



APSEZL/EnvCell/2019-20/016

Date: 20.05.2019

To

Additional Principal Chief Conservator of Forests (C),
Ministry of Environment, Forest and Climate Change,
Regional Office (WZ), E-5, Kendriya
Paryavaran Bhawan, Arera Colony,
Link Road No. – 3, Bhopal – 462 016.
E-mail: rowz.bpl-mef@nic.in

Sub : Half yearly Compliance report of Environment Clearance of "Single Point Mooring (SPM), Crude Oil Terminal (COT) and connecting pipes at Mundra Port, District Kachchh by M/s. Adani Ports & SEZ Limited"

Ref : Environment clearance granted to M/s Adani Ports & SEZ Ltd. vide letter dated 21st July, 2004 bearing no. J-16011/30/2003-IA-III.

Dear Sir,

Please refer to the above cited reference for the said subject matter. In connection to the same, it is to state that copy of the compliance report for the Environmental and CRZ Clearance for the period of October – 2018 to March – 2019 has been submitted through mail communication and acknowledge of the same is attached here for your records.

Thank you,

Yours Faithfully,

For, **M/s Adani Ports and Special Economic Zone Limited**

Avinash Rai
Chief Executive Officer
Mundra & Tuna Port

Encl: As above

Copy to:

- 1) The Director (IA Division), Ministry of Environment, Forests & Climate Change, Indira Paryavaran Bhawan, Jor Bagh Road, New Delhi-110003
- 2) Zonal Officer, Regional Office, CPCB – Western Region, Parivesh Bhawan, Opp. VMC Ward Office No. 10, Subhanpura, Vadodara – 390 023
- 3) Member Secretary, GPCB – Head Office, Paryavaran Bhawan, Sector 10 A, Gandhi Nagar – 382 010
- 4) Deputy Secretary, Forests & Environment Department, Block – 14, 8th floor, Sachivalaya, Gandhi Nagar – 382 010
- 5) Regional Officer, Regional Office GPCB (Kutch-East), Gandhidham, 370201

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Environmental Clearance Compliance Report

of



SPM, Crude Oil Terminal and
Connecting Pipes

at

Mundra Port,
Dist. Kutch, Gujarat

of

Adani Ports and SEZ Limited

Period:

October-20 18 to March-20 19

	Adani Ports and SEZ Limited	From : Oct'18 To : Mar'19
Status of the conditions stipulated in Environment Clearance under CRZ notification		

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Compliance Report

Status of the conditions stipulated in Environment Clearance

Half yearly Compliance report of Environment and CRZ Clearance of “Single Point Mooring (SPM), Crude Oil Terminal (COT) and connecting pipes at Mundra Port, District Kutch issued by MoEF vide letter no. J-160 11/30/2003-IA.III dated 21st July 2004.

Sr. No.	Conditions	Compliance Status as on 31-03-2019
A. Specific Condition		
1.	Mangrove afforestation in 25 ha of area, suitably identified in consultation with State Forest Department. The GAPL shall bear the cost of the said land as well as the cost of the plantation of mangroves and its sustenance and implant within 6 months from the date of clearance of this letter. Further, it shall be ensured that mangroves in the vicinity of the salt works are not affected due to the project.	<p>Complied.</p> <p>25 hectare of mangrove plantation with a cost of 10 Lakh is already completed near railway yard in consultation with Dr. Maity, Mangrove consultant of India.</p> <p>There are no salt works within the project area.</p> <p>It may be noted that to enhance the marine biodiversity, till date APSEZ has carried out mangrove afforestation in more than 2850 ha. area across the coast of Gujarat. Total expenditure for the same till date is INR 832 lakh. Details on mangroves afforestation & Green belt development carried out by APSEZ till date is annexed as Annexure – 1.</p>
2.	In addition to the mangrove plantation, GAPL should also take up massive green belt developments in 30 acres of land in and around the project in consultation with the Forest Department. Detailed plan indicating the area identified for the mangrove plantation as indicated at (i) above and for green belt development along with the financial outlay shall be provided to this ministry within 6 months from the date of receipt of this letter.	<p>Complied.</p> <p>During the course of development of the project, green belt was developed in 6.18 Hectares of land. Total 7607 trees were planted with the density of 1230 trees per hectare at a cost of Rs. 25.00 Lakh. This plantation was done in consultation with Gujarat Ecological Commission (as they are one of the authorized agencies of Dept. of Forest & Env. Dept., Govt. of Gujarat).</p> <p>In addition to this, various activities on green belt development and mangrove plantation are being carried out on regular basis by horticulture department. Total expenditures of the horticulture dept. for the financial year of 2018-19 have been INR 580 lakh.</p> <p>It may be noted that, APSEZ has developed more than 455 ha. area as greenbelt with plantation of more than 8.3 Lacs saplings within the APSEZ area. Details on mangroves afforestation & Green belt development carried out by APSEZ till date is annexed as Annexure – 1.</p>

Status of the conditions stipulated in Environment Clearance

Sr. No.	Conditions	Compliance Status as on 31-03-2019
3.	No dredging activity shall be carried out.	Complied. Construction activities are completed & project is in operation stage. SPM is approximately 8.6 km inside the open sea from the shore where 30 m of draft is naturally available. Hence no dredging is required.
4.	No ground water should be tapped at the project site / within CRZ area.	Complied. No ground water is tapped at the project site. Water requirement is not on regular basis. However during operation and maintenance activity, approximately 100 liters per day water is being consumed for drinking purpose only.
5.	Adequate facilities as listed in National Oil spill Disaster Contingency Plan for the Mundra Port which includes firefighting equipment of 1200 cum/hr. spray capacity with 2 monitor fitted with the dolphin 2, 3, 4 and 5 oil spill dispersant foam liquid etc. should be maintained and put into operation immediately in case of oil spills.	Complied. Oil spill contingency plan is in place to handle Tier 1 level oil spills considering different accident scenarios, and the vulnerable areas are identified and mitigation plan is prepared. The OSCRP updated on 01.10.2018 is in place and implemented. The updated copy of Oil Spill Contingency Response Plan is attached as Annexure – 2 . Based on the oil spill modeling study, it has been observed that crude oil spill of 700 tons (Tier-I) will spread over an area having radius of around 400 m within 4hr. APSEZ already has facilities for combating a Tier-1 spill. Some of them are mentioned below: <ul style="list-style-type: none"> • 11 Tugs are fitted with Oil Spill Dispersant boom and proportionate pump to mix OSD and Sea water as required. • 10 Tugs are fitted with a fire curtain and remote controlled fire monitors. • Dolphin 11 has firefighting system of 1200 m³/hr. along with 20 ton lifting "A" frame and diving support facility. • The equipment are being kept in working condition. Routine inspection, maintenance and testing is performed as per the stipulated requirements.
6.	The duration of construction phase of the project should be kept to a maximum of 8 months to avoid impact on marine environment and birds as suggested	Already complied. Not applicable at present. Construction activity is already completed and the project is in operation.

Status of the conditions stipulated in Environment Clearance

Sr. No.	Conditions	Compliance Status as on 31-03-2019																																														
	by NIO.																																															
7.	It shall be ensured that there is no displacement of people, houses or fishing activity as a result of the project.	Not Applicable Location of SPM is unmanned (approximately 8.6 km inside the open sea from the shore) hence; there is no displacement of people, houses or fishing activity as a result of the project.																																														
8.	The project proponents must make necessary arrangements for disposal of solid wastes and for the treatment of effluents / liquid wastes. It must be ensured that the effluents / liquid wastes are not discharged into the seawater.	<p>Complied. Used oil / Spent oil generated is being sold to registered recyclers time to time.</p> <p>No other type of solid waste as well as no effluent or liquid waste are generated from operation of SPM or discharged into the sea water.</p> <p>In order to analyzed marine water quality, marine sampling is being carried out at a location nearby SPM by NABL and MoEF&CC accredited agency namely M/s. Pollucon Laboratories Pvt. Ltd. Summary of the same for duration from Oct'18 to Mar'19 is mentioned below.</p> <p>Sampling Locations & Frequency: 9 Nos. (Monthly)</p> <table><tr><th rowspan="2">Parameter</th><th rowspan="2">Unit</th><th colspan="2">Surface</th><th colspan="2">Bottom</th></tr><tr><th>Max</th><th>Min</th><th>Max</th><th>Min</th></tr><tr><td>pH</td><td>--</td><td>8.37</td><td>8.07</td><td>8.24</td><td>8.03</td></tr><tr><td>TSS</td><td>mg/L</td><td>382</td><td>182</td><td>364</td><td>218</td></tr><tr><td>BOD (3 Days @ 27 °C)</td><td>mg/L</td><td>12.8</td><td>3.0</td><td>5.0</td><td>2.0</td></tr><tr><td>DO</td><td>mg/L</td><td>6.8</td><td>6.0</td><td>6.8</td><td>5.6</td></tr><tr><td>Salinity</td><td>ppt</td><td>35.7</td><td>33.9</td><td>36.0</td><td>3.0</td></tr><tr><td>TDS</td><td>mg/L</td><td>36734</td><td>34327</td><td>37434</td><td>34218</td></tr></table> <p>The results depict that there is no damage to the marine ecology. Please refer Annexure – 3 for detailed analysis reports. Approx. INR 20.36 Lakh is spent for all environmental monitoring activities during the FY 2018-19.</p>	Parameter	Unit	Surface		Bottom		Max	Min	Max	Min	pH	--	8.37	8.07	8.24	8.03	TSS	mg/L	382	182	364	218	BOD (3 Days @ 27 °C)	mg/L	12.8	3.0	5.0	2.0	DO	mg/L	6.8	6.0	6.8	5.6	Salinity	ppt	35.7	33.9	36.0	3.0	TDS	mg/L	36734	34327	37434	34218
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9.	The camps of labor shall be kept outside the Coastal Regulation Zone area. Proper arrangements for cooking fuel shall be made for the labor during construction phase so as to ensure that mangroves are not	<p>Complied. Not applicable at present.</p> <p>Construction activities are completed and project is in operational phase.</p>																																														

Status of the conditions stipulated in Environment Clearance

Sr. No.	Conditions	Compliance Status as on 31-03-2019						
	cut / destroyed for this purpose.							
10	Regular drills should be conducted to check the effectiveness of the on-site Disaster Management Plan. The recommendations made in the Environmental Management Plan and Disaster Management Plan, as contained in the Environmental Impact Assessment and Risk analysis reports of the project, shall be effectively implemented.	<p>Complied.</p> <p>Disaster Management plan is in place and implemented. Updated DMP was submitted to the MoEF & CC along with half yearly compliance report for the period from Apr – 2016 to Sep – 2016 and there is no further change.</p> <p>All the recommendations given in the report of NIO and Tata AIG Risk Management Services are implemented. Few examples are provided below.</p> <p>Few Marine EIA recommendations:</p> <table><tr><td>Temporary colonies of workforce should be located sufficiently away from the HTL with proper sanitation. Adequate arrangement of fuel supply to the workers should be made to discourage them from using mangroves for firewood.</td><td>Construction activity is already completed. Most of the construction labours were residing in the nearby villages where all basic facilities are easily available. However, for those residing near the construction site, infrastructure facilities such as water supply, fuel, sanitation, first aid, ambulance etc. were provided by APSEZL.</td></tr><tr><td>As a step towards improvement in marine environment quality, mangrove afforestation of intertidal mudflats should be encouraged through adequate institutional support.</td><td>25 hectare of mangrove plantation with a cost of 10 Lakh is already completed near railway yard in consultation with Dr. Maity, Mangrove consultant of India. Details on mangroves afforestation & Green belt development carried out by APSEZ till date is annexed as Annexure – 1.</td></tr><tr><td>The prevailing traffic control management of deep-sea ships navigating through the gulf needs thorough review and introduction of state of the art VTS should be considered.</td><td>APSEZ is practicing well defined traffic control procedure. A VTS service for Gulf of Kutch is provided by the VTS Gulf of Kutch, operated by Directorate General of Lighthouses and Lightships (DGLL), Govt. of India. Marine Control of APSEZ provides traffic update to vessels in Mundra Port Limit on VHF Channel- 77.</td></tr></table>	Temporary colonies of workforce should be located sufficiently away from the HTL with proper sanitation. Adequate arrangement of fuel supply to the workers should be made to discourage them from using mangroves for firewood.	Construction activity is already completed. Most of the construction labours were residing in the nearby villages where all basic facilities are easily available. However, for those residing near the construction site, infrastructure facilities such as water supply, fuel, sanitation, first aid, ambulance etc. were provided by APSEZL.	As a step towards improvement in marine environment quality, mangrove afforestation of intertidal mudflats should be encouraged through adequate institutional support.	25 hectare of mangrove plantation with a cost of 10 Lakh is already completed near railway yard in consultation with Dr. Maity, Mangrove consultant of India. Details on mangroves afforestation & Green belt development carried out by APSEZ till date is annexed as Annexure – 1.	The prevailing traffic control management of deep-sea ships navigating through the gulf needs thorough review and introduction of state of the art VTS should be considered.	APSEZ is practicing well defined traffic control procedure. A VTS service for Gulf of Kutch is provided by the VTS Gulf of Kutch, operated by Directorate General of Lighthouses and Lightships (DGLL), Govt. of India. Marine Control of APSEZ provides traffic update to vessels in Mundra Port Limit on VHF Channel- 77.
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			Arrival and departure information before arrival and departure respectively in Gulf of Kutch is provided to VTS information cell through agent or by directly sending mail to vtsmanagergulfofkutch@yahoo.com and vtsgok@yahoo.com
		Few Tata AIG Risk Assessment Recommendations:	
		There should be facilities of boom, skimmer, dispersant, diving suits, firefighting equipment and excellent communication facilities.	11 Dolphin tugs fitted with Oil Spill Dispersant boom and proportionate pump to mix OSD and Sea water as required; out of them 10 Dolphin Tugs are fitted with a fire curtain and remote controlled fire monitors.
		In the event of oil spillage the oil slick normally will be carried away by water current and wind. It is very difficult to identify oil slick patches by boats/vessels, hence it is suggested that GAPL may take help from coast guard/Navy for aerial surveillance in order to identify and monitor oil slick movement.	Oil spill contingency plan is in place to handle Tier 1 level oil spills considering different accident scenarios, and the vulnerable areas are identified and mitigation plan is prepared. Oil spill contingency plan updated & approved by coast guard is attached as Annexure – 2.
11.	The entire stretch of the pipelines shall be buried underground except at the booster pumping station, which will be properly fenced and the station would be manned round the clock. The buried lines will be protected with anticorrosive coal tar based coating. The coating will be tested by high voltage detector in accordance with prescribed standards.	Complied. Entire SPM pipeline is buried underground. Total pipeline length is 15.4 km including 8.6 km inside the open sea and 6.8 km on landward side. Booster pump is not provided throughout the pipeline. However the material is transferred by using pumping system of respective vessels berthed at SPM. Anticorrosive 3 LPE coating is provided to the portion of onshore pipeline while offshore pipeline is also protected by concrete coating. For offshore pipeline, Cathodic Potential (CP) survey is being done once in five years. Last CP inspection of offshore pipeline done in Oct'2017 and report for the same was	

Status of the conditions stipulated in Environment Clearance

Sr. No.	Conditions	Compliance Status as on 31-03-2019								
		provided along with EC compliance report submission for the period of Apr'17 to Sep'17. For onshore pipeline also CP survey is being done by APSEZ on monthly bases. Report of monitoring done within this compliance period is enclosed as Annexure – 4 .								
12.	Markers shall be installed at every 30 m to indicate the position of the line. Regular patrolling of the pipelines needs to be done. This will help in identifying any activity that have the potential to cause pipeline damage or to identify small leaks whose effects are too small to be detected by instrument.	<p>Complied.</p> <p>Markers are installed at every 30 m to indicate position of pipeline. Photograph of the same is enclosed as Annexure – 5.</p> <p>Pressure at vessel and reception points of transfer line is being monitoring during operation to ensure no leakage in pipeline.</p> <p>Regular patrolling of pipeline is being done by APSEZL Security Department. Following mitigation plan is followed in case of small leaks leading to spills.</p> <table><tr><th>Activity</th><th>Adequacy of Measures</th></tr><tr><td>Hose Connection / Disconnection (liquid operation)</td><td>It is collected in deep tray in case of leakage. Stop the supply of liquid discharge.</td></tr><tr><td>Hose Connection / Disconnection (liquid operation)</td><td>Immediately stop the supply of liquid discharge. Marine break away coupling available for control of load.</td></tr><tr><td>Tanker discharge operation (SPM operation)</td><td>Emergency operation shut off (stopping the discharge)</td></tr></table>	Activity	Adequacy of Measures	Hose Connection / Disconnection (liquid operation)	It is collected in deep tray in case of leakage. Stop the supply of liquid discharge.	Hose Connection / Disconnection (liquid operation)	Immediately stop the supply of liquid discharge. Marine break away coupling available for control of load.	Tanker discharge operation (SPM operation)	Emergency operation shut off (stopping the discharge)
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Tanker discharge operation (SPM operation)	Emergency operation shut off (stopping the discharge)									
13.	There should be display boards at critical locations along the pipeline viz. road / rail /river crossings giving emergency instructions as well as contact details of GAPL. This will ensure prompt information regarding location of accident during any emergency. Emergency Information board should contain emergency instructions in addition to contact details.	<p>Complied.</p> <p>Display boards with emergency contact detail are provided at critical locations.</p> <p>Photographs of the same were submitted as part of the compliance report for the period from Oct'16 to March'17 and there is no farther change.</p>								

Status of the conditions stipulated in Environment Clearance

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14.	During operation phase, proper precautions should be taken to avoid any oil spills and no oily wastes shall be discharged into the water bodies.	<p>Complied</p> <p>During operation, SPM team takes responsibility and actively supervises the operation. Inspection and maintenance activities are carried out regularly for prevention of any kind of oil spill at SPM.</p> <p>No liquid waste are generated / discharged from the project activity. In order to analyze marine water quality, marine sampling is being carried out at a location near SPM. Please refer condition no 8 for further details.</p>
15.	All conditions stipulated by the Forest and Environment Department, Government of Gujarat should be strictly implemented.	<p>Complied</p> <p>All the conditions stipulated by Forest and Environment Department are being complied. Point wise compliance report of CRZ recommendations issued vide letter No. ENV-10-2002-124-P (Part1) dated 8th October 2003 is enclosed as Annexure- A.</p>
16.	All conditions stipulated in Gujarat Pollution Control Board vide their letter No. PC/NOC/381/1039 dated 8 th January, 2002 should be implemented.	<p>Complied.</p> <p>Consent to Operate (CC&A) was granted by GPCB based on the compliance of conditions of the No Objection Certificate (CtE). This CC&A is renewed from time to time based on its validity. The last renewal was obtained vide GPCB consent no. WH 86980 valid till 26th April, 2022. Copy of the same was submitted as part of compliance report for the duration of Apr'17 to Sep'17 and there is no further change.</p>
B. General Condition		
1	Construction of the proposed structures should be undertaken meticulously confirming to the existing Central / local rules and regulations. All the construction designs / drawings relating to the proposed construction activities must have approvals of the concerned State Government Department / Agencies.	<p>Complied. Not applicable at present.</p> <p>Construction activities are completed & project is in operation stage. Entire SPM pipeline is buried underground. Total pipeline length is 15.4 km including 8.6 km inside the open sea and 6.8 Km on landward side.</p> <p>Construction activities are carried out based on the approvals of the concerned state government department and prevailing laws.</p>
2	The project authorities should take appropriate	<p>Complied.</p> <p>APSEZ is actively working with local community around the</p>










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	community development and welfare measures for the villagers in the vicinity of the project site, including drinking water facilities. A separate fund should be allocated for this purpose.	<p>project area and provides required support for their livelihood and other concerns through the CSR arm – Adani Foundation. Brief information about activities in the main four persuasions is mentioned below. Please refer Annexure – 6 for full details of CSR activities carried out by Adani Foundation in the Mundra region.</p> <table><tr><th>Area</th><th>Activity</th></tr><tr><td>Community Health</td><td><ul style="list-style-type: none">The Adani Foundation runs two mobile health care units. Main objective of Mobile Van is to reduce travel time, hardships and expenses. Two mobile health care units cover 34 villages and 05 fishermen settlements. Around 109 types of general and lifesaving medicines are available in these units. Total patient was treated under this scheme during the year 2018-19: 19092 Nos. & 22256 Nos. through Rural ClinicDuring the year 2018-19, total 10161 transactions were done by 8599 card holders of 66 villages of Mundra Taluka and they received cash less medical services under this project. The limit for the beneficiary was set to 30000/- within a period of 3 years.Total 10161 OPDs were given medical treatment in various villages through rural dispensaries.During this year, anthropometry study done for 6548 children. under “Suposhan” Project. Additionally, 965 FGD were conducted during this year.During the year 2018-19, Specialty camps were organized and 4384 Patients were benefitted.<table><tr><th>Project Details</th><th>Beneficiaries (Nos.)</th><th>Remarks</th></tr><tr><td>Mobile Van</td><td>19092</td><td>OPD Numbers</td></tr><tr><td>Rural Clinic</td><td>22256</td><td>OPD Numbers</td></tr><tr><td>Senior Citizen</td><td>10161</td><td>Transactions</td></tr><tr><td>Medical Camps</td><td>4384</td><td>Patients</td></tr><tr><td>Awareness Sessions</td><td>987</td><td>Participants</td></tr><tr><td>Needy Patients Support</td><td>1022</td><td>OPD/IPD</td></tr><tr><td>Shakti Raksha Project</td><td>624</td><td>Breast n cervix Cancer</td></tr><tr><td>Dialysis</td><td>5</td><td>Patients (2 times a week)</td></tr><tr><td>Suposhan</td><td>17025</td><td>Mundra and Bitta</td></tr></table></td></tr><tr><td>Sustainable Livelihood – Fisher folk</td><td><ul style="list-style-type: none">Average 123 KL of water was supplied to 1086 households from different settlements on a daily basis under Machhimar Shudhh Jal Yojana.Adani Foundation constructed four Balwadis for kids between the age group of 2.5 years to 5 years at different settlements under Vidya Deep Yojana.Participatory scholarship support for fisherman children studying in SMJ high school Luni and to above 12th standards Students. 80 percentage support given by Adani foundation and 20 percentage support by parents!RTG Crane Operator: 03 Fisherman YouthDori Work & Mud Work Training: 65 WomenMangrove Plantation, moss cleaning, etc.: 6261 Man-days.In addition to this, employment worth of 35787 man-days has been provided till date. The Foundation has also supported Pagadiya fishermen as painting labours by providing them with employment and job in various fields.Total average 560 fishermen were benefitted by Mobile</td></tr></table>	Area	Activity	Community Health	<ul style="list-style-type: none">The Adani Foundation runs two mobile health care units. Main objective of Mobile Van is to reduce travel time, hardships and expenses. Two mobile health care units cover 34 villages and 05 fishermen settlements. Around 109 types of general and lifesaving medicines are available in these units. Total patient was treated under this scheme during the year 2018-19: 19092 Nos. & 22256 Nos. through Rural ClinicDuring the year 2018-19, total 10161 transactions were done by 8599 card holders of 66 villages of Mundra Taluka and they received cash less medical services under this project. 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Remarks	Mobile Van	19092	OPD Numbers	Rural Clinic	22256	OPD Numbers	Senior Citizen	10161	Transactions	Medical Camps	4384	Patients	Awareness Sessions	987	Participants	Needy Patients Support	1022	OPD/IPD	Shakti Raksha Project	624	Breast n cervix Cancer	Dialysis	5	Patients (2 times a week)	Suposhan	17025	Mundra and Bitta	Sustainable Livelihood – Fisher folk	<ul style="list-style-type: none">Average 123 KL of water was supplied to 1086 households from different settlements on a daily basis under Machhimar Shudhh Jal Yojana.Adani Foundation constructed four Balwadis for kids between the age group of 2.5 years to 5 years at different settlements under Vidya Deep Yojana.Participatory scholarship support for fisherman children studying in SMJ high school Luni and to above 12th standards Students. 80 percentage support given by Adani foundation and 20 percentage support by parents!RTG Crane Operator: 03 Fisherman YouthDori Work & Mud Work Training: 65 WomenMangrove Plantation, moss cleaning, etc.: 6261 Man-days.In addition to this, employment worth of 35787 man-days has been provided till date. 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Community Health	<ul style="list-style-type: none">The Adani Foundation runs two mobile health care units. Main objective of Mobile Van is to reduce travel time, hardships and expenses. Two mobile health care units cover 34 villages and 05 fishermen settlements. Around 109 types of general and lifesaving medicines are available in these units. Total patient was treated under this scheme during the year 2018-19: 19092 Nos. & 22256 Nos. through Rural ClinicDuring the year 2018-19, total 10161 transactions were done by 8599 card holders of 66 villages of Mundra Taluka and they received cash less medical services under this project. The limit for the beneficiary was set to 30000/- within a period of 3 years.Total 10161 OPDs were given medical treatment in various villages through rural dispensaries.During this year, anthropometry study done for 6548 children. under “Suposhan” Project. Additionally, 965 FGD were conducted during this year.During the year 2018-19, Specialty camps were organized and 4384 Patients were benefitted. <table><tr><th>Project Details</th><th>Beneficiaries (Nos.)</th><th>Remarks</th></tr><tr><td>Mobile Van</td><td>19092</td><td>OPD Numbers</td></tr><tr><td>Rural Clinic</td><td>22256</td><td>OPD Numbers</td></tr><tr><td>Senior Citizen</td><td>10161</td><td>Transactions</td></tr><tr><td>Medical Camps</td><td>4384</td><td>Patients</td></tr><tr><td>Awareness Sessions</td><td>987</td><td>Participants</td></tr><tr><td>Needy Patients Support</td><td>1022</td><td>OPD/IPD</td></tr><tr><td>Shakti Raksha Project</td><td>624</td><td>Breast n cervix Cancer</td></tr><tr><td>Dialysis</td><td>5</td><td>Patients (2 times a week)</td></tr><tr><td>Suposhan</td><td>17025</td><td>Mundra and Bitta</td></tr></table>	Project Details	Beneficiaries (Nos.)	Remarks	Mobile Van	19092	OPD Numbers	Rural Clinic	22256	OPD Numbers	Senior Citizen	10161	Transactions	Medical Camps	4384	Patients	Awareness Sessions	987	Participants	Needy Patients Support	1022	OPD/IPD	Shakti Raksha Project	624	Breast n cervix Cancer	Dialysis	5	Patients (2 times a week)	Suposhan	17025	Mundra and Bitta							
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Sustainable Livelihood – Fisher folk	<ul style="list-style-type: none">Average 123 KL of water was supplied to 1086 households from different settlements on a daily basis under Machhimar Shudhh Jal Yojana.Adani Foundation constructed four Balwadis for kids between the age group of 2.5 years to 5 years at different settlements under Vidya Deep Yojana.Participatory scholarship support for fisherman children studying in SMJ high school Luni and to above 12th standards Students. 80 percentage support given by Adani foundation and 20 percentage support by parents!RTG Crane Operator: 03 Fisherman YouthDori Work & Mud Work Training: 65 WomenMangrove Plantation, moss cleaning, etc.: 6261 Man-days.In addition to this, employment worth of 35787 man-days has been provided till date. The Foundation has also supported Pagadiya fishermen as painting labours by providing them with employment and job in various fields.Total average 560 fishermen were benefitted by Mobile																																					

Status of the conditions stipulated in Environment Clearance

Sr. No.	Conditions	Compliance Status as on 31-03-2019
		<p>Dispensary during last half year. Adani Foundation has extended financial assistance to more than 114 financially challenged patients from the Fisher Folk Community in case of medical urgency during this year.</p> <ul style="list-style-type: none"> The project for the senior citizens is popularly known as Vadiil Swasthya Yojana and till date 350 senior citizens from fisher folk community are enrolled in the scheme. <p>Fisherman Amenities work</p> <ul style="list-style-type: none"> 391 Students : Education Support 134 Stunners : Adani Vidya Mandir 16 Fisherman : Alternate livelihood 78 Fisherwomen : Linkages for schemes 1312 Fisherman : Community Engagement 1086 Fisherman : Potable water provision 6261 Mandays : Mangroves Plantation 231 Fisherman : Capacity Building
	Education	<ul style="list-style-type: none"> Adani foundation adopted 17 government school located at Mundra Taluka under the project 'UTTHAN' a drive of quality education. To motivate children for schooling by providing the welcome kit / education kit and to create conducive children for "joyful learning" Environment for children for Learning during shala Praveshotsav Govt. has wide spread network of 111 Govt. primary schools in total 62 villages of Mundra Taluka, 3 villages of in Anjar taluka, YMC school, AVMB and two villages of Mandvi Taluka (118 Schools) every year on an average 2550 to 2700 children gets enrolled in 1st std in Taluka For 2018-2019 total 2300 children got enrolled & Adani foundation provided the "Enrollment kit" to all new enrollee in Taluka Total 3270 educational institutes has visited Adani Port, Adani Power & Adani Wilmar and 236032 beneficiaries of the project till date and 33932 beneficiaries during current year. Along with quality education, the school also focuses on providing nutritious food, uniforms and other services to the children for free. Currently, 387 students, from Std. 1 to Std. 10 are studying in the Adani Vidya Mandir. Out of these 134 children come from the fisher folk community. <p>Beneficiaries Details</p> <ul style="list-style-type: none"> 2598 Students : 17 Schools Utthan 2300 Enrollment Kit : 118 Schools 704 Students : Dignity of Workforce 345 Mothers : Mother's meet 5542 Students : 116 Institute Udaan 387 Students : Adani Vidya Mandir 206 Teachers : Guruvandana- I,II,III,IV
	Rural Infrastructure	<ul style="list-style-type: none"> Under Dignity of Drivers Project, Adani Foundation has constructed Resting Shed for Drivers entering in SEZ Premises. Total 50 beds are constructed, drinking water and sanitation plus recreational – TV Facilities. Adani Foundation has constructed 45 Toilet block and proper bathing place for labours. Work Completed Road repairing various vasahat Open shed at Juna Bandar Sand Filling plot at JUNA BANDAR

Status of the conditions stipulated in Environment Clearance

Sr. No.	Conditions	Compliance Status as on 31-03-2019	
			<ul style="list-style-type: none">  Concrete Step ladder at Juna Bandar  House construction at Shekhadia  Two approach road 5000 meter Zarpara Fishermen and 5000 meter Luni Pagadiya  Drinking water storage tank 5000 ltr capacity bavdi Bandar -2, Juna Bandar -2, Kutdi Bandar -1  water pipe line installation at Wandi village 2000meter.  Basic amenities at Rampar Village Paver block 6000 LTR Storage tank and Boundary wall at community place.  Additional civil work in community hall  Open shed Gundiyali  Boundary wall in common place at Tragadi. <div data-bbox="618 695 764 747">Skill Development</div> <ul style="list-style-type: none"> • Soft skill training – 362 Nos. • Technical Training – 1457 Nos.
3	To meet any emergency situation, appropriate fire – fighting system should be installed. Appropriate arrangements for uninterrupted power supply to the environment protection equipment and continuous water supply for the firefighting system should be made.	<p>Complied.</p> <p>Tug (Dolphin-11) has firefighting system of 1200 m3/hr. along with 20 ton lifting “A” frame and diving support facility for support at offshore.</p> <p>With respect to onshore facilities valve station, pumping station and transportation pipeline , foam base fire tender is available .</p> <p>With respect to onshore facilities valve station , pumping station and transportation pipeline, foam base fire tender, fire water network is available Fire-fighting system has been installed and maintained to meet emergency situations. Additionally for emergency, DG Set is provided for fire water pumps to ensure continuous water supply for firefighting purpose. Detail information on firefighting facility available at APSEZL was submitted as part of the compliance report for the period from Oct'16 to March'17 and there is no farther change.</p>	
4	A separate Environment Management Cell with suitably qualified staff to carry out various environment related functions should be set up under the charge of a Senior Executive who will report directly to the Chief Executive of the	<p>Complied.</p> <p>M/s APSEZ has a well structured Environment Management Cell, staffed with qualified manpower for implementation of the Environment Management Plan. The Environment Management Cell is headed by Sr. Manager who directly reports to the top management.</p> <p>Environment Management Cell Organogram is attached as Annexure – 7.</p>	

Status of the conditions stipulated in Environment Clearance

Sr. No.	Conditions	Compliance Status as on 31-03-2019
	Company.	
5	The funds earmarked for environment protection measures should be maintained in a separate account and there should be no diversion of these funds for any other purpose. A year wise expenditure on environmental safeguards should be reported to this Ministry's Regional Office at Bhopal.	<p>Complied.</p> <p>Separate budget for the Environment Protection measures is earmarked every year. All environmental and horticulture activities are considered at group level and budget allocation is also done accordingly. No separate bank account is maintained for the same however, all the expenses are recorded in advanced accounting system of the organization.</p> <p>Budget for environmental management measures (including horticulture) for the FY 2018-19 is to the tune of INR 1069 lakh. Out of which, Approx. INR 1008 lakh are spent during the FY 2018-19. Detailed breakup of the expenditures for the past 3 years is attached as Annexure – 8.</p>
6	Full support should be extended to the officers of this Ministry's Regional Office at Bhopal and the officers of the Central and State Pollution Control Board by the project proponents during their inspection for monitoring purposes, by furnishing full details and action plans including the action taken reports in respect of mitigative measures and other environmental protection activities.	<p>Complied</p> <p>APSEZL is always extending full support to the regulatory authorities during their visit to the project site.</p> <p>Last visit of Regional Office, GPCB was done on 20.07.2017 for Main port. APSEZL has submitted the reply to the site visit report vide letter dated 04.08.2017 incorporating details of action taken in respect of the observations of the GPCB representative.</p> <p>There was no visit carried out by any government authority during the compliance period of Oct'18 to Mar'19 with respect to SPM project.</p>
7	In case of deviation or alteration in the project including the implementing agency, a fresh reference should be made to this Ministry for modification in the clearance conditions or imposition of new one for ensuring	<p>Point noted.</p> <p>There is no change in the approved project proposal.</p>

Status of the conditions stipulated in Environment Clearance

Sr. No.	Conditions	Compliance Status as on 31-03-2019
	environmental protection. The project proponents should be responsible for implementing the suggested safeguard measures.	
8	This Ministry reserves the right to revoke this clearance, if any of the conditions stipulated are not complied with to the satisfaction of this Ministry.	Point noted.
9	This Ministry or any other competent authority may stipulate any other additional conditions subsequently, if deemed necessary, for environmental protection, which should be complied with.	Point noted.
10	A copy of the clearance letter should be marked to the concerned Panchayat / local NGO, if any, from whom any suggestion / representation has been received while processing the proposal.	Not applicable at present
11	State Pollution Control Board / Committee should display a copy of the clearance letter at the District Industries Center and Collector's Office/ Tehsildar's Office for 30 days from the date of receipt of this letter.	Not Applicable This condition does not belong to project proponent.
12	The project proponent should advertise at least	Already Complied.

Status of the conditions stipulated in Environment Clearance

Sr. No.	Conditions	Compliance Status as on 31-03-2019
	in two local newspapers widely circulated in the region around the project, one of which shall be in the vernacular language of the locality concerned informing that the project has been accorded environmental clearance and copies of clearance letter are available with the Gujarat Pollution Control Board and may also be seen at the website of the Ministry of Environment & Forests at http://www.envfor.nic.in/	
13	The project proponents should inform regional Office Bhopal as well as the Ministry, the date of financial closure and final approval of the project by the concerned authority and the date of start of work.	Already Complied
14	The project proponent will obtain Forest clearance for any stretch of land if it passes through the forest land.	Not Applicable No forest land was involved in the project.
15	So as to maintain ecological features and avoid damage to the ecosystem, movement of vehicles in the Inter Tidal Zone shall be restricted to minimum.	Complied. All activities are carried out as per the permissions obtained from competent authorities. No unauthorized movement of vehicles is allowed in the intertidal zone.
16	Since the pipeline	Complied. Not applicable at present

	Adani Ports and SEZ Limited	From : Oct'18 To : Mar'19
Status of the conditions stipulated in Environment Clearance		

Sr. No.	Conditions	Compliance Status as on 31-03-2019
	passes along mangrove areas and the mud flats of Mundra area, the project proponents will ensure adequate protection to mangroves.	Construction activities are completed & project is in operation stage. Please refer to specific condition no 1 for detailed reply regarding mangrove plantation activity.
17	Budgetary break up for Environmental Management Plan for the project to be mentioned.	Complied. Please refer to general condition no 5 for detailed reply regarding budgetary break up.

Annexure – A

	Adani Ports and SEZ Limited	From : Oct'18 To : Mar'19
Status of the conditions stipulated under CRZ Recommendation		

Half yearly Compliance report of CRZ recommendation for “SPM,COT and connecting pipeline at Mundra Port, Dist. Kutch in Gujarat” issued by DoEF, GOG vide letter no. ENV-10-2002-124-P (Part1) dated 8th October 2003.

Sr. No.	Conditions	Compliance Status as on 31-03-2019
1	The provision of the CRZ notification of 1991 and its amendments issued from time to time shall be strictly complied with by the GAPL.	Complied. Construction activities are completed and the project is in operation phase. All stipulations with respect to the CRZ notification and its subsequent amendments are complied with.
2	This recommendation is only for those activities proposed to be commissioned before the end of the year 2008 as mentioned in the bar chart submitted by GAPL.	Point noted. Construction activities are completed and the project is in operation phase.
3	A separate clearance shall be obtained by the GAPL for construction of the SPM No. 3 and 4, corresponding pipelines and COTs after demonstrating the compliance of the conditions, ecological upliftment activities undertaken successfully and mitigative measures implemented while developing the SPM no.1 and corresponding COT. A regional EIA shall also be commissioned immediately by the GAPL and all future development should be based on the outcome of the said regional EIA only.	Point Noted. APSEZL has only developed SPM no. 1 so far. SPM no. 3 and 4 are not developed yet and required permissions for the same will be obtained by following procedures mentioned in respective notifications.
4	Before commissioning of the construction activities, the construction design and pipeline alignment shall be validated/ approved by National Institute Oceanography to ensure that there is no negative	Complied. Construction activities are completed and the project is in operation phase. The EIA report was prepared by NIO and specific design considerations were taken into account for carrying out various studies for preparation of the same. Findings of the studies were considered before commissioning of the

Status of the conditions stipulated under CRZ Recommendation

Sr. No.	Conditions	Compliance Status as on 31-03-2019
	impact on the coastal morphology, hydrodynamics and ecological systems including the corals, if any. The mitigative measures as may be suggested by the NIO for this purpose shall be implemented by the GAPL.	<p>construction activities.</p> <p>There are no corals present at the project site.</p>
5	A comprehensive EIA shall be prepared and submitted to this Department by the GAPL, before commissioning of the SPM. All the suggestions for environmental protection /management that may be given in the comprehensive EIA shall be implemented by the GAPL.	<p>Complied.</p> <p>EIA study has been completed and report is already submitted to MoEF&CC and other concerned authorities. Based on the same, Environment and CRZ clearance was granted by MoEF&CC.</p> <p>However, APSEZ has appointed a NABET accredited consultant M/s. Cholamandalam MS Risk Services Limited to prepare a cumulative impact assessment report for the entire Mundra region. The study is recently concluded and the final report is submitted vide our letter dated 30.04.2018 to GCZMA and MoEF&CC for their consideration. Details of the same were submitted along with last EC Compliance report for the period Apr'18 to Sep'18.</p>
6	The ground water shall not be tapped in any case to meet with the water requirements during construction and/or operation phases.	<p>Complied.</p> <p>APSEZ does not draw any ground water for the water requirement. Present source of water for entire port and SEZ is desalination plant and/or Narmada water through Gujarat Water Infrastructure Limited.</p> <p>Location of SPM is unmanned (approximately 8.6 km inside the open sea from the shore) hence no operation or maintenance activities require use of water on regular basis.</p>
7	The GAPL shall ensure that the free flow of water in the intertidal area is not hampered due to proposed construction activities for pipeline corridor as well as other activities including the COT. Further, it shall be	<p>Complied.</p> <p>Construction activity is already completed and the project is in operation phase.</p> <p>Free flow of water in the intertidal area is not hampered due to any operational activities. There are no filling or reclamation activities done at any of the creeks or mangrove areas in the vicinity of the project. As per recent</p>

Status of the conditions stipulated under CRZ Recommendation

Sr. No.	Conditions	Compliance Status as on 31-03-2019
	ensured by the GAPL that the nearby mangroves are not at all affected due to proposed development activities specifically the COT.	<p>bathymetry study carried out by NCSCM, it can be concluded that there are sufficient depths at the creek mouths and all creek mouths are open allowing flushing of water.</p> <p>NCSCM final report on comprehensive and integrated plan for preservation and conservation of mangroves and associated creeks in and around has been submitted to the concerned authorities i.e. MoEF&CC, New Delhi and GCZMA, Gandhinagar vide our letter dated 04.06.2018 and details of the same were submitted along with last EC Compliance report for the period Apr'18 to Sep'18.</p>
8	The GAPL shall take up massive mangroves plantation activities in addition 25 Ha. of area suitably identified in consultation with the office of the Principal Chief Conservator of Forests, GoG, as well as this Department. The GAPL shall bear the cost of the said land as well as the cost of the plantation of mangroves & its sustenance for a reasonable period of time.	<p>Complied.</p> <p>Construction activities are completed & project is in operation stage. Please refer to specific condition no 1 of the compliance of EC and CRZ clearance for detailed reply regarding mangrove plantation activity.</p>
9	In addition to the mangroves plantation, the GAPL shall also take up massive greenbelt development in and around the project site in consultation with the Forest Department.	<p>Complied.</p> <p>Construction activities are completed & project is in operation stage. Please refer to specific condition no 2 of the compliance of EC and CRZ clearance for detailed reply regarding greenbelt development activity.</p>
10	The GAPL shall provide financial contribution as many as decided by this department for any common study like carrying capacity for the Gulf of Kachchh as well as for any common facilities including Vessels Traffic	<p>Complied.</p> <p>Necessary financial support will be provided on hearing from MOEF&CC.</p> <p>APSEZ is practicing well defined traffic control procedure.</p> <p>A VTS service for Gulf of Kutch is provided by the VTS Gulf of Kutch, operated by Directorate General of Lighthouses</p>

Status of the conditions stipulated under CRZ Recommendation

Sr. No.	Conditions	Compliance Status as on 31-03-2019
	Management System in the Gulf of Kachchh, for the purpose of the environment protection/management.	and Lightships (DGLL), Govt. of India. Marine Control of APSEZ provides traffic update to vessels in Mundra Port Limit on VHF Channel- 77. Arrival and departure information before arrival and departure respectively in Gulf of Kutch is provided to VTS information cell through agent or by directly sending mail to vtzmanagergulfofkutch@yahoo.com and vtsgok@yahoo.com
11	The GAPL shall provide financial support in implementation of National Green Corps scheme (being implemented in Gujarat by the GEER Foundation) in Kachchh district in consultation with Forests & Environment Department.	Complied Necessary support will be provided on hearing from GEER foundation to support NGC scheme.
12	The GAPL shall bear the cost of the external agency that may be appointed by the Forests and Environment Department, GoG for supervision/monitoring of their activities during construction and/or operational phases.	Point noted. APSEZ will provide full support for supervision and monitoring of the project operations after due discussion with the concerned agency and Forests & Environment Department, GoG. No such agency was appointed during the compliance period.
13	The dredged material that may be generated, if any, shall be disposed of at location suitably identified in consultation with the institute of repute like NEERI/NIO after due consideration of various environmental aspects and ensuring no significant negative impacts due to the same.	Complied. Construction activities are completed & project is in operation stage. SPM is approximately 8.6 km inside the open sea from the shore where 30 m of draft is naturally available. Hence no dredging is required.
14	No waste including the construction debris, oily waste from construction equipment's, untreated	Complied. Construction activities are completed and the project is in operation phase.

Status of the conditions stipulated under CRZ Recommendation

Sr. No.	Conditions	Compliance Status as on 31-03-2019
	<p>sewage, etc. would be disposed of in to sea/ river/ creek or in the CRZ areas. The treated sewage meeting with the norms fixed by the Gujarat Pollution Control Board and the reject water from RO plant if any, shall be disposed of at a point in the deep sea as may be suggested by the institute of repute like the NEERI/NIO.</p>	<p>There is no disposal of any waste including civil debris in CRZ area.</p> <p>No Sewage or RO Reject water is being generated by SPM activity.</p>
15	<p>The Gujarat Maritime Board shall ensure that the Vessel Traffic Management System for safe navigation in the Gulf of Kachchh shall be established and commissioned before commissioning of the SPM No. 1 by the GAPL. The GAPL shall follow up for this with various stakeholders and provide financial and technical inputs for the same.</p>	<p>Complied.</p> <p>Kandla, GMB & DGLL are the agencies who financially support to VTMS. For SPM, APSEZ is mutual partner to support in case of Oil spill & vice versa. For further details regarding traffic management, please refer condition no. 10 of CRZ recommendations above.</p>
16	<p>A mutual aid system for the Mundra Port region shall be developed to meet with any unforeseen circumstances or to meet with any accidental condition. The GAPL shall take a lead for this by involving other stakeholders including HPCL.</p>	<p>Complied.</p> <p>APSEZ has signed an MoU with HPCL, Mittal Pipeline Ltd., Mundra in the region of Gulf of Kutch to assist each other within stipulated time frame with best combination of resources.</p> <p>Interface with ROSDCP and NOSDCP For responding to oil spill, the Indian Coast Guard has developed the National Oil Spill Disaster Contingency Plan NOSDCP which has the approval of the Committee of Secretaries and has been in operation since 1996. The NOSDCP brings together the combined resources of the various organizations and departments, Coast Guard, Ports and Oil handling Agencies, and related industries, to provide a level of preparedness to the threat posed to the marine environment by oil spills.</p>

Status of the conditions stipulated under CRZ Recommendation

Sr. No.	Conditions	Compliance Status as on 31-03-2019
17	A detailed Risk Assessment and Disaster Management Plan shall be worked out before commissioning of the SPM by the GAPL and the mitigative measures shall be identified and implemented. The local Oil Spill Contingency Plan in lines with the National Oil Spill Disaster Contingency Plan for the Mundra Port shall be put in to operation immediately.	<p>Complied.</p> <p>Detailed Risk Assessment and Disaster Management Plan were prepaid By Tata AIG risk assessment services and few mitigation measures are addressed in compliance of specific condition no 10 of EC & CRZ clearance above. These studies were carried out before the start of the development activity and were considered by MoEF&CC before grant of the EC and CRZ clearance.</p> <p>For responding to oil spill, the Indian Coast Guard has developed the National Oil Spill Disaster Contingency Plan NOSDCP which has the approval of the Committee of Secretaries and has been in operation since 1996. Oil Spill Contingency Response Plan (OSCRP) is prepared in accordance with the NOSDCP.</p> <p>OSCRP is updated regularly. The updated OSCRCP is enclosed as Annexure – 2.</p>
18	Proper rehabilitation scheme shall be worked out for local fisherman communities in consultation with the District Collector/the Commissioner of Fisheries, Government of Gujarat, before commissioning of the SPM and report shall be furnished to the Forests and Environment Department.	<p>Not applicable</p> <p>Location of SPM is unmanned (approximately 8.64 km inside the open sea from the shore) hence, there is no displacement of people, houses or fishing activity as a result of the project. However, APSEZ performs large scale socio-economic upliftment program and shares the details with FOKIA (Federation of Kutch Industries Association) chaired by District Collector quarterly.</p> <p>For further information related to CSR activities carried out by Adani Foundation in the Mundra region, please refer to compliance of General condition no. 2 of the EC and CRZ clearance above.</p>
19	The construction labour shall be provided with adequate amenities/facilities including the water supply, sanitation and fuel to ensure that the existing environmental condition is not deteriorated by them. The camps for the construction labour shall be kept outside the CRZ area. The GAPL	<p>Complied.</p> <p>Construction activity is already completed, project is in operation phase.</p> <p>No construction camps were located in CRZ area. Most workers came from nearby villages however, for others; construction camps were located outside CRZ area.</p> <p>All necessary infrastructure and facilities like mobile toilets, safe drinking water, medical health care etc. were provided.</p>

	Adani Ports and SEZ Limited	From : Oct'18 To : Mar'19
Status of the conditions stipulated under CRZ Recommendation		

Sr. No.	Conditions	Compliance Status as on 31-03-2019
	shall ensure that there is no confrontation amongst the local villagers and construction labour.	
20	All possible social and health impacts due to the proposed development at Mundra Port shall be assessed in detail in the comprehensive EIA and a detailed management plan shall be developed to mitigate the same.	<p>Complied.</p> <p>Aspects of social and health impact were studied as part of EIA report prepared by NIO and mitigation measures have been implemented.</p> <p>APSEZ performs large scale socio-economic upliftment program and shares the details with FOKIA (Federation of Kutch Industries Association) chaired by District Collector quarterly.</p>
21	The GAPL shall work out a detailed socio-economic upliftment programme in consultation with the District Collector and District Development Officer and shall implement the same. Separate budgetary provisions shall be kept for this purpose.	<p>For further information related to CSR activities carried out by Adani Foundation in the Mundra region, please refer to compliance of General condition no. 2 of the EC and CRZ clearance above.</p>
22	An Environmental Management Cell with person having proper background shall be constituted. A separate budgetary provision shall have to be made for implementation of the Environmental Management Plan.	<p>Complied.</p> <p>APSEZL has a well structured Environment Cell, staffed with qualified manpower for implementation of the Environmental Management Plan. For further details on the same, please refer to compliance of general condition no. 4 of the EC and CRZ clearance above.</p> <p>Separate budget for the Environment Protection measures is earmarked every year. For further details on the same, please refer to compliance of general condition no. 5 of the EC and CRZ clearance above.</p>
23	Post project environmental monitoring shall be carried out regularly through a reputed institute like NEERI/NIO and report shall be submitted to the Forests and Environment Department, GoG every year.	<p>Being complied.</p> <p>Monitoring of various environmental parameters for Ambient Air, Noise, marine water and sediments is being carried out by NABL accredited and MoEF&CC approved agency namely M/s. Pollucon Laboratory Pvt. Ltd.</p> <p>Ambient Air Quality (twice in a week) and Noise (once in a month) monitoring are being carried out by NABL and</p>

Status of the conditions stipulated under CRZ Recommendation

Sr. No.	Conditions	Compliance Status as on 31-03-2019																																								
		<p>MoEF&CC accredited agency namely M/s. Pollucon Laboratories Pvt. Ltd. Summary of the same for duration from Oct'18 to Mar'19 is mentioned below.</p> <p>Total Ambient Air & Noise Sampling Locations: 4 Nos.</p> <table><tr><th>Parameter</th><th>Unit</th><th>Max</th><th>Min</th><th>Perm. Limit^{\$}</th></tr><tr><td>PM₁₀</td><td>µg/m³</td><td>99.6</td><td>50.2</td><td>100</td></tr><tr><td>PM_{2.5}</td><td>µg/m³</td><td>59.2</td><td>20.4</td><td>60</td></tr><tr><td>SO₂</td><td>µg/m³</td><td>27.5</td><td>6.6</td><td>80</td></tr><tr><td>NO₂</td><td>µg/m³</td><td>46.6</td><td>13.6</td><td>80</td></tr><tr><th>Noise</th><th>Unit</th><th>Max</th><th>Min</th><th>Perm. Limit</th></tr><tr><td>Day Time</td><td>dB(A)</td><td>74.1</td><td>56.0</td><td>75</td></tr><tr><td>Night Time</td><td>dB(A)</td><td>72.3</td><td>57.4</td><td>70</td></tr></table> <p>^{\$} as per NAAQ standards, 2009 Values recorded confirms to the stipulated standards</p> <p>Marine water monitoring is carried out on monthly frequency In order to analyzed marine water quality, marine sampling is being carried out at a location nearby SPM. Please refer specific condition No. 8 of EC & CRZ clearance above.</p> <p>Environmental monitoring reports for the period from Oct'18 to Mar'19 are enclosed as Annexure – 3.</p>	Parameter	Unit	Max	Min	Perm. Limit ^{\$}	PM ₁₀	µg/m ³	99.6	50.2	100	PM _{2.5}	µg/m ³	59.2	20.4	60	SO ₂	µg/m ³	27.5	6.6	80	NO ₂	µg/m ³	46.6	13.6	80	Noise	Unit	Max	Min	Perm. Limit	Day Time	dB(A)	74.1	56.0	75	Night Time	dB(A)	72.3	57.4	70
Parameter	Unit	Max	Min	Perm. Limit ^{\$}																																						
PM ₁₀	µg/m ³	99.6	50.2	100																																						
PM _{2.5}	µg/m ³	59.2	20.4	60																																						
SO ₂	µg/m ³	27.5	6.6	80																																						
NO ₂	µg/m ³	46.6	13.6	80																																						
Noise	Unit	Max	Min	Perm. Limit																																						
Day Time	dB(A)	74.1	56.0	75																																						
Night Time	dB(A)	72.3	57.4	70																																						
24	No construction activities shall be carried out by the GAPL in any of the Forest areas.	<p>Already Complied. Not applicable at present.</p> <p>The construction work is completed and project is in operation phase. No construction activity at any of the forest area is carried out for project of SPM, COT and connecting pipeline.</p>																																								
25	All necessary clearances from different Government Department/Agencies shall be obtained before commissioning any construction activities.	<p>Complied.</p> <p>All necessary clearances as per prevailing laws have been already obtained. Construction activity is already completed, project is in operation phase.</p>																																								
26	A half yearly compliance report with respect to above mentioned conditions as well as the implementation of the suggestions/ recommendations of the	<p>Complied.</p> <p>Half yearly compliance report is being submitted regularly. Last compliance report including results of monitoring data for the period of Apr'18 to Sep'18 was submitted to Regional Office of MoEF&CC @ Bhopal, Zonal Office of CPCB @ Baroda, GPCB @ Gandhinagar & Gandhidham and</p>																																								

Status of the conditions stipulated under CRZ Recommendation

Sr. No.	Conditions	Compliance Status as on 31-03-2019																					
	EIA and Risk Assessment reports shall be furnished to the Forest and Environment Department, GoG, without fail at regular interval.	<p>Dept. of Forests & Env., Gandhinagar vide our letter dated 23.11.2018. Copy of the same is also available on our web site https://www.adaniports.com/ports-downloads. A soft copy of the same was also submitted through e-mail on 30.11.2018 to all the authorities. Please refer below for the details regarding past six compliance submissions.</p> <table border="1" data-bbox="690 636 1442 867"> <thead> <tr> <th>Sr. no.</th><th>Compliance period</th><th>Date of submission</th></tr> </thead> <tbody> <tr> <td>1</td><td>Oct'15 to Mar'16</td><td>30.05.2016</td></tr> <tr> <td>2</td><td>Apr'16 to Sep'16</td><td>01.12.2016</td></tr> <tr> <td>3</td><td>Oct'16 to Mar'17</td><td>30.05.2017</td></tr> <tr> <td>4</td><td>Apr'17 to Sep'17</td><td>01.12.2017</td></tr> <tr> <td>5</td><td>Oct'17 to Mar'18</td><td>29.05.2018</td></tr> <tr> <td>6</td><td>Apr'18 to Sep'18</td><td>30.11.2018</td></tr> </tbody> </table> <p>All the recommendations given in the report of Tata AIG Risk Management Services are implemented. For further information related to the same, please refer to compliance of specific condition no. 10 of the EC and CRZ clearance above.</p>	Sr. no.	Compliance period	Date of submission	1	Oct'15 to Mar'16	30.05.2016	2	Apr'16 to Sep'16	01.12.2016	3	Oct'16 to Mar'17	30.05.2017	4	Apr'17 to Sep'17	01.12.2017	5	Oct'17 to Mar'18	29.05.2018	6	Apr'18 to Sep'18	30.11.2018
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5	Oct'17 to Mar'18	29.05.2018																					
6	Apr'18 to Sep'18	30.11.2018																					
27	The GAPL shall also have to comply with any other condition as may be stipulated by the Forests and Environment Department, GoG, from time to time.	Point noted.																					

ANNEXURE – 1

Details of Greenbelt development at APSEZ, Mundra

LOCATION	Total Green Zone Detail Till Up to March - 2019				
	Area (In Ha.)	Trees (Nos.)	Palm (Nos.)	Shrubs (SQM)	Lawn (SQM)
SV COLONY	69.53	32480.00	7298.00	68327.00	95019.00
PORT & NON SEZ	79.87	139992.00	19205.00	74210.78	61295.18
SEZ	114.72	227835.00	17302.00	220583.60	28162.03
MITAP	2.48	8168.00	33.00	3340.00	4036.00
WEST PORT	86.04	186827.00	51342.00	24112.00	22854.15
AGRI PARK	8.94	17244.00	1332.00	5400.00	2121.44
SOUTH PORT	14.25	25530.00	3470.00	3882.00	3327.26
Samundra Township	55.63	52481.00	11818.00	20078.07	46571.67
Productive Farming (Vadala Farm)	23.79	27976.00	0.00	0.00	0.00
TOTAL (APSEZL)	455.23	718533.00	111800.00	419933.45	263386.73

Details of Mangrove Afforestation done by APSEZ

Sl. no.	Location	Area (ha)	Duration	Species	Implementation agency
1	Mundra Port	24.0	-	Avicennia marina	Dr. Maity, Mangrove consultant of India
2	Mundra Port	25.0	-	Avicennia marina	Dr. Maity, Mangrove consultant of India
3	Luni/Hamirmora (Mundra, Kutch)	160.8	2007 - 2015	Avicennia marina, Rhizophora mucronata, Ceriops tagal	GUIDE, Bhuj
4	Kukadsar (Mundra, Kutch)	66.5	2012 - 2014	Avicennia marina	GUIDE, Bhuj
5	Forest Area (Mundra)	298.0	2011 - 2013	Avicennia marina	-
6	Jangi Village (Bhachau, Kutch)	50.0	2012 - 2014	Avicennia marina	GUIDE, Bhuj
7	Jakhau Village (Abdasa, Kutch)	310.6	2007-08 & 2011-13	Avicennia marina, Rhizophora mucronata, Ceriops tagal	GUIDE, Bhuj
8	Sat Saida Bet (Kutch)	255.0	2014-15 & 2016-17	Avicennia marina & Bio diversity	GUIDE, Bhuj
9	Dandi Village (Navsari)	800.0	2006 - 2011	Avicennia marina, Rhizophora mucronata, Ceriops tagal	SAVE, Ahmedabad
10	Talaza Village (Bhavnagar)	50.0	2011-12	Avicennia marina	SAVE, Ahmedabad
11	Narmada Village (Bhavnagar)	250.0	2014 - 2015	Avicennia marina	SAVE, Ahmedabad
12	Malpur Village (Bharuch)	200.0	2012-14	Avicennia marina	SAVE, Ahmedabad
13	Kantiyajal Village (Bharuch)	50.0	2014-15	Avicennia marina	SAVE, Ahmedabad
14	Devla Village (Bharuch)	150.0	210-16	Avicennia marina	SAVE, Ahmedabad
15	Village Tala Talav (Khambhat, Anand)	100.0	2015 - 2016	Avicennia marina	SAVE, Ahmedabad
16	Village Tala Talav (Khambhat, Anand)	38.0	2015 - 2016	Avicennia marina	GEC, Gandhinagar
17	Aliya Bet, Village Katpor (Hansot, Bharuch)	62.0	2017-18	Avicennia marina & Rhizophora spp.	GEC, Gandhinagar
Total Mangrove Plantation:		2889.90 Ha			

ANNEXURE – 2

Date: 01.10.2018

APSEZ/MARINE/CG/04

The Commander
(For Regional Pollution Response Officer)
Headquarter Coast Guard Region (NW)
Gandhinagar

Sub: Annual Updating of Oil Spill Contingency Response Plan (Tier 1) – APSEZ, Mundra

Dear Sir,

The Oil Spill Contingency Plan was approved vide your letter no 7563 dated 07th November 2016.

The annual updating of Oil Spill Contingency Plan was done on 01 Oct 2018. The details of changes incorporated are mentioned below:

SI No	Amendment	Page No
1	Shore line resources updated	26
2	Annex 3- Tug details updated	75
3	Annex 4- Contact details of APSEZ personnel updated	78

The above is for your kind information and updating your records.

Thanking you,

Yours faithfully,

For Adani Ports and SEZ Ltd



Capt Anubhav Jain
Head- Marine Services
E Mail: ANUBHAV.JAIN@ADANI.COM
Mob: +91 8980015245

Capt. Anubhav Jain
AGM - Marine & PFSO
Adani Ports & SEZ Ltd.
Mundra - Kutch - Gujarat

CC: The Commanding Officer, Indian Coast Guard Station, Mundra



OIL SPILL CONTINGENCY RESPONSE PLAN TIER 1

(To be used in conjunction with OSRA Vol-1 and Vol-2)

**ADANI PORTS AND SPECIAL
ECONOMIC ZONE LIMITED
POST BAG NO. 1
NAVINAL ISLAND
MUNDRA 370 421**

PH. : (02838) 289221 / 289371

FAX : (02838) 289170 / 289270

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MUNDRA
OIL SPILL CONTINGENCY RESPONSE PLAN

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This document is distributed as per Oil Spill Contingency Response plan. In addition, documents on a "need based" basis will be distributed.

All documents so distributed will be controlled documents & identified by a unique control number as per Oil Spill Contingency Response plan.

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DISTRIBUTION LIST OF OIL SPILL CONTINGENCY RESPONSE PLAN			
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5.	Auditor's Copy	05	01/01/2014
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7.	HOD (Marine)	06	01/01/2014
8.	Coast Guard	07	01/01/2014
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RECORD OF CIRCULATION

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OIL SPILL CONTINGENCY RESPONSE PLAN

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MUNDRA
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Section 03: 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 Interfaces 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

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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, 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 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, manpower
- 9.5 Preparing daily incident log and management reports
- 9.6 Preparing operations accounting and financial 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.

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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, communication 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

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Annexures

Annexure 1	Initial Oil Spill Report
Annexure 2	POLREP Report
Annexure 3	List of resources available
Annexure 4	List of Telephone numbers of Expert and advisors
Annexure 5	Responsibilities: Marine Officer / SPM Officer
Annexure 6	Responsibilities: Marine Manager / On Scene Commander
Annexure 7	Responsibilities: SPM Pilot
Annexure 8	Responsibilities: HOD – Marine
Annexure 9	Oil Spill Progress report
Annexure 10	Emergency response Log
Annexure 11	Classification of oils
Annexure 12	Response Guidelines
Annexure 13	Site Specific Health and Safety Plan.
Annexure 14	Indian Chart 2079
Annexure 15	List of recycler approved by state of Gujarat
Annexure 16	List of agency for support & guidance for rescue & rehabilitation of oiled bird & mangroves management during oil spill

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Strategy

1. Introduction

The movement of Petroleum/ Petroleum-products from the production centre in middle east to Adani Ports and SEZ Ltd and various other ports in Gulf of Kutch is handled through ships at sea and to refineries using pipe lines on ground. Like any other port, Adani Port is very much vulnerable to oil spill disaster arising due to collision, leakage or grounding of vessels in sea and damage to pipelines on ground.

This action plan prepared by Adani Ports and SEZ Ltd, Mundra is to combat the oil spill (LOS-DCP) is in accordance with the NOS-DCP, International Petroleum Industry Environmental Conservation Association (IPIECA).

1.1 Authorities and responsibilities

Adani Ports and SEZ Limited

APSEZL has responsibility for dealing with oil spillages which occur within port limit if the estimated quantity of product lost is 700 tons or less.

Should the spill migrate to other areas, the Coast Guard Monitor will assume the position of On Scene Commander and will direct the response effort. In both cases, APSEZL will act and deploy their resources as required by the relevant On Scene Commander.

This operational version of Oil Spill Contingency Response Plan for the Adani Ports and SEZ Ltd, Mundra is intended for use by all such personnel like Marine Personnel, Tug Masters and all others as indicated in the Spill Response Organization who may be involved in the response to oil spills which may occur within Adani Port Limits.

This plan has been prepared as per the stipulation of Ministry of Environment and Forest Clearance (MoEF) and Coast Guard Requirements.

Gujarat Maritime Board

While responsibility for oil spill contingency remains with conservator of the port – Gujarat Maritime Board Port Officer, this plan (Tier 1) demonstrates the readiness of Adani Port for mitigating oil spill incidents.

Port Conservator will monitor and provide the necessary assistance required for administering the oil spill operation within the port limit.

Indian Coast Guard

The Indian Coast Guard has a statutory duty to protect the maritime and other national interests of India in the Maritime Zones of India and to prevent and control marine pollution. Coast Guard is also the Central Co-coordinating Authority for marine pollution control in the country. The Indian Coast Guard is responsible for implementation and enforcement of the relevant marine pollution laws.

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The National Oil Spill Disaster Contingency Plan stipulates the organizational and operational details to effectively combat a national oil spill contingency. The plan promotes the development of Regional and Local Contingency Plans in the three Coast Guard Regions.

The Coast Guard Monitor will assume the role of On Scene Commander in the event that any oil spill involving PLL operations exceeds 700 tons.

Gujarat Pollution Control Board

The Gujarat Pollution Control Board is responsible for, and control, waters up to 5 km from the shoreline. They require to be advised of all pollution incidents.

Ministry of Environment, Gujarat

The Ministry requires to be informed of all pollution incidents.

Emergency Response Team

Emergency Response Team (ERT) is the nomenclature used to describe the command and control team established for an oil spill incident at the jetty or in the jetty approaches, with representatives of organisations attending as described in section 2.4.

The ERT will convene at the Terminal Control Room, under the chairmanship of the Terminal Manager, and will consist of a Management Team and a Support Team as noted in section 2.3.

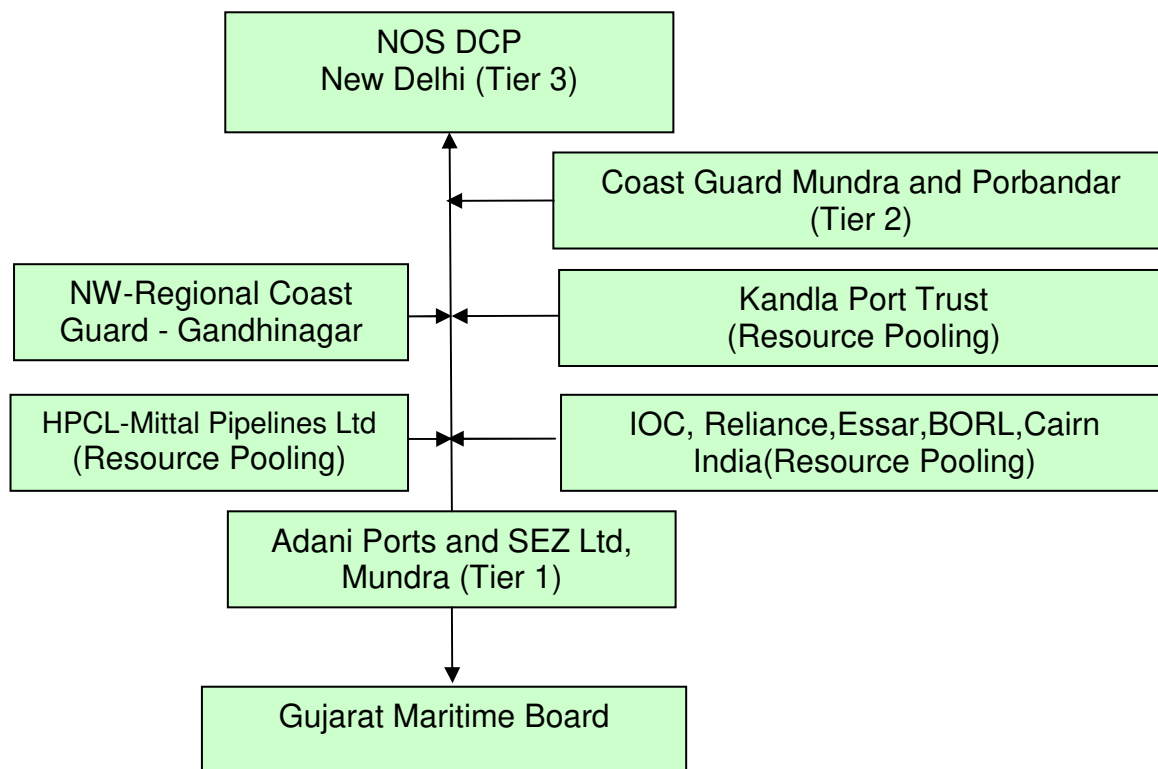
It is a strategic plan to quickly call on additional resources in a systematic manner firstly from Adani port and subsequently from other ports.

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OIL SPILL CONTINGENCY RESPONSE PLAN

1.2 Coordinating Committee



1.3 Statutory requirements

The Indian Government is a signatory to the International Convention on Oil Pollution Preparedness, Response and Co-operation which came into force in May 94. Under the NOSDCP, it is obligatory for a port to have a Local Oil Spill Contingency Plan to combat oil spills within port limits.

This oil spill contingency response plan (Tier 1) is the response plan in accordance with the facilities available at Adani Port only.

This plan is prepared in accordance with:

- a) Marine Environmental Impact Assessment of SPMs, COTs and connecting pipelines of APSEZL at Mundra dated February 2001, prepared by National Institute of Oceanography, Mumbai.
- b) Report on Risk assessment study and On-site disaster management Plan for SPMs, COTs and connecting Pipelines of Adani Ports and Special Economic Zone Limited, by TATA AIG Risk Management Services Limited, dated February 2001.
- c) HAZOP study report of SPM Terminal pipeline project by Intec Engineering, dated 26/02/2004.
- d) IPIECA guide to Contingency planning for oil spills on water.
- e) Oil spill risk assessment and contingency plan study done by M/s Environ Software Pvt. Ltd. (Copy enclosed)

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OIL SPILL CONTINGENCY RESPONSE PLAN**

1.4 Mutual aid agreements

APSEZL signed MOU with HPCL Mittal Pipelines Limited, Mundra operating in the region of Gulf of Kutch to have mutual aid agreement for the purpose of assisting each other within stipulated time frame with best combination of resources to combat and overcome any large and worst spill with the intent of maximizing the availability of the private, public and government sector response resources during oil spills where assistance is requested by another member.

As per agreement, the member agencies of the affected member state or province may directly request cascable response resources located in oil handling agencies operating in the region of Gulf of Kutch.

1.5 Geographical limits of plan

Adani Ports and SEZ Ltd, Mundra is situated at the North head of Gulf of Kutch which is at the west coast of India. Ships calling Adani Port therefore have to traverse across the GOK. This oil spill contingency response plan (Tier 1) is applicable for the following:

- 1) Loading and Unloading of liquid cargo at the Multi-purpose terminal jetty at the Adani Port.
- 2) Unloading of the crude oil the vessels at the single point mooring (SPM) to offload 70,000 to 3,00,000 DWT.
- 3) Bunkering operations carried out within the port limits.
- 4) Any spill that occurs from any source within port limit (including West Basin, South Basin and LNG Terminal) whether at berths, anchorages or in the channel.

APSEZL falls within the area jurisdiction of The Commander, No.1 Coast Guard District (Gujarat), located at Porbandar. Mundra has a full-fledged Indian Coast Guard Station. The Port limit of APSEZL, Mundra is shown in enclosed chart in annexure 14.

1.6 Interface with ROSDCP and NOSDCP

For responding to oil spill, the Indian Coast Guard has developed the National Oil Spill Disaster Contingency Plan NOSDCP which has the approval of the Committee of Secretaries and has been in operation since 1996. The NOSDCP brings together the combined resources of the various organizations and departments, Coast Guard, Ports and Oil handling Agencies, and related industries, to provide a level of preparedness to the threat posed to the marine environment by oil spills.

The NOSDCP sets out a clear definition of the responsibilities of the major participants, such as the Coast Guard, various ministries and departments, ports and oil industry.

The national oil spill contingency plan hierarchy outlined in Figure 1 consists of NOSDCP at the apex level to coordinate significant or disaster type spills, the Regional Oil Spill Disaster Contingency plan (ROSDCP) to coordinate spill in the Gulf of Kutch, utilizing the resources available within the region.

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MUNDRA**

OIL SPILL CONTINGENCY RESPONSE PLAN

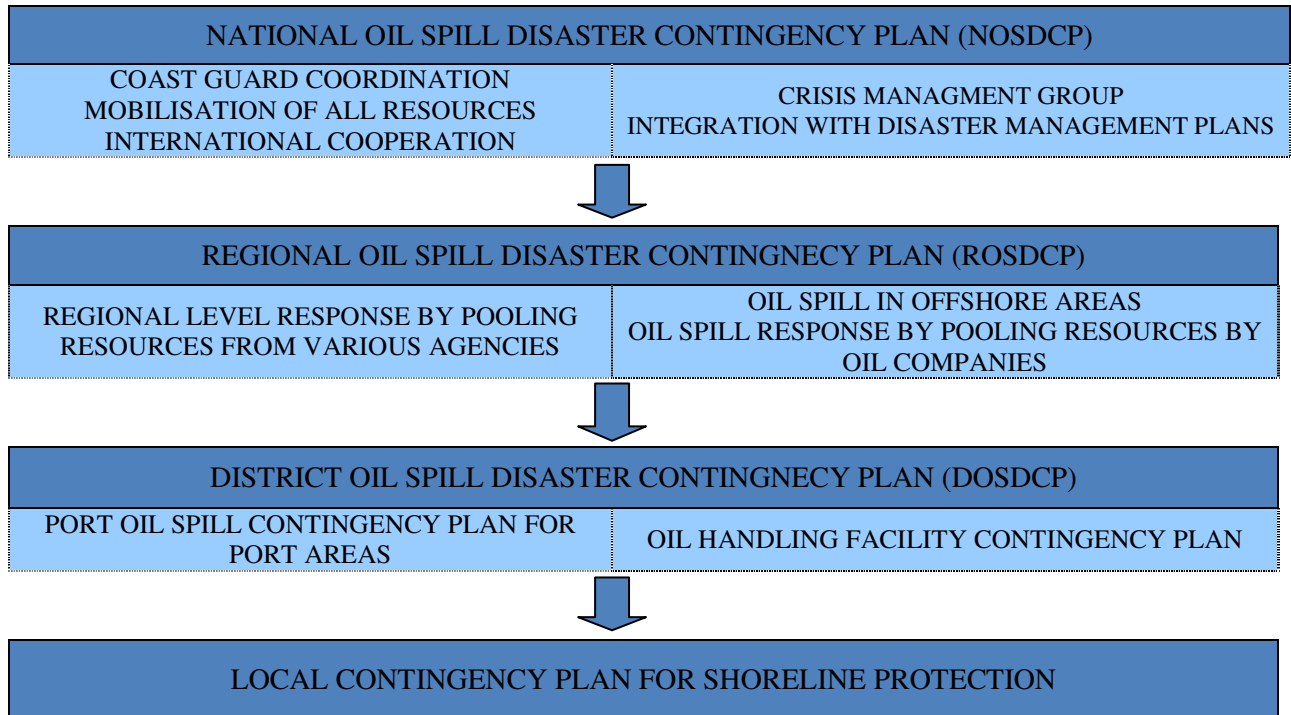


Figure 1 - Contingency Plan hierarchy

The aim of Local Contingency Plan - for the Mundra Port, is to outline arrangements for responding to oil spills in the coastal and shoreline areas, with the aim of protecting against environmental pollution as a result of oil spill or, where this is not possible, minimise the effect and respond the oil spill in an environment friendly manner and dispose the collected oil/debris in according to the existing laws/regulations/orders in force. **CONTINGENCY PLAN FOR SHORELINE PROTECTION**
DISTRICT OIL SPILL CONTINGENCY PLAN

2 Risk Assessment

The number of vessels calling annually at APSEZL is more than 3000 including Chemical and oil tankers. The threat of oil spill is much high in Gulf of Kutch and is very oil spill sensitive area. A marine national park is located in the Southern shore of GOK. There is a popular beach spot on the Northern shore namely Mandvi. Lastly, as GOK is a closed system, any oil spilled will arrive to the shores.

2.1 Identification of activities and risks

The scenario of the spill are classified under two categories :

- Oil Spill at Mundra Port Multi-Purpose Terminals
- Oil Spill at SPM

The oil spill could occur due to various reasons at any of the APSEZL's marine facilities (SPMs, Basins/ berths, anchorage or approach channel) within the new Mundra Port limit. The spills beyond these areas are not covered in this plan. Both the categories are discussed in detail

Accidental oil spill at Multipurpose terminals/ Basins/ berths, anchorage or approach channel is possible from overflow of slop tanks, bunker tanks, reception facility and road tankers (generally a low pressure operation).

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Accidental oil spill at the SPM may be due to hose puncture while unloading, failure of swivel joint of SPM or Leakage of Crude Oil at PLEM or from the submarine pipeline.

Following risks are being addressed to mitigate incident of oil pollution:

- Connection of hoses with established work instructions for use of blank flanges, drip trays etc.
- Thorough understanding of use of OSD and limitations of vessel surging due to slack mooring ropes in given weather conditions.
- Monitoring of ships pump room atmosphere, display of fire notices and acknowledging accidental explosion through the use of IMO ship / shore check list.
- Spillage of F.O. during bunkering operations by using bunkering check list
- Ballast discharge contamination or malfunction of ship's sea side valves by prohibiting such operations without written permission of the port.
- Non use of reception facility of the port by ships on cost plus basis.

Operational leakage

Spill due to floating hose failure at SPM: (183 t, at pumping rate of 10000 m³/h of crude oil for 75 sec): (Spill points - S1 at HMEL SPM & S2 at Mundra SPM)

Crude oil pumping rate from the tanker to the shore tanks will be varying between 5000 m³/hr and 10000 m³/hr. In the present study, the maximum pumping rate of 10000m³/hr has been considered to assess the risk on a higher side. The Safety Break Away Coupling in the crude oil transfer hose will be activated within a few seconds in the event of hose rupture or hose failure. Again for the sake of assessing higher risk, a response time of 60 sec – 75 sec (worst case scenario) is considered to estimate the amount of oil that would spill at the SPM. Thus the quantity of crude oil spill has been estimated to be a maximum of 183 tons in the event of hose failure or rupture.

Spill due to rupture of sub-sea crude oil pipeline from SPM to shore tanks: (384 tons of crude oil, at pumping rate of 10000 m³/hr for 60 sec): Spill point S3 taken at midpoint of the pipeline from HMEL SPM to LFP)

Crude oil pumping rate from the tanker will be in the range of 5000 m³/hr to 10000 m³/hr. In the present study, to assess the maximum risk, pumping rate of 10000 m³/hr has been considered. The minimum wall thickness of sub-sea crude oil pipeline is 15.6 mm and the maximum thickness is 24 mm. Moreover all along, 5 inches concrete cladding (weight coating) is provided on the surface of the pipeline. Crude oil pipelines designed, constructed and laid as per the international norms are safe and leakages are extremely rare during their designed life. However, a rupture of size 1 cm x 12.7 cm has been assumed for assessing the quantum of oil spill through sub-sea pipeline.

The maximum manifold pressure will be 12 kg/cm² and crude oil will be pumped to the shore tanks without any boosting device in-between. As the level in the tanker depletes, discharge pressure would also be reduced. Moreover, with the flow distance the crude oil pressure inside the pipe drops. For the sake of assessing the amount of oil spill in case of rupture of sub-sea pipeline, an average pressure of 10 kg/cm² and a water column height of 35 m have been considered.

Accordingly the quantity of Crude oil spill has been estimated using the formula given by

$$Q = C_d A (2gH)^{1/2}$$

Where,

Q = quantity of spill (m³/s)

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C_d = coefficient of discharge (0.9)

A = Area of rupture (m^2) (1 cm x 12.7 cm)

H = Net head (m) ($6.5 \text{ kg/cm}^2 = 65 \text{ m}$)

This would give a value of 0.04 m^3 of crude oil per sec spilling out of the pipeline through the rupture as the pump will be in operation.

The availability of solenoid operated hydraulic shutoff valves in the sub-sea pipeline, which will get activated in less than 15 seconds time as soon as the pressure falls, will limit the amount of oil leaked in case of pipe rupture and consequent drop inside the pipeline. However 60 sec response time has been considered for quantification of oil spill. Accordingly the quantity of Crude oil spill has been estimated to be 2.4 m^3 before the pump discharge valve closes. However, there will be high pressure inside the pipeline initially and the oil inside the pipeline will start leaking into the waters through the hole as the pressure inside the pipe line is higher than the outside pressure, even after the valve is closed and pumping is stopped. Even after the pipeline inside pressure equalises the outside static pressure acting on the rupture, oil continues to start leaking as the density difference between the oil and water; oil being lighter and LFP is higher in elevation compared to the pipeline elevation. Two factors need to be considered here; the specific gravity of the crude oil inside the pipeline is less than 1 whereas the sea water specific gravity is more than 1. Also depending on the location of the hole/leak, there will always be a static head of sea water acting on the leak when the oil tries to flow out and sea water trying to flow in to occupy the place vacated by the leaked oil. Hence all the oil in the pipeline will not leak and there would be an equilibrium point reached when there would be no more oil leaking from the hole as the sea water pressures effectively blocks the oil leak. Also, the leak would be attended to within the stipulated time as per the standard maintenance procedures followed by the organisation. For the purpose of this study and as a worst case scenario before the leak is repaired by the established maintenance procedures, it is assumed that a maximum of 5% of the pipeline oil volume would leak and though it would be a continuous leak, this total quantity is taken to be instantaneous for the purpose of the study.

