Bhagwat Swaroop Sharma

From: Bhagwat Swaroop Sharma
Sent: Monday, May 30, 2022 11:23 AM
To: 'eccompliance-guj@gov.in'; 'iro.gandhingr-mefcc@gov.in'
Cc: 'ec-rdw.cpcb@gov.in'; 'ro-gpcb-kute@gujarat.gov.in'; 'ms-gpcb@gujarat.gov.in'; 'mefcc.ia3@gmail.com'; 'monitoring-ec@nic.in'; 'direnv@gujarat.gov.in'; Snehal Jariwala
Subject: Half Yearly EC Compliance Report Submission Terminal-2 for Period Oct'21 to Mar'22
Attachments: 4. EC Compliance Repor_MPT T2 2007_Oct'21 to Mar'22.pdf

adani
Ports and Logistics

APSEZL/EnvCell/2022-23/020 **Date:** 27.05.2022

To
The Inspector General of Forest / Scientist C,
Integrated Regional Office (IRO),
Ministry of Environment, Forest and Climate Change,
Aranya Bhawan, A Wing, Room No. 409,
Near CH 3 Circle, Sector – 10A,
Gandhinagar – 382007.
E-mail: eccomplinace-guj@gov.in, iro.gandhingr-mefcc@gov.in

Sub : Half yearly Compliance report of Environment Clearance for the project namely "Development of Multipurpose berth (Terminal- 2) at Mundra Port, Dist. Kutch"

Ref : Environment clearance under CRZ notification granted to M/s Adani Ports & SEZ Limited vide letter dated 5th February, 2007 bearing no. 11-84/2006- 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-2021 to March-2022 is being submitted through soft copy (e-mail communication & CD).

Kindly consider above submission and acknowledge.

Thank you,
Yours Faithfully,
For, **M/s Adani Ports and Special Economic Zone Limited**

Douglas Charles Smith
Chief Executive Officer
Mundra & Tuna Port

Encl: As above

Copy to:

Thanks & Regards,

Bhagwat Swaroop Sharma
Sr. Manager - Environment
Mundra & Tuna port

Adani Ports & Special Economic Zone Ltd.

Environment Cell | 1st floor | Adani House | Mundra Kutch | 370421 | Gujarat | India
Mob +91 6357231713 | Ext. 52474 | www.adani.com

O/C

adani

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Chief Executive Officer
Mundra & Tuna Port

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Copy to:

1) The Director (IA Division), Ministry of Environment, Forests & Climate Change, Indira Paryavaran Bhawan, Jor Bagh Road, New Delhi-110003.
2) The Zonal Officer, Regional Office, CPCB – Western Region, Parivesh Bhawan, Opp. VMC Ward Office No. 10, Subhanpura, Vadodara – 390023.
3) The Member Secretary, GPCB – Head Office, Paryavaran Bhavan, Sector 10 A, Gandhi Nagar – 382010.
4) The Director, Forests & Environment Department, Block – 14, 8th floor, Sachivalaya, Gandhi Nagar – 382010.
5) The Regional Officer, Regional Office GPCB (Kutch-East), Gandhidham – 370201.

01/06/2022
Gujarat Pollution Control Board
Head Office
Sector No. 10-A,
Gandhinagar-382010

Adani Ports and Special Economic Zone Ltd
Adani House,
PO Box No. 1
Mundra, Kutch 370 421
Gujarat, India
CIN: L63090GJ1998PLC034182

Tel +91 2838 25 5000
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Registered Office: Adani Corporate House, Shantigram, Nr. Vaishno Devi Circle, S.G. Highway, Khodiyar, Ahmedabad – 382421, Gujarat, India

adani

Ports and Logistics

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Ports and Logistics

Environmental Clearance Compliance Report

of

Multipurpose Berth (Terminal -2) at Mundra Port, Dist. Kutch, Gujarat

of

Adani Ports and SEZ Limited

Period:

October – 2021 to March – 2022

Index

EC & CRZ Clearance Compliance Report

- Chronology of company name change from **M/s. Gujarat Adani Port Limited** to **M/s. Adani Ports and Special Economic Zone Ltd.** was submitted along with last half yearly EC Compliance report for the period Apr'21 to Sept'21.

Half yearly Compliance report of Environment and CRZ Clearance for the project namely "Development of Multipurpose berth (Terminal – 2) at Mundra Port, Dist. Kutch" issued vide MoEF letter no. 11-84/2006-IA.III dated 5th February 2007.

<table>
<tr><th>Sr. No.</th><th>Conditions as per clearance letter</th><th>Compliance Status as on 31-03-2022</th></tr>
<tr><td colspan="3">A. Specific Condition</td></tr>
<tr><td>(i)</td><td>All the conditions stipulated by Forests Environment Department, Government of Gujarat vide their letter no. ENV-10-2005-222-P dated 12/10/2006 should be strictly implemented.</td><td>Complied.

Point wise compliance report of CRZ recommendations issued vide letter No. ENV-10-2005-222-P dated 12/10/2006 is enclosed as Annexure – A.</td></tr>
<tr><td>(ii)</td><td>No Objection Certificate from Gujarat State Pollution Control Board should be obtained before initiating the project.</td><td>Complied.

APSEZL had obtained No Objection Certificate vide GPCB letter No. GPCB/Unit-1/FT-139/11944 dated 27th April 2005.

Consent to operate (CC&A) has been renewed from GPCB vide consent no. AWH-117045 valid till 20th November, 2026. The copy of renewed Consent to operate (CC&A) is enclosed as Annexure – 1.

Consent to Establish (CtE) and Consent to Operate (CtO) are obtained from GPCB and renewed/amended from time to time as per the progress of the project activity. The present in-force CtE / CtO are mentioned below.

<table>
<tr><th>Sr. No.</th><th>Permission</th><th>Project</th><th>Ref. No. / Order No.</th><th>Valid till</th></tr>
<tr><td>1</td><td>CtO – Renewal</td><td>Mundra Port Terminal</td><td>AWH-117045</td><td>20.11.2026</td></tr>
<tr><td>2</td><td>CtE – Amendment</td><td>WFDP</td><td>17739 / 15618</td><td>18.05.2027</td></tr>
</table>

The CtE – Amendment (Sr. No. 2) was submitted along with earlier compliance report submission. The copy of renewed Consent to operate (CC&A) (Sr. No. 1) is attached as Annexure – 1.</td></tr>
<tr><td>(iii)</td><td>The proposed project should not handle any hazardous goods and</td><td>Complied.

Only containers and dry cargo is being handled on Multi-</td></tr>
</table>

Sr. No.	Conditions as per clearance letter	Compliance Status as on 31-03-2022
	cargo.	Purpose Berth (Terminal – 2). During the compliance period, no hazardous cargo / goods are handled at the Multi-Purpose Berth (Terminal – 2).
(iv)	Quarantine condition should be provided for keeping the hazardous containers if they are accidentally received.	Complied. Only containers and dry cargo is being handled on Multi-Purpose Berth (Terminal – 2). During the compliance period, no hazardous cargo / goods are handled at the Multi-Purpose Berth (Terminal – 2).
(v)	Green belt area should be developed along the project and budget earmarked.	Complied. Green belt was developed 72.81 ha. Total 1,33,462 trees were planted with the density of 1835 trees per hectare within the port area. So, far APSEZ has developed 486.19 ha. area as greenbelt with plantation of more than 9.4 Lacs saplings within the APSEZ area. To enhance the marine biodiversity, till date APSEZ has carried out mangrove afforestation in 3140 ha. area across the coast of Gujarat. Total expenditure for the same till date is INR 847.8 lakh. Details on Mangroves afforestation & Green belt development carried out by APSEZ till date is annexed as **Annexure – 2**. Other than this Adani Foundation – CSR Arm of Adani Group at Mundra-Kutch has initiated multi-species plantation of mangroves in Luni village in association with GUIDE, Gujarat. During 2018-2019 (Phase-I) multi-species mangrove plantation was carried out in 10 ha, during Phase-II (2019-2020) it was 02 ha and during Phase III (2020-2021) it is 01 ha. During current FY 2021-22, 03 ha area coastal stretches have been planted with selected mangrove species. Total 16 Ha. multi-species mangrove plantation has been carried out till March-22 association with M/s. GUIDE, Gujarat. Please refer attached **Annexure – 3** for CSR activity report carried out by Adani Foundation.

Sr. No.	Conditions as per clearance letter	Compliance Status as on 31-03-2022
(vi)	A disaster management plan covering emergency evacuation mechanisms etc. to deal with natural disaster event should be prepared and furnished to the ministry.	Complied. Disaster Management plan is in place and implemented to deal with natural disasters such as cyclone, earthquake, flood/heavy rain and tsunami. 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 in that. On Site Emergency Response Plan and Crisis Management Plan is in place and implemented. The updated Onsite emergency plan is attached as **Annexure – 4**.
(vii)	The company must take up and earmark adequate funds for the socio-economic development and for welfare measures in the area including drinking water supply, vocational training, fishery related development programmes (like cold storages)	Complied. RO Plants are provided at Samaghogha, Siracha village & Vallabh Vidyalaya at Mundra village. To reduce water born disease and women drudgery to get water, Potable water is provided to the fishermen communities at different vasahat through water tanker since 9 years. APSEZ is actively working with local community around the project area and provides required support for their livelihood and other concerns through the CSR arm – Adani Foundation. Adani Foundation is working in main four persuasions as below. - Education - Community Health - Rural Infrastructure - Sustainability Livelihood Brief information about activities in the main four persuasions is mentioned below. Other than this, Adani Foundation has also worked for fight against COVID – 19 pandemic situations during this compliance period Activities carried out for the same are summarized as below.

Area	Activity
Fight Against COVID-19	• Started Covid care centre service at Samudra town ship to Provide medical services at 24 x7 hrs. Home Visit for Medical Prescription and advise for further treatment & co-ordination. • AF team voluntary performed patients care and co-coordination duty at GKGH, Bhuj for 23 days.

Sr. No.	Conditions as per clearance letter	Compliance Status as on 31-03-2022	
			• AHMPL, Mundra was converted into Covid Hospital with 110 bed Facilities with oxygen to extend Covid medical treatment over community. All related coordination done by our team for more than 353 OPD and IPD. • Provided Oxygen Concentrator machines for Home isolated patients resulted in goodwill. • Provide Dead body van service to shift covid demise patients to Crematorium with all dignity. • Precautionary voice message dissemination through Awaj de voice message service Over Community. • Started Village Sanitizing activities and Ukalo, Vitamin C tablet distribution
		Community Health	• Mobile Heath Care Units and Rural Clinics • 12 Rural Clinics • 09 villages of Mundra, 03 villages of Anjar & Mandvi block has benefited by rural clinic service. • Support to 1409 vulnerable patients. • 31 villages covered, with 94 types of general and lifesaving medicines through Mobile healthcare unit • 57420 patients direct & 193661 patient indirect benefited during FY 2021-22. • 344 patients are directly/indirectly benefitted by Dialysis support at various times with nominal charges at Adani Hospital. • 05 patient with critical & severe condition has been supported for dialysis various time with nominal charges. • 1409 –Economically Challenged patients have been supported for operation, OPD, IPD, Medicines and lab-test. • For Preventive health care General and multispecialty camps Pediatric camp, General Health camps in 9 villages and Super specialist camp which benefitted more than 1100 patients of Mundra Taluka. • 154 Widows, Senior Citizens and Handicapped people linked with Government pension scheme • 16 Senior Citizens have been linked with Government Niradhar pension scheme, 34 senior Citizens linked up with Ayushman Yojana and 67 Senior Citizens were referred to GKGH Bhuj for chronic illness.
		Sustainable Livelihood – Fisher folk, Agriculture & Women	• 1031 families has benefitted by water supply at nine fisher folk vasahats under Machhimar Ajivika Uparjan Yojana. • Average 75 KL of water was supplied to 676 households at 5 fisherman vasahat on a daily basis under Machhimar Shudhh Jal Yojana and other 4 fisherman vasahat has linkaged with Narmada water through GWIL and Mundra Gram Panachayat from which 355 households get benefited. • Engage more than 500 fisher folk youth in Skill Development Training to provide consistent scope of income. • 11604 fisherfolk direct or indirect benefitted with Education, Mangrove, Water and Livelihood.

Sr. No.	Conditions as per clearance letter	Compliance Status as on 31-03-2022	
			• 39 Fisher Youth were interviewed in various industries among that 12 have been selected. Our target is to support 500+ Fisherman in alternative livelihood till March 2022. • Facilitation of Pagadiya Welfare scheme & boat license sanction letter to 06 Fishermen. Till date 59 Form has been submitted to fisheries department, Bhuj for pagadiya and boat License. • During the Taukate cyclone fishermen family had been shifted to safe Places As well as support to disaster management team for advance preparation. • To promote Natural farming Adani Foundation has originated cow-based farming initiative with interconnected techniques which can increase farmer yield. • Survey and identification of farmers to adopt Natural farming-Total 150 Farmers were selected ascriteriain first phase of the Project. • 23 Vermi compost unit have been set-up. Which is facilitated through Government with farmer Contribution. • 150 Farmers have started to preparing Jiva Mrut & Gaukrupa Amrutam Bio-fertilizer and using in agricrop. Series of Training is arranged by ATMA and Adani Foundation. • Four Farmers Groups is registered with ATMA–Agricultural technology management Agency–it will leverage Government schemes. • Adani Foundation has also provided 117.11 lacs kg Dry Fodder and 89.00 lacs kg Green fodder in 29 villages of Mundra and Anjar Block to support the resource dependent villagers, to avoid their dependency on mangroves. The expenditure for fodder supporting activities was approx. 206.11 Lacs during FY 2021-22. • Adani Foundation provides Good Quality dry and green fodder to 24 Villages. Project is covering total 14116 Cattels / 3008 farmers and hence enhancing cattle productivity. Dry Fodder 895398 Kg Green –2425230 Kg. • Fodder Cultivation-To made fodder sustain villages -25 Acre Gauchar land of Siracha village is being cultivated for the same. • Current year for the dates Packaging and Marketing, KKPC Started to sell 10 Kg capacity packaging Box at Minimum Profit Margin At Rs.29/Boxes which resulted in turnover of Rs. 24 Lacs with Profit of 1 Lac. This initiative has supported more than 1800 farmers indirectly. • Dragon fruit farming is ongoing by five farmers each farmer is doing in 2 Acre farm –Total 11000 plants. • Skill Development and Income Generation –Adani Foundation is working with 15 Self-help group and supporting to develop entrepreneur skills to become self-reliant, sourcing more than 350 women to absorb in various job.

Sr. No.	Conditions as per clearance letter	Compliance Status as on 31-03-2022	
		Education	• The Virtual and Offline classes (Shrisikshan) with parents permission with all precautionary measures as Government Guide Lines. Its very encouraging that inspired by Our Sheri Sikshan Initiative-Gov Teachers also started same approach. • Online Outreach – 259 Students • Individual Home visit – 415 Students • Sheri sikshan and school students - 838 Students • Uthhan First phase 17 Schools and 2951 students were part of the program, and second phase 14 Schools and 1952 Students were part of the programme. Total 4903 students are getting benefit from Utthan. • Dedicatedly 80 hours provided for preparing JNV and NMMS examination. 19 number of students qualified for JNV and NMMS. • 100 hours capacity building programs for Utthan Sahayaks and school Teachers. • Total 394 webinar and capacity building program were arranged for Utthan Sahayaks and Government Officers. • Arranged Virtual Tour regarding Plastic Waste Management with Municipal Corporation, Surat and aware about waste Collection, Segregation, treatment and Disposal Process. Total 178 Students were participated for the same. • 473 underprivileged students of Fisherman & Maldhari communities from 8 villages taking education at the Adani Vidya Mandir school. • Celebration of various days is villages school.
		Rural Infrastructure & Environmental Sustainability	Adani foundation designed and build various structure and provide service in the Health, Education, agriculture and sustainable livelihood area. **WORK COMPLETED** • 50 RRWHS structure have been completed • 83 Bore-well recharging activity is completed. • Development Approach road Prasala vadi vistar Gogan Pachim at Zarpara • Earthen bund Repairing work at Pond, Luni. • Pre-monsoon activity Approach repairing, Village Pond Lake strengthen and river cleaning (babul cutting) work is ongoing in Various Villages • Approach Road repairing at Various Fishermen Vasahat (ARC). • Construction of community gathering and training Center construction at different villages • 23 Fishermen of Randar bandar are benefitted to Pakka house constructed under AF Fishermen Avasa yojna **ENVIRONMENT SUSTAINABILITY PROJECTS** • **Miyawaki Forest Development, Nana Kapaya** - Plantation of 4965 saplings of different 42 species is completed which will result in dense forest within 2 years

Sr. No.	Conditions as per clearance letter	Compliance Status as on 31-03-2022	
			• **Smruti Van** – Plantation more than 40,000 sapling with more than 115 species through Miyawaki methodology. • **Ecosystem Restoration, Guneri** – Grassland ecosystem restoration and mangrove conservation in 40 Ha area over a period of 4 years. The faunal survey was initiated in the month of December and continued till February 2022. • **Multi-Species Mangrove Park** - Adani Foundation at Mundra's initiated multi-species plantation of mangroves in Kutch association with GUIDE. During 2018-2019 (Phase-I) multi-species mangrove plantation was carried out in 10 ha, during Phase-II (2019-2020) it was 02 ha and during Phase III (2020-2021) it is 01 ha. During current FY 2021-22, 03 ha area coastal stretches have been planted with mangrove species. Total 16 Ha. multi-species mangrove plantation has been carried out till March-22 association with M/s. GUIDE, Gujarat. • **Home biogas** - Under Gram Utthan Project, Adani Foundation is supporting home biogas to farmers to Uthhan Villages phase wise. Current year supported 223 home biogas system in Dhrub, Zarpara and Navinal Villages • As per SORI use of biogas each farmer can save Rs.23399/year. Total 223 farmers can save Rs.5217977/- in a year. • **Seaweed Culture** - A pilot cultivation facility (5 KL tanks in 6 nos.) for the farming of different economically important seaweeds in the tanks on the onshore has been established and commenced the cultivation trials with red seaweeds Kappaphycus alvarezii, Gracilaria dura and green seaweed Ulva. • **Water Conservation Projects** – ✓ A large number of water harvesting structure (Total 21 Nos. of check dams and Augmentation of 2 check dams (1 Check dam current year). ✓ Ground recharge activities (pond deepening work for more than 56 ponds) individually and 26 ponds under Sujlam Suflam Jal Abhiyan ✓ Pond deepening and bund strengthen of Rampar village pond increase water storage capacity. ✓ Roof Top Rain Water Harvesting 115 Nos. (50 Nos current FY 2021-22) which is having 10,000 litre storage which is sufficient for one year drinking water purpose for 5 people family. ✓ Recharge Borewell 189 Nos (83 Nos current FY 2021-22) which is best ever option to. ✓ Drip Irrigation 1158 Farmers (180 formers are supported with 15% of amount of total cost for maximum 4.0 lac. in current FY 2021-22) ✓ Bund construction on way of Nagmati River could save more than 575 MCFT water quantity which recharged in ground due to which borewell depth decreased by 50-100 Ft in Zarpara, Bhujpur and Navinal Vadi Vistar. ✓ Luni Pond Bund Repairing Work.

<table>
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<tr><td></td><td></td><td colspan="2">
<table>
<tr><td>Skill Development</td><td>Over the previous few years, Adani Skill Development Center has assessed various aspects of the technical, leadership and soft skills gaps that organizations, in general, face and accordingly focuses on imparting required training in those areas in partnership with various colleges and institutes.

<u>ASDC, Mundra</u>
• RPL–Recognition of Prior Learning Training given to Adani Group Contractual Employees–Total 218 Employees have been benefitted
• In Phase I, 51 fishfolk community youth will be skilled and certified in job roles like Assistant Electrician, Mason and Bar bender under 90 days training program supported by placements.
• Junior Crane Operator practical training to 36 Candidates for (Group-1, 2 & 3) At MICT Port.
• Guest Lecture on Mehendi products, Beauty Therapist & Resin art Total 100 candidate have been benefitted.
• Certificate Distributed to Mud work candidates at MICT Colony – 30 women learnt Mud work.
• Volunteer Support in GKGH and Adani Hospital during covid pandemic.
• 21 students were coordinated for interview in seabird CFS of Mundra.
• Basic computer and spoken English training for 152 Fisherfolk students of Zarpara and Luni Vasahat.

<u>ASDC, Bhuj</u>
• Launched New online General Duty Assistant & Beauty Therapist for 63 candidates under (DDU-GKY).
• Soft Skills Training Certificate distribution to Prisoners of Palara Special Jail.
• Guest lecture on "Tally: Older vs New" & "Concept of Emerging E-way Bill"

<u>Total Beneficiaries:</u>
• Technical Training: 365 Nos.
• Sof-Skill Training: 52 Nos.</td></tr>
</table>

Please refer Annexure – 3 for full details of CSR activities carried out by Adani Foundation in the Mundra region. Budget for CSR Activity for the FY 2021-22 is to the tune of INR 1628.45 lakh. Out of which, Approx. INR 1492.6 lakh are spent during current FY 2021-22.

Till Mar'22, Adani Foundation has done total expenditure of INR 147.69 Cr. for CSR activities in Kutch region since its inception.</td></tr>
<tr><td>(viii)</td><td>The fishing activities by the fishermen living in</td><td colspan="2">Complied.

No commercial fisheries are prevailing in this area except</td></tr>
</table>

Sr. No.	Conditions as per clearance letter	Compliance Status as on 31-03-2022
	the settlement along the creek should not be hindered and a mechanism may be evolved for the movement of fishing boats vis-a-vis shipping activities.	Pagadia and fishermen with small boats. Unhindered access is provided to the fishing boats. During project proposal, APSEZ proposed to provide four (4) dedicated accesses at Juna Bandar, Luni, Bavdi Bandar and Zarpara for the fishermen to approach the sea for fishing activity. However, during construction as well as operation, through fishermen consultative process, APSEZ has provided seven (7) access roads. Total length of all the approach roads is approx. 23 Kms and expenditure involved is Rs. 637 Lacs. There is no hindrance to the movement of fisherman boats. Details of the same were submitted along with EC Compliance report for the period Apr'18 to Sep'18. Communication mechanisms have been developed for the smooth movement of fishing boats vis-à-vis shipping activities. Please refer point no. vii above for further details regarding CSR activities being carried out by Adani Foundation.
(ix)	The relocation of the fishermen and local community if any, in the area should be done strictly in accordance with the norms prescribed by the State Government. The relocated communities should be provided with all facilities including health care, education, sanitation and livelihood.	Complied. The project was conceptualized in such a way that there are no fishermen or local community settlements in the project proposal. APSEZ performs a large-scale socio-economic upliftment program in consultation with FOKIA (Federation of Kutch Industries Association) chaired by District Collector quarterly. APSEZL have provided necessary facilities including health care, education, sanitation, livelihood, drinking water & other infrastructural support to fisher folk community in the region. Please refer point no. vii above for further details regarding CSR activities being carried out by Adani Foundation.
(x)	The project proponent should not undertake any destruction of mangroves during construction and operation of the project.	Complied. Construction phase is already completed and the project is in operation phase. All developments are carried out as per permissions granted.

Sr. No.	Conditions as per clearance letter	Compliance Status as on 31-03-2022
		Conservation of mangroves: • In and around APSEZ, approx. 1800 ha. mangrove area was identified by NIO in an EIA report prepared the year 1998. • Out of this 1800 ha area, 1254 ha area was further demarcated as potential mangrove conservation by NIO in the year 2008 (as part of the EIA report of WFDP). • It may be noted that the entire area of 1254 ha is not covered with mangroves. • Entire area is being conserved and there is no disturbance to the mangroves in this area. Measures such as restricted entry and regular surveillance have resulted in overall growth of mangroves within this area. • As per MoEF&CC directive, APSEZ entrusted NCSCM to demarcate mangroves in and around APSEZ area. As per their study, mangrove cover in and around APSEZ was over 2340 ha. The analysis of the comparison between 2011 and 2016-17 has shown an overall growth of 246 ha. NCSCM final report on comprehensive and integrated plan for preservation and conservation of mangroves and associated creeks in and around was submitted along with half yearly EC Compliance report for the period Apr'19 to Sep'19. The same was further submitted to GCZMA and MoEF&CC for their examination and recommendation vide (with a copy to MoEF&CC vide letter dated 04.06.2018 & reminder letter vide dated 4th Jan, 2019). Presentation on the findings of the report was made to GCZMA committee on 4th October 2019 and the recommendation for the same has been received vide email dtd 22nd Sept, 2020 with conditions, which was submitted as a part half yearly EC compliance report for the period Oct'20 to Mar'21. As a part of GCZMA recommendations and NCSCM mangrove conservation action plan, APSEZ has undertaken following activities. **Sr. No. / Recommendations / Compliance** 1. Mangrove mapping and monitoring in and around APSEZ • APSEZ entrusted NCSCM, Chennai to carry out Monitoring of mangrove distribution in creeks in and around

Sr. No.	Conditions as per clearance letter			Compliance Status as on 31-03-2022
				APSEZ and shoreline changes in Bocha island. • As a part of this study, overall growth of mangroves in the creeks in and around APSEZ was assessed comparing Google earth images of 2017 & 2019 and it is observed that there was increase in mangrove cover between March 2017 and September 2019 to the extent of 256 Ha, which is about 10.7%. • This suggests that the mangroves and the tidal system in the creeks remain undisturbed over this period. Analysis of data between categories indicated that there was an increase in dense mangroves and also conversion of scattered to sparse which also shows that the growth of mangroves in a progressive direction. • Hence, there is an overall growth of mangroves in creeks in and around APSEZ, Mundra is 502 Ha between 2011 and 2019. • The cost of the said study was INR 23.56 Lacs incurred by APSEZ.
		2.	Tidal observation in creeks in and around APSEZ	• APSEZ carried out the tidal observations at locations similar to 2017 in Kotdi, Baradimata, Navinal, Bocha and Khari creeks under the guidance of NCSCM. • The observed tidal ranges indicate that the creeks experience normal tidal ranges, adequate for the growth of mangroves. • The cost of the said activity was INR 1.0 Lacs.
		3.	Removal of Algal and Prosopis growth from mangrove areas	• Algal and Prosopis growth monitoring was done in and around mangrove area and algal encrustation was found in some of the mangrove areas, which has been removed manually. • The cost of the said activity was INR 2.8 Lacs during FY 2021-22. Please refer attached **Annexure – 5** for Report of Algal removal work in mangrove area.

Sr. No.	Conditions as per clearance letter	Compliance Status as on 31-03-2022
		4. Awareness of mangroves importance in surrounding communities • Adani Foundation – CSR Arm of Adani group has done awareness camps/activities created in the community regarding importance of mangroves. • Adani Foundation provides good Quality dry and green fodder to 24 Villages. Project is covering total 14116 Cattle's / 3008 farmers and hence enhancing cattle productivity during last FY 2021-22 (Till Mar'22). • Individual Farmer fodder cultivation supported for Maize seed and NB21 to more than 200 farmers which has created revenue of Rs. 27 Lacs. • Adani foundation and Government Animal hospital jointly organizing Cattle awareness camps total 22 villages and in 2021, Total 666 families 5083 animal benefited. • Awareness of mangroves importance in surrounding communities & Fodder support - The expenditure for fodder supporting activities was approx. 206.11 Lacs during FY 2021-22, which was incurred by APSEZ. • Village Gauchar land development for the fodder cultivation to made fodder sustain village & Avail green fodder in scarcity phase. With the support of Gauchar Seva Samiti Grassland development in Siracha – 85 Acre & Zarpara – 25 Acre done which resulted in total production of 82 ton. • Other than this dedicated security guard with gate system deployed by APSEZ across the coastal area and no any unauthorized persons allowed within coastal as well as mangrove areas. • Refer CSR report attached as **Annexure – 3**. Details of activities done as a part of GCZMA recommendations and NCSCM mangrove conservation action plan were submitted as a part of half yearly EC compliance report for the period Oct'20 to Mar'21.

<table>
<tr><th>Sr. No.</th><th>Conditions as per clearance letter</th><th>Compliance Status as on 31-03-2022</th></tr>
<tr><td>(xi)</td><td>Sewage arising in the port area should be disposed off through septic tank – soak pit system or should be treated along with the industrial effluent to conform to the standards stipulated by Gujarat Pollution Control Board and should be utilized / recycled for gardening, plantation and irrigation.</td><td>Complied.

Sewage generated from port is being treated in designated ETP and treated sewage is used for horticulture purposes.

<table>
<tr><th>Location</th><th>Capacity</th><th>Quantity of Treated Water (Avg. from Oct'21 to Mar'22)</th><th>Type of ETP / STP</th></tr>
<tr><td>LT</td><td>265 KLD</td><td>78 KLD</td><td>Activated Sludge</td></tr>
</table>

Summary of ETP treated water analysis results during compliance period as mentioned below.

<table>
<tr><th>Parameter</th><th>Unit</th><th>Min</th><th>Max</th><th>Average</th><th>Perm. Limit$</th></tr>
<tr><td>pH</td><td>--</td><td>7.11</td><td>7.59</td><td>7.29</td><td>6.5 – 8.5</td></tr>
<tr><td>SS</td><td>mg/L</td><td>23</td><td>56</td><td>35</td><td>100</td></tr>
<tr><td>TDS</td><td>mg/L</td><td>1376</td><td>1678</td><td>1542</td><td>2100</td></tr>
<tr><td>COD</td><td>mg/L</td><td>71.10</td><td>78.00</td><td>74.38</td><td>100</td></tr>
<tr><td>BOD</td><td>mg/L</td><td>16</td><td>22</td><td>18</td><td>30</td></tr>
<tr><td>Ammonical Nitrogen as NH_3-N</td><td>mg/L</td><td>7.44</td><td>25.40</td><td>11.35</td><td>50</td></tr>
</table>
$ as per CC&A granted by GPCB

The quality of marine water, treated effluents, air emissions and noise levels are being regularly analyzed by NABL accredited and MoEF&CC approved agency.

Please refer Annexure – 6 for detailed analysis reports. Approx. INR 14.31 Lakh is spent for all environmental monitoring activities during the FY 2021-22 for overall APSEZ, Mundra.

It is also noted that GPCB is doing regular site inspection along with wastewater sampling and analysis. The last GPCB sample analysis report was submitted as part of compliance report submission for the duration of Apr'21 to Sep'21 which shows all the parameters are well within the permissible limit.</td></tr>
</table>

<table>
<tr><th>Sr. No.</th><th>Conditions as per clearance letter</th><th>Compliance Status as on 31-03-2022</th></tr>
<tr><td>(xii)</td><td>Project proponent should prepare and regularly update the disaster management plan from time to time.</td><td>Complied.

Disaster Management plan to deal with natural disasters such as cyclone, earthquake, flood/heavy rain and tsunami is in place and implemented. Copy of the same was submitted to MoEF & CC along with half yearly compliance report for the period from Apr – 2016 to Sep – 2016.</td></tr>
<tr><td>(xiii)</td><td>There should be no withdrawal of ground water in CRZ area, for this project. The proponent should ensure that as a result of the proposed constructions, ingress of saline water into ground water does not take place. Piezometers should be installed for regular monitoring for this purpose at appropriate locations on the project site.</td><td>Complied.

There is no withdrawal of ground water in CRZ area, for this project. Entire water requirement is sourced from GWIL and desalination plant of APSEZ. Average water consumption for entire APSEZ area is 3.45 MLD during compliance period i.e. Oct'21 to Mar'22.

To monitor the ground water quality, bore wells are provided at various location in the port and SEZ areas. Third party analysis of the ground water is being carried out twice a year by NABL and MoEF&CC accredited agency namely M/s. Pollucon Laboratories Pvt. Ltd. Surat and Unistar Environment and Research Labs Pvt. Ltd., Vapi. Summary of the same for duration from Oct'21 to Mar'22 is mentioned below. Monitoring Reports are attached as Annexure – 6 for the same.

Number of Sampling Locations: 5
<table>
<tr><th>Parameter</th><th>Unit</th><th>Minimum</th><th>Maximum</th><th>Average</th></tr>
<tr><td>pH @ 25 ° C</td><td>--</td><td>7.6</td><td>8.06</td><td>7.87</td></tr>
<tr><td>Salinity</td><td>ppt</td><td>0.95</td><td>11.85</td><td>4.66</td></tr>
<tr><td>Oil & Grease</td><td>mg/L</td><td>ND*</td><td>ND*</td><td>ND*</td></tr>
<tr><td>Hydrocarbon</td><td>mg/L</td><td>ND*</td><td>ND*</td><td>ND*</td></tr>
<tr><td>Lead as Pb</td><td>mg/L</td><td>0.036</td><td>0.064</td><td>0.04</td></tr>
<tr><td>Arsenic as As</td><td>mg/L</td><td>ND*</td><td>ND*</td><td>ND*</td></tr>
<tr><td>Nickel as Ni</td><td>mg/L</td><td>ND*</td><td>ND*</td><td>ND*</td></tr>
<tr><td>Total Chromium as Cr</td><td>mg/L</td><td>0.084</td><td>0.092</td><td>0.09</td></tr>
<tr><td>Cadmium as Cd</td><td>mg/L</td><td>ND*</td><td>ND*</td><td>ND*</td></tr>
<tr><td>Mercury as Hg</td><td>mg/L</td><td>ND*</td><td>ND*</td><td>ND*</td></tr>
<tr><td>Zinc as Zn</td><td>mg/L</td><td>0.154</td><td>0.282</td><td>0.21</td></tr>
<tr><td>Copper as Cu</td><td>mg/L</td><td>ND*</td><td>ND*</td><td>ND*</td></tr>
<tr><td>Iron as Fe</td><td>mg/L</td><td>0.38</td><td>1.12</td><td>0.96</td></tr>
<tr><td>Insecticides/Pesticides</td><td>µg/L</td><td>ND*</td><td>ND*</td><td>ND*</td></tr>
<tr><td>Depth of Water Level from Ground Level</td><td>meter</td><td>1.90</td><td>2.15</td><td>2.07</td></tr>
</table>
*ND = Not Detectable</td></tr>
</table>

Sr. No.	Conditions as per clearance letter	Compliance Status as on 31-03-2022
		Please refer **Annexure – 6** for detailed analysis reports. Approx. INR 14.31 Lakh is spent for all environmental monitoring activities during the FY 2021-22 for overall APSEZ, Mundra.
(xiv)	The project should not be commissioned till the requisite water supply and electricity to the project are provided by PWD/ Electricity Department.	Complied. Construction activity is already completed and the project is in operation phase. Necessary agreement for supply of Electricity is done through MPSEZ Utilities Ltd. (MUL). Copies of agreements were submitted to MoEF&CC along with half yearly compliance report for the period from Apr – 2016 to Sep – 2016.
(xv)	Specific arrangements for rainwater harvesting should be made in the project design and the rain water so harvested should be optimally utilized. Details in this regard should be furnished to this Ministry's Regional Office at Bhopal within 3 months.	Complied. Groundwater recharge cannot be done at the project site since the entire project is in the intertidal / sub tidal areas. Rainwater within project area is managed through storm water drainage. We have installed Rainwater recharge bore well (4 Nos.) within our township to recharge ground water. Details of the same were submitted along with half yearly EC compliance report for the period Apr'19 to Sep'19. During FY 2021-22 Approx. 2.06 ML of rainwater has been recharged to increase the ground water table. We have also connected roof top rainwater duct of operational building (Tug berth building within MPT) with u/g water tank for utilization of collected rain water for gardening / horticulture purpose. Details of the same were submitted along with EC Compliance report for the period Oct'18 to Mar'19. However, Adani Foundation – CSR arm of Adani Group has carried out rainwater harvesting activities in the nearby villages for benefit of the locals. Water conservation Projects i.e. Roof Top Rain Water Harvesting, Desilting of Check dams, Bore Well Recharge and Pond deepening were taken up in past years, review

Sr. No.	Conditions as per clearance letter	Compliance Status as on 31-03-2022
		and monitoring of all water harvesting structures had been taken up. To make connections between human actions and the level of biological diversity found within a habitat and/or ecosystem, this year Adani Foundation launch project "Sanrakshan" in coordination with GUIDE and Sahjeevan. Since 10 years considerable Water Conservation Work carried out in Mundra Taluka. Due to satisfactory rain in current year 1.11 mtr ground water table increased as per increased in coastal belt of Mundra as per Government Figures. **Our water conservation work is as below.** • A large number of water harvesting structure (Total 21 Nos. of check dams and Augmentation of 2 check dams (1 Check dam current year). • Ground recharge activities (pond deepening work for more than 56 ponds) individually and 26 ponds under Sujlam Suflam Jal Abhiyan were built leading to a significant increase in water table and higher returns to the farmers. • Pond deepening and bund strengthen of Rampar village pond increase water storage capacity. • Roof Top Rain Water Harvesting 115 Nos. (50 Nos current FY 2021-22) which is having 10,000 litre storage which is sufficient for one year drinking water purpose for 5 people family. • Recharge Borewell 189 Nos (83 Nos current FY 2021-22) which is best ever option to. • Drip Irrigation 1158 Farmers (180 formers are supported with 15% of amount of total cost for maximum 4.0 lac. in current FY 2021-22). • Bund construction on way of Nagmati River could save more than 575 MCFT water quantity which recharged in ground due to which borewell depth decreased by 50-100 Ft in Zarpara, Bhujpur and Navinal Vadi Vistar. • Luni Pond Bund Repairing Work is completed. With the objective of to preserve the rainwater to reduce the impact of salinity and recharge the ground water (the main source of water) to facilitate the Agricultural activities as well as for drinking water.

Sr. No.	Conditions as per clearance letter	Compliance Status as on 31-03-2022
		Please refer **Annexure – 3** for full details of CSR activities carried out by Adani Foundation in the Mundra region. Budget for CSR Activity for the FY 2021-22 is to the tune of INR 1628.45 lakh. Out of which, Approx. INR 1492.6 lakh are spent during current FY 2021-22.
(xvi)	The facilities to be constructed in the CRZ area as part of this project should be strictly in conformity with the provisions of the CRZ Notification, 1991 as amended subsequently.	Complied. Construction activities are completed in accordance with the prevailing laws.
(xvii)	No product other than those permissible in the coastal Regulation Zone Notification, 1991 should be stored in the Coastal Regulation Zone area.	Complied. APSEZ store only those product / cargo within CRZ area, which are permissible as per Coastal Regulation Zone Notification, 1991 & its amendments.
B. General Condition		
(i)	Construction of the proposed structures should be undertaken meticulously confirming to the existing Central / local rules and regulations including Coastal Regulation Zone Notification 1991 and its amendments. All the construction designs / drawings relating to the proposed construction activities must have approvals of the concerned State Government Department / Agencies.	Complied. All construction activities are carried out confirming to the existing rules and regulation and as per the CRZ notification. Required details on No Objection Certificate from Gujarat State Pollution Control Board and applicable consent are as provided in Specific Condition No. 2 above.
(ii)	Adequate provisions for infrastructure facilities	Complied.

Sr. No.	Conditions as per clearance letter	Compliance Status as on 31-03-2022
	such as water supply, fuel, sanitation, etc. should be ensured for construction workers during the construction phase of the project so as to avoid felling of trees / mangroves and pollution of water and the surroundings.	Construction activity is completed and the project is in operation phase. No construction camps were located in CRZ area. Most workers came from nearby villages however, for others; construction camps were located outside CRZ area. All necessary infrastructure and facilities like mobile toilets, safe drinking water, medical health care etc. were provided.
(iii)	The project authorities must make necessary arrangements for disposal of solid wastes and for the treatment of effluents by providing a proper waste water treatment plant outside the CRZ area. The quality of treated effluents, solid wastes and noise levels etc. must conform to the standards laid down by the competent authorities including the Central / State Pollution Control Board and the Union Ministry of Environment and Forest under The Environment Protection Act, 1986, whichever are more stringent.	Complied. **Liquid Effluent & Sewage** - It is being treated at ETP/STP plants outside the CRZ area, treated water from ETP/STP is being used for horticultural purposes. Please refer point no xi of the specific conditions above for further details. All attributes of environment viz. air; water; soil and noise are being regularly analyzed by NABL and MoEF&CC accredited agency M/s. Pollucon Laboratories Pvt. Ltd. Surat and Unistar Environment and Research Labs Pvt. Ltd., Vapi. Please refer **Annexure – 6** for detailed analysis report. **Waste Management** – APSEZ has adopted 5R concept for environmentally sound management of different types of solid & liquid wastes. Please refer below details about management of each type of waste. **Non-Hazardous Solid Waste**: A well-established system for segregation of dry & wet waste is in place. All wet waste (Organic waste) is being segregated & utilized for compost manufacturing and/or biogas generation for cooking purpose. The compost is further used by in house horticulture team for greenbelt development. Whereas dry recyclable waste is being sorted in various categories. Presently manual sorting is being done for sorting of different types of solid waste. Segregated recyclable materials such as Paper, Plastic, Cardboard, PET Bottles, and Glasses, etc. are then sent to respective recycling units, whereas remaining non-recyclable waste is bailed and sent to cement plant (M/s. Ambuja Cement Ltd., Kodinar) for Co-processing as RDF (Refused Derived Fuel).
(iv)	The proponents should provide for a regular monitoring mechanism so as to ensure that the treated effluents	

Sr. No.	Conditions as per clearance letter	Compliance Status as on 31-03-2022
	conform to the prescribed standards. The records of analysis reports must be properly maintained and made available for inspection to the concerned state /central officials during their visits.	APSEZ, Mundra is certified for Zero Waste to Landfill management system (ZWTL MS 2020) by TUVRheinland India Pvt. Ltd. (valid up to 31.05.2024). APSEZ, Mundra has also been certified as Single Use Plastic (SUP) Free Port by Confederation of Indian Industry (CII) (valid up to 25.05.2022). Details of the same were submitted during the last half yearly EC compliance report during period Apr'21 to Sept'21. **Hazardous & Other Waste:** • Bio medical waste generated from OHCs and Adani Hospital is being disposed at Common Bio Medical Waste Treatment Facility namely M/s. Distromed Kutch Services Pvt. Ltd., Bhuj. • E – Waste & Used Batteries are being sold to GPCB registered recyclers namely M/s. Galaxy Recycling, Rajkot and Sabnam Enterprise, Kutch respectively. • Solid Hazardous Waste is being disposed through co-processing / incineration through common facility i.e. M/s. Saurashtra Enviro Projects Pvt. Ltd., Bhachau and/or cement industries of Ambuja Cement Ltd., Kodinar. APSEZ, Mundra exploring a new vendor Wander Wall Cement industry for managing solid Hazardous Waste through co-processing / incineration. The agreement process is under progress. The Used/Waste Oil is being sold to GPCB authorized recyclers / re-processors namely M/s. Western India Petro Chem Ind - Bhavnagar, Aviation Corporation - Kutch & Aroma Petrochem - Bhavnagar. It is also being reused within organization for lubrication purpose. • Discarded drums / barrels are being sold to authorized decontamination facility i.e. M/s. Jawrawala Petroleum, Ahmedabad. It is also being reused within organization for filling hazardous waste. • Solid hazardous waste i.e. Tank bottom sludge is being sold to authorized recycler namely M/s. Mundra Oil Pvt. Ltd., Mundra for recycling. • Expired paint materials is being disposed by incineration through common facility i.e. M/s. Saurashtra Enviro Projects Pvt. Ltd., Bhachau.

<table>
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<tr><td></td><td></td><td>

Downgrade chemicals generated from cleaning of storage tanks / pipelines are being sold to authorized solvent recovery facilities namely M/s. Acquire Chemicals, Ankleshwar however during the compliance period, there was no disposal of downgrade chemicals.
Slop Oil received from vessels is treated to separate water and oil particles in Oil Water Separator system. Separated oil from the same is being sold to authorized recycler / reprocessor namely M/s. Western India Petro Chem Ind - Bhavnagar, Aviation Corporation - Kutch & Aroma Petrochem - Bhavnagar and water is sent to ETP for further treatment. However during the compliance period, there was no received or disposal of Slope Oil.
Horticulture waste is collected from various green belt areas and it is using for making of manure and manure is being utilizing in horticulture purpose within plant premises.

Details of permissions / agreements of hazardous waste authorized vendors were submitted along with pervious half yearly EC Compliance Reports. And there is no further change.

The following table summarizes the waste management practice (from Oct'21 to Mar'22) for different types of wastes at APSEZ:
<table>
<tr><th>Type of Waste</th><th>Quantity in MT</th><th>Disposal method</th></tr>
<tr><td colspan="3">Hazardous Waste</td></tr>
<tr><td>Pig Waste</td><td>6.71</td><td rowspan="3">Co-processing at cement industries</td></tr>
<tr><td>ETP / CETP Sludge</td><td>4.84</td></tr>
<tr><td>Oily Cotton waste</td><td>64.89</td></tr>
<tr><td>Used / Spent Oil</td><td>146.984</td><td>Sell to registered recycler</td></tr>
<tr><td>Discarded Containers / Barrels</td><td>2.89</td><td>Sell to registered recycler</td></tr>
<tr><td colspan="3">Other Waste</td></tr>
<tr><td>E-Waste</td><td>2.91</td><td>Sell to registered recycler</td></tr>
<tr><td>Bio Medical Waste</td><td>3.62</td><td>To approved CBWTF Site</td></tr>
<tr><td colspan="3">Non-Hazardous Waste</td></tr>
<tr><td>Recyclables Dry Waste / Scrap</td><td>1906.771</td><td>After recovery sent for recycling / Reuse within premises</td></tr>
<tr><td>Non-Recyclable Dry Waste (RDF)</td><td>158.15</td><td>Co-processing at Cement Industries</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Sr. No.</th><th>Conditions as per clearance letter</th><th>Compliance Status as on 31-03-2022</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><td>Wet Waste (Food waste + Organic waste)</td><td>412.96</td><td>Converted to Manure for Horticulture use / Biogas for cooking purpose</td></tr>
<tr><td>Horticulture Waste</td><td>404.00</td><td>Used for making of manure and utilize for horticulture purpose</td></tr>
</table>
</td></tr>
<tr><td>(v)</td><td>In order to carry out the environmental monitoring during the operational phase of the project, the project authorities should provide an environmental laboratory well equipped with standard equipment and facilities and qualified manpower to carry out the testing of various environmental parameters.</td><td>Complied.

Ambient Air Quality (twice in a week) and Noise (once in a month) monitoring are being carried out by NABL and MoEF&CC accredited agency namely M/s. Pollucon Laboratories Pvt. Ltd. Surat and Unistar Environment and Research Labs Pvt. Ltd., Vapi. Summary of the same for duration from Oct'21 to Mar'22 is mentioned below.

Total Ambient Air & Noise Sampling Locations: 4 Nos.
<table>
<tr><th>Parameter</th><th>Unit</th><th>Max</th><th>Min</th><th>Average</th><th>Perm. Limit$</th></tr>
<tr><td>AAQM</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>PM10</td><td>µg/m3</td><td>91.55</td><td>41.55</td><td>76.44</td><td>100</td></tr>
<tr><td>PM2.5</td><td>µg/m3</td><td>55.39</td><td>18.65</td><td>36.33</td><td>60</td></tr>
<tr><td>SO2</td><td>µg/m3</td><td>40.18</td><td>6.53</td><td>19.23</td><td>80</td></tr>
<tr><td>NO2</td><td>µg/m3</td><td>44.38</td><td>14.35</td><td>29.20</td><td>80</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><th>Noise</th><th>Unit</th><th>Leq Max</th><th>Leq Min</th><th>Leq Average</th><th>Leq Perm. Limit*</th></tr>
<tr><td>Day Time</td><td>dB(A)</td><td>69.90</td><td>55.40</td><td>64.82</td><td>75</td></tr>
<tr><td>Night Time</td><td>dB(A)</td><td>64.90</td><td>52.34</td><td>60.20</td><td>70</td></tr>
</table>
$ as per NAAQ standards, 2009
* as per CC&A granted by GPCB
Values recorded confirms to the stipulated standards.

Please refer Annexure – 6 for detailed analysis reports. M/s. Pollucon Laboratories Pvt. Ltd. Surat and Unistar Environment and Research Labs Pvt. Ltd., Vapi has an environmental laboratory well equipped with standard equipment and facilities and qualified manpower to carry out the testing of various environmental parameters.

Approx. INR 14.31 Lakh is spent for all environmental monitoring activities during FY 2021 - 2022 for overall APSEZ, Mundra.</td></tr>
<tr><td>(vi)</td><td>The sand dunes and mangroves, if any, on the site should not be</td><td>Complied.

There are no sand dunes and mangroves within the project</td></tr>
</table>

Sr. No.	Conditions as per clearance letter	Compliance Status as on 31-03-2022
	disturbed in any way.	area. However mangrove conservation plan has been developed by NSCSM and same has been submitted. Please refer Condition No. x of specific conditions for further details.
(vii)	A copy of the clearance letter will 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
(viii)	The Gujarat Pollution Control Board should display a copy of the clearance letter at the Regional Office, District Industries center and Collector's Office / Tehsildar's Office for 30 days.	Not Applicable This condition does not belong to project proponent.
(ix)	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 and the State Pollution Control Board.	Complied. Separate budget for the Environment protection measures is earmarked every year. All environment and horticulture activities are considered at corporate level and budget allocation is done accordingly. No separate bank account is maintained for the same however, all the expenses are recorded in advanced accounting system of the organization. Budget for environmental management measures (including horticulture) for the FY 2021-22 is to the tune of INR 1521.59 lakh. Out of which, Approx. INR 1371.79 lakh are spent during the year 2021-22. Detailed breakup of the expenditures for the past 3 years is attached as **Annexure – 7**.
(x)	Full support should be extended to the officers of this Ministry's	Complied. APSEZL is always extending full support to the regulatory authorities during their visit to the project site.

Sr. No.	Conditions as per clearance letter	Compliance Status as on 31-03-2022
	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.	Last visit of Regional Office, GPCB was done on 07.03.2022 for Main port and compliance of the same has been submitted vide our letter dated 11.03.2022. Details of the same is attached as **Annexure – 8**. Inline to the compliance certification process of Environment Clearance condition of Waterfront Development Plan, RO, MoEF&CC Bhopal had visited the site on 27th & 28th January, 2020 for compliance verification. APSEZ provided all requisite information and documents required by the Regional Officer MoEF&CC). During the said compliance verification visit and as per the compliance certification received, there was no major non-compliance observed. Inline to the compliance certification process of Consent to Operates of existing facilities developed under Waterfront Development Plan, RO, GPCB, Gandhidham had visited the site on 17th March, 2021 for compliance verification. APSEZ provided all requisite information and documents required by the Regional Officer GPCB). During the said compliance verification visit and as per the compliance certification received, there was no non-compliance observed. Inline to the compliance of MoEF&CC Order dated 18th September, 2015, Joint Review Committee (JRC) comprising officials from various competent authorities visited the APSEZ, Mundra from 1st to 3rd September, 2021 to monitor the progress of implementation of the conditions stipulated in the order. APSEZ provided all requisite information and documents required by the JRC. As per the report received by MoEF&CC vide dated 01.12.2021, there was no non-compliance observed.
(xi)	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	Complied. Construction phase is completed and the project is in operation phase. There is no deviation or alteration in project including implementing agency.

Sr. No.	Conditions as per clearance letter	Compliance Status as on 31-03-2022
	imposition of new one for ensuring environmental protection.	
(xii)	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.
(xiii)	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.
(xiv)	The project proponent should advertise in at least in two local newspapers widely circulated in the region around the project, one of which should 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 State Pollution Control Board and may also be seen at the website of the Ministry of Environment & Forests at http://www.envfor.nic.in	Complied

Sr. No.	Conditions as per clearance letter	Compliance Status as on 31-03-2022
	. The advertisement should be made within seven days from the date of issue of the clearance letter and a copy of the same should be forwarded to the Regional office of this Ministry at Bhopal.	
(xv)	The projects proponents should inform regional Office at Bhopal as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities and the date of start of land development work.	Complied. The construction phase is complete and the project is in operation phase.

Compliance Report of CRZ Recommendations

Half yearly Compliance report of CRZ recommendation for the project namely "Development of Multipurpose berth (Terminal – 2) at Mundra Port, Dist. Kutch" issued by DoEF, GOG vide letter no. ENV-10-2005-222-P dated 12th October, 2006.

Sr. No.	Conditions	Compliance Status as on 31-03-2022
Specific Condition		
1	The provision of the CRZ notification of 1991 and subsequent amendments issued from time to time shall be strictly adhered to by the GAPL. No activity in contradiction to the provision of the CRZ Notification shall be carried out 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	All permissions from different Government Departments / agencies shall be obtained by the GAPL before commencing the expansion activities.	Complied. Please refer to specific condition no. 2 of the EC and CRZ clearance above for details upon NOC & CC&A obtained from GPCB. Construction activity is already completed and the project is in operation phase. APSEZ had obtained No Objection Certificate vide GPCB letter No. GPCB/Unit-1/FT-139/11944 dated 27th April 2005.
3	No Dredging and /or reclamation activity shall be carried out in the CRZ area categorized as CRZ (i) and it shall have to be ensured that the mangrove habitats and other ecologically important and significant areas are not affected due to any of the project activities.	Complied. No dredging or reclamation is carried out in CRZ – 1 (A) area. Capital dredging is completed and only maintenance dredging is being carried out, Please refer to specific condition no. x of the EC and CRZ clearance for mangrove conservation.
4	The dredge material shall be disposed of into pre-designated areas duly identified and got approved through the Gujarat Coastal Zone Management Authority	Complied. Construction and capital dredging activities are completed and the project is in operation phase. Impact assessment was done for the same and EIA report was submitted to GCZMA and MoEF&CC based on which the final Environmental and CRZ clearance was granted.

Sr. No.	Conditions	Compliance Status as on 31-03-2022
	for which the company shall have to make separate application along with proper EIA indicating the exact location of the dredge material disposal area on the CRZ map of the region prepared by the Space Application Center, Ahmedabad, as there exists best mangrove area in and around Bocha and Navinal islands, which requires to be protected.	Detail on study for conservation and monitoring for natural mangrove stands at Mundra is as provided in condition no. 3 above.
5	Massive mangrove plantation activity in at least 1200 ha. Area shall be carried out within a time frame of 5 years commencing from July, 2006 without any delay whatsoever.	Complied. It may be noted that to enhance the marine biodiversity, till date APSEZ has carried out mangrove afforestation in 3140 ha. area across the coast of Gujarat. Total expenditure for the same till date is INR 847.8 lakh. Details on mangroves afforestation & Green belt development carried out by APSEZ till date is annexed as **Annexure – 2**. Please refer condition no. v of specific conditions (EC & CRZ Clearance) for further details.
6	No effluent or sewage shall be discharged into the sea / creek or in the CRZ area and shall be treated to conform the norms prescribed by the Gujarat Pollution Control Board and would be reused/ recycled within the plant premises.	Complied. Entire quantity of sewage generated is being treated in designated STPs and treated sewage is used for gardening. Please refer to specific condition no. xi of the EC and CRZ clearance above for more details.
7	All the recommendation and suggestions given by the NIO in its Comprehensive Environment Impact Assessment report for conservation / protection and betterment of	Complied. All the recommendation and suggestions for conservation / protection and betterment of environment given by the NIO in its comprehensive EIA have been implemented. Few examples are provided below.

<table>
<tr><th>Sr. No.</th><th>Conditions</th><th colspan="2">Compliance Status as on 31-03-2022</th></tr>
<tr><td></td><td>environment shall be implemented strictly by the GAPL.</td><td colspan="2">Few Marine EIA recommendations:

<table>
<tr><td>Operational protocols and safety procedure should be printed and freely available to concerned staff. The employees must be adequately trained to inculcate a high level of competence not only in day to day operations but also during emergency situations. Periodic refresher courses must also be organized to maintain the level of their competence.</td><td>The company has written the operational protocols and safety procedures as a part of ISO 14001:2015, ISO 45001:2018 and ISO 9001:2015 certifications.

APSEZ has established training department to impart training to its employees.

IMO module course organized by Maritime Training Institute is conducted & 24 personnel have achieved IMO level 1 & 04 personnel have achieved IMO Level 2. Different training modules as Oil Spill, Oil Spill Equipment, Oil spill Management course, Notification exercise, Table Top, Incident are conducted at different frequency.</td></tr>
<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 APSEZ.</td></tr>
<tr><td>Adequate vigilance is required to adherence of ships to Marpol protocol and related regulations.</td><td>During the vessel declaration compliances with respect to Air Pollution and Oil are monitored by the Port Authority. The ships are certified with international certification bodies only after complying with the Marpol protocol.</td></tr>
<tr><td>Manual Listing Procedure for conducting ship movement operations in the port area must be available to the concerned staff.</td><td>Berthing Policy & Tariff Structure is made available for conducting ship movement to the concerned staff and made available on web link www.adaniports.com/pdfs/PIB_06122013.pdf
Port Information Booklet is also made available on web link www.adaniports.com/Port_Operations_Port_Tariffs.aspx</td></tr>
</table>
</td></tr>
</table>

Sr. No.	Conditions	Compliance Status as on 31-03-2022
8	The construction and operational activities shall be carried out in such a way that there is no negative impact on mangroves and other coastal / marine habitat. The construction activities and dredging shall be carried out only under the constant supervision of the NIO.	Complied. Construction and capital dredging activity is already completed. All operational activities are being carried out in such a way that there are no impacts on the nearby mangroves. Details on mangrove conservation and afforestation are provided against Specific Condition No. 5 above.
9	The GAPL shall strictly ensure that no creeks are blocked due to any activity at Mundra Port and the mangrove habitats are neither disturbed nor destroyed due to any activity.	Complied. As per Marine EIA carried out by NIO in 2008, prominent creek system (main creeks and small branches of creeks) in the study region are: (1) Kotdi (2) Baradimata (3) Navinal (4) Bocha (5) Mundra (Oldest port (Juna Bandar) leading to Bhukhi river). All above creeks are in existence allowing free flow of water and there is no filling or reclamation of any creek area. APSEZL has so far constructed 19 culverts having total length of approx. 1100 m with total cost of INR 20 Crores. Three RCC Bridges have been constructed over Kotdi creek with total length of 230 m and cost of INR 10 Crores. Photographs of the same have already been submitted as part of the compliance for the period of Apr'17 to Sep'17. As per the bathymetry study carried out by NCSCM in 2017-18, it can be concluded that there are sufficient depths at the creek mouths and all creek mouths are open allowing flushing of water.
10	The GAPL shall contribute financially for any common study or project proposed that may be proposed by this Department for environmental management / conservation / improvement for the Gulf of Kutch.	Complied As part of the directions given by MoEF&CC vides order dated 18th Sep, 2015, following studies were conducted. 1. NCSCM study on comprehensive and integrated plan for preservation and conservation of mangroves and associated creeks in and around APSEZ and the same was submitted to the GCZMA on 04.06.2018.

Sr. No.	Conditions	Compliance Status as on 31-03-2022
		Details of the same were submitted along with half yearly EC Compliance report for the period Apr'19 to Sep'19. The cost of said study was 3.15 Cr, which was incurred by APSEZ. The same was further submitted to GCZMA and MoEF&CC for their examination and recommendation vide (with a copy to MoEF&CC vide letter dated 04.06.2018 & reminder letter vide dated 4th Jan, 2019). Presentation on the findings of the report was made to GCZMA committee on 4th October 2019 and the recommendation for the same has been received vide email dtd 22nd Sept, 2020 with conditions. As a part of GCZMA recommendations and NCSCM mangrove conservation action plan, APSEZ has undertaken following activities with expenditure. a. Mangrove mapping and monitoring in and around APSEZ – 23.56 Lacs b. Tidal observation in creeks in and around APSEZ – 1.0 Lacs c. Algal & Prosopis removal from Mangrove area - The cost of the said activity is INR 2.8 Lacs incurred by APSEZ during FY 2021-22. Please refer attached **Annexure – 5** for Report of Algal removal work in mangrove area. d. Awareness of mangroves importance in surrounding communities & Fodder support - The expenditure for fodder supporting activities was approx. 206.11 Lacs during FY 2021-22, which was incurred by APSEZ. Please refer to specific condition no. x of the EC and CRZ clearance for more details w.r.t. Mangrove conservation action plan. 2. A Regional Impact Assessment study to identify impacts of all the existing as well as proposed project activities in Mundra region inline to ToR issued by GCZMA. CIA Report was prepared inline to the ToR by Chola MS and the same was submitted to the GCZMA on 30.04.2018. Details of the same were

Sr. No.	Conditions	Compliance Status as on 31-03-2022
		submitted along with half yearly EC Compliance report for the period Apr'19 to Sep'19. The cost of said study was 1.3 Cr, which was incurred by APSEZ. • Presentation on the findings of the report was made to GCZMA committee on 4th October 2019 and after detailed discussion, authority has decided to constitute committee to discuss the details of the report further. • Reminder Letter vide dated 07.09.2020 & 10.03.2021 submitted to the GCZMA, Gandhinagar for further directives to present the findings of the CIA report in detail. Details were submitted along with last half yearly compliance report for the period Oct'20 to Mar'21. • Presentation done before GCZMA on 31.10.2021 and 16.02.2021 to discuss proposed EMP of CIA study in detail and way forward. However, APSEZ is already complying with the Environment Management Plan (applicable to APSEZ) suggested in Cumulative Impact Assessment report. The detailed compliance, applicable to APSEZ is attached as **Annexure – 9**.
11	The construction debris and/or any other type of waste shall not be disposed of into the sea, creek or in the CRZ areas. The debris shall be removed from the construction site immediately after the construction is over.	Complied. Construction activity is already completed. Project is in operation phase.
12	The construction camp shall be located outside the CRZ area and the construction labour shall be provided the necessary amenities, including sanitation, water supply & fuel and it shall be ensured that the environmental conditions are not deterioted by the	Complied. The construction activity of said project is already completed. Project is in operation phase. No construction camps were located in CRZ area. Most workers came from nearby villages however, for others; construction camps were located outside CRZ area. All necessary infrastructure and facilities like mobile toilets, safe drinking water, medical health care etc.

Sr. No.	Conditions	Compliance Status as on 31-03-2022
	construction labours.	were provided.
13	The GAPL shall prepare and regularly update their local Oil Spill Contingency and Disaster Management Plan in for their all activities in Mundra Port consonance with the National Oil Spill and Disaster Contingency Plan and shall submit the same to this department after having it vetted through Indian Coast Guard.	Complied. Oil spill contingency response plan is being updated on regular basis and the same was last updated on 01.11.2021 is in place and implemented. The Oil spill contingency response plan is enclosed as **Annexure-10.** Regional Level Pollution Response exercise **"SWACHCHH SAMUDRA-NW 2019"** was carried out by Indian Coast Guard on 18th Dec, 2019. All participants from various Oil Handling Agencies and Stakeholders (ICG, GMB Port, DPT Vadinar, IOCL, RIL, NAYARA Energy, BORL, ESBTL Salaya, APSEZL, HMEL, GSFC, PCB, Forest Dept., Customs, Fisheries & DPT Kandla) were participated in this exercise. Details of the same were submitted along with half yearly compliance report for the period Oct'19 to Mar'20. 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) prepared by APSEZ is in accordance with the NOSDCP. Disaster Management Plan is updated regularly and the updated DMP was submitted to the MoEF & CC along with half yearly compliance report Apr – 2016 to Sep – 2016. On Site Emergency Response Plan and Crisis Management Plan is in place and implemented. The updated On site emergency plan is attached as **Annexure – 4**.
14	The Gujarat Maritime Board shall expedite for the Vessel Traffic Management System for the Gulf of Kutch and would work out the modus operandi for cost sharing by	Point noted. APSEZ is practicing well defined traffic control procedure. A VTMS service for Gulf of Kutch is operated by

Sr. No.	Conditions	Compliance Status as on 31-03-2022
	the different players in the Gulf indicating the GAPL. The GAPL shall contribute for the same as may be decided by the Gujarat Marine Board or any other competent authority for this purpose.	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. Arrival and departure information before arrival and departure respectively in Gulf of Kutch is provided to VTMS information cell through agent or by directly sending mail to vtsmanagergulfofkutch@yahoo.com and vtsgok@yahoo.com. Mundra port has subscribed and taking VTMS feed from Kandla from link www.vts.gov.in
15	The GAPL shall bear the cost of the external agency that may be appointed by this Department for supervision / monitoring of proposed activities and the environmental impacts of the proposed activities.	Complied Please refer to condition no. 10 of the CRZ recommendations above for details upon cost incurred for various proposed studies and activities.
General Condition		
16	The ground water shall not be tapped by the GAPL to meet with the water requirement in any case.	Complied. APSEZ does not draw any ground water for the water requirement. Present source of water for various project activities is desalination plant of APSEZ and/or Narmada water through Gujarat Water Infrastructure Limited. Average water consumption for entire APSEZ area is 3.45 MLD during compliance period i.e. Oct'21 to Mar'22.
17	The GAPL shall take up massive greenbelt development activities in consultation with Forest and Environment Department.	Complied. APSEZ has consulted Gujarat Institute of Desert Ecology (GUIDE) as they are one of the authorized agencies of Dept. of Forest & Env., Govt. of Gujarat for carrying out mangrove afforestation. Please refer condition no. v of specific conditions (EC & CRZ Clearance) for further details.
18	The GAPL shall have to	Complied.

Sr. No.	Conditions	Compliance Status as on 31-03-2022
	contribute financially for taking up the socio-economic upliftment activities in this region in consultation with the Forests and Environment Department and the District Collector / District Development officer.	APSEZ performs a large-scale socio-economic upliftment program and shares with FOKIA (Federation of Kutch Industries Association) chaired by District Collector quarterly. APSEZL have provided necessary facilities including health care, education, sanitation, livelihood, drinking water & other infrastructural support to Local community in the region. For further information related to the CRS activities being carried out by Adani Foundation in Mundra region, please refer to specific condition no. 7 of the EC and CRZ clearance above.
19	A separate budget shall be earmarked for the purpose of socio-economic upliftment activities and details thereof shall be furnished to this department as well as the MoEF&CC, GOI from time to time. The details with respect to the expenditure from this budget head shall also be furnished on annual basis.	
20	A separate environment management cell with qualified personnel shall be created for environmental monitoring and management during construction and operational phases of the project.	Complied. APSEZL has a well-structured Environment Management Cell, staffed with qualified manpower for implementation of the Environment Management Plan at site. Site team report to Sr. Manager (Environment) at Corporate, who heads the Environment Management Cell who directly reports to the top management. Environment Management Cell Organogram were submitted as part of compliance report submission for the duration of Apr'21 to Sep'21. And there is no further change.
21	Environmental Post Project Monitoring report indicating the changes, if any, with respect to the baseline environmental quality in the coastal and marine environment shall be submitted every year by the	Complied. The quality of treated effluent, emission and noise level is being monitored regularly by a MoEF&CC/NABL accredited agency namely Unistar Environment and Research Labs Pvt. Ltd. Monitoring results are confirming to the applicable norms.

<table>
<tr><th>Sr. No.</th><th>Conditions</th><th>Compliance Status as on 31-03-2022</th></tr>
<tr><td></td><td>GAPL to this department as well as to the MoEF&CC, GOI.</td><td>Marine monitoring is being carried out once in a month. Summary of the same for duration from Oct'21 to Mar'22 is mentioned below.

Total Sampling Locations: 09 Nos.
<table>
<tr><th rowspan="2">Parameter</th><th rowspan="2">Unit</th><th colspan="3">Surface</th><th colspan="3">Bottom</th></tr>
<tr><th>Max</th><th>Min</th><th>Average</th><th>Max</th><th>Min</th><th>Average</th></tr>
<tr><td>pH</td><td>--</td><td>8.26</td><td>7.78</td><td>8.01</td><td>8.21</td><td>7.5</td><td>7.97</td></tr>
<tr><td>TSS</td><td>mg/L</td><td>144</td><td>92</td><td>116.76</td><td>118</td><td>76</td><td>97.50</td></tr>
<tr><td>BOD (3 Days @ 27 °C)</td><td>mg/L</td><td>3.3</td><td>2.1</td><td>2.77</td><td>ND*</td><td>ND*</td><td>ND*</td></tr>
<tr><td>DO</td><td>mg/L</td><td>6.7</td><td>5.8</td><td>6.11</td><td>6.5</td><td>5.7</td><td>5.98</td></tr>
<tr><td>Salinity</td><td>ppt</td><td>36.7</td><td>34.1</td><td>35.51</td><td>36.46</td><td>33.4</td><td>35.77</td></tr>
<tr><td>TDS</td><td>mg/L</td><td>37604</td><td>29104</td><td>35921</td><td>37992</td><td>31828</td><td>36488</td></tr>
</table>
*ND = Not Detectable

Please refer Annexure – 6 for detailed analysis reports. Approx. INR 14.31 Lakh is spent for all environmental monitoring activities during the FY 2021-22 for overall APSEZ, Mundra.</td></tr>
<tr><td>22</td><td>The GAPL shall have to contribute financially to support the National Green Corps Scheme being implemented in Gujarat by the GEER foundation, Gandhinagar in consultation with Forests and Environment Department.</td><td>Complied.

Necessary contribution if require will be provided on hearing from GEER foundation to support NGC scheme.</td></tr>
<tr><td>23</td><td>A six monthly report of compliance of the conditions mentioned in this letter shall have to be furnished by the GAPL on a regular basis to this department without fail.</td><td>Complied.

Six Monthly environment clearance compliance report is being submitted regularly to the concerned authorities.

Compliance report of EC conditions is uploaded regularly. Last compliance report including results of monitoring data for the period of Apr'21 to Sept'21 was</td></tr>
</table>

<table>
<tr><th>Sr. No.</th><th>Conditions</th><th>Compliance Status as on 31-03-2022</th></tr>
<tr><td></td><td></td><td>submitted to Regional Office of MoEF&CC @ Bhopal, Zonal Office of CPCB @ Baroda, GPCB @ Gandhinagar & Gandhidham and Dept. of Forests & Env., Gandhinagar vide our letter dated 27.11.2021. 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 30.11.2021 to all the concern authorities. Please refer below for the details regarding past six compliance submissions.

