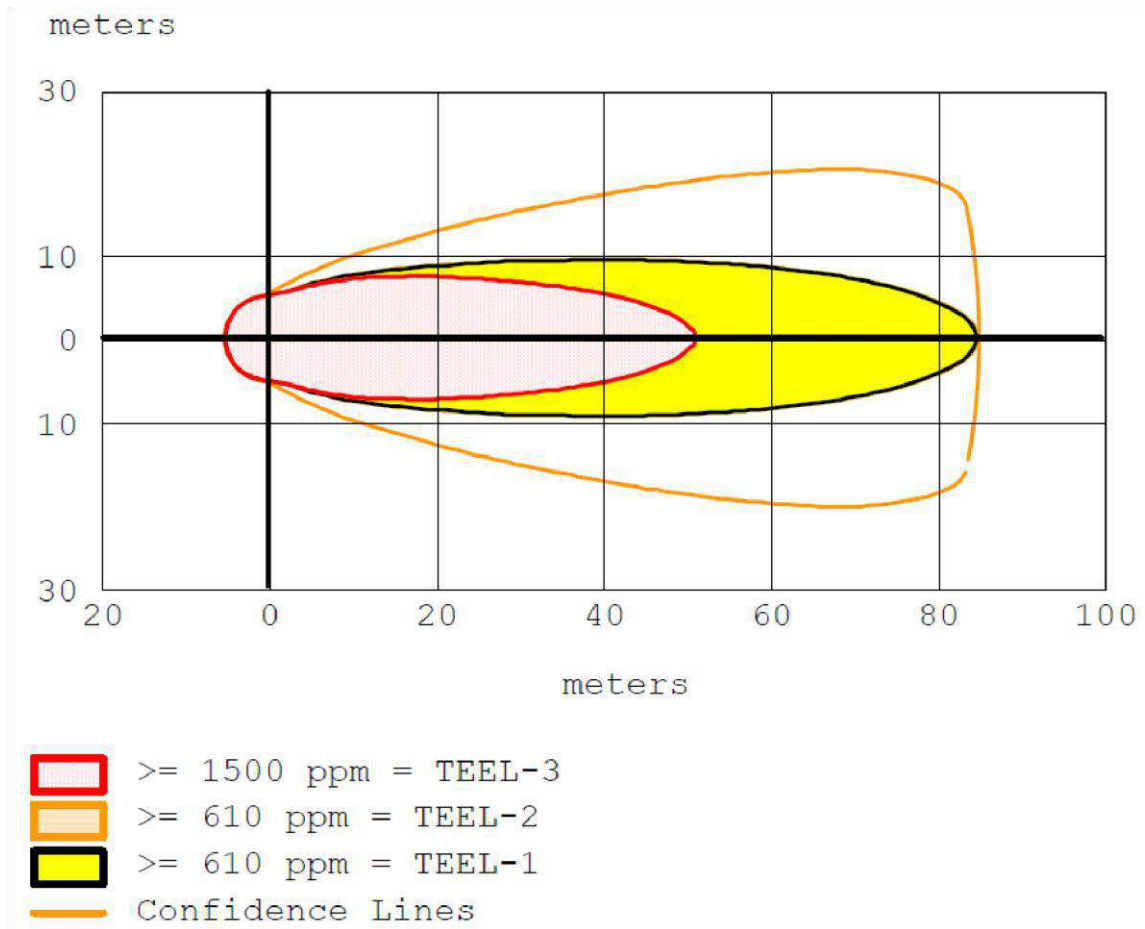
20.1.13.3 Instantaneous Release – Flammable Area of Vapor Cloud (Graph)



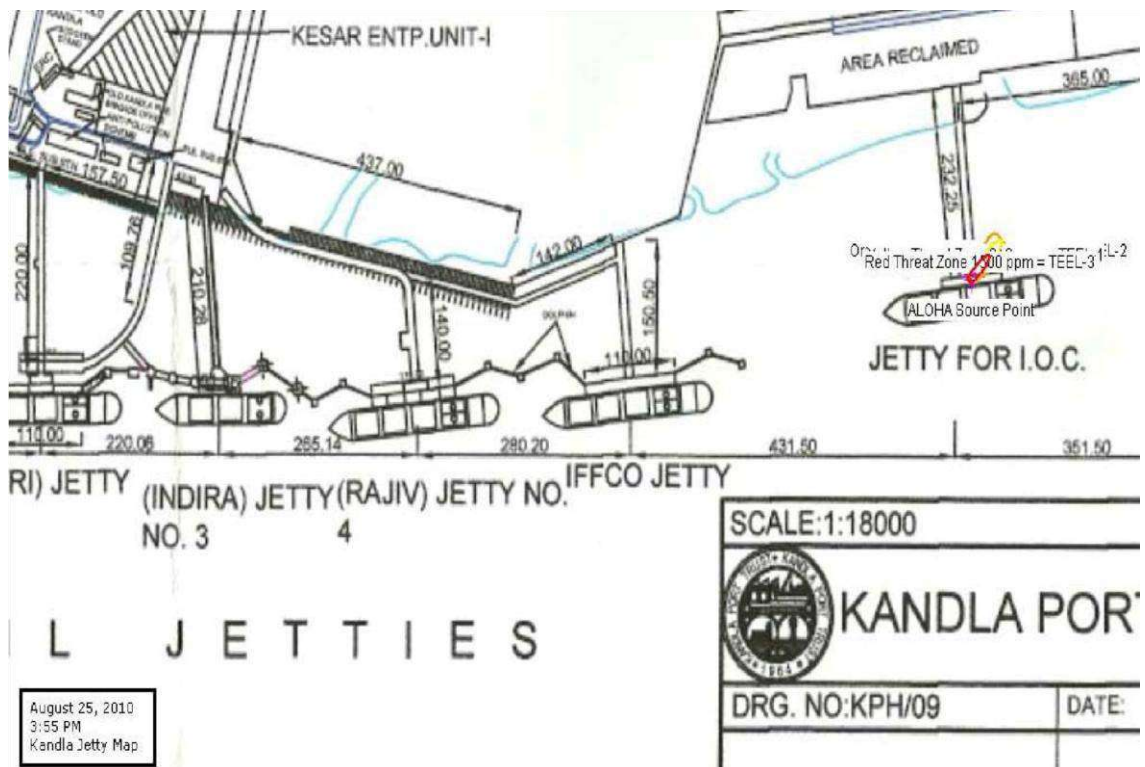
20.1.13.4 Instantaneous Release – Flammable Area of Vapor Cloud (Contour)



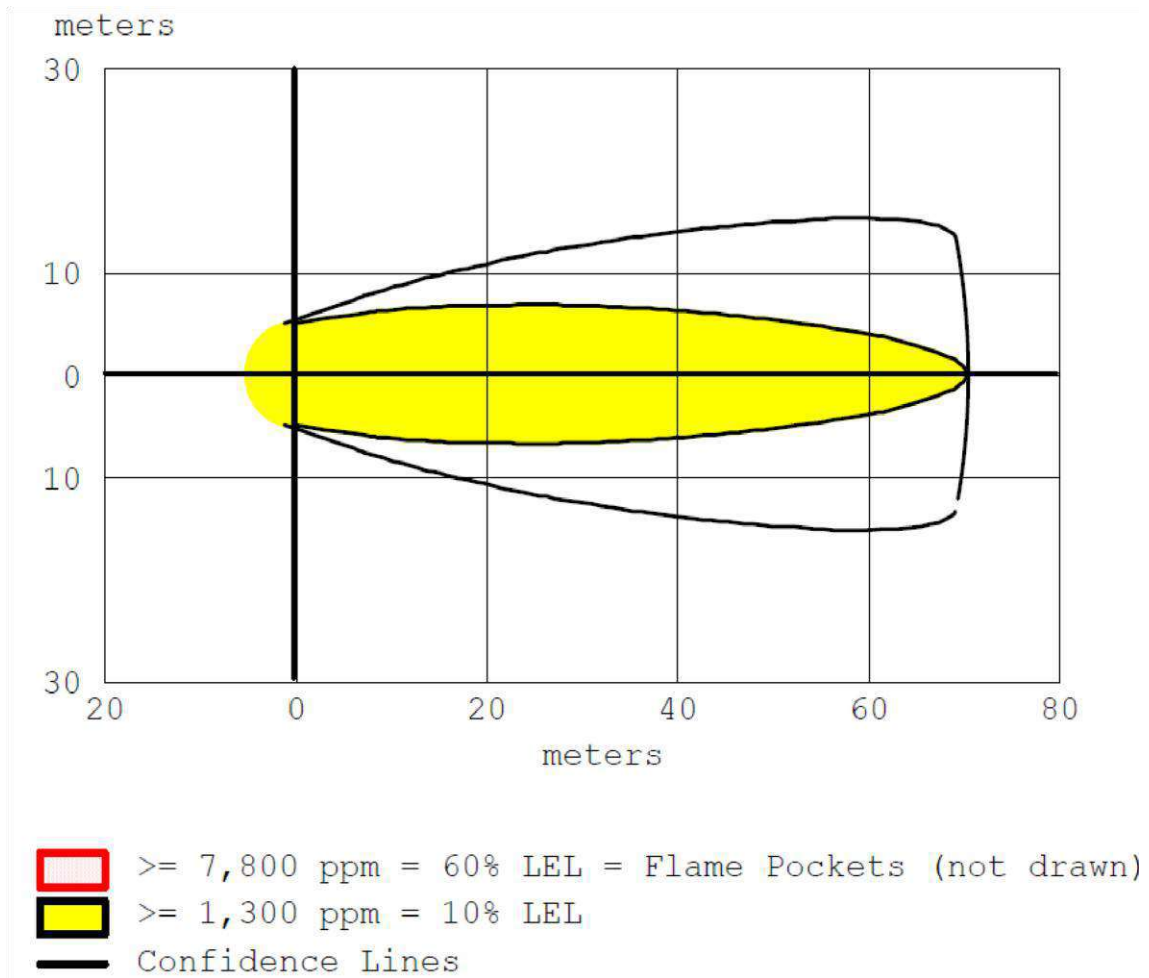
20.1.13.5 Instantaneous Release – Overpressure (Graph)



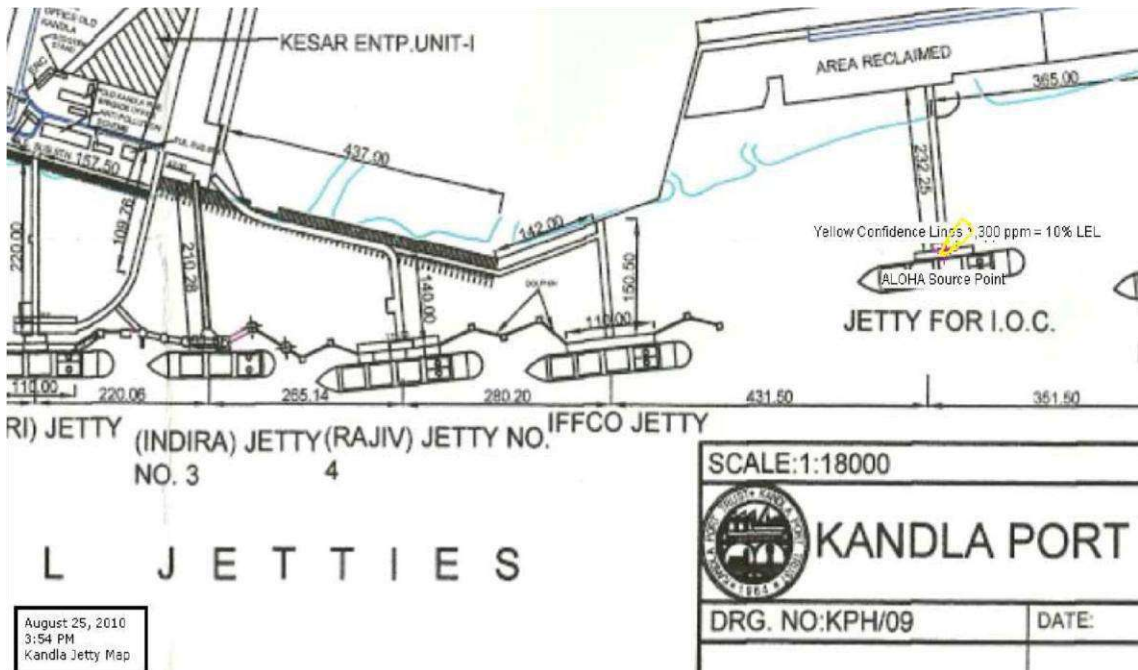
20.1.13.8 Evaporating Puddle – Toxic Threat Zone (Contour)



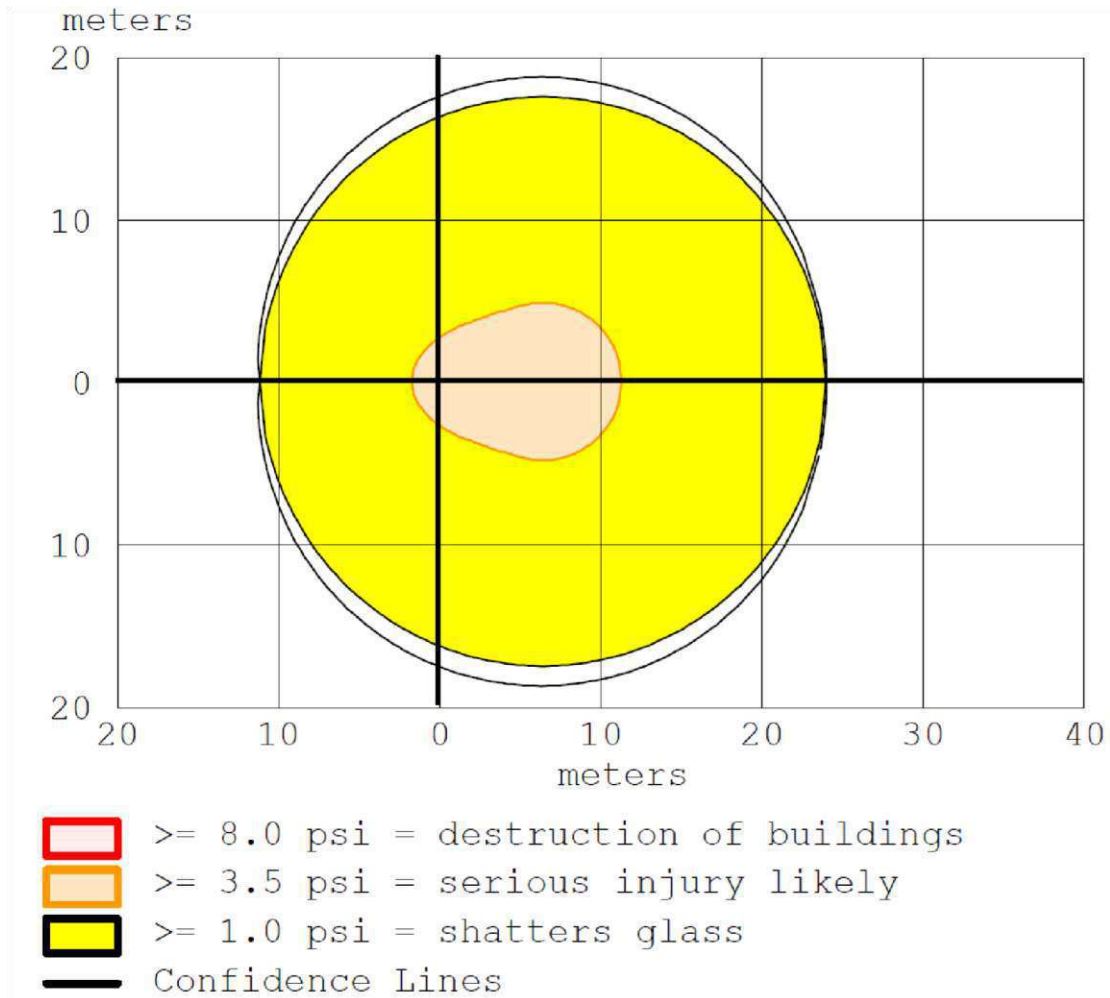
20.1.13.9 Evaporating Puddle – Flammable Area of Vapor Cloud (Graph)



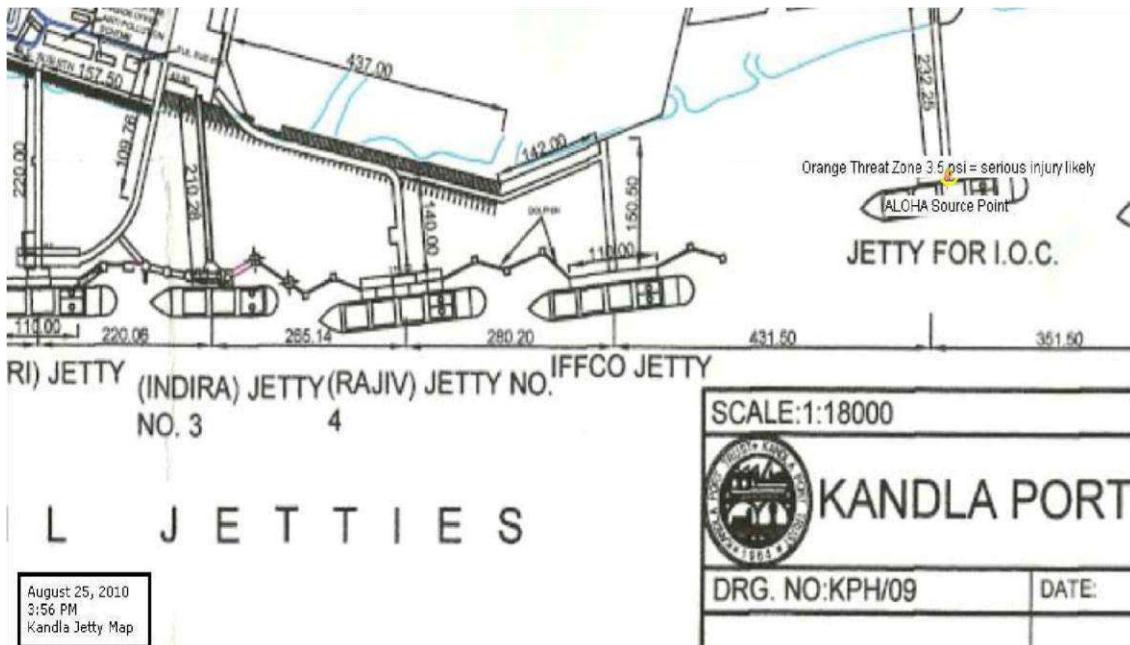
20.1.13.10 Evaporating Puddle – Flammable Area of Vapor Cloud (Contour)



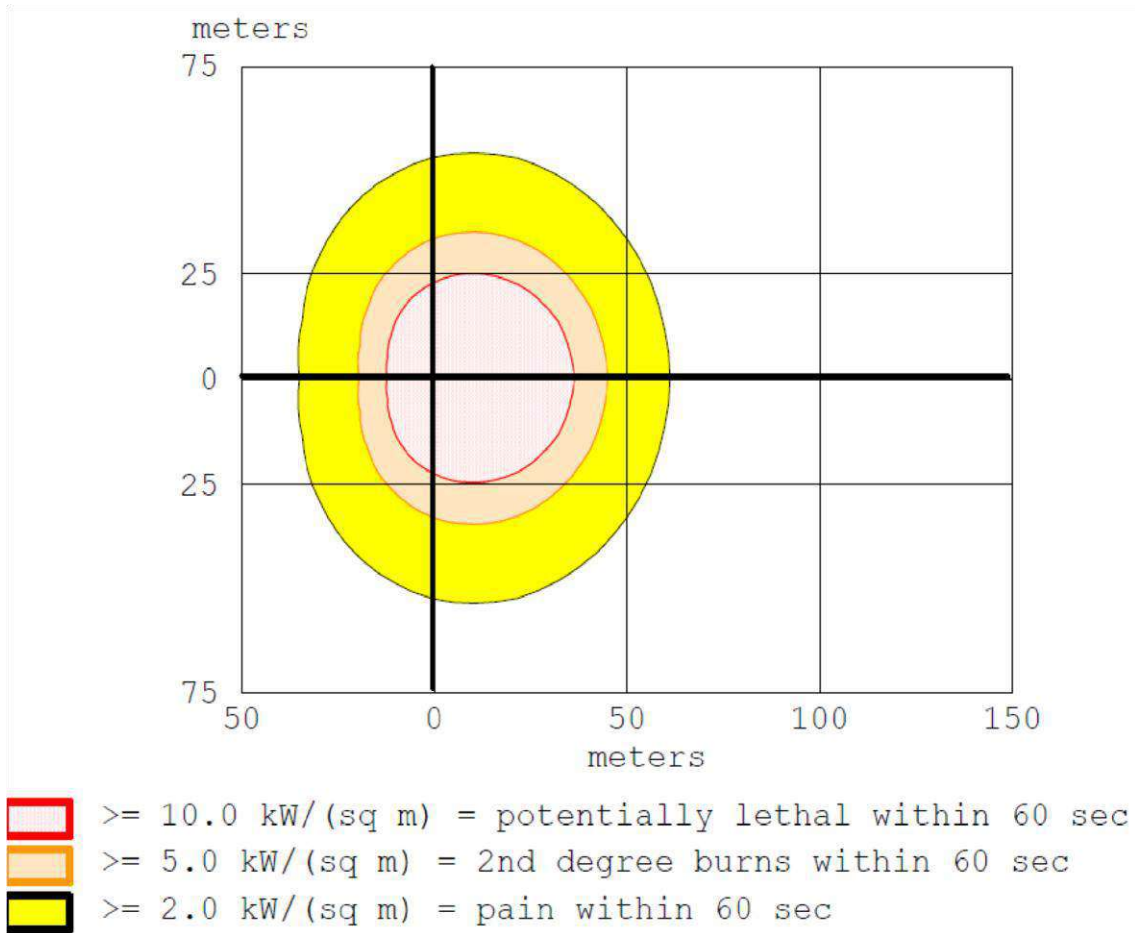
20.1.13.11 Evaporating Puddle – Overpressure (Graph)