The pipeline length is approximately 10 km (from SPM to LFP) and the pipeline size is 42" NB. The pipeline volume works out to be approximately 8662 m^3 or 7622 t.

Hence the total oil leaked due to rupture in sub-sea pipeline will be $2.15 \text{ t} + 5\%$ of pipeline volume of oil in t ($0.05 \times 7622 = 381 \text{ t}$) which works out to be a maximum of 383.45 t, say 384 t of crude oil.

For the purpose of simulation studies, this spill on the pipeline is assumed to have taken place at the midway point from HMEL SPM to LFP (designated as spill point **S3** in the report) and is taken on the sub-sea pipeline from HMEL SPM to LFP. As the pipeline from HMEL SPM to LFP and the Mundra SPM to LFP run very close only one leak point in the pipeline is studied as it gives a representative oil spill study for the pipeline leakage scenario.

Spill due to collision at SPM: (Spill points S1 & S2)

Crude Oil is received at SPM by ocean tankers having capacity between 90,000-360,000 metric tons. Crude Oil is pumped to shore tanks through pipeline/s from the SPM. In the present scenario, collision of the vessel at the SPM or tanker route with another vessel enroute to other terminals can cause partial damage to the vessels cargo tanks (not more than 3 nos. of cargo tanks) leading to a maximum oil spill of about 700 tons to 25,000 tons of crude oil. In the present study, the probable quantity of crude oil spill due collision at SPM is considered as 700 tons at the minimum and as 25,000 tons at the maximum.

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Spill due to collision or grounding in the tanker route: (Spill point S4)

Tankers are expected to call at the SPMs frequently depending upon the demand for the refineries for the crude oil. These tankers may meet accidents like collision with other vessels or grounding in the vicinity of the SPM. In case of such accidents, the spillage may vary depending on the size of the tanker and the extent of damage and number of cargo tanks ruptured etc. In the present study the probable quantity of spill in the tanker route considered for modelling is 25000 tons at a point which lies on the tanker route to SPM not exactly within Mundra port limit; but a spill point is taken along the tanker route in the Gulf but close to the Mundra port limit.

Spills at the berths (applicable to berths at West Basin, South Basin, East Basin, North Basin, LNG berth and existing cargo berths of Mundra port.)

Oil spills can take place at the berths in the basins during the loading / unloading as well as berthing and traversing operations. The likely spill scenarios are discussed below:

a) Spills during the navigation of the vessel along the approach channel: (Spill point S7 for West Basin)

The spill location can be anywhere in the path. One location along the approach path has been selected for carrying out for model runs.

b) Spills around the jetty (in the maneuvering basin / turning circle): (Spill point S6 for West Basin and Spill point S10 for South Basin)

This can occur due to tug boat impacting the vessel and grounding of the vessel. One location around the jetty at the turning circle has been considered for the computational runs

c) Spills at the berths: (Spill point S5 for West Basin, Spill point S9 for South Basin, Spill point S13 for East Basin, Spill point S14 for North Basin, Spill point S8 for LNG jetty, Spill point S11 for MMPT 1 and Spill point S12 for MICT / AMCT berth locations)

During the loading/unloading operations spills may take place due to one or more of the following: –

Hose/ loading arm leakage (liquid products handled at the liquid berth), overflow on the vessel deck, vessel grounding at the jetty, vessel colliding with jetty, fire and explosion on the vessel or at the jetty, during bunkering operations etc.

Spills along approach Channel / Route

Vessels to the port berths follow the Deep Water route in Gulf of Kutch and Pilot boards at Pilot Boarding Ground “A” or “B”, subject to tide and the berth allotted to the tanker.

While the risk of grounding is low, it cannot be wholly eliminated; the most likely causes are steering or propulsion system failure or navigational error, any of which could result in grounding on the channel margins. Given that the bed of the Gulf is rocky at some places the likelihood of any significant hull damage cannot be ruled out. In a general case scenario, weld fractures in the forward bunker tanks could give rise to a release of approximately 10 Tons of diesel oil and in a worst case scenario extensive damage to the bunker tanks may occur which would cause a spill of 500 to 700 t of FO spill.

Collision

The risk of collision while transiting the channel is negligible given the reason that port authorities use sophisticated ship tracking and navigational systems as the Gulf traffic has increased. These systems would ensure that the chances of any collision are remote or non-existent when ships / marine craft traverses / transits through the channel. However, even if any collision occurs, it is beyond reasonable

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doubt that such an incident would result in the fore part rather than the parallel mid-body of the vessel and the loss of integrity of hull plating of a cargo tank is most unlikely. A spill quantity of 700 t can be the maximum in such a scenario.

Berthing Incident

Oil and/ or liquid chemical spill can occur as a result of hull coming in contact with the corners of the jetty structure during ship berthing or un-berthing maneuvers. Such incidents are generally due to failure of a

vessel's main propulsion or steering systems, loss of control onboard on support tug in attendance or Master error or wrong judgment.

The potential spill quantities involved depend on the vessel type and the location and extent of the impact damage; hull damage to a 20000 DWT – 80000 DWT tanker / vessel in way of a forward or aft wing tank, for example, could give rise to a release of some 500 Tons of product. The potential spill quantity, should hull plating be ruptured in way of an aft wing diesel oil bunker tank can, historically, be up to 100 Tons.

Tug Impact

There are well-documented incidents where cargo or bunker oil has been released as a result of hull impact damage by tugs. This can occur when tugs are approaching a vessel underway prior to berthing, or when coming alongside a moored vessel prior to un-berthing. The potential spill quantities again depend on the location and extent of the impact damage but can be over 20 tons for Diesel oil and 100 Tons for cargo (FO) oil. Spills from this cause are considered to be of low likelihood but the risk is acknowledged.

Loading Arms / Flexible hoses

The operation of loading arms / flexible hoses can lead to minor releases of oil. Common sources are vent valves, swivel joints and hydraulic lines. Such spillage seldom exceeds 0.1 Tons.

Cargo Tank Overflow

Cargo tank overflows can occur on board loading vessels; spills of this nature can be due to instrumentation failure, tank valve mismanagement or operator error. The spill quantity is a function of the flow rate and also the number of tanks being loaded at the time of the incident. Some of the oil and/or chemical will be retained on deck but, in a worst case scenario, up to 3 tons could escape overboard.

Hull Failure

The incidence of oil pollution due to hull failure is low and some 84% of the incidents attributed to this cause by ITOPF involved spill quantities of less than 7 tons; these spills were caused mainly by minor hull fractures and weld failures. The potential for more serious incidents with spill quantities in excess of 700 tons must however be acknowledged.

Fire and Explosion

Fires and explosions on board ship represent a safety hazard with the risk of pollution as a secondary impact. Most tankers engaged for trading will be equipped with inert gas systems. Given the controls, which are imposed and enforced by APSEZL authorities in respect of the oxygen content of cargo tanks, the risk of fire and/or explosion in the cargo spaces must be regarded as minimal, insofar as cargo transfer operations are concerned.

Strict monitoring and control of the main cargo pump room atmosphere will minimize the fire and explosion risks associated with this space.

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Fires resulting from uncontrolled smoking in the accommodation, unauthorized hot work such as welding, and engine room fires can spread rapidly if not dealt with swiftly and can give rise to incidents of a very serious nature.

While the likelihood of fire or explosion occurring on board vessels berthed at the Mundra port berths is low, the risk is nevertheless acknowledged. Such an incident could give rise to a spillage of 700 tons or more.

Bunkering – spillage of fuel oil

Bunkering at the port may sometimes give rise to spills due to hose failure and / or bunker tank overflow etc. in spite of the strict regulatory supervision of the port operations. These spills could be as small as a few kgs to a maximum of 500 t of FO.

As can be seen from the spill scenarios mentioned above, the spills range from extremely negligible quantities to enormous quantities in rare catastrophic events. The simulation of oil spills does not vary significantly in various scenarios except for the magnitude of impact zone and the quantity involved in such impacts. Though the software is intended to be used for specific scenarios so as to get the trajectory and other weathering information; in this study, a few hypothetical scenarios have been simulated and computations carried out considering the worst-case scenarios of oil spills at the different likely locations in the domain.

Based on the above deliberations, the following scenarios for computations have been selected for carrying out modeling studies for the oil spill trajectory and weathering processes.

Computational Scenarios:

Spill Locations	Pre-monsoon (Jan)	Monsoon (July)	Post monsoon (Nov)
SPM			
Crude oil spill of 183 t at the pumping rate of 10000 m ³ /hr (for 75 sec release) at the SPMs (due to Hose failure) Spill points: S1 and S2 During spring and neap tide conditions (tide conditions : PF and PE)	■	■	●
Instantaneous crude oil spill of 700t at the SPMs Spill points: S1 and S2	■	■	●
Instantaneous crude oil spill of 25000t at the SPMs -- Spill points: S1 and S2	■	■	●
Pipeline Leakage			
Crude oil spill of 384 t at the pumping rate of 10000 m ³ /hr (for 60 sec release) along the pipeline corridor at a select (midway) point of subsea pipeline in the pipeline routes. -- Spill point: S3	■	■	●
Tanker route			
Instantaneous crude oil spill of 25000t along the tanker route at select location. Spill point: S4	■	■	●

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West Basin (berths)			
100 tons (due to Berthing incident/ collision) at the West Basin berths (FO) Spill point: S5	■	■	●
50 Tons (due to Berthing incident/ collision (diesel oil tanks) at the West Basin berths (HSD) Spill point: S5	■	■	●
700 Tons due to Hull Failure / Fire / Explosion (FO) at the berths -- Spill point: S5	■	■	●
In the maneuvering basin: <ul style="list-style-type: none"> ○ 20 Tons of HSD oil due to Tug Impact (HSD) ○ 100 Tons of FO due to Tug Impact Spill point: S6	■	■	●
Along the vessel route at one location: Instantaneous oil spill of 700t along the tanker route at a select location.(FO): Spill point: S7	■	■	●
LNG Berth			
100 tons (due to Berthing incident/ collision) at the LNG berth (FO) -- Spill point: S8	■	■	●
50 Tons (due to Berthing incident/ collision (diesel oil tanks)) at the LNG berth (HSD) – Spill point: S8	■	■	●
700 Tons due to Hull Failure / Fire / Explosion (FO) at the berth-- Spill point: S8	■	■	●
South Basin (Berths)			
100 tons (due to Berthing incident/ collision) at the South Basin berths (FO) -- Spill point: S9	■	■	●
50 Tons (due to Berthing incident/ collision (diesel oil tanks) at the South Basin berths(HSD) – Spill point: S9	■	■	●
700 Tons due to Hull Failure / Fire / Explosion (FO) at the berth -- Spill point: S9	■	■	●
At the turning circle: <ul style="list-style-type: none"> ○ 20 Tons of HSD oil due to Tug Impact ○ 100 Tons of FO due to Tug Impact Spill point: S10	■	■	●
At the existing MMPT 1 Berth: : Spill Point S11			
100 tons (due to Berthing incident/ collision) at the berth(FO) -- Spill point: S11	■	■	●
50 Tons (due to Berthing incident/ collision (diesel oil tanks)) at the berth (HSD) – Spill point: S11	■	■	●
700 Tons due to Hull Failure / Fire / Explosion (FO) at the berth	■	■	●

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At the existing MICT / AMCT Berths: : Spill point S12			
100 tons (due to Berthing incident/ collision) at the (FO) - Spill point S12	■	■	●
700 Tons due to Hull Failure / Fire / Explosion (FO) at the berth - Spill point S12	■	■	●
At the East Basin: Spill point S13			
100 tons (due to Berthing incident/ collision) at the East Basin berth (FO) - Spill point S13	■	■	●
At the North Basin: Spill point S14			
100 tons (due to Berthing incident/ collision) at the North Basin berth (FO) - Spill point S14	■	■	●

2.2 Types of oil likely to be spilled

Mundra Port mainly deals with Vegetable oils, Furnace oil, Naphtha, Methanol, High Speed Diesel, Super Kerosene Oil and other light oils at its Multi-Purpose terminal. The vessels calling at the port (or the designated anchorage areas) may spill fuel, diesel or a minimal quantity of lubricating oils. The SPM is being used to discharge crude oils from tankers.

At Berths:

- Vegetable oils,
- Furnace oil,
- Naphtha,
- Methanol,
- High Speed Diesel,
- Super Kerosene Oil,
- Carbon Black Feed Stock (CBFS),
- Motor Spirit,
- Other light oils

At SPM:

- Crude oil

At anchorages or within port limits:

- Fuel oil,
- Diesel oil,
- Minimal quantity of lubricating oil.

2.3 Probable fate of spilled oil

APSEZL is all weather, commercial port with geographical and hydrological advantages on the West Coast of India, in the Gulf of Kutch. Tidal range is between +0.37 m during Neaps and + 6.40 m during springs. Tidal streams flow 070° – 250° at an average rate of 3 kts and 4-5 kts during spring tides.

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It has been observed from the modeling study that during pre-monsoon season, the spills occurring at the APSEZL marine facilities move towards the southern / southwestern part of the Gulf of Kutch nearer to the facilities depending on tide phase.

The spills taking place at the APSEZL marine facilities move towards northern coast of Gulf of Kutch during monsoon season and affect the coast near Mundra, Kandla etc.

During post - monsoon season, the spills taking place at the APSEZL marine facilities move towards south / southwest and affect the islands /coast on southern side of the Gulf of Kutch.

The surface or subsurface oil spill consists of slick floating on the water surface, which partially dissolves in the water and partially evaporates into the atmosphere. There is a continuous exchange between the suspended and surface oil (floating oil). The assumption made in deriving the governing equations is that the thickness of the oil layer is negligible in comparison with the water depth.

In addition to the location, size and physico-chemical properties of the spill, other major factors affect the fate of the oil slick are governed by complex interrelated transport (turbulence) and weathering processes (evaporation, emulsification and dissolution). The spilled oil spreads and moves by the forces of winds and currents. A small portion of hydrocarbons begin to go into solution in the underlying water column, but most of the oil is lost through evaporation into the atmosphere. In the present model, all these processes are considered in the transport of Oil Slick.

Out of the above mentioned oils the vegetable or light oils do not pose any significant threat to the environment.

The spilled 'persistent' crude oil (or fuel oil) undergoes a number of physical and chemical changes known as "weathering". The major weathering processes are spreading, evaporation, dispersion, emulsification, dissolution, oxidation sedimentation and biodegradation.

The term persistent is used to describe those oils which, because of their chemical composition, are usually slow to dissipate naturally when spilled into the marine environment and are therefore likely to spread and require cleaning up. Non-persistent oils tend to evaporate quickly when spilled and do not require cleaning up. Neither persistence nor non-persistence is defined in the Conventions. However, under guidelines developed by the 1971 Fund, an oil is considered non-persistent if at the time of shipment at least 50% of the hydrocarbon fractions, by volume, distill at a temperature of 340°C (645°F), and at least 95% of the hydrocarbon fractions, by volume, distill at a temperature of 370°C (700°F) when tested in accordance with the American Society for Testing and Materials Method D86/78 or any subsequent revision thereof."

- a) **Spreading:** is one of the most significant processes during early stages of a spill is initially due to gravity. The oil spreads as a coherent slick and the rate is influenced by its activity. After a few hours, the slick begins to break-up and after this stage, spreading is primarily due to turbulence. Wind and wave actions also tend to fragment the slick, breaking it up into islands and windrows.
- b) **Evaporation:** The rate and extent of evaporation depends primarily on the volatility of the oil. In general, oil components with a boiling point below 200 D C evaporate within 4 to 16 hours in tropical conditions. Spills of refined products such as kerosene and gasoline evaporate completely and light crude lose up to 40 % of its volume within a few hours. In contrast, heavy crude and fuel oils undergo little evaporation.
- c) **Dispersion:** Waves and turbulence act on the slick to produce droplets of oil of different sizes. Small droplets remain in suspension while the larger ones rise to the surface. The rate of dispersion mainly depends on the nature of the oil and the sea state. Oils which remain fluid can spread unhindered by other weathering processes can disperse completely in moderate sea conditions within a few days. Viscous oils tend to form thick lenses on the water surface with slow tendency to disperse, which can persist for several weeks.

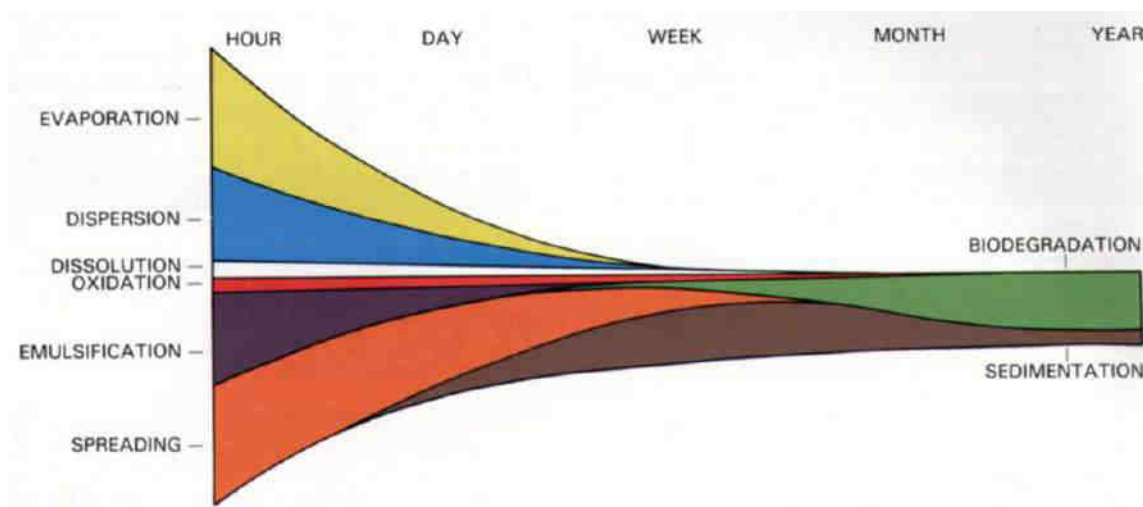
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- d) **Emulsification:** Several oils have tendency to absorb water to form water-in-oil emulsions thereby increasing the volumes of the emulsified mass by a factor of 3 to 4. The rate at which the oil is emulsified is largely a function of sea state though viscous oils absorb water slowly. In turbulent sea conditions, low viscosity oils can incorporate as high as 80 % water by volume within 2 to 3 hours.
- e) **Dissolution:** The heavy components of crude oil are virtually insoluble in sea water while lighter compounds are slightly soluble. Hence levels of dissolved PHC rarely exceed 1 mg/l following a spill. Therefore, dissolution, does not make a significant contribution to the removal of oil from the sea surface.
- f) **Sedimentation:** Very few oils are sufficiently heavy to sink in sea water. However, the weathered residue gets mixed up with the suspended substances in water and may sink. This process becomes significant when water-in-oil emulsions attain specific gravity near to one and therefore need very little suspended substances to exceed the specific gravity of sea water (1.025).
- g) **Oxidation:** Hydrocarbon molecules react with oxygen and either breaks down into soluble products or combine to form persistent tars. Many of these oxidation reactions are promoted by sunlight and their effect on overall dissipation is minor in relation to other weathering processes.
- h) **Biodegradation :** Sea water contains a range of marine bacteria, moulds and yeasts which can use oil as source of carbon and energy. The main factors affecting the rate of biodegradation are temperature and the availability of oxygen and nutrient, principally compounds of nitrogen and phosphorous. Each type of micro-organism tends to degrade a specific group of hydrocarbons and whilst a range of bacteria exists between them which are capable of degrading most of the wide variety of compounds in crude oil, some components are resistant to attack.

Because the micro-organisms live in sea water, biodegradation can only take place at an oil/water interface. At sea, the creation of oil droplets, either through natural or chemical dispersion, increases the interfacial area available for biological activity and so enhances degradation.

The processes of spreading, evaporation, dispersion, emulsification and dissolution are most important during the early stages of a spill whilst oxidation, sedimentation and biodegradation are long-term processes, which determine the ultimate fate of oil. Fig.3.1 shows schematic diagram of weathering processes with time.



Schematic diagram of weathering processes with time

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It should be appreciated that throughout the lifetime of an oil slick, it continues to drift on the sea surface, independent of these processes. The actual mechanism governing movement is complex but experience shows that oil drift can be predicted by taking into account wind-induced effects and surface water currents. These can be calculated using mathematical modeling to determine the oil spill trajectory. The wind-induced effect is normally taken as 1-3% of the wind velocity, and the current effect as 110% of the current velocity. Reliable prediction of slick movement is clearly dependent upon the availability of good wind, tide and current data.

An understanding of the way in which weathering processes interact is important in forecasting their combined effect in changing the characteristics of different oils and the lifetime of slicks at sea. In order to predict such interactions, numerical models have been developed, based on theoretical and empirical considerations.

Accidental oil spills as indicated in 'Oil Spill Scenario' in section 2.1 of this plan might occur in the area of SPM. On the basis of the data modeled, the results indicate that

- a) about 38 % of hydrocarbons are lost by evaporation, 2.8 % by emulsification and 0.75 % by dissolution within 5 hours;
- b) the quantum of dissolved oil increases up to initial 5 hours and thereafter decreases as lighter (more soluble) hydrocarbons evaporate;
- c) after 50 hour, no oil dissolves;
- d) the trend of emulsified oil is similar to that of evaporated oil but emulsification occurs at a slow rate;
- e) the radius of oil slicks increases to nearly 1400 m at the end of 148 hours; and
- f) the maximum PHc concentration in water is about 39 µg/l.

The spill trajectories clearly reveal the dominance of wind in deciding the location of landfall of the weathered oil. Thus during June-August, the spill will be preferentially transported in the north east direction under the influence of south west winds while during October-November, and possible up-to February, the oil will be predominantly carried to the southern shore. It is also evident that under the influence of the southwest winds, the oil will be deposited on the northern shore within 60 hours, while it might take about 80 hours to reach the southern shore during north east winds.

2.4 Development of oil spill scenarios including worst case discharge

The scenario of the spill are classified under two categories:

- 1. Oil Spill at Mundra Port Multi-Purpose Terminals/ Basins
- 2. Oil Spill at SPM

Oil Spill at Mundra Port Multi-Purpose Terminals/ Basins

- a) Leak during cargo transfer operations Minor (250 liters)

This can occur at the start of cargo operations, during operation due to leakage in pipes, expansion joints, and at the time of disconnection of hose at manifold. However, such instances are remote on implementation of International Safety Management by Ships and Quality Management systems by Port.

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b) Slop tank / bunker tank overflow at, Jetty / Ship Minor (250 - 1000 ltrs.)

This source of pollution is purely of an accidental nature. The ship is expected to be ship shape with good trained crew and this has been emphasized to the Master of the vessel at the time of cargo transfer / bunkering. Based on a rate of 20 cbm/hr. and reaction time of 1 min, and hose content of 150 ltrs., likely spill is only 250 litres. A ship shore check list for cargo operations and bunkering is employed. A joint declaration is made by Marine Staff and Chief Officer / Master and enforced by Marine Manager. This results in good ship / shore co-ordination.

c) Spill during berthing (tug impact) Moderate (3000 liters)

Accidental contact with tugs or another marine structure is a possibility but quantum is not going to be significant because of Fendering system employed and training given to tug crews. Also with concept of double hull tanker the entire cargo compartments are protected by another hull, thus cargo spillage due to impact of tug is remote.

d) Grounding / Hull Damage :

APSEZL operates dry cargo & liquid cargo berths. Tankers mainly carry Furnace oil, Naphtha, Methanol, High Speed Diesel, Super Kerosene Oil and Vegetable oil. Oil transfer operations at the jetty are supervised by Liquid terminal staff. Manifold area has receptacle facilities to prevent accidental spills at connection / disconnection time. Berthing is done under controlled conditions and spill due to contact damage to underwater oil tanks is very remote. Radio officer controls movement of vessels in and around the berth and traffic presently is insignificant to pose any collision damage risk. Under water sea bed characteristic is soft sand. The berth area of about 500² m is surveyed monthly for any changes and underwater obstructions; hence grounding resulting into oil spill is very remote.

Oil Spill at SPM

a) Hose Puncture while unloading:

In such an event, crude oil, about 10670 Kgs may spill onto water. On spillage the oil slick will be carried away at a distant location depending upon water current and wind direction. The trained crew of the maintenance vessel patrolling the area during unloading, would control the oil slick movement by using booms and subsequently, the oil will be collected by the skimmer.

b) Failure of Swivel joint of SPM:

In this event about 17780 Kgs of crude oil may spill onto water. In this case the leakage may be detected visually by the personnel monitoring the operation from the ship tanker or by the detectors provided on the SPM.

c) Leakage of Crude oil at PLEM or from the submarine pipeline:

This case will occur at least 20 m below the water surface, oil being lighter than water will travel upward and float on to water. By the time oil water reaches the sea water surface, the oil droplets may start undergoing "weathering process" and it may form emulsion along with water.

d) Ship Collision Frequency :

Based on the statistical data and its analysis carried out by National Institute of Oceanography, the probability of this type of accident is about one in every seven years for the traffic projection and hence, this case is ignored.

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e) Ship Grounding Frequency :

Based on the statistical data and its analysis carried out by National Institute of Oceanography, the probability of this type of accident is about one in eleven years for the traffic projection and hence, his case is also ignored. Also with concept of double hull tanker the entire cargo compartments are protected by another hull, thus cargo spillage due to grounding is remote.

2.5 Shoreline sensitivity mapping

Gulf of Kutch is a typical semi-enclosed basin where the tidal forces interact with the open ocean waters of the sea, across its western open boundary at Okha. The currents of the region are tidal-driven and the water column is vertically well mixed. These features make the numerical modeling task easier, as a 2-D hydrodynamic model is sufficient to accurately reproduce the tides and currents for the study region in the Gulf of Kutch at Mundra.

The model domain of longitudes of 68° 50' 56.7" E and 70° 27' 36.9" E and the latitudes of 22°14' 58.8" N and 23° 01' 49.1" N is selected for carrying out sensitivity analysis and predicting the fate and transport of oil spill that may take place at APSEZL's SPMs, Basins, berths and tanker route near Mundra coast in Gulf of Kutch.

The bottom roughness in the Gulf of Kutch varies due to the variation of bed sediment grain sizes. The bed consists of various sizes of clay, sand, silt and rocky soils. In the present study a uniform Manning's roughness coefficient has been used for numerical runs of hydrodynamic processes. The filled contours of Chezy's roughness coefficient are shown in Fig. A.1.4. The same roughness coefficient has been used to predict tides and tidal velocities in the Mundra area for prediction of oil spill trajectory.

The interpolated Chezy's coefficient calculated based on Manning's roughness and total water depth is shown in Fig.A1.4. The sensitivity analysis has been carried out with various Manning's value, which is the combined effect of d_{50} sediment size and bed configuration, to calibrate the model with respect to the tide data of March and October 1994, at Sikka. The computational runs were continued with various sets of various bed roughness values till computed and measured tide levels are within the acceptable limit.

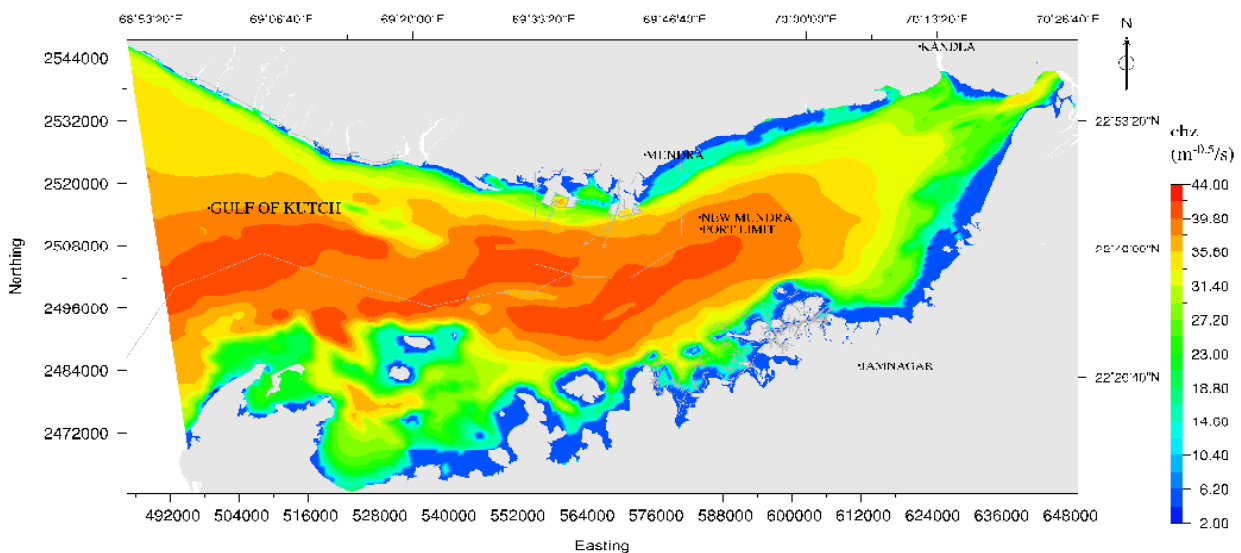


Fig.A1.4 Chezy's coefficient

For Shoreline sensitivity mapping refer Volume 2 (Annexure-V, VI and VII) of Oil Spill Risk Assessment.

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2.6 Shoreline resources, priorities for protection

The SPMs and the Marine facilities (Existing Berths, South Basin, West Basin, North Basin, East Basin and LNG Berth etc.) are located in the Northern side of Gulf of Kutch at Mundra. VLCCs bring Crude oil and unload at the two SPMs which are connected to the Shore tanks by means of Submarine pipelines. The Crude unloaded at these SPMs is pumped through Submarine pipeline to Shore tank farm area.

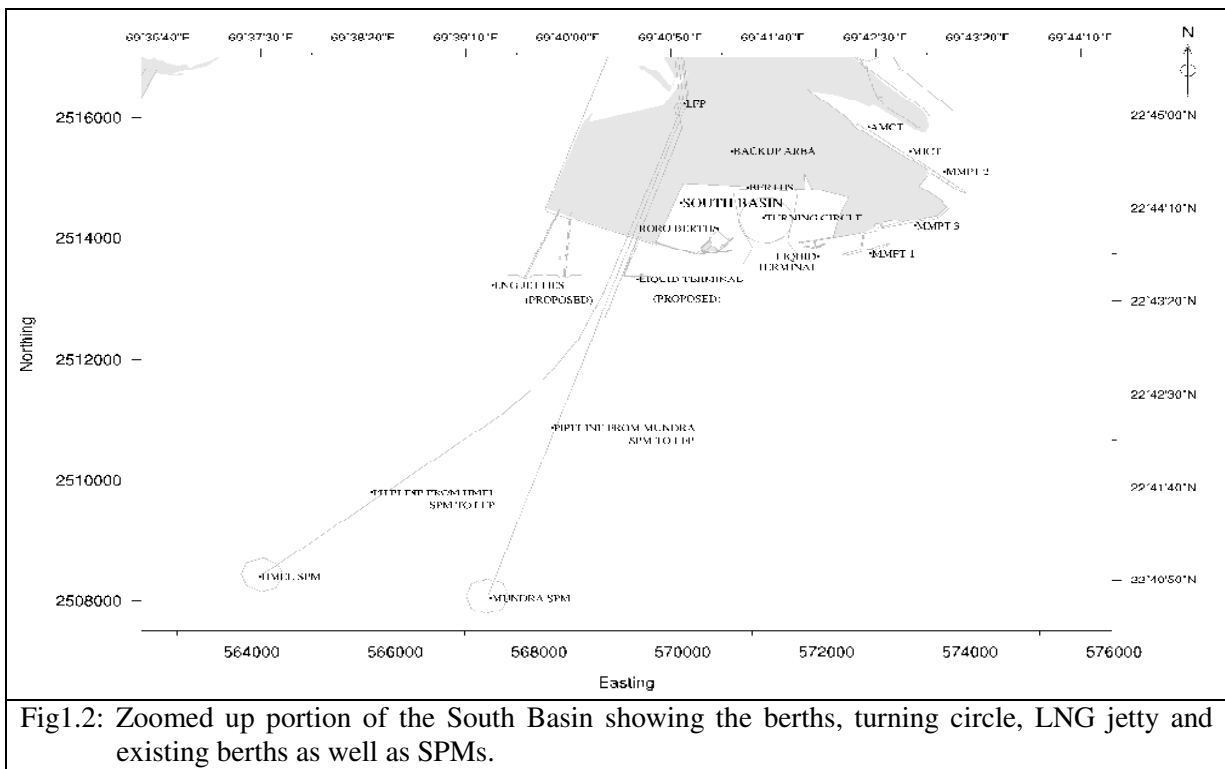
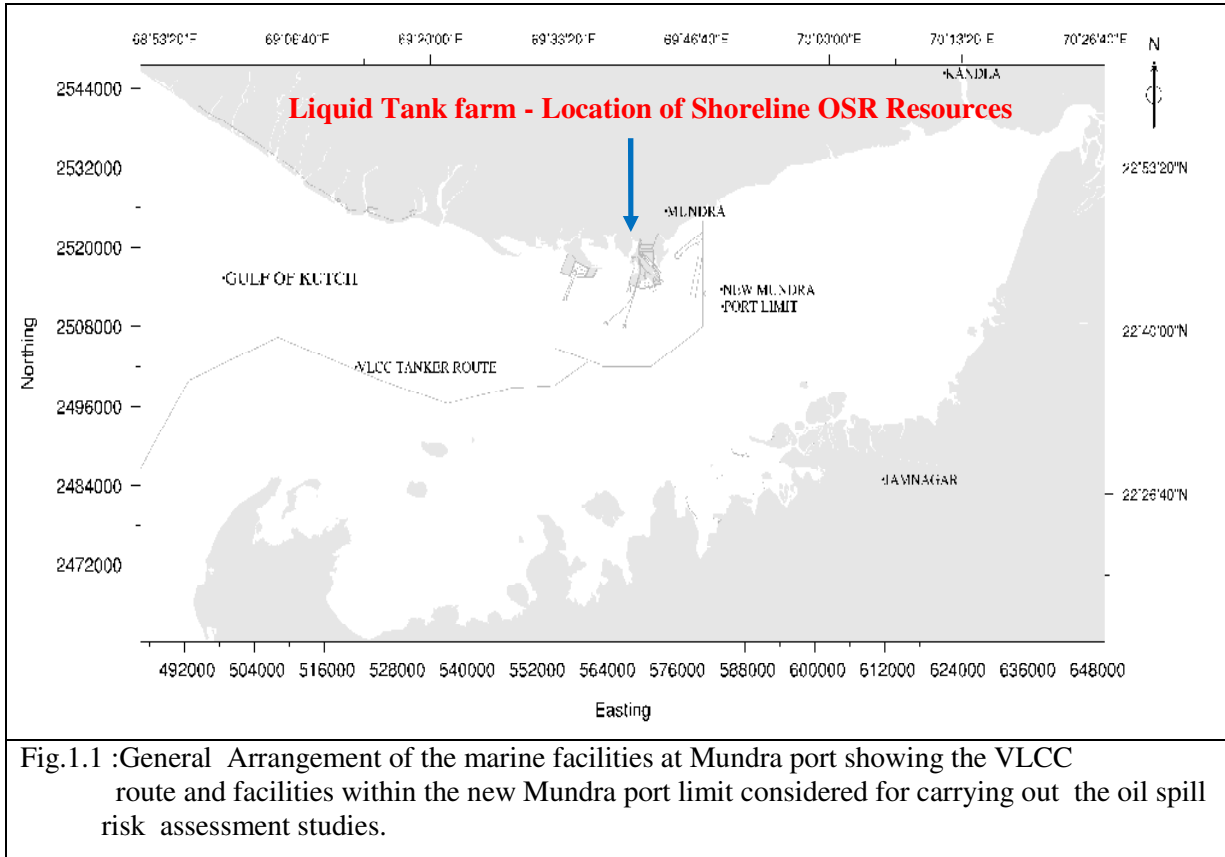
Various Marine craft / solid cargo/ liquid cargo vessels traverse through the Gulf waters to berth at the various Terminals / Berths located in the new Mundra port limit. The general layout of the various facilities like SPMs, terminals etc. within the Mundra port limit area are shown in Fig.1.1 to Fig.1.4 in chapter 1. There is a probability of spillage at SPMs, along the sub-sea pipelines and tanker route during unloading operations and transportation. Apart from these operations at the SPMs, loading / unloading operations at the different berths of the Mundra port – South Basin, West Basin, North Basin, East Basin, LNG jetty and existing berths also may give rise to accidental spills at the berth locations. The spills at these locations may affect the shore and other facilities along the coast of Gulf of Kutch. The coast of Mundra has tidal flats, sand bars and not much in the way of mangroves. The mangroves, Marine Park / Marine Sanctuary etc. are on the Southern side of Gulf of Kutch. As it was observed that the spills occurring at the various locations of the APSEZL Marine facilities may reach the Coast on the Northern side as well as on the Southern side of the Gulf depending upon the season, there is a need to protect the environment in the event of an oil spill at any of the APSEZL Marine facilities.

Shoreline Resources available with APSEZL, Mundra for deployment during shoreline cleanup/emergent situation:

Item	Quantity
Oil Spill Dispersants	15000 liters
Sorbent pads	2000 nos.
Portable dispersant storage tank: 1000 ltr capacity	1 no.
Portable pumps	2 nos.
Oil discharge hose, 3", 2 x 10 m	1 set
Tanker Trucks	04 nos.
Mini Vacuum Pump (30 m ³ / hr)	05 nos.
Sorbent Boom Pack(12.5cm x 4 M)	500 mtr
Slurry Pump (60 m ³ / hr)	01 no.
Start Tank with capacity 10000 liter(10 m ³)	02 nos.
OSD Applicator- Oil Dispersant Spry Unit(20 ltr) for use on beach and inter tidal zones	02 nos.

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Fig.1.3 Zoomed up portion of the West Basin showing the berth locations and the approach channel for the vessels

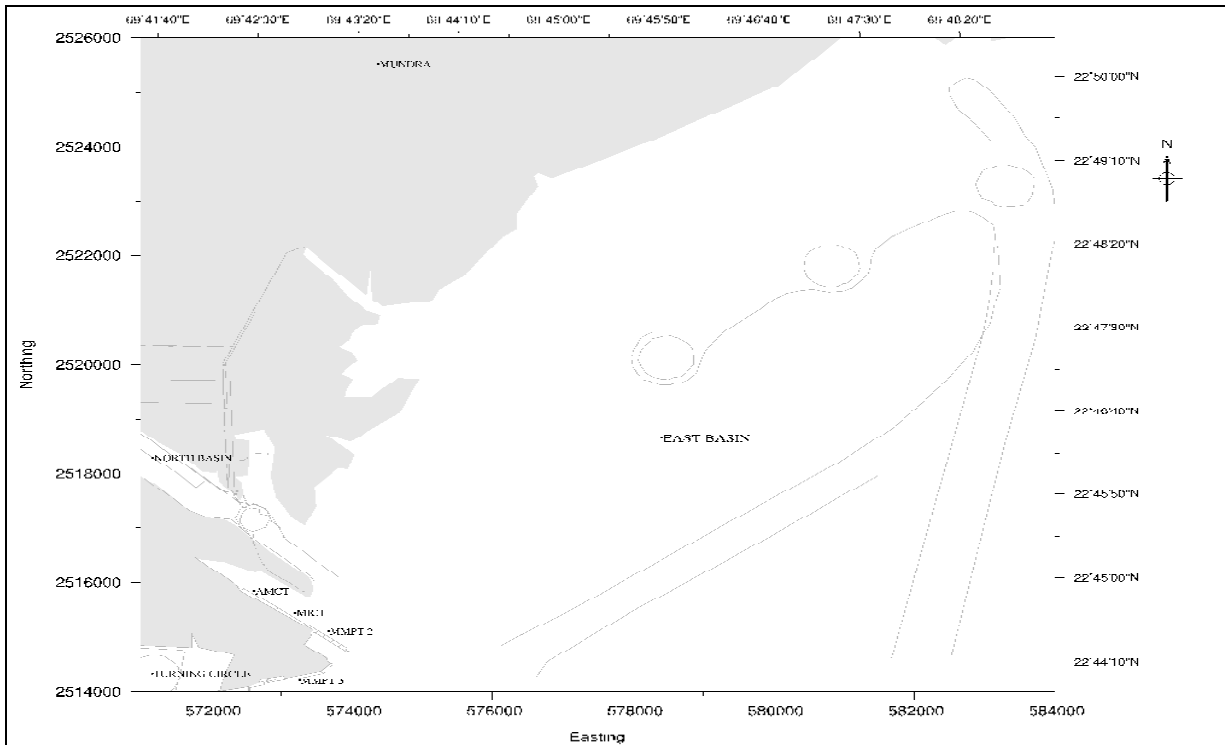


Fig.1.4 Zoomed up portion showing the East Basin & North Basin

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Marine resources in Gulf of Kutch

Phytoplankton

Phytoplanktons are vast array of minute and microscopic plants passively drifting in natural waters and mostly confined to the illuminated zone. In an ecosystem these organisms constitute primary producers forming the first link in the food chain. Phytoplankton long has been used as indicators of water quality. Some species flourish in highly eutrophic waters while others are very sensitive to organic and/or chemical wastes. Some species develop noxious blooms, sometimes creating offensive tastes and odours or anoxic or toxic conditions resulting in animal death or human illness. Because of their short life cycles, plankton responds quickly to environmental changes. Hence their standing crop in terms of biomass, cell counts and species composition are more likely to indicate the quality of the water mass in which they are found. Generally, phytoplankton standing crop is studied in terms of biomass by estimating chlorophyll and primary productivity, while in terms of population by counting total number of cells and their generic composition. When under stress or at the end of their life cycle, chlorophyll in phytoplankton decomposes to phaeophytin as one of the major products.

Phytopigments

During April 2010, the phytoplankton pigments viz. chlorophyll a (1.7 – 2.4 mg/m³; av 1.9 mg/m³) and phaeophytin (0.3 – 1.2 mg/m³; av 0.7 mg/m³) varied considerably. In October 2010, chlorophyll a ranged from 2.0 – 4.2 mg/m³ (av 3.1 mg/m³) and phaeophytin from 0.7 - 1.1 mg/m³ (av 0.7 mg/m³) (Tables 8.1 and 8.2). The average concentration (mg/m³) of chlorophyll a off Vadinar during different sampling events (2010) is listed in Table 8.1:

Table 8.1: Average chlorophyll a (mg/m³) off Vadinar (April 2010 to October 2010)

Area	Pathfinder	Nearshore	ESSAR DP	IOC SPM	ESSAR SPM	Salaya Creek	Gulf
April 2010	2.4	2.1	1.9	1.4	2.0	2.0	1.7
Oct 2010	2.1	4.2	2.8	4.1	2.0	-	3.7

The values of phaeophytin during the present monitoring period are given in Tables 8.2, while, the average concentrations (mg/m³) between different sampling events (April 2010 and October 2010) are listed in Table 8.2.

Table 8.2: Average phaeophytin (mg/m³) off Vadinar (April 2010 to October 2010)

Month	Pathfinder	Nearshore	ESSAR DP	IOC SPM	Essar SPM	Salaya Creek	Gulf
April 2010	1.2	0.6	0.8	0.3	0.6	0.8	0.6
Oct 2010	1.1	0.9	1.1	0.9	0.7	-	0.8

Phytoplankton population

As is generally the case with Coastal waters, the phytoplankton population density (68-332 nox10³/l; av 186 no x 10³/l) and generic diversity (11-30 no; av 18 no) varied over a wide range and in a random manner during April 2010 (Table 8.3). In October 2010 the phytoplankton population density ranged from 100-789.6 nox10³/l (av 329.4 no x 10³/l) and generic diversity ranged from 12-25 no (av 19 no) (Table 8.4) off Vadinar.

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Table 8.3: Average phytoplankton population density (no x 10³/l) and total genera (no) off Vadinar (April 2010 to October 2010)

Month	Pathfinder		Nearshore		ESSAR DP		IOC SPM	
	Cell count (nox10 ³ /l)	Total genera (no.)	Cell count (nox10 ³ /l)	Total genera (no.)	Cell count (nox10 ³ /l)	Total genera (no.)	Cell count (nox10 ³ /l)	Total genera (no.)
Apr-10	216.2	19	200.5	17	192.7	15	127.7	18
Oct 2010	203.1	19	446.6	20	323.6	23	360.4	18

Month	Essar SPM		Salaya Creek		Gulf	
	Cell count (nox10 ³ /l)	Total genera (no.)	Cell count (nox10 ³ /l)	Total genera (no.)	Cell count (nox10 ³ /l)	Total genera (no.)
Apr-10	124	16	198.5	18	211	15
Oct 2010	260	16	-	-	487.6	14

The above results indicated wide temporal and spatial fluctuations in the standing stock of phytoplankton between April 2010 and October 2010 off Vadinar. In general, the coastal waters revealed high average cell counts during October 2010 as compared to previous data. The generic diversity of phytoplankton during April 2010 widely varied with the dominance of genera such as Nitzschia (17.7%), Guinardia (16.7%), Skeletonema (9.1%), Thalassiosira (7.4%), Hemiaulus (7.2%), Navicula (6.1%), Rhizosolenia (4.5%), Biddulphia (3.4%) and Leptocylindrus (3.4%). In October 2010, the dominant phytoplankton genera were Leptocylindrus (57.6%), Guinardia (13.9%), Nitzschia (8.1%) and Chaetoceros (7.2%)

Mangroves

According to one estimate the dense mangrove cover of Narara Bet is spread over an area of 5.5 km². The mangrove area has increased in recent years due to extensive plantations made by the Forest Department. Mangrove cover and mudflat areas (km²) in Jamnagar, Lalpur, Khambalia and Kalyanpur Talukas estimated based on satellite data are given in Table 8.4 below:

Table 8.4: Mangrove areas (km²) along Jamnagar coast

Taluka	Mangroves (Dense)	Mangroves (Sparse)	Tidal mudflats
Jamnagar	12.03	23.91	83.53
Lalpur	1.96	3.95	50.50
Khambalia	3.86	11.48	101.94
Kalyanpur	0.04	0.01	0.78

*Singh H.S., 2000. Mangrove in Gujarat, GEER foundation

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Mangroves at Vadinar

The intertidal expanse in the vicinity of Dargah ranged in 1 – 1.2 km. Lower intertidal zone was muddy with dense algal growth. The mid and upper intertidal zone sustained mangrove vegetation of ~ 500 m width. The zone around HTL was dominated by a sandy beach with ~ 5 m width and a narrow beam at the backshore. The distribution of mangroves at Vadinar during the present monitoring (April 2010) is given in Table 8.5 below:

Table 8.5: Distribution of mangroves at Vadinar (Dargah - North side)

	Location	Species	% FQ	Density	Height (m)	DBH (cm)	Seedling (no/m ²)
D1	22° 26' 42.6''N 69° 42' 07.8''E	<i>A. marina</i>	100	Sep-67 -38	0.5 - 3.5	<2.6 - 6	0 - 2
D2	22° 26' 50.5''N 69° 41' 52.9''E	<i>A. marina</i>	40	0 - 5 -2	0.5 - 1.5	<2.5 - 4	0 - 1
Vadinar (Dargah - south side; afforested area)							
D3	22° 26' 30.8''N 69° 42' 05.6''E	<i>A. marina</i>	100	(20 - 75) -50	1.0 - 2.3	<1.5 - 5	0 - 15

As evident from above data, the stand density of *A.marina* at two locations (D1 and D2) along North-east of Vadinar Dargah varied from nil to 67 plants/100 m² with higher density of plants noticed at location D1. Frequency of occurrence ranged from 40 - 100% in the mid and upper intertidal zones. The height varied from 0.5 to 3.5 m. Mostly the plants were dwarf (av 1 m) with occasional tall plants of 3.5 m. Diameter at Breadth Height (DBH) varied from <2.5 to 6 cm. The seedling density was poor and varied from 0 - 2 no/m². The mid intertidal segment was the popular feeding site for flocks of flamingos.

The upper intertidal expanse along South-west of Vadinar Dargah (D3) showed good growth of afforested mangroves (Table 8.5). The density of mangroves ranged from 20 - 75 plants/100 m² with an average of 50 plants/100 m². The plant height varied from 1.0 to 2.3 m and the DBH ranged from <1.5 to 5 cm. The seedling density was low (0-15 no/m²), however, better than that noticed along North-east of Vadinar - Dargah (D1 & D2). Present results are comparable with earlier monitoring studies (2007 - 2009).

Mangroves at Narara

The intertidal expanse along the IOCL pipeline corridor varied from 2000 - 2200 m. The mangroves vegetation from upper intertidal region was observed to be healthy, dominated by *A.marina* on both sides of the pipeline corridor. Four locations (N1 to N4) were selected for monitoring of mangroves at Narara as detailed in below given Table 7.6.

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Table 8.6: Distribution of mangroves at Narara

	Location	Species	% FQ	Density	Height (m)	DBH (cm)	Seedling (no/m ²)
N1	22° 27' 56.8''N 69° 43' 43.2''E	<i>A.marina</i>	100	20-45 (38)	2-3	3-8	0-85
		<i>C.tagal</i>	10	0.7*	-	-	-
		<i>R.mucronata</i>	5	0.2*	-	-	-
N2	22° 27' 59.1''N 69° 43' 21.3''E	<i>A.marina</i>	100	60-90 (85)	2-4	25-12	0-7
N3	22° 28' 03.5''N 69° 43' 27.4''E	<i>A.marina</i>	100	28-85 (50)	0.5-2.5	<15-7	0-55
		<i>R mucronata</i>	3	-	-	-	-
N4	22° 28' 07.2''N 69° 43' 24.6''E	<i>A.marina</i>	100	30-130 (80)	0.5-3.5	<2.0-3.5	0-10

* no/500 m²

As can be noticed in the above table, the plant density of *A.marina* varied from 20 - 130 plants/100 m² with a frequency of occurrence of 100% at Narara. The species like *Ceriops tagal* (7 plants/500 m²) and *Rhizophora mucronata* (2 plants/500 m² - 3 plants/100 m²) were rarely noticed. The locations N2 (85 plants/100 m²) and N4 (80 plants/100 m²) revealed better average density of *A.marina* as compared to the rest. The height of *A.marina* varied from 0.5 to 4 m with N2 and N4 locations indicating better plant height than the rest. The DBH varied from <1.5 to 12 cm at the monitoring locations. The seedling density ranged from 0 - 85 no/m² with N1 and N3 locations sustained better seedling density than the rest. Few new plants (30 - 45 cm in height) of *C.tagal* and *R.mucronata* were noticed at the EOL pipeline corridor during the present monitoring.

Sand dune vegetation

The narrow beach of ~ 5 m width around HTL along Narara Bet is marked with berm of ~ 1.5-2 m width, followed by back shore sandy zone. Occasional shrubs of *Salicornia brachiata* and *Suaeda maritima* are observed on the backshore sandy zone. The sand dune flora is more predominant on berm and immediate back shore zone of ~5 m width. Sand dune flora is represented by seven species viz; *Crassa sp*, *Cyperus arenarius*, *Launea sp*, *Suaeda maritima*, *Salicornia brachiata*, unidentified *Poaceae* member and unidentified *Fabaceae* member.

Seaweeds and Seagrasses

Seaweeds, which are known as a source of food, fodder and manure, are mostly found attached to various substrata like sandy, muddy and coralline sediments as well as rocky areas and play a significant role in enriching the sea by adding dissolved organic matter, nutrients and detritus besides serving as nursery areas for the larvae and juveniles of innumerable marine organisms. Some green Seaweeds are edible, red algae are the important source of agar and some of the brown algae are used for manufacturing algin and alginic acid. Seaweeds are also used to produce some bioactive compounds.

The algal zone of Narara Bet is confined to 1.2-2.5 km width. A total of 62 species of algae and 3 species of sea grasses are recorded from this region. Among them *Lyngbya*, *Caulerpa*, *Cladophora*, *Ulva*, *Cystoceira*, *Dictyota*, *Hydroclathrus*, *Padina*, *Sargassum*, *Acanthopora*, *Amphiroa*, *Champia*, *Centraceros*, *Gracilaria*, *Hypnea* and *Polysiphonia* were common with the dominance of *Padina* and *Gracilaria* at the lower reef flat. The open mudflats of Narara Bet are dominated by algae like *Enteromorpha*, *Ulva*, *Lyngbya* and *Polysiphonia*, while, the upper sandy shore and mangrove areas are associated with *Enteromorpha* and *Ulva*. Seagrasses such as *Halophila ovata* and *Halodule uninervis* are common in patches on sandy regions of the reef, while, *Halophila beccarii* occasionally occurred on mudflats along the tidal channels.

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Open mudflats near Dargah and Narara pipeline corridor supported growth of twelve marine algae dominated by Enteromorpha spp (Table 8.7). The biomass of Enteromorpha estimated at ~ 4 kg/m².

Table 8.7: Marine algal flora along Narara/Vadinar

Sr. No.	Species	% FO*	ES*
1	<i>Enteromorpha clathrata</i>	100	D
2	<i>Enteromorpha intestinalis</i>	100	D
3	<i>Caulerpa racemosa</i>	50	C
4	<i>Ulva fasciata</i>	100	D
5	<i>Ulva lactuta</i>	100	D
6	<i>Ulva reticulate</i>	90	D
7	<i>Codium elongatum</i>	30	O
8	<i>Sargassum ilicifolium</i>	45	C
9	<i>Sargassum tenerimum</i>	60	CD
10	<i>Gracilaria corticata</i>	55	C
11	<i>Gracilaria verrucosa</i>	85	C
12	<i>Polysiphonia platycarpa</i>	20	O

*%FO: Percentage Frequency Occurrence, ES: Ecological Status, D: Dominant (% FO = 80-100), CD: Co-dominant (% FO = 60-79), C: Common (% FO = 40-59), O: Occasional (% FO = 20-39).

The intertidal zone of Kalubhar Tapu harbours 47 species of marine algae and three species of seagrasses. The reef areas of this island are dominated by *Dictyota*, *Gracilaria*, *Padina*, *Hydroclathrus*, *Ulva* and *Hypnea*. The open mudflats and sandy areas at the upper intertidal are preferred by *Enteromorpha*, *Ulva*, *Lyngbya* and *Polysiphonia*. The sandy region of the reef flat supported seagrasses like *Halophila* and *Halodule*.

Zooplankton

The zooplankton standing stock in terms of biomass and population density during April 2010 (Table 8.8) varied from 0.2 to 121.2 ml/100m³ (av 3.3 ml/100m³) and 2.2-722.7 x 10³/100m³ (av 39 x 10³/100m³), respectively while during October 2010 the zooplankton biomass and abundance ranged from 0.2 to 12.0 ml/100m³ (av 3.5 ml/100m³) and 2.5-157.8 x 10³/100m³ (av 48.4 x 10³/100m³) respectively suggesting normal secondary production off Vadinar during the monitoring period.

The average zooplankton biomass (ml/100m³), population density (nox10³/100m³) and total groups (no) off Vadinar during the monitoring period varied in accordance with the data presented in Table 8.8.

Table 8.8: Average values of zooplankton (A) biomass (ml/100m³) (B) Population density (nox10³/100m³) and (c) total groups (no) off Vadinar (April 2010 – October 2010)

Area	Pathfinder	Nearshore	ESSAR DP	IOC SPM	Essar SPM	Salaya Creek	Gulf
April 2010	A	8.3	1.1	1.1	0.9	1.4	3.5
	B	89.9	24.6	14.4	22.7	12.7	37.4
	C	17	15	12	16	13	17
Oct 2010	A	4	3.9	1.5	3	5.7	2.1
	B	57.4	55.9	23.5	30.5	83.1	32.8
	C	13	11	10	10	9	7

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The overall zooplankton standing stock was low and highly variable off Vadinar which could be due to high patchiness and seasonal variability in their distribution apart from high grazing pressure at higher trophic levels.

During April 2010, 24 faunal groups were identified in the coastal waters off Vadinar during the monitoring period while 17 faunal groups were present in the samples of October 2010. The most common faunal groups were copepods (40.5%), decapod larvae (19%), gastropods (22.5%), lamellibranchs (10.7%), and foraminiferans (2.1%) in April 2010. In addition to the above, groups like chaetognaths, siphonophores, *Lucifer* sp, polychaetes, ctenophores, medusae, amphipods, ostracods, mysids, heteropods, isopods, stomatopod larvae, appendicularians and fish larvae were also frequently noticed but in less numbers during April 2010. During October 2010, the dominant groups were copepods (93.6%) and decapod larvae (4.8%). In general, the coastal waters off Vadinar revealed a moderate production of zooplankton associated with random fluctuations and seasonal changes.

Macro benthos

The organisms inhabiting the sediment are referred as benthos. Depending upon their size, benthic animals are divided into three categories, macrofauna, microfauna and meiofauna and macrofauna. Benthic community responses to environmental perturbations are useful in assessing the impact of anthropogenic perturbations on environmental quality. Macrobenthic organisms which are considered for the present study are animals with body size larger than 0.5 mm. The presence of benthic species in a given assemblage and its population density depend on numerous factors, both biotic and abiotic.

Intertidal macrofauna

During April 2010, Intertidal macrofauna was studied along 5 transects viz. 1 transect (Transect I) at Kalubhar Island and 4 transects at Narara Bet. Several locations were sampled along each transect between the HTL and the LTL viz; High Water (HW), Mid Water (MW) and Low Water (LW). The intertidal macrofaunal standing stock in terms of population density (50-7800 no/m², av 2292 no/m²) and biomass (0.1-37.2 g/m²; wet wt, av. 9.2 g/m²; wet wt) varied widely During the post monsoon, only the first three transects were sampled. In October 2010, the intertidal macrofaunal standing stock in terms of population density ranged from 0-3625 no/m² (av 1185 no/m²) and biomass from 0-67.8 g/m²; wet wt (av. 14.6 g/m²; wet wt). These results are compared with historical data in Table 8.9.

Table 8.9 Average of intertidal macro benthos off Vadinar during April 2010 to October 2010, (A) Biomass (g/m²) (B) Population density (no/m²) and (C) Total groups

Transect		I	II	III	IV	V
April 2010	A	11.2	4.2	13.7	10.7	6.1
	B	3983	1172	1292	2401	2614
	C	5	3	6	6	3
Oct 2010	A	11.9	16.8	15.1	-	-
	B	1495	904	1156	-	-
	C	5	7	5	-	-

Overall, the intertidal region sustained good faunal standing stock and diversity and the contribution of major faunal components are comparable over the past many years at Narara Bet/Kalubhar.

Subtidal macrofauna

Subtidal macrofauna was studied at 13 stations in the coastal system off Vadinar during April 2010 and at 10 stations during October 2010. The distribution of subtidal faunal standing stock in terms of biomass (0.3 - 41.0 g/m²; av 8.0 g/m² wet wt) and population density (150-8925 no/m²; av 1902 no/m²) during April 2010. In October 2010 the biomass ranged from 0.3 – 23.9 g/m² (av 7.1 g/m²; wet wt) and population density ranged from 125-14975 no/m² (av 2282 no/m²) The current data is listed (April 2010 – Oct 2010) in Table 8.10.

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Table 8.10 Average of subtidal macrobenthos off Vadinar during April 2010 to October 2010, (A) Biomass (g/m²) (B) Population density (no/m²) and (C) Total groups

Area		Pathfinder	Nearshore	ESSAR DP	IOC SPM	ESSAR SPM	Salaya Creek	Gulf
April 2010	A	11.2	2.9	2.0	6.1	1.3	15.5	6.4
	B	3833	338	388	694	2375	1553	1865.5
	C	7	3	4	6	5	6	4
Oct 2010	A	12.1	7.7	1.9	4.9	1.8	-	10.6
	B	5019	2967	400	1169	181	-	1652
	C	8	5	4	4	2	-	7

The macrobenthic population was dominated by polychaetes (50.1%), amphipods (18.5%), pelecypods (8.2%), decapod larvae (7.4%), tanaids (3.6%) and foraminiferans (3.2%) during April and by polychaetes (76.3%), amphipods (12.3%) and pelecypods (5%) during October 2010.

Corals and associated biota

Live corals at the Narara and Kalubhar reefs are mainly confined to the lower littoral (reef flat) and shallow subtidal zones (< 8 m). They are absent at the upper reef flat probably because of high rate of sedimentation and long exposure during low tide.

Narara Bet

The eastern segment of Narara Bet represents a formation of vast mud flat, which resulted in significant negative influence on the live coral population. Many regions along the reef flat on the western side are exposed during low tide for prolonged periods because of which the distribution of live corals was poor. In all 30 and 22 Scleractinian species have been identified in the intertidal and subtidal zones respectively of Narara Bet with *Montipora*, *Goniopora*, *Porites*, *Favia*, *Favites*, *Goniastrea*, *Platygyra*, *Cyphastrea*, *Pseudosiderastrea*, *Turbinaria*, *Leptastrea* and *Symphyllia* as the dominant genera.

In general, the live coral density decreased with depth. The live corals were absent beyond 8 m (CD). However, the subtidal area at Narara sustained good coral populations within 5 m (CD). Distance-wise corals were rich within 250 m towards the sea from the LTL. The corals of the genera *Montipora*, *Porites*, *Favites*, *Goniastrea*, *Goniopora*, *Cyphastrea*, *Leptastrea*, *Favia* and *Turbinaria* dominated the subtidal area.

Kalubhar

In general, Kalubhar reef sustained relatively healthy live corals at the lower intertidal and subtidal (<7 m depth) zones as compared to the population at the Narara reef. The north and north-west regions of Kalubhar had better coral density and diversity as compared to the east and south-east regions because of high sedimentation of the reef flat and the subtidal zones. Overall, 30 and 7 species of Scleractinians in the intertidal and subtidal zones respectively at Kalubhar have been identified. The corals at Kalubhar were mainly represented by genera *Montipora*, *Favia*, *Favites*, *Porites*, *Goniastrea*, *Goniopora*, *Cyphastrea*, *Platygyra*, and *Symphyllia* and *Turbinaria*. The live corals were absent at the reef edge of 50 m width due to total exposure for longer period whereas their coverage increased (90 to 100%) at the reef slope below 1 m depth.

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A rich reef associated flora and fauna was noticed at Kalubhar. The common and dominant seaweed genera were *Sargassum*, *Gelidiella*, *Acanthophora*, *Ulva*, *Caulerpa*, *Codium*, *Dictyota*, *Padina*, *Halymenia*, *Enteromorpha*, and *Gracillaria*. Varieties of sponges were associated with coral boulders. The fauna consisted of coelenterates (*Zoanthus* sp., *Discosoma* sp., *Stoichactis*, *giganteum*, *Cerianthus* sp. and variety of corals), annelids (various polychaetes), echiuroid (*Ikedella misakiensis*), crustaceans (amphipods, isopods, *Acetes* sp., shrimps and crabs), molluscs (*Octopus* sp., *Sepia* sp., *Loligo* sp., gastropods, bivalves, nudibranchs etc.) echinoderms and variety of reef fishes.

Fishery

Gujarat ranks number one position in marine fish production in India. The Gulf contributes about 22% to the fish production of the state. The share of the Jamnagar District is between 5 and 14% (av 10%) to the State's total marine fish landings. The important fish landing centres in the vicinity of IOCL SPM area which falls under Khambalia zone are Vadinar, Bharana, Nana Amla and Salaya which together contributed about 6823 t, 8253 t and 5330 t of fish landings in 2006-07, 2007-08 and 2008-09 respectively to the total landings of the Jamnagar District. Similarly, the important fish landing centres in the vicinity of Sikka which falls under Jamnagar zone are Sachana, Baid, Sarmat, Bedi and Sikka which together contributed about 4768 t, 5122 t and 5848 t of fish landings in 2006-07, 2007-08 and 2008-09 respectively. Within the Jamnagar zone, the major landings (98%) were from Sachana (32%), Baid (27%), Sikka (19.7%) and Bedi (18.9%) during the last 3 years. Within the Khambalia zone, the major landings (81-89%) were at Salaya during the period 2006-09. On an average the Khambalia zone (56.5%) contributed to about 13% higher fish landings than Jamnagar zone (43.5%) for the last 3 years. However, the landings at Sikka (1.3%) and Vadinar (0.5%) to the total landings of the district were negligible during the period 2006-2009.

Reptiles and mammals

The reptiles are mainly represented by marine turtles *Chelonia mydas* and *Lepidochelys olivacea* which breed and spawn on the sandy beach along the Sikka-Vadinar coast as well as on the islands.

Dolphin (*Dolphinus delphis*) and whale (*Balanoptera* sp) are common in the Gulf. Though occurrence of Dugong (*Dugong dugon*) in the Gulf particularly along the Jamnagar coast has been reported, there are no recent sightings.

The resources discussed above likely to be threatened are tidal flats, Phytoplankton, Phytopigments, Mangroves, seaweeds and seagrasses, Zooplankton, Macrobenthos, Corals and associated biota, salt works fishing activities and other vocational related to marine sensitive areas in the coast of Vadinar and Sikka.

It has been observed from the modeling study that during pre-monsoon season, the spills occurring at the APSEZL marine facilities move towards the southern / southwestern part of the Gulf of Kutch nearer to the facilities depending on tide phase.

The spills taking place at the APSEZL marine facilities move towards northern coast of Gulf of Kutch during monsoon season and affect the coast near Mundra, Kandla etc.

During post - monsoon season, the spills taking place at the APSEZL marine facilities move towards south / southwest and affect the islands /coast on southern side of the Gulf of Kutch.

2.7 Special local considerations

Considering the distant proximity of various other installations with the port of Mundra, in case of a tier 1 spill, no other special considerations are deemed to be required apart from an active spill response close to the port facility itself.

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3 Response strategy

3.1 Philosophy and objectives

This plan is intended to assist APSEZL in dealing with an accidental release or discharge of oil. Its primary purpose is to set in motion the necessary actions to stop or minimize the discharge and to mitigate its effects. Effective planning ensures that the necessary actions are taken in a structured, logical and timely manner.

This plan guides the HOD– Marine and his Duty Staff through the decisions which will be required in an incident response. The tables, figures and checklists provide a visible form of information, thus reducing the chance of oversight or error during the early stages of dealing with an emergency situation.

For this plan to be effective, it must be:

- familiar to those APSEZL staff with key response functions;
- regularly exercised; and,
- Reviewed and updated on a regular basis.

This plan uses a tiered response to oil and chemical pollution incidents. The plan is designed to deal with Tier One spillage. The products handled are likely to pose a greater fire and safety, rather than an environmental risk; there may thus be additional factors involving the safety of personnel, which will take precedence over the pollution response. In this case, reference must be made to the APSEZL Emergency Procedures Manual. The salvage and casualty management of any vessel that poses a threat of pollution is priority considerations.

During oil spill response activities, account must be taken of the following:

- site hazard information
- adherence to permit procedures
- spill site pre-entry briefing
- boat safety
- APSEZL safety manual and material safety data sheets
- Personal protective equipment needs
- heat stress
- decontamination

3.2 Limiting and adverse conditions

APSEZL is situated in natural protected Gulf of Kutch and there are less incidences of heavy wind or any other factor affecting operation.

3.3 Oil spill response in offshore zones

SPM handles (unloading) crude oil and pumps it to shore tank farm area through sub-sea pipeline. The impact of such spills on marine environment is on the higher side. Hence, oil spill equipments are required for combating oil in case of such spills at the marine facilities at Mundra.

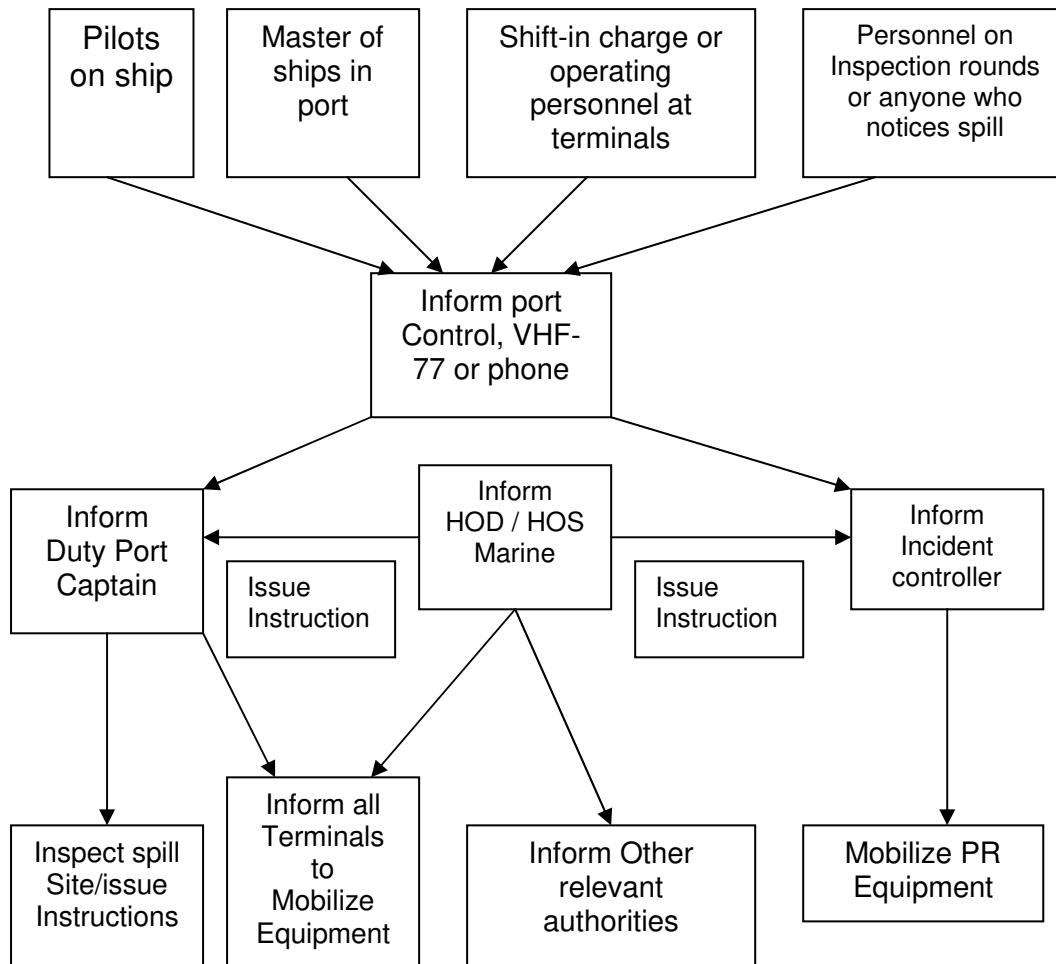
Based on the oil spill modeling study, it has been observed that crude oil spill of 700 tons (Tier-I) will spread over an area having radius of around 400 m within 4hr. APSEZL has already having facilities for combating a Tier-1 spill.

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3.4 Oil spill response in coastal zones

Contingency Chart to deal with Oil Spill



On-site Crisis Management Group – Action Group

In an emergency, the personnel available at or near the incident site play vital role. This concept is made use of in nominating the Key Persons. It is necessary to nominate a functionary as the Incident Controller who is invariably a shift-in-charge of the facility. The Incident Controller tackling the emergency in real times requires the support from various other services i.e. Fire & Safety, Medical Services covering communication, transport and personal functions etc. A key person for each of these services therefore, is nominated.

Overall in charge of these activities is **Chief Operating Officer – Mundra Port**. The different functional coordinators, designated, will co-ordinate with Chief Controller in their respective functional areas. It is suggested that key personal chart be developed, giving the names, designation, telephone nos. of top level personnel who will act as coordinators in different disciplines/services. The duties and the responsibilities of various Key Persons and Coordinators need to be written down on a chart and should be made available across the organization at the site / location.

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Roles & Responsibilities

Incident Control Officer – (HOS – Marine / Duty Port Captain)

- Directs and co-ordinates all field operations at the scene of the accident
- Assess incident/crisis at site, nature, location, severity, casualties, resource requirement
- Classifies incident - Advises Exe. Controller, Civil Defence, Dy. Conservator, Traffic Manager - regarding crisis severity status and emergency level, wind direction, temperature, casualties and resource requirements.
- **Conducts initial briefing to Chairman**
- Activates elements of the terminal emergency plan/ site response actions
- Protect port personnel and the public
- Directs security/fire fighting/oil spillage/gas leakage/vessel accidents/natural calamities, cargo operations shutdown
- Search for casualties and arrange first aid and hospitalization
- Brief or designate a person to brief, personnel at the incident scene
- Determine information needs and inform Crisis Management Group
- Coordinates all functional heads in field operations group to take action
- Manages incident operations to mitigate for re-entry and recovery
- Coordinate search and rescue operations
- Arrange evacuation of non-essential workers to assembly points –outside port
- Arranges tugs, mooring boats and pilot(s) for sailing vessel(s)
- Co-ordinates actions, requests for additional resources and periodic tactical and logistical briefings with Site Emergency Coordinator
- Coordinate incident termination and cleanup activities
- Instructs various emergency squads as necessary

Site Emergency Coordinator – (Senior Pilot and Duty Radio Officer)

- Direct operations from the emergency control center with assistance from Crisis Management Group
- Take over central responsibility from the Site incident controller (SIC)
- Decide level of crisis and whether to activate off site emergency plan
- Instruct SIC to sound appropriate alarm
- Direct the shutting down, evacuation and other operations at the port
- Monitor on site and off site personal protection, safety and accountability
- Monitor that casualties if any are given medical aid and relatives informed
- Exercise direct operational control of the works outside the affected works
- Monitor control of traffic movements within the port
- Coordinate with the senior operating staff of the fire, police and statutory authorities
- Issue authorized statements to the news media
- Review and assess possible developments to determine the most probable course of events
- Authorize the termination of the emergency situation by sounding the all clear siren-continuous long single tone siren for one minute
- Control rehabilitation of affected areas after emergency
- Arrange for a log of the emergency

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Fire Coordinator – (HOS - Fire / HOS -Safety)

(Under the direction of the Incident Control Officer)

- Announces fire incident point over the public address system and evacuates workers to the assembly points
- Informs fire station immediately and leads fire fighting team to the incident location
- Informs SIC if external fire tender / fire-fighting equipment / materials/mutual aid is required
- If necessary, arranges and activates other fire-fighting equipment
- Arranges safety equipment e.g. fire suits, protective gloves and goggles, breathing apparatus
- In liaison with Civil Engineering Department, ensures that adequate water pressure is maintained in the fire hydrant system/at the area supply
- Maintains adequate records

HOS - Security / Duty Security Officer

- Directs, gate security and facilitates evacuation, transport, first aid, rescue
- Controls the entry of unauthorized persons and vehicles-disperses crowd
- Permits the entry of authorized personnel and outside agencies for rescues operations without delay. Liaises with State police
- Allows the entry of emergency vehicles such as ambulances without hindrances
- Ensures that residents within port area are notified about disaster and instructs to evacuate if necessary
- Ensure that all people are aware of the assembly points, where the transportation vehicles are available
- Ensure that the people are as per the head count available with the assembly point section of that area
- Liaise with the Chief Medical Officer to ensure first aid is available at the assembly points
- Carry out a reconnaissance of the evacuated area before declaring the same as evacuated and report to SIC.

Medical Superintendent

- Direct medical team
- Set up casualty collection centre arrange first aid posts
- Arrange for adequate medicine, antidotes, oxygen, stretchers etc
- Contact and cooperate with local hospitals and ensure that the most likely injuries can be adequately treated at these facilities e.g. burns
- Advise Chief Emergency Controller on industrial hygiene and make sure that the facility personnel are not exposed to unacceptable levels of toxic compounds
- Make arrangements for transporting and treating the injured
- Inform the hospitals of the situation in case of a toxic release and appraise them of the antidotes necessary for the treatment
- Maintain a list of blood groups of each employee with special reference to rare blood groups
- Liaise with Govt. Hospitals/Red Cross

Marine Pollution Coordinator – Manager (Marine / pollution control)

- Minimizes the impact of an accident on the environment for which it would develop methodologies to control hazardous spills
- Monitors cooperation with emergency response squads to conduct the actual cleanup work during and after the emergency.

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- In case of fire and specially if the fire involves toxic/flammable materials, to ensure responsible actions for containing the run off fire water and other water from the damaged units
- Determines the level of contamination of the site as a result of the accident
- During cyclones/floods arranges sand bags and transfers important plans and documents to higher levels

Traffic Coordinator – Duty Port Captain

- Directs operation staff
- Prepares vessels to vacate from berth
- Arranges to protect cargo in vicinity from damage
- Arranges to segregate and shift cargo in sheds
- Submits consolidated list of dangerous goods in port including tankers in port and tank farms in port area
- Coordinates with ship owners / agents/C & F agents/stevedores

Communications Officer – (Duty Port Captain / Marine Control In-charge)

- Ensure telephone operator/signal room advises entire emergency team
- On receipt of instructions from the chief Incident controller, notifies the fire brigade/police/hospitals/district collector/mutual aid partners
- Keep the switchboard open for emergency calls and transmit the same to the concerned personnel effectively
- Refrain from exchanging any information with authorized persons unless authorized to do so by the Chief Incident Controller
- Maintains contact with other vessels through VTMS

Chief Emergency Controller – (Head - HSE)

- Inform district emergency authorities-District Collector, Medical officer-Coast Guard Pollution control -Inspector of factories-Inspector of Dock Safety & Health,
- Activate the off site plan if necessary
- Liaise with Jt. Secy./Director MOST (Ministry of Shipping) or relevant Govt. authority
- Inform the media

Civil Coordinator – (HOS – Environment cell / HOS - Estate)

- Inform Gujarat Pollution Control Board and other environmental agencies about the incident for getting necessary guidance
- Instruct the contractors to carry out urgent civil works if required
- Hire the barges for collecting the spilled oil, if required

Marine Engineering Coordinator – (HOS – SPM / Diving Team in-charge)

- Organise the tugs for combating the pollution
- Start the rigging of pollution combating equipment on tugs/launches
- Hire additional crafts if required

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HOD- Corporate affairs:

- Collect detailed information periodically and liaise with press about the incident
- Arrange transport facilities, if required
- Inform local authorities/District Collector about the incident (as per EAP)

HOS - Legal & HOD - Estate:

- Issue notice under Major Port Trusts Act, Indian Ports Act(Prevention & Control of Pollution) Rules, etc; to the defaulting master/owner/agent
- Arrange for settlement of claims related to the pollution(as per EAP)

3.5 Shoreline oil spill response

Most oil spills reach the shorelines and cause visible oil pollution which is particularly sensitive to public opinion. The selection and correct application of clean up techniques are therefore essential. When an oil spill occurs on open water the optimal solution is to intercept and recover the oil before it reaches the shoreline. This is because:-

- The environmental damage is normally less critical in the open water environment
- The logistics of oil removal becomes more complex in the varied natural environment of coastlines compared with the open sea.
- The costs of oil recovery increases dramatically when oil reaches sensitive shorelines compared with open water operations.

Experience has shown that it is very difficult to avoid some oil reaching the shorelines. Mechanical equipment and chemical treatment at sea are often insufficient to recover all oil spilled at sea. When the oil reaches the shoreline, a number of different parameters specific for this particular situation have to be taken into consideration:-

- Quantity of oil
- Characteristics of the oil (for instance, toxicity and viscosity)
- Prevailing on-site conditions (weather, season, tides, temperature)
- Shoreline type or combination of types (cliffs, pebble, sand, marsh)
- Special Considerations

The four main steps in a shoreline clean-up operation are:

Step 1: Assessment

- Determine the need to clean, setting priorities in line with this contingency plan
- Determine required degree of clean-up for each area in accordance with priorities
- Attain agreement between clean-up team, ecological experts, government authorities

Step 2: Select Clean-up Method

- Choose method appropriate to type of shoreline, access, degree of oiling
- Minimize damage caused by choice of clean-up technique, degree of clean-up
- Address conflicts of interest (e.g. needs of amenity use versus environment or response speed versus aggressiveness)

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Step 3: Clean-up Operations

- Monitor clean-up, confirm choices made above, re-evaluate if necessary
- Minimize disturbance of shoreline features
- Minimize collection of un-oiled debris, sediments

Step 4: Termination / Monitoring

- Ongoing assessment of clean-up operations
- Determine when clean-up objectives have been met
- Post-spill monitoring to confirm recovery of shoreline features, biota

The four main methods for shoreline clean-up are as follows:-

A. Pumping and Skimming Techniques

- Applicable to shorelines that are heavily oiled.
- Often the first step in cleaning a heavily contaminated shoreline.
- Preferred option because it results in fluid wastes that are relatively free of sediments and debris, which are more easily dealt with in disposal.
- Pumping and skimming techniques can also be used in conjunction with flushing techniques.