<table>
<tr><th>Sr. No.</th><th>Compliance period</th><th>Date of submission</th></tr>
<tr><td>1</td><td>Oct'18 to Mar'19</td><td>31.05.2019</td></tr>
<tr><td>2</td><td>Apr'19 to Sep'19</td><td>28.11.2019</td></tr>
<tr><td>3</td><td>Oct'19 to Mar'20</td><td>20.05.2020</td></tr>
<tr><td>4</td><td>Apr'20 to Sep'20</td><td>26.11.2020</td></tr>
<tr><td>5</td><td>Oct'20 to Mar'21</td><td>25.05.2021</td></tr>
<tr><td>6</td><td>Apr'21 to Sep'21</td><td>30.11.2021</td></tr>
</table>
</td></tr>
<tr><td>24</td><td>Any other condition that may be stipulated by this department from time to time for environment protection / management purpose shall also have to be complied with by the GAPL.</td><td>Complied.
Any other condition stipulated for environment protection / management purpose will be complied by APSEZ.</td></tr>
</table>

Annexure – 1

GPCB

GUJARAT POLLUTION CONTROL BOARD
PARYAVARAN BHAVAN
Sector-10-A, **Gandhinagar**-382 010
Phone : (079) 23226295
Fax : (079) 23232156
Website : www.gpcb.gov.in

By R.P.A.D

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

And whereas Board has received consolidated consent application **inward No. 202362** dated 19/09/2021 for the **Renewal of Consolidated Consent and Authorization (CC&A)** of this Board under the provisions / rules of the aforesaid Acts. Consents & Authorization are hereby granted as under:

CONSENTS AND AUTHORISATION:
(Under the provisions /rules of the aforesaid environmental acts)

To,
M/s. Adani Ports & Special Economic Zone,
Plot no. 169/P, At Navinal Island,
Tal: Mundra,
Dist: Kutch - 370 421

1. **Consent Order No. AWH-117045 Date of issue: 14/02/2022.**
2. The consents shall be **valid upto 20/11/2026** for the use of outlet for the discharge of trade effluent and emission due to operation of industrial plant for storage & handling of the following items/ products:

Sr. No	Product/Services	Capacity
1	General Cargo Handling	112.8 MMTPA
2.	Dry Cargo Handling	
3.	Liquid Cargo (Chemical/ POC Products)	5 MMTPA.
4.	Import, Storage and Distribution of Edible Oil	2.20 MMTPA
5.	Storage and Distribution of Bitumen	0.30 MMTPA
6.	Container Terminal Handling Operation	5.7 Million TEUs/ Annum
7.	Waste Destruction system for decomposition/ destruction of municipal solid waste	3.5 Cubic Meter (MSW Destruction Capacity @ 500 kg/day)
8.	Oil water separate (Flame Proof) to remove oil portion from slope oil received from vessels/ ships	25 M^3/Hr

Subject to specific condition:

1. Industry shall comply with conditions of CRZ Clearance issued by MoEF vide order no. 10-47/200/-IA-III dated 12/01/2009 & its amendment.
2. Industry shall comply with conditions of Environment Clearance and CRZ Clearance issued by MoEF vide order no. F. no. 10-138/2008-IA-III dated 15/07/2014.

3. Industry shall comply with this office circular dated 27/08/2021 regarding retrofitting of emission control/ equipment in D.G. Set of capacity 125 KVA and above at the earliest and submit compliance.
4. Industry shall comply with Manufacture, Storage and Import of Hazardous Chemicals Rules-1989 (MSIHC) as amended time to time.
5. Industry shall ensure that all storage terminal located within DPT area shall strictly comply with MSIHC Rules including site notification & submit details periodically to board with relevant details.
6. Industry shall renew Public Liability Insurance time to time & submit a copy to this Board.
7. Industry shall notify site under MSIHC Rule-1989 from competent authority as mentioned in schedule-5 of MSIHC Notifications.
8. Industry shall not withdraw groundwater without prior NOC from CGWA as per Hon. National Green Tribunal order.
9. Industry shall manage Solid Wastes generated from industrial activities as per Solid Waste Management Rules-2016 (solid waste as defined in Rule-3(46)).
10. Industry shall comply with Plastic Waste Management Rules– 2016 and amendments made therein.
11. Industry shall strictly comply with coal handling guideline of this board.
12. Industry shall provide dedicated storage facility for dry cargos& ensure to take adequate measures to prevent dusting.
13. Industry shall ensure that there shall be no damage to the existing mangrove patches near site and also ensure the free flow of water to avoid damage to the mangroves.
14. Industry shall ensure as per EC condition that no creeks or rivers are blocked due to any activities at the site and free flow of water is maintained.
15. Industry shall provide proper system for collection, storage & treatment & disposal of waste water generated by vessel as per MARPOL& maintain records.
16. Industry shall install storm drainage catch basin to avoid directly discharge into surface water.
17. Waste effluent accumulated with port activities including storm water & sewage from port operation including sewage ballast water, bilge water &clean waste water from ships shall be as per MARPOL norms.
18. Industry shall make separate records regarding generation, collection, transportation& disposal of waste generation from ship & maintain its records.
19. Industry shall made necessary arrangement for the plastic Waste, Solid Waste or other waste generation due to port activities & for facilitation of reception facilities under MARPOL & Environment (Protection) Act-1986 rules etc.
20. Ports shall obtain approval of their oil spill contingency plan (OSCP) as required under national oil spill disaster contingency plan (NOS-DCP) of coast guard, ministry of defence, govt. of India.
21. Best environmental practices by ports maybe uploaded on "Indian ports Association" as well as the same maybe linked to websites of CPCB and respective SPCBs.

22. Manually handling of cargo should be converted into mechanized system, in time bound manner.

3. Conditions under the Water act-1974:

3.1 Source of Water: - Narmada Water from GWIL/ Sea water from APSEZ/ Desalination Plant.

3.2 The quantity of the fresh water consumption for industrial purpose shall not exceed 1304.1 KL/Day.

3.3 The quantity of the fresh water consumption for domestic purpose shall not exceed 370 KLD.

3.4 The quantity of the industrial effluent to be generated from the manufacturing process and other ancillary industrial operations shall not exceed 90.31 KL/Day.

3.5 The quantity of domestic waste water shall not exceed 248 KLD.

3.6 Domestic waste water shall be treated in ETP along with industrial effluent.

3.7 Industry shall operate Effluent Treatment Plant (ETP) adequately so that treated effluent shall comply with following norms:

PARAMETERS	PRESCRIBED LIMITS
pH	6.5 to 8.5
Temperature	40°C
Colour (Pt.Co. scale) in units	100 units
Total Suspended Solids	100 mg/L
Oil and Grease	10 mg/L
Ammonical Nitrogen	50 mg/L
BOD (3 days at 27o C)	30 mg/L
COD	100 mg/L
Chlorides	600 mg/L
Sulphates	1000 mg/L
Total dissolved solids	2100 mg/L
Percent Sodium	60 %
Sulphides	5.0 mg/L
Sodium Absorption Ratio	26

3.8 Treated effluent, confirming to above norms shall be discharged on land for gardening and plantation purpose within premises only having area 175 hectare. In no case effluent shall be discharged outside premises.

3.9 Industry shall provide fixed pipeline network with flow meter for even distribution of treated effluent and maintain its record.

3.10 Disposal system for storm water shall be provided separately. In no case storm water & sewage from port facility shall not be discharge into surface water.

4. **Conditions under the Air Act-1981:**

4.1. The following shall be used as a fuel in Hot Water Generator, Fuel Heater and D.G. Sets respectively:

Sr. No.	Utility	Fuel	Quantity
1	Hot Water Generator & Fuel Heater	LDO/ HSD	975 Lit/Hr
2	D.G. Sets	HSD	100 Ltr/Hr

4.2. The applicant shall install & operate air pollution control system efficiently in order to achieve prescribed norms.

4.3. The flue gas emission through stack attached to Hot Water Generator, Fuel Heater and D.G. Sets shall conform to the following standards

Sr. No.	Stack attached to	Stack height in Meter	APCM	Parameter	Permissible Limit
1	Hot Water Generator-1	35		PM SO_2 NO_x	150 mg/NM^3 100 ppm 50 ppm
2	Hot Water Generator-2	35			
3	Fuel Heater (Thermic) (2 nos.)	35		PM SO_2 NO_x	150 mg/NM^3 100 ppm 50 ppm
4	D.G. Set (9 nos.) (500 KVA) (Stand by)	9 meter each	Adequate Stack Height		
5	D.G. Set (3 nos.) (1250 KVA) (Stand by)	30 common stack	Adequate Stack Height		
6	D.G. Set (6 nos.) (1500 KVA) (Stand by)	30 meter each	Adequate Stack Height		

4.4. The Process gas emission through stack attached to Waste Destruction System with auxiliary heater shall conform to the following standards.

Sr. No.	Stack attached to	Stack height in Meter	APCM	Parameter	Permissible Limit
1	Waste Destruction System with auxiliary heater	10	Ventury Scrubber	SO_2 NO_x	40 mg/NM^3 25 mg/NM^3

4.5. The concentration of the following parameters in the ambient air within the premises of the industry shall not exceed the limits specified hereunder as per National Ambient Air Quality Standards issued by MoEF & CC dated 18th November-2009.In addition to following parameters Industry shall also carry out AAQ monitoring of all

other applicable parameter as per MoEF notification dated 18/11/2009 and submit the report to the Board.

Sr. No.	Pollutant	Time Weighted Average	Concentration in Ambient air in µg/M^3
1.	Sulphur Dioxide (SO_2)	Annual 24 Hours	50 80
2.	Nitrogen Dioxide (NO_2)	Annual 24 Hours	40 80
3.	Particulate Matter (Size less than 10 µm) or PM_{10}	Annual 24 Hours	60 100
4.	Particulate Matter (Size less than 2.5 µm) or $PM_{2.5}$	Annual 24 Hours	40 60

4.6. The applicant shall provide portholes, ladder, platform etc at chimney(s) for monitoring the air emissions and the same shall be open for inspection to/and for use of Board's staff. The chimney(s) vents attached to various sources of emission shall be designed by numbers such as S-1, S-2, etc. and these shall be painted/displayed to facilitate identification.

4.7. The industry shall take adequate measures for control of noise levels from its own sources within the premises so as to maintain ambient air quality standards in respect of noise to less than 75dB(A) during day time and70 dB (A) during night time. Daytime is reckoned in between 6a.m. and10 p.m. and nighttime is reckoned between 10 p.m. and 6 a.m.

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

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

5.1 Authorization order no:-**AWH-117045** Date of issue: 14/02/2022.

5.2 **M/s. Adani Ports & Special Economic Zone** is hereby granted an authorization to operate facility for following hazardous wastes on the premises situated at Plot no. 169/P, At Navinal Island, Tal: Mundra, Dist : Kutch.

Sr. No.	Waste	Quantity/ Year	Schedule &Category	Facility
1	Used/ Spent Oil	300 MT	I- 5.1	Collection, storage, Transportation,, Disposal by selling out to registered recyclers/ reprocessor
2	ETP Sludge	109.5 MT	I-34.3	Collection, storage, Transportation & disposal at TSDF site of SEPPL.
3	Sludge & filters contaminated with oil	5 MT	I-3.3	Collection, storage, Transportation, Disposal by co-processing at cement industries,and/or CHWIF site

4	Waste Residue containing Oil/ oily rags	150 MT	I-33.2	Collection, storage at designated place, Transportation, Disposal at TSDF Site.
5	Pig Waste	24 MT	I-3.1	Collection, storage, Transportation, Disposal by co-processing at cement industries and/or CHWIF site
6	Tank Bottom sludge	Whatever Quantity generated	I-3.2	Collection, storage, Transportation, Disposal by co-processing at cement industries and/or CHWIF site/ or recycling to registered recycler.
7	Discard containers/ barrels	16 MT	I-33.3	Collection, storage, Transportation, Disposal by reuse within premises and / or selling out to registered decontamination.
8	Asbestoses Waste	Whatever Quantity generated	I-15.1	Collection, storage, Transportation, Disposal at CHWIF site.
9	Glass Wood Waste	Whatever Quantity generated	II-9	Collection, storage, Transportation, Disposal by co-processing at cement industries and/or incineration at CHWIF site and / or recycling through registered recycler.
10	Downgrade Chemical	Whatever Quantity generated	I-20.2	Collection, storage, Transportation, Disposal by reuse within premises and / or selling out to authorized solvent recover.
11	Waste Oil	0.18 MT	I-5.2	Collection, storage, Transportation,, Disposal by selling out to registered recyclers
12	Expired Paint Material	10 MT	I-21.1	Collection, storage, Transportation, Disposal by co-processing at cement industries and/or CHWIF site

5.3 The authorization shall be valid up to **20/11/2026.**

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

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

5.6 **TERMS AND CONDITIONS OF AUTHORISATION**

1. The applicant shall comply with the provisions of the Environment (Protection) Act-1986 and the rules made there under.
2. The authorization or its renewal shall be produced for inspection at the request of an officer authorized by the Gujarat Pollution Control Board.
3. The persons authorized shall not rent, lend, sell, and transfer or otherwise transport the hazardous wastes without obtaining prior permission of the Gujarat Pollution Control Board.
4. Any unauthorized change in personnel, equipment or working conditions as mentioned in the authorization order by the persons authorized shall constitute a beach of this authorization.
5. The person authorized shall implement Emergency Response Procedure (ERP) for which this authorization is being granted considering all site specific possible scenarios such as spillages, leakages, fire etc. and their possible impacts and also carry out mock drill in this regard at regular interval of time;
6. The person authorized shall comply with the provisions outlined in the Central Pollution Control Board guidelines on "Implementing Liabilities for Environmental Damages due to Handling and Disposal of Hazardous Wastes and Penalty"
7. It is the duty of the authorized person to take prior permission of the Gujarat Pollution Control Board to close down the facility.
8. An application for the renewal of an authorization shall be made as laid down in rules 6(2) under Hazardous and Other Waste Rules, 2016.
9. The imported hazardous and other wastes shall be fully insured for transit as well as for any accidental occurrence and its clean-up operation.
10. The record of consumption and fate of the imported hazardous and other wastes shall be maintained.
11. The hazardous and other wastes which gets generated during recycling or reuse or recovery or pre-processing or utilization of imported hazardous or other wastes shall be treated and disposed of as per specific conditions of authorization.
12. The importer or exporter shall bear the cost of import or export and mitigation of damages if any.
13. Any other conditions for compliance as per the Guidelines issued by the Ministry of Environment, Forest and Climate Change or Central Pollution Control Board from time to time.
14. The waste generator shall be totally responsible for (i.e. collection, storage, transportation and ultimate disposal) the wastes generated.
15. Records of waste generation, its management and annual return shall be submitted to Gujarat Pollution Control Board in Form-4 by 30th day of June of every year for the preceding period April to March.

16. In case of any accident, details of the same shall be submitted on Form-11 to Gujarat Pollution Control Board.
17. As per "Public Liability Insurance Act-91" company shall get Insurance Policy, if applicable.
18. Empty drums and containers of toxic and hazard material shall be treated as per guideline published for "Management & Handling of discarded containers". Records of the same shall be maintained and forwarded to Gujarat Pollution Control Board regularly.
19. In case of transport of hazardous wastes to a facility for (i.e. treatment, storage and disposal) existing in a State other than the State where hazardous wastes are generated, the occupier shall obtain 'No Objection Certificate' from the State Pollution Control Board or Committee of the concerned State of Union Territory Administration where the facility exists.
20. Unit shall take all concrete measures to show tangible results in waste generation, reduction, avoidance, reuse and recycle. Actions taken in this regard shall be submitted within three months and also along with Form-4.
21. Industry shall have to display the relevant information with regards to hazardous waste as indicated in the Hon. Supreme Court's Order in W.P. No.657 of 1995 dated 14th October, 2003.
22. Industry shall have to display on-line data outside the main factory gate with regard to quantity and nature of hazardous chemicals being handled in the plant, including wastewater and air emissions and solid hazardous wastes generated within the factory premises.

6. **SPECIFIC CONDITIONS:-**

6.1 The authorized actual user of hazardous and other wastes shall maintain records of hazardous and other wastes purchased in a passbook issued by the State Pollution Control Board along with the authorization.

6.2 Handling over of the hazardous and other wastes to the authorized actual user shall be only after making the entry in the passbook of the actual user.

6.3 In case of renewal of authorization, a self-certified compliance report in respect of effluent, emission standards and the conditions specified in the authorization for hazardous and other wastes shall be submitted to SPCB.

6.4 The occupier of the facility shall comply Standard operating procedure/guidelines published by MOEF&CC or CPCB or GPCB from time to time.

6.5 Unit shall comply provisions of E-Waste Management Rules-2016.

6.6 The disposal of Hazardous Waste shall be carried out as per the waste Management hierarchy.

6.7 The occupiers of facilities shall not store the hazardous and other wastes for a period not exceeding **ninety days**. Prior permission of the Board shall be obtained for extension of the storage period.

6.8 The occupier shall maintain the records of generation, sale, storage, transport, recycling, co processing and disposal of hazardous waste and make available during the inspection.

6.9 The transportation of the hazardous waste shall be carried out in GPS mounted dedicated vehicles.

GPCB

GUJARAT POLLUTION CONTROL BOARD
PARYAVARAN BHAVAN
Sector-10-A, Gandhinagar-382 010
Phone : (079) 23226295
Fax : (079) 23232156
Website : www.gpcb.gov.in

7. **GENERAL CONDITIONS: -**

7.1 Any change in personnel, equipment or working conditions as mentioned in the consents form/order should immediately be intimated to this Board.

7.2 Applicant shall also comply with the general conditions given in annexure I.

7.3 Whenever due to accident or other unforeseen act or ever, such emissions occur or is apprehended to occur in excess of standards laid down such information shall be forthwith reported to Board, concerned Police Station Office of Directorate of Health Service, Department of Explosives, Inspectorate of Factories and local body.

7.4 In case of failure of pollution control equipments, the production process connected to it shall be stopped. Remedial actions/measures shall be implemented immediately to bring entire situation normal.

7.5 The Environmental Management Unit/Cell shall be setup to ensure implementation on and monitoring of environmental safeguards and other conditions stipulated by statutory authorities. The Environmental Management Cell/Unit shall directly report to the Chief Executive of the organization and shall work as a focal point for internalizing environmental issues. These cells/units also coordinate the exercise of environmental audit and preparation of environmental statements.

7.6 The Environmental audit shall be carried out yearly and the environmental statements pertaining to the previous year shall be submitting to this State Board latest by 30th September every year.

7.7 The Board reserves the right to review and/or revoke the consent and/or make variations in the conditions, which the Board deems, fit in accordance with Section 27 of the Act.

7.8 In case of change of ownership/management the name and address of the new owners/ partners/directors/proprietor should immediately be intimated to the Board.

7.9 Industry shall have to display the relevant information with regard to hazardous waste as indicated in the Hon. Supreme order in w.p. no. 657 of 1995 dated 14th October 2003.

For and on behalf of
GUJARAT POLLUTION CONTROL BOARD

(Smt. U.K. Upadhyay)
Senior Environment Engineer

NO: GPCB/CCA-Kutch-39(7)/ID-17739/ 625051 **Date:-** 9/3/2022

Issued to:
M/s. Adani Ports & Special Economic Zone,
Plot no. 169/P, At Navinal Island,
Tal: Mundra,
Dist: Kutch - 370 421

Annexure – 2

Details of Greenbelt Development at APSEZ, Mundra

Total Green Zone Detail Till Up to March – 2022					
LOCATION	**Area (In Ha.)**	**Trees (Nos.)**	**Palm (Nos.)**	**Shrubs (SQM)**	**Lawn (SQM)**
SV COLONY	71.66	34920	7962	69696.00	100646.00
PORT & NON SEZ	81.61	149359	19220	75061.78	62966.38
SEZ	116.60	227120	20489	220583.60	28162.03
MITAP	2.52	8168	33	3340.00	4036.00
WEST PORT	109.37	256552	70831	24612.00	22854.15
AGRI PARK	8.94	17244	1332	5400.00	2121.44
SOUTH PORT	14.45	27530	3470	3882.00	3327.26
Samudra Township	57.27	63722	11834	23908.89	47520.07
Productive Farming (Vadala Farm)	23.79	27976	--	--	--
TOTAL (APSEZL)	**486.19**	**8,12,591**	**1,35,171**	**426484.27**	**271633.33**
		Total Saplings: 9,47,762 Nos.			

Details of Mangrove Afforestation done by APSEZ

Sl. no.	Location	District	Area (Ha)	Duration	Species	Implementation agency
1	Mundra Port	Kutch	24	-	Avicennia marina	Dr. Maity, Mangrove consultant of India
2	Mundra Port	Kutch	25	-	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)	Kutch	298	2011 - 2013	Avicennia marina	Forest Dept, Bhuj
6	Jangi Village (Bhachau)	Kutch	50	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	2014-15 & 2016-17	Avicennia marina & Bio diversity	GUIDE, Bhuj
9	Dandi Village	Navsari	800	2006 - 2011	Avicennia marina, Rhizophora mucronata, Ceriops tagal	GEC, Gandhinagar
10	Talaja Village	Bhavnagar	50	2011-12	Avicennia marina	Forest Dept, Talaja
11	Narmada Village	Bhavnagar	250	2014 - 2015	Avicennia marina	GEC, Gandhinagar
12	Malpur Village	Bharuch	200	2012-14	Avicennia marina	SAVE, Ahmedabad
13	Kantiyajal Village	Bharuch	50	2014-15	Avicennia marina	SAVE, Ahmedabad
14	Devla Village	Bharuch	150	210-16	Avicennia marina	SAVE, Ahmedabad
15	Village Tala Talav (Khambhat)	Anand	100	2015 - 2016	Avicennia marina	SAVE, Ahmedabad
16	Village Tala Talav (Khambhat)	Anand	38	2015 - 2016	Avicennia marina	GEC, Gandhinagar
17	Aliya Bet, Village Katpor (Hansot)	Bharuch	62	2017-18	Avicennia marina & Rhizophora spp.	GEC, Gandhinagar
18	Kukadsar-(Bhadeswar-Mundra)	Kutch	250	2021-22	Avicennia marina	Shreeji Enterprise
Total			**3139.9**			

Annexure – 3

2021-22

Annual Report

CSR Kutch

Adani Foundation
Adani House, Port Road, Mundra – Kutch 370 421
[info@adanifoundation.com] [www.adanifoundation.com]

adani Foundation

Our journey

Corporate Social Responsibility in India is going through an accelerating phase where the need for community centered impact is increasingly becoming more crucial than ever before. It is not just about the compliance with the laws and regulations but also about transitioning beyond the mandated CSR, Stakeholder engagement is a critical tool to ensure a comprehensive approach in carrying out responsible business and within that community ownership holds an important place.

Mundra is now Industrial and employment hub. Tremendous development is expected in upcoming years. In Year 2021-22, **Uthhan Project expanded its wings from 17 Primary schools to 35 Primary schools** with **MOU with Education Department**. Sustainable Agriculture Initiatives i.e. Natural Farming, Home biogas, Drip Irrigation, Vermi compost, Tissue Culture and Various type of fodder growing are started as a mission with Capacity Building with **5500+ Farmers and 3500+ cattle owners**. Mangroves costal biodiversity, water harvesting structures and Home Biogas promotion is ongoing sustainable project with proper documentation and demarcation. Adani Vidya Mandir has proven best in education by reaching to its apex level of Quality Education through digital technology. It is nurturing fisher folk community students by enabling them access to Tablets to prepare them techno-savy.

Under the guidance of leadership team, Community Resource Centre is developed as a systematic model for empowering rural community with an aim to bridge the gap between underprivileged community who need support and government schemes. Adani Foundation firmly believes to carry all its project by involving community in its operations. The involvement of Fisherman community and women provides real-time feedback and leads to successful projects.

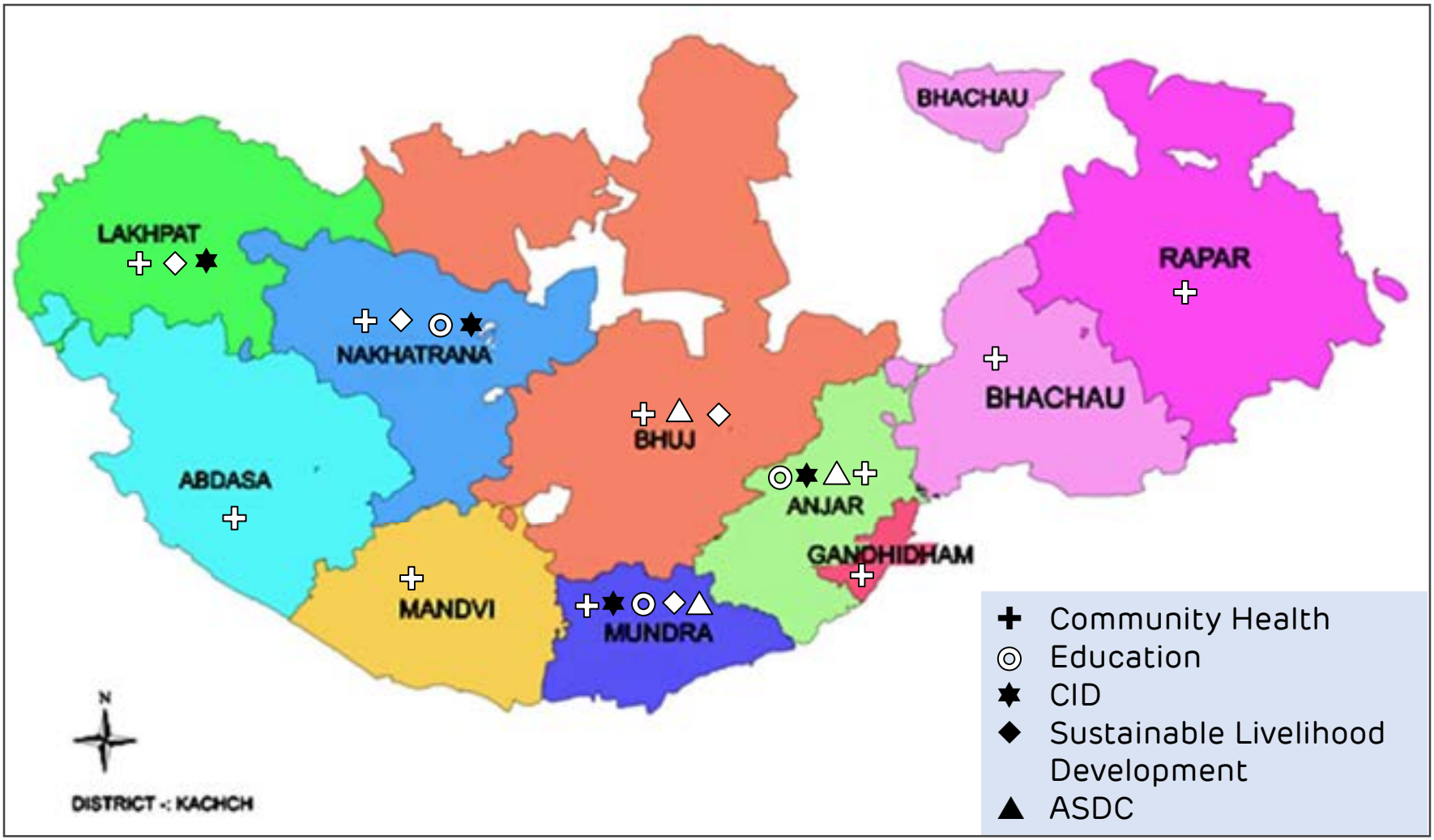
'Technical Training Program' by Adani Skill Development Centre for Fisher Folk community youth is a flagship program to provide them with a platform to get skilled and carve their future into new career options. The ASDC is committed to the cause of the deprived and underprivileged to generate employment through enhancing skills. It has been working relentlessly which resulted in rapport building with District Administration Kutch also.

Respected Shri Dr. Priti G. Adani, Chair Person, Adani Foundation with her charismatic leadership has transformed millions of lives through sustainable development initiatives. Along with her, Rakshit Shah, Executive Director, APSEZ has been a great mentor and involves himself thoroughly in all development initiatives. Mundra team would also like to acknowledge Shri Vasant Gadhvi, Executive Director, Adani Foundation for cultivating great ideas and guidance to the team. We are also grateful to Respected Gowda Sir (COO, AF) for being a source of motivation.

AF Mundra team acknowledges CEO - APSEZ, Human Resource Department- APSEZ, Finance Department-APSE for continuous support and facilitation.

Towards Growth with Goodness, Adani Foundation presents highlights of FY 2021 in this Annual Report!

Our Presence in Kutch



INDEX

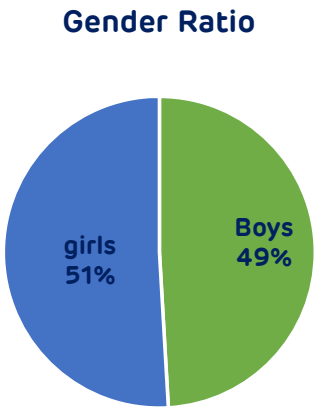
Education (SDG - 4/4.a)

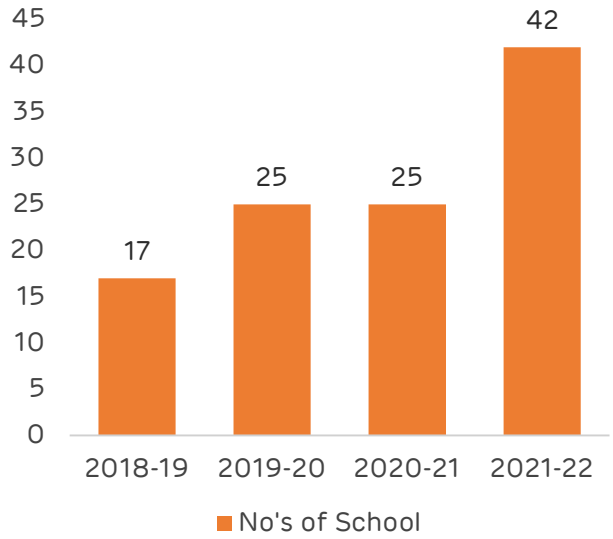
Education Projects

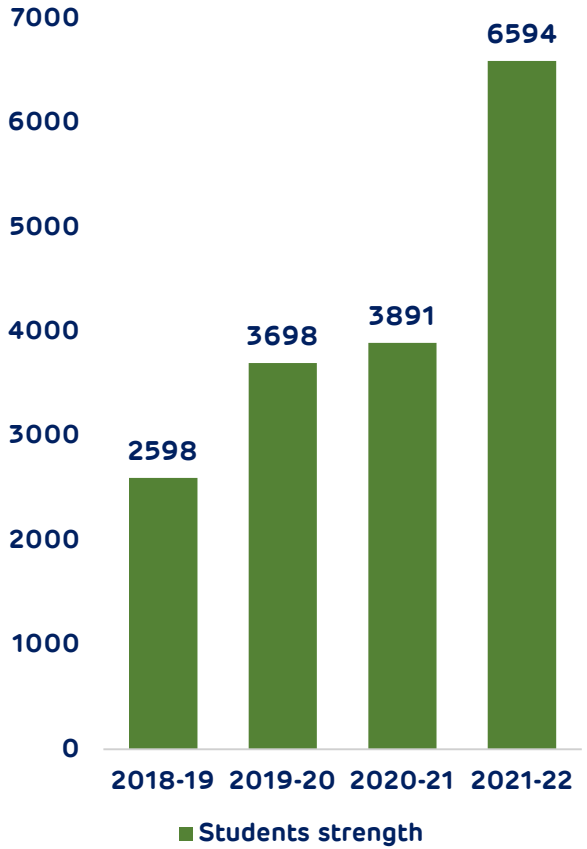
To foster students' learning abilities and achieve better learning outcomes at the grassroots, Adani Foundation charted an innovative intervention in Year 2018-19 through Project Utthan.

This comprehensive intervention entails:

- ✔ Adopting government primary schools
- ✔ Tutoring Priya Vidyarthi's (progressive learners)
- ✔ Arresting dropout rates
- ✔ Collaborating for teachers' capacity building
- ✔ Creating joyful learning spaces







Annual Achievement

- Introducing English as a third language.

Though talent has no barriers to success yet often rural community children and youth are devoid of higher education and better job opportunities only because of lack of command over English language. However, getting equipped with International language expands horizon of a student by opening wide communication mediums for them to learn and grow.

In Gujarat, The language gets introduced from Class4 whereas under the Project Utthan, Adani Foundation initiated to provide basics of English from class 1 with a structured syllabus. Utthan assisted 3,246 students to learn English from Class 1.

Table shows the result of Gunotsav of year 2021-22 for 18 Schools (24 Schools Results are awaited)

Gunotsav Result					
Academic year	Numbers of school in grade				
	A+	A	B	C	D
2020-21	1	0	30	11	0
2021-22	2	8	7	1	0

Utthan assisted

3246

students to learn English from Class 1

Class		Students are able for....
I	62 %	✔ Standing line, sleeping line, Left Slanting line, Right Slanting line, Left Curve, Right Curve, Up Curve, Down Curve ✔ Writing capital letter of A to Z, Identification of alphabet, Match alphabet with object
II	64 %	✔ Writing capital and small letters ✔ Vowel and consonant ✔ Week, month, and numbers up to 30
III	73 %	✔ Differentiate between capital and small letters ✔ Recite rhymes ✔ Numbers 1-50, English name of shapes, fruit, vegetable, and stationary items ✔ Action words: Sit down, stand up, Run, Walk, Jump
IV	76 %	✔ Capital and small letters ✔ Body parts, Golden words ✔ Self-introduction in 5-7 sentences

IT ON WHEELS
Benefited 3418 students

Digital literacy in early schooling is the first step to addressing access disparities in this evolving digital environment which is not feasible for rural students. This impede their development.

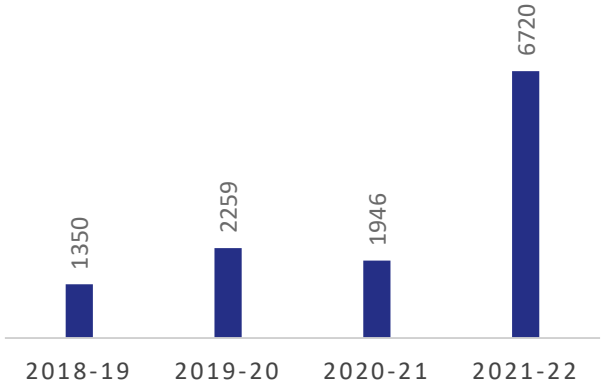
IT on wheel program is run to teach them Basic emphasizes elementary school digital literacy.

Highlights

- ✔ 40 laptops + 2 IT instructor + 01 Van with customize basic syllabus
- ✔ Catering students from classes: 4-8
- ✔ IT on Wheel visits fortnightly to each school under project Utthan.

Annual Mother's meet

A child's maximum growth occurs in initial years of education where involvement of teacher as well as mother plays a key role in nurturing their character and personality. Many of the students are first generation learners with uneducated parents, in such case, Mother's meet helps mother and teacher are both in sync towards child's education. Moreover, mothers feel empowered and valued and gets insight of the school activities regularly.



Celebration/competition	Activities performed
World Book Day	▪ Virtual Group Reading, Puppetry Show etc.
Mother's Day	▪ Letter to supermom
International Yoga Day	▪ Performing Yoga Virtually + Physically
World emoji day	▪ Preparing emoji + exchanging with friends
Azadi ka Amrut Mahotsav	▪ Poster making competition
Rashtra Gaan	▪ Certificate from Ministry of Education for 'Recitation of Rashtragaan'.
Raksha Bandhan	▪ Eco Friendly Rakhi for Corona warriors
Teachers' day	▪ Gratitude wall for teachers
ISLM Participation	▪ Digital bookmark exchange with 11 partner schools from 5 countries
Virtual connection around the World	▪ Live connected with partner school of Croatia
Children's Day	▪ Paint party
World computer literacy day	▪ Restart of 'IT on Wheel'
National Maths Day	▪ Match Competition & Documentary movie on Shri Ramanujan.
National Youth Day	▪ Character sketch, Speech on Swamiji, Quote Competition ,Short documentary on Swamiji.
National Girl Child Day	▪ Contribution of Savitribai Phule in girl child education
National Science Day	▪ Girl/Women noble laurels in science , Model making ▪ Documentary on Raman effect
International Women's Day	▪ Women's Day with 1000 Mothers

Healthy competition inspires kids to exhibit their maximum potential. When students compete, they will become more inquisitive, research independently and learn to work with others. They will strive to do more than is required. These abilities prepare children for future situations of all kinds. Due to pandemic students were away from multiple competitions and celebrations were planned in school. Which helps them for-

- Improving teamwork and collaboration
- Enhancing social and emotional learning
- Increasing intrinsic motivation
- Facilitating growth mind-set
- Building mental toughness
- Virtual celebrations and competitions to engage students during lockdown period.

Capacity Building Program

To make the project sustainable, Utthan closely **works with block resource coordinators to organize monthly training sessions for Government teachers + Utthan sahayaks on various subjects.** Entire academic year teachers training is focused on National Education Policy 2020.

Utthan's outreach strategies to support children's learning

- 100 hours capacity building programs for Utthan sahayaks and school Teachers
- 90% students were involved in various activities under Aazadi ka Amrit Mahotsav
- 6600 hours were given in 'SAMAYDAAN'
- 100 % participation in 100 days reading campaign
- Project is in alignment with NIPUN Bharat: FLN
- Dedicatedly 80 hours provided for preparing JNV and NMMS examination. 19 number of students qualified for JNV and NMMS.

100% Utthan Schools are equipped with:

- ✓ Smart classrooms
- ✓ LED TV
- ✓ Library cupboard with 350 books
- ✓ Annual subscription of 07 magazines
- ✓ Sports materials
- ✓ Music instruments
- ✓ BALA Painting
- ✓ TLMs focusing language and numeracy
- ✓ Kitchen garden – 4200 plants planted

Reaching out to students with no smartphones at home

24,748 Voice messages sent to create awareness regarding Precautions during Covid19

All students taught during sheri shikshan by Utthan sahayaks

74% progressive learners virtually connected on various platform

12

Adani Vidya Mandir, Bhadreshwar (SDG - 4/4.1)

EDUCATION: FREE AND COMPULSORY – WHAT A WAY TO LEARN LOGIC!" The quote mentioned unfolds the distinguished vision of Adani Foundation to provide cost-free education, food, uniform, books to the children of economically challenged families of Mundra Bock. Adani Vidya Mandir, Bhadreshwar was established in June 2012, with aim of uplifting the communities through education.

The school is equipped with excellent infrastructure and resources required for all-round development of the student. The child is given admission in class 1 and is molded to be an educated and a good human being by experienced and compassionate teachers.

The school follows a curriculum designed by GSEB. Due to Covid Pandemic this year Class 1st Admission was done.

AVMB –Adani Vidhya Mandir, Bhadreswar is accredited By NABET under 'Quality Council of India'

SDG

- ✓ ***Quality education - 4***
- ✓ ***GenderEquality - 5***
- ✓ ***Reduced Inequality - 10***

National Accreditation Board for Education and Training is a constituent Board of Quality Council of India.

NABET is offering accreditation program for Quality School Governance in the Country, with a view to provide framework for the effective management and delivery of the holistic education program aimed at overall development of students.

State level First Gujarati Medium school accredited by NABET

Adani Vidya Mandir Bhadreshwar Gujarat Board Standard 10th Examination Result is 100% (27 students have passed the examination out of 27). Adani Foundation took complete responsibility of further study of students with respect to their interest.

The global upsurge of the Covid-19 pandemic and the resultant lockdown has brought all of us to face such unprecedented times and situations. The challenge was rural locality, network unavailability, lack of health awareness, apprehensions for technology and gadgets and financial crunch to spend on mobile / Internet.

But We did not Give-up and reached out to our students to pursuit educational through virtual platform by various initiative.

Objective

- Provide free and Quality Education to economically and socially under-privileged students
- Support to students for academics and co-curricular activities and overall well-being

Project Activity

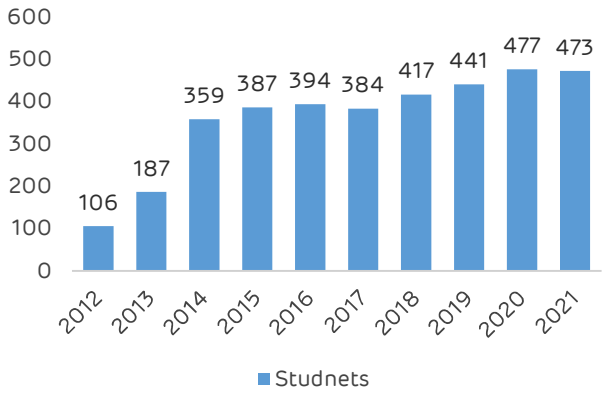
- Balwadis started in 2010, for students in age group of 2-5 yrs. In 2013, this school was built on a donated land
- Cost Free food, education, uniforms, online tablets
- Classes from Gr-I to Gr-X with 22 qualified teachers and 8 helping staffs
- Monthly stay of Gr-X students at school before exam, along with teachers

Outcome

- **473 underprivileged students** of Fisherman & Maldhari communities from **8 villages** taking education at the school
- Educated children have better opportunities of income beyond fishing
- Quality of life and change of mindset of students & families
- With education, many addictions reduced

AVMB STD - 10 SE BATCH RESULT
Year 2021-2022

SR NO	GRADE	STUDENTS
1	Above 80 %	01
2	Above 70 %	00
3	Above 60 %	07
4	Above 50 %	07
5	Above 35 %	12
	TOTAL	27



- Street Education popularly known as 'Sheri Shikshan' was initiated for the students who could not attend sessions online.
- Offline education was started for Class 10 students under the Covid19 Guidelines.
- 'Fit India week' celebrated by arranging various sports events, Elocution, Written and Drawing competition for class 9 and 10 students.
- Covid Vaccination drive for Class 10 students in coordination with GKGH, Bhuj Hospital.
- Various National and International day celebrations at School level with learn and fun activities as well as conducted Motivation Sessions.
- Motivating Girl Child from fisherfolk families for Education after 10th Standard.

Community Health Projects

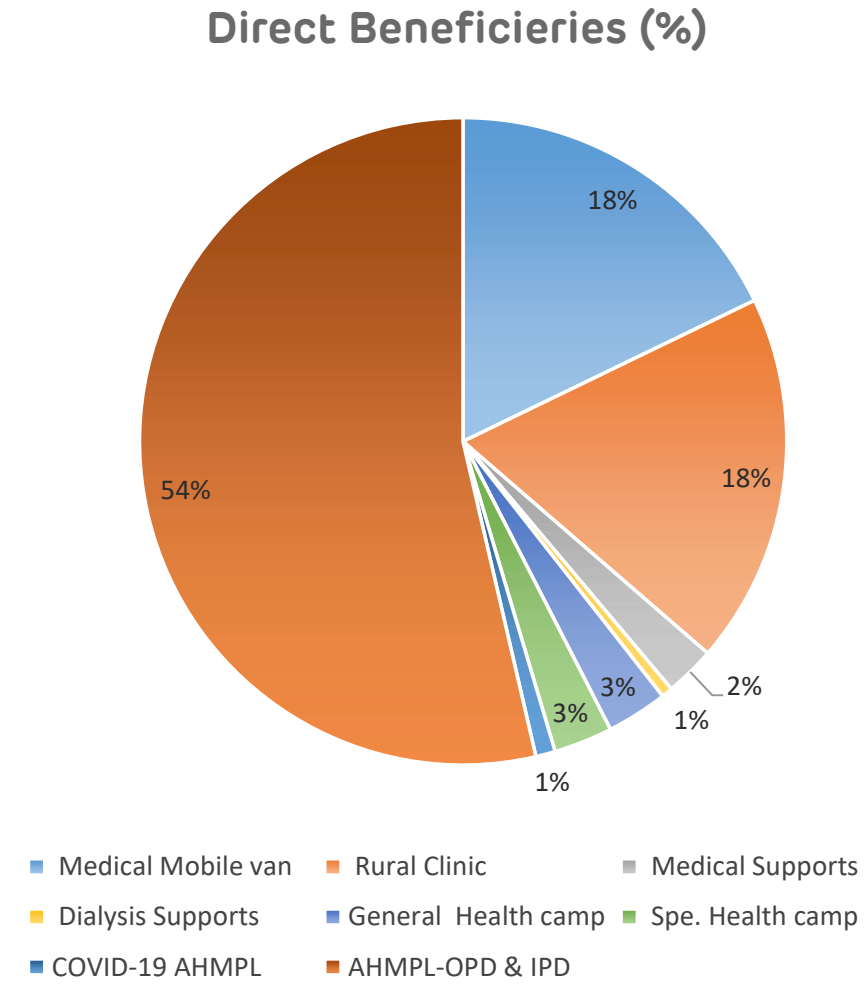
Good Health is extremely important, invaluable and indispensable. A Healthy body paves the way for a healthy mind. Adani Foundation team at Kutch works towards better health of community and access to easy consultation with expert doctors in collaboration with G.K General Hospital, Bhuj and Adani Hospital, Mundra. For more than a decade, Community care is provided through Mobile Health Care Units, Rural Clinics and Health Cards for senior citizens.

In span of 6 years, there are number of cases reported for Kidney related diseases. Under those circumstances, periodic and special health camps are scheduled to address this issue, provide them necessary treatment support. We also conduct awareness camps for preventive measures against kidney problems.

It is health that is real Wealth , not a piece of Gold and silver.

Preventive and curative healthcare are critical to sustaining community health and promoting economic prosperity. The objective is to find the proper balance that will lead to a long, healthy, and fulfilling life journey for that AF

Project	Direct Beneficiary	In-Direct Beneficiary
Medical Mobile van	10043	39844
Rural Clinic	10439	41436
Medical Supports	1409	5532
Dialysis Supports	314	30
General Health camp	1715	6852
Spe. Health camp	1655	6624
COVID-19 AHMPL	554	2770
AHMPL-OPD & IPD	31291	90573
Total	57420	193661



Rural Clinic & Mobile Health Care unit

Health is the most basic prerequisite for community development and in order to transform rural healthcare landscape Adani Foundation has initiated **'Mobile Health Care'** and **'Rural Clinic Service'** to providing primary, preventative and curative healthcare services accessible in inaccessible areas which is being executed since a decade. Adani Foundation has acted as catalyst to reduce health disparity and hardship of medical expenses among community.

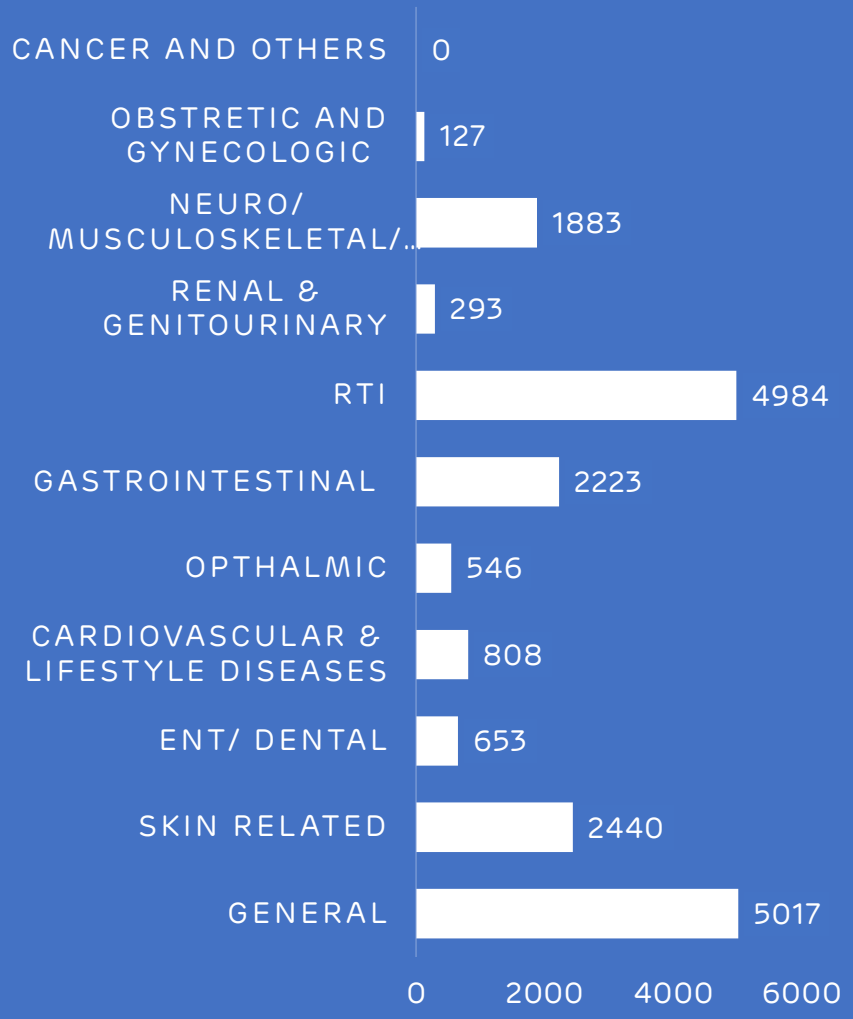
- ✓ Time saving
- ✓ Reduce Medical expenses
- ✓ diagnosis and treatment
- ✓ Preventive health screenings
- ✓ Early disease diagnosis
- ✓ Chronic disease management
- ✓ Health education & Counseling

The mobile health care unit is operated by Medical officer and health care assistant and equipped with various integrated medical devices that allows Medical staff to conduct preliminary check up. more than 90 types of general life saving medicines are available in MHCU and covered 29 villages and 07 fishermen settlements population. MHCU and Rural Clinics are providing services of Bloood pressure checking, Sugar testing and ECG as well,

Similarly rural clinics are serving at **9 Villages of Mundra 3 Villages of Anjar Block and Mandavi Block.**

The MHCU and Rural Clinics services are available with Token Charges Rs. 20 per patient.

DISEASE WISE DATA OF MHCU & RURAL CLINIC



Under the '**Preventive Health Care**' programme, specific screening and questionnaire are developed for Non communicable disease(NCD) like ***Blood pressure, Sugar, Thyroid*** and suspected patients are referred for secondary examination at Adani Hospital, Mundra.

More than **110 Patients are diagnosed with NCD and are cured before patient reaches to severity stage**.

Support to Vulnerable Patients

Adani foundation provide financial assistance to the most economically challenged patients who are suffering from life threatening diseases related to heart, liver, kidney and cancer cases with Minimum Participation.

In the current year total **1409 patients from Mundra, Mandavi and Anjar Block were supported in Adani Hospital Mundra.**

Dialysis Support

Patients with kidney disorders must undergo periodic dialysis, which is expensive and lends financial burden to family.

Adani Foundation has initiated a dialysis program to support foremost needy patients .

Till date 5 patients with critical and severe condition has been supported for dialysis with token charge of Rs. 150 per session. Regular dialysis has improved patients condition prolonging their life.

Senior Citizen Project

Adani Foundation has launched Senior citizen project with the aim to provide access for Promotive, Preventive and Curative health service to more than **8500+** elderly people of Mundra since 2011 to 2020 – A Decade.

After 2021 to make the project sustainable, Linkages with Government Schemes and senior citizens are initiated. Total **61 Senior citizens has been Facilitated with Senior Citizen and Widow Pension Scheme Rs. 1250/Month in 2021**. Till more than **750+ Senior citizens ARE Linked with Gov.schmes..**

Health camps

Getting the right health screenings and treatments is the key to living longer and better.

Major Activities

- Under Dignity of workforce program, weekly medical camps organized at labour colonies.
- General health check up of work force plus deaddiction counselling done by Medical Officers.
- Motivational sessions by "**Prajapita Brahmakumaris**" are also organized to make them strong against addiction.
- General Health camps, Specialty camps, Pediatric camp especially for Malnourished children are organized frequently to provide health care treatment to the community.

In this year **total 5200+ People are diagnosed and treated accordingly**.

Corona Related Work at GKGH and AHMPL

- Started Covid care centre service at **Samudra town ship** to Provide medical services at 24 x7 hrs. Home Visit for examining patients with severe conditions and providing them immediate relief.
- AHMPL, Mundra was converted into Covid Hospital with 100 bed Facilities with oxygen to extend treatment to Covid patients. All related coordination done by our team for more than **350+ OPDs and IPDs**.
- Provided Oxygen Concentrators to home isolated patients to safeguard their lives during pandemic.
- Provide hearses to shift Covid deceased patients to Crematorium with all dignity.
- Precautionary voice message dissemination through '*Awaj de*' voice message service **Over 11000+** Community.
- Sanitized villages, Distribution of Vitamin C tablet to **2300+people**
- Adani Foundation employees volunteered for providing service in G K General Hospital, Bhuj during pandemic.

Machhimar Ajivika Uparjan Yojana

The availability of water for personal and domestic hygiene has been found to be an important factor in decreasing the rates of water-related diseases such as ascariasis, diarrhea, schistosomiasis, and trachoma. **2091 female beneficiaries** at nine fisherfolk vasahats.

- To Reduce women drudgery to get water at fisherfolk settlement
- To Reduce Water borne disease

Sr. No	Vashat	Family	Requirement	Remarks
1	Luni	116	15000	9 Months
2	BavdiBandar	107	17500	9 Months
3	RandhBandar	245	25000	9 Month
4	KutdiBandar	118	-	Linkages with MSPVL
5	ZarapraVasahat	90	-	Linkages with Port
6	Virabandar	80	-	Linkage with GWIL
7	Junabandar	160	-	Linkage with Mundra GP
8	GhavarvaroBanada	60	-	Linkage with GWIL
9	Zaraprachacha	55	-	Linkages with Port GWIL
Total		**1031**		

Gujarat Adani Institute of Medical Science (GAIMS) - Bhuj

Adani Foundation Team has initiated coordination with GKGH hospital since 2015 and established a reception area for the smooth patient coordination.

•GKGH Hospital is Covid Care Hospital since 22nd March 2020. in the second wave of Covid Adani Foundation staff members supported in patient counselling, coordinating and supporting for dead body Covid care van.

•Total **7826** Covid patients got treatment from overall Kutch with satisfaction.

•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 1163 dead bodies privileged till now to different locations in Kutch including Covid Patients.

•Mahiti Setu, A Platform at GKGH to Guide and Assist to get Government health scheme benefit. Through Mahiti Setu 6923 beneficiaries are sourced and more than 947 beneficiaries are linked with Ayushman Yojna and MAA Yojna.

Facilitation of Government Bal sahay Yojna- Rs.50000 Financial support to **527 family** who had lost their members due to covid-19.

Patient Care and Coordination at GKGH Bhuj to avail proper treatment and Guide for 100% satisfaction.

Environment Sustainability

Environmental sustainability involves making decisions and taking actions that are in the interests of protecting the natural world, with particular emphasis on preserving the capability of the environment to support human life. It is an important topic at the present time, as people are realizing the full impact that businesses and individuals can have on the environment.

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 radius villages from SEZ Boundaries.

To make connections between human actions and the level of biological diversity found within a habitat and/or ecosystem, In year 2017-18 project "Sanrakshan" was launched in coordination with GUIDE. MOU has been signed with Dr. Vijay Kumar – GUIDE for conservation of five spices of mangroves.

Miyawaki–Nana Kapaya

Miyawaki is a technique pioneered by Japanese botanist Akira Miyawaki, that helps build dense, native forests. The Miyawaki method of reconstitution of "indigenous forests by indigenous trees" produces a rich, dense and efficient protective pioneer forest in 20 to 30 years. The approach is supposed to ensure that plant growth is 10times faster and the resulting plantation is 30 times denser than usual. It involves planting dozens of native species in the same area, and becomes maintenance-free after the first three years.

Nana Kapaya village and proposed site for Miyawaki-Dense Plantation is very close to many industries in and around the Mundra landscape. This area is also very close to main roads and coastal creeks. Mainly dense to sparse Prosopis Juliflora- (Ganda Bavar cover) is recorded surrounding to project site with very few scattered native trees like-Limda, Deshi Bavaretc. Shrubs species like-Akadoand Aavarare also predominant close to site; while, grasses like
Chhabarand Dhrabare recorded in proposed plot area.

As shared and discussed by villagers, this proposed plot is also very close to sewage water tank and nallahs; and proposing for watering to our proposed plantation.
As discussed with villagers and Adani Foundation, we proposed the close or dense plantation at site-called 1Miyawaki Types of Plantations with following four major compartments (45X20 meters approx.) and with following strategies:

1.Mixed Plantation dominant Drought Resistant Plants
2.Mixed Plantation dominant by Larger Leaves
3.Mixed Plantation dominant by Saline Resistant Plants
4.Mixed Plantation dominant by Medicinal Values.
Plantation of 4965 saplings of different 42 spices is completed which will result in dense forest within 2 years.

Smriti van

Smriti van Memorial park is a unique initiative by Prime Minister in order to commemorate the death of about 13,805 people during this massive earthquake which had its epicenter in Bhuj District.
The memorial will occupy around 406 acres of space of the Bhujia Dungar near Bhuj, Kutch that will show people's oppressive response to a natural disaster.
As a part of this Smritivan Memorial Park, it will have a museum, convention Centre, sunset point and Ecological park with around varied species of trees to attract different biodiversity.
For the ecological park, approx. 24 acres of land has been demarcated, wherein it is proposed to plant ~3 lakh local species trees.

Under Phase –1 project, Govt of Gujarat through GSDMA will be planting across 1 lakh trees, across 8 acres through "Miyawaki" methodology(Japanese technology of tree plantation). They have already enrolled the services of M/s Forest Creator, a Mumbai, based agency expertise in carrying out afforestation project, through Miyawaki technology.

Forest Creators have already been involved and completed 58such kind of project of Terrestrial afforestation, across India and this will be their 59thproject. (Details of project carried out Forest Creator attached)
Under this project, 60+ local species of trees will be planted and further the entire scope of development of Nursery, Soil enrichment, Plantation of saplings, mulching, biomass application, water supply & maintenance for 3 years are considered .
All Corporate of Kutch has supported fund for the same. APSEZ has done monitory support under CSR and Adani Foundation is coordinating for monitoring.

Coastal Bio diversity

Mangrove is a tropical tree or shrub that grows in swampy areas and has tangled roots located above ground. Mangroves, seagrass beds, and coral reefs work as a single system that keeps coastal zones healthy and provide essential habitat for thousands of Flora and Fauna.

Mangrove cover in India is 4992 km2 which is around 3% of global distribution and 0.15% of the country's total geographical area. With the second-largest mangrove cover in India, mangroves cover in Kutch increased from 794.77 km2 to 798.44 km2 *With dominant species of Avicennia marina, Rhizophora, Ceriops, Aegiceros* For the past two decades and APSEZ, Mundra is actively involved in mangrove conservation and management activities.

Adani Foundation contemplated to establishment of multi-species Mangrove Biodiversity Park to help disseminate knowledge on the mangrove ecosystem and simultaneously conserve the species with collaboration of Gujarat Institute of Desert Ecology (GUIDE), Bhuj, Kachchh.

Total 12 hector area have been developed with multi-species Mangrove plantation of ***Avicenna Marina ,Rhizophora Mucronata ,Ceriops Tagal ,Ceropos decandra at Luni Coast as phase wise in*** the year 2018-2019 (Phase-I). & Phase-II (2019-2020) with good survival rate.

So, to develop that as Bio- diversity park ,another 03 ha area coastal stretches have been planted with selected true mangrove species.

Fisheries Diversity

Mudskippers and bivalves were found near the waterfront. The gastropod, *Pirenella cingulata* few crabs ,Dead razor clams were also found inside the plantation site, A few crablets of *Scylla serrata* species and mud-skippers (*Periophthalmus waltoni*) were found in the cultivation site. In addition, catfish and mullets also occurred at the intertidal zone that the fisherman collected.



Macro Fauna

- *Gelasimus tetragonon*
- *Austruca variegata*
- *Periophthalmus waltoni*
- *Tubuca dussumieri*
- *Calidris pugnax Ardea cinerea*
- *Recurvirostra avosetta*
- *Larus fuscus*
- *Pirenella cingulata*
- *Solen sp.*
- *Painted strock*

- ✓ reduce carbon sequestration by 3 T per hector annually in early five years - after it reduces up to 20-25 T per hector
- ✓ provide alternate livelihood to fisherman by providing 3500 person days employment annually .
- ✓ Provide natural Habitat for Flora and Fauna.

Water Conservation (SDG 6/6.6)

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 due to negligible rainfall we are getting less outcome of this intervention.

The Foundation's Water Conservation program, Swajal, is aimed at addressing the alarming depletion of groundwater levels and reduction in water sources in various parts of the country. Devising eco-friendly and cost-efficient methods of water body rejuvenation, the project works to revive existing water resources, plan sustainable infrastructure for protection of natural water bodies and improve ecological conditions around the area. Interventions are focused on groundwater recharge, sustainable agriculture and boosting livelihoods post stream rejuvenation.

Total 110 Roof Top Rain Water Harvesting, 190 Recharge Borewell and 56 Pond Deepening carried out in up to year.

Impact

- ✓ 218500 men, women, children and elderly impacted by this initiative.
- ✓ Total Dissolved Solids (TDS) in the ground water down by 16.7%.
- ✓ Ground water table up by 4.2 ft. over the last 5 years.
- ✓ In four villages water levels have increased by 15-20 ft. through bore-well recharging facility
- ✓ Storage capacities of check dams and ponds increased by 106.44 MCFT. Total area benefited 2857 hectors.
- ✓ Annually 10000 Liters of water saved and up to INR 10000 saved per family.
- ✓ 80% reduction in money spent on labour.
- ✓ Up to 20% less money spent on electricity bills.
- ✓ 50% less water used as compared to conventional methods.
- ✓ Potable water available at doorstep. Earlier on an average women used to walk 1.3 kms to fetch water.
- ✓ On an average there has been up to 25% decrease in expenses on healthcare.
- ✓ Water availability has also ensured safety, security and overall well-being of women and children in the area.
- ✓ Initiatives and efforts made under water projects by Adani Foundation continues to provides sustainable solutions for community for their improved farming and ease of living.

Initiative	FY 2021	Total
Roof Top Rain Water Harvesting	50	115
Bore & well recharge	83	189
Pond Deepening	-	56
Check dams	-	21
Drip Irrigation	180	1158

Drip Irrigation Project (SDG 2/2.4)

The fragile economy of Kutch is hampered by the salinity ingress and higher saline ground water which consequently impact on cultivation area and farmers yields as well.

Hence, To Conserve the Water. It is necessary to bring the land under **'Micro Irrigation System'** by allowing water to drip slowly to the roots of the plants, either from above the soil surface or buried below the surface we have started project Drip irrigation to Provide Financial support to adopt & Install Drip irrigation system.

This year **More than 180** farmers are supported with 15% Amount of Total Cost for maximum Rs.0.40lac.

Till the date Total **2229 acre of land are covered under Drip system by 1158 farmers** impacted to save their Money ,time and water and electricity as well.

The process to availing Benefits

- Farmers have to apply in the prescribed form of Adani foundation with photographs _
- Inspection and verification will be by AF representative.
- Ration card, work order of GGRC, 7/12 certificate, and all bills must be attached.
- Solutions to Queries .
- Primary information about farmer land will be recorded.
- Farm visit within 10 days of receipt of application and verified installation of the system as per map and material.
- Feedback from farmers.

Farmers selection Criteria

- Farmer should belong to the intervention villages of AF (Adhar Card) within Mundra block
- Small/marginal farmer – having maximum 3 hectors total family land were considered.
- Submit copy of application and copy of approval certificate from GGRC for drip irrigation .
- Consent to contribute and participate as per the provision of the AF scheme.
- Spot check/ field visit at the farmer's farmland by AF team before and after setting up the drip irrigation system and regular monitoring visit.
- Opening a bank account (the financial assistance was provided only through cheque).

Grassland Ecosystem Restoration project - Guneri

Lakhpat taluka is bestowed with rich mineral resources, lignite being the most important. Additionally, the area is also known for presence of tropical thorn forest. The region exhibits a great correlation between floral and faunal species and many rare and threatened species including Helichrysum cutchicum (endemic species), Cistanche tubulosa, Campylanthus ramoissimus, and Sida tiagii hence area is a proposed Biodiversity Heritage Site. However, the stress on this biological pool is constant, which arises primarily due to dynamic environmental conditions culminating in frequent droughts.

- With this background, and as a part of Biodiversity initiatives, to conceptualizing the landscape ecology and social-ecological systems together, by taking grassland restoration as its epicenter, APSEZ has proposed to take the pioneering steps towards building sustainable growth in the Lakhpat region, Kutch by taking **the initiation of restoring the natural grassland habitats (Ecological Restoration) along the Guneri village, i.e. ~40 Ha grassland ecosystem in gauchar land**, by collaboration with Gujarat Ecology Society (GES) – A Nonprofit Organization, based in Vadodara, Gujarat.

Grassland Ecosystem Restoration project - Guneri

Guneri village is situated north of Lakhpat fort with a population of 967 as per the 2011census. A Biodiversity Management Committee (BMC)already exists there and hence it becomes easy to undertake grassland restoration with the help of committee members. The gauchar land available for restoration is around 100 Ha and about 40 Ha of the area can be considered for restoration. The restoration process will be spread over a time period of three years, starting initially with 10 Ha and slowly moving up to 40 Ha by the third year.

The faunal survey was initiated in the month of December and continued till February 2022. This time is suitable to record the migratory birds. The survey highlights the presence of 9 threatened species based on IUCN (2021) viz., Monitor Lizard Black tailed Godwit, Black-headed Ibis, Common Pochard, Tawny Eagle, Steppe Eagle and White-backed Vulture were sighted in the area.

MILESTONES ACHIEVED

- Restoring the grasslands in the Gauchar lands.
- Preparatory phase for plantation activity.
- Capacity building of the locals in the ecological monitoring process and process of documentation and observation of changes.
- faunal Survey Mambles-07 species ,Reptiles-04 Species Birds-59 Species ,Threatened species-09 Species were Found.
- On Soil day celebration, An expert session was presented by Dr. Jayendra Lakhmapurkar for the APSEZ staff, students and farmers.
- International Wetland day was celebrated on 2nd February jointly by Adani port and logistics and GES with the theme "**Action on wetlands for people and nature'** . Key note speaker Dr. Deepa Gavali took insightful session to create awareness.

Sustainable Livelihood Projects

Empowering lives and broadening their scope for economic opportunities, Adani Foundation's initiatives introduced under 'Sustainable Livelihood Development Program', is formed to empower and uplift community towards better living and better livelihood.

At Mundra Taluka, several communities are economically side-lined and 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.

A comprehensive program for Fishermen community is developed with holistic approach to improve their Education, health, economic status, Employment opportunities, Infrastructure and social awareness.

With support of Adani Foundation, Education Scenario is changing in fisher folk community which wasn't a cake walk but with the hard work and commitment Adani Foundation has created miracles to motivate this vulnerable students to pursue Education for their bright future .

To inculcate Education in first generation learners – **SMART Balwadis are set up with an aim to provide quality education,** scholarship support to girl child along with transportation facility.

SMART Balwadi

A child's early years experience provide strong base for their lifelong learning. A Balvadi center for their holistic development was set up at Four fishermen vasahat where trained Balvadi teachers looks after Children's Physical, cognitive, Emotional and Social development.

Initiatives taken to provide Study Material and Cycle are the distributed to keep fisher folk children motivated to continue their study as well as reduce financial burden of their parents.

68 fisher folk children studying in 9th to 12th standard were provided with educational material and stationary material and Cycle support to Juna bandar secondary school going students.

Economic Empowerment is necessary for "ATMA NIRBHAR BHARAT" and Skill Development is the base of comprehensive growth. To Develop various technical and Non-Technical Skills in youth - training was conducted for Fisher Youth and Women.

Digital literacy and spoken English class:- Basic computer and spoken English training for 152 Fisherfolk students of Zarpara and Luni Vasahat which will help them to grow with confidence.

sewing training given to 26 fisher women of Juna bandar to make them Self-reliance. Planning industry tie-ups to provide them with livelihood opportunities.

Awareness programs For fisherwomen :

Fisherfolk women are still living in 19th Century, due to lack of education they are having issues of addiction, hygiene and independence.

More then **1250+ women** participated in various sessions awareness workshop at Fisherfolk settlements periodically.

Process for livelihood support to Fisher folk
39 Fisher Youth were interviewed in various industries among that 12 are selected.

Mangroves Nursery Development

Optional livelihood provision during Two-month Fishing Offseason is taken care by Mangrove Planation and maintaining at Luni Hamiramora site.

Till the date 162 hector area have been planted with Avacinia marina mangrove species which provided **46247 person days** and create environment Sustainability as well.

Years	Mandays
2012-13	6943
2013-14	1480
2014-15	3240
2015-16	3533
2016-17	3125
2017-18	3666
2018-19	7539
2019-20	6261
2020-21	5020
2021-22	5440
Total	46247

Project Fish

Skill Enhancement of Fisher folk Youth

Objectives

- To Promote long-term socio-ecological effectiveness through focused interventions like employment through Skill enhancement.
- Engage more than 500 fisher folk youth in Skill Development Training to provide consistent scope of income
- Alternative incomes mean fishers are less pressured to go out to fish especially when the weather is bad
- Skill Enhancement in technical sector will motivate them for Education provision in future generations
- Livelihood interventions to improve fisheries dependent households and also reduce risk during open sea fishing

Project Goal

To develop new livelihoods opportunities for more than 500 fishing families and therefore to helping with family finances this leads to an increased sense of empowerment and confidence.

Pre-launch Activities

Brewing Big

Fish project ideation bring into existence after researching and analyzing the existing situation of Fisher folk youth and challenges they face due to which the future of the community was at stake.

The future of any community depends upon its youth. Considering this phenomenon, Adani Foundation targets fishermen youth at remotest location of Kutch district covering villages like Zarpara, Navinal, Mundra, Shekhadiya and others.

The key activities conducted before the launch were:

Mobilization - Team reaches out to villages to created awareness regarding the purpose of project and providing detailed information about training and the employment opportunities provided to them.

Counselling - A regular Interaction with every potential beneficiary to understand their educational background and interest areas along with mental and emotional capabilities. On the basis of individual's educational background and capabilities, counsellor suggests best fit course to the beneficiaries.

1 Jan' 2022

11 Jan' 2022

10 April 2022

Project Launch

Getting started

Project 'FISH' was inaugurated with an aim to enable fishermen community youth in 3 trades
Assistant Electrician, Mason and Digital Literacy.

52 aspirants from community were given an opportunity to get holistic skilled development environment by Adani Foundation under Adani Skill Development Centre. The certified training program of ___months. The expert trainers of ASDC acts as a catalyst to develop not just technical skills but to provide trainees a holistic learning platform to develop their personality and to make them industry ready.

