

DEENDAYAL PORT AUTHORITY
(Erstwhile: DEENDAYAL PORT TRUST)

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EG/WK/4712/Part II /227

Date: 01/02/2023

To,
The Deputy Director General of Forests (C),
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 : eccomplaine-guj@gov.in

Sub: Setting up of Single Point Mooring (SPM) and Allied Facilities off-Veera in Gulf of Kutch for handling Crude oil on BOT basis – **Six Monthly compliance Report of conditions stipulated in Environmental & CRZ Clearance & Monitoring Report in Data Sheet reg.**

- Ref.:**
- 1) MoEF, GOI vide letter No. F.No. 11-27/2010-IA-III dated 11/12/2013
 - 2) DPT letter No. EG/WK/4712/Part I/1164 dated 04/01/2014
 - 3) DPT letter No. EG/WK/4712/Part I/128 dated 15/05/2014
 - 4) DPT letter No. EG/WK/4712/Part I/226 dated 17/05/2014
 - 5) DPT letter No. EG/WK/4712/Part I/165 dated 15/10/2015
 - 6) DPT letter No. EG/WK/4712/Part I/130 dated 09/05/2016
 - 7) DPT letter No. EG/WK/4712(EC)/Part I/128 dated 08/12/2016
 - 8) DPT letter No. EG/WK/4712(EC)/Part I/233 dated 28/06/2017
 - 9) DPT letter No. EG/WK/4712(EC)/Part II/601 dated 12/12/2017
 - 10) DPT letter No. EG/WK/4712(EC)/Part II/286 dated 08/06/2018
 - 11) DPT letter No. EG/WK/4712(EC)/Part II/10 dated 15/02/2020
 - 12) DPT letter No. EG/WK/4712/EC/Part II/40 dated 12/11/2020
 - 13) DPT letter No. EG/WK/4712/EC/Part II/151 dated 12/07/2021
 - 14) DPT letter No. EG/WK/4712/EC/Part II/134 dated 01/02/2022
 - 15) DPT letter No. EG/WK/4712/EC/Part II/125 dated 30/06/2022

Sir,

Kindly refer above cited references for the said subject.

In this connection, it is to state that MoEF&CC, GOI vide the above-referred letter dated 11/12/2013, has accorded Environmental & CRZ Clearances for the subject project.

In this regard, it is to mention here that, as the above project is to be implemented based on Public Private Partnership Guidelines of the Government (Built, Operate & Transfer Basis), Deendayal Port will grant a concession to the successful bidder (BOT/Captive Operator) for the subject project to build, operate & maintain for 30 years. The project is yet to be awarded. DPA is exploring the possibility of identifying the captive user for the project. No activity has been initiated to date on the project site.

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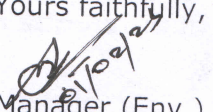
As directed under condition 7 (General Conditions) sub-para iii, "A six monthly monitoring report shall need to submit by the project proponent to the Regional Office of the Ministry at Bhopal regarding the implementation of the stipulated condition"; please find enclosed herewith point-wise compliance of the conditions stipulated in Environmental & CRZ clearance granted by MoEF&CC, GOI vide above-referred letter dated 11/12/2013 (**Annexure 1**) & monitoring report in datasheet (**Annexure 2**) for the period up to November, 2022 for kind information and record.

Further, as per the MoEF&CC, GOI Notification S.O 5845 (E) dated 26/11/2018 stated that "In paragraph 10, in sub-paragraph (II), for the words "hard and soft copies" the soft work copy shall be substituted". Accordingly, we are submitting herewith a soft copy of the same in CD and also communicated via email ID apccf@gmail.com.

In addition to the above, DPA also submitted an application for a validity clause of EC & CRZ clearance in the online portal of the MoEF&CC, GOI, dated 15/10/2020 (within the validity period) for extending 11/12/2020 to 10/12/2023.

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

Yours faithfully,


Manager (Env.)

Deendayal Port Authority

Encl: as stated

Copy to:

Shri Amardeep Raju,
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Regional Officer, (Kutch East)
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Annexure -1

Annexure 1

Compliance Report for the period upto November, 2022

Subject: Point-wise Compliance of the conditions stipulated in EC&CRZ Clearance accorded MoEF&CC, GoI for the project "Single Point Mooring (SPM) and allied facilities off Veera in Gulf of Kutch for handling crude oil on BOT basis in the state of Gujarat by M/s. Kandla Port trust".

Ref No: - MoEF&CC, GoI vide F. No. 11-27/2010-IA.III dated 11/12/2013 accorded EC&CRZ Clearance to the subject project. Further, MoEF&CC, GoI vide letter dated 29/12/2020 granted extension of validity of the accorded EC&CRZ Clearance for a further period of 3 years up to 10/12/2023.

Status of work: No activity started yet

Sr. No.	Stipulated Conditions	Compliance
i	Consent for Establishment" shall be Obtained from state pollution control Board under Air and Water Act and a copy shall be submitted to the Ministry before start of any construction work at the site.	No activity has started yet. However, it is relevant to mention that, DPA had already obtained CTE/NOC from GPCB vide letter No. PC/ CCA – KUTCH – 971/ GPCB ID: 36299/ 106252 dated 06/03/2012 and GPCB further extended the CTE validity vide Order dated 02/03/2017.
ii	The pipeline from SPM to shore will be laid down 5 meters below the sea bed Level	No activity started yet
iii	After unloading the crude oil, the sea water shall be pumped in to the pipeline to flush the crude oil from the floating hoses. In order to avoid the oil spill, the floating hoses will be disconnected and the butterfly valves shall be sealed	No activity started yet
iv	Necessary Clearance for the COT shall be obtained from the competent Authority as applicable before the commencement of construction of COT and other related facilities.	Point noted
v	The port shall ensure that the ship under operation follows the MARPOL convention regarding discharge or spillage of any toxic, hazardous or polluting material like ballast water, oily water or sludge, sewage, garbage etc. The emission of NOx and SOx shall remain within the permissible limits.	No activity started yet
vi	The smooth and safe operation of the system shall be ensured by incorporating a computerized SCADA (Supervisory Control and Data Automation) system.	No activity started yet

	Any leakage in the pipeline shall be immediately detected by the computer system and product pumping shall be immediately cut off.	
vii	To prevent discharge of sewage and other liquid wastes including ballast into marine environment, adequate system for collection, treatment and disposal of liquid waste must be provided.	No activity started yet
viii	It must be ensured that the untreated effluents and solid wastes are not discharged into the sea or on the beach, and no effluent or solid waste shall be discharged on the beach	No activity started yet
ix	The quality of treated effluents, Solid Wastes, emissions and noise levels and the like, from the project area must conform to the standards laid down by the competent authorities including the central or State Pollution Control Board and under the Environment (Protection) Act, 1986.	No activity started yet
x	CSR activities shall cover the villages Within 10 KM radius.	CSR activities are being attended by DPA. Copy of the activities undertaken by DPA as a part of CSR is enclosed as Annexure A.
xi	Oil spills if any shall be properly collected and disposed as per the rules. Proper oil contingency management Plan shall be put in place.	No activity started yet. However, it is relevant to mention here that, DPA is already having Oil Spill contingency plan in place. Copy of the same is attached herewith as Annexure B.
xii	All the recommendation of SCZMA Shall is complied with	No activity started yet The compliance report of the conditions stipulated in CRZ clearance issued by GCZMA vide letter dated 24/05/2012 is attached as Annexure C.
xiii	The responses / commitments made during public hearing shall be complied with letter and spirit.	The details of CSR Activities carried out by Deendayal Port Authority is enclosed as Annexure A.
xiv	All the recommendation of the EMP, DMP shall be complied with letter and spirit. All the mitigation measures submitted in the EIA report shall be prepared in a matrix format and the compliance for each mitigation plan shall be submitted to MoEF along with half yearly compliance report to MoEF – RO.	No activities have been started yet in the project site. Mitigation Measures submitted in EIA report has been prepared in a matrix format and submitted to MoEF, Bhopal along with compliances report submitted dated on 03/01/2014. However, same will be complied with by successful bidder (BOT / Captive operator) as this project is to be implemented as per PPP guidelines of GOI.
xv	Construction activity shall be carried out	No activity started yet

	strictly as per the provisions of CRZ Notification, 2011. No construction work other than those permitted in coastal Regulation zone notification shall be carried out in coastal regulation zone area.	
xvi	The Project shall be executed in such a manner that there shall not be any displacement of people, houses or fishing activity as a result of the project.	No activity started yet
xvii	The Project proponent shall set up separate environmental management cell for effective implementation of the stipulated environmental safeguard under the supervision of a senior Executive.	<p>However, 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 D).</p> <p>Further DPA has appointed Manager Environment on contractual basis for the period of 3+2 years. A copy of office order is attached herewith as Annexure E.</p>
xviii	The funds earmarked for environment management plan shall be included in the budget and this shall not be diverted for any other purposes	The allocation made under the "Environmental Services & Clearance of other related Expenditure" scheme during BE 2021- 22 is Rs. 266 Lakhs. and BE 2022-2023 is Rs. 345 Lakhs.
B. GENERAL CONDITIONS:		
xix	Appropriate measures must be taken while undertaking digging activities to avoid any likely degradation of water quality	No activity started yet
xx	Full Support shall be extended to the officers of this Ministry / Regional office at Bhopal by the project proponent during inspection of the project for monitoring purposes by furnishing full details and action plan including action taken reports in respect of mitigation measures and other environmental protection activities	Point noted
xxi	A six – Monthly monitoring report shall need to be submitted by the project proponents to the Regional office of this Ministry at Bhopal regarding the implementation of the stipulated conditions.	<p>Noted and Agreed</p> <p>It is hereby assured that this stipulated EC condition will be complied once in construction Phase.</p>

xxii	Ministry of Environment & Forests or any other component authority may stipulate any additional conditions or modify the existing ones, if necessary, in the interest of environment and the same shall be complied with	Point noted
xxiii	The ministry reserves the right to revoke this clearance if any of the conditions stipulated are not complied with the satisfaction of the ministry.	Point noted
xxiv	In the event of Change in project profile or change in the implementation agency, a fresh reference shall be made to the ministry of Environment and Forests.	Point noted
xxv	The project proponents shall inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities and the date of start if land development work.	Point noted No construction activity started yet
xxvi	A copy of the clearance letter shall be marked to concerned Panchayat / local NGO, if any, from whom any suggestion / representation has been made received while processing the proposal	DPA vide letter no. EG/WK/4712 (EC)/part I dated 30/12/2013 has already been sent to the NGO, Parayvaran Mitra as they have submitted their representation during Public Hearing.
xxvii	State Pollution Control Board shall display a copy of the clearance letter at the regional office, district industries Centre and collector's office / Tehsildar's Office for 30 Days.	---
xxviii	These stipulations would be enforced among others under the provisions of water (Prevention and control of Pollution) Act 1974, the Air (Prevention and control of pollution) Act 1981, the environment (Protection) Act, 1986, the Public Liability (Insurance) Act, 1991 and EIA Notification 1994, including the amendments and rules made thereafter.	Point noted
xxix	All other statutory clearance such as the approvals for storage of diesel from Chief Controller of Explosives, Fire Department, Civil Aviation Department, Forest Conservation Act, 1980 and Wildlife (Protection) Act, 1972 etc. shall be obtained, as applicable by project proponents from the respective competent authorities.	No construction activity started yet

xxx	The project proponent shall advertise in at least two local newspapers widely circulated in the region, one of which shall be in the vernacular language informing that the project has been accorded Environmental and CRZ Clearance and copies of clearance letters are available with the state Pollution Control Board and may also be seen on the website of the Ministry of Environment and Forests at http://www.envfor.nic.in the advertisement should be made within 10 days from the date of receipt of the clearance letter and a copy of the same should be forwarded to the Regional office of this Ministry at Bhopal.	Deendayal Port Authority had already published the advertisement in two local newspapers widely circulated in the region, one of which shall be in the vernacular language informing that the project has been accorded Environmental and CRZ Clearance and copies of clearance letters are available with the state Pollution Control Board and may also be seen on the website of the Ministry of Environment and Forests at http://www.envfor.nic.in Deendayal Port Authority (erstwhile known as Deendayal Port Trust) had published above said advertisement on 27/12/2013 Kandla Port vide letter no. EG/WK/4712 (EC)/Part I, Dated : 30/12/2013 along with a copy of newspaper cuttings in which advertisement regarding Environmental / CRZ clearance published has already been informed to the Regional office of MoEF, GoI. Please refer Annexure E .
xxxix	This clearance is subject to final order of the Hon'ble supreme court of India in the matter of Goa Foundation Vs. Union of India in Writ Petition (Civil) No. 460 of 2004 as may be applicable to this project.	Point noted
xxxix	Any appeal against this clearance shall be lie with the National Green Tribunal, if preferred, within a period of 30 days as prescribed under Section 16 of the National Green Tribunal Act, 2010	Point noted
xxxix	Status of compliance to the various stipulated environmental conditions and environmental safeguards will be uploaded by the project proponent in its website.	DPA has been regularly uploading the status of compliance to the various stipulated environmental conditions and environmental safeguards on its websites www.deendayalport.gov.in
xxxix	A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, Zilla Parisad / Municipal Corporation, Urban Local Body and the Local NGO, if any, from whom suggestions / representations, if any, were received while processing the proposal. The clearance letter shall also be put on the website of the company by the proponent	DPA vide letter no. EG/WK/4712 (EC)/Part I dated 30/12/2013 has already sent the copy of clearance letter to NGO, Paryavaran mitra as They have submitted their representation during public hearing. DPA also uploaded the copy of clearance letter on DPA website www.deendayalport.gov.in
xxxix	The proponent shall upload the status of compliance of the stipulated clearance conditions, including results of monitored data on their website and	DPA has been regularly uploading the compliance of the stipulated clearance conditions submitted to the Regional office of the respective Statutory bodies on its

	shall update the same periodically. It shall simultaneously be sent to the Regional office of MoEF, the respective Zonal office of CPCB and SPCB	website www.deendayalport.gov.in
xxxvi	The environmental statement for each financial year ending 31st March in Form – V as is mandated to be submitted by the project proponent to the concerned State pollution control board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of clearance conditions and shall also be sent to the respective regional office of MoEF by e – Mail.	No activity started yet

Annexure -A

CSR Activities at Decendayal Part Time

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	64 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 Vasانبhai 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 Sharpanchs 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 Sharpachsetc 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)	<p><u>As per CSR Guideline-</u></p> <ul style="list-style-type: none"> ➤ Env Sustainability ➤ Eradicating extreme hunger and poverty <p>(to be Consider for health Center ,Drainage line, Water sump etc activities) (Appx Cost - 51.00 Lakhs)</p> <p>(Land authorization of Gram Panchayat)</p>
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)	<p><u>As per CSR Guideline-</u></p> <ul style="list-style-type: none"> ➤ Promoting gender equality and empowering women ➤ Eradicating extreme hunger and poverty (Considered shed and hall) <p>Fab Shed - 30'x100' x 1250=37.00 Lakh & RCC Hall - 20'x100'x1500=30.00 Lakh</p> <p>(Appx Cost Rs 67.00 Lakhs) Land authority belongs to Trust given by GDA and NOC given by SRC. Doc submitted.</p>
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)	<p>AppxRs 5.00 Lakhs</p> <p><u>As per CSR Guideline-</u></p> <ul style="list-style-type: none"> ➤ 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 VIDl Village, Ta –Anjar. (Sr no- 12)	Village- VIDl, 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 Sharpachsetc 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 NariJanshktiVikas Foundation at Gandhidham near Shakti Nagar. (Sr no-33)	NariJanshktiVikas 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)

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
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Annexure -B

KANDLA PORT TRUST



Conducting Various Studies for Oil Spill Contingency Plan for Kandla

Final Report

August, 2016



**Femith's P.B No: 4407,
Puthiya Road, NH Bypass,
Vennala, Kochi**

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ABBREVIATIONS

CCA	Central Coordinating Authority
CIC	Chief Incident Controller
CMG	Crisis Management Groups
COMDIS	District Commander
CoC	Chain of Custody
DCP	Disaster contingency plan
DDMA	District Disaster Management Authority
DGICG	Director General Indian Coast Guard
DOSC	Deputy On-scene Commander
ECC	Emergency Control Centre
EEZ	Exclusive Economic Zone
ELO	Environmental Liaison Officer
ERU	Emergency response units
ESA	Environmental Sensitive Areas
ESC	Environmental and Scientific Coordinator
ESI	Environmental Sensitivity Index
ETV	Emergency Towing Vessel
FPSO	Floating production, storage and offloading
GoK	Gulf of Kachchh
GoKh	Gulf of Khambhat
GPS	Global Positioning System
GSDMA	Gujarat State Disaster Management Authority
GSPCB	Gujarat State Pollution Control Board
HOD	Head of the Department
IAP	Incident Action Plans
IBA	Important Bird and Biodiversity Areas
ICG	Indian Coast Guard
ICMBA	Important Coastal and Marine Biodiversity Areas
IMO	International Maritime Organization
IMT	Incident Management Team
INCOIS	Indian National Centre for Ocean Information Services
IOCL	Indian Oil Corporation Limited
IPIECA	The International Petroleum Industry Environmental Conservation Association
ITOPF	The International Tanker Owners Pollution Federation Limited
KPT	Kandla Port Trust
LAG	Local Action Group
LOSCP	Local Oil Spill Contingency Plan
LRK	Little Rann of Kachchh

LST	Local Action Group Support Team
MMD	Mercantile Marine Department
MNPS	Marine National Park and Sanctuary
MoD	Ministry of Defence
MoPNG	Ministry of Petroleum & Natural Gas
MoS	Ministry of Shipping
MRCC	Maritime Response Control Centre
MRC	Marine Response Centre
MRU	Marine Response Unit
NCCM	National Crisis Management Committee
NEBA	Net Environmental Benefit Analysis
NEC	National Executive Committee
NOAA	National Oceanic and Atmospheric Administration
NOS-DCP	National Oil Spill Disaster Contingency Plan
NOS	National oil spill
OCU	Offshore Control Unit
OGP	International Association of Oil & Gas Producers
OIM	Offshore Installation Manager
OOSA	Online Oil Spill Advisory
OOT	Offshore Oil Terminal
OPRC	Oil Pollution Preparedness, Response and Cooperation
OSC	On-Scene Commander
OSCP	Oil Spill Contingency Plan
OSRL	Oil Spill Response Limited
OSR	Oil Spill Response
OSRRI	Oil Spill Response Resource Inventory
PAH	Poly Aromatic Hydrocarbons
P&I	Protection and Indemnity
PPE	Personal Protection Equipment
POR	Place Of Refuge
ROS-DCP	Regional Oil Spill Contingency Plan
SCAT	Shoreline Cleanup Assessment Technique
SIC	Site Incident Controller
SEZ	Special Economic Zone
SLCP	State Level Oil Spill Disaster Contingency Plan
SMCU	Salvage Monitoring and Control Unit
SOPEP	Ship Oil Pollution Emergency Plan
SOP	Standard Operating Practices
SPM	Single Point Mooring
SRC	Shoreline Response Centre
SRU	Shoreline Response Unit
STS	Ship to Ship

TEZ	Temporary Exclusion Zone
UNEP	United Nation Environment Programme
VHF	Very High Frequency
VLCC	Very Large Crude Oil Vessels
VOC	Volatile Organic Carbon
WLS	Wild Life Sanctuary

EXECUTIVE SUMMARY

Major Port Kandla is the northwest gateway of India, located strategically on western coast of the India, inside natural harbor at the head of Gulf of Kachchh. The all-weather port lying close to the important international trade routes is facilitating easy trade with various countries all over the world. Vadinar Terminal located within Kandla Port Trust limit is an integral part of it.

Being a major port with oil handling facilities belonging to a unique ecological area in the Gulf of Kachchh region, it has to give highest priority on the environmental protection aspects including combating of adverse effects from it.

At present, Indian Coast Guard is the Central Coordinating Agency for any oil spill events in sea including the territorial water limit of the country. In this context, they have published National Oil Spill Disaster Contingency Plan (NOS-DCP). The Ministry of Shipping, the Department of Ocean Development, the Ministry of Petroleum and Natural Gas, Oil companies, Port authorities and Maritime States are the important stakeholders in the plan. In line with this, the Ports and the Oil Handling agencies have to develop local oil spill disaster contingency plan and Tier-1 pollution response capacity to address oil spills up to 700 tonnes in their respective area of jurisdictions.

Accordingly, the Kandla Port Trust (KPT) at Gandhidham, Gujarat proposes to develop “Oil Spill Disaster Contingency Plan for Kandla Port” and studies to supplement the same have been entrusted to M/s KITCO Ltd. Kochi, Kerala.

This Final Report presents the studies made in this regard in the sections such as Review of Indian Coast Guard Documents, Resources Assessment & Sensitivity Mapping Development of Response Strategy, Incident Management Mechanism, Operations Planning, Mutual Aid and Waste Disposal Plan. Summary of the study are as follows:

- *Port handles ships with a capacity above 50,000 Dead Weight Tonnage (DWT) while Single Point Moorings (SPMs) handle Very Large Crude Carriers (VLCC) having capacities ranging from 87,000 to 3,25,000 DWT. Important types of oil handled includes Crude Oil, Petroleum Oil and Lubricants (POL) products, Edible Oil and Bunker Fuel Oil. Hence, KPT*

limit is unreasonably under the oil spill threat. Vadinar being the hub, extreme caution is required for this area.

- Majority areas towards the coast within port limit are essentially the part of the protected areas such as Marine National Park & Sanctuary (MNPS) and Important Bird and Biodiversity Areas (IBAs). Hence, the risk of oil spill here is determined to be very high.
- Corals and Mangroves should be given the highest priority, followed by mudflats, fishing grounds and intake locations while responding to oil spill. Rocky Coast is having the lowest priority and can be used as sacrificial areas.
- From the present Oil Spill Response Resource inventory available, it can be seen that, sufficient shoreline protection and clean-up resources are not available at KPT. Hence additional resources have been proposed.
- Dy. Conservator, KPT have been proposed as the Chief Incident Controller who will be coordinating the response activities through Emergency Control Centre will be established at KPT office with 24 hr control room at the Port office under the supervision Crisis Management Group headed by Chairman.
- Circumstances of the possible spill and the surrounding environment within KPT limit calls for an early declaration of Tier-2 even in case of a smaller spill. Hence actual level of response should be fixed based on realistic observation and projections from spill scene. MoUs should be executed and maintained in such a way that optimization of resources and minimization of response time can be achieved.
- Temporary storage of oil waste shall be done at suitable location close to the staging area after ensuring that there is no threat for ground water utilized for domestic and industrial purpose. Later the same can be transported to KPT and can be handed over to approved oil waste dealer or recyclers.

1

INTRODUCTION

Oil spill is one of the major threats for marine environment for the consequences from an oil spill is profound and can adversely affect harbors, beach, wild life, fisheries, human health, tourism and industrial plants that located far away from the original spill location. When these resources are affected, there may be a serious impact to the local economy of the affected coastal area.

Continuously increasing maritime activities, like oil tanker transportation and exploration-cum-exploitation of oil from the sea bed have focused attention on the need for an adequate system to monitor, legislate and ensure quick response to an eventuality of oil spill disaster that may take place due to an accident, releases of crude oil from tankers, accidental release of heavier fuels used by large ships such as bunker fuel or the spill of any oily refuse or waste oil.

The Oil Pollution Preparedness, Response and Cooperation (OPRC) Convention, 1990 established by the International Maritime Organisation (IMO) provides all states to establish measures for dealing with pollution incidents either nationally or in cooperation with other countries in which India is a signed party. In India, Indian Coast Guard (ICG) is the Central Coordinating Agency (CCA). As per National Oil Spill Disaster Contingency Plan (NOS-DCP) promulgated by ICG the emergency response operations within the port limit is the responsibility of the port authority.

Kandla port is one among the thirteen major ports of India located in Gulf of Kachchh (GoK) which hosts one of the world's splendid ecosystems and its rich & highly bio-diversified intertidal flora and fauna. During the financial year 2014-15 the port handled 92.50 MMT cargo. Kandla & Vadinar terminals were visited by 1724 & 530 ships respectively during the same period including Very Large Crude Carriers (VLCC). Also the coast is active and occupied with human settlements and other socio-economic resources, co-existing with the nature, its treasures and threats. Being situated in coastline which has ecological, biodiversity, historical and economic significance at the same time oil spill can cause long term impacts, including threatening the life of these distinguished resources. Also high tidal ranges and strong tidal streams of the area escalate the impacts of oil spill. Hence oil spill events in the region of Kandla Port will turn out to be sensitive. In this context the protection of coastline with distinct & highly productive ecosystems is a responsible task. Therefore preparedness or contingency planning for addressing oil spills is highly required for KPT.

In view of the above, the KPT, Gandhidham, Gujarat proposes to develop “Oil Spill Disaster Contingency Plan for Kandla Port ” and studies related with the same has been entrusted to M/s KITCO Ltd. Kochi, Kerala.

Since Kandla port and its surroundings have been extensively studied, primary data collection is not generally anticipated and included in the present proposal. From the various published reports and research papers and through reconnaissance surveys, the sensitivity of the shoreline will be documented which will form the basis of the study. Site visit was conducted by KITCO, detailed discussion was held with Marine Department and also interactions were done with various other departments for the collection of relevant detail for supporting oil spill contingency planning studies, based on the above and the comments received from time to time this Final Report was presented herewith.

PROJECT BACKGROUND

In India, the responsibility for coordination of oil spill emergency response was transferred from Director General of Shipping to Indian Coast Guard (ICG), Ministry of Defense, Govt. of India on 7th March, 1986 by an Office Memorandum of the Ministry of Defence dated 07 March 1986 and further, by amendment to the Government of India (Allocation of Business) Rules, 1961 vide Gazette notification dated 12 December 2002. The Indian Coast Guard has been designated as the Central Coordinating Authority (CCA) for combating oil spills in Indian waters and undertaking oil spill prevention and control. Maintaining of pollution response resources by a singular government agency like Indian Coast Guard for a developing country such as India is not cost effective. The most economical solution is achieved through pooling of resources and integrating the capability available with other agencies for national cause. Pollution response unlike other crisis management, is a specialized subject and requires elaborate preparatory measures and availability of skilled manpower. In this context in order to delineate entire national preparedness and response system including both public and private resources for responding to an oil spill emergency, ICG had prepared a NOS-DCP which describes the basic framework and guidelines for a national response to a significant spill at sea.

NOS DCP is the apex guidance document for acting on emergencies within the geographical profile of coastal water in India. This plan is intended to delineate functions of various concerned departments and agencies for the operational responsibility to marine incidents which could result due to spillage of oil into water. The plan also provides the frame work of co-ordination of integrated response by various government departments and agencies to protect the environment from the deleterious effects of pollution by oil. It is intended to promote the development of regional and local contingency plans in the three coast guard regions, various ports, offshore petroleum exploration and production agencies, and coastal state pollution control boards for prevention and response of water pollution and other authorities to be able to respond to any further national oil spill disaster contingency. The NOS-DCP has been in operation since July 1996 and brings together the combined resources of:

- The Government of India including that of the Indian Coast Guard;
- The State Governments including emergency services; and

- Ship, ports, and oil industries.

Since 1993 the year when the NOS-DCP was formalized, the Indian Coast Guard has been very persistent in endorsing two preventive measures, the first one establishing a “Contingency Plan” and the second “Maintenance of Tier – 1 pollution response capability” by the ports, oil handling companies and the State Government. The latest NOS-DCP has been published in 2015. Further, NOS-DCP circulars on oil spill response preparedness has been published time to time which gives guidance on the preparation of oil spill contingency plan at various levels. In order to plan for the range of potential spill sizes, from small operational spills to worst-case scenarios, local authorities need to develop their plan based on the internationally recognised tiered response that classifies oil spills into three categories by IMO as follows:

(a) Tier-1 is concerned with preparedness and response to a small spill within the capabilities of an individual facility or harbour authority. 700 tonnes is often cited as the upper limit of ‘Tier-1’. However, the circumstances of the spill and the surrounding environment will determine the actual level of response.

(b) Tier-2 is concerned with preparedness and response to a spill that requires the co-ordination of more than one source of equipments and personnel. For a Tier-2 response, assistance can come from a number of entities within a port area or from sources outside the immediate geographic area. Tier-2 describes a wide range potential spill scenarios and deals with operational spills upto 10,000 tons.

(c) Tier-3 is concerned with a major spill requiring the mobilization of all available national resources and depending upon the circumstances will likely involve mobilization of regional and international systems. It deals with the spills of more than 10,000 tonnes.

As per the directives of the Ministry of Shipping (MoS) and Department of Oil Industry Safety Directorate (Ministry of Petroleum and Natural Gas), the Ports and the Oil Handling agencies are to establish oil pollution contingency plan and Tier-1 pollution response capacity to address oil spills upto 700 Tonnes in their respective area of jurisdictions. With the initiative made by the Indian Coast Guard, a major step has been instituted since the 9th NOS-DCP meeting to conduct audit of Tier –1 facilities of Port and Oil handling agencies. Regional co-operation is required to combat Tier 2 & 3 spills. ICG recommends the maritime facilities and the coastal states to undertake mutual aid agreements for the same and present escalations of resources considering potential pooling in the regional scale.

This report have been prepared in this context to support the oil spill contingency planning studies of Kandla Port Trust for catering Tier-1 spill. The port belong to the Risk Category –A for an oil handling port with SPMs & STSs.

Located in the Kandla Creek, in the western most part of Little Rann of Kachchh (LRK) at the mouth of GoK, the port area is immediately surrounded by high density of creeks, mangrove swamps, mud, patches of dry salt waste Rann, vast salt pan and aquaculture ponds. However the port limit extends to Vadinar in the southern arm which is located amidst of the extremely sensitive coastline with rich corals and islands, where the SPMs and other oil handling facilities are operating for various petroleum companies, which are essentially part of the protected areas Marine National Park & Sanctuary (MNPS) and Important Bird and Biodiversity Areas (IBAs). Flora constitutes the algae, sea grass, herbs, shrubs and trees is dominated by mangroves and fauna constitutes the mammals, birds, reptiles, arthropods, amphibians, fishes etc. Eventhough less productive segment compared to the southern arm of GoK, area between Mundra and Kandla is having comparatively higher sensitivity than the rest of northern coastline of Gujarat with exception to the Kori creek area (Vijayalakshmi Nair, NIO).

The area is located close to the international shipping line and is an approach for another 5 ports. Presently there are oil handling facilities of Reliance, IOCL, BORL including SPMs within the Kandla port limit near Kandla, Oil berths at Kandla creek and another SPM is to be operational off Veera, also being located close to the busy international shipping routes, the area is unreasonably under the oil spill threat. Hence the risk of oil spill in this area is determined to be very high (Sensitive Coastal Marine Areas of India, Oil Spills and their Impacts, Indian Coast Guard). The port is already having an Oil Spill Contingency Plan in place and Oil Spill Response (OSR) resources are in place. In this context supplementing studies for the contingency planning for Kandla Port Trust was conducted covering the following aspects.

- Review of Indian Coast Guard Documents including NOS-DCP 2015 and relevant circulars.
- Environmental Resources Assessment, Identification of Coastal and Shoreline Zones and Sensitivity Mapping
- Development of Response Strategy including- selection of response resources and infrastructure facilities to be in place.
- Detailing of Incident Management Mechanism
- Operations Planning
- Oil Waste Disposal Plan
- Mutual Aid Provisions available



SCOPE & OBJECTIVE

3.1 Scope

To support the preparation of Oil Spill Contingency Planning for Kandla Port Trust which will be base document for the emergency preparedness, response and mitigation during an oil spill in accordance with NOS-DCP 2015 and is to comply with its amendment issued from time to time.

3.2 Objective

- To ensure the protection of marine as well as coastal environment including its dependents within its jurisdictional limit
- To assist the national cause by supporting distressed group affected by oil spill through Mutual Aid outside its jurisdictional limit

3.3 Responsibility

The details of responsible combat agency during various spill scenarios are given as **Table 3.1** below.

Table 3.1. Responsible Combat Agencies

Sl. No	Jurisdictional Limit	Type of Spill	Responsible Combat Agency	
1	Within Port Limit	Tier-1	KPT based on NOS-DCP,2015	ICG may assist if requested by Port Authority
		Tier-2/3	ICG	
2	Outside Port Limit Marine	Tier-1/2/3	ICG	
3	Outside Port Limit Shoreline	Tier-1	Gujarat State Government	ICG may assist if requested by Port Authority
		Tier-2/3	ICG	

This document is to support the Local Oil Spill Contingency Plan (LOSCP) of Kandla port and is a property of Kandla Port Trust which is to be maintained, reviewed and updated as per ICG guidelines For executing the responsibility assigned in NOS-DCP 2015 as the Responsible Combat Agency within their Port Limit.

3.4 Statutory Requirements

As per NOS- DCP, Kandla Port is to maintain Risk Category-A. The details are already given as Annexure.

3.5 Geographical Limit

This facility level plan applies to the port limit of Kandla Port Trust which includes the Vadinar Terminal within the limits of Tier -1 response level.

3.6 Mutual Aid

Mutual Aid is applicable to the stakeholders of the area including ESSAR, RELIANCE, Bharat Oman Refineries Limited (BORL) & IndianOil Corporation Ltd (IOCL) terminals & operators which are operating within the port limit and also having individual facility level contingency plan and also for the ports located in the locality Navlakhi under taken by Gujarat Maritime Board and Adani Port & Special Economic Zone, Mundra for combating Tier-2 spills upto 10,000 Tonnes under the coordination of Onscene Command of Regional Commander ICG.

3.7 Interface with ROSDCP & NOSDCP

The plan provides the structure for an effective oil spill disaster contingency for Kandla Port Trust inline with the objectives of the NOS-DCP, 2015 and Regional Oil Spill Contingency Plan (ROS-DCP) & District Oil Spill Contingency Plan (DOS-DCP) prepared under North-West Region (NW) CGRHQ Gandhinagar & DHQ-1 Porbandar through the Indian Coast Guard Station (ICGS) Gandhinagar, Pipavav, Jakhau, Mundra, Veraval, Vadinar & Okha also the Coast Guard Air Enclave (CGAE) Porbandar.

During a severe spill event due to its nature, extent or both, ICG through its predesignated On-scene Commander. As already discussed in the previous section, The Regional Pollution Response Officer will be the On-Scene Commander (OSC) and act as the representative of the Regional Commander to co-ordinate all activities at the scene of pollution through the relevant District Commander (COMDIS) in the vicinity of the region/area. The Coast Guard District Commander (COMDIS) will designate an officer as Pollution Response Officer for the district who will act as the Deputy On-scene Commander (DOSC) and lead the initial response team to the scene of incidence within his area of jurisdiction under the overall guidance of the Regional Pollution Response Officer. He will be responsible for the following:

- Directing the employment of needed resources for prevention of pollution, containment, cleanup, and disposal of any pollutants, and restoration of the site
- Providing a focal point of information for all agencies concerned

- Preparing cost analysis and detailed report covering all aspects of the spill
- Collecting samples for possible analysis.

The OSC will pass on regular reports to the Regional Headquarters and the Coast Guard Headquarters, of his assessment, and of resources and assistance required. In case if situation further worsens, Tier -3 will be declared and the National On-Scene Commander will take over the authority.

REVIEW ON NATIONAL OIL SPILL DISASTER CONTINGENCY PLAN (NOS-DCP)

NOS-DCP published by ICG is the apex manual for the response towards any oil spill event. In NOS-DCP efforts are taken in the direction for preparing a basic frame work towards an oil spill emergency preparedness & response towards the preparation of response plan for state/regional/port/oil installation. In spite of its exhaustive nature NOS-DCP provides enough flexibility in the preparation of response plan for state/regional/port/oil installation.

4.1. Scope of NOS-DCP

- The plan is action oriented and covers aspects such as reporting, communication, alerting, assessment, operations, administration, finances, public relations and arrangements with other contiguous states. The plan assigns responsibility for various tasks to relevant government departments and agencies, identifies trained personnel, equipment, and surface craft, and aircraft and means of access to these resources.
- It delineates functions of various departments and agencies for the operational responsibility for marine incidents that could result due to spillage of oil into water.
- The plan also provides the framework for co-ordination of integrated response by various government departments and agencies to protect the environment from the deleterious effects of pollution by oil.
- The plan outlines combined stakeholder arrangements designed to allow a rapid and cooperative response to marine oil spills within the defined area. This plan also coordinates the provision of national and international support.
- This plan parallels similar documents dealing with the Government of India's responsibility for saving life at sea, for search and rescue and for caring for survivors brought ashore.
- The plan co-exists with incident and security plans operated by ships, ports and offshore installations. Mutual respect between those in command and control of this

plan and those in charge of all other relevant plans is imperative to ensure that all of the plans can continue to function efficiently, whatever the circumstances.

4.2. Objectives of the Plan

The objectives of the plan are:-

- To establish an effective system for detection and reporting of spills;
- To establish adequate measures for preparedness for oil and chemical pollution;
- To facilitate rapid and effective response to oil pollution;
- To establish adequate measures for crew, responders, and public health and safety, and protection of the marine environment;
- To establish appropriate response techniques to prevent, control, and combat oil and chemical pollution, and dispose-off recovered material in an environmentally sound manner
- To establish record-keeping procedures to facilitate recovery of costs.
- To maintain the evidences for the purpose of identifying the polluter and taking suitable administrative, civil or criminal action against the polluter.

4.3. National Pollution Response Areas of NOS-DCP

NOS-DCP applies to all incidents of marine casualty or acts relating to such casualty occurring with grave and imminent danger to Indian coast line or related interests from pollution or threat of pollution in the sea by deliberate, negligent or accidental release of oil, ballast water, noxious liquid and other harmful substances into the sea including such incidents occurring on the high seas.

The plan also covers all incidents in any part of the sea, or inland, that are likely to affect the maritime zones of India, that includes all the Territorial Waters and the Exclusive Economic Zone (EEZ) of India, as detailed in **Figure 4.1** , and the High Seas where an oil or chemical spill has the potential to impact on Indian interests in the maritime zones of India.

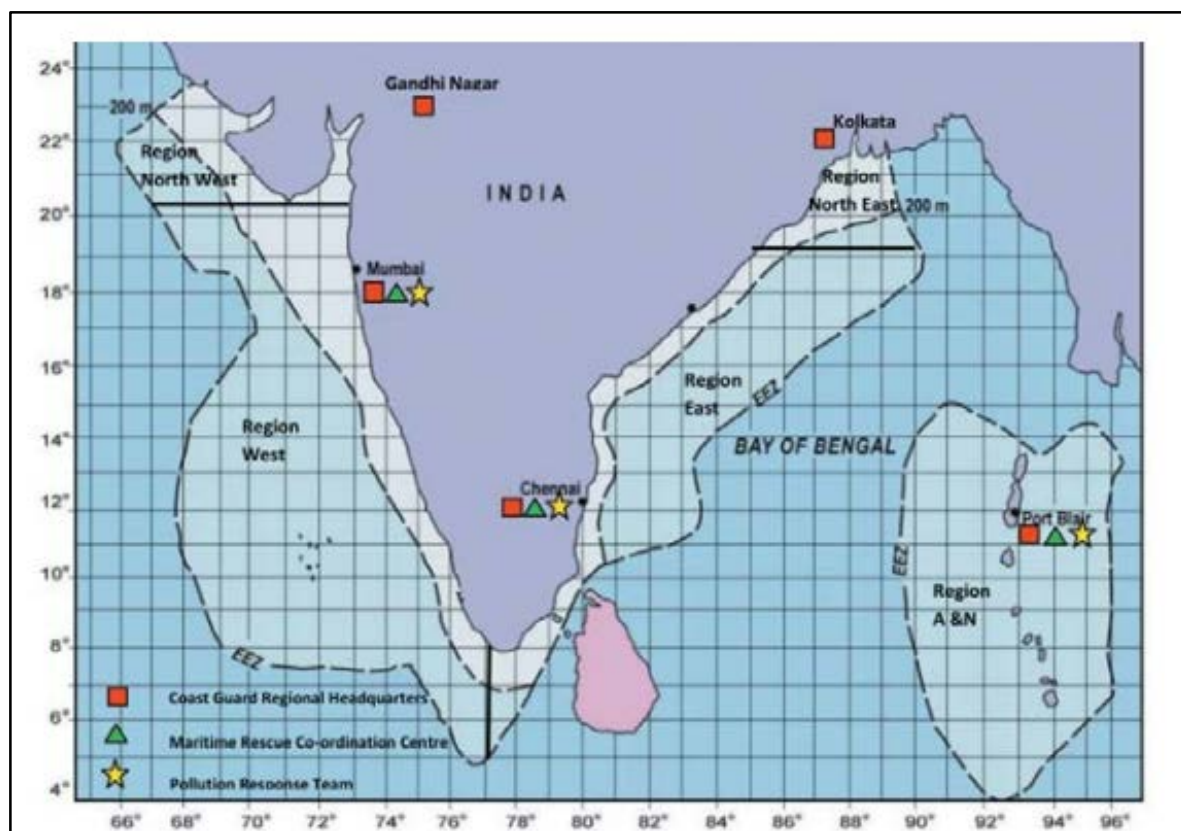


Figure 4.1. National pollution response areas

4.4. Designed spill size

The designed spill size for planning and operational reasons is 10,000 tonnes. This spill size was decided at the meeting with national plan stakeholders as the appropriate level for which to plan national equipment inventory and other resource requirements. Additionally, the oil exploration and production industries hold membership with private international oil spill response organisations for access to their equipment stockpiles.

4.5. Concept of tiered response

The size, location and timing of an oil spill are unpredictable. Spills can arise from oil loading, unloading or pipeline operations, and from a collision or grounding of vessels carrying crude oil and products in local ports or coastal waters. They can also arise from tankers or barges operating on inland waterways, or from exploration and production operations and tankers operating in international waters. Oil spill risks and the responses they require should be classified according to the size of spill and its proximity. This leads to the concept of ‘Tiered Response’ to oil spills. International Maritime Organization (IMO) classifies oil spills into three categories as follows.

(a) **Tier-1** is concerned with preparedness and response to a small spill within the capabilities of an individual facility or harbour authority. 700 tonnes is often cited as the upper limit of ‘Tier-1’.

However, the circumstances of the spill and the surrounding environment will determine the actual level of response.

(b) **Tier-2** is concerned with preparedness and response to a spill that requires the co-ordination of more than one source of equipment and personnel. For a Tier-2 response, assistance can come from a number of entities within a port area or from sources outside the immediate geographic area. Tier-2 describes a wide range potential spill scenarios and deals with operational spills up to 10,000 tons.

(c) **Tier-3** is concerned with a major spill requiring the mobilization of all available national resources and depending upon the circumstances will likely involve mobilization of regional and international systems. It deals with the spills of more than 10,000 Tonnes.

4.6. Emergency Organizational Structure for Oil Spill Disasters

NOS-DCP delineated the organization structure for handling the oil spill disasters and is presented in **Figure 4.2**. In the oil spill response profile, the emergency organisation has responsibilities allocated within various groups dealing with Management Support, Coordination of Activities, Emergency Response Units and Incident Management team in place. The details of the above groups are presented below:

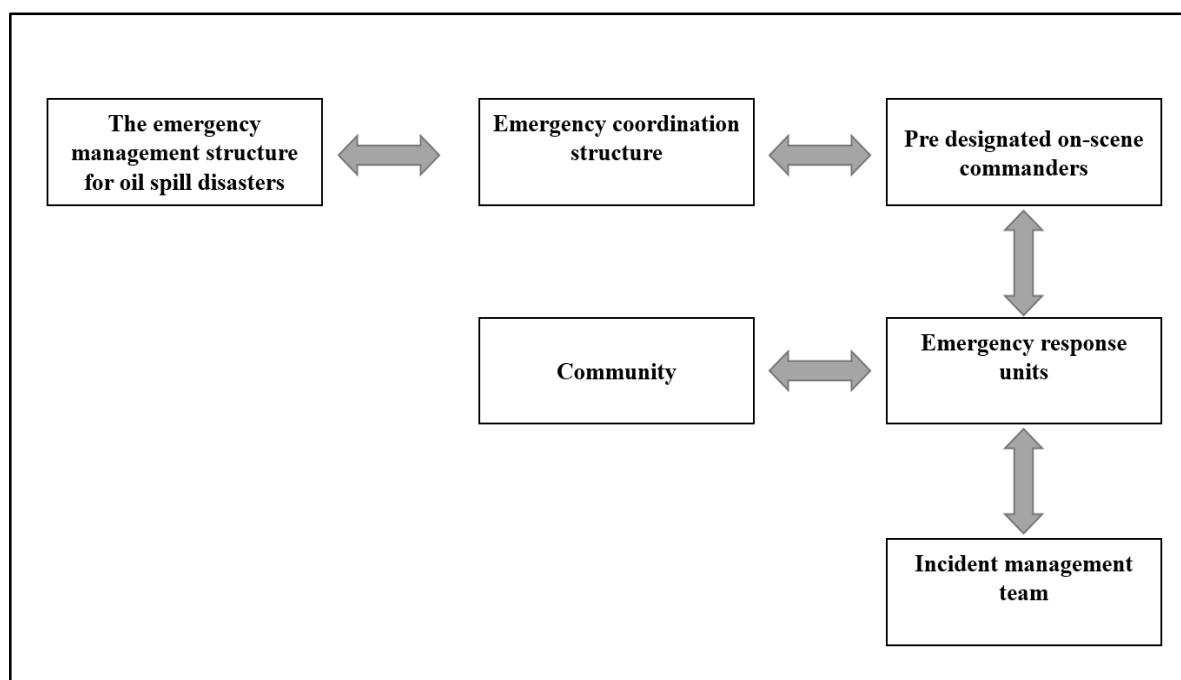


Figure 4.2. Organization structure for handling the oil spill disasters in India

4.6.1. The Emergency Management Structure for Oil Spill Disasters

Emergency management structure take the managerial responsibility at the apex operational level, in the event of an oil spill. The National Crisis Management Committee (NCMC) headed by the Cabinet

Secretary constitutes institutional framework of emergency management structure for the oil spill disasters. NCMC is supported by the Crisis Management Groups (CMGs) of the various central nodal ministries .

The NCMC supported by Crisis Managemnet Group will provide management, operational, technical and environmental advice and support to the combat agencies as required inregards of response to a crisis.

The Structure of Disaster Management System in India playing key managerial role in oil spill emergencies is represented in **Figure 34.3**. The composition, functional responsibilities and reporting requirements of CMG is as presented in **Annexure I**.

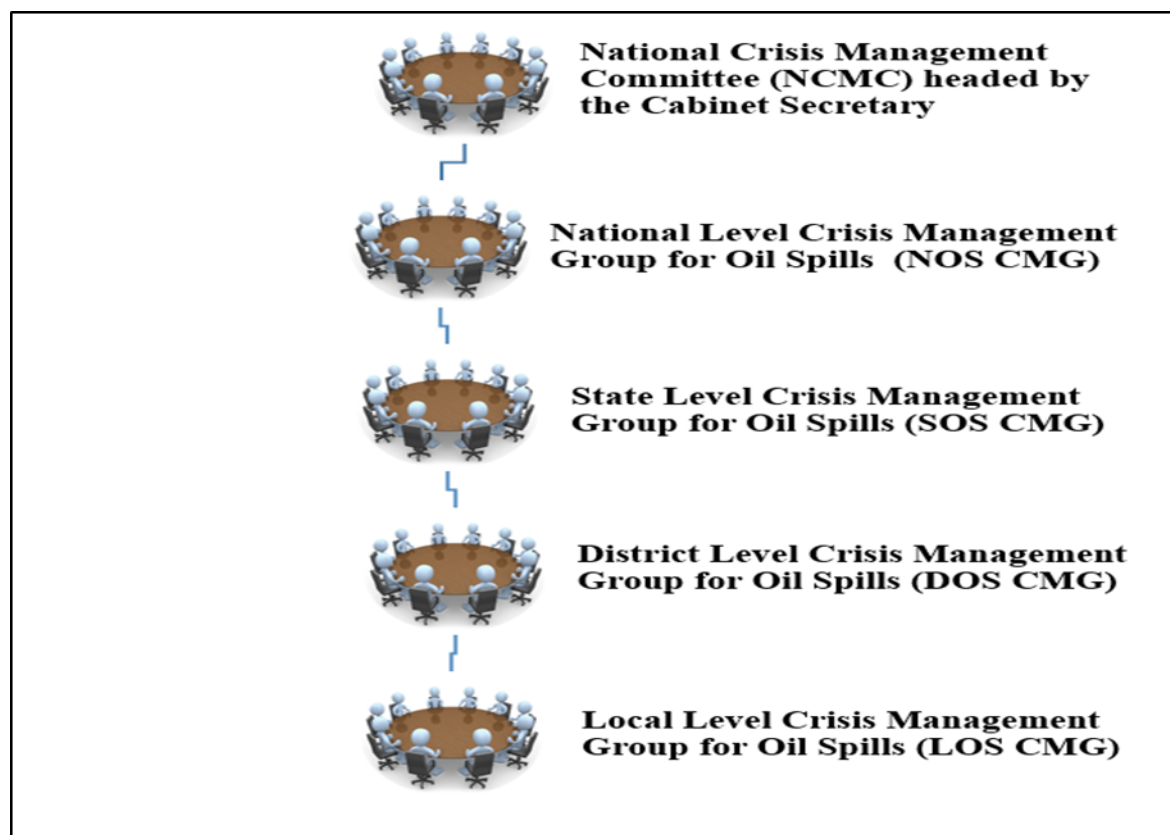


Figure 4.3. The Structure of Disaster Management System in India Playing in the Key Managerial Role in Oil Spill Emergencies

4.6.2. The Emergency Coordination Structure for Oil Spill Disasters

The coordination of an oil spil response action is executed through a well framed emegency coordination structre. The Director General Indian Coast Guard (DGICG) is the Central Coordinating Authority (CCA) and has the overall responsibility to ensure that appropriate response is made to any incidence in the seas around India. He will direct the various aspects of the pollution response

operations and will be assisted by the Commanders, Coast Guard Region North West (NW), West (W), East (E), North East (NE), and Andaman & Nicobar (A&N) as required, depending on the proximity to the scene of contingency. The Regional Commanders will in turn be assisted by the Coast Guard District Commanders in the coordination of response to oil pollution within a coastal State. The emergency coordination structure as presented in NOS DCP is presented in **Figure 4.4** below.

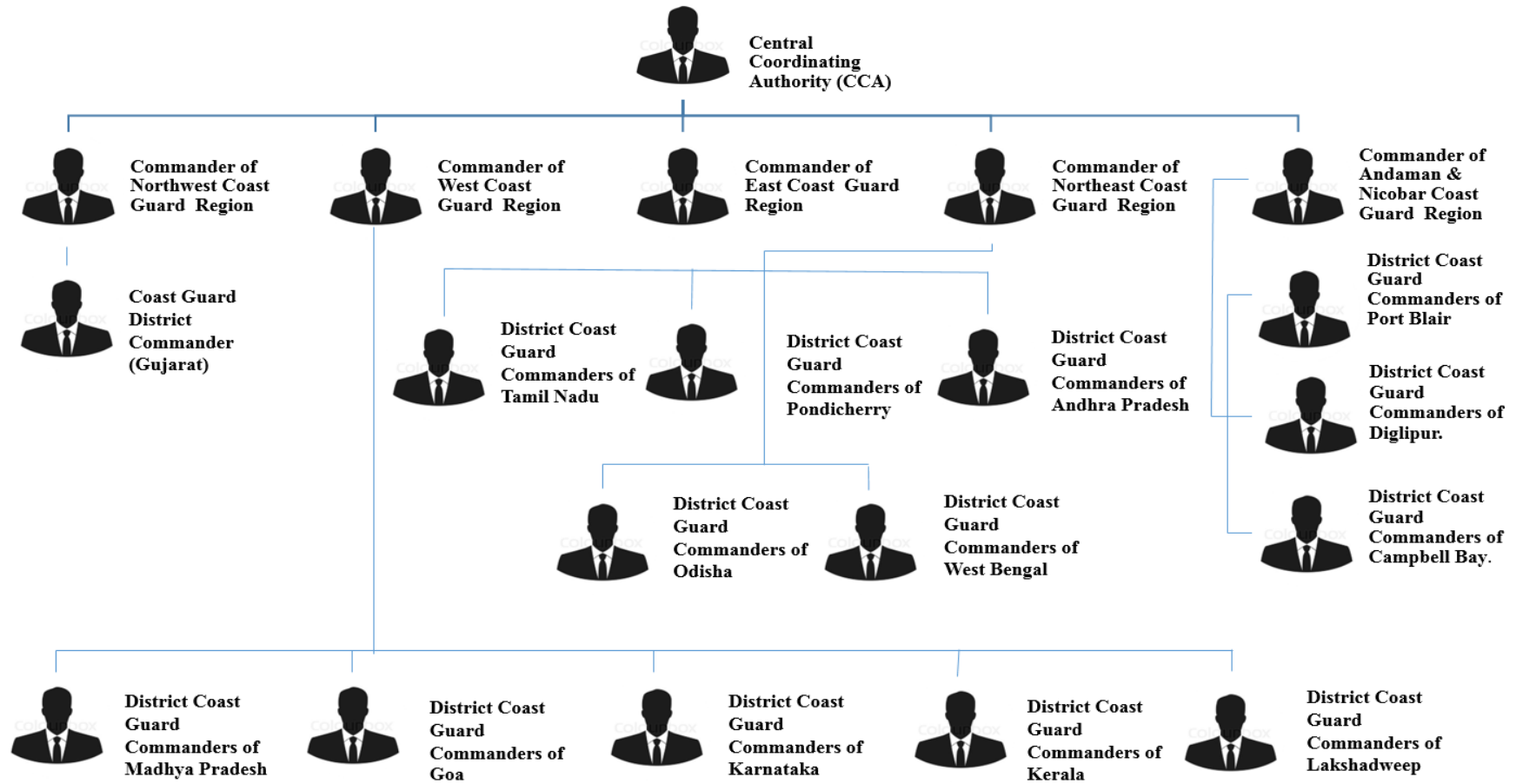


Figure 4.4. The Emergency Coordination Structure

4.6.3. Predestinated On-Scene Commanders

The management of oil spill response action is executed through a well structured on-scene commanders group under the coordination of emergency coordination structure described above. On-scene commander is a person responsible for the control and management of the marine oil spill clean-up. The Director (Environment) at Coast Guard Headquarters serves as the National On-scene Commander in the event of a spill of national significance. The Regional Pollution Response Officer will be the On-Scene Commander (OSC) and act as the representative of the Regional Commander to co-ordinate all activities at the scene of pollution through the relevant District Commander (COMDIS) in the vicinity of the region/area. The Coast Guard District Commander (COMDIS) will designate an officer as Pollution Response Officer for the district who will act as the Deputy On-scene Commander (DOSC) and lead the initial response team to the scene of incidence within his area of jurisdiction under the overall guidance of the Regional Pollution Response Officer. He will be responsible for the following:

- Directing the employment of needed resources for prevention of pollution, containment, cleanup, and disposal of any pollutants, and restoration of the site
- Providing a focal point of information for all agencies concerned
- Preparing cost analysis and detailed report covering all aspects of the spill
- Collecting samples for analysis.