B. Flushing Techniques

- Use water or steam to flush oil from the beach, and direct it to a recovery location.
- Applicable to heavily contaminated beaches, and substrates that are relatively impermeable (e.g., mud and saturated beaches, boulders, and man-made structures) that will not allow the flushed oil to penetrate the beach surface.
- Typically carried out in conjunction with a skimming operation. The flushed oil is directed down-slope to skimmers positioned at the water's edge, with booms deployed around the skimmers to prevent any loss of the water.
- Options of using low or high pressure water, and of using ambient temperature water versus warm water or steam.
- Low pressure, cold water is generally the least effective, particularly with sticky oils and emulsions, but is least harmful on the environment.
- High pressure water and heated water and steam are more effective, but may remove and/or kill beach-dwelling organisms.

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C. Sediment Removal Techniques

- Applicable to a variety of shoreline types, and in particular, when the shoreline is heavily contaminated, though likely to cause the greatest environmental impact
- The requirements are access for the heavy equipment required for transporting away oily debris and sediments for disposal and a surface which is able to support heavy equipment
- An important factor to consider is the depth of oil penetration
- Important to limit the depth of material removed in order to minimise disturbance to the beach, and to minimise disposal requirements
- The best option is to use manual labour to pick up the oily sediment and mechanical means to transport it away

D. Biodegradation Techniques

- Generally refers to "active" bioremediation, where nutrients and/or microorganisms are applied to enhance natural degradation
- Generally suitable for areas that are lightly oiled, especially lightly oiled salt marshes and tidal flats where the use of equipment could increase the environmental effects by forcing oil into the substrate
- It can also be used as a final clean-up step following more active efforts

The shoreline clean-up operation is normally not an emergency operation as is the case with an oil spill on open water. A clean-up project can last many weeks or months depending on the amount of oil spilled. Many wrong decisions can be made in planning and carrying out a shoreline clean-up operation. The contingency plan must be used in combination with consulting experts with experience of shoreline clean up. The agencies such as NIO, NEERI, Ports and Oil companies have experts with experience which is relevant for the specific oil spill situation and they should be consulted prior undertaking shoreline clean-up.

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3.6 Storage and disposal of oil and oily waste

After the natural degradation by coagulation and evaporation of oil on water, residual oil and waste material collected during a Tier 1 response will be disposed off by in-situ or terrestrial burning.

	Type of material	Separation methods	Disposal methods
LIQUIDS	Non-emulsified oils	Gravity separation of free water	Use of recovered oil as fuel or refinery feedstock
	Emulsified oils	Emulsion broken to release water by ; - Heat treatment - Emulsion breaking chemicals - Mixing with sand	Use of recovered oil as fuel or refinery feedstock. Burning Return of separated sand to source.
SOLIDS	Oil mixed with sand	Collection of liquid oil leaching from sand during temporary storage Extraction of oil from sand by washing with water or solvent Removal of solid oil by sieving	Use of recovered oil as fuel or refinery feedstock. Direct disposal Stabilization with inorganic material. Degradation through land farming or composting. Burning
	Oil mixed with cobbles, pebbles or shingle	Collection of liquid oil leaching from beach material during temporary storage Extraction of oil from beach material by washing with water or solvents	Direct disposal. Burning
	Oil mixed with wood, plastics, sea weeds, sorbents	Collection of liquids leaching from debris during temporary storage Flushing of oil from debris with water	Direct disposal. Burning. Degradation through land farming or composting for oil mixed with sea weeds or natural sorbents.
	Tar balls	Separation from sand by sieving	Direct disposal Burning

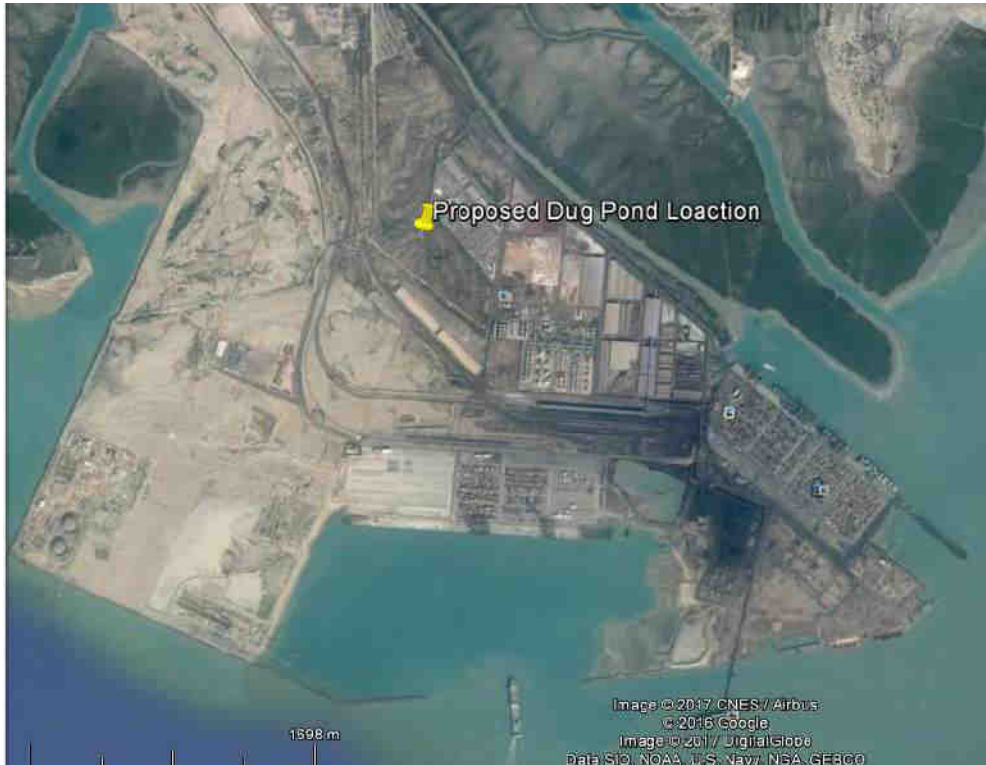
Location for Dug Pond for temporary storage of oily water:

To store the contaminated oily water, temporary dug pond will be excavated for storage of oily water. It is expected that 20 times volume of oil & water mixture will be generated if oil spill happen in the sea. Storage capacity of dug pond of volume 14000 m³ considering spill of level 1 (Tier-1) is required.

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Location Identified for Dug Pond behind Maruti Yard (Lat. 22° 45.252'N , Long. 69° 41.093'E) is roposed.



- Size of Dug Pond to be provided : 100 mtr X 100mtr X 1.5mtr
- Total storage capacity (m3) : considering 20 times oily water @ 700 m3 = 14000 m3

Once the contaminated mixture of oil and water is stored, the same will be transferred via tanker to following location. Following are the steps require to be followed.

1. Oil Water Separator: Capacity 25 m3/hr.
2. Effluent Treatment Plant: Capacity 120 KLD
3. Parallely oil recyclers will be approached for the collection and transportation of the oily water.
4. Contaminated Soil / Sediments will be directly sent to the Treatment Storage and Disposal Facility (TSDF) site. List of Oil recyclers and TSDF sites are shown in Annexure – 15
5. Different types of equipment & manpower require for creating dug pond:

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Name of Equipment	Quantity	Primary Responsibility of Equipment & Material	Secondary Responsibility
Excavator	10 Nos.	Marine Dept.	MHS section (Dry Cargo) / Asset Department / Procurement
JCB Machines	10 Nos.	Marine Dept.	ES Civil / Asset Department / Procurement
Material			
HDPE Liners for dug pond	10600 Sq. mtr.	Marine Dept.	Stores & Procurement

In phase wise manner stored oily water will be treated at both the above facility to separate oil from water to the possible extent. Whereas, after recovery of oil from water, water confirming to the effluent discharge limit of oil (< 10 ppm) will be discharged in to sea.

Whereas in case oily water will not capable of treat at OWS & ETP will be dispose through sending it to registered recyclers, for which APSEZL have already done tie up with the registered recyclers as mentioned in **Annexure – 15**.

APSEZL have also done necessary tie up with various institutes/agency/NGO as mentioned in **Annexure – 16** for providing service for rescue & rehabilitation of oil soaked birds as well as restoration of mangroves, when oil reaches to the sea shore and mangrove areas during oil spill. Mobile van / vehicle require for rescue of oil soaked birds to transfer from affected area to treatment facility center.

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4 Equipment

4.1 Marine oil spill response equipment

Detailed in Annexure 3

4.2 Inspection, maintenance and testing

The equipments are being kept in working condition. Routine inspection, maintenance and testing performed as per the stipulated requirements.

4.3 Shoreline equipment, supplies and services

The shoreline clean-up equipment which are essential for the oil removal operations at beaches are as follows:-

- Protective clothing for everybody (including boots and gloves), spare clothing.
- Cleaning material, rags, soap, detergents, and brushes.
- Equipment to clean clothes, machinery, etc., with jets of hot water.
- Plastic bags (heavy duty) for collecting oily debris.
- Heavy duty plastic sheets for storage areas especially for the lining of temporary storage pits.
- Spades, shovels, scrapers, buckets, rakes
- Ropes and lines
- Anchors, buoys
- Lamps and portable generators
- Whistles
- First Aid material.

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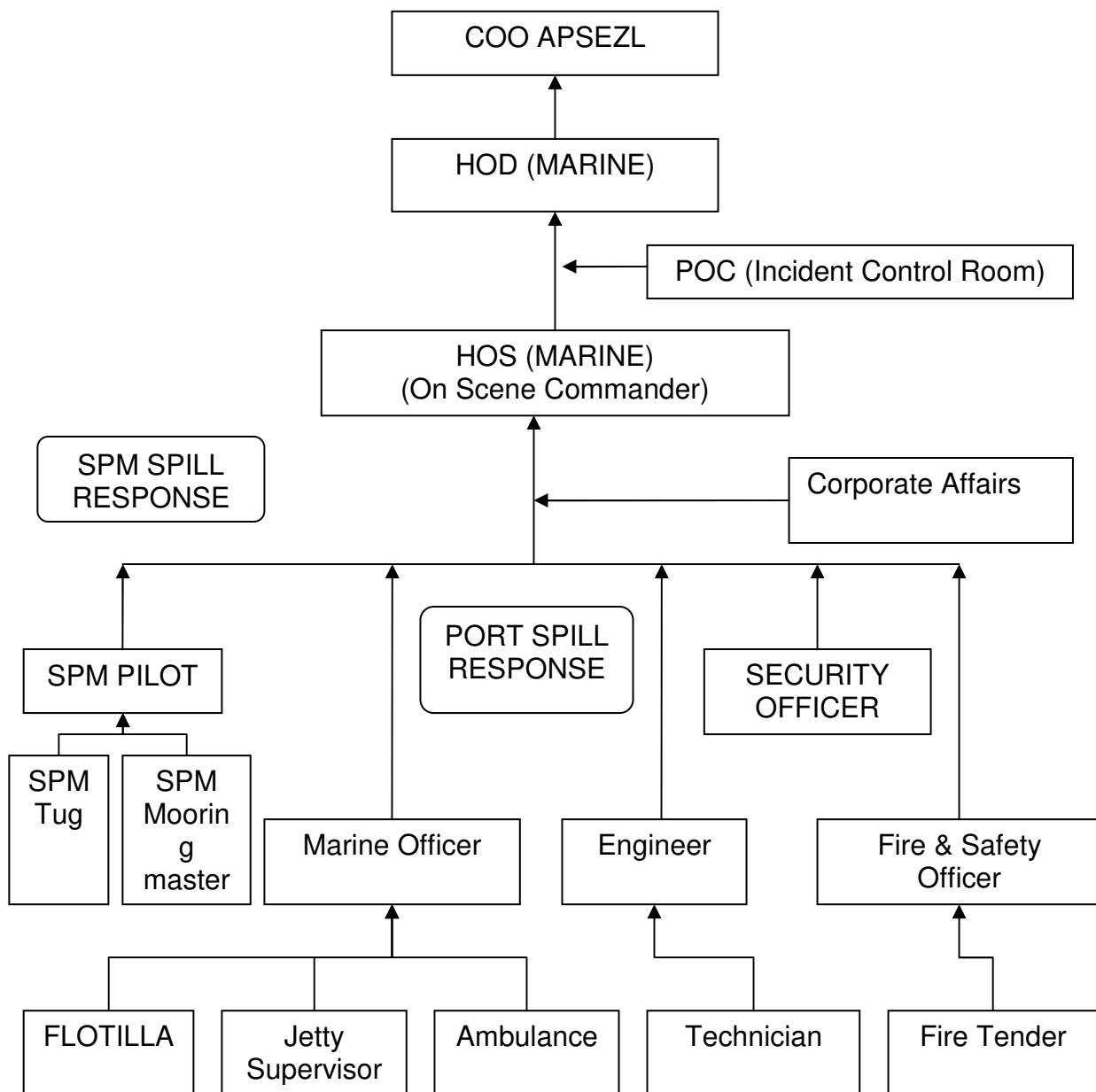
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5 Management

5.1 Crisis manager and financial authorities

The COO of APSEZL is the final authority of the oil spill response in case of a Tier 1 scenario. He is responsible for raising the level of the response if required and summoning additional help. The authority of all financial decisions rest with him.

5.2 Incident organization chart



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5.3 Manpower availability (on-site, on call)

In an event of incident Kandla Port Trust, Gujarat Maritime Board, Gulf of Kutch Ports, District and Regional plans are deemed to have been implemented. Adani Ports and Special Economic Zone Limited (APSEZL) manpower and resources will be put at the disposal and will be deployed as required, provided APSEZL is the polluter and spill is within the Port Limits.

In the event of APSEZL not being the polluter and any event outside the port limit of Adani Port, APSEZL equipment will be subject to mutual assistance plan and it will be the responsibility of the above forum.

5.4 Availability of additional manpower

Similarly in the event of APSEZL being the polluter, additional manpower and supplies can be requested from the resources which are part of this forum.

A numbers of private parties have their labor force working round the clock in the port and on call these can be available.

5.5 Advisors and experts – spill response, wildlife and marine environment

APSEZL, being the nodal agency in this LOS-DCP, will function as the main agency. In the event of the emergency getting raised to higher tier, i.e. in case the incidence becomes a national disaster, the help and advice of Indian Coast Guard will be taken.

5.6 Training / safety schedules and drill / exercise programme

Training of all APSEZL staff who may get involved in implementing this plan is acknowledged. In house and external facilities (of ICG) are used periodically to impart training as per matrix below. Marine Manager has been appointed as training coordinator and custodian of oil pollution equipment. He shall organize training, drills and inspection of equipment as per the plan in force.

Training Module	Duration	Frequency	Participants	Remarks
IMO Model Course	2-5 days	Once	Key persons	By Maritime Training Institute
Oil Spill	1-5 days	Once every 5 years	Key persons	Coast Guard
Oil spill equipment	1-5 days	Once every Year	Managers	In house
Oil spill Management course	1 day	Once every year	Managers & junior staff	In house for in-depth knowledge
Notification exercise	1-2 hours	6 months	Operational staff	Check systems & communication
Table top	2-6 hours	12 months	Managers	Interactive discussions
Incident	6-8 hours	12 months with others	All	Mock drill

Number of IMO Level-1 and IMO Level-2 qualified staff available with Adani Ports and SEZ Ltd, Mundra:

IMO Level-1 - 30

IMO Level-2 - 03

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6 Communications

6.1 Incident control room facilities

Detailed in Annexure 3

6.2 Field communication equipment

Detailed in Annexure 3

6.3 Reports, manuals, maps, charts and incident logs

A copy of the relevant manual is kept with HOD – Marine. Maps/ Charts of APSEZL are kept in Marine Control Tower and attached in Annexures

Action and operations

7 Initial procedures

7.1 Notification of oil spill to concerned authorities

The emergency (due to spill) should be initiated by the first person noticing it by activating the fire alarm from the nearest call-point or by contacting the fire control room immediately on the internal telephone or through mobile phone or through VHF Channel.

The SPM Pilot or On Scene Commander will report the spill to the Marine Control Room.

7.2 Preliminary estimate of response tier

The first few minutes after the incident / accident are invariably the most critical period in prevention of escalation. Therefore the person available at or near the incident site (and often responsible for carrying out that particular activity) on round the clock basis play a vital role in an emergency. The SPM Pilot or On Scene Commander will report the spill to the control room along with his estimate of the response tier.

7.3 Notifying key team members and authorities

Statutory First Information Report (FIR - given in annexure 1) is to be communicated by fastest means possible to President, GMB port and CG at Porbandar followed by full Pollution Report (POLREP – given in annexure 2). The report is to be updated, should the oil spill not be contained and likely to increase to Tier 2

7.4 Manning Control Room

Auxiliary control center is located at Port Operation Centre. Escalation of emergency if any is monitored here. Statutory reporting procedures of FIR and POLREP of developing situation and action taken are also sent from this center. The detail of the contacts to whom the information is to be given is placed at Annexure 4.

7.5 Collecting information (oil type, sea / wind forecasts, aerial surveillance, beach reports)

Marine Manager has the responsibility of arranging the collection of the relevant information which will help in mitigating the emergency

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7.6 Estimating fate of slick (24, 48, 72 hours)

Considering the prevalent tidal stream, wind and weather conditions, section 8.3 is to be used in estimating the fate of the slick

7.7 Identifying resources immediately at risk, informing parties

Depending on the quantity of fluid spilled and the prevalent wind & weather conditions, the resources / facilities immediately at risk have to be identified by the On scene commander and the concerned parties informed.

8 Operations planning

8.1 Assembling full response team

On being appraised of the spill, the duty marine officer will inform the marine manager, who will, in turn initiate the assembly of the complete response team which essentially involves relaying information to all relevant personnel, parties and authorities and informing them of the initial response requirements.

8.2 Identifying immediate response priorities

Depending on the initial estimated response tier and the prevalent weather conditions, the marine manager, in consultation with the on scene SPM pilot / marine officer will identify the immediate resources at risk and the response priorities.

8.3 Mobilizing immediate response

The Manager - Marine will initiate the mobilization procedure of the spill equipment, resources and personnel depending on the scale of emergency at hand.

8.4 Media briefing

No other person is authorized to communicate with any external party by any means whatsoever unless expressly permitted by the HOD – Marine or COO, APSEZL.

8.5 Planning medium-term operations (24, 48 and 72 hour)

The HOD – Marine will plan the subsequent action to be taken in response to the tier 1 spill after the initial response is well under way and its consequences / effectiveness are duly evaluated.

8.6 Deciding to escalate response to higher tier

After carefully assessing the scenario and appraising the efficiency of the initial response in the prevalent conditions, the HOD – Marine will decide whether or not to escalate the response.

8.7 Mobilizing or placing on standby resources required

It is recommended that in case of a doubt (as the exact estimate of the quantity of oil spilled is quite difficult and the boundaries between the tiers will inevitably be blurred) it is important to be prepared to involve the next higher tier from the earliest moments. It is easier to stand down an alerted system than to try to escalate a response by calling up unprepared reserves at a late stage.

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8.8 Establishing field command post communications

Communications between the Emergency Response Center/ Marine Control room and marine personnel during the response to any oil spillage will be primarily by VHF marine band radio on Channel 73 or 77

Communications between the Marine Control Room and other vessels will be established on VHF radio Channel 16 and will thereafter be conducted on Channel 73 / 77.

Use of cellular telephones will be minimized.

Communications between the Emergency Response Center/ Marine Control Room and external authorities and organizations will be undertaken by telephone and facsimile.

9 Control of operations

9.1 Establishing a Management team with experts and advisors

Detailed in Annexure 4

9.2 Updating information (sea, wind, weather forecasts, aerial surveillance, beach reports)

The Marine Control Room is well equipped in assimilating data on weather and its forecasts. In case of a Tier 1 response, aerial surveillance and beach reports are not deemed to be essential

9.3 Reviewing and planning operations

Ongoing response and its influence in mitigating the situation will have to be constantly under review in order to contain the spill at the earliest.

9.4 Obtaining additional equipment, supplies, manpower

While deciding not to elevate the tier of the response the HOD- marine may still request additional resources from nearby port facilities which are essentially members of the common forum and are obliged to assist.

9.5 Preparing daily incident log and management reports

A complete report will be submitted by the Marine Manager to the HOD (Marine) every morning (in case the response extends to more than 1 day).

Format for the above report in Annexure 9

9.6 Preparing operations accounting and financial reports

The Port's accounting department will assess the expenditure incurred in the ongoing operation and submit a report to the President's office.

9.7 Preparing releases for public and press conferences

The COO's office, HOD – Marine and the Corporate communications cell will formulate the requisite press releases from time to time and hold press conferences.

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9.8 Briefing local and government officials

The COO's office, HOD – Marine and the Corporate communications cell will formulate the requisite reports to brief local and government officials..

10 Termination of operations

10.1 Deciding final and optimal levels of beach clean-up

If at all a distant beach is affected, the COO APSEZL office will decide the optimal levels of cleanup in consultation with the conservator of the port – Gujarat Maritime Board Port Officer.

10.2 Standing down equipment, cleaning, maintaining, replacing

Considering the natural disintegration of the residual oil on water after the cleanup of the bulk amount, The HOD – Marine will decide when to stand down the response. The resources which have been used will have to be re-instated to the original condition by elaborate cleanup or replacement.

10.3 Preparing formal detailed report

The COO's office, HOD – Marine and the Corporate communications cell will formulate the requisite reports to brief local and government officials and media.

10.4 Reviewing plans and procedures from lessons learnt

A complete spill response report will be produced by the Marine manager providing comprehensive and all-inclusive details of the circumstances leading to the spill, initial response and consequent affect of the same, subsequent follow up, effect of prevailing weather, adverse situations, safety issues, difficulties faced and lessons learnt.

Requisite changes will be affected to this plan on basis of such report.

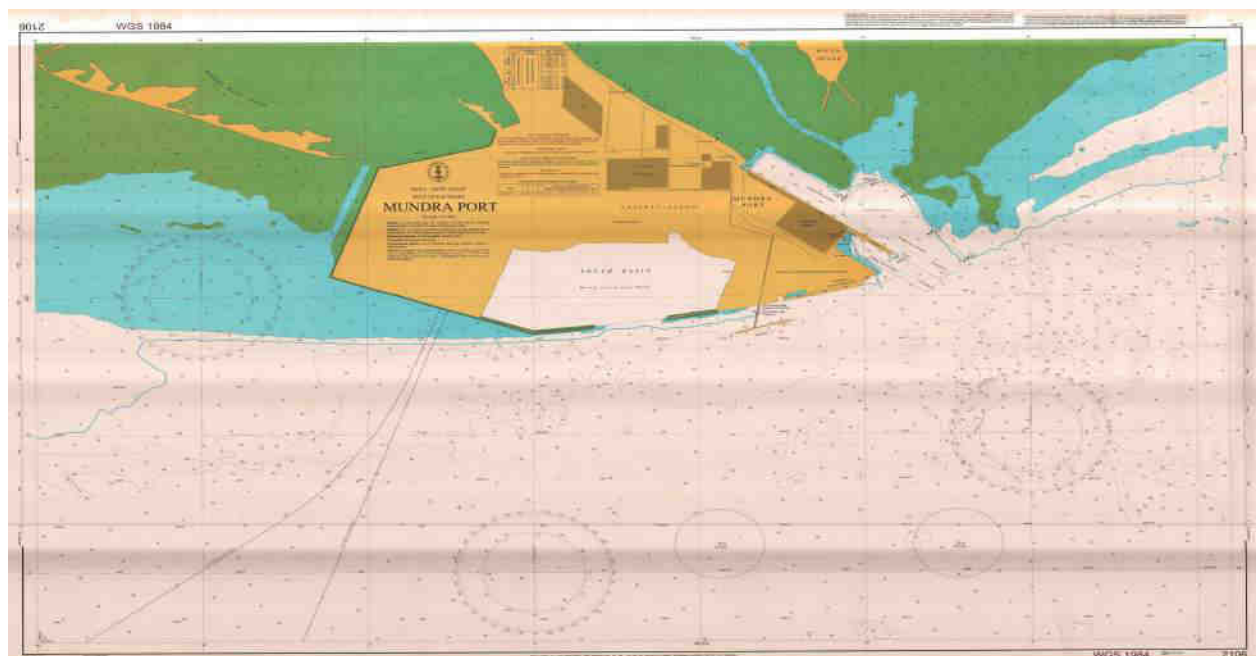
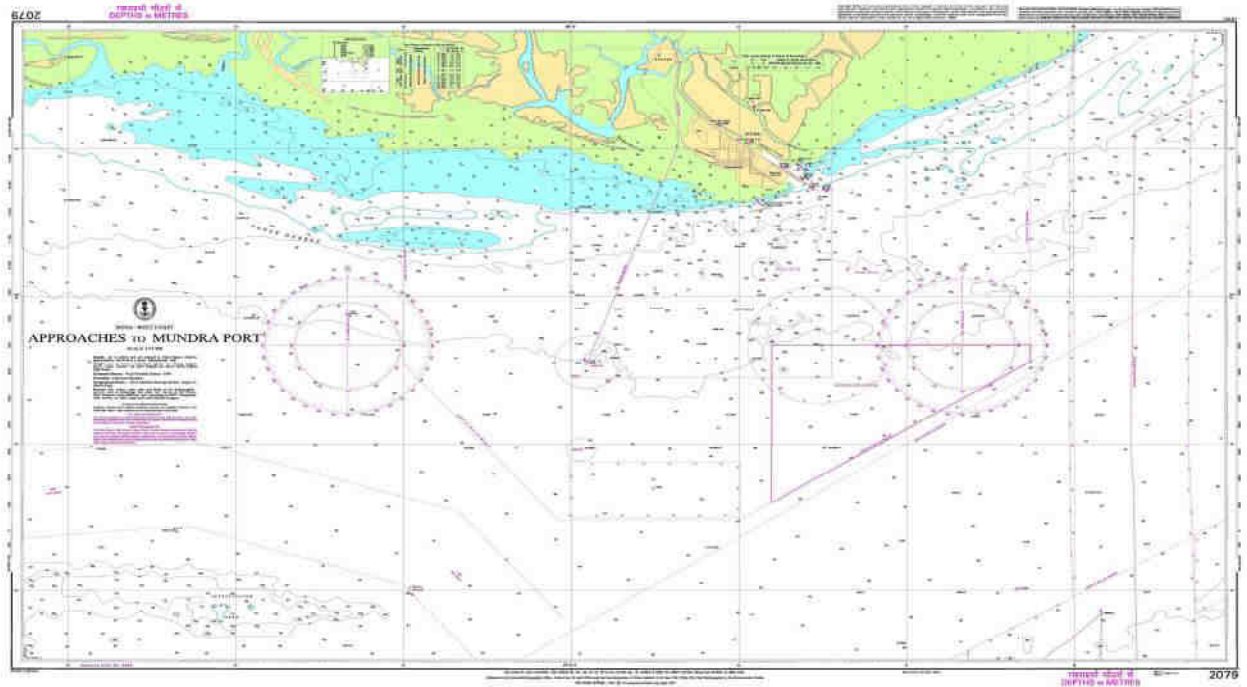
Such a report will also be prepared by the marine manager after each drill or training session and requisite modification(s) incorporated to the plan in order to enhance the overall efficacy of the same.

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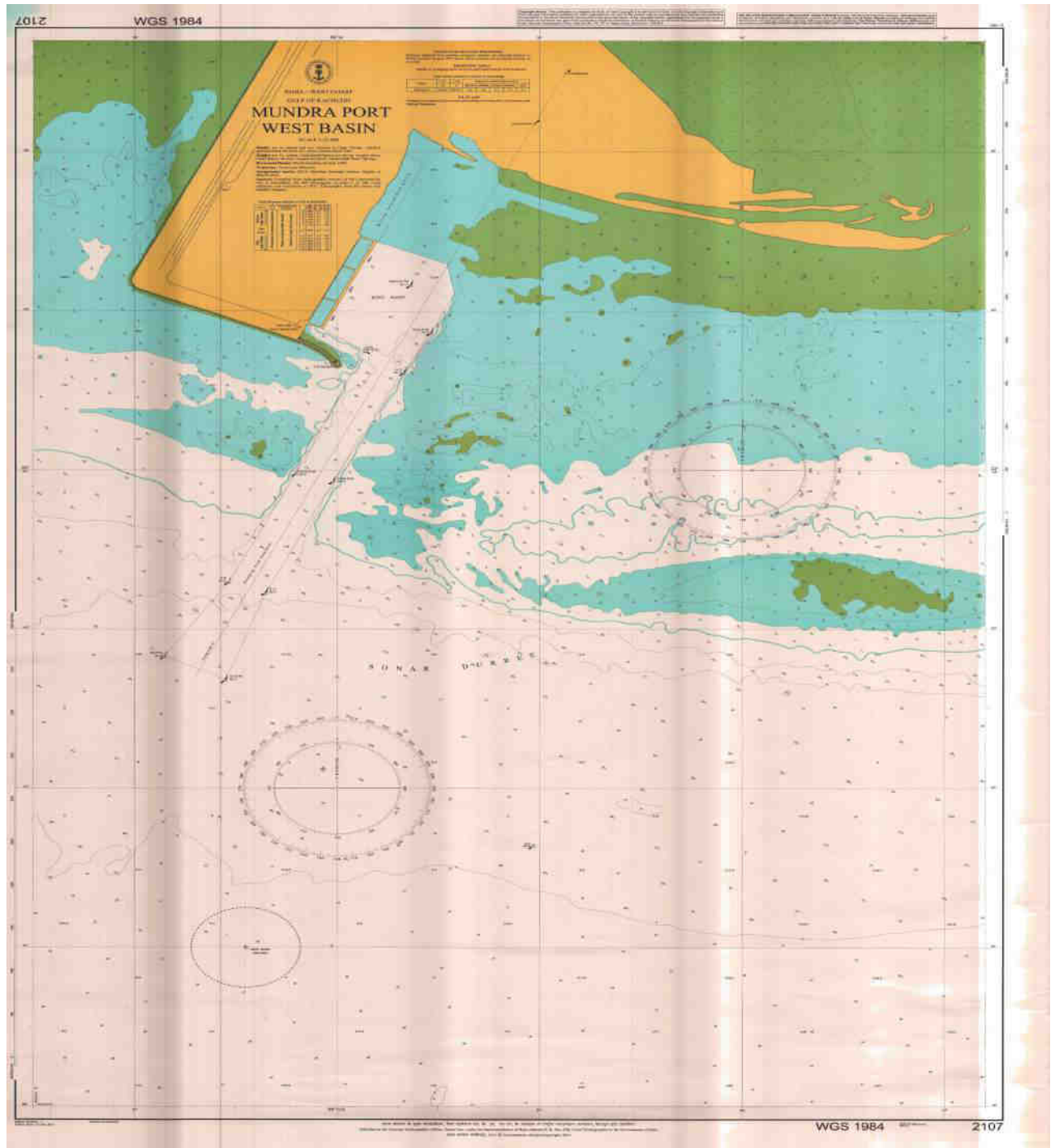
2. Coastal charts, currents, tidal information (ranges and streams), prevailing winds

Currents, tidal information (ranges and streams) : Detailed in Annexure- II, Annexure- III and Annexure- IV (Volume 2) of Oil Spill Risk Assessment



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3. Risk locations and probable fate of oil

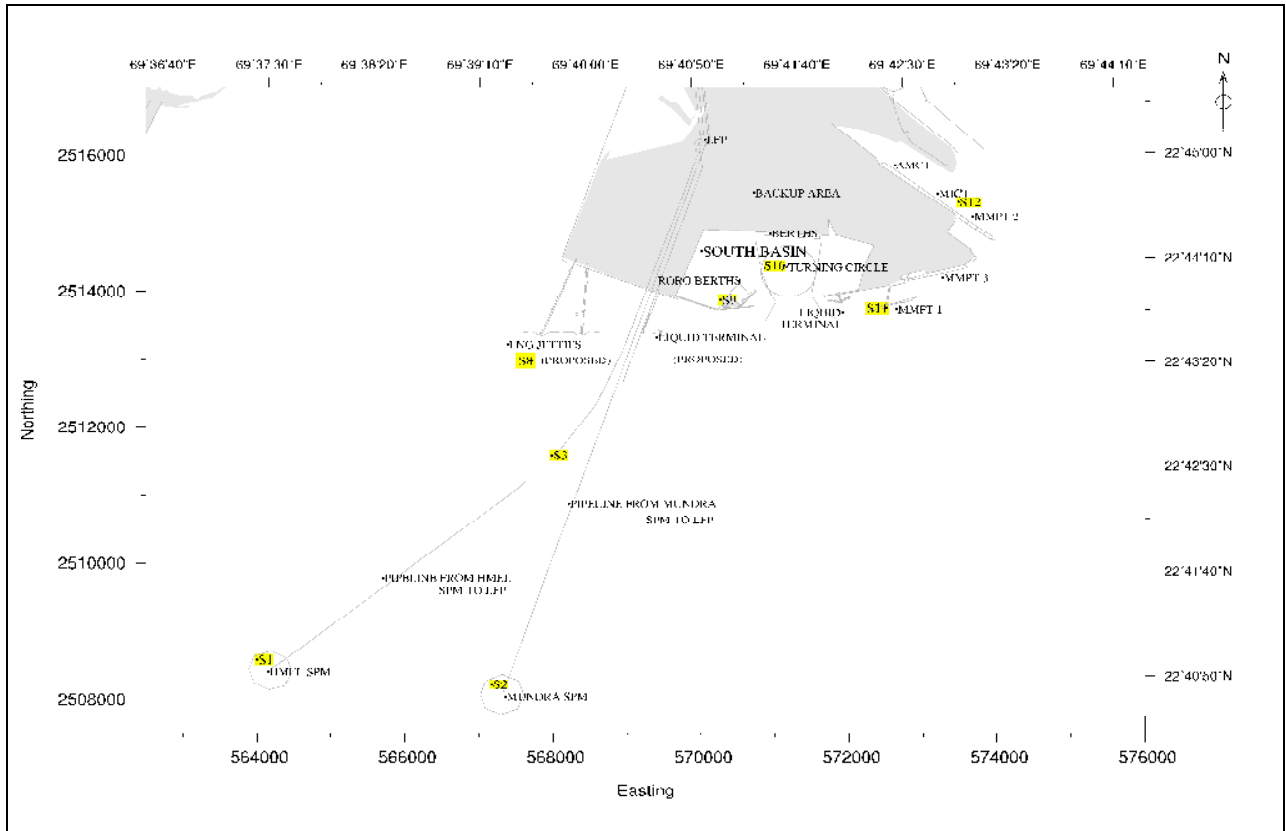


Fig.1: General layout of the Mundra port facilities of APSEZL showing the location of Spill Points for SPMs, South Basin berths, LNG jetty and existing berths

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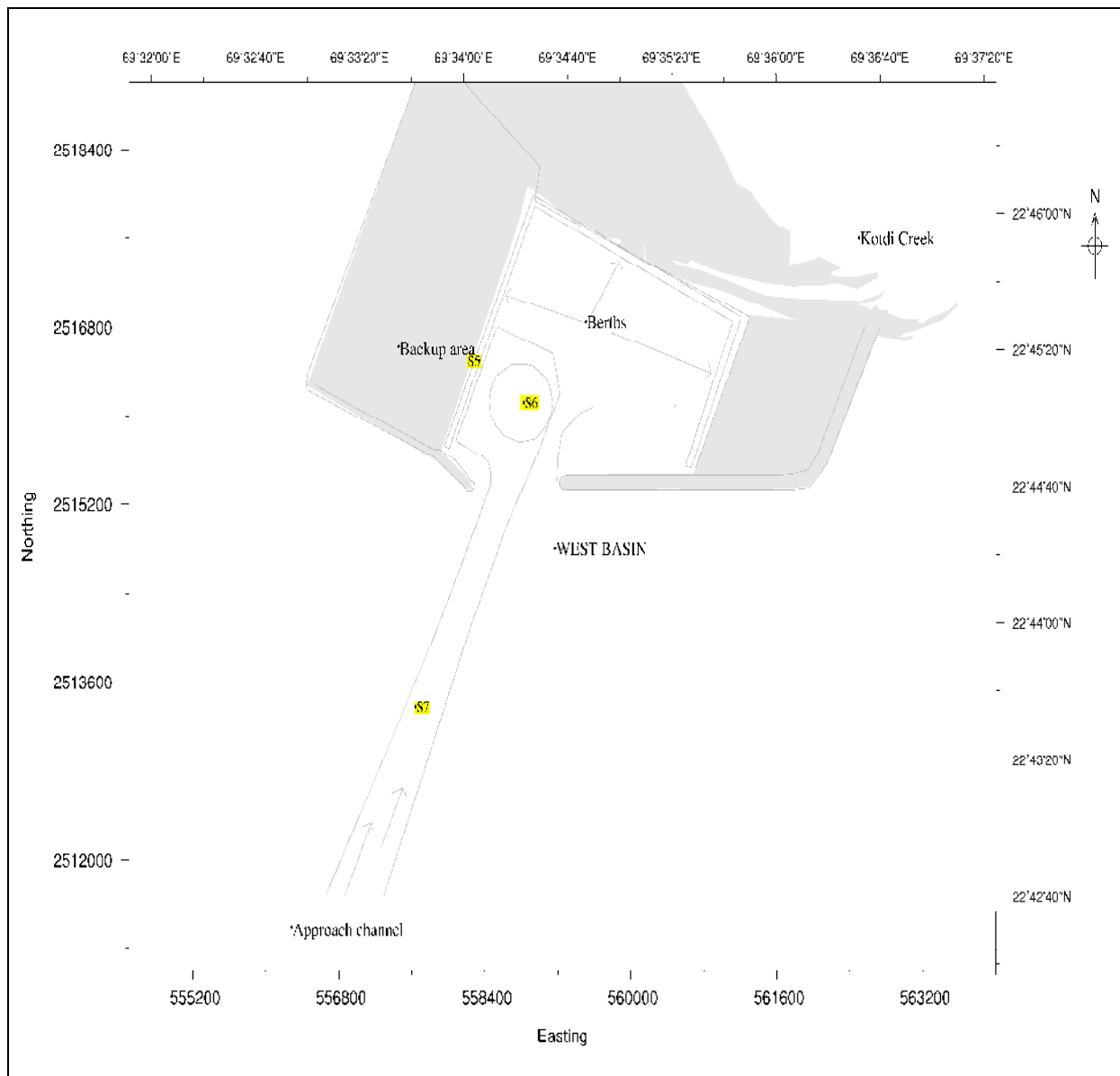


Fig.2: Zoomed up portion of Mundra port facilities of APSEZL showing the location of Spill Points for West Basin

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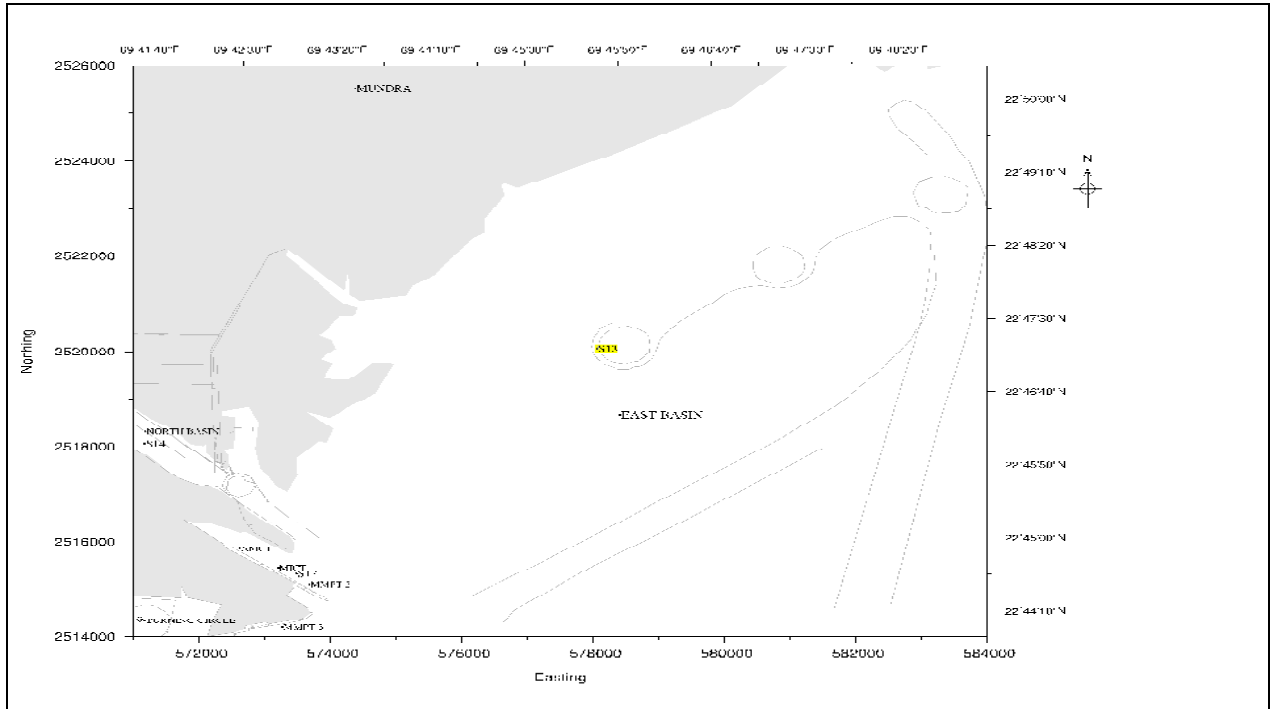
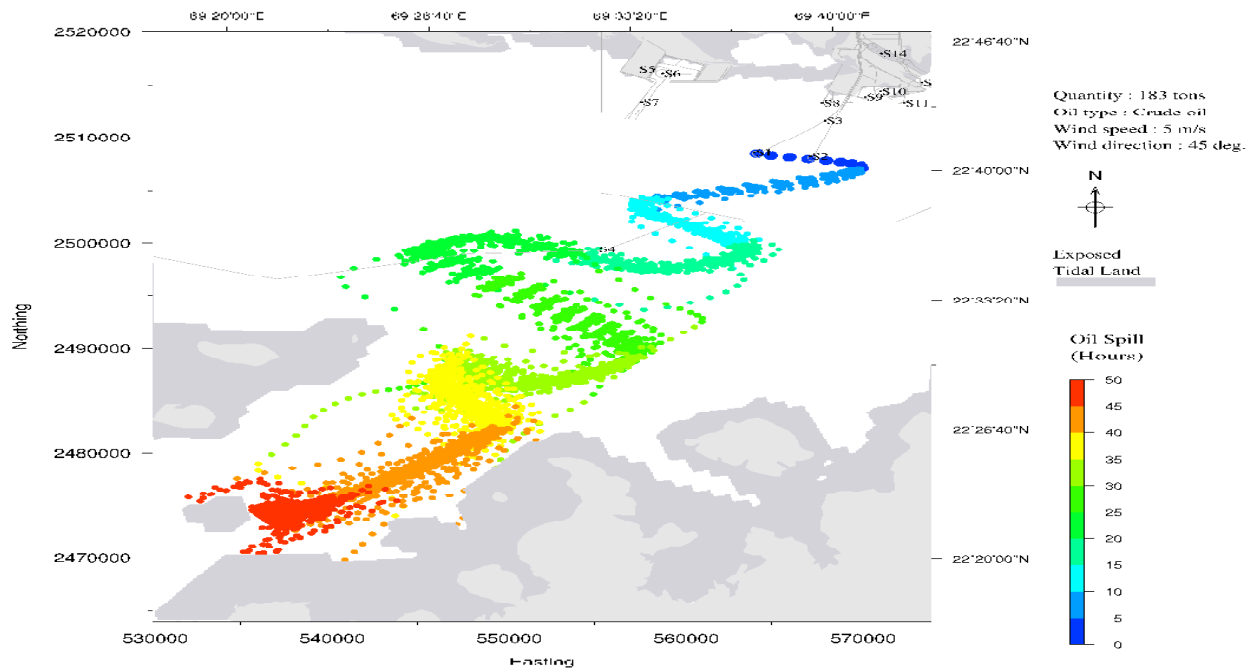


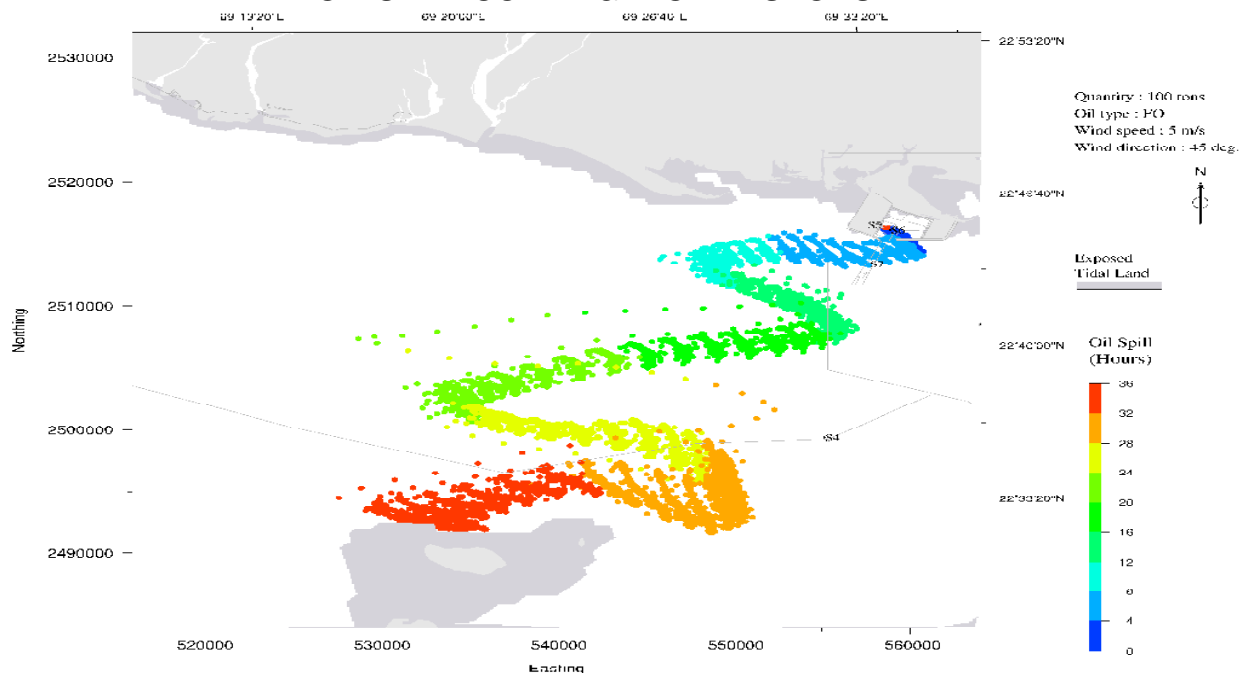
Fig.3: Zoomed up portion of Mundra port facilities of APSEZL showing the location of Spill Points for North Basin & East Basin



Oil Spill trajectory due to instantaneous crude oil leakage of 700 t (due to collision) at spill point S1 (HMEI SPM) after 50 hours during flood condition of the neap tide

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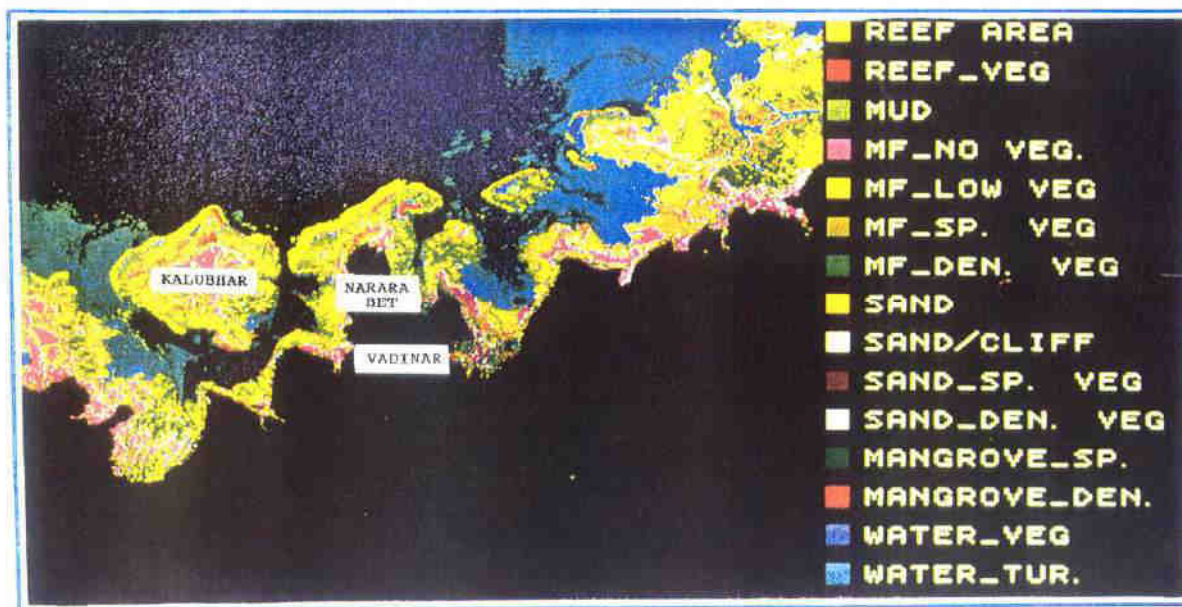
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Oil Spill trajectory due to instantaneous FO leakage of 700 t (due to hull failure/ fire / explosion) at typical berth location in the West Basin

For Risk locations and probable fate of oil refer Annexure- V (Volume 2) of Oil Spill Risk Assessment.

Shoreline resources for priority protection



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Sensitivity Maps/ Atlas

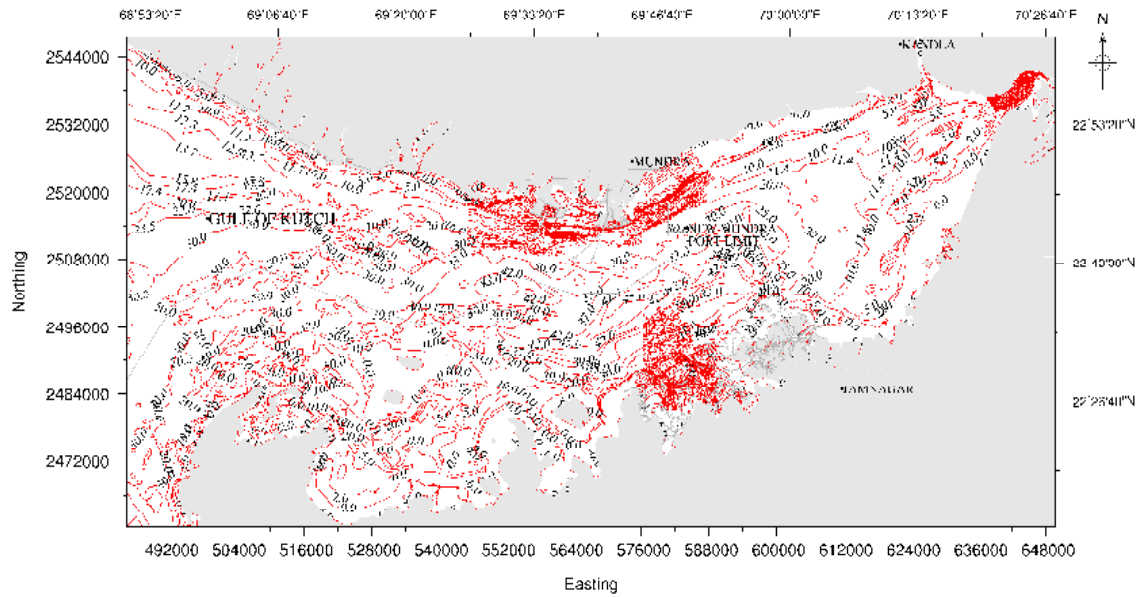


Fig.A1.1 Terrain features of study domain.

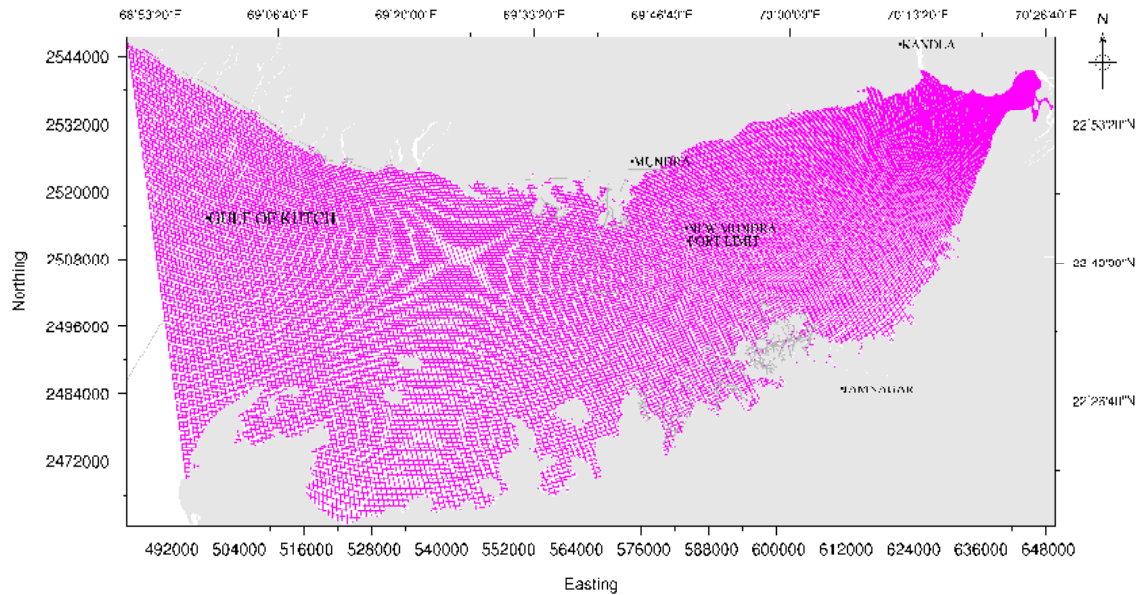


Fig.A1.2 Computational grid

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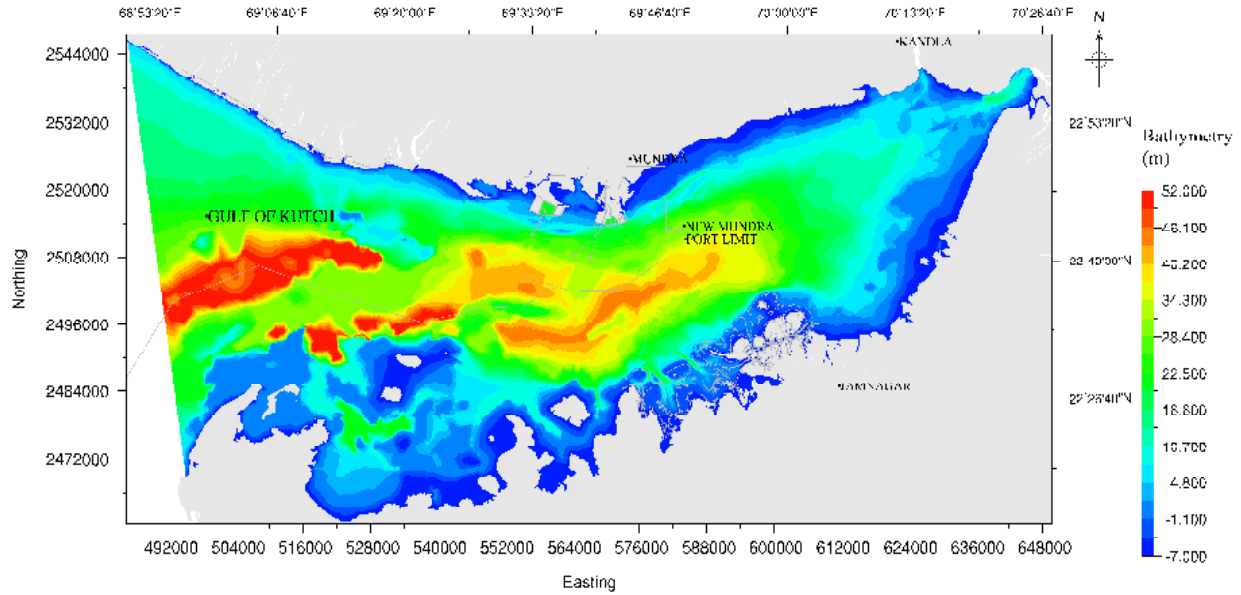


Fig.A1.3 Interpolated depth contours

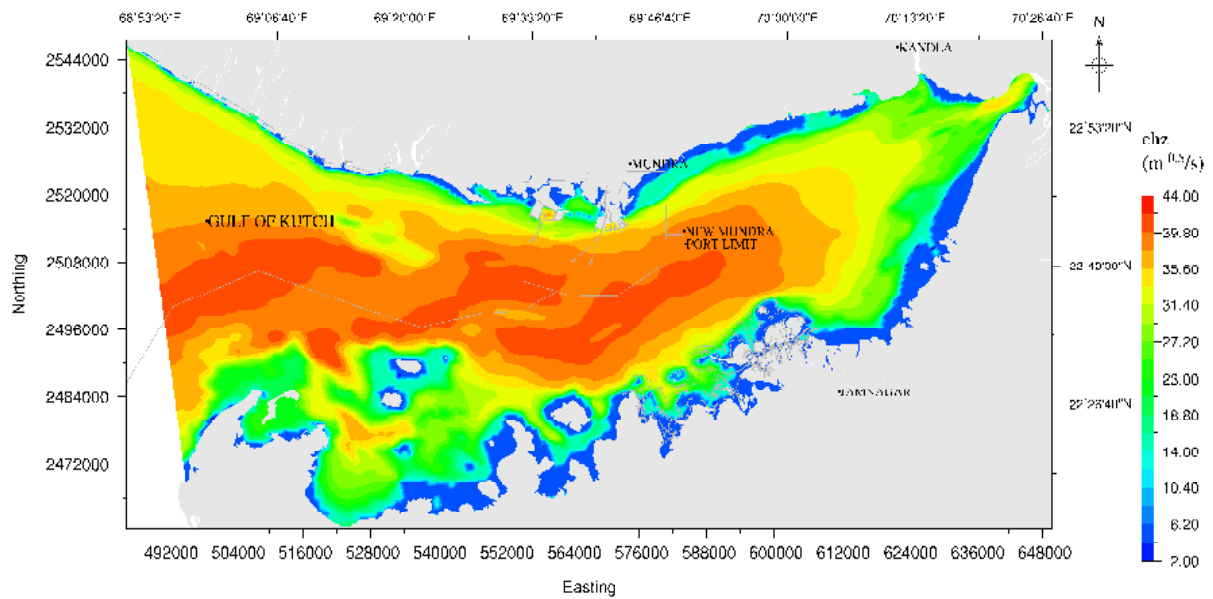


Fig.A1.4 Chezy's coefficient

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Lists

1. **Primary Oil spill Equipment:** booms, skimmers, spray equipment, dispersant, absorbents, oil storage, Radio communications etc.

Detailed in Annexure 3

2. **Auxiliary Equipment:** Tugs and work boats, aircraft, vacuum trucks, tanks and barges, loaders and graders, plastic bags, tools, protective clothing, communication equipment etc.

Detailed in Annexure 3

3. **Support Equipment:** Aircraft, communications, catering, housing, transport, field sanitation and shelter etc. (Availability, contact, cost and conditions)

Not applicable

4. **Sources of Manpower:** Contractors, local authorities, caterers, security firms (Availability, numbers, skills, contact, cost and conditions)

Refer Para 5.3

5. **Experts and Advisors:** Environment, safety, auditing (Availability, contact, cost and conditions)

Detailed in Annexure 4

6. **Local and National Government contacts:** Name, rank and responsibility, address, telephone, fax, telex.

Detailed in Annexure 4

Data

1. Specification of Oils commonly traded

At the liquid berth, the representative products that would be handled are petroleum products like FO/ HSD / SKO / MS / CBFS / CPO / Naphtha etc. Vessels calling at the port will be having FO and HSD for their propulsion requirements.. The products like MS, Naphtha etc are oils of non – persistent nature; they tend to evaporate fast and will not stay long on the surface of the sea waters. Hence spill studies have been carried out for FO and HSD spills at the berths.

At the SPMs, Crude oil unloading takes place.

Physical and Chemical Properties of products handled at the SPMs, Berths and of the propulsion fuels of the ships / tankers

Data on the properties for the hydrocarbons / products handled at the jetty is required for quantitative hazard identification and consequence calculations. The properties of the FO and HSD, the petroleum hydrocarbons likely to be spilled due to the operations at the jetty are given in Table-3.1.

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Table-3.1: Properties of Crude Oil, FO and Diesel

Sl. No	Chemical	Boiling Range (° C)	Specific Heat of Liquid (J/Kg ° K)	Heat of Evaporation (x 10 ⁵ J/Kg)	Heat of Combustion (x 10 ⁵ J/Kg)
1	Crude Oil	IBP - 700+	2385	3.4	425
2	HSD	200 - 350	2889	4.65	448
3	Fuel Oil	180 - 450	2500	3.4	452

The following characteristics of oil are used for modelling study:

(a) Crude Oil

Sp. Gr = 0.82 to 0.88

Surface Tension = 3.0 e-03

Molar Volume = 0.002

Viscosity: 275 CST at 37.8 deg C

Wax content: 12 – 19 %

Pour point of untreated crude: 30 deg C

Pour point of treated crude: 18 deg C

(b) FO

Sp. Gr = 0.92

Boiling point = > 260⁰ C

Vapor pressure = < 0.1 psia at 21⁰ C

(c) HSD

Sp. Gr = 0.86

Pour point = 6⁰ C - 18⁰ C

Vapor pressure = 2.12 to 26 mm Hg at 21⁰ C

2. Wind and weather

Meteorological and Oceanographic Conditions

The met-ocean conditions have been previously ascertained at several stages in the course of various studies conducted in past in respect of Mundra port projects. Flow modeling for the Mundra port location has been covered in the model developed by Environ, India, who have developed the model for whole of Gulf as relevant to Mundra region. It has been observed during model studies that flow regime does not have significant changes due to the proposed developments. The following are the main hydro-meteorological parameters for planning and designing of the marine facilities described below.

Rainfall and Temperature

The Kutch is a semi-arid region with weak and erratic rainfall confined largely to June-October period. With a few rainfall days, the climate is hot and humid from April till October and pleasant during brief winter from December to February. Although the monthly mean maximum temperature recorded is 37°C during 2005, it occasionally exceeds 40°C. Rainfall alone forms the ultimate source of freshwater resource to the region. The average rainfall at Mundra is about 400 mm/year.

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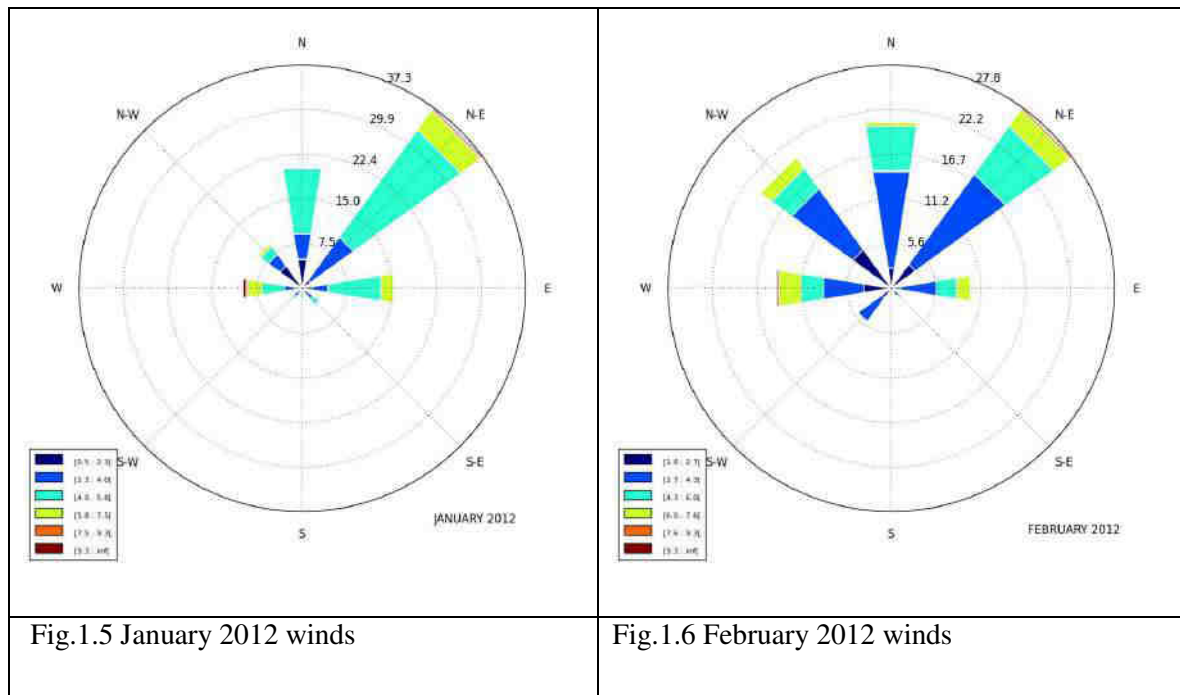
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Cyclones

Cyclonic disturbances strike North-Gujarat, particularly the Kachchh and Saurashtra regions, periodically. These disturbances generally originate over the Arabian Sea and sometimes the Bay of Bengal. Generally during June, the storms are confined to the area North of 15°N and East of 65°E. In August, the initial stages, they move along the northwest course and show a large latitudinal scatter. West of 80°E, the tracks tend to curve towards North. During October the direction of movement of a storm is to the West in the Arabian Sea. However, East of 70°E some of the storms move North-Northwest and later recurves North East to strike Gujarat-North Mekran coast.

Wind

There are strong winds at times at Mundra Port. The month wise wind rose diagrams for the year 2012 and for the months of January and February of the year 2013 are given below. In the period lasting over months March to May the wind direction is generally SWW (225° - 250°) and velocity varies from 20 to 25 Knots. From June through August, the wind direction is predominantly SW and velocity varies from 25 to 30 Knots with short gusts going up to 35 to 40 Knots. Towards end of September and through October wind direction changes to NE with velocities ranging from 7 to 10 Knots. Direction remaining same the velocity varies 10 knots to 25 Knots in the period November to January. February is the calm period when wind direction is Southerly with velocity in the range of 7 Knots. Stormy weather may generate winds having velocity up to 100 Knots which should be taken as the worst case scenario for design of tall structures and heavy duty cranes.



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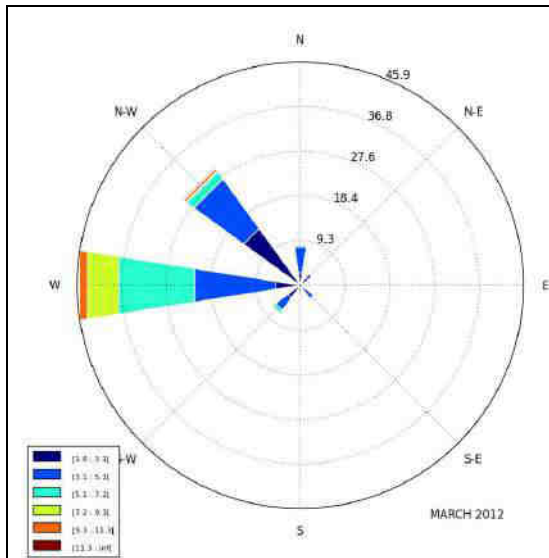


Fig.1.7 March 2012 winds

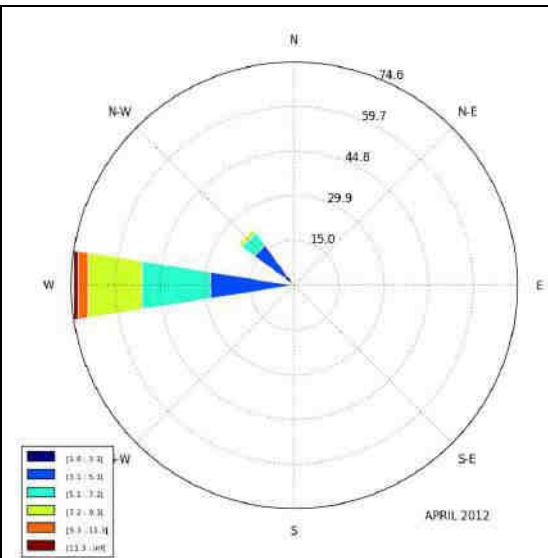


Fig.1.8 April 2012 winds

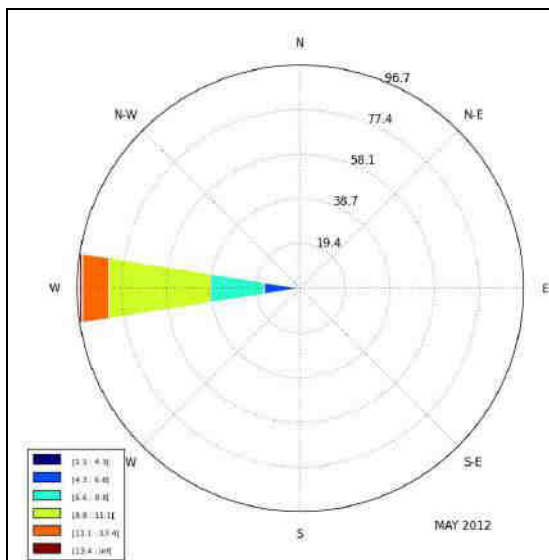


Fig.1.9 May 2012 winds

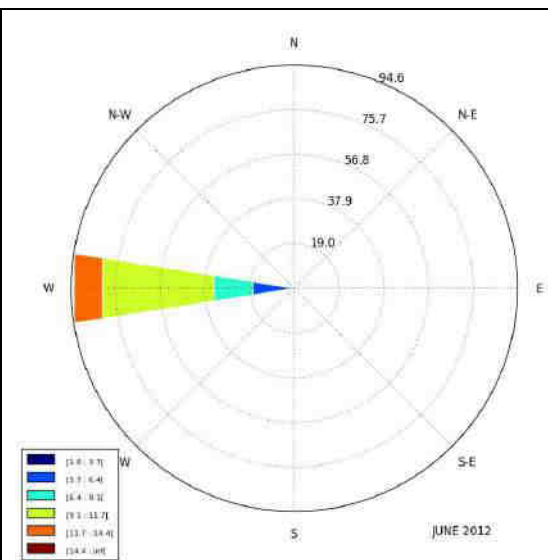
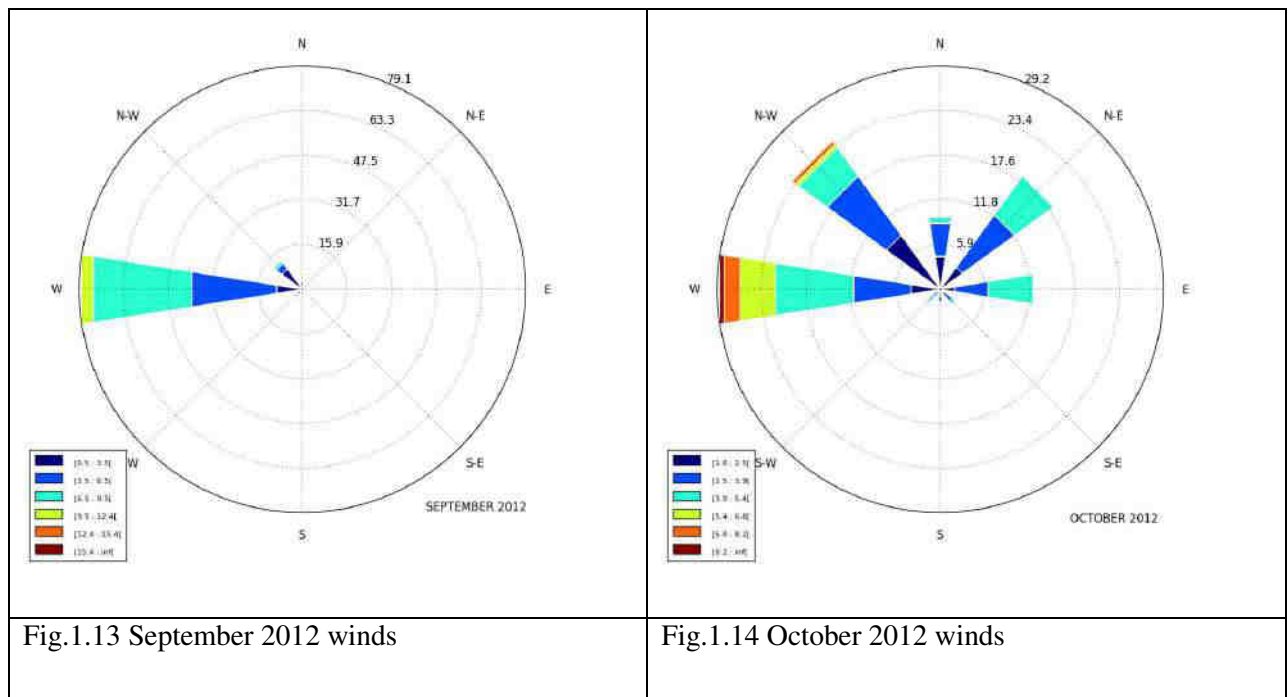
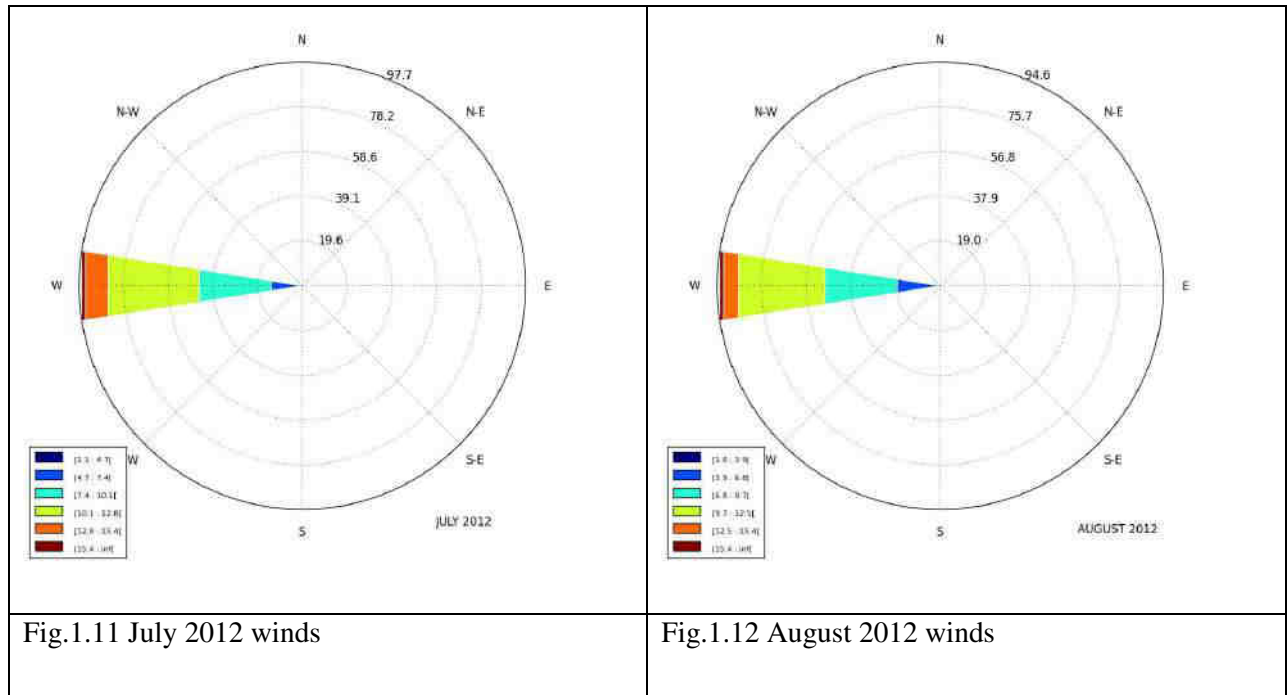


Fig.1.10 June 2012 winds

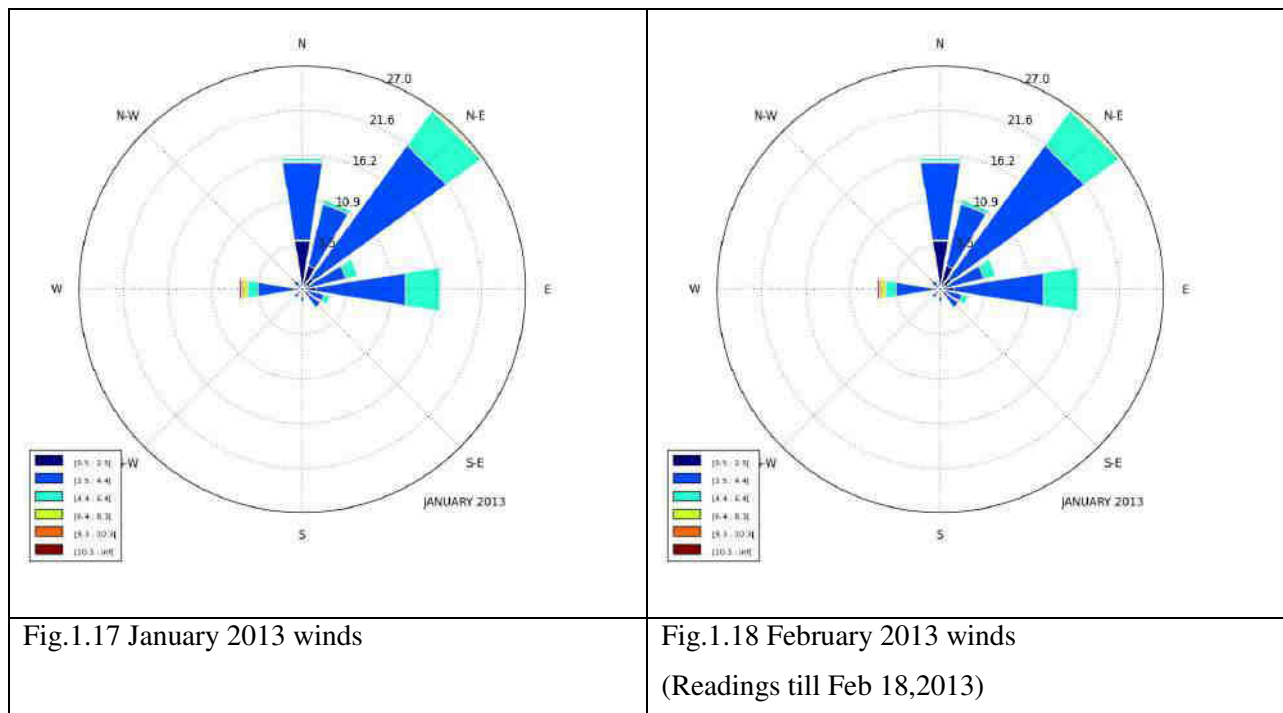
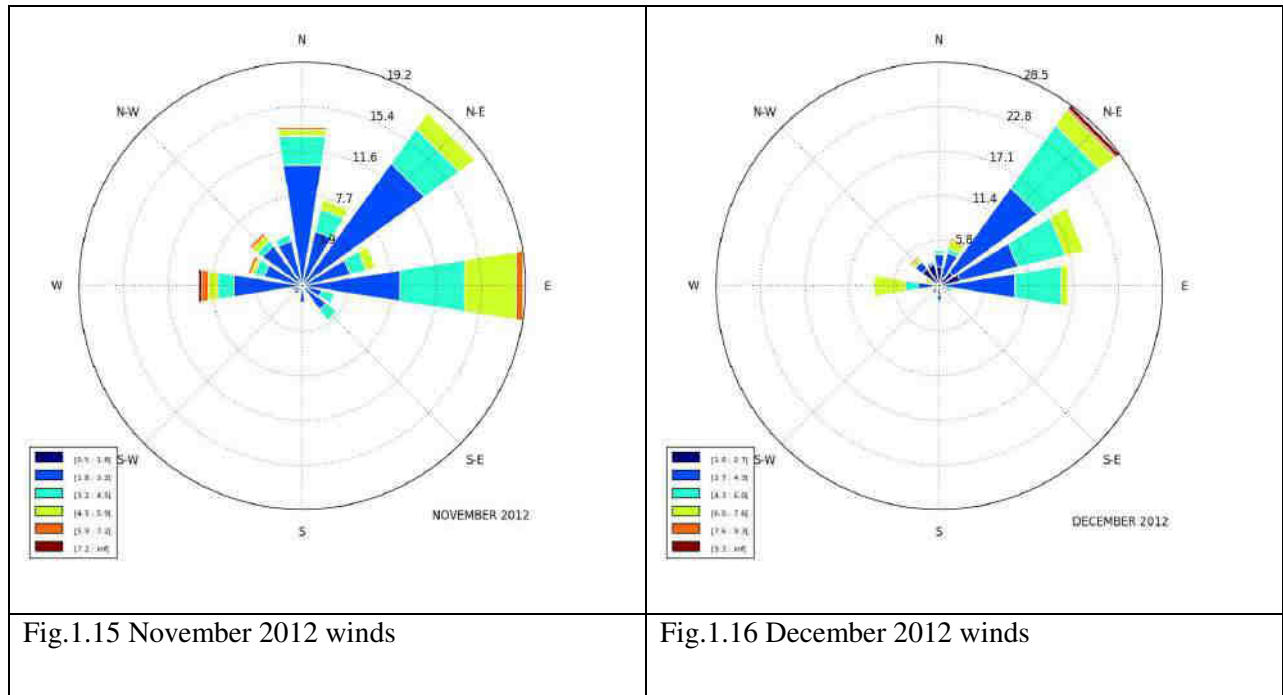
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Tides

The tidal planes were assessed in 1998 and are as shown in Table below.