Job Roles

- ❑ Mason General
- ❑ Bar Bender & Steel Mixer
- ❑ Assistant Electrician

Training & Beyond

Skill journey of Beneficiaries

Life at Skill Centre

Once beneficiary enrolls in a skill training program, he undergoes various modes and methods of training to develop his overall personality during his technical skill journey.

The training cycle started with theory sessions and practical sessions in respective job roles. Post that, Soft skills sessions and activity based learning sessions were conducted to boost their confidence. Though, beneficiaries start career at entry level, to grow themselves further ASDC prepares them with well with sessions like communication skills and Digital literacy.

I am happy that I am getting chance to get skilled and choose to make a living doing other occupation and no more dependent on just fishing. When my trainer appreciated my drawing skills for project and grasping power,
I got determined to study dedicatedly to score maximum in my assessment.

- Rahim Bhatti

In 3 months of training, I feel immense confidence in myself. My changed personality is even witnessed by my family and friends.
Post training session, I even do home study and discuss queries with trainers regularly to get myself prepare for my first job.

- Ayub Vagher

Initially I was hesitant to speak in class and also struggled in theory sessions. But our trainer is so supportive and helped me to understand better through practical.
I am looking forward to start my career post skill training and all set to enter into an occupation to make my parents and fishermen community proud.

- Abdullah Vagher

Transforming Lives

Home like meal service by SHG members

One of the interesting initiative of project the 'Fish' is the involvement of SHG group women named 'Saheli Gruh Udhyog' in the successful training of fishermen youth in the form of providing freshly cooked meal for the beneficiaries and arranging their lunch at training centre.

Adani Skill Development centre has given a meal service contract to SHG member and bears complete cost of beneficiaries meal and supporting SHG members in expanding their services.

About 'Saheli Gruh Udhyog'

It's a group of 10 members among whom, some are widows. They are making active efforts to run their SHG group by providing meal services for their sustenance.

Getting a chance to serve 52 young men for 3 months proved as a big achievement for their SHG group. *Moreover, food quality is appreciated by trainees and they express their gratitude by saying 'the food reminds them of home as it tastes like home'.*

Sustainable Livestock Management

The inadequate rainfall and high saline ground water acts as a threat for agriculture practices. Also, cattle sustenance is the main cause of concern due to dry arid region in lean months. Adani Foundation contributed its exceptional efforts in Mundra block for consistent betterment in livelihood sector.

The organization has carried out remarkable activities in the agricultural and animal husbandry sectors i.e. Cattle Health care, Natural Farming, Soil health enhancement, Fodder sustainability etc.

Pashudhan :

Fodder Support Programme, Individual Fodder Cultivation

- Adani Foundation provides good Quality dry and green fodder to 24 Villages. Project is covering total 14116 Cattle's / 3008 farmers and hence enhancing cattle productivity. Fodder support is of prime importance for sustaining the cattle in dry months.
- Fodder Cultivation- To made fodder sustain villages - 25 Acre Gaucher land of Siracha village is being cultivated for the same.
- Fodder support MOU- with Gram panchayat at Zarpara, Nana Kapaya, Borana, Mangara, Sadau, Shekhdiya , tuna , Rampar, Dharab, Navinal, Luni, Gundala, hamiaramora , Raga.
- Individual Farmer fodder cultivation supported for Maize seed and NB21 to more than 200 farmers which has created revenue of Rs. 27 Lacs.

Preventive Health Care

- Adani foundation and Government Animal hospital jointly organizing Cattle awareness camps total 22 villages .
- Vaccination of susceptible animals against foot-and-mouth disease (FMD) is a well established strategy for helping to combat the disease. Traditionally, FMD vaccine has been used **to control a disease incursion in countries where the disease has been endemic rather than in countries considered free of the disease**.
- Foot-and-mouth disease (FMD) and Deworming done with 1883 cattle owner benefitted to 15700 cattle.
- Sheep and goats have weakened immune systems when they are sick with other diseases, are quite young or old, and during highly stressful events such as lambing. Deworming strategies should seek to protect these higher at-risk groups, controlling parasite levels in all animals to prevent visible effects of parasitism.
- Special Camps organized at Kira Dungar Nakhatrana for camel which benefitted 525 camels.




To protect Cattles against **Bovine Brucellosis** zoonotic disease, Awareness and vaccination program is ongoing with Kutch fodder fruit & Forest development trust (KFFT) in our 13 Villages , Last year 287 families 2132 Animals benefited. In 2021, **In Total 666 families 5083 animal benefited.**

Bovine brucellosis is a chronic infectious disease of cattle that causes abortion, the birth of weak or dead calves, infertility and, as a consequence, reduced milk production. Cattle and buffaloes of all ages are susceptible, and infection can persist for many years. In females, abortion is the major clinical sign, typically occurring between five and seven months of gestation. Most infections result from ingestion of bacteria either from diseased animals or contaminated feed. Infection may also be acquired by respiratory exposure and by contamination of abraded skin and mucosal surfaces. Infected bulls can spread the disease through semen. This disease is also zoonotic (a disease that can be transmitted from animals to people or, more specifically, a disease that normally exists in animals but that can infect humans). Under this project following activities were carried out so far,

- Meeting with Gram Panchayat, Farmers and Livestock Owners.
- Development and Distribution of the Awareness Materials among the stakeholders.
- Mass Level awareness by pasting the poster and meetings with Village Leaders and Gram Panchayats.
- Primary Survey and Sample Collections i.e. Milk Ring Test, Blood Collection and testing.
- Brucella Vaccination and Ear Tagging etc.

Sustainable Agriculture

Sustainable agriculture is to protect the environment, public health, communities, and the welfare of animals. Sustainable agriculture also promotes economic stability for farms and helps farmers to better their quality of life.

Soil Enrichment, Crop Pattern, Agro Cover, Natural Farming, Orchard Development, Tissue Culture, Water Harvesting Practices, Replacement of chemical fertilizers and pesticides, Bio intensive Integrated Pest Management are the main parameters of Sustainable Agriculture Practices.

Sustainable Agriculture benefits are:

1. Contributes to Environmental Conservation
2. Saves Energy for Future
3. Prevents Soil Erosion
4. Enriches Soil quality
5. Biodiversity
6. Sustainable Livestock management
7. Economically Beneficial For Farmer
8. Quality Food to consumers

Home biogas

Home biogas is the Israel based company was founded in 2012 manufactures dynamic biogas unit not only for farm waste but for kitchen waste too.

- Reducing organic waste,
- Transitioning to renewable energy
- Motivation for reduction in use for fertilizer

And Improving the health and living conditions for the millions of families that are still cooking on charcoal and wood. Adani Foundation is not only supporting but creating awareness to save environment and health of the community who regularly cooking on Chula. It is proven that one hour cooking on Chula is as dangerous as smoking 40 cigarettes.

As a Main Process, Bacteria break down organic waste in a naturally occurring process, and Home Biogas stores and harnesses the energy created so that it can be used for gas.

Sustainable agriculture Project is revolving around Home biogas which is not just utilized for cooking gas but its by product is bio slurry which is replacement of chemical fertilizers and promotes soil enrichment.

Adani Foundation has supported for **223 Home biogas system** till date with 20% participation by the community.

As per SORI use of biogas each farmer can save Rs.23399/-year. Total 223 farmers can save Rs.5217977/- in a year.

Promotion of Natural Farming

To promote Natural farming Adani Foundation has originated cow based farming initiative with interconnected techniques which can increase farmer yield – our main objective is to improve quality of soil. Pre testing and post testing is carried out for designing carbon content management of soil.

Implementation

- Survey and identification of farmers to adopt Natural farming –**Total 150 Farmers were selected as criteria in first phase of the Project.**
- Arranged Workshop & Hands on training for them which was conducted by Agri expert ,KVK and Progressive farmers with 700+ farmers.
- **23 vermi compost unit have been set-up** to give guidance n training to other farmers. This units are provided Which is facilitated through Government with farmer Contribution.
- **150 Farmers have started to preparing JivaMrut & Gaukrupa Amrutam Bio-fertilizer** and using in agri crop. Series of Training is arranged by ATMA and Adani Foundation in which more than 700 farmers participated.
- Four Farmers Groups is registered with **ATMA –Agricultural technology management Agency – it will leverage Government schemes.**

Promotion of Horticulture : Kutch Kalptaru FPO

Kutch Kalpaturu Producer Company (KKPC) is established to address the challenges faced by the farmers, particularly to enhanced access for inputs, technology up gradation in Agri practices, output, Sorting, Grading, Value addition & marketing. by the farmers of Mundra Block in the year of 2020. The company is started with 350 shares of 280 holders, Right now it is on path of expansion up to 5000 Farmers.

Current year for the dates Packaging and Marketing, KKPC Started to sell **10 Kg capacity packaging Box** at Minimum Profit Margin At **Rs.29/Boxes** which resulted in turn over of Rs. **24 Lacs with Profit of 1 Lac.** This initiative has supported more than 1800 farmers indirectly.

Regular Director Board Meeting as well as capacity building Training were arranged.

In Coordination with KKPC, Adani Foundation has supported for Dates Offshoot plants to 100 farmers. It will start fruiting from 4th year and matured from 7th year. 4th year

expected yield is 50 Kg. and Minimum fetch rate is 50 per Kg so each farmer will produce 1000 Kg high quality dates and Rs.50000/- income from it and all 100 farmers will produce 100000 Kg dates and income will be generate Rs.50 Lacs in first fruiting year.

It will increasing year by year till 7th year, when dates plants matured and after that 2000 plants produced 300000 Kg expected high quality dates and expected income will 1.5 Cr. Approx.

Five farmers are cultivating Dragon Fruits in 2 acre each – Total 11000 plants.

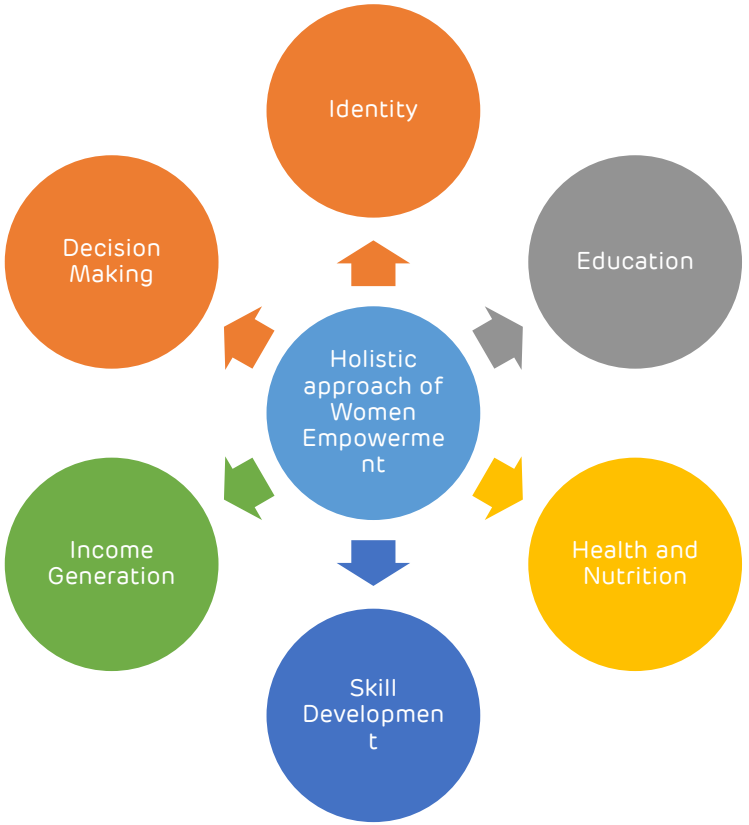
Women Empowerment Projects

Women are central to the entire development process, be it in an individual family, village, state or to a nation. Adani Foundation provides platform to community women to break the ceiling and move out as a change makers in their communities and among societies keeping their traditions intact. A considerable change has been witnessed in Mundra in terms of development of women beneficiaries in various fields of occupation like farming, self entrepreneurship, agriculture, etc. Adani Foundation has a special focus on empowering rural women and uplift by providing sustainable livelihood support resulting socio-economic shits in rural population.

The below mentioned figure shows determinants associated with the empowerment of women and these are the challenges for us as a CSR to work upon.

Adani Foundation focuses on is all parameters as a part of holistic approach towards empowering Women.

- Education – **More than 1200** girls are impacted under project Utthan. Project promotes girl child education, Creating awareness through various Govt schemes like Vahali Dikri Yojana, Sukanya Samriddhi Yojana and others.
- Health and Nutrition – Suposhan Project focus on adolescent and Reproductive age women nutrition part. Till date covered more than **12500 women** and **8700 adolescent** under this Project and brought them to considerable status.
- Skill Development and Income Generation – Adani Foundation is working with **15 Self help groups** and supporting to develop entrepreneur skills to become self reliant, sourcing more than 350 women to absorb in various job – this will give them identity, confidence and right to speak in any decision for home, village and working area.
- Drinking Water and Sanitation – Total **115** Roof Top Rain Water Harvesting is supported for hassle free household chores. **1057** families are supported for Potable water at Fisherfolk settlement to reduce drudgery of women.



Total 15 Active SHG Groups are engaged as mentioned in table Income generation activity. We facilitate them capacity building training for quality ,Marketing Finance and team work to made them self sustain.

Major Achievements:

- Saheli Swa Sahay Juth have **completed order of 15000 Sanitary pad** from District Health Department.
- "**Shradhha Saheli Sva sahay Juth**" has won tender to provide Catering service in Block level Government.
- **Tejasvini SHG has received order** of three layer mask preparation worth Rupees Nine Lacks
- **Sonal Saheli** Women SHG had **supplied 500 KG washing powder** to Adani port & Will mar.
- Shradha Saheli & Jay Adhar Saheli have been registered in FSSAI (Food safety and standards Authority of India.
- Turn over of Tejaswi Saheli, Shraddha Saheli and Meghdhanush Saheli is **@ 40 Lacs till date**.

Sr. No	Name of IG activity	Activity	Nos
1	Sonal Saheli Swa Sahay Juth	Phynale & Washing Powder	11
2	Jay Adhar Saheli Swa Sahay Juth	Dry Nasta	12
3	Tejasvi Saheli Swa Sahay Juth	Stiching,Uniform,Bag	12
4	Umang Saheli Swa Sahay Juth	Soft toys, Jula,	13
5	Vishvas Saheli Swa Sahay Juth	Tie & Die, Stitching	13
6	Jay Momay Saheli Swa Sahay Juth	Tie & Die, Stitching	12
7	Meghadhanush Saheli Swa Sahay Juth	Mud Works,	10
8	Saheli Swa Sahay Juth	Sanitary Pad	10
9	Radhe Saheli Swa Sahay Juth	Dhadaki, Small Godadi	14
10	Shraddha Saheli Swa Sahay Juth	Fresh Food	10
11	Chamunda Saheli Swa Sahay Juth	Tie & Die	10
12	Jay shakti Saheli Swa Sahay Juth	Stitching	10
13	Navdurga Saheli Swa Sahay Juth	Sanitary Pad Sale	10
14	Sakhi Saheli Swa Sahay Juth	Sanitary Pad Sale	10
15	Sonal Krupa Saheli Swa Sahay Juth	Stitching	10
		168 Members in Group	

Economic Empowerment of women means “Enhancing the role of women as drivers of poverty reduction, promoting female investors and entrepreneurs as per SDG 5” in this half year all 15 women groups did turn over of Rs. 11.5 Lacs. 43 women got job in various SEZ industries by AF intervention and 11 women got absorbed as Gram Rakshak Dal, Bank Sakhi and Bima Sakhi.

Registration Certificate
Government of Gujarat
Food And Drugs Control Administration
Food Safety and Standards Authority of India
Registration Certificate under FSS Act, 2006

/ Registration Number: 20721013000245

1.	Name and permanent address of Food Business Operator (FBO)	JAI AADHAR SAHELI VIA JAIHO JUTH BAROI , Baroi , Mandra, BHUJ(KUTCH), Gujarat-370421
2.	Address of location where food business is to be conducted / premises	BAROI, Baroi , Mandra, BHUJ(KUTCH), Gujarat - 370421
3.	Kind of Business	General Manufacturing
4.	Photo Identity Card	N/A

This Registration certificate is issued under and is subject to the provisions of FSS Act, 2006 all of which must be complied with by the petty food business.

Place / BHUJ(KUTCH)
Issued On / 12-03-2021 (New Registration)
Valid Upto: 11-03-2022 (For details, refer Annexure)

Registering Authority

Annexures:
1. Product Annexure
2. Validity Annexure
3. Registration Id Card

Note:
1. **Application for renewal of Registration Certificate can be filed as early as 180 days prior to expiry date of Registration Certificate. You can file application for renewal or modification of Registration Certificate by login into FSSAI's Food Safety Compliance System( ) with your user id and password or call us at 1800112100 for any clarification.**
2. **This Registration Certificate is only to commence or carry on Food businesses and not for any other purpose.**
3. **This is computer generated Registration Certificate and doesn't require any signature or stamp by authority.**
4. **This Registration Certificate is allowed to conduct food businesses activities having annual turnover upto Rs. 12 Lacs only.**

Community Resource Center

Adani foundation acting as bridge between Government and needy beneficiaries to facilitated government scheme leverages since 2015. and after our efforts and observation, we decided to established Community resource center, where people can have easy access for Guidance and complete all necessaries document for Government Scheme.

CRC is Located just near to Mundra Bus stand and known to all People.

In the year of 2021-22 Total 667 people have benefitted through CRC center.

Total 2243 beneficiaries have been benefited and get support through Government and Adani Foundation. Among them more than 712 people have been getting financial support as Monthly base that is. Rs16.Lacs.

Scheme Detail	Beneficiaries 2021-22	Remarks	Total Beneficiaries	Revenue Convergence (Rs)
Senior Citizen	10	Rs.750/ Month	104	78000
Online Application	13		13	
Widow Pension	289	Rs.1250/ Month	526	657500
Medical Certificate	59		59	
AF Support	32		32	
Divyang pension	2	Rs.1000/ Month	7	7000
E-Shram CARD	8		8	
Divyang Job	14		14	
Sukanya	123		123	
Vahali Dikri	23		23	
Bal Yog Yojna	51	Rs.2000/ Month	51	102000
Covid -Support	13	Rs.50000/ one time	13	650000
Aditya birla Scholarship	30		30	
palak mata pita		Rs.3000/ Month	9	27000
sanakat Mochan		Rs.40000- One Time	2	80000
Tool and Kits Support by through Government			1057	
Support By AF (Widow and Divyag)			159	
Ration support To Widow and Niradhar			13	
Total	667	0	2243	1601500

Project Swavlamban

Project Swavlamban Launched with an aim to make **differently abled people of MUNDRA TALUKA self sustainable.**

Our objectives:

- To increase awareness about Government schemes for Divyang people, widows and senior citizens and coordinate them with Social Welfare Department, Government of Gujarat.
- After getting income generation equipment support - Proper training provision to make them self-reliant in true sense!!
- Adani Foundation is playing key role as 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.

Community 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 Fisherfolk Development Project, Adani Foundation has constructed 46 shelters at Randh Bandar with pre cast structure. Fisherfolk Community cum Training center is the biggest project of current year and will also create impact as a boon for fisherfolk youth for various trainings.

Balwadi development work at Bandar and Shed for Adani Skill Development Center for technical trainings will also improve quality of many lives in true sense.

- 23 Fishermen of Randar bandar are benefitted to Pakka House constructed under AF Fishermen Avasa yojna
- Renovation and Up-gradation of Check Dam & River Rejuvenate work at siracha and Bhupur villages.
- RRWHS & Bore well recharge Construction at Various Villages.
- Basic amenities and maintenance and reparing work at all Fishermen vasahat.
- Community gathering and training Center construction at Different villages
- LED Street Light and Sky Lifter Structure at Municipality Mundra Baroi.
- Supply & Fixing of Hi Mask Tower at Gundala village work.

Adani Skill Development Centre

A section 8, not-for-profit company, registered on May 16, 2016, 'Adani Skill Development Centre' is an initiative of Adani Foundation. ASDC focuses on skill development activities to contribute towards nation building by bridging the skill gap demand & supply, in line with Government of India's Skill India Mission.

"SAKSHAM" is an ideology of the Adani Skill Development Centre to make youth of India 'SAKSHAM' (capable) of achieving their goals in life by becoming skilled professionals.

Mobilization and Counselling

Theory and Placement support

Practical training for all job roles

On the Job training

Post training placement support

A strategic model of skill training is implement by ASDC in which Mobilisers visit remotest locations to encourage youth and women to get skilled, Counsellors provide in-depth information and assist in suggesting need based course, Certified trainers with expertise provides theory and practical training. Trainees are provided with soft skills sessions and interview preparation sessions to make them employable and industry ready. For each batch, ASDC team will arrange Panel Interviews and Campus Interviews for trainees to get directly selected as soon as they complete training.

Practical Training : As a training part we are conducting other activities. We have conducted Learn with Fun activities, Parents Meeting, Certificate distribution program, Preparation for Interview etc.

Women's Day Celebration : Conducted 7 days seminar to empower female candidates in line with International Women's Day theme. More than 60 women participated.

Educational Exposure Visit of GDA candidates (DDU-GKY) at K. D. Hospital Ahmedabad. 21 candidates visited.

Guest session organised for trainees to provide them soft skills training and make them industry ready with a doze of motivation.

Certificate distribution to GDA batch Students

Course wise Admission Bhuj

Name of Trade	Total
General Duty Assistant	90
Digital Literacy	42
Financial Literacy	45
GST with Tally	169
Frontline Health Worker	11
Welding Technician	1
Basic Functional English	5
Beauty Therapist	5
Logistics & Supply Chain Management	1
Junior Crane Operator	3
Occupational Safety and Health Administration	1
Pedicurist and Manicurist	2
Domestic Data Entry Operator	2
Diet & Nutrition	41
First Aid	81
Total Admission	**499**

Name of Trade	Bhuj	Kutch University	Chanakya College	DDU-GKY	Total
Total Admission	97	179	191	32	**499**

Name of Trade	Total Trained	Placement	Self-Employed	Upskilled
General Duty Assistant	32	10	0	22
Digital Literacy	38	0	0	38
Financial Literacy	20	0	0	20
GST with Tally	92	0	0	92
Beauty Therapist	3	0	3	0
Junior Crane Operator	3	1	0	2
Pedicurist and Manicurist	1	0	1	0
Domestic Data Entry Operator	1	0	0	1
Diet & Nutrition	41	0	0	41
First Aid	41	0	0	41
Total	272	11	4	257

Name of Trade	Mundra
Basic Functional English	170
Digital Literacy	152
Self Employed Tailor	120
Pedicurist and Manicurist	107
Junior Crane Operator	54
Mason General	42
Bar Bender and Steel Fixer	42
Dori Work	22
Mud Work	18
Assistant Electrician	10
General Duty Assistant	6
GST with TALLY	5
Beauty Therapist	2
Data Entry Operator	3
Checker	1
5S	1
Total Admission	**755**

Placement Details for the F.Y. of 2021-22 (Mundra)

Name of Trade	Total Trained	Placement	Self-Employed	Upskilled
General Duty Assistant	6	0	0	6
Digital Literacy	99	0	0	99
GST with TALLY	5	0	0	5
Mud Work	18	0	18	0
Basic Functional English	105	0	0	105
Dori Work	22	0	22	0
Junior Crane Operator	46	25	1	20
Data Entry Operator	3	0	0	3
Pedicurist and Manicurist	27	0	27	0
Self Employed Tailor	29	0	29	0
Total Admission	**360**	**25**	**97**	**230**

CSR 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).

- Socio economic survey of Widow women and than linked with Government Widow pension scheme Rs.1250 /Month. Total **246 widow women have been facilitated with Widow pension scheme** with convergence of Rs.307500 /Month on Regular basis.
- **Till the date 22 Bore well** were recharged at Ugedi and Deshalpar Villages. Two pond deepening work and **4 Old check dams** were repaired. Tree Plantation at Jinjay & Ugedi Villages Primary schools.
- **Government Scheme Awareness Session** was held at Deshalpar village on the silver Jubille of Foundation day .
- **Distribution of 1000+ Mangoes Sapling** to farmers of Ugedi and Deshalpar Villages for promotion of Horticulture farming.

CSR 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.

Main focus of Adani Foundation is to prevent community from life threatening diseases and provide basic healthcare services.

Activities:

- Barred land of the Kapurashi crematorium afforestation with **2222 different type of trees in collaboration of forest department and Bhagvati Gramaya Vikas trust**. Arranging **water pipelines to facilitate regular watering** of plants to ensure nurturing. Impact: Attracts peacocks and other birds at crematorium site.
- General health camp and speciality health camp was arranged frequently at villages. More than **425 Patients were diagnosed and refer to GK General Hospital** for further treatment and operation if needed.
- Sewing machine training was conducted Kapurashi women. Main objective of the training was to empower women to boost their self confidence and thus financial independency,

CSR Tuna Port (AKBPTL)

Adani Kandla Bulk Terminal Pvt. Ltd. is joint venture of Adani Ports and SEZ Limited and handles all types of dry bulk cargo including coal, fertilizers, minerals, industrial salt and agriculture products.

Various activities were carried out for the community development under core areas of Education ,Health ,SLD & community Infrastructure of Tuna ,Ramapar Vandi villages and Fishermen vasahat

Rural clinic and MHCU

Basic health facilities is being facilitated through Rural clinic Rampar, vandi and MHCU to vira bandar.

Specialist health camp was arranged at Tuna Villages. More than **184 patients was diagnosed and treated** as well as suggest to GKGH for Further test and treatment.

Drinking Water

Potable water supply to Dhavlavaro and Vira bandar vandi villages impact on fishermen health to reduce water born disease.

Covid Vaccination camp

covid vaccination camp was held at AKBTPL for labors and security Staff through government health department.

Fodder support

Fodder scarcity is always remained prime need of farmers which is being resolve through Fodder supply intervention to Rampar and Tuna village from April to July -2021 which improved cattle health and milk quality.

26680Kg Dry fodder support

721855Kg green fodder support

Pond deepening and bund strengthen of Rampar village pond increase water storage capacity.

Construction of Community gathering center at vandi village provide access for community function and training as well.

Water pipeline installation near to Rampar village pond to Watering tree planation which was developed by villagers and maintain regularly.

CSR Bitta

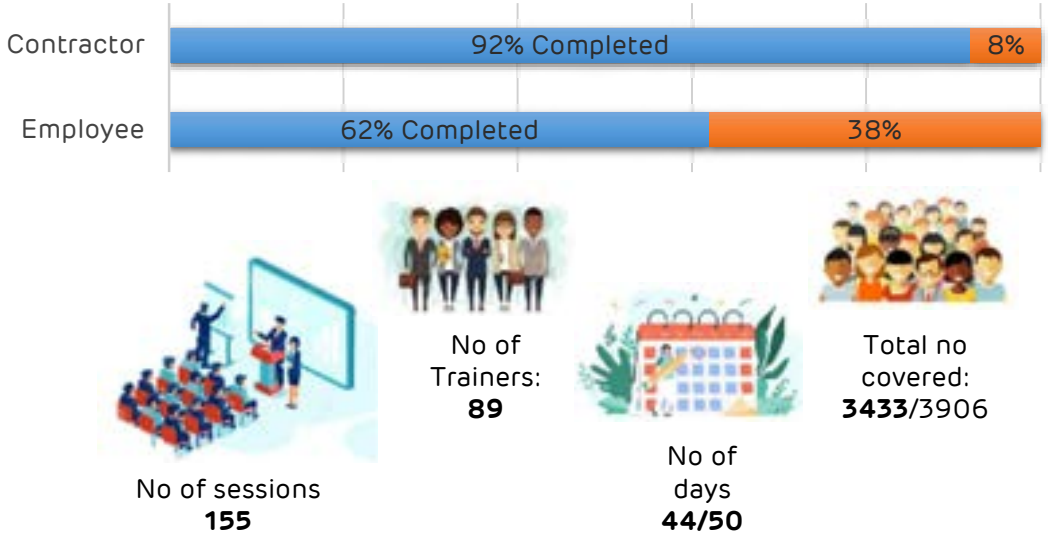
One of the Largest single location solar power project was commissioned by the Adani Group at Bitta, in Gujarat in year 2011. It spans a vast area of 450 acres. The massive plant comprises 2 lakh solar modules, 73782 foundations, 4500 tons of structure, 2800 km of cables, 56 inverters and 33 transformers. And now fully operational mode as well as connected with the 66 kV GETCO substation of GETCO TO powering 16,326 homes in a suitable manner and for the Sustainable rural development various Activities was carried by AF as mentioned.

- Avail Dinking Water and drainage line facilities by availing pipeline connection to Dhufi village which reduce drudgery and lead toward 'Swachh village'.
- Repairing and maintenance Bavnipar village cricket ground to offer hassle free playing ground as well; crated strong repo with Youth.
- Cleanliness of village Pond inlet in the Bita Village which lead more storage capacity and Village. Pond bunding construction in Dhufi village.
- Support Bita Primary school with Four Solar Light which reduce Electricity consumption and nurture renewable energy concept.
- Pota container and LED light support at Mathla check post for security and safety purpose.
- Cleanliness awareness session was conducted with Cleanliness program with youth involvement to create my Village clean village concept.
- Panchayat Building construction was carried out by Adani Foundation's support and technical guidance.

Dignity of Work Force Programe - EVP

India's National TB Elimination Programme (NTEP) aims to meet the ambitious goal, announced by the Honorable Prime Minister Shri. Narendra Modi, of ending the TB epidemic by 2025, five years ahead of the UN Sustainable Development Goals (SDG) of 2030. In response to this call, the Government of India and USAID jointly launched the Corporate TB pledge (CTP), in April 2019 to galvanized corporate support to end TB.

To continue the momentum and efforts, the USAID-supported iDEFEAT TB project, which is working towards institutional strengthening to accelerate actions for Tuberculosis (TB) and drug resistant TB (DR-TB) in India; was launched as USAID/India's flagship TB project. The project works in collaboration with the Central TB Division (CTD), Ministry of Health and Family Welfare (Mo HFW) of the Government of India across a network of diagnostic, treatment, and program management institutions.



The CTP secretariat, hosted at The Union under the iDEFEAT TB project, provides technical assistance to government and corporates to adapt, implement TB interventions, and guide corporate resources for TB and DR-TB care.

Early diagnostics and treatment initiation are key to saving lives and minimizing disease transmission. In 2019, India reached a milestone of 24 lakh notified cases in India, an increase of 12% compared with 2018. Even then, an estimated 5.4 lakh were 'missing' across India, a serious drawback to our TB elimination efforts as what is not measured is unlikely to be improved. Diagnostic delays are also prevalent in India, with studies indicating that these can be attributed to patients as well as health systems.

Adani foundation with APSEZ, APML, AWL and MSPVL HR department in coordination of FOKIA has launched cluster based screening program to eliminate TB in labors under Dignity of workforce program. Adani Ports and SEZ Limited has initiated screening with 2300 work force in first phase with target of screening more than 10,000 workforce of all group businesses and SEZ Industries.

USAID/India team including Director – Health Office has planned to visit Adani Foundation CSR Activities related to community health. He visited Adani Hospital, GKGH Hospital and related activities.

"जन जन को जगाना है, टीबी को भगाना है"

Dignity of Work Force Programe - EVP

"Joy of giving week" celebrated by employees of APSEZ and AWL by distributing clothes and stationary items to labour workforce of APSEZ.

More than 7500 Clothes distributed to 650 workers of Labor Colony.

Support to children Vallabh Vidyalaya

In year 2018-19 year Adani group employees has adopted **704 students** and in year 2019-20 adopted **800 students** who are from families of migrant labourers working in various industries in and around Mundra.

And in 2021, **997 students were registered and** to make employees connected with children Vallabh Vidyalaya regularly send progress report twice in a year. Current year Women group of Samundra Ladies has donated Rs. 55,000 for support activities of School and motivation to teaching staff in street education.

De-addiction Awareness Campaign is going on with "Prajapati Brahmakumaris" at Labour Vasahat Areas. This campaign has changed life of many labours. Cleanliness Drive is organized in May and August with Adani Willmar Limited at vasahat areas. In this series of event 225+ labours remained present and 9 labours took pledge to leave liquor and Tabaco.

Events

Community Resource Inauguration

Inauguration of **'Community Resource Centre'** to support and facilitate community regarding various government schemes.

District Magistrate of Kutch Ms.Pravina D,K , IAS, District Development Officer was guest of Honour. Other dignitaries present was Mr Bhavya Verma – IAS ,Director, DRDA Mr Joshi , Director- Social welfare office Mr Arvind Rohadiya, Mr Chaudhary Sub Divisional Magistrate , Sarpach and volunteers from villages were remain present.

'**Schematic Guideline book super -51**' book launch on 3rd April . Book consists in-depth scheme information on , Health, Education, Fisher folk based schemes and Social welfare schemes.

All dignitaries along with National Rural Livelihood Mission (NRLM) **visited to Sanitary pad making unit**, ensuing support to create sustainable Group.

International Day of Persons with Disabilities

International Day of Persons with Disabilities is an international observance promoted by the United Nations since 1992. Since 2011 – **Adani Foundation Mundra is celebrating the day with enthusiasm and Zeal in coordination with District Social Welfare office** by planning various support to divyang people.

Adani Foundation has supported **more than 35 Divyang** to initiate their livelihood i.e. Stitching, Flour mill, Ration shop, E-Rickshaw, Gift Shop and Agarbatti making machine. In connection with this, current year Adani Foundation has organized **'Divyang Employment Fair'** in coordination with more than 14 Industries of Mundra on 1st December 2021. Same platform was utilized for distributing "**E-Shram Card**' with Labor Commissioner of GOG which will give benefit of Rs. 2 Lacs accidental Insurance and unique pension scheme (3000 INR per month for any Divyang after age of 60 years) for all Disable people of Mundra.

Total 28 Divyang had applied for interview and out of them 11 received confirmation for job. Apart from this 92 E-shram cards were developed.

World Wetlands Day programme

Adani Foundation, Mundra and Gujarat Institute of Desert Ecology (GUIDE), Bhuj-Kachchh has jointly organized the **World Wetlands Day programme on 2nd February 2022**

Shri. V. S. Gadhavi, IAS (Retd.) was the chief guest proceeded by Smt. Pankti Shah and officials from Adani Groups and Adani Foundation along with Dr. V. Vijay Kumar, Director, GUIDE and scientists from GUIDE were participated in the programme.

Eminent personalities; Prof. K. Padmakumar, Former PVC Kerala University of Fisheries and Ocean Studies, also Director, Centre for Marine Biodiversity, Department of Aquatic Biology and Fisheries, University of Kerala delivered an enlightening talk on "Mangroves Ecosystem – Global and Indian Perspectives".

Prof. I. R Gadhvi, Head, Dept of Marine Sciences, Maharaja Krishnakumarsinhji Bhavnagar University delivered a talk on "Mangrove Scenario of Kachchh" and in his talk highlighted the increase of mangrove cover especially in Kachchh district.

Dr. Sheetal Pachpande, Mangrove Foundation, Mumbai delivered a talk on "Mangrove Interpretation Center" that highlighted replication of such centers in Mundra, Kachchh for enhancing the knowledge among students, naturalists and local inhabitants in mangroves and marine sciences.

Students from the HSC Science school of Mundra .Block are Partcipated in Drawing competition and Students from Maharaja Krishnakumarsinhji Bhavnagar University, Bhavnagar; Atmiya University, Rajkot Did paper presentation. Among them decalared 1st winner for Paper presentation and 1st to 5th winner for Drawining competition as well Provide Precipitation certificate to all.

Apart Them Site Head and Adani foundation and All site head were remain present Virtually Program is conveyed by Mrs Panktiben Shah –UCH and concluded by Shri. V. S Gadhavi, in which he has pointed out the conservation and management of coastal and mangrove ecosystem and the need for the preparation of long-term action plan for the effective conservation of the same.

International Women's Day

Activities:

Bhuj
- Session on Gender Equality and Women Empowerment at G.K General Hospital, Bhuj. The guest of honour was Mr Nimaben Acharya, Speaker, Gujarat Vidhan Sabha.
- Felicitating **Disha Gada**, a woman pilot who rescued 275 students from Ukraine.

Mundra
- Session on Importance of Health and Hygiene for women organized in association with Rotary Club at Mundra.
- Honored 230 women of best two blocks of Anganwadi with certificate and memento for their successful contribution at work.

Nakhtrana
- General Health camp was organized at Nakhtrana Gram panchayat specially for women in collaboration with GKGH.

- Utthan
- Recreational activities for woman sahayaks, Educationalist, Principals, Sarpanch of 42 Utthan schools.

2059 Women participated in celebration of Women's Day week.

Fishermen Youth Employment Training

Inauguration of Technical Skill Development Training Program for the Fisher folk youth by Adani Foundation

Adani Foundation and Adani Skill Development Center had jointly inaugurated of the **"Technical Skill Development Training Program for Fisher folk youth on 10th January.** To Promote long-term socio-ecological effectiveness through focused interventions like employment through Skill enhancement and "To improve fisheries dependent households

In Phase I, 51 fish folk community youth will be skilled and certified in job roles like Assistant Electrician, Mason and Bar bender under 90 days training program supported by placements.

World Environment day Celebration

- Adani Foundation celebrated World Environment day on 5th June with Inauguration of Maiyawanki forest development.

Activities done on World Environment Day:

- **MOU with KSKV Kutch University** and Adani Foundation to provide technical guidance on **'Cow based'** natural farming.
- Conducted **training on 'Jivamrut' and 'Vermi compost preparation'** to farmers promote cow-based natural Farming with Home Bio-gas distribution.
- **Inauguration of Miyawaki forest developed at Nana Kapaya village** in 2.5-acre land with collaboration of Forest and Manrega Department and Gram Panchayat participation.
- **2000 trees have been planted with spreading awareness among people at various places of Mundra, Nakatrana and Tuna location.**

Adani Foundation Day

Silver Jubilee of Adani Foundation was celebrated on 11th August at Adani House Mundra. **11 women** were felicitated who have done Remarkable work in the their filed of Agriculture , Education , Entrepreneur, Government and having special recongnization among society and Communities for their work by Shree Rakshit Shah, Executive Managing Director- APSEZ and HR Head- APSEZ.

Also felicitated first fisherman youth- Shakil Manjaiya with Offer letter to work with APSEZ after completing Mechanical Diploma.

World water day celebration

World water day was celebrated on the Theme of "Groundwater, making the invisible visible" at Adani House auditorium **felicitating all progressive farmers with a memento** who have done remarkable work for water harvesting and management as an individual and at village level.

The event was graced by chief guest, Mr. Dipeshbhai Shroff, President of Kutch Nav Nirman, Mr. Rakshit Shah- EDM ,APSEZ , Mr. Yogesh bhai Jadeja Director of Arid Community and Technology, Mr. Niraj Kumar, Deputy director of NABARD ,Kutch.

Mr. Rakshit Shah, Executive Director, APSEZ expressed compliments to all **14** progressive farmers for their exceptional work for water conservation and management.

International Coastal Cleanup Drive

Indian Coast Guard, Adani Foundation team, NGO team, Students of SV Arts and Commerce College unanimously dedicated a day to clean Mandvi Beach and to create awareness among local community towards save guarding coastal areas by becoming responsible citizen towards clean ocean.

Utthan Second Phase Inauguration

Inauguration of Phase II of Utthan was inaugurated on 28th September spreading its impact to more 14 schools. On this occasion District Primary Education Officer, Utthan schools Principal and teachers have graced the occasion.

"Like an Oasis in a desert"

Dema ben's family has returned home from a neighbour country in 1971 war. Today Demaben is happy to be in her own country but prior to that she and her family faced lot of stress and underwent a lot of trauma living in a conflicted place away from home.

She lives with her Husband and daughters. Her one daughter is suffering from mental illness and completely dependent for care. Her husband is doing labour work in farms. He is sole bread earner of this vulnerable family. Being single earning person of the family doing labour work and a responsible father of a dependent daughter, his income is never sufficing which creates constant distress in family. Her willpower is strong, but all these did a toll on his health, and she suffered constant headache, Fatigue, High Blood Pressure, Nausea, etc.

Demaben Umed
Village Pragpar-2, Kutch

Dr. Mukesh Parmar, Adani Foundation inspected her condition, her BP was 197 /97 mmhg. He immediately started symptomatic treatment and later second follow-up, Dr started anti-hypertensive treatment and provided required medicines and advised her some lifestyle changes and list of food items to add in her regular intake of meals. On regular follow-up checkups and treatment, Dema ben followed her road to recovery. Dr has witnessed steady progress in her health, and she finally got a relief from a disease.

She expresses gratitude in her vernacular language expresses Adani Foundation as 'વિરાન જંગલ મા મીઠા જલ ની વિરડી સમાન' meaning 'Sweet water well in barren Jungle'.

"Live many more years Chacha!"

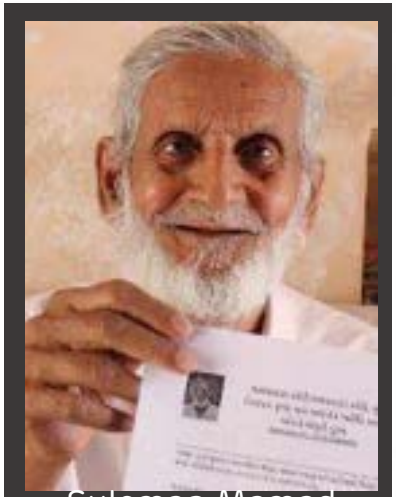
Ramzan Adam Chacha lives with his family at Juna Bandar. For the last 8 years he is the victim of Kidney Failure. He needs to go for dialysis regularly. However, the treatment facility was only available in Bhuj which compelled him to travel to Bhuj for 2 days in a week. He had to skip his work for the days, if there is any delay in his dialysis routine, which is very difficult situation for a fisherman whose income depends on daily catch, he need to skip his work to rest. Moreover, in his thin financial position, it was difficult for him to arrange money for the treatment and transportation too was a big issue. Learning about dialysis centre at Adani Hospital Mundra, he approached for aid from Adani Foundation.

Ramzan Adam Chacha
Village Shekhdiya, Kutch

In no time Adani Foundation team planned a routine dialysis for him against no cost. Earlier he used to visit thrice in a week and from the last two years, he is coming twice in a week. "Watching him every year is the biggest source of inspiration for not just me but our whole team. I wish Chaha to live many more years" says Manharbhai, Adani Foundation Employee.

"Mari toh umer vadhari didhi Adani Foundation e, treatment ma sahay kari," chuckles Ramzan Chacha in his local language. Meaning "Adani Foundation has prolonged my age by providing Dialysis support for the last 8 years".

: ‘Hands are softer than a stick’



Suleman Mamad Kevar
Village : Pragpar

A senior citizen named Suleman bhai hails from Pragpar village. Father of 6 girls out of which 5 got married. He lives with her wife and 1 daughter. Both Suleman bhai and his wife are senior citizens. Being a father of 6 girls, Suleman bhai was concerned about his financial situations, this did not stop him from giving best life to his daughters. 5 of them got married and youngest one is graduated. Suleman bhai and his wife along with daughters used to work as house helps and did labour work to earn living.

Due to their slim economic condition and constant labour work, Suleman Bhai's health started deteriorating. He started having blur vision, watery eyes and constant discomfort in his eyes. On consulting doctor, he got to know that he needs to undergo cataract surgery for both his eyes. It was heart wrenching to know for the family as the cost of surgery was too high. Someone recommended him to consultant Doctor from whom he got to know about ‘Adani Vadil Swasth Yojana’ under which Adani provides necessary health care support to senior citizens who are from underprivileged families. He inquired about the scheme and immediately completed all the necessary procedures to avail benefit of the scheme.

After completion of necessary formalities, He got his cataract surgery done for both the eyes on pro bono basis. He and his family were overjoyed that the surgery happened on time, saving his eyes from complete loss of vision. From here, Sulemanbhai stayed in constant touch with Adani Foundation team as a family.

He was also counselled about Vrudh Pension Yojana scheme of government by concerned Adani Foundation employee under which seniors above the age of 60 receives Rs. 750/- monthly in the form of pension. Adani Foundation has a dedicated group of employees working for rural senior citizens providing liasoning support to avail benefit of schemes to support the community. Under ‘Vrudh Pension Scheme’ both Sulemanbhai and his wife received Rs.1500/- every month. It might not be suffice but for them, it’s like a shade of tree from scorching heat.

On receiving amount for the first time, they contacted AF and expressed gratitude. He also encouraged his daughter Ruksana to spread awareness about these schemes to fellow villagers so that they can also get benefit from these schemes.

A naturalistic learner, shines bright in the class!

We have been fascinated to see how the holistic development took place in Seda Malshree Karaman, studying in class 5. An introverted student transforming into a dynamic learner is not only surprising to us but also to her family members. Mr. Mahendrasingh Solanki, School Principal of Zarpara Shala no. 3 says "I would like to congratulate Utthan team and Utthan Sahayk named Rajendra Chauhan for his commendable work in empowering progressive students and bringing them in line with average and above average performance level."

Malshree's story of transformation began during the pandemic period when schools were shut, and education was made available for the students at their doorstep under the title 'Sheri shikshan' provided by the Government of Gujarat. Seda Malshree Karaman was in class 4 in 2020. However, she is finding difficulties with the minimum level of learning.

During the home visit, Rajendra(Utthan Sahayak) met Seda Malshree. Initially, dealing with an introverted child was challenging. But slowly, within 10 days, he could boost her confidence.

On mentoring her regularly, Sahayak identified that she was a 'Naturalistic learner'. From the very next day, he started teaching Malshree with multiple natural resources which are easily available at her residence lived in 'Wadi'(backyard).

This was observed by her parents too. Slowly and steadily, Malshree took an interest in language and arithmetic. Gradually, Mr. Rajendra measured her learning outcomes by conducting a timely assessment. Her academic growth inspired other students too to give a lot of attention during classes. Today she is in class 5 where she can read, write, and do basic arithmetic calculations.

Name: Malshree Seda
School: Zarpara Shala No. 3

Hanif Mohammad
School: Deshalpar Group Shala

As Sunflower faces Sun, Progressive students always look forward to Sahayaks

Hanif, a small child was abandoned by his parents. Such young boy might even don't know what happened to him and why his parents left him. Hanif might not ask these questions today as he is too young to absorb all of it but it did affect him mentally and emotionally. It was obvious to feel isolated and different from other fellow student.

On one side, he is dealing with this somber transformation in life and adapting to living life with his uncle and aunt, and on other side, he has this immense interest and curiosity towards knowledge but lacked direction in life and also in academics. Under project Utthan, the purpose is to identify and uplift progressive students and bring them at par with fellow students. To do that, it's the duty of Sahayak to know a student inside out and that's what happened to Hanif.

On regular interaction, Uthhan sahayak motivated Hanif and taught him to start reading and practice writing skills. With consistent efforts Sahayak managed to make Hanif regular in school and made sure he does his homework daily. Not just that, Sahayak shared inspiring stories and motivated him to participate in 'Bal Mela Program' in which Hanif with the support of Sahayak prepared a Wind Mill from the waste. The project was successfully exhibited receiving appreciation from the visitors at Mela.

It is said that 'Distraction heals Pain' and in Hanif's case, he has completely changed his focus from pain towards his passion for learning. Hanif is rejuvenated to learn in this new academic year holding Utthan Sahayak's hand.

Anju Chauhan
Village : Zarpara

Uplifting progressive students

Little Anju studies in class 4th of Zarpara Primary School. She was in 2nd Class when the lockdown declared. Unlike urban schools, rural students do not get a chance to immediately start learning through online platforms. In such situation, Utthan Sahayak initiated online teaching and mentoring and tried to reach out to rural students who do not have access to mobile phones in their families.

Anju could not cope up with her education for 2 years and when she resumed school, she found out to be a progressive student due to her inability to read, write and count. School teachers noticed Anju's poor performance and handed over her case to Utthan Sahayak. It took few months, where one to one mentoring and teaching sessions were arranged for Anju and dedicated Utthan Sahayk made rigorous efforts to improve Anju's performance till examinations, preventing her from failing in class.

"Hard work and consistent efforts of Anju is appreciable. Yes, the start was tough but I was determined to bring Anju out of progressive students zone to average learner and we did it successfully." Says Bindya, Utthan Shayak

Adani Foundation as 'Moonbeem in Valima's lightless life.'

Valima is a senior citizen with disability (blind with both eyes) residing at Gurjarvas of Kutch District. Living in extremely poor condition. Her story is heart wrenching. She has proved to be an epitome of strength. She is a strong woman and even stronger as a mother who is taking care of her divyang and mentally challenged daughter who is 30 years old as of 2021.

One could get goose bumps to witness how this old blind mother takes care of her divyang daughter. Valima's two sons got married and started new life leaving mother and sister to suffer and survive on their own. With no vision but only pain in her eyes, Valima has fulfilled all responsibilities but now she is old. Adani Foundation's encounter with Valima was a beginning of the end of her problems. Earlier when her husband was alive, he used to make arrangements for family's survival. But now, Valima being blind and living in remote area is unaware of any of the schemes which can ease her living. Moreover, to get support from any of the rural development scheme, on needs identity proof and documents. Kanta, her daughter was not even having her identity proof, Valima was unaware of her widow pension rights and the support provided to divyang by government.

Here comes the role of Adani Foundation, to support the most needy and vulnerable who is completely devoid of information and their rights. Under project swavlamban, Adani Foundation provides end to end support to senior Citizens, Divyang and Widows. Adani Foundation team assisted valima to get necessary documents first. Starting from Ration card, Adhar Card, Voter Id, Disability card and Bank account was requested for her daughter and mother from respective departments . Post completion of all necessary compliances for documents, Valima started receiving 'Senior Citizen Pension', 'Widow Pension' and got free 'Bus Pass' for their ease of mobility.

Name: Valima L. Sibhi
Gurjasvas, Mundra

Narpant Singh Jadeja
Village Hatadi, Ta. Mundra

Overshadowing disability with his ability to make living.

Narpat singh resides in outskirts of Mundra. He lives a simple life. He, being Divyang, is unable to walk. Before few years, Adani Foundation provided him wheelchair for his ease of life. That's when he met Foundation team and stayed connected. His life was in routine before pandemic. He used to run flour mill and earn basic livelihood. At times, the mill does not work and creates problem. In those situations, Narpatbhai himself juggled with spare parts and repair it.

In 2021, His flour mill stopped working. He tried repeatedly but could not repair it by himself. Due to his less mobility, he was not able to move out and explore other options to repair it. With damaged machine, his income also stopped, and he got worried for his living. He contacted Adani Foundation again for the support. On inspecting his machine's condition, Adani Foundation decided that it does not require repairing, it requires total replacement.

Narpat Singh took a breath of relief as he was provided with new flour mill. 70% cost of flour mill was borne by Adani Foundation and 30% by Narpat Singh. Hearing about his new flour mill, villagers again started visiting Narpatsingh and his earning rose to 8000/- from 6000/- monthly.

Shakil Manjaliya
Village : Luni, Ta. Mundra

"From AVMA to APSEZ, Fishermen communities pride'

"From fishing to studying, from helping to hold a pencil to helping to have a social position, from my first book to my first offer letter, Adani has played a key role in my life." Proudly states Shakil

Shakil, A first generation learner of a fisherman community has studied in Adani Vidya Mandir School. It is an initiative of Adani Foundation to establish a school to provide free education to underprivileged and economically challenged community children providing best in class education for their bright future.

Hailing from fisherman community whose income mostly depends on daily wages, it was impossible for his parents to bare the cost of his education. Learning about Adani Vidya Mandir school, they applied for his admission. They fulfill the criteria of a deserving family and shakil's journey of change began by studying in school. He got 78percentage in 10th standard, which motivated him to pursue engineering stream. He then, successfully completed Mechanical Engineering Diploma course and applied to APSEZ.

His intelligence and hard work surpassed his poor financial conditions. All the struggles he and family faced due to low income have come to an end. Shakil says "I used to dream in Adani Vidya Mandir that one day I will work and earn enough to change my family condition."

It's a fruit of his continuous sowing of hard work and dedication that he reaps employment in APSEZ. He got his first offer letter from Mr Rakshit Shah, EDM, APSEZ. Not just his family but even his teachers of Adani Vidya Mandir are proud of him today to see him grown so far and starting his career as first generation learner of his family who has managed to get livelihood in the form of job. Small steps taken for years will now lead to an socio-economic shift for all those fisher folk young boys and girls who have completed their education and will enter into a professional world with a dream to bring out community from a difficult living to an improved standard of living.

Ishaq
Village : , Ta. Mundra

"There is no greater disability in society, than the inability to see a person as more." – Robert M. hensel

Ishaq is a young 29-year-old responsible husband and a sole bread winner of a family. He was 14, when he got hit by Polio. He managed to complete his schooling and got H.S.C cleared successfully. He also achieved computer diploma degree to cope up with the present work scenario. Hailing from a Fisherman community, he is a first-generation individual who dreams to get employment. He always dreamt of working with Adani but never applied as he thought he is not ready yet. Therefore, He decided to get work experience for couple of years and apply confidently.

On one occasion where Adani Foundation organized 'Divyang Rojgar Mela' where Ishaq applied in an interview and showcased his knowledge, skills and dedication towards work. *Looking at his zeal and agility towards work and his preparedness, he was offered a job as a weight-bridge operator Job in APSEZ.*

Ishaq elated receiving an offer let his dream company and made his community extremely proud.
With open arms, Adani always welcomes Talent Divyang and Energetic Fisherman community to join hands for nation's growth with goodness.

Dipak Maheshwari
Village :

Getting back on track with Sheri Shikshan !

Dipak Maheshwari is a student of Muru Primary School. Losing his father at an early age has made him numb and inattentive in class. At first, he showed no interest in studies and slowly he started skipping lessons. His irregularity was concerning his school teachers where Utthan Sahayaks are contributing their mentorship and guidance to progressive student.

The root of his loss of interest in academics and difficulty to cope up with academics has started when his father was constantly keeping unwell and losing him has made Dipak vulnerable. He lost hope and was tired of making efforts to balance his emotions and studies. He chooses to remain at home.

On learning about Dipak's situation, Utthan Sahayak visited him to check on his mental and emotional condition. When Utthan Sahayak visited his place, Sahayak decided that it was not the right time to push Dipak to attend school, therefore he planned to teach Dipak under Sheri Shiksha teaching methodology (Study at home under the guidance of Sahayak).

Dipak found comfort and developed great understanding with Shayak and was able to grasp Foundation Learning Numeracy. Sometimes with written and other time by activities, Dipak used to study well. When he resumed his confidence and zeal back on track, Sahayak encouraged him to start his schooling again.

Utthan Sahayak keeps close contact with his family and still keeps a track on his academic performance.

Rasilaben Goyal

Right treatment at a right time !

Rasilaben is a 28year old woman from Fechariya village, Kutch. She has 6 sisters and 1 brother. Her father died due to cancer. Family's financial condition was stressful because they have incurred lot of expense for father's treatment but couldn't save him. Rasila, being the eldest among all sibling took all responsibilities on her shoulders. Loosing husband and a father of 7 children, Rasila's mother suffered a huge shock. She could not come out from the trauma and started keeping unwell. Unfortunately, her mother died in just few months after the father's demise. Situation could not get more worse than this for the family. Rasila had her uncle who used to run a small tea shop, he used to help family a bit as per his own capacity.

In 2013, Rasila started facing some health issues. She used to complaint of trouble in her stomach and also was facing gynecological problems. On her visit to hospital, she came to know that she has ulcers in her intestine. Her world had turned upside down, her siblings were not prepared to hear this devastating news. She started her treatment with a hope but continued to manage household chores and responsibilities of her siblings. But, the cost of treatment was 3,000 to 4,000 monthly, which is too much for a family to manage on their own. In such critical situation, they were in dilemma as to how to manage the cost of treatment when they don't have sufficient funds with them.

One her visit to G. K General Hospital, Rasila got satisfactory treatment but some of the medicines prescribed were supposed to be bought from pharmacy. She was not having enough money to purchase medicine regularly, therefore she approached Adani Foundation expecting some relief to support her in completing her treatment and medicines. Her issues were immediately taken into consideration, her medicines were arranged and provide to her for free.

For the past 2 years, Rasila's medicine expenditure is taken care by Adani Foundation observing fair improvement in her condition.

Ankita Bhatt
Beauty Therapist

'Smile on my client's face is my final touchup'

Ankita bhatt hails from Bhuj, kutch. She runs her own beauty parlor for the last 5 years now. Though her beauty treatment skills were good, she used to do selective basic treatment. Ankita believes, gone are the days, where we used to think this is a small service. Now, it's a booming industry where every year there is something new and advanced techniques comes up daily in beauty industry. Keeping up with industry is not an easy task.

Ankita's beauty skills were limited and stagnant and that's when she decided to take her profession seriously and master her beauty treatment skills and understanding through proper training. Also, the Covid years hit badly to small scale, self-entrepreneurs and service providers. She decided to utilize the no-rush time in developing new skills.

In Adani Skill Development Centre, online training program was a big hit in rural areas which enable women and girls to get trained just by sitting at home without Hustle. Post covid, all trainees were invited to complete their practical training at ASDC Bhuj Centre where Ankita cleared the program with flying colours and started earning better than before giving a new look to her parlour at home.

From Failures, one only gets better for the future!


Hetal Purabiya
General Duty
Assistant

"It was my mother's dream to see me working in Healthcare Industry. Even after ample efforts to get admission in GNM course to pursue dream, I didn't make it due to inadequate percentage. My confidence broke, thinking I will never get another chance to study further and will always remain a 12th pass.

I never knew any other way to fulfill my mother's dream until I learned about *GDA training course provided by Adani Skill Development Centre under DDUGKY scheme.* I decided to grab this moment to visit ASDC Centre. On my visit, I got amazed to see a hospital like setup which they call it as Practical Lab. I was well explained regarding the GDA training contents, systematic training methodology and as soon as I got to know that they are providing On the Job Training (OJT) with placement support, I got prompted to join immediately.

Unlike regular training centres, ASDC provides a lot more. *Regular guest sessions, activities and soft skills training helped us become industry ready.* Post completion of GDA course, it was the time to appear for interviews. I was confident not just because of the knowledge I gained but also because of my successful OJT period organized by ASDC. After undergoing GDA training, I became certified GDA , my lost confidence is back and I am determined to update and advance my health care skills to climb more ladders in future.

After 6 months of rigorous GDA training, OJT and placement support by ASDC, *my career kick started as Patient Care Assistant at Dr. Rashmi Shah Hospital, Kutch. I will never forget the moment when I hugged my mother and informed about my selection.*

ASDC has paved way for my successful career journey!" shares Hetal .

Hiral S. Darad
Beauty Therapist

From a next-door beautician to a professional one

"I am a 12th pass self-employed Beautician; I do beauty treatments at home. With no professional degree or certification, I never got a chance to take this work to the next level. Also, self-learning was not enough, I was looking for a training program, where I could get a mentor and practical training. In my locality, there was no option to learn beautician course and its difficult to learn from random videos. I am glad that I got recommendation from my friend about Adani Skill Development Centre, where Beauty Therapist training is provided in the form of certified course along with the planned theory and practical sessions. I got so happy thinking I will finally get to attend a professional training program which will add value to my basic skills and bring me close to my dream to become expert beautician.

It gave me lot of joy to see so many young girls and women coming to ASDC Centre while undergoing training at Centre, even housewives, working women joins courses as per their interest. In many of the cases, they have developed interest and became self-employed. One of the main reasons I love ASDC Centre is to see fellow friends/batch mates and develop a network of people with similar interests in our small town. Making friends and networking with trainees is very empowering. The reason is, we got to know stories of many women and how they are utilizing skills post completion of training course.

As I was also running beauty parlour before joining course, my aim was clear that I need to master beauty treatment skills and become professional. Not just me, but even my clients have witnessed a huge transformation in my beauty treatment methodologies post training. My training journey has been a most memorable one. Post completion of the course, my income increased significantly and the number of my clients rose to a level that most days I remain busy. "

Knowledge gives Degree, Skill gives employment.

Khushal Pargadu
General Duty Assistant

"I am a resident of Naliya village, Kutch district. I completed my Graduation and also did ITI. Coming from a village location, I couldn't find enough of job opportunities with me. Most youth of our locality, move out of hometown in search of job but this is not an option for many of us because of the responsibilities.

Khushal adds, "as much as I loved attending GDA sessions, I also thoroughly enjoyed my On-the-Job experience because we got to experience working directly under expert nurses and learnt that patient care which is the most critical and crucial element in any hospital. It was an overwhelming experience on initial days of OJT when we had to deal with lot of patients, managing time and serving patients with right kind of care in case-to-case basis. *No wonder why Health Care Providers are called as 'Warriors'. OJT was no less than a Healthcare training camp where me and my fellow batch mates were prepared to become Warriors to provide best of care to the patients."*

The major impact of GDA course run by ASDC Bhuj is that many young graduates who are from Bhuj and are looking for employment are preferring to come to the Centre because they don't have to move out of Bhuj to get skilled.

ASDC has provided a platform to get skilled under various courses and supports in placement which helps local residents to stay in their hometown and generate livelihood."

Awards

Adani Foundation received CII National Award for Excellent in Water Management 2021 for 'Water Conservation Project' on 7th January 2022 under National Competition for Water Management 2021. The Award ceremony was announced by Union Jal Shakti Minister in virtual presence of dignitaries from CII and nominees from other industries.

Adani Foundation awarded for CSR in water conservation at 3rd National Water Awards from the Ministry of Jal Shakti in the category of Best Industry for CSR activities, on 29 March 2022.

The award ceremony was conducted in the presence of President Shri Ramnath Kovind, Minister of State for Jal Shakti and Food Processing Industries, Shri Gajendra Singh Shekhawat, and Minister of State for Jal Shakti and Tribal Affairs, Shri Bishwesar Tudu.

Beneficiaries Data F.Y. 2021-2022

Sr.No	Program	Direct	Indirect	Remarks
1	Education	6585	26340	Utthan , Mundra & Nakhtrana
2	AVMB-Vidhyamandir	473	2365	AVMB Students
3	Community Health-Mundra	26129	193661	Rural clinic, MHCU,Health camp, AHMUPL
4	Community Health-Bhuj	16261	65044	Medical Support , Mahiti setu, Patients Care & Co-ordination
5	AHMUPL	31291		OPD and IPD Patients
6	SLD-Women	780	3900	SHG Group & Individual Incoem Generation
7	SLD-Agri & Animal Husbandry	7398	29731	Drip,Fooder,Home bio gas,Farmers training
8	SLD -Fisherfolk	6114	5490	Education, Mangrove, Water and Livelihood
9	CRC-Gov Schemes	667	3272	Government Schmes
10	CID	138174	189617	Fishermen Amenities & Shelter & Other Amenties
11	Nakhtrana	1428	5712	Utthan, Governemnt schems
12	Tuna	6601		Fodder,Health , Pond deepning
13	Bita	2150		CID & Pond deepning
14	Lakhpat	2455		women training and palnttaion
15	ASDC	1374	6870	soft skill and DL .GDA & Online Training
	Total	247880	657166	

Summary - Budget Utilization F.Y. 2021-2022

Rs. In lacs

Sr No	Particulars	Budget 2021-22	Utilization(LE) 2021-22	% of utilization
A.	General Management and Administration	76.12	79.27	104%
B.	Education	172.05	110.38	64%
B1	Utthan-Education -Mundra & Anjar	149.51	99.88	67%
B2	Utthan : Fisherfolk	22.54	10.50	47%
C.	Community Health	330.38	323.51	98%
D.	Sustainable Livelihood Development	426.28	453.84	106%
E.	Community Infrastructure Development	141.35	130.71	92%
F.	EDM Recommended Projects	100.00	82.01	82%
G.	COVID 19 Support	25.00	22.16	89%
	Total AF CSR Budget :	1,271.18	1,201.89	95%
[I]	Adani Vidya Mandir-Bhadreshwar	189.84	117.86	62%
[II]	Project Udaan-Mundra	167.42	66.85	40%
	TOTAL Budget with AVMB & UDAAN :	1,628.45	1386.60	85%
	Project "FISH"		106.00	
	GRAND TOTAL :	1,628.45	1,492.60	92%

Media coverage


અદાણી ફાઉન્ડેશન દ્વારા નાના કપાયા ખાતે ગાઢ જંગલ ઉભું કરાશે


કચ્છ પત્રિકા
અદાણી ફાઉન્ડેશન અને તાલુકા હેલ્થ ઓફીસના સંયુક્ત ઉપક્રમે "ટી.બી.હારેગા દેશ જીતેગા" અંતર્ગત કાર્યક્રમ યોજાયો


કોરોનાકાળમાં મહિલાઓએ મેળવી રોજગારી


માછીમારનો દીકરો મિકેનિકલ એન્જિનીયર બન્યો, મોટી કંપનીમાં નોકરી પણ મળી


adani Foundation
અદાણી ફાઉન્ડેશનનો મંત્ર : સેવાનું ઉત્તરદાયિત્વ
મુંદરા એસઇઝેડ ઔદ્યોગિક વિવિધતાની ઓળખ


કચ્છ પત્રિકા
"શાળા બંધ પણ શિક્ષણ નહિ"
અદાણી વિલ્મર લિમિટેડ, ભદ્રેશ્વર દ્વારા આંતરિયાળ ગામોમાં સોલર સિસ્ટમ શરૂ કરાયું


કચ્છ
મુંદરામાં કોમ્યુનિટી રિસોર્સ સેન્ટરનો કરાયેલો પ્રારંભ


મુન્દ્રાની અદાણી હોસ્પિટલમાં કોરોના પોઝિટીવ દર્દીઓની કરાતી સેવા-ચાકરી

Media coverage


adani Foundation

અદાણી ફાઉન્ડેશનનો મંત્ર : સેવાનું ઉત્તરદાયિત્વ

મુંદરા એસઇઝેડ ઔદ્યોગિક વિવિધતાની ઓળખ

પ્રજાલક્ષી કાર્યોમાં અદાણી ફાઉન્ડેશન હંમેશાં અગ્રેસર

કોરોના સામેના જંગમાં અદાણી ગ્રુપના પ્રયાસો

વિશ્વ દિવ્યાંગ દિને અદાણી ફાઉન્ડેશન દ્વારા

મુન્દ્રામાં ૧૪ દિવ્યાંગને રોજગારી પૂરી પાડી દિવ્યાંગ દિવસની ઉજવણી કરાઈ

કચ્છ પત્રિકા

અદાણી ફાઉન્ડેશન અને તાલુકા હેલ્થ ઓફીસના સંયુક્ત ઉપક્રમે "ટી.બી.હારેગા દેશ જીતેગા" અંતર્ગત કાર્યક્રમ યોજાયો

અદાણી ફાઉન્ડેશનના પશુ વિકાસ કાર્યક્રમ અંતર્ગત પશુઓને રસીકરણ, કૃમિનાશક દવા તથા સારવાર

૧૨ ગામોના ૧૮૦૦૦ થી ૨૦૦૦૦ નાના અને મોટા પશુઓને આવરી લેવાના લાખાંક સાથે શરૂઆત

'જોય ઓફ ગિવિંગ' અંતર્ગત ૭૫૦ જરૂરતમંદોને

અદાણી ગ્રૂપના કર્મચારીઓ દ્વારા કપડાં અને રમકડાંનું વિતરણ કરાયું

'જોય ઓફ ગિવિંગ' એટલે કે કંઈ આપવાના આનંદની ઉજવણી કરતા અદાણી ગ્રૂપના કર્મીઓએ અદાણી ફાઉન્ડેશનની માધ્યમની ત્રણ શ્રમિક વસાહતના ૭૫૦ જરૂરિયાતમંદ લોકોમાં કપડાં અને રમકડાંનું વિતરણ કર્યું હતું

પોર્ટ અને રમકડાં એકત્ર કરાયા હતા. તાજેતરમાં અદાણી વિલ્મર સામેની વસાહતોમાં અદાણી પોર્ટ અને સેઝના

અદાણી ફાઉન્ડેશનને

CSR પ્રવૃત્તિ માટે એવોર્ડ

કેન્દ્રીય જળ શક્તિ મંત્રાલય દ્વારા જાહેર કરાયેલા વિવિધ એવોર્ડ પૈકી ગુજરાત અદાણી ફાઉન્ડેશનને બેસ્ટ ઈન્ડસ્ટ્રી ફોર સીએસઆર એક્ટિવિટી માટે પ્રથમ નંબરના એવોર્ડની જાહેરાત કરાઈ છે. જળશક્તિ મંત્રાલય દ્વારા 11 વિવિધ શ્રેણીઓમાં રાજ્યો, સંસ્થાઓ અને વ્યક્તિઓ વગેરેને પુરસ્કાર અપાય છે.

Thank You

Annexure – 4

ON SITE EMERGENCY PLAN

JANUARY 2022

PRODUCER

ADANI PORTS AND SEZ LTD

P.O Box No: 1, Mundra - 370421
(KUTCHH)

:: COMPILED BY ::

M.J.PATEL & ASSOCIATES

HAPPY ASSOCIATES
DISH approved Comp.Persons & Safety Proffessionals

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PREFACE

Adani Port Mundra is the seamless integration of 3 verticals consisting of Ports, Logistics and Special Economic Zone. APSEZ Mundra with the flagship port in the Gulf of Kachchh, is India's largest commercial port. Adani Port handles a wide variety of cargo ranging from coal, crude, containers to fertilizers, agri products, steel & project cargo, edible oil, chemicals, automobiles etc. A corporate agenda for APSEZ is to deliver overarching principle of tipple bottom-line. Adani Ports is striving to become Green Port by managing port operations and services responsibly, creating safe, secure and eco-friendly working environment.

Adani Port - Mundra has infrastructure to handle containers pan-India. We have container terminals operational. Deep draft berth facilitate berthing of largest container vessels arriving at the ports and best-in-class infrastructure ensures world class productivity, fast turnaround of vessels and efficient evacuation of containers from the port.

The Port operates two Single Point Mooring (SPM) facilities to evacuate imported crude oil. These SPMs can handle Very Large Crude Carriers (VLCC) and Ultra Large Crude Carriers (ULCC) up to 360,000 DWT. The crude is transported to refineries in North India through cross country pipeline network.