The OSC will pass on regular reports to the Regional Headquarters and the Coast Guard Headquarters, of his assessment, and of resources and assistance required. Organogram of pre-designated On-scene Commanders is presented in **Figure 4.5**

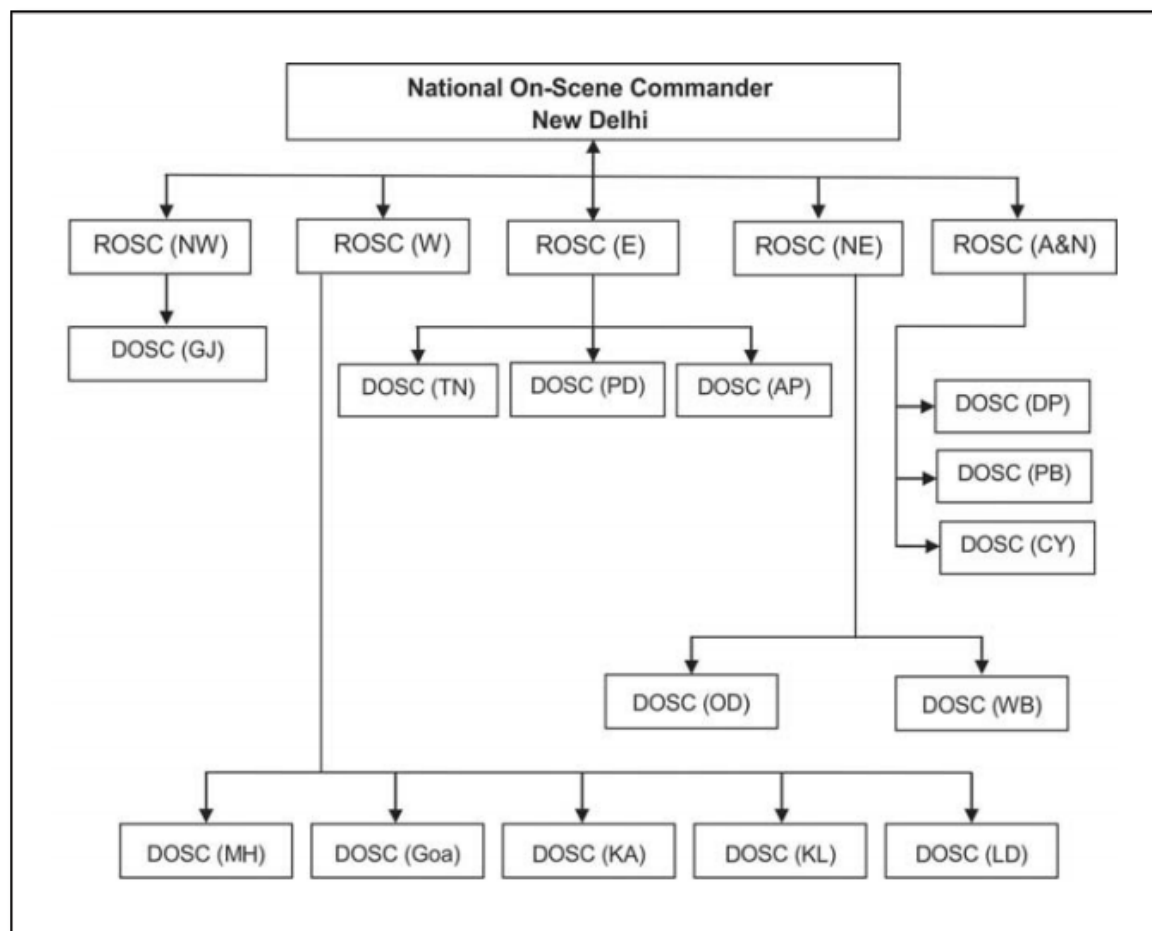


Figure 4.5. Hierarchical arrangement of On Scene Commander

4.6.4. Emergency Response Units (ERU)

The Emergency response units (ERU) may be defined as the place from which the operations to handle an emergency are directed and coordinated. It will be attended by the chief incident controller, key personnel and the senior officers responsible for control of emergency. The Emergency response unit will be equipped to receive and transmit information and directions from all the areas of the marine terminal as well as outside and will be located in an area of minimum risk.

The ERU shall be away from the potential hazards and provide maximum safety to personnel and equipment and should be preferably made of non-combustible building of either steel frame or reinforced concrete with two exits and adequate ventilation. The objective of the ERU is

- First, to prevent pollution from occurring;
- Second, to minimize the extent of any pollution that occurs;
- Third, to mitigate the effects of that pollution

Different modules of emergency units, separate, but linked, were established at federal level in order to direct operations in the event of an incident requiring response. These modules are presented in **Table 4.1**

Table 4.1. Emergency response units

Sl. No	Response Unit	Title	Role
a	Salvage Monitoring and Control Unit	SMCU	To monitor and control salvage operations
b	Marine Response Centre	MRC	To direct response action at sea
c	Shoreline Response Centre	SRC	To direct shoreline response
d	Emergency Control Centre	ECC	To monitor operations to contain any potential pollution within an offshore installation and its reservoir and apart facility jurisdiction
e	Environment Group	EG	To provide environmental and public health advice to all these centers
f	Offshore Control Unit	OCU	To direct response action at offshore Installations

Not all incidents require all these emergency response units. However, the arrangements for managing the incidents must allow for the possibility of salvage operations, action at sea and action on shore taking place simultaneously.

4.6.4.1. Salvage Monitoring and Control Unit (SMCU)

Salvage Monitoring and Control Unit (SMCU) is set up by Indian Coast Guard District or Regional Commander as per the necessity of the salvage operations involved in an event. The members of the SMCU are :

- The Indian Coast Guard District or Regional Commander;
- The Salvage Manager from the salvage company appointed by the ship owner,
- The harbour master, if the incident involves a harbour or its services;
- A single representative nominated by agreement between the ship owner and insurers (for both the physical property and their liabilities);
- The District or Regional Pollution Response Officer;
- A Surveyor from the Mercantile Marine Department
- A Surveyor from the Indian Register of Shipping, if required; and
- An Environment Liaison Officer, nominated by the Environment Group.

4.6.4.2. Marine Response Centre (MRC)

In almost all cases involving a national response, whether ship or offshore installation related, the Indian Coast Guard establishes a Marine Response Centre (MRC) at the nearest Maritime Response Control Centre (MRCC) which is a communication hub between all response centres. It contains the following persons, although some of the Coast Guard staff may play more than one role.

- An ICG Pollution Response Officer, to manage sea borne and air borne operations;
- Where a ship is involved, an Mercantile Marine Department (MMD) officer to manage cargo transfer operators;
- A Coast Guard Logistics Officer, to organize the deployment of the equipment needed and control all Coast Guard financial commitments;
- If the incident involves a port or its services, a representative of the port authority;
- An officer of the state fisheries department, to advise on the impact on fisheries and to liaise with fishing organization;
- A local administration official to act as liaison officer with the Shoreline Response Centre;
- An Environmental Liaison Officer (ELO) nominated by the Environment Group; and
- Defense Public Relations Officer, to liaison with the media

The SMCU may be co-located with the MRC, if needed and in such case , the membership of the SMCU needs to include the members of the MRC with Indian Coast Guard staff fulfilling more than one role.

4.6.4.3. Shoreline Response Centre (SRC).

When the threat of pollution at the shoreline exceeds the capability of the most affected local authority, the Coast Guard initiates a national response, and that local authority (or authorities) sets up a Shoreline Response Centre (SRC) in order to continue the response action.

Each local authority's own contingency plan details the mechanism for escalating the response in accordance with the tiered response concept and specifies how to set up the SRC in the light of its own practices and organisation. These plans also contain the necessary authorisation to each local authority to enable the designated officer directing the SRC to take decision on behalf of the other local authorities concerned.

An SRC needs to contain representative of all the local authority services that may need to participate in the clean-up operation, and representative of all local and port authorities that may become involved. In addition, it contains an Environment Liaison Officer (ELO) nominated by the Chair of the Environment Group.

4.6.4.4. Emergency Control Centre (ECC)

Emergency Control Center (ECC) provides a centralized location where key staff members can monitor, track and make decisions regarding the oil spill response. Each oil installation and sea-port facility shall have the provision of an Emergency Control Centre (ECC) preferably with a back-up arrangement. The ECC shall be away from potential hazards and provide maximum safety to personnel and equipment. ECC should be a noncombustible building of either steel frame or reinforced concrete construction and should have at least two exits and adequate ventilation

Each response unit, including the ECC at seaports and oil installations, should be provided with the following basic supplies and dedicated equipment.

- A copy of the Oil Spill Contingency Plan (OSCP).
- Maps and display charts and diagrams showing buildings, roads, underground fire mains, important hazardous material and process lines, drainage trenches, and utilities such as steam, water, natural gas and electricity
- Situation boards (continuously updated to present a summary of the current situation and response actions being taken).
- Aerial photographs, if possible, and maps showing the site, adjacent industries, the surrounding community, high-ways, rivers, etc., help determine how the disaster may affect the community so that the proper people can be notified, adequate roadblocks established, and the civil authorities advised sufficient telephone lines to enable full liaison with outside bodies
- Names, addresses, and telephone numbers of employees, off-site groups and organizations that might have to be contacted; all telephone lists being reviewed for accuracy on a scheduled basis and updated, as necessary
- Dedicated and reliable communication equipment; enough telephones and at least one fax line to serve the organization for calls both on-and off-the-site
- Fixed and portable two-way radio equipment to keep in contact with activities on-scene and to maintain continuity of communications when other means fail

-
- Plan board, logbook, tape recorder, television, DVD and Video facilities for playing back records from aircraft and helicopters, as well as monitoring media coverage of the incident with a person assigned to record pertinent information and to assist in investigating causes, evaluating performance, and preparing reports
 - Emergency lights so that operations can continue in the event of power failure
 - Photocopy, fax and e-mail facilities
 - Dedicated computers with LAN/ internet facility to access the installation data and the latest and updated soft copies of all standard operating practices (SOP) etc.

Each response unit will be supported by an Administration Team responsible for the general management of the unit and providing personnel for:

- Communication links between the units
- The distribution of messages within the units
- Keeping records of messages and expenditure
- Taking minutes during meetings to record decision
- Typing services
- Updating situation boards and charts
- Providing catering to the units.

4.6.4.5. Environment Group

Response to any maritime incident requiring a regional or national response would involve the establishment of an Environment Group since all those involved in operations at sea (including salvage) and shoreline clean up need timely environment advice. The Coast Guard would initiate the request on the relevant civil administrative authority for the formation of the Environment Group. The core membership of the Group would come from the relevant statutory authorities and include relevant civil administration authorities, forest and wildlife authorities, fisheries authorities, Block Development Officer, local public health officials and relevant non governmental organisations for appropriate expert advice. The Group may also include a Coast Guard representative

Environment Group would perform a purely advisory role and provide advice on environment aspects and public health impacts of the incidents. Being a common facility, they will provide comprehensive advice to all response units and represent all environmental and public health interest considered being at risk. The expert advice based on immediately available and prepared data and

information, may encourage the collection of real time environmental data by the relevant government agencies. Such environment data may provide accurate baseline data of vulnerable environmental features immediately before impact of the pollution plume, so that risk can be identified and the damage can be quantified.

Environment Group will track the success of preventive and counter pollution measures throughout the incident, and begin to assess the overall long term environment impact, dependent on timely provision, from each response unit, of all relevant information on the fate and modeling of pollutants, and each unit's forecasts, plans actions and outcomes. If a marine pollution incident is expected to have a significant impact on the marine environment, or the shoreline, the group may promptly make the arrangements to monitor and assess the impact in the longer term.

During the time of an oil spill event, response units shall make all reasonable efforts to consult the Environment Group, or its chair, about any proposed action that is likely to have lasting impact on the environment. If time does not permit the response unit to consult before acting, it will circulate a written report to the Environment Group and all other response units as soon as after the action (or decision) has been taken.

4.6.4.6. Offshore Control Unit (OCU)

Apart from above described response units each offshore installations should identify the location for an Offshore Control Unit (OCU) in close proximity to the operators ECC as part of installation's oil spill response plan .

The OCU requires the same support and structure as an SCU and similar links to their operations units engaged in other tasks including search and rescue, at sea clean up and shoreline clean up, as appropriate. The administrative support required by the OCU will be provided by Ministry of Petroleum & Natural Gas (MoPNG).

The members of the OCU are:-

- The Coast Guard Commander
- The Emergency Operations Manager, a role defined in the operator's oil spill contingency plan, acts a link between Coast Guard and the Emergency Response Centre where is a line to the Offshore Installation Manager;
- The Operator's Representative, a role defined in the operator's oil spill contingency plan, representative the interests of the owner, operator, contractors, and liability underwriters of the offshore installation,

- An Environmental Liaison Officer, nominated by the Environment Group, advises the Coast Guard on the environmental implications of any proposed actions;
- The DGH provides the Coast Guard with advice on the importance of the installation to strategic supplies and other matters of public interest; and
- A specialist or technical advisor to the Coast Guard, either from the operator, the DGH or an independent source, provides advice as circumstances require

4.6.5. Incident Management Team (IMT)

The Incident Management Team (IMT) is the team who actually takes up the response activities at the time of an event. The IMT is headed by a Chief Incident Controller (CIC) and he will be assisted by a Site Incident Controller (SIC) and other supporting groups, who actually deals with the response activities at field. **Figure 4.6** illustrate composition of a typical Incident Management Team (IMT) for control of an oil spill emergency. Any entity of IMT can merge the functions as per their other statutory requirements and based on level of risk and range of operations.

The number of staff required to fill positions in the IMT of the emergency organisation can be varied according to the size and complexity of the incident and the number of staff available. In a major incident all positions may be filled, but in a lesser incident one person may fill a number of positions. In a very small incident, SIC will be able to carry out all management functions.

Persons in charge of sea ports and oil installations ensure that persons with appropriate experience and skills are identified so that they can be appointed to the various positions in the emergency organisation in the event of a marine pollution incident. If agency input into a response is required the Coast Guard may place its liaison officer/s within the IMT, so as not to burden personnel that will be fully engaged in response activities.

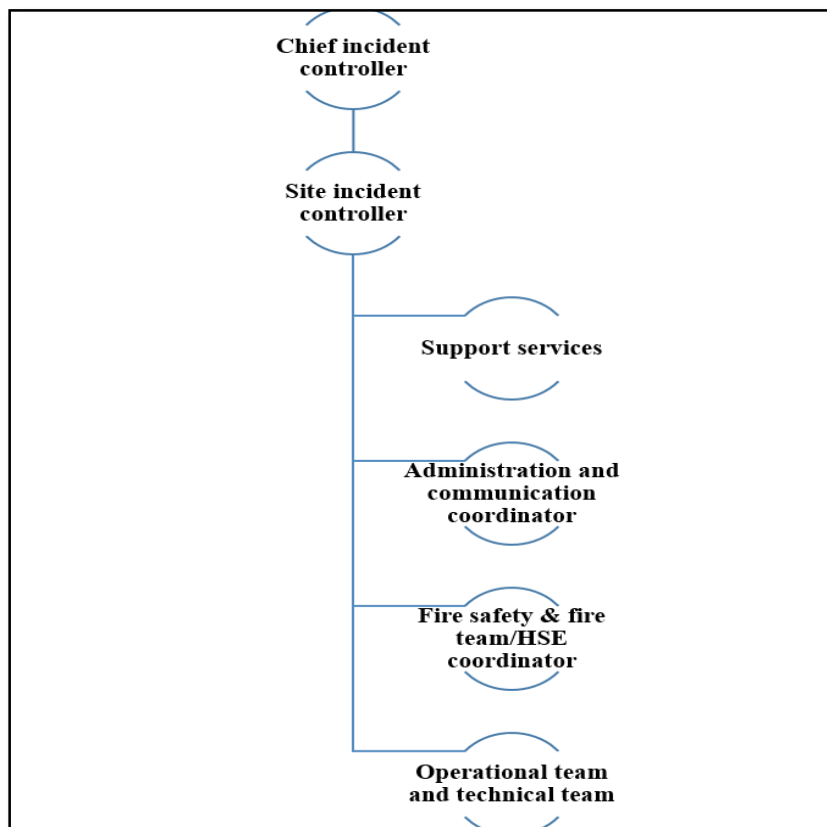


Figure 4.6. Composition of a typical Incident Management Team (IMT)

The section below presents the functional responsibilities and reporting requirements of IMT and facilities established as a part of it..

4.6.5.1. Chief Incident Controller (CIC)

Chief Incident Controller (CIC) is the key responsible officer for the management and coordination of response operations at the scene of a pollution incident to achieve the most cost effective and least environmentally damaging resolution to the problem. Persons in charge of sea ports and oil installations shall identify appropriate individuals to act as a Chief Incident Controller (CIC). CIC shall have overall responsibility to protect personnel, site facilities, and the public before, during, and after an emergency or disaster. The CIC shall be present at the main emergency control centre for counsel and overall guidance. Responsibilities of the Chief Incident Controller shall include the following:-

- Preparation, review and updating of the OSCP
- Assessment of situation and declaration of an oil spill emergency
- Mobilization of main coordinators and key personnel
- Activation of Emergency Control Centre

-
- Taking decision on seeking assistance from mutual aid members and external agencies
 - Continuous review of situation and decide on appropriate response strategy;
 - Taking stock of casualties and ensure timely medical attention;
 - Ensuring correct accounting and position of personnel after the emergency
 - Ordering evacuation of personnel as and when necessary;
 - Taking decision in consultation with local Coast Guard and District Authorities when a tier 2 or tier 3 spill is to be declared.

During a major incident the CIC will act under the purview of the relevant Coast Guard Commanders.

4.6.5.2. Site Incident Controller (SIC)

The Site Incident Controller (SIC) shall be identified by the Chief Incident Controller and will report directly to him. During lesser incidents the SIC shall have overall responsibility for managing the response. Persons in charge of sea ports and oil installations should ensure that the SIC is assisted by a response team with appropriate planning, operational, technical, scientific, chemical, environmental, logistical, administrative, financial, and media liaison skills.

Responsibilities of the Site Incident Controller shall include the following:-

- To maintain a workable oil spill emergency control plan, establish emergency control centers, organize and equip the organization with OSCP and train the personnel;
- To make quick decisions and take full charge
- To communicate to the Emergency Control Centre where it can coordinate activities among groups
- To be responsible for ensuring that appropriate local and national government authorities are notified, preparation of media statements, obtaining approval from the CIC and releasing such statements once approval received
- To ensure that the response to the oil pollution emergencies is in line with entity procedures, and to coordinate business continuity or recovery plan from the incident;
- To co-ordinate any specialist support required for the above purpose
- To decide on seeking assistance of mutual aid members and external agencies.

4.6.5.3. Administration and Communication Coordinator

The SIC will be assisted by an administration and communication coordinator whose duties shall include the following:-

- To coordinate with mutual aid members and other external agencies;
- To direct them on arrival of external agencies to respective coordinators at desired locations;
- To mobilize oil spill responders and resources for facilitating the response measures;
- To monitor mobilization and demobilization of personnel and resources;
- To provide administrative and logistics assistance to various teams.
- To be responsible for all financial, legal, procurement, clerical, accounting and recording
- Activities including the contracting of personnel, equipment and support resources
- To be responsible for the management of the Emergency Control Centre (ECC)

4.6.5.4. Support Services

Along with administration and communication coordinator following additional coordinators will be nominated at the sea ports and oil installations and delegated the specific responsibilities falling under the basic functions of SIC and/ or CIC for Human Resources Services, Logistics Services, Media and Public Relations Coordinator, Operations and Technical Coordinator, Environmental and Scientific Coordinators and Fire Safety & Fire Team. The important responsibilities of support services that are to be executed through respective coordinators are detailed in the following section:

Human Resources Services Coordinator

Logistics Services Coordinator: In any response there is a vital need to ensure that response personnel are provided with adequate resources to enable an effective response to be mounted. The Logistics Services Coordinator shall ensure that all resources are made available as required. This includes the procurement and provision of personnel, equipment and support services for operations in the field and for the management of resource staging areas.

Media and Public Relations Coordinator: The Media and Public Relations Coordinator shall ensure adequate liaison between the incident management team and the media. All queries received from the media should be directed to this person. Before releasing any information, the Media and Public

Relations Coordinator, action should have the approval of either the relevant Coast Guard Commander or CIC, depending on the size of the spill.

Operations and Technical Coordinator: The Operations and Technical Coordinator is responsible for the provision of scientific and environmental information, maintenance of incident information services and the development of Strategic and Incident Action Plans. He shall ensure the distribution of all information to the Incident Management Team and to all response personnel generally. He is responsible to the CIC for all response operational activities. This includes ensuring that the requirements of Incident Action Plans (IAP) are passed on to operational personnel in the field, and for ensuring that the plans are implemented effectively.

Environmental and Scientific Coordinator: The State Government shall pre-appoint the Environmental and Scientific Coordinator (ESC), either on a State, regional or local area basis. During a spill response the ESC will normally form part of the Operations team. In this role the Operations Team is to provide the CIC with an up-to-date and balanced assessment of the likely environmental effects of an oil spill. The Planning Section will advise on environmental priorities and preferred response options, taking into account the significance, sensitivity and possible recovery of the resources likely to be affected. In major incidents, the ESC may directly advise the relevant Coast Guard Commander.

Fire Safety & Fire Team/HSE Coordinator: Fire and safety officer of Port/ local Fire Station shall be acting as the Fire and Safety Coordinator. Fire and Safety officer will be reporting to the Chief Incident Controller and responsibilities are as follows

- Development & execution of emergency response plan
- Train all team members for fire response
- Overall responsible for fire prevention
- To ensure that everyone is evacuating and none is entering the restricted area during emergency
- Operation and maintenance fire detection, notification and suppression systems
- Providing first aid to the injured person and transportation of the patient
- Recommend the Site Incident Controller to impose as well as release fire emergency

4.6.6. Community

Support of the local community is essential for the success of any response operation, particularly shoreline response. The community will include volunteers from the National Cadet Corps, National

Disaster Mitigation Resource Centres, National Service Scheme, Nehru Yuva Kendra, and Non Governmental Organisations. The specialized National Disaster Response Force may be called in addition to the community volunteers. Awareness programmes are to be conducted for the local inhabitants and also their representatives are to be trained for dealing with the emergencies.

4.7. Local Action Group and Local Action Group Support Team

4.7.1. Local Action Group

In order to aid the support to the Union and State Governments in the event of a major oil pollution incident a Local Action Group (LAG) will be formulated in coastal states. LAG provides support management team, specifically in the roles of response managers, and response team leaders. Each coastal State nominates personnel to the LAG as indicated in **Table 4.2** except Goa, Puducherry Daman and Diu, Lakshadweep and Minicoy, and Andaman and Nicobar which will nominate one response team leader instead of five.

Table 4.2. Composition of Local Action Group

Role	Positions per State
Planning Coordinator	1
Operations and Technical Coordinator	1
Logistics and Administration Coordinator	1
Response Team Leader	5

4.7.2. Local Action Group Support Team

The local Action Group (LAG) is supported by a subgroup Local Action Group Support Team (LST) at the time of event. LST will comprise of following components,

- Environmental Advisers
- Finance & Administration Officer
- Wildlife Officer
- Equipment Operator
- Offshore Containment/Recovery
- Inshore Containment/Recovery
- Engine driver and Lascar
- Vessel-based dispersant spraying
- Shoreline Assessment
- Shoreline Cleanup

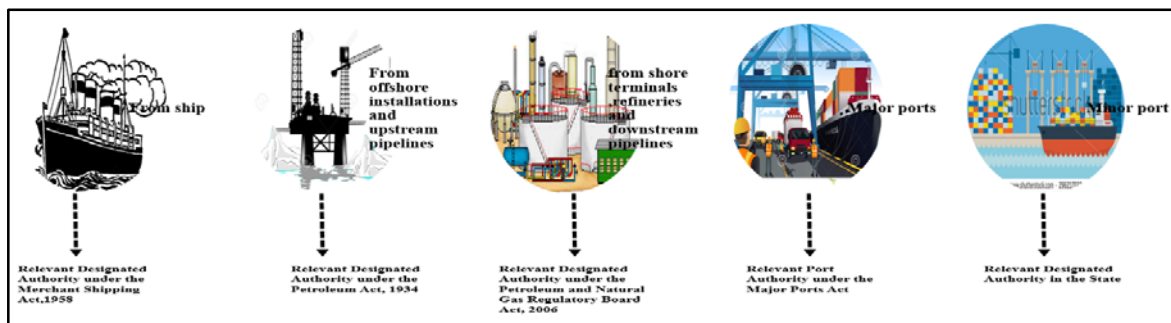
The Equipment Operator role has been broken down into areas of specific expertise. Equipment Operators may be competent in more than one area.

Each coastal State would identify personnel to fulfil these roles, as these personnel would be required when responding to major incidents within their own jurisdictions, and will become part of the LAG when succession planning. Sea ports and oil installations are expected to nominate personnel to these positions. Certified personnel of private oil spill response organisations may also be considered for such roles. Training of LST is the responsibility of the respective coastal States with support of the sea ports, oil agencies, Coast guard and other government agencies, non-governmental organisations, etc. During an oil spill incident, if required, the relevant combat or statutory agency is responsible for activation of LAG and LST in accordance with applicable contingency plans or State arrangements.

Also during an oil spill incident the Chief Incident Controller or the relevant Coast Guard Commander may requisition for personnel from other coastal States to become part of the Incident Management Team or the incident response team. At that time suitable personnel will be selected by Coast Guard from the LAG or the LST of the coastal State with a maximum release period of ten days (including travel time) unless both Coast Guard and the LAG/ LST member’s organisation reach a separate agreement. The selected personnel will remain in the employment of their own agency, and all entitlements in relation to their contract of employment will remain unchanged.

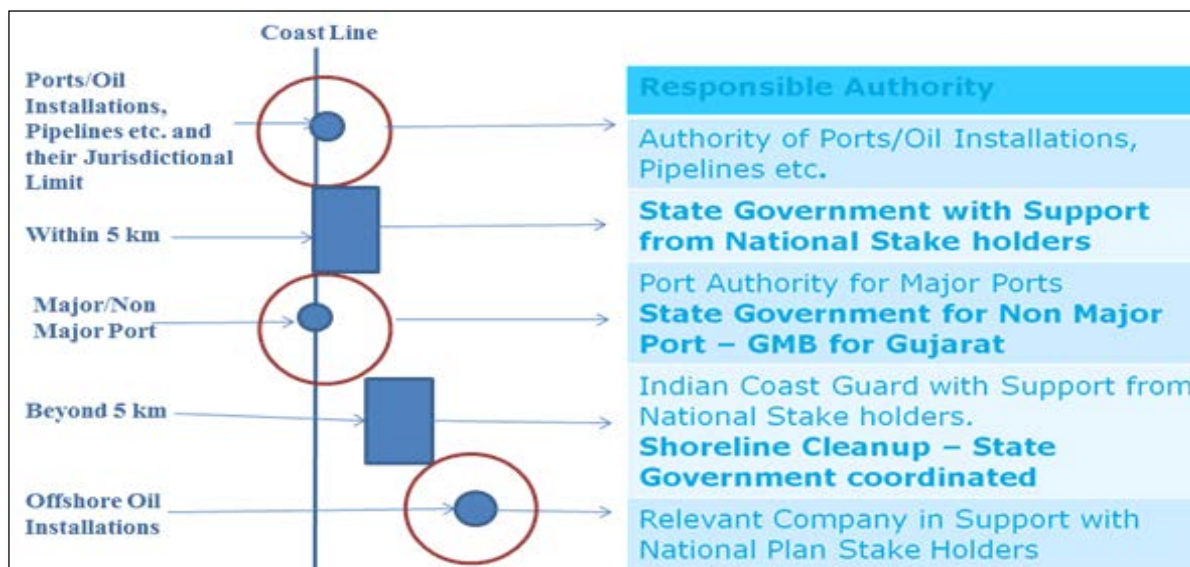
4.8. Responsibility for Responding to Oil Spills

Responsibilities for responding to an oil spill in Indian waters are shared between the Indian Coast Guard, State Governments, Port Authorities and Corporations. Liability for clean-up of both, oil and HNS spills remains with the polluter. The details of the combat agencies and statutory agencies responsible for the oil spill response according to the nature of origin of the spill is shown in **Figure 4.7** and **Figure 4.8**. The resources of the Combat Agency will need to be supplemented by other local, regional, and national resources.



Note : The Statutory Agency is responsible for the institution of prosecutions and the recovery of cleanup costs on behalf of all participating agencies.

Figure 4.7. The Statutory Agencies Responsible for Oil Spills



Note: Combat Agencies have the operational responsibility to take action in order to respond to an oil spill in the marine environment in accordance with the relevant contingency plan

Figure 4.8. Combat Agencies Responsible for the Oil Spill Response

Each port facilities, oil terminal and. Installations should have capability to provide first response to oil spill in their areas(ie Tier 1 level pollution). The capability includes trained manpower and equipment in line with NOS-DCP provision for which are given as **Annexure II**. In cases where additional resources are required, these will generally be available from the local port authority, or from adjacent industry operators under mutual aid arrangements or locally from the Indian Coast Guard.

In case of tier 2 event preparedness and response requires the co-ordination of more than one source of equipment and personnel. ‘Tier 2’ event response requires the assistance from multiple entities within a port area or from national sources outside the immediate geographic area.

Incase of Tier 3 events mobilization of all available regional /national/ international resources are required depending upon the circumstances, will likely involve mobilization of and systems. It is this tier ofresponse where positive advance customs arrangements are critical to facilitate a successful effort. If required, internationalresources can be facilitated by the Statutory Agency through the Ministry of External Affairs.

Incase of oil industry, each company will designate an Industry Adviser. During a tier 2 or tier 3 incident, the Industry Adviser of the affected company will provide a direct high-level linkage to the response organisation. Industry personnel will nominate their personnel to the respective State, District, and Local CMG, Local Action Group, and Local Action Support Team (LST). Each company will designate its CIC and IC. During lesser incidents the CIC shall be

responsible for overall response strategy. The CIC shall keep the Statutory Agency informed of progress with the response. The response actions will be supported by the LAG and LST.

4.9. Discovery and Notification of an Event

Marine pollution needs an immediate response in order to minimize the damage to marine environment. The Indian Coast Guard is the national operational contact point for the receipt and transmission of reports on oil pollution in Indian waters.

4.9.1. Reporting of an Event

Masters or other persons having charge of ships and persons having charge of offshore facilities involved in an incident (any event involving probable discharge of oil, of any quantity, in Indian waters) shall report the particulars of such incidents without delay and to the fullest extent possible to the nearest Indian Coast Guard Maritime Rescue Coordination Centre (MRCC).

In the event of the ship or offshore facility involved in an incident being abandoned, or in the event of a report from such a ship or offshore facility being incomplete or unobtainable, the obligations shall, to the fullest extent possible, be assumed by the owner, charterer, manager or operator of the ship, or offshore facility, or the agent in case of a ship.

Masters or other persons having charge of ships and persons having charge of offshore facilities involved in an incident shall report the particulars of such incidents without delay and to the fullest possible extent to the nearest Indian Coast Guard MRCC any observed event at sea involving a discharge or probable discharge of oil, of any quantity, or the presence of oil in Indian waters.

Persons having charge of sea ports and oil handling facilities in India shall report without delay to the nearest Indian Coast Guard MRCC any event at their sea port or oil handling facilities involving a discharge or probable discharge of oil, of any quantity, or the presence of oil in Indian waters.

Maritime inspection vessels and aircraft of other services including the Air Force, Navy, Border Security Force, Customs department, Forest department, Police, Marine Police, Fisheries Survey of India and Port Pilots, or officials and civil organisations such as Air India and other private aircraft operators shall report without delay to the nearest Indian Coast Guard MRCC any observed event at sea or at a sea port or oil handling facility involving a discharge of oil, of any quantity, or the presence of oil in Indian waters.

Any other organisation (for example, a local authority, harbour authority or environmental organisation) receiving a report of marine pollution of any quantity, or a threat of marine pollution, whether from a ship, offshore installation or unknown sources, should send that information

immediately to the nearest Indian Coast Guard MRCC. The MRCC contacts the concerned Duty Staff Officer. The format for reporting an event is presented in **Annexure III**.

Oil spill event shall be reported in the following events

- Discharge above the permitted level or probable discharge of oil or of noxious liquid substances for whatever reason including those for the purpose of securing the safety of the ship or for saving life at sea; or
- A discharge or probable discharge of harmful substances in packaged form, including those in freight containers, portable tanks, road and rail vehicles and ship borne barges; or
- Damage, failure or breakdown of a ship of 15 meters in length or above which:
- Affects the safety of the ship; including but not limited to collision, grounding, fire, explosion, structural failure, flooding and cargo shifting
- Results in impairment of the safety of navigation; including but not limited to, electrical generating system, and essential ship borne navigational aids; or failure or breakdown of steering gear, propulsion plant,
- A discharge during the operation of the ship of oil or noxious liquid substances in excess of the quantity or instantaneous rate permitted under the MARPOL Convention.

Organizations sending information should make every practicable effort to identify :

- Identity of ships or offshore facilities involved;
- Time, type and location of incident;
- Quantity and type of harmful substance involved;
- The weather, sea state and tidal conditions in the area;
- Assistance and salvage measures; and
- Events and actions so far

The initial report send to the authority regarding oil spill identification can be supplemented as necessary, and provide information concerning further developments; and comply as fully as possible with requests for additional information. The report on identification of any oil spill can be made by radio or telephone or facsimile.

When an incident, which could result in marine pollution, is reported to the relevant Indian Coast Guard Maritime Rescue Coordination Centre (MRCC), the details of the event will be recorded and respective agency or departments will be intimated for the necessary action. The flow chart of the information flow from the site of incident to the cabinet secretariat in the event of an oil spill is depicted in **Figure 4.9**.

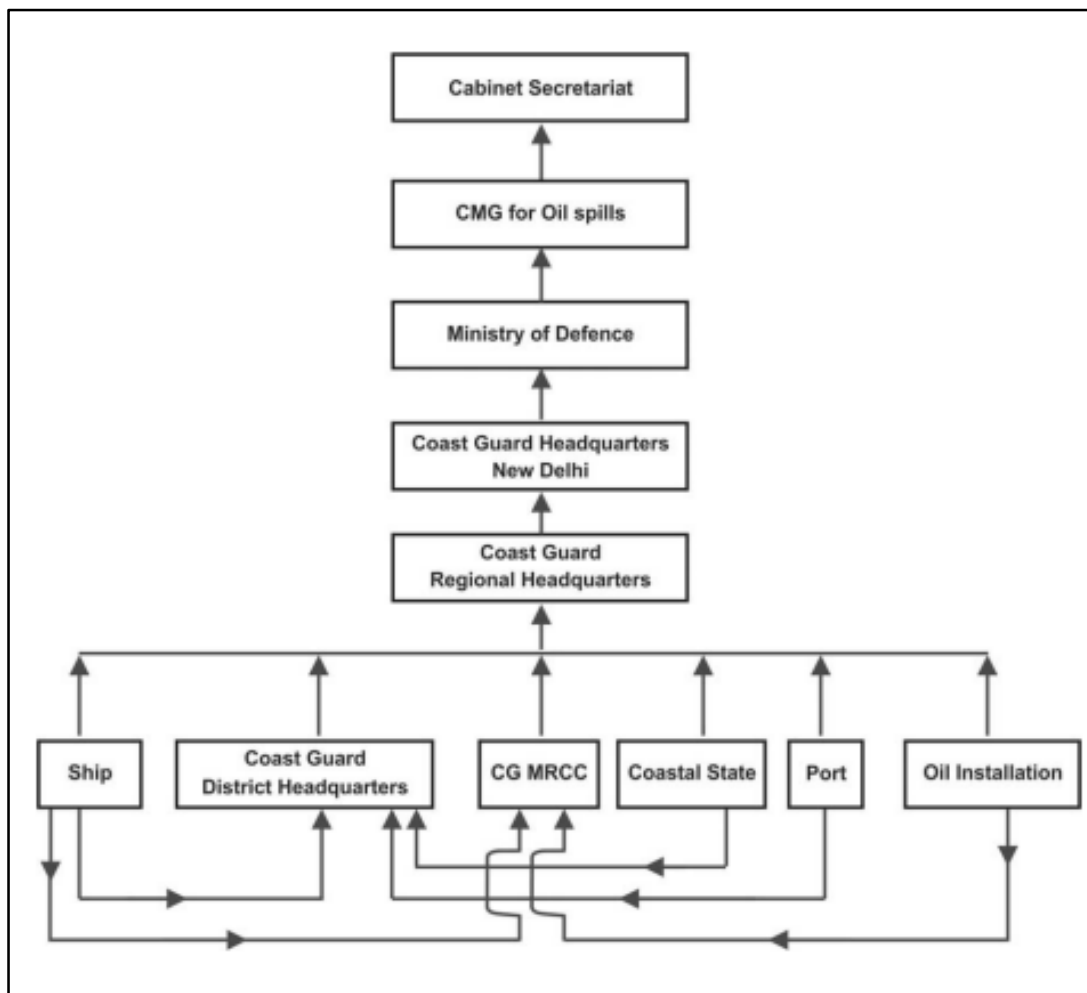


Figure 4.9. Flow Chart of the Information Flow from the Site of Incident to the Cabinet Secretariat

Follow-up on the submitted report regarding the identification of oil spill event will be monitored by MRCC. The MRCC contacts the ship or offshore installation to ascertain, following :

- The nature of incident (collision, loss of containment, etc.)
- The number of people on board;
- The type, size and name of the ship or installation;
- The precise location, course and speed of the ship, and its proximity to other ships, offshore installations, shallow water and the shore;

-
- Information on the ship's cargo, stores or bunkers, and whatever any are dangerous;
 - The structural and mechanical integrity of the ship or installation;
 - The weather, sea state and tidal conditions;
 - Any assistance available to the casualty and the intentions of the Master or Offshore Installation Manager (OIM);

When an incident is reported MRCC initiates any search and rescue response required and then reports any pollution incident or a risk of significant pollution (whether or not known to involve oil or any other hazardous substance, and even if of unknown origin) to the concerned Duty Staff Officer for response action.

After reporting of a tier 2 or tier 3 incident to the Coast Guard, the Regional On-Scene Commander or/ and the National On-Scene Commander will have responsibility of informing all concerned authorities and will coordinate with appropriate level in the State or/ and Central Government till termination of response.

4.9.2 Initial Actions Taken

When an incident is reported to Indian Coast Guard MRCC the following actions will be initiated under the purview of Coast Guard District or Regional Commander as appropriate. ordering aerial surveillance of the ship, if possible with an experienced observer;

- Arranging for inspection of the ship by an IRS surveyor or other qualified person;
- Putting on stand-by or deploying:
- Dispersant spraying aircraft and ships,
- Oil recovery equipment,
- Booms
- Emergency Tow Vehicles (ETVs) or other tugs
- Establishing the availability of salvage and lightering ships;
- Moving the ship to shelter;
- Exercising the power of intervention;
- Obtaining specific weather forecasts
- Requesting control of airspace in vicinity of the casualty; and

- Establishing a Temporary Exclusion Zone (TEZ).

4.9.3 Assessment of the Event

The Regional Headquarters of the Coast Guard are to prepare for combating a major oil spill up to 10,000 tonnes. The requirement of combating a major oil spill above 10,000 tonnes will be undertaken by pooling all available resources and equipment in the country. There for in case of major spill a rapid assessment of the threat presented by the marine accident is essential. If an actual spill has occurred, then the designated Regional Commander, On Scene Commander should, if possible, conduct aerial surveillance of the oil slick and from weather and hydrographic data, predict probable trajectory of the oil slick. If the oil slick is moving offshore towards the open sea, then monitoring on a regular basis is the preferred control option. If the oil slick is moving onshore, then the response could be either containment and recovery, chemical dispersion or shoreline cleanup. The On Scene Commander must evaluate whether the required response is within the local resource capability or requires resources/equipment from other agencies and accordingly advise the Director General, Coast Guard

4.9.4 Criteria for Triggering Regional or National Response

When the Indian Coast Guard MRCC is notified of a major incident, the Coast Guard District or Regional Commander will decide if a regional or national response is warranted. In a local response, the Coast Guard has no role other than to maintain records of any pollution for statistical purposes. In a regional response, the Coast Guard Regional Commander may deploy regional Coast Guard equipment and facilities to support the port authorities, contracted responders or local authorities.

In the event of an incident involving an offshore installation the decision on the level of response will be in consultation with the owner or operator of the offshore installation involved in the incident. NOSDCP lays down no rigid criteria for triggering a regional or national response. However, the Coast Guard District or Regional Commander may trigger a regional or national response as appropriate if;

- A shipping casualty gives rises to the risk of significant pollution requiring a salvage operation;
 - An oil spill from an offshore installation requires the deployment of vessels and/or aircraft by the Indian Coast Guard to contain, disperse or neutralize it;
 - An oil spill within the jurisdiction of a port authority requires the deployment of regional or national resources to contain, disperse or neutralize its, or other action beyond the capacity of the harbour authority with support of mutual aid arrangements;
- or

- A local authority requests the deployment of shoreline response resources and manpower with other states or under national control because the action is beyond the local capacity with mutual aid arrangements

4.9.5 Action after Initiating a National or Regional Response

When a threat of significant pollution justifies a regional or national response, the Coast Guard District or Regional Commander notifies the CCA of the incident. The CCA may decide to supplement the response or stand down.

4.9.6 Situation Reports

A situation report is exactly what the name implies: a report on a situation containing verified, factual information that gives a clear picture of the "who, what, where, when, why and how" of an incident or situation.

In relation to incidents involving ships, Indian Coast Guard with support of the Directorate General of Shipping takes the lead in providing the Ministry of Defence and other concerned ministries officials of the devolved administration affected or potentially affected by the incident, with situations reports.

In relation to incidents involving offshore installations, the Ministry of Petroleum and Natural Gas takes the lead in providing both operations and policy advice. The Indian Coast Guard also disseminates situation reports to the Ministry of Defence and other concerned ministries and the coastal state affected or potentially affected by the incident.

4.9.7 Final Report

A final closure report of all major incidents viz., Tier 2 and Tier 3 oil pollution incidents will be submitted post investigations and analysis to the Central Coordinating Authority and other concerned authorities within 45 days of termination of response by the facility or installation where the discharge occurred.

4.10 International Assistance

Generally the oil industry maintains membership with an oil spill response organisation, such as Oil Spill Response Limited (OSRL), Singapore. M/s OSRL holds a Tier 3 stockpile and provides response training, and other services. The oil industry membership provides for access to OSRL equipment and personnel at Singapore and in the United Kingdom. If resources in addition to the national resources are required to respond to an incident in India, then Oil Spill Response Limited (OSRL) will be called out invoking the membership of the concerned oil company. The Global Response Network is a collaboration of seven major oil industry funded spill response organisations whose mission is to harness cooperation and maximise the effectiveness of oil spill response services worldwide.

The Indian Coast Guard, in accordance with current MoU and relevant International Conventions, may also assist neighbouring countries in relation to oil spill incidents in their waters. Also in the event of a major oil spill incident, it is likely that additional overseas assistance may be sought from overseas in accordance with the International Convention on Oil Pollution Preparedness, Response and Cooperation (OPRC 1990). In such cases, customs and immigration authorities of ports and air ports need to provide immediate facilitation for temporary import of equipment and personnel in order to transfer them in the scene of action expeditiously.

4.11 Cross Border Incidents

In case of incidents close to International Maritime Boundary Line, or incidents which are likely to result in transboundary pollution, high-level consultation and cooperation will be maintained with the Competent National Authority or Authorities of concerned State (s), with due regard to the provisions of any Regional Contingency Plan or Memorandum of Understanding or other arrangement, with an objective to ensure a clear delineation of responsibility for the response. In case of incidents close to State or Union Territory borders, high-level consultation and cooperation will be maintained between the two Statutory Agencies, with an objective to ensure a clear delineation of responsibility for the response.

4.12 Allocation of Responsibilities in the Management of Oil Spills

In the event of a oil spill various responsibilities are allocated to various federal departments in order to aid the speedy recovery and the same is detailed in **Annexure IV**.

4.13 Specialist Advice and Assistance

Specialist technical advice is available to response team from a variety of sources. Advice can vary from the fate of oil, selection and deployment of pollution control equipment, and dispersant use, to the associated environmental effects of an oil spill. Specialist advice can also be provided in relation to the safety and stability of ships.

The range of specialist environmental and operational technical advice in the event of an oil spill in the marine environment that can be provided by varied departments and organisations of the Government of India and other agencies is enumerated in the **Annexure V**.

4.14 Inventory for the Oil Spill Response

As mentioned in previous sections each port facilities, oil terminal and. Installations should required to maintain the equipments and manpower for the response towards a teir 1 level pollution. The standard inventory required for ports, oil agencies, and coastal states in regards of oil spil response is already presented in **Annexure II**. In addition to this, the Indian Coast Guard maintains stockpiles of

equipment at its pollution response centre at Mumbai, Chennai, Port Blair and at Vadar. The Indian Coast Guard also operates two dedicated pollution response vessels. The third pollution response vessel in the series is in the final stages of commissioning. Stocks of oil spill dispersant are additionally held at each Coast Guard Station/ Air Station. The current national inventory is at **Annexure VI**. The national oil spill response capability supported by the concerned Ministries is presented in **Annexure VII**.

4.15. Provision for Mutual Aid

In case of a major emergency it is not possible to combat an event by a individual unit since it will be beyond its capability. Hence it is essential to have mutual aid arrangements with neighbouring industries. Consideration shall be given to the following while preparing mutual aid arrangements:-

- Written mutual aid arrangements are to be worked out to facilitate additional help in the event of Level-II emergencies by way of rendering manpower, medical aid or firefighting equipments, etc.
- The mutual aid arrangement shall be such that the incident controller of the affected installation shall be supported by neighbouring industries on call basis for the support services materials and equipments already agreed. Further, all such services deputed by member industry shall work under the command of the site incident controller of the affected installation.
- Mutual aid associations shall conduct regular meetings, develop written plans and test the effectiveness of their plans by holding drills. Drills are essential to establish a pattern for operation, detect weaknesses in communications, transportation and training. Periodic drills also develop experience in handling problems and build confidence in the organization.
- To make the emergency plan a success, the following exchange of information amongst the member organizations of mutual aid association is considered essential: -
- The types of hazards in each installation and firefighting measures.
- The type of equipment, that would be deployed and procedure for replenishment.
- Written procedures which spell out the communication system for help and response. This is also required to get acquainted with operation of different firefighting equipment available at mutual aid members and compatibility for connecting at users place.

- Familiarization of topography and drills for access and exit details carried out by mutual aid members.

4.16 Inspections

The preparedness of ports and oil handling agencies will be inspected periodically, by nominated Coast Guard officers, acting on behalf of the Central Coordinating Authority, and if deemed necessary, jointly with the concerned statutory authority. The periodicity and manner of such inspections will be as decided by the Central Coordinating Authority. Report of such inspection will be rendered as per the *pro forma* provided in **Annexure XII**.

4.17 Online Oil Spill Advisory System

The Online Oil Spill Advisory (OOSA) system has been developed by INCOIS for use by the Indian Coast Guard and other statutory authorities and combat agencies involved in oil spill cleanup and control measures in the event of oil spill. OOSA delivers the trajectory of the spilled oil immediately, and enables the combat agency to plan clean up activity. On submission of necessary information like location of the spill, date, time, pollutant type and its quantity, the trajectory prediction set up is triggered in the background, along with the forecasted forcing parameters such as wind and currents. The trajectory prediction for a period of 48 to 90 hrs is generated and disseminated to registered users.

OOSA is launched as an experimental set up, and a full-fledged system will be in place after obtaining the feedback/ suggestions from the user community.

4.18 24-Hour Emergency Advice Center

Ensuring access to the initial risk assessment capability 24-hours a day, 365 days a year should be a central element of the contingency planning to deal with chemical spills on water. At a national level, there should ideally be one contact point for ensuring immediate access to information on chemical hazards. It would be linked to the ICE (International Chemical Environment) scheme - a voluntary programme, co-ordinated through The European Chemical Industry Council (CEFIC), to create an international network for chemical distribution incidents. The aim of ICE is to ensure that information on the chemical hazards posed by an incident, practical help and, if necessary and possible, appropriate equipment is provided to the emergency services to minimise adverse effects.

However, it will take time in India to have a complete database and to establish a monitoring agency for the chemicals of its origin, to its hinterland movements, the destination, the customer, the chemical characteristics, the possible threats, the response to such threats and the likely threat to environment. In the interim, it is necessary as much information available through open sources and from the manufacturers and exporters of the characteristics of the chemical substances that are moved

from the Indian ports is gathered and a database maintained by Indian Ports Association (IPA) for supporting an effective spill response.

4.19. Provision for Salvage

If there is a threat of significant pollution the MRCC contacts the salvor or, if not yet appointed, the master or owner of the ship, and the harbour master, if the incident is in a port or its approaches, and offers assistance. The MRCC states that intervention powers may be exercised and instructs those in command of the vessel to provide the Indian Coast Guard information which must include:

- Whether the owner has appointed a salvor and, if so, its name and contact details;
- The broad nature of the contract between owner and salvor;
- Information on the intentions of the salvor; and
- Any other important information that has not yet been gathered.

Simultaneously, as a pollution prevention tactic, the MRCC may also task the contracted Emergency Towing Vessel (ETV) to proceed to the area. The Indian Coast Guard District or Regional Commander decides whether it is necessary to set up a Salvage Monitoring and Control Unit (SMCU) based on the merits of the incident. The members of the SMCU are;

- The Indian Coast Guard District or Regional Commander;
- The Salvage Manager from the salvage company appointed by the ship owner,
- The harbour master, if the incident involves a harbour or its services;
- A single representative nominated by agreement between the ship owner and insurers (for both the physical property and their liabilities);
- The District or Regional Pollution Response Officer;
- A Surveyor from the Mercantile Marine Department
- A Surveyor from the Indian Register of Shipping, if required; and
- An Environment Liaison Officer, nominated by the Environment Group.

In the event that the SMCU is co-located with an MRC, the membership of the SMCU needs to include the members of the MRC with Indian Coast Guard staff fulfilling more than one role.

If it is necessary for the salvage operation in addition to the SMCU another on board salvage team will be established in consultation with India Coast Guard. This team will comprising a coast guard representative, salvage master, crew and a special casualty centre (as per the decision of ship owner).

The Salvage Master will, in consultation with the Coast Guard, strictly monitor and, if necessary, control access to the casualty, establishing any necessary protocols, through the SCR, with the security plan operated by the casualty in compliance with the Interventional Ship and Port Security Code (ISPSC).

Consultation with Coast Guard is essential because every additional body increase the potential problem of rescue, and every additional person increase the risk of confusion as to what the Salvage Master and his crew are doing.

4.20 Requirement of Communication Aids

In a pollution incident it is important that the CIC has access to adequate communication facilities. In addition to the facilities available through the ECC it is envisaged that port and oil installation should have Very High Frequency (VHF) radio facilities, the Coast Guard communications networks would be available to coordinate a response. In a major incident it may be necessary to seek assistance from other Government agencies and utilise the Government Radio Network or the emergency services or Naval radio communications network.

4.21 Training and Exercises

The Indian Coast Guard conducts regular training programs and exercises for personnel likely to be involved in a response to an oil spill in the marine environment. These training programs and exercises are designed to enable India to have sufficient numbers of trained personnel to mount a credible and effective response to an oil spill incident.

Training programs are regularly conducted at two levels, which recognise the overall technical complexity of managing an oil spill response and that the associated knowledge required by personnel varies depending on their level of responsibilities. The two levels of training conducted are:

- Level 2 for middle management personnel responsible for managing the operational response, e.g. incident controllers, their deputies and environment and coordinators, and Fire Brigade (Hazardous Materials) specialists
- Level 1 for operator level personnel, i.e. those undertaking on-site clean-up operations. In a major incident this would also include supervisors appointed as site managers.

A certificate of level 1 course is deemed to be valid for a period of five years from the date of its issue. It is imperative that personnel designated for oil spill response operations undergo periodic training to maintain currency of certification.

The persons qualified in level 2 course will be designated for carrying out duties as Chief Incident Controller and Incident Controller.

Mock drills and exercises will be conducted by every port facility and oil installation at such periodicity and at such scales as required by the Central Coordinating Authority. However, such mock drills and exercises shall in any case be conducted at least once every three months and a record shall be maintained of its conduct including the personnel participated, resources mobilized, etc. Area or regional level exercises will be conducted at least once every six months. National level pollution response exercises will be conducted at least once a year and involve mobilization of stakeholder resources.

4.22 Provision for Place of Refuge

It is generally recognised that when a ship has suffered an incident, the best way of preventing damage or pollution from its progressive deterioration is to transfer its cargo and bunkers, and to repair the damage. Such an operation is best carried out in a Place Of Refuge (POR), that is, a place where a ship in need of assistance can take action to stabilise its condition and reduce the hazards to navigation, and to protect human life and the environment.

It is ideal to pre-designate places of refuge; however, where no pre-designated place exists, it is imperative to have policies in place to enable the selection of a place of refuge.

The State Government is required to adopt specific policies on places of refuge as part of its contingency plan, and these should be followed as appropriate. Regardless of whether places of refuge are pre-designated or not, the following criteria form the basis for their selection:

- Adequate water depth
- Good holding ground
- Shelter from the effect of prevailing wind/swell
- Relatively unobstructed approach from seaward
- Environmental classification of adjacent coastline and fisheries activity
- Access to land/air transport
- Access to loading/unloading facilities for emergency equipment

4.23. Financial Arrangements

Detailed financial records, including all supporting information, are required, and are of particular importance when submitting claims to the Protection and Indemnity (P&I) insurers, as all claims will be assessed to ensure that the costs are reasonable, and are supported by satisfactory documentation.

Agencies should have in place appropriate systems to ensure that these requirements are met and that these are adequately outlined in contingency plans. In general, costs will be considered “reasonable” if they result from actions that:

- were undertaken on the basis of a technical appraisal of the incident
- sought to enhance the natural processes of recovery
- were not undertaken purely for public relations reasons.

4.24 Record Keeping and Preparation of Claims

In order that claims may be processed with minimum delay, it is essential that accurate records are maintained to support claims. It should be noted that claims should be based on expenses actually incurred, that these are made as a direct result of an incident, and that the expenses incurred are reasonable. In the case of economic loss, documentation supporting the claims should demonstrate how the claim has been calculated. The following aspects are to be considered while assessing cost of an oil spill combating and operating, and preparation of claims:-

- Delineation of the area affected describing the extent of pollution and identifying areas most heavily contaminated. This may be best presented as a map or chart accompanied by photographs.
- Summary of events including a description of the work carried out in different areas and of the working methods chosen in relation to the circumstantial evidence linking an oil pollution with the ship involved in the incident (e.g. chemical analysis).
- Labour costs (numbers and categories of labourers, rates of pay days, hours worked, total costs etc).
- Data on which work was carried out (weekly or daily costs).
- Material costs (consumable materials, fuel utilized, food, shelter, etc.).

4.25 Responsibility Allocation for the Preparation of Oils Spill Response Contingency Plan

Statutory Agencies supported by Combat Agencies, are primarily responsible for ensuring that contingency plans are developed at national, state, regional and local levels, and that these plans complement adjacent plans.

Responsibility allocation for maintaining contingency plans is as follows

- The National Oil Spill Disaster Management Plan will be maintained by the Indian Coast Guard Headquarters with inputs from, and in consultation with, stakeholders to the national plan.
- The Regional Oil Spill Disaster Management Plan will be maintained by the Regional Headquarters of the Indian Coast Guard at Gandhinagar, Mumbai, Chennai, Kolkata, and Port Blair with inputs from, and in consultation with, stakeholders to the regional plan.
- The District Oil Spill Disaster Management Plan will be maintained by the District Headquarters of the Indian Coast Guard in each coastal state with inputs from, and in consultation with, stakeholders to the district plan.
- The Local Contingency Plan for shoreline clean-up will be maintained by the Coastal State with inputs from, and in consultation with, stakeholders in the respective coastal state. The local contingency plan should include the following or a cross reference to where such advise can be located:
- The mechanism for escalating the response in accordance with the tiered response concept; guidance on what equipment and personnel is at the disposal of the SRC, including neighbouring local authority resources;
- Arrangements for establishing working accommodation and catering arrangements for members of the SRC and Environment Group and other groups involved in the incident who may need to be in the area away from their own base;
- Arrangements for handing the media, including the logistics of their presence;
- Temporary, intermediate and final sites and routes for the recovery, rescue or final disposal of waste.
- Maps, clearly depicting sensitive sites, access points, terrain types etc;
- Guidance on the health and safety of workers involved in preventing measures and clean-up activities;
- Financial implications of coastal pollution and actions that can be taken for cost recovery.
- Every ship is required by MARPOL regulations to maintain a The Ship Oil Pollution Emergency Plan (SOPEP) approved by the Flag State Administration. The Merchant Shipping (Prevention of Pollution by Oil) Rules, 2010 requires maintenance of a

pollution emergency plan by Indian ships approved by the Administration or Recognized Organisation acting on its behalf.

- Every sea port facility and offshore oil installation and every oil installation on shore with risk of marine oil or chemical pollution is required to maintain a facility contingency plan approved by the Coast Guard.

4.26. Revision of Contingency Plan

The facility contingency plans are to be updated at least annually and revised at least once in every five years or whenever there is a significant change in any of the elements underlying the plan. The occasions for revision could include, but may not be limited to, an addition to capacity, change in traffic density, change in risk, etc. A revision of a facility contingency plan will necessitate fresh approval and the procedure the approval is explained.

The Ministry of Shipping, State Government of the coastal states and Ministry of Petroleum and Natural Gas should have to up date the details of sea port facilities required to maintain a facility oil spill contingency plan, to the Ministry of Defence and the Indian Coast Guard on timely basis.

Also every plan holder should submit an annual return of preparedness to the Central Coordinating Authority viz., the Director General Coast Guard with a copy to the local Coast Guard authority, the District Administration and such other authorities as may be necessary.