20.1.13.12 Evaporating Puddle – Overpressure (Contour)



20.1.13.13 Burning Puddle – Thermal Radiation (Graph)

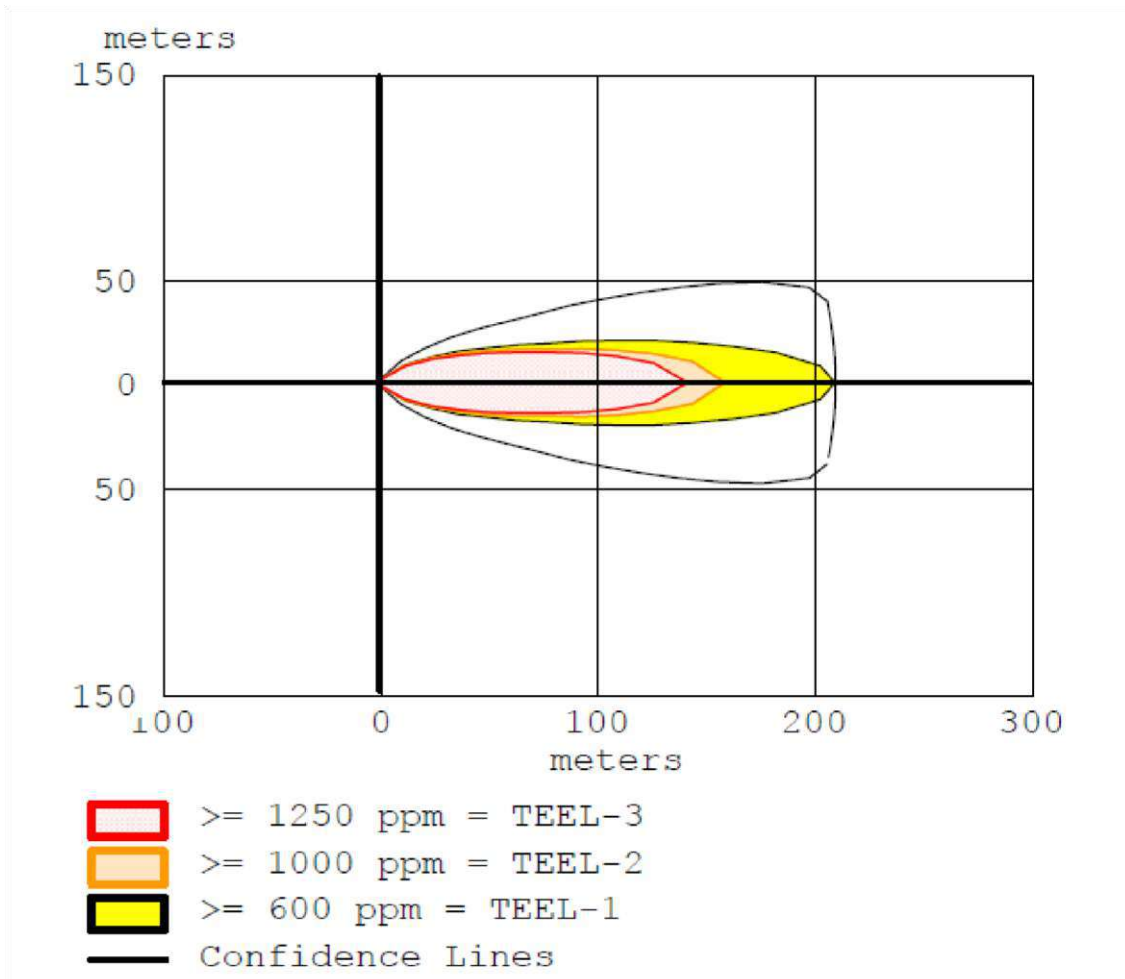


20.1.13.14 Burning Puddle – Thermal Radiation (Contour)

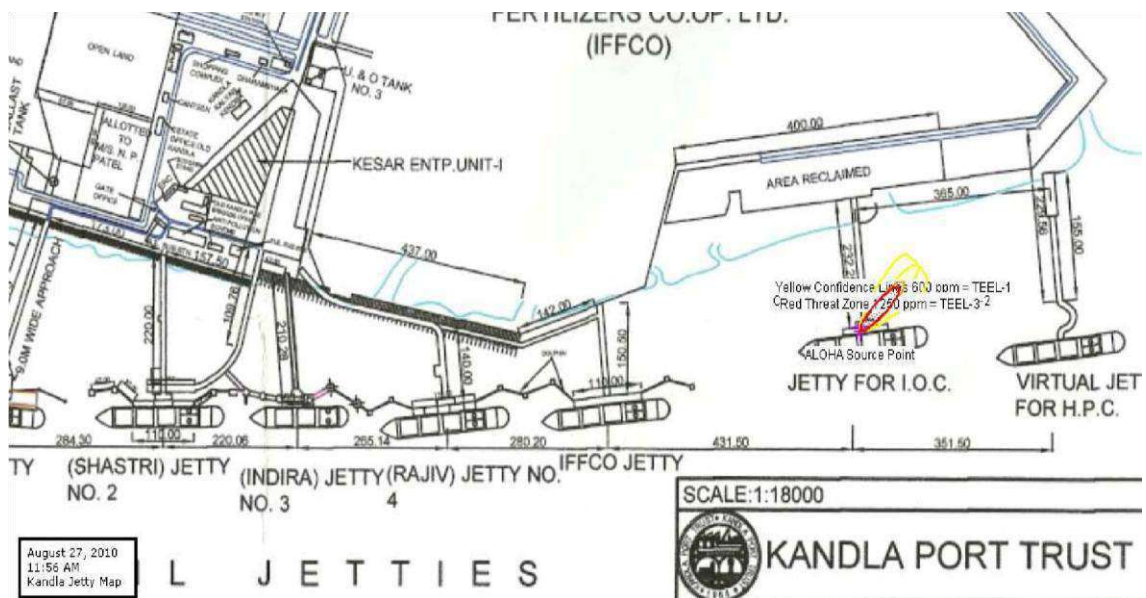


20.1.14 Jetty Six – Motor Spirit

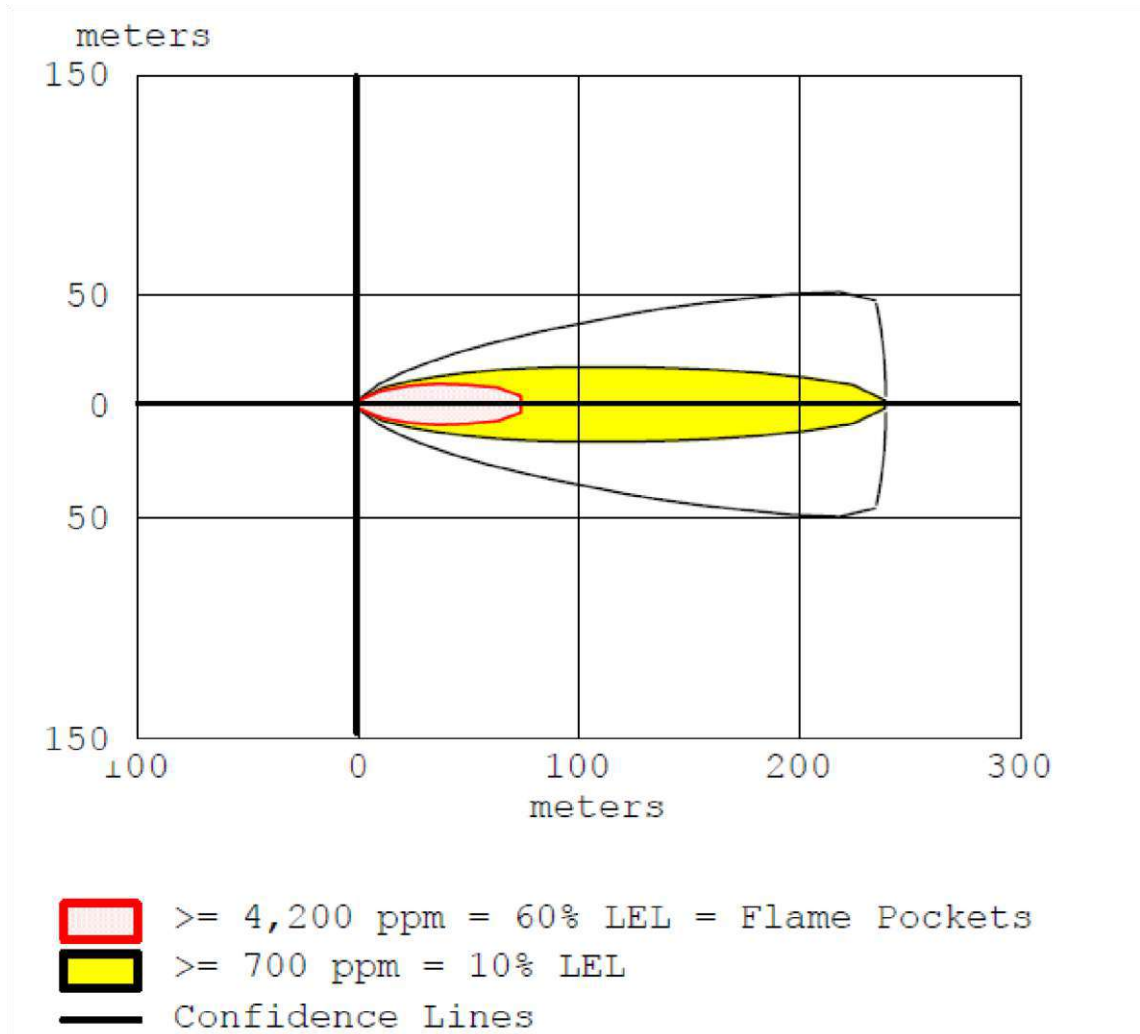
20.1.14.1 Instantaneous Release – Toxic Threat Zone (Graph)



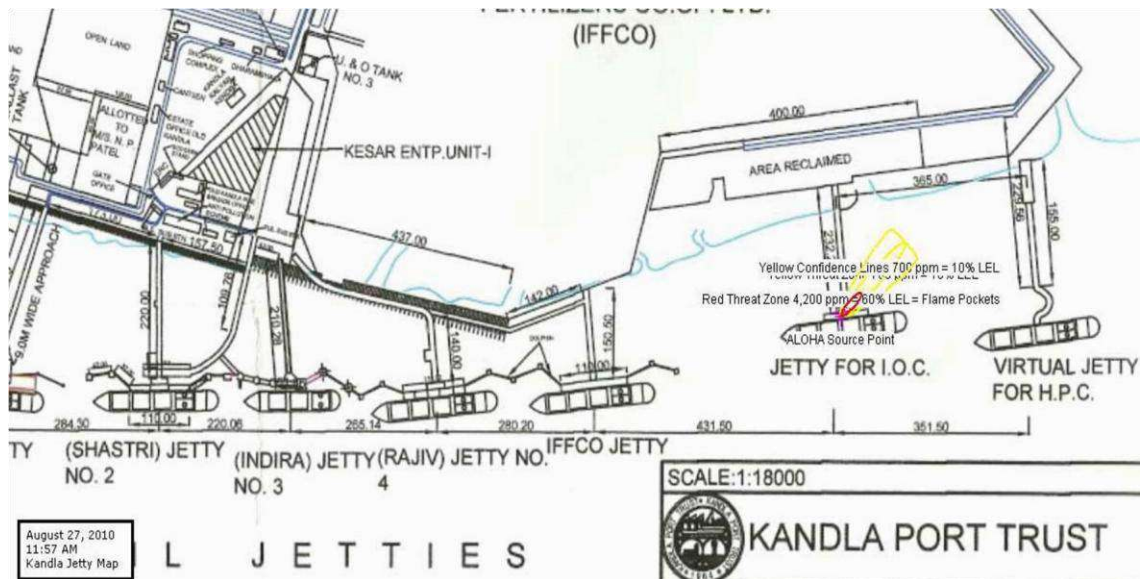
20.1.14.2 Instantaneous Release – Toxic Threat Zone (Contour)



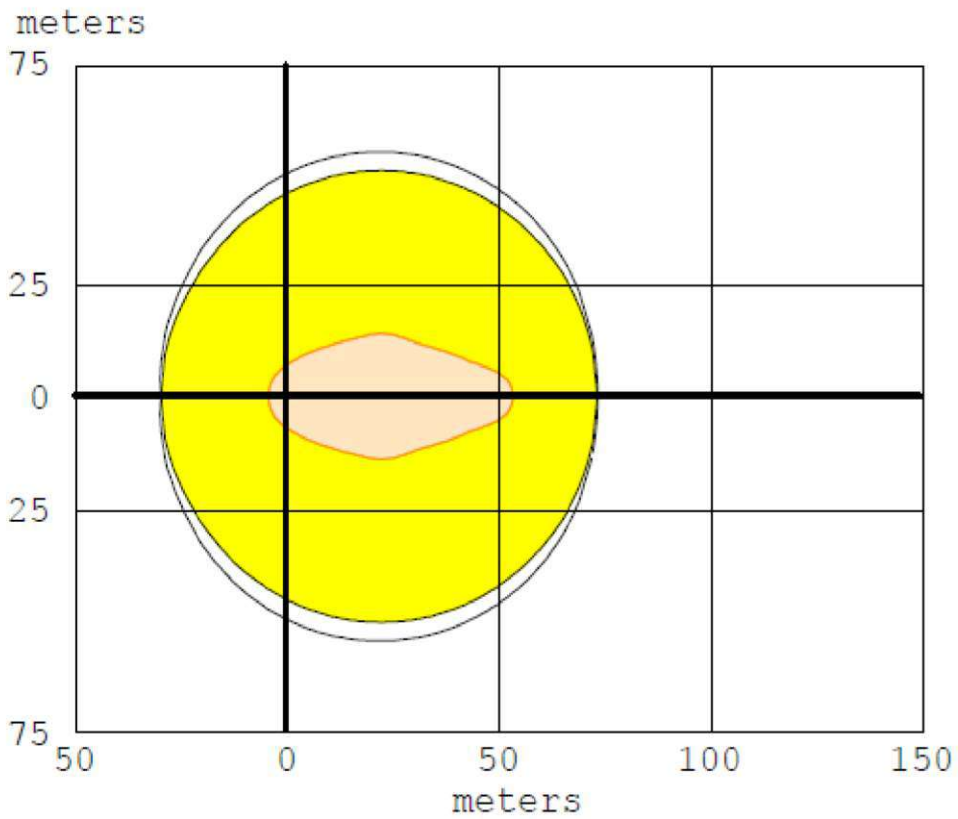
20.1.14.3 Instantaneous Release – Flammable Area of Vapor Cloud (Graph)



20.1.14.4 Instantaneous Release – Flammable Area of Vapor Cloud (Contour)

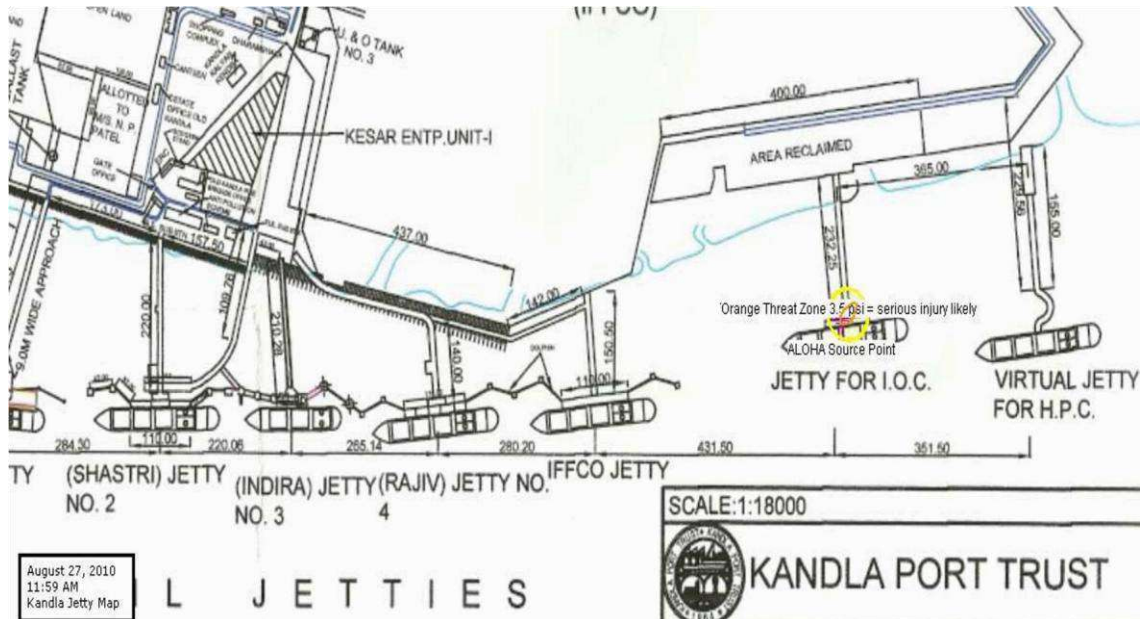


20.1.14.5 Instantaneous Release – Overpressure (Graph)

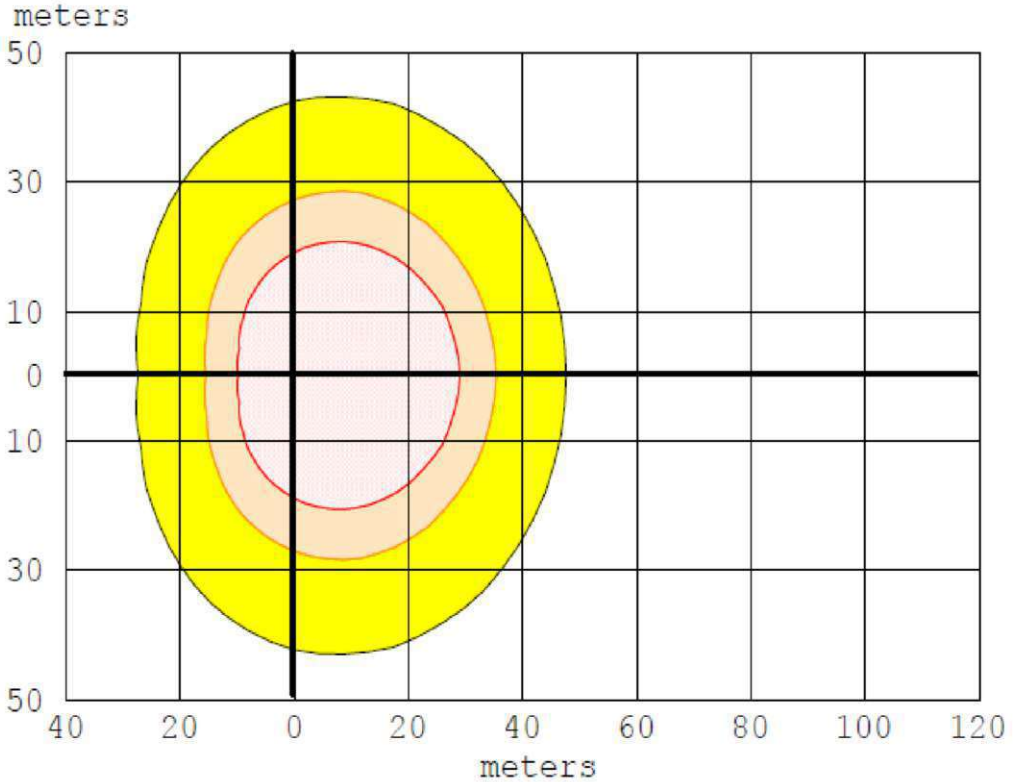


- ≥ 8.0 psi = destruction of buildings
- ≥ 3.5 psi = serious injury likely
- ≥ 1.0 psi = shatters glass
- Confidence Lines

20.1.14.6 Instantaneous Release – Overpressure (Contour)

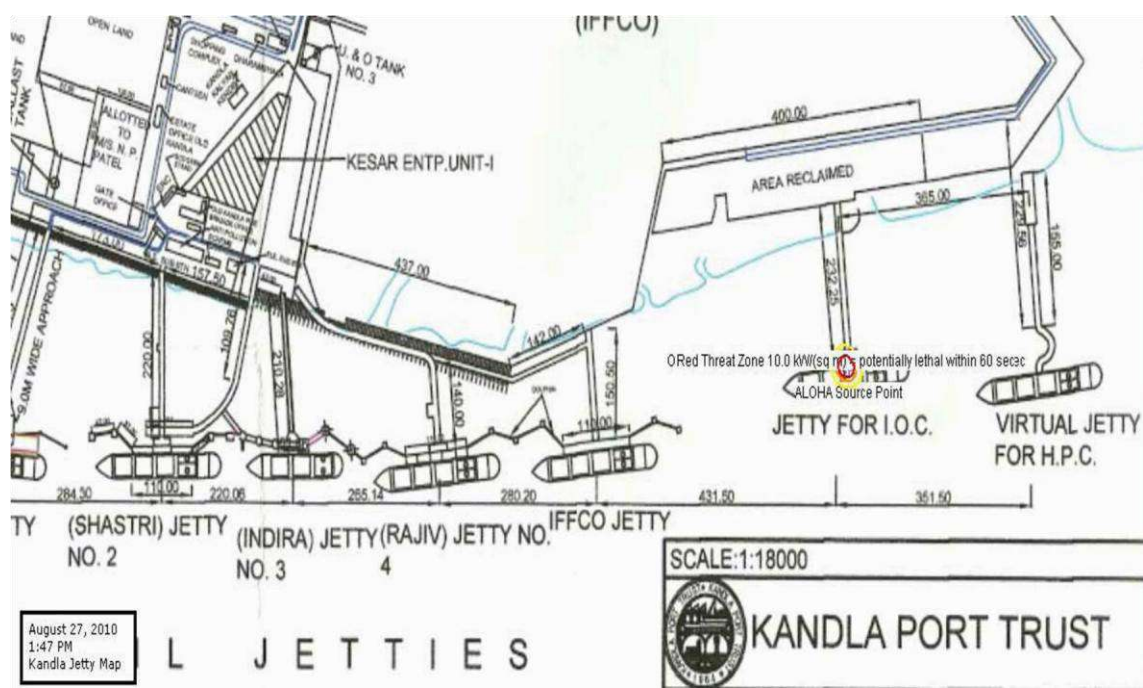


20.1.14.7 Burning Puddle – Thermal Radiation (Graph)



- $\geq 10.0 \text{ kW}/(\text{sq m}) = \text{potentially lethal within 60 sec}$
- $\geq 5.0 \text{ kW}/(\text{sq m}) = \text{2nd degree burns within 60 sec}$
- $\geq 2.0 \text{ kW}/(\text{sq m}) = \text{pain within 60 sec}$