The Highest Astronomical Tide (HAT) is estimated to be about +6.4 m above chart datum (CD), and the Lowest Astronomical Tide (LAT) to be at 0.0 m CD.

Tide	Height (m) above CD
Mean High Water Springs	5.8
Mean High Water Neaps	4.6
Mean Low Water Neaps	2.1
Mean Low Water Springs	1.0

Currents

Currents in the approaches to the port are dominated by the tidal flows, with predictable variations over diurnal, monthly and annual time scales. Currents in this part of the Gulf flow parallel to the natural sea-bed contours. Currents can be relatively strong, with speeds in excess of 3.0 Knots reported at sometimes of the year. The Admiralty Chart shows currents off Navinal point to be 3.0 Knots East & West bound. It is observed that the currents are usually aligned with the bed contours and are stronger in deeper waters off the coast. The impact of future development over the existing coast-line can be determined by the change in current speed resulting from the proposed developments.

Waves

In past HR Wallingford (HRW) has studied the wave climate considering wave energy from locally generated waves and swell propagating in to the Gulf of Kutch from the Arabian Sea. The results of the study carried out by HRW are presented in the Table below.

Design Waves at Mundra

Direction Sector (°N)	Return Period (years)	Inshore Direction (°N)	Hs (m)	T2 (sec)
210	1	222	1.2	5.0
	5	222	1.4	5.3
	20	221	1.6	5.8
	100	221	1.8	6.1
240	1	226	1.5	5.4
	5	226	1.7	5.8
	20	225	1.8	6.1
	100	225	2.0	6.5
270	1	239	1.4	5.5
	5	236	1.7	6.3
	20	236	1.8	6.7
	100	235	2.0	7.4
300	1	240	0.8	5.2
	5	240	0.9	5.6
	20	239	1.0	6.2
	100	238	1.2	6.7

Atmospheric stability is an important factor for predicting the dispersion characteristics of gases/vapours into the surrounding environment. Change in atmospheric stability is a direct consequence of the vertical

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temperature structure. The stability effects are mathematically represented through Pasqual parameters. The following stability classification is employed:

Stability Class	Atmospheric Condition
A	Very Unstable
B	Unstable
C	Slightly Unstable
D	Neutral
E	Stable
F	Very Stable

Condition of atmospheric stability is estimated by a suitable method that uses dispersion parameters viz., vertical temperature gradient, profile of the winds and roughness factor. The roughness factor for the Mundra area is small since it mainly comprises of plain land.

The following meteorological information has been taken in the calculations for the Mundra area (GMB-2010):

Average ambient temperature : 30°C
Average wind speed : Wind data for the whole year 2012 is available and is used
Stability condition : F (Very Stable)

3 Information sources

This plan is prepared in accordance with:

- a) Marine Environmental Impact Assessment of SPMs, COTs and connecting pipelines of APSEZL at Mundra dated February 2001, prepared by National Institute of Oceanography, Mumbai.
- b) Report on Risk assessment study and On-site disaster management Plan for SPMs, COTs and connecting Pipelines of Adani Ports and Special Economic Zone Limited, by TATA AIG Risk Management Services Limited, dated February 2001.
- c) HAZOP study report of SPM Terminal pipeline project by Intec Engineering, dated 26/02/2004.
- d) IPIECA guide to Contingency planning for oil spills on water.
- e) Oil spill risk assessment and contingency plan study done by M/s Environ Software Pvt. Ltd. (Copy enclosed)

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ANNEXURES

INITIAL OIL SPILL REPORT		ANNEXURE 1
Particulars of person, office reporting		
Tel No.		
Date & time of incident		
Spill location		
Likely cause of spill		Witness
Initial response action		By
Any other information		
<p>This FIR is to be sent to Marine Manager by fastest means of communication possible. It is an offence not to report oil pollution incident.</p> <p>This FIR is to be followed by company's incident report also.</p> <p>Following POLREP report to the Government through nearest CG information will also be required:</p>		
Identity of informant		
Time of FIR		
Source of spill		
Cause of spill		
Type of spill		
Colour code information (from CG)		
Radius of slick		
Tail		
Volume		
Quantity		
Weather		
Tide / current		
Density		
Layer thickness		
Air / Sea temp.		
Predicted slick movement		
Size of spill classification (Tier 1, 2 or 3)		

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POLREP		ANNEXURE 2
In case of an oil spill, APSEZ will provide information to Commandant Coast Guard District 1 Porbandar COMDIS 1 and Coast Guard Station Mundra in the following format:		
SN.	Parameter	Data
1.	Identity of the informant	
2.	Time of information receipt	
3.	Source of Spill	
4.	Cause of Spill	
5.	Type of oil	
6.	Colour code information	
7.	Configuration	
8.	Radius	
9.	Tail	
10.	Volume	
11.	Quantity	
12.	Weathered or Fresh	
13.	Density	
14.	Viscosity	
15.	Wind	
16.	Wave Height	
17.	Current	
18.	Layer Thickness	
19.	Ambient air temperature	
20.	Ambient sea temperature	
21.	Predicted slick movement	
22.	Confirm Classification of spill size	
Additional Information :		

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LIST OF RESOURCES AVAILABLE						ANNEXURE 3
Tugs Available for Oil Spill Containment						
Name of Tug	Type	BHP	OSD	AFFF	Capacity (cubm/Hr)	BP
Dolphin No. 3	ASD	2200 X 2	3000 ltr	2000 ltr	1200	55
Dolphin No. 4	ASD	2200 X 2	3000 ltr	2000 ltr	1200	55
Dolphin No. 7	ASD	2200 X 2	3000 ltr	2000 ltr	1200	55
Dolphin No. 10	ASD	3000 X 2	3000 ltr	-	-	70
Dolphin No. 11	ASD (DSV)	2200 X 2	3000 ltr	2000 ltr	1200	55
Dolphin No. 14	ASD	3000 X 2	3000 ltr	2000 ltr	1200	70
Dolphin No. 15	ASD	3000 X 2	3000 ltr	2000 ltr	1200	70
Dolphin No. 16	ASD	3000 X 2	3000 ltr	2000 ltr	1200	70
Dolphin No. 17	ASD	3000 X 2	3000 ltr	-	-	70
Dolphin No. 18	ASD	3000 X 2	3000 ltr	2000 ltr	1200	70
Khushboo	Fixed screw	401 X 2	-	-	-	10
<p>Dolphin No. 3, 4, 7, 10, 11, 14, 15, 16, 17 & 18 are fitted with Oil Spill Dispersant boom and proportionate pump to mix OSD and Sea water as required. Dolphin No.3, 4, 7, 11, 14, 15, 16, 17 & 18 are fitted with a fire curtain and remote controlled fire monitors.</p> <p>All above eleven Tugs have class notation as Harbour Tugs and are certified to work within the Harbour limits only.</p> <p>Reception Facility : 12" pipe line, connected to a slop tank at chemical tank farm.</p> <p>Dolphin 11 has fire fighting system of 1200 m3/hr along with 20 ton lifting "A" frame and diving support facility.</p> <p>Location of Oil Spill Equipment: The Oil Spill Equipments are stored in SPM Store.</p> <p>Resources / Equipment Available with APSEZL, Mundra</p>						

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Item	Quantity
Canadyne Fence Boom (Reel model 7296/8496 with Power Pack, Towing bridles and Tow lines - 235 meter	1 no
Power pack with boom reel with hydraulic hoses	2 nos.
Power pack - 20 KV with boom reel with hydraulic hoses	2 nos.
Lamor Side Collector system (Recovery Capacity 123 m³/ hr) (Side collector LSC-3C/2300(01C02-P536). Oil transfer pump OT A 50 with oil transfer hose set	2 nos. 2 sets
Lamor Minimax 12 m³ skimmer	2 sets
Power pack for skimmers with hydraulic hoses	4 nos.
Power pack - 20 KV for skimmers with hydraulic hoses	1 no.
Floating tank (25 m³)	1 nos.
Foot pumps for floating tank	6 nos
Oil Spill Dispersants	5000 ltr
Portable dispersant storage tank: 1000 ltr capacity	1 no.
Portable pumps	2 nos.
Two – way hydraulic maneuvering panel	2 nos
Oil Containment Boom -Length 2000 metres, Height -1500 mm, Draft-900mm, Free Board-600mm	2000 mtr
Current Buster Boom -Fasflo -75 (for response in fast current)	2 Nos
Skimmer -KOMARA 15 Duplex Skimmer System with floating IMP 6 Pump.	4 Nos
12.5T Flexible Floating Storage Tank (PUA).	3 Nos
Diesel Driven Transfer Pump for Flex Barge	2 Nos
Site Hose Kit for the transfer Pump for the Flex Barge	2 Nos
3" & 2"Hose Adaptor for Transfer Pump and Hose	2 Nos
Shoreline Cleanup Equipment	
Mini Vac System	5 Nos
OSD Applicator - Oil Dispersant Spry Unit(20 Ltr) for use on Beach and Inter Tidal Zones	2 Nos
Startank with Capacity 10000 liter(10m ³)	2 Nos
Sorbent Boom Pack(12.5cm x4 M)	500 mtr
Sorbent pad	2000 Nos

Facilities in the Marine Control room:

1. Tidal stream gauge: This can accurately read the prevalent rate of flow and direction of current.
2. Tide gauge: For accurately calculating the height of tide at any given time.
3. Wind gauge: For direction and speed of wind.
4. VHF sets (fixed and portable) with complete range of marine frequencies to be used for field operations.

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LIST OF TELEPHONE NUMBERS OF EXPERT ADVISORS ANNEXURE 4			
List of Important Telephone Numbers of Govt. Officials and other neighboring Organisations (Expert and Advisors) related to Spill Combating Plan			
SN.	Company	Name and Designation	Telephone Numbers
1.	APSEZL, Mundra	Chief Operating Officer Head Marine Pollution Response Officer Port Control	02838-6272602838-255727 02838-255727 02838-255761 / 289170 (Fax) 02838-255739
2.	Kandla Port Trust	Chairman Dy. Conservator Harbor Master Signal Station	02836-233001 / 234601 02836-223585 / 220235 02836-270201 02836-270194 / 549
3	Indian Oil Corporation, Mundra	CM (Ops) Manager (Ops) Control Room	02838- 222194 02838- 222197 02838- 224444
4	Indian Oil Corporation, Vadinar	DGM (Ops) Manager Tech Services Port Control	02833-256527 02833-256464 02833-256555
5	Reliance Petroleum Ltd Jamnagar	Marine Chief Senior Port Captain Port Control	0288-4013607 0288-4013750 0288-4012600 / 4012610
6	The Commanding Officer Indian Coast Guard Station, Mundra	ICGS, Mundra Station Ops Officer	02838 - 271402 & 03 (Tel) 02838 – 271404 (Fax)
7	The Commander Coast Guard Region (North West), Gandhinagar	COMCG (NW) Regional Ops & Plans Officer	079-23243241 (Tel) 079-23243283 (Fax)
8	The Commander No.1 Coast Guard District (Guj), Porbandar	COMDIS-1 District Ops & Plans Officer	0286-2214422 (Tel) 0286-2210559 (Fax)
9	The Commander Coast Guard Region (West) Mumbai	COMCG (W) Regional Ops & Plans Officer	022-24376133 (Tel) 022-24333727 (Fax)
10	The Officer-in-Charge Coast Guard Pollution Response Team (West), Mumbai	PRT (W) Officer-in-Charge	022-23722438 (Tel) 022-23728867 (Fax)
11	Gujarat Maritime Board	Vice Chairman & CEO Chief Nautical Officer	079-23238346 / 23238363 079-23234716

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12	Ministry of Environment Govt. of Gujarat	Director (Environment)	079-23252154 / 23251062 079-23252156 (Fax)
13	Gujarat Pollution Control Board	Environmental Engineer	079-232 22756 079-232 22784 (Fax)

List Of Important Telephone Numbers Of Adani Group Personnel

S.No.	Description / contact person / designation	Telephone Nos.	
		Landline	Mobile
01	Capt. Anubhav Jain, Head – Marine & PFSO, APSEZL	02838 - 255727	91 9925223674
02	Mr.Cherian Abraham, Dy. PFSO - (AICTPL)	91-2838 - 255733	9189800 48850
03	Capt. Kumar Paritosh, Dy. PFSO, ACMTPL	02838 – 255733	91 9879104839
04	Mr. Hari Govindan V , Dy.PFSO, MICT	91-2838 - 285072	91 9879104805
05	Marine control, APSEZL	02838 – 255333 / 255761	91 9825228673
06	Port Operation center, APSEZL	02838 –255762	91 9825000949
07	Port security Control, APSEZL	02838 – 289322	91 9825000933
08	Head - Security, APSEZL	02838 – 289947	91 90999 99262
09	Head - Health, safety & Environment, APSEZL	02838 - 255777	91 7574894383
10	Head - Fire Dept. APSEZL	02838 – 255857	91 7069083035
11	Occupational Health Centre	02838 - 255710	91 8980015070

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Marine Officer/ SPM Mooring master ANNEXURE 5		
Responsibilities	<ul style="list-style-type: none"> Observe or receive report of oil or chemical spill incident Initiate measures to prevent/ reduce further spillage Maintain communication with other all vessels 	
Step	Actions	Additional Information
Alert	(Marine Manager / On Scene Commander / SPM Pilot Tugs and other support/ response craft	<i>VHF Channel 73 / 77</i>
Initial Actions	Stop all cargo operations Ensure all safety precautions taken/observed Verify incident details Advise all relevant information to (Marine Manager / On Scene Commander / or SPM Pilot Initiate personal log Place tugs/other response craft on stand-by	<i>Liaise with Terminal Shift Engineer</i>
Further Actions	Brief (Marine Manager / On Scene Commander / SPM Pilot as necessary Mobilize response equipment/ personnel as directed by (Marine Manager / On Scene Commander / Maintain personal log of communications and events Act as instructed by (Marine Manager / On Scene Commander / SPM Pilot	
Final Actions	Submit personal log to HOD – Marine Attend debrief	

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MARINE MANAGER / On Scene Commander ANNEXURE 6		
Responsibilities	<ul style="list-style-type: none"> Initially assess situation Verify classification Verify fate of spill Verify resources immediately at risk, inform parties Provide accurate situation reports to Radio Room/ HOD – Marine Collect evidence and/ or statements Liaise with HOD-Health, Safety, Environment & Fire Liaise with incident vessel regarding status of oil spill (if applicable) 	
Step	Actions	Additional Information
Alert	HOD – Marine	
Initial Actions	Proceed to incident location, assume role of On-Scene Coordinator Ensure all safety precautions have been taken Initiate response / Investigate cause/ source of spill Communicate all information to HOD – Marine Ensure samples of spilled oil taken Initiate personal log Take photographic evidence Collect evidence and take statements	<i>Stopped or ongoing</i>
Further Actions	Ensure resources are being deployed as required Provide co-ordination at-sea response Provide detailed situation reports to HOD- Marine Liaise with -Health, Safety Environment & Fire Department.	
Final Actions	Submit personal log to HOD – Marine Attend debrief	

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SPM Pilot			ANNEXURE 7
Responsibilities	<ul style="list-style-type: none"> Initially assess situation Verify classification Provide accurate situation reports to Radio Room/ OSC Collect evidence and/ or statements Liaise with incident vessel regarding status of oil spill (if applicable) 		
Step	Actions	Additional Information	
Alert	<input type="checkbox"/> Marine Control Room <input type="checkbox"/> OSC <input type="checkbox"/> Tugs and other support / response crafts	VHF Channel 73 / 77	
Initial Actions	Assume role of On-Scene Coordinator Investigate cause/ source of spill Communicate all information to Marine Control Room Ensure samples of spilled oil taken Initiate personal log Take photographic evidence Collect evidence and take statements	Stopped or ongoing	
Further Actions	Ensure resources are being deployed as required Provide co-ordination of the at-sea response Provide detailed situation reports to HOD – Marine		
Final Actions	Submit personal log to HOD – Marine Attend debrief		

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HOD – Marine			ANNEXURE 8
Responsibilities	<ul style="list-style-type: none"> • Confirm/ amend initial classification • Manage the APSEZL response • Authorize expenditure after consultation with COO APSEZL • Brief COO, APSEZL • Liaise with Coast Guard • Approve press statements for release 		
Step	Actions	Additional Information	
Alert	Coast Guard External organizations		
Initial Actions	Verify/ amend spill classification Ensure all safety precaution have been taken Confirm external organizations have been alerted Convene Emergency Response Team Predict slick movement Liaise with vessel Agents/ Owners as appropriate		
Further Actions	Chair the Emergency Response Team meetings Constantly review the strategy being employed and advise of changes where necessary Approve all expenditure commitments Brief President APSEZ Agree press statements with Corporate Relations Chief Confirm formal samples have been taken Advise Coast Guard if oil migrates outside of Local Area		
Final Actions Final Actions (contd.)	Terminate the clean-up Collate personal logs. Prepare the incident report. Hold full de-brief involving all members. Amend contingency plan as required. General Report to President		

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OIL SPILL PROGRESS REPORT				ANNEXURE 9	
Incident Name:					
Updated by:					
Date:			Time (local):		
Summary of Incident Response Operations:					
Summary of Incident Response Resource Utilization:					
Number of Aircraft:			Number of Vessels:		
Dispersant Used:		Liters	Length of Booms in Use:		m
Number of Recovery Devices:			Number of Storage Devices:		
Sorbent Used:		kg	Bio-remediation Used:		kg
Number of Personnel:			Number of Vehicles:		
Specialist Equipment:					
Oil Spill Balance Sheet:					
Total amount of oil spilled:			Tons		
Total amount of oil recovered:			Tons		
Outstanding amount of spilled oil:			Tons		
Mass balance:					
Estimated Natural Weathering:			Tons		
Mechanically agitated:			Tons		
Chemically dispersed:			Tons		
Skimmer recovered:			Tons		
Sorbent recovered:			Tons		
Manually recovered:			Tons		
Bio-remediated:			Tons		
Other:			Tons		

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[illegible]

Control Room Officer

HOD – Marine

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Classification of Oil

ANNEXURE 11

Group 1 oils

A: *API > 45 (Specific gravity < 0.8)

B: Pour point °C

C: Viscosity @ 10–20°C: less than 3 Cst

D: % boiling below 200°C: greater than 50%

E: % boiling above 370°C: between 20 and 0%

	A	B	C	D	E
Asgard	48	-28	2 @ 10°C	58	14
Arabian Super Light	51	-39	2 @ 20°C		
Cosack	48	-18	2 @ 20°C	51	18
Curtew	47	-13	2 @ 20°C	57	17
F3 Condensate	54	<43	1 @ 10°C	81	0
Gipsland	52	-13	1.5 @ 20°C	43	8
Hdra	52	42	2.5 @ 10°C	68	11
Terengganu condensate	71	-36	0.5 @ 20°C	>95	0
Willyburt	48	-53	2 @ 20°C	55	4
Gasoline	58		0.5 @ 15°C	100	0
Kerosene	45	-55	2 @ 15°C	50	0
Napha	55		0.5 @ 15°C	100	0

Group 3 oils

A: *API 17.5–35 (Specific gravity 0.85–0.95)

B: Pour point °C

C: Viscosity @ 10–20°C: between 8 Cst and semi solid

D: % boiling below 200°C: between 10 and 35%

E: % boiling above 370°C: between 30 and 65%

Low pour point <6°C

	A	B	C	D	E
Alaska North Slope	28	-18	32 @ 15°C	32	41
Arabian Heavy	28	-40	55 @ 15°C	21	56
Arabian Medium	30	-21	25 @ 15°C	22	51
Arabian Light	33	-40	14 @ 15°C	25	45
Bonny Light	35	-11	25 @ 15°C	26	30
Iranian Heavy	31	-36	25 @ 15°C	24	48
Iranian Light	34	-32	15 @ 15°C	26	43
Khafji	28	-57	80 @ 15°C	21	55
Simi	33	-12	18 @ 10°C	32	38
Thunder Horse	35	-27	10 @ 10°C	32	39
Tia Juana Light	32	-42	500 @ 15°C	24	45
Troll	33	-9	14 @ 10°C	24	35
IFO 180	18–20	10–30	1,500–3,000 @ 15°C		–

High pour point >5°C

	A	B	C	D	E
Cabinda	33	12	Semi-solid	18	56
Coco	32	21	Semi-solid	21	46
Gamba	31	23	Semi-solid	11	54
Mandji	30	9	70 @ 15°C	21	53
Minas	35	18	Semi-solid	15	58

Group 2 oils

A: *API 35–45 (Specific gravity 0.8–0.85)

B: Pour point °C

C: Viscosity @ 10–20°C: between 4 Cst and semi-solid

D: % boiling below 200°C: between 20 and 50%

E: % boiling above 370°C: between 15 and 50%

Low pour point <6°C

	A	B	C	D
Arabian Extra Light	38	-30	3 @ 15°C	26
Azeri	37	-3	8 @ 20°C	29
Brent	38	-3	7 @ 10°C	37
Draugen	40	-15	4 @ 20°C	37
Dukhan	41	-49	9 @ 15°C	36
Liverpool Bay	45	-21	4 @ 20°C	42
Sokol (Sakhalin)	37	-27	4 @ 20°C	45
Rio Negro	35	-5	23 @ 10°C	29
Umm Shaif	37	-24	10 @ 10°C	34
Zakum	40	-24	6 @ 10°C	36
Marine Gas oil (MGO)	37	-3	5 @ 15°C	

High pour point >5°C

	A	B	C	D
Amna	36	19	Semi-solid	25
Beatrice	38	18	32 @ 15°C	25
Binnulu	37	19	Semi-solid	24
Esravos	34	10	9 @ 15°C	35
Sarir	38	24	Semi-solid	24
Statford	40	6	7 @ 10°C	38

Group 4 oils

A: *API <17.5 (Specific gravity >0.95) or

B: Pour point >30°C

C: Viscosity @ 10–20°C: between 1500 Cst and semi-solid

D: % boiling below 200°C: less than 25%

E: % boiling above 370°C: greater than 30%

	A	B	C	D	E
Bachaquero 17	16	-29	3,000 @ 15°C	10	60
Boscan	10	15	Semi-solid	4	80
Cirra	33	43	Semi-solid	10	54
Handil	33	35	Semi-solid	23	33
Merey	17	-21	7,000 @ 15°C	7	70
Nile Blend	34	33	Semi-solid	13	59
Pilon	14	-3	Semi-solid	2	92
Shengji	24	21	Semi-solid	9	70
Taching	31	35	Semi-solid	12	49
Tia Juana Pesado	12	-1	Semi-solid	3	78
Widuri	33	46	Semi-solid	7	70
IFO 380	11–15	10–30	5,000–30,000 @ 15°C		

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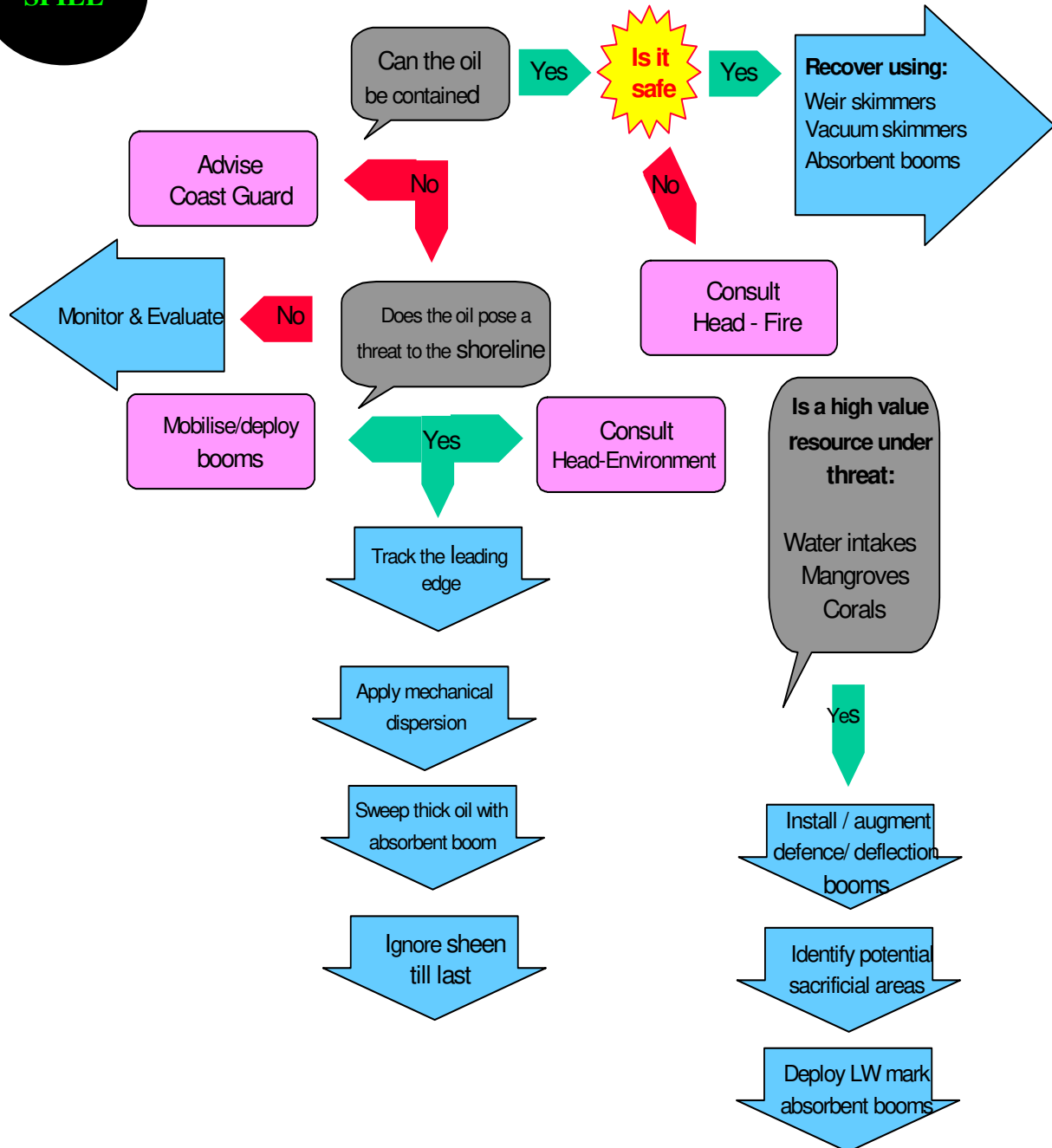
ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD.
MUNDRA
OIL SPILL CONTINGENCY RESPONSE PLAN

Response Guidelines

ANNEXURE 12

OIL
SPILL

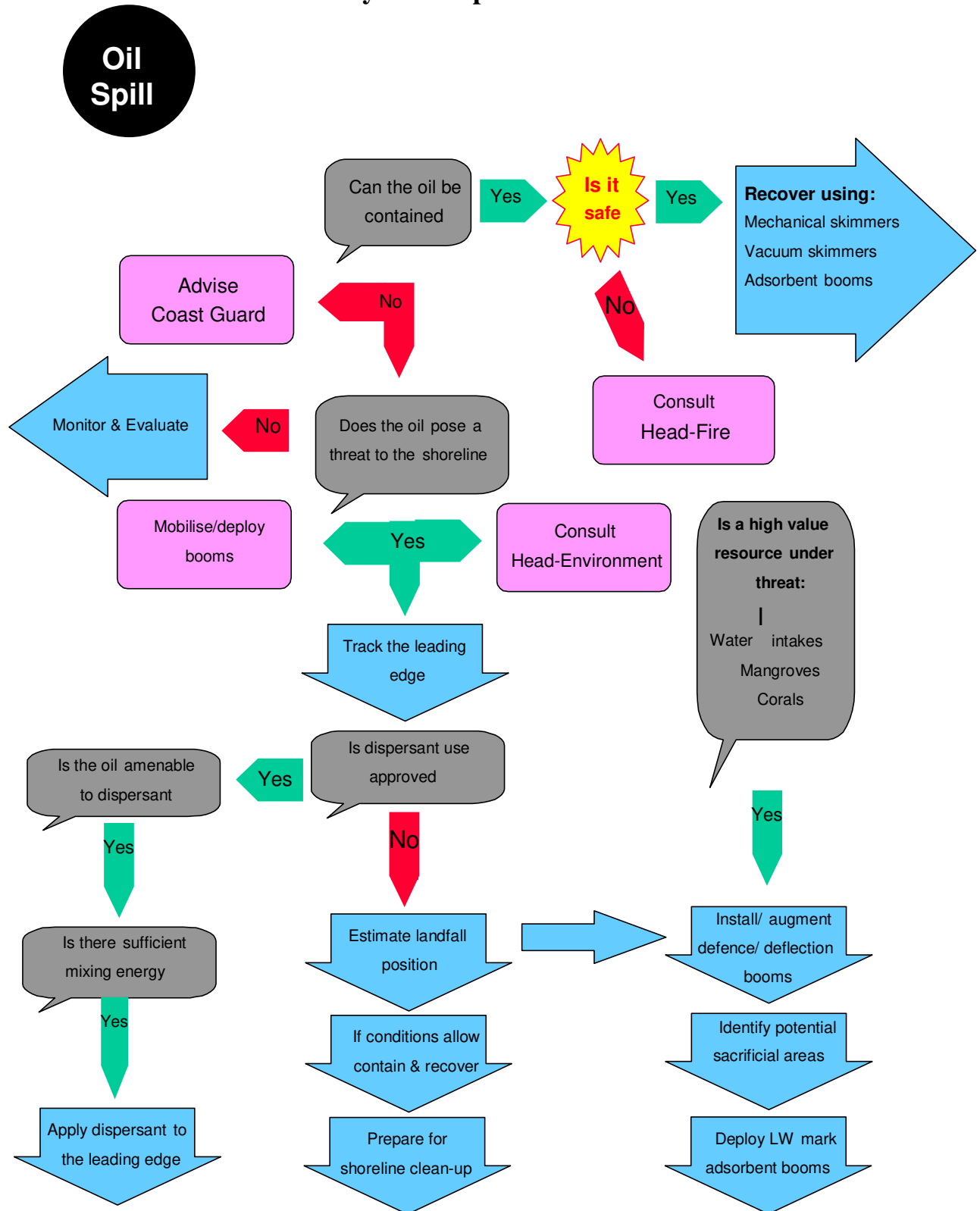
Light Oil Response Guidelines



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Heavy Oil Response Guidelines



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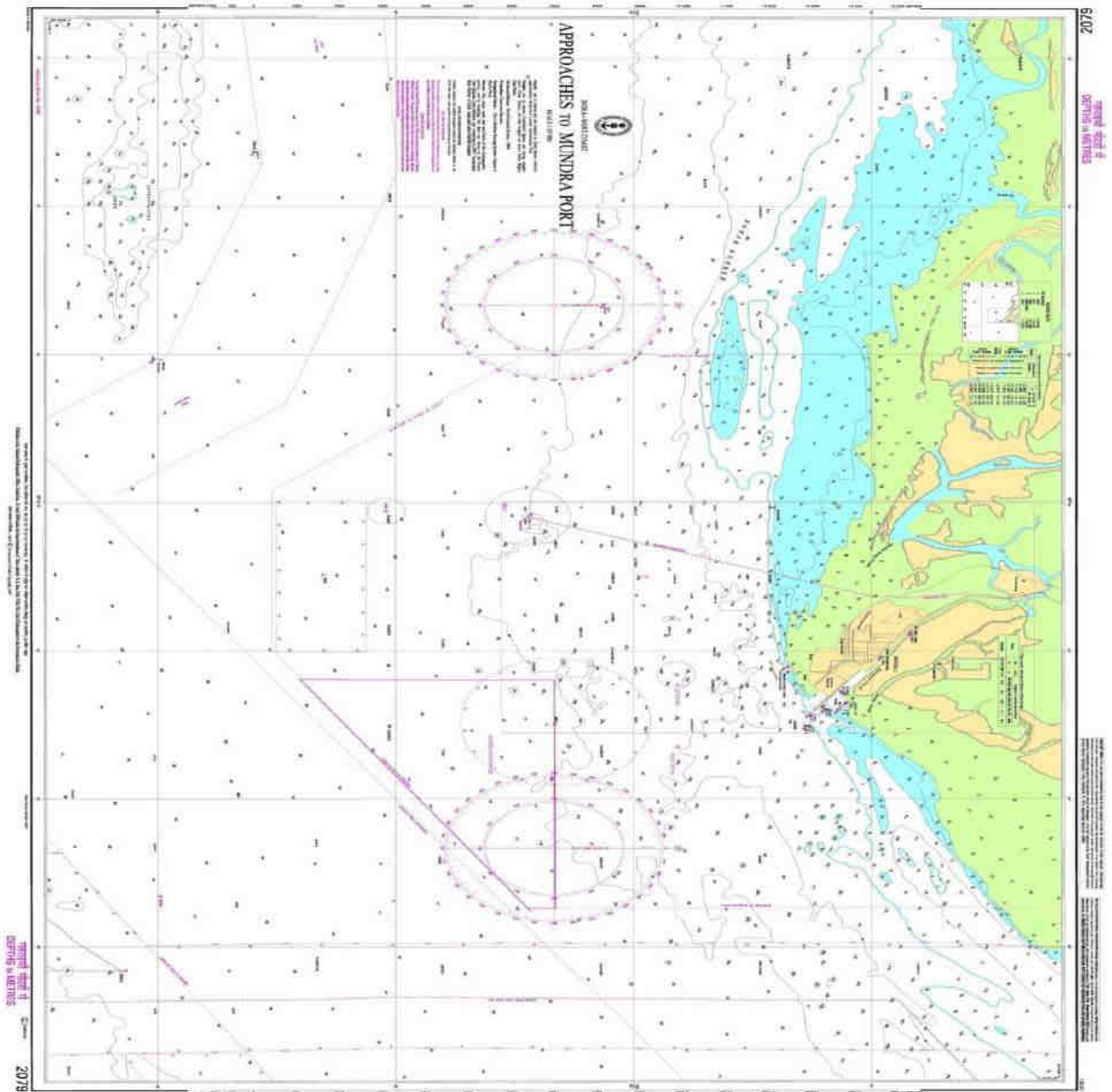
Site Specific Health and Safety Plan ANNEXURE 13									
Assessment Form									
1. APPLIES TO SITE :									
2. DATE :				3. TIME :				4. INCIDENT :	
5. PRODUCT(S) :								(Attach MSDS)	
6. Site Characterization									
6a. Area		<input type="checkbox"/> Open water	<input type="checkbox"/> Inshore water	<input type="checkbox"/> River / Creek	<input type="checkbox"/> Salt marsh	<input type="checkbox"/> Mudflats			
		<input type="checkbox"/> Shoreline	<input type="checkbox"/> Sand	<input type="checkbox"/> Shingle	<input type="checkbox"/> Intake Channel				
6b. Use		<input type="checkbox"/> Commercial	<input type="checkbox"/> Industrial	<input type="checkbox"/> Public	<input type="checkbox"/> Government	<input type="checkbox"/> Recreational			
		<input type="checkbox"/> Residential	<input type="checkbox"/> Other						
7. Site Hazards									
		<input type="checkbox"/> Boat safety		<input type="checkbox"/> Fire, explosion, in-situ burn		<input type="checkbox"/> Slips, trips and falls			
		<input type="checkbox"/> Chemical hazards		<input type="checkbox"/> Heat stress		<input type="checkbox"/> Steam and hot water			
		<input type="checkbox"/> Drum handling		<input type="checkbox"/> Helicopter operations		<input type="checkbox"/> Tides			
		<input type="checkbox"/> Equipment operations		<input type="checkbox"/> Lifting		<input type="checkbox"/> Trenches, excavations			
		<input type="checkbox"/> Electrical hazards		<input type="checkbox"/> Motor vehicles		<input type="checkbox"/> Visibility			
		<input type="checkbox"/> Fatigue		<input type="checkbox"/> Noise		<input type="checkbox"/> Weather			
		<input type="checkbox"/> Others		<input type="checkbox"/> Overhead/buried utilities		<input type="checkbox"/> Work near water			
		<input type="checkbox"/>		<input type="checkbox"/> Pumps and hoses					
8. Air Monitoring									
		<input type="checkbox"/> O ₂		<input type="checkbox"/> LEL		<input type="checkbox"/> Benzene		<input type="checkbox"/> H ₂ S	<input type="checkbox"/> Other
9. Personal Protective Equipment									
<input type="checkbox"/> Foot Protection					<input type="checkbox"/> Coveralls				
<input type="checkbox"/> Head Protection					<input type="checkbox"/> Impervious suits				
<input type="checkbox"/> Eye Protection					<input type="checkbox"/> Personal Floatation				
<input type="checkbox"/> Ear Protection					<input type="checkbox"/> Respirators				
<input type="checkbox"/> Hand Protection					<input type="checkbox"/> Other				
10. Site Facilities									
<input type="checkbox"/> Sanitation				<input type="checkbox"/> First Aid			<input type="checkbox"/> Decontamination		
11. Contact details :									
<input type="checkbox"/> Doctor				Phone					
<input type="checkbox"/> Hospital				Phone					
<input type="checkbox"/> Fire				Phone					
<input type="checkbox"/> Police				Phone					
<input type="checkbox"/> Other				Phone					
12. Date Plan Completed									
13. Plan Completed by									

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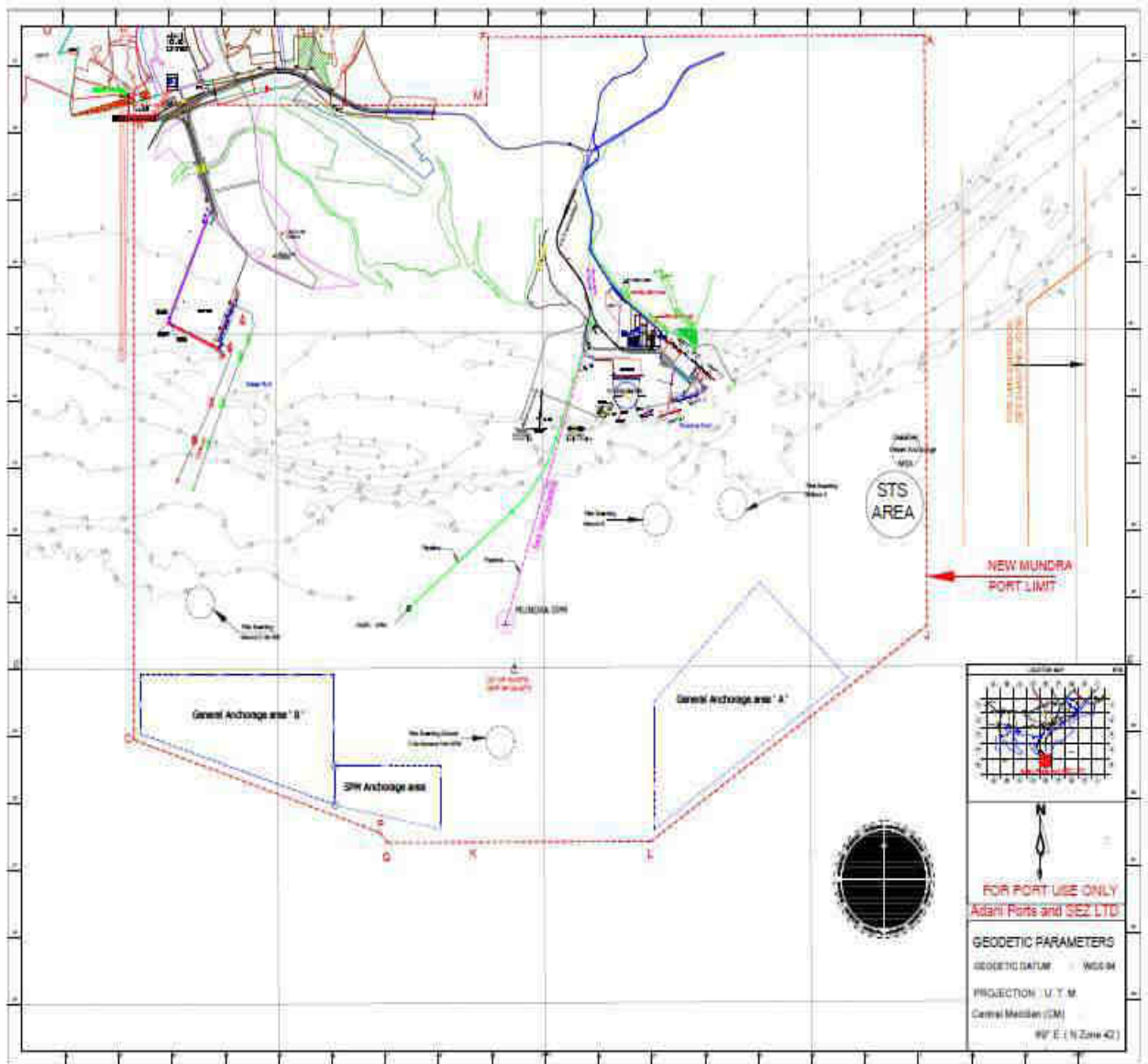
Indian Chart 2079

ANNEXURE 14



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List of recycler approved by state of Gujarat	ANNEXURE 15
--	--------------------

**LIST OF APPROVED VENDOR FOR COLLECTION & DISPOSAL OF OIL SPILL WASTE WATER
AND OILY SOIL**

Sr No.	Name of the party & Contact Detail	Date of Issue of Passbook alongwith validity	Capacity
1	M/s Jawrawala Petroleum, Plot No: 200/33, B/H Kashiram Textile Mill, Narol, Ahmedabad – 382405 Contact Detail - (079) - 25358099 (M) +91 9824045726	18/09/2012 to 17/09/2017	1. 4800 KLPA - Used Oil 2. 9000 KLPA – Waste Oil
2	M/s Reliance Barrel Supply co., 200/34, B/H- Kashiram Mill, Narol, Ahmedabad-382405 Contact Detail - (079) - 25356629 (M) +91 9824090021	03/09/2014 to 02/09/2019	1. 8280 KLA - Used Oil 2. 9000 KLA – Waste Oil
3	M/s Western India Petrochem Industry, Plot No-50, 51, GIDC Estate, Village Gozaria, Dist- Mehsana. Contact Detail - Tel:+91- 278- 420941 Fax:+91- 278- 429503	25/07/2014 to 24/07/2019	1. 3660 KLPA – Used oil 2. 11100 KLPA – waste oil
4	M/s Saurashtra Enviro Projects Pvt. Ltd.(SEPPL) 3rd Floor,K.G.Chambers, Udhana Darwaja, Ring Road, Surat, Gujarat, India-395002 Contact Detail - +91 261 2351248	TSDf Site	3,95,000 MT (Landfilling) + 7.50 Million Kcal/Hr. (Incineration)
5	M/s Bharuch Enviro Infrastructure Ltd, Ankleshwar Contact Detail - Phone 91-2646-253135 Fax 91-2646-222849	TSDf Site	23,00,000 MT (Landfilling) + 120 MT/Day (Incineration)
6	M/s Nandesari Environment Control Ltd. Nandesari, Vadodara, Contact Detail – Phone 265 – 2840818 Fax 265 – 2841017	TSDf Site	3,00,000 MT (Landfilling) + 700 Kg/Hr. (Incineration)

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LIST OF AGENCY FOR SUPPORT & GUIDANCE FOR RESCUE & REHABILITATION OF OILED BIRD & MANGROVES MANAGEMENT DURING OIL SPILL

ANNEXURE 16

Sr No.	Name of the party & Contact Detail	Contact Person	Contact Detail	Activity
1	Gujarat Institute of Desert Ecology P.O Box No. #83, Opp. Changleshwar Temple, Mundra Road Bhuj - 370001 Gujarat – India.	Dr. Thivakaran	EMAIL: desert_ecology@yahoo.com FAX: 02832-235027 02832-235025	Restoration of Mangroves
2	Kalapooranasuri Karunadham Karunadham Hospital, At – Shedata, Bhuj, Kutch		(M) 9925020776	Rescue of oil soaked birds / animals and medical treatment facility
3	Anchorwala Ahinshadham Bhagwan Mahavir Pashu Raksha Kendra, Pragpar, Mundra, Kutch.		Phone (02838) 22352	Rescue of oil soaked birds / animals and medical treatment facility
4	ASHA Foundation C/182, Ashoknagar, Opposite ISRO Satellite, Ahmedabad – 380015, Gujrat, India.	Lalubhai	Phone: 09824037521 ,09879877281 Email: ashahmedabad@yahoo.co.in Website: www.ashafoundationindia.org	Rescue of oil soaked birds / animals and medical treatment facility

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ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD.
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OIL SPILL CONTINGENCY RESPONSE PLAN

Terms, definitions and abbreviations used in this plan

APSEZL	Adani Ports and Special Economic Zone Ltd.
COO	Chief Operating Officer
DGM	Deputy General Manager
DGS	Directorate General of Shipping
ENGR.	Engineer
ESD	Emergency Shut Down
FIR	First Information Report
FO	Furnace Oil
GMB	Gujarat Maritime Board
GPCB	Gujarat Pollution Control Board
HOD	Head Of Department
HQ	Head Quarters
HSD	High Speed Diesel
ICG	Indian Coast Guard
IMO	International Maritime Organization
IPMS	Integrated Port Management System
KPT	Kandla Port Trust
LWS	Low Water State
MCLS	Maximum Credible loss scenario
MMD	Mercantile Maritime Deptt.
MOEF	Ministry of Environment & Forest
MSDS	Material Safety Data Sheets
NOS DCP	National Oil Spill Disaster Contingency Plan
OSC	On Scene Commander
PLEM	Pipe line end manifold
POLREP	Pollution Report
PPE	Personal Protective Equipment
PR	Public Relations Officer
R/O	Radio Officer
SKO	Super Kerosene Oil

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ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD.
MUNDRA
OIL SPILL CONTINGENCY RESPONSE PLAN
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:

Capt. Anubhav Jain
AGM - Marine & PFSO
Adani Ports & SEZ Ltd.
Mundra - Kutch - Gujara

Signature:

Name: Capt. Anubhav Jain

Designation: Head - Marine

Organisation: Adani Ports and SEZ Ltd, Mundra

Place: Mundra

Date: 01 Oct 2018

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**ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD.
MUNDRA**

OIL SPILL CONTINGENCY RESPONSE PLAN

Appendix E5 to NOS DCP 2015

(Para 4.5 refers)

Contingency Planning Compliance Checklist

Name of the Port/ Oil Handling Agency	Adani Ports and SEZ Limited, Mundra
--	--

DESCRIPTION		Complied Yes/No	Remarks
Risk Assessment			
1.	Whether the facility produces / handles / uses / imports / stores any type of petroleum product.	Yes	(Ref. OSCR P 2.2)
2.	Whether risk assessment is done	Yes	(Ref. OSCR P 2.0)
3.	Who did the risk assessment	Yes	Environ Software (P) Ltd. & APSEZ
4.	Whether maximum volume of oil spill that can occur in the worst case scenario is considered.	Yes	(Ref. OSCR P 2.4)
5.	Whether relative measures of the probability and consequences of various oil spills including worst case scenario are taken into account.	Yes	(Ref. OSCR P 2.4)
6.	Whether all types of spills possible in the facility are considered including grounding, collision, fire, explosion, Rupture of hoses.	Yes	(Ref. OSCR P 2.3 & 2.4)
7.	Please specify the list of oils considered for risk assessment	Yes	(Ref. OSCR P 2.2)
8.	Whether the vulnerable areas are estimated by considering maximum loss scenario and weather condition	Yes	(Ref OSCR P 2.1 Computational Scenarios)
9.	Whether impacts on the vulnerable areas are made after considering the marine protected areas ,population ,fishermen ,saltpans ,mangroves ,corals, and other resources within that area	Yes	(Ref. OSCR P 2.6)
10.	Whether measures for reduction of identified high risk are included by reducing the consequences through spill mitigation measures	Yes	(Ref. OSCR P 1.4, 2.3, 2.6. 3 & 5)
11.	Whether steps have been considered to reduce risks to the exposed population by increasing safe distances by acquiring property around the facility ,if possible	NA	All facilities developed within SEZ keeping safe distances from the exposed population.
12.	Whether risk levels are established for each month after considering the probability with tide and current and consequences of each such spill	Yes	(Ref. OSCR P 2.1 computational scenarios & 2.3)
13.	Whether prevention and mitigation measures are included in the plan	YES	(Ref. OSCR P 4.0, 7.0, 8.0 & 9.0)
14.	Whether the spill may affect the shoreline.(length of the shoreline with coordinated)	Yes	Ref. OSCR P 2.3 & 2.6)
15.	Whether time taken the oil spill to reach ashore in each quantity of spill in various month are mentioned in the plan	Yes	(Ref. OSCR P 2.3)
16.	Whether sensitivity mapping has been carried out	Yes	(Ref. OSCR P 2.5)
17.	Does the sensitivity mapping clearly identify the vulnerable areas along with MPAs, corals fishermen community, saltpans, mangroves and other socio-economic elements in the area	Yes	(Ref. OSCR P 2.5 & 2.6)

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MUNDRA**

OIL SPILL CONTINGENCY RESPONSE PLAN

18	Do the sensitivity maps indicate area to be protected on priority	Yes	(Ref. OSCRP 2.6)
19	Does the maps indicate boom deployment locations	NA	Booms not deployed permanently
20	Whether any marine protected area will be affected	YES	(Ref. OSCRP 2.5 & 2.6)
21	Whether total number of fishermen likely to affected is mentioned in the plan	Yes	(Ref. OSCRP 2.6)
22	Whether any saltpan in the area is going to be affected	Yes	(Ref. OSCRP 2.6)
23	Whether any mangroves in the area will be affected by a spill	Yes	(Ref. OSCRP 2.6)
Preparedness			
24	whether any containment equipment is available	Yes	(Ref. OSCRP Annex 3)
25	Whether any recovery equipment is available	Yes	(Ref. OSCRP Annex 3)
26	Whether the facility is having any temporary storage capacity	Yes	(Ref. OSCRP Annex 3)
27	Whether location of the oil spill response equipment is mentioned in the plan	Yes	Has been included in Annex 3
28	Whether suitable vessels available for deploying the boom skimmer etc.	Yes	(Ref. OSCRP Annex 3)
29	Whether OSD held with facility	Yes	(Ref. OSCRP Annex 3)
30	Whether the OSD held with the facility is approved for use in Indian waters	Yes	
31	Whether the facility has MoU with other operator for tier -1 preparedness	Yes	(Ref. OSCRP 1.4)
32	Whether the list of oil spill response equipment available with each agency in deliberation	Yes	MoU document
33	Whether the facility has any MoU with private OSRO	NA	Port itself is equipped to deal with oil spill emergencies
34	Whether the procedure for evoking the mutual aid is clearly described in the plan	Yes	(Ref. OSCRP 1.4)
35	Whether additional manpower is available	Yes	(Ref. OSCRP 5.4)
36	Whether list of approved recyclers is mentioned in the plan	Yes	List of recycler approved by state of Gujarat is included in Annexure 15.
37	Whether NEBA (net environmental Benefit Analysis) has been undertaken	Yes	Before commissioning of any new project, various environmental aspects with their positive or adverse impact is considered under EIA Environment Impact Assessment stage.
38	Whether the areas from priority protection have identify in the plan	YES	(Ref. OSCRP 2.5 & 2.6)
39	Whether relevant authorities and stakeholder were consulted for NEBA and during the areas for property protection	Yes	Before commissioning of any new project Environment Impact Assessment & Public consultation is carried out, in which relevant authorities & stakeholders

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**ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD.
MUNDRA
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			were consulted.
40	Whether district administration has been appraised of the risk impact of oil spills?	Yes	District Level Disaster Management Plan is prepared and regularly updated at district level by District Collector of Kutchh. Under DMP Oil spillage contingency is identified as risk. During preparation & updating of disaster management plan, District Level Authority organises & compiles information from various industries of kutchh. APSEZL is regularly participating in the same & providing necessary information to district level administration.
Action Plan			
41	Whether the plan outlines procedure for reporting of oil spill to coast guard	Yes	(Ref. OSCRP 7.3)
42	Whether the oil spill response action is clearly mentioned	Yes	(Ref .OSCRP 3.1 to 3.6)
43	Whether the action plan include all duties to be attended in connection with an oil spill	Yes	(Ref. OSCRP 3.4)
44	Whether the action plan includes key personnel by their name and designation viz. C/C, S/C	Yes	Ref. OSCRP Annexure-4
45	Whether alternate coverage is planned to take care of the absence of a particular person [in cases where action plan is developed basic names]	Yes	(Ref. OSCRP 5)
46	Whether the plan includes assignment of all key coordinators viz.the communication controller ,safety coordinator ,Emergency management team, Administration and communication coordinator and safety coordinator	Yes	(Ref. OSCRP 3.4)
47	Whether contact directory containing numbers of key response and management personnel is intimated in the plan	Yes	Ref. OSCRP Annexure-4
48	Whether approved recyclers are identified for processing recovered oil and oily debris	Yes	List of approved recycler of Gujarat state is included in annexure 15. Membership of common disposal facility for disposal of oily debris is also attached annexure 16.
49	Whether the shoreline likely to be affected is identified	Yes	(Ref. OSCRP 2.5 & 2.6)
50	Whether final report on the incident is submitted to CGHQ as per NOS-DCP 2014	NA	No incident
51	Whether the spill incident and its consequences	NA	No incident

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**ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD.
MUNDRA**

OIL SPILL CONTINGENCY RESPONSE PLAN

	are informed to fishermen and other NGOs for environment protection through media		
	Training and exercises		
52	Whether mock fire /emergency response drills are specified in the plan	Yes	(Ref. OSCRP 5.6)
53	Whether the mock drills cover all types of probable oil spill	Yes	
54	Whether the plan mentions list of trained manpower	Yes	(Ref. OSCRP 5.6)
55	Whether record for periodic mock drill are maintained in a well-defined format	Yes	
56	Whether the plan updated according to the finding in mock-drills and exercises	Yes	
	DESCRIPTION		
57	What is the frequency of updation /review of contingency plan?	Yes	As Per NOSDCP 2015
58	Periodicity of joint exercises with mutual aid partner	Yes	
59	Frequency of mock-drills for practice	Yes	(Ref. OSCRP 5.6)
60	Whether the records for periodic mock drills are maintained in a well-defined format	Yes	(Ref. OSCRP 5.6)
61	Whether the plan is updated according to the finding of mock-drills and exercises	Yes	
62	Frequency of updation /review of contingency plan	Yes	As Per NOSDCP 2015

I, hereby, declare that the all information appended above and true and correct to my knowledge of belief

Capt. Anubhav Jain
AGM - Marine & PFSO
Adani Ports & SEZ Ltd.
Mundra - Kutch - Gujarat

Date: 01 Oct 2018



Chief conservator /Installation manager

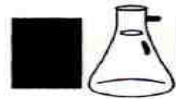
VERIFIED

Date: (District commander ICG)
or his representative

Date: (Regional commander ICG)
or his representative

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ANNEXURE – 3



POLLUCON

LABORATORIES PVT. LTD.

Environmental Auditors, Consultants & Analysts.
Cleaner Production / Waste Minimization Facilitator

Recognised by MoEF, New Delhi Under Sec. 12 of Environmental (Protection) Act-1986

"HALF YEARLY ENVIRONMENTAL MONITORING REPORT"

FOR



**ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED
TAL: MUNDRA, KUTCH, MUNDRA – 370 421**

**MONITORING PERIOD:
OCTOBER 2018 TO MARCH 2019**

PREPARED BY:



POLLUCON LABORATORIES PVT.LTD.

**PLOT NO.5/6 "POLLUCON HOUSE", OPP. BALAJI INDUSTRIAL SOCIETY,
OLD SHANTINATH SILK MILL LANE, NEAR GAYTRI FARSAN MART,
NAVJIVAN CIRCLE, UDHANA MAGDALLA ROAD, SURAT-395007.
PHONE/FAX – (+91 261) 2455 751, 2601 106, 2601 224.
E-mail: pollucon@gmail.com web: www.polluconlab.com**

TC - 5945

ISO 9001:2015

ISO 14001:2015

OHSAS 18001:2007

MARINE WATER MONITORING SUMMARY REPORT

RESULTS OF MARINE WATER [M1 LEFT SIDE OF BOCHA CREEK - N 22°45'183" E 069°43'241"]

SR. NO.	TEST PARAMETERS	UNIT	OCTOBER 2018		NOVEMBER 2018		DECEMBER 2018		JANUARY 2019		FEBRUARY 2019		MARCH 2019		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1	pH	--	8.07	8.01	8.21	8.18	8.12	8.09	8.16	8.1	8.21	8.19	8.13	8.05	IS3025(P11)83Re.02
2	Temperature	oC	30.4	30.2	30.5	30.4	30.1	29.9	30	29.9	30.2	30	30.1	29	IS3025(P9)84Re.02
3	Total Suspended Solids	mg/L	284	252	264	224	256	270	224	251	191	244	210	234	IS3025(P17)84Re.02
4	BOD (3 Days @ 27 °C)	mg/L	4	3	5	3	4	BDL *	7.2	BDL*	4.8	BDL*	5.2	BDL*	IS 3025 (P44)1993Re.03Edition 2.1
5	Dissolved Oxygen	mg/L	6.4	6.1	6.2	5.9	6.1	5.8	6.2	5.9	6	5.8	6.1	5.9	IS3025(P38)89Re.99
6	Salinity	ppt	34.4	34.1	34.8	34.2	34.9	34.6	34.5	34.7	35.4	35.7	35.6	35.9	APHA (22 nd Edi) 2550 B
7	Oil & Grease	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	APHA(22 nd Edi)5520 D
8	Nitrate as NO ₃	μmol/L	5.8	5	8.58	7.79	6.3	4.68	18.51	10.77	10.22	8.53	8.4	6.3	IS3025(P34)88
9	Nitrite as NO ₂	μmol/L	1.4	1	1.78	1.25	1.24	1.1	1.55	1.27	0.56	0.42	1.33	1.08	IS3025(P34)88 NEDA
10	Ammonical Nitrogen as NH ₃	μmol/L	2.64	2.15	2.23	2.04	2.96	2.14	3.83	3.35	2.82	2.51	2.64	2.42	IS3025(P34)88Cla.2.3
11	Phosphates as PO ₄	μmol/L	1.9	1.5	2.67	2.41	2.3	2.2	2.66	2.39	2.27	1.45	2.12	1.8	APHA(22 nd Edi) 4500 C
12	Total Nitrogen	μmol/L	9.84	7.15	12.59	11.08	10.50	7.92	18.51	15.38	13.6	11.46	12.37	9.86	IS3025(P34)88
13	Petroleum Hydrocarbon	μg/L	15	6	14	12	18	14.2	17	12	20	16	13	8	PLPL-TPH
14	Total Dissolved Solids	mg/L	34712	34519	36212	35844	35920	35624	35690	35734	36218	36594	36730	37434	IS3025(P16)84Re.02
15	COD	mg/L	14	10	18	12	15	6	24	7.0	27	19.0	23.6	11.4	APHA(22 nd Edi) 5520-D Open Reflux
A Flora and Fauna															
16	Primary productivity	mgC/L /day	1.26	1.12	1.66	1.26	3.6	2.8	4.5	4	8.32	5.62	8.55	5.4	APHA (22 nd Edi) 10200-J
B Phytoplankton															
17.1	Chlorophyll	mg/m ³	2.06	1.69	2.21	2.11	2.7	2.2	2.67	2.15	3.38	2.79	2.64	2.33	APHA (22 nd Edi) 10200-H



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17.2	Phaeophytin	mg/m ³	1.9	1.3	1.49	1.57	1.96	1.84	2.24	1.92	2.93	2.51	1.86	1.60	APHA (22 nd Edi) 10200-H
17.3	Cell Count	No. x 10 ³ /L	131	111	212	124	270	146	203	122	249	95	207	85	APHA (22 nd Edi) 10200-H
17.4	Name of Group Number and name of group species of each group	--	<i>Coscinodiscus nitzschia</i> <i>Navicula biddulphiana</i> --	<i>Navicula pleurosigma</i> -- -- --	<i>Rhizosolenia biddulphiana</i> <i>Cheatoceus</i> <i>Ceratium</i> -- -- --	<i>Nitzschia synedra</i> <i>Cyclotella</i> -- -- -- --	<i>Thalassiosira</i> <i>Navicula</i> <i>Biddulphia</i> -- --	<i>Nitzschia</i> <i>Rhizosolenia</i> -- --	<i>Rhizosolenia</i> <i>Navicula</i> <i>Thalassiosira</i> <i>Cosmarium</i>	<i>Coscinodiscus</i> <i>Nitzschia</i> -- --	<i>Rhizosolenia</i> <i>Cheatoceus</i> <i>Coscinodiscus</i> --	<i>Nitzschia synedra</i> <i>Fragillaria</i> --	<i>Rhizosolenia</i> <i>Navicula</i> <i>Coscinodiscus</i> <i>Thalassionema</i>	--	APHA (22 nd Edi) 10200-H
C Zooplanktons															
18.1	Abundance (Population)	noX10 ³ /100 m ³	53		66		46		61		55		48		APHA (22 nd Edi) 10200-G
18.2	Name of Group Number and name of group species of each group	--	Foraminiferans Polychaetes Gastropods --		Polychaete Bivalves Ostracodes Gastropods		Gastropods Decapods Crustaceans		Copepods Mysids Bivalves --		Foraminiferans amphipods Gastropods		Polychaetes Gastropods Crustaceans		APHA (22 nd Edi) 10200-G
18.3	Total Biomass	ml/100 m ³	6.6		7.25		6.2		4.8		3.9		5.6		APHA (22 nd Edi) 10200-G
D Microbiological Parameters															
19.1	Total Bacterial Count	CFU/ml	1300		1840		1880		1840		1760		1820		IS 5402:2002
19.2	Total Coliform	/ml	Absent		Absent		Absent		Absent		Absent		Absent		APHA(22 nd Edi)9221-D
19.3	Ecoli	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS:1622:1981Edi.2.4 (2003-05)
19.4	Enterococcus	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 15186 :2002
19.5	Salmonella	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 5887 (P-3)
19.6	Shigella	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 1887 (P-7)
19.7	Vibrio	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 5887 (P-5)



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RESULTS OF SEDIMENT ANALYSIS [M1 LEFT SIDE OF BOCHA CREEK - N 22°45'183" E 069°43'241"]

SR. NO.	TEST PARAMETERS	UNIT	OCTOBER 2018	NOVEMBER 2018	DECEMBER 2018	JANUARY 2019	FEBRUARY 2019	MARCH 2019	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
1	Organic Matter	%	0.48	0.64	0.42	0.56	0.69	0.71	FCO:2007
2	Phosphorus as P	µg/g	246	212	256	278	311	264	APHA(22 nd E di) 4500 C
3	Texture	--	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy	--
4	Petroleum Hydrocarbon	µg/g	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	PLPL-TPH
5	Heavy Metals								
5.1	Aluminum as Al	%	5.35	5.18	4.9	5.2	4.98	5.24	AAS APHA 3111 B
5.2	Total Chromium as Cr ⁺³	µg/g	190	210	164	170	235	270	AAS 3111B
5.3	Manganese as Mn	µg/g	1780	1698	1430	1286	1384	1258	AAS APHA 3111 B
5.4	Iron as Fe	%	5.1	4.82	5.2	4.9	5.32	4.89	AAS APHA(22 nd E di)3111 B
5.5	Nickel as Ni	µg/g	53	20.4	34	27	47	24.8	AAS APHA(22 nd E di)3111 B
5.6	Copper as Cu	µg/g	49	37	49	33	30	31.6	AAS APHA(22 nd E di)3111 B
5.7	Zinc as Zn	µg/g	318	348	230	310	291	270	AAS APHA(22 nd E di)3111 B
5.8	Lead as Pb	µg/g	3.8	1.9	2.6	3	2.8	1.98	AAS APHA(22 nd E di)3111 B
5.9	Mercury as Hg	µg/g	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	AAS APHA- 3112 B
6	Benthic Organisms								
6.1	Macrobenthos	--	Polychaetes Decapods --	Mysids Crustaceans Decapods Polychaetes	Crustaceans Polychaetes --	Gastropods mollusca Decapods	Polychaetes Crustaceans --	Polychaetes Crustaceans --	APHA (22 nd E di) 10500-C
6.2	MeioBenthos	--	Nematodes Bryozoans --	Hydrozoan Gastrotriches ---	Bryozoans -- --	-- -- --	Foraminiferans Nematodes --	Foraminiferans Hydrozoans --	APHA (22 nd E di) 10500-C
6.3	Population	no/m2	382	645	616	821	794	853	APHA (22 nd E di) 10500-C



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RESULTS OF MARINE WATER [M2 MOUTH OF BOCHA & NAVINAL CREEK - N 22°44'239" E 069°43'757"]

SR. NO.	TEST PARAMETERS	UNIT	OCTOBER 2018		NOVEMBER 2018		DECEMBER 2018		JANUARY 2019		FEBRUARY 2019		MARCH 2019		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1	pH	--	8.15	8.09	8.19	8.12	8.2	8.16	8.19	8.15	8.17	8.14	8.15	8.1	IS3025(P11)83 Re.02
2	Temperature	oC	30.3	30	30.6	30.4	30.4	30.2	30	29.8	30.2	30	30.3	30	IS3025(P9)84R e.02
3	Total Suspended Solids	mg/L	254	240	328	290	272	218	216	228	186	246	230	263	IS3025(P17)84 Re.02
4	BOD (3 Days @ 27 °C)	mg/L	3	BDL*	4	BDL*	3	BDL*	5.0	BDL*	3.9	BDL*	5.3	BDL*	IS 3025 (P44)1993Re.03 Edition2.1
5	Dissolved Oxygen	mg/L	6.4	6.2	6.2	5.9	6.6	6.1	6.1	5.9	6.2	5.8	6	5.7	IS3025(P38)89 Re.99
6	Salinity	ppt	34.1	33.8	34.4	34.1	34.7	34.5	34.3	34.5	35.6	35.8	35.4	35.7	APHA (22 nd Eti) 2550 B
7	Oil & Grease	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	APHA(22 nd Eti)5 520D
8	Nitrate as NO ₃	μmol/L	8.5	7.2	7.55	6.34	5.8	6.4	8.16	5.87	7.2	6.29	7.96	5.84	IS3025(P34)88
9	Nitrite as NO ₂	μmol/L	1	0.6	1.23	1.16	1.5	0.8	0.98	0.69	0.58	0.81	0.84	0.99	IS3025(P34)88 NEDA
10	Ammonical Nitrogen as NH ₃	μmol/L	2.4	1.8	9.28	8.98	11.4	8.2	3.89	3.6	2.6	2.4	2.7	2.5	IS3025(P34)88 Cla.2.3
11	Phosphates as PO ₄	μmol/L	2.45	1.6	2.78	2.14	2.56	2.4	2.39	2.07	2.4	1.74	2.3	1.86	APHA(22 nd Eti) 4500 C
12	Total Nitrogen	μmol/L	11.9	9.6	18.06	16.49	18.70	15.40	13.03	10.16	10.37	9.5	11.5	9.33	IS3025(P34)88
13	Petroleum Hydrocarbon	μg/L	6	2	12	4	15	BDL*	18	BDL*	23	BDL*	16	BDL*	PLPL-TPH
14	Total Dissolved Solids	mg/L	34608	34416	35731	35296	36012	35940	35842	35964	36728	36943	36432	36936	IS3025(P16)84 Re.02
15	COD	mg/L	12	BDL*	14	BDL*	12	BDL*	20.0	BDL*	17.0	6.8	24.8	8.0	APHA(22 nd Eti) 5520-D Open Reflux
A Flora and Fauna															
16	Primary productivity	mgC/ L/day	1.57	1.3	2.07	1.68	2.6	1.8	5.4	4	7.98	5.26	7.65	4.72	APHA (22 nd Eti) 10200-J
B Phytoplankton															
17.1	Chlorophyll	mg/ m ³	1.6	0.968	2.25	1.33	1.94	1.2	2.42	1.98	3.4	2.8	3.12	2.31	APHA (22 nd Eti) 10200-H
17.2	Phaeophytin	mg/ m ³	2.35	1.01	1.76	1.54	1.68	0.99	1.8	1.54	3.0	2.13	1.4	0.8	APHA (22 nd Eti) 10200-H
17.3	Cell Count	No. x 10 ³ /L	150	106	198	134	172	80	203	99	231	87	219	74	APHA (22 nd Eti) 10200-H



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17.4	Name of Group Number and name of group species of each group	--	Cheatoceus	Biddulphia sp.	Nitzschia a sp.	Nitzschia a sp.										APHA (22 nd Edi) 10200-H
			<i>Nitzschia Biddulphia</i>	<i>Melosira Navicula</i>	<i>Nitzschia sp. Cheatoceros sp.</i>	<i>Navicula sp. Rhizosolenia sp.</i>	<i>Thallasiosira sp. Cheatoceros sp.</i>	<i>Nitzschia sp. Thallasiosira sp.</i>	<i>Navicula sp. Bacteriaster</i>	<i>Nitzschia sp. Synedra sp.</i>	<i>Thallasionema sp. Fragillaria sp.</i>	<i>Nitzschia sp. Biddulphia sp.</i>	<i>Rhizosolenia sp. Biddulphia sp.</i>	<i>Thallasionema sp. Nitzschia sp.</i>		
			<i>Thallasionema</i>	--	<i>Coscinodiscus sp.</i>	--	--	--	<i>Cosmarium</i>	--	<i>Closterium sp.</i>	<i>Synedra sp.</i>	<i>Navicula sp.</i>	<i>Synedra sp.</i>		
			<i>Coscinodiscus</i>	--	<i>Fragillaria sp.</i>	--	Biddulphia sp.	--	<i>Biddulphia sp.</i>	--	<i>Synedra sp.</i>	--	<i>Thallasionema sp.</i>	--		
			<i>Cyclotella</i>		--	--										
C	Zooplanktons															
18.1	Abundance (Population)	noX10 ³ / 100 m ³	48		57		65		71		58		51		APHA (22 nd Edi) 10200-G	
18.2	Name of Group Number and name of group species of each group	--	Crustaceans Gastropods Polychaetes --		Hydrozoa Bivalves Foraminiferans Crustaceans		Gastropods Crustaceans Chaetognathes		Copepods Gastropods Cyclops --		Chaetognathes Polychaetes Foraminiferans		Polychaetes Gastropods Bivalves		APHA (22 nd Edi) 10200-G	
18.3	Total Biomass	ml/100 m ³	4.94		5.57		5.8		5.1		4.78		4.29		APHA (22 nd Edi) 10200-G	
D	Microbiological Parameters															
19.1	Total Bacterial Count	CFU/ml	1450		1620		1680		1640		1560		1620		IS 5402:2002	
19.2	Total Coliform	/ml	Absent		Absent		Absent		Absent		Absent		Absent		APHA(22 nd Edi)9221-D	
19.3	Ecoli	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS:1622:1981Ed i.2.4(2003-05)	
19.4	Enterococcus	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 15186 :2002	
19.5	Salmonella	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 5887 (P-3)	
19.6	Shigella	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 1887 (P-7)	
19.7	Vibrio	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 5887 (P-5)	



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RESULTS OF SEDIMENT ANALYSIS [M2 MOUTH OF BOCHA & NAVINAL CREEK – N 22°44'239" E 069°43'757"]

SR. NO.	TEST PARAMETERS	UNIT	OCTOBER 2018	NOVEMBER 2018	DECEMBER 2018	JANUARY 2019	FEBRUARY 2019	MARCH 2019	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
1	Organic Matter	%	0.56	0.84	0.51	0.62	0.72	0.68	FCO:2007
2	Phosphorus as P	µg/g	214	232	220	278	319	246	APHA(22 nd Eti) 4500 C
3	Texture	--	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy	--
4	Petroleum Hydrocarbon	µg/g	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	PLPL-TPH
5	Heavy Metals								
5.1	Aluminum as Al	%	5.18	5.18	4.9	5.2	5.19	4.84	AAS APHA 3111 B
5.2	Total Chromium as Cr+3	µg/g	164	152	184	190	213	201	AAS 3111B
5.3	Manganese as Mn	µg/g	1698	1366	1230	1350	1320	1298	AAS APHA 3111 B
5.4	Iron as Fe	%	5.06	5.1	4.92	5.1	4.83	4.94	AAS APHA(22 nd Eti)3111 B
5.5	Nickel as Ni	µg/g	38	27	32	40	20	27.3	AAS APHA(22 nd Eti)3111 B
5.6	Copper as Cu	µg/g	46	33	46	28	37	34.6	AAS APHA(22 nd Eti)3111 B
5.7	Zinc as Zn	µg/g	260	218	240	298	278	204	AAS APHA(22 nd Eti)3111 B
5.8	Lead as Pb	µg/g	2.9	3.1	2.1	3.4	1.9	2.32	AAS APHA(22 nd Eti)3111 B
5.9	Mercury as Hg	µg/g	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	AAS APHA- 3112 B
6	Benthic Organisms								
6.1	Macrobenthos	--	Polychaetes Chaetognaths Mysids	Echinoderms Bivalves Polychaete worms	Echinoderms Gastropods --	Gastropods Crustaceans --	Polychaetes Bivalves --	Crustaceans Gastropods --	APHA (22 nd Eti) 10500-C
6.2	MeioBenthos	--	Copepods Ostracodes --	Nematodes --- ---	Copepods -- --	Ostracodes -- --	Foraminiferans -- --	Nematodes Foraminiferans --	APHA (22 nd Eti) 10500-C
6.3	Population	no/m ²	250	499	528	645	733	850	APHA (22 nd Eti) 10500-C



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RESULTS OF MARINE WATER [M3 EAST OF BOCHAISLAND - N 22°46'530" E 069°41'690"]

SR. NO.	TEST PARAMETERS	UNIT	OCTOBER 2018		NOVEMBER 2018		DECEMBER 2018		JANUARY 2019		FEBRUARY 2019		MARCH 2019		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1	pH	--	8.11	8.07	8.25	8.12	8.18	8.11	8.14	8.12	8.19	8.16	8.13	8.06	IS3025(P11)83Re.02
2	Temperature	oC	30.2	30	30.3	30.2	30.5	30.4	30.2	30.1	30.3	30.1	30.2	30	IS3025(P9)84Re.02
3	Total Suspended Solids	mg/L	318	364	348	306	298	252	256	271	196	219	203	226	IS3025(P17)84Re.02
4	BOD (3 Days @ 27°C)	mg/L	BDL*	BDL*	6	BDL*	4	BDL*	5.0	BDL*	5.9	BDL*	4.2	BDL*	IS 3025 (P44)1993Re.03Edition2.1
5	Dissolved Oxygen	mg/L	6.2	5.8	6.1	5.7	6.4	6.2	6.1	6.0	6	5.8	6.1	5.9	IS3025(P38)89Re.99
6	Salinity	ppt	33.9	33.7	34.6	34.3	35.2	35	34.9	35.1	35.4	35.7	35.6	35.9	APHA (22 nd Edi) 2550 B
7	Oil & Grease	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	APHA(22 nd Edi)552 OD
8	Nitrate as NO ₃	μmol/L	6.6	4.9	9.09	8.64	4.8	5.1	6.41	5.69	9.1	4.5	7.2	6.0	IS3025(P34)88
9	Nitrite as NO ₂	μmol/L	1.2	0.8	1.33	1.12	1.7	1.9	0.86	0.63	0.73	0.86	0.84	0.92	IS3025(P34)88 NEDA
10	Ammonical Nitrogen as NH ₃	μmol/L	2.8	1.7	2.25	1.95	3.4	3.6	3.16	2.91	2.7	2.4	2.4	2.1	IS3025(P34)88Cla.2.3
11	Phosphates as PO ₄	μmol/L	2.59	1.8	3.21	2.78	2.8	2.6	2.7	2.4	1.76	1.36	1.62	1.21	APHA(22 nd Edi) 4500 C
12	Total Nitrogen	μmol/L	10.6	7.4	12.68	11.72	9.90	10.60	10.42	9.23	12.53	7.74	10.46	9	IS3025(P34)88
13	Petroleum Hydrocarbon	μg/L	24	10	17.4	12	19	BDL*	16	11.0	18.4	BDL*	15.3	BDL*	PLPL-TPH
14	Total Dissolved Solids	mg/L	34418	34356	35218	35078	36118	35678	35670	35834	36679	36830	36516	37293	IS3025(P16)84Re.02
15	COD	mg/L	BDL*	BDL*	14	BDL*	16	10	19.0	8.0	21	BDL*	22	BDL*	APHA(22 nd Edi) 5520-D Open Reflux
A Flora and Fauna															
16	Primary productivity	mgC/L/day	1.23	1.08	1.98	1.64	2.84	2.76	4.2	3.8	8.3	6.4	7.2	5.17	APHA (22 nd Edi) 10200-J
B Phytoplankton															
17.1	Chlorophyll	mg/m ³	1.97	1.13	2.93	1.01	2.46	2.3	3.76	2.26	3.1	2.46	2.92	2.21	APHA (22 nd Edi) 10200-H
17.2	Phaeophytin	mg/m ³	1.59	0.865	1.22	0.43	1.8	1.2	2.2	1.3	2.35	1.5	2.18	0.5	APHA (22 nd Edi) 10200-H



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17.3	Cell Count	No. x 10 ³ /L	141	66	204	72	190	84	161	73	224	96	197	59	APHA (22 nd Edi) 10200-H
17.4	Name of Group Number and name of group species of each group	--	Biddulphia <i>Melosira synedra</i> <i>Navicula Nitzschia</i> Cheatoceros	Navicula <i>Nitzschia Biddulphia</i> <i>a Melosira</i> -- --	Biddulphia sp. <i>Pleurosigma sp.</i> <i>Nitzschia sp.</i> <i>Cheatoceros sp.</i> <i>Cyclotella sp.</i> <i>Diplones</i> --	Synedra sp. <i>Coscinodiscus sp.</i> <i>Navicula sp.</i> -- -- --	<i>Nitzschia sp.</i> <i>Cheatoceros sp.</i> <i>Rhizosolenia sp.</i> <i>Amphiproteron sp.</i>	<i>Navicula sp.</i> <i>Thallasiosira sp.</i> <i>Guinardia</i> --	<i>Coscinodiscus sp.</i> <i>Rhizosolenia sp.</i> <i>Nitzschia sp.</i> <i>Thallasiosira sp.</i>	<i>Navicula sp.</i> <i>Thallasiosira sp.</i> -- --	<i>Thallasiosira sp.</i> <i>Nitzschia sp.</i> <i>Rhizosolenia sp.</i> <i>Coscinodiscus sp.</i>	<i>Synedra sp.</i> <i>Biddulphia sp.</i> <i>Navicula sp.</i> --	<i>Biddulphia sp.</i> <i>Navicula sp.</i> <i>Thallasiosira sp.</i> <i>Coscinodiscus sp.</i>	<i>Nitzschia sp.</i> <i>Synedra sp.</i> <i>Biddulphia sp.</i> --	APHA (22 nd Edi) 10200-H
C Zooplanktons															
18.1	Abundance (Population)	noX10 ³ /100 m ³	58		63		50		64		79		59		APHA (22 nd Edi) 10200-G
18.2	Name of Group Number and name of group species of each group	--	Copepods Polychaetes Crustaceans --		Cephalopods Ostracodes Bivalves Crustaceans		Foraminiferans Ctenophores Ostracods		Polychaete Gastropods Crustaceans --		Polychaetes Crustaceans Bivalves		Polychaetes Bivalves --		APHA (22 nd Edi) 10200-G
18.3	Total Biomass	ml/100 m ³	8.1		8.7		6.2		5.6		6.1		5.85		APHA (22 nd Edi) 10200-G
D Microbiological Parameters															
19.1	Total Bacterial Count	CFU/ml	1700		1980		1880		1820		1860		1780		IS 5402:2002
19.2	Total Coliform	/ml	Absent		Absent		Absent		Absent		Absent		Absent		APHA(22 nd Edi)922 1-D
19.3	Ecoli	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS:1622:1981Edi.2 .4(2003-05)
19.4	Enterococcus	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 15186 :2002
19.5	Salmonella	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 5887 (P-3)
19.6	Shigella	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 1887 (P-7)
19.7	Vibrio	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 5887 (P-5)



H. T. Shah

Lab Manager




Dr. Arun Bajpai

Lab Manager (Q)