4.27. Fishing Restrictions

The State Fisheries Authorities may temporarily prohibit or restrict fishing, on precautionary basis, if resources are, or are likely to become, contaminated to prevent health risk to consumers. A delay in revocation of such prohibition or restrictions must take into consideration the implications for reimbursement of claims for damages from the Protection and indemnity insurance, (P&I) Club (P & I Club is a mutual insurance association that provides risk pooling, information and representation for its members) and The International Oil Pollution Compensation Funds (IOPC) Fund. Guidance on sensory testing of sea food following an oil spill and imposition of fishing restriction is published separately by the Coast Guard.

4.28. Oil Spill Clean up

Procedure for cleaning up of the spilled oil is not an easy task. Various factors need to be considered before carrying out operations. Some of them being amount of oil spilled, temperature of water, type of beaches and many more. When an oil spill occurs, there are very clear rules about who pays for the direct response activities, the cost of assessing environmental damages, and implementing the

necessary restoration. The Oil Pollution Act of 1990, spells out that those responsible for the pollution pay for all costs associated with the cleanup operations.

The responsibility for cleanup of pollution on the water and at jetties wharves/ structure within jurisdiction, and at beach/shoreline owned by the port authority, whatever the source of the pollution, lies with the port authority. Cleanup of shoreline (including land exposed by falling tide) beyond port jurisdiction vests with the local State. In case of major events the Coast Guard District or Regional Commander decides on actions to contain, disperse, or neutralise pollution, and to remove potential pollutants from the scene.

After an oil spill, urgent decisions need to be made about how to minimize environmental and socio-economic impacts. Different response techniques are available for cleanup process. The advantages and disadvantages of different responses need to be compared with each other and with natural clean-up. This process is called Net Environmental Benefit Analysis (NEBA). Net Environmental Benefit Analysis (NEBA) is a methodology for identifying and comparing net environmental benefits of alternative management options, usually applied to contaminated sites. The use of NEBA should result in better decisions, resulting in greater improvements in environmental quality at lower cost.

From time to time India Coast Guard issues circulars for detailing various clauses of NOSDCP. The relevant circulars published by ICG is detailed in following section

4.29 Over view of Circular No: 02/2012

Subject: Guideline on Elements of Facility Oil Spill Contingency Plan

Over view: Every owner or operator of a port facility, oil installation or offshore installation is required to maintain an oil spill contingency plan duly approved by the India coast guard. This circular set outs the desired elements of a typical facility oil spill contingency plan. As per the circular a typical facility level contingency plan should require following three components

- A strategy section, which describes the scope of the plan, its geographical coverage, perceived risks, roles and responsibilities of those charged with implementing the plan and the proposed response strategy;
- An action and operations section, which specifies the emergency procedures that will allow rapid assessment of the spill and the mobilization of appropriate response resources; and
- A data directory, which should contain all relevant maps, resource lists and data sheets required to support an oil spill response effort and conduct the response according to an agreed strategy.

The guiding template for the preparing of a new facility level contingency plan is as presented in **Annexure VIII**. It should be noted that this is only a guideline for structuring the plan.

4.30 Over view of Circular No: 01/2013

Subject: Annual; Returns on Preparedness for Oil Spill Response

Over view: Apart from an approved facility oil spill contingency plan, an inventory of oil spill response equipment proportional to the estimated risk and adequate pool of trained manpower for operating and maintaining the pollution response equipment is required to be maintained by all ports and oil handling agencies. A combined database of such inventories as part of its preparedness for oil spill contingencies in all facilities is maintained by Indian Coast Guard for the smooth execution of oil spill response. With a view to regularly update the national database of inventory and trained manpower every contingency plan holder should pass the updated details of their own oil spill response inventor on annual basis and the same is called as Annual Return .

Every plan holder will submit an annual return of preparedness to the Central Coordinating Authority viz., the Director General Coast Guard with a copy to the local Coast Guard authority, the District Administration and such other authorities as may be necessary. This circular details the required informations and format of annual return. The annual return should be submitted to the Coast Guard Headquarters as on 31st December in each year and the same should be submitted by 15th February at dte-fe@indiancoastguard.nic.in. The format of Annual Return is presented in **Annexure IX**.

Further, the preparedness of ports and oil handling agencies is inspected periodically by the Coast Guard jointly with the concerned statutory authority and the report on inspections will be made according to a pre structured *pro forma*.

4.31. Over view of Circular No: 02/2013

Subject: Radar Oil Spill Detection System at sea port and Handling Facilities

Over view: In 16 the NOSDCP meeting held on 19th April 2011, discussions on a fool proof system to monitor and detect the presence or discharge of oil spill in order to intensify the oil spill response was made. The committee of secretaries in its meeting on 2nd December 2011 decided to study the effectiveness of the installations of oil spill detection software in VTMS radars at ports and VATMS radars of oil companies along the coastline. According to the study result it was identified that the radar detection of oil spill may be achieved by way of IMO type approved SOLAS compliant radar or by installing a software patch on existing radar

Through this circular Indian Coast Guard urged to establish radar oil spill detection system in seaports and oil handling facilities.

4.32. Over view of Circular No: 03/2013

Subject: certification of facility oil spill risk assessment and response preparedness

Over view: The facility contingency plans are to be updated at least annually and revised at least once in every five years or whenever there is a significant change in any of the elements underlying the plan. Every new or updated contingency plan should require an approval from the Coast Guard. For the approval from the coast guard every owner of a port facility, oil installation or offshore installation should submit their contingency plan accompanied with a certificate of endorsement of the facility oil spill risk assessment and response preparedness as per the format prescribed at **Annexure X**, duly endorsed by an officer not below the post of Deputy Conservator of a port facility or the installation Manager of an oil installation, or offshore installation, or equivalent legally responsible authority.

4.33. Over view of Circular No: 01/2014

Subject: Pre-booming of tankers at alongside berths and SPMs

Over view: Pre-booming is the process of completely surrounding any vessels, facilities, or dock areas that are involved in the process of transferring oil. It is a preventative measure to keep potential spills from spreading beyond reasonable limits and driving up costs and damage to the environment. Pre booming of the oil tankers engaged in discharge of cargo at alongside berths and at SPM was the topic of discussion in 17th NOSDCP meeting held on 12th June 2012 and subsequently coast guard examined the feasibility of implementing pre-booming at each port and SPM. The study by the coast guard reveals following facts;

- Pre-booming is practiced at oil berths at Karaikkal, Tuticorin, Chennai, Ennore and Vishakapatnam port and permanent boom is laid on dockside at Sikka Reliance terminal.
- Pre-booming was reported feasible and recommended for oil berths at Mumbai and Kochi.
- Pre-booming was reported feasible but not recommended for oil berths at Mormugao and New Mangalore view obstruction to adjacent berths and low shoreline sensitivity respectively.
- The study further brought out that pre-booming is also not being practiced at any of the SPMs within the port jurisdiction.
- Reported constraints in pre-booming included strong currents and tidal streams, high tidal ranges, periodic change of direction with flood and eddy stream, as also the swing

of tanker at SPM with tide change and presence of standby tug in vicinity for immediate assistance.

However, ecological sensitivity is of significant concern, particularly in the GoK and at Kochi, Kakinada, and Paradip.

With a view to curtail the risk of oil spill, every deliverer will pre-boom oil transfers as a Standard Operating Procedure (SOP). However, when it is determined that it is not safe and effective to pre-boom the oil transfer, a suitable oil spill response craft will be stationed during cargo discharge, in the vicinity of the tanker for immediate response and backed by capability to track a spill in low visibility conditions. The SOP for pre-booming is placed at **Annexure XI**.

4.34. Over view of Circular No: 03/2014

Subject: Measures for Prevention and Control of Oil Pollution from FPSOS and FSUS Operating in Indian Exclusive Economic Zone

Over view: Floating production, storage and offloading (FPSO) unit used by the offshore oil and gas industry for the production, processing of hydrocarbons and for storage of oil designed to receive hydrocarbons produced by itself or from nearby platforms or subsea template, process them, and store oil until it can be offloaded onto a tanker or, less frequently, transported through a pipeline are preferred in frontier offshore regions. FPSOs can store up to 350,000 m³ of crude oil. Operation of FPSOs, therefore, poses a significant threat of oil pollution in the event of a contingency.

This circular details the guidelines for the Measures for prevention and control of oil pollution from FPSOs and FSUs operating in Indian Exclusive Economic Zone and the same is detailed in following section

4.34.1 Measures for prevention and control of oil pollution from FPSOs and FSUs operating in Indian Exclusive Economic Zone.

The measures for the prevention and control of oil pollution required to be complied by masters, owners, operators, charterers of FPSOs and FSUs operating in the Exclusive Economic Zone of India with a view to protect and preserve the marine environment are appended in the succeeding paragraphs.

Recognizing that the unified interpretation of regulation 37.1 requires that FPSOs and FSUs be provided with an oil pollution emergency plan approved in accordance with the procedures established by the Coastal State, no FPSO or FSU shall be used for the offshore production and storage or for offshore storage of produced oil in the Exclusive Economic Zone of India without a shipboard oil pollution emergency plan conforming to the Guidelines contained in Chairman NOSDCP Circular 02/2012 dated 09 August 2012 as amended, and duly approved by the Indian Coast Guard.

-
- Prior to positioning of the FPSO or FSU in the Exclusive Economic Zone of India, the owner/operator/Indian agent of FPSO or FSU shall submit the following to the nearest Indian Coast Guard authority:-
 - Copy of Issue or endorsement of certificate as per revised MAEPOL Annex I;
 - Copy of Shipboard Oil Pollution Emergency Plan as per revised MARPOL Annex I;
 - Copy of International Oil Pollution Prevention Certificate as per revised MARPOL Annex I;
 - Copy of Record of Construction and Equipment for FPSOs and FSOs as per resolution MEPC.139 (53) adopted on 22 July 2005;
 - Copy of International Sewage Pollution Prevention Certificate as per revised MARPOL Annex IV;
 - Copy of Record of oil discharge monitoring and control system for the last ballast voyage as per revised MARPOL Annex I;
 - Copy of Certificate of insurance or other financial security in respect of civil liability for oil pollution damage as per CLC 1969, article VII;
 - Copy of Certificate of insurance or other financial security in respect of civil liability for oil pollution damage as per CLC 1992, article VII;
 - Details of intended position and operation; and
 - Details and contact particulars of the Designated Person Ashore.
 - The FPSO/ FSU or the owner/ operator/ agent acting on behalf is required to provide prior intimation to the Indian Coast Guard of the occurrences of the following:-
 - The vessel leaving field for passage to any port outside India;
 - On leaving the area of operations for operational turn around;
 - As and when any crew change takes place;
 - As and when vessel is off hired;
 - As and when production stopped for more than 48 hrs; and
 - Any discharge of oil, as required by the National Oil Spill Disaster Contingency Plan promulgated by the Indian Coast Guard.

With a view to curtail the risk of oil spill, every FPSO and FSU will pre-boom oil transfers as a Standard Operating Procedure (SOP). If owing to metrological or other factors it is not feasible to safely and effectively implement pre-booming as a SOP. The following alternate measures will be taken by the owner/operator/ agent of the FPSO to address any oil spill:-

- As an alternative to pre-booming, a suitable oil spill response craft will be stationed during offloading, in the vicinity of the FPSO for immediate response;
- On being made aware of a spill, the FPSO will have the ability to safely commence tracking of the spill in low visibility conditions; and
- Within one hour of being made aware of a spill, the FPSO will be able to completely surround the vessel(s) or pre-boom the portion of the vessel and transfer area which will provide for maximum containment of any oil spilled into the water.
- The FPSOs and FSUs will be inspected for MARPOL compliance and oil spill response preparedness by the Indian Coast Guard, independently or with other concerned authorities.
- The Coast Guard may undertake boarding and surprise inspections. The FPSOs and FSUs are to take all measures to facilities safe boarding and provide full cooperation as required for the inspection of the vessel/ presentation of documents.

4.35 Over view of Circular No: 02/2015

Subject: Net Environmental Benefit Analysis (NEBA)

Over view: After an oil spill, urgent decisions need to be made about how to minimize environmental and socio-economic impacts. The advantages and disadvantages of different responses need to be compared with each other and with natural clean-up. This process is called Net Environmental Benefit Analysis (NEBA). This circular explains how the process takes into account the circumstances of the spill, the practicalities of clean-up response, the relative impacts of oil and clean-up options, and the process by which judgments are made on the relative importance of social, economic and environmental factors.

The NEBA for oil dispersants is an assessment of positive and negative consequences of dispersant use, as compare to the use of other response techniques, taking into consideration the biological resources and socio-economics of the region, such as the season, state of fisheries, economic and social values, and other biological resources.

The following documents are to be prepared before proceeding with the NEBA, in order to determine which resources may be damaged and which ones should be preserved:-

- An inventory of the local sensitive resources;
- The vulnerability of the resources identified; and
- The definition of the importance of the resources identified.

The NEBA may performed as follows:

- As a preliminary measure at the facility oil spill response plan development stage; or
- In a specific situation during an oil spill.

A preliminary NEBA is preferred in order for oil spill scenarios of 10 tons, and its exponential values up to and including the worst-case scenario. Each scenario will be supplemented with recommendations on practicability, from an ecological point of view, of dispersant usage or its prohibition. Each potential oil spill scenario must address the following:-

- Description of assets where oil spills are possible;
- Potential oil spill scenarios and spill volumes including worst case spill, physical and chemical properties of oil;
- Results of mathematical simulation of oil spill behavior on water (spreading, possible drift directions, quantitative changes of oil, when presented on the sea surface, which occur due to evaporation and dispersion under the influence of wave energy and currents; amount of oil stranded onshore, oil remaining on the sea surface and penetrating into water column);
- List of ecosystem components that exist within the action zone of the facility contingency plan, depending on the priority of their protection in time of potential emergency scenarios, from the point of view of preserving natural resources, and taking into account their seasonal changes;
- List of economically and socially valuable assets which require protection;
- Prioritization of the identified environmental and economic resources, decided with the local stakeholders;
- Advantages and disadvantages of various available, in-place oil spill response methods including dispersion and an in-principle, assessment of the expected results of each possible response technique: dispersion, containment and recovery, monitoring for action; and

- Impact of floating and dispersed oil on selected ecosystem components and state of the environment in general.

Both natural and economic resources should be considered. In general, endangered species, highly productive areas, sheltered habitats with poor flushing rates, and habitats which take a long time to recover should receive top protection priority. The list should take into account factors like possible seasonal variations as well as the time needed by each impacted resource to recover (damage on a resource which can regenerate quickly is often more acceptable than damage to one which needs a very long restoration time). These factors will affect priorities.

Habitats and resources should be considered as a whole and not independently, as the decision to apply dispersant may benefit particular habitats or resources and at the same time affect adjacent ecosystems.

In terms of priority, it is better to protect the habitat before the species themselves, as the species are dependent on the preservation of their habitat. In terms of species, the objective must be to protect the reproductive potential.

The NEBA for the use of dispersant in particular, must take the following into consideration:-

- Consider the behavior (drift and weathering) of the treated oil (drift according to the current and speed of dilution of the plume) and of the untreated oil (drift according to the current and wind);
- Identify resources potentially affected by the treated oil or untreated surface oil;
- Assess possible vulnerability of these resources (vulnerability = sensitivity + restoration time);
- Rank these resources according to their vulnerability and/or importance and decide on the priorities (what must be preserved, what could be sacrificed);
- Predict the possible impacts for the different response options (e.g. chemical dispersion or not) and make a decision on the use of dispersants;
- In case of conflicting conclusions,
- Preserve the habitat before the species, and
- Preserve reproductive potential.
- Where local birds are concentrated, accord special concern for application of dispersants to ensure that direct contact between dispersants and feathers of seabirds is absolutely avoided.

The NEBA results must include mapping of areas where dispersants should not be used according to different criteria (e.g. seasonal or at any time of year, tides or current, weather conditions, or the size of the spill – tier 1,2,3).

The plot of valuable ecosystem components on environmental sensitivity maps and mathematical modeling of spilled oil behavior constitutes the basis for a NEBA. The results of preliminary NEBA are to be arranged in the form of a set of oil spill response scenarios. The scenarios are to be supplemented with recommendations on practicability, from an ecological point of view, of dispersant usage or its prohibition. The scenarios are to be then included in the relevant facility oil spill contingency plan.

Consequent to conduct of NEBA, consideration of certain response options may be immediately ruled out because of their ineffectiveness in the given conditions and, others ranked in terms of effectiveness and preference. The use of different techniques may be recommended for different parts of the slick. With respect to chemical dispersion, the recommendations must indicate whether it is possible or impossible to use dispersants in a given situation or which parts of the slick should be treated with dispersants.

At the time of an actual spill, approval for the use of dispersants will be given based on positive results of NEBA. Also, decisions will be made on the basis of NEBA, with adjustment if the real spill situation differs significantly from the pre-studied scenarios.

The NEBA results must be documented in a report approved by the relevant pollution control board, or environment ministry.

NEBA is a time intensive process. It is required to be conducted on scientific basis by a team of stakeholders, which preferably includes specialists in several fields (e.g. ecology; bird, mammal, fish, and benthos biology; mathematical modeling of the behavior of spilled oil). Running the scenarios will require specialized models designed for impact assessment.

4.36 Over view of Circular No: 03/2015

Subject: Online Oil Spill Advisory –Stake holder registration and table top exercise

Over view:The Online Oil Spill Advisory (OOSA) is a system to generate the predicted trajectory of oil spill after submitting the details of the spilled oil.. OOSA has been developed by INCOIS for use by the Indian Coast Guard and other statutory authorities and combat agencies involved in oil spill cleanup and control measures in the event of oil spill. OOSA integrates high resolution current and delivers the trajectory of the spilled oil immediately, and thereby enables planning of clean up activity. On submission of necessary information like location of the spill, date, time, pollutant type and its

quantity, the trajectory prediction set up is triggered in the background, along with the forecasted forcing parameters such as wind and currents. The trajectory prediction for a period of forty eight to ninety hours is generated and disseminated to registered users. The OOSA system provides trajectory prediction for both, continuous and instantaneous spills. All stakeholders to the national plan can register as user and access OOSA under <http://www.incois.gov.in/portal/osf/osf.jsp#>, or alternately at <http://115.113.76.60/OilSpill/Login.jsp>. The step by step procedure for “OOSA” Table top exercise is provided in following section

Step1: Create word document with the name of the Company and date of exercise which will be forwarded to the Coast Guard Headquarters with all the relevant outputs. (e.g. MbPT_12 May 15.docx)

Step2: Log into OOS at <http://115.113.76.60/OilSpill/Login.jsp> with e-mail ID and password.

Step3:

- After login, select type of spill as appropriate;
- Region of spill as appropriate;
- In type of spill continuous, enter data in Start date and End date; or in type of spill instantaneous, enter data in Start date and run duration (hrs);
- For start position specify latitude and longitude of the jetty, terminal, installation, fairway, outer harbour, SPM as appropriate;
- Mention pollutants;
- Select quantity released;
- Select units as appropriate;

Step4: On submitting, “Oil spill trajectory prediction system” will appear. Before proceeding, take a screen shot and save in word document for onward submission.

Step5: View output in web map. Take screen shots of the spill trajectory, in small scale and medium scale, and save in word document. Download the output as required. Repeat steps for each scenario and log out.

Step6: Forward the soft copy of word document to the Coast Guard Headquarters at dte-fe@indiancoastguard.nic.in.

4.37 Over view of Circular No: 04/2015

Subject: Revised pro forma for annual return on preparedness for oil spill response and joint inspection.

Over view: As per the NOSDCP 2015, every plan holder is required to submit an annual return of preparedness for oil spill response. The pro forma of the annual return is prescribed at Appendix E7 to NOSDCP 2015. Further, the preparedness of ports and oil handling agencies is inspected periodically by the Coast Guard jointly with the concerned statutory authority and the report on inspections is rendered in the pro forma prescribed in appendix G to NOSDCP 2015.

Through this circular the coast guard had merged the both preformas to a common perfoma which is as shown in **Annexure XII**.

5

PORT PROFILE

Kandla Port established under Major Port Act, 1963 is now one of the busiest major multi-product port of India located in the Kachchh district of Gujarat. The port has been achieved the first position among all major ports of India, in most of the years of last decade. Presently the port can handle dry bulk, break bulk, liquid bulk and container cargo. Being located in an arid region, food grains is one among the most important commodity handled by the port. Other important commodities handled at the port is Coal, Petroleum Oil and Lubricants (POL) and Container Cargo.

5.1 Location

Major Port of Kandla, is situated about 90 km off the mouth of Gulf of Kachchh in the Kandla Creek at Latitude 23 degree 1 minute North and Longitude 70 ° 13' East, is the lone Major Port on the Gujarat coast. Kandla Port has good connectivity by rail and road. It is closest to International Sea Routes. The port has two lane & four lane approaches to NH 8A from the Port Gates. Kandla Port has dual gauge railway system in operation. It is connected by BG link to Mumbai and Delhi via Ahmedabad. The port is well connected with the hinterland by National Highway No. 8-A and broad gauge railway system. The nearest railway station & airport is located at Gandhidham.

Vadinar Oil Terminal is located close to Jamnagar. It is connected by road through SH-25. 12.5km spur line connects the rail gantry of Vadinar Terminal to Modpur railway station. Nearest railway station is Jamnagar.

The location of the Kandla port and Vadinar Terminal is depicted in **Figure 5.1**.

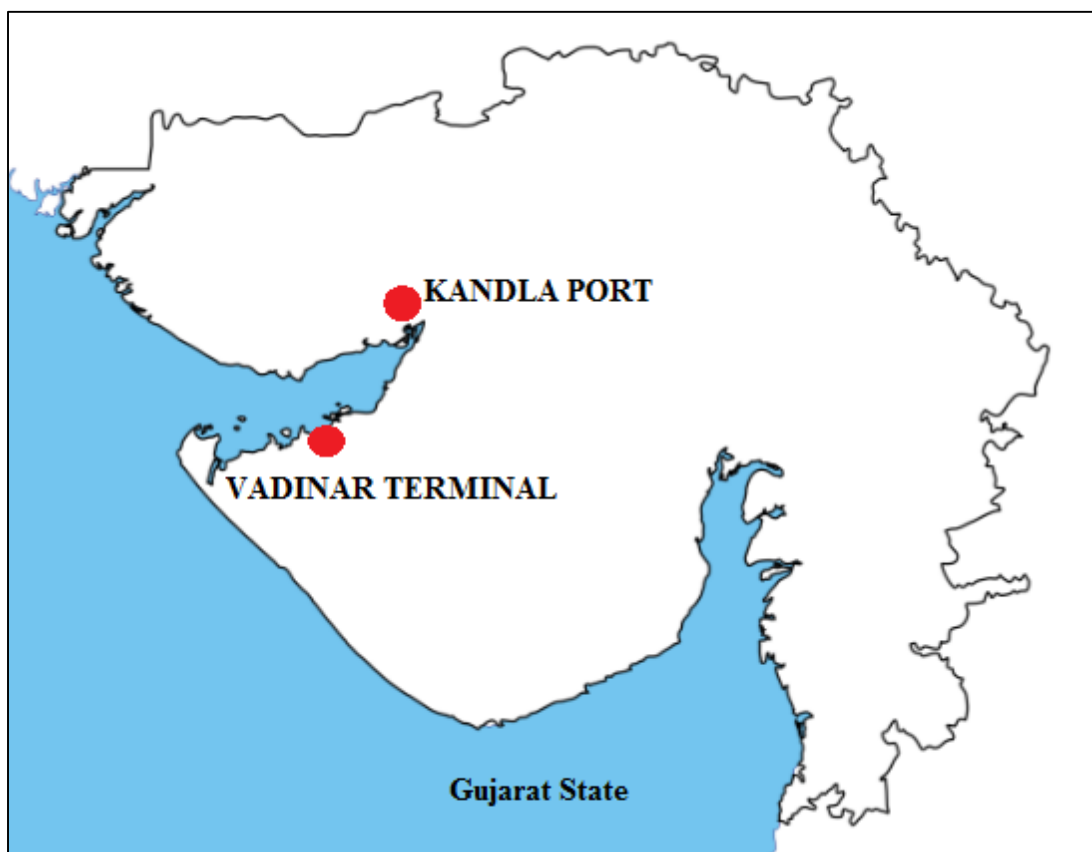


Figure 5.1 Location map of Kandla Port & Vadinar Terminal

5.2. Port Description

It has 12 dry cargo berths with a total of 2.57km in a straightline and 6 dedicated oil berths for handling POL and chemicals. Also there are three Single Point Moorings (SPMs) in Vadinar which can handle Very Large Crude Oil Vessels (VLCC) with a capacity 87,000T to 325,000 Dead Weight Tonnage (DWT) with a maximum pumping capacity of 10000 tonnes per hour. During 2014-15 the port handled 92.5 MT of cargo and thereby retaining number one position for volume of cargo handled among the Major Ports of India.

The total length of the port approach channel is around 26 km. The minimum width is 250 m. The contour depth along the shipping channel is around 10 meters. The KPT & Vadinar Terminal is given in **Figure 5.2**

Being located in the NW Coast of India, Kandla is the closest major port to the Middle East and Europe also it is the en-route port for ships calling at Karachi in Pakistan. Located at the head of Gulf of

Kachchh, it is well protected from strong monsoon winds and high waves of the coast, so is operational throughout the year.



Kandla Port



Vadinar Terminal

Figure 5.2 **Layout of Kandla Port & Vadinar Terminal**

Source: KPT

5.2.1. Existing Facilities at Kandla Port

5.2.1.1. Terminals

Kandla port has 10 berths, 6 oil jetties, 1 maintenance jetty, 1 dry dock and a few small jetties for small vessels. Adjacent to all these terminals and jetties there are storage facilities for covering cargo received in containers to petroleum products.

5.2.1.2. Steel Floating Dry Dock

The existing steel floating dry dock within the port caters the need of Port crafts as well as outside organizations and has capacity to accommodate vessels of following parameters.

- Length overall (LOA) - maximum up to 95 meters.
- Breadth - maximum up to 20 meters.
- Draft - maximum up to 4.5 meters.
- Lift displacement - maximum up to 2700 tones.

5.2.1.3 Chemical & Liquid Handling Complex

The Port of Kandla's Chemical and Liquid Handling Complex has total storage capacity for 21.9 Lakh kiloliters. Private sector storage terminals have capacity for 9.8 Lakh kiloliters.

5.2.1.4 Storage Facilities

Port consist of 185 hectares of custom bonded port area. Port offers an excellent and vast Dry Cargo Storage Facilities inside the Custom Bonded Area for storage of Import and Export cargoes, on very competitive rates. Also it has the largest capacity in India for storing liquid cargoes, and it is served by a modern pipeline network. The storage facility for liquefied petroleum gas has capacity for 30 thousand cubic meters. The container handling facilities include 545 m of quays equipped with four rail-mounted quay cranes and two harbor mobile cranes. The container facilities include an almost 11-hectare container yard, a 6.5 thousand square meter container freight station, and 90 reefer points for refrigerated containers.

The existing storage facilities at the dry cargo jetty area are presented in **Table 5.1**, the liquid storage facilities under private sector is presented in **Table 5.2** and other liquid storage facilities is presented in **Table 5.3**

Table 5.1 Existing Storage Facilities at the Dry Cargo Jetty Area

SI No	Description	No	Area (Sq. M)	Capacity in (Tones)
1	Warehouses	33	1.68 Lakhs	4.47 Lakh
2	Open storage space	67	13.10 Lakhs	32.27 Lakh

Source: <http://www.kandlaport.gov.in/>

Table 5.2 Private Sector Liquid Storage Facilities

Sl No	Name of the Terminal Operator	No of Tanks	Capacity (KL)
1	CRL (Chemicals & Resins Ltd)	112	247000
2	FSWAI (Friend Salt Works & Allied Industries)	132	271650
3	Kesar Enterprise	44	90081
4	N P Patel Pvt Ltd	09	38497
5	FOCT (Friend Oil & Chemicals Terminal)	21	39263
6	USTTL – Liquid Terminal	22	63038
7	Agencies & Cargo Care Limited	27	50000
8	J K Synthetics	14	25176
9	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

Source: <http://www.kandlaport.gov.in/>

Table 5.3 Public Sector Liquid Storage Facilities

Sl. No	Name of the Terminal Operator	No.of Tanks	Capacity (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

Source: <http://www.kandlaport.gov.in/>

5.2.1.5. Port Equipments

5.2.1.5.1. Wharf Cranes

Sixteen Wharf cranes are available at the port that include 4 wharf cranes of 3/6 tons capacity and 4 heavy duty, modern, state of the art, having lifting capacity of 12/16 tons.

5.2.1.5.2. Weighbridges

Nine weighbridges are there inside the port, which include four weighbridge of 40 MT capacity, One Weighbridge of 50 MT capacity, One Weighbridge of 60 MT capacity, One Weighbridge of 80 MT capacity, Two Private Weighbridge of 40 MT & 20 MT capacities respectively.

5.2.1.5.3. Other Support Equipments

Port contain loading equipment such as Forklifts, Tractor, Trailers, Pay loaders of various capacities. Also private handling equipment like Mobile cranes, Top lifters, Pay loaders, Forklifts, Heavy duty Trailers, etc. available on hire at competitive rates.

5.2.1.5.4. Various Facilities

Other facilities available within the port area are

- One deep draft mooring and four cargo moorings in the inner harbour area for stream handling.
- Loading/Unloading facilities for barges available for stream handling.
- Seventy licensed private barges available at competitive rates.
- Adequate storage capacity in both dry and liquid areas.
- 66 KV power supply.
- Standby power to the extent of 2000 kW available for emergency operations.
- Well-developed road network directly connecting the national highway.
- Railway network connecting the broad gauge main line, which is being upgraded.

5.2.1.5.5. Navigation Facilities within the Port

Kandla port facilitate round-the-clock navigation. It offers maximum permissible draft of 12 meters, but projects are underway to deepen the port to 14 meters. presently, the Port can accommodate ships up to 240 meters in length and 65 thousand DWT. Also, the Port offers a huge anchorage area for vessels waiting to enter the port and for lighterage services in the outer harbor. Navigation channel of the port is marked with 22 lighted navigational buoys, and a light house also assists navigation.

5.2.1.5.6. Offshore Oil Terminal (OOT), Vadinar

KPT had commissioned offshore oil terminal facilities at Vadinar in 1978, jointly with Indian Oil Corporation. It has a capacity of 58 MMTPA and handles crude oil and petroleum products. Vadinar is one of the deepest natural draft terminals in India and it does not require any maintenance dredging. The facilities consist of three offshore Single Point Mooring (SPM)/ Single buoy mooring (SBM), two jetties for handling liquid petroleum products, tanks for storage of crude oil and petroleum products

and rail and road gantries for dispatch of petroleum products. 2nd SBM was commissioned in the year 1998. 3rd SBM at Vadinar is for importing crude for the oil refinery of Essar Oil.

The features of the OOT Vadinar is as presented below .

- A draft of up to 33 m at SBMs and Lighterage Point Operations (LPO)
- Handling VLCCs of 300000 DWT and more.
- Providing crude oil for the refineries of Koyali (Gujarat), Mathura (Uttar Pradesh), Panipat (Haryana) and Essar Refinery, Jamnagar (Gujarat)
- Simultaneous handling of three VLCCs possible at the SBMs with vast crude tankage facility.
- Two nos. of 50 Tons state-of-art B.R SRP Pull-back tugs are available for smooth and simultaneous shipping operations on the SBMs and product jetty.
- One oil and debris recovery tug for oil pollution control has been acquired and stationed at Vadinar.
- Excellent infrastructure facilitating transshipment operations, even during the monsoon.

5.3 Operational Profile of the Port

Ongoing operational profile of Kandla port is described in following section :

5.3.1 Commodities Handled

Coal is the largest commodity handled by the port with respect to tonnage. The details of commodity handled at the port during 2014-15 and 2013-14 are given as **Table 5.4** below.

Table 5.4. Traffic Handled at Kandla Port during 2013-14

Sl. No.	Commodity	Tonnage Handled (in Lakh Tonne)		% Increase
		2014-15	2013-14	
Imports				
1	POL	8.67	7.02	(+) 24
2	Edible Oil	34.58	24.90	(+) 39
3	Phosphoric Acid	10.85	9.91	(+) 09
4	Fertiliser	38.47	26.44	(+) 45
5	Iron & Steel	11.82	8.42	(+) 4
6	Ores	11.96	5.98	(+) 100
7	Thermal Coal	97.25	60.80	(+) 60
8	Sugar	12.67	6.11	(+) 107
9	Timber Logs	28.51	26.52	(+) 08
Exports				

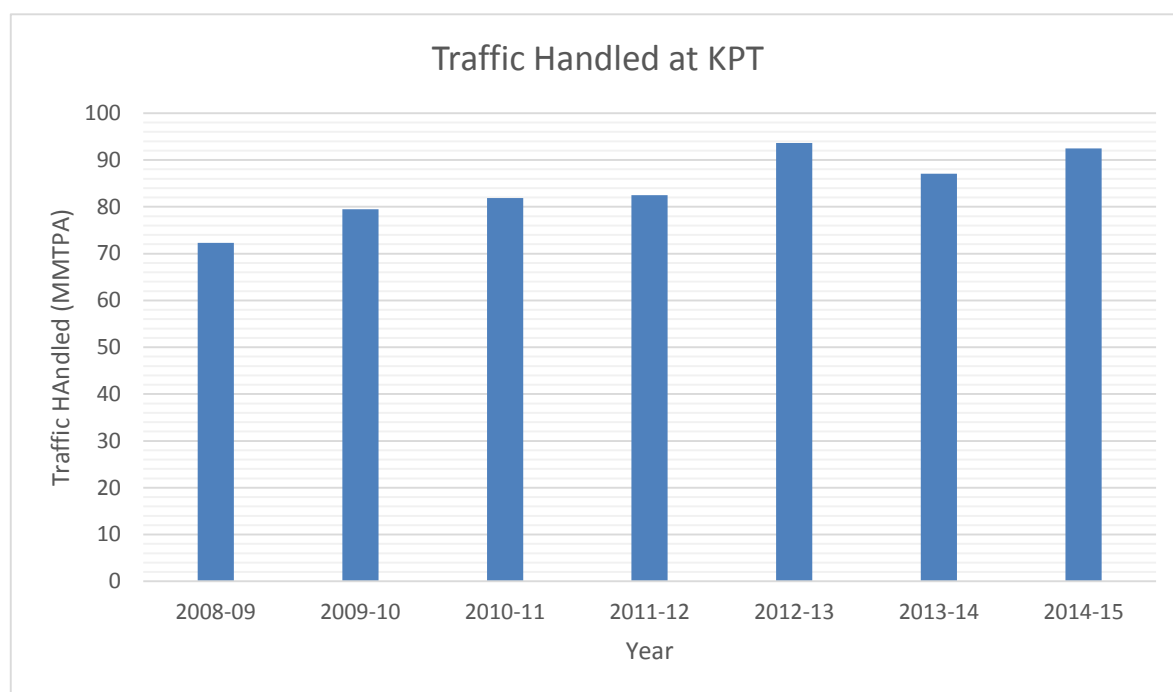
1	Edible Oil	2.10	1.66	(+) 27
2	Bauxite	3.39	0.86	(+) 294
3	Other Food	3.82	3.79	(+) 01

Source: Administrative Report 2014-15

From the above table it may be inferred that 8.67 Lakh Tonne of POL is being handled at Kandla. Also it can be seen that +24 % increase is shown by the POL commodity compared to the previous year.

5.3.2 Traffic Handled at Kandla

Kandla Port has shown buoyant growth in cargo handling in the recent past. The port's share in traffic handled by all major ports has risen steadily over the years. The past traffic profile of the port is shown in **Figure 5.3**. During 2013 -14 & 2014 -15 total traffic handled are 870.05 and 924.97 lakh tones respectively.

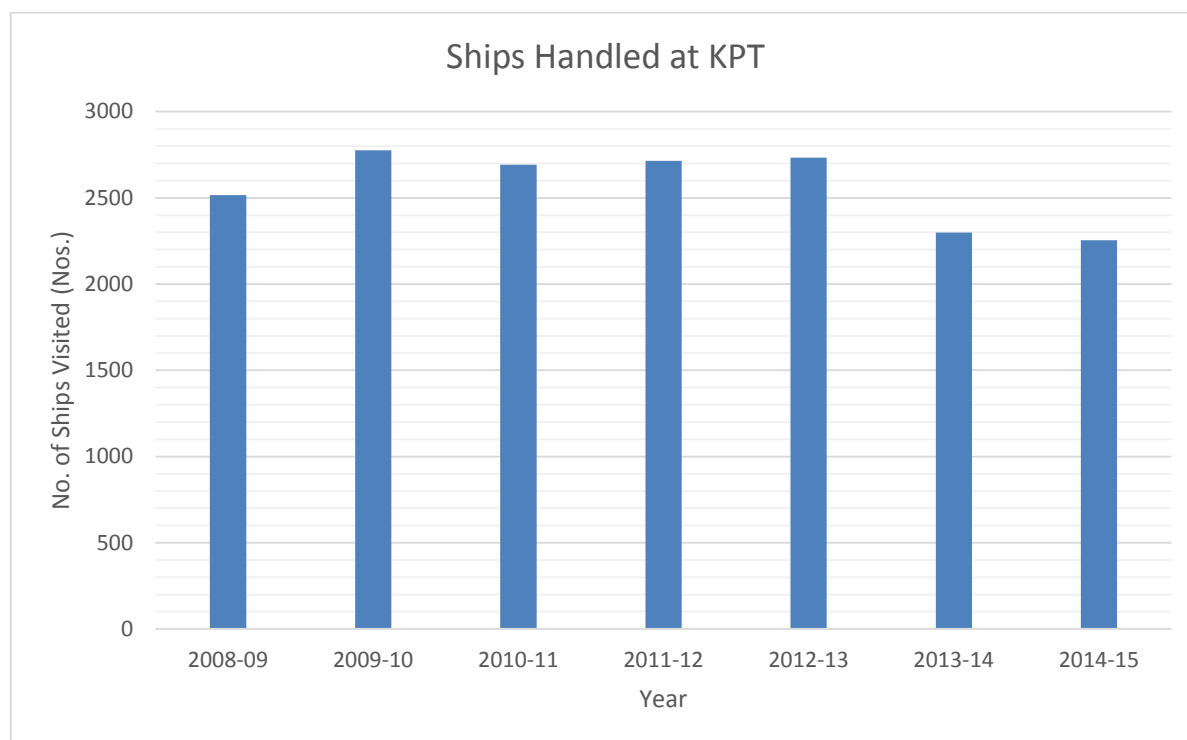


Source: <http://www.kandlaport.gov.in/>

Figure 5.3 Traffic Profile of Kandla Port

5.3.3 Ships Handled at KPT

Total number of ships visited KPT during the year 2008-2015 are given as shown in **Figure.5.4**. During 2013-14 & 2014-15 a total number of 2299 & 2254 vessels entered the port respectively. Among them more than 75 % visited KPT and remaining 25 % visited Vadinar.



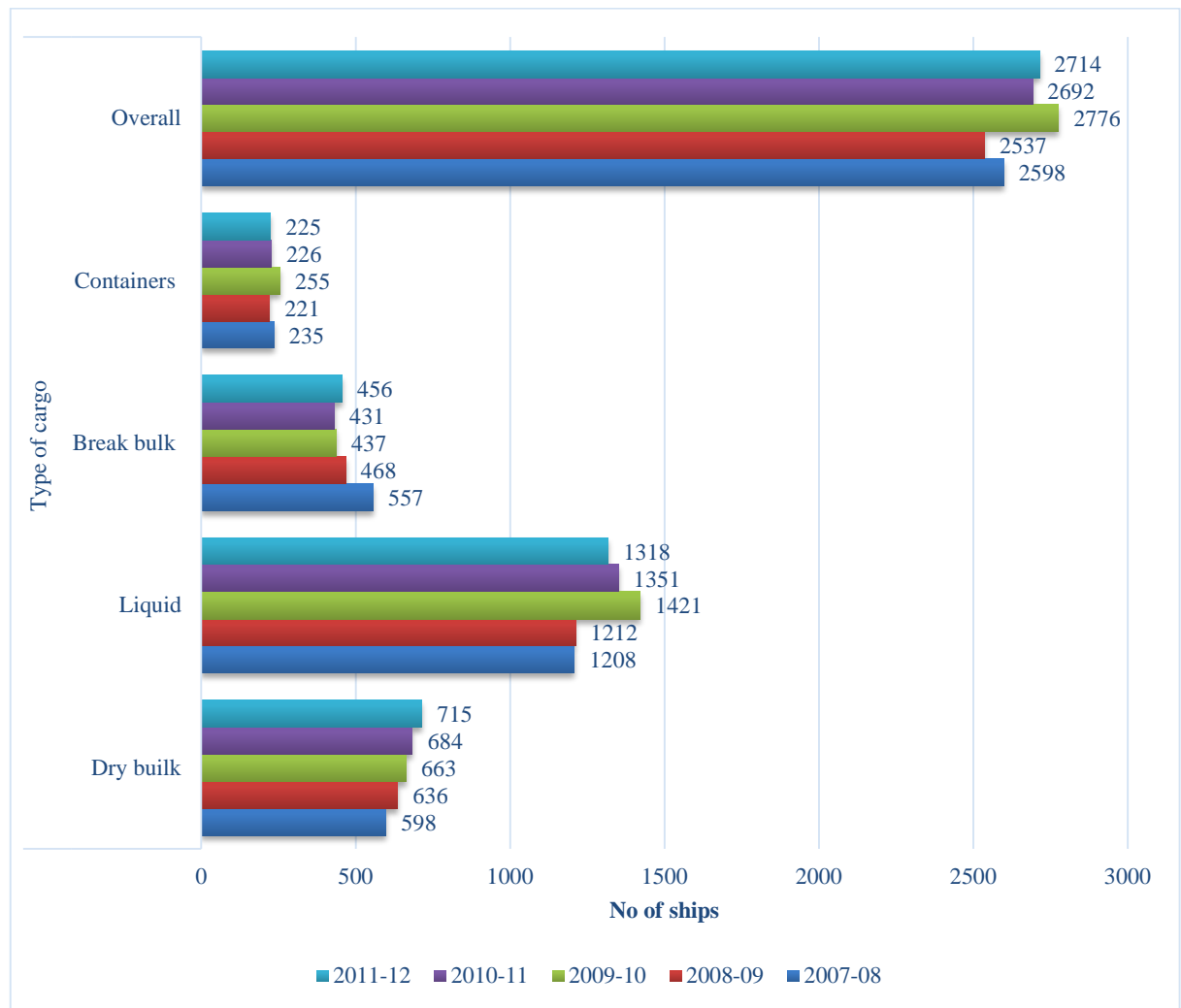
Source: <http://www.kandlaport.gov.in/>

Figure 5.4 Ships Handled at KPT

Total number of ships handled at KPT commoditywise during the period of 2007 – 2012 is as presented in **Figure 5.5**

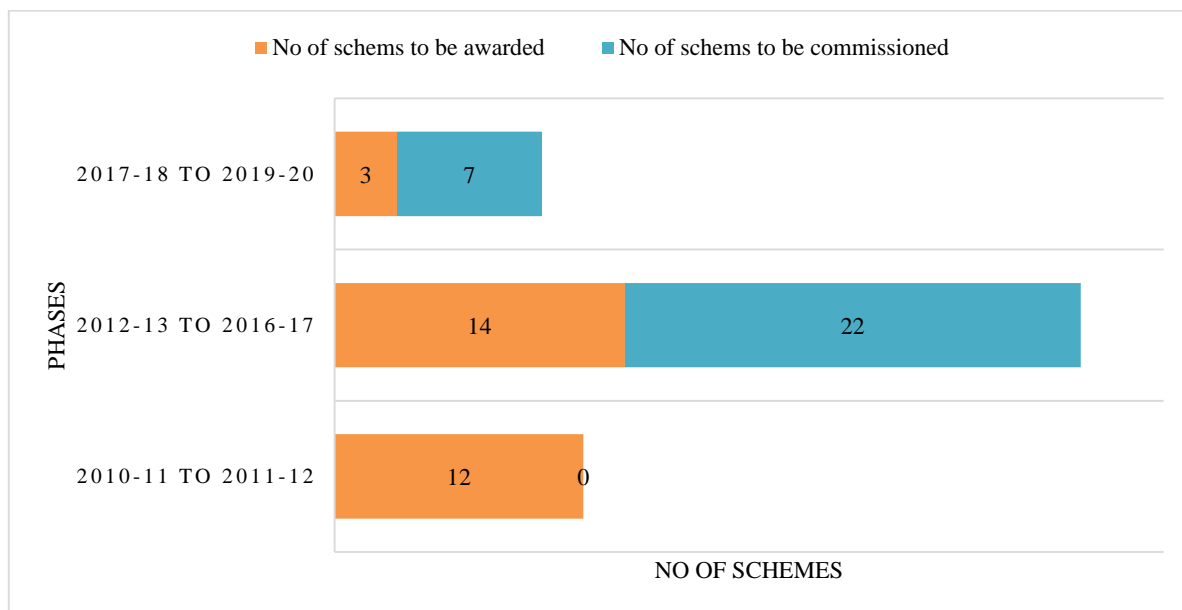
5.4 Future Perspective of Kandla Port

In order to increase the productivity and to reduce the turnaround time KPT have a well-defined future plan. This will in turn demand the capacity addition of the port. The future perspective of Kandla port up to 2020 is shown in **Figure 5.6** and future capacity addition plan up to 2020 is given in **Figure 5.7**.



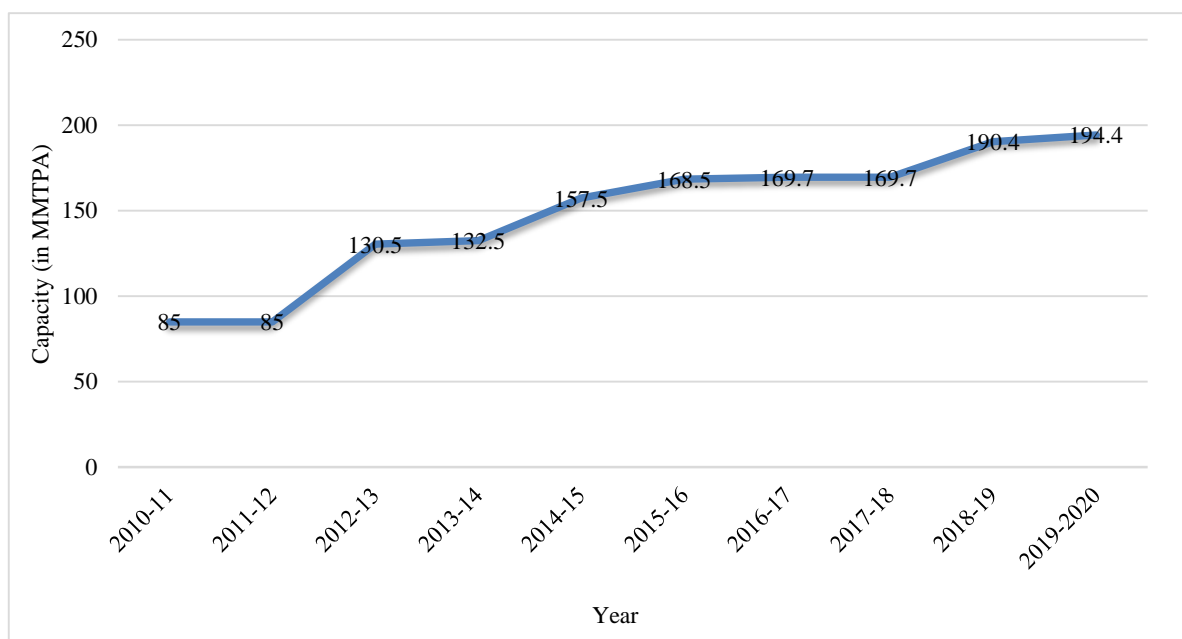
Source: <http://www.kandlaport.gov.in/>

Figure 5.5 Total number of ships handled at KPT



Source: <http://www.kandlaport.gov.in/>

Figure 5.6 The future perspective of Kandla port up to 2020



Source: <http://www.kandlaport.gov.in/>

Figure 5.7 The Future Capacity Addition Plan of Kandla Port upto 2020

Considering the ever increasing traffic at the Port which is also handling the POL, a sound contingency plan should be maintained to cater the threat posed by an uncertain oil spill event. Also it may be noted that Vadinar being the POL hub, extreme caution is required for this area.

SENSITIVITY MAPPING

The area within Kandla Port limit as well as its surroundings is rich in both ecological and socioeconomic resources. As per the It is important to identify the areas of highest risk, so that prioritisation of resources is possible. Appendix E3 of NOS-DCP 2015 - Environmental Sensitivity Index Mapping Guidelines, the role of sensitivity mapping is the "Basis for the definition of priorities for protection, development of response strategy and cleanup operations, considering the oil spill sensitive elements including protected areas, important areas of biodiversity, sensitive ecosystems, critical habitats, endangered resources and key natural resources". In this context,realising the importance of protection of these resources from the impacts of oil spill, resources within the Kandla Port Limit were assessed, and strategic oil spill sensitivity map was prepared for the port limit. This map provides information on the Shoreline Classification, Biological Resources & Human-use resources as per NOS-DCP guidelines. These three are the most important consideration as, it directly implies to the risk from an oil spill in terms of vulnerability, persistence and ease of cleanup. The subsequent sections details are as follows:

- Resources assessment
- Sensitivity Mapping
- Response Considerations

6.1 Resources Assessment

Kandla port located in the northern plank of the GoK, in an area with irregular and dissected configurations, with numerous creeks surrounded by marshy land on the bank of Kandla creek. Located at the juncture of Kathiawar and Saurashtra peninsula, i.e., at a transition zone between arid and semi-arid zone having striking characteristics of the arid area.



Figure 6.1. Kandla Port - An Ariel View

At Kandla, the Gulf of Kachchh narrows down into a distinct constriction getting itself dividing into a creek system often called the Little Gulf of Kachchh, leading to an area called Little Rann of Kachchh (LRK) which receives water supply only during the high tide. Hence close to the port area are vast mudflats and many of them are hard flats, which gets submerged only during the spring tide. Among them Sathsaida bet is the largest. Aerial view of Kandla port is given as **Figure 6.1**. The top of the picture depicts the Sathsaida bet whereas the bottom is the port area with its tank farms and warehouses.

The port limits extend from Navlakhi at the head of GoK to Narara Bet in the southern arm. While from Tuna in the north coast to Kalumbhar Bet in the southern arm. The limit is bounded by Kachchh in the North & North-East, Morbi at East and Devbhoomi Dwaraka & parts of Jamnagar district towards South & South-East respectively. Along the coast there are numerous coastal villages with people engaged in traditional occupation of fishing hosting large and small fish landing centres. Also being the adjoining land masses of ports, many of them have been developed into port towns and subsequently developed as industrial pockets.

Within the port limit is the most productive and diversified habitats along the West coast of India. The high tidal influx covers vast low lying areas comprising a network of creeks, marshy tidal flats and rocky regions which provide congenial environment to a wide variety of marine biota. The northern shore is predominantly sandy or muddy confronted by numerous shoals and creeks also sustains large stretches of mangroves. There are vast mudflats towards the Mundra coast. There are narrow beaches

along the coast behind the mudflats. Towards the southern limit, shoreline is comprised of numerous islands and inlets which harbour vast areas of mangroves and coral reefs with living corals.

Important organisms includes algae, mangroves, corals, sponges, molluscs, prawns, fishes, reptiles, birds and mammals. In order to protect the rich biodiversity of the Gulf of Kachchh, several intertidal mudflats and coral reefs along its southern shore are declared as Marine National Park and Marine Sanctuary (MNPS). There are also areas declared as Important Bird and Biodiversity Areas (IBAs) which are large bird flocking areas, Important Coastal and Marine Biodiversity Areas (ICMBAs).

Thus the peculiarities of Kandla Port Area which are to be duly considered with respect to oil spill sensitivity can be briefed as follows:

- An all-weather Major Port with several oil handling facilities including SPMs within port limits
- Dry Weather and Mild Monsoon
- High tidal ranges and strong tidal currents
- Extensive creek system acting as tidal channels
- Valuable ecological resources such as Corals, Mangroves, Mudflats and bird flocking areas around the vast creek system
- Extensive socio-economic activities including Special Economic Zone (SEZ), saltpans, fishing areas and intake points of shore based industries.

Important features of the port area are discussed below which directly has relevance to oil spill sensitivity and its response. Map showing KPT limit with its facilities, adjoining land and marine features of the areas are given as **Figure 6.1** below.

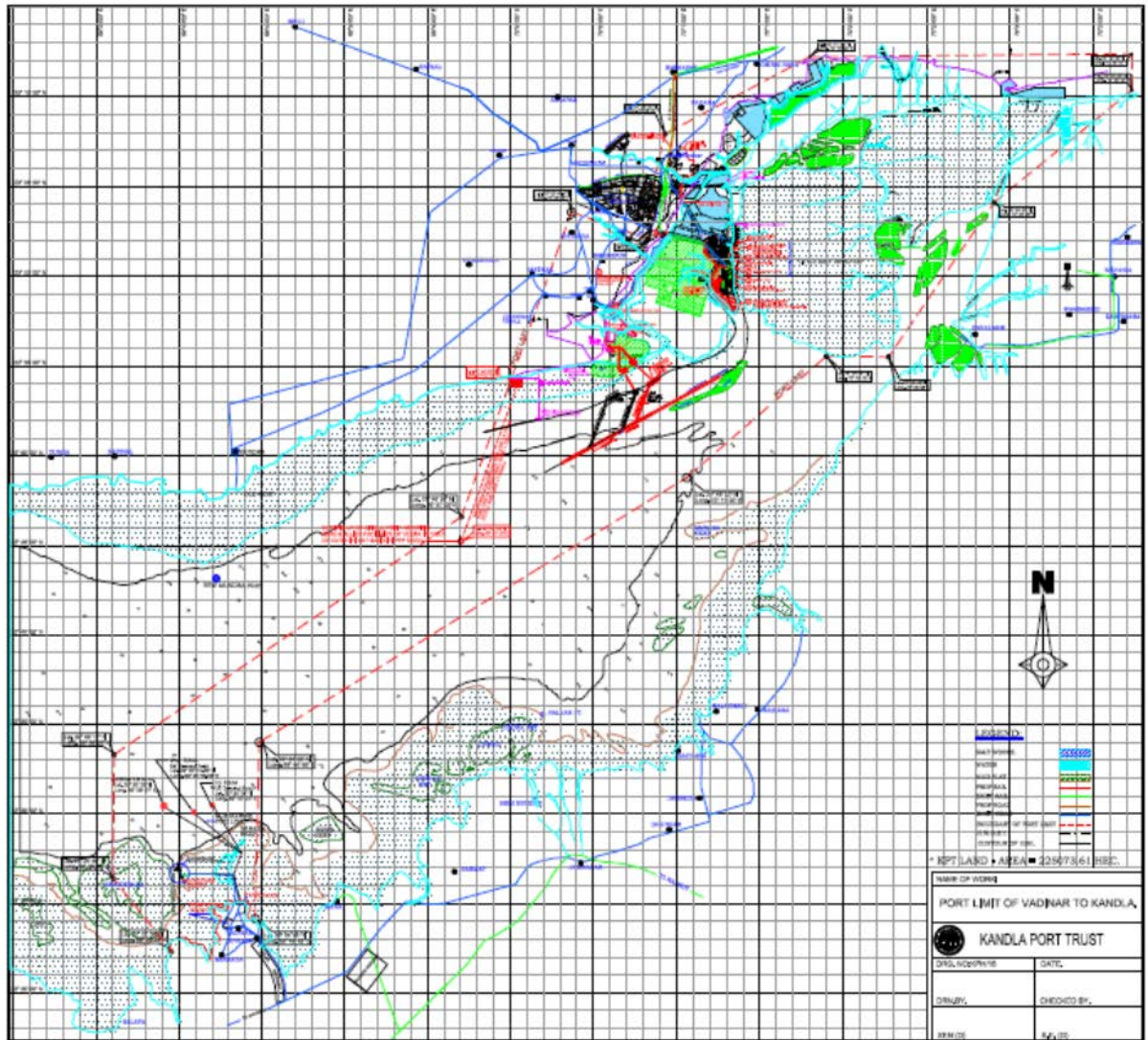


Figure 6.2. KPT Limit

Kandla Port is located inside extensive creek system surrounded by bays including intertidal and high tidal mudflats, while its limit extends to the MNPS where the Vadinar Terminal is located. Because of its geographical extent the area is described as two zones- Kandla Zone for the areas in Northern side of the port limit and Vadinar Zone is located towards the southern side of port limit. The inner portion of Gulf area has more uniform and stable environmental conditions. Kandla port region is free from significant wave disturbances while the Vadinar has marine meteorological conditions dominated by tides and monsoons. The important features of the port limit is given as **Table 6.1**.