Adani Port - Mundra has capabilities and infrastructure to handle liquid cargo at Mundra. Multiple berths are equipped with different types & sizes of pipelines from jetty to tank farm to ensure safe and efficient handling of liquid products in big parcels. The tank farms can store multiple types of liquid cargo including vegetable oil, chemicals & petroleum, oil & lubricants (POL) products. The infrastructure at the Liquid terminal ensures best in class storage, safe and contamination free handling of liquid cargo.

Adani Port - Mundra is equipped with adequate infrastructure to handle coal. **Adani Port** handle all types and grades of coal including steam coal, imported coking coal & thermal coal, sourced from domestic sources. It has installed high speed ship unloaders / mobile harbour cranes for faster discharge of coal cargo and mechanized storage yards & integrated conveyor system to handle huge volumes of coal cargo.

Adani Port - Mundra is well equipped to handle minerals. Minerals & related cargo including Bauxite, Bentonite, Cement, Clay, Industrial salt, Iron ore fines, Rock phosphate and Gypsum, amongst others are handled here. Dedicated infrastructure, including specially demarcated concrete storage yards ensure zero ground loss. All necessary measures, with regards to equipment & storage are taken to ensure that there is no cargo loss or contamination.

Adani Port - Mundra has excellent capabilities to handle agri- cargo. Agri-commodities handled at the port include Yellow Peas, Chick Peas, Sugar, Wheat, de-oiled cakes, Barley, Sorghums, Maize & Rice, among others. Stringent standards concerning handling of Agri-products are followed at the port. Separate dedicated berths and specialized facilities ensure clean and contamination free handling of Agri-cargo along with abundant storage facilities and labour. Rail connectivity ensures that imported Agri-cargo is transported to distant areas within the country.

Adani Port - Mundra has capabilities and infrastructure to handle fertilizers. The fertilizers handled here include all types and grades including Granular Urea, Prilled Urea, DAP, DAP Lite, MOP Red, MOP White, NP, NPK etc. The Port team understands the delicate nature of fertilizer cargo and therefore employs the best method to handle fertilizer cargo, even during the peak season, ensuring full customer satisfaction. Dedicated berths, dedicated fleets of equipments, abundant covered storage facilities and adequate labour are available for handling fertilizer cargo at Mundra has state-of-the-art dedicated mechanized infrastructure for handling fertilizer cargo which is capable of loading ten rakes daily.

Adani Port - Mundra can capably handle all types & grades of steel cargo including Plates, Beams, Coils, Pipes, Slabs, Bars, Billets & over dimension Steel Plates / Beams or Pipes, amongst others, requiring specialized operations. The Mundra port has state-of-the-art technology Goliath cranes attached with vacuum lifters for scratch free handling of quality sensitive cargo and a best-in-class steel yard spread across 1.5 lacs sq. mtrs to handle 6 MMT/ year.

Adani Port - Mundra has the requisite infrastructure to handle project cargo. We are specialized in handling over-sized and overweight project cargo. The port has loaded / discharged, heavy/oversized machinery / equipment like Boilers, Rail Wagons (of Delhi metro), Heavy Transformers, complete Windmills and Heavy Machineries.

Adani Port - Mundra has the perfect infrastructure to handle timber. The port handles timber logs of different kinds for different customers. It has earmarked a storage area capable of 350,000MT timber storage.

Mundra port established the RoRo terminal in 2009 and since then has been serving as a gateway port for automobile companies situated in Delhi NCR, Rajasthan and Gujarat region. Mundra port handles exports of Cars, Buses, and Trucks.

Adani Port - Mundra is committed to uphold high standards of health and safety practices far beyond satisfying legal or regulatory requirements & promoting a culture seeking continuous improvement in the Health & Safety performance of the organization.

In view of presence of various materials handled, hazardous nature of liquids, due to situation of the port, various types of hazards exist in handling, storage and logistic activities. Hence, it is desirable and also statutory to prepare an emergency action plan for any emergency which may affect plant personnel, property as well as neighbouring areas and population.

Therefore, we have prepared this book which incorporates all required matters along with on site emergency plan. Our safety policy dictates that we will take all precautions and preventive steps to see that our workers carry out their job in a safe and healthy working condition. We have taken reasonably practicable preventive measures to avoid any accident. Necessary testing, checking, inspections, maintenance are carried out regularly.

It is also obvious that systematic and methodical action in any emergency would reduce and mitigate risk to life, property not only of the port but also of the surrounding area and environment. This on site emergency plan is prepared to carryout a systematic and methodical action in the event of any emergency. It gives different pre-emergency, emergency time and post emergency actions to be taken in a planned way. Such actions would go a long way in preventing or mitigating risk to life, environmental and property in emergency.

We are responsible to carryout planning and do everything reasonably practicable to comply with requirements of this plan and revise and amend from our experience. This plan will also be circulated to all senior personnel for their knowledge, information and subsequent action.

For **ADANI PORT & SEZ LTD.** MUNDRA

(Auth.Sign)

(This emergency action plan has been prepared for **Adani Port, Mundra** as per the guidelines laid down by the office of Director, Industrial Safety & Health. The source of data regarding Gas Dispersion and other information is based upon the book of Major Hazard Control – published by International Labour Organization).

CHAPTER–1

PRELIMINARY

CONTENTS

1.0 INTRODUCTION OF THE PLAN

Today in this world many kind of chemicals, oils, minerals & materials are handled & transported in enormous quantities, probably beyond safe manageable levels and that too in many cases with record speed. People working in ports & industries, storing, handling, transporting and using various chemicals & other material are constantly exposed to hazards like fire, explosion, toxic gas releases, spillage of dangerous substances, exposure etc. Disaster means accidents causing catastrophic situation, in which day to-day pattern of life is in many instances, suddenly disrupted and people are plunged into helplessness and suffering, as a result need protection, clothing, shelter, medical and social care and other necessities of life. Disaster may occur by natural phenomena, by man or by mans impact upon the environment.

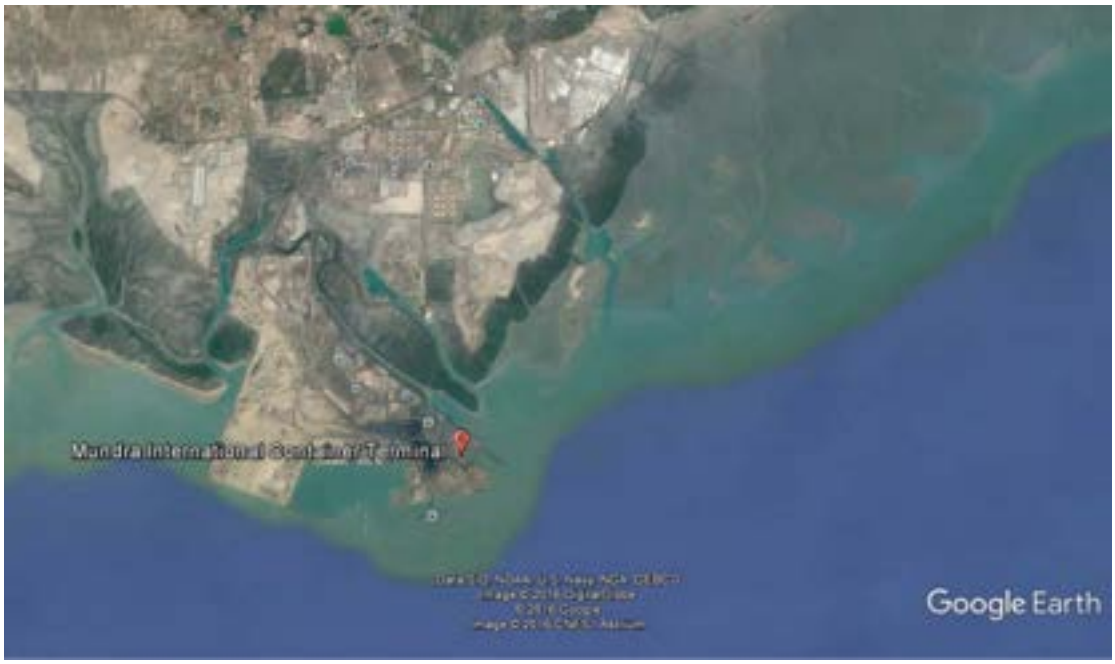
This emergency action plan has been prepared based upon the specific needs of the site for dealing with those emergencies which, it is foreseen, may still arise despite taking of all reasonably practicable precautions. An emergency element of the plan must be the provision to attempt to make safe the port. Emergency incidents considered are ranging from small event which can be dealt with by port personnel, without the help of outside services to the worst event which involves outside public, emergency services agencies etc. This plan is in two sections, the first section explains basic requirements as below:

A – Definitions
B – Objectives
C – Hazard identification
D – Risk analysis and environmental impact
E – Organizational set-up
F – Communication system
G – Action on-site
H – Off-site emergency plan
I – Training, rehearsal and record aspect

The second section is annexure section. This 33 number annexure are designed to give specific information required during emergency. A considerable time can be saved due to handy information at the time of emergency. This information can also be helpful to the government in preparing district contingency plan.

1.1 IDENTIFICATION OF THE FACTORY

Adani Port at Mundra consisting of Ports, Logistics and Special Economic Zone. APSEZ handles a wide variety of cargo ranging from coal, crude, containers to fertilizers, agri products, steel & project cargo, edible oil, chemicals, automobiles etc.



Adani Port near mundra is 7 Kms from the town of Mundra which is about 9 km from the Gulf of Kachchh, the ancient Mundra Town is the headquarter of the Mundra Taluka, about 70 km away form the Dist. Headquarter of Bhuj, Dist. Kachchh. Mundra is directly linked to the National Highway NH-8A (ext.), State Highway SH-6 and SH-48. Gandhidham railway station is the nearest passenger rail head 50 km away. Mandavi airstrip (about 30 km), Kandla airstrip (about 45 km) and Bhuj Airport (about 70 km) are the airstrips/airports in the vicinity. Mundra was a small town with agriculture and minor commerce dominating its socio-economic character about a decade back. Mundra was devastated like other towns and villages in the earthquake that struck Kuchchh on January 26, 2001. With the reconstructive spirit of the people and economic incentive packages given by the Govt. of Gujarat as well as Govt. of India for the Kachchh distt., Mundra is now witnessing a spate of industrial activity. The industrial and entrepreneurial potential of the town started unfolding with the Adani Group setting up its Port on the Mundra sea front in 1998.

IDENTIFICATION

Port Commissioned :	1998
Port & APSEZ area:	Mundra SEZ - 18000 ha, Notified SEZ area 8481.2784 ha.
Village :	Mundra
Nearest City:	Bhuj
Nearest Railway station	Bhuj, 6 0 Km
Nearest Airport	APSEZ Private Airstrip

SITE LOCATION		
State		Gujarat State
Nearest Important Town & Distance		Mundra – 10 Kms
Nearest Railway Station & Distance		Gandhidham – 50 Kms
Nearest Port & Distance		Kandla Port Trust - 60 Kms
Nearest Airport & Distance		Mandavi airstrip (about 30 km), Kandla airstrip (about 45 km) and Bhuj Airport (about 70 km) are the airstrips/airports in the vicinity
Nearest Highway Milestone & Distance		National Highway 8A Extn. & State Highways 6 & 48.
Approach Road		4-Lane Rail-over-Bridge to ensure that two modes of transportation i.e. road & rail, do not impede each other‘s movement.
GEOGRAPHICAL DATA		
Height above mean sea level		14 meter
Site characteristics (Terrain Type)		Coastal Area
Location of APSEZ		Geographically, located between 22°.4451.73 North latitude and 69°.41.41.60 East Latitude
Seismic Zone		Zone 5, as per IS : 1893 -2002
METEOROLOGICAL DATA		
Climate of Area		Dry, Arid Coastal Climate
Highest Daily maximum Temperature		46.1 °C
Max. dry & wet bulb temperature		37.7 / 26.8 °C
Wind Regime		Summer - SW & W, Monsoon - SW, Winters - N, NW
Annual Rainfall		268.5 mm
Visibility		Good through out of the year
Relative Humidity %		
	Max	80
	Min	22
Wind Velocity Average		32.4 km/hr study period (Dec-05 to Feb 06).

Wind Velocity	Max	90 Km/ hr
Wind velocity during monsoon		50 KM/hr
WATER SUPPLY		
Source of Water		Well nearby area.

Adani Port - Mundra is committed to uphold high standards of health and safety practices far beyond satisfying legal or regulatory requirements & promoting a culture seeking continuous improvement in the Health & Safety performance of the organization.

Annexure – 1 attached in the report gives remaining detail of the port such as name of the occupier, manager, with their residence address and telephone numbers. Persons to be contacted in respective shifts etc. is mentioned. We have for our all the activities made the identification of hazards and relevant actions are taken as stated in Chapter – 2 of this plan.

1.2 MAP OF THE AREA

A map of the surrounding area of our Port & SEZ is enclosed marked as Annexure – 2, showing following locations of port such as:

- **A.** Exact location of the Port & SEZ
- **B.** Surrounding area
- **C.** Approach roads
- **D.** Off site emergency services
- **E.** Company owned Fire Station, Police Station
- **F.** North direction

This map is useful to know the surrounding area, location of above facilities in advance and identify the area which could be affected due to an emergency, if turned into off-site emergency and if evacuation of workers and others is necessary. Another map is attached marked as **Annexure – 3, Factory layout** showing all vital detail of the unit such as (1) Hazardous storage & process area (2) Other Process Plants Departments & Machines (3) Location of Assembly points (4) location of Emergency Control Centre (5) location of fire fighting equipments, entry, exit gates etc.

1.3 IMPORTANT DEFINITIONS

All important definitions stated in the guidelines by DISH, are adhered to in preparation of this plan. These definitions are accepted by all the concerned government, semi-government bodies and institutions as mentioned relevant to the emergency planning.

1.4 ABOUT OBJECTIVES OF THE EMERGENCY PLAN

An emergency can not always be prevented but controlled within limits and its effects minimized by using the best available resources at the time. Emergency planning is a management function and it should not be considered in isolation. Management should evaluate the activities, operations and process carried out within the works before starting to plan an emergency operation.

A check must be made to ensure that all required steps have already been taken are included in emergency planning. Considering the number of employees, material and process, availability of resources, location of site, size and complexity of the works, we have prepared this plan. In this plan, we have given clear instructions without overlap or confusion for all concerned staff members. The same details are prepared as per annexures.

In spite of various preventive and precautionary measures taken in the plant, the possibility of a mishap cannot be totally ruled out. Hence, the need to prepare a Contingency Plan for dealing with incidences which may still occur and are likely to affect LIFE and PROPERTY both within the plant and in the immediate neighborhood.

Such an emergency could be the result of malfunction of the Plant & Equipment or non-observance of operating instructions. It could, at times, be the consequence of acts outside the control of plant management like severe storm, flooding, or deliberate acts of arson or sabotage.

OBJECTIVES OF THE PLAN

1. To control the emergency, localize it and if possible eliminate it.
2. To avoid confusion, panic and to handle the emergency with clear cut actions.
3. To minimize loss of life and property to the plant as well as to the neighborhood.
4. To make head count and carry out rescue operations.
5. To treat the injured persons.
6. To preserve records and to take steps to prevent recurrence.

7. To restore normalcy.

The **On site Emergency Plan (OEP)** explains the code of conduct of all personnel in the plant along with the actions to be carried out in the event of an Emergency. This plan gives the guidelines for employees, contractors, transporters, etc. It not only defines responsibilities but also inform about prompt rescue operations, evacuations, rehabilitation, co-ordination and communication.

EMERGENCY

An emergency is a situation which may lead to or cause large scale damage or destruction of life, property or environment within or out side the factory. Such an unexpected situation may be too difficult to handle for the normal work-force within the plant.

NATURE OF EMERGENCY

The emergency specified in the OEP refers to the occurrence of one or more of the following events:

1. Fire/Explosion
2. Major accident such as structural or building collapse, overturning of road tanker containing chemicals.
3. Natural calamities like storm, flood, earth quake, etc.
4. Sabotage act of terrorism, civil commotion, air raid etc.

On Site Emergency Plan (ONLY PORT AREA)
Adani Ports and Special Economic Zone Limited
Code for Declaration of Emergency
Siren for one minute followed by 5 sec gap repeated four times.
Code for Declaration of All Clear
Continuous siren for two minute
Schedule of Siren Testing
4th and 19th Every Month – 1000 hours (Port) & 1100 hours (West Basin)

CONTACT IN EMERGENCY (Intercom Numbers):

FIRE – 52400 [MPT], 52985 [WB] QHSE – 52778 [MPT], 52974 [WB]

SECURITY – 52300 [MPT], 52900 [WB] OHC – 52444 [MPT], 52984 [WB]

ISCR – 52100 [MPT]POC [MPT] – 52442, 52762 [MPT] CCR [WB] – 52934

CONTACT IN EMERGENCY (Landline Numbers): STD CODE – 02838

FIRE – 289101 [MPT], 255985 [WB] QHSE – 255778[MPT], 255974 [WB]

SECURITY –289322 [MPT], 255900 [WB] OHC – (02838) 289267 [MPT], 255984 [WB]

POC [MPT] – 289371 / 72 CCR WB – 255934

CHAPTER NO. II

INTRODUCTION OF RISK AND ENVIRONMENTAL IMPACT ASSESSMENT

CONTENTS

2.00 INTRODUCTION OF RISK & ENVIRONMENTAL IMPACT ASSESSMENT

In this chapter all vital information such as Port installations, machinery, quantum of substance stored – Its storage and handling, loading-unloading practices, Its potential to damage the work place, its potential to create an emergency, its potential to damage the environment and life, nature of process carried out, types of emergency likely to take place, provisions to control such emergencies, are given. Hazard identification is made based upon handling of various substances and relevant steps to avoid probable hazards.

2.01 FACTORY LAYOUT

Layout of the port is enclosed as annexure-3, which shows following important locations for emergency planning.

1. Main approach to the port & main gate
2. Liquid Terminal having 97 tanks for storage of different liquid commodities
3. Closed godowns
4. Open storage yards
5. Fertilizer Cargo Complex
6. Steel Yard for handling steel cargo
7. The SPM facility
8. Berths & Jetty for Liquid cargo
9. Docks alongside its berths for handling dry bulk & break bulk cargo
10. Security Cabin / Exit & Entrance routes
11. The container terminals having a combined infrastructure consisting of 2.1 km of quay length
12. Admin buildings, canteens
13. Control buildings,
14. Other various building consists of offices
15. Fire stations,
16. Medical centers & occupational health centers
17. Internal Roads & railway line

The Port layout plan is kept in the Emergency Control Center (ECC) so that proper and immediate actions can be taken by the concerned personnel.

2.02 IDENTIFICATION OF HAZARDS IN STORAGE & CONTROL MEASURES

In **ADANI PORT - Mundra**, huge quantities of dangerous chemicals are handled and kept for intermediate temporary storage in liquid terminal for further transport. By its nature, in which dangerous chemicals are handled (storage/transportation) carries the probability of an accident and gives rise to the laying out of different accident scenarios.

In addition to observe safe standards for the operation of Port, close attention shall be paid to overall site security arrangements. Highly flammable Substances such as : High Speed Diesel, Vinyl Acetate Monomer, Furnace Oil, Naphtha, De-natured Ethyl Alcohol, Methanol, Low Aromatic White Spirit are stored in giant capacity tanks. Besides above some intermediate compounds & chemicals such has Linear Alkyl Benzene, Acetic Acid, Acetic Anhydride are stored. Other than above chemicals some mineral oils & other oil compounds such as Mineral Turpentine Oil, Alpha Plus, CBFS, Crude Soyabean Oil are stored. All above are very hazardous substances, even while handling in small quantity, safety should be the prime consideration.

As fire is likely in the case of Methanol, Naphtha, VAM, solvents & HSD due to leakage, ignition, spark, vapour dispersal, materials are kept isolated from any source of fire-ignition. Bonding, Earthing & grounding to all pipes, joints, tanks to mitigate static charges. Their handling is strictly monitored.

Hazardous Chemical	Storage · Location	Major hazards	Physical Form	Maximum Quantity Stored Onsite kl
Motor spirit	Liquid terminal Tank farm	pool fire, flash fire, unconfined vapor cloud explosion	Liquid	15042
Naphtha	Liquid terminal Tank farm	pool fire, flash fire, unconfined vapor cloud explosion	Liquid	2944
Gasoil	Liquid terminal Tank farm	pool fire, flash fire, unconfined vapor cloud explosion	Liquid	461122

Methanol	Liquid terminal Tank farm	pool fire, flash fire, unconfined vapor cloud explosion	Liquid	18000
Toluene	Liquid terminal Tank farm	pool fire, flash fire, unconfined vapor cloud explosion	Liquid	3000
Acetic acid	Liquid terminal Tank farm	pool fire, flash fire, unconfined vapor cloud explosion	Liquid	2960
P- Xylene	Liquid terminal Tank farm	pool fire, flash fire, unconfined vapor cloud explosion	Liquid	6460
Vinyl Acetate Monomer	Liquid terminal Tank farm	pool fire, flash fire, unconfined vapor cloud explosion, toxic gas	Liquid	1458

In addition of above raw materials, there are various open & closed godowns, scattered fuel storages for D.G.Sets, Coal Yards.

In spite of all controlling measures, accident can happen due to dangerous physical properties of above substances – Risk of fire, leak of chemical and subsequent toxic atmosphere**.** Although, the port operations are running since quite a long time without any incidence of fire or leak due to sound handling practices & laid down safety systems.

In Port Operations it is likely that some of the accidents occur due to all following mentioned reasons ::

- **Falls from height** :: can occur whilst carrying out trimming, sheeting and container lashing, securing loads, accessing ships, working on board a ship or working on heavy machinery.

- **Falling Objects** :: Whilst carrying out loading and unloading operations and stacking and stowing goods there is a risk of falling objects. Items may be loose and incorrectly or poorly slung or stacked. Fittings and fixtures used during lashing operations may be dropped. Loads or objects may collapse or fall having become unstable during transport or having been poorly loaded.

- **Fatigue**:: Dock operations can be prone to unexpected events and delays over which there may be little control. Fatigue can develop slowly and will not always be obvious. It can increase the risk of accidents through poor perception or physical exhaustion.

- **Mooring Hazards** :: Mooring can be a hazardous activity as there is a risk of a person getting caught in a line or a winch. The lines can be very heavy and awkward, particularly if they are wet, and may break and snap back.

- **Lifting Equipments** :: Container Lifting & material loading/unloading are very much dependent on lifting equipments. If proper inspection, maintenance is not followed, these operations may cause severe accidents.

- **Fire/Electrocution ::** All electrical equipment and installations if not designed, constructed, installed, maintained, protected and used properly, it can lead to fire, electrocution accidents.

- **Hazardous or Asphyxiate Substances** :: Workers loading and unloading solid bulk cargoes may be exposed to dust or respiratory sensitizers that can cause asthma. Cargoes may be flammable, toxic, poisonous or corrosive. Some cargoes, for example grain, may have been fumigated. Some solid bulk cargoes in the hold may not be hazardous themselves, for example fishmeal or bark, but may produce gases due to decomposition or bacterial action. Vehicle exhaust emissions in the ship‘s hold may also give rise to hazardous fumes.

- **Moving Vehicles and Equipment** ::An appropriate traffic management system must be in place and will aid both safety and operational control of the port.

- **Night Work** ::Night work/shift work can contribute to or produce negative biological effects (heart and stomach disorders), psychosocial effects (fatigue, increased accidents, stress) and individual effects (disrupted family life, isolation, stress).

- **Noise**:: Equipment and engines may produce noise which is augmented when they are operated in a ship‘s hold or a warehouse. As a rule of thumb you may be at risk if you have to shout to be clearly heard by someone 2 metres away, if your ears are still ringing after leaving the workplace or if there are noises due to impacts such as those caused by hammering.

- **Slips and Trips** ::The majority of dock accidents reported to the HSA are due to slips, trips and falls on the same level.

- **Tidal and Environmental Hazards** :: The weather can have an adverse effect on port and dock operations and can reduce visibility. Cold and wet weather can reduce concentration and make manual work more difficult. Hot weather may result in heat exhaustion, sunburn or sunstroke. Wind, ice and fog can all increase the risk of slips, trips and falls. Tidal movements can affect access and egress to the ships, cause difficulties during loading operations and result in collisions between dockside equipment and a ship.

- **Severe weather and other natural hazards**
  - ✓ Ports may suffer from a variety of natural events. These include:
  - ✓ High winds and severe storms;
  - ✓ Flooding from tides, river water, land water or a combination of both;
  - ✓ Temperature extremes;
  - ✓ Earthquakes;

The ports regularly operate in temperatures over 40°C. Exposure to extremely high is likely to affect the ability of port workers to continue to work safely and without endangering their health. At this Mundra port, large cargo of dangerous chemicals (toxic or flammable) are unloaded from the ships and stored in liquid terminal. Unloaded dangerous chemicals are transferred to the storage tanks through the pipelines. Storage tanks are provided to store finished products which receive from the ship prior to transfer to consumer end for their processing. Huge quantities of dangerous chemicals are handled and kept for intermediate temporary storage in liquid terminal for further transport. Petroleum products, hazardous chemicals are transported to consumer by rail wagons, road tankers and cross country pipelines. The industrial and commercial activities in the area heavily pollute the environment.

2.03 IDENTIFICATION OF HAZARDS IN STORAGE / PROCESS & CONTROL MEASURES.

FIRE HAZARD

- Flammable substances are stored and handled in large quantity.
- Static electricity due to weak/loose earthing
- Slight – intermittent or steady leak causing flammable vapour cloud and any stray ignition.
- Accidental fire in Combustible materials godowns

TOXIC HAZARD

- Due to toxic physical properties of chemicals handled
- All above mentioned chemicals are stored and used in relatively sound quantity in storage tank. Transferred mechanically.
- There are chances of corrosion of pipes, tanks, receiver tanks due to materials as also external corrosive atmosphere.
- Leakage of toxic-corrosive substance in large amount – dispersion of toxic – corrosive chemical vapour - mist in the surrounding area of the unit.
- Splash of chemical and/OR its exposure to any working person due to mishandling or by accident

EXPLOSION HAZARD

- Sudden outburst of fire, heat or steam, finding inadequate or no escape may cause bursting or explosion.
- Other Pressure equipments (pneumatic operations, utilities, air receivers containing compressed air & gas in utility may cause such a situation

2.4 PROCESS DESCRIPTION

A port is a facility at the edge of an ocean, for receiving ships and transferring cargo to and from them. The term seaport is used for ports that handle ocean-going vessels Ports have specially-designed equipment to help in the loading and unloading of vessels. In fact, it can be stated that a port is an intermodal node where goods are loaded/unloaded to/from vessels and sent to their destination, be it onshore or offshore.

A port system could be thought of as a complex, often huge, environment where several transport operations are carried out, including. not only maritime transport, but also unloading and, of course, storage of goods, along with typical process activities. Ports are normally located near a city, unless they are isolated terminals serving a process plant or a pipeline. Many cities have in fact been founded and have grown around spots that offered shelter for fishing boats, and later, with the growth of commerce and sea-exploration, have become port-cities Transport includes ships and barges as well as Lorries, trains, and pipelines. Process operations embrace mainly storage, which can be of different types: solid bulks in silos, stacks, warehouses, packages; liquid bulks in tanks; containerized goods of any kind. Bulk carriers, used to transport bulk solids such as (iron) ore, coal, coke, bauxite/alumina, food staples (rice, grain, etc.), cement, sugar,

quartz, phosphate rock, fertilizers, sulphur, scrap, and similar cargo. They can be recognized by the large box-like hatches on their deck, designed to slide outboard for loading. Bulk carrier's discharge at terminals provided with proper cranes; ore and coal can be stored in heaps. Tankers are usually large ships which carries petroleum products or chemicals in bulk. Apart from pipeline transport, tankers are the only method of transporting large quantities of vegetable oils around the world . Among the chemicals transported by sea, the most important are methanol, ethanol, toluene, acetic acid, caustic soda lye, naphtha, gasoil, motor spirit etc. Land transport activities, which are carried out by lorry, train and pipelines. - Storage, warehouses, container terminals, car parks, bulk solid wharves, etc. Chemical releases from tank farms on site are the most probable. It includes highly flammable and toxic chemicals. The latter is at approximately atmospheric pressure so that even a catastrophic failure should not result in the formation of a large flammable vapor cloud . The causes for overpressure may be overheating due to a neighboring fire, overfilling or rollover. Overfilling is a common phenomenon in storage installations and has one of the highest probabilities of occurrence values. Another possibility is the liquid catching fire due to a local incident or operation, which may lead to stress rupture of the tanks. Severe mechanical damage may occur from impacts from projectiles from disintegration of nearby vessels, aircraft impacts or nearby railway accident due to derailment. The tank farm storing of non-boiling liquids can be affected by pool fires and unconfined vapor cloud explosions. These spills may also result in the direct formation of a flammable vapor cloud. The latent heat required for evaporation has to be provided by the surroundings and the ground. The rate of evaporation will be initially high but decreases rapidly as the available heat from the surroundings is exhausted.

Liquid Terminal ::

Liquid terminal comprises of tank farm area, pump house, and loading bays. Flammable Chemicals / petroleum products receive from the bulk ship carriers and transfer to intermediate storage tank for further distribution to the customer. Tank farm area comprises of finished petroleum products

2.5 OTHER HAZARDS AND CONTROLS

In the plant, in addition to the hazards from storage handling and usage of flammable substances and other substances, there are certain other hazards likely due to failure of machinery and equipments. Such hazards are listed below:

- Machineries and equipments failure
- Structural collapse
- Hazards during maintenance of plant

- Health hazards & Physical injuries
- Failure of electrical Installations
- Natural calamities (Earthquake, fall of lightening, floods, Tsunami, cyclones, storms) or manmade hazards. Causes of such other hazards, their effects on plant and the surrounding area, their preventive measures etc. are stated in ANNEXURE - 7

2.6 TRADE WASTE DISPOSAL

In Port Operations, no production activities are available. No hazardous trade waste is likely to generate in daily basis. Though effluent treatment plant has been provided for some of the identified waste.

In air pollution, the source of emission is from DG stack has been provided at sufficient height. Periodical monitoring of stack is done. Periodical Noise monitoring, ambient air monitoring are carried-out and records maintained.

We are having consolidated consent from the Gujarat Pollution Control Board : which is valid for 5 years. Other detail is furnished in Annexure – 8.

2.7 RECORD OF PAST INCIDENTS

So far, no incident has occurred in the past at our Port. However, due to port operations, handling of various hazardous chemicals at liquid terminals, container terminals & at various dry ports certain undesired situations have occurred at other ports in the world. Hence, from those incidents, we have already taken preventive steps, controlling measures. Regular checking, maintenance, tests are carried out to avoid any unwanted situations taking place.

2.8 GAS DISPERSION CONCENTRATION

Using Gaussian formula, as there are more chances of ground level release, assuming small leak rate to the worst event i.e. rupture of the tank and release, its down wind concentration is calculated at wind speed 2.0 M/second and Annexure – 10 is compiled. Subsequent to this, Evacuation Table, Annexure-11 is prepared to provide a quick guide to an On Site personnel to take proper actions. Moreover, such data are stated in Risk Assessment, but it is a crude approach and may not be fully appropriate for decision making as change of wind velocity and weather conditions may cause certain variations.

2.9 RISK ASSESSMENT

Identification of hazards constitutes the first step in the task of hazard analysis, which in turn produces a basis for risk assessment.

Points 2.2 to 2.7 give us the hazard identification in the unit. Probability of frequency of such hazards will give risks and analysis, how they could occur and estimation to the extent, magnitude and likelihood of any harmful effects or consequences will give risk analysis. Fire risk shall be calculated considering the worst event which can be used as guideline at the time of an emergency.

The main objective of the Risk Assessment (QRA) is to identify the potential hazardous scenarios and assess the impact of major accident hazards from the liquid terminal as well as from the tanker loading and ship unloading facilities on the Mundra port and property within and outside the battery limit of the facilities. The study was initiated by Mundra Port SEZ Pvt. Ltd to evaluate the potential hazardous situation in the liquid terminal, its consequences and impact over onsite and offsite areas, to investigate and determine the overall risks to health and safety arising from any possible major interactions between existing or proposed installation in the area, where the significant quantities of dangerous substances are stored, handled, and transported including the loading and unloading of such substance to and from vessels, to assess the risks. The Canvey reports were the first significant contribution to industrial port environment QRAs, and they are still relevant today however, it is an attempt at standardizing the process of risk assessment of navigation and unloading operations for a generic port terminal. The focus of entire study was on accidents where a serious loss of containment could result in production of large cloud of flammable or toxic substances. The general method adopted is described as follows: (Courtesy: **The QRA Report data taken from CHILWORTH Global**)

- To identify potentially hazardous materials and establish maximum total inventories and location. This information was gathered through conducting visits to each of the installation involved and holding discussions with site personnel
- To consider the behavior of the dangerous substances on release, on the basis of information on material properties and process/ storage conditions
- To identify ways in which serious losses of containment could occur, presenting a hazard to the local population
- To assess the level of risk and the probable impact to the surroundings for certain port areas
- To assess the probability and consequences of selected failure events Liquid terminal and jetty areas are required to produce a contingency plan for accidental marine hydrocarbon pollution, including a study of the effects of possible spills and of their evolution.

The QRA results are immense use in developing onsite offsite emergency plan. The study covers liquid terminals, pump house and loading bays. Accidents occurring during the (external) approach of the tankers to the port were not taken into account. Possible sabotage-related scenarios and accidents likely to occur during tanker maintenance operations were excluded from the analysis. Hazardous flammable chemicals, liquid hydrocarbons were considered for the study. Moreover, only bulk transportation and handlings are included within the scope of the study in Mundra port huge quantities of dangerous chemicals are handled and kept for intermediate temporary storage in liquid terminals for further transport. By its nature, in which dangerous chemicals are handled (storage/transportation) carries the probability of an accident and gives rise to the laying out of different accident scenarios. The industrial and commercial activities in the Mundra port area heavily pollute the environment. Some chemicals are present for years in these sites, due to enterprising problems. In general, many incidents have occurred in various chemical storage facilities during the past few years with considerable consequences to neighboring populations. The study team identified 49 numbers of Maximum Credible Loss Scenarios (MCLS), DNV- PHASTRISK software has been used for estimating the potential impact to surrounding environment. The types of accident that may take place in the Mundra port are: fire, explosion, release and dispersion of toxic gases/vapors or a combination of these. The thermal/toxic compound doses were first computed . The types of damage investigated were burns of various degrees, acute poisoning, or even death. The types of accident considered in the scenarios of this study are analyzed below

Jet fire:

When pressurized flammable liquids are released from storage tanks or pipelines, the materials discharging through the hole will form a gas jet that entrains and mixes with the ambient air. If the material encounters an ignition sources while it is in the flammable range, a jet fire may occur

Pool fire

The continuous release of a flammable liquid usually results in a pool fire. When the liquid is spilled in a confined space, the pool size is also confined and the amount of air that sustains the fire is limited, because the ventilation is controlled by the vent ducts In this case the type of the fire is characterized as 'confined'. When the liquid is spilled in an open area, it covers a large surface area and the amount of air is unlimited.

UCVE

Then the fire is referred to as 'unconfined' Unconfined Vapor Cloud Explosion (UVCE) This type of explosion takes place when a sufficient amount of flammable material (gas or liquid having high vapor pressure) is released and mixed with air to form a flammable cloud, such that the average concentration of the compound in the cloud is higher than the lower limit of explosion. The explosion occurs in an open space and the resulting overpressure affects humans and buildings through a blast wave covering large distances.

BLEVE

BLEVE (Boiling Liquid Expanding Vapor Explosion) is a phenomenon resulting from the failure of a vessel containing a liquid at a temperature significantly above its boiling point at normal atmospheric pressure. The main hazard posed by BLEVE of a container filled with a flammable volatile liquid is a fireball and the resulting radiation, due to instantaneous ignition of the flammable vapor cloud. Release and dispersion of toxic gases and vapors During the combustion of a flammable material a lot of chemical compounds are produced and travel large distances downwind, forming a combustion gas cloud. Some of them (CO, NOx) are toxic and even fatal to humans at sufficiently high doses. In this way the particles are carried away by these gases traveling some distance into the heavy gas cloud and affect inhabitants before they meet the ground

Consequence Analysis Results Summary

In general, it was observed that effect of catastrophic rupture of storage tank in enclosures extends beyond the tolerable range. It is also observed that in these enclosures, only full bore rupture of the pipe lines and catastrophic rupture of the storage tanks are of main concern for high risk. For the catastrophic failure of the storage tank, one of the main causes is escalation of minor events.

Jet fire : Jet fires can arise from gas, two-phase, or liquid releases. The worst-case jet fires are likely to be from the pump house and mainly from the maximum credible accident scenarios in the critical pipeline failure in pump house and tanker loading bays. The following jet fire results obtained from the DNV PHAST software are presented below:

Naphtha transfer pump discharge line rupture scenario which results into jet fire flame radiation intensity of 37.5 kW/m2 to the distance of 127 meter impinges directly to the adjacent pumps in the pump house and associated pipelines carrying hydrocarbons to the loading bays

Vinyl Acetate Monomer discharge line rupture scenario, which results into jet fire flame radiation intensity of 37.5 kW/m2 to the distance of 75 meters, impinges directly to pipelines carrying to the loading bays

Gasoil pump discharge line rupture scenario, which results into jet fire flame radiation intensity of 37.5 kW/m2 to the distance of 41 meters, impinges directly to pipelines carrying to the loading bays

Pool fire: Pool fires can arise from any site that handles liquid hydrocarbons. The worst case is likely to be in the tank farm . Mostly tank farm pool fire is contained within the tank bund itself. Oil spills on ground from the pipelines handling hydrocarbons may results into pool fire and may affect adjacent equipment resulting into domino effects (BLEVE).

Scenario No	MCLS	Radiation intensity kW/m^2	Distance, m
1	Catastrophic rupture of Naphtha storage tank T-01 (2944 kl)	12.5	214
10	Catastrophic rupture of storage tank P-Xylene T-39 (1460 kl)	37.5	408
13	Catastrophic rupture of Vinyl Acetate Monomer VAM storage tank T-24 (1458 kl)	37.5	285
16	Catastrophic rupture of methanol storage tank T-119 (5000 kl)	37.5	303
19	Catastrophic rupture of storage tank P-Xylene T-115 (5000 kl)	37.5	226
31	Loss of containment from P-Xylene tanker 30 MT	37.5	126
40	Loss of containment from P- Xylene tanker 20 MT	37.5	117
47	P-Xylene pump P-39 discharge line full bore rupture	37.5	117

Vapor cloud explosion:

In general catastrophic gas explosions happen when considerable quantities of flammable material are released and dispersed with air to form an explosive vapor cloud before ignition takes place. A vapor cloud explosion (VCE) occurs if a cloud of flammable gas burns sufficiently quickly to generate high overpressures. The following vapor cloud explosion results obtained from the DNV PHAST software are presented below:

Catastrophic failure of Naphtha storage tank T-01 is a worst case scenario, which results into dispersion of naphtha (flammable mixture) in the atmosphere; it may generate overpressure (0 .2608 bar) to the distance of 1235 meter and affecting the adjacent storage tanks as well as to the nearby enclosures

The following vapor cloud explosion results obtained from the DNV PHAST software in which overpressure blast waves affecting the adjacent storage tanks, as well as major impact to adjacent enclosures.

Scenario No	MCLS	Overpressure (bar)	Distance, m
7	Catastrophic rupture of methanol storage tank T-32 (1000 kl)	0.2068	124
10	Catastrophic rupture of storage tank P-Xylene T-39 (1460 kl)	0.2068	121
13	Catastrophic rupture of Vinyl Acetate Monomer VAM storage tank T-24 (1458 kl)	0.2068	433
16	Catastrophic rupture of methanol storage tank T-119 (5000 kl)	0.2068	257
19	Catastrophic rupture of storage tank P-Xylene T-115 (5000 kl)	0.2068	226
22	Catastrophic rupture of Toluene storage tank T-122 (3000 kl)	0.2068	465
31	Loss of containment from Naphtha tanker 30 MT	0.2068	147
37	Loss of containment from Naphtha tanker 20 MT	0.2068	126

46	Naphtha pump P- 01 discharge line full bore rupture	0.2068	257
48	Toluene pump P-122 discharge line full bore rupture	0.2068	93
49	VAM pump P-24 discharge line full bore rupture	0.2068	110

Toxic Gas Release :

In case of release of toxic gas, when a gas that is heavier than air is released, it initially behaves very differently from a neutrally buoyant gas. The heavy gas will first "slump," or sink, because it is heavier than the surrounding air. As the gas cloud moves downwind, gravity makes it spread; this can cause some of the vapor to travel upwind of its release point. Farther downwind, as the cloud becomes more diluted and its density approaches that of air, it begins behaving like a neutrally buoyant gas. This takes place when the concentration of heavy gas in the surrounding air drops below about 1 percent (1 0,000 parts per million). For many small releases, this will occur in the first few yards (meters). For large releases, this may happen much further downwind. A gas that has a molecular weight greater than that of air will form a heavy gas cloud if enough gas is released. Gases that are lighter than air at room temperature, but that are stored in a cryogenic (low temperature) state, can also form heavy gas clouds. Many substances that are gases under normal pressures and temperatures are stored under pressures high enough to liquefy them. When a tank rupture or broken valve causes a sudden pressure loss in a tank of liquefied gas, the liquid boils violently and the tank contents foam up, filling the tank with a mixture of gas and fine liquid droplets (called aerosol). Flash boiling is the term for that sudden vaporization of a liquid caused by a loss of pressure. When the liquid and gas phases of a chemical escape together from a ruptured tank, the release is called a two-phase flow. When a two-phase mixture escapes from storage, the release rate can be significantly greater than that for a release of pure gas. The two-phase mixture that escapes into the atmosphere may behave like a heavy gas cloud. The cloud is heavy in part because it is initially cold, and therefore denser than it would be at ambient temperatures, and also because it consists of a two-phase mixture. The tiny aerosol droplets mixed into the cloud act to weigh the cloud down and make it denser than a pure gas cloud, and their evaporation cools the cloud. Toxic materials that become airborne are carried by the wind and transported away from the spill site. While being transported downwind, the airborne chemical(s) mix with air and disperse. Gases and two-phase liquid-vapor mixtures are divided into three general classes:

- Positively buoyant
- Neutrally buoyant
- Negatively buoyant.

These classifications are based on the density difference between the released material and its surrounding medium (air). The classifications are influenced by release temperature, molecular weight, presence of aerosols, ambient temperature at release, and relative humidity.

Ignition Sources :

In order for a fire or explosion to start there must be an ignition source of sufficient heat intensity to cause an ignition. Ignition causes a release of flammable liquid or gas to become a fire Uet fire, flash fire, pool fire etc.) or explosion. There are many possible sources of ignition and those that are most likely will depend on the release scenario. Sources of ignition include electrical sparks, static electricity, naked flames, hot surfaces, impact, friction, etc. The following Ignition sources identified in a QRA under several categories including: **Hot Surfaces**- unlagged surfaces on hot equipment can act as sources of ignition; **Current Electricity**- electrical equipment and cables can act as sources of ignition if sparks are generated at contact points or where wires overheat; e.g. electrical equipment sparking **Static Electricity** - static electricity can build up on any unearthed equipment and generate sparks. Static is commonly found on vehicles, vessels handling particulate solids and manned areas with nonconductive floor or footwear unearthed floors; e.g. electrostatic discharges **Naked Flames** - all naked flames (including cigarettes) are potential sources Cofignition; this category also includes welding, flame-cutting and other hot work, fired furnaces and flares; e.g. Open flame heaters (boilers and flame heaters) **Friction** - equipment with moving parts in contact can generate heat through friction if not properly lubricated. This includes all rotating equipment and cold cutting devices such as drills, lathes and saws; Mechanical sparking **Impact** - impact between hard surfaces, particularly metal-to-metal contact, can generate sparks. This includes lifted objects lowered to a metal floor too quickly and the use of hand tools such as hammers; and **Chemical ignition**- some chemicals can spontaneously ignite if exposed to air, while oxidizing agents such as oxygen gas and peroxides can cause flammable materials to ignite at ambient temperatures.

Meteorology :

Atmospheric stability plays an important role in the dispersion of chemicals. Stability means, its ability to suppress existing turbulence or to resist vertical motion". Variations in thermal and mechanical turbulence and in wind speed are greatest in the atmospheric layer in contact with the surface. These turbulences have been influenced greatly by the air temperature and air temperature decreases with the height. The rate at which the temperature of air decreases with height is called Environment Lapse Rate (ELR). It will vary from time to time and from place to place. The atmosphere is said to be stable, neutral or unstable according to ELR less than, equal to or greater than Dry Adiabatic Lapse Rate (DALR), which is a constant value of 0.98° C per 100 meters.

Pasquill Stability Classes :

Pasquill has defined 6 stability classes.

A Extremely unstable.
B Moderately unstable
C Slightly unstable.
D Neutral
E Slightly stable.
F Moderately stable.

Three prime factors that defines Stability

1. Solar radiation
2. Night-time sky over
3. Surface wind

When the atmosphere is unstable and wind speeds are moderate or high or gusty, rapid dispersion of vapors will occur. Under these conditions, air concentrations will be moderate or low and the material will be dispersed rapidly. When the atmosphere is stable and wind speed is low, dispersion of material will be limited and air concentration will be high. Six stability classes from A-F are defined while wind speed can take any one of numerous values.

Results For Different Weather Conditions:

For the flammable and toxic releases which reaches off-site of the plant, calculations iterated with different weather conditions, since wind speed and stability have a great effect on cloud dispersion. Stable weather gives the greatest effect distances considered for the most stable weather conditions that occur at the site, as well as the most common weather conditions. The key meteorological data required for consequence modeling are wind and temperature. The wind speed and stability define the dispersion of a material, whilst the temperature defines the evaporation rate. The data utilized here for the base case QRA model were a temperature of 35°C.

Ambient temperature:

Maximum	Normal/average	Minimum
43 deg C	28 deg C *I* 30 deg C	17 deg C

Relative humidity%: 65% to 90%

CLIMATOLOGICAL TABLE:

S.No	Month	Maximum wind speed (kmph)	Average wind speed
1.	January	18	3
2.	February	20	5
3.	March	24	6
4.	April	22	7
5.	May	20	1
6.	June	24	1
7.	July	18	8
8.	August	67	7
9.	September	17	5
10.	October	18	3
11.	November	13	2
12.	December	18	2

These wind speed and stability class are used in consequence modeling:

Stability class	**F**	**D**	**C/D**	**C/D**
Wind speed m/s	2	3	5	9

Scenario No.	Scenario Description	Hazard Distances- Flash Fire				Explosion Results			
		Concentration	Distance in meters			Over pressure in bar	Distance in meters		
			2F	3 D	5 C/D		2F	3D	5 C/D
1.	Catastrophic rupture of Naphtha storage tank T-01 (2944 kl)	UFL	264	223	189	0.02068	2380	2004	1803
		LFL	757	617	549	0.1379	1312	1045	896
		LFL-50%	1001	837	785	0.2068	1235	980	844
2.	Major leak (25 mm) in Naphtha storage tank T-01 (2944 kl)	UFL	8.48	8.38	8.07	0.02068	182	156	134
		LFL	57.79	50.84	40.7	0.1379	99	92	79
		LFL-50%	75	71	60	0.2068	92	87	74
3.	Minor leak (10 mm) in Naphtha storage tank T-01 (2944 kl)	UFL	4.57	4.34	3.62	0.02068	73	63	46
		LFL	28	21	12	0.1379	41	38	26
		LFL-50%	39	33	26	0.2068	38	36	25
4.	Catastrophic rupture of Acetic acid storage tank T-40 (2960 kl)	UFL	6.88	6.88	6.88	0.02068	NH	NH	NH
		LFL	6.9	6.9	7.57	0.1379	NH	NH	NH
		LFL-50%	15.6	15.7	18.2	0.2068	NH	NH	NH
5.	Major leak (25 mm) in Acetic acid storage tank T-40 (2960 kl)	UFL	5.46	5.45	5.39	0.02068	-	-	-
		LFL	5.53	5.53	5.52	0.1379	-	-	-
		LFL-50%	5.55	5.56	5.55	0.2068	-	-	-

Scenario No.	Scenario Description	Hazard Distances- Flash Fire				Explosion Results			
		Concentration	Distance in meters			Over pressure in bar	Distance in meters		
			2F	3 D	5 C/D		2F	3D	5 C/D
6.	Minor leak (10 mm) in acetic acid storage tank T-40 (2960 kl)	UFL	3.43	3.27	3.03	0.02068	-	-	-
		LFL	4.10	4.06	3.96	0.1379	-	-	-
		LFL-50%	4.27	4.26	4.22	0.2068	-	-	-
7.	Catastrophic rupture of methanol storage tank T-32 (1000 kl)	UFL	28	28	30	0.02068	459	448	453
		LFL	44	36	47	0.1379	148	140	146
		LFL-50%	130	62	90	0.2068	124	117	122
8.	Major leak (25 mm) in methanol storage tank T-32 (1000 kl)	UFL	0.24	0.23	0.28	0.02068	-	36	-
		LFL	3.46	3.18	3.03	0.1379	-	16	-
		LFL-50%	9.85	10.16	7.88	0.2068	-	15	-
9.	Minor leak (10 mm) in methanol storage tank T-32 (1000 kl)	UFL	0.13	0.09	0.11	0.02068	-	-	-
		LFL	1.38	1.27	1.25	0.1379	-	-	-
		LFL-50%	3.27	3.38	2.83	0.2068	-	-	-
10.	Catastrophic rupture of storage tank P-Xylene T-39 (1460 kl)	UFL	29	29	31	0.02068	272	268	263
		LFL	52	49	48	0.1379	130	118	112
		LFL-50%	118	110	113	0.2068	121	111	106
11.	Major leak(25 mm) in P-Xylene storage tank T-39 (1460kl)	UFL	4.91	4.95	4.86	0.02068	-	-	-
		LFL	4.94	5.04	4.93	0.1379	-	-	-

Scenario No.	Scenario Description	Hazard Distances- Flash Fire				Explosion Results			
		Concentration	Distance in meters			Over pressure in bar	Distance in meters		
			2F	3 D	5 C/D		2F	3D	5 C/D
		LFL-50%	5.21	5.05	4.94	0.2068	-	-	-
12.	Minor leak (10 mm) in P-xylene storage tank T-39 (1460 kl)	UFL	3.35	3.39	3.08	0.02068	-	-	-
		LFL	3.51	3.97	4.04	0.1379	-	-	-
		LFL-50%	3.53	4.02	4.09	0.2068	-	-	-
13.	Catastrophic rupture of Vinyl Acetate Monomer VAM storage tank T-24 (1458 kl)	UFL	33	33	36	0.02068	898	828	802
		LFL	240	212	195	0.1379	463	400	364
		LFL-50%	347	307	295	0.2068	433	372	337
14.	Major leak (25 mm) in storage tank Vinyl Acetate Monomer VAM T-24(1458 kl)	UFL	4.77	4.68	4.71	0.02068	32	21	23
		LFL	9.23	7.45	5.53	0.1379	23	13	13
		LFL-50%	23.8	19.5	15.03	0.2068	22	12	12
15.	Minor leak (10 mm) in storage tank Vinyl Acetate Monomer (VAM) T-24 (1458 kl)	UFL	3.11	2.92	2.69	0.02068	-	-	-
		LFL	4.29	3.94	4.21	0.1379	-	-	-
		LFL-50%	11.8	6.91	4.67	0.2068	-	-	-
16.	Catastrophic rupture of methanol storage tank T-119 (5000 kl)	UFL	80	75	88	0.02068	857	857	937
		LFL	83	78	97	0.1379	290	284	309
		LFL-50%	153	145	261	0.2068	247	240	259

Scenario No.	Scenario Description	Hazard Distances- Flash Fire				Explosion Results			
		Concentration	Distance in meters			Over pressure in bar	Distance in meters		
			2F	3 D	5 C/D		2F	3D	5 C/D
17.	Major leak (25 mm) in methanol storage tank T-119 (5000 kl)	UFL	6.07	5.56	4.91	0.02068	-	-	-
		LFL	6.93	7.06	6.95	0.1379	-	-	-
		LFL-50%	9.35	8.20	7.03	0.2068	-	-	-
18.	Minor leak (10 mm) in Methanol storage tank T-119 (5000 kl)	UFL	2.56	2.47	2.36	0.02068	-	-	-
		LFL	4.81	4.78	4.89	0.1379	-	-	-
		LFL-50%	5.32	5.08	5.14	0.2068	-	-	-
19.	Catastrophic rupture of storage tank P-Xylene T-115 (5000 kl)	UFL	57	55	59	0.02068	531	521	575
		LFL	101	87	107	0.1379	232	204	231
		LFL-50%	252	217	224	0.2068	225	193	226
20.	Major leak (25 mm) in P-xylene storage tank T-115 (5000 kl)	UFL	6.31	6.30	6.34	0.02068	-	-	-
		LFL	6.39	6.38	6.58	0.1379	-	-	-
		LFL-50%	6.40	6.40	6.61	0.2068	-	-	-
21.	Minor leak (10 mm) in P-Xylene storage tank T-115 (5000 kl)	UFL	3.7	4.02	3.58	0.02068	-	-	-
		LFL	4.3	4.9	4.8	0.1379	-	-	-
		LFL-50%	4.4	5.03	4.93	0.2068	-	-	-
22.	Catastrophic rupture of Toluene storage tank T-122 (3000 kl)	UFL	45	44	48	0.02068	929	855	819
		LFL	260	230	220	0.1379	495	425	387

Scenario No.	Scenario Description	Hazard Distances- Flash Fire				Explosion Results			
		Concentration	Distance in meters			Over pressure in bar	Distance in meters		
			2F	3 D	5 C/D		2F	3D	5 C/D
		LFL-50%	388	355	346	0.2068	465	398	362
23.	Major leak (25 mm) in toluene storage tank T-122 (3000 kl)	UFL	5.38	5.35	5.30	0.02068	17.5	17.4	17.7
		LFL	6.68	6.13	5.60	0.1379	11.9	11.9	12.0
		LFL-50%	15.9	13.3	10.1	0.2068	11.51	11.48	11.55
24.	Minor leak (10 mm) in toluene storage tank T-122 (3000 kl)	UFL	3.8	4.2	3.8	0.02068	-	-	-
		LFL	4.4	4.8	5.04	0.1379	-	-	-
		LFL-50%	7.54	5.73	5.09	0.2068	-	-	-
25.	Catastrophic rupture of gasoil storage tank T-101 (15040 kl)	UFL	55	48	47	0.02068	980	965	990
		LFL	110	106	116	0.1379	480	484	490
		LFL-50%	180	178	192	0.2068	185	192	196
26.	Major leak (25 mm) in gasoil storage tank T-101 (15040 kl)	UFL	5.8	5.8	5.8	0.02068	31	31	22
		LFL	8.7	7.6	6.1	0.1379	22	22	13
		LFL-50%	25.5	23.2	17.2	0.2068	22	22	12
27.	Minor leak (10 mm) in gasoil storage tank T-101 (15040 kl)	UFL	3.54	3.38	3.12	0.02068	-	-	-
		LFL	4.3	4.35	4.76	0.1379	-	-	-
		LFL-50%	4.4	4.42	4.81	0.2068	-	-	-

Scenario No.	Scenario Description	Hazard Distances- Flash Fire				Explosion Results			
		Concentration	Distance in meters			Over pressure in bar	Distance in meters		
			2F	3 D	5 C/D		2F	3D	5 C/D
28.	Catastrophic rupture of motor spirit storage tank T-01 (2944 kl)	UFL	245	232	198	0.02068	1830	1960	1642
		LFL	780	712	708	0.1379	1421	1034	900
		LFL-50%	980	825	812	0.2068	1123	1025	985
29.	Major leak (25 mm) in motor spirit storage tank T-01 (2944 kl)	UFL	8.56	9.12	9.01	0.02068	210	195	165
		LFL	63	58	42	0.1379	184	162	114
		LFL-50%	95	92	90	0.2068	94	83	62
30.	Minor leak (10 mm) in motor spirit storage tank T-01 (2944 kl)	UFL	5.23	5.12	4.98	0.02068	150	148	132
		LFL	38	41	34	0.1379	60	51	38
		LFL-50%	28	24	20	0.2068	38	30	24
31.	Loss of containment from Naphtha tanker 30 MT	UFL	31	28	25	0.02068	363	344	335
		LFL	82	83	86	0.1379	161	152	147
		LFL-50%	101	111	121	0.2068	147	140	136
32.	Loss of containment from Acetic acid tanker 30MT	UFL	4.65	4.71	4.88	0.02068	-	-	-
		LFL	4.69	4.76	4.92	0.1379	-	-	-
		LFL-50%	4.71	4.77	4.94	0.2068	-	-	-
33.	Loss of containment from methanol tanker 30MT	UFL	4.52	4.57	4.74	0.02068	93	90	88
		LFL	55.5	53.3	55.9	0.1379	81	65	74

Scenario No.	Scenario Description	Hazard Distances- Flash Fire				Explosion Results			
		Concentration	Distance in meters			Over pressure in bar	Distance in meters		
			2F	3 D	5 C/D		2F	3D	5 C/D
		LFL-50%	190	134	159	0.2068	81	64	73
34.	Loss of containment from P-Xylene tanker 30 MT	UFL	3.54	3.59	3.71	0.02068	122	40	NH
		LFL	76	22	3.75	0.1379	96	32	NH
		LFL-50%	131	54	58	0.2068	94	32	NH
35.	Loss of containment from toluene tanker 30 MT	UFL	3.30	3.34	3.46	0.02068	1029	46	76
		LFL	28	29	27	0.1379	56	47	43
		LFL-50%	42	46	52	0.2068	52	46	42
36.	Loss of containment from VAM tanker 30 MT	UFL	4.11	4.16	4.3	0.02068	150	127	121
		LFL	33	32	29	0.1379	68	59	54
		LFL-50%	50	51	51	0.2068	62	55	51
37.	Loss of containment from Naphtha tanker 20 MT	UFL	26	24	22	0.02068	315	301	292
		LFL	70	72	74	0.1379	139	132	127
		LFL-50%	87	97	108	0.2068	126	120	117
38.	Loss of containment from acetic acid tanker 20 MT	UFL	3.99	4.04	4.17	0.02068	-	-	-
		LFL	4.02	4.08	4.20	0.1379	-	-	-
		LFL-50%	4.04	4.09	4.22	0.2068	-	-	-

Scenario No.	Scenario Description	Hazard Distances- Flash Fire				Explosion Results			
		Concentration	Distance in meters			Over pressure in bar	Distance in meters		
			2F	3 D	5 C/D		2F	3D	5 C/D
39.	Loss of containment from methanol tanker 20 MT	UFL	3.87	3.92	4.05	0.02068	79	83	84
		LFL	48.9	54	54	0.1379	64	65	73
		LFL-50%	161	166	128	0.2068	63	64	72
40.	Loss of containment from P- Xylene tanker 20 MT	UFL	3.03	3.07	3.16	0.02068	87	NH	NH
		LFL	58	3.10	14.02	0.1379	74	NH	NH
		LFL-50%	110	45	48	0.2068	73	NH	NH
41.	Loss of containment from Toluene tanker 20 MT	UFL	2.82	2.86	2.94	0.02068	91	72	65
		LFL	23	24	22	0.1379	45	40	34
		LFL-50%	37	37	46	0.2068	42	38	33
42.	Loss of containment from vinyl acetate monomer (VAM) tanker 20 MT	UFL	3.52	3.57	3.67	0.02068	133	116	104
		LFL	28	27	24	0.1379	59	52	46
		LFL-50%	43	47	44	0.2068	54	47	42
43.	Acetic acid pump P-40 discharge line full bore rupture	UFL	8.12	7.92	7.3	0.02068		15.3	15.4
		LFL	8.2	8.02	7.36	0.1379		11.3	11.4
		LFL-50%	9.83	10.0	10.2	0.2068		11.07	11.4
44.	Gasoil pump P-101 discharge line full bore rupture	UFL	9.2	8.8	9.3	0.02068	111	84	122
		LFL	36	28	40	0.1379	80	51	83

Scenario No.	Scenario Description	Hazard Distances- Flash Fire				Explosion Results			
		Concentration	Distance in meters			Over pressure in bar	Distance in meters		
			2F	3 D	5 C/D		2F	3D	5 C/D
		LFL-50%	77	47	75	0.2068	78	49	80
45.	Methanol pump P-119 discharge line full bore rupture	UFL	9.12	10.38	10.9	0.02068	80	78	99
		LFL	24.4	24.3	29.4	0.1379	50	49	70
		LFL-50%	43.5	40.3	70.9	0.2068	48	47	67
46.	Naphtha pump P- 01 discharge line full bore rupture	UFL	31	30	32	0.02068	484	480	429
		LFL	172	158	129	0.1379	238	271	237
		LFL-50%	221	214	179	0.2068	233	257	222
47.	P-Xylene pump P-39 discharge line full bore rupture	UFL	8.4	8.2	8.2	0.02068	39	62	48
		LFL	14	15	13	0.1379	25	45	34
		LFL-50%	27	45	38	0.2068	23	44	33
48.	Toluene pump P-122 discharge line full bore rupture	UFL	8.12	8.74	8.07	0.02068	118	146	134
		LFL	37	46	43	0.1379	67	97	86
		LFL-50%	58	80	73	0.2068	63	93	82
49.	VAM pump P-24 discharge line full bore rupture	UFL	8.88	8.74	9.29	0.02068	212	175	158
		LFL	70	57	50	0.1379	116	104	92
		LFL-50%	102	87	74	0.2068	110	99	87

Scenario No.	Scenario Description	Pool Fire Results				Jet Fire Results			
		Radiation Levels (kW/m2)	Distance in meters			Radiation Levels (kW/m2)	Distance in meters		
			2F	3D	5C/D		2F	3D	5C/D
1.	Catastrophic rupture of Naphtha storage tank T-01 (2944 kl)	4	289	290	295	4	-	-	-
		12.5	211	209	214	12.5	-	-	-
		37.5	NR	NR	NR	37.5	-	-	-
2.	Major leak (25 mm) in Naphtha storage tank T-01 (2944 kl)	4	29	29	29	4	65	62	59
		12.5	22	23	23	12.5	49	46	43
		37.5	NR	NR	NR	37.5	40	37	34
3.	Minor leak (10 mm) in Naphtha storage tank T-01 (2944 kl)	4	20.6	20.6	20.9	4	28	27	25
		12.5	15.7	16	16.9	12.5	21	20	19
		37.5	11.4	12	13.8	37.5	17	16	15
4.	Catastrophic rupture of Acetic acid storage tank T-40 (2960 kl)	4	26	26	29	4	-	-	-
		12.5	15	16	19	12.5	-	-	-
		37.5	NR	NR	NR	37.5	-	-	-
5.	Major leak (25 mm) in Acetic acid storage tank T-40 (2960 kl)	4	26	27	27	4	17	17	16
		12.5	16	16	17	12.5	14	13	13
		37.5	NR	NR	NR	37.5	NR	NR	NR

Scenario No.	Scenario Description	Pool Fire Results				Jet Fire Results			
		Radiation Levels (kW/m2)	Distance in meters			Radiation Levels (kW/m2)	Distance in meters		
			2F	3D	5C/D		2F	3D	5C/D
6.	Minor leak (10 mm) in acetic acid storage tank T-40 (2960 kl)	4	22	22	22	4	-	-	-
		12.5	13	13	14	12.5	-	-	-
		37.5	NR	NR	NR	37.5	-	-	-
7.	Catastrophic rupture of methanol storage tank T-32 (1000 kl)	4	30	30	32	4	-	-	-
		12.5	20	21	25	12.5	-	-	-
		37.5	NR	NR	NR	37.5	-	-	-
8.	Major leak (25 mm) in methanol storage tank T-32 (1000 kl)	4	55	59	68	4	29	34	36
		12.5	40	46	57	12.5	12.5	6.89	19.5
		37.5	29	34	45	37.5	NR	NR	NR
9.	Minor leak (10 mm) in methanol storage tank T-32 (1000 kl)	4	20	23	25	4	4.69	8.90	9.66
		12.5	14	18	20	12.5	NR	NR	NR
		37.5	NR	NR	NR	37.5	NR	NR	NR
10.	Catastrophic rupture of storage tank P-Xylene T-39 (1460 kl)	4	943	948	951	4	-	-	-
		12.5	593	599	609	12.5	-	-	-
		37.5	377	390	408	37.5	-	-	-

Scenario No.	Scenario Description	Pool Fire Results				Jet Fire Results			
		Radiation Levels (kW/m2)	Distance in meters			Radiation Levels (kW/m2)	Distance in meters		
			2F	3D	5C/D		2F	3D	5C/D
11.	Major leak(25 mm) in P-Xylene storage tank T-39 (1460kl)	4	55	56	56	4	17	16	16
		12.5	36	37	38	12.5	13	13	12
		37.5	22	24	26	37.5	11	10	10
12.	Minor leak (10 mm) in P-xylene storage tank T-39 (1460 kl)	4	54	55	55	4	8.78	8.52	8.17
		12.5	35	36	37	12.5	6.74	6.46	6.12
		37.5	20	23	25	37.5	6.23	5.82	4.54
13.	Catastrophic rupture of Vinyl Acetate Monomer VAM storage tank T-24 (1458 kl)	4	637	639	646	4	-	-	-
		12.5	406	414	424	12.5	-	-	-
		37.5	250	263	285	37.5	-	-	-
14.	Major leak (25 mm) in storage tank Vinyl Acetate Monomer VAM T-24(1458 kl)	4	33	33	34	4	33	32	30
		12.5	22	23	24	12.5	26	25	24
		37.5	10	11	11	37.5	21	20	19
15.	Minor leak (10 mm) in storage tank Vinyl Acetate Monomer (VAM) T-24 (1458 kl)	4	31	32	33	4	16	15	14
		12.5	20	22	24	12.5	13	12	11
		37.5	9.8	10.1	11	37.5	NR	NR	NR
16.	Catastrophic rupture of methanol storage tank T-	4	602	598	610	4	-	-	-

Scenario No.	Scenario Description	Pool Fire Results				Jet Fire Results			
		Radiation Levels (kW/m2)	Distance in meters			Radiation Levels (kW/m2)	Distance in meters		
			2F	3D	5C/D		2F	3D	5C/D
	119 (5000 kl)	12.5	426	429	447	12.5	-	-	-
		37.5	295	289	303	37.5	-	-	-
17.	Major leak (25 mm) in methanol storage tank T-119 (5000 kl)	4	29	30	30	4	36	34	32
		12.5	21	22	23	12.5	28	27	26
		37.5	NR	NR	NR	37.5	NR	NR	NR
18.	Minor leak (10 mm) in Methanol storage tank T-119 (5000 kl)	4	25	25	26	4	17	16.5	15.4
		12.5	17	18	19	12.5	NR	NR	NR
		37.5	NR	NR	NR	37.5	NR	NR	NR
19.	Catastrophic rupture of storage tank P-Xylene T-115 (5000 kl)	4	1621	1627	1634	4	-	-	-
		12.5	1028	1036	1053	12.5	-	-	-
		37.5	666	683	711	37.5	-	-	-
20.	Major leak (25 mm) in P-xylene storage tank T-115 (5000 kl)	4	21	20	20	4	58	59	59
		12.5	16	16	15	12.5	39	40	41
		37.5	13	13	12	37.5	24	26	29
21.	Minor leak (10 mm) in P-Xylene storage tank T-	4	56	58	58	4	10.8	10.5	10.08

Scenario No.	Scenario Description	Pool Fire Results				Jet Fire Results			
		Radiation Levels (kW/m2)	Distance in meters			Radiation Levels (kW/m2)	Distance in meters		
			2F	3D	5C/D		2F	3D	5C/D
	115 (5000 kl)	12.5	37	38	39	12.5	8.43	8.07	7.58
		37.5	22	25	27	37.5	7.21	6.7	6.08
22.	Catastrophic rupture of Toluene storage tank T-122 (3000 kl)	4	410	430	463	4	-	-	-
		12.5	226	225	230	12.5	-	-	-
		37.5	NR	NR	NR	37.5	-	-	-
23.	Major leak (25 mm) in toluene storage tank T-122 (3000 kl)	4	37	37	39	4	28	27	26
		12.5	23	25	27	12.5	22	21	20
		37.5	11	11	11	37.5	19	17	16
24.	Minor leak (10 mm) in toluene storage tank T-122 (3000 kl)	4	36	37	38	4	15	15	14
		12.5	22	24	26	12.5	12	11	10
		37.5	10	11	11	37.5	9.9	9.4	8.78
25.	Catastrophic rupture of gasoil storage tank T-101 (15040 kl)	4	320	318	291	4	-	-	-
		12.5	230	229	220	12.5	-	-	-
		37.5	NR	NR	NR	37.5	-	-	-
26.	Major leak (25 mm) in gasoil storage tank T-101	4	44	46.5	48.2	4	24	23	23

Scenario No.	Scenario Description	Pool Fire Results				Jet Fire Results			
		Radiation Levels (kW/m2)	Distance in meters			Radiation Levels (kW/m2)	Distance in meters		
			2F	3D	5C/D		2F	3D	5C/D
	(3000 kl)	12.5	23	24.8	26.8	12.5	18	18	17
		37.5	NR	NR	NR	37.5	15	14	13
27.	Minor leak (10 mm) in gasoil storage tank T-101 (3000 kl)	4	36	36	38	4	11.8	11.5	11.12
		12.5	22	23	26	12.5	9.16	8.8	8.32
		37.5	12	12	12	37.5	7.4	7	6.5
28.	Catastrophic rupture of motor spirit storage tank T-01 (2944 kl)	4	285	291	289	4	-	-	-
		12.5	204	201	215	12.5	-	-	-
		37.5	NR	NR	NR	37.5	-	-	-
29.	Major leak (25 mm) in motor spirit storage tank T-01 (2944 kl)	4	31	34	30	4	72	68	61
		12.5	26	24	23	12.5	48	43	48
		37.5	NR	NR	NR	37.5	38	37	31
30.	Minor leak (10 mm) in motor spirit storage tank T-01 (2944 kl)	4	24	22	19	4	41	43	38
		12.5	18	13	17	12.5	28	26	21
		37.5	NR	NR	NR	37.5	17	19	21
31.	Loss of containment from Naphtha tanker 30 MT	4	20	21	21	4	-	-	-