20.1.14.8 Burning Puddle – Thermal Radiation (Contour)



August 27, 2010
1:47 PM
Kandla Jetty Map

SCALE:1:18000



KANDLA PORT TRUST

L J E T T I E S

CBRN: Chemical Biological Radio Activity Nuclear related contingencies Dos & Donts

20 ANNEXURE Very useful telephone
numbers

NDMA CONTACT DETAILS

NDMA Bhawan,
A-1, Safdarjung Enclave,
New Delhi - 110029
Telephones:
+91-11-26701700
Control Room: +91-11-26701728
Fax: +91-11-26701729
E-mail: controlroom@ndma.gov.in

NDMA CONTROL ROOM

Name	Office	Fax	Mob.	E.mail id
Control Room	011-26701728 011-1078	011-26701729	9868891801 9868101885	controlroom@ndma.gov.in , ndmacontrolroom@gmail.com ,

GSDMA

- Block No.11 , 5thFloor, Udyog Bhavan , Sector-11 , Gandhinagar,
Gujarat.
- *Email*

info@gsdma.org
- *PHONE* +91-79-23259283

21.1 Telephone Nos of Gujarat State District Collectors

No.	District	Collector Name	Phone	Fax
1	Ahmedabad (079)	Dr. Vikrant Pandey	(O)079-27551681	7927552144
2	Amreli (02792)	Shri Oak Aayush Sanjeev	(O)02792-222307	2792222710
3	Anand (02692)	Shri Dilip Kumar Rana	(O)02692-261575	2692261575
4	Arvalli (02774)	Shri Nagarajan M.	(O)02774-250200	2774250202
5	Banaskantha (02742)	Shri Sagale Sandip J.	(O)02742-257171	2742252740
6	Bharuch (02642)	Shri Ravi Kumar Arora	(O)02642-240600	2642240602
7	Bhavnagar (0278)	Shri Harshadkumar Ratilal Patel	(O)02782428822	2782427941
8	Botad (02849)	Shri Sujeet Kumar	(O)02849271301	2849271304
9	Chhotaudepur (02669)	Shri Sujal Jayantibhai Mayatra	(O)02669-233003	2669233002
10	Dahod (02673)	Shri Vijaykumar Lalubhai Kharadi	(O)02673-239001	2673239005
11	Dangs-Ahwa (02631)	Shri N.K. Damor	(O)02631220201	2631220294

12	Devbhumi Dwarka-Khambhaliya	Dr. Narander Kumar Meena	(O)02833232804	2833232102
13	Gandhinagar (079)	Shri S. K. Langa	(O)079-23220630	7923259040
14	Gir-Somnath-Veraval (02876)	Shri Ajay Prakash	(O)02876240001	2876243300
15	Jamnagar (0288)	Shri Ravi Shanakar	(O)02882555869	2882555899
16	Junagadh (0285)	Dr. Pardhi Sourabh Zamsingh	(O)0285-2630100	2852635599
17	Kachchh (02832)	Ms. Remya Mohan Moothadath	(O)02832250020	2832250430
18	Kheda (0268)	Shri S.B. Patel	(O)0268-2553334	2682553358
19	Mahisagar-Lunavada (02674)	Shri R.B. Barad	(O)02674-250664	2674250655
20	Mehsana (02762)	Shri H K Patel	(O)02762222211	2762222202
21	Morbi (02822)	Shri R. J. Makadia	(O)02822-240701	2822240701

22	Narmada-Rajpipla (02640)	Shri I.K. Patel	(O)02640222161	2640222171
23	Navsari (02637)	Dr. M. D. Modia	(O)02637-244999	2637281540
24	Panchmahal (02672)	Shri Udit Agrwal	(O)02672-242800	2672242899
25	Patan (02766)	Shri Anand Babulal Patel	(O)02766233301	2766233055
26	Porabandar (0286)	Shri M. A. Pandya	(O)0286-2221800	2862222527
27	Rajkot (0281)	Dr. Rahul Babubhai Gupta	(O)0281-2473900	2812453621
28	Sabarkantha (02772)	Ms Praveena D.K.	(O)02772-241001	2772241611
29	Surat (0261)	Dr. Dhaval Kumar Patel	(O)0261-2652525	2612655757
30	Surendranagar (02752)	Shri Kankipati Rajesh	(O)02752-282200	2752283862
31	Tapi-Vyara (02626)	Shri R.S. Ninama	(O)02626224460	2626221281
32	Vadodara (0265)	Ms. Shalini Agarwal	(O)0265-2433000	2652431093
33	Valsad (02632)	Shri C.R. Kharsan	(O)02632253613	2632243417

21.2 District Level Authorities

District Collector Office
Near Circuit House, Mandvi Road,
Nr. Mota Bandh,
Bhuj,
Gujarat - 370001

- +91 2832 250650
- +91 2832 250430
- collector-kut@gujarat.gov.in

Emergencies

District Helpline
Call : +91 2832 1077
District EOCs Helpline No.
Call : +91 2832 250650

Commissioner of Rescue & Relief
Call : 1070

Shri R. M. Thakkar

Dy. Mamlatdar Disaster

+91 2832 250923

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Upgraded Emergency Plan/ DMP for Kandla Port Gandhidham (Kutch)

MP Bhuj		252595	251177
Dy. Collector, Anjar Mob. 9825228049		243345	243363
Shri N. C. Rajgor Mamlatdar, Anjar +91 2836 242588 mam-anjar@gujarat.gov.in		242588	243362
Shri J. S. Sindhi (I/C) Mamlatdar, Gandhidham +91 2836 250270 mam-gandhidham@gujarat.gov.in		250475 250270	222875 250475

Collector, Jamnagar		2555869	2554059
Collector's Control Room, Bhuj. Mehul Padharia Kutch District Project Officer Officer 02832- 252347 09557920767 02832- 224150 mehul.nitb04@gmail.com District Project Officer Disaster Risk Management Program, District Emergency Operation Center(DEOC) , Emergency Operation Branch, Collector Office, Kutch		2252347 2231733 02832- 252347 09557920767 02832- 224150	-
Doordarshan, Bhuj		2251107	
Dy. Mamlatdar, Gandhidham		250475 250270	
Civil Defense, Gandhidham		220221	
PGVCL, Gandhidham		221728 222809	
GW&SB, Gandhidham		220975	
GSRTC, Gandhidham		220198	
Duty Officer, All India Radio, Bhuj		222503	
State Information Dept. (Shri Antani)		224859 250954	253034 252855
Air Force Duty Officer, Bhuj		252501 252502	
Air Force, Bhuj		223450	
Air Port, Bhuj		254550	
Aerodrome Officer, Kandla		238370	223247
Indian Navy, Jamnagar		550263 to 5	550825
Air force, Jamnagar		550245 to 7	550247

21.3 List of Telephone Numbers of Gujarat Maritime Board

Sr. No.	Name, Designation and place of Office	Tele. No. (Office)	Tele. No. (Residence)	Fax No.
1	Chairman, G'nagar	23250508 23250506		079-23250589
2	VC&CEO,Gandhinagar	23238363	23262280	23234703
3	Chief Nautical Officer, Gandhinagar	23238346-47		-do-
4	Chief Engineer(C), Gandhinagar	23238346		-do-
5	Officer on Special Duty, Gandhinagar	23238346	079- 2323232	-do-
6	Exe. Asst. to VC&CEO, Gandhinagar	3238363	7451465	-
7	Head Office, G'nagar	3238346 to 8	-	34703/04
8	Port Officer, Magdalla	0261- 2470533	-	2475645
9	Port Officer, Bharuch	02642- 241772	229082	220377
10	Port Officer, Bhavnagar	0278- 2519221	2568580	2211026
11	Port Officer, Jafrabad	02794- 245165		245152
12	Port Officer, Porbandar	0286- 2242408	2242412	2244013
13	Port Officer, Veraval	02876- 220001	242956	243138
14	Port Officer, Okha	02892-	262010	262002

		262001		
15	Port Officer, Jamnagar	0288- 2755106	2557163	2756909
16	Port Officer, Navlakhi Main Gate	02822- 220435		232470
17	Port Officer, Mandvi	02834- 220033	220040	230033
18	Traffic Inspector, Mundra	02838- 222136	222136	-
19	Executive Engineer(C), Jakhau	02831- 287261	222996	-
20	Gujarat Pipavav Port Ltd., Chief Operating Officer, Duty Office	02794286314 86001/92	286070	-
21	Gujarat Adani Port Ltd., Mundra.	02838- 288201 to 8	287241	-

21.4 For supply of Food Packets etc. following agencies to be contacted.

Sr. No.	Name of Agency	Contact Person	Telephone No.
1	Arya Samaj Mandal	Mr.Vachanidhi	231223 Mob. 9824221332
2	Agrawal Samaj	Mr.Dinanath	231638
3	RSS	Mr. Sunil Kothari	222560 / 232909
4	Lions Club, Gandhidham	Mr. Naresh Bulchandani	220212 Mb: 982428470

5	Rotary Club, Gandhidham	Mr. Rajabhai / P.K. Mukherjee	228213 / 232035
6	Red Cross Society	Dr. Bhavesh Acharya	234854, 232736
7	Lohana Mahajan, Gandhidham	Mr. Premji Bhai Thakker	220925
8	Rajasthan Yuva Mandal	Mr. Sunil Bajaj (President) Mr. Dilip Jain	221459 / 230902 234525 / 9825168170
9	Swaminarain Mandir	Mr.Lavjibhai Thackker	231555, 233666
10	Sindhi Youth Circle	Mr.Vijay Khubchandani & Mr.Kundabhai	220490
11	Satwara Samaj	Mr.Agavjibhai	235659
12	Sitaram Parivar	Mr.Mohanbhai Dharsi	222373, 234603
13	Gurudwara, Gandhidham		220643
14	Swaminarayan Gurukul	Swamimukta Prasadji	228098, 226555

21.5 Apart from the above, if required, the following hotels may be contacted for the supply of food packets:-

Sr. No.	Name of Hotel	Contact Person	Telephone No.
1	Shiv	Mr. Nagendra Singh / Mr. Bharat Singh	237712-13-14-15, 221297
2	Sharma Resorts	Mr. Madan Mohta / Mr. J. Gonasaives	31824/231823/231825/ 224885-86-87-88-89

3	Satkar	Mr. Babu Bhai Agrawal	234100/222597 234101 (R)
4	Natraj	Mr. Maulinbhai Acharya	221749/221956/221955 221954/238002
5	President	Mr. Rameshbhai	220053/229364/238002
6	K.K.Caterers	Kaniyalal Rajwani	(O) 227419, (R) 224995, (Mob) 9825226998
7	Bhawani Caterers	Mr. Hukamsinh Purohit	230366(PP)
8	Hotel Mid-Town, Adipur	Mr. Nagendra Singh	9825226568 260237/260080
9	Hotel Sea-Rock, New Kandla	Mr. Vithal Shetty	270490

21.6 List of Labour contractors operating at Kandla Port

Sr. No.	Name of the Company	Contact person	Address	Contact Nos
1	Neelkant Handling A/c Shree Radhey Shipping	Haresh Bupendra	Tenament B Plot 290, Ward 10/A, G'dham	237040 9825001743
2	Ratnakar Handling A/c Aditya Marine	Radhakishan Parida	83-84, GIDC G'dham	9879123371
3	Tirupati Handling Co.	Dayalal B. Rabari	6-8, Goyal Chamber, GIM	235504 9825056599

4	Al Pirani Al Sailani	Akbar Yakub	CS-10, Port Colony, Kandla	22053,232174 9979331100 9825787808
5	Shree Ravechi Handling A/c Trinity Shipping	Mahadeva Agaria	11,2nd Floor, Plot.343, Ward 12- B, GIM	250286 9825361347
6	Shree Ramdev Handling	Nimbaram Gulabji	377, Sector-7 GIM	9825348935 9979898564
7	AVB & Co	Mukesh Gujjar	15, GF, Gokul Park, GIM	232967
8	Ashapura Labour Supply	Khimji Jallabhai Rathod	48, GIDC, Near Ambika Weigh Bridge, GIM	9979053378 9898128069
9	Shree Krishna Handling	Harinder Yadav	E – 108, GHB ,Sec- 5,GIM	9879549803
10	Naasmin & Co	Umar Osman Chamadia	Plot – 14, Sector- 7, GIM	9898333397
11	M.S. Logistics	Asgar Haji Mungrani	Shop No. 5, Opp.CISF Gate,Kandla	9825241065 9913620407
12	Shree Majeesa Handling	Jugal Kishor Joshi	Block 24, MIG, Kidana, GIM	9879373992 9979898564
13	Shree Kailash Handling Co.	Mohanbhai Heera	Plot No. 7, Sector- 8, GIM	9825228555 9879288875
14	Javed Abu Saicha	Javed Abu Saicha Gani Patel	Shop – 13, Port Colony, Kandla	9825092748 9825563094
			Kandla	

15	Shree Ganesh Handling	Dayabhai Rabari	6-8, Goyal Chamber, GIM	9825056599
16	Bhupendra & Co	Mayur M Ahir	Plot 253, Ward 12/C, GIM	9727762191 9825225239

21.7 List of Doctors in Gandhidham Complex

Sr No	Name of Doctor	Telephone	Telephone	Mobile No
Consulting Physician (MD Medicine)				
1	Dr. Babita	261802	322111	
2	Dr. Gandhi C. K.	234561	230111	
3	Dr. Gonsair R. M.	230333	239944	
4	Dr. Johnson Samuel	222344	232244	
5	Dr. Morkahia V. L.	222008	232161	
6	Dr. Raiyani V. R.	230022	234214	9824241220
7	Dr. Sakaria S. B.	230114	230947	
8	Dr. Siju	230160	223852	
Dentist				
1	Dr. Asha Y. Parekh	234295	234451	
2	Dr. Ajay Bhimjiani	233347	260256	982544118
3	Dr. Chadotra M.	220142	237909	
4	Dr. Hitesh Sheth	226763	220965	
5	Dr. Kela B.V.	222094	231181	
6	Dr. Sanghvi V.K.	234979	223343	
7	Dr. Sharma R.	229211	227627	
8	Dr. Singh N.	230769	261343	

9	Dr. Soneta S.	236319	229172	
Dermatologist				
1	Dr. Jhala J.J.	223568	235567	
2	Dr. Deepak Sorathia	242882		9426909822
E.N.T. Surgeon				
1	Dr. Dave A.B.	221931 260394	260461	
2	Dr. Harani D.D.	222096	239121	9825227322
3	Dr. Khatri R.S.	222701	235959	9879195798
4	Dr. Maheswari S.K.	231874	250940	
M.B.B.S				
1	Dr. Acharya B.F.	220715	232736	9825210157
2	Dr. Acharya C.M.	220263		
3	Dr. (Mrs.) Acharya S.C	232606		
4	Dr. Agarwal B.B.	227767	570212	9825225599
5	Dr. Asher G.K.	239139	233765	
6	Dr. Bhadra D.M.		230259	
7	Dr. (Mrs.) Bhatia K.	260255		
8	Dr. C. Jonwal	220263	263987	
9	Dr. (Mrs.) Chellani	220099	270441	
10	Dr. Chudasama V.K.		240952	
11	Dr. Dasani M.G.	260001	261495	
12	Dr. Goswami S.K.	261399		
13	Dr. Guptabhaya D.N.	221305	231777	
14	Dr. Gurdasani V.S.	260674		
15	Dr. Harani H.C.	235369	239327	

16	Dr. (Mrs.) HitemathU.S.	261844	260097	
17	Dr.Joshi N.L.	260666	261661	
18	Dr. Kela H.V.	232069	232071	
19	Dr. Khushlani A.	260562	260738	
20	Dr. Leon A.	261802	262188	
21	Dr. Makwana	220263	263406	
22	Dr. Minocha Ravi	236306	232127	
23	Dr.Mehta H.K.	231590	235021	
24	Dr. Mehta J.R.	220164	220834	
25	Dr. Morbia V.M.	230011		
26	Dr. Parekh S.K.	260608	261123	
27	Dr. Puri R.P.	223355		
28	Dr.Rawal S.	235119		
29	Dr. Singh D.P.	221990		9825359928
30	Dr. Thakkar A. D.	220582	222829	
31	Dr. Thakkar H. M.	223506	222350	
32	Dr. Thakkar M. C.	260577		
33	Dr. Thakkar S. B.	221046 228267 221177	238467	
34	Dr. Vaccharajani N. D.	220088		
35	Dr. Vasudev Jethani	260577	261650	
36	Dr. Vora C. B.	223084		
37	Dr. Vadhwani Vjay	262076	262843	
38	Dr. Zola Mithubhai	260608		
39	Dr. (Mrs.) Raiyani P.V.	230022	234214	

40	Dr. (Mrs.) Singh R. D.	221990		
General Surgeon				
1	Dr. Ahir J. K.	237744		
2	Dr. Dasani D. G.	229231 227505	223346	
3	Dr. Gandhi R. G.	236700	229156	

4	Dr. Girdhani R. C.	233300	231219	
5	Dr. Jiladiya A.	220263	244844	
6	Dr. Joshi Y. V.	221557 230013	233324	
7	Dr. Naik S. K.	234333	231332	
8	Dr. Patel J .K.	230007		
9	Dr. Vora Chetan	224787	229369	9825225942

Obstetrician & Gynecologist

1	Dr. (Mrs.) Acharya N.B.	220715	232736	9825226700
2	Dr. Alpa D. Mehta	262599	265266	
3	Dr. Chandrakant Thacker	224488	225588	
4	Dr. Darshak Mehta	220263	265266	9824211534
5	Dr. (Mrs.) Gor A. A.	235135	239635	
6	Dr. Khanchandani	260833	260839	
7	Dr. (Mrs.) Kaur J. P.	229655	220673	
8	Dr. (Mrs.) Naik P. S.	234333	231332	
9	Dr. (Mrs.) Patel M. H.	230202	230353	

Ophthalmic Surgeon

1	Dr. Gor A.	235135	239635	
2	Dr. Masand S. N.	220139	234187	9825196989

3	Dr. Parikh Y. B.	234295	234451	
Orthopedic Surgeon				
1	Dr. Hotchandani	220039	261530	
2	Dr. Patel H. A.	230202	230353	
3	Dr. Sailesh Ramawat	230160		
4	Dr. Vachhani P. S.	230400	222400	
Pediatrician				
1	Dr. Dubal J. A.	232591	233777	
2	Dr. Jeswani R. M.	255689		9825229249
3	Dr. Majithiya M. S.	222413 222406	227134	
4	Dr. Rupesh Seth	260836	222397	
5	Dr. Naveen Thacker	230195	230894	
6	Dr. Nitin Thacker	221046	220615	
Pathologist				
1	Dr. Sukla K. L.	221611	234062	
2	Dr. (Mrs.) Pawde S. V.	230370	231352	
3	Dr. (Mrs.) Verma G. H.	229168	238386	
Psychiatrist				
1	Dr. Barot S.	221041	234885	
Radiologist				
1	Dr. Shah R. M.	222878 234215	222868 235868	
2	Dr. Bhupendra Shah	572824	227724	

21.8 List of Essential Services

HOSPITALS	OFFICE	RESIDENT
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1	General Hospital, Bhuj Civil Surgeon, Bhuj	222850	250554
2	Referral Hospital, Anjar	232455	
3	Rambaugh Hospital Gandhidham	220263	
4	Divine Life, Adipur	261802	
5	Railway Hospital Gandhidham	231874	
6	Government Dispensary dipur	260608	
TELECOMMUNICATION			
1	General Manager, BSNL, Bhuj	253000	252322
2	Dy. Manager, Bhuj	252505	251505
3	Area Manager, Gandhidham	238000	235000
4	SDO, Gandhidham	236250	236251
ELECTRICITY			
1	S.E., PGVCL, Bhuj	222550	250189
2	Jr. S.E., Anjar	243008	242656
3	XEN, Anjar	242845	242446
4	Dy. Engineer, Gandhidham	222809	--
5	Line Office, Gandhidham	221728	
WATER SUPPLY			
1	S.E., GWS&SB, Bhuj	221806	250601
2	XEN, Bhuj	250685	253016
3	SE, Anjar	242416	242421
4	XEN, Gandhidham	220717	223273
5	Control Room, Gandhidham	221252	