Table 6.1. Important Features of the Port Limit

Sl. No.	Nature of Coast	Coastal Stretch	Length (km)	Major Geomorphic Feature
1	Mix- Wave & Tide dominating Coast	Mundra - Tuna	45	Mudflat, Paleomudflat/ Salt Pan, Ebb Delta/ Sand Ridges
2	Tide Dominating Coast	Tuna - Kandla	15	Mudflat including Hard Mudflats bordering LRK, Paleomudflat/ Salt Pan, Mangrove
3	Tide Dominating Coast	Kandla - Vadinar	60	Islands of southern arm such as Kalumbhar and Narara with Corals, Mangroves & Mudflats.

Source: S.B. Sukla et al, Indian Journal of Geo-sciences, 2010

6.1.1. Kandla Zone

Kandla Zone includes the area near urban settlement Gandhidam towards West barren land including Sathasida bay occupying the South-West portion of LRK and adjoining creek system. The areas as a whole have a marshy nature and the high water balance make the area hypersaline. Almost the entire shoreline of Kandla zone is highly corrugated, which are the extension of LRK i.e., the fringing Rann with mangroves on banks of the creek. The port area is immediately surrounded by barren marshy lands especially in the North & North East. There is growth of mangroves including plantations towards North, North East and South and South West. Also there are extensive salt pans surrounding the port. Settlements are there within the port area as well as towards the West of the port.

Average depth of the area at head of Gulf of Kachchh is 20m. Near the Kandla creek the depth reaches 5m or less. The present channel is called the Sogal Channel. And dredging is concentrated for about 2.3km length out of the approach channel 23km. (Coastal Environments- Problems and Perspectives, K.S Jayappa, A.C. Narayana). The width of the channel varies from 200 meters to 1,000 meters. The contour depth along the shipping channel is around 10 meters.

Tides in the Gulf are of mixed, predominantly semidiurnal type with a large diurnal inequality. The high tidal factor can be attributed to the shallow inner regions and narrowing cross-section. Tidal range in the area is around 7m. Tidal expense of along the shores of Kandla increases the Gulf up to 2 km Kandla. There are strong currents up to 3 knots.



Figure 6.3. Important Resources of Kandla Zone

6.1.1.1. Creek

The vast creek systems of Kandla function as tidal channels. The width of the channels are highly variable and there are smaller channels that are mud during the low tide and submerge during the high tide. Kandla creek is the major creek of the area. Two large creeks, Sara and Phang creeks join the Kandla creek and act as its tributaries. Besides that, one more creek, Nakti creek also joins the Kandla creek at the confluence of Sara and Phang creeks.

All these creeks bring water from Little Rann into the Kandla creek, which has a fairly good depth and stable banks. The width of the creek channel varies from 200 m in the upstream to 1000 m at the mouth and the depth varies from 8 to 12 m, while the tidal height ranges from 0.83 to 7.2 m, with tidal currents varying from 0.08 to 2 m/s. Kandla and Nakti creeks however retain high salinities (> 35 ppt) even during monsoon. (Vijayalakshmi Nair). Tuna area is having smaller creeks.

6.1.1.2. Mudflats

The port is surrounded by vast mudflats that get inundated during high tide. Sathsaida Bet, Khengriji bet are important of them. They consist of thick deposits of very soft marine clay up to a depth of 12-15m underlain by calcareous sand and highly weathered, weak sedimentary rock formations comprising of compact sand, siltstone, claystone and sandstone (Vijayalakshmi Nair). The mud flats of Kandla port area are important bird flocking sites.

Sat Saida Bet is located opposite to the Kandla Port and falls within the port jurisdiction. It is a vast tidal inundated area mostly made of mudflats and tidal swamps. Small creek systems arising from Kandla creek, Nakti creek and other creek systems bring tidal water to this Bet and vast area along the fringes gets flushed tidally. Sat Saida has natural but degraded mangroves of around 10sq.km which are mostly present along the banks of the minor tidal creeks and seawater inlets. Sat Saida Bet is surrounded on all three sides by creek systems creating a conducive environment for the mangrove

plantation. Remoteness of the site and presence of vast mudflats renders Sat Saida Bet an ideal site for mangrove plantation activities. The southwest portion of the Sathsaida bet is known as Flamingo flats which are many times referred to as shoals. Birds like Pelicans are often found swimming the water near these flats. Tidal Pools are often formed in the mudflats which forms habitat various small marine organisms. Khejranji Bet is another important bets of the area.

6.1.1.3. Salt Marshes

Salt marshes are halophytic areas with grass, shrubs or dwarf wood on alluvial sediments bordering salinewater bodies with tidal fluctuations either tidally. Vast complex of marshland is present lying crisscrossed by innumerous creeks.

6.1.1.4. Salt Pans

Saltpans are unique tide water impounded enclosed system adjacent to creek environment. They are characteristically exposed to a wide range of environmental stress and perturbation which manifest mainly through salinity changes. The distinct feature of the brine ecosystem is its biotic simplicity and stability. saltpans are immature ecosystem as compared with a typical marine system and harbour a high proportion of opportunistic and fugitive species These saltpans serve as feeding grounds for a variety of resident as well as migrant birds. They are small shallow more or less rectangular man made depressions where saline water accumulated and evaporates leaving salt deposits. There are aquaculture activities occurring in the area were coastal waterbodies used for breeding and rearing of brackish/ saline water in captivity. Mainly salt pans are used seasonally as aquaculture ponds.

6.1.1.5. Sandy Ridges & Beaches

There are narrow ridges of coarse sand and shell from 0.3m to 1.8m height from the Rann on the Western side of the Nakti Creek. Flamingo flat of dry mud extends up to 4km off the South-Western side of the Sathsaida Bet is an important mudflat of the area. Also the southern side of the Sathsaida bet on the eastern side of the entrance of Kandla creek is fronted by ridges of coarse sand and broken shell. Also between Mundra and Kandla there narrow sandy beaches.

6.1.1.6. Shoals

Sand bars and islands which change their location frequently are present in the area parallel to the entrance of Kandla creek from Jodiya onwards. The important them are as follows:

- Kaladara Shoals - Hard dry sand dries 2.7m south-westward of the Flamingo flat consisting of hard sand
- Kapoor shoal – Parallel to Kaladara with least depth 1.2m consists of ridges and pinnacles of coarse sand , small stones and broken shells

- Mid shoal
- Sangvi Shoals

6.1.2. Vadinar Zone

Vadinar Zone is located in the border of Jamnagar and Devbhoomi Dwaraka Districts. Ecologically important coastal ecosystems or habitats such as corals, mangroves, mudflats, flocking areas of birds are present in the area with peak concentration of including the migrants during the winter season i.e., from October to February. The important features in Narara Zone is given as **Figure 6.4**.



Bird flocks near

Mangrove of MNPS Islands

Narara Island

Figure 6.4. Important features in Vadinar Zone

6.1.2.1. Coral Islands

Towards the southern port limit near Vadinar there exists two coral islands Kalumbhar and Narara.

6.1.2.1.1. Kalumbhar Island

Kalumbhar is the largest island in the GoK having some agricultural land, excellent corals and associated reef flora and fauna in North, North-Eastern and Western side of reef. Narara bet also has coral reef associated with it which gets covered at 0.8m fringing Narara Bet and extending about 3.2km North and North East of the island. The seaward edges of all reefs are generally steep (NBDB & MSSRF). They form an integral part of the MNPS. There are mudflats in the centre and sandy beaches towards North and North-West. These mudflats and beaches are intervened by many creeks which supplies tidal water.

6.1.2.1.2. Narara Island

Narara has Hard Coralline Areas, Sandy, Muddy habitats with Mangroves, Sea Weeds and Sea Grass. Northern areas along the reef edge support subtidal corals. Reef flora and fauna in good condition, diversity is good, mangroves in excellent condition. Nesting sites of many birds (NBDB & MSSRF) are present here. The intertidal expanse at Narara Bet varies from 2.5 km to 3.8 km. The main algal zone is however confined to 1.2 to 2.5 km (Vijayalakshimi Nair, 2002).

6.3 Biological Resources

The marine vegetation is highly varied, which includes sand dune vegetation, mangroves, sea grasses, macrophytes and phytoplankton. In general, the northern shore of the Gulf supports very poor algal diversity.

6.3.1 Corals

Most of the Islands in the Souther arm GoK support fringing reefs and the coral patches are also found between Islands. The present day coral growth is patchy rather than reefs as they are supported by intertidal sandstones or wave cut eroded shallow banks. There are also coral pachthes near Off Mundra-Mandvi Coast.

Corals near Vadinar have a moderate live coral population with variety. These corals are already under environmental stress due to heavy sedimentation. The sturdy corals like Goniopora, Porites, Favia and Goniastrea are the common species. Live corals are mainly confined to the lower littoral and shallow subtidal zones (< 8 m). The distribution of live corals along the intertidal reef flat of Kalubhar is closely comparable with that of Narara Bet. Live coral colonies are relatively more especially at the lower reef flat of Kalubhar as compared to Narara Bet. The corals are mainly represented by the genera Favia, Favites, Porites, Goniastrea, Goniopora, Pseudosiderastrea, Cyphastrea, Symphyllia and Turbinaria. The live corals are absent at the reef edge of 50 m width while their coverage increases (90 to 100%) at the reef slope below 1 m depth. These corals are under high environmental stress due to heavy sedimentation which is more prevalent along the eastern side. Hence live corals are mostly confined to the subtidal and the lower reef flat and absent at the upper reef flat.



Figure 6.5. Corals of Narara

Eastern segment of Narara Bet, have as vast mud flat and hence the presence of coral is less. The live corals are restricted to the subtidal regions upto 8 m depth while they are absent beyond 15 m depth due to sandy/ muddy bottom. Kalubhar Island has relatively better live corals diversity as well as density at the lower intertidal and subtidal (< 1 m depth) as compared to Narara Bet in its north and north-west regions. (Vijayalakshmi Nair, 2002).

6.3.2. Mangroves

Kandla zone is dominated by extensive patches of mangroves predominated by *A. marina* including natural ones and plantation. Other dominant species are *A officinalis*, *Bruguiera parviflora*, *B gymnorhiza*, *Rhizophora mucronata*, *R. apiculata*, *Ageiceros corniculata* and *Sonneratia apetata* alongwith the associated species of *Salicornia brachiata*, *Sueda fruticosa*, *Artiplex stocksii* and a lichen, *Rosella Montana*.



A. marina



A officinalis



Bruguiera parviflora



B gymnorhiza



Rhizophora mucronata



Avicennia corniculata

Figure 6.6. Important Mangrove species within KPT limit

Middle and downstream portions of Kandla Creek was seen with dense patches of mangroves with species of *Avicennia marina*. The Nakti Creek sustained dense mangrove vegetation at both the banks. The average density of plants was seen between 150-225 plants/100m² with average height varying 0.5-3.5m in Kandla and Nakti Creek. Also there are natural mangroves in the Tuna region within the jurisdiction. A total plantation of 520 ha has been covered till the end of April 2013 in the Sat Saida Bet, mainly *Avicennia marina* and in the Nakti Creek total area of 150 ha. Higher & better vegetation is seen in Tuna mangroves and also they have better regeneration potential.

Narara bet harbours a dense mangrove forest covering an area of 116.57 ha where as sparse mangroves for 135.55 ha along the eastern and western side. *Avicennia marina* is the dominant species having a height between 0.5 to 2m. About 0.5 km² area of Narara Bet was afforested with *A. marina* by the MNPs Authorities. About 6 species of mangroves and 4 associated species are recorded at Narara Bet. *Salvadora persica*, *Salicornia brachiata* and *Suaeda fruticosa* are occasionally seen along high saline zones at the supralittoral and nearby saltpans. (Vijayalakshmi Nair, 2002).

There are natural formation of open scrubby type, with isolated and discontinuous distribution from Kandla- Navlakhi.

6.3.3. Sand dune flora

Seashores of the port limit mainly hosts shrubby and herbaceous vegetation. Most of the plants on the shore are prostrate and xeromorphic in nature, e.g. *Euphorbia caudicifolia*, *E. nerifolia*, *Aloevera* sp, *Ephedra foliata*, *Urochorda setulosa*, *Sporobolus maderaspatenus*, *Eragrostis unioides*, *Calotropis procera*, *Fimbristylis* sp, *Indigofera* sp and *Ipomoea* sp. and *Launea sarmentosa*. The vegetation becomes gradually stable at a distance away from the tidemark with the stabilization of the soil.

6.3.4. Marine Algae

Marine algal species within the port limit are mainly found in the Narara and Khalumbhar Islands. Most common among them are *Ulva fasciata*, *U. reticulata*, *Enteromorpha intestinalis*, *Dictyota* sp, *Hypnea*

musciformis, Sargassum tennerimum, S. ilicifolium, Gracilaria corticata, Cystocera sp, Padina tetrastomatica, Corallina sp, Laurencia sp, Caulerpa racemosa, C. peltata, Bryopsis sp, Turbinaria sp, Ectocarpus sp, Acanthophora sp, Chondria sp, and Codium sp. The Narara reef flat immediately behind the reef ridge upto 1 km from the low tide level supports diverse and abundant algal flora. Extensive intertidal mudflats at the upper zone are dominated by filamentous algae like Enteromorpha clathrata, L. mujuscula and Polysiphonia platycarpa. Ulva lactuca and E. clathrata are commonly associated with mangroves at the upper intertidal area. The salt pans and water pools in the saline bank regions are also dominated by E. clathrata. The main channel with silt/ clay bottom does not sustain significant populations of marine algae (Vijayalakshmi Nair, 2002).

The open mudflats at Narara Bet are covered with algae like Enteromorpha, Ulva, Lyngbya and Polysiphonia. The upper sandy shore and mangrove areas are associated with Enteromorpha and Ulva. Lyngbya, Caulerpa cladophota, Ulva cystoseira, Dictyota, Hydroclathrus, Padina, Sargassum, Acanthopora, Amphiroa, Champia, Centroceros, Gracilaria, Hypnea and Polysiphonia are common. Padina and Gracilaria are most dominant (50-70%) at the lower reef flat.

The intertidal segments of Kalumbhar harbour 47 species of marine algae and three species of seagrasses. The reef areas are dominated by Digenia, Gracilaria, Padina, Hydroclathrus, Ulva and Hypnea. The open mudflats and sandy regions at the upper intertidal zone are represented by Enteromorpha, Ulva, Lyngbya and Polysiphonia. (Vijayalakshmi Nair, 2002).

6.3.5. Sea Grasses

Seagrasses such as Halophila ovata and Halodule uninervis are common in patches on sandy regions of the reef. Halophila beccarii occasionally occur at the mudflat along the water channels of Narara Reef (Vijayalakshmi Nair, 2002). Seagrass species exist in the subtidal regions. Two Halophila species exist off Kalubhar The sandy region of the reef flat supports the growth of seagrasses like Halophila and Halodule (Vijayalakshmi Nair, 2002).

6.3.6. Terrestrial Mammals

Eleven species of mammals were recorded in the study area of KPT (Integrate EIA, KPT, 2013). But they have no direct relation with water other than frequenting water for water or food. There are namely Pteropus giganteus, Presbytis entellus entellus, Canis pallipes, Canis aures aures, Canis bengalensis, Herpestes auro-punctatus, Felis silvestris ornata, Sus scrofa cristatus, Funambulus pennanti, Rattus rattus, Gazella bennetti.



Sus scrofa cristatus(Indian Wild Boar)



Gazelle benetti (Indian Gazalle)



Presbytis entellus entellus (Common Langur)



Indian Flying Fox

Figure 6.7. Some Mammals in the areas adjoining KPT Limit

6.3.7. Reptiles

Six species of reptiles were reported from the area. Out of these two were of under the lizard category and rests 04 were snakes. *Mabuya macularis*, *Eryx johni*, *Ptyas mucosus*, *Sphalerosophis diadema*, *Cytrodactylus kachhensis*, *Hemidactylus leschenaulti* are them.



Rana cyanophlyctis



Mabuya macularis



Eryx johni(Indian Sand Boa)

Figure 6.8. Major Amphibians & Reptails of KPT Area

6.3.8. Amphibians

Two species of amphibians were also recorded *Rana cyanophlyctis* & *Bufo melanostictus*

6.3.9. Zooplankton

The inner Gulf sustained a higher rate of zooplankton production. The composition was fairly diverse and consisted mainly of cope pods and decapods. (Bio Resource Status of Selected Coastal Regions). As per recent EIA studies including copepoda, Decapoda, Lamellibranchiata, Lucifer, Mysids, Polychaete, Stamatopod larva with an average density of 250 no./l is present in the waters around Kandla Port Area.(Integrated EIA Study, KPT Area, 2013). Fish eggs are rarely represented. Fish larval population have been recorded more during monsoon.

6.3.10. Benthos

Benthic macro fauna includes Amphipodes, Bivalves, Porifers, Gastropoda, Oligochaete. In Kandla the most common groups are polychaetes, amphipods, crabs and mysids while in Nakti Fish larvae, brachyurans, macrurans, insects are common. Subtidal macro benthos include Polychaetes, brachyurans & insects. Meio Benthos includes Gastrotrichs, Hapticoidea, Nematoda, Tubellaria having around 500nos/10cm².

6.3.11. Mollusca

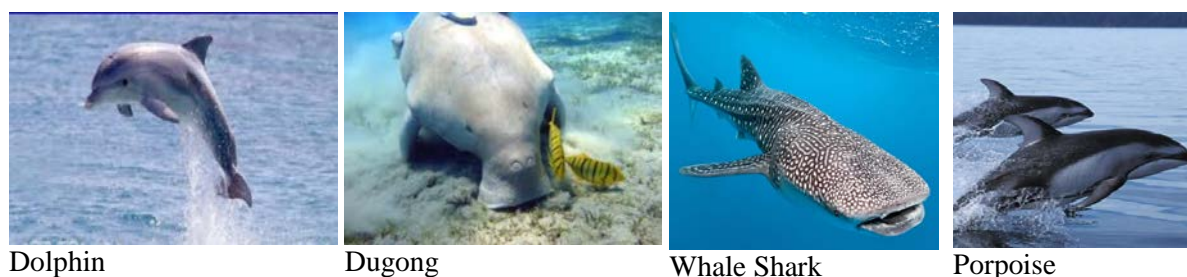
11 species of mollusca, seven species of shrimps (Prawn) Arthropodes and seven species of annelids were recorded. Larvae of *P.merguensis*, *M.kutchensis*, *M.brevicornis* and *M.monoceros* are the penaeid species available in the region. *M. affinis* is dominant during the monsoon.

6.3.12. Turtles

In the Gulf, the reptiles are mainly represented by marine turtles *Chelonia mydas* and *Lepidochelys olivacea*. They have been known to breed and spawn on the sandy beaches along the coast as well as on the Islands particularly along the southern Gulf between Okha and Okha Madhi and Vadinar-Sikka coast as well as on the Islands within the MNP and MS (Vijayalakshmi Nair, 2002). Goose reef have sand dunes. But active sites are less in this area which can be attributed to the presence of mudflats. They are not present in the Kalumbhat area, as there are no potential nesting site for their breeding exists here. Sandy beaches here are located close to marshes or mudflats and hence are not so easily approached these species. Hence presently there exist no potential breeding site.

6.3.13. Marine Mammals

Marine mammals are chiefly represented by dolphin (*Dolphin delphia*) and Dugong (*Dugong dugon*) in the Gulf especially along the Jamnagar coast. Common dolphins, Bottle-nosed dolphins and Pacific hump-back dolphins are the important dolphin species often found in the GoK area. A highly isolated breeding population of Dugongs exists in the Marine National Park, GoK. It is the only population remaining in western India. Whale Sharks and Porpoises also frequent the area.



Dolphin

Dugong

Whale Shark

Porpoise

Figure 6.9. Marine Mammals

Dolphins and Porpoises are found in the shallow water near Narara reefs of the area (H.S Singh, 2003). *Balaenoptera borealis* was reported from Salaya by Khacher (1998). Dolphins, Porpoises and Dugongs also exist in the area (H.S Singh, 2003). Rich sea grass beds off Kalubhar islands indicate high prospects of the presence of the rare and endangered species Dugong dugon, the sea cow (Vijayalakshmi Nair, 2002).

6.3.14. Fishes

The common species in Kandla creek are *Chiloscyllium arabicum*, *Lepturacanthus savala*, *Ilisha metastoma*, *Otolithoides biauritus*, *Pampus argenteus*, *Harpodon nehereus*, *Parapenaeopsis hardwickii* and *Exopalaemon styliferus*. The common species are *Pampus argenteus*, *Polynemus tetradactylus* and *Harpodon nehereus*. Nakti Creek hosts *Lagocephalus* sp., *Escualosa thoracata*, *Ilisha* sp. Prawns such as *Parapenaeopsis stylifera*, *Exopalaemon styliferus*, *Metapenaeus* sp. are available in the Nakti creek. Vadinar- Salaya accounts for about 4-19% of the total landings of Jamnagar district. Fish landings at Salaya indicate a fluctuating trend. Composition of marine fish landing at Salaya during 1990 to 1994 shows the occurrence of 22 groups of fishes. The dominant group found in the area is sciaenids followed by shrimps, mullets, white pomfret, catfish and shark. Total number of fishing crafts at Salaya amounts to 330 and the fishermen population engaged in fishery operations are 1220 (GEC).

6.3.15. Birds

The Gulf area which has many salt pans, Islands and intertidal coastal system with mangroves offers favourable conditions for feeding, breeding and shelter to a variety of birds. Birds find the most congenial environment in the mangrove forests lining the Islands and along the coasts. A large number of migratory species pass through the Gulf and a small population of most species comprising mainly of juveniles and non breeding adults take shelter during summer.

On the whole, 140 species are documented; 85 terrestrial and 55 aquatic. Out of these, 71 are resident species, 44 migrant and another 25 resident migrant. The area is located in the Central Asian Flyway of migratory birds, also a portion of West Asian – East African Flyway. Thousands of waterfowls can

be seen in the salt- pans from October to March. These include flamingos, godwits, sandpipers, plovers, stilts, terns and so forth. *Mycteris leucocephala*, *Sterna acuticauda*, *Pelecanus crispus*, *Limnosa limnosa*, *Numenius arquata* are the important birds of the area.



Figure 6.10. Some Birds found in the area within KPT Limit

Though salt pans are the man-made habitats, they are also valuable congregating for many resident and migratory birds as they provide food such as shrimps for them.

6.4. Human Use Resources

6.4.1. Salt Pan

95% of salt produced in Gujarat State belongs to GoK. The port has allotted approximately 16112 acres of land for manufacture of salt and allied industries connected with the salt manufacturing. There are 16 major lessees having land varying in area from 99 acres to 3890 acres and 25 minor lessees having land admeasuring 10 acres each for the salt works. Near Vadinar there are salt pans of in small area. Salt pans are important bird congregating area as they provide food such as fishes & shrimps. Many times brackish aquaculture ponds are function seasonally associated with salt pans.



Woman at work in the Salt Pan



Birds Congregation in the Salt Pan

Figure 6.11. Salt Pans

6.4.2. Fisheries

No fishing activities are found in the area except using small craft in Kandla Creek area. There is a fishing harbour exists north of the Kandla port. Unlike the other parts of GoK there are no fish ponds functioning in the area. High tidal movements and unusually strong currents make trawling or gill-netting for fish difficult and risky in Kandla creek. Evidently, no large-scale commercial fishing operations are conducted in the area except for minor shore-based hand-net and gill net operations.

The northern areas of Kachchh were found to be the most productive areas and had a dominance of Silver Grunt and Cat Fish species. In Kachchh, the largest fish landings occur at Jakhau (66.2%), while Kandla and Mitha Port account only for 3% of the Kachchh landings.



Figure 6.12. Fishermen

Among the different creeks in the Northern arm, Kandla is the most productive system comparable with Kori, but the production potential decreases interiors. The expansions of Kandla port and increase in saltpans in the mouth of the Gulf of Kachchh have affected the fishery in the region. Thus, negative growth observed in these two talukas (Ecoprofile of Coastal Taluks of Gulf of Kachchh, GEC, 2014). During monsoon period, penaeid larvae are abundant in the inner creeks leading to a flourishing backwater fishery off Surajbari.

Fishery is prawns exists only on the area of 1200sq.km on the southern border ie., in the head of GoK, where the bottom is muddy. The prawn fishery is more seasonal. (Marine Fisheries Research and Management, V.S Pillai and N. G. Menon, CMFRI). The details of prawn fishery in Kandla and Tuna is given as **Table 6.2**.

Table 6.2. Details on Prawn Fishery at Kandla and Tuna

Sl. No:	Location	Season	Nature of Bottom	Prawn Species
1	Kandla	May-February	Muddy	M. monoceros 64.7 % ; P. indicus 20.8 % ; Leander sp. 9.3% ; M. brevicornis 4.2% ; P. sculptilis, P. stylifera and Palaeomon sp. 2.0%
2	Tuna-Sangdha	September-February	Muddy	M. monocarps 47.5% ; P. indicus 15.6% ; M. brevicornis 15.3% ; Leander sp. 14.5% ; P. sculptilis 5.8% ; P. canaliculatus, P. stylifera and Palaeomon sp. 1.3%.

Source: http://eprints.cmfri.org.in/1654/1/Ramamurthy_146-148.pdf

The three districts around GoKnamely Rajkot (now Morbi), Jamnagar (now Jamnagar and Devbhoomi Dwararka) and Kachchh have 1, 23 and 51 fishing centres respectively. The collective contribution of GoKis about 22 % to the total production of Gujarat State. The major share is Jamnagar (now Jamnagar and Devbhoomi Dwaraka) and Kachchh districts with very low landings from Rajkot (now Morbi). Around 200 species of fish were recorded from the Gulf. Sciaenids predominated the area.

Common fishes in the area were pomfrets, Bombay duck, shrimps, ribbon fish, clupeids, shark and catfish. Details of fishermen population in the three (now four) districts indicate that active fishermen are more in Kachchh as compared to Jamnagar and Rajkot districts. The number of trawlers are more at Jamnagar while the gill netters are more at Kachchh district.

6.4.3. Kandla & Tuna SEZ

Two SEZ have been proposed within the KPT limit one at Kandla (3600 ha.) and another at Tuna (1400 ha) is to be located southwest of Kandla port at a distance of around 2 km from its periphery.

Land cover in the terrain is mostly sparse halophytic vegetation like scrubby mangroves, creek water and salt encrusted land mass. Creek water occupies a major area. Also there are mud flats in the south and east. Kandla area is having mangroves such as *A. marina*, *Suaeda*, *Salicornia* and *Salvadora*. Salt pans and mudflats are more in the Kandla area compared to the Tuna area (Final Environmental Impact Assessment Report for Port Based Multiproduct SEZ at Kandla Port, Part I Terrestrial EIA & EMP, Gujarat Institute of Desert Ecology March, 2015).



Figure 6.13. Location of Kandla and Tuna SEZs*

Note: Boundaries are indicative only

6.4.4. Intake Points of Industries

Vadinar and Mundra are the important industrial areas within the port limit. There are intake points of ESSAR at Vadinar and CGPL, Mundra.

6.4.5. Protected Ecosystems

Being these areas are of high biodiversity and as well as vulnerability, southern area of GoK have been declared as Ecologically Sensitive Areas (ESA) and categorized as under / as protected areas under Marine National Park and Sanctuary. Marine National Park and Marine Sanctuary (**Figure 7.11**) are situated along the southern shore of the Gulf from Okha (22°30'N, 69°00'E) eastwards to the vicinity of Khijadia (22°30'N, 70°40'E).

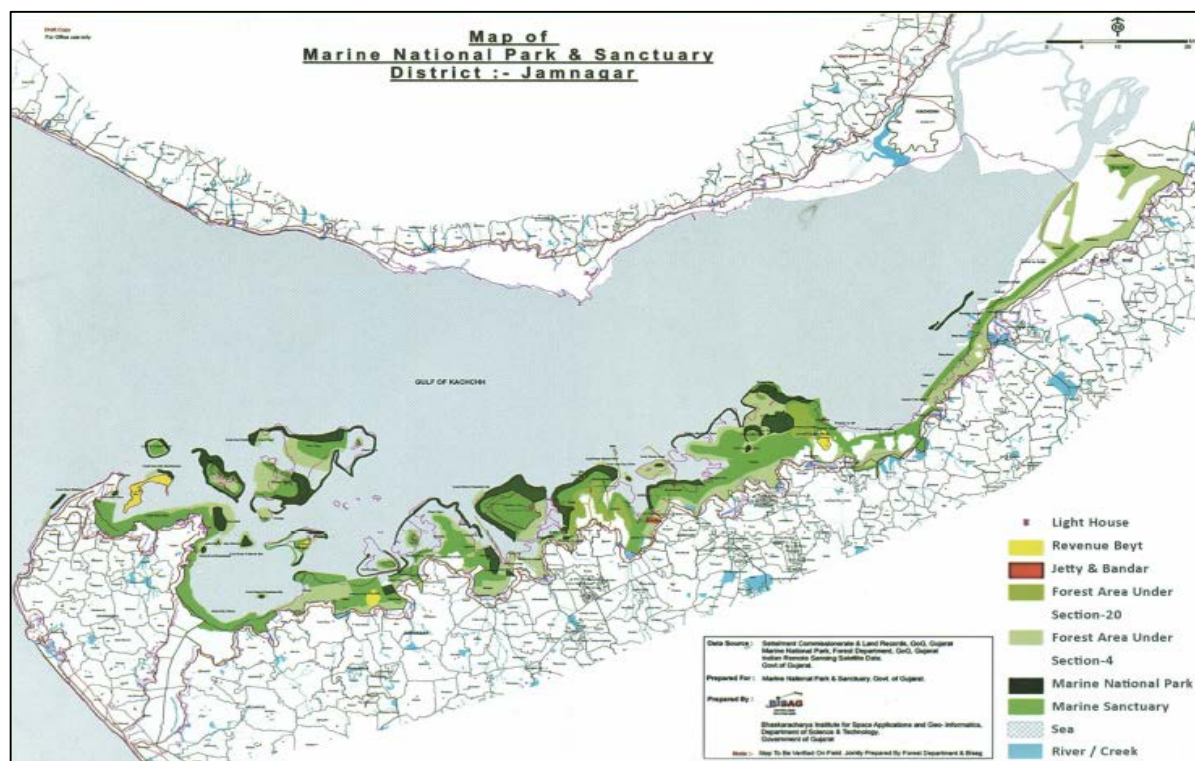


Figure 6.14. Marine National Park and Sanctuary

It is India's first Marine Protected Area declared by Govt. of Gujarat in 1980. This include 42 islands and a complex of fringing reefs backed by mudflats and sand flats, coastal salt marsh and mangrove forests, sand and rocky beaches which support a great diversity of fauna and flora. The area also has many islands fringing with corals and mangroves which provide a disturbance free habitats for many species of nesting birds. Besides these islands there are a number of wavecuts, eroded shallow banks like the Narara & Kalumbhar within the Kandla Port Limit near Vadinar.

6.5. Environmental Sensitivity Mapping

Sensitivity mapping is an essential step of oil spill preparedness. Environmental Sensitivity Index (ESI) map will serve as a basis for combating oil spill and help in the identification of resources at immediate risk and thus end up in prioritization of resources. This colour coded map accommodates the vulnerability of the shoreline to oil spill based on the Environmental Sensitivity Index (ESI) ranging between 1-10, where the each colour stands for a single ESI. In this map the shoreline and intertidal zones are ranked based on their vulnerability to oil spill, which is determined by shoreline type, exposure to wave & tides and its biodiversity. ESI maps gives emphasis to areas of threatened and endangered species, high concentration, sensitive life stages, protected areas and socio-economic resources that may be impacted by oiling, response or clean-up.

While preparation of the sensitivity map vast secondary data was utilised including those on Ecology, Hydrography, Coastal Geomorphology, Wetland, Landuse.

6.5.1. Environmental Sensitivity Index

Environmental Sensitivity Index (ESI) is an international scheme used for classifying as well as ranking the shoreline based on their sensitivity towards oil spill. This methodology was prepared by NOAA further promulgated jointly by IMO, IPIECA, & OGP. NOS-DCP-2015 put forwards the same scheme for the preparation oil spill contingency plan at various levels in the Indian context.

ESI index is based on three parameters including:

- Shoreline Classification, which takes sensitivity of the shore habitats, natural persistence of oil and ease of cleanup.
- Biological Resources including oil-sensitive animals, rare plants
- Human-Use Resources that have sensitivity because of their typical use, such as beaches, parks and marine sanctuaries, water intakes, and archaeological sites.

While preparing the ESI maps, the sensitivity of the shore is represented by color-codes along the coast while, biological and human-use resources are represented by symbols.

Areas requiring special consideration include,

- Presence of protected areas such as National Park, Sanctuaries
- Threatened species
- Birding Areas and other animal frequenting areas.
- Estuaries, Mangroves & Fish Breeding Areas
- Tourist Areas including Recreational & Heritage Areas
- Industrial Water Intake Points
- Resource Extraction such as Salt Pans and Aquaculture ponds
- Multi-features - especially in the 42 island with variable features within a short distance

6.5.1.1. Shoreline Classification

- Depends on Relative exposure to wave and tidal energy
- Shoreline Slope
- Substrate Type and biological productivity

6.5.1.2. Biological Resources

Marine, coastal, and aquatic/wetland species may be present over a very large geographic area. Maps or data indicating the entire distribution of a large number of species potentially located in an area may not be very helpful to responders setting protection priorities. Therefore, it is important to identify the types of species that tend to be vulnerable to spilled oil, the most sensitive life-stages, and in which habitats these life-stages occur, as habitat type plays an important role in the persistence of oil and species exposure to oil. Biological resources are most at risk when :

- Large numbers of individuals are concentrated in a relatively small area;
- Marine or aquatic species come ashore during special life stages or activities, such as nesting, birthing, resting, or molting;
- Early life stages or important reproductive activities occur in sheltered, near shore environments where oil tends to accumulate;
- Limited suitable habitat exists within an area for specific life stages or along critical
- critical migratory routes;
- Specific areas are known to be vital sources for seed or propagation;
- A species is threatened, endangered, or rare; or
- A significant percentage of the population is likely to be exposed to oil

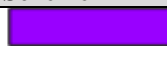





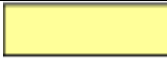



6.5.1.3. Human- Use Resource

There are mainly four types of four major components.

- High-use recreational areas and shoreline access locations
- Management Areas
- Resource Extraction area Salts and Minerals
- Archeological & historical cultural Resources

The ESI classification which consider the ecological sensitivity alone is given as **Table 6.3**.

Table 6.3. ESI Classification as per NOAA Guidelines

Sl. No	Shoreline Type	Rank	Colour Scheme
1	Exposed, Impermeable Vertical Substrates	1	
2	Exposed, Impermeable Substrates, Non-Vertical	2	
3	Semi-Permeable Substrate, Low Potential for Oil Penetration and Burial; infauna present but not usually abundant	3	
4	Medium Permeability, Moderate Potential for Oil Penetration and Burial; in fauna present but not usually abundant	4	
5	Medium-to-High Permeability, High Potential for Oil Penetration and Burial; infauna present but not usually abundant	5	
6	High Permeability, High Potential for Oil Penetration and Burial	6	
7	Exposed, Flat, Permeable Substrate; in fauna usually abundant	7	
8	Sheltered Impermeable Substrate, Hard; epibiota usually abundant	8	
9	Sheltered, Flat, Semi-Permeable Substrate, Soft; in fauna usually abundant	9	
10	Vegetated Emergent Wetlands	10	

(Source: NOAA)

This ranking of the mapped resources is in order to locate the most sensitive sites and establish priorities for protection and also to work out efficient clean-up strategies. The ESI ranking reflects the general sensitivity of shoreline habitats for ex., all fine-grained sand beaches have an ESI = 3. Tidal flats are ranked high on the ESI scale because of their high benthic productivity and importance as feeding areas for fish and birds. The presence of other sensitive resources on a specific shoreline segment, such as turtle nesting on a fine-grained sand beach, does not affect the ESI ranking. The seasonal presence of other resources on a shoreline segment is addressed by mapping biological and human-use resources.(NOAA). Color scheme are used for representing the shoreline habitats ranking while sensitive biological receptors and human use resources are given as standard symbols and are given as **Figure 6.15..**



Figure 6.15. ESI symbols for Ecological and Socio-economic Resources

6.6. Environmental Sensitivity of KPT Limit

KPT and its limit are part of the highly sensitive region of Gulf of Kachchh which is a part of Indian coastline already earmarked as Environmental Sensitivity Areas (ESAs) realising the importance of

their protection. ESA are defined as areas of coastal zone which need special protection and play an important role in maintaining the functional integrity of the coastal and marine environment. The following ecosystems were shortlisted as ESAs :

Mangroves, Coral reefs, Mud flats, Lagoons, Beaches, Estuaries, Sea grass beds, Sand dunes , Creeks Sea weed beds, Littoral forests, Salt marshes, Mud banks , Rocky shores by various studies conducted on Coastal Management (*ICMAM*). Also ESAs have been evaluated and risk level against oil spill have been assigned by ICG (*Ecosensitive Areas, ICG*). In the case GoK all these habitats are present on the shoreline and islands blending to one resulting in a highly diverse ecosystem. These areas of extreme ecological significance and declared as Marine National Park and Sanctuary (MNPS). The area within Kandla Port limit have been studied to identify resources at risk were identified after studying the nature of the resources both ecological and socio-economic, shoreline characteristic, ecological interrelationship etc. for determining their sensitivity towards oil spill.

Since the area has almost equal distribution of ecological and socio economic resources, the determination of sensitivity parameters and resource prioritisation is an integral part of sensitivity mapping. The following section describes the sensitivity parameters used for preparation of oil spill sensitivity map, the shoreline characteristics, Marine- Meteorological Condition and the sensitivity of receptors.

6.6.1. Sensitivity Parameters

Sensitivity of the shoreline was determined based on the ecological and socio- economic importance vulnerability of the specific geographic region. This result will be useful for oil spill risk assesment, modelling and selection of response and clean up operations. It is assumed that the area is biologically stable at present and the shipping canal which is undergoing periodic dredging is already having lesser sensitivity for the floating species over the area have been already shifted to better premises. Sensitivity parameters considered for identification of vulnerable sub groups and group features around Kandla are given as **Table 6.4.**

Table 6.4. Sensitivity Parameters for determine ESI

Sl. No	Sensitivity Parameter	Sub Groups	Group Features
1	Shoreline Classification	Land Forms	Creeks, Bays, Estuary, Beaches, Swamps, Tidal Flats.
		Geological	Grain Size, Geomorphology, Slope
		Hydrological	Tides, Waves, Currents
2	Ecological	Sensitive Species	Birds, Corals, Mangrove, Turtles
		Wild Life Areas	High no. of individuals along the area, especially congregation, breeding, nesting, feeding, resting sites.
3	Socio-economic	Commercial	Salt Pans, Fishing Areas, Agriculture
		Recreational	Beaches

		Historical	Onshore, Underwater sites
		Industrial	Intake Points
		Strategic	Restricted Entry Areas, Frontiers

(Source: Data Analysis)

Gulf of Kachchh has a very dynamic ecosystem. They have both abiotic and biotic receptors. Abiotic receptors include the water, soil, air of the area while biotic resources includes all the living components. The abiotic receptors influence to biotic ones through their interaction in food chain , respiratory systems etc. Their sensitivity is described in the sections below. Final aim of oil spill response should be after considering their interrelations and solving the issue holistically.

Impacts of oil spill to biotic as well as abiotic environment were identified considering the features of GoK. The effects of oil on Ecological and Socio economic resources are discussed. There are a number of ecological effects from oil spill. These includes physical and chemical changes to habitats as well as organisms. There effects mainly depend on the physical contamination of oil in to water, sea bed and land. The magnitude and persistence of oil contamination in the intertidal area depends greatly on the energy of waves, shoreline/ sediment characteristics (IMO).

Oil spill into an aquatic environment including tidally influenced adjoining land, will harm organisms that live on or around the water surface and those that live under water. Spilled oil can also damage parts of the food chain, including human food resources. Oil spills will affect, contaminate and may even kill the organisms like algae, plants, invertebrates, fish, amphibians and reptiles, birds, and mammals. These species and communities are at risk of smothering, hydrocarbon toxicity, hypothermia, and chronic long-term effects that may result from the physical and chemical properties of the spilled oil. Severity of the impact depends on a variety of factors such characteristics of oil, natural conditions, such as water temperature, weather etc., and sensitivity of aquatic habitats to oil spills.

Both petroleum and non-petroleum oil can affect the environment surrounding during an oil spill. All types of oils have chemical and physical properties that produce similar adverse effects on the environment. In some cases, non-petroleum oil spills can produce more harmful effects than petroleum oil spills. Some toxic substances in an oil spill may evaporate quickly and hence plants, animal and human exposure to the most toxic substances are reduced with time. It is usually limited to the initial spill area. Although some organisms may be seriously injured or killed very soon after contact with the oil in a spill, non-lethal toxic effects can be often long lasting. The area where an organism spends most of its time in open water, near coastal areas or on the shoreline will determine the effects an oil spill is likely to have on that organism. Hence aquatic life on reefs and shorelines is at higher risk of being

smothered by oil that washes ashore. It can also be poisoned slowly by long-term exposure to oil trapped in shallow water or on beaches.

For higher organisms the primary effects of oil contamination include loss of the insulative capability of feathers or fur which can lead to hypothermia, dehydration resulting from lack of uncontaminated water, stomach and intestinal disorders and destruction of red blood cells resulting from ingestion of oil, pneumonia resulting from inhalation of oil vapors, skin and eye irritation from direct contact with oil and impaired reproduction. Fauna can also suffer during capture and rehabilitation operations, potential ailments include infectious diseases, skin problems, joint swellings, and lesions. In addition, eggs and juveniles are particularly susceptible to contamination from oil. Even a very small quantity of oil on bird eggs may result in the death of embryos. From a purely economic perspective, the economic loss to the tourism and fishing industries alone from a major oil spill within GoK would be massive. The loss can be divided into on three broad areas like Loss of jobs and wages, Loss of fishing & allied activities in the closure period of ports, Loss on tourism.

Considering the case of Kandla- Vadianr Zones, high tidal ranges and strong tidal streams escalate the impacts of oil spill. Extreme tidal ranges and extensive creek system will guide oil landward during high tide while there a few outflows at its mouth will expel oil offshore. These creeks accomplish the connection during the monsson with Little Ran of Kachch through epherimal rivers emtying in to GoK during rain. Hence there is also a chance that they get trapped into the high tidal flats during this time. Thus making the escape of difficult.

6.6.1.1. Shoreline Characteristics

The geomorphology of Kandla Port Limit, suggest the area with in and adjoining the KPT limit can be divided in to three. They are the portions of the Western flank between Kori Creek to Mundra with extensive mudflats, they are highly dissected and the important resource are the mangroves. The coast is tide dominated having a mximum width of 2km. Eastern Flank between Mundra to Kandla is having narrow beaches, wide mudflats and salt marshes. They are having narrow littoral zone. This area is characterised by very low wave energy but high currents inside the channel.

The presence of bars cause later high tides and longer low tides. Between Hansthal and Kandla creek there lies the vast sathsaida bet. Kandla creek futher bifrucates into branches, Sara & Phang. The flood streams in the Kandla creek are 3 to 5 knots. In the Western approach to the Kandla and Hansthal creeks the tidal streams in general are extremely irregular and appear to be gently influenced by a strong wind from any quarter. They gradually increase from outer to inner areas from 2.5 knots up to 4 -7 knots. (Source: Comprehensive Environmental Impact Assesment Report for Port Based MultiProduct Based SEZ at Kandla by Kandla Port Trust). Vadinar area, which is a part of the Navlakhi - Dwaraka

segment of the Saurashtra Coast. They are having numerous offshore islands which are having corals both reef and live. The shoreline is having a very low gradient resulting wider impact of oil during a spill. Wave energy is slightly higher compared to that of Kandla Port Area. The details on the same are given as **Table 6.5**.

Table 6.5. Geomorphology of Kandla Port Area

Sl. No.	Segments	Align ment	Feature	Sedime nt	Substrate	Intertidal Zone	Processes
Gulf of Kachchh							
1	Western Flank- Kori Creek to Mundra	NW- SE	Dissected, facing Arabian sea, Extensive mud flats known as Thars, Mangroves, Small sluggish seasonal streams, creeks	Muddy	Muddy Alluvium and Soft Rocks	Maximum width 2km	Tides dominant shoreline currents, moderate wave energy, low currents.
2	Eastern Flank from Mundra to Kandla	E-W	Comparatively less dissected with narrow beaches and wide mudflats & salt wastes	Sand, Silty		Narrow littoral zone	Tide dominant shoreline currents, low wave energy, high tides, turbid and saline to hypo saline water
Saurashtra Coast							
1	Navlakhi - Dwaraka	E-W	Highly crenulated coastline with extensive mudflats, offshore islands, rocky platform ,narrow beaches, coral reefs etc.,prominent drainage	Sandy, Silty as well as Muddy	Coralline, limestone and Deccan trap basalt	Width of 5-10km, low gradient with calcareous sediment	Long shore currents low wave energy, high tidal energy moderate tides 3 to 5m water turbid and hypo saline

Source: Gujarat Ecology Society

6.6.1.2. Marine- Meteorological Condition

The port is located in the tropical dry climate. The winter temperatures vary between 10 to 25 deg C and between 25 to 44 deg C during winter. Dry weather, short spell and scanty monsoon is the most important feature of the area. Tides are highly irregular and is influenced by strong winds. Mean spring tide is 6.66m. Thus the port has high tidal impact, low water depth and high rate of evaporation. Water

temperature varies between 20 to 28 deg C and surface tidal pools may reach a temperature of 32 deg C.

6.6.1.3. Sensitivity of Ecological and Socio-economic Receptors

6.6.1.3.1. Abiotic Receptors

Aquatic environments are made up of complex interrelations between plant and animal species and their physical environment.. The nature, extent, depth and mobility of the water body determine the sensitivity of aquatic habitats. GoK and the adjoining coastal area where different types of aquatic habitats such as creek, bays, beaches, reefs and mudflats coexist, show sensitivities to the harmful effects of oil contamination and varied abilities to recuperate from oil spills. Harm to the physical environment will often lead to harm for one or more species in a food chain, which may lead to damage for other species further up the chain through bioaccumulation and biomagnification

Spilled oil immediately begins to move, weather and breaking down, changing its physical and chemical properties. As these processes occur, the oil threatens surface resources as well as a wide range of subsurface aquatic organisms linked in a complex food chain.

In some areas, habitats and populations can recover quickly while in others the recovery from persistent or stranded oil may take years. These detrimental effects are caused by both petroleum and non-petroleum oil.

In the case of open water, fishes have the ability to swim away from a spill by going deeper in the water or further out to sea. Thus they have reduced susceptibility that they get harmed by even a major spill. Other aquatic animals that spent more time closer to shore, such as turtles, seals, and dolphins are at the risk of contamination by oil that washes onto beaches or by consuming oil-contaminated prey. In shallow waters, oil may harm sea grasses and kelp beds, which are either food, shelter or nesting sites by many species. Along with spilled oil, cleanup operations can also threaten different types of aquatic habitats. The sensitivity of different aquatic habitats of the Kandla Port area are enumerated as follows:

Tidal Creeks: A number of tidal creek is the portion of a stream that is affected by ebb and flow of ocean tides, in the case that the subject stream discharges to an ocean, sea or strait. There are unique biota associated with tidal creeks which are specialised to such zones. Creeks may often dry to a muddy channel with little or no flow at low tide. They often have significant depth of water at high tide.

Tidal flats: They are broad, low-tide zones, usually containing rich plant, animal, and bird communities. Deposited oil may seep into the muddy bottoms of these flats, creating potentially harmful effects on the ecology of the area. Vast mudflats infringes the entire coastline of GoK.

Mudflats: Mudflats spreading all along the Gulf, which are very sensitive to oil in comparison to sandy coast, due to their geographical locations. They are found in the areas of high tidal amplitude. Hence an oil spill during high tide can leave serious traces. (Kankra et al)

Marshes and swamp: These two habitats have little water movement and are likely to incur more severe impacts oil spill. In such calm water conditions, the affected habitat will take years to restore.

Other standing water bodies: Salt pans and aquaculture ponds are coastal standing water bodies of GoK, support a variety of fishes and birds. The food chain can be affected by spills in these environments and can reach up to the highest order of ecological pyramid the humans.

Coral reefs: The reefs in and around the islands of MNPS. They are important nurseries for shrimp, fish, and other animals and have ecological value. Coral reefs and the aquatic organisms that live within and around them are at risk from exposure to the toxic substances within oil as well as smothering.

Important Manmade abiotic resources are:

Fishing Industry: Fishing may not be feasible due to oil slick or imposition of fishing bans. Aquaculture facilities may be severely affected by direct oiling or loss of market confidence.

Harbour and Marinas: Functioning of commercial ports and harbours can be disrupted by oil slicks and subsequent cleaning activities. Boats in marinas are also have to be cleaned.

Industrial Sea Water Intakes: Sea water intakes may be at risk from floating and/ or dispersed oil leading need for protection or even shutting down activities.

6.6.1.3.2. Bio receptors

Sensitivity of biodiversity varies from species to species. Rare animals or Plants or those with limited geographic distribution may be particularly vulnerable to oil impacts and raise specific concerns. An oil spill can harm animals especially birds and mammals in several ways. Direct physical contact, toxic contamination, destruction of food sources and habitats, and reproductive problems. When fur or feathers come into contact with oil, they get matted down. This matting causes fur and feathers to lose their insulating properties, placing animals at risk of freezing to death. For birds, the risk of drowning increases, as the complex structure of their feathers that allows them to float or to fly becomes damaged. Some species are susceptible to the toxic effects of inhaled oil vapors. Oil vapors can cause damage to the animal's central nervous system, liver and lungs. Animals are also at risk from ingesting oil, which can reduce the animal's ability to eat or digest its food by damaging cells in the intestinal tract.

Even species which are not directly in contact with oil can be harmed by a spill due to destruction of food resources and habitats. Predators that consume contaminated prey can be exposed to oil through ingestion. Since oil contamination gives fish and other animals unpleasant tastes and smells. Predators

will sometimes refuse to eat their prey. They will begin to starve especially when a local population of prey organisms gets destroyed completely. In some environments, the spilled oil may linger in the environment for long periods of time, adding to the detrimental effects where as in calm water conditions, oil that interacts with rocks or sediments can remain in the environment indefinitely. Oil can be transferred from birds' plumage to the eggs they are hatching. Oil can smother eggs by sealing pores in the eggs and preventing gas exchange. Developmental defects in bird embryos that were exposed to oil have been also observed. The number of breeding animals and of nesting habitats can be considerably reduced by the spill. Long-term reproductive problems have also been shown in some studies in animals that have been exposed to oil. Sensitivity of various bioreceptors are described below:

Fishes: Fishes may be exposed to spilled oil in different ways. They may come into direct contact and contaminate their gill, the water column may contain toxic and volatile components of oil that may be absorbed by their eggs, larvae, and juvenile stages and they may eat contaminated food. Fish that are exposed to oil may suffer from changes in heart and respiratory rate, enlarged livers, reduced growth, fin erosion, a variety of biochemical and cellular changes, and reproductive and behavioral responses. Chronic exposure to some chemicals found in oil may cause genetic abnormalities or cancer in sensitive species. If chemicals such as dispersants are used to respond to a spill, there may be an increased potential for tainting of fish and shellfish by increasing the concentration of oil in the water column. This can affect humans in areas that have commercial and recreational fisheries.

Eggs and Larvae : In shallow bays may suffer heavy mortalities under slicks, particularly when dispersants are used. Adult fishes tend to swim away from oil. No evidences to date exist for an oil spill that has significantly affected adult population in open sea. But adult fish in aquaculture cages may be killed or lose their market value at least because of training. Adult population survive even when many fish larvae have been killed possibly because Fish eggs and larvae: They are sensitive to oil, may experience mortality, which may affect the fish production, even though the extent of damage is insignificant and to a greater extent for short term. use they have a competitive advantages such as ,ore food and lower vulnerability to predators. (Kankra et al)

Invertebrates: Invertebrates such as shellfish –molluscs and crustaceans, worms, sea urchin and corals suffer heavy casualties when directly exposed to fresh oil. Barnacles, winkles and limpets living on rocks can be seen surviving in the presence of residual weathered oil.

Birds: Birds are very susceptible to oil spills. Seabirds, for example, spend a lot of time on the ocean's surface, dive when disturbed, and have low reproductive rates, making them particularly vulnerable to oil spills. In addition, the populations of species with small numbers of individuals, a restricted

geographic range, or threatened and endangered species may be very adversely affected by oil spill contamination. A bird's feathers overlap to trap air and provide the bird with warmth and buoyancy. Birds that contact an oil slick may get oil on their feathers and lose their ability to stay waterproof, they may ingest oil while trying to clean their feathers or when they try to eat contaminated food, and they may suffer long-term reproductive effects.

Heavily oiled birds usually die. Their treatment requires specialised expertise and appropriate facilities. Recovery of local population mainly depends on existence of reservoir of young non-breeding adults from which breeding colonies can be replenished or high reproductive rate. No evidences to date exist for an oil spill that has permanently damaged any sea bird population. But species with very local distribution could be at risk in exceptional circumstances.

Also there is every possibility that the reduced wave action due to surface oil will attract the birds to coastal waters. Hence they get trapped in the sticky emulsified layer of oil. A 0.1 mm thick oil layer is assumed to cause high risk to sea birds (Kankra et al., 2008). Thus oil spill is fatal to birds and its eggs. (Kankra et al)

Mammals: Mammals that may be affected include whales, porpoises, dugongs, dolphins and other land mammals occupying the intertidal area. The sensitivity of mammals to spilled oil is highly variable. The amount of damage appears to be most directly related to how important the fur and blubber are to staying warm, which is called thermoregulation. Land mammals need clean fur to remain warm. Hence they are more vulnerable while whales, dolphins etc., are rarely affected by oil spill. Direct exposure to oil can result in temporary eye problems. Ingestion of oil can result in digestive tract bleeding and in liver and kidney damage. Ingestion of oil is of greater concern for species that groom themselves with their mouth, such as sea otters and polar bears. Breathing hydrocarbon vapors can result in nerve damage and behavioral abnormalities to all mammals. Capturing and cleaning oiled marine mammals generally is not feasible. While procedures for dealing with oiled birds have been developed, no such procedures have been developed for most of the marine mammals. Procedures for capturing, treating, and releasing animals may hurt them more than the oil does.

The cetaceans such as porpoises, dolphins, and whales have not been reported in the area. Their blubber for insulation and do not depend on fur to stay warm. This characteristic makes them less susceptible to oil spills than other mammals. When they come to the surface to breathe they may inhale hydrocarbon vapors that may result in lung injuries, oil that comes in contact with the animals' sensitive mucous membranes and eyes may produce irritations. Young cetaceans may be injured due to ingestion of oil from contaminated teats when nursing. There may be long-term chronic effects as a result of migration through oil-contaminated waters.

Planktons: Serious effects of oil spill on plankton have not been observed so far in open sea. This is probably due to high reproductive rates and immigration from unaffected areas. The plankton population in shallow water is moderate of range and may be affected to some extent, which may take few weeks to recover.

Algae: Oil does not stick on to larger algae because of their mucilaginous coating. Intertidal areas denuded of algae in oil spill, readily gets repopulated after the removal of oil. Algae cultured for the economically important products such as Agar lose their commercial value if tainted.

Marsh Plants: There are variations in the effect of oil spill among different species of marsh plants. Perennials with robust underground root system are more resistant than annuals and shallow rooted plants. But annuals such as Glasswort recolonise faster than perennials like grass *Spartina* since they produce large number of tidally dispersed seeds at a time.

Mangroves: Mangroves are home to diverse of plant and animal life. The term mangroves applies to several species of trees and bushes having some form of aerial breathing root which enable them to live in fine, poorly, oxygenated mud. The long roots, called prop roots stick out well above the water level and help to hold the mangrove tree in place. A coating of oil on these prop roots can be fatal to the tree. Since the growth rate of mangroves are very so slow, replacing a mangrove tree will take decades (IMO). Mangroves: are very sensitive to oil. Natural recovery of oiled mangroves will take many years. They are also breeding and nursing grounds of fishes and prawns. They are also home to many species living in harmony with them. They are highly productive ecosystems and have very high sensitivity in terms of both biodiversity and slow recovery.