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RESULTS OF SEDIMENT ANALYSIS [M3 RIGHT SIDE OF BOCHA CREEK - N 22°46'530" E 069°41'690"]

SR. NO.	TEST PARAMETERS	UNIT	OCTOBER 2018	NOVEMBER 2018	DECEMBER 2018	JANUARY 2019	FEBRUARY 2019	MARCH 2019	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
1	Organic Matter	%	0.52	0.46	0.54	0.48	0.69	0.72	FCO:2007
2	Phosphorus as P	µg/g	208	218	240	290	312	230	APHA(22 nd Eti) 4500 C
3	Texture	--	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy	--
4	Petroleum Hydrocarbon	µg/g	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	PLPL-TPH
5	Heavy Metals								
5.1	Aluminum as Al	%	5.1	4.9	4.86	5.2	4.97	5.12	AAS APHA 3111 B
5.2	Total Chromium as Cr ⁺³	µg/g	174	198	130	168	218	150	AAS 3111B
5.3	Manganese as Mn	µg/g	1540	1614	1346	1240	1475	1136	AAS APHA 3111 B
5.4	Iron as Fe	%	4.9	4.2	4.82	5.1	4.96	5.14	AAS APHA(22 nd Eti)3111 B
5.5	Nickel as Ni	µg/g	46.8	30.2	36	42	53	32	AAS APHA(22 nd Eti)3111 B
5.6	Copper as Cu	µg/g	51.6	29	46	35	27	39	AAS APHA(22 nd Eti)3111 B
5.7	Zinc as Zn	µg/g	296	250	234	310	219	250	AAS APHA(22 nd Eti)3111 B
5.8	Lead as Pb	µg/g	3.3	2.6	2.9	2.2	1.7	2.16	AAS APHA(22 nd Eti)3111 B
5.9	Mercury as Hg	µg/g	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	AAS APHA- 3112 B
6	Benthic Organisms								
6.1	Macrobenthos	--	Amphipods Isopods Polychaetes	Polychaete worms Bivalves Chaetognathes	Polychaete Chaetognathes Bivalves	Crustaceans Polychaete --	Crustaceans Gastropods --	Gastropods Polychaetes --	APHA (22 nd Edi) 10500-C
6.2	MeioBenthos	--	Copepods Foraminiferans --	Nematodes Hydrozoan ---	Copepods -- --	Nematodes -- --	Nematodes hydrozoans --	Gastropods Polychaetes --	APHA (22 nd Edi) 10500-C
6.3	Population	no/m ²	279	557	587	704	853	824	APHA (22 nd Edi) 10500-C



H. T. Shah

Lab Manager





Dr. Arun Bajpai

Lab Manager (Q)


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RESULTS OF MARINE WATER [M4 JUNA BANDAR N 22°47'57" E 069°43'620"]

SR. NO.	TEST PARAMETERS	UNIT	OCTOBER 2018		NOVEMBER 2018		DECEMBER 2018		JANUARY 2019		FEBRUARY 2019		MARCH 2019		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1	pH	--	8.18	8.05	8.17	8.06	8.07	8.03	8.1	8.08	8.14	8.13	8.13	8.1	IS3025(P11)83R e.02
2	Temperature	oC	30	29.9	30.7	30.5	30.8	30.4	30.2	30.1	30.1	29.9	30.2	30	IS3025(P9)84Re .02
3	Total Suspended Solids	mg/L	296	272	338	299	264	226	248	272	208	234	217	243	IS3025(P17)84R e.02
4	BOD (3 Days @ 27 °C)	mg/L	4	BDL*	3	BDL*	4	BDL*	5.2	BDL*	6.4	BDL*	5.8	BDL*	IS 3025 (P44)1993Re.03 Edition2.1
5	Dissolved Oxygen	mg/L	6.5	6	6.2	5.9	6.6	6.8	6.2	5.8	6.1	5.7	6.2	5.8	IS3025(P38)89R e.99
6	Salinity	ppt	34.3	34.1	34.2	33.9	34.8	34.4	35	35.2	35.7	35.9	35.6	36	APHA (22 nd Edi) 2550 B
7	Oil & Grease	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	APHA(22 nd Edi)5 520D
8	Nitrate as NO ₃	µmol/L	7.8	6.2	11.45	9.91	10.2	9.4	13.37	11.67	10.77	9.56	8.52	5.46	IS3025(P34)88
9	Nitrite as NO ₂	µmol/L	3.4	2	1.47	1.23	1.60	1.5	0.96	0.78	0.78	1.12	0.83	0.94	IS3025(P34)88 NEDA
10	Ammonical Nitrogen as NH ₃	µmol/L	2.75	2.1	2.46	2.27	2.40	2.8	3.43	3.2	2.9	2.6	2.6	2.4	IS3025(P34)88C la.2.3
11	Phosphates as PO ₄	µmol/L	1.95	1.6	2.14	1.82	2.31	2.2	1.96	1.59	1.19	1.18	1.32	1.27	APHA(22 nd Edi) 4500 C
12	Total Nitrogen	µmol/L	13.95	10.3	15.38	13.41	14.20	13.70	17.75	15.65	14.49	13.31	11.94	8.76	IS3025(P34)88
13	Petroleum Hydrocarbon	µg/L	16	4	18	5	10	BDL*	14	BDL*	20	BDL*	17	BDL*	PLPL-TPH
14	Total Dissolved Solids	mg/L	34692	34460	35384	35130	35816	35718	35946	36218	36734	36984	36581	37134	IS3025(P16)84R e.02
15	COD	mg/L	14	BDL*	12	BDL*	14	BDL*	18.0	6.0	23.0	10.0	19.0	8.3	APHA(22 nd Edi) 5520-D Open Reflux
A	Flora and Fauna														
16	Primary productivity	mgC/L/d ay	2.25	1.35	2.36	1.71	3.64	2.9	4.5	3.3	8.43	5.58	7.42	4.38	APHA (22 nd Edi) 10200-J
B	Phytoplankton														
17.1	Chlorophyll	mg/m ³	1.55	1.02	1.86	1.14	2.8	2.62	3.2	2.6	3.25	2.8	2.79	2.2	APHA (22 nd Edi) 10200-H
17.2	Phaeophytin	mg/m ³	0.94	0.64	1.44	0.88	1.68	1.52	2.4	1.1	2.1	2.2	1.33	0.96	APHA (22 nd Edi) 10200-H


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17.3	Cell Count	No. x 10 ³ /L	146	87	178	84	204	106	146	73	193	67	179	64	APHA (22 nd Edi) 10200-H
17.4	Name of Group Number and name of group species of each group	--	Nitzschia <i>Navicula Coscinodiscus Rhizosolenia Thallasiosira</i>	Nitzschia <i>Pleurosigma Navicula</i>	Navicula sp. <i>Biddulphia sp. Synedra sp. Rhizosolenia sp. Cyclotella sp.</i>	Thallasiosira sp. <i>Nitzschia sp. Pleurosigma sp.</i>	Gyrosigma sp. Cheatocerous sp. Fragillaria sp. Pleurosigma sp.	Nitzschia sp. Rhizosolenia sp. Thallasiosira sp.	<i>Navicula sp. Biddulphia sp. Coscinodiscus sp. Rhizosolenia sp.</i>	<i>Nitzschia sp. Thallasiosira sp. Synedra sp.</i>	<i>Rhizosolenia sp. Cheatocerous sp. Pleurosigma sp. Biddulphia sp.</i>	<i>Synedra sp. Biddulphia sp. Navicula sp.</i>	<i>Thallasiosira sp. Nitzschia sp. Coscinodiscus sp. Pleurosigma sp.</i>	<i>Synedra sp. Navicula sp. Cheatocerous sp.</i>	APHA (22 nd Edi) 10200-H
C	Zooplanktons														
18.1	Abundance (Population)	noX10 ³ /100 m ³	67		59		72		64		81		73		APHA (22 nd Edi) 10200-G
18.2	Name of Group Number and name of group species of each group	--	Polychaetes Gastropods Decapods	--	Gastropods Bivalves Crustaceans Oligochaeta		Foraminiferans Ctenophores Polychaetes		Gastropods Crustaceans Polychaete		Foraminiferans Ostracods Polychaetes		Gastropods Polychaetes Decapods		APHA (22 nd Edi) 10200-G
18.3	Total Biomass	ml/100 m ³	5.87		6.05		6.9		5.5		6.2		4.94		APHA (22 nd Edi) 10200-G
D	Microbiological Parameters														
19.1	Total Bacterial Count	CFU/ml	1600		1870		1820		1840		1840		1860		IS 5402:2002
19.2	Total Coliform	/ml	Absent		Absent		Absent		Absent		Absent		Absent		APHA(22 nd Edi)9 221-D
19.3	Ecoli	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS:1622:1981Edi .2.4(2003-05)
19.4	Enterococcus	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 15186 :2002
19.5	Salmonella	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 5887 (P-3)
19.6	Shigella	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 1887 (P-7)
19.7	Vibrio	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 5887 (P-5)



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RESULTS OF SEDIMENT ANALYSIS [M4 JUNA BANDAR N 22°47'57" E 069°43'620"]

SR. NO.	TEST PARAMETERS	UNIT	OCTOBER 2018	NOVEMBER 2018	DECEMBER 2018	JANUARY 2019	FEBRUARY 2019	MARCH 2019	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
1	Organic Matter	%	0.48	0.64	0.52	0.68	0.56	0.67	FCO:2007
2	Phosphorus as P	µg/g	224	178	240	310	259	218	APHA(22 nd Edi) 4500 C
3	Texture	--	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy	--
4	Petroleum Hydrocarbon	µg/g	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	PLPL-TPH
5	Heavy Metals								
5.1	Aluminum as Al	%	5.24	5.3	5.12	4.9	5.2	5.1	AAS APHA 3111 B
5.2	Total Chromium as Cr ⁺³	µg/g	154	167	180	192	174	140	AAS 3111B
5.3	Manganese as Mn	µg/g	1590	1630	1346	1484	1376	1198	AAS APHA 3111 B
5.4	Iron as Fe	%	5.14	5.2	4.98	4.78	5.1	4.6	AAS APHA(22 nd Edi)3111 B
5.5	Nickel as Ni	µg/g	58	74	42	60	31	39	AAS APHA(22 nd Edi)3111 B
5.6	Copper as Cu	µg/g	44	44	52	39	45	33	AAS APHA(22 nd Edi)3111 B
5.7	Zinc as Zn	µg/g	256	310	230	296	330	274	AAS APHA(22 nd Edi)3111 B
5.8	Lead as Pb	µg/g	4.2	1.8	2.1	3.2	2.4	1.96	AAS APHA(22 nd Edi)3111 B
5.9	Mercury as Hg	µg/g	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	AAS APHA- 3112 B
6	Benthic Organisms								
6.1	Macrobenthos	--	Polychaetes Isopods Mysids	Bivalves Decapods Polychaete worms	Decapods Gastropods --	Gastropods Mysids --	Polychaetes Gastropods --	Crustaceans Polychaetes --	APHA (22 nd Edi) 10500-C
6.2	MeioBenthos	--	Nematodes Bryozoans --	Foraminiferans Nematodes ---	Foraminiferans Bryozoans --	Nematodes Bryozoans --	Foraminiferans -- --	Nematodes Bryozoans --	APHA (22 nd Edi) 10500-C
6.3	Population	no/m ²	294	528	556	673	824	882	APHA (22 nd Edi) 10500-C



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RESULTS OF MARINE WATER [M5 TOWARDS WESTERN SIDE OF EAST PORT – N 22°46'041" E 069°47'296"]

SR. NO.	TEST PARAMETERS	UNIT	OCTOBER 2018		NOVEMBER 2018		DECEMBER 2018		JANUARY 2019		FEBRUARY 2019		MARCH 2019		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1	pH	--	8.19	8.08	8.15	8.1	8.24	8.17	8.12	8.09	8.16	8.13	8.1	8.06	IS3025(P11)83Re.02
2	Temperature	oC	30.5	30.3	30.4	30.2	30.6	30.3	31.1	30	30.2	30	3.01	30	IS3025(P9)84Re.02
3	Total Suspended Solids	mg/L	369	332	356	304	312	294	228	251	182	218	250	276	IS3025(P17)84Re.02
4	BOD (3 Days @ 27 °C)	mg/L	5	BDL*	4	BDL*	5	BDL*	6.2	BDL*	8.3	BDL*	12.8	BDL*	IS 3025 (P44)1993Re.03E dition2.1
5	Dissolved Oxygen	mg/L	6.4	6	6.2	5.8	6.2	6	6.1	5.9	6.2	6.0	6.1	5.9	IS3025(P38)89Re.99
6	Salinity	ppt	34.5	34.1	34.3	34.1	34.6	34.3	34.8	35.1	35.5	35.9	35.6	35.8	APHA (22 nd Edi) 2550 B
7	Oil & Grease	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	APHA (22 nd Edi)55 20D
8	Nitrate as NO ₃	μmol/L	10.4	6.2	9.37	7.79	7.4	6.2	8.2	7.2	3.45	2.12	6.84	4.7	IS3025(P34)88
9	Nitrite as NO ₂	μmol/L	5.1	3.4	1.96	1.57	2.1	2.4	1.5	1.3	1.47	0.87	1.36	1.94	IS3025(P34)88 NEDA
10	Ammonical Nitrogen as NH ₃	μmol/L	2.8	2.4	3.71	3.34	2.7	2.9	3.6	3.3	1.75	1.59	1.58	1.35	IS3025(P34)88CI a.2.3
11	Phosphates as PO ₄	μmol/L	2.36	1.8	2.67	2.14	2.85	2.45	2.1	1.8	1.04	1.49	1.3	1.5	APHA(22 nd Edi) 4500 C
12	Total Nitrogen	μmol/L	18.3	12	15.04	12.71	12.20	11.50	13.41	11.95	6.67	4.6	9.78	6.99	IS3025(P34)88
13	Petroleum Hydrocarbon	μg/L	12	6	16	8	18	BDL*	11	BDL*	18	BDL*	14.3	BDL*	PLPL-TPH
14	Total Dissolved Solids	mg/L	34814	34518	35810	35334	35511	35273	35710	35994	36394	36996	36534	36840	IS3025(P16)84Re.02
15	COD	mg/L	16	BDL*	13	BDL*	15	BDL*	21.0	10.0	26.0	7.0	15.0	BDL*	APHA(22 nd Edi) 5520-D Open Reflux
A Flora and Fauna															
16	Primary productivity	mgC/L /day	1.55	1.21	1.95	1.32	2.46	2.1	4.1	2.8	7.42	5.62	8.1	5.17	APHA (22 nd Edi) 10200-J
B Phytoplankton															
17.1	Chlorophyll	mg/m ³	1.94	1.12	2.13	1.25	2.2	1.98	2.9	2.10	3.24	2.60	3.4	2.74	APHA (22 nd Edi) 10200-H
17.2	Phaeophytin	mg/m ³	2.18	0.7	0.96	0.7	1.6	0.86	1.8	1.1	2.45	1.44	2.77	1.97	APHA (22 nd Edi)



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17.3	Cell Count	No. x 10 ³ /L	150	106	192	106	202	124	193	89	240	73	210	60	10200-H APHA (22 nd Edi) 10200-H
17.4	Name of Group Number and name of group species of each group	--	Rhizosolenia <i>Melosira</i> <i>Nitzschia</i> <i>Biddulphia</i> <i>a</i> <i>Coscinodiscus</i> Cyclotella <i>a</i>	Pleurosigma <i>Navicula</i> <i>Rhizosolenia</i> <i>---</i> <i>---</i> <i>---</i>	Cyclotella <i>Nitzschia</i> <i>Skeletonema</i> <i>ma</i> sp. <i>Cheatoceus</i> sp. <i>Pleurosigma</i> sp. <i>Biddulphia</i> sp. <i>---</i>	Navicula <i>Rhizosolenia</i> sp. <i>Synedra</i> <i>sp.</i> <i>Fragillaria</i> <i>sp.</i> <i>---</i> <i>---</i> <i>---</i>	<i>Thallasiosira</i> sp. <i>Coscinodiscus</i> sp. <i>Cyclotella</i> sp. <i>Ceratizam</i>	<i>Navicula</i> sp. <i>Biddulphia</i> sp. <i>Gyrosigma</i> sp. <i>---</i>	<i>Thallasiosira</i> sp. <i>Nitzschia</i> sp. <i>Rhizosolenia</i> sp. <i>Coscinodiscus</i> sp.	<i>Navicula</i> sp. <i>Biddulphia</i> sp. <i>Thallasiosira</i> sp.	<i>Synedra</i> sp. <i>Coscinodiscus</i> sp. <i>Biddulphia</i> sp. <i>Navicula</i> sp.	<i>Nitzschia</i> sp. <i>Pleurosigma</i> sp. <i>Skeletonema</i> sp. <i>---</i>	<i>Nitzschia</i> sp. <i>Pleurosigma</i> sp. <i>Biddulphia</i> sp. <i>Coscinodiscus</i> sp.	<i>Thallasiosira</i> sp. <i>Skeletonema</i> sp. <i>Nitzschia</i> sp. <i>---</i>	APHA (22 nd Edi) 10200-H
C	Zooplanktons														
18.1	Abundance (Population)	noX10 ³ / 100 m ³	51		56		38		63		52		60		APHA (22 nd Edi) 10200-G
18.2	Name of Group Number and name of group species of each group	--	Hydrozoans Polychaetes Cheatocerous --		Polychaetes Decapods Crustaceans Fish Larve		Ostracods Polychaetes Foraminiferans		Polychaete Foraminiferans Ostracodes Decapods		Polychaetes Bivalves Amphipods		Foraminiferans Ostracodes Bivalves		APHA (22 nd Edi) 10200-G
18.3	Total Biomass	ml/100 m ³	9.6		9.3		5.6		5.9		4.3		3.95		APHA (22 nd Edi) 10200-G
D	Microbiological Parameters														
19.1	Total Bacterial Count	CFU/m l	1650		1980		1820		1860		1720		1740		IS 5402:2002
19.2	Total Coliform	/ml	Absent		Absent		Absent		Absent		Absent		Absent		APHA(22 nd Edi)92 21-D
19.3	Ecoli	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS:1622:1981Edi. 2.4(2003-05)
19.4	Enterococcus	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 15186 :2002
19.5	Salmonella	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 5887 (P-3)
19.6	Shigella	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 1887 (P-7)
19.7	Vibrio	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 5887 (P-5)

H. T. Shah

Lab Manager



Dr. Arun Bajpai

Lab Manager (Q)

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RESULTS OF SEDIMENT ANALYSIS [M5 TOWARDS WESTERN SIDE OF EAST PORT – N 22°46'041" E 069°47'296"]

SR. NO.	TEST PARAMETERS	UNIT	OCTOBER 2018	NOVEMBER 2018	DECEMBER 2018	JANUARY 2019	FEBRUARY 2019	MARCH 2019	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
1	Organic Matter	%	0.7	0.74	0.52	0.68	0.82	0.63	FCO:2007
2	Phosphorus as P	µg/g	216	283	210	296	319	270	APHA(22 nd Edi) 4500 C
3	Texture	--	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy	--
4	Petroleum Hydrocarbon	µg/g	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	PLPL-TPH
5	Heavy Metals								
5.1	Aluminum as Al	%	5.2	5.18	4.9	5	4.86	5.1	AAS APHA 3111 B
5.2	Total Chromium as Cr ⁺³	µg/g	158	163	170	192	218	158	AAS 3111B
5.3	Manganese as Mn	µg/g	1710	1599	1248	1336	1492	1206	AAS APHA 3111 B
5.4	Iron as Fe	%	5	4.92	5.1	4.97	5.16	4.82	AAS APHA(22 nd Edi)3111 B
5.5	Nickel as Ni	µg/g	62	34.6	26	48	40	21	AAS APHA(22 nd Edi)3111 B
5.6	Copper as Cu	µg/g	56.4	50.2	64	42	33	48.4	AAS APHA(22 nd Edi)3111 B
5.7	Zinc as Zn	µg/g	344	256	296	310	347	203	AAS APHA(22 nd Edi)3111 B
5.8	Lead as Pb	µg/g	4.6	2.7	2	3.6	3.2	1.2	AAS APHA(22 nd Edi)3111 B
5.9	Mercury as Hg	µg/g	BDL*	BDL*	0.01	BDL*	BDL*	BDL*	AAS APHA- 3112 B
6	Benthic Organisms								
6.1	Macrobenthos	--	Hydrozoa Gastropods Mysids	Amphipods Mysids Bivalves	Gastropods Bivalves Echinoderms	Gastropods Bivalves --	Gastropods Brachyurans --	Bivalves Gastropods --	APHA (22 nd Edi) 10500-C
6.2	MeioBenthos	--	Bruchyran Nematodes --	Hydrozoan Foraminiferans ---	Nematodes -- --	Foraminiferans -- --	Nematodes -- --	Foraminiferans Brachyurans --	APHA (22 nd Edi) 10500-C
6.3	Population	no/m2	397	469	557	616	733	850	APHA (22 nd Edi) 10500-C



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RESULTS OF MARINE WATER [M7 EAST PORT N 22°47'120" E 069°47'110"]

SR. NO.	TEST PARAMETERS	UNIT	OCTOBER 2018		NOVEMBER 2018		DECEMBER 2018		JANUARY 2019		FEBRUARY 2019		MARCH 2019		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1	pH	--	8.37	8.24	8.3	8.16	8.31	8.24	8.19	8.16	8.13	8.11	8.15	8.10	IS3025(P11)83Re.02
2	Temperature	oC	30.4	30.2	30.5	30.3	30.8	30.5	30.6	30.4	30.2	30.1	30.3	30	IS3025(P9)84Re.02
3	Total Suspended Solids	mg/L	342	296	370	308	348	314	270	286	208	231	274	296	IS3025(P17)84Re.02
4	BOD (3 Days @ 27°C)	mg/L	7	3	8	2	5	3	7.4	BDL*	5.6	BDL*	5.9	BDL*	IS 3025 (P44)1993Re.03 Edition 2.1
5	Dissolved Oxygen	mg/L	6.6	6.2	6.4	6.1	6.6	6.1	6.2	5.9	6.1	5.7	6.2	5.9	IS3025(P38)89Re.99
6	Salinity	ppt	34	33.8	34.8	3	34.3	34.2	34.7	34.9	35.4	35.6	35.5	35.8	APHA (22 nd Edi) 2550 B
7	Oil & Grease	mg/L	BDL*	BDL*	BDL*	34.5	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	APHA(22 nd Edi)5520D
8	Nitrate as NO ₃	μmol/L	7.9	5.2	6.68	5.23	6.2	5.4	7.2	6.8	5.78	4.23	8.34	6.9	IS3025(P34)88
9	Nitrite as NO ₂	μmol/L	1.6	1.2	1.57	1.47	1.2	1.6	1.39	0.78	1.24	1.47	1.56	1.73	IS3025(P34)88 NEDA
10	Ammonical Nitrogen as NH ₃	μmol/L	2.8	2.4	2.98	2.41	3.1	2.4	3.5	3.1	2.36	2.08	2.51	2.3	IS3025(P34)88Cla.2.3
11	Phosphates as PO ₄	μmol/L	2.46	2.15	1.76	1.44	2.1	1.84	2.5	1.6	1.3	1.48	1.58	1.74	APHA(22 nd Edi) 4500 C
12	Total Nitrogen	μmol/L	12.3	8.8	11.23	9.11	10.50	9.40	12.24	10.81	9.38	7.78	12.41	10.93	IS3025(P34)88
13	Petroleum Hydrocarbon	μg/L	28	14	21	10	18	BDL*	14.8	BDL*	16	BDL*	9.4	BDL*	PLPL-TPH
14	Total Dissolved Solids	mg/L	34327	34218	35930	35634	35227	35108	35698	35846	36274	36480	36570	36984	IS3025(P16)84Re.02
15	COD	mg/L	22	15	25	11	18	10	26	12.0	21	7.0	15	BDL*	APHA(22 nd Edi) 5520-D Open Reflux
A Flora and Fauna															
16	Primary productivity	mgC/L/day	1.75	1.14	2.58	1.91	2.94	2.5	4.23	3.78	7.31	4.77	7.87	5.62	APHA (22 nd Edi) 10200-J
B Phytoplankton															
17.1	Chlorophyll	mg/m ³	1.72	1.26	2.52	2.4	2.82	2.24	2.41	2.02	2.69	2.31	2.5	2.28	APHA (22 nd Edi) 10200-H
17.2	Phaeophytin	mg/m ³	1.86	0.502	1.49	1.03	2.36	1.96	1.86	1.3	2.27	2.12	1.2	1	APHA (22 nd Edi) 10200-H



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17.3	Cell Count	No. x 10 ³ /L	151	97	178	104	270	130	187	99	201	87	231	76	APHA (22 nd Edi) 10200-H
17.4	Name of Group Number and name of group species of each group	--	Biddulphia <i>Navicula</i> <i>Cheatoceros</i> <i>Nitzschia</i> Melosira <i>Gyrosigma</i>	Navicula <i>Synedra</i> <i>Melosira</i> -- -- --	Navicula sp. <i>Cyclotella</i> <i>sp.</i> <i>Biddulphia</i> <i>sp.</i> <i>Surirella</i> <i>sp.</i> <i>Cheatoceros</i> <i>sp.</i> --	Fragillaria <i>Rhizosolenia</i> <i>sp.</i> <i>Navicula</i> <i>sp.</i> -- -- --	<i>Thallasiosira</i> <i>sp.</i> <i>Nitzschia</i> <i>sp.</i> <i>Coscinodiscus</i> <i>sp.</i> <i>Biddulphia</i> <i>sp.</i>	<i>Navicula</i> <i>sp.</i> <i>Cheatoceros</i> <i>sp.</i> <i>Gyrosigma</i> <i>sp.</i> --	<i>Thallasiosira</i> <i>sp.</i> <i>Biddulphia</i> <i>sp.</i> <i>Synedra</i> <i>sp.</i> <i>Pleurosigma</i> <i>ma</i> <i>sp.</i>	<i>Nitzschia</i> <i>sp.</i> <i>Gyrosigma</i> <i>sp.</i> <i>stauronei</i> <i>sp.</i> --	<i>Cheatoceros</i> <i>sp.</i> <i>Rhizosolenia</i> <i>sp.</i> <i>Biddulphia</i> <i>sp.</i> <i>Navicula</i> <i>sp.</i>	<i>Nitzschia</i> <i>sp.</i> <i>Fragillaria</i> <i>sp.</i> <i>Navicula</i> <i>sp.</i> --	<i>Cheatoceros</i> <i>sp.</i> <i>Rhizosolenia</i> <i>sp.</i> <i>Coscinodiscus</i> <i>sp.</i> <i>Thallasiosira</i> <i>sp.</i>	<i>Nitzschia</i> <i>sp.</i> <i>Gyrosigma</i> <i>sp.</i> <i>Fragillaria</i> <i>sp.</i> --	APHA (22 nd Edi) 10200-H
C Zooplanktons															
18.1	Abundance (Population)	noX10 ³ / 100 m ³	44		56		68		63		51		59		APHA (22 nd Edi) 10200-G
18.2	Name of Group Number and name of group species of each group	--	Polychaetes Bivalves Decapods --		Copepods Mysids mollusca Echinoderms		Siphonophores Gastropods Chaetognathes		Gastropods mollusca Crustaceans --		Polychaetes Bivalves Ostracods		Gastropods Copepods Bivalves		APHA (22 nd Edi) 10200-G
18.3	Total Biomass	ml/100 m ³	7.1		7.8		6.1		5.15		3.7		3.45		APHA (22 nd Edi) 10200-G
D Microbiological Parameters															
19.1	Total Bacterial Count	CFU/ml	1820		1740		1860		1800		1840		1820		IS 5402:2002
19.2	Total Coliform	/ml	Absent		Absent		Absent		Absent		Absent		Absent		APHA(22 nd Edi)922 1-D
19.3	Ecoli	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS:1622:1981Edi.2 .4(2003-05)
19.4	Enterococcus	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 15186 :2002
19.5	Salmonella	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 5887 (P-3)
19.6	Shigella	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 1887 (P-7)
19.7	Vibrio	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 5887 (P-5)



H. T. Shah

Lab Manager




Dr. Arun Bajpai

Lab Manager (Q)

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RESULTS OF MARINE WATER [M8 RIGHT SIDE OF BOCHA CREEK N 22°45'987" E 069°43'119"]

SR. NO.	TEST PARAMETERS	UNIT	OCTOBER 2018		NOVEMBER 2018		DECEMBER 2018		JANUARY 2019		FEBRUARY 2019		MARCH 2019		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1	pH	--	8.29	8.06	8.26	8.12	8.24	8.17	8.21	8.17	8.16	8.14	8.15	8.12	IS3025(P11)83Re.02
2	Temperature	oC	30.5	30.2	30.3	30.1	31	30.8	30.9	30.6	30.1	29.9	30.2	30	IS3025(P9)84Re.02
3	Total Suspended Solids	mg/L	298	242	318	276	382	319	264	283	204	276	228	263	IS3025(P17)84Re.02
4	BOD (3 Days @ 27 °C)	mg/L	4	3	6	BDL*	3	BDL*	5.2	BDL*	7.8	BDL*	5.9	BDL*	IS 3025 (P44)1993Re.03E dition2.1
5	Dissolved Oxygen	mg/L	6.4	5.6	6.3	5.9	6.4	6	6.2	6.1	6.6	6.2	6.1	5.8	IS3025(P38)89Re.99
6	Salinity	ppt	34.3	34.1	34.4	34.1	34.1	33.9	34.5	34.7	35.3	35.7	35.6	35.9	APHA (22 nd Edi) 2550 B
7	Oil & Grease	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	APHA(22 nd Edi)552 OD
8	Nitrate as NO ₃	μmol/L	7.2	6	8.76	7.01	5.72	3.98	6.68	5.59	5.81	4.42	6.94	4.8	IS3025(P34)88
9	Nitrite as NO ₂	μmol/L	1.9	1.6	1.14	0.88	0.68	0.52	1.06	0.98	1.14	1.08	1.33	1.14	IS3025(P34)88 NEDA
10	Ammonical Nitrogen as NH ₃	μmol/L	2.4	1.8	1.69	1.43	2.32	1.8	3.74	2.63	1.9	1.65	1.81	1.42	IS3025(P34)88Cla.2.3
11	Phosphates as PO ₄	μmol/L	2.68	1.95	2.46	1.87	1.9	1.72	2.28	2.63	1.07	2.47	1.24	1.37	APHA(22 nd Edi) 4500 C
12	Total Nitrogen	μmol/L	11.5	9.4	11.59	9.32	8.72	6.30	11.49	9.21	8.85	7.15	10.08	7.36	IS3025(P34)88
13	Petroleum Hydrocarbon	μg/L	30	20	28	20	24	17	14	BDL*	19	BDL*	15.2	BDL*	PLPL-TPH
14	Total Dissolved Solids	mg/L	34772	34596	35618	35213	35418	34832	35684	35840	36320	36619	36498	37348	IS3025(P16)84Re.02
15	COD	mg/L	20	10	18	BDL*	13	BDL*	19	7	25	6	19.8	7	APHA(22 nd Edi) 5520-D Open Reflux
A	Flora and Fauna														
16	Primary productivity	mgC/L /day	1.28	1.19	2.25	1.93	3.1	2.9	4.36	3.93	7.2	6	7.87	5.06	APHA (22 nd Edi) 10200-J
B	Phytoplankton														
17.1	Chlorophyll	mg/m ³	2.14	1.12	2.54	1.05	2.84	1.84	2.9	2.41	3.2	2	2.76	2.2	APHA (22 nd Edi) 10200-H
17.2	Phaeophytin	mg/m ³	2.4	1.04	0.64	0.32	1.7	1.1	2.2	1.49	2.9	1.9	2	1.6	APHA (22 nd Edi) 10200-H



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17.3	Cell Count	No. x 10 ³ /L	154	89	184	96	260	170	201	73	226	84	251	79	APHA (22 nd Edi) 10200-H
17.4	Name of Group Number and name of group species of each group	--	Rhizosolenia <i>Melosira</i> <i>Navicula</i> <i>Nitzschia</i> Coscinodiscus --	Guinardia <i>Synedra</i> <i>Nitzschia</i> -- -- --	Navicula <i>Thalassiosira</i> sp. <i>Cyclotella</i> sp. <i>Synedra</i> sp. <i>Coscinodiscus</i> sp. --	Nitzschia <i>Rhizosolenia</i> sp. <i>Synedra</i> sp. -- -- --	<i>Navicula</i> sp. <i>Melosira</i> sp. <i>Thalassiosira</i> sp. <i>Rhizosolenia</i> sp. --	<i>Nitzschia</i> sp. <i>Cheateocerous</i> sp. <i>Fragillaria</i> sp. --	<i>Biddulphia</i> sp. <i>Nitzschia</i> sp. <i>Pleurosigma</i> sp. <i>Thalassionema</i> sp.	<i>Navicula</i> sp. <i>Gyrosigma</i> sp. <i>Synedra</i> sp. --	<i>Rhizosolenia</i> sp. <i>Biddulphia</i> sp. <i>Thalassiosira</i> sp. <i>Coscinodiscus</i> sp.	<i>Synedra</i> sp. <i>Nitzschia</i> sp. <i>Thalassiosira</i> sp. --	<i>Biddulphia</i> sp. <i>Coscinodiscus</i> sp. <i>Thalassiosira</i> sp. <i>Gyrosigma</i> sp.	<i>Nitzschia</i> sp. <i>Pleurosigma</i> sp. <i>Fragillaria</i> sp. --	APHA (22 nd Edi) 10200-H
C Zooplanktons															
18.1	Abundance (Population)	noX10 ³ /100 m ³	49		60		76		65		59		42		APHA (22 nd Edi) 10200-G
18.2	Name of Group Number and name of group species of each group	--	Polychaetes Copepods Isopods Mysids		Copepods Gastropods Bivalves Crustaceans		Ctenophores Ostracods Gastropods		Crustaceans Gastropods Decapods --		Copepods Polychaetes Bivalves		Crustaceans Ostracods Copepods		APHA (22 nd Edi) 10200-G
18.3	Total Biomass	ml/100 m ³	6.55		8.15		6.92		5.6		4.8		4.95		APHA (22 nd Edi) 10200-G
D Microbiological Parameters															
19.1	Total Bacterial Count	CFU/ml	1925		2120		1860		1920		1960		1940		IS 5402:2002
19.2	Total Coliform	/ml	Absent		Absent		Absent		Absent		Absent		Absent		APHA(22 nd Edi)922 1-D
19.3	Ecoli	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS:1622:1981Edi. 2.4(2003-05)
19.4	Enterococcus	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 15186 :2002
19.5	Salmonella	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 5887 (P-3)
19.6	Shigella	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 1887 (P-7)
19.7	Vibrio	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 5887 (P-5)



H. T. Shah

Lab Manager




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RESULTS OF SEDIMENT ANALYSIS [M8 RIGHT SIDE OF BOCHA CREEK – N 22°45'987" E 069°43'119"]

SR. NO.	TEST PARAMETERS	UNIT	OCTOBER 2018	NOVEMBER 2018	DECEMBER 2018	JANUARY 2019	FEBRUARY 2019	MARCH 2019	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
1	Organic Matter	%	0.51	0.56	0.48	0.59	0.64	0.69	FCO:2007
2	Phosphorus as P	µg/g	270	332	290	318	370	252	APHA(22 nd Eti) 4500 C
3	Texture	--	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy	--
4	Petroleum Hydrocarbon	µg/g	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	PLPL-TPH
5	Heavy Metals								
5.1	Aluminum as Al	%	5.28	5.16	4.96	4.84	4.7	4.93	AAS APHA 3111 B
5.2	Total Chromium as Cr ⁺³	µg/g	216	298	280	230	248	218	AAS 3111B
5.3	Manganese as Mn	µg/g	1680	1534	1346	1276	1424	1240	AAS APHA 3111 B
5.4	Iron as Fe	%	5.14	4.85	5.1	5.2	4.86	4.92	AAS APHA(22 nd Eti)3111 B
5.5	Nickel as Ni	µg/g	48	68	21	33	57	23.6	AAS APHA(22 nd Eti)3111 B
5.6	Copper as Cu	µg/g	51	62.4	28	48	33	42.8	AAS APHA(22 nd Eti)3111 B
5.7	Zinc as Zn	µg/g	286	324	260	271	302	268	AAS APHA(22 nd Eti)3111 B
5.8	Lead as Pb	µg/g	4.7	3.2	2.18	3.3	2.8	1.9	AAS APHA(22 nd Eti)3111 B
5.9	Mercury as Hg	µg/g	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	AAS APHA- 3112 B
6	Benthic Organisms								
6.1	Macrobenthos	--	Crustaceans Polychaetes Chaetognaths	Polychaete worms Bivalves Crustaceans	Polychaete Crustaceans Gastropods	Gastropods Echinoderms --	Gastropods Polychaetes --	Polychaetes Crustaceans --	APHA (22 nd Eti) 10500-C
6.2	MeioBenthos	--	Copepods Bryozoans --	Nematodes Hydrozoan --	-- -- --	Nematodes -- --	Copepods Foraminiferans --	Copepods Nematodes --	APHA (22 nd Eti) 10500-C
6.3	Population	no/m ²	265	411	559	647	824	794	APHA (22 nd Eti) 10500-C



H. T. Shah

Lab Manager




Dr. Arun Bajpai

Lab Manager (Q)

RESULTS OF MARINE WATER [M11 MPT T1 JETTY N 22°42'278" E 069°43'450"]

SR. NO.	TEST PARAMETERS	UNIT	OCTOBER 2018		NOVEMBER 2018		DECEMBER 2018		JANUARY 2019		FEBRUARY 2019		MARCH 2019		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1	pH	--	8.19	8.06	8.24	8.11	8.17	8.15	8.12	8.09	8.2	8.17	8.15	8.1	IS3025(P11)83Re.02
2	Temperature	oC	30.1	30	30.4	30.3	30.3	30.2	30.1	30	30.1	30	30.2	30	IS3025(P9)84Re.02
3	Total Suspended Solids	mg/L	382	316	364	304	319	287	246	281	199	218	236	253	IS3025(P17)84Re.02
4	BOD (3 Days @ 27 °C)	mg/L	7	5	6	BDL*	4	BDL*	5.0	BDL*	6.7	BDL*	5.4	BDL*	IS 3025 (P44)1993Re.03E dition2.1
5	Dissolved Oxygen	mg/L	6.6	5.9	6.5	BDL*	6.6	6.4	6.1	5.9	6.1	5.9	6.2	5.8	IS3025(P38)89Re.99
6	Salinity	ppt	34.3	33.8	34.8	34.3	35.1	34.7	34.9	35.1	35.3	35.5	35.4	35.6	APHA (22 nd E di) 2550 B
7	Oil & Grease	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	APHA(22 nd E di)552 OD
8	Nitrate as NO ₃	μmol/L	13.4	8.2	9.09	8.76	10.4	9.6	8.1	7.14	5.75	4.38	6.2	4.63	IS3025(P34)88
9	Nitrite as NO ₂	μmol/L	2.6	2	1.78	1.43	1.96	1.54	1.14	0.88	0.96	1.18	1.28	1.34	IS3025(P34)88 NEDA
10	Ammonical Nitrogen as NH ₃	μmol/L	4.4	3.6	3.82	2.77	2.6	1.2	3.99	3.71	2.72	1.91	2.5	2.14	IS3025(P34)88Cla.2.3
11	Phosphates as PO ₄	μmol/L	2.5	2.4	1.82	1.29	2.16	1.75	2.13	1.81	1.84	1.36	1.7	1.46	APHA(22 nd E di) 4500 C
12	Total Nitrogen	μmol/L	20.4	13.8	14.69	12.96	14.96	12.34	13.23	11.72	9.43	7.47	9.98	8.11	IS3025(P34)88
13	Petroleum Hydrocarbon	μg/L	35	24	28	16	16	BDL*	10	BDL*	8	BDL*	14.6	BDL*	PLPL-TPH
14	Total Dissolved Solids	mg/L	34718	34448	35218	34972	35767	35415	35634	35410	36184	36474	36314	36679	IS3025(P16)84Re.02
15	COD	mg/L	28	22	27	BDL*	16	10	18	11.0	23	6.0	19.6	7.4	APHA(22 nd E di) 5520-D Open Reflux
A	Flora and Fauna														
16	Primary productivity	mgC/L /day	1.58	1.03	2.48	1.8	2.64	2.28	5.63	3.82	7.29	5.89	7.43	4.95	APHA (22 nd E di) 10200-J
B	Phytoplankton														
17.1	Chlorophyll	mg/m ³	1.9	1.57	1.62	1.78	2.4	1.96	3.6	2.70	3	2.54	3.6	2.79	APHA (22 nd E di) 10200-H
17.2	Phaeophytin	mg/m ³	1.1	0.58	1.28	0.42	1.7	1.02	2.24	1.92	2.56	1.13	2.16	1.74	APHA (22 nd E di)



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17.3	Cell Count	No. x 10 ³ /L	157	99	176	80	284	110	230	181	201	97	223	76	10200-H APHA (22 nd Edi) 10200-H
17.4	Name of Group Number and name of group species of each group	--	Nitzschia <i>Thallasiosira</i> <i>Coscinodiscus</i> <i>Synedra</i> <i>Rhizosolenia</i> --	Nitzschia <i>Navicula</i> <i>Fragillaria</i> -- --	Navicula <i>Thallasiosira</i> <i>Coscinodiscus</i> <i>Biddulphia</i> <i>Rhizosolenia</i> <i>Nitzschia</i> <i>Navicula</i> sp.	Nitzschia <i>Fragillaria</i> <i>Synedra</i> <i>Gyrosigma</i> -- -- --	Rhizosolenia <i>Nitzschia</i> <i>Thallasiosira</i> --	Cheatoceus <i>Biddulphia</i> <i>Cyclotella</i> --	<i>Navicula</i> <i>Cheatoceus</i> <i>Thalassioema</i> --	<i>Rhizosolenia</i> <i>Skeletonema</i> --	<i>Cheatoceus</i> <i>Nitzschia</i> <i>Rhizosolenia</i> <i>Coscinodiscus</i> sp.	<i>Navicula</i> <i>Pleurosigma</i> <i>Synedra</i> --	<i>Nitzschia</i> <i>Thallasiosira</i> <i>Coscinodiscus</i> <i>Navicula</i> sp.	<i>Nitzschia</i> <i>Rhizosolenia</i> --	APHA (22 nd Edi) 10200-H
C	Zooplanktons														
18.1	Abundance (Population)	noX10 ³ / 100 m ³	45		51		62		58		62		55		APHA (22 nd Edi) 10200-G
18.2	Name of Group Number and name of group species of each group	--	Bivalves Polychaetes Decapods Foraminiferans		Polychaetes Gastropods Nematodes Mysids		Lamellibranches Ctenophores Polychaetes		Gastropods molluscan Bivalves --		Gastropods molluscs Bivalves		Gastropods Copepods Mysids		APHA (22 nd Edi) 10200-G
18.3	Total Biomass	ml/100 m ³	5.7		6.6		5.92		4.3		5		2.95		APHA (22 nd Edi) 10200-G
D	Microbiological Parameters														
19.1	Total Bacterial Count	CFU/ml	1800		1760		1860		1820		1720		1860		IS 5402:2002
19.2	Total Coliform	/ml	Absent		Absent		Absent		Absent		Absent		Absent		APHA(22 nd Edi)922 1-D
19.3	Ecoli	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS:1622:1981Edi. 2.4(2003-05)
19.4	Enterococcus	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 15186 :2002
19.5	Salmonella	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 5887 (P-3)
19.6	Shigella	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 1887 (P-7)
19.7	Vibrio	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 5887 (P-5)



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RESULTS OF MARINE WATER [M12 SPM N 22°40'938" E 069°39'191"]

SR. NO.	TEST PARAMETERS	UNIT	OCTOBER 2018		NOVEMBER 2018		DECEMBER 2018		JANUARY 2019		FEBRUARY 2019		MARCH 2019		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1	pH	--	8.25	8.11	8.24	8.05	8.35	8.17	8.19	8.14	8.17	8.13	8.15	8.12	IS3025(P11)83Re.02
2	Temperature	oC	30.3	30	30.1	29.8	30.6	30.3	30.2	30	30.2	29.9	30.2	30	IS3025(P9)84Re.02
3	Total Suspended Solids	mg/L	296	236	286	244	252	257	210	232	213	256	228	249	IS3025(P17)84Re.02
4	BOD (3 Days @ 27°C)	mg/L	4	2	3	BDL*	BDL*	BDL*	5.0	BDL*	6.8	BDL*	4.5	BDL*	IS 3025 (P44)1993Re.03E dition2.1
5	Dissolved Oxygen	mg/L	6.8	6	6.3	5.8	6.4	6.2	6.0	5.8	6.4	5.7	6.1	5.8	IS3025(P38)89Re.99
6	Salinity	ppt	34.5	34.3	34.3	34.1	34.8	34.5	34.4	34.5	35.4	35.6	35.5	35.7	APHA (22 nd Edi) 2550 B
7	Oil & Grease	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	APHA(22 nd Edi)552 OD
8	Nitrate as NO ₃	μmol/L	13.2	9.2	11.72	8.7	8.9	7.1	7.86	6.65	2.84	1.87	2.27	1.63	IS3025(P34)88
9	Nitrite as NO ₂	μmol/L	3.4	2.8	1.98	1.74	1.15	2.45	1.49	1.1	0.43	0.37	0.68	0.89	IS3025(P34)88 NEDA
10	Ammonical Nitrogen as NH ₃	μmol/L	4.6	4	3.39	2.87	4.6	3.9	3.85	3.54	2.37	1.99	2.2	1.93	IS3025(P34)88Cla.2.3
11	Phosphates as PO ₄	μmol/L	2.95	2.16	2.36	1.82	2.5	2.41	2.23	1.86	0.98	0.9	0.84	0.72	APHA(22 nd Edi) 4500 C
12	Total Nitrogen	μmol/L	21.1	16	17.09	13.31	14.65	12.45	13.21	11.29	5.64	4.23	5.15	4.45	IS3025(P34)88
13	Petroleum Hydrocarbon	μg/L	32	10	25	12	16	10	14	BDL*	18.2	BDL*	13.5	BDL*	PLPL-TPH
14	Total Dissolved Solids	mg/L	34983	34649	35860	35648	35117	34992	35528	35664	36520	36796	36718	36984	IS3025(P16)84Re.02
15	COD	mg/L	20	8	18	BDL*	10	BDL*	19	8	27	8	22.6	7	APHA(22 nd Edi) 5520-D Open Reflux
A Flora and Fauna															
16	Primary productivity	mgC/L /day	1.71	1.57	2.11	2.04	3.2	2.6	5.1	3.3	7.09	4.6	5.62	3.37	APHA (22 nd Edi) 10200-J
B Phytoplankton															
17.1	Chlorophyll	mg/m ³	1.99	1.51	2.17	1.8	2.9	2.3	3.2	2.6	3.8	2.85	3.27	2.67	APHA (22 nd Edi) 10200-H
17.2	Phaeophytin	mg/m ³	1.6	1.44	1.6	1.46	2.2	1.96	2.5	1.5	2.7	1.4	2.56	1.54	APHA (22 nd Edi) 10200-H



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17.3	Cell Count	No. x 10 ³ /L	173	90	198	112	230	170	217	213	213	96	236	81	APHA (22 nd Edi) 10200-H
17.4	Name of Group Number and name of group species of each group	--	Rhizosolenia <i>Nitzschia</i> <i>Melosira</i> <i>Cyclotella</i> <i>Cosmarium</i> --	Amphiprora <i>ceratium</i> <i>Nitzschia</i> -- -- --	Rhizosolenia <i>Nitzschia</i> <i>Synedra</i> <i>Biddulphia</i> <i>a sp.</i> <i>coratizum</i> <i>sp.</i> <i>Melosira</i> <i>sp.</i>	Nitzschia <i>Navicula</i> <i>sp.</i> <i>Fragillaria</i> <i>sp.</i> -- -- --	Rhizosolenia <i>Navicula</i> <i>sp.</i> <i>Thallasiosira</i> <i>sp.</i> <i>Coscinodiscus</i> <i>sp.</i>	Nitzschia <i>Cyclotella</i> <i>sp.</i> <i>Cheateococcus</i> <i>sp.</i> --	<i>Thallasiosira</i> <i>sp.</i> <i>Rhizosolenia</i> <i>sp.</i> <i>Coscinodiscus</i> <i>sp.</i> --	<i>Navicula</i> <i>sp.</i> <i>Synedra</i> <i>sp.</i> <i>Fragillaria</i> <i>sp.</i> --	<i>Coscinodiscus</i> <i>sp.</i> <i>Rhizosolenia</i> <i>sp.</i> <i>Thallasiosira</i> <i>sp.</i> <i>Synedra</i> <i>sp.</i>	<i>Synedra</i> <i>sp.</i> <i>Navicula</i> <i>sp.</i> <i>Gyrosigma</i> <i>a sp.</i> --	<i>Coscinodiscus</i> <i>sp.</i> <i>Rhizosolenia</i> <i>sp.</i> <i>Fragillaria</i> <i>sp.</i> <i>Synedra</i> <i>sp.</i>	<i>Navicula</i> <i>sp.</i> <i>Pleurosigma</i> <i>ma sp.</i> <i>Biddulphia</i> <i>a sp.</i> --	APHA (22 nd Edi) 10200-H
C Zooplanktons															
18.1	Abundance (Population)	noX10 ³ /100 m ³	43		40		58		45		64		53		APHA (22 nd Edi) 10200-G
18.2	Name of Group Number and name of group species of each group	--	Foraminiferans Chaetognaths Gastropods --		Polychaetes Bivalves Crustaceans Copepods		Bivalves Gastropods Crustaceans		molluscan Crustaceans Gastropods --		Polychaetes molluscans		Polychaetes Foraminiferans Bivalves		APHA (22 nd Edi) 10200-G
18.3	Total Biomass	ml/100 m ³	5.1		5.6		3.2		4.4		3.9		3.4		APHA (22 nd Edi) 10200-G
D Microbiological Parameters															
19.1	Total Bacterial Count	CFU/ml	2100		1870		1860		1850		1720		1820		IS 5402:2002
19.2	Total Coliform	/ml	Absent		Absent		Absent		Absent		Absent		Absent		APHA(22 nd Edi)922 1-D
19.3	Ecoli	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS:1622:1981Edi. 2.4(2003-05)
19.4	Enterococcus	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 15186 :2002
19.5	Salmonella	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 5887 (P-3)
19.6	Shigella	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 1887 (P-7)
19.7	Vibrio	/ml	Absent		Absent		Absent		Absent		Absent		Absent		IS : 5887 (P-5)



H. T. Shah

Lab Manager




Dr. Arun Bajpai

Lab Manager (Q)

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RESULTS OF ETP WATER OUTLET

SR. NO.	PARAMETERS	UNIT	RESULTS OF ETP WATER OUTLET						GPCB Limit	TEST METHOD
			03/10/2018	11/05/2018	04/12/2018	04/01/2019	05/02/2019	04/03/2019		
1	Colour	Co-pt	70	50	60	50	70	80	100	IS3025(P4)83Re.02
2	pH	--	7.1	7.52	8.4	7.3	8.1	7.45	6.5 TO 8.5	IS3025(P11)83Re.02
3	Temperature	°C	32.4	30.8	31.2	30.8	31.6	31.9	40	IS3025(P9)84Re.02
4	Total Suspended Solids	mg/L	34	25	39	52	72	64	100	IS3025(P17)84Re.02
5	Total Dissolved Solids	mg/L	1024	1712	1698	1318	1560	1921	2100	IS3025(P16)84Re.02
6	COD	mg/L	88	92	76	94	84	68	100	APHA(22 nd Edi) 5520-D Open Reflux
7	BOD (3 Days @ 27 °C)	mg/L	26	18	20	24	20	19	30	IS 3025 (P44)1993Re.03Edition2.1
8	Chloride as Cl	mg/L	429	510	529	399	489	596	600	IS3025(P32)88Re.99
9	Oil & Grease	mg/L	3.8	2.4	3.2	2.4	4	7.8	10	APHA(22 nd Edi)5520D
10	Sulphate as SO ₄	mg/L	72	110	98	112	156	172	1000	APHA(22 nd Edi)4500 SO ₄ E
11	Ammonical Nitrogen as NH ₃	mg/L	2.7	3.4	4.6	3.2	5.2	7.2	50	IS3025(P34)88Cla.2.3
12	Phenolic Compound	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	1	IS3025(P43)92Re.03
13	Copper as Cu	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	3	AAS APHA(22 nd Edi)3111 B
14	Lead as Pb	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	0.1	AAS APHA(22 nd Edi)3111 B
15	Sulphide as S	mg/L	1.8	1.4	1.1	1.4	1.8	1.2	2	APHA(22 nd Edi) 4500-S
16	Cadmium as Cd	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	2	AAS APHA(22 nd Edi)3111 B
17	Fluoride as F	mg/L	0.75	0.65	0.45	0.5	0.6	0.5	2	APHA(22 nd Edi) 4500 F D SPANDS

*Below detection limit



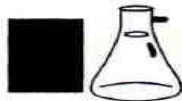
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**POLLUCON****LABORATORIES PVT. LTD.**Environmental Auditors, Consultants & Analysts.
Cleaner Production / Waste Minimization Facilitator

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RESULT OF AMBIENT AIR QUALITY MONITORING

ADANI PORT – T1 TERMINAL NR.MARINE BUILDING								
Sr. No	Date of Sampling	Particulate Matter (PM10) $\mu\text{g}/\text{m}^3$	Particulate Matter (PM 2.5) $\mu\text{g}/\text{m}^3$	Sulphur Dioxide (SO2) $\mu\text{g}/\text{m}^3$	Oxides of Nitrogen (NO2) $\mu\text{g}/\text{m}^3$	Carbon Monoxide as CO mg/m^3	Hydrocarbon as CH ₄ mg/m^3	Benzene as C ₆ H ₆ $\mu\text{g}/\text{m}^3$
1	02/10/2018	84.33	43.68	13.61	20.68	0.70	BDL*	BDL*
2	05/10/2018	92.48	57.62	21.29	42.31	0.41	BDL*	BDL*
3	09/10/2018	89.64	39.44	14.36	35.61	0.39	BDL*	BDL*
4	12/10/2018	72.66	29.46	16.42	30.44	0.33	BDL*	BDL*
5	16/10/2018	87.60	48.35	24.29	39.35	0.57	BDL*	BDL*
6	19/10/2018	79.45	37.40	10.44	38.26	0.31	BDL*	BDL*
7	23/10/2018	86.30	45.39	19.44	32.51	0.17	BDL*	BDL*
8	26/10/2018	97.29	59.24	17.55	43.24	0.72	BDL*	BDL*
9	30/10/2018	88.40	40.27	18.42	27.50	0.49	BDL*	BDL*
10	02/11/2018	88.55	38.64	14.30	23.51	0.31	BDL*	BDL*
11	06/11/2018	96.60	58.46	20.32	35.65	0.36	BDL*	BDL*
12	09/11/2018	78.56	37.57	11.56	29.26	0.22	BDL*	BDL*
13	13/11/2018	85.61	49.23	19.60	32.49	0.52	BDL*	BDL*
14	16/11/2018	73.92	31.56	13.60	24.26	0.48	BDL*	BDL*
15	19/11/2018	95.34	52.32	15.66	30.52	0.11	BDL*	BDL*
16	21/11/2018	84.38	35.35	18.48	36.63	0.34	BDL*	BDL*
17	26/11/2018	79.37	42.60	8.64	28.49	0.87	BDL*	BDL*
18	28/11/2018	90.41	39.34	12.52	33.60	0.27	BDL*	BDL*
19	03/12/2018	85.65	48.24	9.69	31.71	0.27	BDL*	BDL*
20	05/12/2018	97.52	42.64	14.54	27.73	0.46	BDL*	BDL*
21	10/12/2018	87.38	50.67	22.71	33.25	0.87	BDL*	BDL*
22	12/12/2018	79.44	34.36	12.31	39.39	0.70	BDL*	BDL*
23	17/12/2018	92.47	44.25	21.34	42.65	0.50	BDL*	BDL*
24	19/12/2018	86.58	57.39	20.39	35.92	0.82	BDL*	BDL*
25	24/12/2018	99.55	40.66	11.31	32.48	0.76	BDL*	BDL*
26	26/12/2018	87.39	37.57	25.61	40.25	0.96	BDL*	BDL*
27	31/12/2018	83.56	55.37	13.62	45.38	0.18	BDL*	BDL*
28	02/01/2019	92.66	57.55	23.42	45.76	0.63	BDL*	BDL*
29	07/01/2019	88.35	39.59	15.59	43.59	0.90	BDL*	BDL*
30	09/01/2019	98.30	42.31	12.50	35.83	1.00	BDL*	BDL*

Continue ...

H. T. Shah

Lab Manager



Dr. Arun Bajpai

Lab Manager (Q)

**RESULT OF AMBIENT AIR QUALITY MONITORING**

ADANI PORT – T1 TERMINAL NR. (MARINE BUILDING)								
Sr.No.	Date of Sampling	Particulate Matter (PM ₁₀) $\mu\text{g}/\text{m}^3$	Particulate Matter (PM _{2.5}) $\mu\text{g}/\text{m}^3$	Sulphur Dioxide (SO ₂) $\mu\text{g}/\text{m}^3$	Oxides of Nitrogen (NO ₂) $\mu\text{g}/\text{m}^3$	Carbon Monoxide as CO mg/m^3	Hydrocarbon as CH ₄ mg/m^3	Benzene as C ₆ H ₆ $\mu\text{g}/\text{m}^3$
31	15/01/2019	89.40	52.44	10.24	38.64	0.37	BDL*	BDL*
32	16/01/2019	96.32	48.20	22.45	32.49	1.02	BDL*	BDL*
33	21/01/2019	86.50	36.54	14.53	46.55	0.23	BDL*	BDL*
34	23/01/2019	99.53	58.38	27.52	39.49	0.81	BDL*	BDL*
35	28/01/2019	83.64	46.55	16.25	29.43	0.97	BDL*	BDL*
36	30/01/2019	95.43	54.30	24.80	36.29	1.10	BDL*	BDL*
37	04/02/2019	76.51	32.38	13.59	39.36	0.30	BDL*	BDL*
38	06/02/2019	81.53	44.53	16.74	37.67	0.54	BDL*	BDL*
39	11/02/2019	94.37	56.48	19.88	43.45	0.74	BDL*	BDL*
40	13/02/2019	84.64	50.26	8.64	36.83	0.50	BDL*	BDL*
41	18/02/2019	90.58	33.20	11.26	38.65	0.78	BDL*	BDL*
42	20/02/2019	95.32	53.43	22.43	35.47	0.61	BDL*	BDL*
43	25/02/2019	74.60	41.65	12.48	24.27	0.93	BDL*	BDL*
44	27/02/2019	91.64	49.19	25.67	33.50	0.69	BDL*	BDL*
45	04/03/2019	77.51	42.43	22.73	36.48	0.60	BDL*	BDL*
46	06/03/2019	84.37	36.79	12.58	44.26	0.49	BDL*	BDL*
47	11/03/2019	74.36	38.23	18.22	41.63	0.39	BDL*	BDL*
48	13/03/2019	92.49	56.28	20.55	38.68	0.78	BDL*	BDL*
49	18/03/2019	69.46	32.42	15.30	35.38	0.23	BDL*	BDL*
50	20/03/2019	86.27	44.29	24.20	39.55	0.48	BDL*	BDL*
51	25/03/2019	78.30	40.25	13.64	25.41	0.63	BDL*	BDL*
52	27/03/2019	81.21	46.18	27.20	45.39	0.52	BDL*	BDL*
	TEST METHOD	IS:5182(Part 23):Gravimetric CPCB - Method (Vol.I,May-2011)	Gravimetric-CPCB - Method (Vol.I,May-2011)	IS:5182(Part II):Improved West and Gaeke	IS:5182(Part VI):Modified Jacob & Hochheiser (NaOH-NaAsO ₂)	NDIR Digital Gas Analyzer	SOP: HC: GC/GCMS/Gas analyzer	IS 5182 (Part XI):2006/CPCB Method

*Below detection limit

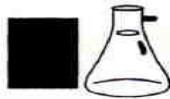
H. T. Shah

Lab Manager



Dr. Arun Bajpai

Lab Manager (Q)



RESULT OF AMBIENT AIR QUALITY MONITORING

NEAR FIRE STATION								
Sr. No.	Date of Sampling	Particulate Matter (PM10) $\mu\text{g}/\text{m}^3$	Particulate Matter (PM 2.5) $\mu\text{g}/\text{m}^3$	Sulphur Dioxide (SO2) $\mu\text{g}/\text{m}^3$	Oxides of Nitrogen (NO2) $\mu\text{g}/\text{m}^3$	Carbon Monoxide as CO mg/m^3	Hydrocarbon as CH ₄ mg/m^3	Benzene as C ₆ H ₆ $\mu\text{g}/\text{m}^3$
1	02/10/2018	89.34	47.50	26.40	36.30	0.79	BDL*	BDL*
2	05/10/2018	97.69	50.58	14.61	33.49	0.62	BDL*	BDL*
3	09/10/2018	84.65	36.56	21.62	39.37	0.23	BDL*	BDL*
4	12/10/2018	79.35	33.44	11.60	26.46	0.52	BDL*	BDL*
5	16/10/2018	80.30	39.46	20.61	25.62	0.63	BDL*	BDL*
6	19/10/2018	93.67	45.63	18.39	41.32	0.45	BDL*	BDL*
7	23/10/2018	77.34	30.36	10.37	30.32	0.38	BDL*	BDL*
8	26/10/2018	92.63	53.57	24.25	37.20	0.90	BDL*	BDL*
9	30/10/2018	82.46	34.56	16.36	24.42	0.36	BDL*	BDL*
10	02/11/2018	82.31	36.74	12.98	18.49	0.21	BDL*	BDL*
11	06/11/2018	91.53	48.35	18.29	30.25	0.55	BDL*	BDL*
12	09/11/2018	89.32	40.58	16.35	34.62	0.46	BDL*	BDL*
13	13/11/2018	78.42	39.63	10.56	20.63	0.41	BDL*	BDL*
14	16/11/2018	85.72	35.66	17.52	28.76	0.45	BDL*	BDL*
15	19/11/2018	67.93	41.20	7.52	24.67	0.24	BDL*	BDL*
16	21/11/2018	57.81	24.50	8.52	32.37	0.53	BDL*	BDL*
17	26/11/2018	83.55	45.66	21.64	36.77	0.73	BDL*	BDL*
18	28/11/2018	61.33	23.64	19.22	27.51	0.47	BDL*	BDL*
19	03/12/2018	96.35	55.70	14.35	36.29	0.69	BDL*	BDL*
20	05/12/2018	79.66	33.89	17.64	25.53	0.30	BDL*	BDL*
21	10/12/2018	82.41	37.65	20.41	22.53	0.60	BDL*	BDL*
22	12/12/2018	92.39	53.56	16.67	29.48	0.53	BDL*	BDL*
23	17/12/2018	65.68	30.62	25.59	35.81	0.89	BDL*	BDL*
24	19/12/2018	80.47	42.85	23.46	30.35	0.78	BDL*	BDL*
25	24/12/2018	68.64	29.51	22.45	28.25	0.62	BDL*	BDL*
26	26/12/2018	91.18	51.20	10.51	38.29	0.57	BDL*	BDL*
27	31/12/2018	89.48	36.53	7.58	34.42	0.36	BDL*	BDL*
28	02/01/2019	74.69	46.32	26.55	40.53	0.98	BDL*	BDL*
29	07/01/2019	68.37	29.46	17.61	32.36	0.65	BDL*	BDL*
30	09/01/2019	78.50	35.37	23.58	28.65	0.72	BDL*	BDL*

Continue ...

H. T. Shah

Lab Manager



Dr. Arun Bajpai

Lab Manager (Q)

**RESULT OF AMBIENT AIR QUALITY MONITORING**

NEAR FIRE STATION								
Sr.N o.	Date of Sampling	Particulate Matter (PM ₁₀) $\mu\text{g}/\text{m}^3$	Particulate Matter (PM _{2.5}) $\mu\text{g}/\text{m}^3$	Sulphur Dioxide (SO ₂) $\mu\text{g}/\text{m}^3$	Oxides of Nitrogen (NO ₂) $\mu\text{g}/\text{m}^3$	Carbon Monoxide as CO mg/m^3	Hydrocarbon as CH ₄ mg/m^3	Benzene as C ₆ H ₆ $\mu\text{g}/\text{m}^3$
31	15/01/2019	85.60	48.62	19.31	41.26	0.87	BDL*	BDL*
32	16/01/2019	91.57	42.65	20.48	35.64	0.70	BDL*	BDL*
33	21/01/2019	60.43	24.50	8.68	38.54	0.45	BDL*	BDL*
34	23/01/2019	72.13	45.66	10.48	31.24	0.71	BDL*	BDL*
35	28/01/2019	67.50	36.32	18.20	25.50	0.44	BDL*	BDL*
36	30/01/2019	90.27	50.25	21.31	29.49	0.78	BDL*	BDL*
37	04/02/2019	54.78	23.55	7.58	32.49	0.60	BDL*	BDL*
38	06/02/2019	60.44	30.50	19.51	27.57	0.46	BDL*	BDL*
39	11/02/2019	86.36	52.23	24.57	37.57	0.97	BDL*	BDL*
40	13/02/2019	78.68	45.66	16.24	29.86	1.05	BDL*	BDL*
41	18/02/2019	69.34	28.43	15.61	24.35	0.87	BDL*	BDL*
42	20/02/2019	82.37	46.53	14.41	31.78	1.01	BDL*	BDL*
43	25/02/2019	59.81	31.49	18.59	21.28	0.52	BDL*	BDL*
44	27/02/2019	66.30	38.39	11.56	40.26	0.98	BDL*	BDL*
45	04/03/2019	73.28	39.55	19.19	40.30	0.50	BDL*	BDL*
46	06/03/2019	63.47	29.67	17.07	28.45	0.66	BDL*	BDL*
47	11/03/2019	55.35	26.78	21.26	38.75	0.36	BDL*	BDL*
48	13/03/2019	86.46	51.45	25.49	43.47	0.74	BDL*	BDL*
49	18/03/2019	51.44	20.46	8.68	25.32	0.44	BDL*	BDL*
50	20/03/2019	75.32	34.26	16.39	33.31	0.78	BDL*	BDL*
51	25/03/2019	58.68	27.36	20.57	22.50	0.39	BDL*	BDL*
52	27/03/2019	62.81	30.54	12.87	39.53	0.76	BDL*	BDL*
	TEST METHOD	IS:5182(Part 23):Gravimetric CPCB - Method (Vol.I,May-2011)	Gravimetric-CPCB - Method (Vol.I,May-2011)	IS:5182(Part II):Improved West and Gaeke	IS:5182(Part VI):Modified Jacob & Hochheiser (NaOH-NaAsO ₂)	NDIR Digital Gas Analyzer	SOP: HC: GC/GCMS/Gas analyzer	IS 5182 (Part XI):2006/CPCB Method

*Below detection limit

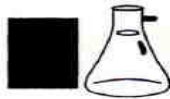
H. T. Shah

Lab Manager



Dr. Arun Bajpai

Lab Manager (Q)



RESULT OF AMBIENT AIR QUALITY MONITORING

ADANI HOUSE								
Sr. No.	Date of Sampling	Particulate Matter (PM10) $\mu\text{g}/\text{m}^3$	Particulate Matter (PM 2.5) $\mu\text{g}/\text{m}^3$	Sulphur Dioxide (SO2) $\mu\text{g}/\text{m}^3$	Oxides of Nitrogen (NO2) $\mu\text{g}/\text{m}^3$	Carbon Monoxide as CO mg/m^3	Hydrocarbon as CH ₄ mg/m^3	Benzene as C ₆ H ₆ $\mu\text{g}/\text{m}^3$
1	02/10/2018	62.57	31.51	18.73	24.53	0.40	BDL*	BDL*
2	05/10/2018	84.35	44.38	11.35	29.67	0.55	BDL*	BDL*
3	09/10/2018	79.63	35.34	16.22	31.22	0.20	BDL*	BDL*
4	12/10/2018	57.24	27.55	13.52	22.43	0.46	BDL*	BDL*
5	16/10/2018	72.80	38.44	10.83	30.58	0.41	BDL*	BDL*
6	19/10/2018	67.89	30.42	8.65	25.69	0.26	BDL*	BDL*
7	23/10/2018	58.64	23.50	12.37	19.40	0.33	BDL*	BDL*
8	26/10/2018	71.58	38.63	15.62	26.19	0.50	BDL*	BDL*
9	30/10/2018	65.65	29.38	9.61	20.60	0.22	BDL*	BDL*
10	02/11/2018	63.77	27.26	7.64	16.26	0.14	BDL*	BDL*
11	06/11/2018	80.35	43.62	12.46	20.25	0.33	BDL*	BDL*
12	09/11/2018	70.43	33.23	6.81	23.70	0.17	BDL*	BDL*
13	13/11/2018	69.32	30.45	8.46	18.64	0.50	BDL*	BDL*
14	16/11/2018	56.38	23.51	11.37	22.48	0.29	BDL*	BDL*
15	21/11/2018	53.45	20.65	13.47	26.83	0.42	BDL*	BDL*
16	26/11/2018	73.64	39.29	16.50	19.53	0.64	BDL*	BDL*
17	28/11/2018	58.42	26.88	17.26	21.24	0.37	BDL*	BDL*
18	03/12/2018	80.24	44.50	6.56	25.71	0.39	BDL*	BDL*
19	05/12/2018	68.32	29.36	19.59	21.60	0.21	BDL*	BDL*
20	10/12/2018	76.34	31.67	13.64	18.65	0.33	BDL*	BDL*
21	12/12/2018	61.25	38.82	10.19	24.61	0.44	BDL*	BDL*
22	17/12/2018	58.35	24.35	8.92	27.60	0.61	BDL*	BDL*
23	19/12/2018	89.32	48.62	12.48	20.37	0.56	BDL*	BDL*
24	24/12/2018	63.57	24.69	17.55	17.69	0.65	BDL*	BDL*
25	26/12/2018	82.68	46.31	14.46	22.68	0.73	BDL*	BDL*
26	31/12/2018	67.87	31.29	9.56	30.23	0.48	BDL*	BDL*
27	02/01/2019	65.56	37.35	9.64	30.34	0.77	BDL*	BDL*
28	07/01/2019	76.51	34.58	11.41	27.70	0.57	BDL*	BDL*
29	09/01/2019	69.32	30.75	18.67	20.46	0.85	BDL*	BDL*
30	15/01/2019	70.20	39.63	7.54	15.63	0.38	BDL*	BDL*

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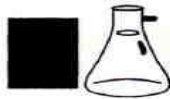
H. T. Shah

Lab Manager



Dr. Arun Bajpai

Lab Manager (Q)



RESULT OF AMBIENT AIR QUALITY MONITORING

ADANI HOUSE								
Sr. No.	Date of Sampling	Particulate Matter (PM10) $\mu\text{g}/\text{m}^3$	Particulate Matter (PM 2.5) $\mu\text{g}/\text{m}^3$	Sulphur Dioxide (SO2) $\mu\text{g}/\text{m}^3$	Oxides of Nitrogen (NO2) $\mu\text{g}/\text{m}^3$	Carbon Monoxide as CO mg/m^3	Hydrocarbon as CH ₄ mg/m^3	Benzene as C ₆ H ₆ $\mu\text{g}/\text{m}^3$
31	16/01/2019	81.27	32.56	13.61	23.92	0.66	BDL*	BDL*
32	21/01/2019	74.35	29.57	10.41	33.55	0.55	BDL*	BDL*
33	23/01/2019	91.39	51.53	8.51	24.72	0.36	BDL*	BDL*
34	28/01/2019	62.34	27.51	14.41	17.66	0.50	BDL*	BDL*
35	30/01/2019	85.45	33.57	19.30	26.62	0.41	BDL*	BDL*
36	04/02/2019	62.47	26.37	10.36	28.69	0.84	BDL*	BDL*
37	06/02/2019	70.53	37.52	13.37	23.74	0.73	BDL*	BDL*
38	11/02/2019	54.68	22.38	16.50	25.49	0.40	BDL*	BDL*
39	13/02/2019	63.59	34.24	19.38	18.69	0.65	BDL*	BDL*
40	18/02/2019	58.64	24.86	17.53	17.60	1.09	BDL*	BDL*
41	20/02/2019	76.49	33.48	11.36	22.70	0.48	BDL*	BDL*
42	25/02/2019	53.40	23.43	15.19	29.27	0.76	BDL*	BDL*
43	27/02/2019	84.28	45.30	7.54	26.54	0.47	BDL*	BDL*
44	04/03/2019	65.65	35.33	14.52	33.49	0.64	BDL*	BDL*
45	06/03/2019	54.35	25.62	21.54	21.75	0.82	BDL*	BDL*
46	11/03/2019	66.24	33.69	15.65	24.40	0.53	BDL*	BDL*
47	13/03/2019	50.22	23.47	18.39	28.52	0.26	BDL*	BDL*
48	18/03/2019	56.86	27.55	11.85	32.50	0.62	BDL*	BDL*
49	20/03/2019	70.42	41.22	12.36	25.79	0.33	BDL*	BDL*
50	25/03/2019	51.28	24.52	17.50	34.57	0.54	BDL*	BDL*
51	27/03/2019	75.59	39.62	8.91	29.50	0.34	BDL*	BDL*
	TEST METHOD	IS:5182(Part 23):Gravimetric CPCB - Method (Vol.I,May-2011)	Gravimetric-CPCB - Method (Vol.I,May-2011)	IS:5182(Part II):Improved West and Gaeke	IS:5182(Part VI):Modified Jacob & Hochheiser (NaOH-NaAsO2)	NDIR Digital Gas Analyzer	SOP: HC: GC/GCMS/Gas analyzer	IS 5182 (Part XI):2006/CPCB Method

*Below detection limit

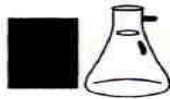
H. T. Shah

Lab Manager



Dr. Arun Bajpai

Lab Manager (Q)

**RESULT OF AMBIENT AIR QUALITY MONITORING**

CT-3 DG HOUSE								
Sr.N o.	Date of Sampling	Particulate Matter (PM10) $\mu\text{g}/\text{m}^3$	Particulate Matter (PM 2.5) $\mu\text{g}/\text{m}^3$	Sulphur Dioxide (SO2) $\mu\text{g}/\text{m}^3$	Oxides of Nitrogen (NO2) $\mu\text{g}/\text{m}^3$	Carbon Monoxide as CO mg/m^3	Hydrocarbon as CH ₄ mg/m^3	Benzene as C ₆ H ₆ $\mu\text{g}/\text{m}^3$
1	02/10/2018	71.67	26.35	15.66	28.39	0.53	BDL*	BDL*
2	05/10/2018	63.62	38.23	19.61	37.34	0.29	BDL*	BDL*
3	09/10/2018	75.64	33.71	11.66	26.32	0.57	BDL*	BDL*
4	12/10/2018	50.32	20.45	8.28	18.35	0.42	BDL*	BDL*
5	16/10/2018	65.70	30.50	12.41	34.55	0.50	BDL*	BDL*
6	19/10/2018	57.40	27.35	16.21	21.31	0.22	BDL*	BDL*
7	23/10/2018	68.20	41.62	6.56	24.70	0.26	BDL*	BDL*
8	26/10/2018	85.46	50.32	13.32	29.36	0.69	BDL*	BDL*
9	30/10/2018	73.38	25.68	10.24	16.37	0.50	BDL*	BDL*
10	02/11/2018	73.41	40.26	8.40	13.59	0.40	BDL*	BDL*
11	06/11/2018	85.32	45.44	11.45	23.61	0.44	BDL*	BDL*
12	09/11/2018	54.62	26.44	14.54	17.58	0.15	BDL*	BDL*
13	13/11/2018	64.31	35.26	20.22	28.40	0.31	BDL*	BDL*
14	16/11/2018	50.35	20.40	6.62	14.65	0.25	BDL*	BDL*
15	19/11/2018	86.12	48.66	18.57	35.26	0.18	BDL*	BDL*
16	21/11/2018	75.86	31.62	15.45	30.62	0.30	BDL*	BDL*
17	26/11/2018	69.43	38.44	19.29	25.51	0.57	BDL*	BDL*
18	28/11/2018	79.63	34.51	9.63	19.67	0.66	BDL*	BDL*
19	03/12/2018	60.76	31.66	12.66	20.84	0.23	BDL*	BDL*
20	05/12/2018	81.62	34.64	9.27	17.63	0.58	BDL*	BDL*
21	10/12/2018	70.60	29.42	18.85	30.45	0.47	BDL*	BDL*
22	12/12/2018	55.90	42.87	6.55	36.55	0.80	BDL*	BDL*
23	17/12/2018	85.78	39.39	13.69	31.61	0.55	BDL*	BDL*
24	19/12/2018	93.82	53.63	10.68	26.39	0.66	BDL*	BDL*
25	24/12/2018	88.60	37.28	8.62	21.66	0.52	BDL*	BDL*
26	26/12/2018	77.17	33.44	16.61	32.60	0.86	BDL*	BDL*
27	31/12/2018	94.32	52.47	19.51	38.46	0.26	BDL*	BDL*
28	02/01/2019	98.69	51.52	15.40	35.33	0.69	BDL*	BDL*
29	07/01/2019	82.58	36.46	7.22	39.28	1.03	BDL*	BDL*
30	09/01/2019	92.38	46.84	9.21	24.57	0.64	BDL*	BDL*

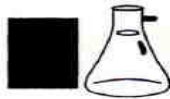
H. T. Shah

Lab Manager



Dr. Arun Bajpai

Lab Manager (Q)



RESULT OF AMBIENT AIR QUALITY MONITORING

CT-3 DG HOUSE								
Sr.N o.	Date of Sampling	Particulate Matter (PM10) $\mu\text{g}/\text{m}^3$	Particulate Matter (PM 2.5) $\mu\text{g}/\text{m}^3$	Sulphur Dioxide (SO2) $\mu\text{g}/\text{m}^3$	Oxides of Nitrogen (NO2) $\mu\text{g}/\text{m}^3$	Carbon Monoxide as CO mg/m^3	Hydrocarbon as CH ₄ mg/m^3	Benzene as C ₆ H ₆ $\mu\text{g}/\text{m}^3$
31	15/01/2019	76.30	56.32	13.38	21.60	0.29	BDL*	BDL*
32	16/01/2019	85.32	38.24	11.35	29.25	0.86	BDL*	BDL*
33	21/01/2019	79.66	33.64	23.37	42.71	0.32	BDL*	BDL*
34	23/01/2019	87.64	55.74	16.34	36.89	1.07	BDL*	BDL*
35	28/01/2019	75.60	42.17	21.59	40.35	0.74	BDL*	BDL*
36	30/01/2019	80.47	39.31	20.36	33.33	0.42	BDL*	BDL*
37	04/02/2019	69.64	29.50	20.40	37.40	0.41	BDL*	BDL*
38	06/02/2019	75.62	40.55	6.61	32.65	0.96	BDL*	BDL*
39	11/02/2019	59.32	34.51	13.64	29.51	0.85	BDL*	BDL*
40	13/02/2019	94.53	55.49	11.58	43.90	0.37	BDL*	BDL*
41	18/02/2019	80.96	36.46	8.78	20.43	0.90	BDL*	BDL*
42	20/02/2019	72.68	30.66	18.42	28.33	0.55	BDL*	BDL*
43	25/02/2019	66.25	33.56	21.57	33.73	0.94	BDL*	BDL*
44	27/02/2019	76.83	39.48	14.18	30.29	0.89	BDL*	BDL*
45	04/03/2019	85.32	49.45	10.49	27.52	0.56	BDL*	BDL*
46	06/03/2019	74.82	32.44	7.65	23.47	0.71	BDL*	BDL*
47	11/03/2019	67.63	30.42	23.43	36.48	0.62	BDL*	BDL*
48	13/03/2019	55.68	33.68	15.70	32.52	0.69	BDL*	BDL*
49	18/03/2019	62.49	24.37	21.37	42.50	0.32	BDL*	BDL*
50	20/03/2019	90.41	39.39	19.49	30.56	0.44	BDL*	BDL*
51	25/03/2019	83.32	44.24	24.26	38.37	0.74	BDL*	BDL*
52	27/03/2019	69.45	35.46	16.25	34.33	0.55	BDL*	BDL*
	TEST METHOD	IS:5182(Part 23):Gravimetric CPCB - Method (Vol.I,May-2011)	Gravimetric-CPCB - Method (Vol.I,May-2011)	IS:5182(Part II):Improved West and Gaeke	IS:5182(Part VI):Modified Jacob & Hochheiser (NaOH-NaAsO ₂)	NDIR Digital Gas Analyzer	SOP: HC: GC/GCMS/Gas analyzer	IS 5182 (Part XI):2006/CPCB Method

*Below detection limit

H. T. Shah

Lab Manager



Dr. Arun Bajpai

Lab Manager (Q)