6	Water Tank, Sunderpuri	231313	
7	Water Tank, NU-4	654564	
8	Gandhidham Municipality	231610	
9	Chief Officer, Gandhidham Municipality	234967	

21.9 List of Vehicle Suppliers

Sl. No	Name of Institution	Contact Person	Parking Place	Name and Phone No.	Availability
				Phone No.	of Driver Vehicle.
(A) Vehicle Hire Contractors					
2	M/s Rohit Enterprise /RISHABH ENTERPRISE	Mr. Rohit Shah 228550/237538 237547 (O) 234140 (R) Mob.982522512 1			
3	M/s Jai Somnath Travels (GIM)	Mr. Mishra Mob.982538673 9			
(B) Ambulance Pool					
01	St. Joseph Hospital, Gandhidham	Administrator 230160/229336	Hospital Premises	Driver available round the clock	First come first serve

02	IFFCO-Kandla on contract, Dispensary No. 20164 Dr. Mehta (R) 220832 Plant. Dispt. 270832	Mr. Mukesh Agrawal Hotel Gokul 221311			First come first serve
03	Kandla Salt Mfg. Ass. Neelkanth Bldg.	Mr. Shamji Ahir 231485 (R) 222765/220421 (O)	Zanda Chowk	Driver available round the clock	First come first serve
04	Zhulelal Mandir Trust	Mr. Kundan Guwalani 221760 (R) 229800 (O) Kundan Stores 221533/227800 229580	Mandir Premises	255580	
05	Red Cross Society	Dr. B F Acharya 225636/230345	Red Cross	Driver available round the clock	
06	Western Railway, Gandhidham	Medical Supdt. 231874 (R)	Hospital		
07	Rambaugh Government Hospital	220263	Hospital Premises	Driver available round the clock	
				clock	

08	Gautam Frei Pvt Ltd.	Mr. Ramesh Proprietor 232605/220163, 230345 (O)	GIDC Work shop Sector10C, Plot No. 24.		First Come First Serve
09	Sindhu Sewa Trust, Samiti Adipur	Mr. Jotwar (R) 260836, 260698 TBX-45, Adipur	Hospital Premises	Driver round the clock residence in hospital (Break duty at present)	
10	Tolani Eye Hospital	1. Supd (O) 260497 (R) 260773 2. Vic Chairman (C) 260373 Mr. N Chandnani (R) 260456, Prabhu Chaya, Behind Prabhu Darshan	Hospital Premises	One driver in absence of compounder residing in hospital	First Come first Serve
11	Divine Life Society, Adipur	261802	Hospital Premises	Round the clock	
12	Atmaram Severam Charitable Trust	237759 Mok 9825225294	Gandhid ham	Round the clock	
13	Dev Smru Trust	222096/231073			

14	Mobile Morgue	229430/239965	Lions Club		
15	Shav Vahini/Mobile Mrogue	239965			

21.10 List of Clearing & Forwarding Agents at Kandla

A V Joshi & Co Tel. 232605, 232227, 230345	C. Jivram Joshi & Sons (Gujarat) Tel. 220621 Fax. 231141
Fax. 233924 Mr. Harshandu Mr. Vaidya (Mob.) 9825226013	Mr. Sunil Chowdhari (Mob) 9825225400
ACT Shipping Ltd Tel. 270111/12/13, 270530, 220407 Fax. 270579, 232175	Cargo Movers Tel. 220453, 230883, 270563 Fax.231687
A. Jaswantrai & Co. Tel. 222630, 222717, 222145, 221943 Fax. 232308, 270385	Cargo Clearing Agency (Gujarat) Tel. 221721, 221674, 220655, 270542 Fax. 233034
Asia Shipping Services Tel. 230954. Fax. 231285	Chinubhai Kalidas & Brothers Tel. 232284 Fax. 231881
Airol Shipping Services Tel. 230080, 220180. Fax. 236131	CAP Shipping Pvt Ltd Tel. 221460, 232081 Fax. 233734
Aarpee Clearing Agency Tel. 222614. Fax. 255252	Centrans Shipping Agency (I) Pvt Ltd Tel. 256854 Fax. 234074
Ashirwad Clearing Agencies Tel. 232426, 233245 Fax. 234107	Cargo Shipping Tel. 270802, 270803 Fax. 270802
Ambalika Enterprises Tel. 255382. Fax. 255577	C. Joshi & Sons Tel. 221094

Ashmka Shipping (Tel. 222481)	Dilip A Goplani Tel. 224082, 255423 Fax. 224082
Ashis Enterprise (Tel. 234722)	D.B.C. & sons Gujarat Pvt Ltd Tel. 270263, 270348, 270503 Fax. 270631
Anchor Shipping Tel. 235781 Fax. 235781	Damjidhiroo & Sons Tel. 222329, 221328 Fax. 230139
B N Thakkar & Co., Tel. 222293, 222285, 270239 Fax. 230556	Dvji Premji Punara & Sons Tel. 222057, 221338 Fax. 230139
B. Devchand & Sons Pvt Ltd Tel. 232220 Fax. 234014	Express Transport Pvt Ltd Tel. 220193, 220179, 270591, 222565 Fax: 220193
Benits Forwarders Pvt Ltd Tel. 221707, 222086 Fax. 223151	Friends & Friends Shipping Pvt Ltd Tel. 232227, 231588 Fax. 233924
Blue Sea Shipping Agencies Tel. 235317 Fax. 255221	Fast & Fair Company Tel. 255254, 238175 Fax. 255254
Bhanu Clearing Agency Tel. 256861 Fax. 256861	Flamingo Shipping & Forwarding Pvt Ltd Tel. 256755, 257756 Fax. 256755
Global Marine Agencies Tel. 222928, 223196, 223252 Fax.255418	Liladhar Passoo Forwarders Pvt Ltd Tel. 252288, 252297, 252402, 252617 Fax. 252383
Gayatri Shippers Tel. 230692, 223292 Fax. 230818	Lalbahi Trading Company Tel. 222139
Hiral Enterprise Te. 255644	Leap Forwarders Pvt Ltd Tel. 255530, 255509 Fax. 252383
Hindustan Shipping services Tel. 255644, 222821 Fax. 256618	Link International Tel. 255206/07 Fax. 255530

Hardip Shipping Logistics Pvt Ltd Tel. 232909, 222560 Fax. 232909	Lexicon Shipping Agencies Pvt Ltd Tel. 229951- 53 Fax. 229949/50
Hansraj Pragji & Sons Tel. 221650, 255228 Fax. 255228	Logistics Enterprise Pvt Ltd Tel. 255157, 255458 Fax. 255520
H K Dave Pvt Ltd Tel. 221504, 2333632 Fax. 230411	Mathuradas Narndas & Sons Forwards Pvt Ltd, Tel. 252224, 252350, 252115 Fax.252221
Intralink Clearing & Forwarding Tel. 255188 Fax. 23148	Magal Singh & Company Tel. 224030, 255253, 234688
J M Baxi & Co. Tel. 270630/35, 270148/50, 270525 Fax. 270616	Meridian Shipping Services Tel. 233981, 255362 Fax. 230701
Jesia Mistry Agencies Pvt Ltd Tel. 222317, 223317	Megha Shipping Agency Tel. 222671, 255304 Fax. 230937
Jaisu Shipping Company Pvt Ltd Tel. 270428, 270128/538 Fax.270556	Mayur Forwarders Pvt Ltd Tel. 222671, 255304 Fax. 230937
Jivanlal Laloobhai Tel. 220308, 230530 Fax. 231640, 233803	Maritime service Pvt Ltd Tel. 222671, 255304 Fax. 255304
Krishna Clearing Agency Tel. 223813, 230501 Fax. 233135	Marathon Shipping Combine Tel. 222202, 230106 Fax. 255220
Kiran Roadlines Tel. 232297, 231984, 234108 Fax.231422	Shiv Shipping Service Tel. 255568 Fax. 22256
Kandla Clearing Agency Pvt L td Tel. 232337, 223211, 223210 Fax.230402	Narendra Forwarders Pvt Ltd Tel. 232504, 231795 Fax. 256678
Kamat & Co. Tel. 223471, 232730, 232729 Fax. 255243, 270779	Natwar Parikh Industries Ltd Tel. 232628 Fax. 232628

K S Chaya & Co Tel. 256604 Fax. 230693	New Dholera Shipping & Trading Company Limited. Tel. 222637 Fax. 255329
Kashyap Shipping Ltd Tel. 220816 Fax. 230030	National Shipping Tel. 232319 Fax. 232319
Kanak Shipping & Transport Tel. 231314, 230543, 222059 Fax.221702	Navjeevan Enterprise Tel. 252611, 252360 Fax. 252515
IEE & Muirhead Pvt Ltd Tel. 231535/36 Fax. 231018.	N. G. Bhanushali & Company Tel. 233648, 256791 Fax. 256879
OTA Kandla Pvt Limited	Shivji Kanji & Company

Tel. 220145, 223241, 270450 Fax.223241	Tel. 230127, 223728, 223729 Fax.220308
Pravin Bhatt & Sons Tel. 224032, 230079 Fax. 230079	South India Corp. (Agencies) Limited Tel. 234646, 231494, 221276, 255209 Fax.234416
Prime Forwarders Tel. 234047, 232505 Fax. 231345	S J Thacker & Company Tel.255678,221745 Fax.230659
Purshotam Ramjee & Company Tel. 220354, 222287 Fax. 231754	Star Shipping Services Tel.255424,255425,235326(F)255426
Patel Handling Agency Tel. 221718, 224024, 231004, 270017 Fax. 231143	Shivani Shipping, Tel. & Fax.256836
P S Bedi & Company Tel. 223201, 222841 Fax. 255494	Sea Trans Shipping Agency Tel. 255564 Fax. 233228, 233517
Purshotam Chtrabhuj Thacker Tel. 222720	Seaster Shipping Services Tel. 255349 Fax. 232719
Prashant Shipping Tel. 255306, 223927 Fax. 223927	Seaway Shipping Services Tel. 234272 Fax. 232719

Pramukh Forwarders Tel. 255400 Fax. 232602	Star Clearing Agencies Tel. 230273, 255529, 222983 Fax.232719
P M Agency Pvt Ltd Tel. 232553, 233973, 236414 Fax.255413	S S Shipping Agencies Tel. 236605, 238283 Fax. 236605
Raj Shipping Service Tel. 233948, 232402 Fax. 231395	SPN Shipping Services Tel. 222453, 270733 Fax. 236605
Rajesh Shipping Service Tel. 255444, 255450/52, Fax.255151	Sierra Shipping Pvt Limited Tel. 255395 Fax. 232771
Rudra Shipping Service Tel. 220429, 255317 Fax.255317	Sonal Enterprises Tel. 252666, 252053
Rishi Shipping Tel. 220813, 229830, 2555661/2/3 Fax. 238943, 255522 Mr. B K Mansukhani (M)9825225170	S R Clearing Agency Tel. 232974, 255494 Fax. 255494
Rudraksh Shipping Service Tel. 235937 Fax. 255582	St. John Freight System Limited Tel. 235414, 236444 Fax.235414
Sanghvi Freight Forwarders Pvt Ltd Tel. 234993, 234995, 222401 Fax.230508	Siddi Shipping Services Tel. 232356, 230268 Fax.256712
Sri R K Shipping Pvt Ltd Tel. 232028, 231940, 231936 Fax. 232740	Spalsh Shipping Pvt Limited Tel. 255562, Fax. 220710
Shakti Enterprises Tel. 223531, 221591 Fax. 233898	Thakarshi Madhavji & Sons Tel. 255457, 255458 Fax. 221770
Shree Ambica Commercial Company Tel. 220213, 221253	Trinity Shipping & Allied Services Pvt Ltd Tel. 223703, 230911 Fax. 232060

Shri Maruti Shipping Services. Tel. 270760, 256853, 233245 Fax.220308	Tokto Shipping Services Tel. 234040
Unity Shipping Tel. 255271	Vinson Tel. 220466 Fax. 231948
Umiya Shipping Agency Tel. 255640 Fax. 233625	Vaz Forwarders Ltd Tel. 235317 Fax. 255221
Unique Forwarders Tel. 230080, 255417 Fax. 236131	Varsh Shipping & Travels Tel. 222386, 255300 Fax. 255300
V. Arjoon Tel. 221049, 221335, 222058, 223307 Fax. 234167	Venus Clearing Agency Tel. 233960 Fax. 233362
Velji Dosabhai & Sons Tel. 270220, 270025, 221818, 231423 Fax. 270164, 232363	Vishal Shipping & Handling Tel. 223960 Fax. 233362
Vishvajyoti Enterprises Tel. 252381, 252318 Fax. 253091	Worldwide Cargo Care Pvt Ltd Tel. 221290, 221479, 220307, 230217 Fax. 231913
Velji P & Sons Tel. 255327, 231545, 231546, 270976 Fax. 255328	Zenith Trade Link Tel. 223193 Fax. 255522
Vailash Transport Co. Tel. 233579, 223580	

21.11 Surveyors at Kandla

Adnuralty Marine Services Tel. 235412, 256813 Fax. 256813	Marine Consultants & Surveyors Pvt Ltd Tel. 255293 Fax. 234416
Capt. S. Kochar & co. Tel. 222247, 221084 Fax. 231357	Murray Fenton (India) Surveyors Limited Tel. 235960, 236238 Fax. 233335

Dr. Amin Superintendents & Surveyors Pvt Limited, Tel. 221520, 235636 Fax. 226527	M. M. Cargo Gear & Marine Surveyors Tel. 231385 Fax. 235255
Det Norske Veritas (DNV) Tel. 232712	M.B.S. Surveyors Tel. 256782
Geo-Chem Laboratories Pvt Limited Tel. 221841, 222179 Fax. 233743	Navark & Mareng Surveyors & Consultants Tel. 232123, 233270
G. P. Dave & Sons Tel. 234288 Fax. 234382	S.G.S. India Limited Tel. 221857, 238047, 231869 Fax.232883
Gupta & Associates Tel. 222542 Fax. 222542	S. K. S. Surveyors Assessors Tel. 220555
Inspectorate (India) Consulting	Seascan Surveyors Pvt Limited
Engineering Pvt Limited Tel. 221520, 235636 Fax. 255217	Tel. 221833, 233639, 221627 Fax. 233639
Indian Register of Shipping & Indian Register Quality System Tel. 238623, 233695 Fax. 233695	Sterling Surveyors Tel. 230216 Fax. 230216
Iteng Engineering Tel. 221520, 255429 Fax. 255247	Technomar Surveyors Pvt Limited Tel. 221966
J B Boda Surveyors Pvt Limited Tel. 231801, 231946 Fax. 231693	TCRC Surveyors Tel. 220862, 230050 Fax. 230050
Lloyds Register of Shipping Tel. 234068	Uni Lab (India) Surveyors and Superintendents Tel. 255503
Mitra S K Pvt Limited Tel. 222648	Universal Cargo Inspection Agencies Tel. 222542

Metcalfe Hodgkinsons Pvt Limited Tel. 220940, 221740, 233707, 221845 Fax. 231629	U Marine (India) surveyors Tel. 220070 Fax. 233228
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ANNEXURE-I**PARTICULARS OF THE ACTION PLAN COMMITTEE MEMBERS**

Sr. No	Name	Desgn.	Telephone Nos.			
			Office	Resi.	Fax	Mobile
1	Mr SANJAY MEHTA, IFS	Chairman	233001 234601	233002	235982	
2	Mr.	Deputy Chairman	234121	234218	236323	
3	Capt. T. Srivnivas	Dy. Conservator	233585	232806	233585	98252 32982
4	Mr. A. Krishnan	Dy. FA & CAO	220214	223854	-	98252 27036
5	Mr. R. V. Rajwani	Dy. FA & CAO	221648	226112	-	98793 70975
6	Mr. AJAY GUPTA	Sr. DD (EDP)	239623	234116	-	98252 27095
7	Mr. Bimal Kumar Jha	Secretary	220167	231939	233172	81410 84794
8	Mr.	Sr. Dy. Secy	220033	234730	-	98252 27480
9	Mr. Suresh Balan	Dy. Secretary	221375	236086	-	98252 27044
10	Mr.	Sr. Astt. Secy	221679	-	-	82380 37207
11	Mr.	SE(H) and OSD(Estate)	270429	235683		98252 25963
12	Mr. Y. K Singh	Personnel Officer	223828	228584		98252 27079
13	Mr.	Traffic Manager				
14	Mr. S. Krupanand Swamy	Sr. Dy.TM	270270	235100		98252 27049
15	Mr. Shankar Jivaji	Deputy TM	270324	234918		94264 51554
16	Mr. D. N. Sondhi	FA & CAO	233174	-	233174	98252 14726
17	Capt. S. K. Pathak	Harbour Master	270201	231310		98258 03499
18						
19	Mr. Sunil Kumar	Flotilla Supdt.	270280	226121		78746 27756
20	Mr. K. Varughese	FCSO	270176/ 78	227512	270176	98252 27041

21	Mr. SSP PATIL	Chief Engineer	233192	228777	220050	98252 27243
22	Mr	C.M.E.	270632	231043		
23	Mr.	Dy. CME	270426	226067	270184	98252 35196
24	Mr. N M Parmar	DY CHIEF ENGINEER	270787	252624		98252 27046
25	Dr. Kalindi Gandhi	Chief Medical Officer	225767 220072	225555	232288	98256 11208
26	Dr. Mahesh Bapat	Sr. MO	234598	228167		96876 07528
27	Shri CHAUDHRI	Sr. Commandant CISF	271037	229140	271037	98252 27282

THE TELEPHONE NUMBERS OF SOME OF THE VIPS

Sr. No.	Name and Designation	Fax / Mobile	Telephone (Office)	Telephone (Resi)
1	District Collector, Bhuj	02832-250430	250020	250350
2	Resident Add. Collector, Bhuj	250430 9978405099	250650	
3	Superintends of Police, Bhuj,	99784 05073	250444 250250	250850
4	Asstt. Supdt. Of Police, Bhuj		253405	250850
5	Dy. Collector, Anjar	99784 05079	243345	243345
6	Mamlatdar, Anjar		242588	243362
7	Mamlatdar, Gandhidham.	75670 03975	250475 250270	222875 250475
8	Traffic Manager, IOC	234396	231871	236442
9	Air Force Commander, Jamnagar		2550245	-
10	Collector, Jamnagar		2555869	2554059
11	Commandant, BSF, Gandhidham		223845	
12	Mrs. Vinod Chawda, MP, Kachchh	02832 - 225466 9825905467		
13	Mr. Vasan Ahir, MLA, Anjar	9825025148		
14	Dr. Nimaben Acharya, MLA, Bhuj	9825226700	220715	
15	Mr. Rameshbhai Maheshwari, Gandhidham	9909910619		
16	Mr. Tarachand Chedda, MLA, Mandvi	9825225394		
17	Mr. Pankaj Mehta, MLA, Rapar	9825227883		
18	Mr. <u>Shaktisinh Gohil</u> ,	95865 58120		

	MLA, Abdasa,			
19	Kum. Tulsi P. Anandani, SRC	260401	260404 260811	260631
20	Civil Surgeon, GK Gen. Hospital, Bhuj		222850	

ANNEXURE -III**IMPORTANT TELEPHONE NUMBERS OF
INDIAN METEOROLOGICAL DEPARTMENT**

Designation	Address	Office	Resi.	Fax
Director General	Mausam Bhavan, Lodi Road, New Delhi.	011- 24611842	011- 24633692	011- 24611792
		011-		011- 24619167

D.D.G.M. (C.W)	-do -	24611068		
D.D.G.M. (WF)	Met Office, Simla Office, Pune	020- 25535886	020- 25884104	020- 24623210 25893330 25535201
D.D.G.M.	RC Colaba, Mumbai	022- 22150517	22150417	
Director (ACWC)	-do-	022- 22150405	022- 22150452	
Director (I/c)	Met Center Ahmedabad	079- 22865012 22867206		079- 22865449
Met I/C	MET Centre, Ahmedabad	22861413		
Dr. Jayanta Sarkar,	Director I/C.	22865165, 22867657		

Websites

www.imd.emet.in

www.imdmumbai.gov.in

DISASTER MANAGEMENT CELL

Chief Executive Officer,
 9978407002(M), 079-3259276(O)
 079-23254900(R)
 079-3259248(FAX)

ANNEXURE-IV**TELEPHONE NOS. OF STATE MINISTERS**

Sr. No.	Name and Designation	<u>Telephone Numbers</u>		
		Office	Residence	Mobile / Fax
1	Mrs. Anandiben Patel, Hon'ble Chief Minister, Block No.1, 5th Floor, Sachivalaya, Gandhinagar	O) 079 - 23232611- 19	(R) 079 - 23222020	(F) 079 - 23222101
2	Mr Babubhai B. Bokhiriya, Minister for Agri., Animal husbandary. Fisheries	079 - 23238109		079 - 23250133
3	Shri Sankarbhaj Chaudhry Min. for Health & Family Welfare and Transport	079 - 23250193		079 - 23250145
4	Shri Ramanlal Vora Min. for Social Justice and Empower	079 - 23238078		079 - 23257973

	Department			
5	Shri Mangubhai C. Patel Forest and Environment, Tribal Development.	079 - 23250113		079 - 23250306
6	Shri Bhupendrasinh Manubha Chudasma, Education, Food and Civil Supplied.	079 - 23243389		079 - 23250120
7	Mr Saurabhai Patel, (Finance, Energy and Petrochemicals, Salt Industries, Tourism)	079 - 23238152	23250625	079- 23250215