Protected Areas: When a large area is covered by important ecosystems and highly diverse species they become relatively sensitive as the impact of oil on these will be highly dangerous.

6.7. Oil Spill Sensitivity Map

The coastal area has been extensively studied and the ecological resources have been mapped for the Kandla Port Area. The oil spill sensitivity map of the Kandla Port Limit have been given as **Figure 6.3** below.

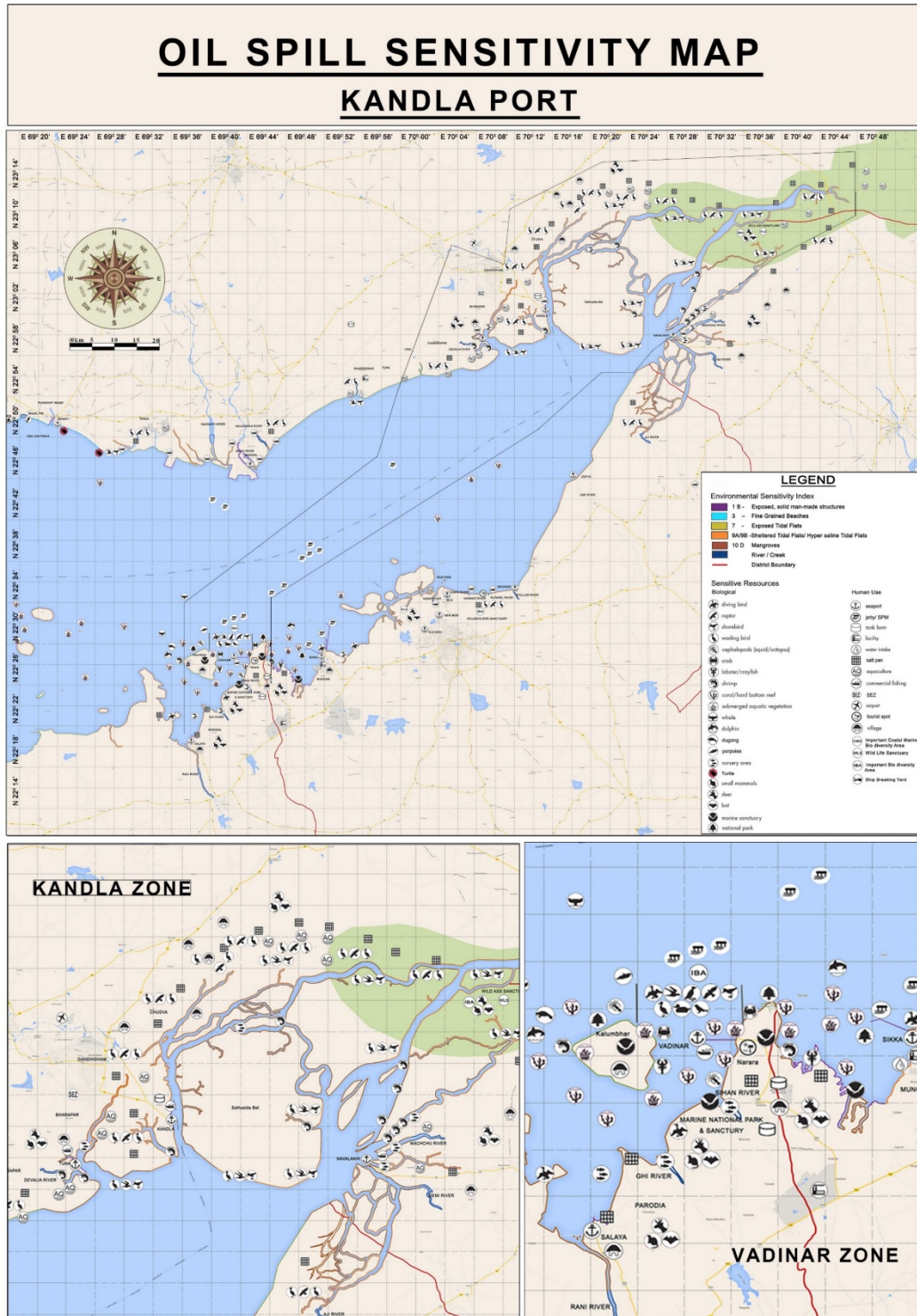


Figure 6.16. Oil Spill Sensitivity Map for Kandla Port

6.8. Response Consideration

As discussed in the previous section, there are highly vulnerable resources and sensitive shoreline throughout the KPT limit. Mangroves are the most sensitive shore, followed by sheltered hypersaline mudflats, exposed mudflats, exposed manmade structures within the KPT limit. In addition to this there are small stretches of exposed shores, wavecut rocky platforms, salt marshes and fine sand beaches adjoining the coral islands but the shores are dominated by mangroves or mudflats having higher sensitivity. Also there are very small ridges of shell and coarse grained beaches adjoining mudflats.

Again small strips of Rip- Raps or Seawalls will be associated with areas of human interferences and low stability such as Beaches.

Corals, Birds nesting and flocking areas, etc., are occurring simultaneously and hence are to be considered as multi-resources area under the biological resources category. All these multi-resource areas are the most sensitive part in the KPT limit. The details of the Shoreline Type, Sensitivity Index and Response Considerations are to be given as **Table 6.6** below. The sensitivity of biological resources have been already discussed in the previous sections.

Table 6.6. Shoreline Type, Sensitivity Index & Response Considerations

Sl. No.	Type of Shoreline	Locations	Oil Behavior
1	Exposed Rocky Shore (1A)	Islands of MNPS near Vadinar Terminal	<ul style="list-style-type: none"> Oil is held offshore by waves reflecting off the steep, hard surface in exposed settings Oil readily adheres to the dry, rough surfaces, but it does not adhere to wet substrates Most resistant oil would remain as a patchy band at or above the high-tide line
2	Exposed Solid Vertical Structures (1B)	Areas near Port, Jetties and Terminals	<ul style="list-style-type: none"> Seawalls and piers are particularly common in developed areas to provide protection to residential and industrial developments. They are common along inlets, urbanized areas, and developed beachfront sites. They are composed of concrete and stone, wooden, or metal bulkheads and wooden pilings. Organisms, such as barnacles, shellfish, and algae may be common on pilings. Biota on concrete structures along the upper intertidal or supratidal zones is sparse. Oil would percolate between the joints of the structures. Oil would coat the intertidal areas of solid structures. Biota would be damaged or killed under heavy accumulations
3	Fine to Medium - Sand Beaches (3)	Islands of MNPS near Vadinar Terminal are having narrow beaches and between Mundra & Tuna. Shell beach ridges are found near Kandla	<ul style="list-style-type: none"> These beaches are generally flat, wide, and hard-packed. They are commonly backed by dunes or seawalls along exposed, outer coasts. Along sheltered bays, they are narrower, often fronted by tidal flats. Upper beach fauna are scarce. Light oil accumulations will be deposited as oily swashes or bands along the upper intertidal zone. Heavy oil accumulations will cover the entire beach surface, although the oil will be lifted off the lower beach with the rising tide. Maximum penetration of oil into fine-grained sand will be 10 cm. Burial of oiled layers by clean sand within the first few weeks will be less than 30 cm along the upper beach face. Organisms living in the beach sands may be killed either by smothering or by lethal oil concentrations in the interstitial water. Shorebirds may be killed if oiled, though they may shift to clean sites
4	Rip Rap (6B)	Adjoining Port areas & terminals either exposed	<ul style="list-style-type: none"> Riprap structures are composed of cobble- to boulder-sized rock fragments. Riprap structures are placed for shoreline protection and inlet Stabilization.

		or sheltered corresponding to 1B & 8B	<ul style="list-style-type: none"> • Mid- and low-intertidal zone biota on the riprap may be plentiful and varied. • Deep penetration of oil between the boulders is likely. • Oil adheres readily to the rough rock surfaces. • If oil is left uncleaned, it may cause chronic leaching until the oil asphaltizes. • Resident fauna and flora may be killed by the oil
5	Exposed Tidal Flats (7)	Throughout the GoK Coast	<ul style="list-style-type: none"> • Oil does not usually adhere to the surface of exposed tidal flats, but rather moves across the flat and accumulates at the high-tide line. • Deposition of oil on the flat may occur on a falling tide if concentrations are heavy. • Oil does not penetrate the water-saturated sediments. • Biological damage may be severe, primarily to in fauna, thereby reducing food sources for birds and other predators.
6	Sheltered Manmade Structures (8B)	At sea ports/terminals such as Kandla, Vadinar, Navlahi & Mundra, Bedi	<ul style="list-style-type: none"> • Oil will adhere readily to rough surfaces, particularly along the high-tide line, forming a distinct oil band • the lower intertidal zone usually stays wet (particularly if algae covered), preventing oil from adhering to the surface
7	Vegetated River Bank	Along major River Sihan & Ghi near Vadinar & Aji, Demi & Machu near Navalakhi, Devalia near Kandla, & Kalagogha near Mundra	<ul style="list-style-type: none"> • These areas are composed of low banks with grasses (subject to flooding) or steeper banks with trees going to the water's edge. • They are found in fresh or brackish water localities. • They are composed of a variety of plant species. • Light oil concentrations will coat the outer fringes of the area. • Heavy oil concentrations will penetrate into the area and heavily coat the plant and ground surfaces. • Biological impact may be severe if oil concentrations are heavy. • Oil persistence may be several months if not cleaned. • During winter, shore-fast ice could prevent or limit oil impact. • Odor and taste of fresh water supplies could be impacted by trace contamination
8	Sheltered Mud Flats(9A)/ Hypersaline Mudflats (9B)	Present all along the coast, inside the creeks and towards the inner portion of islands near Vadinar & Inner creeks of Kandla	<ul style="list-style-type: none"> • oil does not usually adhere to the surface of sheltered tidal flats, but rather moves across the flat and accumulates at the high-tide line • deposition of oil on the flat may occur on a falling tide if concentrations are heavy • oil will not penetrate the water -saturated sediments, but could penetrate burrows or other crevices in muddy sediments

			<ul style="list-style-type: none"> • in areas of high suspended sediments, sorption of oil can result in deposition of contaminated sediments on the flats • • biological damage may be severe
10	Freshwater Swaps/ Marshes(10B)	On the banks of rivers emptying into the GoK	<ul style="list-style-type: none"> • Oil in any appreciable quantity may be very persistent due to minimal flushing and organic soils. • Degree of vegetation oiling is a function of tidal range and local topography. • Season of oiling is important; dormant vegetation is least sensitive to oil; blooming and seeding plants are most sensitive. • Resident biota are likely to be heavily impacted, particularly reptiles, amphibians, and crustaceans, with high mortality predicted. • Odor and taste of fresh water supplies could be impacted by trace contamination • Freshwater marshes/swamps are found in the upper reaches of tidal streams, rivers or tributaries Marshes are characterized by typical soft-bodied, non-persistent, herbaceous vegetation such as grasses. • Swamps have dense stands of water-tolerant shrubs and trees. • These areas have an extremely high degree of species diversity and abundance in flora and fauna; may harbor rare, threatened, or endangered species on the local, regional, or national level. • They are extremely valuable as breeding and nursery areas for wetland-dependent amphibians and reptiles, as well as other fish, birds, and mammals. • Sediment generally consists of organic rather than mineral soils, resulting in a rather soupy consistency, and making foot travel difficult to impossible
11	Fringing and Extensive Salt Marshes (10 C)	Kandla adjoining the creeks of Kandla, Nakti, Phang , Sara	<ul style="list-style-type: none"> • Intertidal wetlands containing emergent, herbaceous vegetation. • Width of the marsh can vary widely, from a narrow fringe to extensive. • Relatively sheltered from waves and strong tidal currents. • Resident flora and fauna are abundant and consist of numerous species. • Provide a nursery ground for numerous fish species. • Bird life is seasonally abundant. • Oil adheres readily to marsh vegetation. • The band of coating will vary widely, depending upon the tidal stage at the time oil slicks are in the vegetation. There may be multiple bands. • Large slicks will persist through multiple tidal cycles and coat the entire stem from the high-tide line to the base. • If the vegetation is thick, heavy oil coating will be restricted to the outer fringe, with penetration and lighter oiling to the limit of tidal influence.

			<ul style="list-style-type: none"> • Medium to heavy oils do not readily adhere or penetrate the fine sediments, but they can pool on the surface and in burrows. • Light oils can penetrate the top few centimeters of sediment and deeply into burrows and cracks (up to one meter)
12	Mangroves (10 D)	All along the creeks in and around Kandla, on the margins of mudflats and also in the islands of MNPS near Vadinar.	<ul style="list-style-type: none"> • Mangrove Forests are composed of salt tolerant trees that form dense stands with distinct zonation. • The fringing forests have relatively high wave activity and strong currents. • But those found in bays and estuaries are well sheltered. • Attached to the prop roots are moderate densities of algae, snails and crab. • They are also nursery grounds of prawns. • Fresh spills of light refined products have acute, toxic impacts to both trees and intertidal biota. These products will penetrate deep into the forests, stopping only at high-tide line resulting in sediment contamination. • Fresh crude will have great persistence where it penetrates burrows and prop root cavities. • Heavier oils tend to coat the intertidal zone, with heaviest concentrations at the high-tide line. • Heavy Oil will coast the intertidal section of prop roots, resulting in defoliation and eventual death of the tree if significant coverage occurs. In the sheltered areas, oil may persist for many years.
13	Corals Reefs	Around the Islands of MNPS near Vadinar, including Kalumbhar and Narara.	<ul style="list-style-type: none"> • Live corals are unlikely to become oiled, since they are rarely exposed at the sea surface except those in the intertidal area. But once oiled

In addition to the above the areas and features requiring special attention are given as **Table 6.7** below.

Table 6.7. Areas Requiring Important Considerations

Sl. No.	Areas requiring special consideration	
1	Oil Spill Threat Zones	<ul style="list-style-type: none"> • Ports, Oil Handling Facilities, Refineries
2	Corals	<ul style="list-style-type: none"> •
3	Sub tidal Habitats	<ul style="list-style-type: none"> • Submerged aquatic vegetation
4	Birds	<ul style="list-style-type: none"> • Nesting sites, Waterfowl overwintering concentration areas • High concentration migration stopovers • High concentration resident bird colonies
5	Marine Mammals	<ul style="list-style-type: none"> • Migration corridors • Population concentration areas
6	Terrestrial Mammals	<ul style="list-style-type: none"> • Concentration & frequenting areas
7	Fish and Shellfish	<ul style="list-style-type: none"> • Anadromous fish spawning streams • Estuarine areas which are important fish nursery areas • Special concentration areas for estuarine and demersal fish • Shellfish seed beds, leased beds, high concentration areas • Crab, shrimp, and lobster nursery areas
8	Reptiles	<ul style="list-style-type: none"> • Marine turtle nesting beaches
9	Recreation	<ul style="list-style-type: none"> • High-use recreational beaches • Marinas and boat ramps • High-use boating, fishing, and diving areas
10	Management Areas	<ul style="list-style-type: none"> • MNPS, WLSs, ICMBA • Research Stations • Mangrove Plantations • Other Wildlife management areas • Estuaries of rivers like Narmada & Tapti
11	Resource Extraction	<ul style="list-style-type: none"> • Commercial fishing areas • Water intakes • Salt Pans • Aquaculture sites • Offshore Exploration Sites • Defense Installations
12	Cultural & Heritage Resources	<ul style="list-style-type: none"> • Archaeological and other historically significant sites

Source: Data Analysis

DEVELOPMENT OF OIL SPILL RESPONSE STRATEGY

The oil spill response strategy is finalized based on vulnerability of the coastline which can be described based on different factors namely source of spill, location of oil slick containment, type and quantity of oil spilled, marine meteorological condition, shoreline characteristics and sensitivity to oil spill in the area. The following section deals with development of oil spill response strategy.

7.1. Potential Sources

Ports, SPMs, other Oil handling facilities & Ships are the sources of oil spill with in Kandla Port Limit. The location map of Ports, SPMs & Captive Jetties of Gulf of Kachchh which are the most probable location of oil spill within Kandla Port limit is given as **Figure 7.1**. The likelihood and the consequence of specific spills should be calculated based on the out comes of a ‘Detailed Risk Assesment Study’.

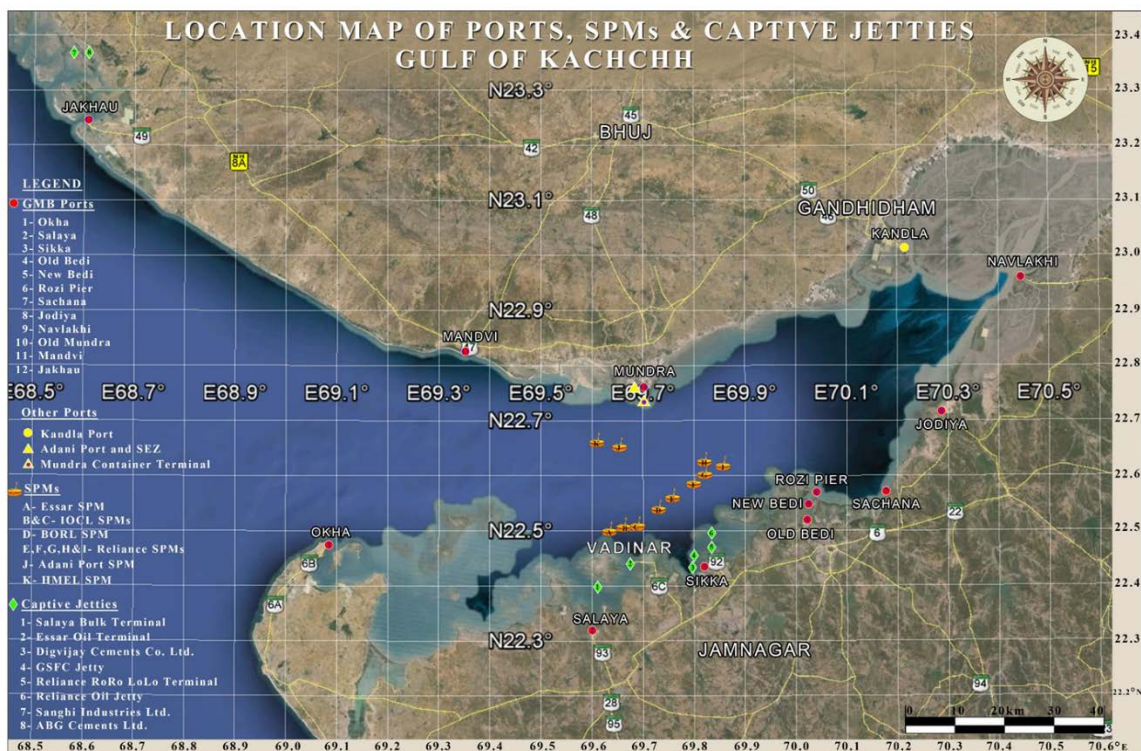


Figure 7.1. Location Port and allied facilities in Gulf of Kachchh

Oil Jetties can handle up to a maximum size of vessel 56,000 DWT.SPM handle Very Large Crude Oil Vessels (VLCC) with a maximum pumping capacity of 10000 tonnes per hour. Hence it should be inferred that the area is having high density of potential sources.

7.2. Types of Oil Handled & Characteristics

Oil is an important commodity handled at the port. The details of oil handled by the facilities in the KPT area and their characteristics are given as **Table 7.1** below.

Table 7.1. Details of Oil Handled & Characteristics

Sl. No:	Type of Oil	Specific Gravity	Genre	Characteristics	Examples
1	Light Oil	< 0.84	White Oil	Non- persistent, Volatile	Products including Aviation Fuel, Kerosene, Motor Spirit, Naphtha, HSD
2	Crude Oil	>0.84	Black Oil	Persistent, Viscous, Emulsion, Fresh Oil amenable to dispersants	Arabian Light, Arabian Heavy etc.,
3	Heavy Oil	>0.95	Black Oil	Persistent, Viscous, Emulsion, Generally not amenable to dispersants	Fuel Oils, LSWR
4	Edible Oil Crude/ Refined	>0.92	Black Oil	Persistent, Viscous,	

(Source: Annual Report)

7.3. Sensitivity of the Shoreline

As already discussed the port limit extends between the Northern and Southern arms of Gulf of Kachchh. Northern and North - Eastern portions are rich in mangroves and the Southern shore is rich in a wide variety of organisms including Corals, Fishes, Birds and Mangoves. The area of Marine National Park adjoining and extending on both sides of Vadinar will be the worst affected area during a recognisable spill scenario. There is also a chance that due the presence of extensive creek systems, the oil can directly spilt into inner areas of GoK. There are rivers system entering into the GoK near Vadinar. During high tide oil can enter inland through these inlets. Also it is important that due to the presence of circulating currents of GoK the contaminants on entering the any part of the inner GoK can exert stress on the Marine National Park and Sanctuary (MNPS) and is a cause of concern. Also fisheries are concentrated in the creek section of Sathsaida Bet and the Surajbari area is famous for seasonal prawn fishery. There are vast salt pans functioning in the Kandla creek area and also there are

patches near Mundra, Navlakhi and Vadinar. There are also prominent water intake points at Vadinar and Mundra.

7.4. Prioritization of Resources

Prioritization of resources is an integral part of sensitivity mapping since it will be helpful in determining the response priorities, achieving optimal resource use and essentially ensure maximum resource protection. This was done by giving ranks to each resource types which has been already described under the heads of Environmental sensitivity ie., Sensitivity to Oil Pollution, Environmental Value, Cultural & Social values and Economic values (Kankra et al, 2008). Ranks between 1-10 was assigned for the resource. Same rank was given to different resource when they occupied same position in different heads. Two resource may take a same value as required by the circumstance. Hence, it is not necessary that all the values must be present under one category at a time. Intake points considered here are only of industrial use. Weightages were given to each head ie., Sensitivity to Oil Pollution (30), Environmental Value (30), Cultural & Social values (20) and Economic values (20). Priority Index (PI) was worked out based on this. Details of Prioritisation of Resources is given as **Table 7.2** below.

Table 7.2. Prioritization of resources

Resources	Sensitivity for Oil Pollution (1-10) Weight (30%)	Cultural & Social Values (10%)	Scientific Values (20%)	Environmental Importance (30%)	Economic Considerations (10%)	Total Relative Response of Sensitivity	Risk Value	Priority	
								Index	Order
Rocky Coast	3	1	2	2	1	2.1	1	2.1	D
Port/ Harbour/ Jetties	1	7	2	4	8	3.4	2	6.8	C
Intake Locations	10	2	1	1	2	3.9	3	11.7	B
Salt Pans	3	8	2	6	5	4.4	1	4.4	D
Sandy Beach	6	8	3	5	2	4.9	2	9.8	D
Fishing Grounds	7	8	5	6	8	6.2	2	12.4	B
Subtidal Coral Reefs	2	9	10	9	6	6.8	1	6.8	C
Intertidal Mudflats	7	4	7	8	3	6.6	2	13.2	B
Mangroves	9	10	8	10	8	9.1	3	27.3	A

Resources	Sensitivity for Oil Pollution (1-10 Weight (30%))	Cultural & Social Values (10%)	Scientific Values (20%)	Environmental Importance (30%)	Economic Considerations (10%)	Total Relative Response of Sensitivity	Risk Value	Priority	
								Index	Order
Intertidal Corals	10	9	10	9	9	9.5	3	28.5	A

(Source: Adopted Kankra)

S- Sensitivity to Oil Pollution, Wi- Weightage, E-Environmental Value, PI- Priority Index

C& S – Cultural & Social, Ec- Economic

7.5. Development of Response Strategy

Based on the above characteristics, suitable response strategy to be adopted is discussed below. The rating process was based upon independent data, manufacturers’ information, experience and engineering estimates. Important consideration for the response technology assesment are discussed below:

7.5.1. Highest Effective Speed

The highest effective speed rating assumes that the equipment being rated is used by people who have been trained and are experienced in fast water response with that technology. The speed in knots represents the highest practical current or speed of advance, as applicable, that the technology can still effectively deflect, contain or skim oil from the water. Effectiveness will generally be diminished at the higher velocities, however, the majority of the oil (more than 50 percent) encountering the device will be controlled or recovered as desired at that upper limit speed rating.

7.5.2. Effective in Waves

Effectiveness in waves is dependent upon the oil recovery rate and oil recovery efficiency or deflection/containment capability. Generally, a technology that has good reserve buoyancy, adequate freeboard and draft, or can be decoupled from the influences of waves, will continue to be effective in waves. Short-crested waves usually degrade the performance of equipment more than large long-period swells. A low (L) rating represents effectiveness in calm water conditions up to one-foot short crested waves. A medium (M) rating indicates effectiveness in short crested waves between 1 and 3-feet high, while a high (H) rating represents satisfactory performance in waves 3 to 6-feet high. Effectiveness in these conditions means that the technology will contain or collect the majority of the oil it encounters.

7.5.3. Effective in Debris

Floating debris will cause problems with equipment by damaging it, moving it or rendering it ineffective. Some equipment is less affected by debris due to its robust nature or method of containment/recovery. Some skimmers use debris screens that protect the pump but often require manual tending to remove the debris. A high (H) rating means that the skimmer will continue to function well in floating debris with minimal manual tending required. Medium (M) rating represents a degraded performance level in debris, while a low (L) rating indicates serious problems with performance in debris. Both M and L ratings require significant manual tending to remove debris.

7.5.4. Effective in Shallow Water

Effectiveness in shallow water indicates the technology has a low or no draft requirement and that it will effectively contain, deflect or remove oil as designed. A yes (Y) indicates that a skimmer or boom system is manufactured that is effective in 2-foot deep water or it is not limited by a water depth of two feet. It is possible that some skimmers or boom systems receiving a no (N) rating could be produced by the manufacturer to function in shallow water.

7.5.5. Ease of Deployment

The ease of deployment rating reflects the amount of complexity, training required, people and logistics involved to deploy and use the technology successfully. The more resources and training required to deploy the technology and use it effectively, the lower the rating. The faster a technology can be deployed with a minimum number of people and support equipment, the higher the rating. Generally, technology with a good (G) or a very good (VG) ease of deployment rating will continue to be effective close to the highest effective speed rating when using inexperienced personnel.

7.5.6. Oil Viscosity Range

A low (L) rating indicates that a skimmer is effective in light oil with a viscosity between 1 and 100 cSt. Medium (M) indicates effectiveness in medium grade oils with a viscosity between 100 and 1,000 cSt, while high (H) means the skimmer was effective at recovering heavy oil with a viscosity between 1,000 and 60,000 cSt. A skimmer was considered effective if tests recorded reasonable recovery rates and recovery efficiencies of at least 50 percent. If a viscosity range is not listed for a skimmer, then the skimmer is not effective at recovering oil in that viscosity range.

7.5.7. Oil Recovery Efficiency & Recovery Rate

Skimmer specific performance ratings are based upon independent performance test data when available and manufacturer claims. When data were not available, physics and engineering principles

were used to approximate performance. Generally, oil recovery efficiency will decrease and oil recovery rate will increase with speed. Technologies with the higher efficiencies and recovery rates that were not significantly degraded by increases in speed were given higher ratings. Skimmers with comparatively lower efficiencies and recovery rates that degraded quickly at faster speeds were given lower ratings. Skimmers that demonstrated a poor (P) performance for recovery efficiency and/or oil recovery rate in currents above one knot were not included in this.

As per above consideration, booming strategies, specialized boom requirements, alternate containment methods and high-speed skimmers are rated in several categories and presented in **Table 7.3** and **7.4** below.

Table 7.3. Booming Strategies

Sl. No.	Technology Name	Highest Effective Speed kts.	Eff. in Waves	Eff. in Debris	Eff. in Shallow	Ease of Deployment	Comments
1	Cascade *	4	L	M	Y	F	Short sections independently moored to shore.
2	Deflection *	4	L	M	Y	F/G	Longer sections with shore tiebacks downstream.
3	Chevron (closed)*	3	M	M	Y	G	Quick to deploy because it uses fewer anchor points.
4	Chevron (open)*	3	M	M	Y	G	Allows for vessel traffic between openings.
5	Current Rudder*	3	M	H	N	F	Allows for vessel traffic by control of rudder from shore.
6	Double Boom*	3	M	H	Y	F	Improved containment but hard to keep separated properly.
7	Boom Deflectors *	4	M	M	Y	G	Deflectors used to keep boom at an angle without anchors.
Boom (Specialized)							
1	Fast Sweep (V-Shaped)	2.	H	L	N	G	Net across foot of boom keeps it in a V-shape.
2	Rapid Current Boom	3.	L	L	N	P	Inclined plane, fabric bottom with outlet holes in pocket.
3	Horizontal Oil Boom	3.	M	L	N	F	Two booms connected by net & filter fabric.
4	Holes in lower draft*	2	M	L	N	G	Larger draft with relief holes in lower skirt to reduce drag.

5	Net in foot of boom	1.	H	L	N	G	Short vertical net at foot of the boom.
6	Foam 6"X 6",two tension lines*	4	L	L	Y	VG	Typical fast water diversion boom with upper & lower tension.
7	External Tension Line foam	2	M	L	N	F	High stability, limited reserve buoyancy.
8	Shell High Current "Boom"	3	L	M	Y	P	Rigid aluminum perforated inclined plane structure, diversion system.
Alternate Methods							
10	Pneumatic Boom	2.	M	H	N	G	High power required (30 hp/ft).
11	Water Jet (Horizontal)	4.	M	M	Y	F	Reasonable power requirements (3 hp/ft).
12	Water Jet (Plunging)	4	M	M	N	F	Reasonable power requirements.
13	Air Jet	3	M	M	Y	F	Low power required (1 hp/ft).
14	Flow Diverters	6	H	M	Y	VG	No power, changes surface currents to direction of anchor point.
15	Floating Paddle Wheel	3	M	M	Y	G	Low power required (0.25 hp/ft), high-energy transfer.
16	Earth Dam (underflow)*	2	M	M	Y	P	Barrier blocking low flow into an inlet or out of a stream.

Table 7.4. Skimmer Specific Performance

Sl. No :	Technology Name	Highest Effective Speed (kts.)	Eff. in Waves	Eff. In Debris	Eff. In Shallow	Ease of Deployment	Oil Viscosity Range	Oil Recovery Efficiency	Oil Recovery Rate	Comments
Incline Skimmers										
1	Dynamic	3	M/H	M	Y	G	L,M,H	G	G	VOSS & Self Propelled versions.
2	Static	5	M/H	M	N	G	L,M,H	G	G	VOSS, low maintenance
ZRV Skimmer										
1	Rope Mop	5	H	H	N	G	L,M,H	VG	F	VOSS & Self propelled catamarans

2	Sorbent Belt	6	M	M	N	G	L,M, H	VG	F	Very high maintenance but effective
Quiescent Zone										
1	Expansion Weir *	3	L	L	Y	G	L,M	F	G	Expansion slows flow
2	Circulation Weir	3	M	L	Y	G	L,M, H	G	G	VOSS, portable lagoon
3	Brush Conveyor	3	M/ H	M/ H	N	G	M,H	VG	F	VOSS, barge & self-propelled
4	Streaming Fiber & Belt	3	M	L	N	G	L,M	G	F	Fibers slow flow, belt & weir remove oil
Lifting Belt										
1	Filter Belt	3.5	M/ H	M/ H	Y	G	M,H	VG	F	Self-propelled & induction impeller
2	Rotating Disk Brush									
3	Rotating Brushes	3	M/ H	M/ H	Y	G	M,H	VG	F	VOSS, barge & self-propelled
Surface Slicing										
1	High Current Oil Boom	6	L	L	N	G	L,M, H	F	G	Weir with foil bow
2	Multi-purpose Oil Skimmer Sys.	3	M/ H	L	N	G	L,M, H	F	G	Wave following weir
3	Russian Debris Skimmer	3	L	M/ H	N	G	L,M, H	G	G	Debris filter, weir and gravity separator tank.
4	Trailing Adsorption									
5	Trailing Rope Mop	4	H	H	N	F	L,M, H	VG	F	Batch processing requires retrieval of rope mops
6	Free Floating Sorbent*	5	H	H	Y	G	L,M, H	VG	F	Free drifting sorbents and recover them downstream
<i>Legend</i>			<i>H</i>	<i>High</i>	<i>Y</i>	<i>Yes</i>		<i>VG</i>	<i>F</i>	<i>Very Good</i>
			<i>M</i>	<i>Medium</i>	<i>N</i>	<i>No</i>		<i>G</i>	<i>F</i>	<i>Good</i>
			<i>L</i>	<i>Low</i>				<i>F</i>	<i>P</i>	<i>Fair</i>
								<i>P</i>		<i>Poor</i>

Notes:	<p>1. Low is effective in calm water to 1 foot waves, Medium is effective in 1 to 3 foot waves, and High is effective in 3 to 6 foot waves</p> <p>2. Yes indicates that a skimmer or boom system is effective in 2 foot of (shallow) water.</p> <p>3. Low indicates a skimmer is effective in light oil 1-100 cSt viscosity, Medium 100-1,000 cSt and High 1,000-60,000 cSt</p> <p>4. Oil recovery efficiency is the percent of oil recovered compared to the total volume of oil and free water collected.</p> <p>5. Oil recovery rate is the rate of oil collected which is a combination of recovery efficiency and throughput efficiency. "Controlled tests results with oil were not available so ratings were based on engineering principles, expert opinions and field experience. Technology names with no asterisk were rated based upon data obtained from controlled tests with oil.</p>
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7.5.8. Shoreline Consideration

Shoreline Response Team should follow Shore Line Clean Up Assessment Technique (SCAT) which is a standardized method of assessing, recording and reporting the degree of oiling of the shoreline. The steps during SCAT include:

- Identify sensitive resources
- Evaluate shoreline oiling conditions
- Recommend clean-up methods and end points
- Apply the concept of Net Environment Benefit Analysis (NEBA) to the shoreline response strategies

The shorelines are to be divided into segments. Segments are defined geographic areas with a similar character in terms of physical features and sediment types. Sub segments can be used if the extent of oiling varies significantly between a given segments. Results are to be standardised. Descriptions are used to describe the oil observed. The SCAT Team should calibrate their classifications of oil observed prior to conducting full scale surveys.

Report / log form (with clipboard), Method of communications (e.g. mobile, satellite phones, VHF radio), Handheld GPS, Digital Camera, Compass, Additional batteries shall be available with the shoreline response team.

The shoreline assessment will be followed by selection of appropriate shoreline clean-up measures. The selection of most appropriate methods and equipment to be used in each case will be determined by presence of hazard:

-
- Character and amount of stranded oil
 - Character of shoreline
 - Tidal range and times
 - Prevailing sea weather conditions
 - Availability of equipment
 - Accessibility of the contaminated area for equipments
 - Availability of personnel
 - Presence of sensitive wildlife or other features which may be damaged by cleaning operations, availability of local transport
 - Storage treatment and disposal facilities for the recovered materials and cost and local, state, national or international policies and priorities.

Shoreline character comprises mainly four components ie., Substrate type- the material that the shore is comprised of, Shoreline form- the shape of the shoreline, Energy- a function of currents, wind and waves, Biological character- the plant and animal communities present. Each component is to be analysed separately before choosing the response option. Parameters used to describe the distribution of the oil on shorelines are given below:

- Length (m) - The distance along a shoreline that is oiled
- Width (m)- The distance from the top of the highest elevation of the shore that is oiled to the bottom
- Percentage cover-An estimate of the percentage of the substrate surface within the area that is oiled
- Thickness (mm or cm) - The distance from the substrate surface to the top of the oil layer. Often this cannot be measured accurately because the surface layer is too thin.
- Depth-The depth below the surface that is oiled. For buried oil, depth should be measures from the top of the substrate surface to the oily layer.

After completing the SCAT survey based on the observation, Shoreline Clean-up operations are to be initiated and guideline for the clean-up of various shoreline types are given as **Table 7.5** below.

Table 7.5. Shoreline Response Operations

Sl. No.	Type of Shoreline	Response Operations
1	Exposed Rocky Shore (1A)	<ul style="list-style-type: none"> • In the case of Gujarat they are many times associated with corals. Hence, have rich biota. Hence immediate severe biological impacts will be occurring especially in tidal pools but, the oil will not remain stranded. • When exposed coral become oiled, it is best left undisturbed and to recover naturally. • Natural cleaning of coral platforms that dry out at low water can be assisted by low pressure flushing with seawater to minimize exposure of reef communities to oil.
2	Exposed Solid Vertical Structures (1B)	<ul style="list-style-type: none"> • These areas require high-pressure spraying in order to: remove oil; prepare substrate for decolonization of barnacle and oyster communities; minimize aesthetic damage; prevent the chronic leaching of oil from the structure. • Walls and other vertical structures may exhibit a band of oil throughout the tidal range that can be removed by pressure washing from boats or rafts. • Oil that has migrated under quays, jetties or other structures built on piles or columns can be difficult to remove, particularly when headspace is restricted. • Wash created by vessels' propellers may assist removal of bulk oil but fine cleaning may not be possible and the oil can be left to degrade naturally. • Wooden structures, particularly where rot is established, may be damaged by more aggressive clean-up techniques.
3	Fine to Medium - Sand Beaches (3)	<ul style="list-style-type: none"> • Among the easiest beach types to clean. • Cleanup should concentrate on the removal of oil from the upper swash zone after all oil has come ashore. • Removal of sand from the beach should be minimal to avoid erosion problems; special caution is necessary in areas backed by seawalls. • Activity through both oiled and dune areas should be severely limited, to prevent contamination of clean areas. • Manual cleanup, rather than road graders and front-end loaders, is advised. • All efforts should focus on preventing the mixture of oil deeper into the sediments by vehicular and foot traffic. • Sand beaches are often regarded as valuable amenity resources, with priority given to cleaning them. • Beaches usually have good access and because the depth of oil penetration into the beach for many oils is limited, are generally considered the easiest shoreline type to clean. • However, oil can become buried in the beach by successive tides and low viscosity oils will penetrate into coarse grained sands.

		<ul style="list-style-type: none"> Flushing, surf washing or harrowing techniques may be appropriate to address buried oil.
4	Rip Rap (6B)	<ul style="list-style-type: none"> When the oil is fresh and liquid, high-pressure spraying and/or water flooding may be effective, making sure to recover all released oil. Heavy and weathered oils are more difficult to remove, require scrapping and/or hot-water spraying. It may be necessary to remove heavily oiled riprap and replace it. In favourable weather conditions, floating oil may be collected at the base from boats. Workers on the structure, and to some extent within it (as far as it is safe to do so), can remove oiled debris and clean boulders and tetrapods with pressure washers or manually with rags and sorbents. Passive cleaning, hereby sorbents are placed along the face of this structures, allows oil washed out with the movement of tides, swell and wave action to be recovered. In certain situations, this natural action can be augmented by pumping water into the structure to flush out the oil. Pressure washing and passive cleaning is recommended in accessible place where as use of sorbents and natural cleaning is preferred in place of inaccessible places.
5	Exposed Tidal Flats (7)	<ul style="list-style-type: none"> Currents and waves can be very effective in natural removal of the oil. Cleanup is very difficult (and possible only during low tides). The use of heavy machinery should be restricted to prevent mixing of oil into the sediments. On sand flats, oil will be removed naturally from the flat and deposited on the adjacent beaches where cleanup is more feasible.
6	Sheltered Manmade Structures (8B)	<ul style="list-style-type: none"> cleanup of seawalls is usually conducted for aesthetic reasons or to prevent leaching of oil • low - to high-pressure spraying at ambient water temperatures is most effective when the oil is fresh
7	Vegetated River Bank (9B)	<ul style="list-style-type: none"> Cleanup should proceed cautiously. Under light coatings, cleanup is probably unnecessary; under heavy accumulations, oil on the sediment surface might be removed to enable new growth. Low-pressure spraying (ambient) may aid oil removal. Plant cutting should be closely supervised if undertaken.
8	Sheltered Mud Flats(9A)/ Hyper	<ul style="list-style-type: none"> These are high-priority areas necessitating the use of spill protection devices to limit oil-spill impact; deflection or sorbent booms and open water skimmers should be used cleanup of the flat surface is very difficult because of the soft substrate; many methods may be restricted

	saline Mudflats (9C)	<ul style="list-style-type: none"> • low -pressure flushing and deployment of sorbents from • Shallow - draft boats may be helpful
10	Freshwater Swaps/ Marshes(10B)	<ul style="list-style-type: none"> • These are high-priority area necessitating the use of spill protection devices to limit oil spill impact; deflection or sorbent booms and skimmers. • Under light oiling, the best practice is to let the area recover naturally. • Any cleanup activity which would mix the oil into organically rich sediments should be avoided. • Manual pickup should be conducted from a floating platform (e.g., jon boat or inflatable). • Only the least-intrusive cleanup methods should be employed to avoid compounding the environmental impact of a spill. • Quick flushing and removal of oil while it is still fluid can reduce long-term impacts
11	Fringing and Extensive Salt Marshes (10 C)	<ul style="list-style-type: none"> • Under light oiling, the best practice is to let the area recover naturally. • Heavy accumulations of pooled oil can be removed by vacuum, sorbents, or low-pressure flushing. During flushing, care must be taken to prevent transport of oil to sensitive areas down slope or along shore. • Cleanup activities should be carefully supervised to avoid vegetation damage. • Any cleanup activity must be sure not to mix the oil deeper into the sediments. Trampling of the roots must be minimized. • Cutting of oiled vegetation should only be considered when other resources present are at great risk from leaving the oiled vegetation in place
12	Mangroves (10 D)	<ul style="list-style-type: none"> • Under light accumulations of any type of oil, no clean-up is recommended • If sheen are present, use sorbent booms to pick up the oil as it is naturally removed, being sure to change the booms frequently. • Only light fuel oil requiring clean-up is diesel oil. • Heavy accumulations could be skimmed or flushed with low- pressure water flooding as long as there is no serious disturbance to substrate. • Oil debris should be removed without disturbing substrate. • Live vegetation should never be cut or otherwise removed. • Sorbents can be used to remove wide heavy coatings from prop roots in the areas of firm substrate with close supervision.
13	Corals Reefs	<ul style="list-style-type: none"> • However, should exposed coral become oiled, it is best left undisturbed and to recover naturally. • Natural cleaning of coral platforms that dry out at low water can be assisted by low pressure flushing with seawater to minimize exposure of reef communities to oil utilizing water of the same locality can be done.

		<ul style="list-style-type: none">• Where recovery of oil is necessary, for example to prevent its embolization, this should be undertaken with care to minimise damage to the fragile structures.• Rehabilitation should be done in worst scenario utilizing undisturbed native fragments.
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7.6. OSR Inventory for KPT Limit

As per risk classification of ports and allied facilities as per NOS-DCP, based on type of cargo handled, quantity of bunkers carried onboard ships calling at the port, single point mooring facility at the port, and ship-to-ship transfer operations at the port KPT belongs to Risk Category A. The risk categorization is appended at **Table 7.6.**

Table 7.6. Risk categorization of ports

Risk Category	Description
A	Ports handling crude oil/ tanker visits/ SPM/ STS
B	Ports handling ships carrying more than 1000 tons of fuel/ bunker oil Ports handling products only
C	Other than Cat 'A' and Cat 'B'

Source: NOSDCP

The planning standards for oil spill response resources for each risk category of ports is appended at **Table 7.7.**

Table 7.7. Oil Spill Response equipment for each risk category of ports

	Description	Risk category			
		A	B	C	
Equipment	Inflatable Boom (metres)	2000	1000	600	
	Skimmer (20 TPH)	4	4	2	
	OSD Applicator (no.)	6	2	2	
	Oil Spill Dispersant (litres)	10,000	5,000	3,000	
	10 Tons Flex Barge (no.)	4	02	2	
	Current Buster booms if tidal current >2 knots (meters)	400	400		
	Sorbent boom (meters)	500	200		
	Sorbent Pads (no.)	2000	1000		
	Shoreline cleanup Equipment	Mini Vacuum pumps	5		
		OSD Applicator	5		
Fast tanks		5			
Vessel	Work Boats	2	1	1	
	Tugs	2	1		
Man Power	IMO Level 1	10	6	2	
	IMO Level 2	4	2		
	Other	10	10	5	

Source: NOSDCP

As per the above categorization Kandla and Vadinar port falls into Category A., which should have minimum inflatable Boom of capacity 2000m. Inflatable booms of capacity 1200m which is already available with the ports. Considering the minimum standards for Category A and the ecological sensitivity areas along the coast and the creek mouth of length not less than 1 km it is preferably to

have 1000m more booms in the deck. Similarly as per NOSDCP, the minimum number of skimmers required is 20 TPH x 3. KANDLA Port is having 49 TPH x 2 fast flow skimmer and Brush skimmer of capacity 12TPH which satisfies the minimum requirement. Oil Spill Dispersant Storage on board with 12000 L in 3 Tugs.

As per NOS-DCP to cater a Tier 1 spill at KANDLA Port, the port should have to have response equipment for containing 700 MT of Oil. The following section evaluates the sufficiency of OSR equipment at KPT. As per the data sheet available, the oil thickness of various types of oil and concentrations with respect to area is shown as **Table 7.8**.

Table 7.8. Oil Appearance, Thickness & Concentration of Spill

Code	Description	Layer-Thickness Interval		Concentration	
		microns (µm)	inches (in.)	m ³ per Km ²	bbbl/acre
S	Sheen (silver/gray)	0.04 – 0.30	1.6 x 10 ⁻⁶ – 1.2 x 10 ⁻⁵	0.04 – 0.30	1 x 10 ⁻³ – 7.8 x 10 ⁻³
R	Rainbow	0.30 – 5.0	1.2 x 10 ⁻⁵ – 2.0 x 10 ⁻⁴	0.30 – 5.0	7.8 x 10 ⁻³ – 1.28 x 10 ⁻¹
M	Metallic	5.0 – 50	2.0 x 10 ⁻⁴ – 2.0 x 10 ⁻³	5.0 – 50	1.28 x 10 ⁻¹ – 1.28
T	Transitional Dark (or True) Color	50 – 200	2.0 x 10 ⁻³ – 8 x 10 ⁻³	50 – 200	1.28 – 5.1
D	Dark (or True) Color	>200	> 8 x 10 ⁻³	>200	> 5.1
E	Emulsified	Thickness range is very similar to dark oil.			

Source: Chart from Bonn Agreement Oil Appearance Code (BAOAC) May 20, 2006 modified by A. Allen

Considering the worse Tier-1 spill, the area of impact is estimated as follows:

- Volume of Oil = 700 MT
- Thickness of Oil at the point of Spill (at zero time) = 200 µm (approx.)
- Area of Impact = (700MT/200µ) = 3.5 x 10⁶ m² (approx.)
- Length of the coast immediately impacted = sqrt (Area of Impact) approx. ≈ 1870m
- Average response time = 60 minutes (Mobilization of Resources + Deployment of Boom, Skimmer etc + considering Flotilla speed of 10 Knots/hr).

As per the above examination it was found that , the OSR equipments available at Kandla is sufficient to cater the requirements of Kandla Zone, but considering the minium requirement for Category A ports and distance between Kandla & Vadinar seriously extending the response time and thus imposing severe treat to sensitive life, preferabely the inventroy at Vadinar could be expanded in a phased manner.

However shoreline response resources are not provided in the present inventory and provision for the same shall be incorporated to it at the earliest through Mutual Aid pooling.Considering the presence of bets within the shoreline and their characteristics, essential resources for shoreline response are to be provided such as River boom, Deflection boom, Intertidal Boom, Shoreline Cleanup Equipments etc. As the entire KPT limit is ecologically important, part of MNPS and supporting species like mangroves and corals calls for the more number of shore line equipments inclusive of Sorbent booms, Absorbent Pads, Pillows, Rolls, Sheets. Details for the same are given as **Table 7.9** below.

Table 7.9. Details of Shoreline Cleanup Equipments for Kandla

Sl No.	Equipments	Unit	Kandla	Vadinar
1	BOOM			
a	Beach sealing Boom(500mtr)	No.		
b	Auto/River Boom(200mtr)	No.	5	2
c	Fence Boom(150mtr)	No.		
2	SORBENT			
a	Boom-50 mtr	No.	6	6
b	Pillows	No.	50	50
c	Rolls	No.	50	50
d	Sheets	No.	50	50
e	Pads	No.	50	100
3	CLEAN UP Equipment			
a	Hot Water Pressure Cleaner, Showels, Rakes, Diggers etc.	set	5	8
4	Miscellaneous			
a	Light set Generator, PPE, Safety Items (Safety Shoes, Hard Hats, etc.),Personal Items (Coveralls, Boots, etc.)	set	10	10
5	Trained minimum man power	set	10	10

INCIDENT MANAGEMENT MECHANISM

Incident management is essential part of efficient emergency response operations. It makes the entire process structured at the same will add flexibility to operations to meet the response goals. It involves command, control and coordination of activities, individuals, organizations and the community.

8.1 Organisation of Oil Emergency Preparedness & Response Team

Effective emergency plans require that, in the event of an accident nominated personnel are given specific responsibilities, often separate from their daily routine activities. It is recommended to setup an Emergency Organisation for responding to a oil spill incident which will be activated from the moment of spill to the termination of operation and even extending to decision making, record keeping etc. The Oil Spill Response Organisation Chart proposed for the Kandla Port Trust is given as **Figure 8.1 below**.

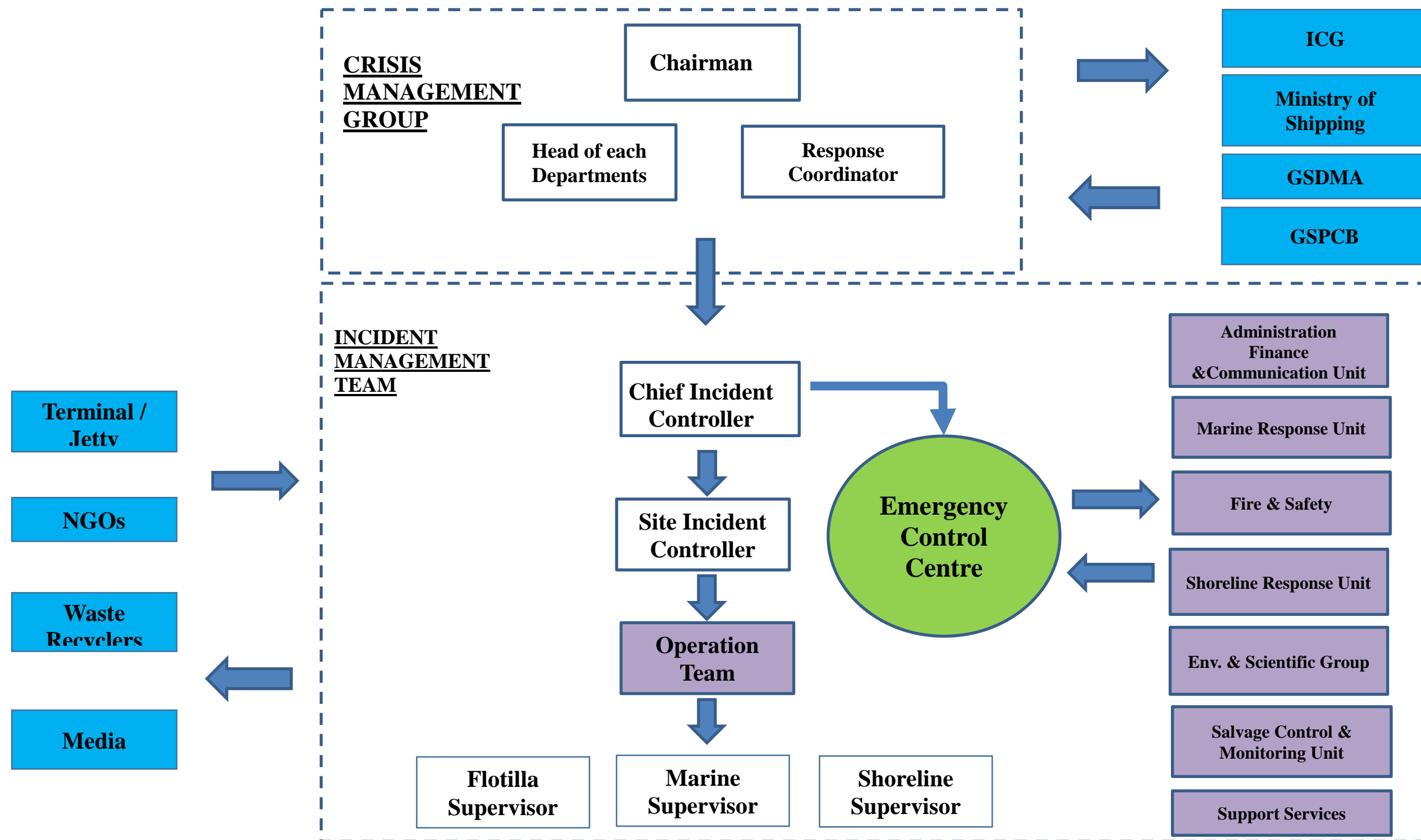


Figure 8.1. Oil Spill Response Organization Chart

8.1.1 Crisis Management Group

Crisis Management Group is the principal authority for oil spill preparedness & response within Kandla Port Limit. It shall be established at Kandla Port Trust utilizing the following key personnels:

- Chairman
- Deputy Chairman
- Chief Engineer (Civil Department)
- Chief Engineer (Mechanical Department)
- Secretary (General Administration)
- Chief Vigilance Officer (Vigilance Department)
- Traffic Manager (Traffic Department)
- FA & CAO (Finance & Accounts Officer)
- Chief Medical Officer (Medical Officer)

An appropriate person shall be nominated as the Response Co-ordinator who will be directly in touch various division, departments & agencies as and when required.

8.1.1.1 Roles & Responsibilities

- Responsible for the preparation and review of Oil Spill Contingency Plan for Kandla Port
- Procurement & development of OSR Equipments and facilities
- Responsible for getting the port personnel trained at IMO level 1 & 2
- Responsible for formulating MoU with Mutual Aid Group
- Review of Oil Spill Response Preparedness
- Site Visit & Review of report prepared by Chief Incident Controller (CIC)
- Responsible for communication with various National and State Level Authorities and media
- Responsible for Coordination, Communication with State Level Agencies such as State Disaster Management Agency (SDMA), State Pollution Control Board, Coast Guard Headquarters NW Region, Dept. of Fisheries, Forest, Wildlife.
- Constitution of Incident Management Teams as nominated by Chief Incident Controller (CIC)
- Responsible for allocation & deployment of personnel for handling oil spill incidents

-
- Providing Guidance to Emergency Response Units including arranging external assistance to
 - Providing administrative and financial assistance to operations
 - Declaration of the closure of Oil Spill Response Operations

8.1.1.2 Specific Duties of Response Coordinator

- Communicate between the Crisis Management Group and Incident Management Team
- Co-ordinate the activities of Incident Management Team after incorporating the recommendation of CMG
- Organise CMG meetings including joint meetings with IMT.
- Give proper instruction to CIC from time to time after consulting with CMG
- Arranging supporting as and when required by the IMT on approval of Chairman

8.1.2 Incident Management Team (IMT)

Oil spill response facility to be established will have an Incident Management Team. The Incident Management Team is the team who takes up the response activities under a Chief Incident Controller with its operation team and independent supporting units, who actually deals with the response activities at field. Incident facilities including Emergency Control Centre, Incident Command Centre, Forward Command Point, Staging Areas, Safe Forward Point, Joint Information Centre, Waste Management & De-contamination blocks will be directly functioning under IMT.

The section below presents the functional responsibilities and reporting requirements of IMT and facilities established as a part of it..

8.1.2.1 Chief Incident Controller (CIC)

CIC is the key responsible officer for the management and co-ordination of response operations at the scene of a pollution incident to achieve the most cost effective and least environmentally damaging resolution to the problem. CIC shall have overall responsibility to protect personnel, site facilities, and the public before, during, and after an emergency or disaster. The CIC shall be present at the emergency control centre (ECC) for counsel and overall guidance. He will be the contact point to the coordinators of individual units under ECC and resources & personnels under this unit will be transferred to the operations team depending upon the requirement of the situation. CIC can also delegate the power to pool the resources and personnel to SIC or SICs depending upon the intensity & extent of the incident and ask for briefing from time to time. In the case of small spills CIC itself can act as the SIC.

8.1.2.2 Official in Charge of CIC

Dy.Conservator, Kandla Port will act as the CIC in an event of oil spill.