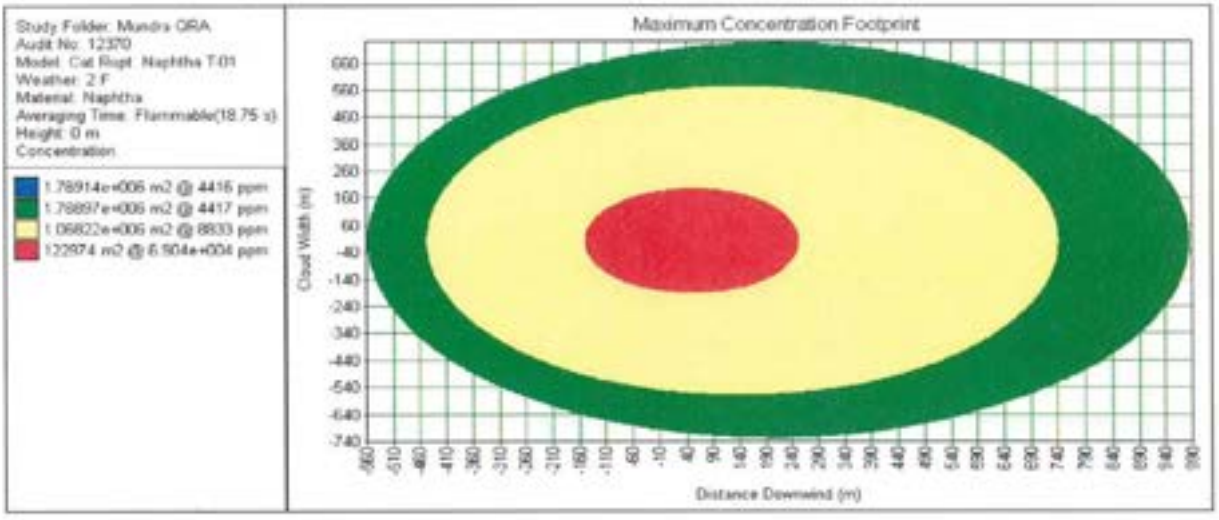
Scenario No.	Scenario Description	Pool Fire Results				Jet Fire Results			
		Radiation Levels (kW/m2)	Distance in meters			Radiation Levels (kW/m2)	Distance in meters		
			2F	3D	5C/D		2F	3D	5C/D
		12.5	14	14	15	12.5	-	-	-
		37.5	NR	NR	NR	37.5	-	-	-
32.	Loss of containment from Acetic acid tanker 30MT	4	101	103	104	4	-	-	-
		12.5	64	67	72	12.5	-	-	-
		37.5	NR	NR	NR	37.5	-	-	-
33.	Loss of containment from methanol tanker 30MT	4	123	123	124	4	-	-	-
		12.5	81	84	87	12.5	-	-	-
		37.5	49	49	49	37.5	-	-	-
34.	Loss of containment from P-Xylene tanker 30 MT	4	330	332	331	4	-	-	-
		12.5	204	207	212	12.5	-	-	-
		37.5	126	133	141	37.5	-	-	-
35.	Loss of containment from toluene tanker 30 MT	4	112	120	130	4	-	-	-
		12.5	47	48	50	12.5	-	-	-
		37.5	NR	NR	NR	37.5	-	-	-
36.	Loss of containment from VAM tanker 30 MT	4	213	215	217	4	-	-	-

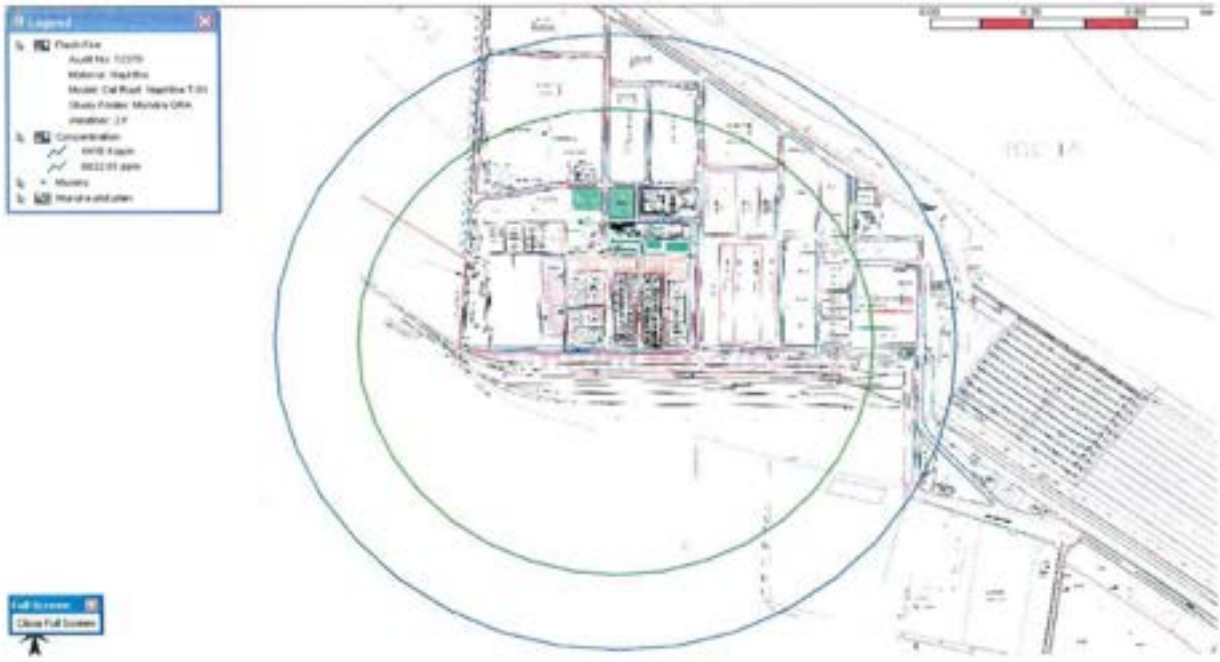
Scenario No.	Scenario Description	Pool Fire Results				Jet Fire Results			
		Radiation Levels (kW/m2)	Distance in meters			Radiation Levels (kW/m2)	Distance in meters		
			2F	3D	5C/D		2F	3D	5C/D
		12.5	133	137	141	12.5	-	-	-
		37.5	74	80	89	37.5	-	-	-
37.	Loss of containment from Naphtha tanker 20 MT	4	20	21	21	4	-	-	-
		12.5	14	14.2	15.6	12.5	-	-	-
		37.5	NR	NR	NR	37.5	-	-	-
38.	Loss of containment from acetic acid tanker 20 MT	4	84	85	87	4	-	-	-
		12.5	52	56	59	12.5	-	-	-
		37.5	NR	NR	NR	37.5	-	-	-
39.	Loss of containment from methanol tanker 20 MT	4	102	103	104	4	-	-	-
		12.5	67	70	72	12.5	-	-	-
		37.5	40	40	40	37.5	-	-	-
40.	Loss of containment from P- Xylene tanker 20 MT	4	274	276	276	4	-	-	-
		12.5	170	173	177	12.5	-	-	-
		37.5	104	110	117	37.5	-	-	-
41.	Loss of containment from Toluene tanker 20 MT	4	95	102	111	4	-	-	-

Scenario No.	Scenario Description	Pool Fire Results				Jet Fire Results			
		Radiation Levels (KW/m2)	Distance in meters			Radiation Levels (KW/m2)	Distance in meters		
			2F	3D	5C/D		2F	3D	5C/D
		12.5	39	40	41	12.5	-	-	-
		37.5	NR	NR	NR	37.5	-	-	-
42.	Loss of containment from vinyl acetate monomer (VAM) tanker 20 MT	4	178	179	181	4	-	-	-
		12.5	111	115	118	12.5	-	-	-
		37.5	60	65	73	37.5	-	-	-
43.	Acetic acid pump P-40 discharge line full bore rupture	4	93	94	95	4	41	39	40
		12.5	61	64	67	12.5	33	32	32
		37.5	NR	NR	NR	37.5	NR	NR	NR
44.	Gasoil pump P-101 discharge line full bore rupture	4	93	98	104	4	66	64	68
		12.5	45	45	47	12.5	51	48	50
		37.5	NR	NR	NR	37.5	41	38	40
45.	Methanol pump P-119 discharge line full bore rupture	4	100	101	103	4	103	104	99
		12.5	69	72	75	12.5	84	86	81
		37.5	45	46	46	37.5	NR	NR	NR
46.	Naphtha pump P- 01 discharge line full bore	4	65	67	66	4	211	213	208

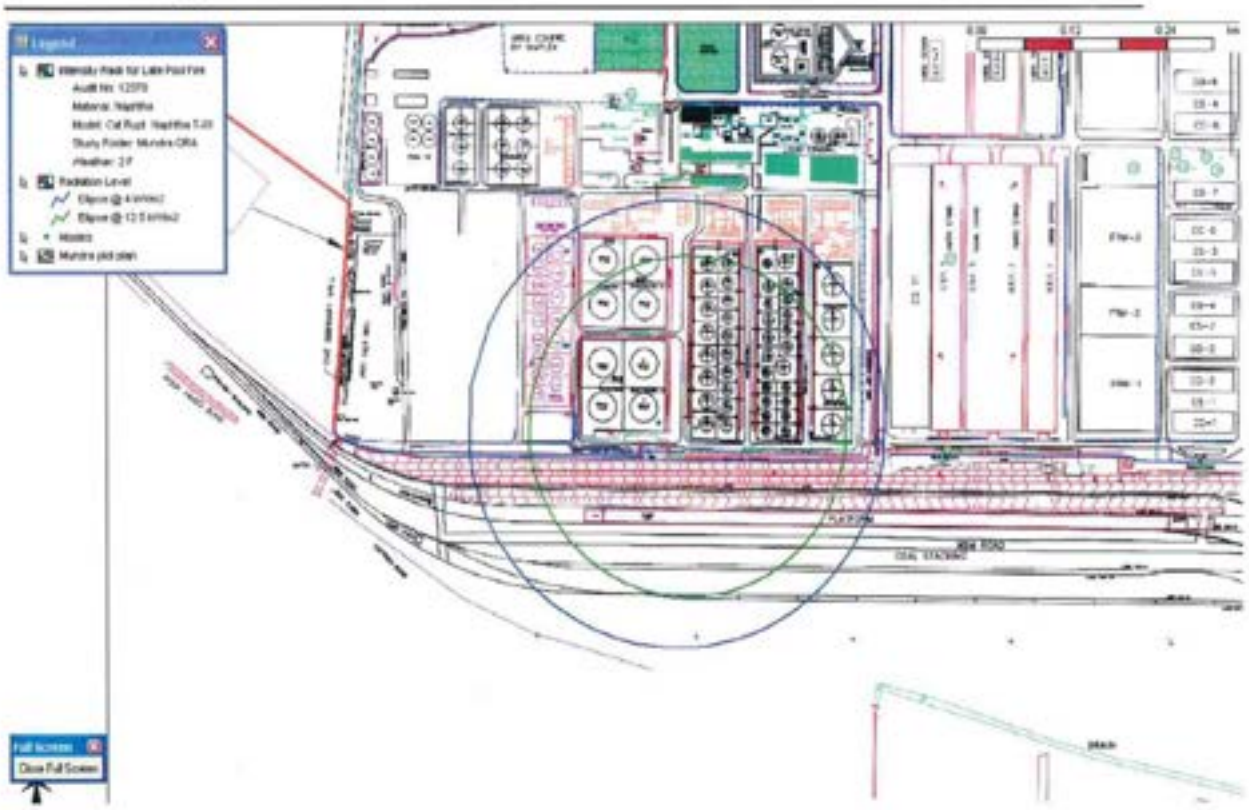
Scenario No.	Scenario Description	Pool Fire Results				Jet Fire Results			
		Radiation Levels (KW/m2)	Distance in meters			Radiation Levels (KW/m2)	Distance in meters		
			2F	3D	5C/D		2F	3D	5C/D
	rupture	12.5	43	45	46	12.5	158	158	151
		37.5	NR	NR	NR	37.5	127	125	118
47.	P-Xylene pump P-39 discharge line full bore rupture	4	263	265	264	4	49	51	47
		12.5	166	169	172	12.5	38	39	35
		37.5	105	110	117	37.5	31	32	28
48.	Toluene pump P-122 discharge line full bore rupture	4	97	105	112	4	72	77	75
		12.5	44	45	46	12.5	56	59	56
		37.5	NR	NR	NR	37.5	46	48	45
49.	VAM pump P-24 discharge line full bore rupture	4	177	179	180	4	116	112	112
		12.5	113	117	120	12.5	91	87	86
		37.5	65	70	77	37.5	75	72	71

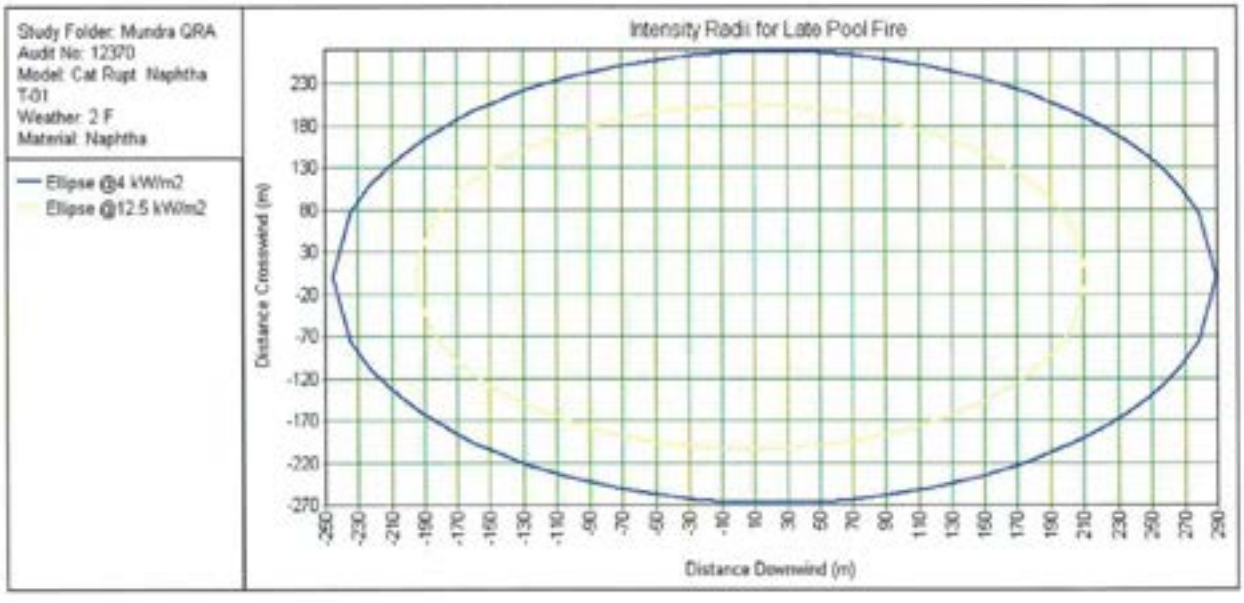
Scenario No.:1

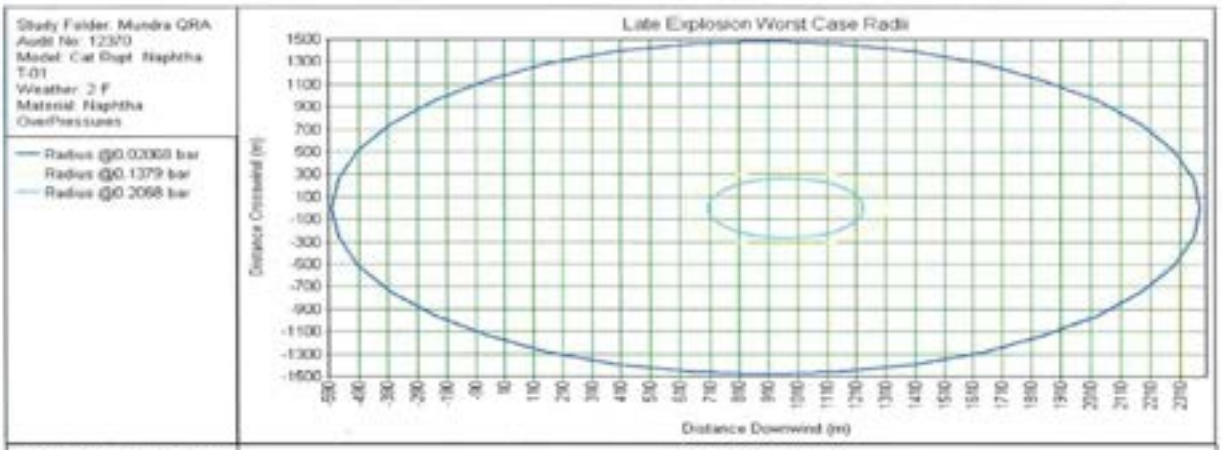


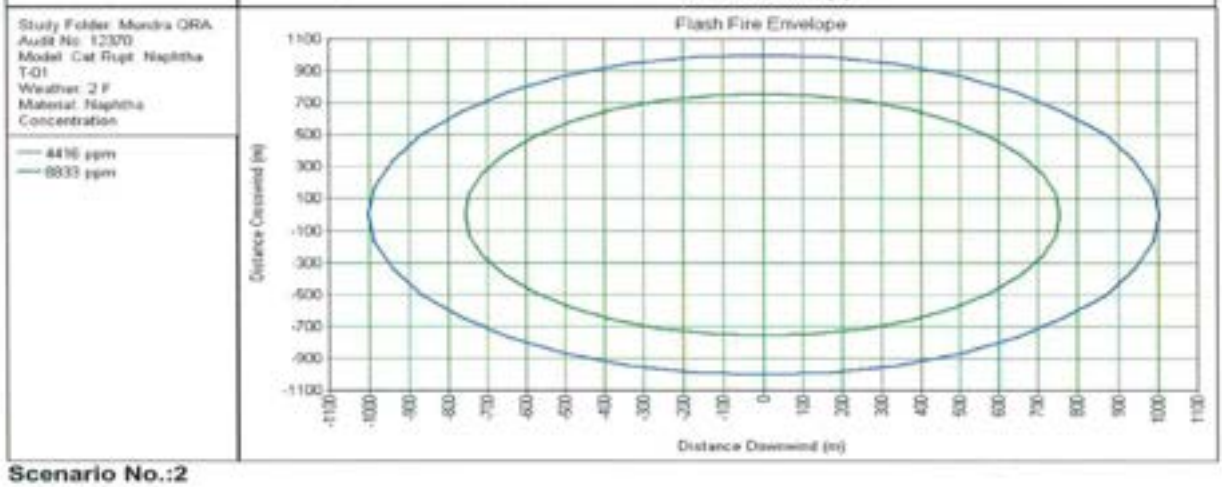


Mundra QRA Study









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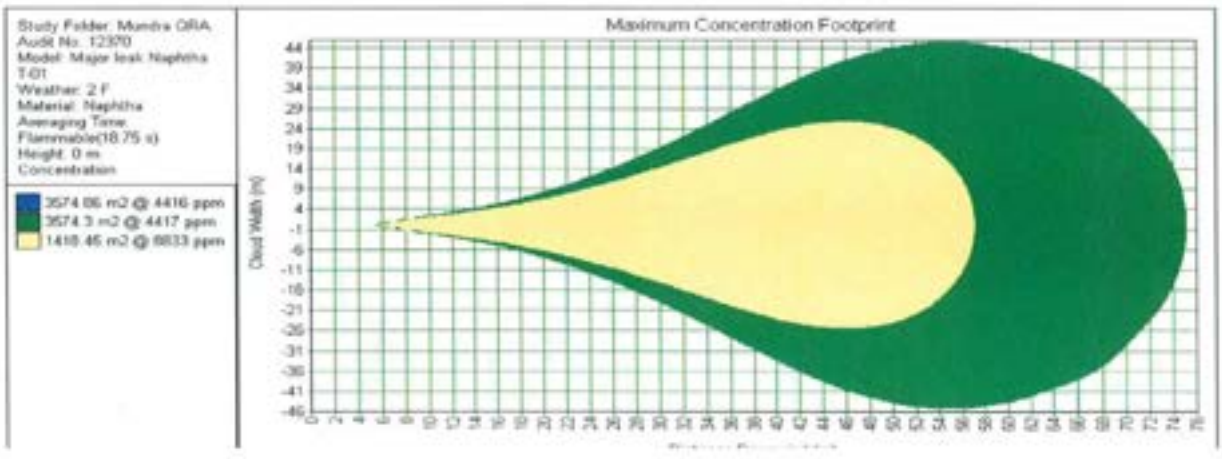
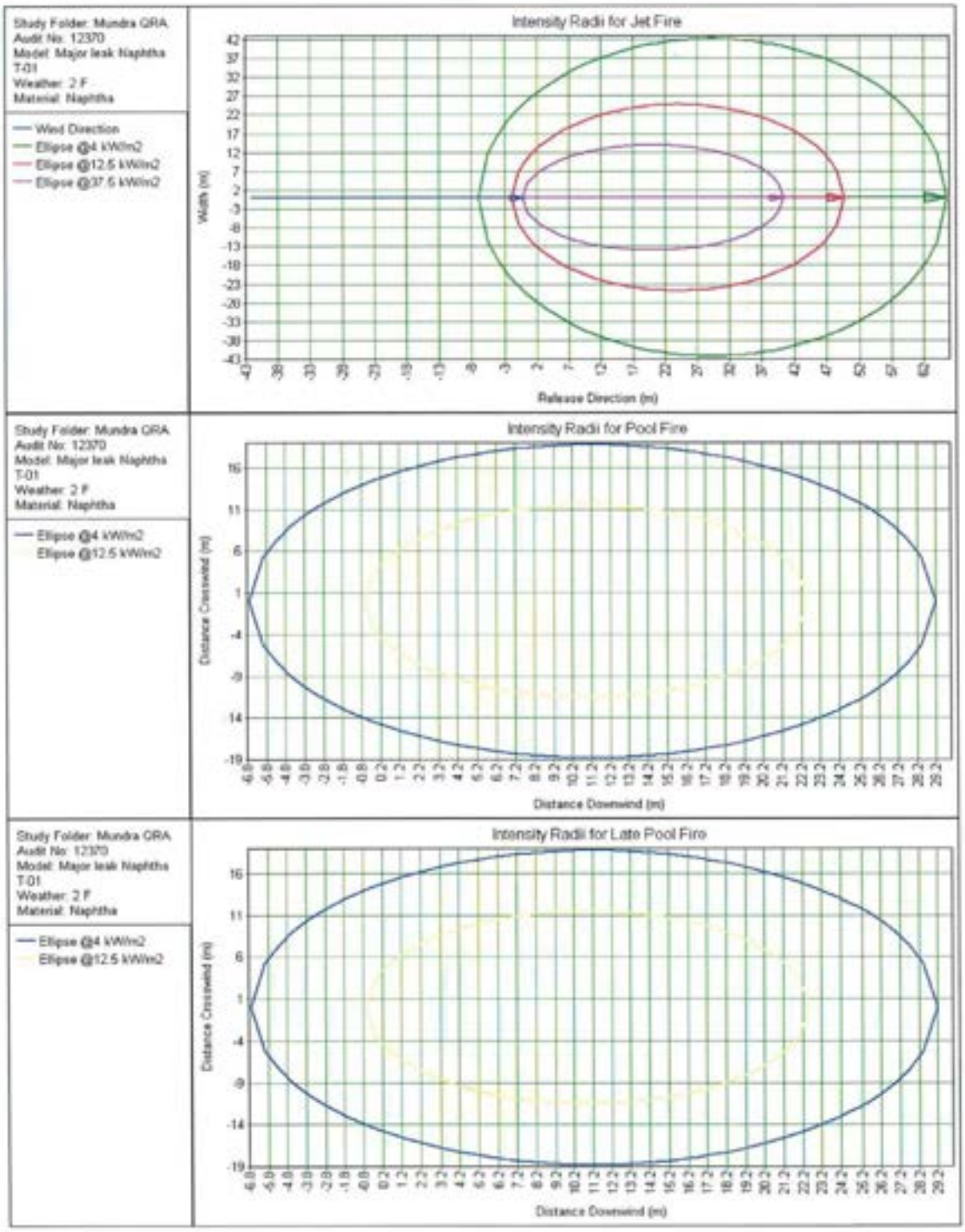
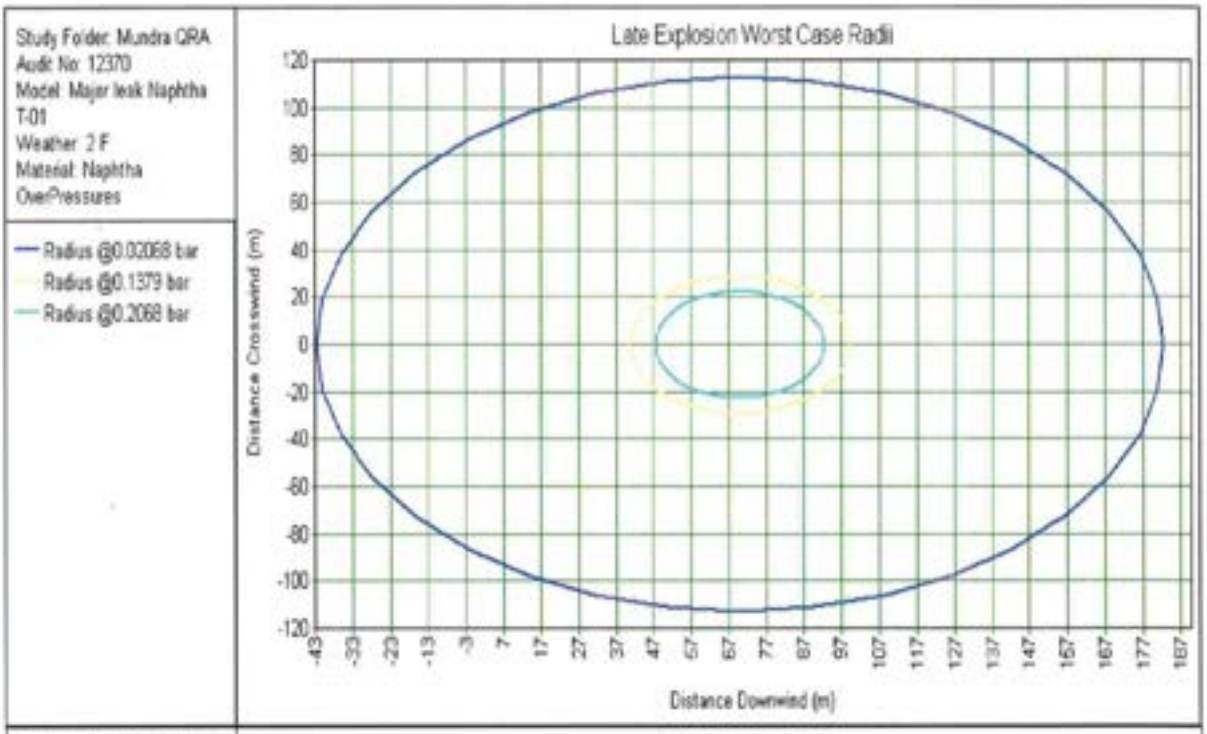
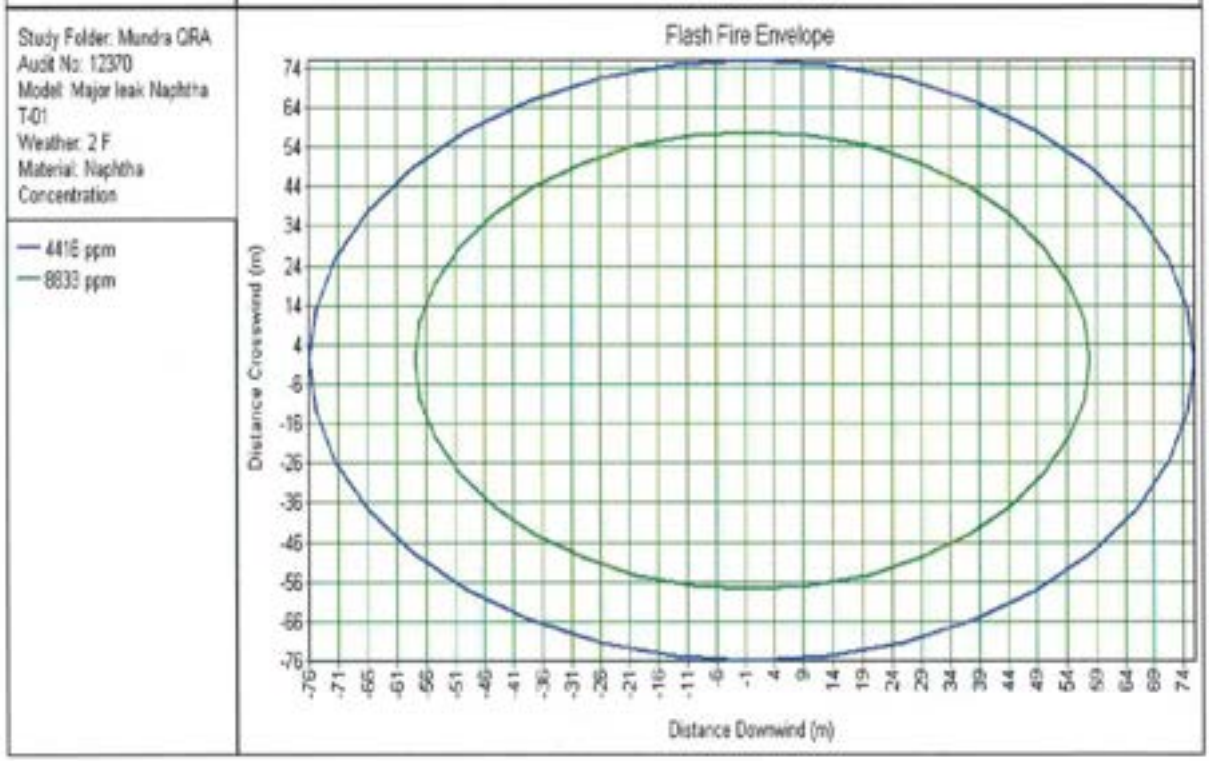
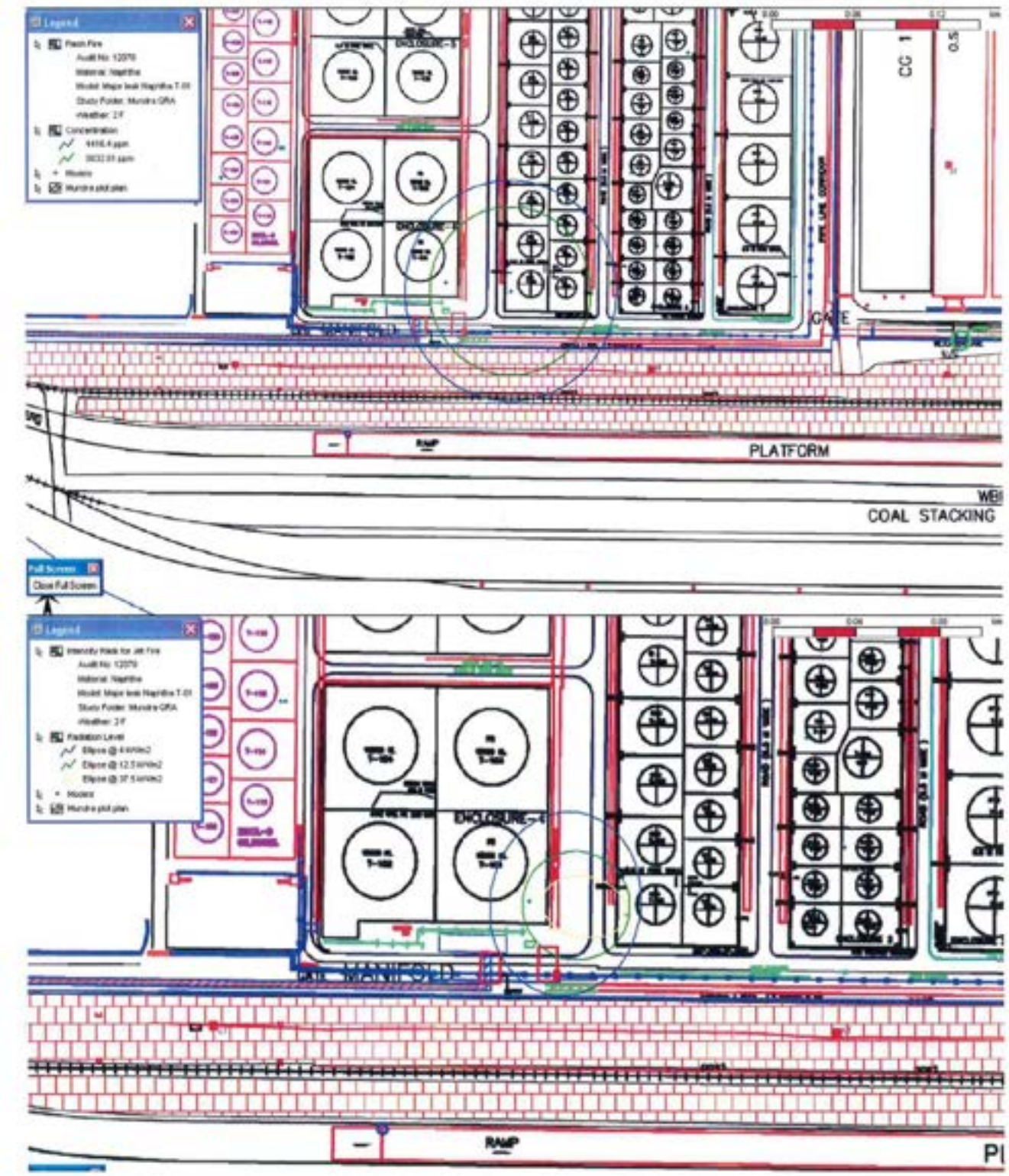
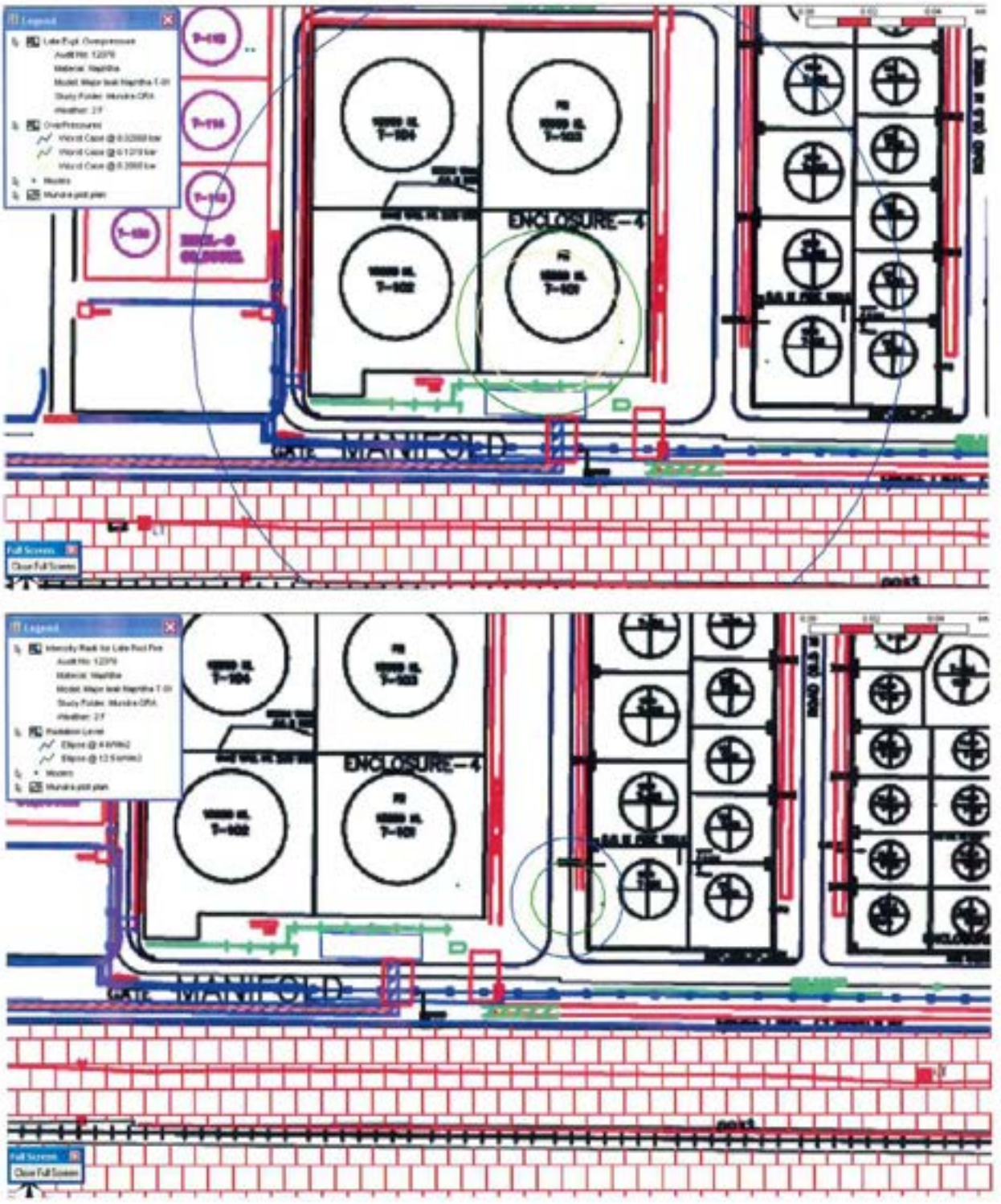



Study Folder: Mundra QRA
Audit No: 12370
Model: Major leak Naphtha T-01
Weather: 2 F
Material: Naphtha
Wind Direction
Ellipse @4 kW/m2
Ellipse @12.5 kW/m2
Ellipse @37.5 kW/m2
Intensity Radii for Jet Fire
Width (m)
Release Direction (m)
Study Folder: Mundra QRA
Audit No: 12370
Model: Major leak Naphtha T-01
Weather: 2 F
Material: Naphtha
Ellipse @4 kW/m2
Ellipse @12.5 kW/m2
Intensity Radii for Pool Fire
Distance Crosswind (m)
Distance Downwind (m)
Study Folder: Mundra QRA
Audit No: 12370
Model: Major leak Naphtha T-01
Weather: 2 F
Material: Naphtha
Ellipse @4 kW/m2
Ellipse @12.5 kW/m2
Intensity Radii for Late Pool Fire
Distance Crosswind (m)
Distance Downwind (m)

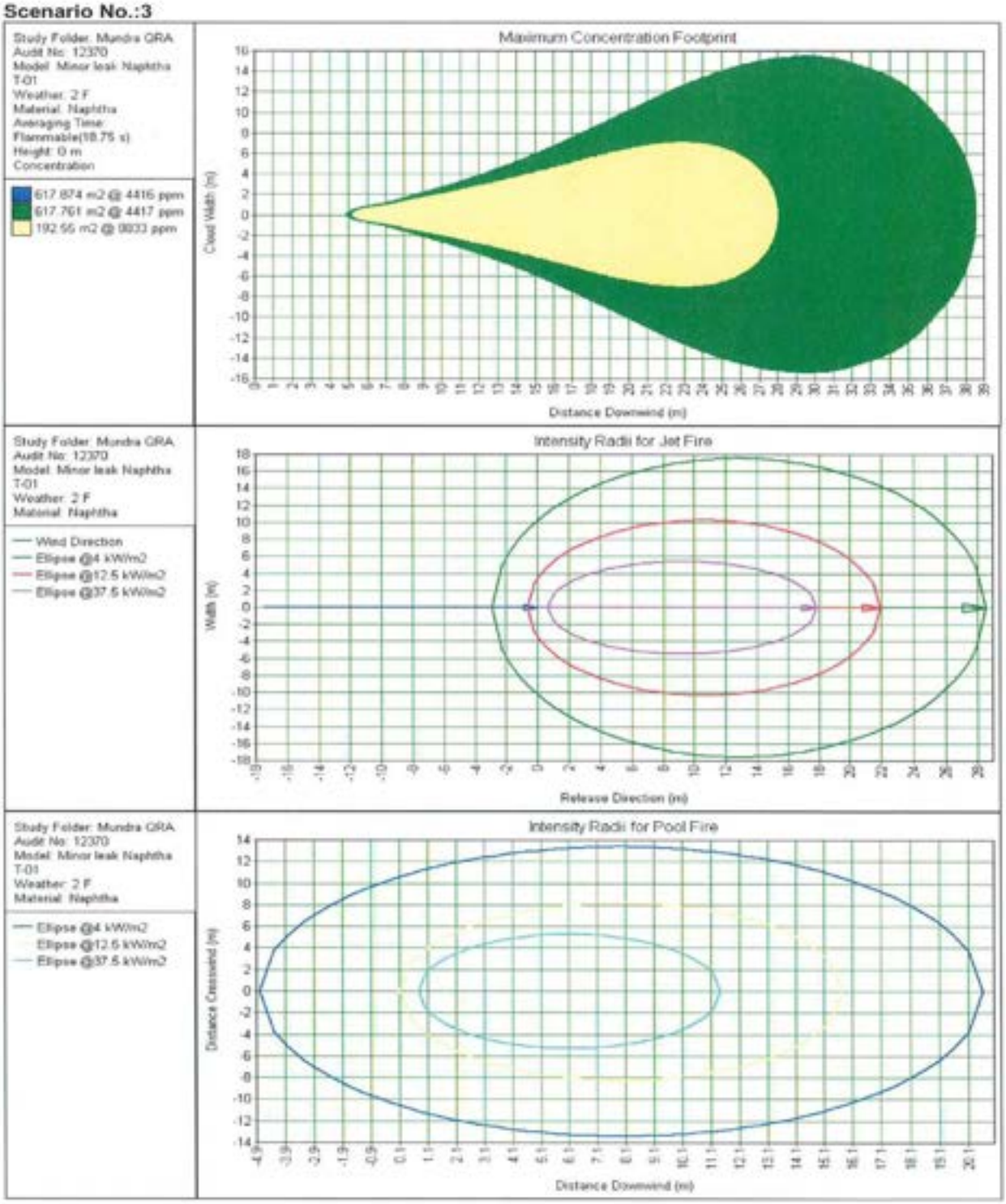

Study Folder: Mundra QRA
Audit No: 12370
Model: Major leak Naphtha T-01
Weather: 2 F
Material: Naphtha
OverPressures
Radius @0.02068 bar
Radius @0.1379 bar
Radius @0.2068 bar
Late Explosion Worst Case Radii
Distance Crosswind (m)
Distance Downwind (m)

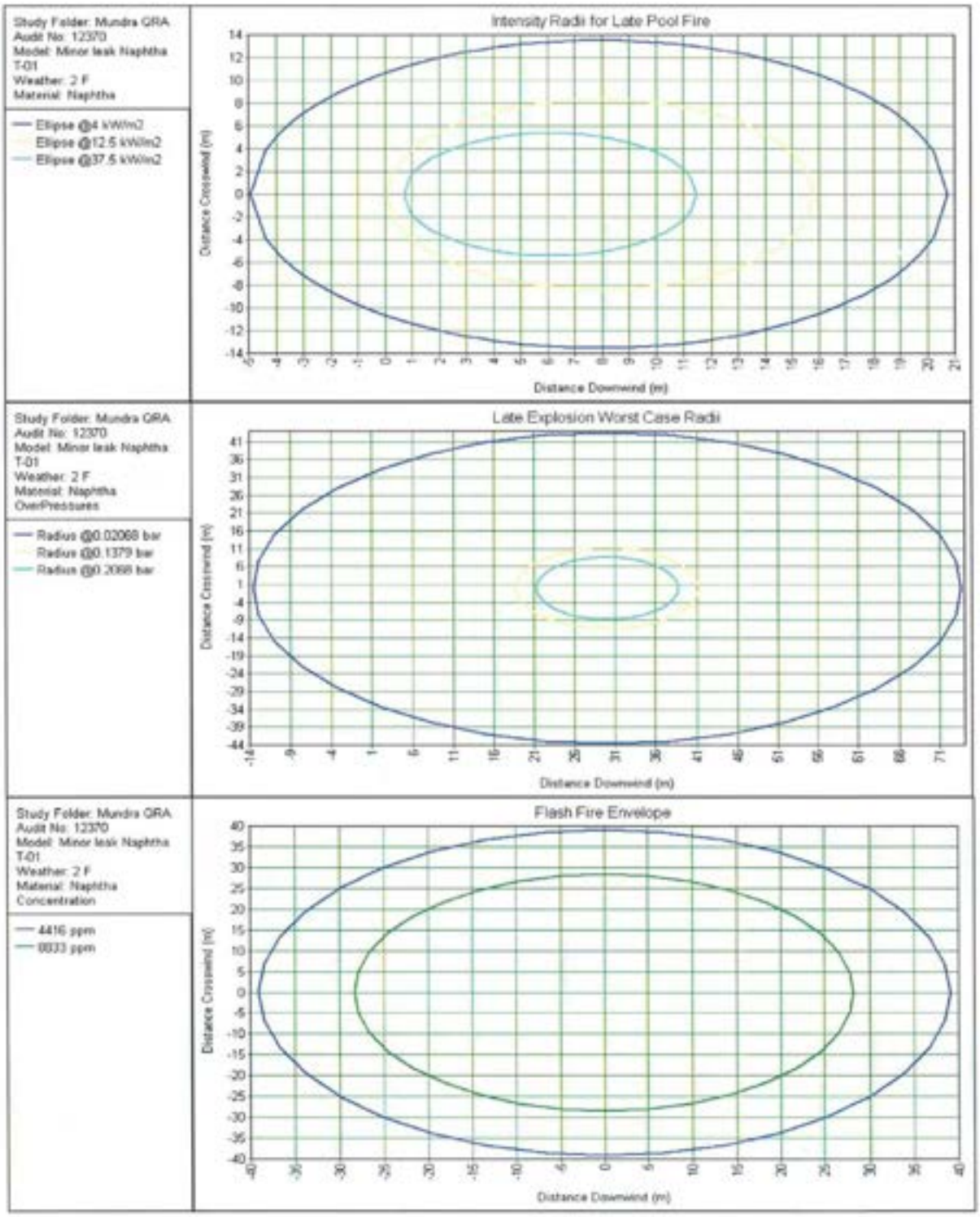

Study Folder: Mundra QRA
Audit No: 12370
Model: Major leak Naphtha T-01
Weather: 2 F
Material: Naphtha
Concentration
4416 ppm
8833 ppm
Flash Fire Envelope
Distance Crosswind (m)
Distance Downwind (m)

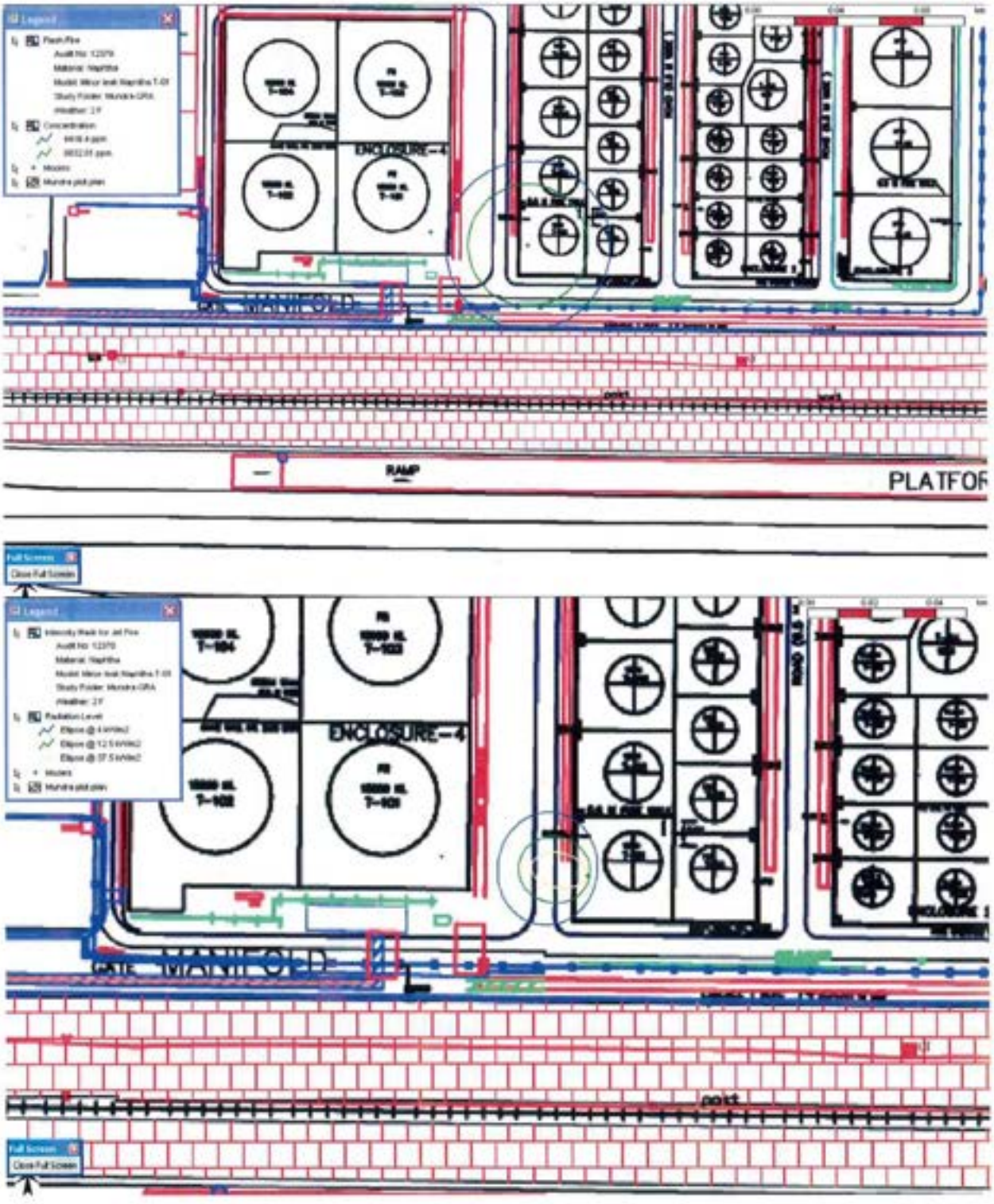

PLATFORM
COAL STACKING
RAMP

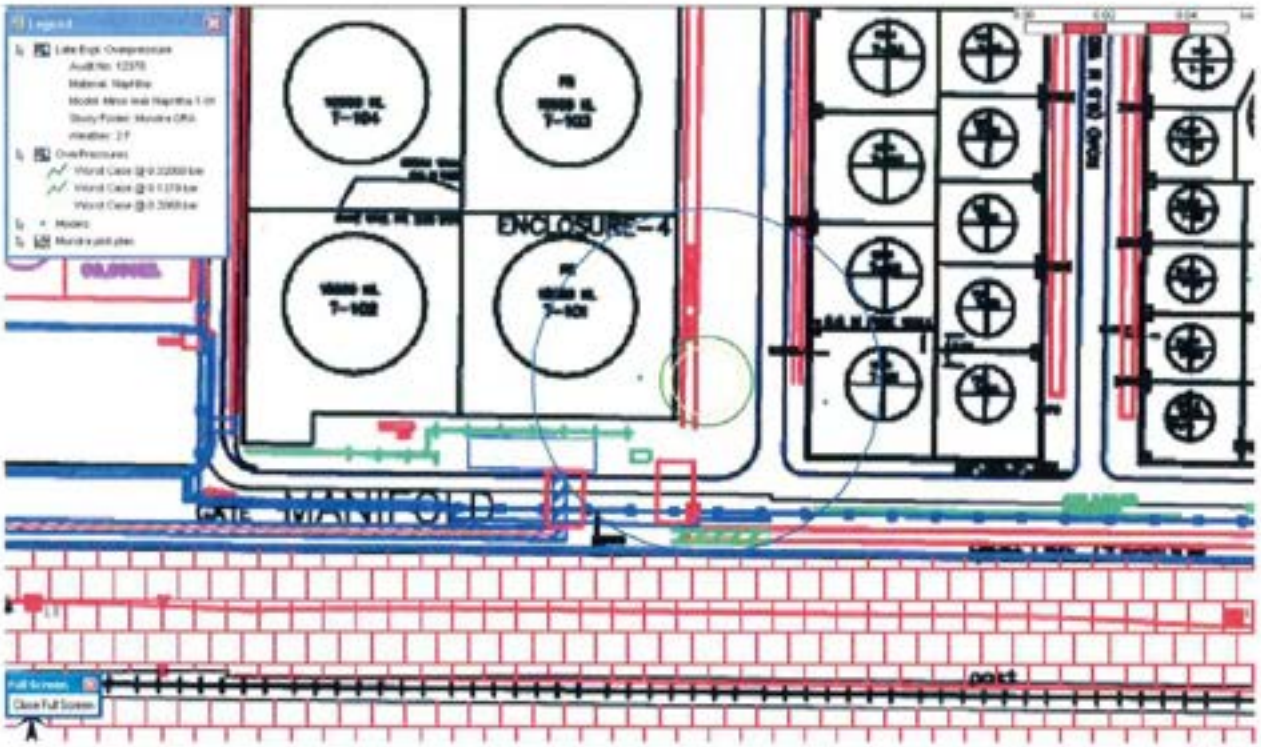

ENCLOSURE-4
MANIFOLD
ENCLOSURE-4
MANIFOLD

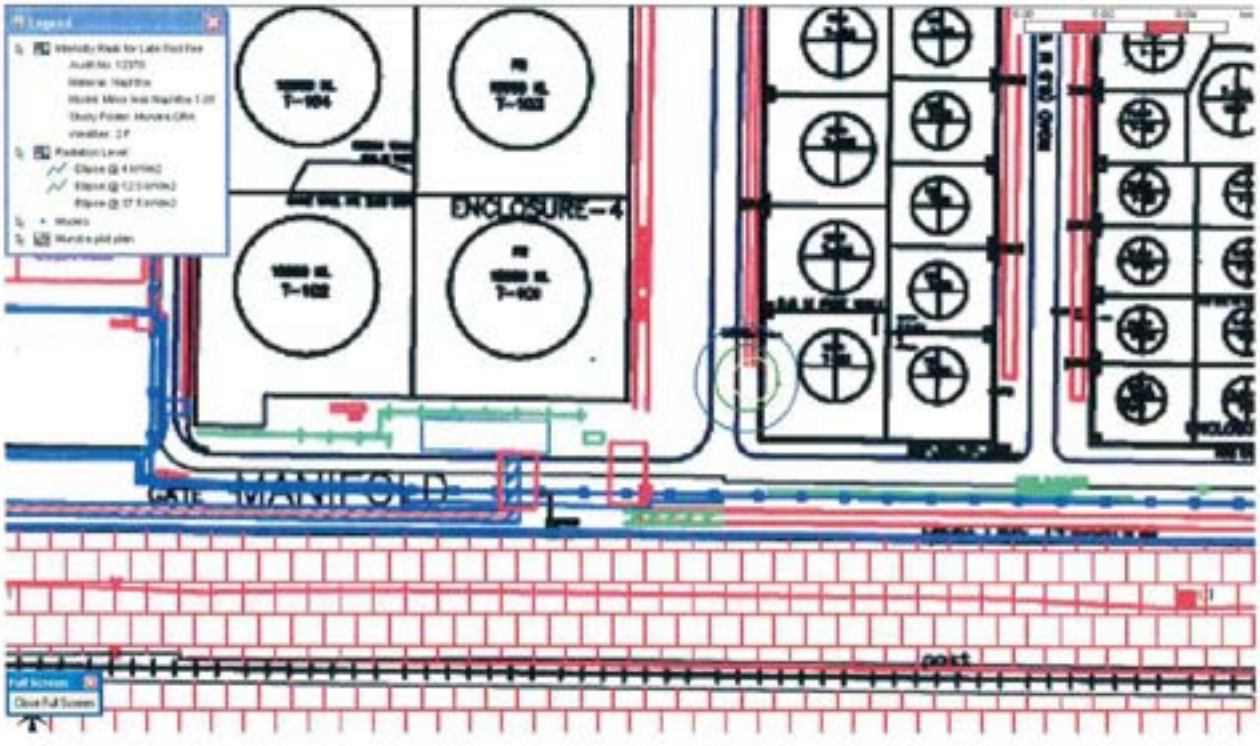
Scenario No.:3



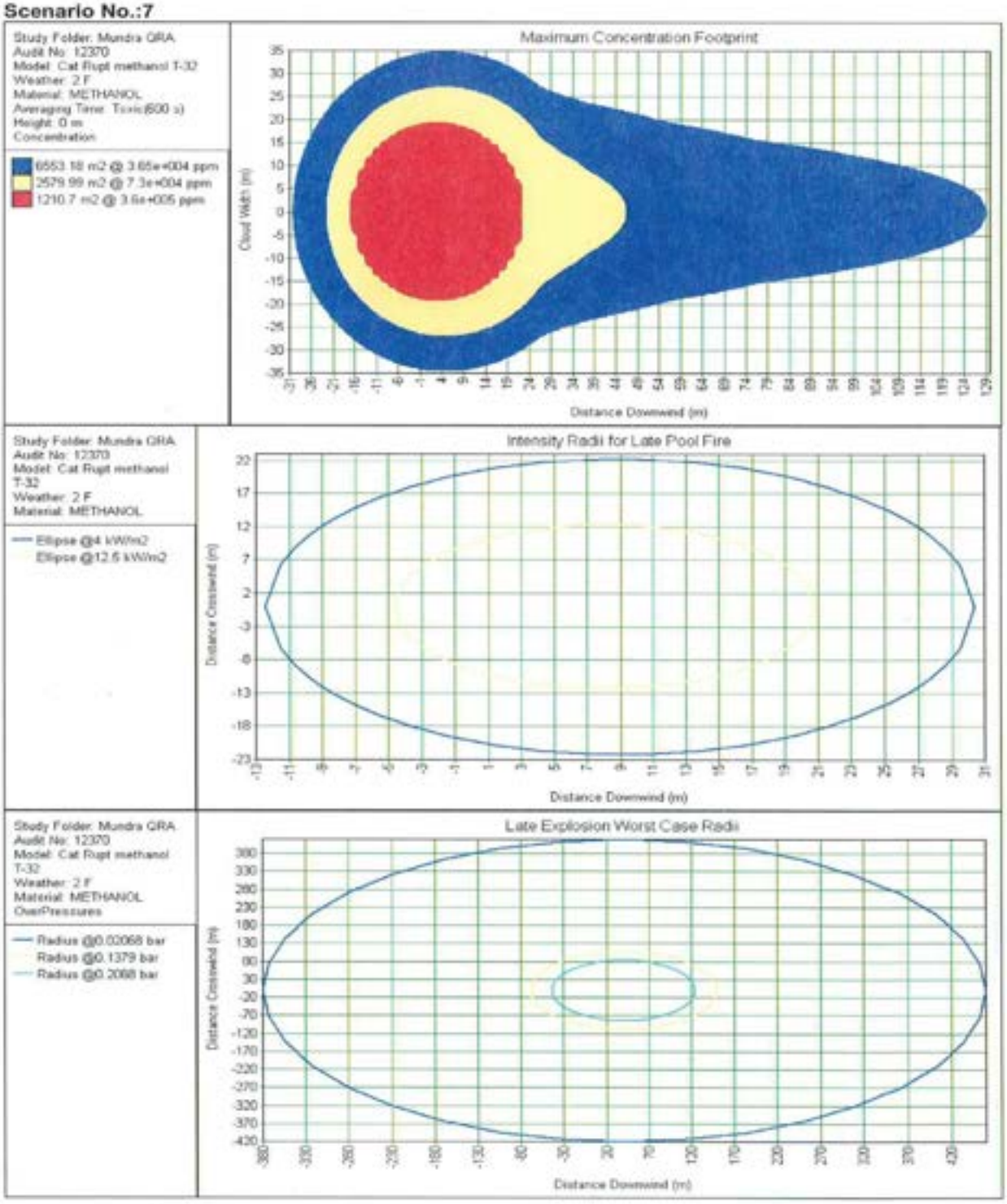

Study Folder: Mundra QRA
Audit No: 12370
Model: Minor leak Naphtha T-01
Weather: 2 F
Material: Naphtha
Ellipse @4 kW/m2
Ellipse @12.5 kW/m2
Ellipse @37.5 kW/m2
Intensity Radii for Late Pool Fire
Distance Crosswind (m)
Distance Downwind (m)
Study Folder: Mundra QRA
Audit No: 12370
Model: Minor leak Naphtha T-01
Weather: 2 F
Material: Naphtha
OverPressures
Radius @0.02068 bar
Radius @0.1379 bar
Radius @0.2068 bar
Late Explosion Worst Case Radii
Distance Crosswind (m)
Distance Downwind (m)
Study Folder: Mundra QRA
Audit No: 12370
Model: Minor leak Naphtha T-01
Weather: 2 F
Material: Naphtha
Concentration
4416 ppm
8833 ppm
Flash Fire Envelope
Distance Crosswind (m)
Distance Downwind (m)

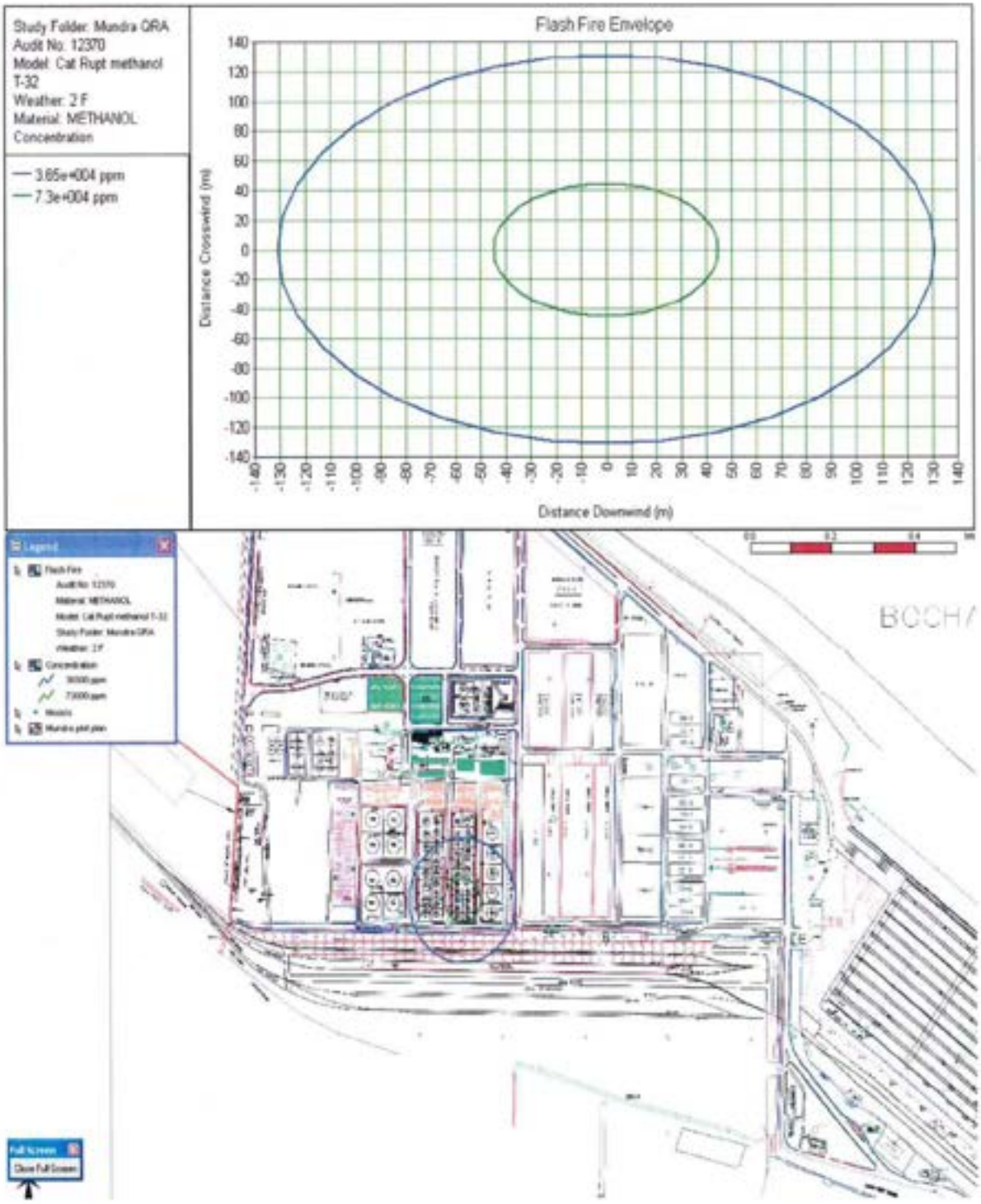

ENCLOSURE – 4
RAMP
PLATFOR
ENCLOSURE – 4
MAIN GATE
port

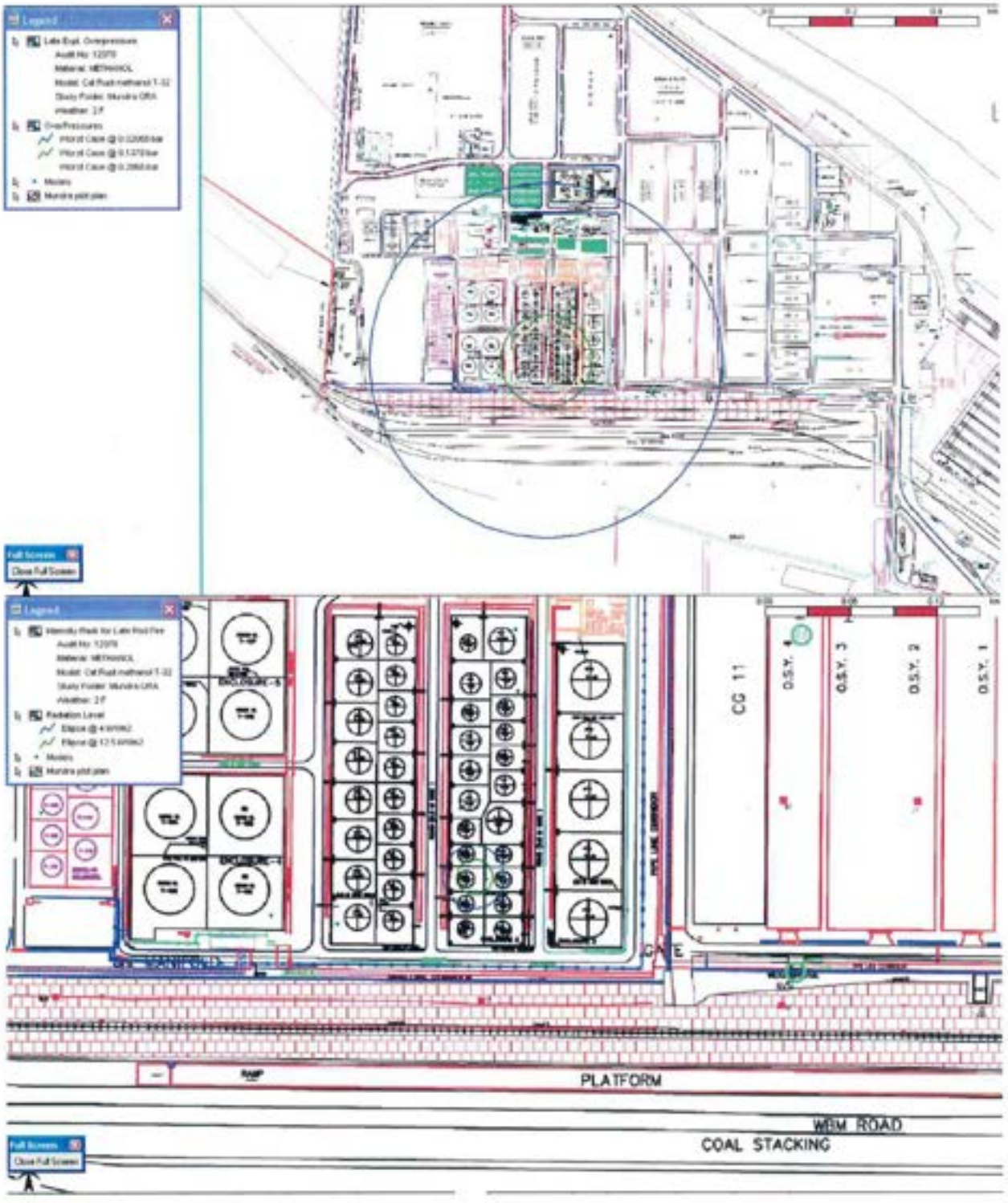

ENCLOSURE-4
T-104
T-103
T-102
T-101
MANIFOLD
port

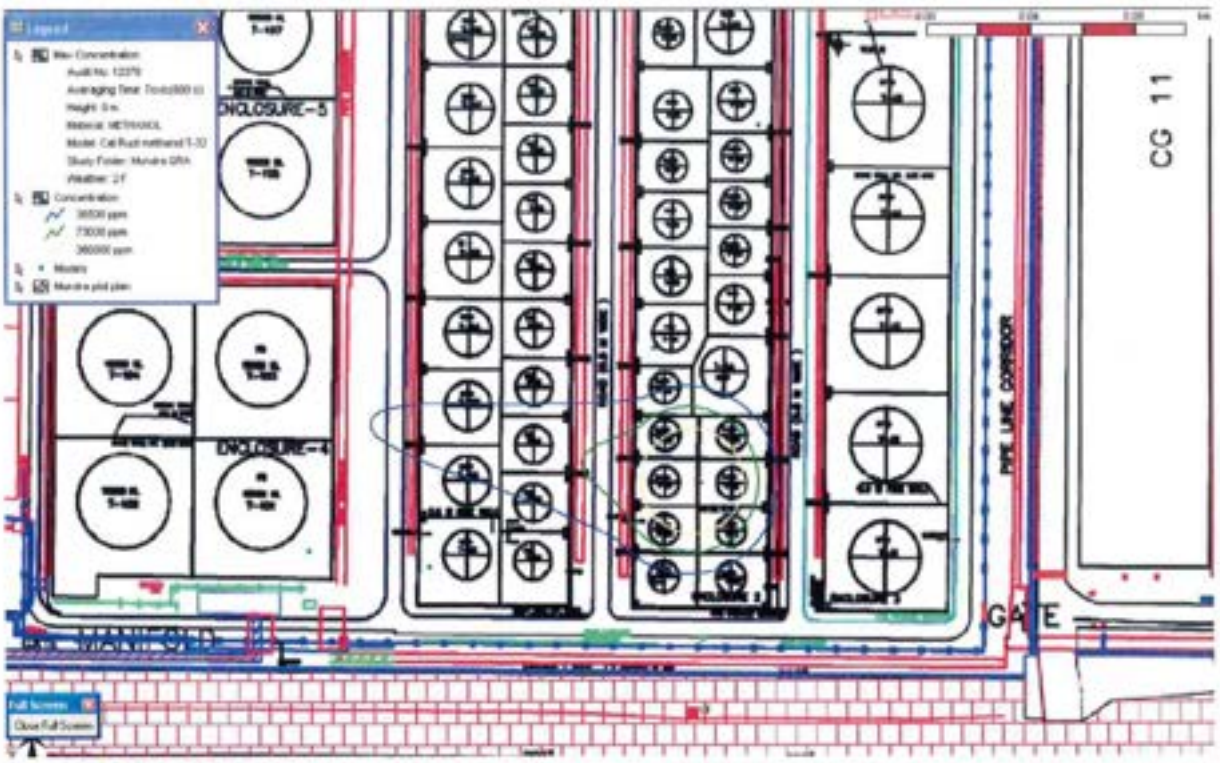

ENCLOSURE-4
T-104
T-103
T-102
T-101
MANIFOLD
port

Scenario No.:7




Study Folder: Mundra QRA
Audit No: 12370
Model: Cat Rupt methanol T-32
Weather: 2 F
Material: METHANOL
Concentration
3.65e+004 ppm
7.3e+004 ppm
Flash Fire Envelope
Distance Crosswind (m)
Distance Downwind (m)
Legend