OFFICIALS

Sr. No.	Designation	office		Fax
01	Chief Secretary, GAD	23220372		23250305
02	Principal Secretary, GAD	23250016		23222101
03	Addl. Chief Secretary, Port & Road Transport	23250506		23252132
04	Principal Secretary (Industries & Mines)	23250701		23250844
05	Principal Secretary (Labour & Employment)	23250871		
06	Addl. Chief Secretary (Home)	23250701		23250844
07	Principal Secretary (Energy & Petro-chemicals)	23250771		23250797
08	Principal Secretary (Finance)	23220286		
09	Principal Secretary (Revenue)	23251603		23251325

10	Principal Secretary (Education)	23251301		23251325
11	Chairman, GMB	23238346	23249356	

ANNEXURE - V**TELEPHONE NOS. OF GUJARAT STATE DISTRICT COLLECTORS**

Sr. No.	District	Office	Residence
1	Ahmedabad	27551681	22863595
2	Amreli	222307	222301
3	Anand	242871	261000
4	Banaskantha	257171	257007
5	Bharuch	240600	223701
6	Bhavnagar	2428822	2568866
7	Dahod	221999	221888
8	Dang	220201	220202
9	Gandhinagar	23220330	23254884
10	Jamnagar	2555869	2554059
11	Junagadh	2651202	2650203
12	Kachchh	250020	250350
13	Kheda	2550856	2556700
14	Mehsana	222200	253565
15	Narmada	222162	222161
16	Navsari	244999	246000
17	Panchmahal	242800	242900
18	Patan	233301	233300

19	Porbandhar	2243800	2243801
20	Rajkot	2463900	2172900
21	Sabarkantha	241001	223001
22	Surat	2471121	2471416
23	Surendranagar	282200	282201
24	Vadodara	2433000	2313131
25	Valsad	253613	253060
26	Vapi	224400	220221

Control Room (Earthquake, Gandhinagar):

3251914 / 3251910 / 3240339 / 3240303 (Fax)

ANNEXURE – VI

GUJARAT STATE DISASTER MANAGEMENT AUTHORITY
TEL. NOS OF SENIOR OFFICIALS

Sr. No.	Name and Designation	Office	Residence	Mobile
1	Dr.Ranjit Banerjee, IAS, Chief Executive Officer, GSDMA	079-3259276 Fax.0793259248		9978407002
2	Mr V.Thirupuzzah,IAS, Addl. CEO, GSDMA	079-3259502 Fax.0793259275	079- 6309273	9825095148
3.	Mr. H.N. Gamit,IAS, Director(Admn.)	079-3259278		9978407005

ANNEXURE –VII

DISTRICT LEVEL AUTHORITIES (EAST)

Name and Designation of Officer	Fax	Telephone Nos. (Office)	Telephone Nos. (Residence)
District Collector, Bhuj. 9978406212	250430	(02832) 250020	02832- 250350
Resident Add. Collector, Bhuj Mob.9978405099	250430	250650	
Mr. Deepakkumar Menghani (IPS) S. P.-(Purab),9978405690		280233	
Mr. C.R. Kotad, GPS Dy. SP (Anjar)9825304239	243254		
Mr. D.R. Agrawat(GPS) Dy. SP(HQ)9825225071			
Mr. Chirag Patel,(GPS) Dy. SP.9824543004	0837- 224040		
Control Room(DC-5)Purab	280287		
Mr. Vinod Chawda, M.P.,Kachchh		(m)	
Dy.Collector, Anjar Mob. 9825228049		243345	243363
Mamlatdar, Anjar Mob. 9879278174		242588	243362
Mamlatdar, Gandhidham 7567003975		250475 250270	222875 250475
Collector, Jamnagar		2555869	2554059
Collector's Control Room, Bhuj.		2252347 2231733	-
Dy. Mamlatdar, Gandhidham		250475 250270	9427719800
Civil Defence, Gandhidham		220221	

PGVCL, Gandhidham		221728 222809	
GW&SB, Gandhidham		220975	
GSRTC, Gandhidham		220198	
Duty Officer, All India Radio, Bhuj		221412	
State Information Dept. (Shri Sony) (m) 9879012714		224859 250954	253034 252855
Air Force, Duty Officer, Bhuj		252501 252502	
Air Force, Bhuj		223450	
Air Port, Bhuj		254550	
Aerodrome Officer, Kandla		238370	223247
Indian Navy, Jamnagar		550263 to 5	550825
Airforce, Jamnagar		550245 to 7	550247

ANNEXURE – VIII**List of Telephone Numbers of Gujarat Maritime Board**

Sr. No.	Name, Designation and place of Office	Tele. No. (Office)	Tele. No. (Residence)	Fax No.
1	Mr. Rajgopal, Chairman, Gandhinagar.	23250508 23250506		079-23250589

2	Mr. A. K. Rakesh VC & CEO,Gandhinagar	23238363	23262280	23234703
3	Chief Nautical Officer, Gandhinagar	23238346-47		-do-
4	Chief EngineerI, Gandhinagar	23238347		-do-
5	Officer on Special Duty, Gandhinagar	23238346	079- 2323232	-do-
6	Exe. Asst. to VC&CEO, Gandhinagar	3238363	7451465	-
7	Head Office, Gandhinagar	3238346 to 48	-	34703/04
8	Port Officer, Magdalla	0261-2470533	-	2475645
9	Port Officer, Bharuch	02642-241772	229082	220377
10	Port Officer, Bhavnagar	0278-2519221	2568580	2211026
11	Port Officer, Jafrabad	02794-245165		245152
12	Port Officer, Porbandar	0286-2242408	2242412	2244013
13	Port Officer, Veraval	02876-220001	242956	243138
14	Port Officer, Okha	02892-262001	262010	262002
15	Port Officer, Jamnagar	0288-2755106	2557163	2756909
16	Port Officer, Navlakhi Main Gate	02822-220435		232470
17	Port Officer, Mandvi	02834-220033	220040	230033
18	Traffic Inspector, Mundra	02838-222136	222136	-
19	Executive EngineerI, Jakhau	02831-287261	222996	-
20	Gujarat Pipavav Port Ltd., Chief Operating Officer, Duty Office	02794-286314 86001/92	286070	-
21	Gujarat Adani Port Ltd.,	02838-	287241	-

	Mundra.	288201 to 208		
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ANNEXURE – IX**POLICE AUTHORITIES**

Name and Designation of Officer	Telephone Nos. (Office)	Telephone Nos. (Residence)
PARIXITA RATHORE S. P. (Purab), 99784 05690	280233	
Dy. SP (Anjar)9825304239	243254	
Dy. SP(HQ)9825225071	243254	
Dy. SP.9824543004	224040	
Police Control Room,DC-5,Poorab, Gandhidham	280287	
Police Control Room, Bhuj	253593 / 250960	Fax – 250427

Dy. Supdt. Of Police, Anjar	02836-243254	242596
Dy. Supdt. Of Police – Bhachau	02837-224040	224020
Bhachau Police Station	02837-224036	
Anjar Police Station	02836 – 242517	242517
Gandhidham Police Station	A. 100/232500/ 229513 B. 233752	
Kandla Police Station	270527	
Adipur Police Station	260615	
Air Commander, Jamnagar	0288-2720003 -009	
Commandant, BSF, GIM	223845	
Air Force Commander, Bhuj	(02832)244005-10	
Army, Bhuj, C.O 128 AD Regmt	229239,229942	

ANNEXURE – X**For the supply of food packets etc., the following Agencies will be contacted:**

Sr. No.	Name of Agency	Contact Person	Telephone No.
1	Arya Samaj Mandal	Mr.Vachanidhi	231223 / 9824221332
2	Agrawal Samaj	Mr. Sunil Sharma	234977
3	RSS	Mr. Sunil Kothari	222560
4	Rotary Club, Gandhidham	Mr. Samir shah	9825093732
5	Red Cross Society	Dr. Bhavesh Acharya	234854 / 232736
6	Lohana Mahajan, Gandhidham	Mr. J.P. Thakkar	9879109826
7	Marvaari Yuva Manch	Mr.Sunil Bajaj (President) Mr. Prashant Agarwal	9879015408
8	Swaminarain Mandir	Mr.Lavjibhai Thackker	231555, 233666
9	Gandhidham Sindhi Youth Circle	Mr.Vijay Khubchandani & Mr.Kundabhai	220490
10	Satwara Samaj	Mr.agavjibhai	235659
11	Sitaram Parivar	Mr.Mohanbhai Dharsi	222373, 234603
12	Gurudwara, Gandhidham		220643
13	Swaminarayan Gurukul	Swamimukta Prasadji	228098, 226555

Apart from the above, if required, the following hotels may be contacted for the supply of food packets:-

Sr. No.	Name of Hotel	Contact Person	Telephone No.
1	Grand Shiv	Mr Nagendra Singh	221297, 9825226568
2	Sharma Resorts	Mr Madan Mohta	31824/231823/231825/ 224885-86-87-88-89
3	Satkar	Mr Babu Bhai Agrawal	234100/222597
4	Natraj	Mr. Acharya	221749/221956/221955 221954/238002
5	President	Mr. Romesh	220053
6	K.K.Caterers	Mr. Kaniyalal Rajwani	(M) 98252 26998 (M) 98983 74896
7	Hotel Mid-Town, Adipur	Mr. Nagendra Singh	98252 26568 260237/260080
8	Hotel Sea-Rock, New Kandla	Mr. Devidas Shetty	270490

LIST OF LABOUR CONTRACTORS OPERATING AT KANDLA PORT

Sr. No.	Name of the Company	Contact person	Address	Contact Nos
1	Neelkant Handling A/c Shree Radhey Shipping	Haresh Bupendra	Tenament B Plot 290,Ward 10/A, G'dham	237040 98250 01743
2	Ratnakar Handling A/c Aditya Marine	Radhakishan Parida	83-84, GIDC G'dham	98791 23371
3	Ganesh Handling Co.	Dayalal B. Rabari	6-8, Goyal Chamber, GIM	235504
4	Al Pirani Al Sailani	Akbar Yakub	CS-10, Port Colony, Kandla	22053 / 232174 99793 31100 98257 87808
5	Shree Ravechi Handling A/c Trinity Shipping	Mahadeva Agaria	11, Second Floor, Plot.343, Ward 12- B, GIM	250286 9825361347
6	Shree Ramdev Handling	Nimbaram Gulabji	377, Sector-7 GIM	9825348935 9979898564
7	AVB & Co	Mukesh Gujjar	15, GF, Gokul Park, GIM	232967
8	Ashapura Labour Supply	Khimji Jallabhai Rathod	48, GIDC, Near Ambika Weigh Bridge, GIM	9979053378 9898128069
9	Shree Krishna Handling	Harinder Yadav	Plot E – 108, Guj Housing Soceity,Sec- 5,GIM	9879549803
10	Naasmin & Co	Umar Osman Chamadia	Plot – 14, Sector- 7, GIM	9898333397
11	M.S. Logistics	Asgar Haji Mungrani	Shop No. 5, Opp. CISF Gate,	9825241065 9913620407

			Kandla	
12	Shree Majeesa Handling	Jugal Kishor Joshi	Block 24, MIG, Kidana, GIM	9879373992 9979898564
13	Shree Kailash Handling Co.	Mohanbhai Heera	Plot No. 7, Sector- 8, GIM	9825228555 9879288875
14	Javed Abu Saicha	Javed Abu Saicha Gani Patel	Shop – 13, Port Colony, Kandla	9825092748 9825563094
15	Shree Ganesh Handling	Dayabhai Rabari	6-8, Goyal Chamber, GIM	9825056599
16	Bhupendra & Co	Mayur M Ahir	Plot 253, Ward 12/C, GIM	9727762191 9825225239

**ANNEXURE –
XII**

LIST OF CIVIL ELECTRICAL AND MECHANICAL CONTRACTORS

Sr. No.	Name & Address of Contractor	Office	Resi	Mobile
1	Mr. Dilip Bhandbe, M/s Mukund Ltd.	223412		
2	M/s. Maheshwari Const. Co., SDX-N-5, Gandhidham-Kutch Mr Rameshbhai	232134		
3	M/s. Apex Engineers, Bajaj Chambers, 12/B, Gandhidham – Kutch (Mr. Vishal)	222002 222223		9898226666
4	M/s. Gadhvi Constructions, Plot No.524, Sector – 5, Gandhidham – Kutch	235772		9426215258
5	M/s. Advance Builders & Contractors, B-23, Apnanagar, Gandhidham – Kutch.		232864 234242	9825255934
6	M/s. Mohan Construction Co., 415, 2/B, Adipur (Mr.Mohan)		264140	9825174351
7	M/s. Star Decorators, 17, Plot No.5, 12/A, National Highway, Gandhidham – Kutch (Mr. Vinod Bajaj)	221450		
8	M/s. Kamal P. Chellani, DBZ-S-81-A, Gandhidham-Kutch (Mr.Kamal)			9825221542
9	M/s. K.K.Construction, E-71, Gujarat Housing Society,			230064

	Devi Krupa, Sector -5, Gandhidham (Mr Milanbhai)			
10	M/s. Mepabhai Madan, Plot No. 21/22, Sector-9, Opp. KPT Office, Gandhidham Mr Rajubhai	222209 222210		233627
11	M/s. S. B. Singh, B-110, Sapna Nagar, Gandhidham - Kutch	239351		
12	M/s. Dipesh Construction Co., 11, Apurva Chambers, Ganga Gate, Anjar - Kutch. (Mr. Parth) (Mr. Sukhdevbhai)	242997	243319	9824294260 9825179040
13	M/s. Raj Construction Co., Deepak Complex, Plot No.315, Ward 12/B, Gandhidham-Kutch Mr Rajesh Makhijani	220911		
14	M/s. M. V. Rajani,444, 2/B, Matruchhaya,Rambaugh Road, Adipur - Kutch (Mr. Narayan)	260800 262920		9825225690
15	M/s. Bhimji Velji Sorathia, 21, Nilesh Park, Plot No.80, Sector - 8, Near New Court Building, Gandhidham - Kutch (Mr. Bhimji Velji)	231383		9825225948
16	M/s. Sollone & Parco Engg. Co., CCX-165, Adipur - Kutch (Mr Ravi Solanki)	261298 263248		9825222919
17	M/s. Mahesh Construction,			

	Plot No. 415, 2/B, Adipur- Kutch (Mr. Mahesh)		264140	9825091599
18	M/s. Patel Construction Co. Zanda Chowk, Gandhidham (Mr. Tejabhai Kangad)	220421		9825227199
19	M/s. M. G. Bhavnani, Plot No.102, Sector 1/A, Gandhidham – Kutch			9825191636
20	M/s. Patel Engineering Works, Gandhidham	231832		
21	M/s. H.M.G. Gandhidham	235710 234609		
22	M/s. Mukund Limited Mumbai	022- 25347373		
23	M/s. Bajaj Electric Mumbai	022- 23724192		
24	M/s. Mishra Brothers Gandhidham	221172		
25	M/s. Sonu Electricals 18, K.P.Shopping Centre, Near Jivan Bharati School, Karelibaug, Vadodara-390018 Shri Jayendrasingh.B. Thakker	0265- 2464108	2647886	
26	M/s. Ravi Electronics, "Prashant", 20, New Jagnath Rajkot – 360 001 Mr. G.K.Patel	465256 460 253		
27	M/s Megha Technicals, CCX – 165, Adipur – Kutch (Mr. Ravi Solanki)	261298 263248		9375320232

28	M/s Maruti Construction, Gandhidham – Kutch			9824893851
29	M/s Ramesh Meghji Sorathia, Anjar – Kutch			9825225948
30	M/s Mohit Construction, B-168, Shaktinagar, Gandhidham – Kutch			9825227072

ANNEXURE – XIII**LIST OF SALT LAND LESSEES**

Sr. No .	Name of Salt Works	Contact Person	Tel. No. Office	Tel. No. Residence
1	Asstt. Salt Commissioner, Gandhidham	Mr. Jagdish Tripathi	233670	263690
2	M/s. Kanoria Chemicals and Ind. Ltd., Plot No.220,	Mr. B. N. Singh, Mr. J. Singh	229470 0237-74433	283325 9825225841

	Sector -4, Gandhidham	Factory -		
3	Shree Krishna Salt Industries, Central Bank Compound, Gandhidham	Mr. Kantibhai Thakkar Mr. Vikash Patel Mb: 9825206214	234727 233990	235315 234089
4	M/s. Chirai Salt Works, DBZ-S-46, Jawahar Chock, Gandhidham.	Mr.Sureshbhai Mr.Parasbhai Mb: 9825225181 Mr.Mayajar	221109 221267 9826214709	234386 233081
5	M/s. Bhuvneshwari Salt Works, TCX-S-62, Gandhidham	Mr.Sreechandji Jain Mob: 9825222269	237114 235203	233605 236860
6	M/s. Dungershee Salt Works, Shop No. D-93, P.B.No.9, Gandhidham	Mr.Hiralal Parekh Mb: 9825019661 Mr. R.B.Agrawal Mb: 9825019662 Mr. Bhikhabhai (Salt Area)	222765 223440 9825225667	232767
7	M/s. Shree Laxmi Salt Allied Ind., "Shree Sadan", 207 / 12-B, Gandhidham	Mr. Rajubhai Rathi Mr. Rameshbhai Rathi Mob.: 9824214901	232167	232167 235482
8	M/s. Jyoti Salt Industries, "Sukh Sadan", Opp. Hotel President, Gandhidham	Mr.Acharya Sukhdevbhai Mr. Sukhdevbhai Acharya Mb: 9825226075	223776 221082 221089 223094	221876
9	M/s. New Kandla Salt and Chemical Co., "Maitri Bhavan", Plot No.18, Sector 8,	Mr. Ashokbhai Sanghvi Mr. Babulalji Sanghvi	232227 231588 234087	234325 231814 232122

	Gandhidham	Mb: 9825226091 Mr. Sukhrajbhai Mb: 98252 26011		
10	M/s. Kutch Salt Works, New Kandla	Mr. Mitenbhai Mb: 9825225990 Mr. S.P.Giria, Works Manager, Mb: 9825228085	234659 022- 22040561 22041598 270371	238633

11	M/s. Vijay Salt Works and Allied Industries, "Friends House", P.No. 50, Sector -1A, P.B.No.106, Gandhidham	Mr. Harishbhai Chaturani Mb: 9825064241 Mr. Babulal Nahata Mr. Lalchandji Nahata	231119 252247 223743	234856 9825228398
12	M/s. Rajesh Salt Works, "Chandan Chambers" National Highway, Plot No.18, 12/A, Gandhidham.	Mr. Kishorbhai Thakkar Mob: 9825177081 Mr. Rameshbhai Mb: 9825226026	220586 221048 222301	234387
13	M/s. Western Chemical, DBZ-S-151, Gandhidham	Mr. Naranbhai Mb: 9825226092	233185 230913	230141
14	M/s. Urvakunj Nicotine Ltd., Central Bank Compound, Plot No.31, Sector No.9, Gandhidham	Mr. Mahendrabhai Patel - 9825206214 Mr. Vikash Patel Mb: 9825226214	234727	234480
15	M/. Friends Salt Works, "Maitri Bhavan", Plot No.18, Sector No.8, Gandhidham	Mr. Babulalji Mb: 9825226015 Mr. Ashokbhai Mb: 9825226091 Mr. Sukhrajbhai Mb: 9825226011	232227 231588 234087	231646 231814
16	Smt. Savitri H.Pandya, DBZ-N-21/A, Gandhidham	Mr. Jagdihbhai	220212 238112	255612

17	Smt. Vimlaben.H. Pandya, DBZ-N-21/A, Gandhidham	Mr. Jadishbhai Mr.Amritlal Pandya Mb: 9825225212	220212/ 238112/ 238212/ 255612 Fax: 222930	
18	M/s. Rajendra Salt Works, D-125, Jawahar Chowk, Gandhidham	Mr. Tarachand	-	-
19	Mr Natwarlal Agrawal, TCX-S-75, Gandhidham	Mr. Natwarlal Mb: 9825393555	222672	231564
20	Mr Indrumal Khubchand, C/o Gulab Salt Works, D-125, Jawahar Chowk, Gandhidham	Mr. Tarachand	233041 234388	234937
21	Mr Virji Khimji C/o Ajit Salt works, D-75, Gandhidham	Mr. Kirtibhai	220310	-
22	Mr Girdharilal.S. Agrawal, Plot No.126, Ward – 12/B, Gandhidham	Mr. Girdharilal	232862	234755
23	Mr Vijay Kumar.D. Palan & Mri Jagdish Kumar.D.	Mr. Navrotambhai Palan	220310	-
24	M/s. Satya Salt Works, DBZ-S-183, Gandhidham	Mr. Candubhai Mb: 9825225911	224055 221445	234739 234469
25	Shri Premji Gangji Soni,	Mr. Mahesh Soni	221263	-

	DBZ-S-183, Gandhidham			
26	Smt. Geetadevi P. Chaturani Plot No.13, Sector 1, Gandhidham	Mr. Romesh / Ashwin Mr. Dayalbhai Chaturani, Mb:9825064245	221048 256713 220586 256706 Fax: 222930	-
27	Shri Rashmin A.Pandya DBZ-N-21/A, Gandhidham	Mr. Jagdish Pandya	220212 238112 238212 Fax: 222930	-
28	M/s. Neelkanth Enterprise, DBZ-S-60, Gandhidham	Mr. Shamjibhai Mb: 9825 25711	220421 220103 Fax: 223560	231485
29	Dayalal G.Chaturani Shop No.1 to 4, "Chandan Chamber" Plot No.18, Ward No.12, Gandhidham	Mr.Dayal	221048 220588	-
30	Shri Chaganlal Punamchand, DBZ-N-197, Gandhidham	Mr. Chaganlal	220545	-