8.1.2.3 Responsibilities of the Chief Incident Controller

The key responsibilities of CIC shall include the following:

- Preparation, review and updation of the OSCP
- Assessment of situation and declaration of an oil spill emergency
- Activation of Emergency Control Centre
- Approval of Incident Action Plan prepared by the SIC/SICs during spill
- Mobilisation of Oil Spill Response Resources
- Coordinate Surveillance and Monitoring Oil Spill Events
- Coordination with CMG and other personnels on direction from CMG
- Continuous review of situation and decide on appropriate response strategy
- Taking stock of casualties and ensure timely medical attention
- Ordering evacuation of personnel as and when necessary
- To be responsible for ensuring that appropriate local and national government authorities are notified, preparation of media statements, obtaining approval from the CMG and releasing such statements once approval received
- Assessing the situation and requesting to CMG for organizing consultation with ICG and District Authorities when a Tier 2 or Tier 3 spill is to be declared.
- Ensuring correct accounting and position of personnel after the emergency

8.1.2.4 Reporting Requirements of CIC

The Chief Incident Controller shall report to the Crisis Management Group through the Response Coordinator.

8.1.3 Emergency Control Centre (ECC)

Emergency Control Centre will be established at KPT office with 24 hr control room at the port office under the supervision CIC. ECC acts as the key coordinating centre for responding to any oil spill incidents. The emergency control center may be defined as the place from which the operations to handle the emergency are directed and coordinated. CIC will be assisted by an In-Charge who will be taking care the reporting requirements of various response units, operation team and other stakeholders of the event and other interested parties.

ECC equipped to receive and transmit information and directions from all the areas of the marine terminal as well as outside and will be located in an area of minimum risk. The ECC shall be away from the potential hazards and provide maximum safety to personnel and equipment and should be preferably made of non-combustible building of either steel frame or reinforced concrete with two exits and adequate ventilation. Preferable it should be placed in connection with KPT Pollution Response Centre or integrated with existing VTMS. It should also act a data repository that will be a point of gathering and dissemination of all information significant to the situation. Thus the Centre shall be equipped with facilities for Communication, Coordination, Surveillance, Monitoring, Conferencing – Real & Virtual and Repository.

8.1.3.1 Officer In charge of ECC

Dy. Conservator, the CIC himself will be Official In Charge of ECC.

8.1.3.2 Role of ECC

8.1.3.3 Facilities to be maintained with ECC

- A copy of the Oil Spill Contingency Plan (OSCP); maps and display charts and diagrams showing buildings, roads, underground fire mains, important hazardous material and process lines, drainage trenches, and utilities such as steam, water, natural gas and electricity;
- Situation boards (continuously updated to present a summary of the current situation and response actions being taken);
- Aerial photographs, if possible, and maps showing the site, adjacent industries, the surrounding community, high-ways, rivers, etc., help determine how the disaster may affect the community so that the proper people can be notified, adequate roadblocks established, and the civil authorities advised sufficient telephone lines to enable full liaison with outside bodies;
- Names, addresses, and telephone numbers of employees, off-site groups and organizations that might have to be contacted; all telephone lists being reviewed for accuracy on a scheduled basis and updated, as necessary;
- Dedicated and reliable communication equipment; enough telephones and at least one fax line to serve the organization for calls both on-and off-the-site;
- Fixed and portable two-way radio equipment to keep in contact with activities on-scene and to maintain continuity of communications when other means fail;
- Meeting room including conference rooms

- Plan board, logbook, tape recorder, television, DVD and Video facilities for playing back records from aircraft and helicopters, as well as monitoring media coverage of the incident with a person assigned to record pertinent information and to assist in investigating causes, evaluating performance, and preparing reports;
- Emergency lights so that operations can continue in the event of power failure; Photocopy, fax and e-mail facilities; and dedicated computers with LAN/ internet facility to access the installation data and the latest and updated soft copies of all standard operating practices (SOP), Reference material such as applicable government regulations, emergency equipment lists etc.

8.1.3.4 Reporting Requirements of ECC

CIC, the head of ECC will report the Crisis Management Group through the response coordinator.

8.1.4 Site Incident Controller (SIC)

CIC shall identify SIC, who will be reporting directly to him and SIC shall be nominated for full day shifts of operation for Port. SIC will have a operational team under him which will be supported with appropriate planning, technical, scientific, chemical, environmental, logistical, administrative, financial units as and when required on request to CIC.

8.1.4.1 Official in Charge of SIC

Dy. HOD, Marine Department/ Chief Operational Manager of port may act as the SIC in an event of oil spill. If EE is given the chart the port officer can be given the charge of operational team.

8.1.4.2 Responsibilities of the Site Incident Controller

The key responsibilities of SIC shall include the following

- Assist in developing and updating workable oil spill emergency contingency plan based on the experience specific to the area, organize and equip the organization inline with OSCP based on the and train the personnel;
- Preparation of Incident action plan (IAP) describing activities and logistical support covering the basic elements the situation, mission, execution, administration and logistics, command, control, co-ordination and communication with functional responsibilities.
- To communicate to the Emergency Control Centre through which it can communicate among groups and organize joint activities
- To ensure that the response to the oil pollution emergencies is in line with entity procedures, and to coordinate business continuity or recovery plan from the incident

- Request for any specialist support to the CIC
- Give feedback on seeking assistance of mutual aid members and external agencies.

Also SIC through respective coordinators will be responsible for:

- Communication links between the units
- Distribution of messages within the units
- Taking Minutes during meetings to record decision
- Typing Services
- Updation of situation boards & Charts
- Providing catering to the units and also forward a copy of the same to CIC.

8.1.4.3 Reporting Requirements of Site Incident Controller

The site incident controller shall report to the CIC

8.1.5 Operational Team

Operations unction is responsible for the management of all activities that are undertaken to resolve the incident and the management of all resources deployed in the field. The operations are organized in to divisions on the basis of the geography or operations being conducted. Divisions are major areas of activities which can be broken down in to the type of activity or geographical area according to the type and demands of the incident. Operations as well as functions involved as given as **Table 8.1** below:

Table 8.1. Functions of the Operation Team

Sl.No:	Operations	Functions
Offshore		
1	Marine operations	Marine containment and recovery
2	Salvage	
3	OSD	Aerial dispersants, Marine dispersants
Onshore		
1	Shoreline operations	
2	Offshore & Onshore	
3	Aerial operations	Aerial surveillance
4	Wildlife response	
5	Waste management	

8.1.5.1 Official In charge for Operational Team

Manpower trained at Level I of IMO Training from Technical wing shall constitute operational team. There may be a team leader to command the operational team as the official Incharge or it can be under the command of SIC himself. The operational team will have ability to conduct marine as well as

shoreline response operations. Marine response include offshore and coastal water operations whereas shoreline team will be positioned on the land area of the coastline. In the interface areas like creeks, salt pans etc, that they may work together. Number of members in each such team may be varied depending upon the incident.

8.1.5.2 Responsibilities

He is responsible for the provision of scientific and environmental information, maintenance of incident information services, and assist in the development of Strategic and Incident Action Plans. He shall ensure the distribution of all information to the operational team as well as take back details from them to Crisis Management Group and to all response personnel generally.

He is responsible to the CIC for all response operational activities. This includes ensuring that the requirements of Incident Action Plans (IAP) are passed on to operational personnel in the field, and for ensuring that the plans are implemented effectively and complied throughout the operation.

Responsibilities of Operational Team in general is described below:

- Obtain briefing from incident command
- Identifying level of priority
- Surveillance of Oil Spill, Monitoring of Water Quality
- Estimation of Quantity of Spill , possible trajectory identification
- Developing Tactics in support of Incident Action Plan (IAP)
- Response resources Allocation for each division or sector and assessment
- Deployment of response resources including flotilla
- Maintain a log of activities
- Review of Operations

8.1.5.3 Reporting Requirements

Operational Team is to report the SIC through its team leader if SIC himself is not in charge. In addition to the regular reporting special incidents, accidents and change overs are to be reported to CIC also. In case of activation of Units from emergency control centre they will be also coming under the operational team with its own team leaders reporting to the Site Incident Controller even though they will be activated by ECC head the Chief Incident Controller

8.1.6. Emergency Response Units

Seven emergency response units are proposed for achieving effective management of emergency. There will be different units having specific roles under the ECC dealing with administration, fire & safety, salvage monitoring and control, marine response activities, shoreline response, environmental and scientific aspects to act on emergencies as required. Response units are directly coming under the CIC through a coordinator. He will be arranging the additional supports by the CMG responsible for management of the ECC. Of which some specialised one will be activated only if the situation recommends, under the recommendation of site incident controller to the CIC.

Table 8.2. Responsibility allocation for Emergency Response Unit

Sl. No.	Emergency Response Unit	Status	Co-ordinator*
1	Shoreline Response Unit	Specialised	Dy. HOD, Civil Department
2	Marine Response Unit	Essential part of OT	Dy. HOD, Marine Department/ Chief Operational Manager #
3	Salvage, Control & Monitoring Unit	Specialised	Dy. HOD, Traffic Department
4	Environmental & Scientific Unit	Specialised	Dy. HOD, Medical Department
5	Fire & Safety Unit	Regular	Dy. HOD, Mechanical Department
6	Administration Unit	Regular	Dy. HOD, General Administration Department
7	Finance Unit	Regular	Dy. HOD, Finance & Accounts Department
8	Support Services – including –		
	Logistics	Regular	Dy. HOD, Vigilance Department
	HR, Media & Public Relations	Regular	Dy. HOD, General Administration Department

Note:

* In the case the organisation is lacking inhouse strength in any of these area, outsourcing can be done and in that case the team leader of the contract agency will be functioning under the respective co-ordinator.

Depending the location of Spill whether Kandla Zone or Vadinar Zone.

8.1.6.1. Administration Unit

Administration and Communication Coordinator is responsible for providing administrative support during the emergency.

Administration team is responsible for the general management of the unit and providing personnel for Communication links between the units, Distribution of messages within the units, keeping records of messages and expenditure, taking minutes during meetings to record decision; typing services, updating situation boards and charts; and providing catering to the units. He shall also ensure adequate

liaison between the incident management team and the media. All queries received from the media should be directed to this person. Before releasing any information, there should be have the approval of either the relevant Coast Guard Commander or CIC, depending on the size of the spill.

8.1.6.2 Official In charge

Dy. HOD, General Administration Department will act as the coordinator.

8.1.6.3 Responsibilities

The key responsibilities shall include

- to coordinate with mutual aid members and other external agencies
- to direct them on arrival of external agencies to respective coordinators at desired locations
- to mobilize oil spill responders and resources for facilitating the response measures
- to monitor mobilization and demobilization of personnel and resources
- to provide administrative and logistics assistance to various teams
- to be responsible for all financial, legal, procurement, clerical, accounting and recording activities including the contracting of personnel, equipment and support resources detail out

8.1.6.4 Reporting Requirements

He is to report the CIC.

8.1.6.5 Fire & Safety Unit

The implementation of operational guidelines and oversight of work practices to ensure the safety of response personnel and the public is integral to any response operation. Monitoring of operations to ensure there are safe working conditions is required throughout the response.

8.1.6.5.1 Official In charge

Dy. HOD, Mechanical Department shall be acting as the Fire and Safety Coordinator.

8.1.6.5.2 Responsibilities

- Development & execution of emergency response plan
- Train all team members for fire response
- Overall responsible for fire prevention

- To ensure that everyone is evacuating and none is entering the restricted area during emergency
- Operation and maintenance fire detection, notification and suppression systems
- Providing first aid to the injured person and transportation of the patient
- Recommend the Site Incident Controller to impose as well as release fire emergency

8.1.6.5.3 Reporting Requirements

He will be reporting to the CIC.

8.1.7 Salvage Monitoring & Control Unit (SMCU)

Salvage operations undertaken by the SMCU shall include:

- Lightering- Transferring Cargo, Pumping, deploying fenders etc., towing after refloating in case of grounding
- Air Lift
- Tidal Lift & Heaving- beach gear
- Refloating of breaking out stranded vessels

8.1.7.1 Role of SMCU

The SMCU will be the agency to monitor and control salvage operations

8.1.7.2 Official In charge of SMCU

Dy. HOD, Traffic Department will act as the official in charge.

8.1.7.3 Reporting Requirements of SMCU

He will be reporting to the CIC.

8.1.8 Marine Response Unit (MRU)

To direct response action at sea/ coastal waters.

8.1.8.1 Role of MRU

Marine response operations include surveillance, monitoring, containment and recovery and temporary storage of recovered oil.

8.1.8.2 Official In charge of MRU

Dy. HOD, Marine Department/ Chief Operational Manager will act as the official in charge.

8.1.8.3. Reporting Requirements of MRU

He will be reporting to the CIC.

8.1.9 Shoreline Response Unit

To direct response action at shore. The shoreline surveys will be conducted by shoreline response unit forming the part of operations team. The results of shoreline surveys will need to be communicated to the crisis management group to plan priority areas for clean-up for the next operational period. It will help to identify and prioritize shorelines for clean up, confirming the shoreline ranking with the ground data based on over flights, aerial photography, remotely sensed data, ground truthing, existing maps and data.

8.1.9.1 Role of SRU

Shoreline assessment survey, Shoreline Cleaning, storage, disposal and transportation are the important duties of SRU

8.1.9.2 Official in charge

Dy. HOD, Civil Department will act as the official in charge.

8.1.9.3 Reporting Requirements of SRC

He will be reporting to the CIC.

8.1.10 Environmental and Scientific Unit

The principal aim of pollution response operations is to minimize impacts upon ecological and socio-economic resources. Effective planning here for requires up to date and coordinated information about the resources within a given area. Resources map, sensitivity charts and risk level matrices for 10km radial distance of each port will provide guidelines for identification of resources at immediate risk. The environment unit identifies and prioritises resources at risk, recommends acceptable method of clean up and the end point at which cleanup activities should cease.

8.1.10.1 Official in Charge

Dy. HOD, Medical Department shall act as the Environmental and Scientific Coordinator at present. The port may pre appoint Environmental Scientist as an In Charge to support the E & S co-ordinator.

8.1.10.2 Role of Environmental and Scientific Coordinator (ESC)

ESC is to provide the CIC with an up-to-date and balanced assessment of the likely environmental effects of an oil spill based on the nature and extent of spill tendency of drift and direction of drift. The Planning Section will advise on environmental priorities and preferred response options, taking

into account the significance, sensitivity and possible recovery of the resources likely to be affected. In major incidents, the ESC may directly advise the relevant Coast Guard Commander.

8.1.10.3 Reporting Requirements of ESC

The Environmental and Scientific Coordinator shall report to the CIC.

8.1.11 Financial Services

Finance function monitors and maintains records about cost incurred in responding to the incident including the provision of accounting, time recording and costs analysis. The function is particularly relevant to the oil and has incidents due to the ability to recover costs under relevant compensation conventions. E.g., CLC Bunkers convention, fund etc. Finance may also be responsible for handling of claims for damages, loss of use or inconveniences.

8.1.11.1 Official in Charge

Dy. HOD, Finance & Accounts Department is the Financial Unit Coordinator

8.1.11.2 Role of Financial Unit Coordinator

Accounts: Accounts refer to arrangement for the payment of services, materials, etc procured during response operations. These payments may be arranged directly by individual organizations involved in the incident in which case accounts becomes more focused on record maintenance for the purposes of cost recover at a later date.

Insurance/ compensation: Insurance or compensation arraignments may be required to cover losses, damages or injury to response resources and personnel. Again these requirements may be covered by individual organsistion. There may be a need to create an office of function within the command structure to specifically address compensation arrangements.

Cost recovery:The polluter pays principle is fundamental to responding to ship sourced pollution incidents. The preparation of claims and in particular co ordination across agencies requires specific attention within the response organsiation. Consideration should be given to the early contact and exchange of information with insurers, IOP fund etc on anticipated costs.

8.1.11.3 Reporting Requirements

The financial coordinator shall report to the CIC.

8.1.12 Support Services

Human Resources & Logistics are the major support services.

8.1.12.1 Official in Charge

Dy. HOD, General Administration Department & Dy. HOD, Vigilance Department are the coordinators for the Human Resources & Logistics services respectively.

Human Resources: This section support the response operations with trained and skilled manpower by evaluating existing manpower, providing additional manpower as requirement arises.

Logistics: Logistic unction supports the operations function through the provision and maintenance of all resources and services. There are strong links between logistics and planning due to the implementation of strategies being depended upon the supply of resources

8.1.12.2 Responsibility

Support Services Coordinators shall ensure that all resources are made available as required. This include the procurement and provision of personnel, equipment and support services for operations in the field and for the management of resources staging areas.

8.1.12.3 Reporting Requirements

He will be reporting to the CIC.

In addition to this the following facilities will be established at the incident location which is important in the case of a large spill. SIC will be responsible for the operation of these facilities.

Incident Command Centre (ICC): The incident command centre is where the incident management team directs response activities in an emergency situation at site. Every incident will have an ICC which can take a number of forms, depending on the type and size of incident and may be a vehicle trailer, tend or offices.

Even in Tier -2 & Tier- 3 Situation - There should be only one ICC for an incident, no matter how many organizations are involved. If the various agencies and or jurisdictions are separated physically, it can be difficult to implement an effective system of management. Each organsiation should be therefore be represented in the ICC.

ICC should be equipped with communication systems. A joint information centre may be established to provide a central point of coordination for information and communications representatives from key organizations.

Important considerations while setting up an ICC are given below:

- Be positions away from the general Nosit and confusion associated with the incident
- Be positions outside the actual and potential hazard zone particularly for HNS incidents
- Have the ability to expand and adapt as the indent demands increases

- Have the ability to provide security for the control access to the ICC as necessary
- Be clearly identified
- Be sheltered from weather.

Staging Area: Staging areas are to be identified where prepared personnel and equipment are gathered prior to deployment. The staging area may include provision for the crew welfare and equipment maintenances.

- Staging areas should provide for
- A secure location for resources prior to deployment
- Greater accountability by having available personnel and resources together in one location
- Keeping track of resources
- Assisting in the check in of personnel arriving at the incident
- Facilitating the planning of resources deployment
- Mitigating traffic congestion

Further considerations in establishing staging areas are:

They should be close to the location of the tactical assignments. They should be close to a safe area. They should have separate entrance and exit routes. They should be large enough to accommodate the anticipated levels of resources flowing through. They should be located in an area where vehicles and personnel will cause minimal environmental damage.

Safe forward point: It is a safe location near the incident from which forward operations can be supported outside the immediately affected area of vapour plume.

Major response programs such as Containment, Recovery shall be followed by associated activities such as decontamination of equipment and temporary waste management whose responsibility will be covered by the incident management team. The SIC shall divide the responsibilities between different team such as operation, logistics etc depending on the situation. Decontamination facilities should be established to wash down both equipment and personnel in order to minimize secondary contamination. Ideally there would be associates with other waste management facilities; however, special requirements, such as bunding, etc., may require separate facilities to be established. Temporary waste management facilities should be established in the early stages of a response operation. Consideration should be given to the establishment of both temporary and long term storage facilities as well as transportation and final disposal requirements. The positioning of the facilities should also take account

of logistics i.e., ability to handle predicted amounts of waste, as well as public health and environmental considerations and transportation routes.

INITIAL PROCEDURES

9.1. Notification of Oil Spill to Concerned Authorities

9.1.1. Identification of Oil Spill

Master or other persons having charge of ships and persons having charge of ships will be many times the first person to identify the spill. Otherwise a representative of the Port authority will be identifying the spill during his routine surveillance or by chance. Sometimes any other organization or individual may report a spill.

Occasions of report:

- a discharge above permitted level or probable discharge of oil
- damage, failure or breakdown of a ship of 15m length
- a discharge during operation of the ship

The pollution shall be reported in a specified format which is usually referred as Marine Pollution Incident Report POLREP. In all these cases the spills within the port limit / premises are to be reported to the respective port authority. The report shall have the following information:

- Identity of ship/ facility
- Time, type and location of the incident
- Quantity and type of the substance involved
- Weather, sea state and tidal conditions in the area

The report of the incident received will be communicated to the emergency control centre by the CIC to the SIC as per the instructions of Crisis Management Group. Irrespective of the quantity of spill even a threat of marine pollution shall be immediately reported to Indian Coast Guard MRCC. Any way in local response of Tier 1 for the Coast Guard has no other role than to monitoring and guidance. After giving due consideration to the importance of the situation, the notification shall be sent to:

- District Disaster Management Authority (DDMA) of all coastal states
- State, District & Local Disaster (Oil Spill Crisis) Management Groups
- All port and terminal/facility operators in Gujarat, with call for attention to the regional ones
- Coast Guard (Regional HQ in Gandhi Nagar and nearby stations-Porbandar)
- Gujarat Pollution Control Board (GPCB)

9.2. Estimating Fate of Slick & Preliminary Estimate of Responses Tier

Quantity of the spill can be assessed from the ship Master or designated person in case of a known source with which the Response Tier could be fixed. Otherwise visual judgment of experienced hands will help to determine it. OOSA of INCOIS can be effectively utilised for this.

9.2.1 Quantifying Floating Oil

Gauging the thickness and coverage of floating oil is a difficult task. Therefore an accurate assessment of the quantity of any oil observed at sea is virtually impossible. At best, the correct order of magnitude can be estimated by considering certain factors. The gravity-assisted spread of spilled oil is quite rapid and most liquid oils will soon reach an equilibrium thickness of about 0.1 mm characterised by a black or dark brown appearance. Similarly, the colouration of sheen roughly indicates its thickness. Approximate quantity of floating oil can be determined from relation between the appearance, thickness and volume of floating oil at sea as given in the **Table 9.1** below.

Table 9.1. Approximate Quantity of Floating Oil

Sl. No	Oil Type	Appearance	Approximate Thickness	Approximate Volume (m ³ /km ^{1/2})
1	Oil Sheen	Silvery	0.0001 mm	0.1
2	Oil Sheen	Iridescent	0.0003 mm	0.3
3	Crude And Fuel Oil	Black/Dark brown	0.1 mm	100
4	Water-In-Oil Emulsions (Mousse)	Brown/Orange	>1 mm	>1000

Source: NOS-DCP

By estimating the percentage coverage of the oil type in question, the actual area covered relative to the total sea area affected can be calculated from timed over flights at constant speed. Aerial photography will sometimes allow the percentage of floating oil to be calculated more accurately and the use of a polaroid or other types of instant picture camera can therefore be valuable. "Response to Marine Oil Spills," ITOPI Ltd. 1987, Page 1.16 illustrate further the process of estimating oil quantities the following example is given: "During aerial reconnaissance flown at a constant speed of

180 knots, crude oil ‘mousse’ and silver sheen were observed floating within a sea area, the length and width of which required respectively 75 seconds and 45 seconds to overfly. The percentage cover of ‘mousse’ patches within the contaminated sea area was estimated at 10% and the percentage cover of sheen at 90%”. From this information it can be calculated that the length of the contaminated area of sea measured is: $75 \text{ (seconds)} \times 180 \text{ (knots)} = 3,75 \text{ nautical miles}$ or 6.945 kilometres ie.,3600 (seconds in one hour). Similarly, the width is: $45 \times 180 = 2.25 \text{ nautical miles}$ or 4.167 kilometres. The total area is 8.4375 square nautical miles which is approximately 29 square kilometres.

The volume of “mousse” can be calculated as 10% (percentage coverage) of 29 (square kilometres) x 1000 (approximate volume in m^3 per km^2 - from the **Table 9.1**). As 50 % of this mousse would be water, the volume of oil present would amount to approximately 1450 m^3 . A similar calculation for the volume of sheen yields 90% of 29×0.1 which is equivalent to approximately 2.61 m^3 of oil. It can be seen from the example that the sheen, through may cover a relatively large area of sea surface, the volume of oil contained will be negligible. Therefore, it is crucial that the observer is able to distinguish between sheen, thicker oil, and emulsion.

9.2.2. Forecasting Slick Movement

It is important to be able to forecast the probable movement of a slick as well as likely changes in properties of the oil after it has been spilled. This helps in identifying sensitive resources in the path of the slick and to take appropriate response measures. The task of forecasting the position of an oil slick can only be accomplished if data on winds and currents are available since both contribute to the movement of floating oil. Other factors to be considered are waves and tides.

It has been found empirically that floating oil will move downwind at about 3% of the wind speed. In the presence of surface water current, an additional movement of the oil equivalent to the current strength will be imposed in any wind-driven motion. If the wind is negligible, which is rarely the case, the oil will move only under the influence of currents and tides. Surface currents dominate the movement of the slick unless the winds are extremely strong. Close to land, tidal currents must be taken into account, but farther out to sea their contribution is minimal since they are cyclic and tend to cancel out over time, although rarely ever completely. This gives rise to a residual current, which will determine the long-term movement of the slick.

9.3. Notifying Key Team Members and Authorities

DDMA will inform the key team members and authorities within and outside the organization after getting due consent of the District Collector.

9.4. Manning Control Room

Control room will be established at ECC with sufficient facilities for control and coordination.

9.5. Collecting Information

Information collected from the field shall be collected in the Field Logbook. This can be maintained as a descriptive notebook detailing site activities and observations so that an accurate, factual account of field procedures may be reconstructed. Logbook entries will be signed by the individuals making them. Entries should include, at a minimum, the following:

- Site name and reference number.
- Names of personnel on-site.
- Dates and times of all entries.
- Description of all site activities, including site entry and exit times.
- Noteworthy events and discussions.
- Weather conditions.

Site observations include oil type, sea/ wind forecast, surveillance, beach reports. Surveillance and sampling are the initial responses immediately started after the occurrence of a spill.

9.5.1 Identifying Resources Immediately at Risk for Informing Parties

Based on the already available data from the resources map and sensitivity maps resources immediately at risk and requiring protection based on priority is identified. Identification of the responsible party or source for an oil spill incident may require the laboratory analysis of oil samples. This is one part of the overall task of investigating the oil spills and suspected sources. Comparison of the spilled oil with its potential source samples can provide evidence of the source of the oil. It is possible to identify the difference between one oil and another and similarities between spilled oil and its source. Early detection of accident and emergency response is essential.

9.6. Surveillance

The aim of surveillance is to detect, characterize and preferably quantify spilled oil that may be present in a range of settings (on-water, in-water and onshore). This is of critical importance in enabling the incident command to effectively determine the scale and nature of the oil spill scenario, make decisions on where and how to respond, control various response operations and, over time, confirm whether or not the response is effective.

Irrespective of the final response strategy selected monitoring of oil spill will commence immediately after the oil spill and will continue until the response operation is terminated. The information gathered through monitoring and evaluation will be used by the Incident Management Team to steer the response, and ensure that the most effective and efficient response strategies are being adopted.

Five monitoring and evaluation methods are discussed in this section:

- Aerial Surveillance
- Vessel Surveillance
- Satellite Surveillance
- Surface Plume Tracking
- Spill Trajectory Modelling.

9.6.1. Aerial Surveillance

Aerial surveillance is the first response for any ongoing reportable incident as it allows the Incident Management Team to quickly gather initial information about the incident and formulate tactical plans to combat the spill. Aerial surveillance can be carried out throughout the incident management process to provide feedback to the command centre on daily progress and to help evaluate the success of the response strategies.

A written or verbal flight task is given to the aerial observer detailing the purpose of the mission, such as:

- Confirming the location of the spill using ladder or spiral search path
- Quantifying the amount of oil on the water and verifying the results from modelling
- Directing response operations such as directing vessels/aerial dispersant application planes onto the thickest part of the oil
- Conducting shoreline surveys to identify areas that may have been, or may be impacted.

Followed by the aerial surveillance and preliminary shoreline survey substantiated by notes, sketches, photographs and videos supported by GPS readings. In case considerable part of oil spill sunk due to environmental conditions, oil characteristics or both, under water survey may be required. The survey may be undertaken using visual assessment, divers, remotely operated vehicles, acoustic sensors or sorbents. Environmentally hazardous areas must be marked specifically based on the secondary data already available so that many accidents resulting in loss of life and property can be averted.

The accuracy of visual assessments can be compromised by the presence of naturally occurring substances similar in appearance, behaviour, or odour to petroleum hydrocarbons. These include mineral sands, rotting vegetation, peats, mud, lichens, marine stains or bacterial films. In the case of an unknown source sampling from suspected sources both offshore and land based installations such as mobile drilling rigs, fixed or moored production systems, pipelines, oil terminals etc.

9.6.2. Vessel Surveillance

Before the arrival of aircraft for aerial surveillance, vessels available on the scene can help to conduct initial visual surveillance by following the leading edge of the slick. This location information can then be communicated to the Incident Management Team to guide the aerial surveillance aircraft to the slick. This is only a temporary measure as the vessel's visibility range is restricted and there is a risk of secondary contamination of the vessel.

9.6.3. Satellite Surveillance

Surveillance of oil spill is also possible through satellites with sensors such as SAR (Synthetic Aperture RADAR – an active sensor that sends out a microwave pulse and reads the return) and Optical sensors – (Relies on reflected energy). RADAR imagery is the preferred option as the active pulse from space reacts with surface textures giving all-weather day/night imaging. This service may be engaged through Space Application Centre, Ahmedabad.

9.7 Sampling

Identification of the responsible source for an oil spill incident is essential because of its legal implication. Laboratory analysis of the oil samples is thus required following a spill incident. From that is possible to identify differences between one type of oil & the other and also to determine the similarities between spilled oil and its source. Source of the oil could be identified by the comparison of the spilled with the potential source samples. Sampling is as important as laboratory analysis and investigation.

Sampling of both biotic and abiotic resources from spill effected area is the first and foremost part of the oil spill testing. Resources can be water, oil, sediment, air or biota. Samples should be representative, since they are used to quantify the oil, predict its weathering characteristics and to identify the source.

Improper samples or sampling will lead to wrong results and conclusions that will not stand up in legal examination and subsequently laboratory analysis and investigations will become mere wastage. Personnels who are supposed to collect the samples should be given minimum training and practice to do better response in a real spill situation. A sampling plan shall be adopted that will describe the

sampling procedures in brief and will ensure that all the required operations are taking place accurately and sequentially without any missing.

Sampling of oil from different environment site, from vessel engine to water body or even from an organism will be required. Also they can be of varied forms mainly of heterogeneous nature some of which are given below.

- Oil, oily water, heavily emulsified oil, tar balls or lumps on the water surface
- Mixtures of oil, sorbents or other materials which are soaked with oil
- Oiled animals on the water surface or on beaches mainly in the intertidal area
- Oil in tanks on ships, offshore constructions or land facilities
- Oily water bilges and slop tanks on ships, offshore constructions or land facilities
- Oily sludge in the sludge tanks on ships, offshore oil installations/ drilling rigs or land facilities.

Sampling equipment shall be pre cleaned to remove any oil residues including finger oils that may mix with the oil collected and interfere with the laboratory analysis. Oil contaminated sampling containers should be avoided. Sampling equipment if not purchased pre cleaned shall be cleaned with a detergent wash, rinsed with distilled water and then rinsed with solvents like dichloromethane, hexanes etc. Pre cleaned supplies can be wrapped in aluminium foil to prevent contamination while being stored or transported to the spill.

Table 9.2. Details for Oil Spill Sampling

Sl. No	Sample Type	Sample Container	Quantity of Sample	
1	Oil	Glass Bottle 500ml Clean. Coloured (dark) glass is preferred for water samples. Preferably supplied by laboratory.	Pure Oil Source Sample	30-50 ml
			Contaminated Oil (Emulsified Oil, oil from the sea or shore, sandy tar ball)	10-20g
			Debris with oil, oil stained sand	Sufficient quantity that oil content is approx. 10g
2	Water	Top should be sealed with aluminium foil under the cap.	Water sample with visible oil	1 litre
			Water sample with no visible oil	3-5 litre
3	Sediment	Fine: Silt - Pebble	Glass Jar 250ml Clean. Coloured (dark) glass is preferred for water containing samples. Preferably supplied by laboratory. Top should be sealed with aluminium foil under the cap.	
		Coarse: Cobble	Wrapped in aluminium foil Once wrapped they can be stored in plastic bags.	

Sl. No	Sample Type	Sample Container	Quantity of Sample	
4	Biota	Glass Jar Same as Glass Bottle/ Jar	Oiled Feather	5-10 feathers depending on the quantity of oil present
		Wrapped in aluminium foil Whole specimens. Once wrapped they can be stored in plastic bags.	Fish, shellfish (flesh and organs)	Multiple individuals of the same species totaling 30g

Source: ITOPF

A sampling kit may be arranged for this with necessary sampling equipments as described in the **Table 9.3** given below.

Table 9.3. Components of the Sampling Kit

Sl. No	Item	Details
1	Sample jars (250 ml or other size)	Pre cleaned, teflon or aluminium cap or alfoil barrier as required. Plastic should not be used
2	Slick/pooled oil sampling equipment	Wooden spatulas/tongue depressors or stainless steel spatulas/spoons.
3	Sheen sampling equipment	TFE fluorocarbon polymer nets or small squares of sorbent. Polymer nets or bags with rings and extension poles, TFE polymer sheets of mesh fabric can also be used.
4	Disposable gloves	100% nitrile medical examination gloves
5	Sorbent padding for storage cooler.	
6	Sample storage coolers with pre-frozen freezer blocks.	
7	Waterproof plastic envelope.	
8	Sample identification labels	>1/sample. White Adhesive 5cm to 10cm water and oil resistant
9	Sample Log Sheets.	
10	Chain of Custody Forms.	
11	Decontamination equipment if needed,	
12	Cardboards Shipping Tubes, & Fibre board boxes	(25cmx25cmx25cm), For packing sample jars for shipment
	Sorbent material	
	Grease proof plastic bags 50cmx 65cm	
13	Tape for sealing jars, shipment tubes and fiberboard box 2 to 10cm wide	
14	Towels absorbent cloth or paper, twine	
15	Tongue depressors or pre-cleaned metal scoop	To aid collecting samples of heavy oil or tar balls

Sl. No	Item	Details
16	Sediment Sampler	
17	Onsite Probes	Eg. DO, Turbidity, Conductivity, Odour, Ambient Hydrocarbon Detector, Mutli Wavelength Fluorimeter etc.
18	Kit/ Pouch to hold all sampling equipment to spill location	

Source:IMO

9.8 Sample Identification and Security

Sampling identification, labelling and security is very important part of oil spill sampling, especially when it has a forensic value. The sample jar is to be sealed using tape to seal the lid to the jar, before placing the labels on the jar. While placing the labels on the jar, two labels should be kept one for the purpose of sample identification and the other for chain of custody. Writings on the jar should be legible and written using indelible ink. A sample identification label has been shown in **Figure 9.3** below.

CASE NO: _____ SAMPLE NO: _____

TIME _____ DATE _____

SPILL SUSPECTED SOURCE

SAMPLE DESCRIPTION _____

LOCATION _____

SAMPLER _____

WITNESS _____

Figure 9.1. Sample Identification Label

9.8.1 Labelling and Sealing

All necessary information required for identification of the sample shall be there on the label such as geographic location, signature on suspected source sample from master or crew man, dates sealed and who sealed sample, etc., should be a part of the label.

Case number is a unique number assigned by investigator to help keep track of spills over time. Sample number stands for serial number given for each sample 1, 2, 3 etc. Sample description used to

distinguish one sample from another sample. For water samples the description should have information relating the sample to a fixed point like name of creek, distance from a bridge pier or any other identifiable structure. For sample from suspected vessels the description should have the name of the vessel and specific location of the sample such as engine oil bilge. Samples taken from a shore facility should include the name of the facility including a city, location of the sample on the facility (IMO).

9.8.2 Sample Log

For each sampling operation a sample log should be prepared and transferred along with along with sampling jars and kept in safe custody. It should contain all the available details regarding the sample including the necessary things given below.

- Sample number or code (Optional, but advisable for multiple sampling at a single location).
- Sample description (oil, debris, thick slick, film, sediment, air and biota etc).
- Time and Date (24 hr clock, Day/Month/Year).
- Location (GPS coordinates or other description).
- Name of person taking the sample.
- Witness (If a sample for legal purposes).
- Identification and description of samples and locations.
- Subcontractor information and names of on-site personnel.
- Dates and times of sample collections and chain-of-custody information.
- Records of photographs.
- Site sketches of sample location including identification of nearest roads and surrounding developments.
- Calibration results.

Additional notes may be added as and when required as follows as:

Sediment type (sand, mud, pebble), colour & texture, biological (shellfish, marine worms, sea grass, algae), visible oil, length of core, Sample leakage or loss during collection, sample disturbance.

9.8.3 Chain of Custody (CoC)

After sampling it is important that a samples are to be kept in a person’s custody or possession so that either he can see them or they are locked up. The sample description here should be exactly same as that of sample label. All persons who have control of the samples need to sign in the signature part of the CoC as well as the chain of custody label on the sample. CoC document should be sent with the samples to the laboratory. Format for chain of custody is attached as **Table 9.4**.

Table 9.4. Format for Chain of Custody

Chain of Custody Record					
Organization’s name					
Address:					
Spill	Source	Sample no	Description of samples for case no:		
Person Assuming Responsibility for Samples					
Sample number	Relinquished by:	Time/ date	Received by	Time/ date	Reason for change of custody
Sample number	Relinquished by:	Time/ date	Received by	Time/ date	Reason for change of custody
Sample number	Relinquished by:	Time/ date	Received by	Time/ date	Reason for change of custody
Page of _					

9.9 Handling the samples

Samples must be handled, stored and transported with care so that they remain uncontaminated, intact and fit for purpose. Handling procedures should also be documented such that sample integrity can be demonstrated. Containers should be filled as full as possible to exclude air and avoid evaporative losses of light hydrocarbons. All samples should be labelled immediately. Labels should not be placed inside the sample container. Labels should be applied to containers after the sample has been sealed. This will allow the container’s exterior to be cleaned and dried before the label is attached. While sampling care should be taken that there is no contamination from exhausts of engines or cooling water of sampling vehicles.

9.10 Storing the samples

Samples should be held overnight or for any extended time in a secure room, within a suitable container ie. a refrigerator. A sample room may be established and a sample room controller may be appointed and log may also be kept for the room. Samples should have a Chain of Custody record attached to

track the location and handling of samples. Samples are stored in a cool dark room. Weathering may be accelerated in the presence of heat and sunlight. The samples may be placed in an insulated pouch or Styrofoam cooler. A closed vehicle is no desirable especially in summer even when a cooler is used. Hence it is better to avoid such journeys or for the optimum condition i.e., keep the samples in an explosion proof refrigerator at 2 to 7 °C. Samples should not be freeze and hence the temperature should be maintained above -4°celcius. The preservation methods are given **Table 9.5** below.

Table 9.5. Preservation Methods for Different Types of Samples

Sl.No	Sample Type	Preservation Method
1	Sediment	Chilled to < 4 °C- but not frozen
2	Oil	Chilled to < 4 °C- but not frozen
3	Soft Marine Fauna/Fish	10 % formalin in sea water Or freshwater if sample is from fresh water
4	Crustaceans/ Fish	Freezing (for large fish and crustaceans)

All areas where samples are handled or stored must be decontaminated before and after use, designated to be NO smoking areas, isolated from combustion engines, exhausts or other sources of hydrocarbon contamination. Samples will be transferred to the sample intake team to be frozen as soon as possible especially for sediment and tissue chemistry samples. Water samples will be analyzed immediately due to holding time limitations, while sediment and tissue samples collected for VOC and PAH analyses will be archived. Sediment samples collected for nutrient analyses will be analyzed within the 28-day holding time. (*MC 252 Oil Spill – Jean Lafitte National Historic Park and Preserve Submerged Aquatic Vegetation NRDA*)

9.11 Shipping of Samples

The guidelines for this are laid down by International Air Transport Association (IATA). This ensure safe, intact arrival of samples and prevent damage to other parcels. Packaging and Shipping of them is regulated under IATA's Dangerous Goods Regulations. Most of the samples belongs to the following to categories Flammable Liquid, packaging group II consists of oils with flash points less than 23°C eg. gasoline, naphtha and most of the crude oil. Flammable Liquid, packaging group III with flash points more than 23°C but less than 60.5 °C eg. Kerosene, jet fuels, turbine fuels, No.1 fuel oils etc.

OPERATIONS PLANNING

10.1. Assembling full Response Team

The chief incident controller is ultimately responsible for assembling the response team. First of all he shall assess the incident, by consider the problems in detail, identifying the severity and possible development of the situation and response resources. Once the operations are started he will assume the command, appoint Site Incident Controller the delegate the power of incident command to the site incident controller. The incident command centre shall be established under the direct control of emergency response centre which is already established at each ports.

Further operational team will be constituted with staff appointed to the operational team according to the size and complexity of the incident. He will anticipate management requirements and make appointments as early as possible. Specific Incident Action Plan (IAP) shall be developed by the site incident controller and get it approved by the command. Its objectives, strategies and tactics should reflect the policy and aims of the response.

10.2. Identifying Immediate Response Priorities

Combinations of response options are needed even for small spills since all the response option are not equally feasible at all places as well as in all situations. Especially when the pollution status changes with time.

The possible response options are:

- No action other than monitoring and evaluating the oil
- Containment and recovery of the oil at sea
- Chemical dispersion of oil at sea
- Burning the floating oil at sea
- Shoreline Clean-up

Immediate response priority may be exercised depending of the quantity of oil spilt and location of spill proximity of resources and their sensitivity.

10.3. Mobilizing Immediate Response

After estimating the quantity of spill, analysing the sea and wind state and determining the constraints of operation, immediate response resources including the equipment's and personnel shall be mobilized. Since Tier 1 response facilities are already available at each port, generally no resources need not be channelized from other operators including those within the organisation unless there is an intensive response operation planned that is to be completed in a very short span or there is a breakdown of the equipment.

10.4. Media Briefing

The Chief Incident Controller or in his absence the Incident Command the SIC shall take the task of making statements to the media on behalf of the KPT after getting the consent of the Crisis Management Group. All the statements shall be made consistent with the overall aims of the effort. As need arises a public information officer may be appointed or a joint information centre may be established.

10.5. Planning Medium Term Operations

Regular meetings shall be conducted with the incident management team should focus on the critical success factors for the incident and asses the effectiveness. It will help to revise the plans and better respond to similar situations. The flow diagrams showing the operation planning for response is given as **Figures 10.1**.

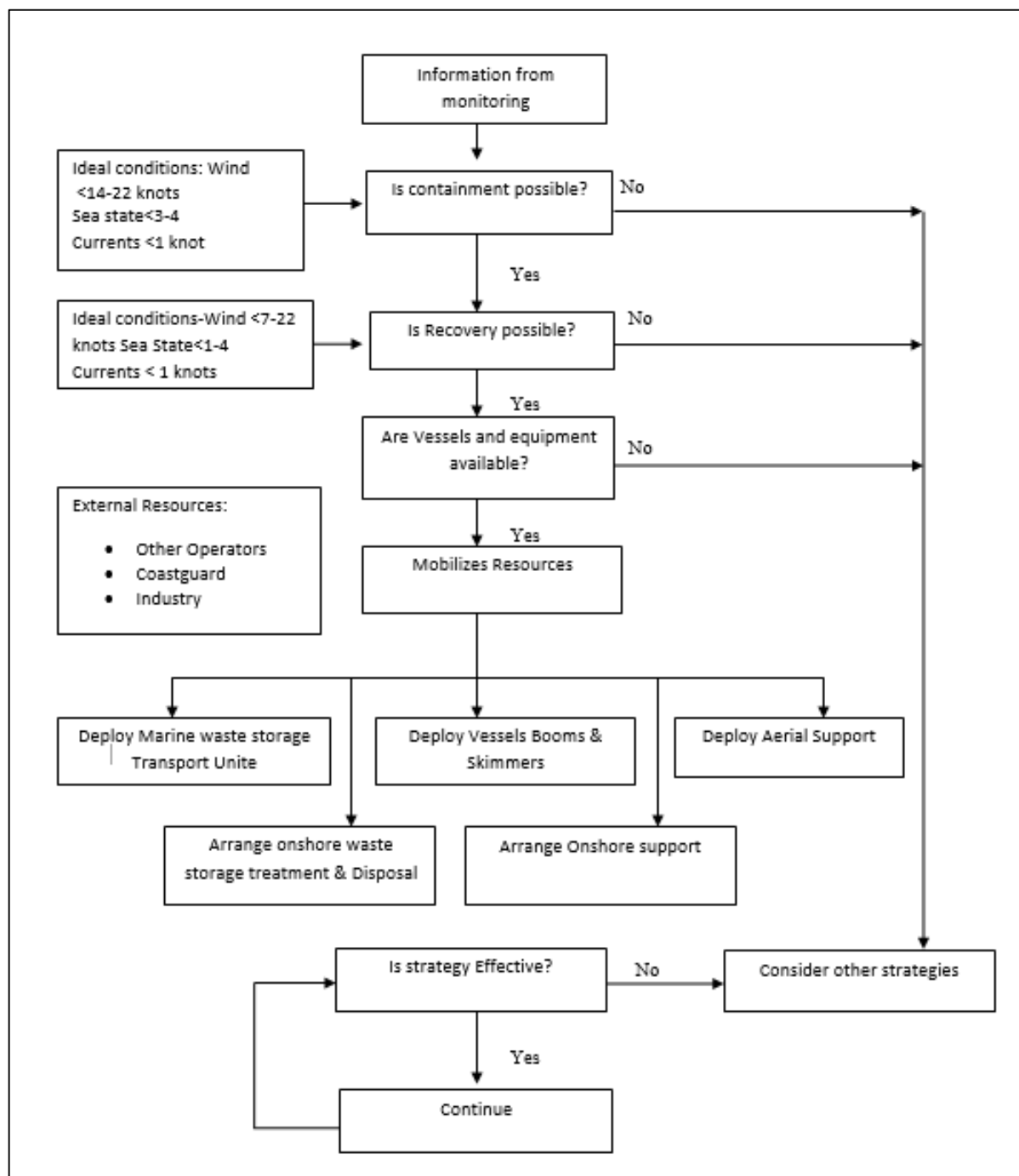


Figure 10.1. Oil Spill Response Planning Chart

(Source: <http://www.au.pttep.com/wp-content/uploads/2013/10/PTTEP-Oil-Spill-Contingency-Plan.pdf>)

In case of threat perception, the response decision is to be arrived at after prioritising the threat perception and areas where the threat perception is likely to cause maximum damage. Certain ‘sacrificial areas ‘may have to be considered for the overall response to the threat perception. The general strategy would be ordered for containment and recovery using existing techniques, which may

involve mechanical recovery equipment or use of chemical dispersants. Dispersion decision tree is given as **Figure 10.2**.

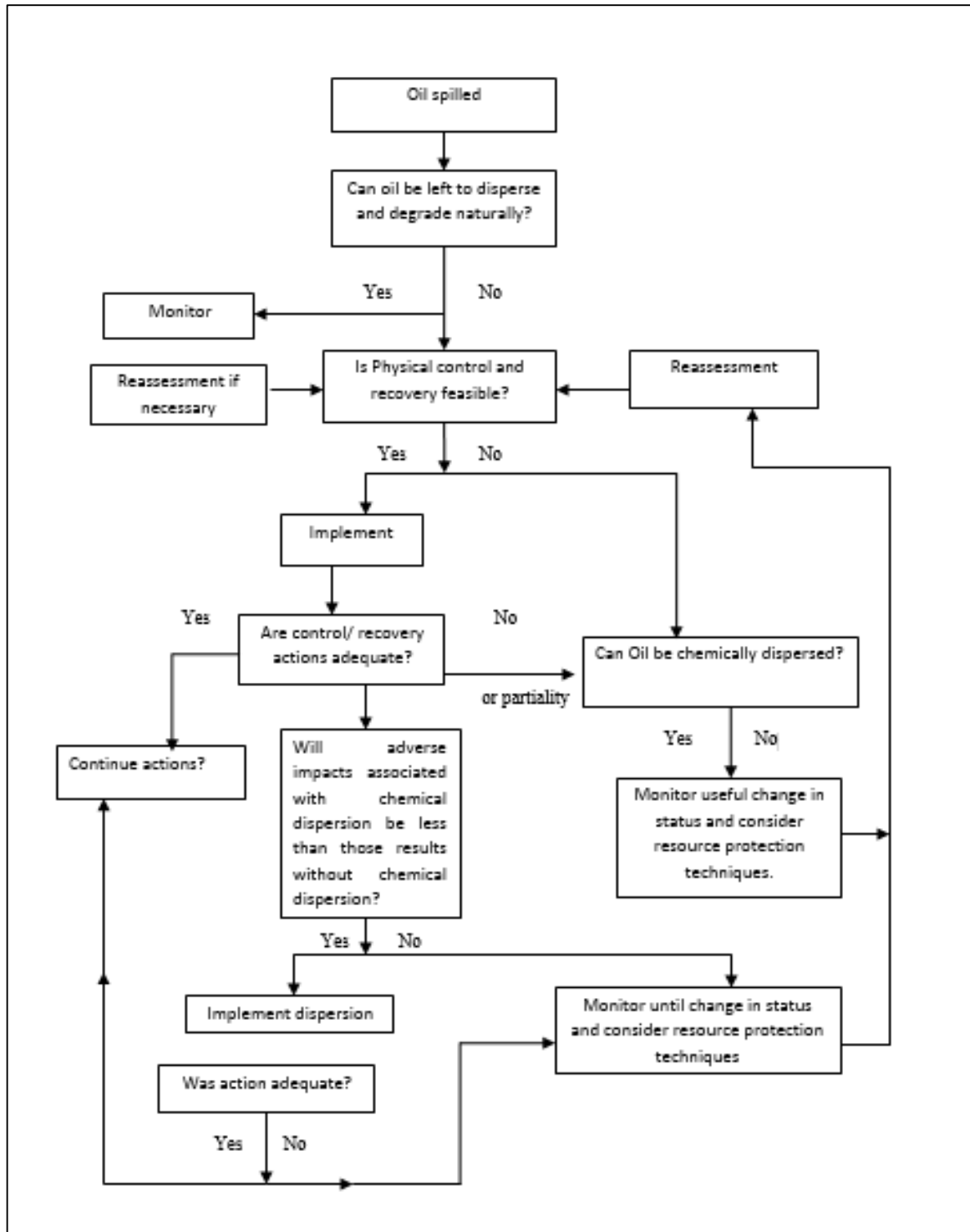


Figure 10.2. Dispersant Decision Tree

CONTROL OF OPERATIONS

11.1. Establishing a management team with experts and advisors

A management team may be constituted with members of the KPT as well as from industry, government and non-government organization with an advisory role to implement following points:

- Ensuring expertise in all fields
- Unbiased review of the situation
- Independent decision making
- Wide confidence and approval

During a spill, the situation will be appraised by the Environmental & Scientific Team will be reported to the Crisis Management team who will pool the expertise as required and request for the ensuring their dedicated availability on-scene. Often experts are required in the areas of Spill Response, Wildlife, Marine Environment especially when the organization is not having any previous experience in oil spill response operations.

Specialist technical advisors may be required to address specific aspects of the incident such as public health and safety, hazardous materials and cultural issues specific to the situation. These specialists may be added to the planning function, though could also be linked directly to the command function if required.

11.2 Organisation of Operation

Staging areas have been selected to accommodate various modes of transportation including overland, air and water. Each location has the means to move equipment and materials quickly and efficiently. These locations have been selected so that they are strategic to coastal terminals and main shipping routes where there is the highest risk of spills.

11.3 Updating Information

Sea weather shall be regularly monitored. Weather forecasts shall be availed from the local and regional meteorological department. Aerial surveillance shall be done as and when required.

11.4 Reviewing and Planning Operations

Studies made of the oil spill risk as well as response measures be done for the area shall be review, especially for determining the possible oil spill trajectories. Available meteorological and hydrographic data should be analyzed to give rough but early predictions of the spill movement. More sophisticated prediction methods may be subsequently used based on the situation. Visual observation of any spill is essential to plan every oil spill response operation.

11.5 Obtaining Additional Equipments, Supplies and Manpower

The equipments and facilities for combating Tier 1 spill is already available at each KPT. Additional response is beyond the scope of the local contingency plan for each port. But MoUs shall be signed between the neighbouring operators to pool the resources for better response during a Tier 1 spill. The spills beyond Tier1 is the responsibility of Coast Guard. The Coast Guard would take over the operation if the spill were beyond the capability of the facility concerned and also when the spill is beyond the port limit ever for a smaller spill.

The Regional Contingency Plan for South Asia sponsored by the United Nations Environment Programme (UNEP) under the UN Regional Seas Programme has been finalised. The participating countries are India, Sri Lanka, Maldives, Bangladesh and Pakistan. The Plan envisages mutual cross border assistance and movement of equipment and personnel for response to an oil spill (Country Profiles, A summary of Oil Response Arrangements & Resources Worldwide, ITOPF).

11.6 Preparing Daily Incident Log and Reports

Daily reports shall be made in the form of incident logs, minutes of meeting, notes on briefing etc. They shall be circulated between respective groups and their officials for different purposes such as informing, evaluation, recommending, approving, documentation, record keeping and circulation.

11.7. Preparing Releases for Public and Press Conferences

Effective public relations are an integral part of any oil spill clean-up operation. In the event of spillage, Chief incident controller will make coordinated arrangements for an experienced public relations officer to disseminate pertinent information to the public and the media to ensure that those who need

to know have a full and timely appreciation of the incident and of the actions taken and progress made during the response.

It is essential that the media team:

- Identifies the agencies that are responsible for handling various aspects of the situation;
- Ensures that media activity does not interfere with the operational activity of the emergency services and
- Ensures that the media do not harass human casualties

A sample initial press release shall include the following details:

- An oil spill has occurred at (location) from (responsible party, if known).
- It was discovered at (time and date).
- The following areas have been affected: (fill in)
- Cause of the spill is being investigated by (fill in) and clean-up operations are underway by (fill in).
- The amount of product spilled is (amount) (or is not known, or is being calculated by the (fill in)).
- Brief statement of operations being undertaken and by whom:
- The spilled material is/is not considered to be a health hazard.
- The following precautions should be taken by members of the public in the (fill in area(s)).
- Further updates will be given at (time, date).

11.8. Briefing Local and Government Officials

Briefings shall be done with the local in matter related to health and safety, environmental issues, oil pollution impacts and mitigation. This help them to evacuate from the affected area until everything is cleared.

Regular meetings shall be held with government official to plan the response strategies especially the operation requiring evacuation of locals, selection of disposal options, monitoring of water resources, selection of pre-booming locations etc.

TERMINATION OF OPERATIONS

12.1. Marine Oil Spill Response Termination

Marine response operations are terminated under the following circumstances:

- Entire oil spill has been removed
- Surface oil slick has broken up and there is negligible chance to impact a shoreline
- Slick has gone out to sea and is beyond the range of response options and is highly likely to degrade naturally
- Oil has already impacted shorelines and is unlikely to be re-floated.

For the last case, marine response resources will remain on standby until shoreline response has been terminated.

12.2. Shoreline Spill Response Termination

Shoreline clean-up operations may be terminated only in consultation with instruction from the respective government authorities under the following circumstances:

- All accessible shorelines are free of oil
- Clean up is having no further net beneficial effect or having a deleterious effects on the shoreline or associated plants or animals
- Remaining oil is judged to be acceptable or of little or no adverse effect.

The shoreline inspection team will determine when each shoreline segment has been cleaned to a reasonable degree, based on minimizing risk of impact to the environment and preventing human contact with the spilled oil. Guidelines provide criteria for assessing marine/shoreline status before the declaration of termination of operation is given as **Table 12.1**.

Table 12.1. Criteria for declaration of Termination of Operation

Sl. No:	Type of Environment	Decision Criteria
1	Water surface	No recoverable floating oil should remain on the water surface.
2	Sand beaches	The shoreline should be free of liquid oil. Tarballs, tar patties, oiled stranded vegetation and oiled debris that could contaminate wildlife should be removed to the extent removal using reasonable clean-up techniques is feasible. Oil stain on sand that does not produce rainbow sheen may be allowed to weather and degrade naturally
3	Marshes	Marsh vegetation should be free of oil that could contact and contaminate wildlife. Oil that is not likely to affect wildlife may be allowed to weather and degrade naturally.
4	Riprap, seawalls and other manmade structure:	Oiled riprap and seawalls should be free of bulk oil except for oil stain (defined as a thin layer that cannot be scraped off using a fingernail), which may be allowed to weather and degrade naturally.

(Source: Oil Spill Response Plan, Shell, 2011)

12.3. Declaration of Termination

Chief incident controller will be announcing the termination on consultation with the Crisis Management Group after receiving the report from the Site incident controller. The following checks are to be done before announcing the Termination:

- All personnel are accounted for
- All equipment is recovered and cleaned
- All vessels return to their respective berths
- All equipment is cleaned / repaired
- All external equipment is returned to the correct owner/location

12.4. Decontamination and Demobilization

12.4.1. Decontamination Plan

This serves to identify general procedures to be followed by vessels involved with oil spill response operations. As these operations involve transiting through slicks, operating within oiled waters or recovery operations, the vessel hulls, decks, machinery, tanks, piping, deck gear and other areas will be impacted with oil. This plan will be used for all vessels and support equipment, either contaminated or suspected of being contaminated with oil, to return to a non-oiled state.