**RESULTS OF NOISE LEVEL MONITORING****Result of Noise level monitoring [Day Time]**

SR. NO.	Name of Location	T1 TERMINAL NR.MARINE BUILDING					
		Result [Leq dB(A)]					
	Sampling Date & Time	16/10/2018	16/11/2018	14/12/2018	04/01/2019	25/02/2019	18/03/2019
1	6:00-7:00	67.2	67.3	63.1	68.4	65.8	68.1
2	7:00-8:00	66.5	66.4	68.7	65.2	69.4	62.8
3	8:00-9:00	63.9	62.4	69.1	66.8	61.4	63.4
4	9:00-10:00	66.5	64.5	62.8	70.2	62.5	69.9
5	10:00-11:00	61.7	61.6	65.8	62.8	68.4	72.4
6	11:00-12:00	66.2	64.3	70.4	68.3	65.2	74.1
7	12:00-13:00	68.7	65.7	69.7	63.7	60.4	70.1
8	13:00-14:00	70.6	68.2	65.7	62.9	67.4	66.4
9	14:00-15:00	71.9	72.5	63.1	68.5	63.4	68.4
10	15:00-16:00	70.3	67.9	62.8	65.1	62.4	62.8
11	16:00-17:00	62.3	62.9	68.4	70.3	68.1	65.6
12	17:00-18:00	64.7	65.6	65.5	71.8	61.4	68.8
13	18:00-19:00	64.6	64.6	69.1	69.4	60.8	64.1
14	19:00-20:00	63.6	65.7	62.8	62.8	69.4	63.4
15	20:00-21:00	64.9	67.7	65.0	65.1	70.6	68.9
16	21:00-22:00	70.1	73.0	66.7	62.5	72.4	66.8
Day Time Limit*		75 Leq dB(A)					

Result of Noise level monitoring [Night Time]

SR. NO.	Name of Location	T1 TERMINAL NR.MARINE BUILDING					
		Result [Leq dB(A)]					
	Sampling Date & Time	16/10/2018 & 17/10/2018	16/11/2018 & 17/11/2018	14/12/2018 & 15/12/2018	04/01/2019 & 05/01/2019	25/02/2019 & 26/02/2019	18/03/2019 & 19/03/2019
1							
2	22:00-23:00	69.5	67.8	63.8	63.1	63.1	65.1
3	23:00-00:00	66.5	64.4	65.7	61.8	65.3	60.8
4	00:00-01:00	64.4	66.9	64.1	65.1	66.3	68.4
5	01:00-02:00	61.9	61.6	62.8	68.7	62.4	67.4
6	02:00-03:00	58.3	60.8	63.7	65.4	62.7	68.4
7	03:00-04:00	66.1	65.6	63.9	62.9	68.3	65.1
8	04:00-05:00	62.8	60.8	69.8	69.4	65.3	62.5
9	05:00-06:00	64.7	66.6	62.7	68.5	66.2	66.1
Night Time Limit*		70 Leq dB(A)					

H. T. Shah

Lab Manager



Dr. Arun Bajpai

Lab Manager (Q)



RESULTS OF NOISE LEVEL MONITORING

Result of Noise level monitoring [Day Time]

SR. NO.	Name of Location	NEAR FIRE STATION					
		Result [Leq dB(A)]					
	Sampling Date & Time	12/10/2018	20/11/2018	04/12/2018	16/01/2019	04/02/2019	11/03/2019
1	6:00-7:00	62.0	62.3	65.4	62.5	68.4	68.1
2	7:00-8:00	63.8	61.2	66.3	68.4	62.1	62.7
3	8:00-9:00	69.2	69.3	66.9	72.4	65.4	65.1
4	9:00-10:00	67.5	69.1	67.4	74.1	73.1	65.9
5	10:00-11:00	63.4	62.5	63.2	70.4	64.1	68.2
6	11:00-12:00	61.8	64.5	62.4	69.9	68.1	63.7
7	12:00-13:00	68.1	70.7	67.4	63.4	62.4	65.4
8	13:00-14:00	62.5	61.7	65.3	60.4	68.4	62.8
9	14:00-15:00	61.1	61.5	62.5	62.4	62.4	69.1
10	15:00-16:00	67.1	64.9	68.4	64.5	69.4	67.1
11	16:00-17:00	69.0	71.4	68.3	65.1	61.4	63.4
12	17:00-18:00	67.7	67.2	68.7	63.4	60.4	69.1
13	18:00-19:00	64.6	65.4	64.3	62.5	62.7	71.1
14	19:00-20:00	64.7	66.3	62.7	63.4	68.4	68.1
15	20:00-21:00	65.2	63.3	65.8	65.2	64.3	65.2
16	21:00-22:00	61.4	64.5	63.6	66.8	61.5	68.1
Day Time Limit*		75 Leq dB(A)					

Result of Noise level monitoring [Night Time]

SR. NO.	Name of Location	NEAR FIRE STATION					
		Result [Leq dB(A)]					
	Sampling Date & Time	12/10/2018 & 13/10/2018	20/11/2018 & 21/11/2018	04/12/2018 & 05/12/2018	16/01/2019 & 17/01/2019	04/02/2019 & 05/02/2019	11/03/2019 & 12/03/2019
1							
2	22:00-23:00	68.0	68.4	64.1	63.2	67.3	65.1
3	23:00-00:00	59.8	60.1	63.4	59.4	64.2	68.7
4	00:00-01:00	67.6	66.3	62.1	60.3	65.3	59.4
5	01:00-02:00	60.8	59.6	60.4	60.3	62.1	60.8
6	02:00-03:00	62.8	65.8	68.4	65.3	67.3	63.1
7	03:00-04:00	65.6	65.1	63.4	62.3	66.3	62.4
8	04:00-05:00	64.9	67.5	65.4	60.2	63.9	60.4
9	05:00-06:00	60.8	58.7	67.1	62.4	61.5	60.8
Night Time Limit*		70 Leq dB(A)					

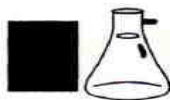
H. T. Shah

Lab Manager



Dr. Arun Bajpai

Lab Manager (Q)



RESULTS OF NOISE LEVEL MONITORING

Result of Noise level monitoring [Day Time]

SR. NO.	Name of Location	ADANI HOUSE					
		Result [Leq dB(A)]					
		02/10/2018	13/11/2018	18/12/2018	02/01/2019	15/02/2019	01/03/2019
1	6:00-7:00	65.0	62.6	60.3	60.3	62.5	65.4
2	7:00-8:00	67.7	68.1	63.4	63.4	68.4	62.8
3	8:00-9:00	67.1	68.7	62.3	62.3	68.1	68.1
4	9:00-10:00	73.0	71.8	67.4	67.4	63.4	72.1
5	10:00-11:00	72.4	71.3	65.6	65.6	72.4	71.5
6	11:00-12:00	64.6	62.8	68.4	68.4	70.4	69.4
7	12:00-13:00	60.3	59.5	70.4	70.4	70.9	65.2
8	13:00-14:00	65.5	69.0	65.3	65.3	68.1	62.8
9	14:00-15:00	64.4	67.4	69.4	69.4	62.4	62.8
10	15:00-16:00	62.5	65.3	69.7	69.7	65.1	62.1
11	16:00-17:00	71.1	72.8	67.3	67.3	62.8	65.1
12	17:00-18:00	69.9	72.0	65.3	65.3	66.8	69.1
13	18:00-19:00	70.9	70.0	63.8	63.8	69.4	63.4
14	19:00-20:00	63.1	60.9	64.3	64.3	62.1	65.1
15	20:00-21:00	57.9	56.0	67.4	67.4	68.4	61.8
16	21:00-22:00	64.9	62.4	63.8	63.8	68.2	60.4
Day Time Limit*		75 Leq dB(A)					

Result of Noise level monitoring [Night Time]

SR. NO.	Name of Location	ADANI HOUSE					
		Result [Leq dB(A)]					
		02/10/2018 & 03/10/2018	13/11/2018 & 14/11/2018	18/12/2018 & 19/12/2018	02/01/2019 & 03/01/2019	15/02/2019 & 16/02/2019	01/03/2019 & 02/03/2019
1	Sampling Date & Time						
2	22:00-23:00	67.8	69.5	60.4	67.4	60.4	62.5
3	23:00-00:00	66.8	64.4	65.1	68.3	65.1	65.1
4	00:00-01:00	64.3	66.8	65.4	63.2	65.4	65.7
5	01:00-02:00	63.8	64.0	61.8	60.1	61.8	60.8
6	02:00-03:00	62.3	61.2	63.4	60.4	63.4	60.7
7	03:00-04:00	62.0	61.2	62.4	62.4	62.4	62.4
8	04:00-05:00	61.3	60.1	65.7	65.3	65.7	58.1
9	05:00-06:00	61.3	63.8	67.1	63.6	67.1	61.8
Night Time Limit*		70 Leq dB(A)					

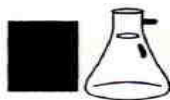
H. T. Shah

Lab Manager



Dr. Arun Bajpai

Lab Manager (Q)



RESULTS OF NOISE LEVEL MONITORING

Result of Noise level monitoring [Day Time]

SR. NO.	Name of Location	CT-3 DG HOUSE					
		Result [Leq dB(A)]					
	Sampling Date & Time	05/10/2018	23/11/2018	21/12/2018	10/01/2019	27/02/2019	07/03/2019
1	6:00-7:00	56.7	56.0	58.1	62.7	58.4	61.2
2	7:00-8:00	59.2	59.2	60.1	65.2	60.4	68.7
3	8:00-9:00	62.2	65.1	59.7	61.4	69.7	65.2
4	9:00-10:00	65.4	66.7	63.4	60.8	64.0	64.3
5	10:00-11:00	66.1	67.3	65.7	65.2	61.5	63.8
6	11:00-12:00	65.3	65.6	69.7	63.1	62.4	69.9
7	12:00-13:00	69.1	71.3	65.1	61.8	61.8	62.7
8	13:00-14:00	69.8	71.4	62.4	65.9	64.7	62.3
9	14:00-15:00	64.3	65.6	68.7	68.2	62.8	65.1
10	15:00-16:00	61.8	62.5	68.4	67.4	61.8	65.4
11	16:00-17:00	65.4	67.4	67.1	64.3	63.4	65.3
12	17:00-18:00	66.8	64.5	65.8	63.5	61.8	68.1
13	18:00-19:00	60.8	62.2	63.8	65.5	67.4	64.2
14	19:00-20:00	64.7	62.1	66.1	66.1	61.9	62.8
15	20:00-21:00	59.2	62.5	69.1	61.4	65.1	65.1
16	21:00-22:00	67.0	67.5	65.8	65.2	62.4	63.4
Day Time Limit*		75 Leq dB(A)					

Result of Noise level monitoring [Night Time]

SR. NO.	Name of Location	CT-3 DG HOUSE					
		Result [Leq dB(A)]					
	Sampling Date & Time	05/10/2018 & 06/10/2018	23/11/2018 & 24/11/2018	21/12/2018 & 22/12/2018	10/01/2019 & 11/01/2019	27/02/2019 & 28/02/2019	07/03/2019 & 08/03/2019
1	22:00-23:00	62.0	60.9	68.7	65.1	65.1	63.1
2	23:00-00:00	64.7	66.9	65.1	59.8	59.8	68.4
3	00:00-01:00	58.7	60.5	62.8	57.4	57.4	64.1
4	01:00-02:00	64.5	66.3	68.4	60.4	60.4	60.4
5	02:00-03:00	63.2	66.0	64.9	61.4	61.4	62.8
6	03:00-04:00	66.3	66.0	69.1	58.7	58.7	64.7
7	04:00-05:00	66.1	67.7	67.5	58.1	58.1	66.1
8	05:00-06:00	59.0	58.2	68.2	60.4	60.4	63.7
Night Time Limit*		70 Leq dB(A)					

H. T. Shah

Lab Manager



Dr. Arun Bajpai

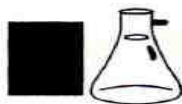
Lab Manager (Q)

**RESULT OF STACK MONITORING**

SR NO	TEST PARAMETERS	UNIT	STD. LIMIT	THERMIC FLUID HEATER (BITUMEN-01)	THERMIC FLUID HEATER (BITUMEN-02)	HOT WATER SYSTEM-1	HOT WATER SYSTEM-2	TEST METHOD
OCTOBER 2018								
1	Particulate Matter	mg/Nm ³	150	19.37	--	16.83	--	IS:11255 (Part-I):1985
2	Sulfur dioxide	ppm	100	3.94	--	5.91	--	IS:11255 (Part-II):1985
3	Oxides of Nitrogen	ppm	50	23.70	--	34.60	--	IS:11255 (Part-VII):2005
NOVEMBER 2018								
1	Particulate Matter	mg/Nm ³	150	23.54	--	19.63	14.28	IS:11255 (Part-I):1985
2	Sulfur dioxide	ppm	100	2.93	--	6.68	4.86	IS:11255 (Part-II):1985
3	Oxides of Nitrogen	ppm	50	28.49	--	39.45	32.79	IS:11255 (Part-VII):2005
DECEMBER 2018								
1	Particulate Matter	mg/Nm ³	150	20.40	--	16.38	--	IS:11255 (Part-I):1985
2	Sulfur dioxide	ppm	100	3.89	--	5.44	--	IS:11255 (Part-II):1985
3	Oxides of Nitrogen	ppm	50	31.19	--	35.67	--	IS:11255 (Part-VII):2005
JANUARY 2019								
1	Particulate Matter	mg/Nm ³	150	24.57	--	--	18.33	IS:11255 (Part-I):1985
2	Sulfur dioxide	ppm	100	4.70	--	--	5.67	IS:11255 (Part-II):1985
3	Oxides of Nitrogen	ppm	50	34.60	--	--	38.27	IS:11255 (Part-VII):2005
FEBRUARY 2019								
1	Particulate Matter	mg/Nm ³	150	18.75	16.51	20.62	--	IS:11255 (Part-I):1985
2	Sulfur dioxide	ppm	100	5.22	4.81	6.60	--	IS:11255 (Part-II):1985
3	Oxides of Nitrogen	ppm	50	32.35	28.65	38.65	--	IS:11255 (Part-VII):2005
MARCH 2019								
1	Particulate Matter	mg/Nm ³	150	16.83	--	24.62	--	IS:11255 (Part-I):1985
2	Sulfur dioxide	ppm	100	4.64	--	5.66	--	IS:11255 (Part-II):1985
3	Oxides of Nitrogen	ppm	50	30.44	--	35.59	--	IS:11255 (Part-VII):2005

*Below detection limit

Results on 11 % O₂ Correction when Oxygen is greater than 11 %. And 12% CO₂ correction when CO₂ is less than 12%**H. T. Shah****Lab Manager****Dr. Arun Bajpai****Lab Manager (Q)**

**POLLUCON**

LABORATORIES PVT. LTD.

Environmental Auditors, Consultants & Analysts.
Cleaner Production / Waste Minimization Facilitator

Recognised by MoEF, New Delhi Under Sec. 12 of Environmental (Protection) Act-1986

Minimum Detection Limit [MDL]

Ambient Air Parameters		
Sr. No.	Test Parameter	MDL
1	Particulate Matter (PM ₁₀) (µg/m ³)	10
2	Particulate Matter (PM 2.5) (µg/m ³)	10
3	Sulphur Dioxide (SO ₂) (µg/m ³)	5
4	Oxides of Nitrogen (µg/m ³)	5
5	Hydrogen Sulphide as H ₂ S (µg/m ³)	6

Stack Parameters		
Sr.No.	Test Parameter	MDL
1	Particulate Matter (mg/Nm ³)	10
2	Sulphur Dioxide (ppm)	1.52
3	Oxides of Nitrogen (ppm)	2.65
4	Carbon Monoxide (mg/Nm ³)	0.1
5	Haydro Carbon NMHC (ppm)	1.0

Sea Water Parameters			
SR. NO.	TEST PARAMETERS	UNIT	MDL
1	pH	--	2
2	Temperature	°C	2
3	Total Suspended Solids	mg/L	2
4	BOD (3 Days @ 27 °C)	mg/L	1
5	Dissolved Oxygen	mg/L	0.1
6	Salinity	ppt	1
7	Oil & Grease	mg/L	2
8	Nitrate as NO ₃	µmol/L	0.5
9	Nitrite as NO ₂	µmol/L	0.01
10	Ammonical Nitrogen as NH ₃	µmol/L	0.2
11	Phosphates as PO ₄	µmol/L	0.5
12	Petroleum Hydrocarbon	µg/L	1
13	Total Dissolved Solids	mg/L	10
14	COD	mg/L	3
15	Primary productivity	mgC/L/day	0.1
16	Chlorophyll	mg/m ³	0.1
17	Phaeophytin	mg/m ³	0.1
18	Cell Count	No. x 10 ³ /L	1

Sea Sediment Parameters			
SR. NO.	TEST PARAMETERS	UNIT	MDL
1	Organic Matter	%	0.1
2	Phosphorus as P	µg/g	1
3	Petroleum Hydrocarbon	µg/g	1
4	Aluminum as Al	%	0.1
5	Manganese as Mn	µg/g	1
6	Mercury as Hg	µg/g	0.1

H. T. Shah

Lab Manager



Dr. Arun Bajpai

Lab Manager (Q)



STP Water parameter(mg/L)		
Sr. No.	Test parameter	MDL
1	pH	2
2	Total Suspended Solids (mg/L)	2
3	BOD (3 days @ 270 C) (mg/L)	1
4	Residual Chlorine (mg/L)	0.2
5	Fecal Coliform (MPN INDEX/100 mL)	1.8

ETP Water Parameters			
SR. NO.	TEST PARAMETERS	UNIT	MDL
1	Colour	Co-pt	2
2	pH	--	2
3	Temperature	°C	2
4	Total Suspended Solids	mg/L	2
5	Total Dissolved Solids	mg/L	10
6	COD	mg/L	3
7	BOD (3 Days @ 27 °C)	mg/L	1
8	Chloride as Cl	mg/L	1
9	Oil & Grease	mg/L	2
10	Sulphate as SO ₄	mg/L	1
11	Ammonical Nitrogen as NH ₃	mg/L	0.2
12	Phenolic Compound	mg/L	0.005
13	Copper as Cu	mg/L	0.01
14	Lead as Pb	mg/L	0.01
15	Sulphide as S	mg/L	0.1
16	Cadmium as Cd	mg/L	0.002
17	Fluoride as F	mg/L	0.05

H. T. Shah**Lab Manager****Dr. Arun Bajpai****Lab Manager (Q)**

"HALF YEARLY ENVIRONMENTAL MONITORING REPORT"

FOR



**BORE HOLE WATER
ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED
TAL: MUNDRA, KUTCH, MUNDRA – 370 421**

**MONITORING PERIOD:
OCTOBER 2018 TO MARCH 2019**

PREPARED BY:



POLLUCON LABORATORIES PVT.LTD.

**PLOT NO.5/6 "POLLUCON HOUSE", OPP. BALAJI INDUSTRIAL SOCIETY,
OLD SHANTINATH SILK MILL LANE, NEAR GAYTRI FARSAN MART,
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TC - 5945

ISO 9001:2015

ISO 14001:2015

OHSAS 18001:2007

Recognised by MoEF, New Delhi Under Sec. 12 of Environmental (Protection) Act-1986

RESULTS OF BORE HOLE WATER

SR. NO	TEST PARAMETERS	UNIT	RESULTS			TEST METHOD
			LIQUID TERMINAL PUMP HOUSE-1 N 22° 44.554' E 069° 41.453'	LIQUID TERMINAL NEAR ENCLOSURE – 3 N 22° 44.554' E 069° 41.453'	NEAR LIQUID TERMINAL ETP OFFICE N 22° 44.554' E 069° 41.453'	
	GPS Location					
	Sampling Date		31/12/2018	31/12/2018	31/12/2018	
1	pH	--	7.42	8.14	7.79	IS3025(P11)83Re.02
2	Salinity	ppt	12.45	1.28	17.33	APHA 2520B
3	Oil & Grease	mg/L	BDL*	BDL*	2.4	APHA(22ndEdi)5520D
4	Hydrocarbon	mg/L	BDL*	BDL*	BDL*	GC/GC-MS
5	Lead as Pb	mg/L	0.094	0.96	0.031	AAS APHA(22ndEdi)3111 B
6	Arsenic as As	mg/L	BDL*	BDL*	BDL*	AAS APHA 3114 B
7	Nickel as Ni	mg/L	BDL*	BDL*	BDL*	AAS APHA(22ndEdi)3111 B
8	Total Chromium as Cr	mg/L	BDL*	BDL*	BDL*	AAS 3111B
9	Cadmium as Cd	mg/L	0.014	BDL*	BDL*	AAS APHA(22ndEdi)3111 B
10	Mercury as Hg	mg/L	BDL*	BDL*	BDL*	AAS APHA- 3112 B
11	Zinc as Zn	mg/L	2.10	BDL*	0.072	AAS APHA(22ndEdi)3111 B
12	Copper as Cu	mg/L	BDL*	0.84	BDL*	AAS APHA(22ndEdi)3111 B
13	Iron as Fe	mg/L	9.8	0.74	0.25	AAS APHA(22ndEdi)3111 B
14	Insecticides/Pesticides	mg/L	Absent	Absent	Absent	GC/GC-MS
15	Depth of Water Level from Ground Level	meter	1.02	1.05	0.9	--

*BDL: Below Detection Limit



H. T. Shah
Lab Manager




Dr. Arun Bajpai
Lab Manager (Q)

Recognised by MoEF, New Delhi Under Sec. 12 of Environmental (Protection) Act-1986

SR. NO	TEST PARAMETERS	UNIT	RESULTS		TEST METHOD
			LIQUID TERMINAL PUMP HOUSE-2	LIQUID TERMINAL PUMP HOUSE-3	
	GPS Location		N 22° 44.554' E 069° 41.453'	N 22° 44.554' E 069° 41.453'	
	Sampling Date		31/12/2018	31/12/2018	
1	pH	--	7.80	7.97	IS3025(P11)83Re.02
2	Salinity	ppt	1.26	6.54	APHA 2520B
3	Oil & Grease	mg/L	BDL*	2.0	APHA(22ndEdi)5520D
4	Hydrocarbon	mg/L	BDL*	BDL*	GC/GC-MS
5	Lead as Pb	mg/L	0.075	0.14	AAS APHA(22ndEdi)3111 B
6	Arsenic as As	mg/L	BDL*	BDL*	AAS APHA 3114 B
7	Nickel as Ni	mg/L	BDL*	BDL*	AAS APHA(22ndEdi)3111 B
8	Total Chromium as Cr	mg/L	BDL*	BDL*	AAS 3111B
9	Cadmium as Cd	mg/L	0.044	0.058	AAS APHA(22ndEdi)3111 B
10	Mercury as Hg	mg/L	BDL*	BDL*	AAS APHA- 3112 B
11	Zinc as Zn	mg/L	1.84	0.17	AAS APHA(22ndEdi)3111 B
12	Copper as Cu	mg/L	0.92	BDL*	AAS APHA(22ndEdi)3111 B
13	Iron as Fe	mg/L	7.2	1.10	AAS APHA(22ndEdi)3111 B
14	Insecticides/Pesticides	mg/L	Absent	Absent	GC/GC-MS
15	Depth of Water Level from Ground Level	meter	0.98	0.95	--

*BDL: Below Detection Limit



H. T. Shah

Lab Manager




Dr. Arun Bajpai

Lab Manager (Q)



POLLUCON LABORATORIES PVT. LTD.

Environmental Auditors, Consultants & Analysts.
Cleaner Production / Waste Minimization Facilitator

Recognised by MoEF, New Delhi Under Sec. 12 of Environmental (Protection) Act-1986

Borehole Water Parameters			
SR. NO.	TEST PARAMETERS	UNIT	MDL
1	pH	--	2
2	Salinity	mg/L	0.5
3	Oil & Grease	mg/L	2
4	Hydrocarbon	mg/L	0.01
5	Lead as Pb	mg/L	0.01
6	Arsenic as As	mg/L	0.001
7	Nickel as Ni	mg/L	0.02
8	Total Chromium as Cr	mg/L	0.025
9	Cadmium as Cd	mg/L	0.002
10	Mercury as Hg	mg/L	0.005
11	Zinc as Zn	mg/L	0.06
12	Copper as Cu	mg/L	0.01
13	Iron as Fe	mg/L	0.1
14	Insecticides/Pesticides	mg/L	0.1

H. T. Shah
Lab Manager



Dr. Arun Bajpai
Lab Manager (Q)

ANNEXURE – 4



ADANI Ports And Special Economic Zone Ltd

Mundra -Kutchh

P.S.P. MONITORING REPORT OF ICCP SYSTEM

MAINT. BASE : Mundra

PIPELINE SECTION : AMC OF CATHODIC PROTECTION FOR SPM-IOCL PIPELINE

Date : 22/10/2018

Criteria for PSP as per OISD 226 / 12.3.5 A or NACE SP0169-2013/ 6.2 underprotected level (-0.85 volt); Overprotected level (-1.2 volt) wrt Cu-CuSO4 reference Electrode

SR. No.	TLP No.	TYPE	Location (detail description)	Chainage (km)	PSP (-ve volt)	Casing PSP(-V)	AC V	Un Protected PSP(-V)	Remarks
1	1	E	Nr. Insulating Joint	0.000	1.390		0.042	0.72	
2	2	D	After Railway Crossing	0.425	1.470	0.67	0.057		
3	3	A	field	1.400	1.150		0.027		
4	4	A	field	2.400	1.480		0.224		
5	5	A	field	3.000	1.450		0.071		
6	6	D	Road crossing	3.440	1.440	0.65	0.072		
7	7	A	field	4.300	1.430		0.014		
8	8	A	field	5.2	1.400		0.014		
9	9	A	IOCL Boundry wall	5.900	1.290		0.014		
10	10	E	Inside IOCL	6.200	0.000		0	NOT APPROACHABLE	

B)

Feeding TRUnit/ CPPSM Locations >>

TP2

Feed Voltage (DC volt) :

3.53

Feed Current (DC amp) :

6.0

AC voltage (50Hz) at input of TRU/CPPSM:

252V

Graphical Representation (Annexure) : **Included**

Any other observation/ discrepancy :

Pipeline is well protected

Reviewed by (APSEZL)

Signature :

Name :

Designation :

Monitored by

Signature :

Name :

Designation :

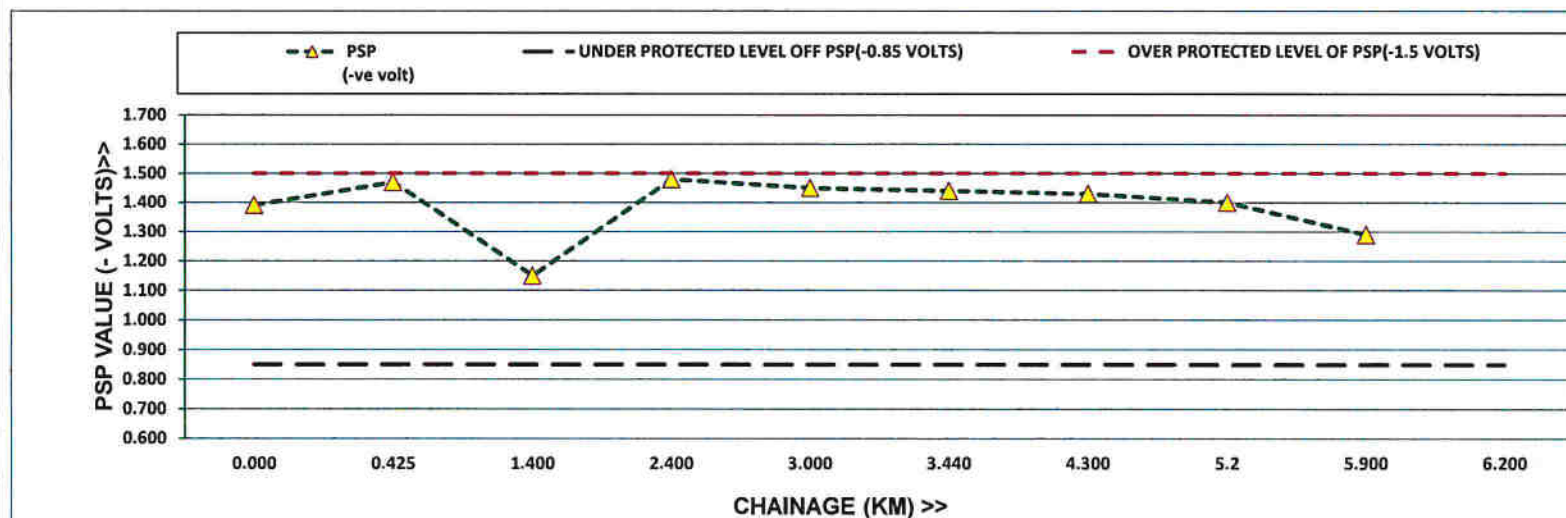
N R ENTERPRISE

GRAPHICAL REPRESENTATION OF ON PSP MEASURED

DESCRIPTION OF PL:
MAINT BASE:
CP CONTRACTOR:

AMC OF CATHODIC PROTECTION FOR SPM-IOCL PIPELINE
Mundra
N R ENTERPRISE

MONTH: Oct-18



LEGENDS

OBSERVED ON PSP (VOLT) (GREEN DOTTED)	
UNDER PROTECTED LEVEL OF PSP (-0.85 VOLTS)	----- (BROWN BROKEN)	(CRITERIA AS PER OISD 226 / 12.3.5 A OR NACE SP0169-2013/6.2)
OVER PROTECTED LEVEL OF PSP (-1.5 VOLTS)	----- (DARK RED DASHED)	(CRITERIA AS PER OISD 226 / 12.3.5 A)
NOTE: PSP VALUE MEASURED WRT CU-CUSO ₄ PORTABLE REFERENCE		



ADANI Ports And Special Economic Zone Ltd

MUNDRA -KUTCHH



MONITORING & MAINTENANCE OF TRU

Maint Base : Adani Mundra

Date of Monitoring : 22/10/2018

Name of TRU/CPSPM Location : TP 2

Pipelines :AMC OF CATHODIC PROTECTION FOR SPM-IOCL PIPELINE

1 Technical details of the Unit :

Manufacturer : Raychem RPG

Model : Cu,Cu,So4

Type (~~OIL-Cooled~~/ **Natural Air Cooled**):

Year of Manufacture : 2011

S No of Unit:- 11007

Input Voltage (AC / ~~DC~~) : 230 V +/- 10 %

Output Rating (Voltage/ Current Range) : 25 V / 25 A

Is unit fitted with built-in Interrupter

NO

2 VISUAL INSPECTION & OBSERVATION :

2.1 Operation of door lock(s) : **OK** / ~~NOT-OK~~

2.2 Earthing of unit : **OK** / ~~NOT-OK~~

2.3 Is door closing properly : **OK** / ~~NO~~

2.4 any indication of overheating/ burning : **NO**/ ~~YES~~

2.5 Transformer oil level : ~~OK~~/~~NOT-OK~~ / **NA**

2.6 Cleaning & Air Blowing : **Done** / ~~Not-Done~~

2.7 Any leak/spillage of OIL observed : **NO**/ ~~YES~~

2.8 Tightening of connections : **Done** / ~~Not-Done~~

2.9 Front panel indications : **OK** / ~~NOT-OK~~

2.1 Interrupter : **NOT Available**

2.11 Condition of Front panel : **OK** / ~~Not-OK~~

2.12 Condition of all Analogue Panel Meters : **OK** / ~~NO~~

2.13 Lightning arrestor at Output : **NOT OK**

2.14 Condition of all Digital Panel Meters : **OK** / ~~NO~~

2.15 Lightning arrestor at Input : **NOT OK**

2.16 Backup power supply condition : **Available/Not available**

3 WORKING PARAMETERS :

Unit	Parameter	Value	UoM	Remarks
TR / CPVCM / CPSSM	3.1 INPUT VOLTAGE (AC / DC)	252	volt	
	3.2 INPUT CURRENT (AC / DC)	1.01	amp	
	3.3 OUTPUT VOLTAGE	3.53	volt	
	3.4 OUTPUT CURRENT	6	amp	
	3.5 MODE of Operation	AUTO		
	3.6 Feed Voltage (-V)	1.2	volt	
	3.8 Drain PSP (-ve Volt)	1.3	volt	
	3.9 PSP VALUE W.R.T. REF - 1 (-ve volt)	1.210	volt	
	REF - 2 (-ve volt)	1.300	volt	
	REF - 3 (-ve volt)	NA	volt	
	4.0 Circuit Resistance (V/I)	0.588		
4	Any other observation/ discrepancy	1)TR unit working ok 2)DC VOLTMETER not working. 3)TR unit door not properly closed.		

Reviewed by(APSEZL)

Monitored by (N R ENTERPRISE)

Signature :

Signature :

Name :

Name :

Designation :

Designation :

ADANI Ports And Special Economic Zone Ltd

MUNDRA -KUTCHH



MONITORING & MAINTENANCE OF TRU

Maint Base : Adani Mundra

Date of Monitoring : 27/11/2018

Name of TRU/CPSSM Location : TP 2

Pipelines :AMC OF CATHODIC PROTECTION FOR SPM-IOCL PIPELINE

1 Technical details of the Unit :

Manufacturer : Raychem RPG

Model : Cu,Cu,So4

Type (Oil-Cooled/ Natural Air Cooled):

Year of Manufacture : 2011

S No of Unit:- 11007

Input Voltage (AC / DC) : 230 V +/- 10 %

Output Rating (Voltage/ Current Range) : 25 V / 25 A

Is unit fitted with built-in Interrupter

NO

2 VISUAL INSPECTION & OBSERVATION :

2.1 Operation of door lock(s) : **OK / -OK**

2.2 Earthing of unit : **OK / NOT-OK**

2.3 Is door closing properly : **NO**

2.4 any indication of overheating/ burning : **NO/ YES**

2.5 Transformer oil level : **OK / NOT-OK / NA**

2.6 Cleaning & Air Blowing : **Done / Not-Done**

2.7 Any leak/spillage of OIL observed : **NO/ YES**

2.8 Tightening of connections : **Done / Not-Done**

2.9 Front panel indications : **OK / NOT-OK**

2.1 Interrupter : **NOT Available**

2.11 Condition of Front panel : **OK / Not-OK**

2.12 Condition of all Analogue Panel Meters : **OK / -NO**

2.13 Lightning arrestor at Output : **NOT OK**

2.14 Condition of all Digital Panel Meters : **OK / NO**

2.15 Lightning arrestor at Input : **NOT OK**

2.16 Backup power supply condition : **Available/Not available**

3 WORKING PARAMETERS :

Unit	Parameter	Value	UoM	Remarks
TR / CPVCM / CPSSM	3.1 INPUT VOLTAGE (AC / DC)	230	volt	
	3.2 INPUT CURRENT (AC / DC)	0.9	amp	
	3.3 OUTPUT VOLTAGE	4.28	volt	
	3.4 OUTPUT CURRENT	5.1	amp	
	3.5 MODE of Operation	AUTO		
	3.6 Feed Voltage (-V) (Internal)	1.13	volt	
	3.8 Drain PSP (-ve Volt)	1.22	volt	
	3.9 PSP VALUE W.R.T. REF - 1 (-ve volt)	1.130	volt	
	REF - 2 (-ve volt)	1.230	volt	
	REF - 3 (-ve volt)	NA	volt	
	4.0 Circuit Resistance (V/I)	0.839		
4	Any other observation/ discrepancy	1)TR unit working ok 2)DC VOLTMETER not working. 3)TR unit door not properly closed.		

Reviewed by(APSEZL)

Signature :

Name :

Designation :

Monitored by (N.R. ENTERPRISE)

Signature :

Name :

Designation :



ADANI Ports And Special Economic Zone Ltd

Mundra -Kutchh

P.S.P. MONITORING REPORT OF ICCP SYSTEM

MAINT. BASE : Mundra

PIPELINE SECTION : AMC OF CATHODIC PROTECTION FOR SPM-IOCL PIPELINE

Date : 27/11/2018

Criteria for PSP as per OISD 226 / 12.3.5 A or NACE SP0169-2013/ 6.2 underprotected level (-0.85 volt); Overprotected level (-1.2 volt) wrt Cu-CuSO4 reference Electrode

SR. No.	TLP No.	TYPE	Location (detail description)	Chainage (km)	PSP (-ve volt)	Casing PSP(-V)	AC V	Un Protected PSP(- V)	Remarks
1	1	E	Nr. Insulating Joint	0.000	1.300		0.042	0.7	
2	2	D	After Railway Crossing	0.425	1.380	0.62	0.04		
3	3	A	field	1.400	1.330		0.03		
4	4	A	field	2.400	1.330		0.016		
5	5	A	field	3.000	1.300		0.001		
6	6	D	Road crossing	3.440	1.320	0.72	0.002		
7	7	A	field	4.300	1.330		0.005		
8	8	A	field	5.2	1.330		0.011		
9	9	A	IOCL Boundry wall	5.900	1.260		0.016		
10	10	E	Inside IOCL	6.200	0.000		0	NOT APPROACHABLE	

B)

Feeding TRUnit/ CPPSM Locations >>

TP2

Feed Voltage (DC volt) :

4.28

Feed Current (DC amp) :

5.1

AC voltage (50Hz) at input of TRU/CPPSM:

230V

Graphical Representation (Annexure) : **Included**

Any other observation/ discrepancy :

Pipeline is well protected

Reviewed by (APSEZL)

Signature :

Name :

Designation :

Monitored by

Signature :

Name :

Designation :

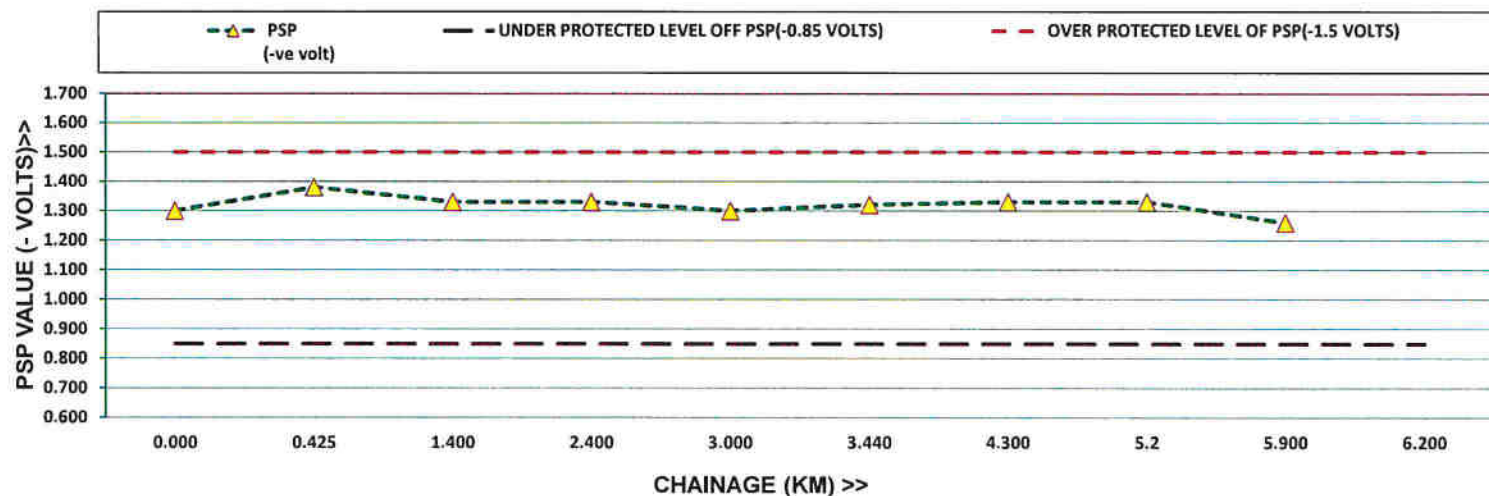
N R ENTERPRISE

GRAPHICAL REPRESENTATION OF ON PSP MEASURED

DESCRIPTION OF PL:
MAINT BASE:
CP CONTRACTOR:

AMC OF CATHODIC PROTECTION FOR SPM-IOCL PIPELINE
Mundra
N R ENTERPRISE


MONTH: Nov-18



LEGENDS

OBSERVED ON PSP (VOLT) (GREEN DOTTED)	
UNDER PROTECTED LEVEL OF PSP (-0.85 VOLTS)	----- (BROWN BROKEN)	(CRITERIA AS PER OISD 226 / 12.3.5 A OR NACE SP0169-2013/6.2)
OVER PROTECTED LEVEL OF PSP (-1.5 VOLTS)	----- (DARK RED DASHED)	(CRITERIA AS PER OISD 226 / 12.3.5 A)
NOTE: PSP VALUE MEASURED WRT CU-CUSO ₄ PORTABLE REFERENCE		



		ADANI Ports And Special Economic Zone Ltd MONITORING OF ANODE GROUND BED and JUNCTION BOX		Doc. No. :- APSEZL/NRAJB/R01 Page No. :- 1 of 1																																																																																																																																																							
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NAME OF TR STATION : ADANI TERMINAL-MUNDRA			DATE : 27/11/2018																																																																																																																																																								
<table border="1"> <thead> <tr> <th>Sr No</th> <th colspan="2">Activities</th> <th></th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>3</td> <td colspan="2">Anode Quantity</td> <td>12</td> <td></td> <td></td> </tr> <tr> <td>4</td> <td colspan="2">Parameters of TR/CPSPM-</td> <td></td> <td></td> <td></td> </tr> <tr> <td>4.1</td> <td colspan="2">AUTO mode/AVCC Mode</td> <td>AUTO</td> <td></td> <td></td> </tr> <tr> <td>4.2</td> <td colspan="2">Output Voltage (Volts)</td> <td>4.28</td> <td></td> <td></td> </tr> <tr> <td>4.3</td> <td colspan="2">Output Current(Amp)</td> <td>5.06</td> <td></td> <td></td> </tr> <tr> <td>5</td> <td colspan="2">Pipe To Soil Potential (PSP) (-ve Volts) w r t ref</td> <td></td> <td></td> <td></td> </tr> <tr> <td>5.1</td> <td colspan="2">PSP Value with RC1 (-ve Volts)w r t ref</td> <td>1.130</td> <td></td> <td></td> </tr> <tr> <td>5.2</td> <td colspan="2">PSP Value with RC2 (-ve Volts) w r t ref</td> <td>1.220</td> <td></td> <td></td> </tr> <tr> <td>5.3</td> <td colspan="2">PSP value with RC3 (-ve Volts) w r t ref</td> <td>NA</td> <td></td> <td></td> </tr> <tr> <td>6</td> <td colspan="2">Total Circuit resistance at TR (Ohm)</td> <td>0.83</td> <td></td> <td></td> </tr> <tr> <td>7</td> <td colspan="2">Individual Anode Current (Amp)</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>Anode</td> <td>A1</td> <td>0.04</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Anode</td> <td>A2</td> <td>0.10</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Anode</td> <td>A3</td> <td>0.69</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Anode</td> <td>A4</td> <td>0.54</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Anode</td> <td>A5</td> <td>1.17</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Anode</td> <td>A6</td> <td>0.63</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Anode</td> <td>A7</td> <td>0.53</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Anode</td> <td>A8</td> <td>0.56</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Anode</td> <td>A9</td> <td>0.22</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Anode</td> <td>A10</td> <td>0.23</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Anode</td> <td>A11</td> <td>0.48</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Anode</td> <td>A12</td> <td>0.44</td> <td></td> <td></td> </tr> <tr> <td>8</td> <td colspan="2">Total Current at Anode Header cable (Amp)</td> <td>5.06</td> <td></td> <td></td> </tr> </tbody> </table>						Sr No	Activities					3	Anode Quantity		12			4	Parameters of TR/CPSPM-					4.1	AUTO mode/AVCC Mode		AUTO			4.2	Output Voltage (Volts)		4.28			4.3	Output Current(Amp)		5.06			5	Pipe To Soil Potential (PSP) (-ve Volts) w r t ref					5.1	PSP Value with RC1 (-ve Volts)w r t ref		1.130			5.2	PSP Value with RC2 (-ve Volts) w r t ref		1.220			5.3	PSP value with RC3 (-ve Volts) w r t ref		NA			6	Total Circuit resistance at TR (Ohm)		0.83			7	Individual Anode Current (Amp)						Anode	A1	0.04				Anode	A2	0.10				Anode	A3	0.69				Anode	A4	0.54				Anode	A5	1.17				Anode	A6	0.63				Anode	A7	0.53				Anode	A8	0.56				Anode	A9	0.22				Anode	A10	0.23				Anode	A11	0.48				Anode	A12	0.44			8	Total Current at Anode Header cable (Amp)		5.06		
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ADANI Ports And Special Economic Zone Ltd

Mundra -Kutchh

P.S.P. MONITORING REPORT OF ICCP SYSTEM

MAINT. BASE : Mundra

PIPELINE SECTION : AMC OF CATHODIC PROTECTION FOR SPM-IOCL PIPELINE

Date : 28/12/2018

Criteria for PSP as per OISD 226 / 12.3.5 A or NACE SP0169-2013/ 6.2 underprotected level (-0.85 volt); Overprotected level (-1.2 volt) wrt Cu-CuSO₄ reference Electrode

SR. No.	TLP No.	TYPE	Location (detail description)	Chainage (km)	PSP (-ve volt)	Casing PSP(-V)	AC V	Un Protected PSP(- V)	Remarks
1	1	E	Nr. Insulating Joint	0.000	1.309		0.035	0.46	
2	2	D	After Railway Crossing	0.425	1.416	0.271	0.005		
3	3	A	field	1.400	1.375		0.038		
4	4	A	field	2.400	1.415		0.022		
5	5	A	field	3.000	1.381		0.002		
6	6	D	Road crossing	3.440	1.351	0.412	0.001		
7	7	A	field	4.300	1.386		0.005		
8	8	A	field	5.2	1.379		0.001		
9	9	A	IOCL Boundry wall	5.900	1.378		0.015		
10	10	E	Inside IOCL	6.200	0.000		0	NOT APPROACHABLE	

B)

Feeding TRUnit/ CPPSM Locations >>

TP2

Feed Voltage (DC volt) :

3.19

Feed Current (DC amp) :

4.4

AC voltage (50Hz) at Input of TRU/CPPSM:

0.29

Graphical Representation (Annexure) : **Included**

Any other observation/ discrepancy :

Pipeline is well protected

Reviewed by (APSEZL)

Signature :

Name :

Designation :

Monitored by

Signature :

Name :

Designation :



GRAPHICAL REPRESENTATION OF ON PSP MEASURED

DESCRIPTION OF PL:

AMC OF CATHODIC PROTECTION FOR SPM-IOCL PIPELINE

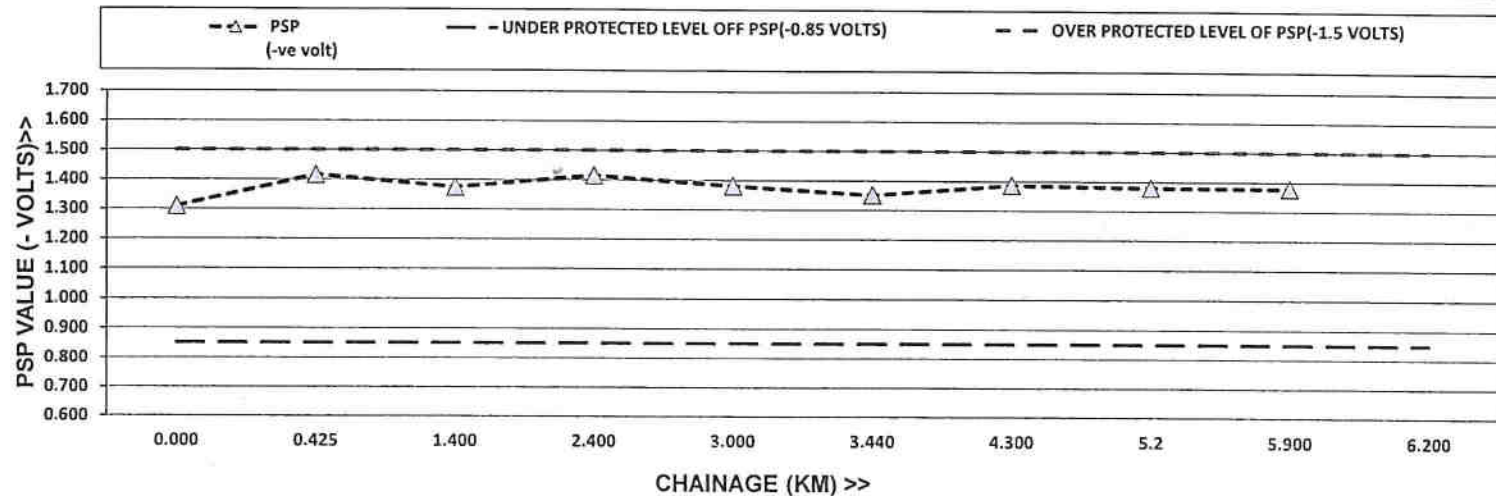
MONTH: Dec-18

MAINT BASE:

Mundra

CP CONTRACTOR:

N R ENTERPRISE



LEGENDS

OBSERVED ON PSP (VOLT) (GREEN DOTTED)	
UNDER PROTECTED LEVEL OF PSP (-0.85 VOLTS)	----- (BROWN BROKEN)	(CRITERIA AS PER OISD 226 / 12.3.5 A OR NACE SP0169-2013/6.2)
OVER PROTECTED LEVEL OF PSP (-1.5 VOLTS)	----- (DARK RED DASHED)	(CRITERIA AS PER OISD 226 / 12.3.5 A)
NOTE: PSP VALUE MEASURED WRT CU-CUSO ₄ PORTABLE REFERENCE		



ADANI Ports And Special Economic Zone Ltd

MUNDRA -KUTCHH



MONITORING & MAINTENANCE OF TRU

Maint Base : Adani Mundra

Date of Monitoring : 28/12/2018

Name of TRU/CPPSM Location : TP 2

Pipelines :AMC OF CATHODIC PROTECTION FOR SPM-IOCL PIPELINE

1 Technical details of the Unit :

Manufacturer : Raychem RPG

Model : Cu,Cu,So4

Type (Oil-Cooled/ Natural Air Cooled):

Year of Manufacture : 2011

S No of Unit:- 11007

Input Voltage (AC / DC) : 230 V +/- 10 %

Output Rating (Voltage/ Current Range) : 25 V / 25 A

Is unit fitted with built-in Interrupter

NO

2 VISUAL INSPECTION & OBSERVATION :

2.1 Operation of door lock(s) : OK / -OK

2.2 Earthing of unit : OK / NOT-OK

2.3 Is door closing properly : NO

2.4 any indication of overheating/ burning : NO/ YES

2.5 Transformer oil level : OK / NOT-OK / NA

2.6 Cleaning & Air Blowing : Done / Not-Done

2.7 Any leak/spillage of OIL observed : NO/ YES

2.8 Tightening of connections : Done / Not-Done

2.9 Front panel indications : OK / NOT-OK

2.1 Interrupter : NOT Available

2.11 Condition of Front panel : OK / Not-OK

2.12 Condition of all Analogue Panel Meters : OK /-NO

2.13 Lightning arrestor at Output : NOT OK

2.14 Condition of all Digital Panel Meters : NO

2.15 Lightning arrestor at Input : NOT OK

2.16 Backup power supply condition : Available/Not available

3 WORKING PARAMETERS :

Unit	Parameter	Value	UoM	Remarks
TR / CPVCM / CPSSM	3.1 INPUT VOLTAGE (AC / DC)	256	volt	
	3.2 INPUT CURRENT (AC / DC)	0.96	amp	
	3.3 OUTPUT VOLTAGE	3.19	volt	
	3.4 OUTPUT CURRENT	4.41	amp	
	3.5 MODE of Operation	AUTO		
	3.6 Feed Voltage (-V) (Internal)	1.16	volt	
	3.8 Drain PSP (-ve Volt)	1.24	volt	
	3.9 PSP VALUE W.R.T. REF - 1 (-ve volt)	1.163	volt	
	REF - 2 (-ve volt)	1.247	volt	
	REF - 3 (-ve volt)	NA	volt	
	4.0 Circuit Resistance (V/I)	0.723		
4	Any other observation/ discrepancy	1)TR unit working ok 2)DC VOLTMETER not working. 3)TR unit door not properly closed.		

Reviewed by(APSEZL)

Monitored by (N R ENTERPRISE)

Signature :

Signature :

Name :

Name :

Designation :

Designation :



adani

ADANI Ports And Special Economic Zone Ltd

GRAPHICAL REPRESENTATION OF ON PSP MEASURED

DESCRIPTION OF PL:

AMC OF CATHODIC PROTECTION FOR SPM-IOCL PIPELINE

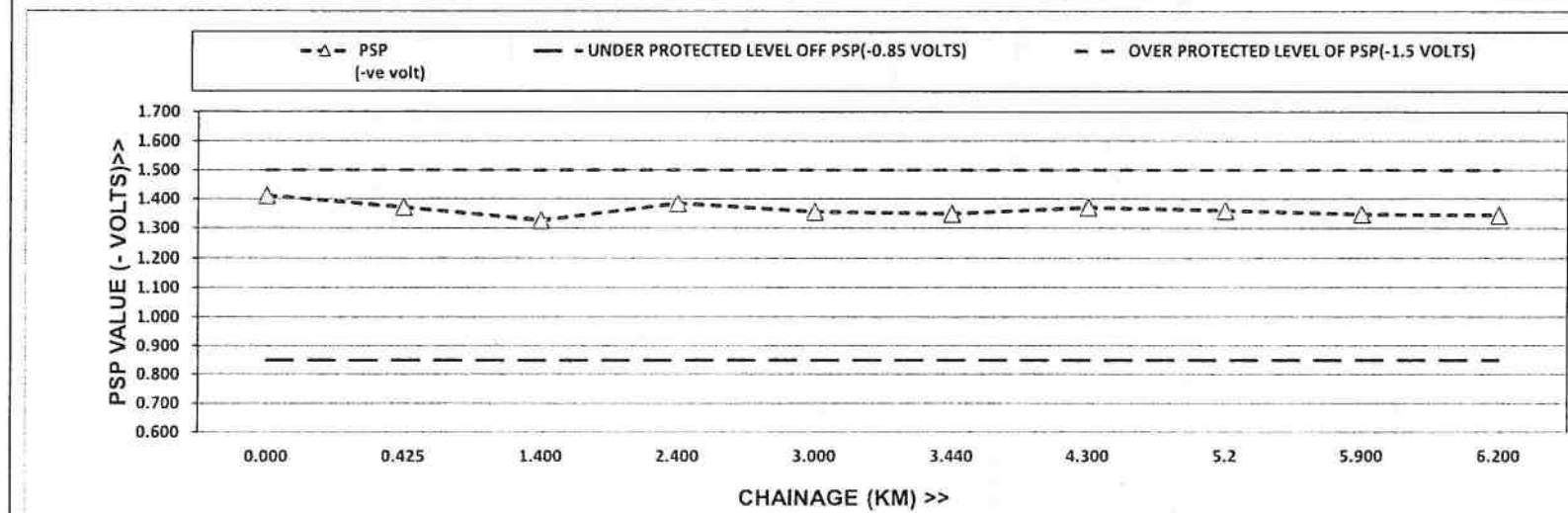
MONTH: Jan-19

MAINT BASE:

Mundra

CP CONTRACTOR:

N R ENTERPRISE



LEGENDS

OBSERVED ON PSP (VOLT)

..... (GREEN DOTTED)

UNDER PROTECTED LEVEL OF PSP (-0.85 VOLTS)

- - - - - (BROWN BROKEN)

OVER PROTECTED LEVEL OF PSP (-1.5 VOLTS)

- - - - - DARK RED DASHED

(CRITERIA AS PER OISD 226 / 12.3.5 A OR NACE SP0169-2013/6.2)

(CRITERIA AS PER OISD 226 / 12.3.5 A)

NOTE: PSP VALUE MEASURED WRT CU-CUSO₄ PORTABLE REFERENCE



ADANI Ports And Special Economic Zone Ltd

Mundra -Kutchh

P.S.P. MONITORING REPORT OF ICCP SYSTEM

MAINT. BASE : Mundra

PIPELINE SECTION : AMC OF CATHODIC PROTECTION FOR SPM-IOCL PIPELINE

Date : 28/01/2019

Criteria for PSP as per OISD 226 / 12.3.5 A or NACE SP0169-2013/ 5.2 underprotected level (-0.85 volt); Overprotected level (-1.2 volt) wrt Cu-CuSO4 reference Electrode

SR. No.	TLP No.	TYPE	Location (detail description)	Chainage (km)	PSP (-ve volt)	Casing PSP(-V)	AC V	Un Protected PSP(- V)	Remarks
1	1	E	Nr. Insulating Joint	0.000	1.412		0.039	0.413	
2	2	D	After Railway Crossing	0.425	1.371	0.671	0.057		
3	3	A	field	1.400	1.327		0.037		
4	4	A	field	2.400	1.385		0.021		
5	5	A	field	3.000	1.356		0.003		
6	6	D	Road crossing	3.440	1.350	0.425	0.004		
7	7	A	field	4.300	1.371		0.004		
8	8	A	field	5.2	1.361		0.005		
9	9	A	IOCL Boundry wall	5.900	1.348		0.012		
10	10	E	Inside IOCL	6.200	1.345		0.039	0.821	

B)

Feeding TRUnit/ CPPSM Locations >>

TP2

Feed Voltage (DC volt) :

3.15

Feed Current (DC amp) :

4.0

AC voltage (50Hz) at input of TRU/CPPSM:

0.269

Graphical Representation (Annexure) : **Included**

Any other observation/ discrepancy :

Pipeline is well protected

Reviewed by (APSEZL)

Signature :

Name :

Designation :

Monitored by

Signature :

Name :

Designation :

N R ENTERPRISE

ADANI Ports And Special Economic Zone Ltd

MUNDRA -KUTCHH



MONITORING & MAINTENANCE OF TRU

Maint Base : Adani Mundra

Date of Monitoring : 28/01/2018

Name of TRU/CPPSM Location : TP 2

Pipelines :AMC OF CATHODIC PROTECTION FOR SPM-IOCL PIPELINE

1 Technical details of the Unit :

Manufacturer : Raychem RPG

Model : Cu,Cu,So4

Type (Oil-Cooled/ Natural Air Cooled):

Year of Manufacture : 2011

S No of Unit:- 11007

Input Voltage (AC / DC) : 230 V +/- 10 %

Output Rating (Voltage/ Current Range) : 25 V / 25 A

Is unit fitted with built-in Interrupter

NO

2 VISUAL INSPECTION & OBSERVATION :

2.1 Operation of door lock(s) : **OK** / -OK

2.2 Earthing of unit : **OK** / NOT-OK

2.3 Is door closing properly : **NO**

2.4 any indication of overheating/ burning : **NO** / YES

2.5 Transformer oil level : **OK** / NOT-OK / **NA**

2.6 Cleaning & Air Blowing : **Done** / Not-Done

2.7 Any leak/spillage of OIL observed : **NO** / YES

2.8 Tightening of connections : **Done** / Not-Done

2.9 Front panel indications : **OK** / NOT-OK

2.1 Interrupter : **NOT Available**

2.11 Condition of Front panel : **OK** / Not-OK

2.12 Condition of all Analogue Panel Meters : **OK** / NOT

2.13 Lightning arrestor at Output : **OK**

2.14 Condition of all Digital Panel Meters : **NO**

2.15 Lightning arrestor at Input : **OK**

2.16 Backup power supply condition : Available/Not available

3 WORKING PARAMETERS :

Unit	Parameter	Value	UoM	Remarks
TR / CPVCM / CPPSM	3.1 INPUT VOLTAGE (AC / DC)	234	volt	
	3.2 INPUT CURRENT (AC / DC)	0.85	amp	
	3.3 OUTPUT VOLTAGE	3.14	volt	
	3.4 OUTPUT CURRENT	3.98	amp	
	3.5 MODE of Operation	AUTO		
	3.6 Feed Voltage (-V) (Internal)	1.15	volt	
	3.8 Drain PSP (-ve Volt)	1.23	volt	
	3.9 PSP VALUE W.R.T. REF - 1 (-ve volt)	1.161	volt	
	REF - 2 (-ve volt)	1.245	volt	
	REF - 3 (-ve volt)	NA	volt	
	4.0 Circuit Resistance (V/I)	0.789		
4	Any other observation/ discrepancy	1)TR unit working ok 2)DC VOLTMETER not working. 3)TR unit door not properly closed.		

Reviewed by(APSEZL)

Monitored by (N-R ENTERPRISE)

Signature :

Signature :

Name :

Name :

Designation :

Designation :

ADANI Ports And Special Economic Zone Ltd

MUNDRA -KUTCHH

adani

MONITORING & MAINTENANCE OF TRU

Maint Base : Adani Mundra

Date of Monitoring : 23/02/2019

Name of TRU/CPPSM Location : TP 2

Pipelines :AMC OF CATHODIC PROTECTION FOR SPM-IOCL PIPELINE

1 Technical details of the Unit :

Manufacturer : Raychem RPG

Model : Cu,Cu,So4

Type (Oil-Cooled/ Natural Air Cooled):

Year of Manufacture : 2011

S No of Unit:- 11007

Input Voltage (AC / DC) : 230 V +/- 10 %

Output Rating (Voltage/ Current Range) : 25 V / 25 A

Is unit fitted with built-in Interrupter

NO

2 VISUAL INSPECTION & OBSERVATION :

2.1 Operation of door lock(s) : **OK / -OK**

2.2 Earthing of unit : **OK / NOT-OK**

2.3 Is door closing properly : **NO**

2.4 any Indication of overheating/ burning : **NO/ YES**

2.5 Transformer oil level : **OK / NOT-OK / NA**

2.6 Cleaning & Air Blowing : **Done / Not-Done**

2.7 Any leak/spillage of OIL observed : **NO/ YES**

2.8 Tightening of connections : **Done / Not-Done**

2.9 Front panel indications : **OK / NOT-OK**

2.1 Interrupter : **NOT Available**

2.11 Condition of Front panel : **OK / Not-OK**

2.12 Condition of all Analogue Panel Meters : **OK / -NO**

2.13 Lightning arrestor at Output : **NOT OK**

2.14 Condition of all Digital Panel Meters : **OK / NO**

2.15 Lightning arrestor at Input : **NOT OK**

2.16 Backup power supply condition : Available/Not available

3 WORKING PARAMETERS :

Unit	Parameter	Value	UoM	Remarks
TR / CPVCM / CPPSM	3.1 INPUT VOLTAGE (AC / DC)	250	volt	
	3.2 INPUT CURRENT (AC / DC)	0.79	amp	
	3.3 OUTPUT VOLTAGE	2.84	volt	
	3.4 OUTPUT CURRENT	2.34	amp	
	3.5 MODE of Operation	AUTO		
	3.6 Feed Voltage (-V) (Internal)	1.11	volt	
	3.8 Drain PSP (-ve Volt)	1.2	volt	
	3.9 PSP VALUE W.R.T. REF - 1 (-ve volt)	1.110	volt	
	REF - 2 (-ve volt)	1.200	volt	
	REF - 3 (-ve volt)	NA	volt	
	4.0 Circuit Resistance (V/I)	1.214		
4	Any other observation/ discrepancy	1)TR unit working ok 2)DC VOLTMETER not working. 3)TR unit door not properly closed.		

Reviewed by(APSEZL)

Signature :

Name :

Designation :

Monitored by (N R ENTERPRISE)

Signature :

Name :

Designation :

adani

ADANI Ports And Special Economic Zone Ltd

Mundra -Kutchh

ON OFF P.S.P. MONITORING REPORT OF ICCP SYSTEM

MAINT. BASE : Mundra

PIPELINE SECTION & DIA. : AMC OF CATHODIC PROTECTION FOR SPM-IOCL PIPELINE

Date :-23-02-2019

Criteria for PSP as per OISD 225 / 12.3.5 A or NACE SP0169-2013/ 6.2 underprotected level (-0.85 volt); Overprotected level (-1.2 volt) wrt Cu-CuSO4 reference Electrode

SR. No.	TLP No.	TYPE	Location (detail description)	Chainage (km)	ON PSP (-ve volt)	OFF PSP (-ve volt)	Casing PSP(-V)	AC V	Un Protected PSP(-V)	Remarks
1	1	E	Nr. Insulating Joint	0.000	1.060	1.098				
2	2	D	Railway Crossing	0.425	1.360	1.190				
3	3	A	field	1.400	1.350	1.130				
4	4	A	field	2.400	1.300	1.010				
5	5	A	nr Road crossing	3.000	1.310	1.070				
6	6	D	Road crossing	3.440	1.310	1.080				
7	7	A	field	4.300	1.310	1.080				
8	8	A	field	5.2	1.310	1.090				
9	9	A	IOCL Boundry wall	5.900	1.270	1.050				
10	10	E	Inside IOCL	6.200	1.260	1.040				

B)

Feeding TRUnit/ CPPSM Locations >>

TP2

Feed Voltage (DC volt) :

2.84

Feed Current (DC amp) :

2.34

AC voltage (50Hz) at output of TRU/CPPSM:

230 V

C)

Graphical Representation (Annexure) : Included

Any other observation/ discrepancy :

pipeline well protcted in ICCP System

Reviewed by (APSEZL)

Signature :

Name :

Designation :

Monitored by N R ENTERPRISE

Signature :

Name :

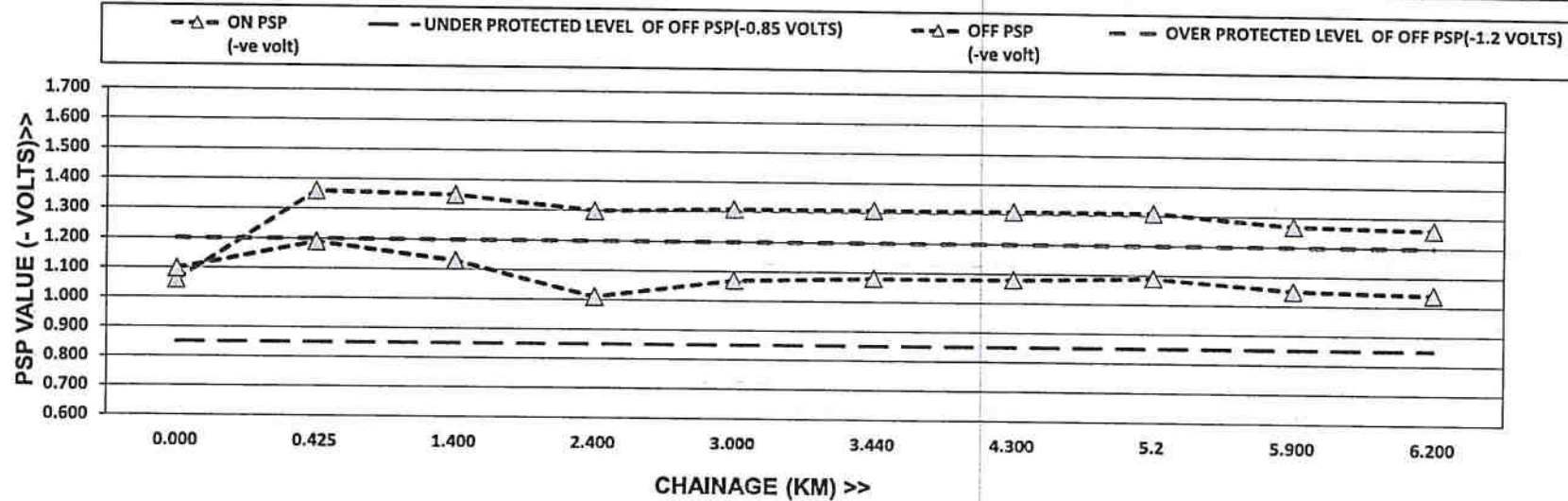
Designation :

GRAPHICAL REPRESENTATION OF ON OFF PSP MEASURED

DESCRIPTION OF PL:
MAINT BASE:
CP CONTRACTOR:

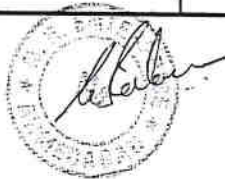
AMC OF CATHODIC PROTECTION FOR SPM-IOCL PIPELINE
Mundra
N R ENTERPRISE

MONTH: Feb-19



LEGENDS

OBSERVED ON PSP (VOLT)	***** (GREEN DOTTED)	
OBSERVED OFF PSP (VOLT)	----- (BLUE DOTTED)	
UNDER PROTECTED LEVEL OF OFF PSP (-0.85 VOLTS)	----- (BROWN BROKEN)	(CRITERIA AS PER OISD 226 / 12.3.5 A OR NACE SP0169-2013/6.2)
OVER PROTECTED LEVEL OF OFF PSP (-1.2 VOLTS)	----- (DARK RED DASHED)	(CRITERIA AS PER OISD 226 / 12.3.5 A)
NOTE: PSP VALUE MEASURED WRT CU-CUSO ₄ PORTABLE REFERENCE CELL		



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ADANI Ports And Special Economic Zone Ltd

Mundra -Kutchh

P.S.P. MONITORING REPORT OF ICCP SYSTEM

MAINT. BASE : Mundra

PIPELINE SECTION : AMC OF CATHODIC PROTECTION FOR SPM-IOCL PIPELINE

Date : 23/02/2019

Criteria for PSP as per OISD 226 / 12.3.5 A or NACE SP0169-2013/ 6.2 underprotected level (-0.85 volt); Overprotected level (-1.2 volt) wrt Cu-CuSO4 reference Electrode

SR. No.	TLP No.	TYPE	Location (detail description)	Chainage (km)	PSP (-ve volt)	Casing PSP(-V)	AC V	Un Protected PSP(- V)	Remarks
1	1	E	Nr. Insulating Joint	0.000	1.060		0.046	0.9	
2	2	D	After Railway Crossing	0.425	1.360	0.67	0.058		
3	3	A	field	1.400	1.350		0.037		
4	4	A	field	2.400	1.300		0.022		
5	5	A	field	3.000	1.310		0.002		
6	6	D	Road crossing	3.440	1.310	0.76	0.001		
7	7	A	field	4.300	1.310		0.007		
8	8	A	field	5.2	1.310		0.004		
9	9	A	IOCL Boundry wall	5.900	1.270		0.008		
10	10	E	Inside IOCL	6.200	1.260		0.038	0.83	

B)

Feeding TRUnit/ CPPSM Locations >>>

Feed Voltage (DC volt) :

TP2

Feed Current (DC amp) :

2.84

AC voltage (50Hz) at input of TRU/CPPSM:

2.34

230V

Graphical Representation (Annexure) : Included

Any other observation/ discrepancy :

Pipeline is well protected

Reviewed by (APSEZL)

Signature :

Name :

Designation :

Monitored by

Signature :

Name :

Designation :

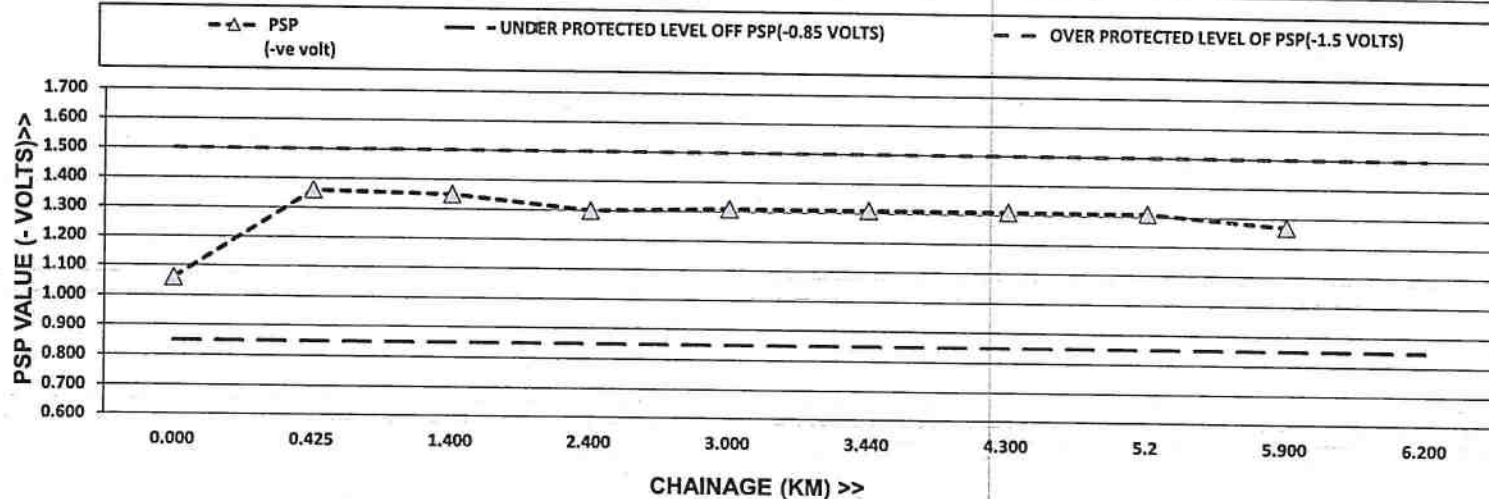


GRAPHICAL REPRESENTATION OF ON PSP MEASURED

DESCRIPTION OF PL:
MAINT BASE:
CP CONTRACTOR:

AMC OF CATHODIC PROTECTION FOR SPM-IOCL PIPELINE
Mundra
N R ENTERPRISE


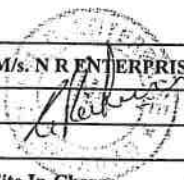
MONTH: Feb-19






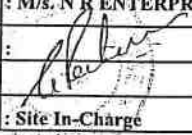
LEGENDS



OBSERVED ON PSP (VOLT) (GREEN DOTTED)	
UNDER PROTECTED LEVEL OF PSP (-0.85 VOLTS)	----- (BROWN BROKEN)	(CRITERIA AS PER OISD 226 / 12.3.5 A OR NACE SP0169-2013/6.2)
OVER PROTECTED LEVEL OF PSP (-1.5 VOLTS)	----- (DARK RED DASHED)	(CRITERIA AS PER OISD 226 / 12.3.5 A)
NOTE: PSP VALUE MEASURED WRT CU-CUSO ₄ PORTABLE REFERENCE		

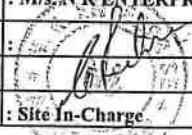


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<table border="1"> <thead> <tr> <th>Sr No</th> <th>Activities</th> <th></th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>3</td> <td>Anode Quantity</td> <td>12</td> <td></td> <td></td> </tr> <tr> <td>4</td> <td>Parameters of TR/CPPSM-</td> <td></td> <td></td> <td></td> </tr> <tr> <td>4.1</td> <td>AUTO mode/AVCC Mode</td> <td>AUTO</td> <td></td> <td></td> </tr> <tr> <td>4.2</td> <td>Output Voltage (Volts)</td> <td>2.84</td> <td></td> <td></td> </tr> <tr> <td>4.3</td> <td>Output Current(Amp)</td> <td>2.34</td> <td></td> <td></td> </tr> <tr> <td>5</td> <td>Pipe To Soil Potential (PSP) (-ve Volts) w r t ref</td> <td></td> <td></td> <td></td> </tr> <tr> <td>5.1</td> <td>PSP Value with RC1 (-ve Volts)w r t ref</td> <td>1.110</td> <td></td> <td></td> </tr> <tr> <td>5.2</td> <td>PSP Value with RC2 (-ve Volts) w r t ref</td> <td>1.200</td> <td></td> <td></td> </tr> <tr> <td>5.3</td> <td>PSP value with RC3 (-ve Volts) w r t ref</td> <td>NA</td> <td></td> <td></td> </tr> <tr> <td>6</td> <td>Total Circuit resistance at TR (Ohm)</td> <td>1.21</td> <td></td> <td></td> </tr> <tr> <td>7</td> <td>Individual Anode Current (Amp)</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>Anode A1</td> <td>0.16</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Anode A2</td> <td>0.26</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Anode A3</td> <td>0.27</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Anode A4</td> <td>0.32</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Anode A5</td> <td>1.11</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Anode A6</td> <td>0.10</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Anode A7</td> <td>0.22</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Anode A8</td> <td>0.20</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Anode A9</td> <td>0.10</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Anode A10</td> <td>0.20</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Anode A11</td> <td>0.05</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Anode A12</td> <td>0.19</td> <td></td> <td></td> </tr> <tr> <td>8</td> <td>Total Current at Anode Header cable (Amp)</td> <td>2.34</td> <td></td> <td></td> </tr> </tbody> </table>					Sr No	Activities				3	Anode Quantity	12			4	Parameters of TR/CPPSM-				4.1	AUTO mode/AVCC Mode	AUTO			4.2	Output Voltage (Volts)	2.84			4.3	Output Current(Amp)	2.34			5	Pipe To Soil Potential (PSP) (-ve Volts) w r t ref				5.1	PSP Value with RC1 (-ve Volts)w r t ref	1.110			5.2	PSP Value with RC2 (-ve Volts) w r t ref	1.200			5.3	PSP value with RC3 (-ve Volts) w r t ref	NA			6	Total Circuit resistance at TR (Ohm)	1.21			7	Individual Anode Current (Amp)					Anode A1	0.16				Anode A2	0.26				Anode A3	0.27				Anode A4	0.32				Anode A5	1.11				Anode A6	0.10				Anode A7	0.22				Anode A8	0.20				Anode A9	0.10				Anode A10	0.20				Anode A11	0.05				Anode A12	0.19			8	Total Current at Anode Header cable (Amp)	2.34		
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	Anode A9	0.10																																																																																																																															
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	Anode A11	0.05																																																																																																																															
	Anode A12	0.19																																																																																																																															
8	Total Current at Anode Header cable (Amp)	2.34																																																																																																																															
REMARKS :																																																																																																																																	
CHECKED BY : M/s. N R ENTERPRISE		REVIEWED BY : ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD																																																																																																																															
SIGNATURE : 		SIGNATURE :																																																																																																																															
NAME :		NAME :																																																																																																																															
DESIGNATION : Site In-Charge		DESIGNATION :																																																																																																																															

		ADANI Ports And Special Economic Zone Ltd		Doc. No. :- APSEZL/NRAJB/R01
		PREVENTIVE MAINTAINANCE OF TEST STATION		Page No. :- 1 of 1
BASE : ADANI-MUNDRA		PIPELINE SECTION : AMC OF CATHODIC PROTECTION FOR SPM-IOCL PIPELINE		
NAME OF TR STATION : ADANI TERMINAL-MUNDRA		DATE : 23/02/2019		
				Report No : 01
Sr No	Activities			
1	Test station no	1		
2	Chainage No	0.000		
3	Location	Near Insulating Joint		
3	Type Of Test Station	E		
4	Cleaning Inside /Outside	OK		
5	Painting of Test Station	Done		
6	Cable Connection Tightness	Done		
7	Repair/Replacement Requirement	Ok Condition		
8	Cleaning 1mx1m area (Housekeeping)	Done		
REMARKS :				
CHECKED BY SIGNATURE NAME DESIGNATION	: M/s N R ENTERPRISE  Site In-Charge	REVIEWED BY SIGNATURE NAME DESIGNATION	: ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD : 	


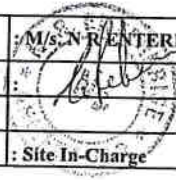
		ADANI Ports And Special Economic Zone Ltd		Doc. No. :- APSEZL/NRAJB/R01
		PREVENTIVE MAINTAINANCE OF TEST STATION		Page No. :- 1 of 1
BASE : ADANI -MUNDRA		PIPELINE SECTION : AMC OF CATHODIC PROTECTION FOR SPM-IOCL PIPELINE		
NAME OF TR STATION : ADANI TERMINAL-MUNDRA		DATE : 23/02/2019		
				Report No : 02
Sr No	Activities			
1	Test station no	2		
2	Chainage No	0.425		
3	Location	Railway Crossing		
3	Type Of Test Station	D		
4	Cleaning Inside /Outside	OK		
5	Painting of Test Station	Done		
6	Cable Connection Tightness	Done		
7	Repair/Replacement Requirement	Ok Condition		
8	Cleaning 1mx1m area (Housekeeping)	Done		
REMARKS :				
CHECKED BY	: M/s. N R ENTERPRISE	REVIEWED BY	: ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD	
SIGNATURE		SIGNATURE		
NAME		NAME		
DESIGNATION	: Site In-Charge	DESIGNATION		