Annexure -XIV**LIST OF STEVEDORES AT THE PORT**

Sr. No.	Name	Address	Fax No.	Telephone Nos.	
				Office	Resi.
1	M/s. Cargo Movers	"Cargo House" BBZS-32A, Gandhidham	231687	220453 231365	261280
2	M/s. DBC & Sons (P) Ltd.	Seva Sadan-II, Room No. 303 / 304, New Kandla	270631	270503 270263 270348	-
3	M/s. A.V.Joshi & Co.	Plot No. 18, Sector-8, Maitry Bhavan, Nr. Post Office, Gandhidham -Kutch	233924	231070 232227 231588	234909

4	M/s. Agarwal Handling Agencies	DBZ-N-47, Gandhidham – Kutch	232749	220282 233187	232749
5	M/s. ACT Shipping P. Ltd	Seva Sadan-II, Room No. 206/207, New Kandla	232175	270111 270112 270015 229967 231734	261308 231416
6	M/s. Cargo Carriers	214/215, Rishab Corner, Plot 93, Sector- 8, GIM	230030	220816 231649 230030	231694
7	M/s. Cargo Clearing Agency (Gujarat)	Plot No. 271, Ward 12-B, Gandhidham	233034	221721 220655	231452
8	M/s. Chotalal Premji Stevedores Pvt. Ltd	C-8, Shaktinagar, GIM	231509	270009	-
9	M/s. Hiralal Maganlal & Co.	C-11, GIDC Area, Gandhidham – Kutch	223914	223914 231832	223878 232430
10	M/s. New Dholera Shipping Company	Goyal Commerce Centre Building – 1, Plot No.259, Ward 12B, Gandhidham – Kutch	-	222637 232267	237284
11	M/s. J.M. Baxi & Co.	Seva Sadan – II, Room No. 301 / 306, New Kandla	270646	270630 270550 270448	260427
12	M/s. Pestonjee	Seva Sadan-II, Room	270650	270257	262914

	Bhicajee (Kutch)	No.203, New Kandla	270556	270367 270221	
13	M/s. OTA Kandla Pvt. Ltd.	BBZ-N-324, Gandhidham	223241	220145 270560	223241
14	M/s. Purshotamdas Jeramdas & Co.	5, Vaswani Chamber, Plot 16, Sector-8, GIM	222850	238242 222598	220598
15	M/s. R. Tulsidas & Co.	Ahit Building , Plot No.323, Gandhidham – Kutch	232308	222717 221943	-
16	M/s. Robinsons	101 / 102, Maritime House, Plot No.45, Sector – 9A, Gandhidham – Kutch	234394	221578 223836	231767
17	Rishi Shipping	Plot 50, Sector 1/A GIM	238943	229830 229831	
18	M/s. Vinsons	BBZ-S-25, Gandhidham – Kutch	231948	220466	222395 239460
19.	Sical Logistics Ltd	403, 4 th Floor, Madhuban Compex, OSLO, GIM	234416	234646 234194	
20	Parekh Marine Agency	C-8, Shaktinagar GIM	231509	229297 221158 230587	
21	Krishna Shipping and	Transport Nagar, NH	233135	230501	

	Allied Services	GIM		223814 229085	
22	Kevar Carrier Handling & Transport	Shop 24, Tolani Chamber, Sector -8 GIM	228298	228298	
23	Trinity Shipping & Allied Industries	Trinity House, Plot 46 Sec 1/A, GIM	232060	230911 230910	
24	Velji P & Sons(P) Ltd	2 nd Floor, Deepak Compex, 315, 12/B GIM	236168	231545 231546 225466	
25	Asean Marine Services	Ashit Bldg, Plot 33 Sector 1/A, GIM	232308	222717 221943 222145	
26	Rishikiran Roadlines	Kiran House, Plot 8 Sector 8, GIM	231422	231894 234108	
27	Universal Shipping Services	Hotel Sea Bird, Plot 173, Sector 1/A GIM	235251	230663 226050 226037	
28	R.T.Bhojwani & Sons	DBZ -S- 146, GIM	232423	222211 221831	
29	Logistic Enterprises(P) Ltd	C-8, Shaktinagar, GIM	231509	235341 230587	

30	Seaways Shipping (P) Ltd	2 nd Floor, Plot 351 Ward 12/B, GIM		226183 237147	
31	Seacrest Shipping Services Pvt. Ltd	216, 2 nd Floor Om Corner, Plot 336 Ward 12/B, GIM	227028	233325	
32	Shree Maruti Shipping Services	18/21, Swaminarayan Bldg, Sector 9, GIM	234107 250690	233245 237247 250690	
33	Liladhar Pasoo Forwarders P.Ltd	Plot 4, Sector -1 KASEZ, GIM	252383 253506	252286 252297 252612	
34	Shree Radhey Shipping Company	14-16/C, GF Green Park, GIM	232967	222919 228919 238883	
35	Pearl Shipping	220, Rishab Corner, Plot 93, Sector 8 GIM	235570	225283 225284	
36	Patel Shipping Agency	Patel Avenue, Floor 2, Plot 170, Sector 1/A GIM	231143	224024	
37	Ashirvad Shipping	18-21, Swaminarayan Bldg, Sector- 9, GIM	250690	233245 237247 222822	
38.	M/s. Swaminarayan	1 st Floor, H-6, Op. Tejas Society,	079-	231981,	

	Vijay Trade Carriar	Ghatlodia, Ahmedabad	231983	231982	
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LIST OF TANK FARM OWNERS

Sr. No.	Tank Farm Owners	Persons to be contacted in case of emergency		
		Name and Position	Telephone No.	Mobile No.
1	Kesar Enterprises Ltd., Near Oil Jetty, Old Kandla (Kutch)-370210	Mr. R.K. Gupta Gen. Manager	270435 (O) 295676 I	9375349181
2	Kessar Enterprises Ltd, Terminal II, Plot No. 5 &6 Old Kandla	Mr. R.K. Gupta G.M	270435 (O) 270177 (O)	9375349181
2	Chemical & Resins Pvt.Ltd Terminal -I, Near Oil Jetty, Old Kandla, Kutch Terminal - II, Near West Gate, New Kandla - Kutch	Mr. Manoj Kumar Gupta, Terminal Manager	270505(O) 270916 (O)	99240 44424
3	Indo-Nippon Co. Ltd., Plot No.2, K.K.Road, Old Kandla,	Mr. R.N. Pathak Asst. Terminal Manager	270795(O) 235818I 270295 (O)	9879571295
4	J. R. Enterprise, Plot No.3, Old Kandla,	Mr. Devendra Dadhich, Terminal In-charge	653528 (O) 257152 ®	9898238380
5	Friends Oil & Chemical Terminals Pvt. Ltd., Near Booster Pump Station, Old Kandla, Kutch	Mr.S.Ramakrishnan Terminal Manager	270987 (O) 257249 ®	9879572107
6	Indian Oil Corporation Ltd., Main Terminal, GIM	Mr. AK. Khanna Sr. Term. Manager	233274 (O) 229002 I	9427216637

	Foreshore Terminal, Kandla KBPL LPG Import Plant	Mr. KS Rao, Sr.TM Mr. PS Negi Plant Manager	270394 (O) 270628 (O) 270477 (O) 233359 ® 270978 (O) 236944 ®	9426416108 9426725342
7	United Storage & Tank Ltd Near IOC Foreshore Terminals, New Kandla Gas Terminal, Plot No. 4 Old Kandla	Mr. Manoj Gor Terminal Manager Mr. G. Chudasama	270609 (O) 653525 (O) 651238 ® 653529 (O)	989850029 9904366855
8	IFFCO Kandla Unit, Kandla, Kutch	Mr. M.R. Patel. Execut. Director, Mr. N.C. Patel, Sr. Manager	270711 270352(O) 270381 (O)	9687666888 9979026415
9	BPCL, KK Road, GIM	Mr.Vineet Bhudhai Sr. Manager Operations	234313 (O) 257808 ®	9409305433
10	HPCL KK Road, GIM	Mr. Murthy Manager (Installation)	230936 (O) 220084 (O) 233078 Ext 109(R)	
11	INEOS ABS (I) Ltd Plot No. 8 Old Kandla	Mr. Vineeth Nair Dy. Manager	270087 (O) 234409 I	9825237029
12	Liberty Investments Pvt. Ltd., Plot No. 1 & 2, Block 'H', New Kandla	Mr. Jitendra Vaidya Terminal Manager	270151 (O) 270464 (O) 270468 I	9825025645

13	Avean International Pvt. Ltd., Liquid Storage Tank Terminal, Plot No. B-1, New Kandla	Mr. Bharat Rathod Terminal Manager	270537 (O)	9375310260
14	Rishi Kiran Logistics Pvt Limited, Plot No. 7, Link Road Old Kandla	Mr. RH. Pandya GM (Terminal)	270223 (O) 270443 (O)	9879104556
15	N.P.P. Pvt. Ltd., Old Kandla	Mr. Jud Sequeira, GM(Terminal)	270347 (O) 257807 (R)	9099944900
16	Friends Salt Works and Allied Industries, KK Road, Old Kandla	Mr. NJ.Zinduwadia Sr. Manager Mr. HA. Mehta Sr. Manager	270814 (O) 262698 I 271260 (O) 235072 I	9825506361 9825506360
17	IMC Ltd, Cargo Jetty New Kandla	Mr. Anil Brahmbhat	270369(O) 653524 (O) 657963	9898126243
18	Agencies & Cargo Care Ltd., Plot No.3,New Kandla	Mr.Shivkumar Menon, Term. Mgr.	270714 (O)	9825226765
19	Dipak Estate Agency Plot No. 5-6, Block -A Behind Petrol Pump New Kandla	Mr. Narendra Thacker	270375 (O)	9879611243
20	Parker Agrochem Exports Ltd, Plot No. 3 -4,Block- H New Kandla	Mr. Bharat Thacker	270486 (O) 270528 (O) 231876 I	9825238260
21	Tejmalbhai & Co Plot 10, Block- A New Kandla	Mr. Ankitbhai Chandan	271330 (O) 230090 I	9825225101 9825222101
22	Parker Agrochem	Mr. P.Raja Babu	270528 (O)	9979158543

	Product P Ltd, Plot 7-9, Block-A, New Kandla	Dy Manager	231876 I	
23	Mother Dairy Fruit & Vegetable Pvt. Ltd, Near Oil Jetty, Old Kandla	Mr. Saju Therattu	270654 (O) 270655 (O) 230979(R)	9974022681
24	Mother Dairy Fruit & Vegetable Pvt. Ltd., Nr. Oil Jetty, Old Kandla	Mr. Saju Therattu	270654(O) 270655(O) 230979(R)	9974022681

ANNEXURE – XVI**LIST OF SCHOOLS IN GANDHIDHAM – KANDLA COMPLEX**

Sr. No.	Name of School	Contact Person	Telephone No.
1	Dr. C. G. High School	Principal	220271
2	SVP Gujarat Vidhyalaya	Principal	220242
3	M.P. Patel Kanya Vidhyalaya	Principal	220705
4	Adarsh Maha Vidhyalaya	Principal	234172
5	Adarsh Kanya Vidhyalaya	Principal	220175
6	Bhartiya Vidhya Mandir, Kandla Bhartiya Vidhya Mandir, Gopalpuri	Head Master Head Master	271049 233684
7	Central School, (IFFCO)	Principal	221288
8	Central School (Railway)	Principal	220657

9	Modern School	Principal	220284
10	Mount Carmel School	Principal	234262
11	Aum Vidhyalaya, IFFCO	Principal	221104
12	Saint Xavier's School, Adipur	Principal	260265
13	Maitri Maha Vidhyala, Adipur	Principal	260445
14	Maitri Kanya Vidhyalaya, Adipur	Principal	260612
15	Model Excelsior High School, Adipur	Principal	260707
16	Gujarat Vidhyalaya, Adipur	Principal	261312
17	Nagarpalika High School, Anjar	Principal	242510
18	Adarsh Nivasi School, Gandhidham	Principal	223246
19	P.N.Amersey School	Principal	223646
20	Shree Gurunanak English School	Principal	238421
21	Swaminarayan Gurukul	Principal	228098
22	Kairali English School	Principal	221050
23	Sarvodaya Pradhamic Shala Near Oslo Cinema, Gandhidham		227958
24	Ganeshnagar Pr.Shala, G'nagar		
25	Jagjivan Pra. Shala, Sapnanagar, Gandhidham		
26	Cargo Pra. Shala, Sapnanagar, Gandhidham		
27	Old & New Sunderpuri Schools	Head Master	224867
28	G'dham Pr. Shala, Near Shivaji Park, Gandhidham	Head Master	229255
29	Adipur Prathmic Shala, Adipur	Head Master	264525 264181
30	Kandla Pr. Shala, Shirva Camp & Thermal Colony & United Salt Works	Head Master	253198

ANNEXURE – XVII**LIST OF DOCTORS IN GANDHIDHAM COMPLEX**

Sl. No.	Name of Doctor	Telephone Numbers	
		Office	Residential
ANAESTHETIST			
1	Dr. (Mrs.) Dubal	232591	233555
2	Dr. (Mrs.) S.R.Gandhi	236700	229156
3	Dr. P. P. Kour	229655	220673

PHYSICIAN			
1	Dr. (Mrs) Gandhi	234561	230111
2	Dr. Johnson	222344	232244
3	Dr. Morakhiya	222008	232161
4	Dr. Sakaria	230114	230947
5	Dr. Siju Jacob (St. Joseph Hospital)	230160	223852
6	Dr. Acharya	220715	232736
7	Dr. D. P. Singh	221990	221990

SURGEONS			
1	Dr. D.G.Dasani	229231	223346
2	Dr. Girdhani	233300	231219
3	Dr. Y.V.Joshi	221557	233324

4	Dr. Hotchandani	230039	261530
5	Dr. Hemang Patel	230202	230353
6	Dr. Vachani	230400	222400
7	Dr. J.K.Ahir	237744	--
8	Dr. Harani	222096	222096

GYNAECOLOGISTS			
1	Dr. (Mrs.) N.B.Acharya	220715	232736
2	Dr. Chandrakant Thakker	224488	225588
3	Dr. (Mrs.) Rekha Singh	221990	221990
4	Dr. (Mrs.) Naik P.S.	234333	231332

PAEDIATRICIANS			
1	Dr. J. A. Dubal	232591	233777
2	Dr. Navin Thakker	230195	230894
3	Dr. Nitin Thakker	221046	220615

PATHOLOGISTS			
1	Dr. K. L. Shukla	221611	234062
2	Dr. (Mrs.) Seema Pavde	230370	231352
3	Dr. (Mrs.) Verma G.H.	229168	238386

ANNEXURE – XVIII*LIST OF ESSENTIAL SERVICES*

HOSPITALS	OFFICE	RESIDENT
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1	General Hospital, Bhuj Civil Surgeon, Bhuj	222850	250554
2	Referral Hospital, Anjar	232455	
3	Rambaugh Hospital, Gandhidham	220263	
4	Divine Life, Adipur	261802	
5	Railway Hospital, Gandhidham	231874	
6	Government Dispensary, Adipur	260608	

TELECOMMUNICATION			
1	General Manager, BSNL, Bhuj	253000	252322
2	Dy. Manager, Bhuj	252505	251505
3	Area Manager, Gandhidham	238000	235000
4	SDO, Gandhidham	236250	236251

ELECTRICITY			
1	S.E., PGVCL, Bhuj	222550	250189
2	Jr. S.E., Anjar	243008	242656
3	XEN, Anjar	242845	242446
4	Dy. Engineer, Gandhidham	222809	--
5	Line Office, Gandhidham	221728	

WATER SUPPLY			
1	S.E., GWS&SB, Bhuj	221806	250601
2	XEN, Bhuj	250685	253016

3	SE, Anjar	242416	242421
4	XEN, Gandhidham	220717	223273
5	Control Room, Gandhidham	221252	
6	Water Tank, Sunderpuri	231313	
7	Water Tank, NU-4	654564	
8	Gandhidham Municipality	231610	
9	Chief Officer, Gandhidham Municipality	234967	

ANNEXURE – XIX***LIST OF VEHICLES SUPPLIER***

Sl. No	Name of Institution	Contact Person	Parking Place Phone No.	Name and Phone No. of Driver	Availabil ity of Vehicle.
(A) Vehicle Hire Contractors					
1	M/s Rohit Enterprise	Mr Rohit Shah 228550/237538 237547 (O) 234140 I Mob.9825225121			
(B) Ambulance Pool					
01	St.Joseph Hospital, Gandhidham	Administrator 230160/229336	Hospital Premises	Driver available round the clock	First come first serve
02	Red Cross Society, Gandhidham.	230269	Red Cross	Driver available round the	

				clock	
03	Western Railway, Gandhidham	238891, 231874	Hospital		
04	Rambaugh Government Hospital, Adipur	261625	Hospital Premises	Driver available round the clock	
05	Gautam Freight Pvt Ltd.	Mr Ramesh, Proprietor 232605/220163, 230345 (O)	GIDC Work shop Sector- 10C, Plot No. 24.		First Come First Serve
06	Tolani Eye Hospital	Supdt.(O)260497 - 260773	Hospital Premises	One driver in absence of compounde r residing in hospital	First Come first Serve
07	Sterling Divine Life Hospital, Adipur	260577, 7698166555	Hospital Premises	Round the clock	
08	Dev Smruti Trust Dr. Harani	222096, 9825227322			
09	Mobile Morgue	229430/239965	Lions Club		
10	Shav Vahini/Mobile Mrogue	239965			
11	Varsha Cheritable Trust C/o Hareshkumar Tulsidas	9909829555			
12	Hari Om Trust Mr. K. Parmar	260833			

PLACEMENT OF PORT CRAFTS ON CYCLONE WARNING.

(A)	SHIPPING TUGS	Heera Mehul	Bunder
		Kalinga	Maintenance Jetty (West side)
(B)	PILOT LAUNCHES AND SURVEY LAUNCHES	M. L. BHARINI, M.L. NIHARIKA M. T. SWATI	Floating Crafts Jetty
		ML Karishma	Bunder Basin
		ML Nirishak	Inside Bunder Area North Side.
I	G.S. LAUNCHES AND MOORING LAUNCHES	M. L. Mrinal	Inside Bunder Area North Side on Pilot Launches
		M. L. Unnati M.L. Vaishali	Inner Side of Floating Craft Jetty
		M. L. Vijay M. L. Priyadashani PL Rakshak	Inside Bunder Area North on G. S. and Pilot Launches.

ANNEXURE -XXI**LIST OF LICENSE HOLDERS TO KEEP THEIR CRAFTS INSIDE THE PORT AREA.**

Sl. No.	Name of Party	Name of Nodal Officer	Tele. (Office)	Tele. (Resi)
01	M/s Jaisu Shipping Co. P Ltd., Kewalramani House, Dinshaw, Bldg. Road, New Kandla	Mr.Preetam, Director, Mob. 9825226114	270538 270128 270428	260235 260224
02	M/s Gautam Freight Pvt Ltd., Plot No. 24, Sector, 10/C, GIDC Area, Gandhidham	Mr. Ramesh Singhvi, CMD	231386 232605 230345 220163	234176 230328
03	M/s Babu's Shipping, Plot No. 32, Sec - 9 GIM	Mr. Vishalsinh Jadeja	222002	
04	M/s Blue Ocean Sea Transport, Manali Chamber, Plot No.306, Sec 1/A GIM	Mr. Hukumat T. Bhojwani & Mr. Dushyant Patel	239143 222518 230488 239058	
05	M/s Rishi Shipping, Rishi House, Sec 1/A, Plot No. 50 Gandhidham	Mr. Manoj Mansukhani Proprietor	220843 229830 229831 223913 229517 Fax. No. 238943	
06	M/s Velji P & Sons, Deepak Complex, 2 nd Floor, Plot No. 315,	Mr. Sureshchandra	231545 231546	232247

	Ward 12/B, GIM			
07	M/s A.S. Moloobhoy & Sons, Anchor House Shivkripa Bldg, Plot No. 135, Sec 1/A, GIM	Mr. Adil Sheth M- 9375312077	326543 225060 225061 225060	
08	M/s Gudani International Pvt. Ltd, C/o Chemoil Adani Mithakali Circle, Ahmedabad.		079- 25555765 25555266	

LIST OF TRAVEL AGENCIES

Sr. No.	Name of Agency	Phone No.	Mobile
01	M/s. Rathod Tours and Travels, Gandhidham	222444	222959
02	M/s. Rishabh Enterprises, M/s. Rishabh Tours and Travels, 30-31, Tolani Chamber, Plot no. 2, Sector No. 8, Nr. B.M. Petrol Pump, Gandhidham	228550 237538 237547	234140 9825225121
03	M/s. Jai Somnath Travels, Mr. Mishra		9727304414
04	M/s. Agrawal Tourists, Gandhidham	221311 220068	
05	M/s. Krishna Travels, Gandhidham	220683 234838	
06	M/s. Shiv Tourists, Gandhidham	221454	
07	M/s. Thakker Travels, Gandhidham	225097	9825271072

LIST OF MAJOR HEAVY LIFT OPERATORS AT K P T

NAME OF PARTY	NAME OF CONTACT PERSON	Phone Number
Swastik Heavy Lifters	Mr. Jigneshbhai	9825758151
	Mr. Aslambhai	9825228421
Kutch Carrier Transport Co	Mr. C. R. Thackar	9825225591
Agarwal Handling Agency	Mr. Rakesh Thackar	9426928728
Active Cargo Movers	Mr. Narendra	9825220411
Raghuvirsingh & Sons	Mr. Harcharan	9879104853
Thacker Brothers	Mr. Kamleshbhai	9825296107
Kiran Roadlines	Mr. Pankaj Gadvi	9879104552
Regal Shipping	Mr. Ashok Dudi	9825326328
Rathore Freight Carriers		220759/ 220380