In view of the extensive equipment inventory involved in the response effort, the responsible party will

- Over see gross decontamination of vessels;

- Establish and oversee temporary berthing of oiled vessels; and
- Over see final decontamination of oil spill recovery vessels and equipment.

The primary focus of this operation will be to expedite clean-up of oiled vessels and response equipment in a safe, organized and efficient manner while minimizing further damage to the environment and waste generation. Equipment decontamination is planned to occur in two phases. Recovered oil is to be off-loaded from skimmers cargo tanks to portable storage tanks and or vacuum trucks pending disposal as per the “Approved” Disposal Plan. Equipment to be transferred into a bermed area and decontaminated. All equipment will undergo full decontamination prior to demobilization.

12.4.2. Methodology

The affected area will be placed inside standard containment boom during the decontamination process. If weather conditions permit, smaller vessels will be used as platforms to facilitate clean-up operations. For Tug/Vessel the hull of the vessel will be wiped by hand with cotton rags. A citrus-based cleaning solution will be used to remove residue oil from the hull. All oil will be wiped from the hull in this manner.

Personnel involved in this operation shall wear modified PPE Level D including raingear, gloves, eye protection and floatation work vest. Preplanning for protection of adjacent areas shall be accomplished in order to minimize cross contamination. Floating oil from sheen-emanating vessels will be minimized with sorbents as necessary to reduce potential loss outside the containment boom. Floating sorbent materials shall be utilized in natural collection points as needed to retain free-floating oil. These sorbents will be tended daily.

12.4.3. Equipment priority

A priority assessment shall be attached to each piece of equipment to ensure a timely flow of equipment through the cleaning process. The Decontamination team leader will work with the appropriate OSR representative to prioritize the vessels to be cleaned.

12.4.4. Cleaning process

A Hypalon liner or like (secondary containment) will be placed under each decontamination pool with the perimeter sufficiently bermed to allow for wastewater and rainwater evacuation. All wastewater will be pumped to a poly portable storage tank vacuum truck for disposal. All pumps, hoses and piping will be left in place to facilitate speedy evacuation of retained oil / water. The final disposal of wash water, oiled sorbents and materials will be accomplished in accordance with the “approved” Disposal

Plan. A citrus-based cleaning solution (PES 51 or like) will be utilized as a degreaser and will be applied by a Hudson sprayer as applicable. By utilizing the PES 51 product, which will not emulsify the oily water, it is possible to recycle/reclaim the rinsates. Because this cleaning solution is citrus based it does not leave a petroleum sheen on the equipment after the cleaning process. Actual pressure washing, if required, will utilize a Landa (or like) hot/cold pressure washer with a temperature range up to 220° F and a pressure rating up to 3000 psi. Every attempt will be exercised to mitigate noise-generating equipment by placing it in insulated areas. Once the piece has been determined clean to the owner's standard, the equipment will be demobilized.

12.5 Preparing formal detailed report

Once the response stand down has been announced, GMB and other stake holders will conduct a formal joint incident investigation considering the following aspects:

- Cause of the incident and other contributing factors
- Mitigating actions taken
- Effectiveness of the response
- Preventive actions required in future

The formal incident investigation will be followed by the preparation of a formal detailed report. It will form the basis for a review of the Crisis Management Group and notes will be circulated with other members of the response organization.

12.6 Reviewing plans and procedures

Feedback will be collected from various levels of the organisation from each stakeholders. The opinions will be finalised in review meetings. Recommendations after the review shall include improvements to the contingency plan, incident actions plans and operating procedures. Independent reviews shall be also to be done with the help of an independent agency which will be helpful in getting correct insight of the cause and impact of spills as well as the response measures taken. These reviews will be especially helpful in developing fine-tuned the communication, demobilization, decontamination and disposal plans and incorporating them in the Area Plan. A review of the spill is the only way to establish the shoreline assessment control points and clean-ups in a region and endpoint documents. From incident assessment it is possible to pre-identify suitable command post locations, tracking of the spill response work can be efficiently assigned and tracked, to ensure the public involvement to save their best interest as well as channelize stakeholder inputs so that the concerned personnel can influence the process.

MUTUAL AID

Other ports of the region, terminals, SPMs and other oil handling facility are the important stakeholders for mutual aid. They are supposed to assist the KPT on executing MoU during a spill greater than Tier-1. Also it may be noted that a spill eventhough happening within Tier-1 limit of 700T, its occurrence in a sensitive area can be make it escalated to higher Tiers.

13.1. Oil Spill Response Resources Inventory (OSRRI)

13.1.1. OSRRI available at KPT

Presently KPT is having OSR equipments corresponding to the Risk Category-A ports for combating Tier-1 spill, as per the existing Oil Spill Contingency Plan. The latest annual return submitted to ICG in this regard is given as **Table 13.1** below.

Table 13.1. Annual Return on Preparedness for Oil Spill Response under KPT

Name Of Port/Oil Handling Agency	Kandla Port Trust, Kandla & Vadinar			
	Description	Length	Quantity (No.)	Operational Status
Containment Equipment	1.Pressure inflatable Boom	200 Mtrs	6	Working
	2.Boom Reels	200 Mtrs	6	Working
	3. Permanent Boom	1000 mtrs	1	Working
	4. Diesel Hydraulic Power Unit		2	Working
	5. Pollution Response Centre		1	Working
	6. Signal Station for communi.		1	Working
	7 Anti-Pollution Craft		1	Working
	8 Oil Absorbent Boom(IOCL)	3'X8" Dia	130	Working
	9 Inflatable Boom(Essar)	450Mtrs	1	Working
	10. Light duty Oil Contain. Book (Coastal Room)(IOCL)	600 Mtrs	1	Working
	Recovery Equipment	Description	Capacity	Quantity (No.)
Fast flow skimmer		40-49 m3/h	2	Working

	(Inclined plane)	-		
	Brush Skimmer	12 cub.m/hr	1	Working
	Disc Skimmer(IOCL)	20 cub.m/hr	1	Working
	Disc oil Absorbent Pillow(IOCL)	12'X8' size	80	
	Disc Slimmer (Essar)	<u>20</u> <u>cub.m/hr</u>	1	Working
Temporary Storage Facility	Description	Capacity	Quantity (No.)	Operational Status
	Storage Tank	10M ³	5	Working
	Storage Tank	250KL	One	Working
	Portable Tank	4000 Lit.	One	Working
	Floating Tank (IOCL)	25 CUM	2	Working
	Floating Tank (IOCL)	12.5 CUM	4	Working
	Floating Tank (Essar)	5 T	2	Working
	Storage Tank (Essar)	25 T	2	Working
Osd Spraying System	Description		Quantity (No.)	Operational Status
	OSD Spraying booms fitted on tugs- Spray system-1		3 Tugs, for Kandla MT	Working
	OSD Booms - 5 mtr long-2		Mehul, MT	
	Pump unit 70 Ipm-2		Kalinga, MT	
	Off-loading pump-1(10C)		Heera tank	
	Oil Transfer pump-30 cub. m/hr-2 (Essar)		for storage on board 4000	
	Dispersant Spray System-2 (IOCL)		Lit. each tug.	
Dispersant Spray System-1(Essar)		3 Tugs, for Vadinar MT Cheeta, 35TBP MT Gajaraj 35 TBP & MT Ashawani 59 TBP Plus 5 Hired Tugs.(3 at Vadinar & 2 at Kandla).		
Oil Spill Dispersant	Make		Quantity (1 (9.))	Expiry Date Mfg-(3/2015) Life 5
	NIO & CG approved(Nova Chemicals)dispersant-II & II		5000 Ktrs	
	NIO approved dispersant- III (IOCL)		3300 Ltrs	
	NIO & ICG approved dispersant (Essar)		25000 Itrs	
	OSD			
Shortline Response Equipment	Description	Capacity	Quantity	Operational Status
	Permanent Storage Tank	5000	1	Working

IMO OPCR Level Trained Responders	Name	Designation	Contact No.	Imo Oprc Level 1/2
	M.N. Kakani	Safety Inspector	02836- 270176	2
	S.J. Makwana	Safety Inspector	02836- 270427	2
	M S Bather	Safety Inspector	02836- 270176	2
	D.S. Pandey	Dy FcSO	02836- 270176	1
	G.C.Sharma	Station officer	02836-	1
	6.R.R.Dubey	Station officer	02836- 270176	1
	7. D.S.Gurjar	Station officer	02836-	1
	8.K.G.Khalsa	Station officer	02836- 270176	1
	9 M.K.Maheshwan	Station officer	02836- 270176	1
	10.D.R.Solanki	Station officer	02836-	1
	11.A.J.Chaudhari	Station officer	02836- 270176	1
	12.G.Nethaji	Station officer	02836- 270176	2
13. M.R.Vadaviya	POCD	02836- 270176		
Oil Spill Response Craft	Craft Name	Discription	Response Capability	
	MT Karishma	Oil recovery cum debri collection	Please provide particulars at Sections 2-6	
	Tug Heera			
	Tug Mehul			
OSRL Particulars (If Outsourced)	Operator Name		Na	
	Address		Na	
	Phone No.		Na	
	Fax No.		Na	
	E-Mail		Na	
	Engagement Expiry Date		Na	
	Equipment On Hire		Please Provide Particulars At Sections 2-7	
	Imo Oprc Level Trained			
	Personnel On Hire		Please Provide Particulars At Sections 8	
	Manpower On Call			
Craft On Hire		Please Provide Particulars At Section 9		
	Year Published	Date Of Last Revision	Status Of Approval By Coast Guard	

Spill Contingency Plan	2011	2014-Revision Under Process	Observations Raise By Coast Guard Are Under Compliance	
Personnel To Be Contacted C-Base Of Spill	Name	Designation	Contact Particulars	
	Capt. T.Sreenivas For Kandla	Deputy Conservator	Landline	02836-233585
			Mobile	9825232982
			Fax	02836-233585
			E-Mail	dckpt@kpt.gov.in
	Dr. G.S.Rao For Vadinar	COM	Landline	02833-256749
			Mobile	9825212360
			Fax	02833-256543
E-Mail			drgrsrao001@yahoo.com	
MoU Details (If Any)	MoU has been made between KPT & Oil Companies for r procurement of Tier-1 facilities for Oil Spill Combat equipments.			

Source: KPT

13.1.2. OSRRI available at ports and allied facilities of the region

Oil spill response capabilities existing as well as proposed at the ports and marine terminals as well as ICG stations in and around Gulf of Kachchh (GoK), in rest of Gujarat and West Coast is given as Tables 13.1 to 13.4 below.

Table 13.2. Details of Oil Pollution Response Capability at Mundra Port, GoK

Sl. No	Particulars	Details
1.	Pollution response equipments held	Three powerful tugs are fitted with OSD spraying boom. All three tugs have 4000 litre of oil Spill dispersant (Approved by NIO) on board for immediate use.
2.	Future plan for acquisition of equipment are	Inflatable boom.
		One more tug with OSD spraying boom and 4000 litre of OSD. Absorbent Pads.
3.	Whether any vessel/aircraft available for pollution response capabilities	Tugs are fitted with OSD Booms and OSD and can be used in emergency however there is no dedicated vessel/craft to operations.

Table 13.3. Details of Oil Pollution Response Capability at each GMB Port, GoK

Sl. No:	Equipments	Details
1	Boom	Boom, Air blower, Towing end, Boom reel (300m capacity.), Hydraulic hose set, Beach sealing boom, Towing end, Boom

		repair kit, Storage bag, Water pump, Spare part kit, Air blower & Spare part kit.
2	Skimmer	Multi-skimmer, Spate pump/power pack, Lifting straps & Hose set
3	Flex barge	Flex barge 10t, Tank fittings, Towing equipment
4	Dispersant	Dispersant spray system (osd applicator), Spray arm, Hose set for DSS
5	Shore clean up set	Absorbent boom, Absorbent pad, Beach broom, Mini vaccum pump, Vaccum dome, Vac aluminium hopper, PPE (5 persons kit), Collapsible tank 6m3, Skimmer rock cleaner, Hydraulic power pack w oil transfer pump, Chalwyn valve and spark arrestor, Oil transfer hose set, Hydraulic hose set, Spare part kit for rock cleaner, Spare part kit for chalwyn valve

Source: Proposed in DPR submitted by KITCO

Table 13.4. Oil Spill Response Capability at Pipav Port, Saurashtra Coast

Sl. No	Particulars	Details
1.	Pollution response equipment held	(a) Floating Skimmers -01 No
		(b) Oil Spill combat boat -01 No
		(c) Dispersant Spray System -01 No
		(d) Oil Collection pump -01 No
		(e) Sorbent Pads -01 No
		(f) Sorbent Booms -01 No
		(g) Sorbent Sheets -01 No
		(h) Sorbent Pillows -01 No
		(j) High pressure cleaning pump -01 No
		(l) Oil Spill Dispersant - Nil
		(k) Oil collection Concentrate -01 Unit
2.	Vessels/ Air effort available	Nil

Table 13.5. Oil spill Response Capability at Reliance Industries Limited – Hazira, Gulf of Khambat (GoKh)

Sl. No	Particulars	Details
1.	Pollution response equipment held	No response equipment available. (operations have been rated as “Low risk” in terms of pollution hazard).
2.	Vessels/ Air effort available	Two tugs, Reltug-3 and Reltug-4, with spray booms on both sides and dispersant capacity of 1000 litre are available at RIL, Hazira. These tugs can be shifted to other Reliance locations as per the requirements.

Table 13.6. Oil Spill Response Capability at Coast Guard Region (West)

Sl. No	Particulars	Details
1.		1.RO Boom OSA 2000 with deck Reel - 04(200 m each)

Sl. No	Particulars	Details
	Pollution response equipment held	2. RO Boom Powerpack (old) - 02
		3. RO Boom Powerpack (New) - 02
		4. Vikoma Hi-Sprint Boom with deck Reel - 04
		5. Vikoma PN Diesel Hydraulic Powerpack - 03
		6. Vikoma Hi-Sprint Boom air blower (Echo)- 02
		7. Vikoma air Blower (Honda) - 02
		8. VimkomaSentinal Boom - 01
		9. VikomaSenital Boom Deck Reel - 01
		10. RO Boom 610 (16 x 25) -16
		11. Air Blower for Sl. 10 - 05
		12. Boom Washing Chamber -01
		13. Fresh water Chemical Pump set for Sl. 12 -02
		14. Powerpack for Sl. 12 - 01
		15. RO set (Settling Tank) - 01
		16. RO Clean Unit -01
		17. Beach Cleaning equipment - 01
		18. Hot water cleaner (KEW) - 04
		19. Hot Water Cleaner (L&T) -01
		20. CCN-100 off loading pump -01
		21. Powerpack for Sl. 20 -01
		22. TC-3 Aerial spray unit with bucket -03
		23. TC-3 Aerial Spray Arm set - 05
		24. Spill Spray Pump -04
		25. Spill Spray Arm (set)for Sl.24 -05
		26. Wide Spray System -02
		27. OMI Oil Mop MK-II-9D - 02
		28. SS-50 Disk Skimmer (Vikoma) -04
		29. Powerpack for Sl.28 -04
		30. Welosep Vertex Skimmer - 02
		31. Powerpack for Sl.30 -02
		32. DesmiDestroil Skimmer DS-250 - 04
		33. Powerpack for Sl. 32 - 04
		34. DesmiDestroil Skimmer DS 210 - 02
		35. Powerpack for Sl. 34 - 02
		36. Dunlop Salvage Barge 100 M3 - 02
		37. Dunlop Salvage Barge 30 M3 - 03
		38. Linductor Oil recovery - 02
		39. Vikoma Sea Devil Skimmer - 03
		40. Powerpack for Sl. 39 - 03
		41. Hydraulic Control for Sl. 39 - 03
		42. Hydraulic hand pallet -03
		43. Hydraulic drum lifter -01
		44. Hydraulic power pack lifter -01
		45. Hand trolley -01
		46.Fork lift -01
		47.SeaVac Heli Skimmer -01

Sl. No	Particulars	Details
		48.Pallet Stacking System (Ex Jay24 & Ex Godrej32) -56
		49.Container top for OSA 200 Boom reel - 03
		50.Oil spill response kit Kochi - 01 At
		51. Seavac 330 Heli skimmer system - 01 -do-
		52. RO Boom -01 -do-
		53. DS 250 Skimme - 01 -do-
		54. Spill Spray equipment - 01 -do-
		55. Spray Pod - 02 747 SQNat Kochi
		56. Spray Pod - 08 750 SQN at Daman
		57. IR/UV System - 02 -do-
		58. TC-3 Bucket with boom S/N 7584 - 01 841 SQN at Daman
		59. Oil Water separator Vadinar - 01 At
		60. Petrol Engine General Purpose - 01 -do-
		61. Rop Mop skimmer(Diesel engine & power pack) - 02 -do-
		62. Oil Spill Kit with accessories - 02 -do-
		63. Dunlop Dragon Barge 30 Ton -03 -do-
		64. Sea Curtain Boom - 2400 m -do-
		65. Sea vacHeli skimmer - 01 -do-
		66. High Pressure Steam Jet Cleaner - 02 -do-
		67. TC-3 Bucket - 01 CGAE Goa
		68. TC-3 Bucke Goa - 01 800 SQN at
		69. TC-3 Bucket Kochi - 01 Veera Flight at
2.	Other efforts/ facilities available	a) Ships and aircraft of Indian Navy as available on West Coast of India. (b)Vessels, equipments and facilities in ports and with other authorities engaged in handling / transporting oil on the West Coast of India.
3.	Vessels / Aircraft available	Offshore Patrol Vessel, IPCs/SDBs, IBs and Workboats, Dorniers and Helicopters.

Source: NOS-DCP

Hence it can be concluded that with enough resources, mutual aid for combating with higher Tier requirements of worst case oil spill with in KPT limit can be achieved with other regional ports and operators. MoUs should be executed and maintained in such as way that optimisation of resources and minimisation of response time can be achieved.

OIL WASTE DISPOSAL MECHANISM

Oil waste disposal is one of the most serious trouble faced during an oil spill. Oil waste generated during and oil spill include recovered oil, oily debris including items of protective clothing, equipment used for cleanup operations etc. The appropriate disposal option depends upon type and amount of oil, location of spill, environmental and legal aspects, economic considerations. It can be seen that only heavier oils such as Crude Oil, Fuel Oil, Lubricants etc., require cleanup and response operations while non-persistent oils do not require cleanup hence disposal.

Extreme care is to be taken while oil collection since earlier it is collected, less likely the contamination and hence easier the recovery operations. Weathering makes the oil more viscous. Oil directly collected from the water will be having less debris but will be highly emulsified. Thus the oil waste can be classified as:

- Oil contaminated with water
- Emulsified Oil contaminated with water
- Oil collected from the shore contaminated with sand
- Oil collected from the shore contaminated with wood, plastic or seaweed
- Solid Tarballs

Hence it can be easily inferred that each type of waste will require a different method of treatment and disposal.

Storage of oil waste collected during spill is important prior to disposal. Initially they will be stored in the temporary staging areas located close to the spill location and further they may be collected and transferred to a suitable location within the KPT area before disposal if possible. Steps involved in oil waste disposal are the following Construction of waste storage areas, Sampling of disposed materials, Testing of accumulated materials for identification of hazardous materials, Segregation and transportation of waste, Dismantling of waste staging areas, Decontamination of the location and Collection & dispose of washdown/ rinseate. Following section details the important steps involved in the oil waste disposal mechanism:

14.1. Temporary/ Onfield Storage

Wastes accumulated in temporary storage location should be categorised, segregated, inventoried and transported off-site for recycling or disposal. No additional permits are needed for collection and temporary storage of the waste from an oil spill emergency as long as the waste is properly contained, labeled and stored. Different types of containers used for oil waste collection and transportation are given as **Table 14.1** below.

Table 14.1. Types of Oil Waste Handled

Sl. No.	Type of Container	Type of Waste	Volume (m ³)	Instructions for Use
1	Plastic Bags	Soild & Liquid ^c	0.04/bag	Not suitable for light oils, sharps or long term storage. Half fill only. Should be moved using
2	200 Litre Drums with Cover	Soild & Liquid ^c	0.2	Half fill only.
3	Flexible bags/ containers	Liquid	1 to 10	Recommended during on vessel operations. Finds difficulty while loading into trucks for final disposal.
4	Barges which are covered during operations.	Liquid	Already available available sizes at KPT	
5	Rigid Tanks	Liquid	Variable	At locations close to the public area requiring additional safety implications
6	Plastic- lined pits	Liquid ^c	Variable	Needs to be well lined at areas of low water table, away from important water sources.

c- Conditional- Adapted only if other preferred options are not available.

Bulk oil should be stored separately from oily debris so that effective treatment and disposal methods can be followed. It is better that in the bulk storage facility for highly viscous materials, the tanks are to be fitted with heating coils.

Highly viscous oils are best stored in open containers such as barges, skips or drums to facilitate treatment and transfer operations. If special purpose containers are not available, bulk oil from shorelines can often be held within compacted earth walls or in simple storage pits lined with suitable oil-proof material like heavy gauge polyethylene. Pits should be filled in after complete removal of the oil and, as far as possible, the area restored to its original state. Plastic bags should be regarded as a means of transporting oily material rather than storage since they tend to deteriorate rapidly under the effect of sunlight. It should also be borne in mind that if the contents are ultimately to be treated in

some way prior to disposal, it will usually be necessary to empty the bags and dispose them off separately.

It is beneficial to reduce the amount of material to be transported by separating oil from water and from sand during temporary storage. Water-in-oil emulsions can be broken to release the water; oil seeping from heaped beach material and debris can be collected in a ditch surrounding the storage area; and sieving techniques can be used to separate clean sand from tar balls.

14.2. Transportation

This phase involves in water and land phase. In water phase floating tanks driven by tugs or inbuilt tanks in tugs. In land phase terrestrial vehicles can be utilised for hauling.

14.3. Segregation

Segregation of the waste can be done prior to transportation or after it. Many times segregation of different types of waste help in reducing the quantity of material to be transported. Preferred segregation of oil waste are given as **Table 14.2** below.

Table 14.2. Preferred Segregation for Various Types of Oil

Sl. No.	Phase & Type of Waste		Preferred Segregation
1	Liquid	Oil	Non-emulsified Oils
			Emulsified Oil
	Wastewater		Water from temporary storage
			Water from emulsion separators
		Water from Chemically demulsified oil	
2	Soild	Oil	High pour point oils
			High viscosity emulsions
			Tar ballls
	Oily Debris	Oil mixed with cobble or sand	
		Oil mixed with wood, vegetation, plastics or sorbents	

14.4. Disposal

Disposal of the oil waste is to done considering the type of oil, availability of space, expenditure etc. Important methods of oil waste disposal are given as **Table 14.3** and are detailed in the following sections.

Table 14.3. Disposal Methods for Oil Waste

Sl. No.	Type of Material	Nature	Disposal Methods
1	Liquid Oil Waste	Mainly oil with some water	Recovery & Recycling
			Incineration
2	Oily water	Mainly water with some oil	Oil water seperation unit
			Bioremediation

3	Soild Oil + Inorganic Waste	Including sediments	Bioremediation
			Landfill. Only after oil content reduced to <30ppm or 20%.
4	Soild Oil + Organic Waste	Dead vegetation, animals & birds and other biodegradable materials	Bioremediation
			Landfill
5	Other soild waste materials	Including synthetic materials	Landfill
6	Hazardous materials		Offsite disposal

14.4.1. Recovery and Recycling

To the maximum possible extent, the oil is to be recovered for eventual processing or blending with fuel oils. Possible recipients for processing or blending are refineries, power stations, cement and brick works and contractors who specialize in recycling waste oils. There are approved waste oil recycler for KPT, the details of are given as **Annexure XIII**.

But for recovery and recycling the oil should be have the following characteristics:

- Pumpable
- Low in solids
- Salt content of less than 0.1% for processing through a refinery or less than 0.5% for blending into fuel oil.

Oil collected from the water is likely to be the easiest to prepare for processing since the requirement will be only to separate water. This separation can frequently be achieved by gravity either in collection devices such as vacuum trucks or in portable tanks, where the water is allowed to run-off or pumped from the bottom of the tank.

The extraction of water from water-in oil emulsions is sometimes more difficult. Unstable emulsions can usually be broken by heating up to 80°C and allowing the oil and water to separated by gravity. More stable emulsions may require the use of chemicals known as emulsion breakers or demulsifiers, which also tend to reduce the viscosity of most oils rendering them more pumpable. But disposal of water collected will contain high percentaged of the emulsion breaker and oil. From oiled sedmiments waterwashing using low pressure hoses can be used to loosen and lift off oil from debris contained in a temporary storage pit. The resulting oil/water mixture can then be pumped away and separated by gravity. Separation can also be achieved in a closed system using water or a solvent. Cleaning of large amount of oiled shore material on site will reduce the cost considerably but avoiding the transportation of large quantity of sediments.

14.4.2. Landfill

This is a disposal option when the recovery of oil is impractical. The oiled waste is directly dumped into the designated landfill sites. Materials intended for direct dumping should have maximum oil content of about 20%. The guidelines to be followed while selecting the landfill sites are the following:

- Landfill Sites should be located well away from fissured or porous strata to avoid the risk of contamination of ground water, particularly if this is abstracted for domestic or industrial use.
- Disused quarries and mines are often ideal.
- Co-disposal of oil and domestic waste is often an acceptable method even though degradation of the oil is likely to be slow due to the lack of oxygen.
- The total quantity of oil should not exceed 1.5% of the total volume of the site.

In the case of shorelines lightly contaminated with oily debris or tar balls, it may be possible to bury the collected material at the back of the beach well above high water mark provided there is no risk of damage to vegetation and with sufficient covering so that the oiled beach is not uncovered through normal beach erosion.

Stabilising agents such as Quicklime or Calcium oxide, cement and pulverized fuel ash can be used to bind oily sand, provided there are no large pieces of debris. This will result in the formation of an inert product which will prevent the oil from leaching out. Then it can be disposed under less stringent conditions than unstabilised oily sand.

14.4.3. Bioremediation

Bioremediation utilizing a group of naturally occurring microorganisms which can break down hydrocarbons either through aerobic or anaerobic processes can be used for disposing oil contaminated debris. It can be done either in-situ or ex-situ. Land farming and disposal in sand dunes are ex-situ techniques which have been practiced over long span of time and are better options that make use of biodegradation. The techniques of bioremediation which utilizes existing microorganisms and manipulating oxygen and nutrient levels are termed as bio stimulation whereas introduction of supplementary organisms to supplement those present is called bio augmentation. Plants are also utilized in some cases and then the technique is termed as phytoremediation. The process is highly temperature dependent. Lighter oils are toxic to microorganisms and many times inhibit their growth while weathered heavier oils may contain large quantity of poorly degradable compounds.

Land farming involves the spreading of the oily materials over the soil in this layers. Hence the aerobic decomposition is largely completed in one to three years. It requires adequate area within reasonable distance and all parts of the site should be accessible to trucks. Located away from surface and underground water sources. The soil should be of low permeability. In the case of biodegradable organic waste composting can be adopted. Dune disposal another option where significant quantities can be buried in stable coastal sandy areas and dune pastures. It will work well only when the area is not water logged.

14.4.4. Incineration

The open burning of oily debris is recommend only in remote areas. When oil is burnt in the open it also tend to spread and can leach into the ground. Tarry residue will remain since it is really possible to achieve complete combustion. Portable incinerators which are able to contain oily waste and can create very high temperatures. Rotary kiln and open hearth types are most appropriate. Fixed industrial incinerators are an option if long term storage is available. The combustion will be self-sustaining if the fuel content is around 25 % and water content is not more than 50%. Monitoring should be done for noxious gases in this case.

CONCLUSION AND RECOMMENDATION

KPT is already having an Oil Spill Contingency Plan in place and Oil Spill Response (OSR) resources are also in place. Considering the ever increasing traffic at the Port which also handle POL commodities, contingency plan shall be maintained in such a way as to cater the threat posed by an uncertain oil spill event. Based on the observation of the study, to supplement the existing plan, the following conclusion and recommendations are made:

- Kandla port is one among the thirteen major ports of India located in Gulf of Kachchh (GoK) which hosts one of the world's splendid ecosystems and its rich & highly bio-diversified intertidal flora and fauna. The area is located close to the international shipping line and is an approach for another 5 ports. Presently, there are oil handling facilities of Reliance, IOCL, BORL including SPMs within the Kandla port limit near Vadinar. Also there are Oil berths at Kandla creek and an SPM is to be operational off Veera. Along with this, its location close to the busy international shipping routes, place the area unreasonably under the oil spill threat. Vadinar being the POL hub, extreme caution is required for this area.
- Port handles ships with a capacity above 50,000 DWT while SPMs handle Very Large Crude Carriers (VLCC) having capacities ranging from 87,000 to 3,25,000 DWT. During the financial year 2014-15 the port handled 92.50 MMT cargo. Kandla & Vadinar terminals were visited by 1724 & 530 ships respectively during the same period. The port handles different kinds of oil including Crude Oil, POL, Edible Oil and Bunker Fuel Oil.
- Presently, KPT holds minimum OSR equipments for Risk Category-A port as per NOS-DCP to cater Tier-1 facilities. Eventhough, Tier-1 is concerned with preparedness and response to a small spill within the capabilities of an individual facility or harbour authority with 700 tonnes cited as the upper limit for quantity, the circumstances of the spill and the surrounding environment will determine the actual level of response. This factor is very critical in the KPT limit, located with in an extremely sensitive as well as vulnerable locality.

- Located in the Kandla Creek, in the western most part of Little Rann of Kachchh (LRK) at the mouth of GoK, the port area is immediately surrounded by high density of creeks, mangrove swamps, mudflats, patches of dry salt waste (Rann), vast salt pans and aquaculture ponds. However, the port limit extends to Vadinar in the southern arm which is located amidst the extremely sensitive coastline with rich corals and islands, where the SPMs and other oil handling facilities are operating for various petroleum companies. These areas are essentially the part of the protected areas Marine National Park & Sanctuary (MNPS) and Important Bird and Biodiversity Areas (IBAs). Hence the risk of oil spill here is determined to be very high.
- Environmental Sensitivity Map was prepared for the KPT limit. Mangroves are the most sensitive shore feature, followed by sheltered hypersaline mudflats, exposed mudflats, exposed manmade structures within the KPT limit. In addition to this there are small stretches of exposed rocky shore shores, wavecut rocky platforms, salt marshes and fine sand beaches adjoining the coral islands. But the shores are dominated by mangroves or mudflats having higher sensitivity. Also there are very small ridges of shell and coarse grained beaches adjoining mudflats. Small strips of rip-raps or seawalls will be associated with areas of human interferences, low stability sections etc. Important biological resources such as Corals, Birds nesting and flocking areas etc., are occurring simultaneously in the MNPS area in the Vadinar Zone. Hence this zone of KPT Limit is to be considered as multi-resources are and is the most sensitive part in the KPT limit.
- While prioritising resources in addition to the oil spill sensitivity, other consideration of the resource such as ecological value, economic value, social and cultural value is to be taken into account. Thus first priority is to be given for Corals and Mangroves, followed by mudflats, fishing grounds and intake locations. Rocky Coast is having the lowest priority.
- Port is responsible for the cleanup operations within port limit. In the case of KPT due to the presence of islands, bays in hard mudflats, shoals etc., the port has to give equal importance to offshore and onshore response operations. From the present inventory available, it can be seen that, sufficient shoreline protection and cleanup resources are not available at KPT. Hence, Beach sealing Boom, Auto/River Boom, Fence Boom, Sorbent in the form of Boom, Pillows, Rolls, Sheets and Pads, Clean up equipment such as Hot Water Pressure Cleaner, Showels, Rakes, Diggers etc., have been proposed.
- Incident Management Mechanism for KPT for ensuring proper Oil Spill Response and Preparedness is proposed. Crisis Management Group headed by the Chairman will be the prime authority of the Oil Spill Response Mechanism. Dy. Conservator, KPT have been proposed as

the Chief Incident Controller. Emergency Control Centre will be established at KPT office with 24 hr control room at the port office under the supervision CIC for coordinating the response activities. Incident Management Team will be lined up under the CIC through the Site Incident Controller and other response unit coordinators. Chief Operating Manager at Vadinar is given the charge of Marine Response Unit in case of spill in Vadinar Zone.

- Presently, KPT is in MoU with ESSAR and IOCL. Mutual Aid is applicable to the other stakeholders of the area including facility operators RELIANCE, BORL (which are operating within the port limit, also having individual facility level contingency plan for 500m area surrounding the facility) and to the local ports of the region Navlakhi (under taken by Gujarat Maritime Board) and Adani Port & Special Economic Zone, Mundra for combating Tier-2 spills upto 10,000 Tonnes under the Onscene Command of Regional Commander ICG. MoUs may be updated including all stakeholders of the region for optimising the resources and minimising the response time.
- Storage of oil waste collected during spill is important prior to disposal. Initially, they will be stored in the temporary staging areas located close to the spill location and further they may be collected and transferred to a suitable location within the KPT area before disposal if possible. Landfill sites should be located well away from fissured or porous strata to avoid the risk of contamination of ground water, particularly if this is utilised for domestic or industrial use. Materials intended for direct dumping should have a maximum oil content of about 20% only. In case of the absence of suitable disposal sites, the same can be transferred to the approved waste oil recycler of KPT.

REFERENCE

- Administration Report, Kandla Port Trust, 2014-15
- Bio Resource Status of Selected Coastal Regions, National Bio-resources Development Board, MSSRF.
- Coral Atlas, Gujarat Ecology Commission
- Clean-up of Oil from Shorelines, Technical Information Paper-7, ITOPF
- Ecological Profile for Coastal Talukas of Gulf of Kachchh, Gujarat Ecology Commission, September 2014
- Feasibility Report for construction of Captive barge jetty at Kandla”, Indian farmers fertilizer cooperative limited Kandla, August 2010
- Final Environmental Impact Assessment Report for Port Based Multiproduct SEZ at Kandla Port, Part I Terrestrial EIA & EMP, Gujarat Institute of Desert Ecology, March, 2015.
- IMO Manuals Series on Oil Pollution
 - Section I – Prevention (2011 edition)
 - Section II – Contingency Planning (1995 edition)
 - Section III – Salvage (1997 edition)
 - Section IV – Combating Oil Spills (2005 edition)
 - Section V – Administrative Aspects of Oil Pollution Response (2009 edition)
 - Section VI – IMO Guidelines for Sampling and Identification of Oil Spills (1998 edition)
- Influence of anthropogenic activities on the existing environmental conditions of Kandla Creek (Gulf of Kutch) P. V. Shirodkar^{1,*}, U. K. Pradhan¹, Dearnyn Fernandes¹, Sonali R. Haldankar¹ and G. S. Rao² National Institute of

Oceanography, CSIR, Dona Paula, Goa 403 004, India 2Kandla Port Trust, Vadinar Oil Terminal, Vadinar 361 010, India

- Integrated Environment Impact Assessment Report For Developing Integrated Facilities Within The Existing Kandla Port At Kandla, Kandla Port, Kandla Port Trust , September 2013
- Mangrove Atlas, Gujarat Ecology Commission
- MC 252 Oil Spill – Jean Lafitte National Historic Park and Preserve. Submerged Aquatic Vegetation NRDA. August 2012
- National Oil Spill Disaster Contingency Plan, India, 2015
- Oil spill waste minimization and management”, IPIECA, April 2014.
- Oil Spill Sensitivity Analysis and Risk Assessment for Gulf of Kachchh, India Kankara, R. S.; Subramanian, B. R., using Integrated Modeling. Journal of Coastal Research. Sep2007, Vol. 23 Issue 5, p1251-1258.
- Oiled Shoreline Cleanup Manual, POSOW, February 2013
- Prostar Sailing Directions, 2005 India & Bay of Bengal Enroute, 2005, National Geospatial Intelligence Agency, United States of America
- Sensitive Coastal Marine Areas Of India, Oil Spills And Their Impacts, Indian Coast Guard
- Status of the Flora and Fauna of Gulf of Kachchh”, Vijayalakshmi Nair, India National Institute of Oceanography, Dona Paula, Goa, India, March 2002.
- Status Report On Mangrove Plantation By Kandla Port Trust as On April 2013
- Taluka Level Environmental Sensitivity Index (ESI) and vulnerability mapping for oil spills: A pilot study from Goa State, India. Mani Murali, Rohan Kumar, Vethamony. P, National Institute of Oceanography and Council of Scientific and Industrial Research (CSIR), India.
- Wet Land In Gujarat, Versatile yet Vulnerable, Dr. H. S. Singh, IFS Chairman, Gujarat Biodiversity Board
- www.indiancoastguard.gov.in/
- www.kandlaport.gov.in/

Annexure

Annexure I

The composition, functional responsibilities and reporting requirements of CMG

The composition, functional responsibilities and reporting requirements of CMG				
Sl. No	Crisis Management Groups (CMGs)	Functions	Composition	Reporting Requirements
1	National Level Crisis Management Group for Oil Spills (NOS CMG)	<ul style="list-style-type: none"> Continuously monitor the post incident situation arising out of a major oil pollution incident and suggest measures for prevention and to check recurrence of such incidents; Arrange, in the event of an oil pollution incident, all manpower, equipments, resources financial assistance as may be necessary; Conduct post-accident analysis of such major oil pollution incidents and evaluate responses; and Review the adequacy of national and other contingency plans, and suggest measures to reduce risks of oil pollution from sea ports and oil installations. 	<ul style="list-style-type: none"> Chairperson – Defense Secretary Members-Defense Secretary, Foreign Secretary, the Secretaries of Environment and Forests, Shipping, Petroleum and Natural Gas, Urban Development, Ocean Development, Science and Technology, Agriculture and Co-operation, Chemicals and Petrochemicals, Industrial Development, Secretary (Security) in the Cabinet Secretariat.,Director General Coast Guard, Chairman of the Concerned Port, Director General Hydro Carbons, Any member co-opted as deemed necessary 	The NOS-CMG is the apex body to deal with major oil pollution incidents and to provide expert guidance for handling major oil spills.
2	State Level Crisis Management Group for Oil Spills (SOS CMG)	<ul style="list-style-type: none"> Review local oil spill contingency plan for the State local and all facility oil spill contingency plans with a view to examine its adequacy and forward a report to the Central Coordinating Authority (CCA) for oil spills once in three months; Nominate personnel to the Local Action Group (LAG) and Local Action Group Support Team (LST) and review the status of these teams; Assist the State Government in managing oil pollution incident at a site in the State; Assist the State Government in the planning, 	<ul style="list-style-type: none"> Chairperson - Chief Secretary Member Secretary- Chairman State Maritime Board Members- Secretary (Labour), Secretary (Environment) ,Secretary (Health) ,Secretary (Industries), Secretary (Public Health Engg.), Secretary (Fisheries), Chairman, State Pollution Control Board, 4- Experts (Industrial Safety & Health) nominated by State Govt., Secretary/ Commissioner(Transport), Director (Industrial Safety)/ Chief Inspector of Factories ,Fire Chief, Commissioner of Police, One Industry Representative nominated by 	The SOS-CMG is the apex body in the State to deal with major oil pollution incidents and to provide expert guidance for handling major oil pollution incidents.

		<p>preparedness and mitigation of major oil pollution incident at a site in the State;</p> <ul style="list-style-type: none"> Continuously monitor the post incident situation arising out of a major oil pollution incident in the State and forward a report to the Central Coordinating Authority for oil spills review the progress report submitted by the District Crisis Management group respond to queries addressed to it by the District Crisis Management groups; Publish a list of experts and officials in the State who are concerned with the management of oil pollution incidents. 	<p>State Govt., State Civil Defense Chief ,Secretary (Revenue/Home), Directorate of Industrial Safety and Health, Any other member deemed necessary by the Chairman</p>	
3	District Level Crisis Management Group for Oil Spills (DOS CMG)	<ul style="list-style-type: none"> Review all the facility oil spill contingency plans prepared by the occupier of Major Accident Hazards installation viz., sea ports and oil installations for the preparation of the district oil spill contingency plan; Assist in the preparation of the district oil spill contingency plan; Assist the district administration in the management of oil pollution incidents; Continuously monitor every oil pollution incident; Ensure continuous information flow from the district to the NOS-CMG and SOS-CMG regarding oil pollution incident situation and mitigation efforts; forward a report of the oil pollution incident within fifteen days to the SOS-CMG; and conduct at least one full scale mock-drill of an oil pollution incident at a facility each year 	<ul style="list-style-type: none"> Chairperson - District Collector Member Secretary- Inspector of Factories Members- District Energy Officer, Chief Fire Officer, District Information Officer, Controller of Explosives, Chief Civil Defense, One Trade Union Representative nominated by District Collector, Deputy Superintendent of police , District Health Officer/Chief Medical Officer, Commissioner Municipal Corporations, Representative of the Department of Public Health Engineering, Representative of Pollution Control Board, District Agriculture Officer, 4 Experts (Industrial Safety & Health) nominated by District Collector, Commissioner (Transport), One Representative of Industry to be nominated by the District Collector, Chairperson/Member-Secretary of Local Crisis Groups, Representative of the Port, 	<p>The DOS-CMG is the apex body in the district to deal with major oil pollution incidents and to provide expert guidance for handling oil pollution incidents;</p>

		<ul style="list-style-type: none">• Forward a report of the oil pollution incident within fifteen days to the SOS-CMG.• Conduct at least one full scale mock-drill of an oil pollution incident at a facility each year and forward a report of the strength and the weakness of the plan to the SOS-CMG.• conduct at least one full scale mock-drill of an oil pollution incident at a facility each year	Representative of State Maritime Board, District Forest Officer/ Wildlife advisor, Any other member deemed necessary by the Chairman	
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4	Local Level Crisis Management Group for Oil Spills (LOS CMG)	<ul style="list-style-type: none"> • Prepare local oil spill contingency plan for the industrial pocket; • Ensure dovetailing of the local oil spill contingency plan with the district oil spill contingency plan; • Train personnel involved in oil pollution incident management; • Educate the population likely to be affected in an oil pollution incident about the remedies and existing preparedness in the area; • Conduct at least one full scale mock-drill of an oil pollution incident at a site every six months forward a report to the DOS-CMG • Respond to all public inquiries on the subject. Months forward a report to the DOS-CMG; and respond to all public inquiries on the subject. 	<ul style="list-style-type: none"> • Chairperson - Sub-divisional Magistrate / District Emergency Authority • Member Secretary- Inspector of Factories • Members- Industries in the District/Industrial area/ industrial pocket, Transporters of Hazardous Chemicals(2 Numbers), Fire Officer, Station House Officer (Police), Block Development Officer, One Representative of Civil Defense, Primary Health Officer, Editor of local Newspaper, Community leader/ Sarpanch/ Village Pradhan nominated by Chairperson, One Representative of Non-Government Organization to be nominated by the Chairperson ,Two Doctors eminent in the Local area, nominated byChairperson, Two Social Workers to be nominated by the Chairperson, Environmental NGOs preferably dealing with corals, mangroves, marine environment, Representative of oil agencies, Any other member deemed necessary by the Chairman 	The LOS-CMG is the body in the industrial pocket to deal with oil pollution incidents and coordinate efforts in planning, preparedness and mitigation of an oil pollution incident
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Annexure II

Inventories for the tier 1 pollution response

Inventory Standards at Port Facilities

The ports are classified into a risk category based on type of cargo handled, quantity of bunkers carried onboard ships calling at the port, single point mooring facility at the port, and ship-to-ship transfer operations at the port. The risk categorization is appended at Table A1

Table A1 Risk categorization of ports

Risk Category	Description
A	Ports handling crude oil/ tanker visits/ SPM/ STS
B	Ports handling ships carrying more than 1000 tons of fuel/ bunker oil Ports handling products only
C	Other than Cat 'A' and Cat 'B'

The planning standards for oil spill response resources for each risk category of ports is appended at Table A2.

Table A2 Oil Spill Response equipment for each risk category of ports

	Description	Risk category			
		A	B	C	
Equipment	Inflatable Boom (metres)	2000	1000	600	
	Skimmer (20 TPH)	4	4	2	
	OSD Applicator (no.)	6	2	2	
	Oil Spill Dispersant (litres)	10,000	5,000	3,000	
	10 Tons Flex Barge (no.)	4	02	2	
	Current Buster booms if tidal current >2 knots (meters)	400	400		
	Sorbent boom (meters)	500	200		
	Sorbent Pads (no.)	2000	1000		
	Shoreline cleanup Equipment	Mini Vacuum pumps	5		
		OSD Applicator	5		
Fast tanks		5			
Vesse Power 1	Work Boats	2	1	1	
	Tugs	2	1		
Man Power	IMO Level 1	10	6	2	
	IMO Level 2	4	2		
	Other	10	10	5	

Inventory Standards at Oil Installations

The oil installations are classified into risk categories based on the number of offshore platforms operated in the area, SPMs in area, drilling and production of crude oil, type of product handled viz., LPG, LNG or Naphtha, or whether FPSO. The risk categorization of oil installations is appended at Table A3

Table A3 Risk categorization of oil installations

Risk Category	Description
Super 'A'	Operating more than five offshore platforms in one area
A	Offshore E&P Installations for crude oil
B	SPMs handling crude oil/FPSO
C	Ship/ platform involved in ship to ship crude oil transfer

The planning standards for oil spill response resources for each risk category of oil installations is appended at Table A4 .

Table A4 Oil Spill Response resources for each risk category of oil installations

	Description	Risk category				
		SUPER A	A	B	C	
Equipment	Inflatable Boom in metres	2000	1000	600	600	
	Skimmer (20TPH)	4	4	2	2	
	OSD Applicator (no.)	6	2	2	2	
	Oil Spill Dispersant (litres)	10,000	5,000	3,000	3,000	
	Flex Barge 10 tons (no.)	4	2			
	Current Buster booms atports where tidal current is>2 Kn (no.)	2	2			
	Sorbent boom pack (meters)	500	200			
	Sorbent Pads (no.)	2000	1000			
	Shoreline Cleanup Equipment	Mini Vacuum pumps	5			
		OSD Applicator	5			
Fast tanks		5				
Vesse	Work Boats	2	1		1	
	MSV/OSV/Tugs	2	1	1		
Man Power	IMO Level 1	10	6	2	2	
	IMO Level 2	4	2			
	OTHER	10	10	5	5	

Inventory Standards at Coastal States

Sl no	Palletized contents
1	Inflatable Boom 240m in 10m & 20m lengths
2	Boom ancillary pallet
3	Shore Sealing Boom 400m in 10m & 20m lengths
4	Minivac System
5	Multi Skimmer 10TPH and 20 TPH
6	Portable temporary Storage Devices x 8 nos.
7	Inflatable Shelters
8	Decontamination Station Equipment
9	Spate pumps x 3
10	Suitable Power pack
11	Discharge hose
12	Command pallet (Walkie Talkie, Torch, Folding Table, Folding Chair Map of the Area, etc)

Annexure III

The format for reporting an event

OIL SPILL REPORT FORM**Particulars of Person/Organisation
Reporting Incident**

- a. Title :
- b. Company :
- c. Telephone/Telex Numbers :
- d. Date/Time :
- e. Spill Location :
- f. Type and Quality of Oil Spill :
- g. Cause of Spill :
- h. Response to Spillage, if any :
- j. Any Other Information :

Annexure

POLREP MESSAGE FORMAT

(See amplification in succeeding table)

Reference : IMO - 560 (1995)

	Address	From	To
	Date		Time Group
	Identification		
	Serial Number		
Part 1 (POLWARN)	1.	Date and time	
	2.	Position	
	3.	Incident	
	4.	Outflow	
	5.	Acknowledge	
Part II (POLINF)	40.	Date and Time	
	41.	Position	
	42.	Characteristics of pollution	
	43.	Source and cause of pollution	
	44.	Wind direction and speed	
	45.	Current or tide	
	46.	Sea state and pollution	
	47.	Drift of pollution	
	48.	Forecast	
	49.	Identify of observer and ships on scene	
	50.	Action taken	
	51.	Photographs or samples	
	52.	Names of other agencies informed	
	53-59.	Spare	
	60.	Acknowledge	
	Part III (POLFAC)	80.	Date and time
81.		Request for assistance	
82.		Coast	
83.		Pre-arrangements for the delivery	
84.		Assistance to where and how	
85.		Other agencies requested	
86.		Change of command	
87.		Exchange of information	
88.		Names and number of	
89.		Description of equipment	
90.		ETA and arrival information	
91.		Place of embarkation	
92.	Place of disembarkation		
93-98.	Spare		

Annexure IV

Allocation of responsibilities in the management of oil spills

Responsibility allocation for various department in management of oil spill		
Sl no	Authority	Responsibility
1	Ministry of Defence	<p>The Ministry of Defence with administrative responsibility for the Coast Guard organization is the Ministry responsible for central coordination of oil spills of national significance in coastal and marine environment of various maritime zones. Their responsibilities are listed as below</p> <ul style="list-style-type: none"> • Surveillance of maritime zones against oil spills • Combating oil spills in various maritime zones except in the waters of major ports • Central Co-ordinating Agency for combating of oil pollution in the coastal and marine environment of various maritime zones of the country • Implementation of national contingency plan for oil spill disaster. • (Following) controlling activities in various maritime zones except within the limits major ports • Inspection of oil record books • Apprehending violators of anti-pollution provisions mentioned under Sections 356 G (1) and (2) of the Merchant Shipping Act. • Checking of vessels for carrying necessary insurance certificates against oil pollution damage
2	Indian Coast Guard	<ul style="list-style-type: none"> • Responsible for maintaining and implementing the National Oil Spill Disaster Contingency Plan. • Responsible for acting as the Central Coordinating Agency for combating of oil pollution in various maritime zones, except in the waters of ports and within five hundred meters of offshore exploration and production platforms, coastal refineries, and associated facilities such as single buoy mooring, crude oil terminal and pipeline • They will review the progress reports submitted by the State Crisis Management Groups; • Respond to queries addressed to it by the State Crisis Management Groups and the District Crisis Management Groups; • Publish State-wise list of experts and officials who are concerned” with the handling of oil pollution incidents.
3	Ministries and departments of the government of India	<p>Ministry of Environment and Forests-</p> <ul style="list-style-type: none"> • Enactment of legislation for prevention and control of marine pollution from land and sea based sources • Prevention and control of marine pollution at source, on land or the sea • Monitoring of pollution up to the shore • Cleaning of beaches affected by oil pollution through coastal states and Union Territories.

		<p>Ministry of Shipping-</p> <ul style="list-style-type: none"> • They are responsible for prevention and control of pollution arising from ships all over the sea including the major ports areas, • Responsible for enactment and administration of the legislation related to prevention and control and combating of pollution arising from the ships • Functions through DG (Shipping)- To Comply with provision made in section 356 G(1) and (2) of Merchant Shipping Act, 1958 (Amendment) for the Purpose of Inspection of construction of ships and tankers in order to comply with provision of MARPOL 73/78 or of the other convention on maritime pollution formulated by IMO and/or other related bodies, Merchant Shipping Act and issue of necessary certificates, and Penalizing the offenders apprehended by the Indian Coast Guard and port authority for violations of the above provisions of the Act, including processing of pollution damage claims etc. • Functions through major ports authorities within port limits- Inspection of oil record books, apprehending of violators of anti-pollution provisions mentioned under section 356 G(1) and (2) of the Merchant Shipping Act, checking of vessels for carrying necessary insurance certificate against oil pollution damage, empowered to handle necessary anti-pollution provisions mentioned under Indian Ports Act, 1908 (Amendment), monitoring and combating of oil pollution in the port areas <p>Ministry of Petroleum and Natural Gas-</p> <ul style="list-style-type: none"> • Combating of oil pollution around offshore exploration and production platforms up to 500 mtrs • Combating of oil pollution around coastal refineries through the concerned refineries <p>Department of Ocean Development– Scientific monitoring of marine pollution arising from land based ship-based and other resources in various maritime zones including coastal waters, but excluding monitoring of oil pollution within the limits of major ports, oil platforms, installations and structures</p>
4	State Governments	<ul style="list-style-type: none"> • The State Governments of coastal states are responsible for coordinating the district and local administration and operation of the National Plan for shore line response and as per the provisions of the National Disaster Management Act, 2005 • The State and District Authorities will provide a wide range of site-specific information and resources, either in relation to environmental impacts, or response activities through authorities, such as Transport, Conservation and Resource Management Departments, Environmental Protection Authorities, emergency services, port/ Harbour authorities, and local conservation groups.

5	Support agencies	<p>The following responsibilities are allocated to various support agencies for implementation of the National Oil Spill Disaster Contingency Plan:</p> <ul style="list-style-type: none"> • The Navy/ coastal state authorities/ port authorities will make their communication/ operation centers facilities available to receive and disseminate reports of marine pollution accidents. • The Indian Navy and the Indian Air Force will provide fixed wing aircrafts or helicopters to conduct aerial surveillance or provide logistic support in movement of men and materials to the incident site. They will also provide ground to air communication link at the site for use by the on scene Commander. • The Port Authority will provide tugs and pollution control equipment at the incident site within port limits. • The Ministry of Shipping, and Ministry of Petroleum and Natural Gas will provide tankers or tank barges for storage of recovered oil or oil in water emulsions, and will arrange for storage and eventual disposal of recovered oil. • Director General of Shipping, Ministry of Shipping, will be responsible for all negotiations with the vessel, cargo owners, and insurers and will also conduct all negotiations regarding compensations and indemnification. • The Ministry of Environment and Forest and Ministry of Agriculture will provide scientific advice regarding species at risk, shore-line sensitivity, restriction of fishing activities, use of dispersant chemicals, beach cleaning methods, etc. • The Ministry of Finance will provide authorization for expenditure and funds for initial response and ensure adequate financial records are maintained. • Coastal state authorities/ district administration/ departments/ public works/civil defence corps will provide personnel and equipment, as required, for shoreline clean-up and ensure safety and protection of the local population and resources.
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Annexure V

Specialist advice and assistance

Specialist Advice and Assistance		
Sl no	Authority	Responsibility
1	Directorate General of Shipping	<ul style="list-style-type: none"> • Issuance of statutory notice to the polluting ship as per the provision of Merchant Shipping Act, 1958. • Invoking relevant provision of the Merchant Shipping Act, 1958 in case the polluting ship fails to the action as required by the act to prevent or minimize pollution. • Advising concerned affected ports or other entities to deal with evidences for the purpose of raising claims on accounts of damage caused by the pollution and initiating legal action against the polluted. • Reporting such incidents to the Flag State of the ship or the neighboring Coastal State which is effected due to pollution. • Supervising salvage operations while dealing with oil pollution casualty if requested by the ports or other entity. • Investigating oil pollution contravention under the provisions of MS Act, 1958. • To keep Ministry of Shipping, Government of India and other concerned authorities posted on the pollution, action taken, progress report on combatment and follow-up action till normalcy of situation. • To advice Indian Coast Guard on pollution related matters under the provision of Merchant Shipping Act, 1958 whenever requested. • To take administrative and legal action for processing claims against damages incurred by Coast Guard and other agencies relating to any other oil pollution incidents • Advice concerned agencies to collect evidences for the purpose of claims pollution ships. • To advice the receiver of wreck with respect to pollution aspect and response. • To advice Indian ship-owners to mobilize ships for the purpose of oil transshipment if required
2	Indian Register of Shipping	<ul style="list-style-type: none"> • To provide advice relating to ship safety, structural integrity and stability of marine casualties; • To depute representatives to attend to a casualty and salvage at the SMCU when established.
3	Maritime Rescue Co-Ordination Centre	<ul style="list-style-type: none"> • In addition to coordinating the rescue and saving of life, to provide drift calculations and advice on offshore currents • Enabling messages to be communicated directly to vessels, during an incident, with its range of communication facilities including International Maritime Satellite (INMARSAT) systems,
4	DG Shipping Communication Centre	To provide advice relating to ship safety, structural integrity and stability of marine casualties and other details of the ship through coordination established with the Flag State of the stricken vessel.