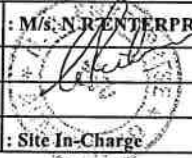
		ADANI Ports And Special Economic Zone Ltd		Doc. No. :- APSEZL/NRAJB/R01 Page No. :- 1 of 1
		PREVENTIVE MAINTENANCE OF TEST STATION		
BASE : ADANI -MUNDRA			PIPELINE SECTION : AMC OF CATHODIC PROTECTION FOR SPM-IOCL PIPELINE	
NAME OF TR STATION : ADANI TERMINAL-MUNDRA			DATE : 23/02/2019	
			Report No : 03	
Sr No	Activities			
1	Test station no	3		
2	Chainage No	1.400		
3	Location	FIELD		
3	Type Of Test Station	A		
4	Cleaning Inside /Outside	OK		
5	Painting of Test Station	Done		
6	Cable Connection Tightness	Done		
7	Repair/Replacement Requirement	Ok Condition		
8	Cleaning 1mx1m area (Housekeeping)	Done		
REMARKS :				
CHECKED BY : M/s. N R ENTERPRISE		REVIEWED BY : ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD		
SIGNATURE : 		SIGNATURE :		
NAME :		NAME :		
DESIGNATION : Site In-Charge		DESIGNATION :		


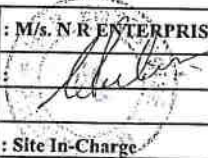
adani		ADANI Ports And Special Economic Zone Ltd		Doc. No. :- APSEZL/NRAJB/R01 Page No. :- 1 of 1	
BASE : ADANI -MUNDRA		PIPELINE SECTION : AMC OF CATHODIC PROTECTION FOR SPM-JOCL PIPELINE			
NAME OF TR STATION : ADANI TERMINAL-MUNDRA		DATE : 23/02/2019			
				Report No : 04	
Sr No	Activities				
1	Test station no	4			
2	Chainage No	2.400			
3	Location	FIELD			
3	Type Of Test Station	A			
4	Cleaning Inside /Outside	OK			
5	Painting of Test Station	Done			
6	Cable Connection Tightness	Done			
7	Repair/Replacement Requirement	Ok Condition			
8	Cleaning 1mx1m area (Housekeeping)	Done			
REMARKS :					
CHECKED BY	: M/s. N R ENTERPRISE	REVIEWED BY	: ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD		
SIGNATURE	: 	SIGNATURE	:		
NAME	: Site In-Charge	NAME			
DESIGNATION		DESIGNATION			

adani		ADANI Ports And Special Economic Zone Ltd		Doc. No. :- APSEZL/NRAJB/R01 Page No. :- 1 of 1	
BASE : ADANI -MUNDRA		PIPELINE SECTION : AMC OF CATHODIC PROTECTION FOR SPM-JOCL PIPELINE			
NAME OF TR STATION : ADANI TERMINAL-MUNDRA		DATE : 23/02/2019			
				Report No : 05	
Sr No	Activities				
1	Test station no	5			
2	Chainage No	3.000			
3	Location	Nr Road Crossing			
3	Type Of Test Station	A			
4	Cleaning Inside /Outside	OK			
5	Painting of Test Station	Done			
6	Cable Connection Tightness	Done			
7	Repair/Replacement Requirement	Ok Condition			
8	Cleaning 1mx1m area (Housekeeping)	Done			
REMARKS :					
CHECKED BY	: M/S. N R ENTERPRISE	REVIEWED BY	: ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD		
SIGNATURE	:	SIGNATURE	:		
NAME		NAME			
DESIGNATION	: Site In-Charge	DESIGNATION			

adani		ADANI Ports And Special Economic Zone Ltd		Doc. No. :- APSEZL/NRAJB/R01 Page No. :- 1 of 1	
BASE : ADANI -MUNDRA		PIPELINE SECTION : AMC OF CATHODIC PROTECTION FOR SPM-IOCL PIPELINE			
NAME OF TR STATION : ADANI TERMINAL-MUNDRA		DATE : 23/02/2019			
				Report No : 06	
Sr No	Activities				
1	Test station no	6			
2	Chainage No	3.440			
3	Location	Road Crossing			
3	Type Of Test Station	D			
4	Cleaning Inside /Outside	OK			
5	Painting of Test Station	Done			
6	Cable Connection Tightness	Done			
7	Repair/Replacement Requirement	Ok Condition			
8	Cleaning 1mx1m area (Housekeeping)	Done			
REMARKS :					
CHECKED BY	: M/s. N.R. ENTERPRISE	REVIEWED BY	: ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD		
SIGNATURE	:	SIGNATURE	:		
NAME	:	NAME	:		
DESIGNATION	: Site In-Charge	DESIGNATION	:		

		ADANI Ports And Special Economic Zone Ltd		Doc. No. :- APSEZL/NRAJB/R01
		PREVENTIVE MAINTAINANCE OF TEST STATION		Page No. :- 1 of 1
BASE : ADANI -MUNDRA		PIPELINE SECTION : AMC OF CATHODIC PROTECTION FOR SPM-IOCL PIPELINE		
NAME OF TR STATION : ADANI TERMINAL-MUNDRA		DATE : 23/02/2019		
				Report No : 07
Sr No	Activities			
1	Test station no	7		
2	Chainage No	4.300		
3	Location	FIELD		
3	Type Of Test Station	A		
4	Cleaning Inside /Outside	OK		
5	Painting of Test Station	Done		
6	Cable Connection Tightness	Done		
7	Repair/Replacement Requirement	Ok Condition		
8	Cleaning 1mx1m area (Housekeeping)	Done		
REMARKS :				
CHECKED BY SIGNATURE NAME DESIGNATION	 M/s. N R ENTERPRISE : Site In-Charge	REVIEWED BY SIGNATURE NAME DESIGNATION	: ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD	

adani		ADANI Ports And Special Economic Zone Ltd		Doc. No. :- APSEZL/NRAJB/R01 Page No. :- 1 of 1	
BASE : ADANI-MUNDRA		PIPELINE SECTION : AMC OF CATHODIC PROTECTION FOR SPM-IOCL PIPELINE			
NAME OF TR STATION : ADANI TERMINAL-MUNDRA		DATE : 23/02/2019			
				Report No : 08	
Sr No	Activities				
1	Test station no	8			
2	Chainage No	5.200			
3	Location	FIELD			
3	Type Of Test Station	A			
4	Cleaning Inside /Outside	OK			
5	Painting of Test Station	Done			
6	Cable Connection Tightness	Done			
7	Repair/Replacement Requirement	Ok Condition			
8	Cleaning 1mx1m area (Housekeeping)	Done			
REMARKS :					
CHECKED BY	: M/s. N.R. ENTERPRISE	REVIEWED BY	: ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD		
SIGNATURE		SIGNATURE	:		
NAME		NAME			
DESIGNATION	: Site In-Charge	DESIGNATION			

		ADANI Ports And Special Economic Zone Ltd		Doc. No. :- APSEZL/NRAJB/R01
		PREVENTIVE MENTAINANCE OF TEST STATION		Page No. :- 1 of 1
BASE : ADANI -MUNDRA		PIPELINE SECTION : AMC OF CATHODIC PROTECTION FOR SPM-IOCL PIPELINE		
NAME OF TR STATION : ADANI TERMINAL-MUNDRA		DATE : 23/02/2019		
				Report No : 09
Sr No	Activities			
1	Test station no	9		
2	Chainage No	5.900		
3	Location	IOCL Boundry wall		
3	Type Of Test Station	A		
4	Cleaning Inside /Outside	OK		
5	Painting of Test Station	Done		
6	Cable Connection Tightness	Done		
7	Repair/Replacement Requirement	Ok Condition		
8	Cleaning 1mx1m area (Housekeeping)	Done		
REMARKS :				
CHECKED BY SIGNATURE NAME DESIGNATION	: M/s. N R ENTERPRISE  : Site In-Charge	REVIEWED BY SIGNATURE NAME DESIGNATION	: ADANI PORTS AND SPECIAL ECONOMIC ZONE LTD : 	

ADANI Ports And Special Economic Zone Ltd

MUNDRA -KUTCHH

adani

MONITORING & MAINTENANCE OF TRU

Maint Base : Adani Mundra

Date of Monitoring : 23/03/2019

Name of TRU/CPPSM Location : TP 2

Pipelines :AMC OF CATHODIC PROTECTION FOR SPM-IOCL PIPELINE

1 Technical details of the Unit :

Manufacturer : Raychem RPG

Model : Cu,Cu,So4

Type (Oil Cooled/ Natural Air Cooled):

Year of Manufacture : 2011

S No of Unit:- 11007

Input Voltage (AC / DC) : 230 V +/- 10 %

Output Rating (Voltage/ Current Range) : 25 V / 25 A

Is unit fitted with built-in Interrupter

NO

2 VISUAL INSPECTION & OBSERVATION :

2.1 Operation of door lock(s) : **OK / OK**

2.2 Earthing of unit : **OK / NOT-OK**

2.3 Is door closing properly : **NO**

2.4 any Indication of overheating/ burning : **NO/ YES**

2.5 Transformer oil level : **OK / NOT-OK / NA**

2.6 Cleaning & Air Blowing : **Done / Not-Done**

2.7 Any leak/spillage of OIL observed : **NO/ YES**

2.8 Tightening of connections : **Done / Not-Done**

2.9 Front panel indications : **OK / NOT-OK**

2.1 Interrupter : **NOT Available**

2.11 Condition of Front panel : **OK / Not-OK**

2.12 Condition of all Analogue Panel Meters : **OK / NO**

2.13 Lightning arrestor at Output : **NOT OK**

2.14 Condition of all Digital Panel Meters : **OK / NO**

2.15 Lightning arrestor at Input : **NOT OK**

2.16 Backup power supply condition : **Available/Not available**

3 WORKING PARAMETERS :

Unit	Parameter	Value	UoM	Remarks
TR / CPVCM / CPSSM	3.1 INPUT VOLTAGE (AC / DC)	254	volt	
	3.2 INPUT CURRENT (AC / DC)	0.88	amp	
	3.3 OUTPUT VOLTAGE	2.92	volt	
	3.4 OUTPUT CURRENT	3.4	amp	
	3.5 MODE of Operation	AUTO		
	3.6 Feed Voltage (-V) (Internal)	1.1	volt	
	3.8 Drain PSP (-ve Volt)	1.2	volt	
	3.9 PSP VALUE W.R.T. REF - 1 (-ve volt)	1.106	volt	
	REF - 2 (-ve volt)	1.206	volt	
	REF - 3 (-ve volt)	NA	volt	
	4.0 Circuit Resistance (V/I)	0.859		
4	Any other observation/ discrepancy	1)TR unit working ok		

Reviewed by(APSEZL)

Signature :

Name :

Designation :

Monitored by (N R ENTERPRISE)

Signature :

Name :

Designation :



ADANI Ports And Special Economic Zone Ltd

Mundra -Kutchh

P.S.P. MONITORING REPORT OF ICCP SYSTEM

MAINT. BASE : Mundra

PIPELINE SECTION : AMC OF CATHODIC PROTECTION FOR SPM-IOCL PIPELINE

Date : 23/03/2019

Criteria for PSP as per OISD 226 / 12.3.5 A or NACE SP0169-2013/ 6.2 underprotected level (-0.85 volt); Overprotected level (-1.2 volt) wrt Cu-CuSO4 reference Electrode

SR. No.	TLP No.	TYPE	Location (detail description)	Chainage (km)	PSP (-ve volt)	Casing PSP(-V)	AC V	Un Protected PSP(- V)	Remarks
1	1	E	Nr. Insulating Joint	0.000	1.040		0.043	0.88	
2	2	D	After Railway Crossing	0.425	1.340	0.66	0.035		
3	3	A	field	1.400	1.200		0.037		
4	4	A	field	2.400	1.330		0.021		
5	5	A	field	3.000	1.300		0.032		
6	6	D	Road crossing	3.440	1.290	0.76	0.032		
7	7	A	field	4.300	1.290		0.035		
8	8	A	field	5.2	1.280		0.034		
9	9	A	IOCL Boundry wall	5.900	1.280		0.041		
10	10	E	Inside IOCL	6.200	1.280		0.037		

B)

Feeding TRUnit/ CPPSM Locations >>	TP2
Feed Voltage (DC volt) :	2.92
Feed Current (DC amp) :	3.4
AC voltage (50Hz) at input of TRU/CPPSM:	230V

Graphical Representation (Annexure) : **Included**

Any other observation/ discrepancy :

Pipeline is well protected

Reviewed by (APSEZL)

Signature :

Name :

Designation :

Monitored by

N R ENTERPRISE

Signature :

Name :

Designation :

GRAPHICAL REPRESENTATION OF ON PSP MEASURED

DESCRIPTION OF PL:

AMC OF CATHODIC PROTECTION FOR SPM-IOCL PIPELINE

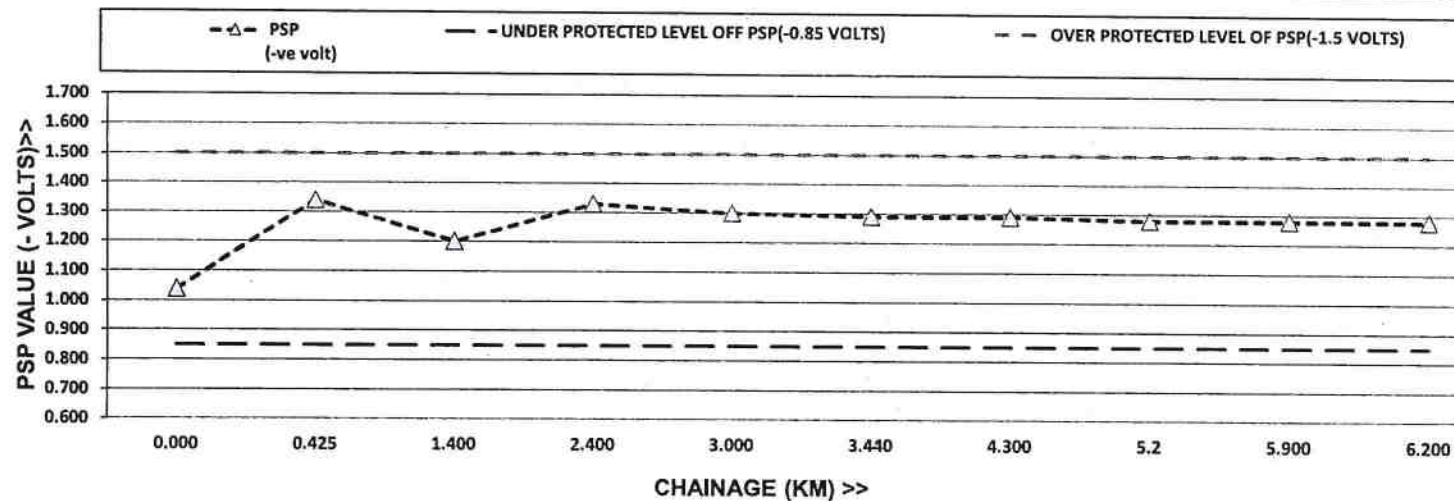
MONTH: Mar-19

MAINT BASE:

Mundra

CP CONTRACTOR:

N R ENTERPRISE



LEGENDS

OBSERVED ON PSP (VOLT)	***** (GREEN DOTTED)	
UNDER PROTECTED LEVEL OF PSP (-0.85 VOLTS)	----- (BROWN BROKEN)	(CRITERIA AS PER OISD 226 / 12.3.5 A OR NACE SP0169-2013/6.2)
OVER PROTECTED LEVEL OF PSP (-1.5 VOLTS)	----- (DARK RED DASHED)	(CRITERIA AS PER OISD 226 / 12.3.5 A)
NOTE: PSP VALUE MEASURED WRT CU-CUSO ₄ PORTABLE REFERENCE		

Signature

ANNEXURE – 5

❖ 30 m Pipeline Marker



ANNEXURE – 6

Adani Foundation, Mundra



ANNUAL REPORT 2018-19

For a better tomorrow

Adani Foundation

Adani House, Port Road, Mundra – Kutch 370 421

[info@adanifoundation.com] [www.adanifoundation.com]

Our Journey

The year 2018-19 has passed off with passion and courage to work for the commitment given to the community. It is essential that sustained growth is achieved at rural level along with the industrial development. This can be made possible by involving more and more people in the rural development programme.

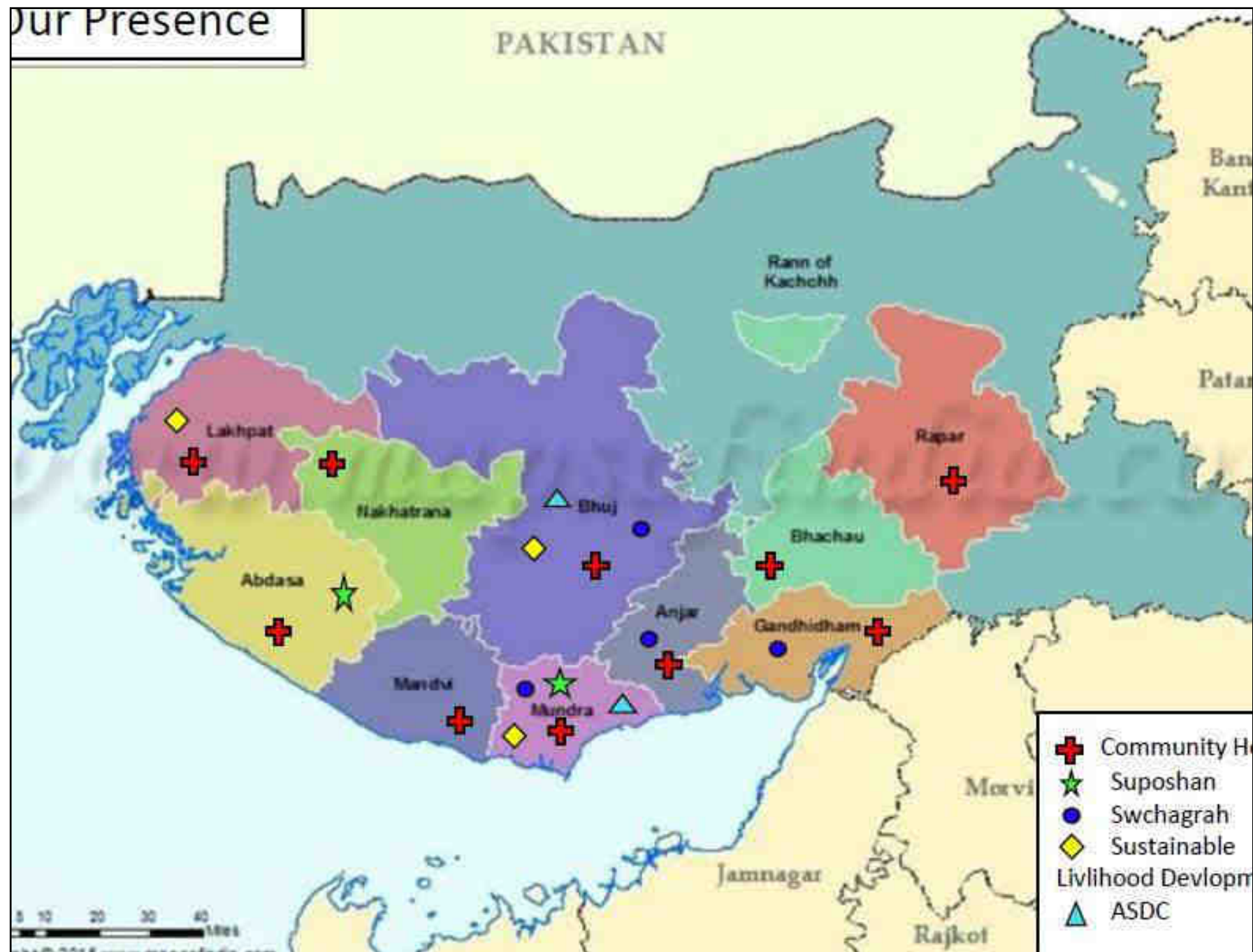
Since 1996, The Adani Foundation Mundra is committed to the cause of the deprived and underprivileged. It has been working relentlessly across 6 Talukas, covering 81 villages, to uplift the lives of more than 42,000 families with a multi-faceted approach.

This year conceded with more streamline projects of Education i.e. Utthan – to enhance primary education of 17 schools of Mundra, milestone achievement in malnourishment project, Launched Swachhagraha in four talukas and 400 schools of Kutchh, considerable impact created by fisherman amenities projects and new era defined in agriculture projects i.e. tissue culture and fodder sustainability .

The people of Kutch, especially that of Mundra, have generously supported the activities carried out by the Adani Group or else this wouldn't have been possible. Their determination, understanding and commitment have strengthened the development even more.

Thanks to Mr. Rakshit Shah and Mr. Avinash Rai for being mentor of the team Always !

Our Achievement would not be possible without the ultimate support by Mr. P N Roy Chaudhry, Executive Director - AF and plentiful faith and passionate support by Dr. (Mrs.) Priti G Adani, Chairperson– Adani Foundation



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Education



Beneficiaries Detail

🚩 2598 Students	: 17 Schools Utthan
🚩 2300 Enrollment Kit	: 118 Schools
🚩 704 Students	: Dignity of Workforce
🚩 345 Mothers	: Mother's meet
🚩 5542 Students	: 116 Institute Udaan
🚩 387 Students	: Adani Vidya Mandir
🚩 206 Teachers	: Guruvandana- I,II,III,IV

Project Utthan

Project Utthan : Adani foundation has been promoting various educational and human initiatives in education, community health, sustainable livelihood and Rural Infrastructure.

In this context with an aim to enhance the quality of primary education in Kutch district, Adani foundation adopted 17 government school located at Mundra Taluka under the project 'UTTHAN' a drive of quality education.

Adani foundation is expected to achieve visible and measurable important in scholastic area.

Adani foundation will be focusing to bring the positive evidences of change in the personal, behavior and academic development of the students.



Kick Start of “Utthan”

School improvement and teachers development is a multilayered approach. Therefore, school reform and initiative need to be carefully planned and executed by involving all stakeholders. In the process of implementing school improvement programme, teachers play critical role in institutionalizing change initiative.

A number of activities have been taken into account bring about change and enhance quality education in schools by Government, NGO and CSR,

From Year 2018 – Government of Gujrat has given responsibility through memorandum of understanding of 17 Schools for academic and overall development of school under Project “Uthhan” to Adani Foundation. Many workshops and training programmes are organized to improve the quality of education and support government schools.

In Utthan, main focus on upbringing of students (Priya Vidhyarthi) to the minimum level of reading, writing and counting (Vachan, Lekhan and Ganan). For making this mission successful, para teacher is appointed for each school.

Apart from this, English is introduced from standard first to create strong base. Also distributed science kit, sports kit, music kit to all 17 schools along with library cupboard and 100 books.

Smart class is given to all 17 schools with proper training to teachers for optimum utilization.



Objective of “Utthan”

- To improve basic knowledge of Math, Languages, English and Computer among students of Govt. schools.
- To Raise Minimum Level of weak students

Output of “Utthan”

- Increase enrolment ratio of students to 100%
- 100% regular present of students in school
- To improve their arithmetic, reading capacity in various languages, English etc.
- To increase confidence level of students
- Involvement of local community, village leaders and local Govt. through various activities

Outcome of “Utthan”

- Students of class 1th to 7th in government schools will take interest in activity based learning.
- Community and teachers will be positive and satisfy from this education project.
- Increase interest of students in school, they develop knowledge and understand importance of library.
- Education friendly environment development in school as well as in community.



Expected impact of “Utthan”

- Vachan, Ganan and Lekhan strengthening in Priya students
- Education department of Gujarat government will include activity based learning in regular course curriculum.

Implementation Partners of “Utthan”

DPEO/TEPO/BRC will provide guidance for implementation and experts will visit on an interval of 6 months to evaluate the project.

Proposed Activities “Utthan”

- Training of Government School Staff
- Reading, Writing and Maths improvement as per Gunotsav Data
- Development of Teaching Learning Material
- English Language
- Role Model Activity in assembly
- Reading Corner Activities
- Monitoring and Evaluation



Shala Praveshotsav



To motivate children for schooling by providing the welcome kit / education kit and to create conducive children for "joyful learning" Environment for children for Learning during shala Praveshotsav Govt. has wide spread network of 111 Govt. primary schools in total 62 villages of Mundra Taluka, 3 villages of in Anjar taluka, YMC school, AVMB and two villages of Mandvi Taluka (118 Schools) every year on an average 2550 to 2700 children gets enrolled in 1st std in Taluka For 2018-2019 total 2300 children got enrolled & Adani foundation provided the "Enrollment kit" to all new enrollee in Taluka

Mother's Meet

To motivate parents to maintain regularity of school, health hygiene and cleanliness we scheduled 3 mothers meet per week, which is really beneficial for student's overall growth. We arrange quiz completion for mother's to update their general knowledge.





Summary of year 2018-19 for Project "UDAAN"						
NO.	MONTH	SCHOOL/ COLLEGE	BOYS	GIRLS	TEACHERS	TOTAL
1	Apr -18	27	1381	515	108	2004
2	May -18	31	1107	827	105	2039
3	June - 18	30	1333	579	107	2019
4	July - 18	29	1280	727	116	2123
5	Aug -18	29	1256	770	109	2135
6	Sep - 18	28	1317	606	107	2030
7	Oct -18	29	1318	682	107	2107
8	Nov - 18	26	1045	575	87	1707
9	Dec - 18	33	1052	928	110	2090
10	Jan - 19	31	1250	763	113	2126
11	Feb - 19	31	1196	577	96	1869
12	Mar - 19	31	1274	585	104	1963
Total		355	14809	8134	1269	24212
Local 2018-19		201	5543	3710	467	9720
Total						33932



Project UDAAN

Mundra has created a position for itself by creating capacities in Port Handling, Edible Oil Refining and Power Generation. With a vision to familiarize, educate and inspire the future generation to become successful business leader, engineers, managers and other professionals, the Adani Foundation organizes Education Exposure visits to Mundra for High schools and educational institutes in Various parts of Gujrat.

Total 3270 educational institutes has visited and 236032 beneficiaries of the project till date and 33932 beneficiaries during current year.



Adani Vidya Mandir, Bhadreshwar

Class	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
1 st	53	40	45	41	38	40	40
2 nd	26	68	46	41	39	37	37
3 rd	27	40	73	45	37	39	39
4 th		39	48	70	44	36	36
5 th			37	46	58	39	39
6 th			37	36	46	58	58
7 th			34	37	35	44	44
8 th			39	34	36	34	34
9 th				38	38	30	30
10 th					23	27	30
Total	106	187	359	387	394	384	387

In Bhadreshwar, Mundra, the Adani Vidyamandir has completely revolutionized the education scenario. Only the children of families with an income of less than 1.5 lakh are admitted to this school. Along with quality education, the school also focuses on providing nutritious food, uniforms and other services to the children for free. Currently, 387 students, from Std. 1 to Std. 10 are studying in the school. Out of these 134 children come from the fisher folk community. Many students are the first generation in their families to attend school.



AVMB Std.-10 Second Batch Result 2018-19

Adani Vidya Mandir Bhadreshwar achievement in Gujrat Board Standard 10th Examination Result 92% (25 students have passed the examination out of 27). Adani Foundation will take all responsibility of further study of students with respect to their interest.

AVMB STD - 10 SECOND BATCH RESULT		
Year 2017-2018		
SR NO	GRADE	STUDENTS
1	Above 80 %	1
2	Above 70 %	3
3	Above 60 %	5
4	Above 50 %	9
5	Above 40 %	7
6	Fail	2
	TOTAL	27

ENVIRONMENT SUSTANABILITY

The Environment Impact Assessment (EIA) Notification, 2006, issued under the Environment (Protection) Act, 1986, as amended from time to time, prescribes the process for granting prior environment clearance (EC) in respect of cevoain development projects/activities listed out in the Schedule to the Notification.

Sustainable development has many important facets/components like social, economic, environmental, etc. these components are closely interrelated and mutually re-enforcing. Under Corporate Environmental responsibility 10 km radious villages from SEZ Boundaries.

To make connections between human actions and the level of biological diversity found within a habitat and/or ecosystem, this year we launch project "Sanrakshan" in coordination with GUIDE. MOU has been signed with Dr. Thivakaran – GUIDE for conservation of five spices of mangroves.



SUJLAM SUFLAM JAL ABHIYAN

The state government announced its 31-day water conservation drive called 'Sujlam Suflam Jal Abhiyan'. The campaign was launched on "Gujarat Gaurav Din" on May 1, which is the foundation day of Gujarat state. Moreover, the government aims to revive 32 rivers in the state and also to create storage capacity in existing village pond.

Inauguration by GOG Hon'ble Minister, MLA and DM Kutch and other guest day on 1st may at Gundala village taluka Mundra by Adani foundation, Mundra

During 1st may to 31st may AF Mundra had completed deepening work in 26 pond works as per given target by District Collector Kutch in 19 villages . Total excavation done 51723 Cum. Total storage capacity created 51.72 million liters. These works done as per government guidelines.





Borana- Artificial bore well recharge –work completed



Mangara- Artificial bore well recharge – work completed



Dhrub- pond deepening work – work completed

PARTICIPATORY GROUND WATER MANAGEMENT

At the turn of millennium, the state watched with growing alarm the steady depletion of its ground water and launched massive drive to achieve water security in Mundra region. As a part of pre monsoon activities with ACT (Arid Communities and Technologies – NGO) we have carried out following work.

But, due to negligible rainfall we are not able to find out outcome of this project.

PROJECT "SANRAKSHAN" - BIODIVERSITY



The mangrove biodiversity enrichment project in and around Adani ports special economic zone limited (APSEZL) aims to introduce select true mangrove species on a pilot scale in suitable coastal belts and assess their survival. Because this project is the first of its kind, the expected survival rate is between 20-30%.

The project is currently in its initial stages of establishing nurseries and sowing seeds of several different species brought in from multiple locations in and outside of Gujarat state. These nurseries have been developed in tidal flats near the village of Luni, Kutchh, Gujarat.

The mangrove seeds/propagules) for the establishment of the nursery were brought in from various locations in India, namely, Machilipatnam (Andhra Pradesh), Pondicherry (Tamil Nadu), Parangipettai (Pichavaram Mangroves, Tamil Nadu), Kandla (Gujarat) and Jamnagar (Gujarat).

In most of these locations, there is adequate fresh water supply available due to high/substantial rainfall and/or presence of major rivers (also important river confluences and deltas that give rise to a thriving estuarine environment). Consequently, the mangrove species that successfully grow in those regions are adapted to a low-salinity environment (where salinity is approximately 20 ppt) against that of 37-44 ppt prevailing in Kutchh coastal waters. Furthermore, the species selected to establish the biodiversity enrichment project also belong to this group of mangrove species. This subsequently creates a challenge for the team heading this project because the Kachchh region does not provide adequate salinity ranges for survival of most of these species. In fact, it provides an extremely harsh saline environment (salinity can range up to as high as 44 ppt during summer).

Considering the above-mentioned scenario, the site selection criteria, need for species of high salinity tolerance and studying their natural occurrence in Kutchh becomes critical in ensuring a substantial survival rate of the mangrove species selected to potentially successfully establish a diverse and resilient mangrove community in the Kutchh region.

Furthermore, a highly diverse set of mangrove species will ensure resilience in the face of changing climate and could probably provide as a thriving gene pool and seed bank in the future for the Kutchh region.

Table 1: NURSERY STATUS AS OF SEPTEMBER 2018

Sr. No.	SPECIES	LOCATION (FROM)	SITE	DATE OF ARRIVAL IN BHUJ	DATE OF SOWING	NO. OF SEED-BAGS ESTABLISHED	NO. OF SEEDS IN EACH BAG	TOTAL NO. OF SEEDS SOWN	APPROX. SURVIVAL RATE TILL DATE
1	<i>Aegiceros corniculatum</i>	Parangipettai		Sept 21	Sept 25	2000	2	4000	
		Kandla							
2	<i>Excoecaria agallocha</i>	Pondicherry		Sept 22	Sept 26	4000	10	40000	
3	<i>Rhizophora apiculata</i>	Machilipatnam		Sept 22	Sept 26	4000	1	4000	
4	<i>Ceriops decantra</i>	Parangipettai		Sept 21	Sept 25				
		Machilipatnam		Sept 22	Sept 26				
5	<i>Bruguiera gymnorhiza</i>								
6	<i>Xylocarpus moluccensis</i>	Machilipatnam		Sept 22	Sept 26	1360	1	1360	
7	<i>Bruguiera cylindrica</i>	Machilipatnam		Sept 22	Sept 26	1500	1	1500	
8	<i>Ceriops tagal</i>	Jamnagar		Sept 15					

Community Health Mundra



Project Details	Beneficiaries (Nos.)	Remarks
Mobile Van	19092	OPD Numbers
Rural Clinic	22256	OPD Numbers
Senior Citizen	10161	Transactions
Medical Camps	4384	Patients
Awareness Sessions	987	Participants
Needy Patients Support	1022	OPD/IPD
Shakti Raksha Project	624	Breast n cervix Cancer
Dialysis	5	Patients (2 times a week)
Suposhan	17025	Mundra and Bitta

Total beneficiaries : 75556



Healthy mind remain in healthy body which create healthy community to make healthy Nation.

Adani Foundation relentlessly working for community in health care area through various kind of activities i.e. Mobile Dispensaries, Rural Clinics, Special Innovative Projects - Health Card to Senior Citizens, "SuPoshan"- Fighting to Mal nourishment in Mundra and support to dialysis patients projects. Adani Foundation also organizes special medical camps during disease outbreak.

Mobile Dispensaries & Rural Clinics



The population of Mundra block is spread over various villages. Due to inadequate transportation facilities, the villagers have to face many hardships even for reaching to the doctor in case of common diseases.

The medical expenses and zero earning per day add surplus to their hardships.

To help them in the above mentioned health related problems, the service of mobile medical van has been started by the Adani Foundation in Mundra block. In big villages, rural dispensaries have been started considering their population and area.

The Adani Foundation runs mobile health care units. Main objective of Mobile Van is to reduce travel time, hardships and expenses. Mobile health care units cover 34 villages and 05 fishermen settlements. Around 109 types of general and life saving medicines are available in these units. It has turned out to be a boon for women and children as the service is availed at their door - step.

Month	Mobile Van	Rural Clinic
Apr-18	1508	1466
May-18	1397	1491
Jun-18	1236	1533
Jul-18	1523	2166
Aug-18	1512	2103
Sep-18	1796	1726
Oct-18	1832	2068
Nov-18	1386	1628
Dec-18	1897	2187
Jan-19	1684	2013
Feb-19	1743	2037
Mar-19	1578	1821
Total	19092	22256

Mobile Dispensaries & Rural Clinics



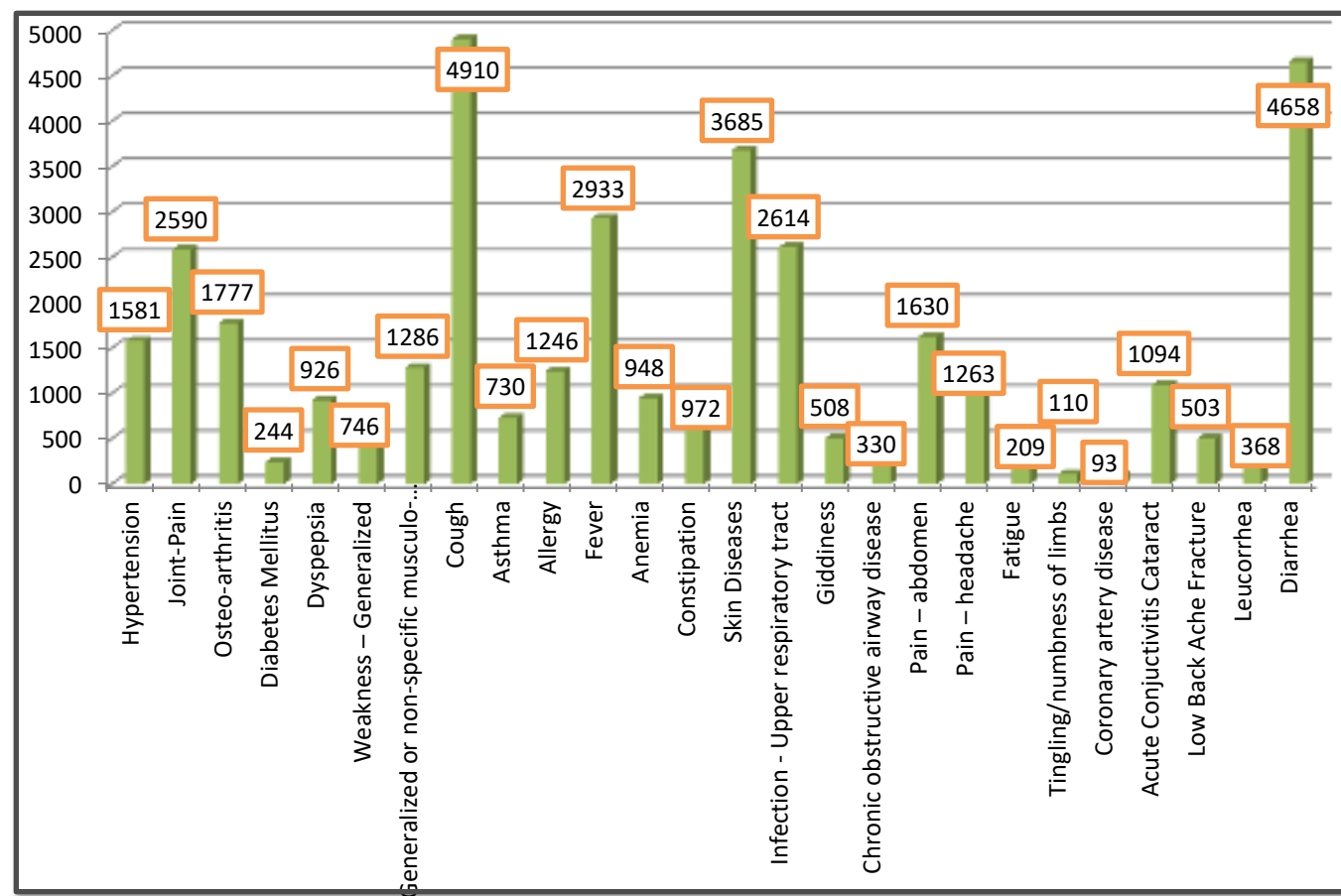
The Adani Foundation operates Rural Dispensaries in 08 villages of Mundra block, 03 villages of Anjar block and 01 village of Mandvi block along with one at Rangoli gate. At these dispensaries, health services are provided free of charge for two hours daily by a doctor and a volunteer.

Sr.No	Villages Name	Total
1	Rangoli Gate	510
2	Luni	6,203
3	Wandh	1,272
4	Siracha	3,794
5	Vadala	1,513
6	Bhadreshwar	1,411
7	Tuna	743
8	Vandi	1,443
9	Rampar	519
10	Tunda	831
11	Tragadi	893
12	Navinal	1,732
13	Labour Colony	53
Total		22,256

Diagnosis	MV	RC	Total
Hypertension	664	917	1581
Joint-Pain	978	1612	2590
Osteo-arthritis	979	798	1777
Diabetes Mellitus	72	172	244
Dyspepsia	699	227	926
Weakness – Generalized	164	582	746
Generalized or non-specific musculo-skeletal pain	430	856	1286
Cough	2478	2432	4910
Asthma	292	438	730
Allergy	266	980	1246
Fever	1404	1529	2933
Anemia	525	423	948
Constipation	406	566	972
Skin Diseases	1980	1705	3685
Infection - Upper respiratory tract	899	1715	2614
Giddiness	220	288	508
Chronic obstructive airway disease	36	294	330
Pain – abdomen	703	927	1630
Pain – headache	589	674	1263
Fatigue	93	116	209
Tingling/numbness of limbs	25	85	110
Coronary artery disease	16	77	93
Acute Conjunctivitis Cataract	831	263	1094
Low Back Ache Fracture	333	170	503
Leucorrhea	298	70	368
Diarrhea	2134	2524	4658
Total	17514	20440	37954

Mobile Dispensaries & Rural Clinics

MV & RC Disease specific pattern reported in the month April-18 to March-19





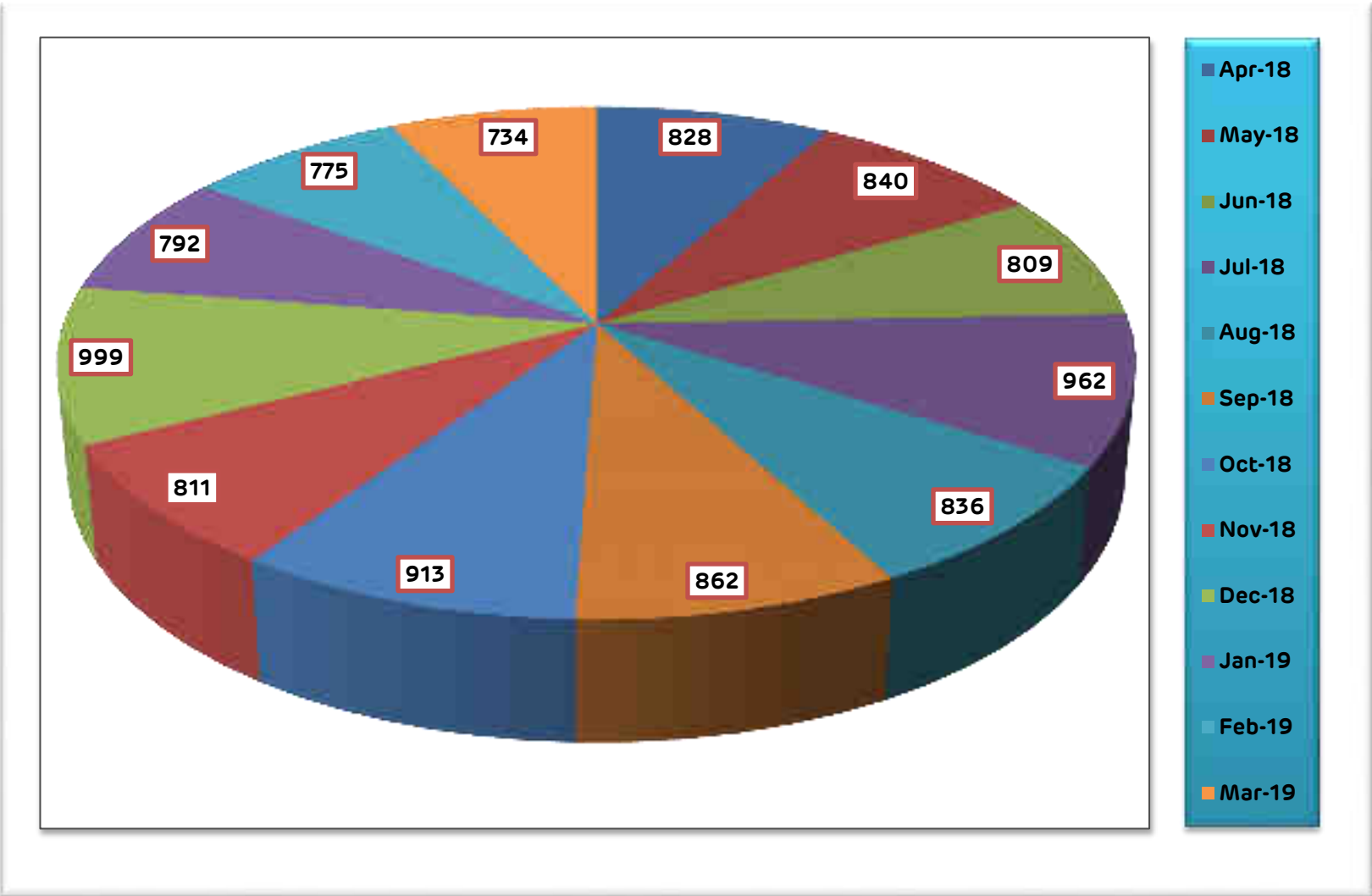
Health Cards to Senior Citizens

The major junctures of human life are - childhood, adulthood and old age. The first phase is well looked after by the parents and second phase is of self-reliant but the last phase is a dependent one. The needs of old people are less looked after. When people become old, they start living a life of aloofness and solitude. Therefore, the Adani Foundation has started the Adani Health Programme for the aged to look after their health. To address the health care issues related to ageing, AF launched a 3 year long pilot project – 'Adani Vadil Swasthya Yojna' on 20th February 2011 at Mundra and further extended the same for the next three years i.e. up to 2017. Under this Programme, the individuals aged 60 years and above are benefitted. Health Cards are issued to them with the purpose of providing adequate and timely treatment. The families consisting of aged ones with a yearly income of Rs. 2 lacs or more get a Blue Card. The Blue Card holders can avail diagnosis facility and treatment at a subsidized rate in the Adani hospitals, Mundra. The families with a yearly income of less than Rs. 2 lacs are issued a Green Card. Green Card holder aged people get treatment for illness in Adani hospitals, Mundra with an aid up to the limit of Rs. 50,000/- within a period of 3 years.

During the year 2018-19, total 10161 transactions were done by 8599 card holders of 66 villages of Mundra Taluka. They received cash less medical services under this project. Scheme is continue since eight years. The third phase of this scheme was started in last year. The limit for the beneficiary was set to 30000/- within a period of 3 years. the senior citizens get emergency medical care at Adani Hospital, Mundra and they are referred to GAIMS

Sr.Citizen card utilization status April-18 to March-19

Month	OPD/IPD
Apr-18	828
May-18	840
Jun-18	809
Jul-18	962
Aug-18	836
Sep-18	862
Oct-18	913
Nov-18	811
Dec-18	999
Jan-19	792
Feb-19	775
Mar-19	734
Total	10161



Suposhan

Suposhan Project endeavors to address the issue of vicious cycle of Malnutrition and Anemia with a life cycle approach that includes community based management. The project is more focused on preventive measures.

Objective of the Project is to reduce occurrence of malnutrition and anemia. For successful implementation of the project, "Sangini – Village Health Volunteer" plays major role in the Project.

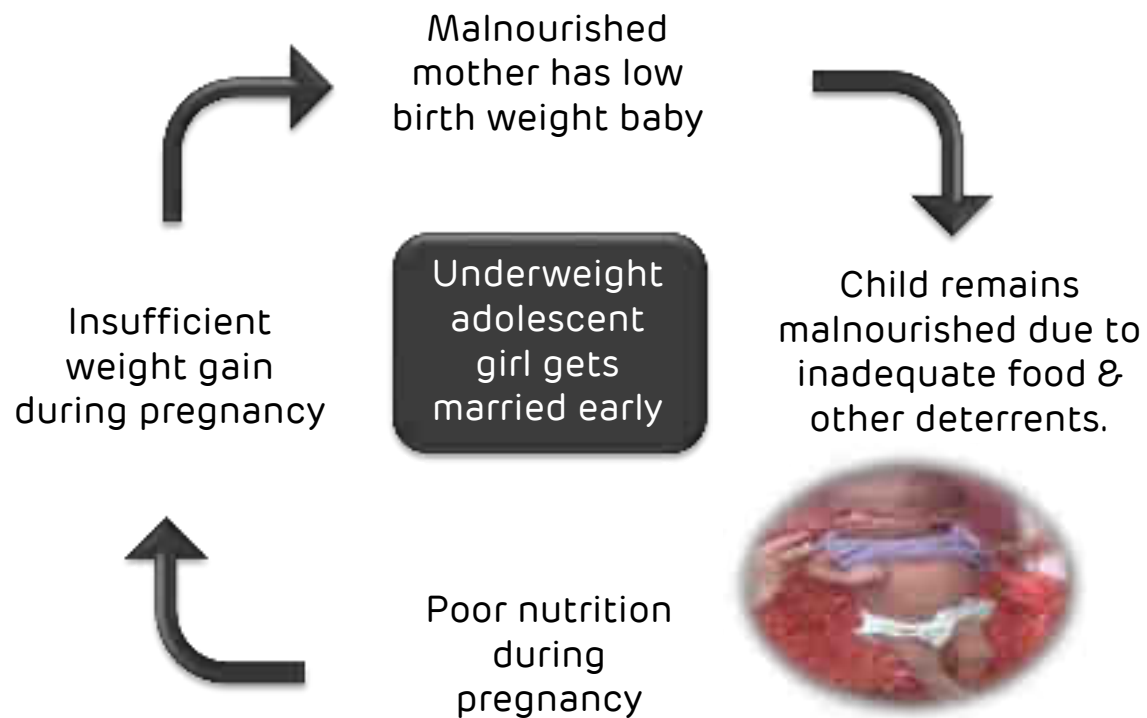
Mundra : 61 Villages

Bitta : 7 Villages

Beneficiaries : 17025

No	Detail	Mundra	Bitta	Total
1	Anthropometric(Children)	5901	647	6548
2	Adolescent – HB Testing	2950	395	3345
3	RPA – HB Testing	5884	1109	6993
4	SAM / MAM to NORMAL	104	35	139
5	FGD	737	228	965





A child's entire life is determined in large measures by the food given to him/her during his/her first five years because childhood is the period of rapid growth and development. Nutrition is one of the most influencing factors in this period. Malnutrition substantially raises the risk of infant and child deaths, and increases the vulnerability to a variety of diseases in later life.

Project Suposhan is initiated with the Motive

Curb malnutrition amongst Children, Adolescent girls and Women in our CSR villages.

- **To reduce malnutrition and anaemia amongst Children 95 % & adolescent girls and pregnant & lactating women by 70 % in three years**
- **Reduction IMR and MMR**
- **Support Awareness & Cover 100 % Vaccination taken by Child & women.**
- **Interventions with ICDS and Taluka health Office**
 - CMTC Center started again after our written request to DDO Office
 - Distribution of EDF(Energy Dense Food) by THO to 23 Children who are in SAM Category

Community Engagement Activity





Suposhan Saptah

The birth of a healthy newborn child is determined by the health of the mother. Mother's health, in turn, has its basis on her health status during adolescence. The health of a society, as a whole, thus depends on the health of the women, in all stages of their lives. Adani Foundation acknowledges this field of health and aims to address women's health, through their entire life cycle. These efforts have culminated in Project Suposhan, Adani Foundation Health initiative. Project aims to generate awareness in communities and facilitate the strengthening of the health systems and healthcare delivery platforms, with a specific focus on the mother and child. Project focuses on increasing health literacy in communities for mothers, child and adolescent health services through trained community health workers (Sangini), creating effective referral linkages to higher services. SuPoshan "Food Guidance Week" celebration systematized in all 61 villages in Mundra Taluka from 13th Nov – 20th Nov. Suposhan Food competition was organized in coordination with ICDS block and Supervisors, Sarpanch, ASHA workers and women leaders. The reason behind celebrating "Suposhan Food Guidance Week" is to make people aware about the importance of nourishment so that everyone is able to live healthy life. It involves community by · The importance of Nutrition and Balanced Diet · Importance of locally available food. · Preparing own variety nutritious dishes, · Folk songs on nutritious, · Slogans with actions, · Spreading awareness on different schemes, · Vaccination · Kitchen garden and · Exclusive Breast Feeding

Specialty camp, General Camp & Surgical Health Camp

Sr.no.	Place	Villages Name	Total Patinets
1	Jat Malek Muslim & Maheshari Samuha Sadi At Mundra	Mundra	178
2	Malaria Camp Sukhpar Mundra	Mundra	36
3	Karva E Mustfa Hospital Health Camp	Mundra	50
4	Mahesh Nagar Primary School	Mundra	190
5	Muslim Jamat Samuh Sadi, Luni	Luni	40
6	Rotary Hall, Mundra Surgical Mega Camp	Mundra	185
7	Mithani Labour colony Health camp	Dhrub	80
8	Shri Swaminarayan Mandir-Baroi Boad	Baroi	191
9	Mithani Labour colony Health camp	Dhrub	105
10	Jain Derasar, Oshwal Seri	Mundra	56
11	Bava Gor Pir Uras Luni	Luni	525
12	Mundra Kadva Patidar Samajvadi Health Camp	Mundra	92
13	Nana Kapaya Primary school health camp with Rotry club	Nana Kapaya	170
14	Luni Maheshwari Samaj Samuh Iagan	Luni	517
15	Bukhari pir uras	Mundra	106
16	Activity Hall Gundala	Gundala	65
17	Ashlambhai Labour colony Health camp	Dhrub	315
18	sonal Bij Health Facility	Zarpara	2
19	Ayushman bharat camp Zarpara Panchyat	Zarpara	19
20	Kapilbhai Labour colony Health camp	Dhrub	140
21	Surgical Mega Camp- Art-comace college	Mundra	109
22	Ayushman bharat camp Art-comace college	Mundra	28
23	Juna Bandar Health camp	Mundra	105
24	Eye checkup camp with THO & Rotry	Mundra	388
25	Vallabha vidyalay Health camp	Dhrab	485
26	General health camp	Juna bandar	107
Total...			4384



Urinary stone – Dialysis Treatment



Drinking water of Mundra contains high Fluoride (amount of salt). Hence, the proportion of patients with urinary stone and kidney failure is more . A project for patients who need dialysis is thus initiated so that the poor patients can receive the treatment at subsidized rates in the nearby, well-equipped hospitals. The main objective of providing dialysis treatment is to help the extremely needy patients to live a healthy life.

Total 5 Patients were being supported for regular dialysis (twice in a week) by participatory approach.

Health Awareness season Programme

Awareness generation program play crucial role to creak and achieve social transformation for same to create awareness about Health and critical disease various kind of session had been organized.

Sr.no.	Session Topic	Villages Name	Total Beneficiaries
1	Woman Health	Bocha	35
2	Brest & Cervical Cancer & Woman Health	Lifra	20
3	Brest & Cervical Cancer & Woman Health	Desalpar	25
4	Woman Health	Dhrub	28
5	Woman Health	Mundra	125
6	Health & Hygine awareness session	Mota Kandagara	51
7	Anaemic & Suposhan	Samaghogha	50
8	Beast Censor Awareness	Nani Bhujpur	40
9	Gyneac Awareness	Mundra	28
10	Beast Censor Awareness	Dhrub	30
11	Health & Hygiene awareness session	Pragpar-2	20
12	Health & Hygiene awareness session	Wandh	155
13	Swain flu awareness season	Nana kapaya	390
Total....			987

Community Health Bhuj



- @ 5274 Patient Care and Coordination
- @ 48 Health Camps 25000 beneficiaries
- @ 543 Dead body referred by carry van
- @ 272 Ayushman Gold Card facilitation
- @ 631 Needy patient support
- @ 3560 Mahiti Setu
- @ 1137 Students School health Camps
- @ 36417 Direct Beneficiaries
- @ Covered 293 Villages



Gujarat Adani Institute of Medical Sciences

Gujarat Adani Institute of Medical Science is the first Medical College of Kutch region. It started in partnership with Adani Group and Government of Gujarat in the year 2009. This college was affiliated by the Medical council of India in the year 2014 for the MBBS with 150 seats per year. Gujarat Adani Institute of Medical Science is affiliate with the first digital university "Krantiguru Shyamji Krishna Verma Kutch University". In GAIMS, currently 750 students are studying, The GAIMS Medical College is situated in heart of Bhuj city on a large plot of 27 acres.



A teaching hospital (G K General Hospital) with 700 beds is established with GAIMS in which patients of Kutch are getting subsidized medical facilities. The Hostel facility is also available for the students in the campus only. The accommodation facility is given to the staff of GAIMS.



- Adani Foundation Team has initiated coordination with GKGH hospital since 2014 and established a reception area for the smooth patient coordination and preparation for the social networking program.
- Adani Foundation organized **48 General Health Camps and Speciality Camps in various interior villages of Kutch in coordination with GKGH which created magical impact and benefitted 25000 patients.** Adani Foundation Bhuj Health team has also organized more than Eleven awareness camps and village level meetings at 293 villages of Kutch regarding services of GKGH.
- Dead body medical van – Dignity to death is one of the noble initiatives taken up by the Adani Foundation. If any death occurs in GKGH, dead bodies are shifted to the native village of the concerned in the Kutch District free of cost. Total 543 dead bodies privileged till now to different locations in Kutch.

Patent Care and coordination



Sr. No.	Month	Total Patient Special Care in OPD and IPD level
1	April to June	1190
2	July to September	1507
3	October to December	1505
4	January to March	1072

In the financial year 18-19 we specially care total 5274 patients from our sites Mundra, bitta and tuna,

Ayushman Yojana

As soon as Government announced for Ayushman Yojana, we started process to enroll Golden card to the eligible families by organizing camps at village level in each taluka

Sr. No.	Month	Total no's ayushman card enrolment
1	December	145
2	January	20
3	February	42
4	March	65
Total		272



Shakti Raksha – Preventive and Curative Breast and Survival Cancer

Adani hospital Mundra, Taluka health office, Indian Red Cross society and Adani foundation has initiated Shakti Raksha Project in which special gynecologist camp for detection of breast n survival camp and thalassemia testing for pregnant women at CHC MUNDRA. In first phase we have covered all PHC and susceptible cases has been referred for pep test and mammogram at GKGH, Bhuj.

In this project we have covered 103 villages of Mundra and Bhuj this year with curative measures. Most medicine will provided by Taluka health office.

We have covered total 624 patients and 120 cases were referred to GKGH Bhuj. In which two cases diagnosed with breast lump (not malignant).

Sr.No	Place	Gaynec	Thelesmia testing	Total Beneficiary	GAMIS Refar Patients
1	Mundra CHC	62	34	118	25
2	Zarpara PHC	26	6	32	5
3	Moti Bhujpur PHC	54	15	86	18
4	Mota Kandagara PHC	42	11	53	10
5	Nani Tumbadi PHC	55	14	69	12
6	Vanki PHC	48	7	55	8
7	Ratadiya PHC	79	11	90	17
8	Bhadreshwar PHC	52	14	66	11
9	Adani Hospital Mundra	183	0	183	11
10	GEB PHC sub center	23	0	23	3
Total....		624	112	775	120





School Health Camp

``Safe child``

Adani Foundation is regularly organizing health camps in primary government school with support of GKGH. Current year we have carried out check up of 1137 students in Bhuj Taluka.

Month	Nos of camps	Nos of School students
August	1	219
September	2	308
November	2	410
December	1	200
Total	6	1137

Arogya Saptah (8th – 14th August 2018)

Adani foundation, Adani Hospital and GAIMS have Jointly Celebrated "Arogya Saptah" 8th to 14th August-2018 in Respect of 72th Independence of our country. Celebration included multi specialty camps, Workshops, truckers health check up, surgical camp on foundation day and adolescent fair at different part of district. Collector, DDO, Minister, MLA and other dignitaries from NGOs had remained present. Objective of the program was to avail health benefits at GKGH and also at Adani Hospital Mundra and Approximately 4500 people will be direct beneficiaries of the program. (2144 Direct beneficiaries)

Day	Date	Event Name	Detail about Event	Beneficiaries
1	8 th August 2018	Specialty Mega Camp	Specialist doctors i.e. Gynaecologist, Paediatrician, Nephrologists and general surgeon from GKGH had extended their services.	218
2	9 th August 2018	Cervical/Brest cancer Screening & Awareness camp	In SOS gada village screening camp organize with preventive awareness session. 17 women critically suggested for further check up at GKGH.	113
3	10 th August 2018	Haemoglobin Testing camp	Haemoglobin testing and awareness for de warming of 917 adolescent girls at Rapar village.	917
4	11 th August 2018	1. Surgical Mega Camp, Mundra 2. Roa accident Awareness programme, Nakhtrana	1. Specialist Doctors from Adani hospital Mundra and Medical officers of Adani foundation had extended their services. 2. On occasion of Adani foundation ay session for Road accident awareness and safety including primary health check up camp was organized at Nakhatrana.	223 172
5	12 th August 2018	Class-4 Staff CPR and first aid training	Class-4 Staff CPR and first aid training was organize in campus of G K general hospital for capacity building of staff and their motivation.	181
6	13 th August 2018	Adolescent fair, Gadhashisha	Adolescent fair was organized at Gadhashisha high school in which lady gynaecologist had cleared doubts of the adolescent girls and given information.	170
7	14 th August 2018	Asha Worker workshop	Capacity building workshop was organized for ASHA workers of urban and rural bhuj.	150

Arogya Saptah (19th – 28th January 2019)

Adani foundation, Adani Hospital and GAIMS have Jointly Celebrated "Arogya Saptah" 19th – 28th January 2019 in Respect of Republic day our country. Celebration included multi specialty camps, Workshops, truckers health check up, surgical camp on foundation day and adolescent fair at different part of district. Collector, DDO, Minister, MLA and other dignitaries from NGOs had remained present. Objective of the program was to avail health benefits at GKGH and also at Adani Hospital Mundra and Approximately 4500 people will be direct beneficiaries of the program. (Direct beneficiaries – 1342)

Day	Date	Event Name	Detail about Event	Beneficiaries
1	19 th January 2019	Workshop for Counseling for Overcome Exam fear.	Workshop Dr.Prutha Deshai (Psychiatrist) she explained about how to reduce Exam Fear and Stress.	250
2	20 th January 2019	Cataract Detraction Camp	Cataract Detection Camp organized at khavda village. In this camp 12 patients were referred in GAIMS hospital Bhuj for further treatment.	322
3	20 th January 2019	Surgical Camp Mundra	Specialist Doctors from Adani Hospital Mundra and Medical officers of Adani foundation had extended their services.	78
4	21 st January 2019	Medical Checkup Camp Swaminarayan Temple	All Shankhyogini Women from Swaminarayan Temple Bhuj were examined by gynecologist and Total blood check up was organized.	209
5	22 nd January 2019	Infection Control Awareness Training	Conducted Training on infection control and antibiotic medicine by Dr Gurudas Khilnani and Dr. Kashyap Buch .	170
6	23 rd January 2019	Anganwadi worker and Asha Training	Training of ASHA and Anganwadi worker conducted by Dr. Hashmukh Chauhan and Dr. Shardul chorasiya.	25
7	24 th January 2019	Multi Specialty Health Camp	Multi speciality Camp was organized at Rapar in which Gynec, Eye Specialist, physician and orthopaedic Doctors had extended their services	203
8	25 th January 2019	Medical Checkup camp of journalist and family	This unique initiative covered all journalists of Kutchhh for health check up and awareness sessions	85

Glimpse of health week



Mahiti Setu



Sr. No.	Month	Total
1	November	814
2	December	814
3	January	764
4	February	889
5	March	279
		3560

"Mahiti Setu"

Objective of Community resource center is to leverage the Government Schemes and making them accessible to community – It's a sustainable community connect!

Mahiti Setu has created trust and easy access to various government schemes – outreach will increase with time and awareness.

SUSTAINABLE LIVELIHOOD DEVELOPMENT PROGRAM

Empowering lives and broadening their scope for economic opportunities, Adani Foundation's initiatives introduced under 'Sustainable Livelihood Development Program', have been founded on community based approaches. In the villages at Mundra Taluka, several communities are economically side-lined and weaker that depend on a sole income source or are unemployed. Sustainable livelihood projects have been launched to cater financial independence through building local partnerships, providing diverse livelihood avenues, inculcate the attitude to establish savings, equipping to earn and updating local skills by making use of existing resources to encourage self-reliant lifestyles. Participation is encouraged by launching specific projects for fishermen communities, farmers and cattle owners, youth and women.





Fisherman Amenities work

- 🚧 391 Students : Education Support
- 🚧 134 Stunners : Adani Vidya Mandir *
- 🚧 16 Fisherman : Alternate livelihood
- 🚧 78 Fisherwomen : Linkages for schemes
- 🚧 1312 Fisherman : Community Engagement
- 🚧 1086 Fisherman : Potable water provision
- 🚧 6261 Mandays : Mangroves Plantation *
- 🚧 231 Fisherman : Capacity Building
- 🚧 3280 Direct Beneficiaries

166 Fisherman for mangroves planation
AVMB beneficiaries can count seprately

Education

Education is one of the most important stepping stones to bring about a unified development in any community. The Adani Foundation, through its rigorous surveys and assessments, could understand that it was education which should be taken up to bring about a real change in the status of the fisher folk communities. Following are some of the major education initiatives taken up by the foundation:

Balvadi		
Sr.	Village & Bandar	Children
1	Juna bandar	55
2	Luni	25
3	Zapara-Chhacha	27
4	Bavadi bandar	30
Total		137



Vidya Deep Yojana

A great amount of efforts were put in developing school preparedness programmes by empowering 'Balwadis' at Fisher folk settlements. Under the Machhimar Vidya Deep Yojana, Adani Foundation constructed four Balwadis for kids between the age group of 2.5 years to 5 years at different settlements. The programme is inclusive of nutritious food, awareness on health, hygiene, cleanliness, discipline, regularity and development of basic age appropriate concepts.

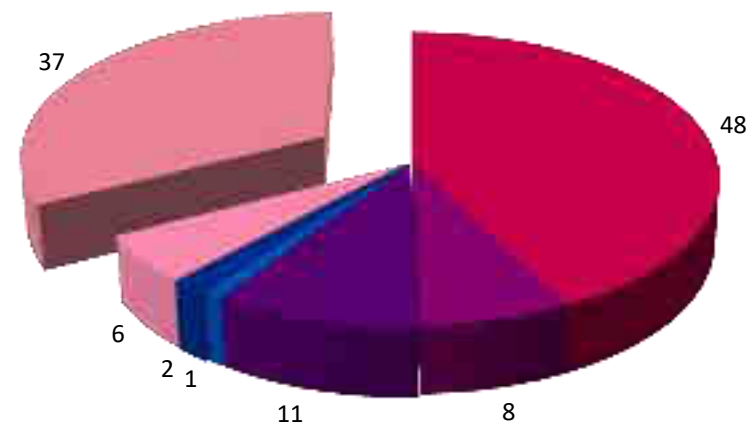


Vidya Sahay Yojana- Scholarship Support

Participatory scholarship support for fisherman children studying in SMJ high school Luni and to above 12th standards Students . 80 percentage support given by Adani foundation and 20 percentage support by parents! They willingly agree for the same.. We also encourage them for technical education for good job opportunities.. Total 66 students has been benefitted.

This year 68 students were given book support and 8 students were given cycle support for higher secondary study.

Education Analysis



■ Study in Higher Secondary ■ ITI ■ College ■ LLB ■ B.ed ■ Personal Shop ■ Job

Rather than learn their children, fishermen joined them in their traditional business due to lack of awareness. But Since Adani foundation has started various kind of education initiative like Balwadi , Scholarship support, Cycle support, Book support, free education in AVMB, Transportation support, skill development training ,we bring them in the Ocean of education. By the job placement and motivation we can transform 37 fishermen youth life who have good job and others one continue their further study as below.

Machhimar Arogya Yojana

A healthy person can work well and earn for his family. Hence it is necessary to provide medical facilities to cure and prevent them and to provide then the treatment of diseases prevailing among the people specially women; children and elderly person, especially due the lack of balanced nutritious diet.

Mobile Health Care Unit - the mobile dispensaries have been run by the Adani Foundation since 2009. The mobile dispensary is available not only in the Vasahats/Settlements but also near the coast where the fishermen, can avail the facilities as and when needed. **Total average 560 fishermen were benefitted by Mobile Dispensary during last half year.**

1. Apart from this, a number of subsidiary initiatives such as health awareness camps, medical check-ups, etc. are conducted by the Adani Foundation at frequent intervals, to provide the fisher folk community with the much needed and required information and assistance.
2. Medical Financial Support –Adani Foundation has extended financial assistance to more than **114 financially challenged patients** from the Fisher Folk Community in case of medical urgency during this year.
3. Health Card for Senior Citizen Project – This is one of the major and prominent and the most innovative project of the Adani Foundation. Under this scheme Health Cards were given to the to Senior Poverty Stricken Citizens to provide them financial support to combat with their health related needs. The project for the senior citizens is popularly known as **Vadil Swasthya Yojana** and till date **350 senior citizens** from fisher folk community are enrolled in the scheme. Most of them keep these cards in their wallets with other important documents and cards.



Machhimar Shudhh Jal Yojana

This scheme of providing potable water has helped in reducing the drudgery of women and contributed largely towards general wellbeing.

Water tank platforms have been constructed and tanks have been set up in order to provide clean potable drinking water to the community. Daily 1,18,000 Litres of water is supplied at different settlements.

Potable Water		
Sr.	Vasahat	Total liters/ day
1	Juna Bandar (By APSEZ)	30,000
2	Luni Bandar	15,000
3	Randh Bandar	25,000
4	Bavadi Bandar	15,000
5	Veera Bandar (By AKBTPL)	10,000
6	Ghavarvaro Bandar (By AKBTPL)	8,000
7	Kutdi Bandar (By MSPVL)	15,000
Total		1,18,000

Linkages with various Departments

Coordination with coast guard, Marine Department and Fisher folk for smooth Port operations Regular Meetings with fisherman for various innovate technology for fishing

Machhimar Kaushalya Vardhan Yojana

Apart from providing formal education, special programmes were conducted to enhance youth employability. Based on the need of assessment, a number of trades were introduced by the Adani Skill Development Centre in Mundra, where the fisher folk youth could join and get vocational training for a number of technical and non-technical skills.

Sr. No	Course Name	No of Students
1	Mud work Zarpara	45
2	Dori work, Navinal	20
3	Checker Cum RTG Crane Operator	03
Total		68



Machhimar Ajivika Uparjan Yojana

The 'Ajivika Uparjan Yojana' was implemented to promote and support alternative livelihoods among the Fisher folk communities during the non-fishing months. The Foundation introduced 'Mangrove Nursery Development and Plantation' in the area as an alternate income generating activity for the people of the region. Both men and women received training on Mangrove plantation, moss cleaning, etc. as per requirements. The Foundation provided them with employment equivalent to 6261 man-days. In addition to this, employment worth of 35787 man-days has been provided till date. The Foundation has also supported Pagadiya fishermen as painting laborers by providing them with employment and job in various field.



Innovative Project : Solar Tent Dryer

CIFT (Central Institute of Fisheries Technology) has been conducting a prototype study on Solar tent dryers with improved technology at their head quarters in Kochi, which is expected to be completed within a span of another three months. They may be able to upscale or replicate the technology once the study is completed. In all probability, they will provide the designs for the solar tent dryer for drying Bombay duck and / or *Acetus Indicus* with financial estimate by the first quarter of next year. Meanwhile the team from the HQ and Veravel centre can visit Mundra region for initial site visit and feasibility studies. CIFT requested our team to visit CIFT HQ at Kochi during coming months to assess the prototype model and understand more on other CIFT developed hybrid dryers

Fisherman Cricket league



Adani foundation, MUNDRA organized Cricket Tournament " Sixth Adani Premiere League among Fishermen community to promote healthy Sportsmanship and harmonically transparent relationship. The Tournament had been played for 13 days at SVC (Shanti Vihar Cricket Ground) by 6 matches per Days with full of Audience, Total 65 Teams with 780 Fishermen youth were participated with 550Rs. Contribution per teams from Mundra, Anjar and Mandvi Block. The Final Match was played on 9.07.2018 and Pir Saheb (Religious Mentor), Rakshit sir (Executive Director- APSEZ), Dr.A.k Vatsani (Deputy collector ,Bhuj) Mr. Mahesh Dafda (Assistant Director of Fisheries, Bhuj), Mrs. Pankti Shah(Unit CSR Head) ,AF staff and Fishermen Leaders remained present. The Final Match was so interesting and Salaya team becomes winner over Luni Team and more than 1200 Audience from various villages were present. The winner's trophy, Runners-up Trophy, Man of the Series, Man of the Match, Best Baller, and Best Bats-Man Trophy has been given to the Respective Teams and players. The 25000Rs, 15000Rs, 2100Rs, 1100Rs, and 500Rs, 500Rs Prize given to the above Respective Teams and Players from the Teams contribution.

Sea weed culture

Sea weed culture as alternate livelihood for fishermen has been started as pilot base with Vivekananda Research and Training Institute.

To create Fishermen alternate livelihood seaweed raft have been installed at Juna Bandar. After successful results we will support for more raft to fisherman as off season employment.

Natural sea weed which is available at Luni coast and being obstacle in fish net is collected and linkages with VRTI for selling.



Sorting Sieve : Time Saving for Fisher Women

During bulk fishing catch fisher women remain engage whole day to sort out fishes by hand this is time consuming and panic for them so, we provide wooden sorting sieve to sort out small fishes, which make them free from finger pain and time saving.

Adani foundation Mundra, Fisheries Department GOG & CMFRI(Central Marine Fisheries Research Institute) had organized sessions for alternate livelihood for fisher women, importance of savings, bank account and also usage of sieve for Fish sorting work along with 78 wooden sorting sieve distribution. Dr. Imelda Joseph, head & principal scientist of CMFRI, Cochin, Dr. Diu incharge of CMFRI, Veraval and their team had given guidance to all fisher women of Juna Bandar for alternate livelihood possibilities with examples.



Fisherman Ramatotsav

To Development of physical and mental Development of youth Ramotsav week Program was organized at various Vasahat i.e Junabandar, Luni, Zarapara, Bavdi Bandar and Navinal for 1st to 10 th standers .



This year Total 485 children were participated and all were facilitated with school bag as well as 1st ,2nd and 3rd prize from each game.

Fisherman Student Ramtotsav Programme-2018-19					
Date- 07-02-2019 to 16-02-2019					
Sr.No	Fishermen vasahat	Date	Students	Attendants	Total
1	Navinal	07-02-2019	47	150	197
2	Zarpara	08-02-2019	94	250	344
3	Zarpara(Chacha)	08-02-2019	81	300	381
4	Bavdibandar	11-02-2019	69	200	269
5	Lunibandar	12-02-2019	60	200	260
6	Junabandar	15-02-2019	134	350	484
Total			485	1450	1935

Agriculture & Animal Husbandry



- ❑ 755 Acre – 164 Farmers Drip Irrigation
- ❑ 380 Acre – 212 Farmers Maize Cultivation
- ❑ 56 Acre - 140 Farmers NB21
- ❑ 24 farmers Organic Farming
- ❑ 21 Numbers Bio gas Provision
- ❑ 387 IG Support and Sadhay Sahay
- ❑ 142 Central Govt. Scheme Beneficiaries
- ❑ 154 Pension Scheme Linkages
- ❑ 132 Women Empowerment Project
- ❑ **1364 Direct Beneficiaries**

Drive for Technology to use in agriculture



Adani Foundation puts efforts in Mundra block for consistent betterment in livelihood sector. The organization has carried out remarkable activities in the agricultural and animal husbandry sectors.

- We have initiated Programme for Awareness of Farmers in collaboration with KVK. The outreach is approximate 80 farmers of 5 villages
- The purpose of this project is to initiate village wise integrated agricultural & allied development for sustaining agriculture and socio economic situation of farming community of Mundra block.

Agriculture Programme		
Sr.no	Village Name	Member
1	Zarapara	40
2	Zarapara	42
3	Siracha-	26
4	Navinal	22
5	Dhrub	141
		271

Fodder Cultivation

The organization provides fodder during the time of scarcity and the last 3 months of summer every year. During this period, fodder is regularly sent to every village with the help of the local people. This has given stability to the families who earn their livelihood through animal husbandry.

In order to meet the demand of fodder, the Adani Foundation purchases it from the regional farmers. This gives them fair rates in return.

This year we have given 1,78,000 man fodder worth Rs. 402.00 Lacs approximately at Mundra, Lakhpur, Anjar, Abdasa and Rapar Taluka

But, For this Critical Condition some Sustainable Solution is required to find out

Fodder is the main issue as rainfall is very less in this region. Adani Foundation is working intensively in direction of fodder sustainability in three ways

1. Individual Fodder Cultivation Support – NB21 demonstration – Supported 140 Farmers of Dhrub and Zarpara
2. Drip Irrigation support Linkages with Fodder – First phase we will support drip irrigation in 22 villages and this linkages will help to convince them for NB21 at least in one acre land



3. Village Level Fodder Cultivation : Participatory Approach

- (a) Winter crop Cultivation – Support to 180 Individual
(Supported for seeds of Makai for 180 acre land)
- (b) Winter Crop Cultivation – Support to Group of Farmers (200
acre of land with 32 farmers)

We are also planning for grassland development at Village Zarpara and Siracha in Gauchar with mutual understanding with Gram Panchayat.

Win win situation of this project

- Cost saving initiative: Financial saving by Rs. 7.23 lac in three months. (15%)
- Assured of green fodder and supply
- Empowerment of farmers by providing livelihood
- Increase of Green fodder cover
- Milk productivity enhancement
- Fulfilment of double the farmer income concept of Govt. of India
- Crop rotation increases the soil fertility





PROJECT "DRIP IRRIGATION"

- **Basis of Requirements of Drip Irrigation**

The main source of livelihood being agriculture, the cultivators tend to use more and more underground water for irrigation. Underground waters have gone very highly saline. The use of such water for irrigation has made the soil also saline and the crop yields have dwindled.

- **Process of Drip Support**

Farmer have to applied in the prescribed form of Adani foundation with photograph. Inspection and verification will be by AF representative.

Ration card, work order of G.G.R.C, 7/12 certificate and all bills must be attached.

Farmer will be informed by telephonic to have form query.

Primary information about farmer land will be received by telephone.

Farm visit within 10 days of after received of application and verified the installation of system as per map and material as per bill will be checked and get farmer feed back.

Verification report submitted to account office.

Payment within 20 days if all document is complete through net banking.

Farmer economic study after our support.

- **Villages of Drip Support**

Keeping in view the situation and request comes from community, once again **Drip irrigation support is planned in three phase. As a part of first phase, we are considering 22 potential villages. We have covered 164 farmers and 755 acre drip irrigation area.**



Biogas

Biogas is a clean, non-polluting and low cost fuel. It contains about 55 to 75 percent methane, which is inflammable. Bio gas can be produced from cattle dung, human waste and other organic matter by a process called "Anaerobic digestion" which takes place in a biogas plant. The digested effluent, which comes out of the plant, is enriched manure.

The Multiple benefits of the biogas have changed many lives in rural areas. During this year 21 plants have been constructed. We are providing support addition to Government support to the beneficiary. (Under bio-gas scheme of government, the total cost is Rs.33, 500 out of which Rs.15, 000 will be granted by the government and out of the pending amount of Rs.18, 500 sum of Rs.10, 000 will be contributed by the Adani Foundation. The beneficiary will have to pay only Rs. 8, 500). Beneficiary women use the time, saved from cooking and fuelwood collection, to take up an additional economic activities.

Representation of Adani Foundation was invited as Guest of honor by Krishi Vigyan Kendra in 'Scientific Advisory Committee Meeting' . Main Objective of meeting was to study about present agricultural Scenario of Kutchh and new CROP Patter. Representative from ICAR ,GOG and Various NGO were present. We made presentation of our activities for sustainable agriculture in this forum.





Agriculture Fair



Adani Foundation has Participated in District Level Agriculture Fair for three days in first week of January. We had show case various activities of Adani Foundation in field of Fodder Sustainability, Bio Gas Support, Cattle care, water conservation and Biodiversity.

Adani Foundation was felicitated award for " To Develop Unique Model for Fodder Sustainability in Kutchh".

State Minister Mr. Vasanbhai Ahir has inaugurated this event. By this platform we could able to connect with approximately 12000 farmers of Kutchh District by providing guidance for NB21 and Maize Cultivation. We have also given information about Saheli Mahila Gruh Udyog and could also our products i.e. Eco Friendly bags, Banana Wafers and Washing powder.

Tissue Culture

Date is the Amrut Fal of Kutchh and Mainly best quality available in some villages in Mundra Taluka. To maintain quality uniformity Adani Foundation is planning for cultivate 4000 tissue cultured plants of elite varieties to the farmers of project area. For this, we will select best offshoots of elite plants from farmers fields in coordination with farmers groups. The selected planting materials will be given to identify tissue culture laboratory for developing tissue culture plants in 3 years. Hence, whole program is coordinating farmers participation basis having four party i.e. Tissue culture laboratory, Adani Foundation, KVK and farmers committee of project area. Major functions of all parties are as under;

• **TC Lab: Develop TC plantlets of elite varieties** • **Adani foundation: Financial support** • **KVK : Technical support to the program**

Farmers committee : Provide best planting materials for developing TC plants & contribution in distribution & provide nominal cost of plants. Hence, the farmers contribution in the program is 10 Lakh.

Ground work for this project is completed during current financial year i.e. Registration of 200 farmers, series of meeting with KVK and Anand University



Project Swavlamban

Project Swavlamban Launched with blessings of differently abled people of MUNDRA TALUKA.

Our objective is

- To increase awareness about Government schemes for Divyang people, widows and senior citizens and coordinate them with Social Welfare Department, GoG
- After getting income generation equipment support - Proper training provision to make them self-reliant in true sense!!
- Adani Foundation is playing the role of facilitator in case of tie up with Government Scheme for Widows, Senior Citizens and Handicapped people. The identity cards are issued for the handicapped in coordination with Bhuj Samaj Suraksha Khata which is beneficial for them to get specific kit for their disability type. This year 154 beneficiaries linked up with pension scheme.
- The financial benefit of the senior citizen Yojana is Rs. 500 per month and the widow scheme is of Rs. 1250 per month. Jilla Samaj Suraksha Officer and team remain present every time.