CG 11
O.S.Y. 4
O.S.Y. 3
O.S.Y. 2
O.S.Y. 1
PLATFORM
WBM ROAD
COAL STACKING



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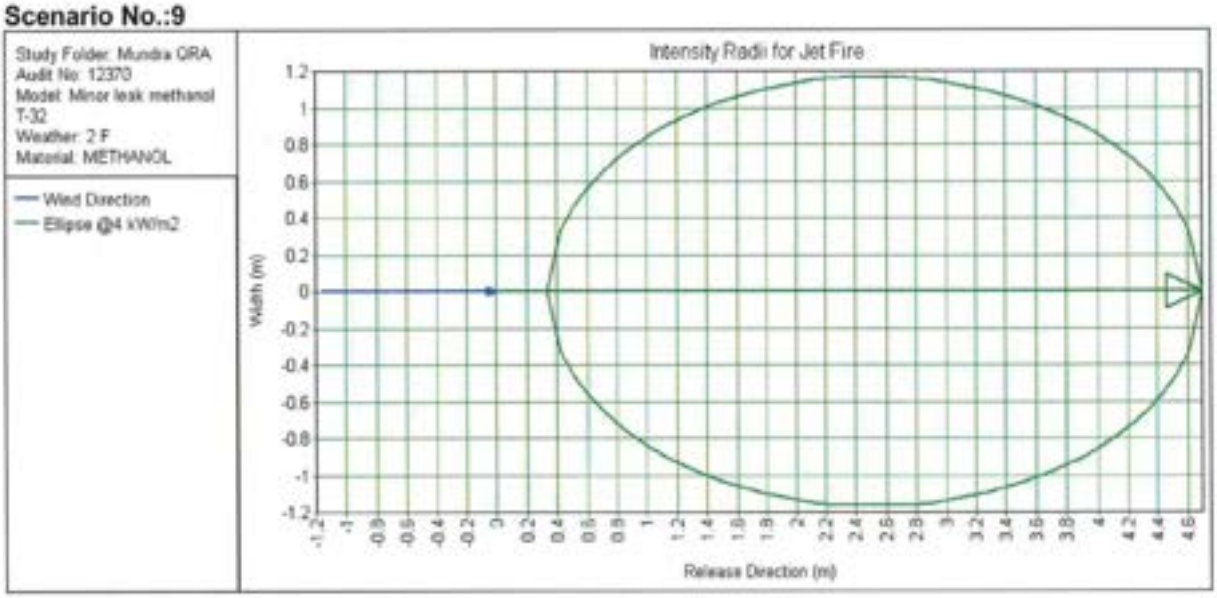
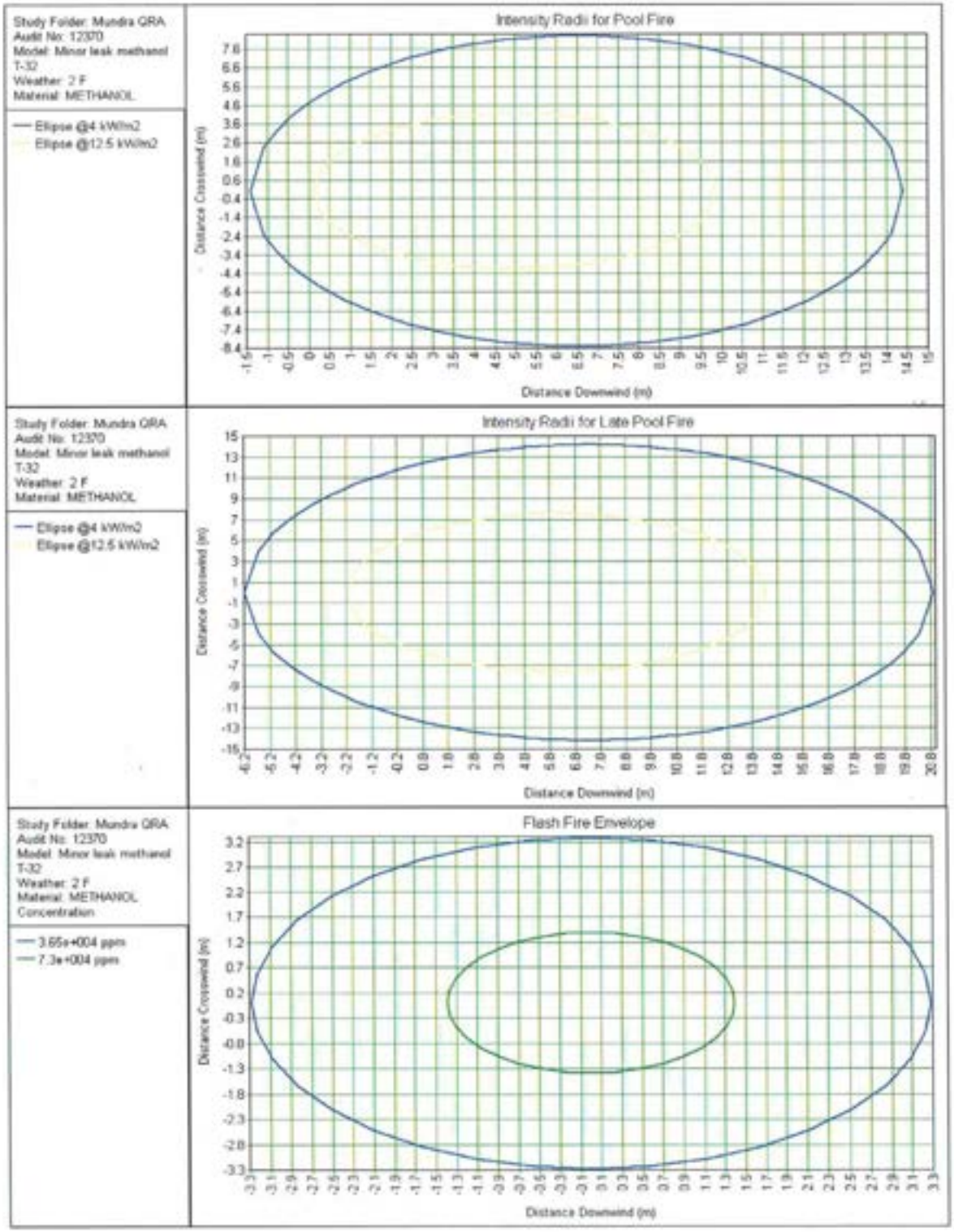
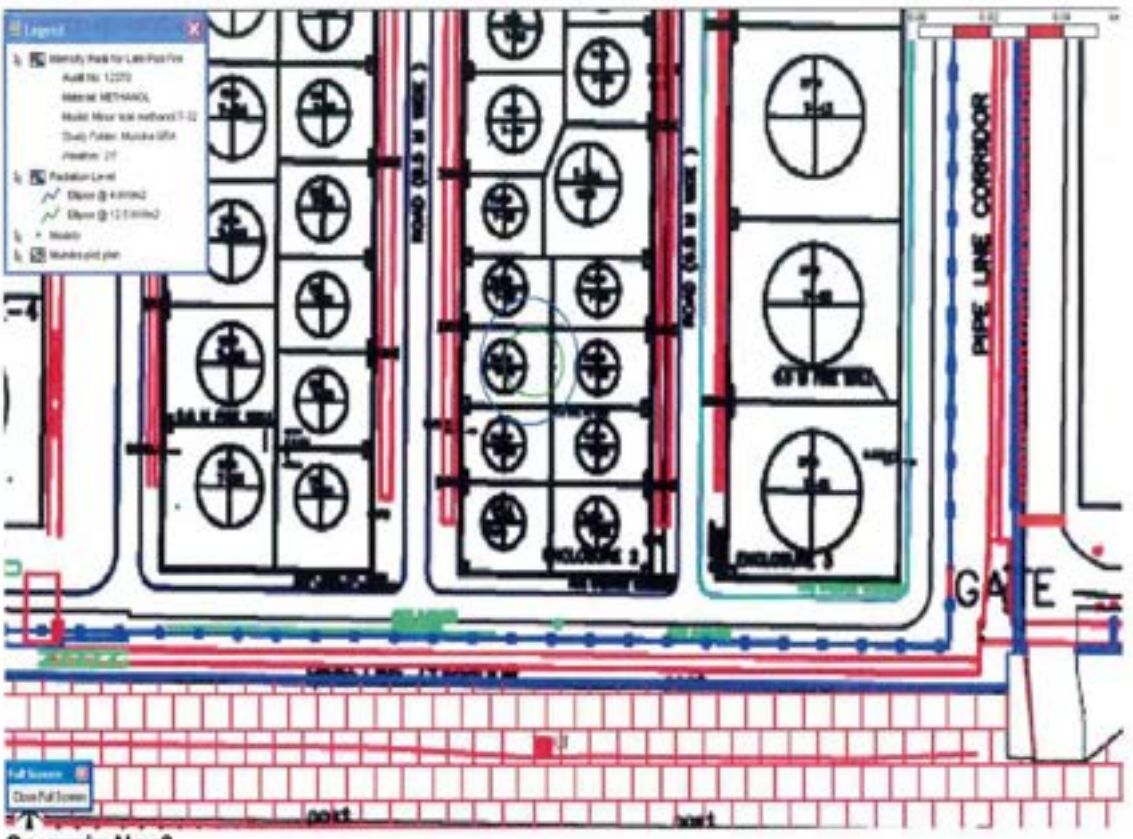
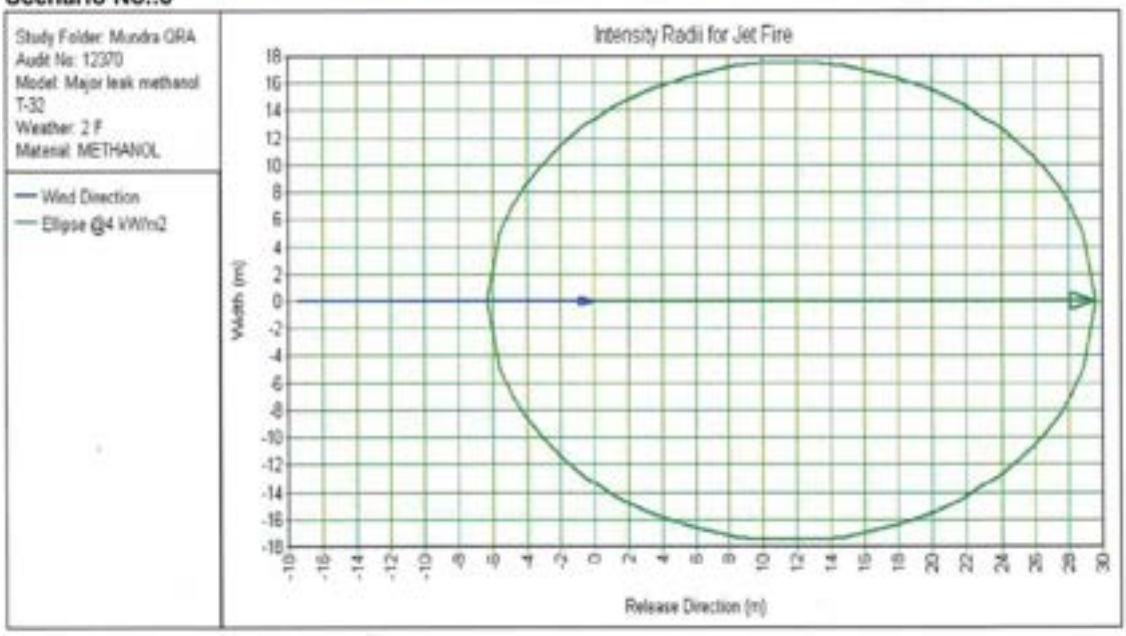
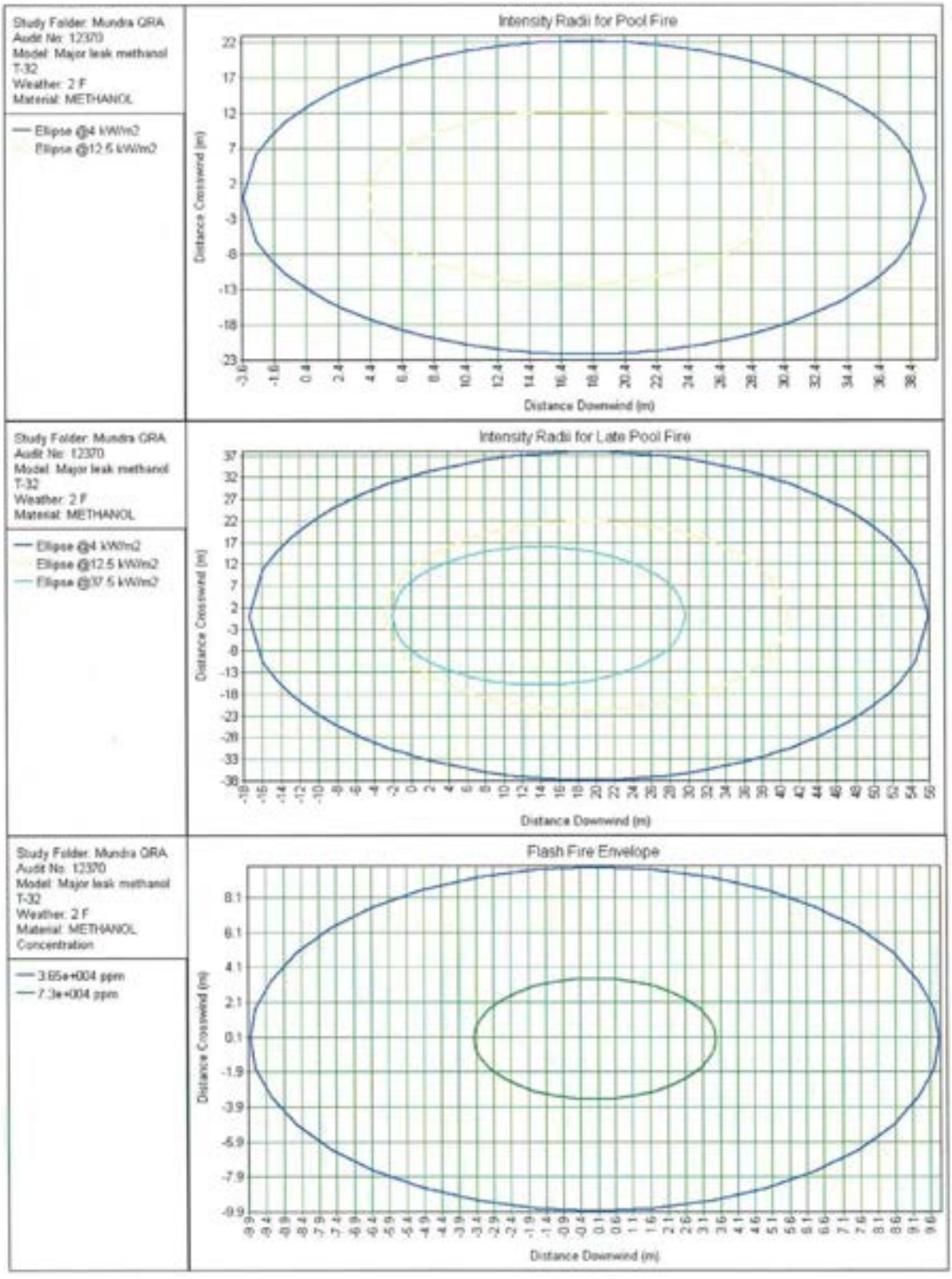


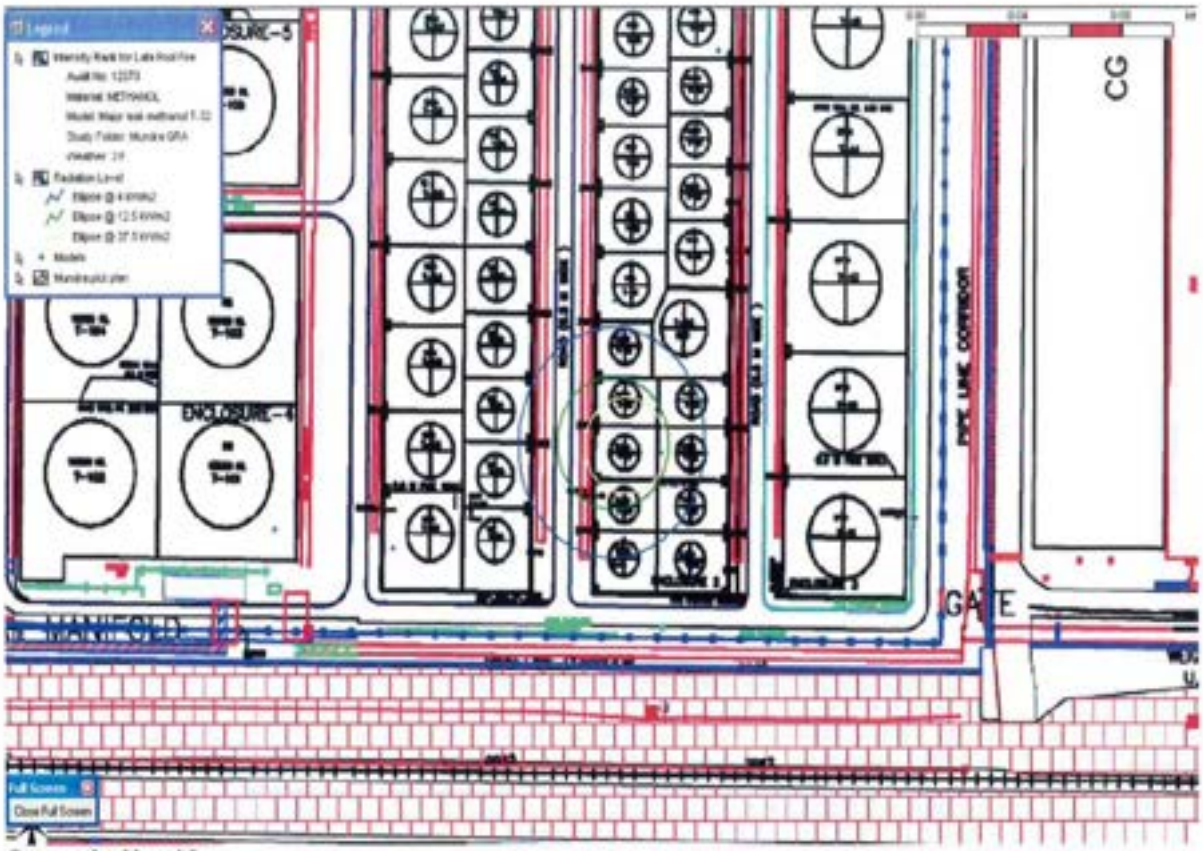

Study Folder: Mundra QRA
Audit No: 12370
Model: Minor leak methanol T-32
Weather: 2 F
Material: METHANOL
Ellipse @4 kW/m2
Ellipse @12.5 kW/m2
Intensity Radii for Pool Fire
Distance Crosswind (m)
Distance Downwind (m)
Study Folder: Mundra QRA
Audit No: 12370
Model: Minor leak methanol T-32
Weather: 2 F
Material: METHANOL
Ellipse @4 kW/m2
Ellipse @12.5 kW/m2
Intensity Radii for Late Pool Fire
Distance Crosswind (m)
Distance Downwind (m)
Study Folder: Mundra QRA
Audit No: 12370
Model: Minor leak methanol T-32
Weather: 2 F
Material: METHANOL
Concentration
3.65e+004 ppm
7.3e+004 ppm
Flash Fire Envelope
Distance Crosswind (m)
Distance Downwind (m)



Scenario No.:8




Study Folder: Mundra QRA
Audit No: 12370
Model: Major leak methanol T-32
Weather: 2 F
Material: METHANOL
Ellipse @4 kW/m2
Ellipse @12.5 kW/m2
Intensity Radii for Pool Fire
Distance Crosswind (m)
Distance Downwind (m)
Study Folder: Mundra QRA
Audit No: 12370
Model: Major leak methanol T-32
Weather: 2 F
Material: METHANOL
Ellipse @4 kW/m2
Ellipse @12.5 kW/m2
Ellipse @37.5 kW/m2
Intensity Radii for Late Pool Fire
Distance Crosswind (m)
Distance Downwind (m)
Study Folder: Mundra QRA
Audit No: 12370
Model: Major leak methanol T-32
Weather: 2 F
Material: METHANOL
Concentration
3.65e+004 ppm
7.3e+004 ppm
Flash Fire Envelope
Distance Crosswind (m)
Distance Downwind (m)



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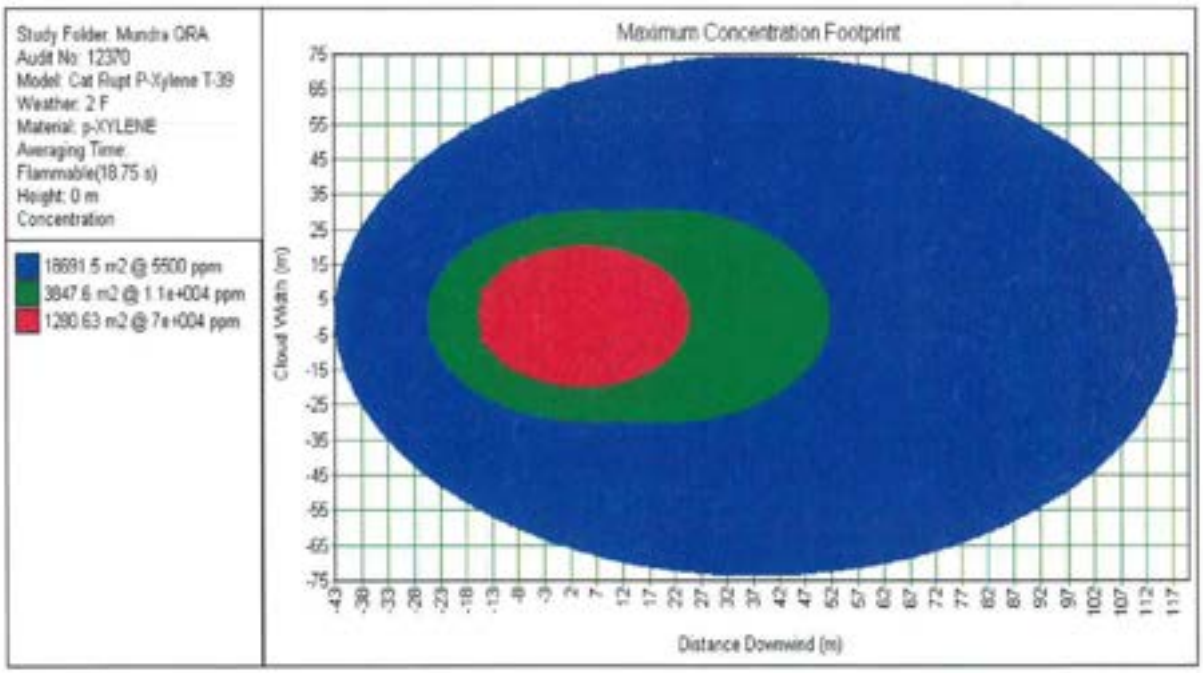
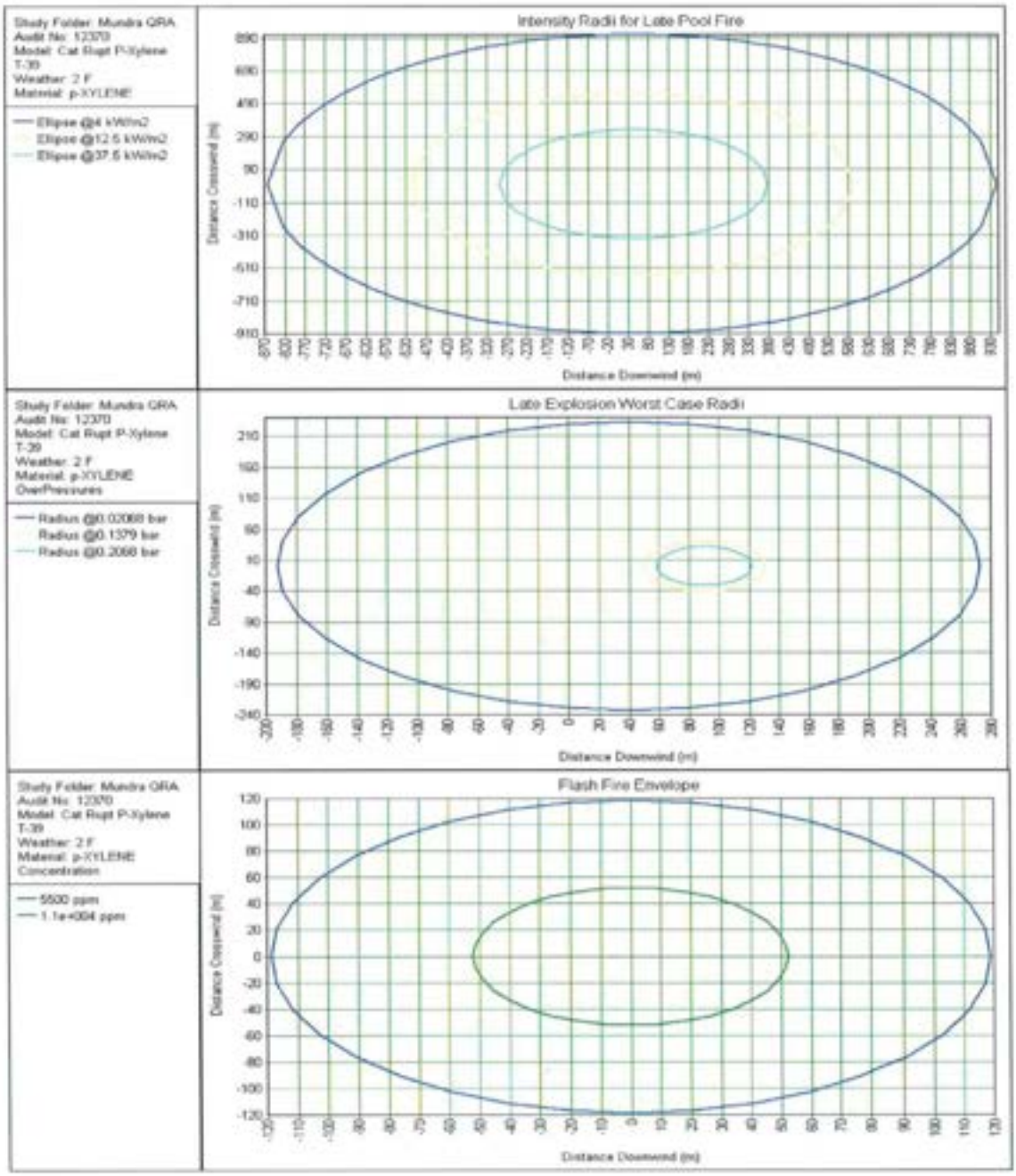
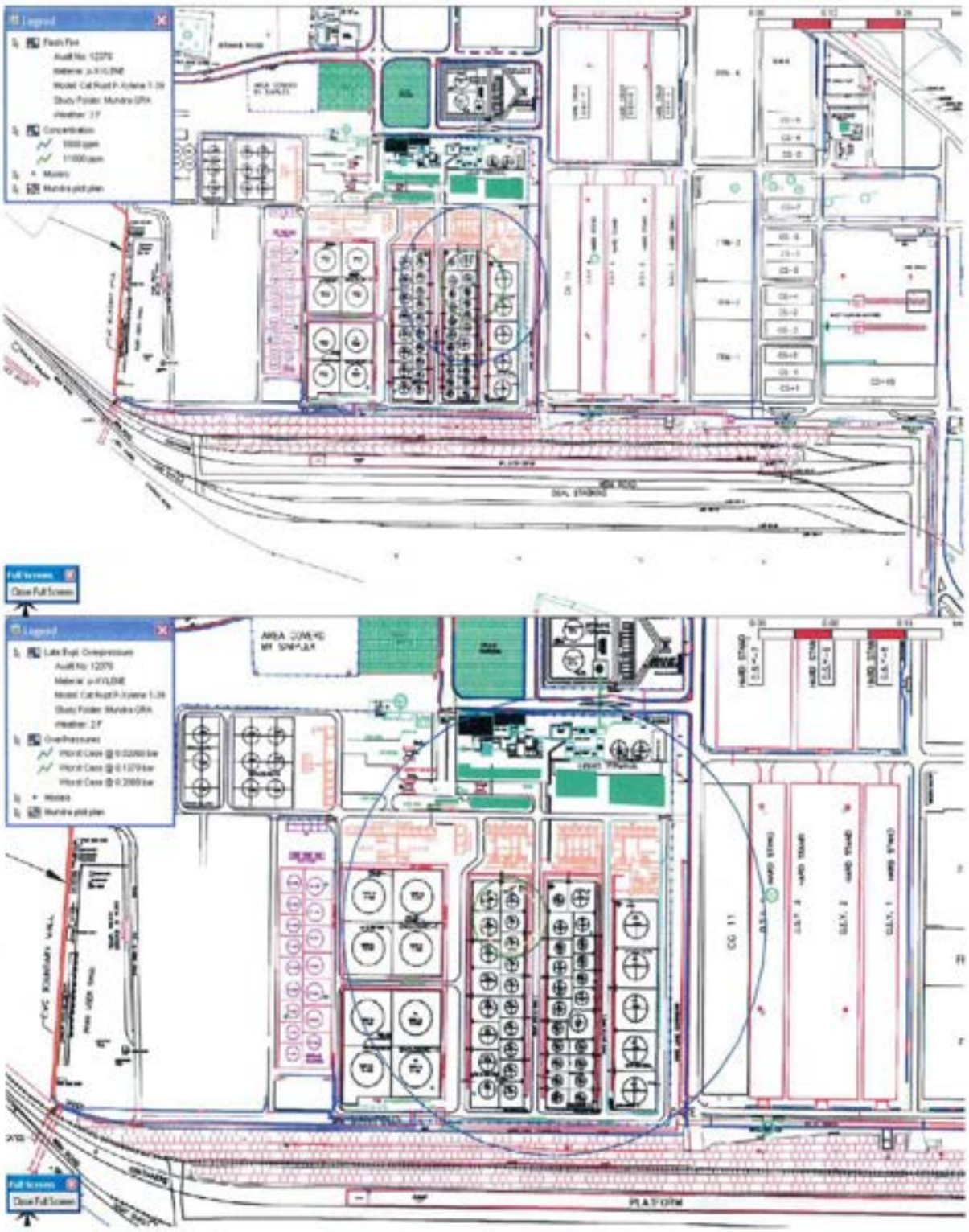
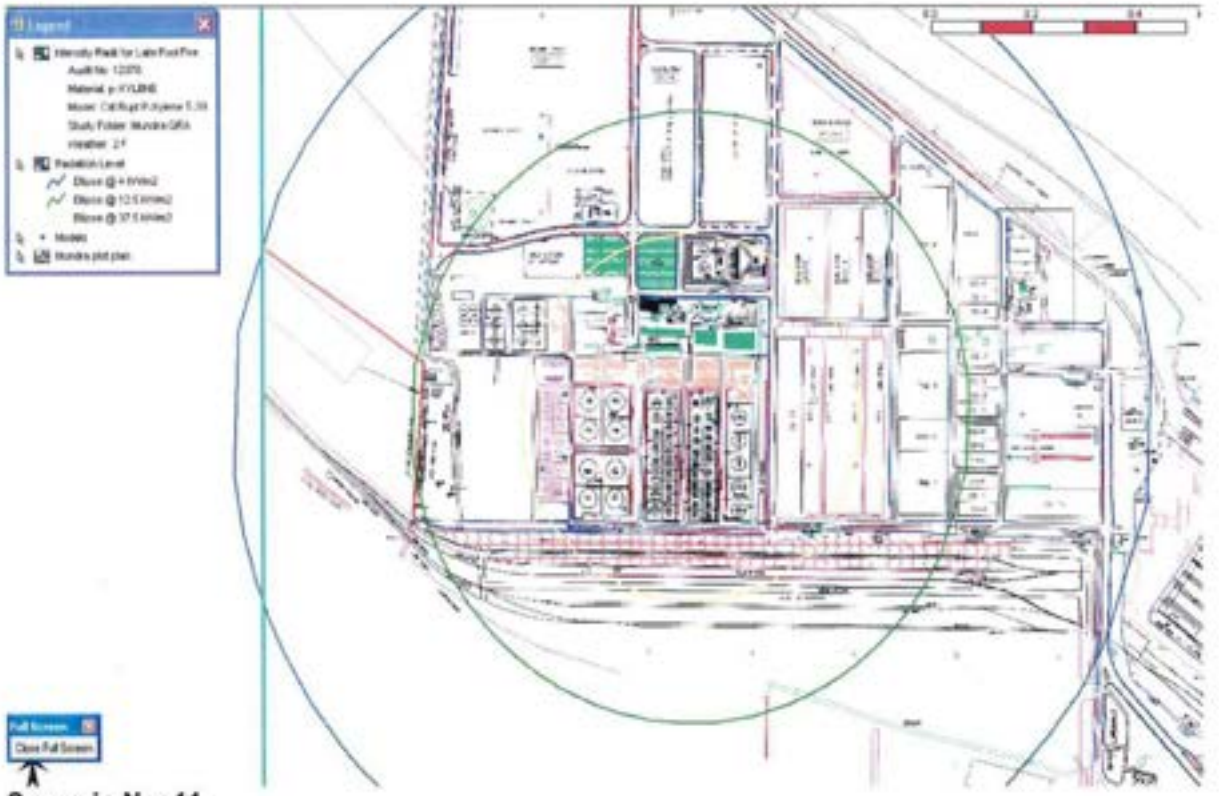



Study Folder: Mundra QRA
Audit No: 12370
Model: Cat Rupt P-Xylene
T-39
Weather: 2 F
Material: p-XYLENE
Ellipse @4 kW/m2
Ellipse @12.5 kW/m2
Ellipse @37.5 kW/m2
Intensity Radii for Late Pool Fire
Distance Crosswind (m)
Distance Downwind (m)
Study Folder: Mundra QRA
Audit No: 12370
Model: Cat Rupt P-Xylene
T-39
Weather: 2 F
Material: p-XYLENE
OverPressures
Radius @0.02068 bar
Radius @0.1379 bar
Radius @0.2068 bar
Late Explosion Worst Case Radii
Distance Crosswind (m)
Distance Downwind (m)
Study Folder: Mundra QRA
Audit No: 12370
Model: Cat Rupt P-Xylene
T-39
Weather: 2 F
Material: p-XYLENE
Concentration
5500 ppm
1.1e+004 ppm
Flash Fire Envelope
Distance Crosswind (m)
Distance Downwind (m)





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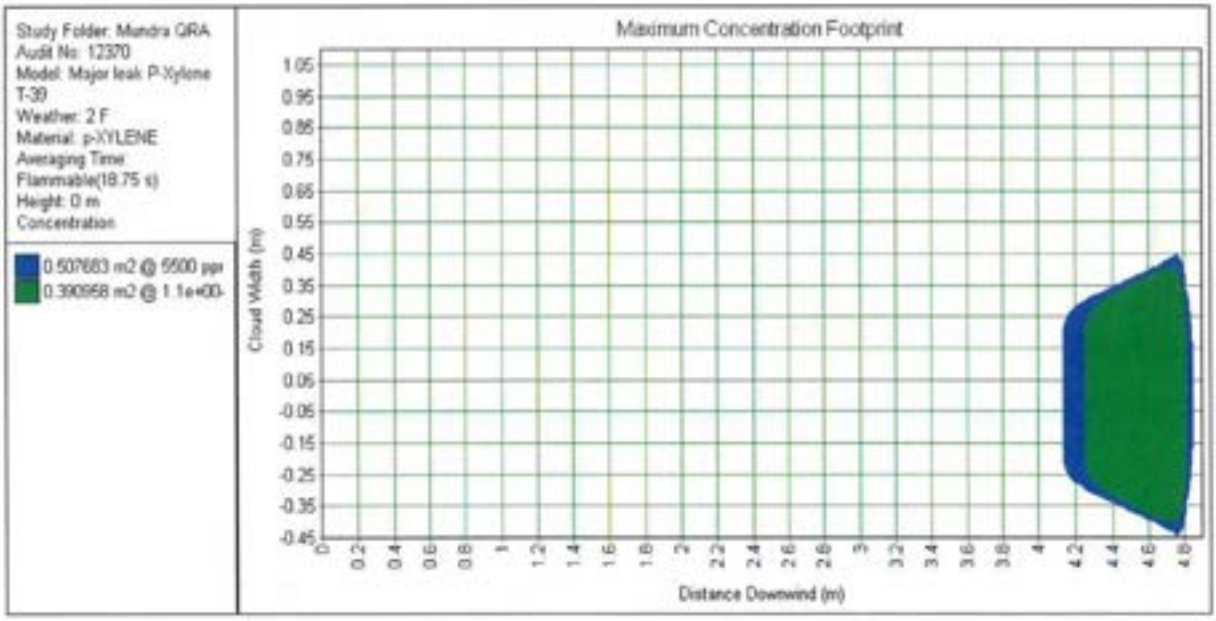

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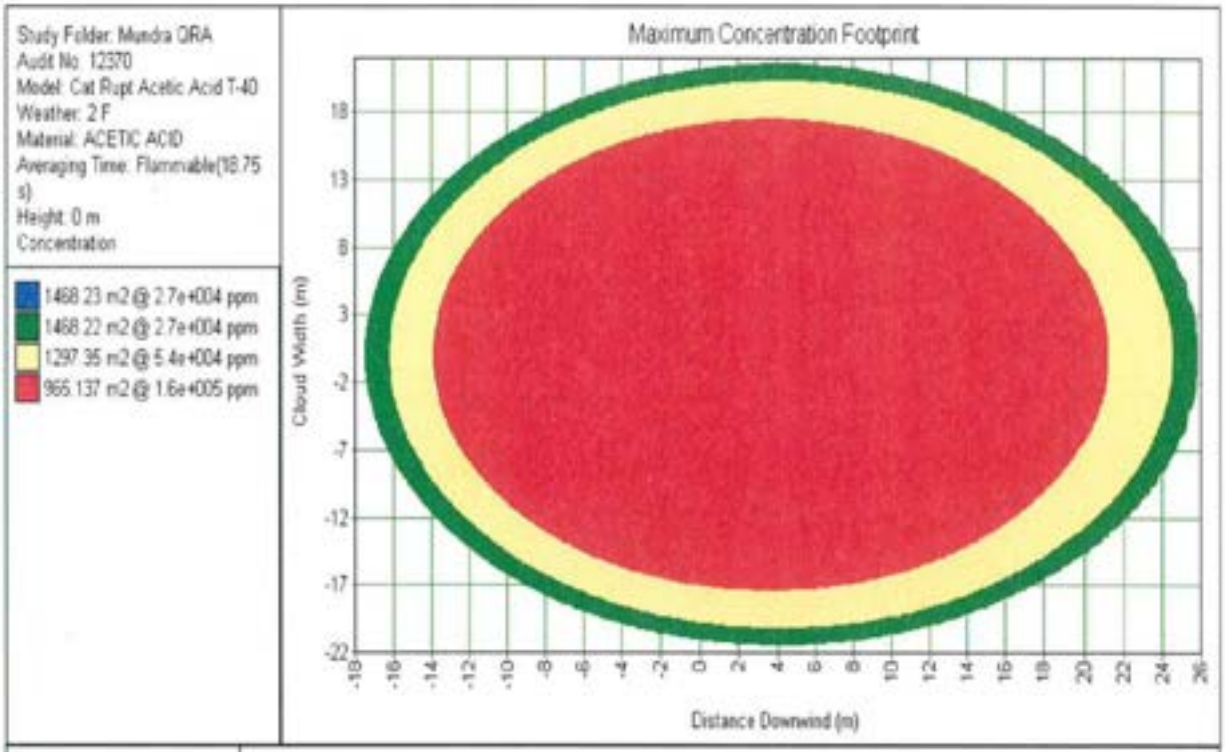
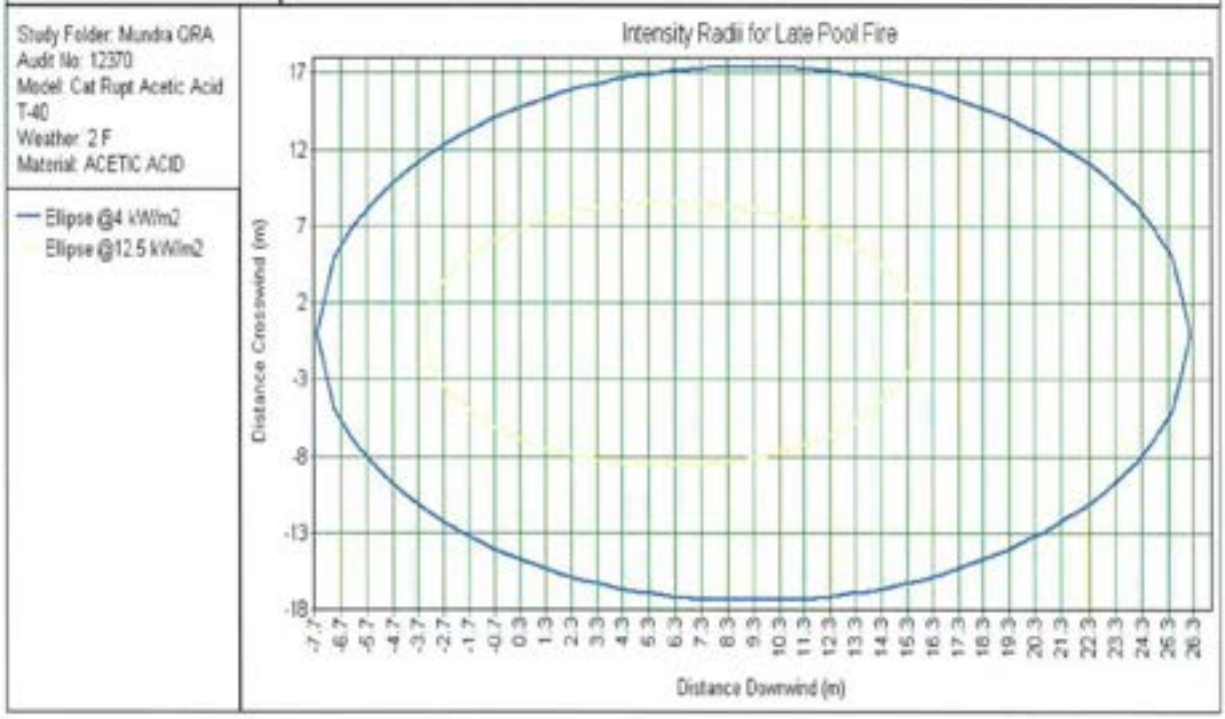




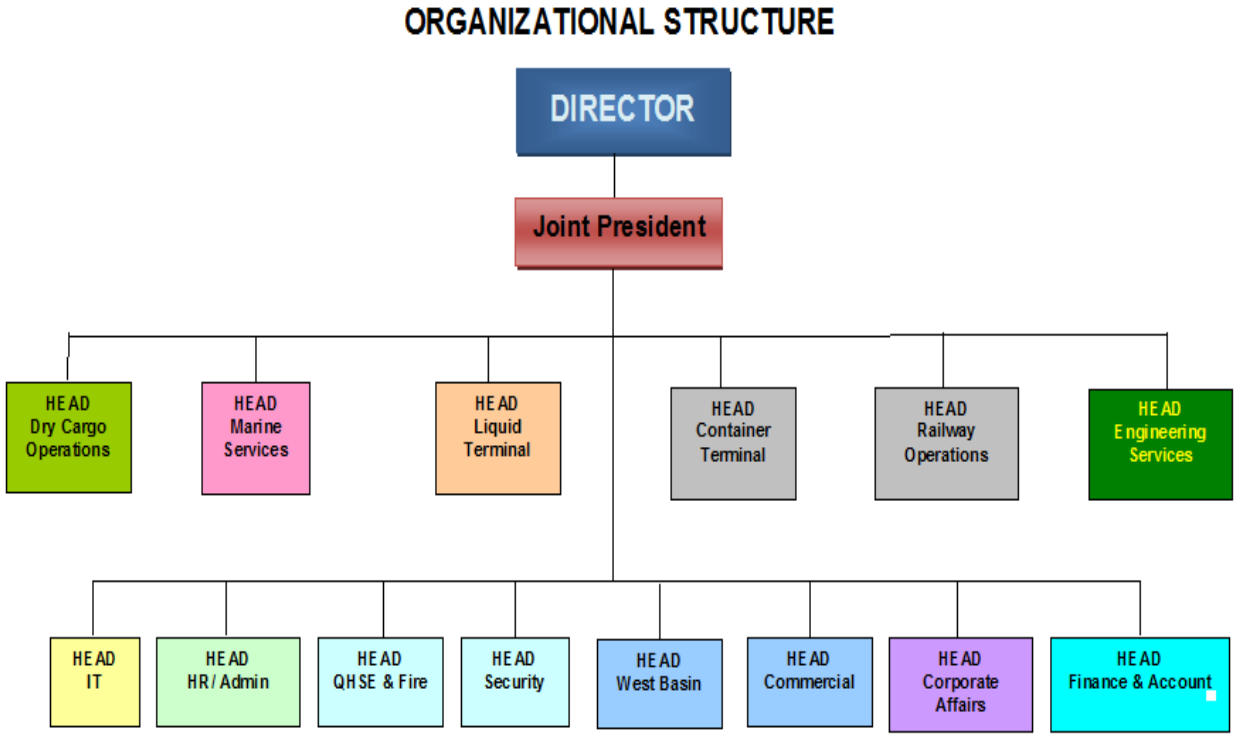
CHAPTER NO. III

ABOUT EMERGENCY ORGANISATION

CONTENTS

3.0 EMERGENCY ORGANIZATION

Emergency organization is the main aim behind preparing this plan. Due weight is added to select and assign suitable responsibilities to the most appropriate persons of the **Adani Port, Mundra** from respective departments. Care is taken to earmark emergency duties from their day-today responsibilities. The organization shall prove effective if activities are carried-out in a defined way. To get maximum advantage of emergency organization, we have defined the activities of various workers in the following way.



TERMS	DEFINITION
Emergency Control Center	In the event of an emergency, Port Operation Center has been declared as Emergency Control Center (POC). Port Operation Center (POC) is situate at Marine Control, **Adani Ports & SEZ Ltd**.

Coordinator	HOD or senior most functionaries in the respective services and other critical personnel available at site at the time of an emergency. They will report at the Emergency Control Center, unless and otherwise instructed by the site main controller.
Plant Key Person	Head of Department of individual process plant(s). {Should assume charge of Site Incident Controller in case of an emergency in their respective plant(s)}.
Non-Essential Personnel	Consists of employees, contractor's employees, visitors etc. (other than emergency response personnel) present at the incident site. In the event of an emergency, these persons shall assemble at the emergency assembly point of the plant/ area and shall respond as instructed by the site incident controller.

3.01 SCOPE & PURPOSE

SCOPE :: The very purpose of this plan is to activate the emergency response organization smoothly and effectively, once the emergency is declared. The plan details the arrangements for responding to emergency scenarios, covering in details the following aspects:

- To assess and define emergency including level of risk.
- To contain the incident and bring it under control.
- To coordinate with mutual aid members and Government authorities.
- To minimize damage to lives, property and the environment.
- To rescue and evacuate workers to safe areas.
- To provide necessary assistance to casualties.

PURPOSE :

The purpose of this plan is to:

- Establish & define roles of coordinators, key personnel and other emergency response personnel.

- Establish guidelines for effective response to any emergency.
- Ensure a smooth interface between various emergency procedures and the APSEZ Emergency Action Plan.

For this plan to be effective, it is necessary that:

- Coordinators, key personnel and other emergency response personnel are familiarized with this action plan.
- On-site resources are mobilized in minimum time.
- Assistance from outside agencies is readily available.
- The drills for identified emergencies are regularly exercised.
- The emergency responses are reviewed and updated based on latest developments, other information and requirements in order to improve effectiveness of the APSEZ – EAP.

3.02 THE NEED OF DISASTER PLANNING AT APSEZ (Port Area)

Disaster at The Port : A major emergency in Port is one, which has the potential to cause serious injury or loss of life. It may cause extensive damage to property and serious disruption both inside and outside the port. Sometimes, it would require the assistance of outside emergency services to handle it effectively. Although an emergency may be caused by a number of different factors, viz plant failure, human error, earthquake, Cyclone, flood, vessel collide, vehicle crash, major spillage or sabotage, it will normally manifest itself in three basic forms viz - Fire, Explosion or toxic release.

Need of Disaster Planning : In spite of universal acceptance of excellent codes of practices for design and operation of plants and storage, there have been occurrences of a number of losses due to major incidents of varying degree of severity. In fact, no industrial plant or office and no commercial or mercantile organization can be totally immune from disaster. These disasters could be attributed to various causes including failure of adherence to codes of practice. The first few minutes after an emergency situation occurs are generally the most critical. The wrong action or a few seconds delayed action in crises can make all the difference. A quick and effective response at that time can have tremendous significance on whether the situation is controlled with little loss or whether it turns into a disaster. Contingency planning increases thinking accuracy and reduces thinking time in an emergency, which reduces loss. The effectiveness of what we should do if disaster strikes will depend upon how well we have prepared the contingency plans and trained the people who will have to implement them. Even if the plans generated and equipment provided are never used, the very fact that the

plans have been developed and equipment have been provided creates confidence among employees and from an economic point, may reduce the insurance rates. The Social and legal consequences of ―Bhopal‖ Gas Tragedy have sufficiently demonstrated that these considerations alone are important enough to persuade management of hazardous plants to develop suitable plans. Thus disaster is a situation generally arising with little or no warning and causing or threatening death, injury or serious disruption to people and services which cannot be controlled, by fire, police and services operating alone. The incident will require special mobilization and co-operation of other bodies and voluntary organization.

3.03 EMERGENCIES - CLASSIFICATION OF EMERGENCES

Different types of emergencies that may arise at the Port can be broadly classified as:

a) Nature – I (On – Site Emergency) – It can be further subdivided into two levels:

Level – I The emergency is perceived to be a kind of situation arising due to an incident which is confined to a small area and does not pose an immediate threat to life and property and this can be handled with resources available within premises.

Level – II The emergency is perceived to be a kind of situation arising due to an incident which poses threat to human lives and/ or property, having potential to affect large area within the factory premises. This kind of situation is beyond the control of internal resources and requires mobilization of additional resources from other sections/ departments and help from outside agencies. The situation requires declaration of On – Site emergency.

b) Nature – II (Off – Site Emergency)

The emergency is perceived to be a kind of situation arising out of an incident having potential threat to human lives and property not only within Port but also in surrounding areas and environment. It may not be possible to control such situations with the resources available within APSEZ. The situation may demand prompt response of multiple emergency response groups as have been recognized under the District Emergency plan for Kutch. A similar situation in neighboring industry that may affect The Port Area and also falls under this category.

POTENTIAL EMERGENCIES

Sr. No.	Emergencies
1.	Cyclonic Storm/ Hurricane
2.	Earthquake
3.	Tsunami
4.	Flood
5.	Industrial unrest
6.	Bomb Threat
7.	War
8.	Food/ Water Poisoning
9.	Fire , Transportation Incidents involving Hazardous Materials
10.	Major Release of Flammable/ Toxic Chemicals
11.	Major Release of Flammable/ Toxic Gases
12.	Transportation Incidents involving Hazardous Material
13.	Marine Emergency

3.04 EMERGENCY RESPONSE ORGANIZATION

For control of an emergency, **Adani Port - Mundra** has established an emergency response organization headed by **COO (alternate – next Sr. Officer In-charge)**, who shall be the Site Main Controller. This emergency response organization will provide the command and control structure to coordinate and direct the response to an emergency, and depending on the circumstances of the emergency will consists of:

Management Team

Director / CEO / COO (Site Main Controller)
QHSE – HOD or senior most functionary of the department
Site Incident Controller – HOD or senior most functionaries available at site
Deputy Site Incident Controller – Section Head

Primary Support Team

Coordinators (HOD or senior most functionaries)

- **–Fire Services**
- **–QHSE**
- **–Security Services**
- **–Occupational Health Center**
- **–Engineering Services**
- **–Human Resource**
- **–Administration**

Secondary Support Team

Coordinators (HOD or senior most functionaries)

- **– Finance & Accounts**
- **– Commercial**
- **– Administration (Transport Cell)**
- **– Administration (Welfare & Canteen)**
- **– Corporate Communication**

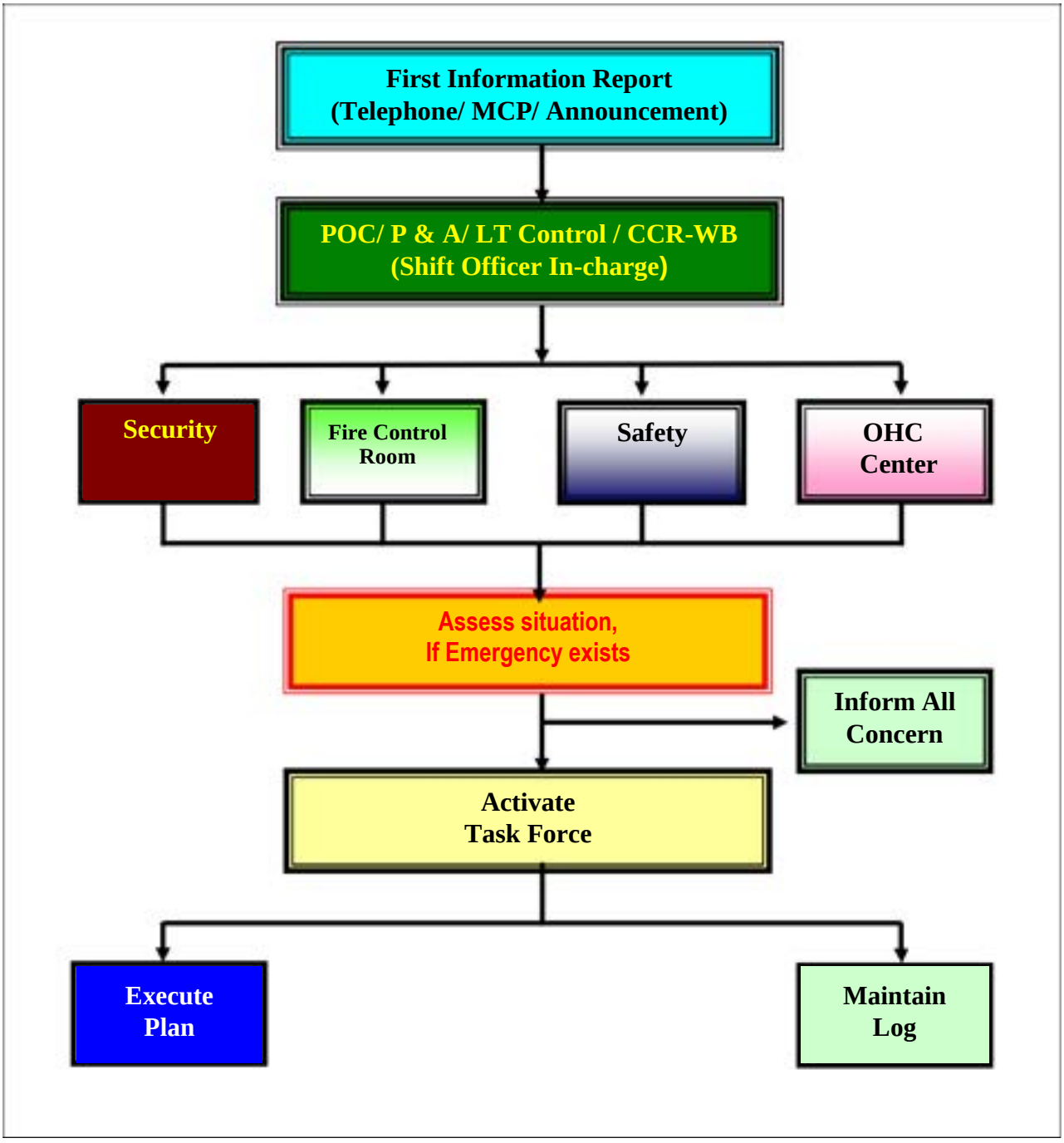
Only Site Main controller can activate the emergency response organization. An Emergency Control Center has been established in the office of Site Main Controller (Alternate – Conference Room – POC).

The primary role of the emergency response organization in an emergency shall be:

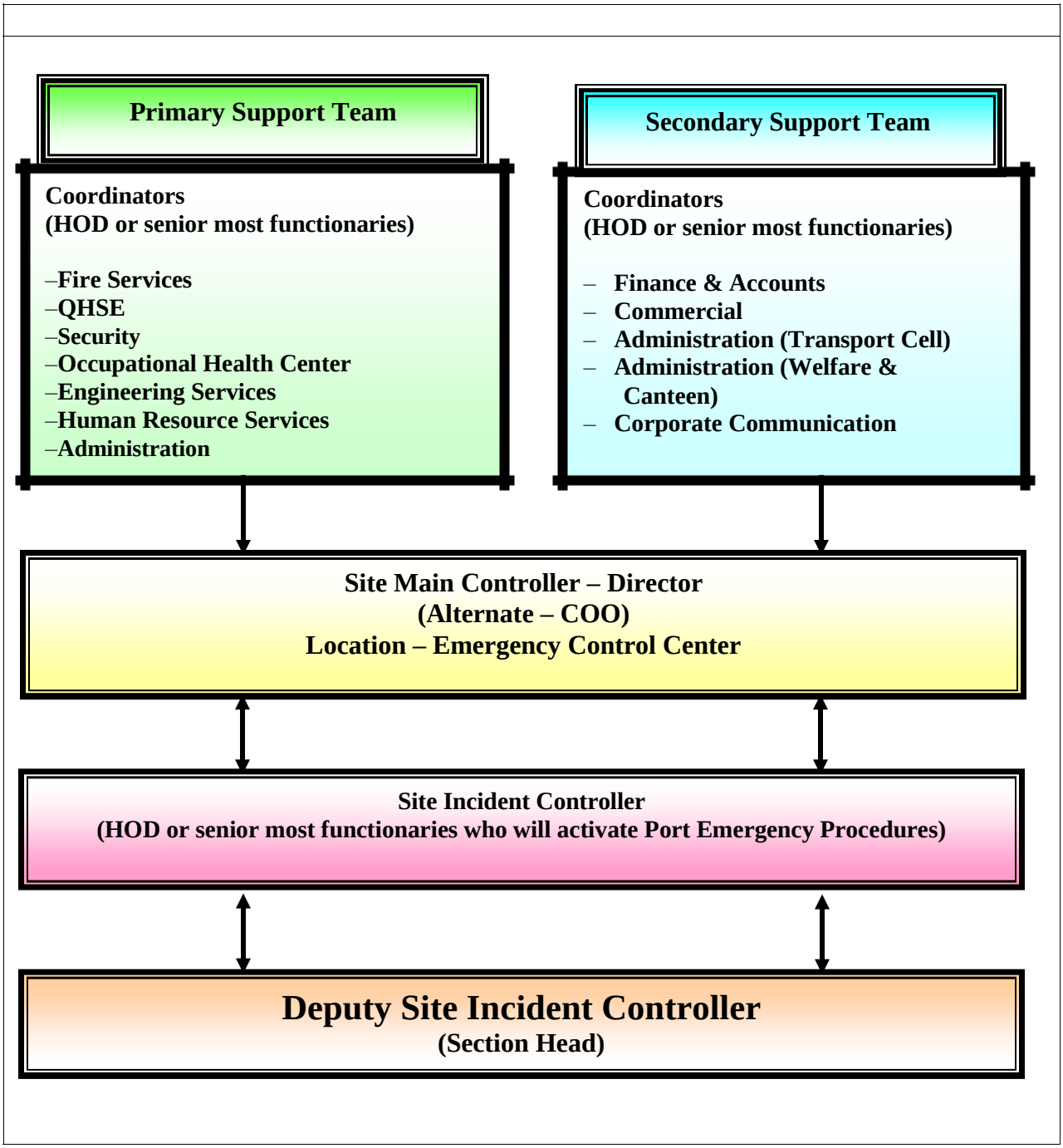
- ❖ Determine the degree to which the emergency response organization shall be activated.
- ❖ Determine extent of actual action required, organize and render assistance to Site Incident Controller.
- ❖ Coordinate with all other concerned.

Emergency Reporting Line is as outlined in **Chart B**.
Emergency Task Force is as outlined in **Chart C**.
Emergency Assembly Points are as outlined in **Chart D**.

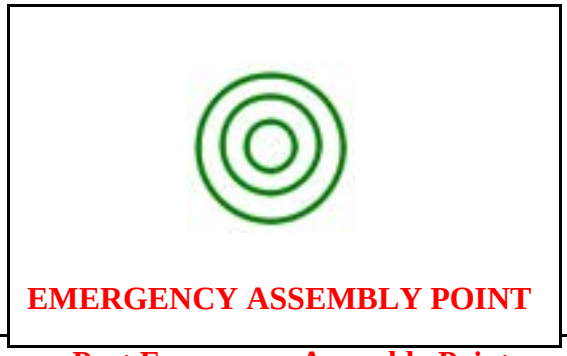
3.05 EMERGENCY REPORTING LINE



EMERGENCY TASK FORCE



3.06 ASSEMBLY POINTS

ASSEMBLY POINT	
	
Port Emergency Assembly Points	
PORT AREA	
ZONE	**AREA**
ZONE – 1	Marine House
ZONE – 2	CG–7
ZONE – 3	Driver Canteen
ZONE – 4	Old Administration Canteen
ZONE – 5	Railway Building (R & D Yard)
ZONE – 6	Terminal – 2 (Security Gate)
ZONE – 7	Container Terminal - 2 (Security Gate)
ZONE – 8	Main Gate
ZONE – 9	Port User Building
ZONE – 10	Adani House
ZONE – 11	Terminal – 03 (Security Gate)
ZONE – 12	South Basin (Security Gate)
WEST BASIN AREA	
ZONE – 1	SS-1
ZONE – 2	PMC Office
ZONE – 3	GIS (Near DG House)
ZONE – 4	Main Gate
ZONE – 5	Approach - 03
ZONE – 6	Amenities Building
Non-essential personnel shall assemble at Emergency Assembly Point as announced by Site Incident Controller.	

3.07 CATEGORIES OF EMERGENCIES

The general action plan to deal with:

- Emergencies (Category wise) are as outlined in **Chart –E.**
- Emergencies (Occurrence - with due warning) are as outlined in **Chart –F.**
- Emergencies (Occurrence – sudden) are as outlined in **Chart –G**.

EMERGENCIES CATEGORY WISE

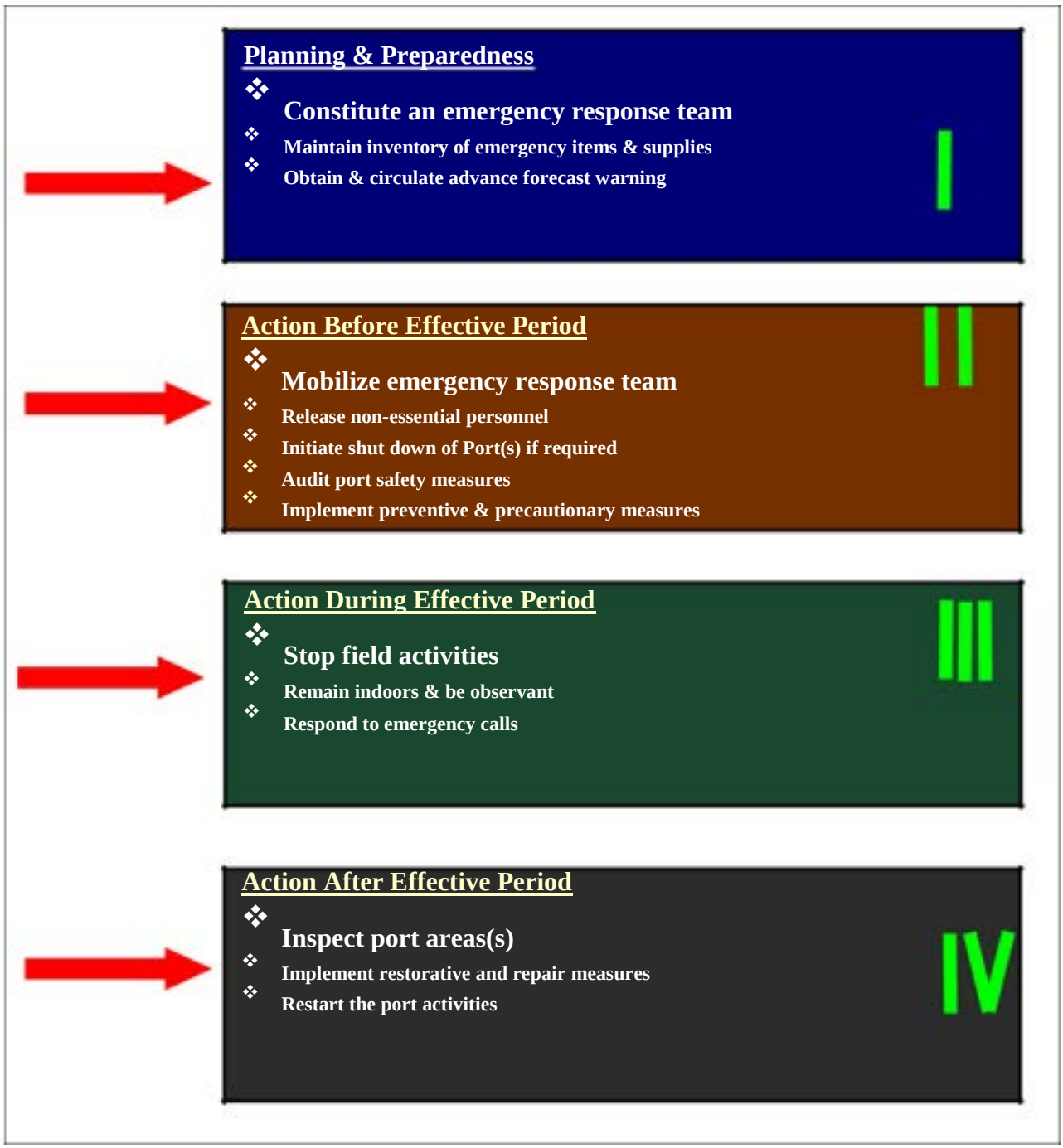
Emergencies (Occurrence – with due warning)

- **Cyclonic Storm/ Hurricane**
- **Earthquake**
- **Flood**
- **Tsunami**
- **Industrial Unrest**
- **Bomb Threat**
- **War**

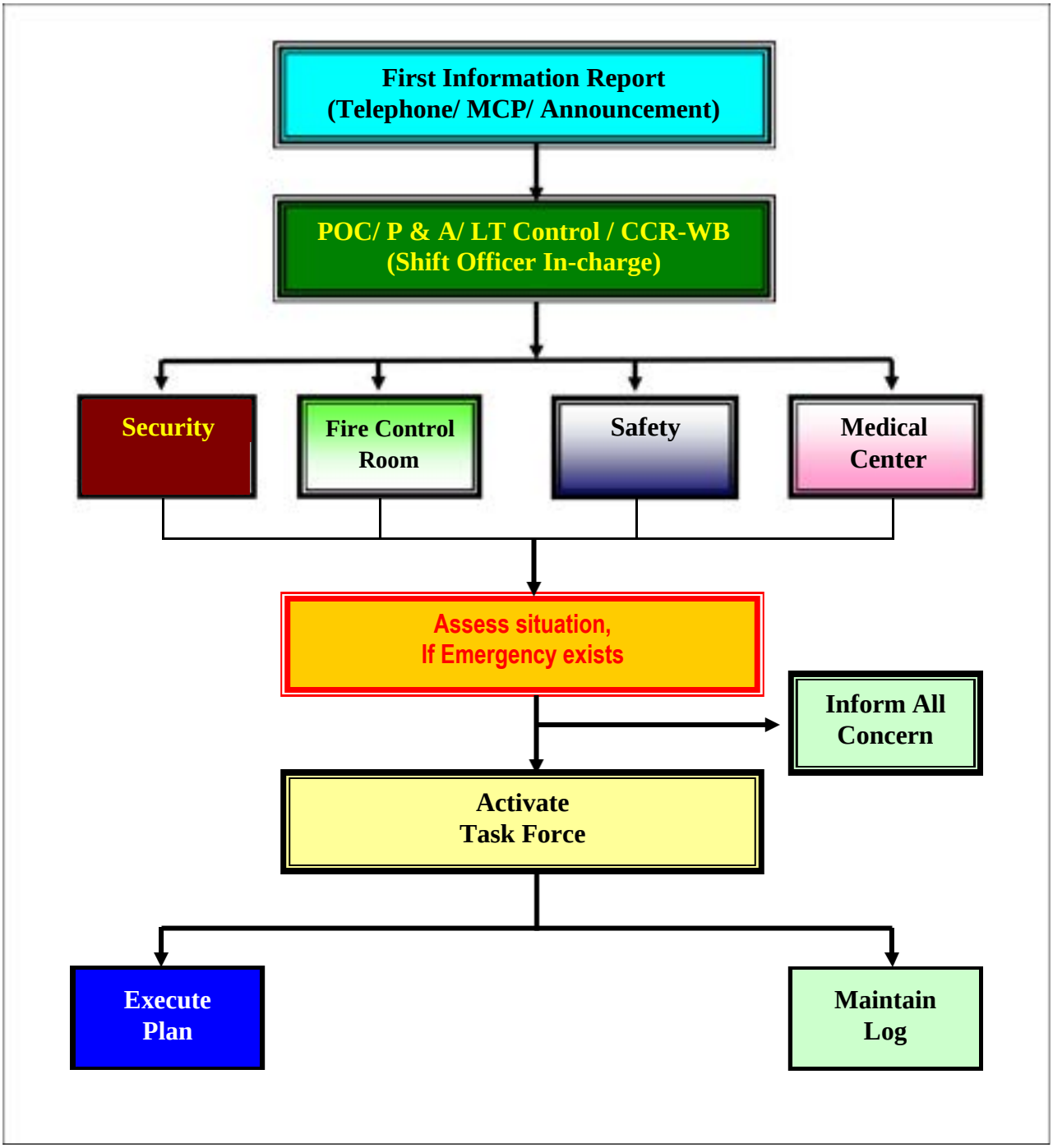
Emergencies (Occurrence – without warning)

- **Food/ Water Poisoning**
- **Fire**
- **Major Release of Flammable/ Toxic Chemicals**
- **Major Release of Flammable/ Toxic Gases**
- **Transportation incidents involving Hazardous Materials**
- **Marine Emergency**

GENERAL ACTION PLAN – EMERGENCIES (OCCURRENCE – WITH DUE WARNING)



GENERAL ACTION PLAN – EMERGENCIES (OCCURRENCE – WITHOUT WARNING / SUDDEN)



3.08 DUTIES & RESPONSIBILITIES

3.8.1 Site Main Controller :

- Has overall responsibility for the conduct of all emergency operations within the port complex.
- Shall immediately assess the situation plus its consequences, formally declare the level of emergency and order appropriate action.
- Shall direct all emergency operations within the port premises with the following priority:
  - Safety of personnel, property and equipment
  - Pollution and environmental impact control
  - Damage and loss control
  - Minimum curtailment of port activities
- Shall ensure all possible assistance to personnel affected for medical attention and hospitalization as appropriate.
- Shall ensure that all local and statutory authorities are kept advised of the facts and status.
- Shall ensure that normalcy is declared only when considered absolutely safe to do so.
- Shall be responsible for making available all possible company resources for emergency operations within Mundra Taluka and Bhuj District, if required/ requested by the appropriate Government Authority or ―Mutual Aid‖ organization.