ADDITIONAL LIST OF FIRMS FOR PAY-LOADERS/CRANES

M/s Mahalaxmi Transport Co., Plot No. 35, Sector No. 8, Behind Hotel Fun & Food, Gandhidham	Mr H K Rathod	(O)222387 I233500
M/s Kandla Earth Mover, DBZ-S-151, Gandhidham	Mr Sanjay Goyal	(O)221759 I222338 (M) 9825020550
Mr Lalji Bhavanji Sathwara, Laljibhai Sathwara, Plot No. 27, Shop No.5, Sector-9/A, Gandhidham		(O)234118 I232566 (M) 9825225957

LINER AND STEAMER AGENTS AT KANDLA

Sl. No.	Name	Fax No.	Tele. No.	Mobile
01	M/s ACT Shipping Ltd Mr. Harshad Gandhi	232175/ 270597	270111 270115-6 229967 231734	9825226141
02	M/s Admiral Shipping Ltd	233596	230552 232823	
03	M/s Areadia Shipping Ltd	232542	234254 223486	
04	M/s Ambica Maritime Ltd Mr. Amit Vyas	252447	252479 252349	9825225210
05	M/s APL (India) Pvt Ltd., Mr. Murli Krishnan	236361	224601/2 236357 236355	9825225753
06	M/s Arebee Star Maritime Agencies Pvt Ltd. Mr. anil Talwar	235831	220465 235832	9824229109
07	M/s Ashit Shipping Ser. Pvt Ltd. Mr. Sanjay Thakkar	232308	221943 222717 222145	9825225698
08	M/s Atlantic Shipping Pvt Ltd	223372	230552	
09	M/a Asia Shipping Services. Mr. Mohan Karia239326	231285	234526 230954	
10	M/s Bayland Freight Systems Pvt Ltd., Mr. Danendran Gopalan	239326	225522/23	9825230880
11	M/s B D Vithlani Shipping Services Pvt Ltd.	234104	232220 221081	
12	M/s Cargo Conveyors Mr. Shekhar Ayachi Mob. 9825226102	233034	221460 220655	
13	M/s CCA Shipping Services Mr. K C Varghese	233034	221721 220655	9825225217
14	M/s Chowgule Brothers	229227	278521	9825361782

	Mr. C R Soman		225051 232365	
15	M/s Coastline Services (India) Pvt Ltd.	221137	232095 222853	
16	M/s Container Marine Agency Pvt Ltd	234541	230026 220416	
17	M/s Conftreight Shipping Agency (India) Pvt Ltd. Mr. K T R Nair	-	233615 236157	
18	M/s Cresent Shipping Agency (India) Pvt Ltd Mr. Sanjay Salve.	224506	221290 221957	9825227311
19	M/s DBC Freight International	230832	230832 230639	
20	M/s DBC Sons (Gujarat) Pvt Ltd. Mr. R C Vazirani	270631	270263 270503	
21	M/s Depe Global Shipping Agency Pvt Ltd. Mr. Jaydeep Roy	232079	231528 233608 234582	9825228121
22	M/s Evershine Shipping Services. Mr. Kishan Motwani	234083	221588 237408	
23	M/s Forbes Gokak Ltd	231464	222634 235004	
24	M/s Freight Connection (India) Pvt Ltd	231357 270726	222247 222545 270727	
25	M/s GAC Shipping (India) Pvt Ltd. Mr. V C Rao	231429	231427 237244	9825225136
26	M/s Ganges Liners Pvt Ltd	233437	231608 233436	
27	M/s German Exp. Shipping Agency Pvt Ltd	236040	223269 236040	
28	M/s Goodrich Maritime Pvt Ltd	222875	222882 222883	
29	M/s G P Dave & Sons (Shipping)	234382	234288 234382	
30	M/s Greenways Shipping Agencies Pvt Ltd	232079	233608 234585	
31	M/s K. Shipping Services Pvt Ltd	233632	231933	

32	M/s Halar Ship & Freight Forwarders. Mr. Tejas Shrma	270224	270192 270568	9825212646
33	M/s Hind Shipping Agencies. Mr. Mahesh Vyas	234795	232710 235375	
34	M/s Hindustan Shipping Services. Mr. M D Sorathiya	239110	239110 222821	9824214994
35	M/s Interocean Shipping India Pvt Ltd. Mr. Suresh Tripathy	232579	235201 230589	9825225583
36	M/s Intra Trade Pvt Ltd. Mr. B P Vasavda	233295	233313 231255	9825226129
37	M/s Trades Shipping Pvt Ltd	231463	235572 233606	
38	M/s James Mackintosh Marine (A) Pvt Ltd. Mr. Satish Nair	270793	270792 270846	9825226077
39	M/s. J.M. Baxi & Co.	270646	270630 270635 270525	9825225107
40	M/s Kutch Shipping Agency Pvt Ltd.	233339	221148 250226/ 7/8	
41	M/s Liladhar Passop Forwarders Pvt Ltd. Mr. S. Chakraborty	252383	252297 252402 252288	9825020523
42	M/s Maersk (India) Ltd. Mr. Dinesh Joshi	231388	231387 236192 233963	9825270419
43	M/s Maheshwari Handling Agency Pvt Ltd. MR. Chaggan Maheshwary	230575 234633	223228 230393	9825227111

44	M/s Maltrans Shipping Agencies India Pv Ltd.	230606	220147 230336 235022	
45	M/s Mathurdas N. & Sons	252221	252224	

	Forwarders Ltd.		252350	
46	M/s Meridian Shipping Agency Pvt Ltd	230212	220305 230220	
47	M/s Mitsutor Shipping Agency Pvt Ltd	230411	220110	
48	M/s M M Shipping Services	235255	231385 238385	
49	M/s Modest Shipping Agency Pvt Ltd	-	230576	
50	M/s NLS Agency India Pvt Ltd. Mr. Sanjay Salve	232413	231318 220305	9825237311
51	M/s Orient Express Lines Ltd	230359	232186 232805	
52	M/s Orient Ship Agency Pvt Ltd. Mr. H G Digrani	233518	223430 223487	9824214801
53	M/s Oscar Shipping Agencies.	231812	226959/60 232123	
54	M/s Parekh Marine Agencies Pvt Ltd. Mr. Mitesh Dharamshi	231509	221409 235341	9825226557
55	M/s Patel Handling Agency (Capt. Kalra)- 9825062912	231143	224024 231004 221718	
56	M/s Patvolk (Mr. Shreekumar Nair)	231464	222624 235004	
57	M/s Pearl Shipping Agency. Capt. Kalra	231143	224024 221718	9825062912
58	M/s Penguin Shipping Agencies Pvt Ltd.	230606	230336 220147	
59	M/s Pestonjee Bhieajee (Kutch)	270650 270556	270221 270257 270367	9825226962
60	M/s Prudential Shipping Agencies Pvt Ltd. Mr. Siddharth Mishra	232911	230479 233982	9825226477
61	M/s P&R Nedlloyed India Pvt Ltd	232207	224906/7 232128	

62	M/s R T Bhojwani & Sons Mr. Gopichand Bhijwani	232423	223831 220839	9825225639
63	M/s Sahasu Shipping Services Pvt Ltd	236358	225224 237854	
64	M/s Sai Shipping Co. (P) Ltd Mr. S T Hingorani	231972	221369 231739	9825228681
65	M/s Samrat Shipping Co Pvt Ltd	232890	231983 222939	
66	M/s Samsara Shipping Pvt Ltd. Mr. Pranesh Rathod	233165	228602	9825225755
67	M/s Scorpio Shipping Agency	-	223085	
68	M/s SDS Shipping Pvt Ltd	231542	221326 221087	
69	M/s Seanay Shipping Pvt Ltd	270026	270788	
70	M/s Seabridge Maritime Agencies Pvt Ltd	231509	221409 221158	
71	M/s Seafreight Pvt Ltd	222850	233530 222393	
72	M/s Sealand Agencies India Pvt Ltd	230584	231179 230584	
73	M/s Scamar Shipping India	255563	-	
74	M/s Scatrade Shipping	234171	233810	
75	M/s Sentrans Maritime Pvt Ltd	236129	230002 220702	
76	M/s South India Corporation (Agencies) Ltd Mr. Antony	234416	221276 234646 231494	9825226256
77	M/s Spoonbill Maritime Agencies Pvt Ltd	234167	221049 222058 234454	
78	M/s Star International	231395	233948 232402	

79	M/s Taipan Shipping Pvt Ltd	236040	223269 227010	
80	M/s Taurus Shipping Services. Mr. Sukhveersingh	231266	221334 223074	9825227325
81	M/s Oceanic Shipping Agency Pvt Ltd	270631	270263 270503	
82	M/s TICC Container Line (Kandla) Pvt Ltd	237854	237854	
83	M/s Total Transport Systems Pvt Ltd	231463	222634	
84	M/s Transocean Shipping Agency Pvt Ltd	-	230832	
85	M/s Transworld Shipping Services India Pvt Ltd Mr. Sandeep Rajvanshi	231913	229824 221290	9825225733
86	M/s Trinity Shipping & All. Services Pvt Ltd Mr. Soly	222060	230911 223703	9825225245
87	M/s Unimarine Agencies (Gujarat). Mr. Jaikumar Ramdasani	224633	224631/ 32 223113	9825225216
88	M/s Unique Shipping Services Pvt Ltd	-	232729 232730	
89	M/s United Liner Agencies of India Pvt Ltd, Capt Rakesj Kumar	236040	227779 223269	9825225741
90	M/s Universal Freight Systems	252383	252288 252297	
91	M/s Universal Shipping Services Mr. Anil Pillai	235251	230663 231708	9824215168
92	M/s Velhi P. Sons (Agencies) Pvt Ltd	255328	255327 231545	
93	M/s Vibhuti Shipping Pvt Ltd Mr. Vinod	236219	236719 230035 232424	9825226536

ANNEXURE-XXV**LIST OF CLEARING & FORWARDING AGENTS AT KANDLA**

A V Joshi & Co Tel. 232605, 232227, 230345 Fax. 233924 Mr. Harshandu Mr. Vaidya (Mob.) 9825226013	C. Jivram Joshi & Sons (Gujarat) Tel. 220621 Fax. 231141 Mr. Sunil Chowdhari (Mob) 9825225400
ACT Shipping Ltd Tel. 270111/12/13, 270530, 220407 Fax. 270579, 232175	Cargo Movers Tel. 220453, 230883, 270563 Fax.231687
Jaswantrai & Co. Tel. 222630, 222717, 222145, 221943 Fax. 232308, 270385	Cargo Clearing Agency (Gujarat) Tel. 221721, 221674, 220655, 270542 Fax. 233034
Asia Shipping Services Tel. 230954. Fax. 231285	Chinubhai Kalidas & Brothers Tel. 232284 Fax. 231881
Airol Shipping Services Tel. 230080, 220180. Fax. 236131	CAP Shipping Pvt Ltd Tel. 221460, 232081 Fax. 233734
Aarpee Clearing Agency Tel. 222614. Fax. 255252	Centrans Shipping Agency (I) Pvt Ltd Tel. 256854 Fax. 234074
Ashirwad Clearing Agencies Tel. 232426, 233245 Fax. 234107	Cargo Shipping Tel. 270802, 270803 Fax. 270802
Ambalika Enterprises Tel. 255382. Fax. 255577	C. Joshi & Sons Tel. 221094
Ashmka Shipping (Tel. 222481)	Dilip A Goplani Tel. 224082, 255423 Fax. 224082
Ashis Enterprise (Tel. 234722)	D.B.C. & sons Gujarat Pvt Ltd Tel. 270263, 270348, 270503 Fax. 270631
Anchor Shipping Tel. 235781 Fax. 235781	Damjidhiroo & Sons Tel. 222329, 221328 Fax. 230139
B N Thakkar & Co., Tel. 222293, 222285, 270239	Dvji Premji Punara & Sons Tel. 222057, 221338 Fax. 230139

Fax. 230556	
B. Devchand & Sons Pvt Ltd Tel. 232220 Fax. 234014	Express Transport Pvt Ltd Tel. 220193, 220179, 270591, 222565, Fax. 220193
Benits Forwarders Pvt Ltd Tel. 221707, 222086 Fax. 223151	Friends & Friends Shipping Pvt Ltd Tel. 232227, 231588 Fax. 233924
Blue Sea Shipping Agencies Tel. 235317 Fax. 255221	Fast & Fair Company Tel. 255254, 238175 Fax. 255254
Bhanu Clearing Agency Tel. 256861 Fax. 256861	Flamingo Shipping & Forwarding Pvt Ltd Tel. 256755, 257756 Fax. 256755
Global Marine Agencies Tel. 222928, 223196, 223252 Fax.255418	Liladhar Passoo Forwarders Pvt Ltd Tel. 252288, 252297, 252402, 252617 Fax. 252383
Gayatri Shippers Tel. 230692, 223292 Fax. 230818	Lalbahi Trading Company Tel. 222139
Hiral Enterprise Te. 255644	Leap Forwarders Pvt Ltd Tel. 255530, 255509 Fax. 252383
Hindustan Shipping services Tel. 255644, 222821 Fax. 256618	Link International Tel. 255206/07 Fax. 255530
Hardip Shipping Logistics Pvt Ltd Tel. 232909, 222560 Fax. 232909	Lexicon Shipping Agencies Pvt Ltd Tel. 229951-53 Fax. 229949/50
Hansraj Pragji & Sons Tel. 221650, 255228 Fax. 255228	Logistics Enterprise Pvt Ltd Tel. 255157, 255458 Fax. 255520
H K Dave Pvt Ltd Tel. 221504, 2333632 Fax. 230411	Mathuradas Narndas & Sons Forwards Pvt Ltd, Tel. 252224, 252350, 252115 Fax.252221
Intralink Clearing & Forwarding Tel. 255188 Fax. 23148	Magal Singh & Company Tel. 224030, 255253, 234688
J M Baxi & Co. Tel. 270630/35, 270148/50, 270525 Fax. 270616	Meridian Shipping Services Tel. 233981, 255362 Fax. 230701

Jesia Mistry Agencies Pvt Ltd Tel. 222317, 223317	Megha Shipping Agency Tel. 222671, 255304 Fax. 230937
Jaisu Shipping Company Pvt Ltd Tel. 270428, 270128/538 Fax.270556	Mayur Forwarders Pvt Ltd Tel. 222671, 255304 Fax. 230937
Jivanlal Laloobhai Tel. 220308, 230530 Fax. 231640, 233803	Maritime service Pvt Ltd Tel. 222671, 255304 Fax. 255304
Krishna Clearing Agency Tel. 223813, 230501 Fax. 233135	Marathon Shipping Combine Tel. 222202, 230106 Fax. 255220
Kiran Roadlines Tel. 232297, 231984, 234108 Fax.231422	Shiv Shipping Service Tel. 255568 Fax. 22256
Kandla Clearing Agency Pvt Ltd Tel. 232337, 223211, 223210 Fax.230402	Narendra Forwarders Pvt Ltd Tel. 232504, 231795 Fax. 256678
Kamat & Co. Tel. 223471, 232730, 232729 Fax. 255243, 270779	Natwar Parikh Industries Ltd Tel. 232628 Fax. 232628
K S Chaya & Co Tel. 256604 Fax. 230693	New Dholera Shipping & Trading Company Limited. Tel. 222637 Fax. 255329
Kashyap Shipping Ltd Tel. 220816 Fax. 230030	National Shipping Tel. 232319 Fax. 232319
Kanak Shipping & Transport Tel. 231314, 230543, 222059 Fax.221702	Navjeevan Enterprise Tel. 252611, 252360 Fax. 252515
IEE & Muirhead Pvt Ltd Tel. 231535/36 Fax. 231018.	N. G. Bhanushali & Company Tel. 233648, 256791 Fax. 256879
OTA Kandla Pvt Limited Tel. 220145, 223241, 270450 Fax.223241	Shivji Kanji & Company Tel. 230127, 223728, 223729 Fax.220308
Pravin Bhatt & Sons Tel. 224032, 230079 Fax. 230079	South India Corp. (Agencies) Limited Tel. 234646, 231494, 221276, 255209 Fax.234416
Prime Forwarders	S J Thacker & Company

Tel. 234047, 232505 Fax. 231345	Tel.255678,221745 Fax.230659
Purshotam Ramjee & Compnay Tel. 220354, 222287 Fax. 231754	Star Shipping Services Tel.255424,255425,235326(F)255426
Patel Handling Agency Tel. 221718, 224024, 231004, 270017 Fax. 231143	Shivani Shipping, Tel. & Fax.256836
P S Bedi & Company Tel. 223201, 222841 Fax. 255494	Sea Trans Shipping Agency Tel. 255564 Fax. 233228, 233517
Purshotam Chtrabhuj Thacker Tel. 222720	Seaster Shipping Services Tel. 255349 Fax. 232719
Prashant Shipping Tel. 255306, 223927 Fax. 223927	Seaway Shipping Services Tel. 234272 Fax. 232719
Pramukh Forwarders Tel. 255400 Fax. 232602	Star Clearing Agencies Tel. 230273, 255529, 222983 Fax.232719
P M Agency Pvt Ltd Tel. 232553, 233973, 236414 Fax.255413	S S Shipping Agencies Tel. 236605, 238283 Fax. 236605
Raj Shipping Servie Tel. 233948, 232402 Fax. 231395	SPN Shipping Services Tel. 222453, 270733 Fax. 236605
Rajesh Shipping Service Tel. 255444, 255450/52, Fax.255151	Sierra Shipping Pvt Limited Tel. 255395 Fax. 232771
Rudra Shipping Service Tel. 220429, 255317 Fax.255317	Sonal Enterprises Tel. 252666, 252053
Rishi Shipping Tel. 220813, 229830, 2555661/2/3 Fax. 238943, 255522 Mr. B K Mansukhani (M)9825225170	S R Clearing Agency Tel. 232974, 255494 Fax. 255494
Rudraksh Shipping Servie Tel. 235937 Fax. 255582	St. John Freight System Limited Tel. 235414, 236444 Fax.235414
Sanghvi Freight Forwarders Pvt Ltd	Siddi Shipping Services

Tel. 234993, 234995, 222401 Fax.230508	Tel. 232356, 230268 Fax.256712
Sri R K Shipping Pvt Ltd Tel. 232028, 231940, 231936 Fax. 232740	Spalsh Shipping Pvt Limited Tel. 255562, Fax. 220710
Shakti Enterprises Tel. 223531, 221591 Fax. 233898	Thakarshi Madhavji & Sons Tel. 255457, 255458 Fax. 221770
Shree Ambica Commercial Company Tel. 220213, 221253	Trinity Shipping & Allied Services Pvt Ltd Tel. 223703, 230911 Fax. 232060
Shri Maruti Shipping Services. Tel. 270760, 256853, 233245 Fax.220308	Tokto Shipping Services Tel. 234040
Unity Shipping Tel. 255271	Vinson Tel. 220466 Fax. 231948
Umiya Shipping Agency Tel. 255640 Fax. 233625	Vaz Forwarders Ltd Tel. 235317 Fax. 255221
Unique Forwarders Tel. 230080, 255417 Fax. 236131	Varsh Shipping & Travels Tel. 222386, 255300 Fax. 255300
V. Arjoon Tel. 221049, 221335, 222058, 223307 Fax. 234167	Venus Clearing Agency Tel. 233960 Fax. 233362
Velji Dosabhai & Sons Tel. 270220, 270025, 221818, 231423 Fax. 270164, 232363	Vishal Shipping & Handling Tel. 223960 Fax. 233362
Vishvajyoti Enterprises Tel. 252381, 252318 Fax. 253091	Worldwide Cargo Care Pvt Ltd Tel. 221290, 221479, 220307, 230217 Fax. 231913
Velji P & Sons Tel. 255327, 231545, 231546, 270976 Fax. 255328	Zenith Trade Link Tel. 223193 Fax. 255522
Vailash Transport Co. Tel. 233579, 223580	

ANNEXURE-XXVI**SURVEYORS AT KANDLA**

Adnuralty Marine Services Tel. 235412, 256813 Fax. 256813	Marine Consultants & Surveyors Pvt Ltd Tel. 255293 Fax. 234416
Capt. S. Kochar & co. Tel. 222247, 221084 Fax. 231357	Murray Fenton (India) Surveyors Limited Tel. 235960, 236238 Fax. 233335
Dr. Amin Superintendents & Surveyors Pvt Limited, Tel. 221520, 235636 Fax. 226527	M. M. Cargo Gear & Marine Surveyors Tel. 231385 Fax. 235255
Det Norske Veritas (DNV) Tel. 232712	M.BS. Surveyors Tel. 256782
Geo-Chem Laboratories Pvt Limited Tel. 221841, 222179 Fax. 233743	Navark & Mareng Surveyors & Consultants Tel. 232123, 233270
G. P. Dave & Sons Tel. 234288 Fax. 234382	S.G.S. India Limited Tel. 221857, 238047, 231869 Fax.232883
Gupta & Associates Tel. 222542 Fax. 222542	S. K. S. Surveyors Assessors Tel. 220555
Inspectorate (India) Consulting Engineering Pvt Limited Tel. 221520, 235636 Fax. 255217	Seascan Surveyors Pvt Limited Tel. 221833, 233639, 221627 Fax. 233639
Indian Register of Shipping & Indian Register Quality System Tel. 238623, 233695 Fax. 233695	Sterling Surveyors Tel. 230216 Fax. 230216
Iteng Engineering Tel. 221520, 255429 Fax. 255247	Technomar Surveyors Pvt Limited Tel. 221966
J B Boda Surveyors Pvt Limited Tel. 231801, 231946 Fax. 231693	TCRC Surveyors Tel. 220862, 230050 Fax. 230050
Metcalfe Hodgkinsons Pvt Limited Tel. 220940, 221740, 233707, 221845 Fax. 231629	U. . Marine (India) surveyors