5	Ministry of Environment, Forest and Climate Change	<ul style="list-style-type: none"> • To develop and implement national policy, programs and legislation to protect and conserve India's natural environment including regulation of dumping of wastes at sea, declaration and management of marine protected areas in Indian waters and conservation of listed threatened, migratory and marine species • To advise on matters relating to the Environment Protection from Dumping at Sea including the permitting and reporting of emergency dumping of material at sea; • To advise on potential impacts of oil spills on threatened marine and migratory species, such as seabirds, marine turtles, whales and dolphins. • To advice on likely to impact of oil spill on marine protected areas in Indian waters • To provide advice on habitats in marine protected areas, seabirds, marine mammals, marine invertebrates and macro algae, along with advice on rates of hydrocarbon biodegradation, dispersal and the use of dispersants. • To determine policy for usage of dispersants in the sea areas of the territorial waters over which the state exercises jurisdiction.
6	Archeological Survey of India	<ul style="list-style-type: none"> • Conduct underwater archaeological studies in Indian Waters • Assist/ advise in protection and maintenance of cultural heritage of the nation near to shore. • Documentation of underwater sites and ancient shipwrecks
7	Indian National Centre for Ocean Information Services	<ul style="list-style-type: none"> • To provide ocean state forecast. • To provide software based prediction of the trajectory of spilled oil.
8	Indian Navy	<ul style="list-style-type: none"> • Augment aerial surveillance capability of Coast Guard as necessary in the area when oil spill has occurred. • To make arrangements for oil transshipment operations from any tanker which has caused or is causing or is expected to cause oil spillage. • Promulgate general cautionary messages.
9	Indian Air Force	<ul style="list-style-type: none"> • Augment aerial surveillance capability of Coast Guard as necessary in the area when oil spill has occurred. • To make available its C-130 J Super Hercules aircraft for aerial monitoring of spills and aerial spraying of oil spill dispersants.

10	Ministry of Earth Sciences/ Department of Ocean Development/ National Institute of Oceanography	<ul style="list-style-type: none"> • Mapping of ecologically sensitive areas in the coastal and offshore region in consultation with Ministry of Environment and Forests. • Review of the sensitivity mapping listed by other agencies. • To provide scientific support through Coastal Ocean Monitoring and Prediction System (COMAPS) Centre and Units in investigations of oil pollution monitoring during oil spills and also deployment of its research vessels for this purpose, whenever necessary. • To organize research on impact of pollution on marine life based on actual oil pollution incidents.
11	Ministry of Agriculture/ Department Of Animal Husbandry, Dairying and Fisheries	<ul style="list-style-type: none"> • To arrange for suitable fishing vessels on which oil dispersant equipment can be mounted if the local action group concerned is unable to mobilize this requirement locally. • Sensitivity mapping of the sea areas within the territorial waters of the state with specific information on fish breeding grounds. • To provide Fishery Survey of India vessels for spraying of oil spill dispersants or other response measures
12	Ministry of Petroleum and Natural Gas and Oil Agencies	<ul style="list-style-type: none"> • To assist, when required, in consultation with DG Shipping, with chartering of tanker/s for oil transshipment operations. • To make available anti-pollution equipment and chemicals as are available with them. • To assist in the storage ashore of oil transshipped from wrecked or damaged tanker. • To assist in the assessment of the value of the oil transshipped. • To provide equipment and personnel resources and advice on a range of issues, including oil characteristics and local industry resource availability • To depute an Industry Adviser to the MRC during response to a major oil spill.
13	Shipping Corporation of India	<ul style="list-style-type: none"> • To arrange for tankers or ships or tank barges for transport and collection of recovered oil. • To arrange for any personnel required to assist oil transshipment operation or to assist otherwise as may be required.

14	Major ports/Non Major ports/Oil Terminals/Oil Installations/SPM operators	<ul style="list-style-type: none"> • To be in charge of the overall co-ordination of actions in the area within port limits as regards to anti-oil pollution • To identify a suitable sea going tug when required for the operations. • To identify surface crafts, on which dispersant spraying equipment can be mounted, and which can be used for rigging the boom. • To ensure that for the purpose of part XIII of the Merchant Shipping Act, 1958, actions are taken by the various authorities under the overall legal responsibility of the receiver of wrecks and dock concerned. • To ensure that at least the minimum equipment are kept available locally at all times • To arrange for training of personnel expected to be engaged in above operations. • To arrange for periodical exercise under the guidance of the RCC to keep equipment and personnel on continuous readiness for oil spill response operations. • To consult the ICG, DG Shipping, or other authority, when further advice/ assistance is required. • To keep the ICG apprised of action being taken.
15	Coastal State Governments and State Pollution Control Boards	<ul style="list-style-type: none"> • To take all suitable measures to prevent pollution on shoreline. • To render all possible assistance to the coordinator of the On Scene Commander, Local Action Group and district Commander particularly in accordance with the contingency plan. • To maintain adequate quantity of basic pollution response equipment like deflective booms, fence booms, spray equipment along with specialized equipment for beach protection and shoreline cleanup. • To identify suitable type of tug/boat/fishing vessel in consultation with On-Scene Commander/ Coast Guard for mounting the dispersant spraying equipment. • To take actions as applicable to the major ports, in respect of incidents at ports under jurisdiction.
16	Mercantile Marine Department	<ul style="list-style-type: none"> • To render all possible assistance to the coordinator of the Local Contingency/ Action Plan. • To provide technical advice to Local Action Group and CCA. • To assist Local Action Group in identifying surface craft suitable for mounting dispersant spraying equipment. • To assist Local Action Group in preparation of Local Contingency / Action Plan. • To assist the CG/RCC in examining ships for efficiency of anti-pollution equipments fitted on board as per Merchant Shipping Act, 1958. • If deemed necessary, to restrict movement of ships and personnel involved in oil pollution on receipt of related information.

17	Local Fisheries Authority	<ul style="list-style-type: none"> To assist/advise Local Groups in identifying the rich fishing grounds so as to give priority for protection of such grounds from oil spills as well as use of dispersants The local action groups in consultation with Coast Guard regional headquarters to identify the fishing vessels suitable for mounting the oil spill dispersant equipment.
18	Coastal Refineries and Crude Unloading Terminals	<ul style="list-style-type: none"> To assist the local action group in the implementation of the Local Action Plan. To assist the local action group in obtaining from their headquarters available additional equipment and chemicals if and when required. To assist in chartering of tankers to undertake transportation / transshipment operations To arrange for the storage of oil transshipped. To assess value of oil transshipped and cost of refining or disposal as the case may be.
19	Offshore Oil Installations	<ul style="list-style-type: none"> Occupiers of offshore oil installations are to maintain an oil spill contingency plan meeting specified requirements and maintain appropriate manpower, equipment and resources for oil spill response taking into consideration any guidelines and suggestions that may be issued by the Government of India/ Coast Guard from time to time. To periodically forward a list of response inventory to the Coast Guard for scrutiny, evaluation and updating holdings. To provide response equipment, material, trained personnel, and ships when required by the Coast Guard/ OSC on as available basis and without affecting safety of operations. To immediately combat oil pollution around its installations up to 500 metres and continue to provide equipment, material, trained manpower, sampling efforts, and vessels as may be required by OSC when such oil spill spreads beyond 500 metres. To provide data on crude oil and oil discharges. To provide data on sub-sea pipe lines as required by OSC or MRC or CG MRCC. To provide transshipment facilities in case the offshore installation, or any agency under its control is the polluter. To provide staging facilities for helicopters in the offshore areas when engaged in pollution response in the vicinity whether or not the installation and agencies under its control are the polluters.
20	Receiver of Wrecks	<ul style="list-style-type: none"> To assist Local Action Groups in whatever manner necessary and possible. To take all actions necessary under Part XIII of the Merchant Shipping Act, 1958 (In this connection, the receiver of wreck shall consult the DGS, as and when required). In situations where he has the local responsibility for certain actions and/or operations, he may authorize other agencies, who are better equipped.

21	Bombay Natural History Society	<ul style="list-style-type: none"> • Advise in restoration and cleaning of affected wildlife • Assist in estimating affected birds, mangroves in the area • Identifying, monitoring and mitigating the adverse impact of oil spill to the bio-diversity • Identifying Important Bird Areas (IBA) • ENVIS (Environmental Information System) Centre to study Avian Ecology and Inland Wetlands • Ecological Benchmarking in association with corporates, government and other NGOs
22	Central Marine Fisheries Research Institute	<ul style="list-style-type: none"> • Assist in estimating the effect of spill to fish and livelihood of fishermen in the area • Assist in identifying the types of fishes in the area • Assist in restoration of fishing in area after cleanup • Assist in estimating the Economic loss due to ban of fishing in the affected area • To understand the fluctuations in abundance of marine fisheries resources in relation to change in the environment • To develop suitable mariculture technologies for finfish, shellfish and other culturable organisms in open seas to supplement capture fishery production. • To act as a repository of information on marine fishery resources with a systematic database. • To provide consultancy services.
23	Integrated Coastal And Marine Area Management Project Directorate	<ul style="list-style-type: none"> • Responsible for preservation and conservation of marine environment in India • Identify the high risk areas • Promulgate the sensitivity mapping and area of priority
24	Mangrove Society of India	<ul style="list-style-type: none"> • To protect and conserve Indian mangroves by adopting environment friendly, scientifically sound techniques/methodologies. • To build up their capacities for protection and conservation of Indian mangroves. • To act as watchdog and advise in matters concerning the conservation of mangroves. • To train younger generations and will create awareness amongst them to conserve and protect mangroves • To organize alliances and networks with partners to develop an appropriate developmental perspective to conserve mangroves. • To organize issue-based Forums to achieve appropriate solutions to mangrove protection. • Capacity building of port and oil agencies, Central government and other state government agencies, stakeholders etc. By providing necessary training for their personnel. • To assist and coordinate activities pertaining to mangrove restoration consequent to oil pollution. • To play an active role in ensuring the participation of local people in making decisions in respect of mangroves. • To provide necessary scientific information in respect of mangroves

25	National Biodiversity Authority	<ul style="list-style-type: none"> • To regulate and advise the Government of India on issues of conservation, sustainable use of biological resources and fair and equitable sharing of benefits arising out of the use of biological resources. • To advise the Central Government agencies on matters relating to the conservation of biodiversity, sustainable use of its components and equitable sharing of benefits arising out of the utilization of biological resources; and advise the State Governments in the selection of areas of biodiversity importance to be notified under Sub-Section (1) of Section 37 as heritage sites and measures for the management of such heritage sites; • The State Biodiversity Boards (SBBs) advise the State Governments, on matters relating to the conservation of biodiversity, sustainable use of its components and equitable sharing of the benefits arising out of the utilization of biological resources; 3Mangrove Society of India (MSI) is a non-profit and non-political organization working for protection, conservation and sustainable use of mangroves. Many of its members are consultants/advisers to various Government agencies. Some are on the National and International mangrove committees. MSI has affiliation with research and government institutions, corporate houses, NGO's and stakeholders etc. from Maharashtra, Gujarat, Kerala, Karnataka, Tamil Nadu etc. • The local level Biodiversity Management Committees (BMCs) promote conservation, sustainable use and documentation of biological diversity including preservation of habitats, conservation of land races, folk varieties and cultivars, domesticated stocks and breeds of animals and microorganisms and chronicling of knowledge relating to biological diversity.
26	Reef Watch Marine Conservation	<ul style="list-style-type: none"> • To conduct education, awareness, training and capacity building programs for stakeholders • To provide expertise through its Information Network of institutions and individuals working on marine and coastal issues for development of OSCPs and incident response • To provide environmental information / education on biodiversity hotspots • To provide policy support • To facilitate a dialogue and consensus at various levels for conservation, management and sustainable utilization of coastal and marine resources / ecosystems in the development of protection priorities in OSCPs, NEBA and incident response.
27	Ms Swaminathan Research Foundation	<ul style="list-style-type: none"> • To provide advice on conservation of mangrove wetlands and sustainable utilization of their resources.
28	Wildlife Trust of India	<ul style="list-style-type: none"> • To assist in managing or preventing wildlife crises and mitigating threats to individual wild animals, their populations and habitats through holistic strategies and practical interventions. • To maintain national database on wildlife protected area and share the data with stakeholders for development of OSCPs and incident response. .

Annexure VI

The current national inventory in regards of oil spill response

National Oil Spill Response Capability

Aid to response	Provision by
Capping device (rating \geq 10,000 PSI, 3000m depth, possibility of offset installation)	Ministry of Petroleum & Natural Gas
Subsea oil spill dispersant system	
Large scale OSD stockpile	
Emergency towing vessels (bollard pull \geq 200 tons) x two	Ministry of Shipping
Salvage vessel	
Hot Tapping Device	
High Volume Offshore Skimming System	Ministry of Defence
Incineration Boom	
Aerial Dispersant Delivery System	
Ecological Sensitivity Index Map	Ministry of Environment and Forests
Oil Finger Printing Laboratory	Dept. of Science and Technology
Radar oil spill detection capability	MoD, MoPNG, MoS

Annexure VII

**The national oil spill response capability supported by the
concerned Ministries**

National Oil Spill Response Capability

AID TO RESPONSE	PROVISION BY
Capping device (rating \geq 10,000 PSI, 3000m depth, possibility of offset installation)	Ministry of Petroleum & Natural Gas
Subsea oil spill dispersant system	
Large scale OSD stockpile	
Emergency towing vessels (bollard pull \geq 200 tons) x two	Ministry of Shipping
Salvage vessel	
Hot Tapping Device	
High Volume Offshore Skimming System	Ministry of Defense
Incineration Boom	
Aerial Dispersant Delivery System	
Ecological Sensitivity Index Map	Ministry of Environment and Forests
Oil Finger Printing Laboratory	Dept. of Science and Technology
Radar oil spill detection capability	MoD, MoPNG, MoS

Annexure VIII

**The guiding template for the preparing of a new facility
level contingency plan**

The guiding template for the preparing of a new facility level contingency plan

Strategy

1. Introduction
 - 1.1 Authorities and responsibilities
 - 1.2 Coordinating committee
 - 1.3 Statutory requirements
 - 1.4 Mutual aid agreements
 - 1.5 Geographical limits of plan
 - 1.6 Interface with ROSDCP and NOSDCP
2. Risk assessment
 - 2.1 Identification of activities and risks
 - 2.2 Types of oil likely to be spilled
 - 2.3 Probable fate of spilled oil
 - 2.4 Development of oil spill scenarios including worst case discharge
 - 2.5 Shoreline sensitivity mapping
 - 2.6 Shoreline resources, priorities for protection
 - 2.7 Special local considerations
3. Response strategy
 - 3.1 Philosophy and objectives
 - 3.2 Limiting and adverse conditions
 - 3.3 Oil spill response in offshore zones
 - 3.4 Oil spill response in coastal zones
 - 3.5 Shoreline oil spill response
 - 3.6 Storage and disposal of oil and oily waste
4. Equipment
 - 4.1 Marine oil spill response equipment
 - 4.2 Inspection, maintenance and testing
 - 4.3 Shoreline equipment, supplies and services
5. Management
 - 5.1 Crisis manager and financial authorities
 - 5.2 Incident organization chart
 - 5.3 Manpower availability (on-site, on-call)
 - 5.4 Availability of additional manpower
 - 5.5 Advisors and experts – spill response, wildlife, and marine environment
 - 5.6 Training/safety schedules and drill/exercise Programme
6. Communications
 - 6.1 Incident control room and facilities
 - 6.2 Field communications equipment
 - 6.3 Reports, manuals, maps, charts and incident logs

Action and operations

7. Initial procedures
 - 7.1 Notification of oil spill to concerned authorities
 - 7.2 Preliminary estimate of response Tier
 - 7.3 Notifying key team members and authorities
 - 7.4 Manning control room
 - 7.5 Collecting information (oil type, sea/wind forecasts, aerial surveillance, beach reports)
 - 7.6 Estimating fate of slick (24, 48 and 72 hours)
 - 7.7 Identifying resources immediately at risk, informing parties
8. Operations planning
 - 8.1 Assembling full response team
 - 8.2 Identifying immediate response priorities
 - 8.3 Mobilizing immediate response
 - 8.4 Media briefing
 - 8.5 Planning medium-term operations (24-, 48-and 72-hour)
 - 8.6 Deciding to escalate response to higher Tier
 - 8.7 Mobilizing or placing on standby resources required
 - 8.8 Establishing field command post and communications
9. Control of operations
 - 9.1 Establishing a management team with experts and advisors
 - 9.2 Updating information (sea/wind/weather forecasts, aerial surveillance, beach reports)
 - 9.3 Reviewing and planning operations
 - 9.4 Obtaining additional equipment, supplies and manpower
 - 9.5 Preparing daily incident log and management reports
 - 9.6 Preparing operations accounting and financing reports
 - 9.7 Preparing releases for public and press conferences
 - 9.8 Briefing local and government officials
10. Termination of operations
 - 10.1 Deciding final and optimal levels of beach clean-up
 - 10.2 Standing-down equipment, cleaning, maintaining, replacing
 - 10.3 preparing formal detailed report
 - 10.4 Reviewing plans and procedures from lessons learnt

Data directory

Maps/charts

1. Coastal facilities, access roads, telephones, hotels, etc.
2. Coastal charts, currents, tidal information (ranges and streams), prevailing winds
3. Risk locations and probable fate of oil
4. Shoreline resources for priority protection
5. Shoreline types

6. Sea zones and response strategies
7. Coastal zones and response strategies
8. Shoreline zones and clean-up strategies
9. Oil and waste storage/disposal sites
10. Sensitivity maps/atlas

Lists

1. *Primary oil spill equipment*: booms, skimmers, spray equipment, dispersant, absorbents, oil storage, radio communications, etc (manufacturer, type, size, location, transport, contact, delivery time, cost and conditions)
2. *Auxiliary equipment*: tugs and work boats, aircraft, vacuum trucks, tanks and barges, loaders and graders, plastic bags, tools protective clothing, communications equipment, etc (manufacturer, type, size location, transport, contact, delivery time, cost and conditions)
3. *Support equipment*: aircraft, communications, catering, housing, transport, field sanitation and shelter etc (availability, contact, cost and conditions).
4. *Sources of manpower*: contractors, local authorities, caterers, security firms (availability, numbers, skills, contact, cost and conditions)
5. *Experts and advisors*: environment, safety, auditing (availability, contact, cost and conditions)
6. *Local and national government contacts*: (name, rank and responsibility, address, telephone, fax, telex)

Data

1. Specifications of oils commonly traded
2. Wind and weather
3. Information sources

Annexure IX

The format of Annual Return

ANNUAL RETURNS ON PREPAREDNESS FOR OIL SPILL RESPONSE					
1	NAME OF PORT / OIL HANDLING AGENCY				
2	CONTAINMENT EQUIPMENT	DESCRIPTION	LENGTH	QUANTITY (No.)	OPERATIONAL STATUS
3	RECOVERY EQUIPMENT	DESCRIPTION	CAPACITY	QUANTITY (No.)	OPERATIONAL STATUS
4	TEMPORARY STORAGE FACILITY	DESCRIPTION	CAPACITY	QUANTITY (No.)	OPERATIONAL STATUS
5	OSD SPRAYING SYSTEM	DESCRIPTION		QUANTITY (No.)	OPERATIONAL STATUS
6	OIL SPILL DISPERSANT	MAKE		QUANTITY (Kg.)	EXPIRY DATE
7	SHORELINE RESPONSE EQUIPMENT	DESCRIPTION	CAPACITY (if applicable)	QUANTITY (No.)	OPERATIONAL STATUS
8	IMO OPRC LEVEL TRAINED RESPONDERS	NAME	DESIGNATION	CONTACT No.	IMO OPRC LEVEL 1/ 2

9	OIL SPILL RESPONSE CRAFT	CRAFT NAME	DESCRIPTION	RESPONSE CAPABILITY	
				PLEASE PROVIDE PARTICULARS AT SECTIONS 2-6	
10	OSRO PARTICULARS (IF OUTSOURCED)	OPERATOR NAME			
		ADDRESS			
		PHONE NO.			
		FAX NO.			
		E-MAIL			
		ENGAGEMENT EXPIRY DATE			
		EQUIPMENT ON HIRE		PLEASE PROVIDE PARTICULARS AT SECTIONS 2-7	
		IMO OPRC LEVEL TRAINED PERSONNEL ON HIRE		PLEASE PROVIDE PARTICULARS AT SECTION 8	
		MANPOWER ON CALL			
	CRAFT ON HIRE		PLEASE PROVIDE PARTICULARS AT SECTION 9		
11	OIL SPILL CONTINGENCY PLAN	YEAR PUBLISHED	DATE OF LAST REVISION	STATUS OF APPROVAL BY COAST GUARD	
12	PERSONNEL TO BE CONTACTED IN CASE OF SPILL	NAME	DESIGNATION	CONTACT PARTICULARS	
				(a) LANDLINE	
				(b) MOBILE	
				(c) FAX	
				(d) E-MAIL	
13	MoU DETAILS (IF ANY)				

Annexure X

The certificate of endorsement

Certificate of Endorsement

(To be certified personally by an officer not below the post of Deputy Conservator of a port facility or the Installation Manager of an oil installation, or offshore installation, or equivalent legally responsible authority)

I hereby certify that:

1. The oil spill contingency plan for the facility under my charge has been prepared with due regard to the relevant international best practices, international conventions, and domestic legislation.
2. The nature and size of the possible threat including the worst case scenario, and the resources consequently at risk have been realistically assessed bearing in mind the probable movement of any oil spill and clearly stated
3. The priorities for protection have been agreed, taking into account the viability of the various protection and clean-up options and clearly spelt out.
4. The strategy for protecting and cleaning the various areas have been agreed and clearly explained.
5. The necessary organization has been outlined, the responsibilities of all those involved have been clearly stated, and all those who have a task to perform are aware of what is expected of them
6. The levels of equipment, materials and manpower are sufficient to deal with the anticipated size of spill. If not, back-up resources been identified and, where necessary, mechanisms for obtaining their release and entry to the country have been established.
7. Temporary storage sites and final disposal routes for collected oil and debris have been identified.
8. The alerting and initial evaluation procedures are fully explained as well as arrangement for continual review of the progress and effectiveness of the clean-up operation
9. The arrangements for ensuring effective communication between shore, sea and air have been described.
10. All aspects of plan have been tested and nothing significant found lacking.
11. The plan is compatible with plans for adjacent areas and other activities.
12. The above is true to the best of my knowledge and belief.
13. I undertake to keep the plan updated at all times and keep the Indian Coast Guard informed of any changes through submission of a fresh certificate of endorsement.

Seal

Place

Signature
Name
Designation
Organisation
Date

Annexure XI

The SOP for pre-booming

Standard Operating Procedure

The Standard Operating Procedures (SOP) for pre-booming will be as follows:-

- The deliverer will deploy the boom such that it completely surrounds the vessel(s) and facility/terminal dock area directly involved in the oil transfer operation or the deliverer may pre-boom the portion of the vessel and transfer area which will provide for maximum containment of any oil spilled into the water.
- The boom will be deployed with a minimum stand-off of five feet away from the sides of a vessel, measured at the waterline. This stand-off may be modified for short durations needed to meet a facility or ship's operational needs.
- The deliverer will periodically check the boom positioning and adjust as necessary throughout the duration of the transfer and specifically during tidal changes and significant wind or wave events.
- For pre-boomed transfers, within one hour of being made aware of a spill, the deliverer will be able to complete deployment of the remaining boom, should it be necessary for containment, protection, or recovery purposes.
- The determination of safe and effective booming must be made prior to starting a transfer or, if conditions change, during a transfer.
- The deliverer must be able to quickly disconnect the entire boom in the event of an emergency.

Alternative Measures

If owing to metrological or other factors or mobility desired of the tanker and it's assisting craft it is not feasible to safely and effectively implement pre-booming as a SOP, the following alternate measures will be taken by the deliverer to address ecological sensitivity concerns of the areas likely to be affected by the spill:-

- As an alternative to pre-booming, a suitable oil spill response craft will be stationed during cargo discharge, in the vicinity of the tanker for immediate response.
- On being made aware of a spill, the deliverer will have the ability to safely commence tracking of the spill in low visibility conditions.
- Within one hour of being made aware of a spill, the deliverer will be able to completely surround the vessel(s) and facility/terminal dock area directly involved in the oil transfer

operation, or the deliverer may pre-boom the portion of the vessel and transfer area which will provide for maximum containment of any oil spilled into the water.

Annexure XII

***Pro forma* for Annual Returns on preparedness for oil spill response and joint inspection**

Pro forma for Annual Returns on Preparedness for Oil Spill Response and Joint Inspection

Appendix E7/G.Rev.1 to NOS-DCP 2015
(Para 4.7 & 4.9 refers)

MAIN PARTICULARS						
1.	Name *					
2.	Place *					
3.	Head of Agency *					
4.	Head of HSE *					
OIL HANDLING INFORMATION						
5.	Total quantity handled *					
6.	Oil handling jetties	Sl no.	1	2	3	4
		Jetty				
		Length (m)				
7.	No. of SPM's (if any)					
8.	Average no. of Ships handled	Daily	Weekly	Monthly	Annually	
9.	Other oil facilities					
OIL SPILL RESPONSE ORGANISATION						
10.	Chief incident Controller					
11.	Site Incident Controller(s) *	1*				
		2				
		3				
		4				
12.	Administration & Communication Coordinator					
13.	Support Services	Human Resource Services Coordinator				
14.		Logistics Service Coordinator				
15.		Media and Public Relation Coordinator				
16.		Operations and Technical Coordinator				
17.		Environmental and Scientific Coordinator				
TRAINING						
18.	Training	Date	No. of participants	Nature of training and brief remarks		
EXERCISES						
19.	Mock drills and exercises	Date	Scale/ level of exercise/ drill	Agency conducting exercise	No. of participants	Agencies participated
STATUS OF CONTINGENCY PLAN						
20.	Plan date *					
21.	Plan approval date					
22.	Plan last resubmission date					
23.	Date of last revision					
24.	Remarks on status					

ASSESSMENT OF CONTINGENCY PLAN						
25.	Has there been a realistic assessment of	the nature and size of the possible threat?				
		the resources at risk?				
		the probable movement of oil spill?				
26.	Have priorities for protection been agreed?					
27.	Has strategy for protecting and cleaning the various areas been agreed and clearly explained?					
28.	Has the necessary organisation been outlined and the responsibilities of all those involved been clearly stated with no 'Grey areas'?					
29.	Will all who have a task to perform be aware of what is expected of them?					
30.	Are the levels of following sufficient to deal with the anticipated size of spill?	Equipment?				
		Materials?				
		Manpower?				
	If not	have back-up resources been identified?				
		have mechanisms for obtaining their release and entry to the country been established?				
31.	Have the following been identified for collected oil and debris?	temporary storage sites				
		final disposal routes				
32.	Are the alerting and initial evaluation procedures fully explained?					
33.	Are the arrangements for continual review of the progress and effectiveness of the clean-up operation fully explained?					
34.	Have arrangements for ensuring effective communication been described?					
35.	Have all aspects of the plan been tested and nothing significant found lacking?					
36.	Is the plan compatible with plans for adjacent areas and other activities?					
RESOURCES AT RISK IN WORST CASE SCENARIO						
37.	Environment	Coral reefs (m ²)	Swamps/ marshes (m ²)	Fish/ spawning grounds (m ²)	Bird breeding/ flocking areas (m ²)	Estuaries (m ²)
38.	Commercial *	Agricultural land (km ²)	Fish farms (m ²)	Aquaculture farms (m ²)	Water intakes (Name & no)	Salt Pans (m ²)
39.	Plankton	Marine mammals		Sheltered shoreline	Shallow sub- tidal	
40.	Recreational	Tourist beaches (Names)	Amenity beaches (Names)	Bathing beaches (Names)	Pilgrimage beaches (Names)	
41.	Wildlife and forest	Mangroves (m ²)	Endangered Species (names)	Marine National parks (m ²)	Wild life habitats parks (m ²)	

RESPONSE RESOURCES					
42.	Containment equipment *	Description	Length	Quantity (no.)	Operational status
43.	Recovery equipment *	Description	Capacity	Quantity (no.)	Operational status
44.	Temporary storage facility *	Description	Capacity	Quantity (no.)	Operational status
45.	OSD spraying system *	Description		Quantity (no.)	Operational status
46.	Oil spill dispersant	Make		Quantity (liters.)	Expiry date
47.	Shoreline response equipment	Description (if applicable)	Capacity	Quantity(no.)	Operational status
TRAINED RESPONDERS					
48.	IMO OPRC level 1 Trained Responders *	<i>Name</i>	<i>Designation</i>	<i>Contact no.</i>	<i>Date of certificate</i>
49.	IMO OPRC level 2 Trained Responders *				
50.	Oil spill response craft	<i>Craft name</i>	<i>Description</i>	<i>Response capability</i>	
				Please fill particulars at SI. 42-46	

EXTERNAL RESOURCES				
51.	OSRO particulars	Operator name		
		Address		
		Phone no.		
		Fax no.		
		E-mail		
		Engagement expiry date		
		Equipment on hire	Yes/No	Please fill particulars at Sl. 42-47
		Trained responders on hire	Yes/No	Please fill particulars at Sl. 48-49
		Manpower on call	Yes/No	Please fill particulars at Sl. 48-49
	Craft on hire	Yes/No	Please fill particulars at Sl. 50	
52.	MoU details (if any)			
FUTURE PLAN				
53.	Proposed jetty/ terminal/ SPM			
54.	Proposed acquisition of response equipment			
CERTIFICATION				
(To be certified personally by an officer not below the post of Deputy Conservator of a port facility or the Installation Manager of an oil installation, or offshore installation, or equivalent legally responsible authority)				
55.	Certified By	Name: *		
		Designation: *		
		Contact No: *		
		Mobile No: *		
		Fax No:*		
		Email Id: *		
		Date: *		
INTERACTION WITH AUTHORITIES RELEVANT FOR SPILL MANAGEMENT				
56.	Interaction Date	Official interacted with	Brief outcome of interaction	
COMMENTS (for Coast Guard Use Only)				
		(Check relevant box)		
		<i>Unsatisfactory</i>	<i>Satisfactory</i>	
			<i>Very Satisfactory</i>	
57.	Response Preparedness			
58.	Efficiency	Equipment handling		
59.	Adequacy	Equipment		
		Trained Manpower		
		Crafts and vessels		
		Infrastructure		
		Support		
60.	Overall assessment			
61.	Final assessment comments			
Name:		Designation:	Signature:	
Date:				
Note : (*) Required field mandatory				

Oil Spill Disposal → Agencies.

29/06/2016

*from.
KPT.*

**STATEMENT SHOWING KANDLA PORT REGISTERED PARTIES FOR REMOVAL
OF GARBAGE, USED OIL/WASTE OIL ETC.**

Sr. No.	Name of Party	License for Removal of	Last Validity of License	Remarks
1	M/s. Harish A. Pandya 15, Brahm Samaj Bldg, Plot-106, Sec-08 Behind Oslo Cinema, G'dham- Kachchh	Dry Soild Waste (Non-hazardous) Kandla, Vadinar & Tuna	From 18/12/2015 to 17/12/2016	info@harishpandya.com
2	M/s. Alicid Organic Industries Ltd., Fact.- 207/208 Hanumant Henduva, Opp. Gujcomasol, Near Khari River, Highway Post - Palavasana, Mehsana - 2.(Guj)	Waste Oil/Used Oil Kandla & Vadinar	From 5/12/2015 to 4/12/2016	aligidorganic@gmail.com naazshippingservice@hahoo.co.in
3	M/s. Shree Venkatesh Engineering Works, Valsura Road Jamnagar-361 002	Dry Soild Waste (Non-hazardous) Vadinar Port	From 12/12/2012 to 11/12/2013	admin@venkateshengg.com Not renewed
4	M/s Continental Petroleum Limited A-166 & F-162-165, RIICO Industrial Area, Behror - 301 701 Dist :- Alwar (Rajasthan)	Used Oil/ Waste Oil Kandla	From 14/10/2015 to 13/10/2016	conpetco@gmail.com Not renewed
5	M/s. Industrial Esters & Chemicals P. Ltd., 202, Madhav Appartment, Jawahar Road, Ghatkopar (East), Mumbai- 400 077	Waste Oil/Used Oil Kandla	From 2/12/2015 to 1/12/2016	sludgeoil16@yahoo.co.in
6	M/s. Anna Petrochem Pvt. Ltd., E-49, RICCO Growth Center, Phase-II P.O. :Maval, Ambaji Industrial Area, Abu Road - 307 026 (Rajasthan)	Waste Oil /used oil Kandla & Vadinar	From 4/9/2015 to 3/9/2016	annapetrochempvtltd@yahoo.com annapetrochempvtltd@gmail.com
7	M/s. Jay Ambe Thinchem, Plot No.- C-1/B-2010, IV Phase, GIDC, Vapi -396 195	Waste Oil/Used Oil Kandla	From 7/5/2015 to 6/5/2016	sludgeoilindia@yahoo.com
8	M/s Gujarat Petrochem Plot No.48-50, GIDC, Vartej Bhavnagar	Waste Oil/Used Oil Kandla	24/12/2009 to 23/12/2010	gujoilad1@yahoo.com Not renewed
9	M/s. Reliance Barrel supply Company 200/34, Behind Kashiram Textile Mill, Narol - Ahmedabad-382 405	Waste Oil/ Used Oil Kandla Port	From 11/03/2013 to 10/03/2014	Not renewed
10	M/s. Hind Petrochem & Refinery Survey No.109 & 111, Part of village Pratapnagar Ta.Savli Dist :- Vadodara	Waste Oil/ Used Oil Kandla Port	From 11/08/2014 to 10/08/2015	hindpetro@hotmail.com Not renewed
11	M/s Gujarat Mobil Pvt.Ltd. R.Survey No.62, Paiki, Behind Plot No.62/A,B,C Vill :- Mamsan Dist : Bhavnagar	Waste Oil/ Used Oil Kandla Port	From 21/12/2011 to 20/12/2012	gmpl1996@gmail.com Not renewed

12	M/s Sanna Oil Process, New Good Luck Market, Opp.PWD stores, Chandola lake, Narol Road, A'bad-380028	Waste oil/ Used oil Kandla Port	From 21/01/2016 to 20/01/2017	kandla.sludgeremoval35@gmail.com shanaoilprocess@yahoo.com
13	M/s Balaji Rang Udyog Pvt. Ltd. Plot No.44,MIDC, Taloja Industrial Area(NCZ), Taloja - 410208 Dist : Raigad(MS)	Waste Oil Kandla Port	From 28/12/2011 to 30/06/2012	Not renewed
14	M/s Shri Rang Petrochem Industries 51/A, AKVN Industrial Area, Meghnagar-457779 Dist : Jhabua (M.P.)	Waste Oil/Used Oil Kandla Port	From 26/02/2013 to 25/02/2014	srpimp05@rediffmail.com Not renewed
15	M/s. United Shipping Company Plot No.167, Sector-1/A G'dham- Kachchh	Waste Oil/Used Oil Kandla Port	From 10/06/2015 to 9/06/2016	info@risinggroup.co sunil@risinggroup.co pritam@risinggroup.co
16	M/s Tanu Petrochem Pvt.Ltd. Plot No.238, PHASE-II,IDA, Pashamailaram (U), Patancheru(M) Medak District - 502 307 (AP)	Used Oil/ Waste Oil Kandla	From 6/07/2012 to 5/07/2013	Tanu Petrochem@yahoo.com Not renewed
17	M/s Navkar Enterprise, Block - 185/186,Village :- Chachravadi, Tehsil :- Sanand, Dist :- Ahmedabad (Guj)	Waste Oil/Used Oil Kandla/ Vadinar	From 8/09/2015 to 7/09/2016	pjani885@gmail.com
18	M/s. Fine Refiners Pvt. Ltd. Plot-40, GIDC, Vartej, Bhavnagar - 364 401 (Guj)	Used Oil/ Waste Oil Kandla	From 20/04/2016 to 19/04/2017	info@finerefiners.com
19	M/s Vishwa Trade Link Inc., Plot No.170/2/A, TP-03, Anjar - Kachchh	Dry Soild Waste (Non-hazardious) Kandla/Vadinar	From 3/12/2014 to 2/12/2015	vishwatradelink@gmail.com umit_jani@yahoo.com
20	M/s. Chirag Enterprise, SRC Shop No.05, Khanna Market, G'dham- Kachchh	Dry Soild Waste Non-hazardious Kandla	From 18/5/2012 to 17/5/2013	nur_sekh@yahoo.com Not renewed
21	M/s. Naaz Shipping Services, Office No.35, First Floor, Grain Merchant Association Bldg. Plot No.297, Ward-12-B, Near Old Court, Gandhidham	Dry Soild Waste Non-hazardious Kandla /Vadinar	From 23/9/2015 to 22/9/2016	naazshippingservice@hahoo.co.in nasirkhan685@gmail.com
22	M/s Jai Ambe Industries 11,Uma Industrial Estate,Opp. Mahalaxmi Rubtech,Vasna, Iyava village Ta:-Sanand- Dist.A'bad	Used Oil/ Waste Oil Kandla	From 7/11/2012 to 6/11/2013	hapandya2003@yahoo.com Not renewed

23	M/s Daman Ganga Paper Mill Pvt.Ltd. Plot No.257/258, Silvasa Road, GIDC, Vapi Valsad	Used Oil/ Waste Oil Kandla	From 17/12/2013 to 16/12/2014	damanganga@damanganga.com Not renewed
24	M/s abc Petrochem Pvt.Ltd Gut No.10, Vill :-Vardha, Tal. Wada, Dist.:- Thane (MS)	Used Oil/ Waste Oil Kandla	From 12/12/2012 to 11/12/2013	Not renewed
25	M/s R.S.Oil Industries Junglepur, Jalan Industrial Complex, Baniyara, P.O.Begri, Domjur Howrah-711411	Used Oil/ Waste Oil Kandla	From 7/1/2013 to 6/1/2014	rsoilindgo@gmail.com Not renewed
26	M/s Kutch Petrochem Pvt Ltd. Plot No.121, Sect- 9-C, Behind Ashok Leyland Gandhidham-Kachchh	Used Oil/ Waste Oil Kandla/Vadinar	From 29/1/2016 to 28/1/2017	kutchppl@rediffmail.com karanpandya@yahoo.in thakarjimmy@gmail.com
27	M/s Talha Traders Plot No.B-510, NU-4, Sapnanagar Gandhidham-Kachchh	Dry Soild Waste Non-hazardious Kandla	From 26/7/2013 to 25/7/2014	Not renewed
28	M/s Omega Marine Services Shop No.2, Brahm samaj Building Plot No. 106, Sector-8, Gandhidham	Dry Soild Waste Non-hazardious Kandla	From 12/5/2016 to 11/5/2017	omegamvn@hotmail.com karanpandya@yahoo.in thakarjimmy@gmail.com
29	M/s North East Lubricia Pvt.Ltd. Factory :- Survey No.404, Village Abitghar, Tal :- Wada, Dist :- Thane -421 303 (MS)	Used Oil/ Waste Oil Kandla	From 24/1/2014 to 23/1/2015	www.nelubrica.com Not renewed
30	M/s Rajdeep Enterprise, Factory :- Survey No.246, Plot No.5, Opp. Galaxy, Bearings Ltd., Rajkot-Gondal N.H.No.8-B, Shapar (Veraval)	Used Oil/ Waste Oil Kandla	From 19/5/2015 to 18/5/2016	rajdeep_enterprise@yahoo.co.in
31	M/s Poonam Petrochem Pvt. Ltd. 513, Nasibullah Compound, Kurla- Kalina Road, Near Baghdadad Hotel, Kurla (W) Mumbai- 400 070	Used Oil/ Waste Oil Kandla	From 6/12/2014 to 5/12/2015	poonampetro@gmail.com Not renewed
32	M/s Priyanshi Corporation C/o Maruti Petroleum, Shop No.2 N.H.-8 B, Shapar Veraval Ta.Kotda, Sangani, Dist-Rajkot-360 024	Used Oil/ Waste Oil Kandla	From 19/8/2015 to 18/8/2016	Contact No.7383599838 Mr.Sharad Jain
33	M/s Atlas Organic Pvt.Ltd. Office No.204/206, Elisbridge Shopping Centre, Opp Town Hall, Ashram Road, A'bad -380 006	Used Oil/ Waste Oil Kandla	From 17/9/2015 to 16/9/2016	atlasorganics@yahoo.com
34	M/s Shine Petrochem A-804, Samudra Complex, Near Classic Gold Hotel, Off-C.G.Road Navrangpura- A'bad	Used Oil/ Waste Oil Kandla	From 9/9/2015 to 8/9/2016	shinepetrochem@gmail.com
35	M/s Amar Hydro Carbon Pvt Ltd. Plot No.36, Survey No.165/1 to 180/1+2, Narayan Estate, Near IOC Pump, Iyava Tal. Sanand, Dist- A'bad	Used Oil/ Waste Oil Kandla	From 14/10/2015 to 13/10/2016	amarhydrocarbon@gmail.com

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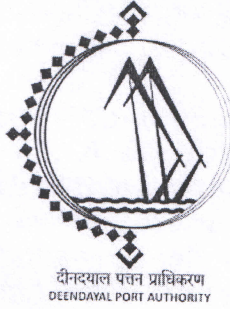
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e-mail: kitcotvm@gmail.com

Annexure -C

DEENDAYAL PORT AUTHORITY
(Erstwhile: DEENDAYAL PORT TRUST)

Tel(O) : (02836) 220038,
Fax : (02836) 220050
E Mail : kptdesignsection@gmail.com
kptemc@gmail.com
Website : www.deendayalport.gov.in



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

EG/WK/5202 (D)/ Part (CRZ 2) / 228

Dated : 01/01/2023

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

Sub: Single Point Mooring (SPM) and allied facilities off Veera in Gulf of Kutch for handling crude oil on BOT basis in the state of Gujarat by M/s. Kandla Port Trust (Now Deendayal Port Authority) - **Six monthly compliance report of conditions stipulated in CRZ Recommendations reg.**

- Ref.:**
- 1) Letter No. ENV-10-2011-1883-E dated 24/05/2012 of Director (Environment) & Additional Secretary, Forest & Environment Department, GoG.
 - 2) DPT letter No. EG/WK/4712/Part I/1164 dated 06/06/2013
 - 3) DPT letter No. EG/WK/4712/Part I/1164 dated 04/01/2014
 - 4) DPT letter No. EG/WK/4712/Part I/128 dated 15/05/2014
 - 5) DPT letter No. EG/WK/4712/Part I/226 dated 15/10/2014
 - 6) PT letter No. EG/WK/4712/Part I/227 dated 06/05/2015
 - 7) DPT letter No. EG/WK/4712/Part I/165 dated 15/10/2015
 - 8) DPT letter No. EG/WK/4712/Part I/130 dated 09/05/2016
 - 9) DPT letter No. EG/WK/4712(EC)/Part I/128 dated 08/12/2016
 - 10) DPT letter No. EG/WK/4712(EC)/Part I/233 dated 28/06/2017
 - 11) DPT letter No. EG/WK/4712(EC)/Part II/601 dated 12/12/2017
 - 12) DPT letter No. EG/WK/4712(EC)/Part II/286 dated 08/06/2018
 - 13) DPT letter No. EG/WK/4712(EC)/Part II/10 dated 15/02/2020
 - 14) DPT letter No. EG/WK/4712/EC/Part II/40 dated 12/11/2020
 - 15) DPT letter No. EG/WK/4712/EC/Part II/152 dated 12/07/2021
 - 16) DPA letter no. EG/WK/(D) Part (CRZ 2) /134-1 dated 01/02/2022
 - 17) DPA letter no. EG/WK/(D) Part (CRZ 2)/126 dated 30/06/2022

Sir,

Kindly refer above-cited references for the said subject.

In this connection, it is to state that the Gujarat Coastal Zone Management Authority, vide the above-referred letter dated 24/05/2012, had recommended Deendayal Port Authority the subject project.

.....cont....

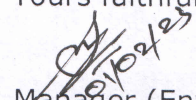
Subsequently, the MoEF&CC, GoI, had accorded the Environmental & CRZ Clearance vide letter dated 11/12/2013 for the subject project. Subsequently, MoEF&CC extended the validity of the Environmental Clearance till 10/12/2023.

Now, as directed under Specific Condition No. 26 mentioned in the CRZ Clearance letter dated 25/05/2012, i.e. **A six-monthly report on compliance of the conditions mentioned in this letter shall have to be furnished by the DPT on a regular basis to this Department and MoEF&CC, GoI**, please find enclosed herewith point-wise compliances of the conditions stipulated in CRZ recommendations issued by GCZMA vide letter dated 24/05/2012 along with necessary annexures (**Annexure 1**) for the period up to November, 2022 for kind information & record please.

Further, as per the MoEF&CC, Notification S.O.5845 (E) dated 26.11.2018, in which it is mentioned 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 a soft copy of the same via e-mail in ID gczma.crz@gmail.com & direnv@gujarat.gov.in.

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

Yours faithfully,


Manager (Env.)

Deendayal Port Authority

Encl.: as above

Copy to:-

Shri Amardeep Raju, MoEF&CC, GoI
Scientist E, Ministry of Environment, Forest and Climate Change,
& Member Secretary (EAC-Infra.1),
Indira Paryavaran Bhavan,
3rd Floor, Vayu Wing, Jor Bagh Road, Aliganj,
New Delhi-110003.
Email ID: ad.raju@nic.in

Annexure 1

Compliance Report for the period upto November, 2022

Subject: Point-wise Compliance of the conditions stipulated in CRZ recommendation granted by Forest & Environment Department, GoG for the project "Single Point Mooring (SPM) and allied facilities off Veera in Gulf of Kutch for handling crude oil on BOT basis in the state of Gujarat by M/s. Kandla Port trust".

Ref No : CRZ recommendations issued vide letter No. ENV-10-2011-1883-E dated 24/05/2012 for the subject project.

S. No.	CRZ Conditions	Compliance Status
SPECIFIC CONDITIONS		
I	The DPT shall strictly adhere to the provisions of the CRZ Notification, 2011, issued by the Ministry of Environment, Forests and Climate Change, Government of India	It is assured that the provisions of the CRZ Notification, 2011 shall be strictly adhered to by DPA.
II	The COT shall be outside the CRZ areas as submitted by the KPT.	No activity has started yet.
III	The KPT shall obtain all necessary permissions from different Government Departments/Agencies before commissioning their activities.	No activity has started yet. It is relevant to mention that, DPA obtained CTE/NOC (CTE-45712) from GPCB vide letter No. PC/CCA-Kutch-971/GPCB ID-36299/106252 dated 06/03/2012. Further, GPCB vide Outward No. 405795 dated 02/03/2017 has granted extension of the CTE validity.
IV	No dredging, reclamation and construction activities shall be carried out in the CRZ area categorised as CRZ I (A), and it shall have to be ensured that the mangrove habitats and other ecologically important and significant areas, if any, in the region are not affected due to any of the project activities	No activity has started yet.
V	The KPT shall be held responsible for any accidental oil spill, if takes place due to rupture/damage of pipelines and the KPT shall bear the total cost for remedial measures and restoring the original environment in the area.	No activity has started yet.
VI	No effluent or sewage shall be discharged into the sea/creek or in the CRZ area and shall be treated to conform to the norms prescribed by the Gujarat Pollution Control	No activity has started yet.

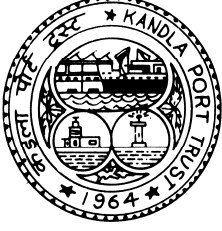
S. No.	CRZ Conditions	Compliance Status
	Board and would be reused/recycled within the plant premises to extract possible.	
VII	The KPT shall prepare and regularly update their Local Oil Spill Contingency and Disaster Management Plan in consonance with the National Oil Spill and Disaster Contingency Plan and shall submit the same to this department after having it vetted through the Indian coast guard.	No activity has started yet. It is relevant to mention that, DPA already has Oil Spill Contingency and Disaster Management Plan.
VIII	No ground water shall be tapped to meet with the water requirements during the construction and/or operation phases.	No activity has started yet.
IX	The KPT shall contribute towards the cost of any common study that may be carried out for the KPT region for environmental protection and management issues.	Point noted
X	The KPT shall implement all the suggestions/recommendations given by the NIO in the marine rapid EIA report.	No activity has started yet.
XI	The KPT shall strictly comply with all the conditions stipulated by the Gujarat Pollution Control Board in its consent to establish (NOC) and the CCA	No activity has started yet.
XII	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.	DPA/successful bidders will bear the cost of external agencies that may appoint by the Department for supervision/monitoring of proposed activities and the environmental impact of proposed activities.
XIII	The KPT shall take up mangrove plantation in an area of 50 Ha. as well as greenbelt development with the Gujarat ecology commission/forest department.	As a part of mangrove conservation, DPA has undertaken Mangrove Plantaion in an area of 1500 Hectares at various locations (Annexure A) till date under the directions of the GCZMA and MoEF&CC,GoI. In addition to it, DPA is carrying out additional mangrove plantation of 100 ha. in consultation with Gujarat Ecology Comission vide Work Order No. DD/WK/3050/Pt-I/GIM/PC-44 dated 02/06/2022 (Annexure B). 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

S. No.	CRZ Conditions	Compliance Status
		<p>about 32 hectares and the work is already 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 31stMay, 2022 (Annexure C).</p>
XIV	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.	No activity has started yet.
XV	The KPT shall have to contribute finically for taking up the socio-economic up-lifting activities in this region in consultation with the forest and environment department and the district collector/district development officer.	CSR activities are being attended by DPA. Copy of the activities undertaken by DPA as a part of CSR is enclosed as Annexure D.
XVI	A separate budget shall be earmarked for environmental management and socio-economic activities and details there of shall be furnished to this department as well as to 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. 275.36 Lakhs for period up to November, 2022.</p>
XVII	A separate environmental management cell with qualified personnel shall be created for environmental monitoring and management during construction and operational phases of the project.	DPA already has an Environment Management Cell. Further, DPA has also appointed an expert agency to provide Environmental Experts from time to time. Recently, DPA appointed M/s Precitech Laboratories, Vapi vide work order dated 5/2/2021 (Copy of work order & scope of work

S. No.	CRZ Conditions	Compliance Status
		<p><u>attached as Annexure E)</u></p> <p>Further, DPA has appointed Manager Environment on a contractual basis for a period of 3+2 years <u>(Copy of the Office order is attached as Annexure F)</u></p>
XVIII	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 MoEF, GOI	No activity has started yet.
XIX	A six-monthly report on compliance of the conditions mentioned in this letter shall have to be furnished by the KPT on a regular basis to this department/MoEF, GOI	DPA has been submitting six monthly compliance reports vide referred letters dated 06/06/2013, 04/01/2014, 15/10/2014, 06/05/2015, 15/10/2015, 09/05/2016, 28/06/2017 04/12/2017, 12/11/2020, 12/07/2021 01/02/2022 and 30/06/2022 to MoEF&CC, GoI
XX	Any other conditions that may be stipulated by this department from time to time for environmental protection/management purpose shall also have to be complied with the KPT.	DPA/Successful bidder will comply with any other condition that may be stipulated by Forest and Environment Department, GoG from time to time for environmental protection/management purposes.

Annexure -D

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.


.....Cont.....

- 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 -E

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 -2

Annexure 2

**Monitoring the implemental Safeguards of Ministry of Environment, Forests &
Climate Change
Regional Office (WZ), Bhopal
Monitoring Report (Up to November, 2022)
DATA SHEET**

Sr. No.	Particulars	Reply
1.	Project type: River valley/ Mining/Industry/ thermal/nuclear/Other (specify)	Infrastructure and Miscellaneous Projects + CRZ
2.	Name of the project	Single Point Mooring (SPM) and allied facilities off Veera in the Gulf of Kutch for handling Crude oil on a BOT basis
3.	Clearance Letter (s). OM no and date	MoEF, New Delhi, vide File No. 11-27/2010-1A.111 dated 11/12/2013, had granted Environmental/CRZ Clearance to Deendayal Port Authority for the subject project. And New Delhi vide File No. 11-27/2010-1A.111 dated 29/12/2020 had granted an extension of Environmental clearance.
4.	Location a) District (s) b) State (s) c) Location/latitude/longitude	Dist: Kutch State: Gujarat Location: Latitude: 22°45'15" to 22°54'50" N Longitude: 69°57'00" to 70°01'30" 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, Annex, Post Box No.-50, Gandhidham- Kutch, Gujarat Pin – 370201 Tel: 02836-233192, Fax-02836-220050. Chief Engineer, Deendayal Port Authority, A.O. Building, Annex, Post Box No.-50, Gandhidham- Kutch, Gujarat Pin – 370201 Tel: 02836-233192, Fax-02836-220050
6.	Salient features a) Of the Project	1. The size of the VLCC proposed to be handled will be 300000 DWT

	<p>b) Of the Environmental Management Plan</p>	<ol style="list-style-type: none"> 2. Length of the offshore and intertidal pipeline from SPM to LFP will be 19 KM (3.25 KM intertidal) 3. The capacity of SPM will be 9 MMTPA 4. The Catenary Anchor Leg Mooring (CALM) will be envisaged for the proposed location considering the advantage of operational ease and experience of such types in operation in the Gulf of Kutch. 5. The CALM-type SPM system comprises a buoy moored to the seabed by a number of category anchor legs connected to anchor points and a rotating part carrying the mooring and product transfer equipment. <ol style="list-style-type: none"> 1. After unloading the crude oil, the seawater will be pumped into the pipeline to flush the crude oil from the floating hoses. In order to avoid the oil spill, the floating hoses will be disconnected, and the butterfly valves shall be sealed 2. The ship under operation follows the MARPOL convention regarding discharge or spillage of any toxic, hazardous or polluting material like ballast water, oily water or sludge, sewage, garbage etc. the emission of NOx and SOx shall remain within the permissible limits. 3. The smooth and safe operation of the system shall be ensured by incorporating a computerised SCADA (Supervisory Control and Data Automation) system. The computer system shall detect any pipeline leakage, and product pumping shall be immediately cut off. 4. Adequate system for the collection, treatment and disposal of liquid waste will be provided to prevent the discharge of sewage and other liquid wastes, including ballast, into the marine environment. 5. Disaster management plan is included in the comprehensive EIA report (NIO/SP-71/2012) 6. Oil Spill Contingency plan has been prepared by NIO, Goa, for maintaining the better environment
7.	<p>Production Details during the compliance period and (or) during the previous financial year</p>	<p>It is under Infrastructure and Miscellaneous Projects and CRZ, so production is not involved.</p>

8.	<p>The breakup of the project area</p> <p>a) Submergence area: forest & non-forest</p> <p>b) Others</p>	<p>a) Nil</p> <p>b) Nil</p>
9.	<p>The breakup of the project affected population with the enumeration of those long houses/dwelling units only agricultural land & landless labourers/artisan</p> <p>a) SC. ST/Adivasis</p> <p>b) Others</p> <p>(Please indicate whether these figures are based on any scientific and systematic survey carried out of only provisional figures if a survey is carried out, give details and years of the survey).</p>	<p>a) Nil</p> <p>b) Nil</p>
10.	<p>Financial details</p> <p>a) Project cost as initially planned and subsequently revised estimates and the year of prices reference.</p> <p>b) Allocation made for environmental management plans with item-wise and year-wise break-up</p> <p>c) Benefit-cost ratio/Internal rate of Return and the year of assessment: (c) includes the cost of environmental management plans.</p> <p>d) Actual expenditure incurred on the project</p> <p>e) Actual expenditure incurred on the environmental management plans so far.</p>	<p>a) Rs. 830.00 Crores</p> <p>b) The allocation made under the scheme of "Environmental Services & Clearance thereof other related Expenditure" during BE 2021-22 is Rs. 266 Lakhs & BE 2022-2023 is Rs. 345 Lakhs.</p> <p>Activities yet to be started at the site.</p> <p>e) The expenditure made under the scheme of "Environmental Services & Clearance thereof other related Expenditure" is Rs. 275.36 Lakhs for period up to November, 2022.</p>
11.	<p>Forest land requirement</p> <p>a) The status of approval for the diversion of forest land for non-forestry use</p> <p>b) The status of clear felling</p> <p>c) The status of compensatory</p>	<p>Nil</p> <p>Nil- Not related.</p> <p>NIL</p> <p>Nil</p>

	<p>afforestation, if any</p> <p>d) Comments on the viability & sustainability of compensatory afforestation programmed in the light of actual field experience so far</p>	None
12.	The status of clear felling in non-forest areas (such as submergence area of the reservoir, approach roads), if any, with quantitative information.	NA, no felling is required.
13.	<p>Status of construction</p> <p>a) Date of commencement (Actual and/or planned)</p> <p>b) Date of completion (Actual and/or planned)</p>	Activities yet to be started at the site.
14.	Reasons for the delay if the Project is yet to start	---
15.	<p>Date of the site visited</p> <p>a) The dates on which the project was monitored by the regional office on previous occasions. if any</p> <p>b) The date site visit for this monitoring report</p>	---
16.	<p>Details of the correspondence with project authorities for obtaining action plans/information on the status of compliance to safeguard other than the routine letters for logistic support for site visit.</p> <p>(The first monitoring report may contain the details of all the letters issued so far but the later reports may cover only the letters issued subsequently.)</p>	---