3.8.2 Site Incident Controller

- Shall immediately assess the scale of emergency and report to Site Main Controller for instructions/ directions.
- Shall be responsible for operations in affected area with priorities as under:
  - Safety of personnel, property and equipment
  - Pollution and environmental impact control
  - Damage and loss control
  - Minimum curtailment of port activities
- Shall liaise with other heads of department for their support and assistance.
- Shall ensure continual reporting of situation to Site Main Controller and shall recommend calling for external resources as appropriate.

3.8.3 Emergency Support Officers

- Shall report to Site Incident Controller immediately and assist him as required (all possible portable emergency equipment, resources and personnel to incident location).
- Shall liaise closely with Head- Administration to facilitate the transfer of equipment, resources and personnel to incident location as appropriate.

3.8.4 Emergency Support Officers (Cont.)

- Shall carefully evaluate the risks, effects and possible consequences of:
  - the incident to his area of responsibility and propose further course of action to the Site Incident Controller with particular concern about safety of personnel, protection of environment and control of operation
- If the emergency situation involves Railways (locomotives, tracks and/or sidings), shall inform the Area Manager of Western Railways for assistance and mobilization of the Railways Emergency Team.

3.8.5 HOS – Administration (Transport Cell, Welfare & Canteen)

- Shall report to Site Incident Controller immediately and assist him as directed.
- Shall coordinate the activities of administration units.
- Shall inform and liaise with local bodies and authorities and police department in respect of the incident/ emergency.
- Shall arrange for transportation of whatever nature for use in the situation.
- Shall ensure that internal and external communication systems are available.
- Arrange for hot drinks/ snacks/ foods as requires at incident location.
- Shall arrange for assistance, if required from the ―**Mutual Aid**‖ system if available and as directed by Incident Controller.

3.8.6 HOD – Human Resources

- Shall report immediately to Site Incident Controller and assist him as directed.
- Shall ensure Assembly Points are manned and all persons reporting there properly identified.
- Shall arrange to record full details of all persons affected by the incident and to inform next of kin as appropriate.
- Shall arrange for the transfer of all affected persons to suitable places for first aid or further medical attention as appropriate.
- Shall arrange for the evacuation, from the location of incident of all personnel not essential.
- Shall arrange to depute company personnel to each location where affected persons are being treated or are gathered for whatever reasons, to render assistance.
- Shall arrange to keep regularly informed of status and facts pertaining to incident to the families of company personal in its residential area.
- Shall inform to Government Authorities (DISH, GPCB etc.)
- Liaison with Government Authorities (DISH, GPCB etc.)

3.8.7 HOD – Corporate Affairs

- Shall report immediately to Site Incident Controller and assist him as directed.
- Shall assume the role of Public Relation Officer (PRO) for communication, dissemination of information, status and facts (preparation of communiqués, statements etc.) Shall co-ordinate with business related statutory and Government organization.

3.8.8 HOD – Engineering Services

- Shall report immediately to Site Incident Controller and assist him as directed.
- Shall ensure activation of departmental damage limitation activities.
- Shall ensure immediate electrical isolation of the incident location thereafter; arrange availability of power after ascertaining safety of doing so.
- Shall make available all support that may be possible for the extrication/ evacuation of persons from the affected area.
- Shall liaise with the Engineering Services of organizations in close neighborhood for sourcing of supplemental equipment resources and assistance.
- Shall depute all available personnel to assist administration department.

3.8.9 HOD – Commercial

- Ensure availability of materials required by the Site Incident Controller.
- Issue materials from central stores round-the-clock (if required).
- Arrange emergency procurements from local dealers/ vendors or from neighboring industries.
- Arrange transportation of materials from central stores to the site of incident in coordination with the Coordinator (Transport Cell).

3.8.10 HOD – Finance & Accounts

- Shall report immediately to Site Incident Controller and assist him as directed.
- Shall ensure availability of funds and cash for all emergent requirements.
- Shall depute all available department personnel to assist HR in their activities.
- Shall ensure that under writers, shareholders, lenders, bankers and other Financial Institutions and statutory bodies are kept advised of the situation as appropriate.

3.8.11 HOD – Security

- Close the visitors‘ gate.
- Instruct the security to occupy pre-determined post for controlling security of installation.
- Call up additional help from Barracks.
- Ensure that unauthorized persons / vehicles do not enter the gate.

3.8.12 HOD – Security (Cont.)

- Ensure that unauthorized persons / vehicles do not enter the gate.
- Provide security men for firefighting & rescue.
- Arrange for transport of higher authorities to the terminal.
- Transport vehicles would be provided near emergency control center.
- Depute two security guards for controlling traffic at scene of disaster.
- Produce a list of port staff on duty in co-ordination with time office.
- Ensure availability of security men at gates so that they can lead authorities to disaster site.
- Ensure that non-essential persons do not crowd affected area.

3.8.13 HOS – Fire Services

- He will report to Site Incident Controller and has the single motive – concern for safety of personnel during emergency response operations. He will normally function as an advisor to the Site Incident Controller.
- He will not be directing any activity, issuing or relaying orders/ information.

3.8.14 HOD/ HOS – Safety

- Report at Emergency Control Center and assist Site Main Controller with necessary information, support and resources.
- Mobilize off-duty personnel for assistance.
- Coordinate with the Coordinator – Commercial to mobilize additional resources, viz. spill containment equipment/ firefighting equipment/ personal protective equipment, spare breathing air cylinders etc., as may be required at the site of incident.

3.8.15 HOS – Occupational Health Center

- Contact Site Main Controller. Report at Emergency Control Center or at Occupational Health Center as instructed by the Site Main Controller.
- Organize first aid arrangements for the affected persons at the site of incident (cold zone) as may be necessary.
- Ensure that adequate paramedical staff, equipment and medicines are available at the Occupational Health Center. Mobilize additional resources (if necessary).
- Liaise with the local medical authorities and city hospitals, if the casualties are high and situation demands external medical help.
- Coordinate with the Coordinator - Transport for transporting victims to various hospitals.

3.09 EXTERNAL AID

In case of an emergency, which poses threat to human lives or/ and property, within **Adani Port - Mundra** as well as in the surrounding neighborhood areas, it may not be possible to control such situations with the resources available at APSEZ. In such situations, additional resources are mobilized from other agencies, which include:

- Neighboring Industries (Mutual Aid Members)
- Government Authorities

External Aid Providers are as outlined in **Chart H**.

Note: Agreement is under process.

3.10 MUTUAL AID MEMBERS

Adani Port has entered into an agreement for mutual aid with following units for help/ assistance in the event of an emergency.

- Indian Oil Corporation Limited,
- Hindustan Petroleum Corporation Limited,
- Jindal SAW Ltd. (IBU),
- Adani Power Limited,
- Costal Gujarat Power Limited,
- Hindustan Mittal Energy Limited

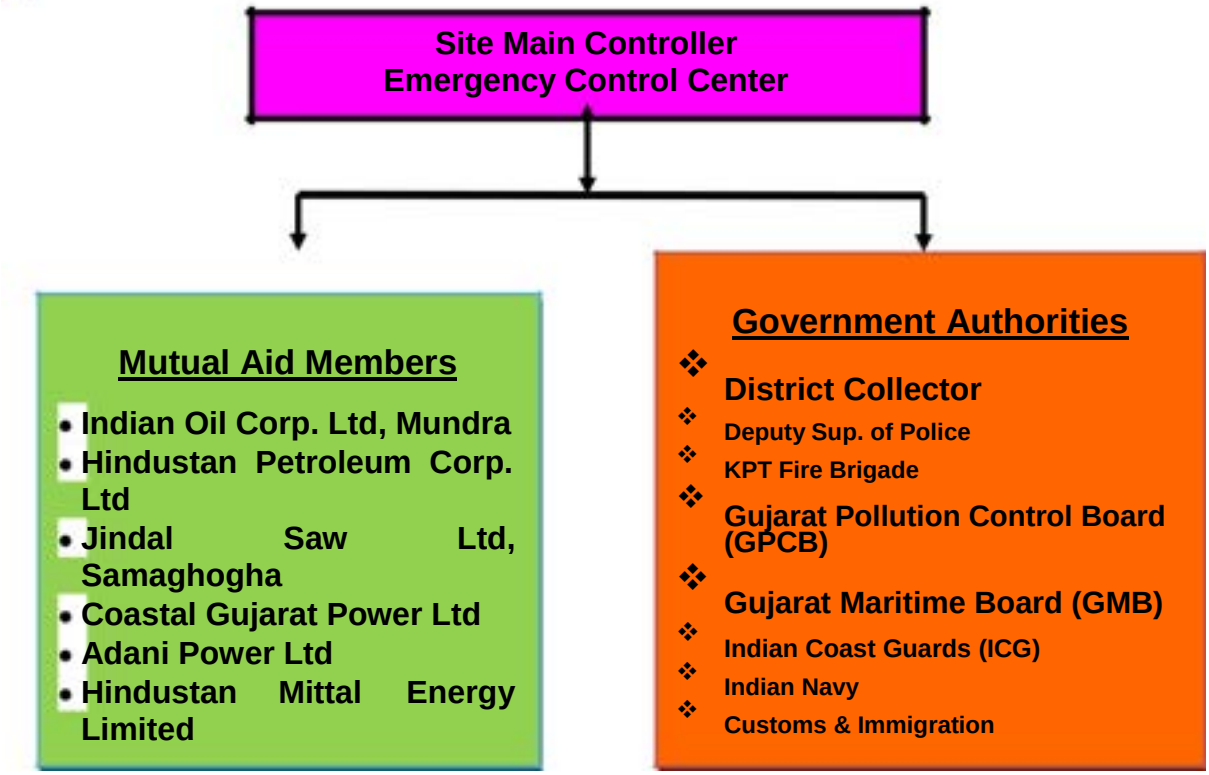
The mutual aid members shall:

- Respond promptly to the emergency call as and when communicated.
- Send their fire tenders/ crewmembers along with necessary supplies/ materials at the site of incident (as requested) and report at the **Adani Port** Security Gate and get instructions from security personnel on duty. These resources and personnel shall be deployed as directed by Site Incident Controller.
- The crew in–charges of the mutual aid members shall be responsible for safety of their crew engaged in emergency operations.

3.11 GOVERNMENT AUTHORITIES

If the situation demands response from multiple groups/ teams, APSEZ may seek assistance from various Government Authorities as have been recognized under the District Disaster Management Plan. These may include:

- District Collector
- Fire Brigade
- Police Commissioner
- Gujarat Pollution Control Board (GPCB)
- Gujarat Maritime Board (GMB)
- Indian Coast Guards (ICG)
- Indian Navy
- Immigration & Customs



3.12 REPORTING & INVESTIGATION

REPORTING :: Any incident (whether minor or major) shall be reported. The main objective of incident reporting is to:

- Provide first-hand information to all the concerned
- Initiate investigation
- Prepare failure analysis report
- Report to the Government authorities (if required)

References

- Procedure for Incident Reporting
- Incident Report Format
- Work Injury Report

INVESTIGATION : All incidents (whether minor or major) shall be investigated. The main objectives of incident investigation are to:

- Identify the root cause(s) of the incident.
- Take appropriate preventive measures to prevent recurrence.
- To comply with the statutory requirements.

References

Incident Investigation Procedure

3.13 COMMUNICATION & PUBLIC AFFAIRS

COMMUNICATION : Communication, an integral part for handling any emergency, helps in taking quick decisions, efficient & effective control of the emergency. Communication between the Emergency Control Center & the Field Command Post is established by means of:

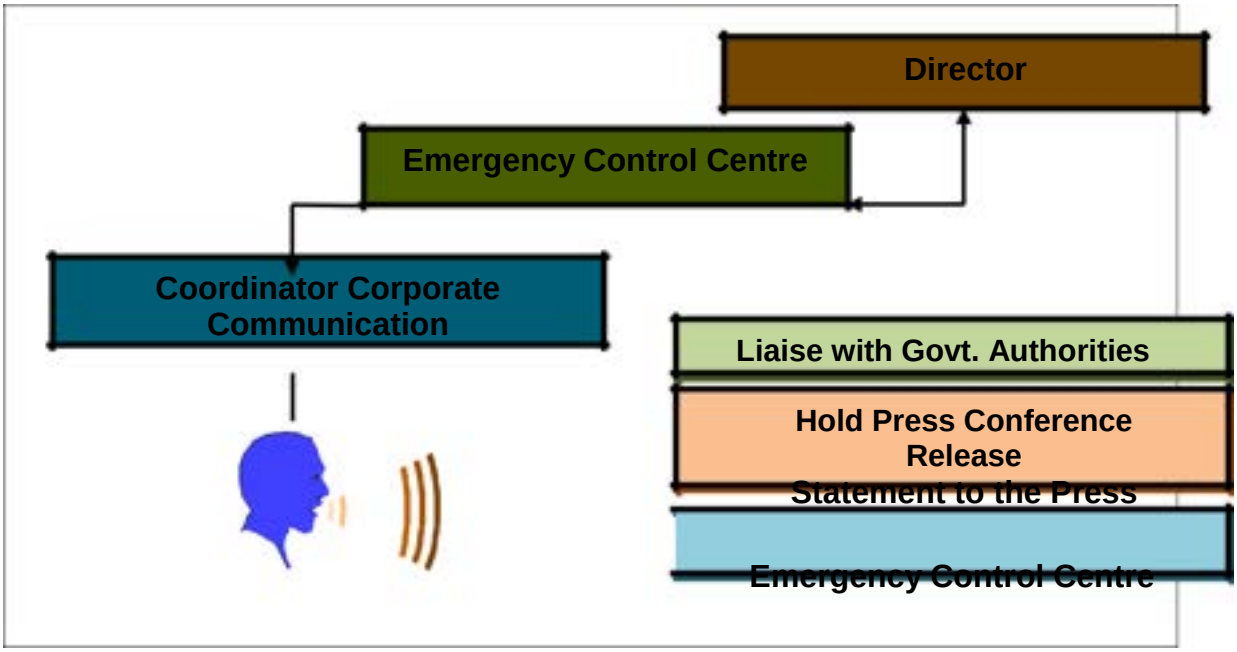
- Telephone
- Mobile
- Port Announcement System
- Wireless VHF / UHF Radio
- E – Mail

- Emergency Vehicle

Communication between the Emergency Control Center and external authorities will be by:

- Telephone
- E – Mail
- Fax
- Emergency Vehicle

3.14 PUBLIC AFFAIRS



CHAPTER - 4

EMERGENCY PLANNING

4.01 DRILLS & TRAINING

Emergency response drills are conducted once a month to ensure effective response by not only the staff within **Adani Port** complex but also by external aid members (as required). The participation & actions will depend on the level of emergency drill planned, as per following table:

Drill	Duration	Port Level	Complex Level	District Level	Frequency	Notes
Siren Testing Drill	1 Minute	X	--	--	Twice in a Month	Test communication, check availability of personnel and evaluate response time.
Emergency Response Drill	1 – 2 hours	--	X	--	Monthly	Consists of interactive discussions of a simulated scenario among members of emergency response team but does not involve mobilization of personnel & equipment

4.02 TRAINING

The importance of training to personnel involved in responding to any emergency scenario is recognized and acknowledged. The training to employees at APSEZ is as per following table:

Course	Duration	New Recruit	Existing Staff	Frequency	Notes
Induction Training	4 Days	X	--	On joining the organization	All employees on joining the organization shall undergo the training at Learning Center

4.03 EMERGENCY PLANS

INDIVIDUAL PLANS ARE REQUIRED TO DEVELOP EMERGENCY PLANS AS PER GUIDELINES PROVIDED IN SAMPLE PLANS

4.3.1 CYCLONIC STORMS / HURRICANE

Cyclonic storms/ hurricanes are intense depressions, which develop in tropical latitudes and are often the cause of very high winds and seas. The wind blows around the center of a tropical storm in a spiral flow inward, anti-clockwise in Northern Hemisphere and clockwise in Southern Hemispheres. Plan for tackling cyclonic storm/ hurricane can be broadly divided in following stages:

Action By	Activity
PLANNING & PREPAREDNESS	
Port Key Person	❑ **Constitute Emergency Response Team(s) comprising of at least:** ❖ Port Engineer (01), Fire Team Member (01), Port Operators (02), Electrician (01) Note ➢ Based on total strength of the individual plant, more than one team may be constituted. ➢ Each member of the team shall have a designated alternate member. ❑ **Maintain inventory of emergency items & supplies as necessary, including but not limited to:** ❖ Torches, Ropes, lines, wires, tarpaulins, plastic sheets, Tool kit, duct tapes, assorted gears, First aid box, Sand bags etc. Note ➢ The list is subject to updating depending on the requirements of the individual plant. ❑ **Liaise with HOD – ES for Civil & Mechanical Support (including supply of spares).** ❑ **Liaise with HOD – HR for food stock, water, blankets & bedding and medicine.** ❑ Liaise with Port Operation Control.

CYCLONIC STORMS/HURRICANE (Cont.)		
Action By		**Activity**
ACTION BEFORE EFFECTIVE PERIOD		

Port Key Person	❑ **Liaise with Site Main Controller** ❑ **Mobilize Emergency Response Team(s).** Note ➢ Members to be briefed about the emergency. ➢ Members to be informed that they may be required to stay at site during & after the emergency. ❑ **Release non-essential personnel.** Note ➢ Port key person reserves prerogative on the release of employees. ➢ Personnel to be briefed on the possible time of return to work. ❑ **Initiate Port shut down based in:** ❖ Consultation with Site Main Controller. ❑ ***Audit Port area(s) for safety measures to ensure that:*** ❖ *Loose items are secured.* ❖ *Electric machinery is covered and protected against water ingress.* ❖ Storm water drains are cleared of any obstructions. ❑ ***Implement preventive & precautionary measures (including but not limited) to ensure:*** ❖ *Inventory of emergency supplies is maintained.* ❖ *Material and equipment that can possibly be damaged by water ingress is elevated.* ❖ *Windows & doors are weather tight.* ❖ *Roof mounted equipment are braced.* ❖ *Material & equipment that cannot be moved are covered.* ❖ Sandbags are placed in doorways where flooding from storm water can occur. ***In flood as consequence of Cyclonic Storm/ Hurricane is anticipated, ensure:*** ❖ *Dyke valves of Hydrocarbon storage tanks are open.* ❖ Oil Spill Management Plan is actuated.

Action By	Activity
ACTION DURING EFFECTIVE PERIOD	
Port Key Person	❑ **Stop** ❖ All field activities. ❖ All permits to work. **Note** ➢ All personnel to be notified against venturing out during effective period.
Emergency Response Team	❑ **Ensure all personnel remain indoor, observant and be alert to:** ❖ Detect any damage to equipment or buildings. ❖ Development of unsafe conditions. **Note** ➢ In case of any emergency warranting immediate response, communicate to Site Main Controller.
Port Key Person	❑ **In consultation with Site Main Controller:** ❖ Make all possible efforts to reach the site of incident/ damage. ❑ **Act appropriately to control prevalent incident/ damage**.
ACTION AFTER EFFECTIVE PERIOD	
Port Key Person & Emergency Response Team	❑ Audit Port area(s) for damage assessment & prepare report ❑ Undertake restorative measures & repairs based on audit report on: ❖ Damaged equipment & buildings. ❖ Unsafe conditions.
Port Maintenance Group	**Note** ➢ Clearance report to be submitted to Site Main Controller through Port Key Person.
Port Process Group	❑ Initiate restart up of the Port.

CYCLONIC STORMS/HURRICANE (Cont.)

Department Wise Emergency Action Plan for Cyclone

Dry Cargo Department	❑ Remove all fine grained cargo stored at open storage yard and store at indoor warehouse. ❑ Secure the fine grained cargo stored at open storage yards with Tarpaulin. ❑ Stop all stevedoring activities, bring all Mobile Harbour cranes to shore, safely park the cranes and down its booms. ❑ Inform all contractors to remove all their equipment from jetty area and safely park at shore, in case of crane down its boom. ❑ Arrest all barge / ship loaders, and Mobile truck loading hoppers at its wheel to prevent horizontal movement due to wind and secure from its top by arranging guy ropes. ❑ Stop loading / unloading of ship and measure the ship cargo quantities along with clients surveyor and communicate Marine Dept. / shipping agencies to take the ship to anchorage area.
Marine Department	❑ In coordination with dry cargo instruct all ship captains to take the ships anchorage. ❑ Stop all activities at jetty area. ❑ Ensure the jetty areas are free from loose and unsecured materials / equipment. ❑ Update all departments about the latest whether conditions. ❑ Ensure TUG‘s are shored and secured. ❑ Stop SPM operation remove pipes connections from the ship and conform to maintain safe distance from SPM.
Liquid Terminal Department	❑ Stop loading / unloading of ship, take ullage with clients surveyor, detach hose connections with the shipping vessels and communicate Marine Dept. / Shipping agencies to take the ship to anchorage area. ❑ Remove all loose materials and equipment from jetty area. ❑ Stop all activities, remove all tanker Lorries from liquid terminal and do not allow any tanker Lorries to enter the liquid terminal area.

Department Wise Emergency Action Plan for Cyclone	
Container Terminal / RORO Department	❑ Stop loading / unloading of ship take stock of containers along with surveyor, and communicate Marine Dept. / Shipping agencies to take the ship to anchorage area. ❑ Stop all activities and park the RTGC and RMQC at specified location and secure in all respect to prevent horizontal movement and topping. Ensure crane operators come out of crane after safely parking the cranes. ❑ Remove all loose materials and equipment‘s from Quay area. ❑ Ensure the height of container stock piling safe withstand the wind force, if it unsafe restrict the stock pile height. ❑ Stop trailer loading and remove all trailer from CT and do not allow any trailer to enter CT. ❑ Secure the all cars stationed at buffer yard by putting blocks on all the wheels.

Security Department	❑ Close the gate ant stop allowing visitors and transport trucks either inward or out ward. ❑ Ensure vehicles are parked at designed parking areas, with wheels are blocked. ❑ Instruct all drivers to take shelter at canteens (concrete buildings).
Fire Department	❑ Equip the fire tenders with rescue equipment, safely park the fire tenders and secure its wheel by providing blocks.
Project Management Cell (PMC)	❑ Stop all activities, park the cranes and equipment's at safe location, lower the booms of cranes and secure them. ❑ Ensure all erected structures are secured with guy ropes and ties are provided. ❑ Remove all loose materials from top of buildings and structures or secure them. ❑ Ensure all workmen are sheltered at safe locations like canteens (concrete buildings). ❑ Secure the Jetty area piling rigs and cranes by tying with guy ropes. ❑ Stop all project vehicle movements and ensure the vehicles are parked at safe location with wheels are blocked. ❑ Ensure the barge type floating cranes are off loaded and brought to shore and its boom is downed. ❑ Ensure all vehicles and cranes are removed from break water embankments.

4.3.2 EARTHQUAKE

Earthquake is most likely to occur without pre-warning and so its severity and destructive potential are highly unpredictable. Earthquake can result in collapse of buildings, structures & elevated equipment, heavy casualties apart from fracture of underground pipelines and uprooting of energized wires etc. The plan to deal with earthquake can be divided in following stages:

Action By	Activity
PLANNING & PREPAREDNESS	
Port Key Person	❑ **Constitute Emergency Response Team(s) comprising of at least:** ❖ Port Engineer (01), Fire Team Member (01), Port Operators (02), Electrician (01) Note ➢ Based on total strength of the individual plant, more than one team may be constituted. ➢ Each member of the team shall have a designated alternate member. ❑ **Liaise with HOD – HR to identify control centers equipped with:** ❖ Communication facilities. ❖ Emergency vehicles/ equipment. ❖ List of emergency contacts & suppliers. ❖ Medical facilities.
ACTION DURING EFFECTIVE PERIOD	

Individuals	❑ Do not panic. ❑ Avoid standing near windows, external walls. ❑ Stand near columns or duck under sturdy furniture. ❑ Assemble at emergency assembly point.
ACTION AFTER EFFECTIVE PERIOD	
Site Incident Controller **Port Key Person**	❑ Take head count. Activate Port emergency plan. ❑ Liaise with Site Main Controller for shut down of Port(s) if required. ❑ Liaise with HOS – Fire Services to initiate search & rescue. ❑ Liaise with – Occupational Health Center Services to provide first aid to the victims and remove causalities (if any). ❑ Report at site. ❑ Assess damage. ❑ Undertake restorative measures & repairs. ❑ Liaise with HOS –Occupational Health Centre to follow up on causalities.

4.3.3 TSUNAMI

Tsunami is Japanese for "harbor wave which is a huge ocean wave that can travel at speeds up to 600 mi/hr (965 km/hr) can have heights of up to 30 m (98 ft), wavelengths of up to 200 km (124 mi) and long periods, usually between 10 and 60 minutes. Sometimes incorrectly called a tidal wave, a tsunami is usually caused by an underwater earthquake or volcanic eruption and often causes extreme destruction when it strikes land. It is a series of waves which travel outward on the ocean surface in all directions in a kind of ripple effect. Since the waves can start out hundreds of miles long and only a few feet high, they would not necessarily be noticeable to a passing ship or a plane flying overhead. The plan to deal with Tsunami can be divided in following stages:

Action By	Activity
PLANNING & PREPAREDNESS	
Port Key Person	❑ **Constitute Emergency Response Team(s) comprising of at least:** ❖ Port Engineer (01), Fire Team Member (01), Port Operators (02), Electrician (01), Marine Control Officer (01), POC Officer (01) Note ➢ Based on total strength of the individual plant, more than one team may be constituted. ➢ Each member of the team shall have a designated alternate member. ❑ **Liaise with HOD – Marine to identify control centers equipped with:** ❖ Communication facilities. ❖ Emergency vehicles/ equipment (tugs, speed/mooring boat). ❖ List of emergency contacts (POC, Marine Control, Deputy PFSO, Port Security) ❖ Occupational Health Facilities.
ACTION DURING EFFECTIVE PERIOD	

Individuals	❑ Do not panic. ❑ Avoid standing near to sea side. ❑ Stand near columns or duck under sturdy furniture. ❑ Assemble at emergency assembly point.
ACTION AFTER EFFECTIVE PERIOD	
Site Incident Controller **Port Key Person**	❑ Liaise with Site Main Controller for shut down of Port(s) if required. ❑ Liaise with HOS – Security and HOS – Fire Services to search & rescue. ❑ Liaise with HOS – Occupational Health Center to provide first aid to the victims and remove causalities (if any). ❑ Report at site. ❑ Assess damage. ❑ Undertake restorative measures & repairs. ❑ Liaise with HOD – Human Resources & Administration.

4.3.4 FLOOD

An overflowing of water onto land that is normally dry. A flood tide is an abundant flow or outpouring. It is a temporary rise of the water level, as in a river or lake or along a seacoast, resulting in its spilling over and out of its natural or artificial confines onto land that is normally dry. Floods are usually caused by excessive runoff from precipitation or snowmelt, or by coastal storm surges or other tidal phenomena. Floods are sometimes described according to their statistical occurrence. A fifty-year flood is a flood having a magnitude that is reached in a particular location on average once every fifty years. In any given year there is a two percent statistical chance of the occurrence of a fifty-year flood and a one percent chance of a hundred-year flood.

Action By	Activity
PLANNING & PREPAREDNESS	
Port Key Person	❑ Constitute Emergency Response Team(s) comprising of at least: ❖ Port Engineer (01), Fire Team Member (01), Port Operators (02), Electrician (01) Note ➢ Based on total strength of the individual plant, more than one team may be constituted. ➢ Each member of the team shall have a designated alternate member. ❑ **Liaise with HOD – HR to identify control centers equipped with:** ❖ Communication facilities. ❖ Emergency vehicles/ equipment. ❖ List of emergency contacts & suppliers. ❖ Medical facilities.
ACTION DURING EFFECTIVE PERIOD	

Individuals	❑ Do not panic. ❑ Avoid standing near to sea side. ❑ Stand near columns or duck under sturdy furniture. ❑ Assemble at emergency assembly point.
ACTION AFTER EFFECTIVE PERIOD	
Site Incident Controller	❑ Liaise with Site Main Controller for shut down of Port(s) if required. ❑ Liaise with HOS – Security and HOS – Fire Services to search & rescue. ❑ Liaise with HOS – Occupational Health Center Services to provide first aid to the victims and remove causalities (if any).
Port Key Person	❑ Report at site. ❑ Assess damage. ❑ Undertake restorative measures & repairs. ❑ Liaise with HOD – Human Resources & Administration.

4.3.5 INDUSTRIAL UNREST

Industrial relation between personnel and management may deteriorate because of any reason. Problems, which may arise due to industrial unrest, include:

- ❖ Dharna/ Strike/ Hunger strike
- ❖ Unofficial gatherings/ Gate meetings/ Forceful entry
- ❖ Work to rule/ Go slow/ Disobedience
- ❖ Gherao/ Rasta roko
- ❖ Intimidation & Use of force
- ❖ Support from local & criminal elements
- ❖ Sabotage

In such a scenario, to ensure smooth operation of Port, protection of lives and property, well-coordinated effort is needed from all concerned. Plan to deal with industrial unrest can be broadly divided in following stages:

Action By	Activity
PLANNING & PREPAREDNESS	
Port Key Person	❑ **Constitute Emergency Response Team(s) comprising of at least:** ❖ Port Engineer (01), Fire Team Member (01), Port Operators (02), Electrician (01) Note ➢ Based on total strength of the individual plant, more than one team may be constituted. ➢ Each member of the team shall have a designated alternate member. ❑ Plan 8 hours shift. ❑ Liaise with HOD – HR for food stock, water, blankets & bedding and medicine.

INDUSTRIAL UNREST (Cont.)

Action By	Activity

ACTION BEFORE EFFECTIVE PERIOD	
Port Key Person	❑ Liaise with Site Main Controller ❑ Liaise with HOD – Security for security & vigilance requirements. ❑ Liaise with HOD – HR for planning of accommodation of additional personnel and transport for additional requirements of vehicle (if any).
ACTION DURING EFFECTIVE PERIOD	
Port Key Person	❑ **Liaise with HOD – Security for** ❖ Strengthening security at sensitive points. ❖ Ensuring protection of lives & property. ❖ Vigilance & patrolling. ❖ Maintaining law & order. ❑ **Liaise with Site Main Controller for** ❖ Updates on the situation.
ACTION AFTER EFFECTIVE PERIOD	
Port Key Person	❑ **Assess damage (if any).** ❑ **Liaise with Site Main Controller for restoring normalcy.**

4.3.6 BOMB THREAT

Bombs can have devastating effect not only on the Adani Port but also on neighboring areas. Hence, any threat received regarding plantation of the bomb shall be viewed seriously. Plan to deal with bomb threat can be divided in following stages:

Action By	Activity
PLANNING & PREPAREDNESS	
Port Key Person	❑ **Constitute Search Team(s) comprising of at least:** ❖ Port Engineer (01), Fire Team Member (01), Port Operators (02), Electrician (01) Note ➢ Based on total strength of the individual plant, more than one team may be constituted. ➢ Each member of the team shall have a designated alternate member. ❑ Increase awareness in the Port personnel regarding threat perception (not to handle suspicious objects, report suspicious movements by unknown persons).
ACTION BEFORE EFFECTIVE PERIOD	

Port Key Person	❑ Inform all personnel to provide information regarding unidentified or suspicious objects/ persons. ❑ Liaise with Port Operation Centre. ❑ Liaise with HOD – Security for ❖ Intensifying vigilance & patrolling. ❖ Initiating bomb search. ❖ Making arrangements to minimize effects. ❖ Making arrangements for evacuation.
ACTION DURING EFFECTIVE PERIOD	
PortKey Person	❑ Liaise with Site Main Controller for any action to be taken on case to case basis.
ACTION AFTER EFFECTIVE PERIOD	
Port Key Person	❑ Liaise with Site Main Controller for restoring normalcy (if bomb recovered/ no untoward incident occurs). If blast occurs ❑ Assess damage (if any). ❑ Take restorative measures. ❑ Liaise with Site Main Controller.

4.3.7 WAR

During an outbreak of war, bombarding by enemy planes at Mundra site can have devastating effects. Plan to deal with bomb threat can be divided in following stages:

Action By	Activity
PLANNING & PREPAREDNESS	
Port Key Person	❑ Constitute Emergency Response Team(s) comprising of at least: ❖ Port Engineer (01), Fire Team Member (01), Port Operators (02), Electrician (01) Note ➢ Based on total strength of the individual plant, more than one team may be constituted. ➢ Each member of the team shall have a designated alternate member. ❑ Make arrangements for camouflage the flares. ❑ Liaise with HOD – Security to increase awareness in the Port personnel regarding war.
ACTION BEFORE EFFECTIVE PERIOD	
Port Key Person	❑ Liaise with Port Operation Centre. ❑ Liaise with HOD – Security for ❖ Intensifying vigilance & patrolling.
ACTION DURING EFFECTIVE PERIOD	

Port Key Person	❑ **Liaise with Site Main Controller for minimizing light (during night) & obtaining updated information.** ❑ **Liaise with HOD – Security for evacuation of non-essential personnel.**
ACTION AFTER EFFECTIVE PERIOD	
Port Key Person	❑ Assess damage (if any). ❑ Liaise with Site Main Controller to restore normalcy**.**

4.3.8 FOOD/WATER POISIONING

Plan to deal with food/ water poisoning can be divided in following stages:

Action By	Activity
PLANNING & PREPAREDNESS	
Port Key Person	❑ Liaise with HOS – Occupational Health Services: ❖ To impart training regarding food/ water poisoning. ❖ For supply of medicines, saline water etc.
ACTION DURING EFFECTIVE PERIOD	
PortKey Person to:	❑ Liaise with Site Main Controller & HOS – Occupational Health Services ❖ Identify the contaminant source. ❖ Seize contaminated material. ❖ Take preventive measures to avoid recurrence. ❖ Inform all concerned. ❖ Arrange sample analysis & alternate supplies. ❖ Arrange medical assistance to the victims.
ACTION AFTER EFFECTIVE PERIOD	
Port Key Person	❑ **Liaise with Site Main Controller & HOS – Occupational Health Services to:** ❖ Conduct epidemiological investigation to identify the cause. ❖ Take preventive measures to avoid recurrence. ❖ Follow up on causalities.

4.3.9 FIRE

Plan to deal with fire can be divided in following stages:

Action By	Activity
PLANNING & PREPAREDNESS	

Port Key Person	❑ **Constitute Emergency Response Team(s) comprising of at least:** ❖ Port Engineer (01), Fire Team Member (01), Port Operators (02), Electrician (01) Note ➢ Based on total strength of the individual plant, more than one team may be constituted. ➢ Each member of the team shall have a designated alternate member. ❑ **Liaise with HOS – Fire Services to:** ❖ Maintain adequate fleet of fire tenders & firefighting equipment. ❖ Maintain patrolling to eliminate potential sources of fire hazard. ❖ Impart regular refresher training to auxiliary fire squad members.
ACTION DURING EFFECTIVE PERIOD	
Emergency Response Team	❑ Activate alarm. Try & contain fire. ❑ Liaise with Site Main Controller, HOS – Fire and HOS – Occupational Health Services to: ❖ Evacuate non-essential personnel. ❖ Ensure search & rescue ❖ Ensure causalities receive attention. ❑ Liaise with HOD – Security to restrict movement in affected area.
ACTION AFTER EFFECTIVE PERIOD	
Emergency Response Team	❑ Assess damage. ❑ Implement fire preventive measures. ❑ Undertake restorative measures & repairs. ❑ Liaise with HOS – Occupational Health Services to follow up on causalities.

4.3.10 MAJOR RELEASE OF FLAMMABLE/TOXIC CHEMICALS

Plan to deal with major release of flammable/ toxic chemicals can be divided in stages:

Action By	Activity
PLANNING & PREPAREDNESS	
Port Key Person	❑ **Constitute Emergency Response Team(s) comprising of at least:** ❖ Port Engineer (01), Fire Team Member (01), Port Operators (02), Electrician (01) Note ➢ Based on total strength of the individual plant, more than one team may be constituted. ➢ Each member of the team shall have a designated alternate member. ❑ **Maintain under flow baffle, over flow baffle, blocking gates & dykes.** ❑ **Liaise with HOD – QHSE for:** ❖ Conducting regular audits. ❖ Training of persons regarding various aspects of spillage. ❖ Identifying locations to set up blockages. ❑ Liaise with HOS – Fire Services for acquiring equipment for recovery.

ACTION BEFORE EFFECTIVE PERIOD	
Emergency Response Team	❑ Control, block or contain flow of spillage. ❑ Suspend all hot work in the vicinity & isolate electric powers to affected area(s). ❑ Recover or direct spill material to effluent pit. ❑ Liaise with HOS – Fire/ Occupational Health Services to: ❖ Evacuate non-essential personnel. ❖ Administer first aid to victims. ❑ Liaise with HOD – Security to restrict movement in the area. ❑ Liaise with Site Main Controller for external assistance required (if any).
ACTION AFTER EFFECTIVE PERIOD	
Emergency Response Team	❑ Assess damage. ❑ Implement fire preventive measures. ❑ Undertake restorative measures & repairs. ❑ Liaise with HOS – Occupational Health Services to follow up on causalities.

Onshore Oil Spill Collection Plan

Onshore Oil spills are classified into three categories

- ❑ Leakage within the enclosure and oil spill is retained by the dyke wall.
- ❑ Leakage from the pipe lines.
- ❑ Leakage from the tanker truck carrying the oil.

Facilities available

- ❑ As the enclosure tanks are stored with various oil products the bund walls are provided to retain the product individually for every tank.
- ❑ For the storage of spilled product, slop tanks are available in each enclosure.
- ❑ 2 nos. Portable pumps of intrinsically safe are available.
- ❑ The tank farm drain point valves are kept closed.
- ❑ Pipe lines are available to transfer the spilled product to slop tank.
- ❑ Spill collection kit is available. (6 nos. Drip trays, 4nos. Empty barrels, 4nos. Carboys, 4nos. Funnels, 2nos. Barrel shifting trolleys and 10nos. Soaking pads, 4 nos. Bonding wire with clamps 20mts long).
- ❑ Emergency response team to collect the spilled oil is available in each shift.
- ❑ PPE‘s are available.

Leakage within the enclosure and oil spill is retained by the dyke wall

Sr.No.	Corrective Action	Action By
1.	Inform Security and stop all vehicles entering the Liquid Terminal and stop all vehicles inside and remove unwanted workmen from the liquid terminal.	LT Shift Incharge/ Security
2.	Inform and assemble the Emergency Response Team at spillage site.	LT Shift Incharge
3.	Ensure necessary PPE‘s are worn by the emergency response team.	LT Shift Incharge
4.	Shift the intrinsically safe portable pump to nearby location to facilitate pumping of the product to slop tank.	LT Shift Incharge

5.	Shift the spill collection kit to the location.	LT Shift Incharge
6.	Inform fire department to perform standby with fire fighting facility.	LT Shift Incharge
7.	Lay the pump suction line foot valve in the pool of spilled liquid.	LT Shift Incharge
8.	Connect the pump discharge line to pipe line network leading to slop tank.	LT Shift Incharge
9.	Ensure jumpers/ bonding is provided if other than wire breaded hose is used or PVC/ Rubber hoses are used (from foot valve to pump & pump to pipe line).	LT Shift Incharge
10.	Give power supply to the pump and run the pump.	LT Shift Incharge
11.	Switch off the pump once the spilled oil level goes below the foot valve and air sucks in.	LT Shift Incharge
12.	Collect the remaining oil with the help of soaking pad, carboys and put it in barrels.	LT Shift Incharge
13.	Pump the oil collected in barrels to slop tank.	LT Shift Incharge
Leakage from the pipe lines		
Sr.No.	**Corrective Action**	**Action By**
1.	Stop the leakage by switching off the pump. Arrest the leakage by closing the valve or plugging the leakage point.	LT Shift Incharge
2.	Inform security and establish security posts at the junction of roads where the pipe line is leaking.	LT Shift Incharge/ Security
3.	Road blockage shall be establised at least 200mts away from the leakage point.	Security
4.	Ensure vehicles are stopped or rerouted 200mts away from leakage point.	Security
5.	Do not allow to switch on or switch off any electrical equipment within 200mts radious of leakage point.	Security
6.	Do not allow mobile phones within the radious of 200mts.	Security
7.	Inform fire department to perform standby duty with fire fighting facility.	LT Shift Incharge
8.	Inform and assemble the Emergency Response Team at spillage site.	LT Shift Incharge
9.	Ensure necessary PPE‘s are worn by the emergency response team.	LT Shift Incharge
10.	Shift the spill collection kit to the location.	LT Shift Incharge
11.	With the help of soaking pad collect the spilled oil in carboys and barrels.	LT Shift Incharge
12.	Shift the barrels to waste oil storage area and dispose it through vendors.	LT Shift Incharge
13.	Put sand or saw dust and clean the area.	LT Shift Incharge

14.	Take action to permanantly arrest the pipe line leakage.	LT Shift Incharge
Leakage from the tanker truck carrying the oil		
1.	Arrest the leakage by closing the particular tanker campartment valve or plugging the leakage point.	LT Shift Incharge
2.	Inform security and establish security posts at the junction of roads where the tanker truck is parked.	LT Shift Incharge/ Security
3.	Road blockage shall be establised at least 200mts away from the leakage piont.	Security
4.	Ensure vehicles are stopped or rerouted 200mts away from the leakage point.	Security
5.	Do not allow to switch on or switch off any electrical equipment within 200mts radious of leakage point.	Security
6.	Do not allow mobile phones within the radious of 200mts.	Security
7.	Inform fire department to perform standby duty with fire fighting facility.	LT Shift Incharge
8.	Inform and assemble the Emergency Respose Team at spillage site.	LT Shift Incharge
9.	Ensure necessary PPE‘s are worn by the emergency response team.	LT Shift Incharge
10.	Shift the spill collection kit to the location.	LT Shift Incharge
11.	With the help of soaking pad collect the spilled oil in carbouys and barrels.	LT Shift Incharge
12.	Shift the barrels to waste oil storage area and dispose it through vendors.	LT Shift Incharge
13.	Put sand or saw dust and clean the area.	LT Shift Incharge

- In all emergencies LT Shift incharge shall inform QHSE department and QHSE department shall monitor everything is happening as per the action plan and guide where ever required.
- For the purpose of Emergency Response Team HOD Liquid Terminal shall ensure at least two staffs are identified and they are available in each shift. The work force for collecting the spill is arranged by stopping some of the LT activities and also can be obtained from Fire Department.
- Fire department shall spare at least four persons (firemen) for spill collection purpose and they shall work under the guidance of LT shift incharge.
- Fire department shall also perform standby duty with fire fighting arrangements during the entire course of spill collection operation.

4.3.11 MAJOR RELEASE OF FLAMMABLE/TOXIC GASES

Plan to deal with major release of flammable/ toxic gases can be divided in following stages:

Action By		Activity
PLANNING & PREPAREDNESS		

Port Key Person	❑ **Constitute Emergency Response Team(s) comprising of at least:** ❖ Port Engineer (01), Fire Team Member (01), Port Operators (02), Electrician (01) Note ➢ Based on total strength of the individual plant, more than one team may be constituted. ➢ Each member of the team shall have a designated alternate member. ❑ Maintain pressure relief valves & vents. ❑ Identify location to isolate, redirect the lines to flares or re-circulation. ❑ Liaise with HOD – QHSE for: ❖ Conducting regular audits. ❖ Training of persons regarding various aspects gas leakage. ❑ Liaise with HOS – Fire Services for personnel protective equipment.
ACTION DURING EFFECTIVE PERIOD	
Emergency Response Team	❑ Control, block or contain leakage. ❑ Suspend all hot work in the vicinity & isolate electric powers to affected area(s). ❑ Isolate and redirect the lines to flares or re-circulation. ❑ Liaise with HOS – Fire/ Occupational Health Services to: ❖ Evacuate non-essential personnel. ❖ Administer first aid to victims. ❑ Liaise with HOD – Security to restrict movement in the area. ❑ Liaise with Site Main Controller for external assistance required (if any).
ACTION AFTER EFFECTIVE PERIOD	
Emergency Response Team	❑ Assess damage. ❑ Implement fire preventive measures. ❑ Undertake restorative measures & repairs. ❑ Liaise with Coordinator – Occupational Health Services to follow up on causalities.

4.3.12 TRANSPORTATION INCIDENTS INVOLVING HAZARDOUS MATERIAL

Various hazardous materials are normally transported to and from **Adani Port** by tank lorries. These tank lorries have the potential to mechanical failures & road incidents (within and/ or outside the complex) resulting in the possible scenarios viz. spillage, leakage, fire & explosion that might pose an imminent danger to vehicular traffic and surrounding populations [mostly in built-up areas] apart from threat to an environment. The plan to deal with transportation incidents involving hazardous material may be divided in following stages:

Action By		Activity
PLANNING & PREPAREDNESS		

Port Key Person	❑ **Constitute Emergency Response Team(s) comprising of at least:** ❖ Port Engineer (01), Fire Team Member (01), Port Operators (02), Electrician (01) Note ➢ Based on total strength of the individual plant, more than one team may be constituted. ➢ Each member of the team shall have a designated alternate member. ❑ Collect information about the product and specification/ design of the tanker for the product. ❑ Liaise with HOD – Security for: ❖ Ensuring safety equipment & fitness certificates are valid. ❖ Auditing the tankers. ❖ Awareness program for transporters, drivers' etc.
ACTION DURING EFFECTIVE PERIOD	
Emergency Response Team	❑ **Liaise with HOD – Security/ Driver/ Transporter to:** ❖ Ascertain extent of damage and impact. ❖ Control, block or contain leakage. ❖ Inform various agencies. ❖ Request for assistance. ❖ Restrict movement in the affected area.
ACTION AFTER EFFECTIVE PERIOD	
Emergency Response Team	❑ Assess damage. ❑ Undertake restorative measures & repairs. ❑ Liaise with HOS – Occupational Health Services to follow up on causalities

4.3.13 MARINE EMERGENCY

Shipping fleet operates outside the premises of **Adani Port** and is subject to international, national and local rules. Marine emergencies are classified into:

On-shore Emergency (Nature I & Nature II)

- May occur in Jetty/ Shipping Division area.
- Shall be handled as per the Adani Port Emergency Action Plan.
- Senior most functionaries to take charge as Emergency Coordinator (Site Incident Controller).
- Radio Room shall function as Marine Control Center.

On-site Emergency (Nature I - Level-I or Nature I – Level II)

- May occur on board APSEZ vessels (not requiring external help)
- Master shall assume charge on board vessel
- Senior most functionaries to take charge as Emergency Coordinator (Site Incident Controller).

Off-Site Emergency (Nature-II)

- Shall be handled as per Contingency Manual & Single Point Mooring Operations Manual.
- Master shall assume charge on board vessel.
- Senior most functionaries on shore to take charge as Emergency Coordinator (Site Incident Controller).

In case of an Oil Spill, the action plan shall be as per "Oil & Chemical Spillage Response Plan" During any of the above-classified marine emergencies:

MARINE EMERGENCY (Cont.)

- During working hours
  - Key Person or senior most functionary to assume charge of Site Incident Controller
  - Next senior most functionary to assume charge of Deputy Site Incident Controller
  - Coordinators to report at Site Shift Managers Office
- During silent hours
  - Radio Officer in duty to assume charge of Site Incident Controller
  - Shift Officer to assume charge of Deputy Site Incident Controller
  - Coordinators to report at Site Shift Managers Office
- Oil & Chemical Spillage Response Plan

CHAPTER – 5

EMERGENCY PREPAREDNESS

5.01 FIRE FIGHTING FACILITIES AVAILABLE WITH ADANI PORT, MUNDRA

5.1.1 FIRE FIGHTING SYSTEM AT THE JETTY

5.1.2 LIQUID TERMINAL

5.1.3 DRY CARGO AREA

5.1.4 TERMINAL – 2:

5.1.6 CONTAINER TERMINAL – 3 [SOUTH BASIN]:

5.1.7 TERMINAL – 1:

5.1.8 WEST BASIN:

5.1.9 ADANI HOUSE & PUB :

5.2.0 SAFETY EQUIPMENTS & PERSONAL PROTECTIVE EQUIPMENTS AVAILABLE WITH ADANI PORT

5.01 FIRE FIGHTING FACILITIES AVAILABLE WITH ADANI PORT, MUNDRA

Adequate fire fighting systems are provided for protection of berths, buildings and facilities of the port. The fire fighting facilities are based upon TAC and NFPA guidelines.

The pumps and fire water pipe network system are provided to serve hydrants suitably located around the entire premises with Extinguishers, Hydrants, Hose boxes and Monitors. The Fire & Safety staff of the **Adani Port** covers the entire premise and provides suitable fire protection coverage with mobile equipment, personnel, etc. The capacity of the fire water system is sized to fight a fire hazard at the proposed berth. A general guidelines for the fire hydrant system is as given below:

5.1.1 FIRE FIGHTING SYSTEM AT THE JETTY

The fire fighting systems at all the berths are designed to be combined with foam concentrate systems. 08 Water/Foam Monitors are installed on the four berths, so that the manifold area of the maximum tanker size (including the tanker drift movements) is included in their throw pattern. An additional Jumbo Jet Water Curtain Nozzle installed at berth no. 01 & 02 to isolate the Valve manifold area or the tanker, in case of fire at one or the other.

- Adequate foam storage is provided to ensure firefighting in all areas for a minimum period as in accordance with Indian Standards or NFPA but on no account less than 30 minutes.
- All the firefighting systems is designed in accordance with the Indian and NFPA standards.
- The system follows the minimum design criteria as stipulated in the Guidelines, which are summarized hereunder:

  - In case of fire, the ship will be towed to the open sea and the firewater protection for the ship will be treated as first aid until towing is done.
  - One single largest risk is considered for providing fire protection facilities.
  - Sea water, which is available at the location, will be conveniently used.
  - As port terminals handling ships of size less than 50,000 DWT, one set of firewater pumps are provided this will cater to both monitors as well as hydrant service and water curtains.
  - The firewater pressure system is designed for a minimum residual pressure of 7 kg/m^2 at the hydraulically remotest point of application in the terminal.
  - Fire water flow rate will be the aggregate of the following:
  - Water flow for Water/Foam Monitors for protection of loading arms/piping manifold and ship;
  - Water flow for areas segregation through water curtains between ship and loading
  - arms and hydrant service.
  - The water network laid to ensure multi-directional flow wherever possible. Isolation valves are provided in the network to enable isolation of any section of the network.

The major components of the firefighting system for the berths are as follows:

1. **Monitors:**
   Two monitors with an adequate capacity with suitable horizontal throw. The positions of the monitors are so designed to cover the entire area of largest tanker berthed at Jetty.

2. **Curtain nozzles:**
   These nozzles are provided between unloading arms and the tanker at berth no. 01 & 02 for segregation of the two with a water curtain.

3. **Water hydrants:**
   Water hydrants are stand post type and are double headed. One hydrant post is provided for every 30 meters length on the jetty. These are located alongside berths for easy accessibility. 6" hydrant heads with standard twin 63 mm hydrant valves are used.

4. **Mobile Monitor:**
   One unit of Mobile Monitor with 800 ltrs foam in tank kept at jetty to reinforce fire fighting system during handling of Chemicals /Hydrocarbons.

5. Foam-concentrate drums are provided for the foam monitors (with 3% concentrate). A total of 3310 ltrs of AR-AFFF concentrate are stored in easily cartable Jerry cans of 20-ltrs and 200 ltrs capacity drum kept at Marine Terminal.

6. Firewater network ring main is of 300 mm diameter.

5.1.2 LIQUID TERMINAL

Presently there are 97 tanks at Liquid Terminal and the area of the tank farm is divided in three zones. They are CTF (61 fixed roof tanks), POL (8 tanks including two floating roof tank), EOL (25 fixed roof tanks) and Bitumen Terminal (3 fixed roof tanks) The Fire fighting systems at the Liquid Terminal area is fully approved by the TAC. It is designed to meet the demand of two major fires at distinct locations. The essence of the systems is quick knock down of fire at the earliest instance. The fire fighting systems consists of six electric pumps, four diesel pumps and two Jockey pump and ring main of 300/250 mm dia. each tank of CTF, POL and Bitumen Terminal is protected with devoted foam and water protection system. All the loading bays and enclosure are suitably covered with Water Monitors and Hydrants.

The major components of the fire fighting system for the Liquid Terminal is as follows:

a. Foam Pourers:

All the fixed roof & floating roof tanks of CTF, POL & Bitumen Terminal are covered by Foam Pourer System. The Foam could be operated by quick opening type butterfly valve positioned near each tank. In case of bitumen tanks foam have to feed in the line from external source.

b. Water Spray Rings:

All the tanks of CTF and EOL are protected by medium velocity water spray system all around the tanks. The discharge rate of water spray is 3 lpm/m^2 for the effective cooling against radiation heat. The water sprays are also operated by quick opening type butterfly valves.

c. Water Monitors:

All the Loading Bays, Tank enclosures are adequately covered by the Water Monitors. The water monitors are strategically positioned to cover maximum area. the monitors are manually operated by the valves placed with each monitor.

d. Hydrants:

Double headed Hydrants are evenly positioned all over the Terminal area in accordance with TAC and NFPA guidelines

5.1.3 DRY CARGO AREA

The Dry Cargo area is the zone of moderate risk hence only fully pressurized Hydrant system is provided. The well designed Single and Double outlet type hydrant posts are located all around the open storage yards and the covered godowns.

a. Hydrants:

All the open and covered type of storage areas are covered by Single or double type Hydrant posts. The hydrant system is kept fully pressurized at 7 Kg/cm^2 with a minimum operating pressure of 6 Kg/cm^2 at any point in the system.

■ FIRE STATION

The Fire station is the nerve center of the Fire concerned matters. The Fire Station Control Room is continuously 24 hours a day, 365 days a year. The control room is equipped with modern communication gadgets like, Wireless set, internal telephone & Mobile phones. Apart from the communication systems, the Fire fighting vehicle Foam Tender and Fire Engine are also stationed there. All sorts of firefighting equipment and appliances are stowed in the Fire Station.

The bellow given is the list of some of the equipments stowed at Fire Station.

- Spare fire extinguishers and foam compound drums
- Delivery Hose pipe
- Different types of Branch Pipes & Foam making equipment.
- First aid Firefighting extinguishers
- Mobile Foam Monitors
- Foam Mobile Units
- Fire suits
- First aid kit
- Safety belts
- Ropes
- Cutting tools
- SCBA
- Safety helmets

PPEs - goggles, Apron, shoes, gloves, nose mask, gumboots

5.1.4 TERMINAL – 2:

- Fire Control Room : Fire Station
- Emergency Siren : 1.6 km range manually operated siren
- Fire Control Plan : As Mentioned Below

Fire Pump: 273 m^3/hr discharge X 02 nos. of Vertical Turbine Diesel Driven Pump and 30 m^3/hr discharge X 01 no. of Vertical Turbine Electric Driven Jockey Pump for fire prevention at Terminal- 2 and back-up yard.

Fixed Fire Fighting System: 14 no. of Double Headed Fire Hydrant at jetties, 18 nos. of Single Headed Fire Hydrants at Terminal – 2 back-up yard and 10 nos. of Delivery Hose kept at pump house for fire prevention.

Fire Extinguishers:
Dry Chemical Powder Fire Extinguishers : 03 no. of 50 kg., 20 no. of 10 kg., 10 no. of 2 kg
CO2 Fire Extinguishers: 15 no. of 4.5 kg.

5.1.5 CONTAINER TERMINAL – 2 [ADANI MUNDRA CONTAINER TERMINAL]:

- Fire Control Room : Fire Station
- Emergency Siren : 1.6 km range manually operated siren

- Fire Control Plan : As Mentioned Below

Fire Pump: 273 m^3/hr discharge X 1 no. of Vertical Turbine Electric Driven Main Pump and 273 m^3/hr discharge X 01 no. of Vertical Turbine Diesel Driven Pump and 25 m^3/hr discharge X 1 no. of Vertical Turbine Electric Driven Jockey Pump for fire prevention at AMCT.

Fixed Fire Fighting System: 33 no. of Single Headed Fire Hydrant, 10 no. of Water Monitors and 20 nos. of Delivery Hose with Hose Station for fire prevention.

Fire Extinguishers:
DCP Fire Extinguishers: 40 Nos. (2 kg), 10 Nos. (9 kg), 5 Nos. (10 kg), 3 Nos. (50 kg) CO2 Fire Extinguishers 70 no. (4.5 kg), 24 (3.5 kg) for QC, RTG, Other Area.

5.1.6 CONTAINER TERMINAL – 3 [SOUTH BASIN]:

- Fire Control Room : Fire Station
- Fire Control Plan : As Mentioned Below

Fire Extinguishers: for for QC, RTG and other area CT 3.
CO2 Fire Extinguishers: 65 Nos (2 kg), 45 Nos (4.5 Kg) for for QC, RTG and other area CT 3.
DCP Fire Extinguishers: 40 Nos (2 kg), 13 Nos (5 Kg), 10 Nos (10 Kg)

Fire Tender: Multipurpose Fire Tender

5.1.7 TERMINAL – 1:

- Fire Control Room : Fire Station
- Emergency Siren : 5 km range manually operated siren
- Fire Control Plan : As Mentioned Below

Fire Pump: 273 m^3/hr discharge X 02 nos. of Vertical Turbine Diesel Driven Pump and 30 m^3/hr discharge X 01 no. of Vertical Turbine Electric Driven Jockey Pump for fire prevention at Terminal- 1.

Fixed Fire Fighting System:
33 no. of Double Headed Fire Hydrant at jetties, at Terminal – 1 and 70 nos. of Delivery Hose kept at pump house for fire prevention. 8 no. of Water / Foam Monitor.

Fire Extinguishers:
DCP Fire Extinguishers: 16 no (50 kg). 15 no (10 kg), 8 no (2 kg)
CO2 fire extinguishers: 12 no (4.5 kg)

5.1.8 WEST BASIN:

- Fire Control Room : Porta Cabin, Fire Station
- Emergency Siren : 1 at SS – 1 Building [Range 1.6 km], Manual Siren [Range 1.6 km] at Fire Station
- **Fire Control Plan : As Mentioned Below**

Fire Pump: 273 m^3/hr discharge X 2 no. of Horizontal end suction type Electric Driven Main Pump and 273 m^3/hr discharge X 01 no. of Horizontal end suction type Diesel Driven Pump and 10.8 m^3/hr discharge X 1 no. of Back pull out type Electric Driven Jockey Pump for fire prevention at West Basin.

Fixed Fire Fighting System: 122 no. of Single Headed Fire Hydrant, 99 no. of Water Monitors and 250 no. of Delivery Hose for fire prevention.

Fire Extinguishers:
DCP Fire Extinguishers: 16 no (50 kg). 15 no (10 kg), 8 no (2 kg)
CO2 fire extinguishers: 12 no (4.5 kg)

Fire Tender:
- Water Tank capacity (in built) - 6000 liters
- Pump discharge - 2250 LPM
- Aluminized Suit - 01 no.
- Water Jel Blanket - 01 no.
- Delivery Hose - 20 nos.
- 35‖ Alluminium Extension Ladder - 01 no.
- Self-contained Breathing Apparatus Set - 03 no.

Other firefighting related equipment.

5.1.9 ADANI HOUSE & PUB :

- Fire Control Room : Fire Station
- Emergency Siren : Adani house & PUB

- Fire Control Plan :

Fire Pump:

96.10 m^3/hr discharge X 01 no. of Electric Driven Main Pump,
10.8 m^3/hr discharge X 01 no. of Electric Driven Jockey Pump for fire prevention.

Fixed Fire Fighting System:

- **Adani House:** 9 nos of Single Headed Fire Hydrant, 5 nos of Hose Reel Hose, 18 nos of Delivery Hose kept at Adani House.
- **PUB:** 19 nos of Single Headed Fire Hydrant, 15 nos of Hose Reel Hose, 38 nos of Delivery Hose.

Fire Extinguishers:

- DCP Fire Extinguishers: 22 nos of 10 kg
- CO2 Fire Extinguishers: 40 nos of 4.5 kg, 8 nos of 9 kg, 2 nos of 22.5kg

Auto Flooding System: NAF S125 Flooding System at IT Server Room and UPS Room connected with Fire Detection System to protect from fire.

Fire Detection System:

- Smoke Detector System in Entire Adani House.
- Separate Fire Alarm System for PUB buildings

5.2.0 SAFETY EQUIPMENTS & PERSONAL PROTECTIVE EQUIPMENTS AVAILABLE WITH APSEZ

HAZARD KIT
The following items of hazard kits are under procurement/have been procured.
Protective Clothing

- Chemical protective suits
- Proximity suit
- Neoprene 14" gloves
- Natural rubber gloves
- Surgical gloves
- High voltage lineman's gloves
- Overalls
- Goggles (polycarbonate lens)
- Hardhats with headband suspensions
- Face shield (full) 10-x19-x.060
- Boots (neoprene, steel toe and modsole)
- Safety harness
- Ear Muffs

Breathing Apparatus

- Emergency Oxygen Bottles.
- Positive pressure self contained breathing apparatus
- Spare cylinders
- Full-face cartridge type respirators

Leak Control Equipment

- Drums
- Epoxy kit
- Patch Kit
- Wooden plug kit
- Rubber plug kit
- Mastic

First Aid Equipment

- Extinguishers capable for handling Class A, B, C and D fires.
- First aid kit (36 units)
- Resuscitator (B.W.S. CPR Portable with aspirator P/N 900 0 002 - 111 - 01 woolen fire blankets.

Miscellaneous

- Teflon thread tape
- Electrical tape
- Pipe pieces, assorted.
- Pipe union, assorted.
- Pipe caps, assorted Hose clamps, assorted.
- Saddle clamps, assorted.
- Couplings (galvanized), assorted.
- Hand cleaner (waterless)
- Flashlight (NS)
- Reflective triangles
- Quick setting cement
- Frontier barriers & safety cones.

Absorbents and Containers

- Absorbent pads
- Plastic can liners / bags
- Recovery drum sets
- Diatomaceous earth bag
- Sponges

Monitoring Equipment

- Combustible gas detector (Explosive meter, Range:0-100 LEL & 0-5ppm)
- Oxygen detector (0-25% oxygen, PAC III, Drage make)
- Organic vapour detector (PAC III, Drager make)
- pH paper (0-14) (Ydrin, 1/2 x 50 with dispenser)
- Indication wind system AC-DC recording cup & vane anemometer with meter telescoping mast.

Miscellaneous

- Portable flood lights (4 Nos.)
- Emergency suits (2 Nos.)
- SCBA - 4 Nos.
- Loud Hailer (battery operated)
- Portable DCP extinguisher
- Emergency Rescue Cage

Tools and hardware

- Drill (electrical)
- Drill set, assorted sizes (short length)
- Drill set, assorted sizes (length)
- Punch set, assorted sizes
- Wire brush
- Paint brushes
- Tape measure steel tape
- Foot ruler (metal)
- Welding kit
- Pipe cutters
- Drum trolleys
- Chemical buckets
- Dust pans
- Hacksaw
- Hacksaw blades

Oxygen Trauma, First-Aid & Emergency Box Kit (Medical)

- Oxygen Cylinder
- Water Jel Blankets
- Rescue Blankets
- Oxygen breathing kit
- Instant Glucose
- Paramedic Scissors
- Forceps
- Gloves
- Ring cutter
- Cervical collar
- Eye pads
- Tourniquets
- Multi-trauma dressings
- Adaptec dressing
- Flexible Bandages
- Pocket Masks - Eyewash bottle
- Bag mask resuscitator
- Portable respirator
- Portable lamps / torches
- Mouth-to-mask
- Blood pressure Equipment

Adequate number of fire tender

- There are three nos of fire tenders one is Foam Tender with water, foam, DCP and CO_2 facility having a centrifugal fire pump. Pump is of gunmetal and stainless steel also with 60 mtrs. long hose and nozzle provided above the pump panel.

- CO_2 gas cylinders of sufficient capacity are mounted for expelling the75 kg DCP extinguishers. The foam tender also carry 6 x 22.5 kg. nos. of CO_2 Cylinder.

- Water Tender of 12000 ltrs water capacity with adequate numbers of fire fighting equipment and rear mounted portable pump of 450 ltr / pmt capacity

Neutralising Agents

- Acid neutralizing agent (neutrasorb 100 = box)
- Neutrasol two
- 2-1/2 gallon container / carton)
- Neutralizer Neutrality
- Clorox

5.03 ABOUT ON-SITE EMERGENCY PLAN

Following three stage activities are planned to perform, as these activities are co-related, provide better ideas for emergency preparedness, and emergency actions with subsequent follow-ups.

a) Pre-emergency activities
b) Emergency time activities
c) Post emergency activities

In Pre Emergency Activities : Following activities are carried-out :: Internal Safety Surveys, Mock Drills & Training : Joint Mock Drills are performed engaging Mutual Aid Units. Arrangement is made to acquire emergency aid in the form of First Aid, chemical leak control, Evacuation, Vehicle for Transportation of affected. Moreover, from Fire Brigade is liaised with. (if the emergency is uncontrollable by the internal resources at the unit).

5.04 ABOUT POST EMERGNECY ACTIVITIES

A) collection of records
B) Making insurance claim
C) Conducting inquiries and taking preventive measures
D) Rehabilitation of affected persons within and outside plant
E) Restart of plant

CHAPTER NO.VI

OFF-SITE EMERGENCY PLAN

CONTENTS

6.00 ABOUT OFF-SITE EMERGENCY PLAN

Ours is a **PORT**, Importing and exporting various goods including liquid chemicals, petroleum products.. Various substances, chemicals are stored at the terminals. Leak of chemicals, fire may lead to a serious off site emergency. In view of this, it is necessary to prepare an off-site emergency plan to deal with any emergency methodically and systematically to control and reduce its effects. In this connection, we have formed a EMERGENCY ORGANIZATION as per Chapter - 3

Incident controllers, Deputy Incident Controllers, Site Main Controllers are appointed and their emergency duties are determined. Arrangements are made for communication with external authorities. Safe assembly points and Emergency Control Centers are determined. Pre-emergency, emergency time and post emergency activities are formulated. A list of all important telephone numbers is prepared. Arrangement is made to get / provide emergency help with mutual aid units. Special knowledge, advise, experts will be available. Liaison will be made with off-site emergency authorities.

6.01 STRUCTURE OF OFF-SITE EMERGENCY

BASIC ACTIONS IN EMERGENCIES

Immediate Actions

Immediate action is the most important factor in emergency control because the first few seconds count, as a fire develops and spreads very quickly unless prompt and efficient actions are taken. In the event of fire in the Port/terminal, the following actions shall be taken as quickly as possible.

- Take immediate steps to stop leakage/fire and raise alarm simultaneously.
- Initiate action as per FIRE ORGANIZATION PLAN or Disaster Management Plan, based on gravity of the emergency.
- Stop all operations and ensure closure of all valves and isolation valves
- All out efforts should be made to contain the spread of leakage/fire.
- Saving of human life shall get priority in comparison to stocks/assets.
- Plant personnel without specific duties should assemble at the nominated place
- All vehicles except those required for emergency use should be moved away from the operating area, in an orderly manner at pre-nominated route.
- Electrical system except for control supplies, utilities, lighting and fire fighting system should be isolated.
- If the feed to the fire cannot be cut off, the fire must be controlled and not extinguished.
- Start water spray system at areas involved in or exposed to fire risks.
- In case of leakage of chemicals without fire and inability to stop the flow, take all precautions to avoid source of ignition.
- Block all roads in the adjacent area and enlist Police support for the purpose if warranted.