	Tel. 220070 Fax. 233228
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ANNEXURE – XXVII**LIST OF JOURNALISTS****PRINT MEDIA**

Sr. No.	Name of Newspaper	Correspondent & Address	Tel. No.	Fax
1	Kutchmitra Neewspaper	Mr. Adwait Anjaria Bureau Chief Gandhidham	222930	222930
2.	Kutch Uday,	Mr. Gangaram Bhanushali Editor, Plot.No.287, Sector- 1/A, Nr.Gayatri Mandir, Gandhidham	235851 231213 9825226987	231267 239887
3	Pandya News Agency	Mr. Jagdish Pandya, Main Bazaar, Gandhidham	220212 238112 238212	221412
4.	AAjkal	Mr. Nidhires Raval Bureau Chief Gandhidham	9825517030	229834
5.	Chanchal	Mr. Satish Upadhyay Bureau Chief, Shardha Appartment, Hinglaj Vadi,Bhuj	02832- 252942	02832- 252945
6.	Sandesh	Ms. Kulsumben Yusuf,	02832- 229200	255601

	Bhuj	Editor, Bhuj		228797
7.	Sandesh - Gandhidham	Mr. Jaydeep Purohit Bureau Chief Office No.: 108, Golden Point, Plot No. 31, Sector - 8, Gandhidham	222411	233211
	Sandesh Ahmedabad	Sandesh Sandesh Bhavan, Lad Society Road, Behind Vastrapur Gam, Ahmedabad-380015	079- 6762952, 6765480, 6765481, 6765482,	
8.	Gujarat Samachar Gandhidham	Mr. Awesh Malviya, B-ureau Chief, Gandhidham	9825425978	228222
	Gujarat Samachar Ahmedabad	Lok Prakashan Ltd. Gujarat Samachar Bhavan, Khanpur, AHMEDABAD	30410000	
9.	Jansatta - Loksatta	Ms Jayshreeben Mehta, Bureau Chief,Gim	9825225453 228797	---
10.	Indian Express Rajkot	216, Dhan Rajni Complex, Dr. Yagnik Road,Rakot	0281- 22481156	0281- 2481158
11.	The Times of India	Sterling Apartments,	9879324200	---

	Rajkot	1st floor, Jawahar Road, Rajkot – 360001	0281- 2226995 2227490	
	The Times of India Ahmedabad	SAKAR-1, 2nd Floor, Opp. Gandhigram Rly. Station, AHMEDABAD–380 009	079- 26554430, 26554431	079- 26587741 26554458
9.	DNA	Mr. D. V. Maheshwari Bureau Chief, Bhuj	02832- 251689	
10.	Mumbai Samachar, Chaupal	Mr. Tridev Vaidya Bureau Chief , Bhuj	02832- 231200	
11.	UNI	Mr. Mahesh Gadhvi Bureau Chief , Bhuj	9428294194	
12.	Exim Newsletter	Mr. P. G.,Nair, Bureau Chief Gandhidham	234194 9898573833	
13.	Daily Shipping Times	Mr. Haresh Manji Bureau Chief Gandhidham	222665 9925744679	
14.	Divya Bhaskar	Mr. Jayesh Shah Bureau Chief Gandhidham	9909944054	
15.	ETV	Mr. Rakesh Kotwal Bureau Chief Gandhidham	9909944080	
16.	Bhandarkar Shipping	Mr. Mehul Raval Bureau Chief Gandhidham	231455 / 9724307499	
17.	Hindustan Times, Ahmedabad	50, 5th Floor, Srikrishna Centre,	079- 6560049	079- 6560037

		Mithakali, Ahmedabad	6560061	
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PRINT MEDIA

18.	Mr. Kishore Ahir	Dy. Director	9427974892
19.	Shri Soni	Assistant Director	9879012714
20.	Mr. Shailesh Vyas	Chief News, All India Radio	9426802510

ANNEXURE-XXVIII**LIST OF FLEET OWNERS**

Sl. No.	Name of Company	Contact Person	Tel. Office	Tel. Resi.	Mobile
01	M/s A V Joshi & Company	Mr. Ramesh Singhvi Mr. Thacker MR. Harshandhu	231386 232605 233147	234176 221451 234325	98251 91325 98252 26105 98252 26013
02	M/s Rishi Shipping	Mr. B. K. Manshukhani Mr. Manoj Manshukhani	220843 229830 238943	234889 235587	98252 25170
03	M/s Maheshwari Handling Agency	Mr. C. P. Maheshwari Mr. Chandan Maheshwari	223228 230393	222339	98252 27111
04	M/s ABC	Mr. Latif Mr. Mithu Mr. Kasam	220483 221390 270190	234163 231477 251684	98252 26707
05	M/s Ganesh Transport	Mr. Hira Rabari Mr. Visa Rabari	223638 223915	260425	
06	M/s Kewar Carrier		220483 227553	234163	
07	M/s Krishna Transport Service	Mr. K. M. Thakker Mr. Pankaj Thacker	223814 224938	220998 234988	98250 19699 98252 25228
08	M/s Gautam Freight Ltd	Mr. Ramesh Singhvi	220163 230345	230328 234176	98251 91325

VTS GOK OFFICERS OF MASTER CONTROL CENTER (MCC) KANDLA

Sr. No.	Name	Designation	Mobile number
01	Shir B. Mishra	Deputy Director	7383576832
02	Shri Hansraj	Deputy Director	9428863924
03	Shri Mukesh Parmar	Asstt. Executive Engineer	9016106566
04	Shri M. Nimare	Asstt. Executive Engineer	9408553192

RADIO ACTIVE DISASTERS DOs AND DONTs

NUCLEAR EMERGENCIES - HOW TO RESPOND:

Nuclear facilities in India adopt internationally accepted guidelines for ensuring their safe operations and safety to the public and the environment. An independent regulatory authority oversees their safe operations. While the limits for radiation release/exposure have been set at a fraction of what can cause any significant harm, emergency procedures get implemented even when these very low limits are exceeded. As a result, it is extremely unlikely that the public near a nuclear facility will be exposed to any radiation beyond the permissible limits. However, to reassure the public, contingency plans are put in place even to handle such unlikely scenarios.

Keeping these facts in mind, if you still feel concerned on hearing any news or rumour about an incident at a nearby nuclear facility, follow these simple guidelines. These guidelines could also be followed in the event of any other nuclear emergency in your area, which does not even involve any nuclear facility.

- **DO THE FOLLOWING:**

1. Go indoors. Stay inside.

2. Switch on Radio/TV and look out for public announcements from your local authority.
3. Close doors/windows.
4. Cover all food, water and consume only such covered items.
5. If in the open, cover your face and body with a wet handkerchief, towel, dhoti or saree. Return home, change/remove clothes. Have a complete wash and use fresh clothing.
6. Extend full co-operation to local authorities and obey their instructions completely - be it for taking medication, evacuation, etc.

- **DO NOT DO THE FOLLOWING:**

1. Do not panic.
2. Do not believe in rumours passed on by word of mouth from one person to another.
3. Do not stay outside or go outside.
4. As far as possible, AVOID - water from open wells/ponds, exposed crops and vegetables, food, water or milk from outside.
5. Do not disobey any instruction of the District or Civil Defence Authorities who would be doing their best to ensure the safety of yourself, your family and your property.

AN OVERVIEW OF THE EMERGENCY RESPONSE PLANS IN THE DEPARTMENT OF ATOMIC ENERGY:

1. The Department of Atomic Energy (DAE) has been identified as the nodal agency in the country in respect of man made radiological emergencies in the public domain.
2. For this purpose, a Crisis Management Group (CMG) has been functioning since 1987 in DAE. In the event of any radiological or nuclear emergency in the public domain, the CMG is immediately activated and will co-ordinate between the local authority in the affected area and the National Crisis Management Committee (NCMC). The CMG comprises of senior officials drawn from various units of DAE like the Nuclear Power Corporation of India Ltd (NPCIL), Bhabha Atomic Research Centre (BARC), Heavy Water Board (HWB) and the Directorate of Purchase and Stores (DP&S). It also includes a senior official from the regulatory authority, the Atomic Energy Regulatory Board (AERB). Each member is backed by an alternate member, so that the CMG can be activated at a very short notice. Several Resource Agencies from BARC also backup the CMG. They can provide advice and assistance in the areas of radiation measurement and protection and medical assistance to radiation affected personnel.
3. As regards major nuclear facilities of DAE like the nuclear power stations, they have an Exclusion Zone of 1.6 km surrounding the power station in which no habitation is permitted. The entire area is fenced or walled off and defines the boundary of the site. Beyond this is the public domain and an area of 16 km radius around the plant site is called the Off Site Emergency Planning Zone (EPZ).
4. As a general practice, elaborate and comprehensive safety systems are in place for the operation of any nuclear facility. These are in turn overseen by the AERB who have powers to license and even shutdown any facility which violates their guidelines. However, as a matter of abundant caution, even some "beyond design basis" accidents are postulated for the nuclear power stations. It is only under such highly unlikely scenarios, that there is a possibility of a radiological emergency in the public domain. Therefore, in addition to the other types of emergency response plans in place within the facility to handle local emergencies, response plans have also been drawn up for handling such emergencies in the public domain, which are called as "Off Site Emergencies". These plans - drawn up separately in detail for each site - which are under the jurisdiction of the local District Administration, cover an area of about 16 km radius around the plant or the Off Site Emergency Planning Zone.
5. The first three types of Emergencies which are foreseen and for which detailed plant specific emergency response plans have been drawn up are Emergency Standby, Personnel Emergency and Plant Emergency. In all these, the consequences of the accident are expected to be limited to the plant facility only. The next type of Emergency which is foreseen is the Site Emergency, wherein the consequences of an accident are not expected to cross the site boundary, that is, the Exclusion Zone - which means that even under this condition, there is no radiological emergency in the public domain. The last type of Emergency which assumes the highly unlikely possibility of radiological releases in the public domain is the "Off Site Emergency" and detailed response plans have been drawn up even for this hypothetical scenario at each site. **The local District Administration, the Crisis Management**

Group, DAE and the National Crisis Management Committee (NCCM) get involved in this last type of Emergency.

6. It is mandatory for NPCIL to have comprehensive and well laid out plans to deal with all the above types of Emergencies. Barring the last one, all the others fall within the domain of responsibility of NPCIL, and the AERB as the Regulatory Authority approves these plans. It is also mandatory for the NPCIL to periodically test out these plans by way of Exercises and Drills and take corrective measures as stipulated by the Safety Committees and AERB. As the first stage of the trigger mechanism, the Crisis Management Group, DAE and its resource agencies are automatically alerted even when a Plant or Site Emergency/Exercise takes place.
7. In accordance with statutory requirements, it is the local District Administration which is responsible for drawing up and testing the Off Site Emergency Plans. NPCIL has co-ordinated with all concerned District Administration to enable them to draw up comprehensive Off Site Emergency Plans for each power station. It may be mentioned that the AERB does not permit any nuclear power station to be commissioned unless and until, such plans for all types of Emergencies are in place well before the commissioning date.
8. The Off Site Emergency Plans are also periodically tested and all power stations have ensured that this is being done atleast once in about two years. During these exercises, all the Members and Alternate Members of the Crisis Management Group, DAE, the Resource Agencies and Key Officials in Mumbai and Delhi are alerted. In these Exercises, the district administration is fully involved and the reports of the independent observers (from AERB, NPCIL and CMG) are used as a feedback to further improve the Emergency Response System.
9. Recognising the importance of communications in the handling of any Emergency, **Emergency Control Rooms (ECRs) are maintained at Mumbai at two different locations. These manned and operated on a round-the-clock and on all days of the year and maintain continuous contact with all the critical facilities of DAE.** The ECRs are equipped with Wireless, Telephone, Facsimile, VSAT and Electronic Mail facilities. These are tested practically on a daily basis to ensure their continuous availability. Further, each major site also carries out fortnightly or monthly communication exercises to test all the links in the entire communication chain.
10. In addition to about 165 communication exercises, about 110 emergency exercises are carried out every year. During the period from 1987 to 2000, 34 Off Site Emergency exercises have been conducted by the respective district administrations at various locations in the country. These involve direct participation by local district officials like police, health, transport, etc. At the end of each of these exercises, the District Collector/Magistrate chairs a "critique or feedback" session at which the deficiencies are recorded for taking corrective actions.
11. As regards transport of nuclear material, mandatory design specifications for the packaging, systems and procedures for handling and transport are in place to ensure that there is no release of radioactivity in the public domain in the unlikely event of such an accident. However, even if such an event were to occur, the procedures are such that the Emergency Control Room at the DAE Secretariat gets an alert which in turn would immediately activate the Crisis Management Group, DAE.
12. In the event of any other type of nuclear emergency in the public domain arising from the unauthorized presence or suspected presence of nuclear materials, a booklet giving the essential guidelines to be followed has been circulated to State Governments and Union Territories. Among other steps, the guidelines require that the nearest listed DAE facility as well as the DAE Emergency Control Room be also contacted immediately, who would then advise on the further necessary steps to be taken to attend to the emergency.

This short write up is primarily meant to educate the public and instill confidence about the Emergency Response System of DAE to handle radiation emergencies. As regards nuclear facilities of DAE, the regulatory and safety systems ensure that equipment are designed to operate safely and even in the unlikely event of any failure or accident, mechanisms like plant and site emergency response plans are in place to ensure that the public is not affected in any manner. In addition, detailed plans which involve the local public authorities, are also in place to respond if the consequences were to spill into the public domain. The System is also in a position to respond to any other radiation emergency in the public domain that may occur at locations which do not even have any DAE facility.

Annexure –G

**Greenbelt Development Work Order
No. EG/WK/4757/Part [Greenbelt
GUIDE], dated 31st May, 2022 [already
placed at Annexure G of CRZ
compliance report (Annexure A)]**

Annexure –H

**Environmental Monitoring Report by
M/s Detox Corporation for the year
2021-2022 [already placed at Annexure
E of CRZ compliance report (Annexure
A)]**

Annexure –I

Public Liability

Insurance

दि न्यू इन्डिया एश्योरन्स कं. लि.

(भारत सरकार का उपक्रम)

बृहत कॉर्पोरेट एवं ब्रोकर्स कार्यालय : 920000

न्यू इन्डिया सेंटर, 11वां मंजिल, 17/ए, कोपरगेज रोड,

डॉ. बी. आर. अंबेडकर चौक, मुंबई - 400 001,

फोन : 022-2204 4973 / 2204 4976 / 2204 4977 / 2204 4974



THE NEW INDIA ASSURANCE CO.LTD.

(A Govt. of India Undertaking)

Large Corporate & Broker's Office : 920000

New India Centre, 11th Floor, 17/A, Cooprage Road,

Dr. B. R. Ambedkar Chowk, Mumbai - 400 001,

Phone : 022-2204 4973 / 2204 4976 / 2204 4977 / 2204 4974

Date: 22nd July, 2021

To,
Deendayal Port Trust,
Administrative Office building,
Near Madhuban Hotel, Gandhidham,
Kutch, Gujarat. India

Insurance Intermediary: Marsh India Insurance Brokers Pvt. Ltd.

Dear Sir,

Subject: Held cover letter for Hull and Machinery Insurance of vessels owned by Deendayal Port Trust

We thankfully acknowledge the receipt of premium of **INR 3,924,592/-** (premium inclusive of brokerage and stamp duty **INR 3,325,925/-** plus 18% GST of **INR 5,98,667/-**), via online method, received by us on 22nd July, 2021 towards Hull and Machinery Insurance of vessels as per the table below:

Sr. No.	Asset Particulars	Sum Insured
A	Tugs	
1	MT Jeyshtha	520,869,308.00
2	MT Kritika	505,538,579.00
3	MT Rohini	82,304,898.00
4	MT Magh	82,304,898.00
5	MT Alok	11,309,118.00
6	MT Atri	11,309,118.00
7	ML Karishma	10,360,211.00
8	ML Swati	97,027,155.00
9	ML Nirikshak	27,995,231.00
B	Floating Dry dock/ SFDD	743,174,105.00
	GRAND TOTAL	2,092,192,621

We hereby hold your vessels covered for Hull and Machinery Insurance for the sum insured as per the above table to this held cover letter for the period 24th July 2021 to 23rd July 2022.

Policy documents are under preparation and will be issued shortly.

Thanking you,

The New India Assurance Insurance Company Ltd.



Authorised Signatory

पंजीकृत एवं प्रधान कार्यालय : न्यू इन्डिया एश्योरन्स बिल्डिंग, 87, महात्मा गांधी रोड, फोर्ट, मुंबई - 400 001.
Regd. & Head Office : New India Assurance Bldg., 87, Mahatma Gandhi Road, Fort, Mumbai - 400 001.

Website : www.newindia.co.in
CIN : U99999MH1919GCI000526

Annexure –J

**Work Order for appointing M/s
Precitech Laboratories, Vapi for
providing Environmental Experts dated
5/2/2021 [already placed at Annexure I
of CRZ compliance report (Annexure A)]**

Annexure –K

**Office Order for appointing
Environment Manager [already placed
at Annexure J of CRZ compliance report
(Annexure A)]**

Annexure -2

Annexure 2

**Monitoring the implemental Safe guards
Ministry of Environment, Forests & Climate Change
Regional office, Gandhinagar
Monitoring Report (For the period up to May, 2022)**

DATA SHEET

1. Project type: River valley/ Mining/Industry/ thermal/nuclear/Other (specify)	Infrastructure and Miscellaneous Projects + CRZ
2. Name of the project	Construction of 13 th to 16 th Cargo Berth at Kandla Port by M/s Deendayal Port Authority (Erstwhile: Deendayal Port Trust) (Under Ministry of Ports, Shipping & Waterways, GoI).
3. Clearance Letter (s). OM no and date	Environment Clearance issued by Govt. of India, Ministry of Environment & Forest – New Delhi vide letter No. 11-70/2006-IA-III Dated September 08. Further, Ministry of Environment & Forest – New Delhi, Govt. of India, extended the Environmental Clearances validity for five years i.e. up to 30/09/2018, vide letter No. F.NO.11 – 70/ 2006 – IA.III dated 7 th February, 2014.
4. Location a) District (s) b) State (s) c) Location/latitude/longitude	District: Kutch State : Gujarat Location: Deendayal Port Authority, 22°58'33.08"N and 70°13'16.28"E
5. Address for Correspondence a) address of Concerned Project Chief Engineer(with pin code & telephone/telex/fax numbers) b) Address of Executive project Engineer/manager/(with pin code fax numbers)	Chief Engineer, Deendayal Port Authority, A.O. Building Post Box No.-50, Gandhidham- Kutch. Gujarat Pin – 370201 Tel: 02836-233192, Fax-02836-220050. Superintending Engineer (C-I), Office of the Superintending Engineer (C-I), Nirman Building, Room No. 110, New Kandla (Kutch) Pin 370 210. Gujarat
6. Salient features of the project	All the 4 berths i.e. 13 th to 16 th Cargo berths are under operation. 13 th Cargo Berth: Under operation 15 th Cargo Berth: Under Operation 14 th Cargo Berth: Under Operation 16 th Cargo Berth: Under Operation 1. The dimension of each berth 300m x 55m consisting of quay and transit area resting on

<p>d) Comments on the viability & sustainability of compensatory afforestation programmed in the light of actual field experience so far</p>	<p>11) Year 2021-22-100 Hectares Total - 1600 hectares As per the directions of the GCZMA and MoEF&CC, GoI, till date, DPA has undertaken Mangrove Plantation in an area of 1500 Hectares since the year 2005.</p> <p>Further, DPA is carrying out additional mangrove plantation of 100 ha. With consultation of Gujarat Ecology Commission vide Work Order No. DD/WK/3050/Pt-I/GIM/PC-44 dated 02/06/2022.</p> <p>Final Report submitted by GUIDE, Bhuj already submitted along with compliance report submitted during November, 2019.</p> <p>Subsequently, DPA awarded the work for monitoring of mangrove plantation to M/s GUIDE, Bhuj vide work order dated 3/5/2021 (Period 2021-2022). M/s GUIDE, Bhuj submitted its final report for the said project in May, 2022.</p> <p>Moreover, Further, DPA has appointed Gujarat Institute of Desert Ecology (GUIDE) for "Green belt development in Deendayal Port Authority and its Surrounding Areas, Charcoal site' (Phase-I)" vide Work Order No. EG/WK/4757/Part [Greenbelt GUIDE], dated 31st May, 2022.</p> <p>The aforementioned statement showing details of mangrove plantation with cost incurred, report and work order is already attached with the compliance report of the conditions stipulated in EC & CRZ clearance.</p>
<p>11. The status of clear felling in non-forest areas (such as submergence area of reservoir, approach roads), if any with quantitative information.</p>	<p>Nil</p>
<p>12. Status of construction a) Date of commencement (Actual and/or planned) b) Date of completion (Actual and/or planned)</p>	<p>All the 4 berths are under operation.</p> <p>13th Cargo Berth: Under operation since 18/2/2013. 15th Cargo Berth: Under Operation since 16/11/2013. 14th Cargo Berth: Under Operation since 8/4/2019. 16th Cargo Berth: Under Operation since 10/3/2019.</p>
<p>13. Reasons for the delay if the Project is yet to start</p>	<p>All the 4 berths are under operation. 13th Cargo Berth: Under operation. 15th Cargo Berth: Under Operation. 14th Cargo Berth: Under Operation. 16th Cargo Berth: Under Operation.</p>

Date of site visited	
a) The dates on which the project was monitored by the regional office on pervious occasion. if any	29/12/2016
b) The date site visit for this monitoring report	-----