No	Type	Beneficiaries	Financial benefit
1	Disabled	409	10,00,000
2	Widow	92	3,25,000
3	Senior Citizen	32	1,75,000
	Total	533	15,00,000



Women Empowerment Projects



- In Kutch, the situation of women is miserable. Women are totally dependent on male members of family for their needs. Consumption of liquor is one of the main culprits in Kutch. Due to this evil prevalent among men many women are suffering.
- Considering this situation, We have started our training program with two major women's group of Villages near Adani Power and Adani Ports. Both the groups of women (**132 women in total**) successfully completed their training for preparing washing powder, phenyl, liquid for cleaning utensils and hand wash etc.
- We have selected 12 women groups having 132 members total, as per their ability for different work i.e. accounting, banking, leadership, marketing, administration etc.
- As a further step to bring sustainability, we thought to start a shop "Saheli Mahila Gruh Udyog" at Shantivan Colony.
- Main Perishable/ Non perishable items by Saheli are
 1. Washing Powder
 2. Phynayle
 3. Dish wash liquid
 4. Pickle of Bijora
 5. Suf handicraft
 6. Ahir Handicraft

Women Empowerment Projects

Step towards socio economic development

No	Village	Group	Members	Saving Amount	Work
1	Mota Kandagra	Jay Mekran	18	100	Stitching
2	Mota Kandagra	Jay Momai	10	200	Stitching
3	Navinal	Vishwas	14	100	Stitching/Dori
4	Navinal	Chamunda	10	100	Phynayle making
5	Baroi	Adhar	12	100	Perishable items
6	Sadau	Vishwasi	16	100	Dhadki, Frames
7	Shekhadia	Sonal	12	200	Washing Powder
8	Mota Kapaya	Tejasvi	10	100	Eco friendly bags
9	Mundra	Meghdhanushya	18	100	Mud work
10	Mundra	Aaarambh	20		Suf Handicraft
			132	1100	

Glimpse of Women Empowerment Projects

SHG Meetings in various Villages regarding record check , Loan , Interest detail also collect information for their hidden Skill.



Adani Foundation launched programme AAARAMBH to revive the dying art form of Suf in a ceremony in Mundra, Kutch. Under this project, Adani Foundation will facilitate the training of about 30 women in the handicraft and also help them with market linkages to ensure sustained livelihood for them. On the occasion, Adani Foundation also launched a website made by the women themselves to market their products.

Suf handicraft was practiced in Kutchh District, Gujarat. Due to lack of patrons this handicraft has been dwindling. Suf handicraft is painstaking embroidery based on the shape of a triangle. Suf is counted on the wrap and weft of the cloth in a surface satin stitch worked from the back. Each artisan imagines her design and then counts it out in reverse.



International Women's Day

International Women's Day Celebration Mundra



International Women's Day has been celebrated by the Adani Foundation, Mundra with Integrated Child Development Scheme. Chief Guest of the event was Mr. Komal Singh (Commandant Coast Guard) and Ms. Ami Rakshit Shah (APS School). Distinguished Guest Mr. Vayda (Taluka Development Officer, Mundra)

On this momentous occasion the supervisors of ICDS were felicitated for their noble work. Adani Foundation also honored Eight women entrepreneurs who were supported by the Adani Foundation, Mundra for income generation.

The Adani Foundation Mundra was also facilitated by the ICDS for their remarkable work in field of women empowerment and Suposhan as well.

Additionally, In coordination with DDO, Kutchh Pradhanmantri Mandhan Yojana form filled up for @ 225 women – who will give benefit of pension of Rs. 3500 per month after age of 60 years. Our Suposhan Sangini remained present and guided about nutrition.

As a Matter of Celebration, Same Day ICDS Mundra got state level Mata Yashoda award at Gandhinagar for best Anganwadi work.

Total 300 women attended the programme with great enthusiasm and Zeal.



International Women's Day Celebration Bhuj

International Women's Day has been celebrated by the Adani Foundation, Bhuj with SOS Gada Village, Bhuj Engineering College as well as Army force Bhuj. Chief Guest of the event was Dr. Kunika Patel (Gynecologist GAIMS) and Dr. Rajendra Harnagar (Gynecologist GAIMS) and Distinguished Guest was Mr. Mishra (Airport Authority, Bhuj)

As a part of Bhuj and Lakhpat CSR celebration International Women's Day in Various place Bhuj Engineering collage, SOS village and Bhuj Airport. Awareness for Breast and cervical cancer, and health - hygiene. Total 230 women are benefitted in this awareness session. Also discussed about various psychological issues during menopause age and its solution.

RURAL INFRASTRUCTURE DEVELOPMENT



Building a strong community relationship is the key to progress of Adani Foundation. The programs such as Education, Health and Sustainable livelihood development play a very important role in building this strong relationship with the community. These three programs are incomplete without the inclusion of the Rural Infrastructure Development program.

This year on path of sustainability, we have taken some steps as follows...

Under Dignity of Drivers Project, Adani Foundation has constructed Resting Shed for Drivers entering in SEZ Premises. Total 50 beds are constructed, drinking water and sanitation plus recreational – TV Facilities and will be charged minimum. Adani Foundation has handed over the project to ASSET Department – SEZ as a revenue generation model.

In this ceremony Mr. Avinash Rai (CEO- APSEZ), Mr. Rakshit Shah(Executive Director – APSEZ), Mr. Pritpal Sinh (Head – SEZ Operation) and other transporters remained present.



RID – Dignity of Workforce

Present condition of migrated labour community of Adani port, power and Willmar is really matter of concern. They are living in pathetic condition. It is true that we cannot achieve our goal of development until we support to up bring lives of this community. Basic needs of this labour force needs to be address. In labour Vasahats they are not getting facility of pure drinking water, proper living condition, sanitation or proper living atmosphere. To build up trust and transparency in labour community, union labours and Smooth business operations and to create more efficiency by providing better living conditions Adani Foundation has constructed 45 Toilet block and proper bathing place for labours.

Work Completed

- ✓ Road repairing various vasahat
- ✓ Open shed at Juna Bandar
- ✓ Sand Filling plot at JUNA BANDAR
- ✓ Concrete Step ladder at Juna Bandar
- ✓ House construction at Shekhadia
- ✓ Two approach road 5000 meter Zarpara Fishermen and 5000 meter Luni Pagadiya
- ✓ Drinking water storage tank 5000 ltr capacity bavdi Bandar -2, Juna Bandar -2, Kutdi Bandar -1
- ✓ water pipe line installation at Wandi village 2000meter.
- ✓ Basic amenities at Rampar Village Paver block 6000 LTR Storage tank and Boundary wall at community place.
- ✓ Additional civil work in community hall
- ✓ Open shed Gundiyali
- ✓ Boundary wall in common place at Tragadi.



An initiative by
adani
Foundation



Swachhagraha

Adani Foundation has launched project "Swachhagraha" Swachhata ka Satyagraha in the year 2015, to support the 'Swachh Bharat Abhiyan'. Falling in line with our Honorable Prime Minister's call for a Clean India, we launched this mass movement towards making our Nation litter free.

The programme draws inspiration from one of the largest mass movements - Satyagraha, which catalyzed action by winning over people's hearts through tremendous patience and resolve, instilling dignity and self-respect among our people. Swachhagraha aims to engage people and bring about a behavior change, where people get involved 'to create a culture of cleanliness'. Swachhagraha is inculcating behavior change education in cleanliness, sanitation, personal hygiene and civic consciousness amongst young minds.



Presently the Swachhagraha project is being implemented in 3000+ schools across 17 States. So far 3500+ teachers have been trained in behavior change education in schools, ranging from elite private schools to government municipal schools. The programme has directly involved over 57000+ students who have further reached out to their peers, parents and community through a variety of planned action projects and campaigns.

Mundra site- Adani Foundation launched Swachhagraha in 4 Blocks of Kutch District (Mundra, Anjar, Gandhidham, Bhuj). The Swachhagraha programme was launched in Bhuj with participation of over 450 Schools in Swachhagraha Prerak's Training Workshop with support of District Education Department, Kutch District. The programme was launched by Mrs. Shilin R. Adani, Trustee (Adani Foundation); Mr. Prabhav Joshi (DDO, Kutch), Mr. V.S.Gadhavi, (Director, Adani Foundation); Mrs. Sushama Oza, (Director, Adani Foundation); Mrs. Ami Rakshit Shah (Adani Public School); Mr. (Rakesh Vyas – DEO, Kutch); Mr. Sanjay Parmar (DPEO, Kutch) on 1st October 2018.



SWACHHAGRAHA - ACTIVITIES



Swachhagraha Marathon : Run Against Depression

Gujarat Adani Institute of Medical Sciences G K General Hospital and Student Counsel Organized the Bhuj Marathon. Theme of the marathon was Run against Depression and Swachhagraha. Total more than 800 participants took part in this marathon with enthusiasm and zeal.



International Coastal Clean up Day

Mundra Adani foundation MUNDRA has celebrated swachhagraha related International Coastal Clean up Day celebrated with Coast Guard" with theme swachhagraha.. School students, Coast Guard staff and Adani foundation staff had cleaned Mandvi beach and give a message of swachhagraha.. At the end information given about swachhagraha project



Adani Skill Development Centre



Adani Skill Development Centre (ASDC) is playing a pivotal role in implementing sustainable development in the state.

Several miscellaneous industries exist in Kutch district. Adani Skill Development Centre has started a center in Mundra block so that the needs of these industries are fulfilled, the local youth is enrolled in various training / skill courses and the distance between the both is minimized.

The objective of this center is to impart different kinds of training to the students of 10th, 12th, college or ITI from surrounding areas. Thus, various employment-oriented trainings are organized to optimize the skills, art and knowledge through proper guidance and direction.

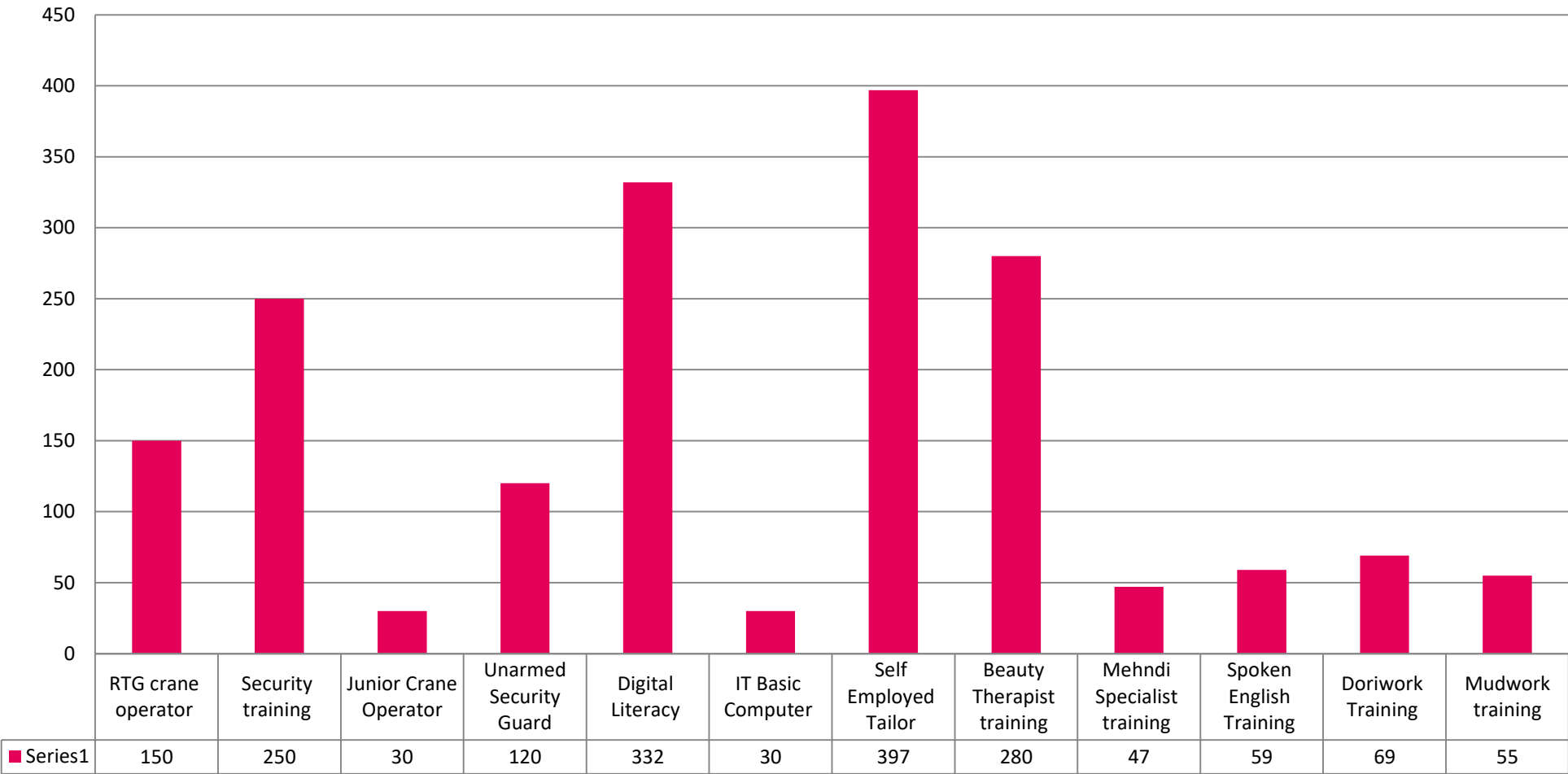
During this year Total 1819 people is given various trainings to enhance socio economic development.

Out of which 1294 People are getting employment or Self Employment and average income up to Rs. 5200 per month. Digital literacy training is very helpful in coordinating with today's Digital world....

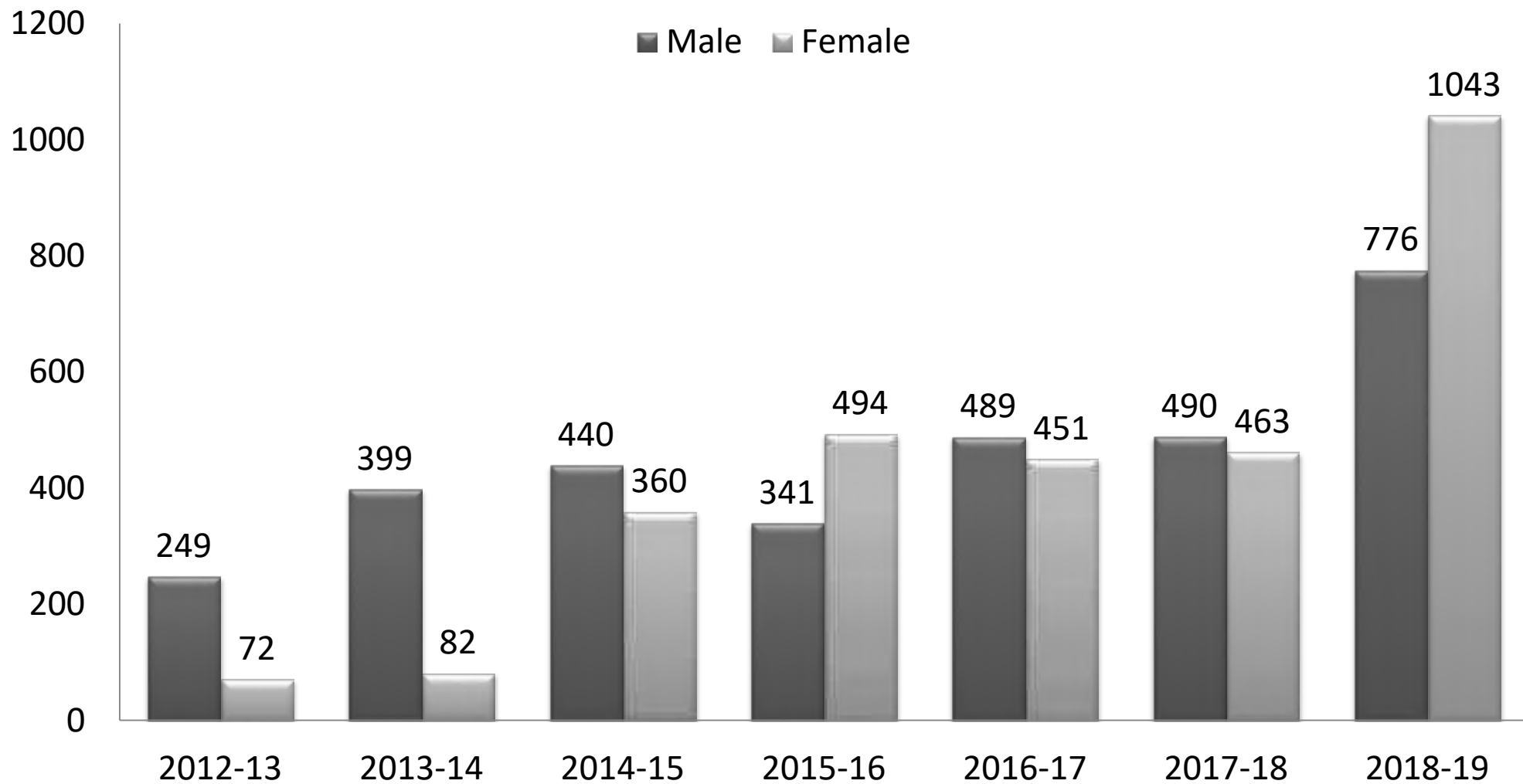
In the year 2018-19, ASDC trained 1819 candidates at Mundra.

THE YEAR IN REVIEW : KEY HIGHLIGHTS

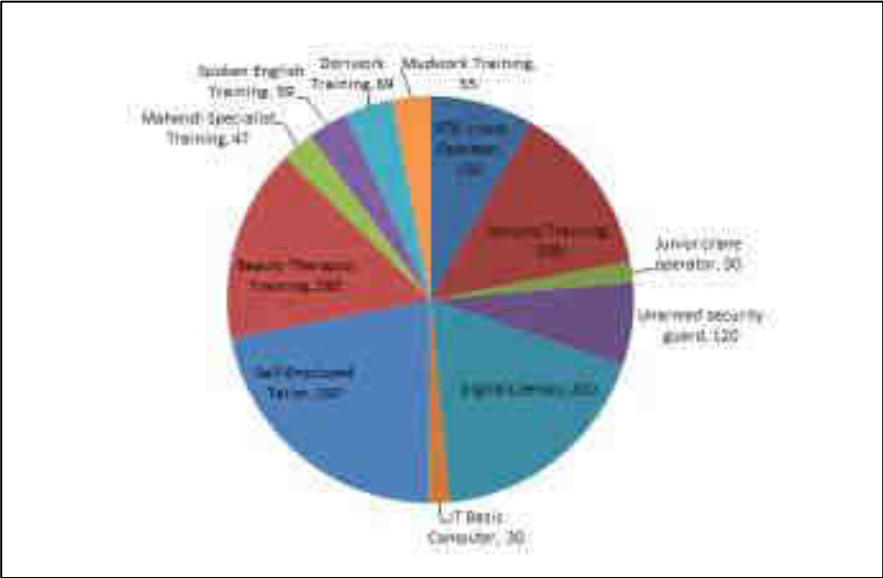
Training chart 2018-19



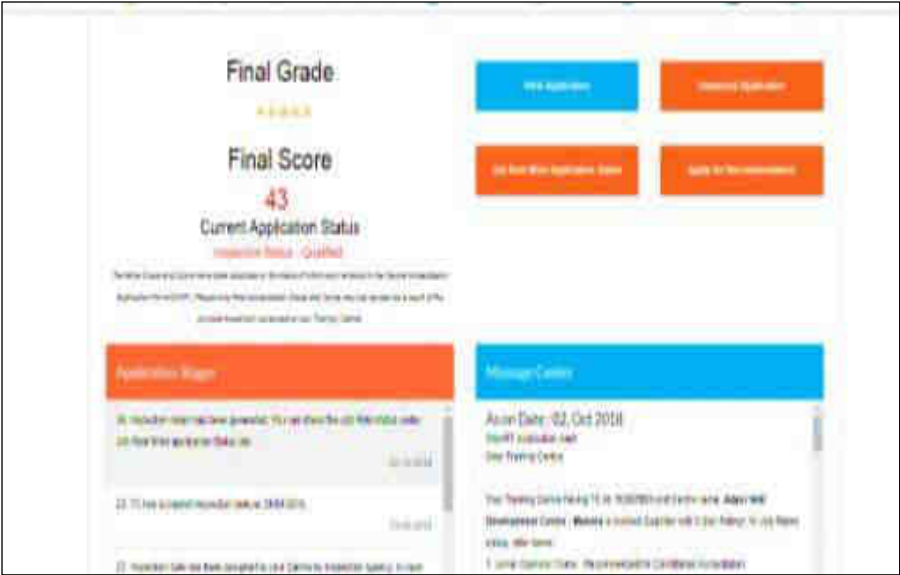
OUR PROGRESS MUNDRA



DETAILS OF VARIOUS TRAINING UNDERTAKEN



Adani skill development centre Mundra Placement figures of ASDC. Total 1294 people are getting employment after training with approximate ROI Rs. 5200 per month.



Adani skill development centre Mundra is qualified in NSDC with 5 star rating for job role junior crane operator and unarmed security guard.

LAUNCHED "SAKSHAM" CENTER AT BAROI GUEST HOUSE



ASDC-Baroi (Mundra):- Adani skill development Center (ASDC) launched 'SAKSHAM' center at Baroi guest house in Mundra on 16th June 2018 to provide skill development training to youth in the Mundra.

An initiative of Adani foundation, the center in the Mundra city will benefit about more than 500 candidates every year in Beauty & Wellness course.

The center will provide skill development training to the youths in the age group of 14-40years initially in Beauty & Wellness course. Total enrolled for this training were 90 students.

LAUNCHED "DIGITAL LITERACY" AT UTHHAN VILLAGES

Adani Skill Development center, Mundra has started digital literacy class in local village. 40 girls and boy are participated in first session. All village people are happy for this training in phase. We have also arrange evening batches to cover all people of various village.

Digital literacy training done through laptops and Tablets:-

- 1). The course duration is 26 days and number of hours is 52.
- 2). Per day training delivery hour is 2.
- 3). This is completely based on demonstrative and practical training methodologies.
- 4). The delivery is intended to be done through Desktops and Tablets
- 5). Attaching Also cover for payment banking topics .



LAUNCHED "JUNIOR CRANE OPERATOR" COURSE UNDER PMKVY



On 6th December 2018 launching program was organized at Adani house for (1) Junior Operator crane (2) Unarmed Security guard

Total 30 beneficiaries identified and registered for Junior operator crane PMKVY portal. Mr. Vasant Gadhavi Sir (Director of Adani Foundation), Mr. Avinash Rai (CEO, APSEZ), Mr. Rakshit sir (ED APSEZ), and all HOD remained present and all motivated by their speech.

STARTED UNARMED SECURITY GUARD COURSE UNDER PMKVY



Adani Skill Development Centre, Mundra received 120 candidates target of Unarmed Security guard training of PMKVY (NSDC). We have started 2 batch with 60 candidates of Unarmed security guard training at Adani Security training school at Mundra.

Adani Skill Development Centre - Bhuj



One more feather added in Cap of Project Saksham – Adani Skill Development Center started in Bhuj.

PMKVY certification received with Four Star Rating in October 2018.

We have started Adani Skill Development Center at Campus of Gujrat Adani Institute of Medical Sciences with a main stream course of “General Duty Assistant”. After that we started digital literacy, beauty and wellness plus stitching courses.

ASDC Bhuj got overwhelming response of district administration for organizing special batch for widows and coordinating for their placements.

We got prodigious rejoinder during training of visually impaired and hearing impaired students at Navchetan Andhjan Mandal Madhapar.

By the unique activities and coordination, ASDC Bhuj received huge amount of appreciation from media.

Total 663 Beneficiaries have taken training out of which 432 people are doing job or self employment.

In the year 2018-19, ASDC trained 663 candidates at Bhuj.

Training Details	Qtr.-1	Qtr.-2	Qtr.-3	Qtr.-4	Total
Digital Literacy	0	27	58	175	260
General Duty Assistant	59	55	83	00	197
Spoken English	0	14	0	0	14
Beauty & Wellness	0	35	18	79	132
Banking Related Training	0	0	0	60	60
Total	59	131	159	295	663



Event Celebration



Teacher's Day Celebration : Guru Vandana



- Teacher's day Celebration - Guruvandana' Program was organized under esteemed presence of Shri Prabhav Joshi (District Development Officer) and teachers of 106 government primary schools with great enthusiasm.
- Objective of the programme was "healthy mind resides in a healthy body which is why a health checkup is scheduled for all the teachers which included BMI, BP, RBS, HB and vision test. Health check was done by Adani hospital Mundra.
- Followed by a motivational speech by Dr. Darshana Dhodakiya who is the Director of Bhasha Bhavan of Gujarati Subject, Throwing light on the principle that teachers cannot be trained in to be coming a teacher, but they are teachers because they actually are born teachers.
- Soft skill training by Ms. Riddhi Trivedi who is a highly skilled trainer from ASDC and would explain us the importance and need of soft skills. A highly thought provoking drama by students of 'Shekhadiya' school. And last but not the least session taken by Mr. Jatin Upadhyay.

Utthan :

Review and setting tone

To review and propel the Project Utthan was scheduled on 18th February 2019 at Kamandpur Primary School and Dhrub. Distinguished Guest of the Programme was Mr. Prabhav Joshi – District Development Officer, Kutch , Mr. Rakshit Shah - ED, Mundra , Shri Vasant Gadhavi, Director - Adani Foundation. SMC members of the School and villagers were gathered in Kamandpur Primary School.

DDO appreciated this unique initiative taken by Adani Foundation to enhance the level of Primary education of Kutch district. He is happy for the concept of Mothers' meet which is the keen area of this project for sending students on regular basis. He requested to all the mothers to send their ward in school daily. He especially recognized the installation of Smart Classroom in all the 17 School.

SMC members were highly appreciated the material support and introduction of English language in classes- 1 to 4 by the teachers which were appointed by Adani foundation. Principal briefed the project and shared his satisfaction towards this project on behalf of 17 School Principal.

Villagers are accepted Project Utthan with open handed and broad minded. Around 130 people were witnessed of this program.



Uthhan : Anganwadi Upgradation

Under Project Utthan and part of early intervention Adani Foundation has upgraded Anganwadi infrastructure. To inauguration of the upgraded Anganwadi was scheduled on 18th February 2019 at Dhrub. Distinguished Guest of the Programme was Mr. Prabhav Joshi – District Development Officer, Kutch , Mr. Rakshit Shah - ED, Mundra , Shri Vasant Gadhavi, Director - Adani Foundation. ICDS members remained present to motivate the Anganwadi supervisors.



Coastal Week Celebration with Indian Coast Guard



During celebration of coastal week - Safety and Security awareness program for fishermen while fishing as well as health check up camp and fishermen shed inauguration program was organized at Juna Badar with collaboration of Indian coast guard department. In this occasion Mamlatdar of Mundra, Commandant of coast guard and Mr. Ashvin Zinzuvadiya (Media : Kutchh Mitra) were present. Mainly they emphasized on national security as well as Personnel security in their speech.

Health camp was organized with support of Adani Hospital Mundra. Total 107 patients were benefitted by health check up camp and prize distributed to winner of Ramaotsav program.

Fisher Folk Amenities..

Adani foundation, MUNDRA organized Cricket Tournament " Sixth Adani Premiere League among Fishermen community to promote healthy Sportsmanship and harmonically transparent relationship. The Tournament had been played for 13 days at SVC (Shanti Vihar Cricket Ground) by 6 matches per Days with full of Audience, Total 65 Teams with 780 Fishermen youth were participated with 550Rs. Contribution per teams from Mundra, Anjar and Mandvi Block. The Final Match was played on 9.07.2018 and Pir Saheb (Religious Mentor), Rakshit sir (Executive Director- APSEZ), Dr. A.k Vatsani (Deputy collector ,Bhuj) Mr.Mahesh Dafda (Assistant Director of Fisheries, Bhuj), Mrs. Pankti Shah(Unit CSR Head) ,AF staff and Fishermen Leaders remained present. The Final Match was so interesting and Salaya team becomes winner over Luni Team and more than 1200 Audience from various villages were present. The winner's trophy, Runners-up Trophy, Man of the Series, Man of the Match, Best Baller, and Best Bats-Man Trophy has been given to the Respective Teams and players. The 25000Rs, 15000Rs, 2100Rs, 1100Rs, and 500Rs, 500Rs Prize given to the above Respective Teams and Players from the Teams contribution.



Celebration of World Environment Day at High School, Moti Khakhar

- Plantation of 1111 trees in Moti Khakhar high school ground in coordination with forest department : Moti Khakhar is a Village in Mundra Taluka .It is located 19 KM from Mundra. School is constructed in year 2008 and it is with large ground. Principal requested Adani Foundation to support for tree plantation in area. As per size of ground we can plant more than 1000 plants. In addition, Soil condition is also appropriate. Adani Foundation contacted Forest Department for Tree plantation before monsoon and Forest Department supported for 4000 plants. After getting support from Forest Department – Adani Foundation supported for Drip and Fence for protection of plantation. On 5th June 2018, Adani Foundation Mundra planted 1111 trees at Moti Khakhar. Function was scheduled by Gram Panchayat. Mr. Vyas (District Education Officer),Mr. Anjan (DCF, Mundra), Mr. Saxena (COO, APSEZ),AF Team, students of the school and Village leaders remained present



Talent Hunt: International Disability Day

Adani Foundation is working intensively for differently abled in Mundra Taluka since 4 years in coordination with District Social Welfare Department. Till date we could able to support more than 560 Divyang in Mundra Taluka .

In celebration of International disability day, Adani Foundation organized Music and Painting competition at Taluka Level and Zone Level.

For Winner s of Zone level – District level competition was organized on 3rd December 2018.

With the blessings of almighty, divine Start of the program with blessings speech of District social Defense officer and Laljibhai Prajapati of Navchetan Andhjan Mandal.

Total 675 people from different institutes remained present in inaugural session. All Divyang participants remained present with full preparation.

Some glimpse of the programme Second session of Talent Hunt - International Disability Day was prize distribution with musical celebration. District Collector Ms. Remya Mohan IAS, Mr. Prabhav Joshi IAS, Rakesh Vyas DEO, Mr Arvind District Social welfare officer remained present. Mr. Rakshit bhai Shah ED, APSEZ was with us throughout the program. All four categories got 3 prizes. District social defense officer had given certificate of appreciation to Adani Foundation Mundra..



Talent Hunt : International Disability Day Glimpse



Divine feeling towards Mata no Madh!!

Mata no Madh is a village in Lakhpatt Taluka of Kutch district, Gujarat, India. The village lies surrounded by hills on both banks of a small stream and has a temple dedicated to Ashapura Mata, the household deity of former Jadeja rulers of Cutch State. She is also considered patron deity of Kutch. Many people are used to reach this Ashapura temple by feet from different parts of India. G K General hospital has organized health facility through at 10 locations on way of Mata Na Madh during Navaratri 5th to 11th oct.. In addition to medical facility, This health shibir will provide awareness of swachhagraha, swine flu and Beti bachavo as well The concept given by Shri Gadhvi Sir and implementation will be taken care by Dr. Chintan and Adani foundation health team.



Employee Volunteering Programme

In a move first of its kind employees of the Adani Group have adopted all the students of the Vallabh Vidyalaya school in Mundra in their Employee Volunteering Programme (EVP). All the 704 children in the school are from families of migrant labourers working in various industries in and around Mundra. Children from migrant labourer families in addition to resource constraints at home also bear the disadvantage of unfamiliarity with local language and culture inhibiting participation in school.

Vallabh Vidyalaya by passes the language barrier as the medium of instruction is in Hindi and mostly the kids are from Hindi speaking families. "Thanks to Adani EVP financial resource constraint will be substantially relieved", Dharmendra Bhai who created the school from one shed institution gratefully acknowledged.

Energised by the inspiring leadership of Adani Foundation's Chairperson Dr. Priti Adani the Group employees handed over a collective cheque in an impressive function at the school premises. One student of Std. VII joyfully expressed, "Your benevolence will have indelible imprints and impact on our lives. Will remember you ever."



Employee Volunteering Programme

Adani Group is deeply involved in all round social and economic development of the areas in and around Mundra. Adani EVP is context driven and employees have taken part in teaching, improving Aanganwadis, giving impetus to national Swachhata Mission and blood donation. The journey continues



Employee Volunteering Programme

Dignity of workforce day was organized jointly of APSEZ (Adani ports n SEZ Limited), AWL(Adani Wilmar Limited), MSPVL (Mundra Solar Pvt Limited) Adani Hospital and Adani foundation at labour colony with medical camp and handing over of sanitation. more than 32 employees have volunteered in this event.

1. Total OPD by Medical camp at Labour colony-315

2. Blanket Distribution to 800 workers

In this event Mr. Sharad Sharna Head-AWL with staff, Bhaktbandhu DGM HR and Admin staff (APSEZ), Mr. Ganesh Sharma Head HR, President - Kutch Labour Union and Adani foundation team remained.



Inauguration of Skill Development training program for Schedule cast beneficiaries

Another milestone reached on 28th Dec 2018, ASDC launched its program for schedule caste in the state of Gujarat. This program will train candidates in various vocational training educational course like Self employed tailor and Beauty & Wellness. Total 60 women/Girls participated in this training. This course is sponsored by Department of Social justice and Empowerment . It was inaugurated in the esteemed presence of Mr. V. S Gadhavi sir (Executive Director ASDC), Mr. Rakshitbhai Shah (ED of APSEZ, Mundra), Mr. K D Kapdiya (Director of Department of social justice and Empowerment), Mr. B P Soyantar (Dep. Director of Social justice and Empowerment, Gandhinagar), Mr. Dhangaru (Dep. Director of Social justice and Empowerment, Bhuj), Mr. Jatin Trivedi (HOD of ASDC), Mrs. Pankti Shah (Unit CSR Head of AF Mundra), Mr. Javaid Akhtar (HR Manager of ASDC).



SWACHHAGRAHA : At Gujrat Adani Institute of Medical Sciences

"Swachhagraha " – Project launched at Adani G K General Hospital to embed values of cleanliness in minds of the staff and community as well. Separate staff member is also appointed by HO team for the same. Mr. Gadhavi had launched swachhagraha by presenting insignia to Dr. Bhadarka' (Head, Adani GKGH).



SAMVEDANA : Series of Motivational Sessions

To motivate and felicitate paramedical and nursing staff motivational session was organized with help of Ms. Hiral Pandya which is critical requirement of GKGH. She talked about behavior aspect as well as compassionate approach to patients.

NAMDA ON REVIVAL PATH

Even as a breakthrough is waiting to happen, five trainees were enrolled on Tuesday 5th Dec 17 by Adani Skill Development Centre (ASDC) for the age-old Namda craft, a dying art form of Kutchh district in Gujarat. First initiative of its kind, the skill development training on Namda is aimed at preparing a future generation of artisans for the historic art form.

Adani Foundation, the CSR wing of Adani Group had vowed to save Namda from extinction and bring back its past glory. Originally innovated by an artisan of Mughal Era in the 11th Century India, Namda craft was primarily practiced by the Pinjara and Mansuri communities and Sama Muslims native to Kutchh. Sans proper encouragement, marketing avenues and promotion, the art suffered a major setback with artisans gradually switching over to other professions for livelihood earning.

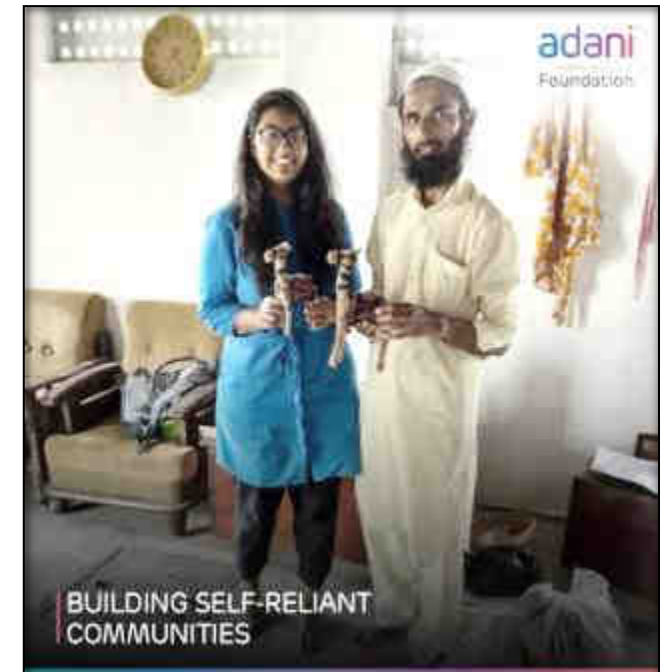
Till recently, when the Adani Foundation, Mundra team members approached Mansuri Karimbhai Umar bhai, perhaps the sole survivor of the craft in Kutchh, Namda was dying a natural death. As a good corporate citizen, the Adani Group initiated a move to protect the art form, as well to make it popular and sustainable.

The first step towards the enormous goal of reviving Namda, the training programme kicked started with lots of positivity and enthusiasm among the trainees, who are committed to put best efforts for bringing back the past glory for this craft. And the best part of the initiative is that, the Namda survivor himself would train the future-artisans.

GREAT ACHIEVEMENT IS....

KARIM MANSOORI ONCE AN ORDINARY NAMDA ARTISAN IS NOW AN ENTREPRENEUR. THE ADANI FOUNDATION FEELS CONTENT IN REVIVING THE DYING NAMDA ART FORM AND SUPPORTING MANSURI IN STARTING HIS OWN BUSINESS.

HIS JOURNEY IS OFF TO A FLYING START AND WE WISH HIM ALL THE BEST.



Beneficiaries Speaks



Utthan : Enhancing Quality of Education !!

Navinal is a small village of Mundra Taluka. The village boasts of the works done by the goodwill of the Mahajans. The village is inhabited by approximately 1000 people. Rameshbhai Sathwara, his wife Champaben along with their three sons are one of the families residing over here. Rameshbhai is a greengrocer and lives a contented life with his family. The eldest son 14 year old Hareesh and the middle one 10 year old Lalji study with devotion and bring good result with god's grace and the blessings of the elders of the family. Their final result would bring a new ray of hope for the parents every year.

But the youngest son, Sanjay studying in class 3 could not read or write. Even after a lot of efforts nothing could not make him read and write. He himself did not even feel like reading or writing. It was meaningless to drag him into learning without his own willingness. The teachers also accepted Sanjay as a dull boy and didn't pay much attention.

But one August morning became august for this boy as it brought a bright ray of hope for him.

A new teacher who had come to teach students like Sanjay talked to Sanjay in his Kutchi mother tongue and this attitude of this teacher made the little boy go wonderstruck. The new teacher made them sing a lot of poems, showed a lot of colourful books and told them a lot of stories. Her attitude interested Sanjay and he willingly came ahead. He sat in the first row and told the teacher about a lot of things including the beehive outside his home, his parents and elder brothers. What appealed Sanjay the most was the constant attention paid by the new teacher to him. The next day led Sanjay to the special classroom made for the students like him.

Thus, every morning became a new, exciting morning for him.

And today, the innovative rangoli making in shape of alphabets using the fallen tree leaves interested him so much that he got interested in writing letters. This interest led him to write alphabets and later words. Moreover, he got interested in co-curricular activities like reciting poems and colouring the pictures.

The factor that attracted him the most was the loving teacher and this teacher is Hansbai Gadhvi. A resident of Mundra itself Hansbai, studied at Adani Public School. She provides her services to Adani Foundation's Utthan programme.

The Utthan project is the result of the agreement under which Shri Bhupendra bhai Chudasama, the Minister of Education of Gujarat assigned the responsibility of improving the quality of Education to the Adani Foundation. And the responsibility has religiously been accepted by Shri V.S.Gadhvi Sir for the 17 government primary school. Shri Gadhvi Sir has taken it as a mission for the foundation to lead the below average students to the upper level. The teachers having command over Hindi, English and Kutchi have been providing their services in these schools.

The Utthan Project initiated in August 2018 has been heartily welcomed and appreciated by the students, parents and teachers of this area. Under this project, the children who are weak at reading, writing and basic calculation are taught in such innovative ways that their foundation becomes strong and they can come into mainstream level of their class.

The best characteristic of this project is introducing English language from the class 1. Talking about the co-curricular activities, these schools have been facilitated by libraries, smart class rooms and sports equipment.

The efforts are made with a hope that these children get the benefit of this teaching mission and move towards a happy, bright and prosperous future.



Utthan : Enhancing Quality of Education !!

"Her eyes today had a shine so different, so divine, probably astral... was the shine real or an illusion? Or it was a simple result reflecting the efforts put in?"

These are the words of Siddhi Shah who is one of the teachers working as Utthan Sahayak in the Utthan project. She works in the Zarpara village, a village where the chief occupation is agriculture and this works as the chief reason behind the irregularity of children in attending school.

The area in and around Zarpara is quite vast and looking at this only the Government has approved 6 Government Primary Schools. But the scenario on the education side is still dismal. There is a long way to go to achieve the desired results. The teachers like Siddhi Shah who work as Utthan Sahayak have their role here. They play a key role in leading the children to school and bringing their academic level up.

Let's talk about what Siddhi Shah has to say about one such girl Pragna who studies in the Khoyadi Government Primary School.

Pragna's father Haribhai is in agriculture field and rearing cattle. This work cannot be carried ahead without the support given by the wife and thus the mother Malsriben too is busy helping the husband in his daily work along with shouldering the responsibilities of performing the household chores of a joint family and bringing up of her own three children. Hence, she finds it difficult to monitor the schooling of her children.

Pragna herself did not have much interest in studies and being the only girl child of the family, Pragna didn't take going to school seriously.

Siddhiben Shah would check the attendance registers daily and would go to meet the parents of those children who do not come to school regularly.

Pragna's irregular attendance was noticed by Siddhiben Shah and she decided to visit her home.

Once she visited her mother Malsriben and persuaded to send Pragna at school. This worked and Pragna started coming regularly. To her surprise, Siddhiben found that Pragna who was not at all interested in reading and writing could do Maths sums excellently well. Siddhiben used her interest in Maths and led her to reading and writing. Under Siddhiben's guidance, Pragna started with letters, words and with the passage of time she acquired fluency in reading flawlessly. It was like a test for the teacher and Pragna's reading fluently and with interest was the fruit the teacher's hard work bore.

And today when in the Saturday morning assembly, Siddhiben saw Pragna reading the newspaper fluently, she realized that it was her hard work that had borne fruit.

Siddhiben Shah is basically a computer engineer but her love for social work, especially in schools brought her to work in Utthan. The students studying in Adani Foundation and in the schools under the Utthan Project salute her dedication.



Swavlamban : Pathways to become Self Reliant !!

Mina Ben is resident of Baroi village. She is widow and living with his two children who are studying in school. Adani foundation is coordinating with Jilla samaj Surakha department for availing various benefits of Government of Gujarat to widow women, differently abled and senior citizens of Mundra, Mandvi and Anjar Taluka. We did all procedure for Mina Ben for regular pension scheme.

Mina Ben was ready n passionate to start Gruh Udyog with loan support with 40 percent subsidy by Vajpayee Bankable scheme "With our efforts she got loan and now she will start Gruh Udyog of " Aggarbatti " with pre defined marketing linkages with Ashapura temple trust.



Swavlamban : Pathways to become Self Reliant !!

Adam Bhai Bayad is living at Moti Khakhar Village He is differently abled and having wife and two children in his family. He is having one skill of mobile and computer repairing. As per his request we allotted him one cabin for income generation. Now he is started to sale Mobile, Mobile accessories. Additionally he started repairing mobile and computer. By hard work he started earning considerable amount. Adam Bhai says "due to this support my children can study well and my quality of life is enhanced



Parvina ben is Divyang but strong lady. She is educated and use to work as a teacher primary school. She was using sticks to reach school. Adani Foundation had given support of tricycle for her comfortable transport.

She says "Adani Foundation is working as a great facilitator for needy people. This is true social work which has created very good imprint in heart of village people. God bless !

Swavlamban : Pathways to become Self Reliant !!

As the wheels of her sewing machine keep moving, so as the dreams of a better life and empowerment enthuse Bhanuben overcome the physical deformities which came in the form an injury in the spinal cord during childhood. Both her legs were malfunctioned forcing dependence on calipers for movements.

Bhanuben Gangji Patariya of Bhujpur village lost her father when she was just 15 years old, and had very little understanding of the materialistic world and struggle of life. Poverty in the family compelled Bhanuben to drop school and do small odd household jobs of fellow villagers and sometimes accompany her mother as daily labour.

The sudden transition in life, from most adorable darling of her father to an unnoticed and uncared human being in the society, often disturbed the innocent mind of Bhanuben.

Few months back, Bhanuben had enrolled at Adani Skill Development Centre for stitching training, which she could successfully complete within the deadline due to a strong will power and aspiration to win over all odds in life. During her training period only she learnt about AF's Project Swavlamban and expressed the desire to be part of it.

Followed by proper counselling and guidance for self-sustainability, AF donated her one wheel chair and a sewing machine which helped Bhanuben change her life and build the self-confidence of stitching a bright future for her family. Now she earns an average of Rs. 2500 a month which takes care of the basic livelihood needs of her family.

Wearing a smile of satisfaction on her face and the pride of being self-sufficient, Bhanuben expresses her heart-felt gratitude to AF for standing by her during this critical juncture of life. She has become a ambassador to spread the message of all good works by AF in her locality. She is yet, another success story in the saga of sustainable CSR by AF.



Swavlamban : Pathways to become Self Reliant !!



Her name is Sanjuben. Residing in Vadala village with her Divyang husband and 9 years old son. Her husband is working at one shop and trying for two ends meet. During Divyang Mahiti card Vitran by Mamlatdar office she came to know about project Swavlamban. She meet Kalyan Gadhvi who is community mobilizer in Adani foundation. Kalyanbhai had given information n support for Divyang pension scheme.

Since two years couple is getting pension which amount can be used for further study of their son. Additionally, Adani foundation supported her for tricycle in coordination with district social welfare department. Sanjuben is daily using tricycle to give tiffin to her husband. Small linkage can bring life transformation !!!

Spruha : Motivating fisher folk for bright future !!



Fakir Mamad Hasan Vagher

24 year old from poor fisherman family was selected by AF To provide cricket coaching last year. he has completed successful training at Rajkot YB sport academy with excellent performance even in Kutch 23 selection. The YB academy organized honor ceremony and invited AF. On this occasion dignitaries and more than 400 peoples were present and they all appreciated noble support by Adani Foundation.

Fakir Mamad saying that he was playing on behalf of other team and earn RS 500 to 600 but after cricket coaching he get status and honor in Kutch cricket even in society and earn Rs 1500 to 2500 for each match.

Spruha : Motivating fisher folk for bright future !!

Mamad Sakil Osman Ghani Adani Vidya Mandir – Bhadreshwar 'A High Leap by a Poor Child from the Fisher folk Community.....Towards Engineering Studies.....Through Adani Vidya Mandir' 2017-18 Name: Mamad Sakil Osman Ghani Father's Name: Osman Ghani Mother's Name: Halimaben Family: Brother (1) + Sisters (4) & Parents; total 8 members Occupation: Fishing Village: Luni; Taluka: Mundra; District: Kutchh In modern times along with its importance, education has also made changes in our lifestyle.

Adani Vidya Mandir, Bhadreshwar, is like a lighthouse giving a ray of hope in remote areas. It was established to provide education to children from socio-economically backward communities. The school provides high-quality education, nutritious food as well other kinds of facilities so that children's self-respect increases through the education. Speaking of students, Mamad Sakil was enrolled in the Std. 7, in 2014-15 in the Adani Vidya Mandir, Bhadreshwar. His father, Osman Ghani, is a fisherman. His family of eight members consists of his mother, his father, a brother and four sisters. They live in Luni Bandar.

From the beginning it was seen that he was a quiet, straightforward, humble and cultured boy. He also exhibits behavior with moral values. Everyone helped the family socio-economically. In the Adani Foundation with the help of Vijayhai and Ishwarbhai noted details of the family and found that nobody was educated. In such times of rising prices and inflation it is difficult to raise so many children. So the school management decided to take over and fulfil his basic necessities. Efforts for this child's educational success were made including counselling and guidance.

During his first year in the school, he participated in the running competition in the Khel Mahakumbh and came first in the district. In this way, he began to progress in not just education but also other areas. He started getting promoted to the next standard every year and eventually he reached Std. 10. With the help of the school in various ways and his own hard work, he successfully cleared Std. 10 with 77%. He stood second in the school. Now, the journey of his life has really started. He has started to see new and inconceivable dreams for his future career. Now, the Adani Foundation will be holding his hand to fulfil his dreams.

After completing studies of the Std. 10, he was gifted an android phone by the school principal, Smt. Lali madam, as he needed new technology to get admission for further studies. In this way all the obstacles have been removed from his career path. He has now taken admission in mechanical engineering in Bhuj Polytechnic, and the Adani Foundation has paid his entire fee. A new innings has started in his life. With his hard work he is making progress step-by-step. He has set a good example for other students. And we all hope that he will eventually become a strong financial support to his family.



Adani Vadil Swasthaya Yojana: Holding Hands !!

Every human being has specific periods of the life wherein the childhood is for fun and the adulthood is spent for the family; remains old age to take care of health

Adani Foundation is holded hands of the senior citizens of Mundra

Manubha and his wife stay alone. Their son and daughters stay separately. They earn their living by grazing cattle. Manubha is having **respiratory disorder**. The source of income is very meager and that to dependent on rain. He had to borrow money from family friends or at times take on interest for taking basic treatment. His wife Shantaba also has blood sugar and hence she also requires medical assistance at times. The couple took **Adani Foundations' Senior Citizen Health Card** in 2015 by which they are able to save good amount, which was their medical expense every month.

"Adani Foundations' Senior Citizen Health Card is like a cure to our emotional, physical and psychological problem; in the times when we are completely lonely and handicap at age."....Says both of them while weeping.



Adani Vadil Swasthaya Yojana: Holding Hands !!

Adani Foundation at Bhuj is aware of its social responsibilities to the surrounding community. Madhapar is a village approximately 28 km away from Bhuj wherein resides Aseembhai who was financially, health-wise and socially unstable until he availed help from AF at G K General Hospital Bhuj. Aseembhai settled in Madhapar 30 years ago. before 8 years, he lost his wife to heart attack.

His parents passed away when he was 3 years of age and the only surviving relative he could call his own was his brother who was also mentally-challenged. His problems did not end there as e suffered from high blood pressure and stress induced thyroid which required he took medication as long as he lived.

Slowly his body stopped reacting to the medicines and these did not work. One He got convulsions as a side effect of over dose of medicine. His neighbors took him to Adani G K G H Hospital. Adani Foundation staff took very good care of Aseembhai. For one month he admitted to hospital and daily staff members ask about his health.

When he got discharged he said

"Adani is Like my Second Son.. I get the services even without asking for it"



Saksham Superhero's : Skill Development



My father is working as a mechanic in ST workshop and his income was not sufficient for live life better so my mother also was working in different fields. I also was trying to find job for support to my family financially. One of my friends suggested me to visit Adani Skill Development Centre – Bhuj and join General Duty Assistant. When I visited center I got all the GDA related information from the staff, I took admission. During this course I learnt lots of Medical related things from the faculty I also was taught about Personality Development, Computer basics, Basic English, Interview Skills. During my practical for 1(one) month in GAIMS, I got chance to work in 4(four) wards. During my practical I learnt many things. After completing GDA course ASDC SAKSHAM is arrange interview At Adani GAIMS Hospital Bhuj. I attended interview and I was selected for physiotherapy section. I was offered monthly salary Rs.10000/- and join the job. After joining this job, I am glad that now I am a working woman and more then that I can help my family financially. With this job my life has become better than before. I would like to thanks Adani Skill Development Centre to give me this Opportunity and for making me SAKSHAM.



22 years old Dhanabai has completed Self Employed tailor course from ASDC in the month of June 2018. Now she start her own tailoring business at home and doing stitch ladies clothes. At present she is earning Rs.6000/- Monthly.

Saksham Superhero's : Skill Development



Bhand Navin Devjibhai is very fond of financial autonomy and self-sufficiency, a principle of life which he has got by virtue of his skill development training at Adani Skill Development Centre (ASDC), Mundra. A Commerce graduate from Mundra village, in the year 2017 Navin had enrolled himself at ASDC for the IT-Basic Computer training. He was unemployed and lacked the minimum confidence of facing any job interview as per his qualification.

As part of the well-designed training curriculum at ASDC, the 21-year old youth learnt skills of public speaking, professional manners, facing interviews etc. along with core subject of IT basic computer. The training helped Navin immensely and fetched him a company job with lucrative Rs. 10,000/- per month salary. Happy with his financial autonomy, he is now in a comfortable position to support his parents and three brothers.

My name is Ashok Maheswari from shedata village, Mundra. My father is no more in this world so I was trying to find job for support to my family financially. One of my friends suggested me to visit Adani Skill Development Centre – Mundra and I have joined



Checker cum RTG crane operator training for 3 months. After successfully my training I sent my resume in various port. One day I received call from aani port at katupalli in Chennai and I attended interview and I was selected for RTG crane Operator. And today my salary 20,000/- per month.

So, I can help my family financially. With this job my life has become better than before. I would like to thanks Adani Skill Development Centre to give me this Opportunity and for making me SAKSHAM.

Saksham Superhero's : Skill Development

Manisha Patel, from Mundra, has completed Std. 12. Her parents are laborers, earning minimum wages. Manisha had always been a bright student in school, wanting to learn new things. Feeling restricted in life, she dreamt of doing something different. She wanted to have a successful career and be recognized by society. Hence, when she was advised by a close friend to join ASDC's Beauty & Wellness course, which is an NSDC certified course, she grabbed the opportunity. She came to the course with a fresh mind and ready to absorb all the knowledge. She actively participated in all activities. She was full of curiosity and questions, and this attitude enhanced her skills. She was extremely happy when the trainer appreciated her enthusiasm upon completion of the training.

She was delighted to open her beauty parlor. She had also undergone extra training in specific soft skills and business manners in order to handle customers. With these skills, she manages customers like a pro and runs her salon smoothly. Her family members, including her in-laws, were initially hesitant to let her join the course but soon relented upon seeing her enthusiasm and zeal for learning. They are quite proud of what she has achieved in such a short time.

Manisha and Shree Beauty Parlor are synonymous with high-standard beauty and wellness services in the Mundra locality. Her quality services and reasonable prices have increased her popularity and helped in attracting more customers. Today, she earns Rs. 12,000-15,000 per month. Her trainer, Ms. Rekha says, "She and many other candidates who completed their training at ASDC are ambassadors of Saksham. They strive to learn and grow by beating all odds. I am proud to be given this opportunity to groom and create skilled beauticians who can handle the ever-increasing standards of beauty treatments in a city like Mundra. I wish them the very best!"



Saksham Superhero's : Skill Development

Lilbai koli- A youngest widow of the general duty assistant (GDA) batch from Adani skill development center (ASDC) Bhuj is an epitome of courage and confidence. She is 22 years old with a one and half year old baby, and lives in a Mirjapur village, Bhuj.

She is 12th pass with Arts stream and used to love drawing and painting as her hobby. Her parents work as laborers and her sister cooks at home. She got married in 2016 and lost her husband in 2018. The most tragic thing is that she didn't even know the exact reason of her husband's sudden death. Happiness is transient, she faced many problems starting with loosing her husband, becoming single parent and loosing financial support from her in-laws which resulted in returning to her parents home.

When asked about her future plan she says "Talking about remarriage is a taboo in our village and culture. I want to be strong enough to work hard and give my son a healthy and happy Life".

Presently, Lilmai is pursuing her ,On the Job Training in G.K General Hospital. A girl who has never seen hospital is now learning technicalities of patient care in emergency ward. A young novice is all set to become a successful patient care assistant with a single goal in life i.e 'To become economically stable enough to educate her child'. Lilbai expresses huge gratitude to Adani Foundation and ASDC Bhuj for giving her opportunity to study GDA course and help her get the job so that she no longer have to depend on anyone's help for herself or her child's future.





Adani Cementation Private Limited (Lakhpur)

Adani Cementation Private Limited (Lakhpat)

Adani Cementation Limited (ACL) proposes to setup an integrated cement project as Lakhpat Cement Works which includes Limestone Mine in 251.9 ha area, Cement Plant of rated production capacity of 10MMTPA Clinker and 3MMTPA of OPC/ PPC/ PSC/ COMPOSITE CEMENT in three phases, and a berthing jetty of 15MMTPA traffic capacity in phase wise manner in Taluka Lakhpat of District Kutch (Gujarat).

Project Public hearing will be in month of May 2019. For Smooth Execution of the Project we have started Participatory Rural Appraisal and Village Development Committee formation at three nearest villages (Koriyani, Kapurashi and Mundhvay) of our upcoming cement plant.



Adani Cementation Private Limited (Lakhpat)

Kutchh is the biggest district in India and Lakhpat is far away from Bhuj which is main city of Kutchh. Health facilities are very poor as District hospital is around 150 Kms Away. Main livelihood is animal husbandry and daily wedge labour. Except GMDC , no big industrial set up is in Taluka.

Critical Issues are as under

1. Poor Health Facilities
2. Quality of Primary Education
3. Infrastructure of School
4. Livelihood options
5. Fodder and water Scarcity
6. Malnourishment



Adani Foundation will make five years plan to mitigate the issues with priorities suggested by Village Development Committees. Detailed PRA including Demographic survey is taken up and submitted.



Adani Green Energy (MP)Limited (Nakhtrana)

Adani Green Energy (MP) Limited (Nakhtrana)

Adani Green Energy(MP) Limited (AGEMPL) proposes to setup an integrated wind energy project as Green Energy Works which includes Limestone 750 Mw, Through approx. 1250 windmill at Dayapar to Nakhtrana in District Kutch (Gujarat).

For Smooth Execution of the Project we have started Participatory Rural Appraisal and Village Development Committee formation at three nearest villages (Ratadiya, Muru and Ambara) of our upcoming Wind Energy Project.



Adani Green Energy (MP)Limited (Nakhtrana)

Kutchh is the biggest district in India and Ratadiya (Nakhtrana) is 70 Km away from Bhuj which is main city of Kutchh. Health facilities are very poor as District hospital is around 70 Km Away. Main livelihood is Agriculture, animal husbandry and daily wedge labour. In Nakhatrana, No big industrial set up is in Taluka.

Critical Issues are as under

1. Poor Health Facilities
2. Quality of Primary Education
3. Infrastructure of School
4. Livelihood options
5. water Scarcity
6. Malnourishment



Adani Foundation will make five years plan to mitigate the issues with priorities suggested by Village Development Committees. Detailed PRA including Demographic survey is taken up and submitted.

Awards and Accolades

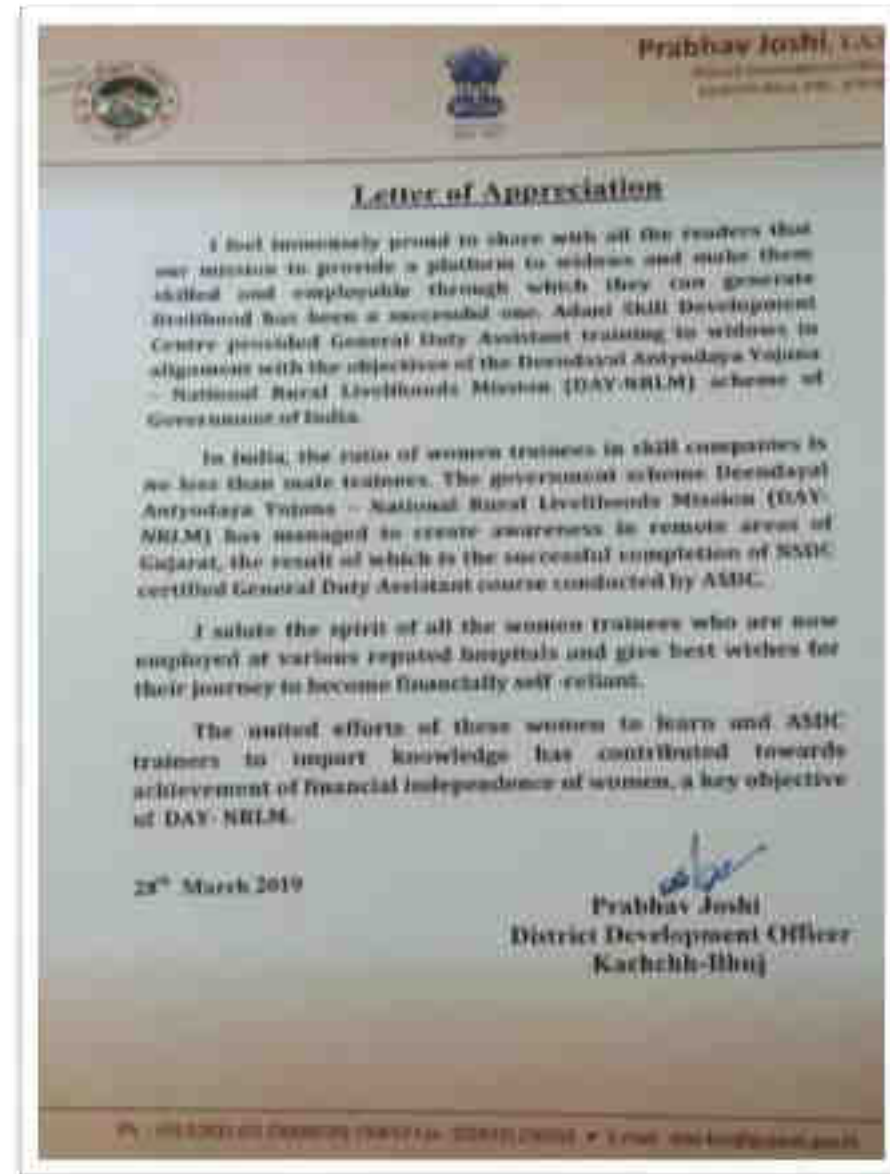
We are glad to announce our latest accolade- the Eminent Award 2018 platinum category presented at the Ek Kaam Desh Ke Naam award ceremony on 25th March , 2019 at New Delhi. The award was bestowed upon Adani Ports and SEZ Ltd, Mundra, for outstanding achievement in Corporate Social Responsibility, specifically " Adani Vadil Swasthaya Yojana - Health card to senior citizen ". The award was presented by Sh. Anil Baijal - Retired IAS & 21st Lieutenant Governor of New Delhi and was received by the Community health team of Adani Foundation, the CSR arm of the Adani Group.



Pleasure to share that
Adani Foundation have received
appreciation letter from
**Mr. Vijay Rupani (Chief Minister,
Government of Gujarat)** for
commendable work for Project
Swavlamban in District Kutchh



Awards and Accolades



Awards and Accolades

જિલ્લા સમાજ સુરક્ષા અધિકારીની કચેરી
નંબરીક સોસાયટી, સોનિપલ ટોલ, ગુજ - ૩૫૩ - ૩૦૦૦૦૧

—: પ્રમાણપત્ર :—

આથી પ્રમાણપત્ર આપવામાં આવે છે કે, અહાલી કોંગ્રેસન, મુકે કારા તાજેતરમાં બીજા ટીલેન્ડરના રીજ વિન્ય વિસ્તારમાં વિસ્તારી ઉજવણીના આયત્તે કચ વિસ્તારમાં વિસ્તારમાં પહેલી અહીં પ્રતિબદ્ધ મહાર આપવા અને ટેલેન્ટ અને કચર્મનું આયોજન કરવામાં આવેલું અને વિસ્તારમાં કોલી વિન્ય કચિત્તને પ્રાચીન કરવાની તક આવી તેમને ઉત્તરમાં આવી નવરત્નમાં આવેલ કચ. જે કચર્મની મુલ પ્રાચીન કરવાની હતી. આ વિસ્તાર પણ અહાલી કોંગ્રેસના કચ વિસ્તારમાં વિન્ય કચર્મનાથી મોજવામાં જેથી કે, વિસ્તારમાં મોજવા કચ. વિસ્તારમાં કચર્મ કચર્મ, ટીલેન્ડર ગ્રાંધી નેત્રાલ ટીલેન્ડર વેનના કચર્મ, વિસ્તારમાં કચર્મ કચર્મ વચે મોજવામાં પ્રમાણ પચાર કરી જરૂરમાં કચર્મમાં મેલ અને તે મટે જરૂરી મોજવામાં આપવા અને કોલી આપવા મટે કરવી તેમજ આ કોલી સંપત્તિ કચર્મમાં પચીત્ત કરી, મુકે કચર્મ કચર્મ કચર્મની કચર્મમાં આવેલ છે. જે વિસ્તારમાં મટે મુલ જ ઉપયોગી છે અને અહાલી કોંગ્રેસના કચ આપ કચર્મનાથી કચર્મ કચર્મ મટે તેથી કચર્મનામાં...

કચર્મ : ગુજ - ૩૫૩.
તારીખ : ૧૮/૧૧/૨૦૧૮

Signature
જિલ્લા સમાજ સુરક્ષા અધિકારી
ગુજ - ૩૫૩.



॥ सा विद्या या विमुक्तये ॥

બ્લોક રિસોર્સ સેન્ટર-મુંદરા

તા. મુંદરા જી. ડરહ.

આમાર પત્ર

**પ્રતિ,
મુખ્ય અધિકારીશ્રી
અદાણી ફાઉન્ડેશન
મુંદરા-૬૨૭.**

સકુર્ષ જણાવવાનું કે આપની સંસ્થા દ્વારા ચાલતા દિવ્યાંગ સ્વયંસંચાલન પ્રોજેક્ટ અંતર્ગત અમારા બ્લોક રિસોર્સ સેન્ટર-મુંદરા ખાતે આજવાસ અર્થે આવતા દિવ્યાંગ વિદ્યાર્થીઓ માટે સફ્ટવેય, સંગીતના સાધનો, રમત-ગમતના સાધનો તથા વ્હીલચેર પ્રભવા છે. જે કાનગીરીને બિરદાવતા અને દુર્વ સાથે અભિનંદન પાઠવીએ છીએ.આપના આ સકુર્ષોગ માટે દિવ્યાંગ વિદ્યાર્થીઓના વાલીઓ તેમજ બી.આર.સી. સ્ટાફના ફાર્ડિક અભાવા વ્યક્ત કરે છે.

અભિપ્રાય આપના સકુર્ષો અમારા દિવ્યાંગ બાળકોને આવી જ રીતે અભિરત સકુર્ષોગ મળતો રહે તેવી આશા સાથે.....



તારીખ : ૨૬-૬-૨૦૧૮
સ્થળ : બ્લોક રિસોર્સ સેન્ટર
મુંદરા-૬૨૭.



કો. મોકનનાથ કે. પરમાર
બી.આર.સી.કો.-ઓફિસેટર
મુંદરા-૬૨૭.

ભદ્રેશ્વર ગામે અદાણી ગુપના ચેરમેનના

જન્મદિનની અનોખી ઉજવણી



અને ૧૦.૧૨ માં આરેલી દિકરીને પ કરવામાં આવી ૫૦૦ ડસ્ટબીન સ્વ મિશનને સાર્થક બનાવવા ગામઝોકી માટે આપવામાં આવે આમ વિવિધ કાર્યો ત્રણે સંસ્થા ઉપક્રમે યોજાઈ કાર્ટેન્ડેશન સાઈડ, દેવ કલ્યાણ બંદ સરપંચશ્રી કારોબારી પ્રધુમનસિંહ ગામના આ હોવા છતાં સમગ્ર બિનાવવા કિરણબેન રમેશભાઈ



તાલુકા હેલ્થ ઓફિસ મુન્દ્રા દ્વારા ઓરી અંગે શાળાના આચાર્યઓનો વર્કશોપ

મુન્દ્રા તા. ૪ | પુસ્તોસહકાર આપે અને બાળકોને આપવામાં આવશે આ ઉપરાંત સરકારી મોજનાઓનો લાભ લેવા માટે શાળામાં લાગી



મુજના ડૉ. આંબેડકર કન્યા છાત્રાલયને આર.ઓ. પ્લાન્ટ મળ્યો

મુન્દ્રા સમયસર પાણી મળીને માટે સરકારી ઉ.મા.શાળા ભદ્રેશ્વર ટપકનિયંત્રિત પદ્ધતિ અમલમાં આવી છે. જન્મદિવસ ઉજવણી



આયુષમાન ભારત યોજના તળે ભુજોડીમાં મેડિકલ કેમ્પ યોજાયો

મુજ, તા. ૬ | અદાણી ગ્રોપના અને આગામી કાર્ડેન્ડેશનના અગાઉના સંવાદમાં આયોજાયેલા આયુષમાન ભારત યોજના તળે ભુજોડીમાં મેડિકલ કેમ્પ યોજાયો. આયોજના તરફથી

જીકે હોસ્પિ.માં કાલે માહિતી સેતુ કેન્દ્ર ખુલ્લું મુકાશે સરકારી યોજનાઓ વિશે વિનામૂલ્યે માહિતી અને ફોર્મ આપવામાં આવશે

આપવામાં આવશે આ ઉપરાંત સરકારી મોજનાઓનો લાભ લેવા માટે શાળામાં લાગી

મુન્દ્રા તાલુકામાં પ્રા. શિક્ષણના ઉર્ધ્વીકરણ અર્થે કરાર કરાયા

મુન્દ્રા તાલુકામાં શિક્ષણના ઉર્ધ્વીકરણ અર્થે અદાણી કાર્ટેન્ડેશન અને જિલ્લા પ્રાથમિક શિક્ષણ અધિકારી વચ્ચે કરાર કરવામાં આવ્યા છે. પ્રાથમિક શિક્ષણની ગુણવત્તા વધે, વિદ્યાર્થીઓનો શિક્ષણ પ્રત્યેનો અભિનય બદલાય



શિક્ષણાધિકારી વચ્ચે કરાર કરાયા હતા. ન અંતર્ગત ચાલુ મુન્દ્રા તાલુકાની ૧૭ ક્ષમગીરી હાથ પરવામાં આવશે. કરાર સંજય પરમાર (જિલ્લા પ્રા. શિક્ષણાધિકારી), છાયાબેન ગઢવી (ચેરમેન જિલ્લા શિક્ષણ સમિતિ) અને

માંડવીમાં ગણિત-વિજ્ઞાન પ્રદર્શનમાં દુપ શાળાના છાત્રો દ્વારા એકસો વિવિધ કૃતિ પેશ કરાઈ

મુજના ડૉ. આંબેડકર કન્યા છાત્રાલયને આર.ઓ. પ્લાન્ટ મળ્યો



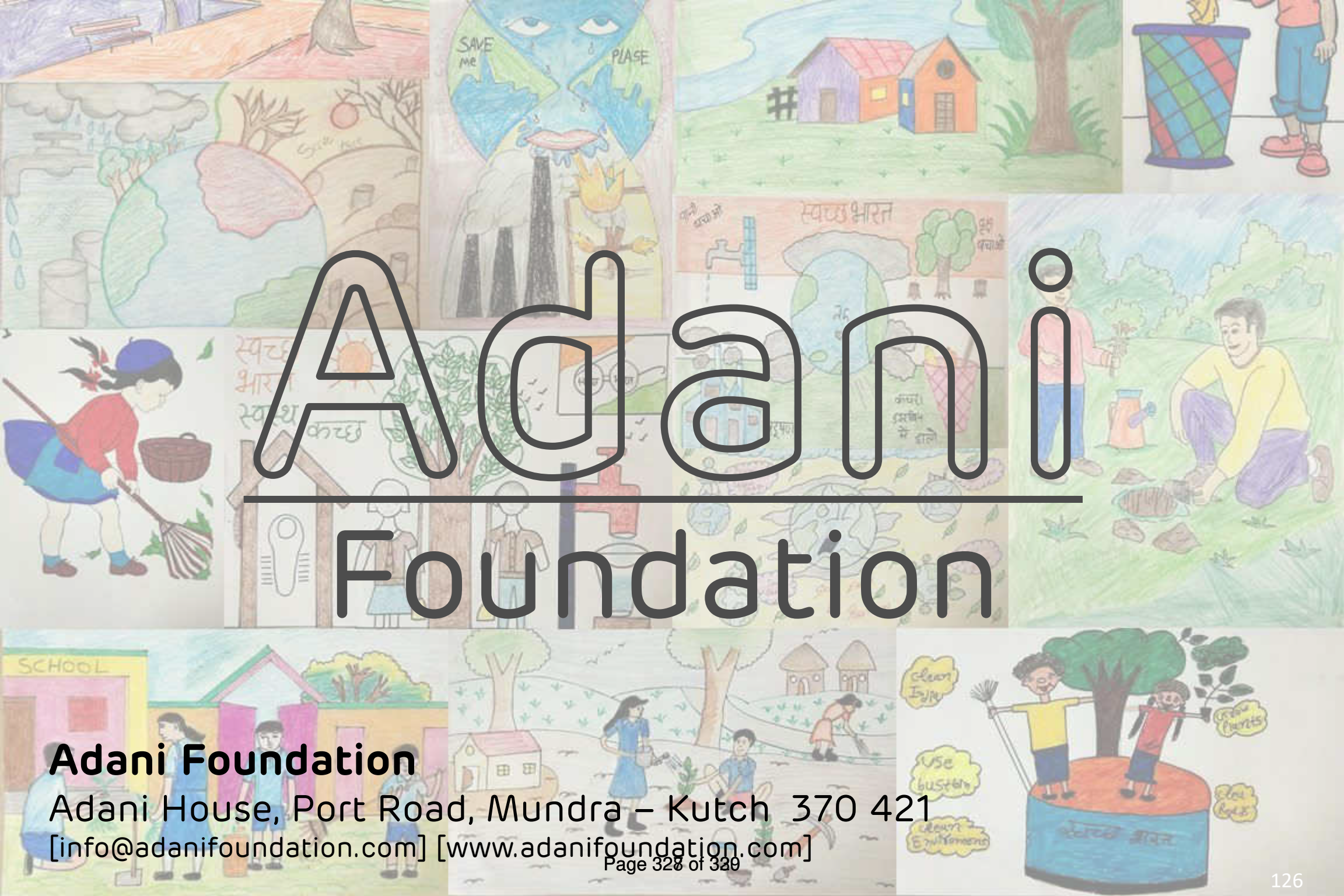
No	Core Area	Beneficiaries	Remarks
1	Education	5602	Uthhan, Labour School, School Enrollment
2	Adani Vidya Mandir	387	School Students
3	UDAAN	33932	116 Institute Visited
4	Adani Skill Dev. Center	2482	Mundra and Bhuj
5	Community health Mundra	58531	MHCU, Medical Camps, Senior Citizen
6	Community health Bhuj	36417	Health Camps, Mahiti Setu, patient care
7	SLD Fisherman	3280	Water, Education, Mangroves etc.
8	SLD Agriculture	1232	Drip Irrigation, Bio gas, tissue
9	SLD Women Empowerment	132	Saheli mahila gruh udyog – 12 SHG
10	Rural Infra. Development	81098	Pond deepening, AKBTPL, Labours work
11	Swachhagraha	3711	Mundra, Bhuj, Anjar and Gandhidham
12	Suposhan Mundra	17025	Adolescent, Children and RPA
13	Suposhan Bitta	6450	Adolescent, Children and RPA
14	Lakhpatt	512	Cattle owner for fodder

Total Beneficiaries : 250791

Financial Overview

Adani Foundation -Mundra				
Executive Summary-Budget Utilization up to March-19				
(Rs. In Lacs)				
Sr. No.	Budget Line Item	Approved Budget 2018-19	Budget Utilization 2018-19	% of utilization
A	Admin Expense	67.55	55.44	82.07%
B.	Education	67.85	59.11	87.12%
C.	Community Health	243.21	203.88	83.83%
D.	Sustainable Livelihood Development	505.87	624.68	123.49%
E	Rural Infrastructure Development	326.34	231.81	71.03%
TOTAL AF CSR Budget :		1210.82	1174.93	97.04%
F.	Adani Vidya Mandir - Bhadreswar	143.15	133.88	93.53%
GRAND TOTAL_MUNDRA CSR WORKS 2018-19		1353.97	1308.81	96.66%
G.	Project Udaan_Mundra	342.82	315.63	92.07%
GRAND TOTAL_MUNDRA CSR+ PROJECT UDAAN		1696.79	1624.44	95.74%

The Utilization will change slightly after receiving data upto first week of April 2019 due to few GRN is pending



Adani Foundation

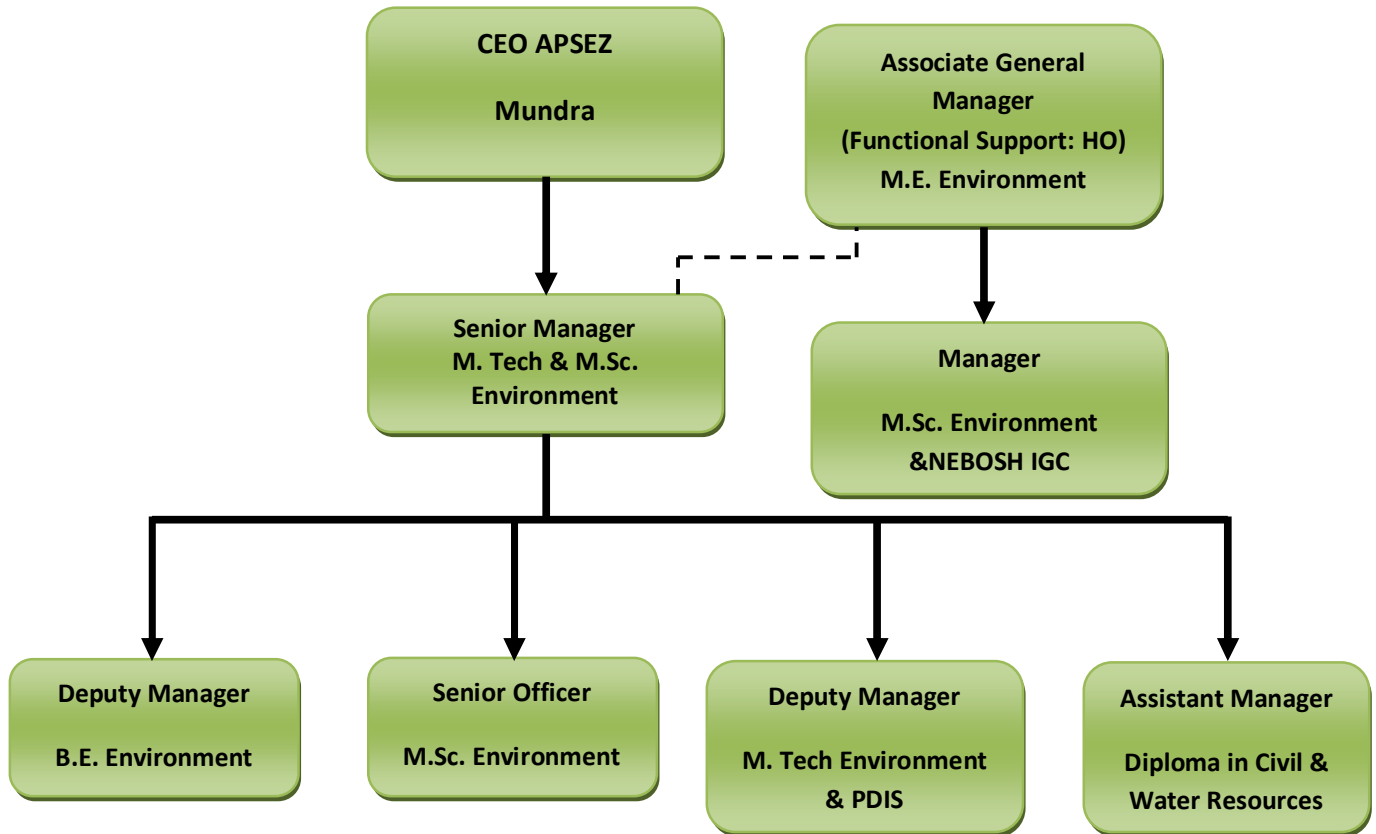
Adani Foundation

Adani House, Port Road, Mundra – Kutch 370 421

[info@adanifoundation.com] [www.adanifoundation.com]

ANNEXURE – 7

Organogram of Environment Management Cell, APSEZ, Mundra



ANNEXURE – 8

Cost of Environmental Protection Measures

Sr. No.	Activity	Cost incurred (INR in Lacs)			Budgeted Cost (INR in Lacs)
		2016 – 17	2017 – 18	2018 – 19	2018 – 19
1.	Environmental Study / Audit and Consultancy	36.78	9.0	6.7	30.5
2.	Legal & Statutory Expenses	4.76	5.07	4.42	5.7
3.	Environmental Monitoring Services	27.95	27.02	20.36	36.0
4.	Hazardous / Non Hazardous Waste Management & Disposal	12.52	65.62	95.72	84.8
5.	Environment Days Celebration	6.71	2.85	0.28	10.0
6.	Treatment and Disposal of Bio-Medical Waste	1.27	1.13	1.21	1.56
7.	Mangrove Plantation, Monitoring & Conservation	72.38	60.0	47.0	50.0
8.	Other Horticulture Expenses	555.00	547.0	579.32	579.32
9.	O&M of Sewage Treatment Plant and Effluent Treatment Plant (including STP, ETP of Port & SEZ & Common Effluent Treatment Plant)	61.50	70.02	144.29	153.9
10.	Expenditure of Environment Dept. (Apart from above head)	131.83	102.15	109.28	117.29
Total		910.70	889.86	1008.58	1069.07