Fire Fighting Operations

- Enlist support of local fire brigade and neighboring industries.
- If escaping vapor cannot be stopped, jets of water should be directed at the point of leakage to asset controlled release of vapor and in between water fog should be used for dilution and rapid dispersion of vapor cloud.
- Fire fighting personnel working in or close to un-ignited vapor clouds or close to fire must wear protective clothing and equipment including safety harness and manned life line. They must be protected continuously by water sprays. Water protection for fire fighters should never be shut off even though the flames appear to have been extinguished until all personnel are safely out of the danger area.
- Exercise care to ensure that static charge is not generated in vapor cloud. For this purpose, solid jets of water must be avoided, instead for nozzles should be used.
- Fire fighters should advance towards a fire down – wind if possible.
- Cylinder fire should be approached using proper barricades / protection to avoid direct hit from flying cylinders.
- If the only valve that can be used to stop the leakage is surrounded by fire, it may not be possible to close it manually. The attempt should be directed by trained persons only. The person attempting the closure should be continuously protected by means of water spraying (through fog nozzles), fire entry suit, water jet blanket or any other approved equipment. The person must be equipped with a safety harness and manned life line.
- Any rapid increase in pressure or noise level of product discharged through safety relief vale of the vessel/pipeline should be treated as a warning of over pressurization. In such cases all personnel should be evacuated immediately
- As in case of any emergency situation, it is of paramount importance to avoid endangering human life in the event of fire involving or seriously exposing equipment containing chemicals or serious leakage of chemicals without the fire.

Action in the event of chemical leakage without fire

- Take basic action as detailed in (1) above
- If escaping is not on fire, close any valve which will stop the flow.

Action in the event of fire

- Take basic action as detailed in (1) above.
- Extinguish Fires – A small fire at the point of leakage should be extinguished by enveloping with a water spray. However, it is against, stressed that fire should not, except in special circumstances explained earlier, be extinguished until the escape of product has been stopped.
- Fire fighting procedure – Fire fighting procedures would vary depending upon various factors such as nature, sources sizes, location etc of fire. Basic fire fighting techniques have been explained earlier in section (2). However, for the purpose of guidelines, fire fighting techniques for few common cases are as follows:
- Cylinder Fire If a cylinder is involved in fire, internal pressure may start rising and if not relieved the built up pressure could rise and ultimately rupture the container. Ignition of the escaping gas would aggravate the fire but the release of pressure would reduce the possibility of rupture of the container. No attempt should be made to extinguish the burning gas. But the container and other containers in the vicinity should be kept cool by water sprays until the

contents of the container have burnt away. If the gas leakage does not ignite, the container should be approached from upwind (if in the open air) and be removed to a place of safety remote from sources of ignition.

- Cylinders not directly involved in the fire should be moved away from heat exposure, while applying cooling water sprays on cylinder directly involved.
- Fire on storage vessel: If a pressure vessel is exposed to radiant heat from external fire, it should be kept cool by water sprays to prevent excessive pressure rise in the vessel. Cooling water sprays must be applied without delay in the heat affected areas using fixed water sprinkler system or equivalent spray water coverage, through fixed monitors or other equipment. Cooling the vessel with water sprays reduces the heat input to the vessel and thereby reduces the pressure, thus reducing the rate of discharge from the relief valves.

Fire Fighting Organization Plan

A plan of action for use in the event of a major leakage of with a fire or risk of fire is essential. Such a plan must be carefully prepared for each area. It should be fully understood by all the Port supervisory personnel and other personnel‘s‘ responsibilities for action as per plan. It shall be based on the following:

- Port personnel shall be fully trained for specialized techniques necessary for combating leakages and fires.
- If leakage and / or fire occurs, all personnel should use the equipment provided and to carry out their allotted tasks as detailed in the fire fighting organization plan.
- Personnel should be conversant with fire control equipment and also its location.
- Port personnel should be familiar with the standard recognition markings of the control, first-aid and all safety equipment, must know the location of emergency exits, and they should know the location of water points/monitors and must be familiar with the sound of the emergency (fire) alarm.
- The fire fighting organization plan together with layout of fire fighting and safety devices shall be displayed at prominent places and explained to all personnel. It shall include the following functions, expanded to suit the location facilities / equipment:
  - Sounding the emergency (fire) alarm.
  - Shutting off the supply to any leakage point / fire.
  - Summoning the fire brigade / police
  - Fire control, with first-aid, fire fighting equipment
  - Closing down all operations in the area pertaining to emergency
  - Preventing all sources of ignition in case flammable substance‘ leak occurs
  - Evacuation of vehicles
  - Evacuation and mustering of personnel
  - Establishing an emergency fire-control center
  - Traffic control
  - Stations and duties of all personnel
  - Policing of affected areas
  - Any other specialized duties
  - Display of fire brigade, ambulance, Police telephone numbers etc.
  - All clear signal by competent person.

Liaison with local Fire Brigade

Close co-operation with the local fire authorities is essential and shall take the following form:

- Fire brigade other than of Port should be made familiar with layout of plant and the location of important equipment / facilities provided, and their method of use. Mock fire drills / exercise jointly by plant personnel and outside fire brigades shall be planned.
- Fire fighting equipment at the plant shall be compatible with the outside fire brigade equipment, otherwise adopters shall be kept ready for hoses,
- The outside fire brigade shall be aware of the ports fire fighting organization plan and the views held at the plan regarding the most effective fire control method. (Water insoluble)
- In the event of an emergency / fire, the Port manager and / or his representative shall advise the Fire Officer about particular or potential hazards that may be present at that particular point of time.

Fire Drills & Training

- Drills for all plant personnel, making use of the Fire Fighting Organization plan and practicing the specialized techniques required for fighting fires or dispensing / diluting vapor shall be held minimum once in a month.
- The drills should cover various types of incidents, e.g. Major spillage, leak / fire, cylinder fire etc.
- Extinguishers due for recharging due for hydro testing shall be discharged during drills and replenished subsequently 50% (Min.) stock of refills as replenishment for Fire Extinguishers should be maintained.
- The fire pump should be run, sprinkler system activated, emergency systems tested, water hoses run out and spray / set techniques practiced during drills.
- Fire alarm shall be sounded / tested / neighbouring areas and the fire brigade shall be warned in advance of this test).
- Protective clothing, mask and any other specialized safety equipment available shall be tried out during drills to train all concerned in their application.
- The local fire brigade should be encouraged to participate in fire drills periodically.
- Any shortcoming, noticed during the drill shall be rectified.

ON-SITE EMERGENCY PLAN (DISASTER MANAGEMENT PLAN)

It is basically a pre-plan to handle any emergency situation of a higher magnitude arising out of factors listed below:

- ✓ Major fire / explosions
- ✓ Lighting
- ✓ Heavy floods
- ✓ Earthquakes
- ✓ Sabotage/ terrorist outrage
- ✓ War situation

Due to varying risk potentials and also varying hazards at / around each location _ON SITE EMERGENCY PLAN' for each location shall be drawn up individually based on the outline given below:

- Identify disaster scenario i.e. the situations under which the plan would become operational. Plan for the worst possible scenario.
- Identify resources required from each of the outside agencies.
- Establish outside agencies, role of each agency and obtain their commitment for rendering the assistance in crises situation as per the agreed plan.
- Establish organogram for ON SITE EMERGENCY PLAN based on available manpower in various groups and identify the leader and alternative leader for each of the groups and the role to be played by each team in various likely crises situations.
- Identify Disaster Control room / group.
- Furnish detailed data and drawings relevant for the crises management.
- Mock drills to be conducted minimum once a year.
- Modify the plan based on the experience gained through mock drills and try out the modified plan through subsequent mock drills.
- The plan shall be updated as and when the changes recorded in the plan occur and communication sent to all concerned.

Communication organogram

As a part of ON SITE EMERGENCY PLAN, communication organogram shall be drawn up giving flow of communication from the originating location to various local agencies and also to Statutory Authorities and upwards within the organization to mobilize support and to consider alternatives for maintaining essential supplies. **(As mentioned in Chapter 3.13 & 3.14 Communication & Public Affairs)**

MANAGER (SITE MAIN CONTROLLER)

1. Rush to the port on receiving the message of the incident
2. Call other persons if required.
3. Inform hospitals, doctor, police, dist.authorities, Director, Industrial Safety & Health
4. Arrange for roll call of workers and find if anyone missing
5. Arrange for first aid of injured and hospitalization
6. Arrange food / water for persons controlling the emergency
7. Arrange for money
8. Assess situation & determine area likely to be affected

OCCUPIER

1. Prepare a statement for press & public release and take responsibilities of press and public relationship
2. Plan out rehabilitation / post emergency activities

6.02 ROLE OF MANAGEMENT

A copy of this on-site emergency to be submitted in duplicate to Deputy Director, Industrial Safety & Health, District Authority.

6.03 ROLE OF POLICE AND EVACUTION AUTHORITY

Police may be required for maintaining low and order outside the factory and on the approach road.

6.04 ROLE OF MUTUAL AID UNITS

Agreement with nearby units is to be made for providing help, aid, assistance, vehicle, expert to overcome the situation.

Annexure – 1

IDENTIFICATION OF FACTORY

Full Name & Address of factory		**ADANI PORTS and SEZ LIMITED P.O. Box 1, Mundra – 370 421 (KUTCH) Gujarat, India.**	
Phone	02838-255000	**Office**	
Fax No.	02838-226301	**E-mail**	**info@mundraport.com**
Full Name & Address of the Occupier		**DR. MALAY MAHADEVIA** C/O. ADANI PORTS & S.E.Z. LIMITED NAVINAL ISLAND, MUNDRA.	
Phone No.		**Office**	**Residence**
		--	**--**
Full Name & Address of the Manager		**CEO. DOUGLAS CHARLES SMITH** C/O. ADANI PORTS & S.E.Z. LTD., NAVINAL ISLAND, MUNDRA	
Phone No.		**Office**	**Residence**
		02838-255000	--
Manufacturing Process		Handling of Dry and Liquid Cargo in Bulk	

Name of the Shift	**Maximum Worker at a time**			
	Male	**Female**	**Total**	In "Workers" include all Employees, Contract Workers, Trainees ,Apprentices, etc.
General Shift – G	1187	42	1229	
Shift – A	402		402	
Shift – B	402		402	
Shift – C	380		380	
Total Shifts:	**2371**	**42**	**2413**	

First Person to be contacted in case of emergency :

Name of the shift	**Name & Designation**	**Place of Availability**	**Phone No.**		
			Mobile	**In Factory**	**Residence**
(A),(B),(C) shifts	Port Operation Center	POC office	9825000949	02838-255762 02838-255781	-

Any Other information, if any : Any of the persons will be available round the clock :

Annexure – 4

STORAGE HAZARDS & CONTROL

Name of the hazardous substance (Mention concentration if any)	Sr. No. of the MSDS enclosed	Quantity		Place of its storage	Operating pressure & Temp.	Type of Hazards possible (Fire, explosion, Toxic release, Spill etc.)	Control Measures Provided	In charge Person	
		Maximum That can be stored	Actually stored (Including in process & handling)					Name & Designation	Phone No.
1	2	3	4	5	6	7	8	9	10
A. Raw Materials:	Available	Storage of Liquid 3.25 Lac KL	185135 MT as on 04.01.22	Liquid Storage Tanks	Ambient Temperature and Pressure	Fire, explosion, Toxic Release, Spill	Water Sprinkler, Foam Pourer, Hydrant System	Mr. Gaurang Chudasama (Head – LT)	8980802997
B. Finished Product:	--	--	--	--	--	--	--	--	--
C. Intermediates	--	--	--	--	--	--	--	--	--
D. Bye-Products :	--	--	--	--	--	--	--	--	--
E. Other: (E.g. Catalysts, inhibitors etc.)	--	--	--	--	--	--	--	--	--

Note: There is no process or manufacturing activity only storage handling of dry and liquid cargo in bulk.

Annexure – 6

PROCESS & VESSEL HAZARDS AND CONTROLS

Sr. No.	Name of the Plant, Department or place	Name of the hazardous process and operation	Materials in the process/ operation with their quantity	Name of the vessel and its location	Operating parameters: (Pressure, Temp. etc)	Type of hazards possible (exothermic, run away, pressure release, toxic release, fire, explosion etc)	Control Measures provided	In charge Person	
								Name	Tele. No.
1	2	3	4	5	6	7	8	9	10
1	Air compressor (LT workshop)	Air compression	Compressed Air	Air driers & Air Receivers	Pressure	High Pressure release	Safety Valve,	Mr. Gaurang Chudasama (Head – LT)	8980802997
2	Nitrogen compressor (LT workshop & Near ISPS Gate)	Nitrogen compression	Nitrogen	Nitrogen Receiver	Pressure	Nitrogen release with high pressure	Safety valve		

Annexure – 8

TRADE WASTE DISPOSAL

Sr. No.	Type and Name of the trade waste	Generation per Annum	Place of its generation	Place of its safe disposal	Treatment method adopted for safe disposal	Alarm indicating accidental release or release in excessive proportion	Monitoring & Control measures provided	In charge person's name, Address & Phone No.
1	2	3	4	5	6	7	8	9
1.	Used/Spent Oil	300.0 MT	All the departments	Reception, Collection, Storage, Transportation & Disposal by selling out to registered recycler/ reprocessor	Send to authorized recycler	-----	Disposal by selling out to registered recycler/ reprocessor	Mr. Ashok Sharma, Central Store 8980015147 (M)
2.	ETP Sludge	1.095 MT	Liquid Terminal	Collection, Storage, Transportation & Disposal by co-processing at cement industries	Disposal by co-processing at cement industries through SEPPL / RSPL		Disposal by co-processing at cement industries	Mr. Gaurang Chudasama Liquid Terminal 980802997 (M)

Annexure – 8

TRADE WASTE DISPOSAL

Sr. No.	Type and Name of the trade waste	Generation per Annum	Place of its generation	Place of its safe disposal	Treatment method adopted for safe disposal	Alarm indicating accidental release or release in excessive proportion	Monitoring & Control measures provided	In charge person's name, Address & Phone No.
1	2	3	4	5	6	7	8	9
3.	Sludge & Filters contaminated with oil	5.0 MT	All the Departments	Collection, Collection, Storage, Transportation & Disposal by co-processing at cement industries	Disposal by co-processing at cement industries through SEPPL / RSPL		Disposal by co-processing at cement industries	Mr. Ashok Sharma, Central Store 8980015147 (M)

Annexure – 8

TRADE WASTE DISPOSAL

Sr. No.	Type and Name of the trade waste	Generation per Annum	Place of its generation	Place of its safe disposal	Treatment method adopted for safe disposal	Alarm indicating accidental release or release in excessive proportion	Monitoring & Control measures provided	In charge person's name, Address & Phone No.
1	2	3	4	5	6	7	8	9
4.	Waste Residue Containing Oil	100.0 MT	All the Departments	Collection, Collection, Storage, Transportation & Disposal by co-processing at cement industries	Disposal by co-processing at cement industries through SEPPL / RSPL / Sanghi Cement / Ambuja Cement		Disposal by co-processing at cement industries	Mr. Bhagwat Swaroop Sharma Environment 7622947676 (M)
5.	Bottom sludge	Whatever quantity generated	Liquid Terminal	Collection, Collection, Storage, Transportation & Disposal by co-processing at cement industries	Disposal by co-processing at cement industries through SEPPL / RSPL / Ambuja Cement		Disposal by co-processing at cement industries	Mr. Gaurang Chudasama Liquid Terminal 8980802997 (M)

Annexure – 8

TRADE WASTE DISPOSAL

Sr. No.	Type and Name of the trade waste	Generation per Annum	Place of its generation	Place of its safe disposal	Treatment method adopted for safe disposal	Alarm indicating accidental release or release in excessive proportion	Monitoring & Control measures provided	In charge person's name, Address & Phone No.
1	2	3	4	5	6	7	8	9
6.	Pig Waste	24.0 MT	Liquid Terminal	Collection, Collection, Storage, Transportation & Disposal by co-processing at cement industries	Disposal by co-processing at cement industries through SEPPL / RSPL / Ambuja Cement		Disposal by co-processing at cement industries	Mr. Gaurang Chudasama Liquid Terminal 8980802997 (M)

Annexure – 13

WEATHER CONDITIONS

Sr. No.	Period of the year Month	Wind Velocity, M/Sec.	Wind Direction	Weather conditions	Pasquill classification A to F
1	2	3	4	5	6
1	JANUARY	5-7	NNE / NE	CALM	D
2	FEBRUARY	5-7	NNE / NE	CALM	D
3	MARCH	7-9	SSW / SW	CALM	D
4	APRIL	9-10	SSW / SW	CALM	D
5	MAY	10-12	WSW / SW	SLIGHT	D
6	JUNE	10-12	WSW / SW	MODERATE / ROUGH	D
7	JULY	12-15	WSW / SW	ROUGH	D
8	AUGUST	12-15	WSW / SW	ROGH / MODERATE	D
9	SEPTEMBER	8-10	WSW / SW	SLIGHT	D
10	OCTOBER	8-9	WSW / SW	CALM	D
11	NOVEMBER	5-7	WSW / SW	CALM	D
12	DECEMBER	5-7	NNE / NE	CALM	D

Legend:
A: Extremely Unstable
B: Moderately Unstable
C: Slightly Unstable
D: Natural
E: Slightly Stable
F: Moderately Stable

Annexure – 14

INCIDENT CONTROLLERS

Sr. No.	Incident Controller's						Runner's		
	Name	Designation	Place of Availability		Phone No.		Name & Designation	Place of Availability	Phone No.
			In Factory	Residence Address	In the Factory	Residence			
1	2	3	4	5	6	7	8	9	10
1	Mr. Bhagwat Upadhaye	Head – Dry Cargo	Tug Berth Building	Shantivan Colony	98792 03599 02838-255870	--	Mr. Mahavirsinh Jhala	Tug Berth Building	9687639228 02838-255838
2	Mr. Gaurang Chudasama	Head - LT	Liquid Terminal	Shantivan Colony	8980802997 02838 - 255742	4459	Mr. K R Rao	Liquid Terminal	99252 03436 02838-255872
3	Mr. Pradeep Jayaraman	Head – AMCT	(AMCT) CT2 Building	Samudra Township	9099005240 02838 – 255732	--	Mr. Prakash Pillai	(AMCT) CT2 Building	7574894335 02838 - 255917
4	Mr. Cherian Abraham	Head - AICTPL	(AICTPL) CT3 – Building	Samudra Township	8980048850 02838 – 255732	--	Mr. Jignesh Bhatt	(AICTPL) CT3 – Building	7069083202 02838 - 255551
5	Capt. Pradeep Ramachandran	Head - ACMTPL	(ACMTPL) CT4 – Building	Shantivan Colony	6358940439 02838 - 255809	4458	Mr. Gajanan Govekar	(ACMTPL) CT4 – Building	7069013836 02838 - 255409
6	Mr. Mavji Vaghamshi	Head - ES	Tug Berth Building	Shantivan Colony	97277 84691 02838-255949	--	Mr. Kuldipsinh Zala	Tug Berth Building	9727784692 02838 - 255949
7	Capt. Sachin Srivastava	Head – Marine	Tug Berth Building	Shantivan Colony	6359883102 02838 – 255727	4629 / 4630	Capt. Divya Gupta	Tug Berth Building	6359631088 02838- 255947

8	Mr. Jawed Iqbal	Head- Railway Services	Railway Building	Shantivan Colony	98982 91000 02838 – 255763	4477	Mr. O P Sharma	Railway Building	98253 00413 02838 - 255765
9	Mr. Vikas Arora	Head – Howe	PUB Building	Shantivan Colony	98792 03557 02838 – 255581	4721	Mr. Harit Mehta	PUB Building	98792 03557 02838 - 259142
10	Mr. Arindam Goswami	Head-HR	Adani House	Shantivan Colony	6357160026 02838 - 255723	4635 / 4636	Mr.Shashikant Patyal	Adani House	8660183841 02838 - 255164

Annexure – 14B (West Basin)

INCIDENT CONTROLLERS

Sr. No.	Incident Controller's						Runner's		
	Name	Designation	Place of Availability		Phone No.		Name & Designation	Place of Availability	Phone No.
			In Factory	Residence Address	In the Factory	Residence			
1	2	3	4	5	6	7	8	9	10
1	Mr. K Hari	Head – West Basin Port	SS-1	Shantivan Colony	9099055203 02838 - 255708	4623 4624	Mr. Kashyap Pandya	SS-1	9925223632
2	Mr. Nirbhay Devmurari	Manager	SS-1	Samudra Township	89800 15303	--	Mr. Vishal Bhavsar	SS-1	9879203580
3	Mr. Bibhudatta Ray	Sr. Manager – DC	SS-1	Shantivan Colony	89800 15282	B-block	Mr. Kasulu Nagireddy	SS-1	89800 15284

Annexure – 15

DEPUTY INCIDENT CONTROLLERS

Sr. No.	Deputy Incident Controller's						Persons to be called if IC & Dy-IC both are not available.		
	Name	Designation	Place of Availability		Phone No.		Name	Place of Availability	Phone No.
			In Factory	Residence Address	In the Factory	Residence			
1	3	4	6	7	8	9	10	11	12
1	Mr. Mahavirsinh Jhala	Manager – Dry Cargo	Tug Berth Building	Shantivan Colony	89800 15471 02838-255939	--	Mr. Mayursinh Jadeja	FCC	8980048813 02838-255987
2	Mr. K R Rao	DGM – LT	Liquid Terminal	Shantivan Colony	99252 03436 02838 - 255745	4501	Mr. Manish Jain	Liquid Terminal	98796 14715 02838 - 284419
3	Mr. Prakash Pillai	Senior Manager – AMCT	(AMCT) CT2- New Building	Samundra Township	8980015456 02838 - 255917	4458	Duty Superintendent	(AMCT) CT2- New Building	96876 39248
4	Mr. Jignesh Bhatt	Manager – AICTPL	(AICTPL) CT3 – Building	Samundra Township	7069083202 02838 – 255551	--	Duty Superintendent	(AICTPL) CT3 – Building	89800 48857
5	Mr. Gajanan Govekar	AGM - AICTPL	(ACMTPL) CT4 – Building	Samundra Township	7069013836 02838 - 255408	4466	Duty Superintendent	(ACMTPL) CT4 – Building	70690 83090
6	Mr. Kuldipsinh Zala	DGM-ES	Tug Berth Building	Shantivan Colony	9727784692 02838 - 255949	4506	Mr. Devendra Dubey	Tug Berth Building	98792 03578 2838-255832
7	Capt. Divya Gupta	DGM- Marine	Tug Berth Building	Shantivan Colony	6359631088 02838- 255947	4444	Mr. Sudhakar Singh	Tug Berth Building	70690 83039 02838-255787

8	Mr. O P Sharma	AGM – Railway	Railway Building	Shantivan Colony	98253 00413 02838 - 255765	4428	Mr. Paresh Palan	Railway Building	99252 03424 02838-255787
9	Mr. Vikas Arora	DGM – Howe	PUB Building	Shantivan Colony	98792 03557 02838 - 259142	4482	Mr. Harit Mehta	PUB Building	98792 03557 02838 – 255719
10	Mr. Shashikant Patyal	GM-Admin	Adani House	Shantivan Colony	9871110840 02838 - 255164	--	Mr. Supratim Sengupta	Adani House	9979855956 02838 - 255158

Annexure – 15B (West Basin)

DEPUTY INCIDENT CONTROLLERS

Deputy Incident Controller's						Persons to be called if IC & Dy-IC both are not available.		
Name	Designation	Place of Availability		Phone No.		Name	Place of Availability	Phone No.
		In Factory	Residence Address	In the Factory	Residence			
2	3	4	5	6	7	8	9	10
Mr. Kashyap Pandya	Senior Manager – WB	SS-1	Shantivan Colony	9925223632	4517	Mr. Nital Bhut	SS-1	89800 15358
Mr. Bibhudatta Ray	Sr. Manager - DC	SS-1	Samudra Township	89800 15282	B – Block	Mr. Kasulu Nagireddy	SS-1	89800 15284
Mr. Kashyap Pandya	Sr. Manager ES – MHS	SS-1	Shantivan Colony	97277 84692	4472	Mr. Mayur Sadhu	SS-1	8980 015121
Mr. Nirbhay Devmurari	Manager ES – MHS	SS-1	Samudra Township	89800 15303	B – Clock	Mr. Vishal Bhavsar	SS-1	98792 03580

Supporting Staff of Channai Radha [Engineering Services]

Name	Designation	Place of Availability in Factory	Residence	Phone No.
Mr. Ravi V	RM – Channai Radha	Workshop	Mundra	8607700609
Mr. Tapankumar Sarkar	Operation Head - Channai Radha	Workshop	Mundra	9726412631
Mr. Mahesh Kumar	Maintenance Head – Channai Radha	Workshop	Mundra	9726418881
Mr. Arha Chakrabarty	HOS E & I - Channai Radha	Workshop	Mundra	9726429031
Mr. Lakshmanan T	Mechanical Head - Channai Radha	Workshop	Mundra	8683800531

Annexure – 16

SITE MAIN CONTROLLERS

Sr. No.	Site Main Controllers						Runner's		
	Name	Designation	Place of Availability		Phone No.		Name & Designation	Place of availability	Phone No.
			In Factory	Residence Address	In the Factory	Residence			
1	2	3	4	5	6	7	8	9	10
1	Mr. Douglas Charles Smith	CEO	Adani House	Shantivan Colony	6357160100 02838 - 255002	4568 / 4569	Mr. Rakesh Mohan COO	ACMTPL	8018059999 02838 – 255404

Annexure – 17

KEY PERSONNEL

EMERGENCY CONTACT NUMBERS

Sr. NO.	NAME	Designation	Place of Availability		Phone No		
			Factory	Residence	Land line	Residence	Mobile
1	2	3	4	5	6	7	8
2	Mr. Douglas Charles Smith	CEO	Adani House	Shantivan Colony	02838 – 255002		6357160100
3	Mr. Mr. Rakesh Mohan	COO	ACMTPL	Shantivan Colony	02838 – 255404		8018059999
4	Mr. K Hari	Head - WB	SS – 01 WB	Shantivan Colony	--	4623 / 4624	9099055203
5	Mr. Rakshit Shah	ED	Adani House	Shantivan Colony	02838 - 255001	52497	99791 21111
6	Mr. Mavji Vaghamshi	Head-ES	Tug Berth Bld.	Shantivan Colony	02838 - 255713	--	97277 84691
7	Mr. Gaurang Chudasama	Head- LT	Liquid Terminal	Shantivan Colony	02838 - 255742	4459	8980802997
8	Mr. Arindam Goswami	Head - HR	Adani House	Shantivan Colony	02838 - 255723	--	90990 05225
9	Mr. Pradeep Jayaraman	Head – AMCT	CT2- New Bld.	Samudra Township	02838 – 255732	4617 / 4618	9152036949
10	Mr. Cherian Abraham	Head – AICTPL	CT3 Bld.	Shantivan Colony	02838 - 255733	--	8980048850
11	Capt. Pradeep Ramachandran	Head - ACMTPL	CT4 Bld.	Shantivan Colony	02838 – 255727	4629 / 4630	6358940439
12	Capt. Sachin Srivastava	Head – Marine	Tug Berth Bldg.	Shantivan Colony	02838 – 255727	4629 / 4630	6359883102
13	Mr. Bhagwat Upadhaye	Head – Dry Cargo	Tug Berth Bldg.	Shantivan Colony	02838-255870	--	98792 03599
14	Mr. Jawed Iqbal	Head - Railway	Rly. Building	Shantivan Colony	02838 – 255763	--	90999 91319
15	Mr. Shivaraman Lvc	Head – OHS & F	CT2- New Bld.	Samudra Township	02838-255777	--	9884869471
16	Mr. Neeraj Kaushik	Head - Security	Adani House	Shantivan Colony	02838-255800	--	9109988165
17	Mr. Mukul Varshney	SEZ Utilities	Adani House	Samudra Township	02838-255828		6357160086

Annexure – 19

SAFE ASSEMBLY POINTS

Identification Sr. No. of the Assembly Point	Location	Accommodation Capacity	At the time of Emergency					
			Person In charge				Land line Nos.	Mobile Nos.
			Name	Designation	Place of availability			
					In the factory	Residential address		
1	2	3	4	5	6	7	8	9
Zone 1.	Terminal -1 (Sec. Gate)	100	Capt. Sachin Srivastav	Head-Marine	Tug Berth Bld.	Shantivan Colony	02838 – 255727	63598 83102
Zone 2.	CG 7	200	Mr. Shivaraman Lvc	Head – OHS & F	CT2 New bld.	Samudra Township	02838 – 255777	89808 02997
Zone 3.	Driver Canteen	200	Mr. Gaurang Chudasama	Head – LT	LT	Shantivan Colony	02838 - 255742	89808 02997
Zone 4.	LT - Behind Encl-09	200	Mr. Gaurang Chudasama	Head – LT	LT	Shantivan Colony	02838 - 255742	89808 02997
Zone 5.	Old Admin Canteen	200	Mr. Bhagwat Upadhaye	Head – Dry Cargo	Tug Berth Bld.	Samudra Township	02838 - 255870	98792 03599
Zone 6.	Rly. Buldng	200	Mr. Jawed Iqbal	Head – Rly	Rly. Buldng	Shantivan Colony	02838 – 255763	98982 91000
Zone 7.	Terminal 2 (Sec. Gate)	200	Capt. Sachin Srivastav	Head-Marine	Tug Berth Bld.	Shantivan Colony	02838 – 255727	63598 83102
Zone 8.	AMCT CT-2 (Sec. Gate)	200	Mr. Pradeep Jayaraman	Head – AMCT	CT2 New bld.	Shantivan Colony	02838 – 255732	91520 36949
Zone 9.	Main Gate	500	Mr. Neeraj Kaushik	AGM - Security	Main Gate	Shantivan Colony	02838 - 255800	9109988165
Zone 10.	PUB	500	Mr. Vikas Arora	Head Howe	PUB	Shantivan Colony	02838 - 255932	98792 03557
Zone 11.	Adani House	200	Mr. Arindam Goswami	Head – HR	Adani House	Shantivan Colony	02838 - 255723	90990 05899
Zone 12.	Terminal – 3 (Sec. Gate)	200	Capt. Sachin Srivastav	Head-Marine	Tug Berth Bld.	Shantivan Colony	02838 – 255727	63598 83102
Zone 13.	AICTPL (Sec. Gate)	500	Mr. Cherian Abraham	Head - AICTPL	CT – 03 (AICTPL)	Shantivan Colony	02838 - 255733	89800 48850

Zone 14.	ACMTPL (Sec. Gate)	500	Capt. Pradeep Ramachandran	Head – ACMTPL	CT – 04 (ACMTPL)	Samudra Township	02838 - 255809	63589 40439

Annexure – 19B (West Basin)

SAFE ASSEMBLY POINTS

Identification Sr. No. of the Assembly Point	Location	Accommodation Capacity	At the time of Emergency					
			Person In charge				Land line Nos.	Mobile Nos.
			Name	Designation	Place of availability			
					In the factory	Residential Address		
1	2	3	4	5	6	7	8	9
Zone 1	Opp. SS-1	100	Mr. Vimal Baldaniya	AM -ES	SS-1	---	----	89800 15123
			Mr. Jignesh Kansara	Junior Officer – DC	SS-1	Mundra	02838 – 252936	99132 43060
Zone 2	Nr. Howe Office	100	Mr. Bharat Pokar	Officer – Safety	Howe office	Mundra	----	89800 15467
Zone 3	GIS	100	Mr. Vishal Bhavsar	Manager – E & I	SS-1	Shantivan Colony	----	89800 15057
			Shift In charge – E & I	----	SS-1	----	----	89800 15212
Zone 4	Nr. Main Gate	100	Mr. Khadim Hussain	Junior Officer, Security	Main Gate	----	----	84609 28563
			Security Shift Incharge	----	Main Gate	----	02838 – 252900	97277 84645
Zone 5	Approach-3	100	Mr. Kashyap Pandya	Sr.Mgr – MHS	SS-1	Shantivan Colony	02838 – 255973	99252 23632
			Mr. Bibhudatta Ray	Sr.Mgr. – DC	SS-1	Samudra Township	02838 – 255924	89800 15282
Zone 6	Amenities Building	100	Mr. Narendrasinh Jadeja	AM - ES	SS-1	Shantivan Colony	02838 – 2562381	89800 16461

			Mr. Paresh Gadhavi	Assistant-Admin	SS-1	Mundra	02838 – 255969	89800 16462

Annexure – 21

Fire & Toxicity Control Arrangements

Fire Water & Other sources	Nos. of Reservoir	03 (U/G water reservoir)	Nos. of Tanks	08 (O/H water storage tank)	Total Quantity				31383 KL	Nos. of CO2 Extinguishers
	No. of hydrant Points	No. of fire pumps, type & Capacity	No. of hose reals & Total Length	No. of fire tenders and capacity	No. of Monitors					
					Fixed(113)		Portable (04)		Alternative power arrangement	
					Lifting height	Pressure	Lifting height	Pressure		
1	2	3	4	5	6	7	8	9	10	11
Sea Water & Narmada water	531	Diesel pump: 09 no. – 1050 M^3/hr 03 no. – 795 M^3/hr 02 no. – 616	60 mtr lengths – 54 nos.& 600 nos hoses	05 no. fire tender	60 mtr horizontal & 40 mtr vertical throw	7 kg/cm^2	60 mtr horizontal & 40 mtr vertical throw	7 kg/cm^2	Diesel Generator backup	1096 Nos.

		M^3/hr 06 no. – 273 M^3/hr 01 no. – 136 M^3/hr <u>Electric pump:</u> 05 no. – 273 M^3/hr 04 no. – 616 M^3/hr 01 no. – 136 M^3/hr <u>Jockey pump:</u> 02 nos -225 M^3/hr 08 nos. –10 to 30 M^3/hr 01 nos-40 M^3/hr 01 no. – 90 M^3/hr		<u>Capacity:</u> 1) Foam tender 01 - 6 KL Water & 3 KL Foam 2) Foam tender 02 - 5 KL water & 1 KL foam 3)Multipurpose fire tender - 8 Kl Water - 3 KL Foam - 45 Kg CO2 - 150 Kg DCP 4) Foam Tender-03 - 9 KL water & 3 KL foam 5) Aviation Mini Fire Tender - 1 KL water & 0.5 KL foam						

Dry Powder Type		Foam Type		Water Jet Product		Other Extinguisher		Personal protective equipments			
								Respiratory		Non-respiratory	
Type of powder & total quantity	No. of portable Extinguisher	Type of foam & total quantity	No. of portable Extinguisher	No. & size of blankets	Other Jet products	Type	Number or Quantity	Type	No.	Type	No.
12	13	14	15	16	17	18	19	20	21	22	23
Sodium bicarbonate; 2000 kg	1463 Nos.	AFFF & AR-AFFF 44KL in Tank & 35 KL storage	26 Nos.	163 cm X 152 cm 04 nos.	Nil	Water CO2 type	9 Ltr – 4	1) Self-Contained Breathing Apparatus Set 2) Airline Self-Contained Breathing Apparatus Set	1) 33 nos. 2) 01 Nos.	Safety Helmet Gumboot	50 nos. 25 Nos.

Annexure – 21B (West Basin)

Fire & Toxicity Control Arrangements

Fire Water & Other sources	Nos. of Reservoir	00 (U/G water reservoir)	Nos. of Tanks	04 (O/H water storage tank)	Total Quantity				2200 KL	Nos. of CO_2 Extinguishers
	No. of hydrant Points	No. of fire pumps, type & Capacity	No. of hose reals & Total Length	No. of fire tenders and capacity	No. of Monitors 215 nos.				Alternative power arrangement	
					Fixed [213]		Portable [02]			
					Lifting height	Pressure	Lifting height	Pressure		
1	2	3	4	5	6	7	8	9	10	11
Sea Water & Narmada Water	Reservior capacity is 2200 KL Nos. of Hydrant 278	Diesel pump: 02 no. – 273 M^3/hr Electric pump: 04 no. – 273 M^3/hr Jockey pump: 02 no. – 10.8 M^3/hr 02 no. – 20 M^3/hr	60 mtr lengths – 81 nos.& 300 nos hoses	01 no. Capacity: 1) 5 KL water	30 mtr head	7 kg/cm^2	20 mtr head	7 kg/cm^2	Diesel Generator backup	271 nos

Dry Powder Type		**Foam Type**		**Water Jet Product**		**Other Extinguisher**		**Personal protective equipment**			
Type of powder & total quantity	**No. of portable Extinguisher**	**Type of foam & total quantity**	**No. of portable Extinguisher**	**No. & size of blankets**	**Other Jet products**	**Type**	**Number or Quantity**	**Respiratory**		**Non-respiratory**	
								Type	**No.**	**Type**	**No.**
12	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**
Sodium bicarbonate; 500 kg	312 nos	AFFF 1000 liter	12 nos	163 cm X 152 cm 04 nos.	Nil	Nil	Nil	Self-Contained Breathing Apparatus Set	03 no	• Safety Helmet • Gumboot	25 no. 20 no.

Mutual Aid Arrangement											
Name & Address of the factories & Fire stations	**Approx. distance**	**Contact**		**FFE available**		**PPE available**		**No. of experts & trained persons available**	**Decontamination substances available**	**Gas detectors available**	**Other equipments available**
		Person	**Phone No.**	**Type**	**Quantity**	**Type**	**Quantity**				
24	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**
Indian Oil Corporation Limited, Mundra-Panipat Pipeline, Post Box No. – 1, P.O. Mundra, Old Port Road, Mundra, District – Kutch, Gujarat, PIN-370421.	**12 km**	Mr. Aswanth / Mr. Aditya Parmar	76370 01443 / 96444 43150	--	--	--	--	--	--	--	--
Hindustan Petroleum Corporation Limited, Mundra-Delhi Pipeline, P.O. Mundra, IOCL Link Road, Mundra, District – Kutch, Gujarat, PIN-370421.	**06 km**	M R Chauhan / Mr. Surabh bhatt	99201 73377 / 96876 06093	--	--	--	--	--	--	--	--
Jindal SAW Ltd. (IBU), Village – Samaghoga, Taluka – Mundra, District – Kutch, Gujarat, PIN-370421.	**28 km**	Mr Girish Kumar / Mr Dipak Kumar	90059 58965 / 96876 78052	--	--	--	--	--	--	--	--

Adani Power Limited, Adani Power Site, Tunda-Wandh, Mundra-Mandvi Highway, Siracha, Mundra, District – Kutch, Gujarat, PIN-370435.	**25 km**	Mr. Anil C Datar / Mr. Dinesh Mishra	96876 60356 / 78944 06485	--	--	--	--	--	--	--	--
Costal Gujarat Power Limited, Ultra Mega Power Project, Tunda Vandh Road, Tunda Village, Mundra, District – Kutch, Gujarat, PIN-370435.	**28 km**	Mr. Pramod Singh /Mr. Jignesh Kumar	92272 95495 / 90999 95701	--	--	--	--	--	--	--	--
Hindustan Mittal Energy Limited Plot no.06 (2), Old port road, Mundra, District -Kutch Gujarat, PIN-370435.	**06 km**	Mr Partha Chakrvab orty / Mr. Vipin Yadav	98996 00434 / 70690 02406	-	-	-	-	-	-	-	-
GSPC (LNG) **South Port-Mundra**	**5.5 km**	Mr.Ranjit Daimry/ Mr.Shaile sh Patel	99090 38955/ 98255 40044								
Mundra LPG Terminal Pvt Ltd **APSEZ**	**3 km**	Mr.Abdul Rahman	63599 30007								

Annexure – 22

Medical Arrangements

First-aid Centers / Ambulance room / OHC / Hospital								Ambulance van or alternate arrangement				
Sr No.	Name & Location	Phone No.	In charge person			Facilities & equipments	Antidotes available	First aiders available	Place of availability	Capacity	Facilities in the van	Driver's name & Address
			Name & Designation	Residence								
				Phone	Address							
1	2	3	4	5	6	7	8	9	10	11	12	13
1	OHC – NR. LT APSEZ LTD	02838 255710 89800 15070	On Duty Dr.	8511078 199	Samdra Township	All equipments as per Factory Act 1948	All Antidotes are available	24 Hours 1.Sanajy Rathod 2. Ashok K. Soni 3. Subash Moond 4. Gulam Khatri 5. Radheshyam 6. Deepu Sharma 7. Dindayal Sharma	OHC – Nr. LT APSEZ LTD	4 Bed capacity	All equipments as per Factory Act 1948	1.Bharat Dhafada (Gundala-Mundra-9925203405) 2.Bhavesh L Maheshwari 3.Nizar Ali 4.Jaspal Zala 5.Jitendra Gadhvi 6.Ashish Anshora 7.Jitubha Zala 8.Bhavesh A Maheshwari 9.Yogendrasinh

2	Adani Hospital, Samundra Township, Old Bander Road, Mundra Kutch	02838 - 255899	Dr. Vatsal Pandya	8980802842	Samundra Township	ICU on Wheel, X ray, Sonography, Physiotherapy, Laboratory, Pharmacy and telemedicine etc.	All Antidotes are available	Adani Hospital Staff	In APSEZ near samundra Township	100 Bed capacity	All equipments as per Factory Act 1948	Mr. Vinay Pratap Singh 9099858095

Annexure – 22B (West Basin)

Medical Arrangements

First-aid Centers / Ambulance room / OHC / Hospital								Ambulance van or alternate arrangement				
Sr No.	Name & Location	Phone No.	In charge person			Facilities & equipment	Antidotes available	First aiders available	Place of availability	Capacity	Facilities in the van	Driver's name & Address
			Name & Designation	Residence								
				Phone	Address							
1	2	3	4	5	6	7	8	9	10	11	12	13
1	OHC – Nr. SS-1 Building	02838-255984 8980015155	Medical Officer	96876 39281	Samudra Township	All equipment as per Factory Act 1948	All Antidotes are available	24 Hours 1.Sanajy Rathod 2. Ashok K. Soni 3. Subash Moond 4. Gulam Khatri 5. Radheshyam 6. Deepu Sharma 7. Dindayal Sharma	OHC – Nr. SS-1 Building	consulting	All equipment as per Factory Act 1948	1.Bharat Dhafada (Gundala-Mundra-9925203405) 2.Bhavesh L Maheshwari 3.Nizar Ali 4.Jaspal Zala 5.Jitendra Gadhvi 6.Ashish Anshora 7.Jitubha Zala 8.Bhavesh A Maheshwari 9.Yogendrasinh

2	Adani Hospital, Samundra Township, Old Bander Road, Mundra Kutch	02838-255899	Dr. Vatsal Pandya	8980802842	Samundra Township	ICU on Wheel, X ray, Sonography, Physiotherapy, Laboratory, Pharmacy and telemedicine etc.	All Antidotes are available	Adani Hospital Staff	In APSEZ near samundra Township	100 Bed capacity	All equipments as per Factory Act 1948	Mr. Vinay Pratap Singh 9099858095

Annexure – 23

TRANSPORT & EVACUATION ARRANGEMENT

Type of siren, if any, for evacuation	**Steam & Electrical hooter type siren**

Own Transport Center					**Own Vehicles**				
Name of Location	Phone No.	In charge person			Sr. No.	Type & No.	Capacity	No & Type of public warning instruments	Driver's name & Address
		Name & Designation	Residence						
			Phone	Address					
Mundra	9909927251	Mr. Archan Bhat	9909927251	Mundra	**During Day Time (0730 hrs. to 1830 hrs.)**				
					1	HMV	56 seater x 8 54 Seater x 13	Nil	All drivers available
					2	LMV	7 seater x 25 (Available at different location)		
					During Night Time (1830 hrs. to 0700 hrs.)				

					1	HMV	56 Seater x 3 (at SVC)	Nil	Naran, Rupsinh, Tulsi Vijay raj, Mulji, Mintoo, Satendra, Pravin, Kapil, (All available at Port, SVC and Drivers Rest room)
					2	HMV	13 Seater x 2 (at CT 2 & CT3)		
					3	LMV	7 seater x 30 (Dry Cargo – 01, LT – 02, CT 2 – 04, Engg. Service – 01,Marine-03,Safety-01, Fire-01, Railway-01, Security-16)		
					4	Ambulance	05 (02 at Port, 01 WP, 01 SEZ, 01 at SVC)		

Outside shelters for evacuated persons							
Sr. No.	**Name, address & distance**	**Phone. No.**	**In charge Person**			**Accommodation capacity**	**Facilities available**
			Name & Designating	Residence			
				Phone	Address		
11	12	13	14	15	16	17	18
1	Shantivan Colony	09727721638	Mr. Shashikant Patyal	9871110840	Shantivan Colony	1500	Open ground available at SV Colony (Cricket ground and Rang Manch), Shopping Complex available
2	Samundra Township	09727721638	Mr. Shashikant Patyal	9871110840	Samundra Township	2500	Open ground available at Samundra Township(Children Park and utility park), Shopping Complex available

Annexure – 24

POLLUTION CONTROL ARRANGEMENTS

Water Pollution Control			Air Monitoring				
Type & Capacity of effluent treatment plant	No. of sample monitoring & its frequency	In charge person's name, address & Phone No.	No. of sample monitoring & its frequency	Type & parameters of tests	Wind direction	Instrument available.	In charge person's name, address & Phone No.
1	2	3	4	5	6	7	9
265 KLD	2 sample per month	Mr. Gaurang Chudasama CTF Building, Liquid Terminal, APSEZ 90990 05225 (M)	Twice a Week	Type Ambient Air Monitoring Parameters PM 10, PM 2.5, SO2, NOx, CO, Hydrocarbon, Benzene	Wind vane	Respirable Dust Sampler & Fine Particulate Dust Sampler	Mr. Gaurang Chudasama CTF Building, Liquid Terminal, APSEZ 90990 05225 (M)

Stack Monitoring				Scrubbers, Incinerators etc.				Land Pollution Controls		Pollution control Board	
No. of sample monitoring & its frequency	Type & parameters of tests	Instrument available.	In charge person's name, address & Phone No	Location	Type & Capacity	For What	In charge person's name, address & Phone No.	No. of sample monitoring & its frequency	In charge person's name, address & Phone No.	Permission obtained?	Conditions fulfilled?

11 sample per month	SO_2, NOx, SPM	Stack Monitoring kit.	As above	---------- N A ----------	2 sample per month	As above	Yes (As per CC&A)	Yes (As per CC&A)

Annexure –26

ALARMS & SIRENS

Sr. No.	Plant wise alarm points						The alarm (signal) is heard (seen) at	Sound difference if any			
	Plant/Dept./Location		Sr. No. of the alarm point	Its place of location (With floor No. if any)	Type of the alarm of siren	Its Period of checking		Type of emergency	Type of alarm or siren	Duration of sounding	Type of sound of alarm /siren
	Name & Location	No. of floor									
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	Liquid Terminal	1) LT Control room, 2) Ground floor of LT office	1 & 2	Roof of the first floor	Wailing	Twice in a month	3 km range	All Type of Emergency	Electrical Operated	02 minute (all clear)	Wailing
2	Dry Cargo area	Ground floor	3	Roof of fire pump house	Wailing	Twice in a month	3 km range	All Type of Emergency	Electrical Operated	02 minute (all clear)	Wailing
3	Marine Control Room T-1	First floor	4	Roof of Marine Terminal building	Wailing	Twice in a month	3 km range	All Type of Emergency	Electrical Operated	02 minute (all clear)	Wailing
4	Adani House	Ground floor	5	Each floor	Wailing	Twice in a month	500 mtr range	All Type of Emergency	Electrical Operated	02 minute (all clear)	Wailing

5	PUB Building	Ground floor	6, 7 & 8	Each floor	Wailing	Twice in a month	500 mtr range	All Type of Emergency	Electrical Operated	02 minute (all clear)	Wailing
6	ES - Building	Ground floor	9	Roof of ES building	Wailing	Twice in a month	3 km range	All Type of Emergency	Electrical Operated	02 minute (all clear)	Wailing
7	AMCT / CT2	Ground floor fire P/H	10	Ground floor	Wailing	Twice in a month	3 km range	All Type of Emergency	Electrical Operated	02 minute (all clear)	Wailing
8	Terminal-2	Ground floor fire P/H	11	Ground floor	Wailing (Manual)	Twice in a month	1.6 km range	All Type of Emergency	Hand Operated	02 minute (all clear)	Wailing
9	AICTPL / CT3	CT3 Building Ground Floor	10	Ground floor	Wailing	Twice in a month	3 km range	All Type of Emergency	Electrical Operated	02 minute (all clear)	Wailing
10	ACMTPL / CT4	RMU	10	Ground floor	Wailing	Twice in a month	3 km range	All Type of Emergency	Electrical Operated	02 minute (all clear)	Wailing

Annexure –26B (West Basin)

ALARMS & SIRENS

Sr. No.	Plant wise alarm points						The alarm (signal) is heard at	Sound difference if any			
	Plant/Dept./Location		Sr. No. of the alarm point	Its place of location (With floor No. if any)	Type of the alarm of siren	Its Period of checking		Type of emergency	Type of alarm or siren	Duration of sounding	Type of sound of alarm /siren
	Name & Location	No. of floor									
1	2	3	4	5	6	7	8	9	10	11	12
1	SS-1	Top floor	1	Top floor	Wailing (Electric)	Twice in a month	3 km range	All Type of Emergency	Electrical Operated	02 minute (all clear)	Wailing
2	SS-3	Ground floor	2	Ground floor	Wailing (Electric)	Twice in a month	3 km range	All Type of Emergency	Electrical Operated	02 minute (all clear)	Wailing
3	Fire Dept.	Ground floor	3	Ground floor	Wailing (Electric)	Twice in a month	3 km range	All Type of Emergency	Electrical Operated	02 minute (all clear)	Wailing
4	Adani Store	Ground floor	4	Ground floor	Wailing (Electric)	Twice in a month	3 km range	All Type of Emergency	Electrical Operated	02 minute (all clear)	Wailing
5	Crew Store	Ground floor	5	Ground floor	Wailing (Electric)	Twice in a month	3 km range	All Type of Emergency	Electrical Operated	02 minute (all clear)	Wailing
6	Jetty	Ground floor	6	Ground floor	Wailing (Manual)	Twice in a month	1.6 km range	All Type of Emergency	Hand Operated	02 minute (all clear)	Wailing

Code of Siren:

- **Emergency** : Wailing Siren continuous for one minute with gap Siren for one minute followed by five second gap. Repeated four times.
- **Testing** : Continuous Siren for one minute (4th and 19th of Every Month at 1100 hrs.).
- **All Clear** : Continuous Siren for two minutes.

Annexure – 27

INTERNAL PHONES

Sr. No.	Name & Location of the plant, departmen of area (including internal emergency service)	Phone No. (Internal)	Person available on this phone				
			Name	Designation	Designation or duty under on-site / offsite emergency plan, if any.	Residence	
						Phone No. (Internal)	Address
1	2	3	4		6	7	8
1	TELEPHONE EXCHANGE	99	SHIFT INCHARGE	SR.OFFICER	MR. PRADEEP TRIVEDI	4258	SHANTIVAN COLONY
2	FIRE CONTROL ROOM	52801	SHIFT INCHARGE	FIRE OPERATOR	MR. RAKESH CHATURVEDI	4731	SAMUDRA TOWNSHIP
3	MEDICAL	52710	INCHARGE	MEDICAL OFFICER	MEDICAL OFFICER	--	--
4	SECURITY	52300	DUTY OFFICER	OFFICER	MR. NEERAJ KAUSHIK	4504	SHANTIVAN COLONY
5	MARINE CONTROL	52761	SHIFT INCHARGE	HEADMARINE	CAPT. SACHIN SRIVASTAVA	4629 / 4630	SHANTIVAN COLONY
6	SAFETY OFFICER	52777	SAFETY OFFICER	SAFETY OFFICER	MR. SHIVARAMAN LVC	--	SAMUDRA TOWNSHIP
7	LT CONTROL ROOM	52744	SHIFT INCHARGE	AGM	MR. GAURANG CHUDASAMA	4459	SHANTIVAN COLONY
8	DRY CARGO	52932	SHIFT INCHARGE	HEAD-DC	MR. BHAGWAT UPADHAYE	--	SAMUDRA TOWNSHIP
9	ELECTRICAL & ISTR.	52826	SHIFT INCHARGE	AGM	MR. MAVJI VAGHAMSHI	4506	SHANTIVAN COLONY
10	PORT OFFICE CONTROL	52762	SHIFT INCHARGE	HEAD MARINE	CAPT. SACHIN SRIVASTAVA	4629 / 4630	SHANTIVAN COLONY

Annexure – 27B (West Basin)

INTERNAL PHONES

Sr. No.	Name & Location of the plant, department of area (including internal emergency service)	Phone No. (Internal)	Person available on this phone				
			Designation or duty under on-site / offsite emergency plan, if any.	Designation	Name	Residence	
						Phone No. (Internal)	Address
1	2	3	4	5	6	7	8
1	TELEPHONE EXCHANGE	99	SHIFT INCHARGE	SR.OFFICER	MR. PRADEEP TRIVEDI	4181	Shantivan Colony
2	FIRE CONTROL ROOM	52900	SHIFT INCHARGE	AGM	MR. RAKESH CHATURVEDI	4731	Samudra Township
3	MEDICAL	52984	INCHARGE	MEDICAL OFFICER	---	4460	Shantivan Colony
4	SECURITY	52939, 52900	DUTY OFFICER	SR.MANAGER	MR. NEERAJ KAUSHIK	--	Shantivan Colony
5	MARINE CONTROL	52933	SHIFT INCHARGE	GM	CAPT. SACHIN SRIVASTAVA	4726	Shantivan Colony
6	LT CONTROL ROOM		SHIFT INCHARGE	AGM	MR. GAURANG CHUDASAMA	4459	Shantivan Colony
7	DRY CARGO	52936	SHIFT INCHARGE	MANAGER	MR. BIBHUDATTA RAY	4439	Samudra Township
8	ELECTRICAL & INS.	52932	SHIFT INCHARGE	SR MANAGER	MR. KASHYAP PANDYA	4506	Shantivan Colony
9	CENTRAL CONTROL ROOM	52932	SHIFT INCHARGE	SR MANAGER	MR. KASHYAP PANDYA	4044	Shantivan Colony

Annexure – 28

EXTERNAL PHONES

Sr. No.	Name & Address of the dept. / Service / Person (including external emergency services)	Phone No. (External)	Person available	
			Designated person	Services Expected Under On-site / off –site Emergency plan
1.	Bhuj Fire Station	02832 – 222590, 101	Fire Officer	Fire fighting Service
2.	Gandhidham Fire Station	02836-231610, 101	Fire officer	Fire fighting Service
3.	Fire & Ambulance serv.	108	Medical Off.	Fire fighting Service
4.	Kandla Fire Station	02836 - 270176, 270178	Chief Fire Off.	Fire fighting Service
5.	Factory Inspector	02836 – 260020, 260262	Asst. Director	Legal Advisory Service
6.	Collector Office	02832 – 250020, 251805	Collector	Administration Service
7.	Civil Defense	02832-220703	Dy. Collector	Evacuation Service
8.	Hospital, Bhuj	02832 – 221610, 250150	Civil Surgeon	Medical Service
9.	KPT- Hospital, Kandla	02836- 270205, 270633	Medical officer	Medical Service
10.	Police	02832 -250511, 250444	DSP	Law & Order
11.	Police control City	100	Control room	Law & Order
12.	Gujarat Maritime Board	02838-22136	Port Off.	Marine Service
13.	Indian Navy, Porbandar	0286-2240954	Navy Officer	Security service (WAR)
14.	Indian Coast Guards	02831-286430,31(Jhakhau) 0286-2240958 (Porbandar)	Cost Guard officer	Security service

Annexure – 29

NOMINATED PERSONS TO DECLARE MAJOR EMERGENCY

Sr. No.	Name of the plant, department or location	Name & Designation of the nominated persons to declare major emergency	Duty of designation given, if any, under the onsite / off-site emergency plan	Phone No.	Residence	
					Phone No.	Address
1	Mr. Douglas Charles Smith	CEO	Site Main Controller	02838 – 255002	63571 60100	Shantivan colony
2	Mr. Rakesh Mohan	COO	Site Main Controller	02838 – 255404	80180 59999	Shantivan colony

Annexure – 5

ALGAL REMOVAL WORK FROM MANGROVE AREAS

Creek area is regularly observed for checking algal encrustations. On the mangrove recruits & where the algal encrustation is found to be substantial, it is removed manually by deployment of required manpower. This operation is performed during the low tide conditions. The main object is to provide better growing condition for the growth of mangroves. Periodically, spread of Prosopisp towards the mangrove areas is also observed as this species will compete with mangrove plants for growth.

Mangroves nursery is developed in a creek behind IOCL & 125,000 nos. of new saplings are planted in creek area.

Reference photographs of activities undertaken as per given guidelines,

A) Removal of algal encrustations & preventing the spread of Prosopis:

Adani Ports and Special Economic Zone Ltd
Adani House,
PO Box No. 1
Mundra, Kutch 370 421
Gujarat, India
CIN: L63090GJ1998PLC034182

Tel +91 2838 25 5000
Fax +91 2838 25 51110
info@adani.com
www.adani.com

B) Development of Nursery & Plantation of Mangroves:

Adani Ports and Special Economic Zone Ltd
Adani House,
PO Box No. 1
Mundra, Kutch 370 421
Gujarat, India
CIN: L63090GJ1998PLC034182

Tel +91 2838 25 5000
Fax +91 2838 25 51110
info@adani.com
www.adani.com

Registered Office: Adani Corporate House, Shantigram, Nr. Vaishno Devi Circle, S.G. Highway, Khodiyar, Ahmedabad – 382421, Gujarat, India

Annexure – 6

“Half Yearly Environmental Monitoring Reports “

For,

M/S. ADANI PORTS & SPECIAL ECONOMIC ZONE LTD.

PLOT NO. 169/P, AT - NAVINAL ISLAND, TAL. - MUNDRA, DIST. - KUTCH - 370421.

Monitoring Period: November – 2021 to March - 2022

Submitted By

UniStar Environment & Research Labs Pvt. Ltd.

White House, Near GIDC Office, Char Rasta, Vapi, Gujarat, India – 396195

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Half Yearly Monitoring Report Details of APSEZ for the period November – 2021 to March-22

UniStar
Environment and Research Labs Pvt. Ltd.

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MoEF&CC (GOI) Recognized Environmental Laboratory under the EPA-1986 (12.01.2020 to17.03.2023) | QCI-NABET Accredited EIA Consultant Organization | GPCB Recognized Environmental Auditor (Schedule-II) | ISO 9001:2015 Certified Company | ISO 45001:2018 Certified Company

RESULTS OF RO Outlet Drinking Water

SR.NO.	TEST PARAMETERS	UNIT	CT-3 Office Building					Acceptable Limit as per IS: 10500:2012	TEST METHOD
			NOVEMBER 2021	DECEMBER 2021	JANUARY 2022	FEBRUARY 2022	MARCH 2022		
			30/11/2021	20/12/2021	19/01/2022	24/02/2022	23/03/2022		
1.	Odour	Pt. Co. Scale	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	**Agreeable**	IS 3025(Part 5)1983
2.	Colour	--	<5	<5	<5	<5	<5	**5 Max.**	IS 3025(Part 4)1983
3.	Taste	^0C	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	**Agreeable**	IS 3025(Part 7)1984
4.	pH @ 25 ° C	mg/L	7.78	7.24	7.16	7.18	7.22	**6.5 – 8.5**	IS 3025(Part 11)1983
5.	Turbidity	mg/L	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	**1 Max.**	IS 3025(Part 10)1984
6.	Total Dissolved Solids	mg/L	220	368	374	362	344	**500 Max.**	IS 3025(PART 16) 1984
7.	Total Hardness as $CaCO_3$	mg/L	36.9	78.4	68.6	83.6	78.4	**200 Max.**	IS 3025(Part 21)2009, Amd.1
8.	Residual free Chlorine	mg/L	0.22	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	**0.2 Min.**	APHA 23rd Ed.,2017,4500-Cl-B
9.	Chloride as Cl^-	mg/L	100.8	207.4	201.9	237.5	228.2	**250 Max.**	IS 3025(PART 32) 1988
10.	Fluoride as F	mg/L	BDL(MDL:0.20)	BDL(MDL:0.20)	BDL(MDL:0.20)	BDL(MDL:0.20)	BDL(MDL:0.20)	**1.0 Max.**	IS 3025(PART 60) 2008
11.	Iron (as Fe)	mg/L	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	**0.3 Max.**	IS 3025(PART 53) 2003
12.	Coliform	/100ml	Absent	Absent	Absent	Absent	Absent	Absent	APHA 23rd Ed.2017,9221-B
13.	E-Coli	/100ml	Absent	Absent	Absent	Absent	Absent	Absent	IS :1622 1981

GUJARAT
VAPI

Mr. Nilesh Patel
Sr. Chemist

Mr. Nitin Tandel
Technical Manager

UniStar
Environment and Research Labs Pvt. Ltd.

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MoEF&CC (GOI) Recognized Environmental Laboratory under the EPA-1986 (12.01.2020 to17.03.2023) | QCI-NABET Accredited EIA Consultant Organization | GPCB Recognized Environmental Auditor (Schedule-II) | ISO 9001:2015 Certified Company | ISO 45001:2018 Certified Company

RESULTS OF RO Outlet Drinking Water

SR.NO.	TEST PARAMETERS	UNIT	CT-3 RMU RO Outlet					Acceptable Limit as per IS: 10500:2012	TEST METHOD
			NOVEMBER 2021	DECEMBER 2021	JANUARY 2022	FEBRUARY 2022	MARCH 2022		
			30/11/2021	20/12/2021	19/01/2022	24/02/2022	23/03/2022		
1.	Odour	Pt. Co. Scale	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	**Agreeable**	IS 3025(Part 5)1983
2.	Colour	--	<5	<5	<5	<5	<5	**5 Max.**	IS 3025(Part 4)1983
3.	Taste	^0C	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	**Agreeable**	IS 3025(Part 7)1984
4.	pH @ 25 ° C	mg/L	7.25	7.18	7.04	7.09	7.14	**6.5 – 8.5**	IS 3025(Part 11)1983
5.	Turbidity	mg/L	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	**1 Max.**	IS 3025(Part 10)1984
6.	Total Dissolved Solids	mg/L	120	264	258	244	256	**500 Max.**	IS 3025(PART 16) 1984
7.	Total Hardness as $CaCO_3$	mg/L	11.6	68.6	70.6	77.9	80.4	**200 Max.**	IS 3025(Part 21)2009, Amd.1
8.	Residual free Chlorine	mg/L	0.25	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	**0.2 Min.**	APHA 23rd Ed.,2017,4500-Cl-B
9.	Chloride as Cl^-	mg/L	46.5	160.3	149.6	204.3	214.8	**250 Max.**	IS 3025(PART 32) 1988
10.	Fluoride as F	mg/L	BDL(MDL:0.20)	BDL(MDL:0.20)	BDL(MDL:0.20)	BDL(MDL:0.20)	BDL(MDL:0.20)	**1.0 Max.**	IS 3025(PART 60) 2008
11.	Iron (as Fe)	mg/L	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	**0.3 Max.**	IS 3025(PART 53) 2003
12.	Coliform	/100ml	Absent	Absent	Absent	Absent	Absent	**Absent**	APHA 23rd Ed.2017,9221-B
13.	E-Coli	/100ml	Absent	Absent	Absent	Absent	Absent	**Absent**	IS :1622 1981

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RESULTS OF RO Outlet Drinking Water

SR.NO.	TEST PARAMETERS	UNIT	CT-4 Office Building					Acceptable Limit as per IS: 10500:2012	TEST METHOD
			NOVEMBER 2021	DECEMBER 2021	JANUARY 2022	FEBRUARY 2022	MARCH 2022		
			30/11/2021	20/12/2021	20/01/2022	24/02/2022	23/03/2022		
1.	Odour	Pt. Co. Scale	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	**Agreeable**	IS 3025(Part 5)1983
2.	Colour	--	<5	<5	<5	<5	<5	**5 Max.**	IS 3025(Part 4)1983
3.	Taste	^{0}C	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	**Agreeable**	IS 3025(Part 7)1984
4.	pH @ 25 ° C	mg/L	7.54	7.42	7.32	7.28	7.16	**6.5 – 8.5**	IS 3025(Part 11)1983
5.	Turbidity	mg/L	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	**1 Max.**	IS 3025(Part 10)1984
6.	Total Dissolved Solids	mg/L	122	456	332	352	364	**500 Max.**	IS 3025(PART 16) 1984
7.	Total Hardness as $CaCO_3$	mg/L	27.1	117.6	113.7	98.8	104.5	**200 Max.**	IS 3025(Part 21)2009, Amd.1
8.	Residual free Chlorine	mg/L	0.23	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	**0.2 Min.**	APHA 23rd Ed.,2017,4500-Cl-B
9.	Chloride as Cl^-	mg/L	48.6	245.2	219	190	202.2	**250 Max.**	IS 3025(PART 32) 1988
10.	Fluoride as F	mg/L	BDL(MDL:0.20)	BDL(MDL:0.20)	BDL(MDL:0.20)	BDL(MDL:0.20)	BDL(MDL:0.20)	**1.0 Max.**	IS 3025(PART 60) 2008
11.	Iron (as Fe)	mg/L	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	**0.3 Max.**	IS 3025(PART 53) 2003
12.	Coliform	/100ml	Absent	Absent	Absent	Absent	Absent	**Absent**	APHA 23rd Ed.2017,9221-B
13.	E-Coli	/100ml	Absent	Absent	Absent	Absent	Absent	**Absent**	IS :1622 1981

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RESULTS OF RO Outlet Drinking Water

SR.NO.	TEST PARAMETERS	UNIT	CT-4 RMU RO Outlet					Acceptable Limit as per IS: 10500:2012	TEST METHOD
			NOVEMBER 2021	DECEMBER 2021	JANUARY 2022	FEBRUARY 2022	MARCH 2022		
			30/11/2021	20/12/2021	20/01/2022	24/02/2022	23/03/2022		
1.	Odour	Pt. Co. Scale	Agreeable	--	Agreeable	Agreeable	Agreeable	**Agreeable**	IS 3025(Part 5)1983
2.	Colour	--	<5	--	<5	<5	<5	**5 Max.**	IS 3025(Part 4)1983
3.	Taste	^{0}C	Agreeable	--	Agreeable	Agreeable	Agreeable	**Agreeable**	IS 3025(Part 7)1984
4.	pH @ 25 ° C	mg/L	7.62	--	7.38	7.12	7.17	**6.5 – 8.5**	IS 3025(Part 11)1983
5.	Turbidity	mg/L	BDL(MDL:0.1)	--	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	**1 Max.**	IS 3025(Part 10)1984
6.	Total Dissolved Solids	mg/L	136	--	456	444	406	**500 Max.**	IS 3025(PART 16) 1984
7.	Total Hardness as $CaCO_3$	mg/L	34.9	--	94.1	104.8	112.1	**200 Max.**	IS 3025(Part 21)2009, Amd.1
8.	Residual free Chlorine	mg/L	0.21	--	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	**0.2 Min.**	APHA 23rd Ed.,2017,4500-Cl-B
9.	Chloride as Cl^-	mg/L	42.2	--	224.2	223.3	218.2	**250 Max.**	IS 3025(PART 32) 1988
10.	Fluoride as F	mg/L	BDL(MDL:0.20)	--	BDL(MDL:0.20)	BDL(MDL:0.20)	BDL(MDL:0.20)	**1.0 Max.**	IS 3025(PART 60) 2008
11.	Iron (as Fe)	mg/L	BDL(MDL:0.1)	--	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	**0.3 Max.**	IS 3025(PART 53) 2003
12.	Coliform	/100ml	Absent	--	Absent	Absent	Absent	**Absent**	APHA 23rd Ed.2017,9221-B
13.	E-Coli	/100ml	Absent	--	Absent	Absent	Absent	**Absent**	IS :1622 1981

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RESULTS OF ETP INLET WATER

SR.NO.	TEST PARAMETERS	UNIT	LIQUID TERMINAL					TEST METHOD
			NOVEMBER 2021	DECEMBER 2021	JANUARY 2022	FEBRUARY 2022	MARCH 2022	
			22/11/2021	20/12/2021	20/01/2022	28/02/2022	23/03/2022	
1.	Colour	Pt. Co. Scale	80	60	50	40	50	IS 3025(Part 4)
2.	pH @ 27 ° C	--	7.82	7.74	7.48	6.74	8.53	APHA 23rd Ed.,2017,4500-H^+B
3.	Temperature	^{0}C	29	29.5	29.8	29.9	30.1	IS 3025(Part 9)1984
4.	Total Suspended Solid	mg/L	182	164	156	178	44	APHA 23rd Ed.,2017,2540 –D
5.	Total Dissolved Solids	mg/L	3096	2680	2588	2604	1356	APHA 23rd Ed.,2017,2540- C
6.	COD	mg/L	222.3	276.9	312.4	388.1	632.7	IS 3025(Part 58)2006
7.	BOD (3 days at 27 ^{0}C)	mg/L	64	77	86	108	177	IS 3025(Part 44)1993Amd.01
8.	Chloride (as Cl) $^-$	mg/L	621.3	484.2	502.8	542.4	679.8	IS 3025(PART 32) 1988
9.	Oil & Grease	mg/L	BDL (MDL:2.0)	3	4	5	8	IS 3025(Part39)1991, Amd. 2

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RESULTS OF ETP OUTLET WATER

SR.NO.	TEST PARAMETERS	UNIT	LIQUID TERMINAL					GPCB Limit	TEST METHOD
			NOVEMBER 2021	DECEMBER 2021	JANUARY 2022	FEBRUARY 2022	MARCH 2022		
			22/11/2021	20/12/2021	20/01/2022	28/02/2022	23/03/2022		
1.	Colour	Pt. Co. Scale	20	30	25	20	25	100	IS 3025(Part 4)
2.	pH @ 27 ° C	--	7.12	7.16	7.28	7.47	7.11	6.5 to 8.5	APHA 23rd Ed.,2017,4500-H^+B
3.	Temperature	^{0}C	29	30	29.9	29.9	30.1	40	IS 3025(Part 9)1984
4.	Total Suspended Solid	mg/L	40	34	32	24	56	100	APHA 23rd Ed.,2017,2540 –D
5.	Total Dissolved Solids	mg/L	1444	1678	1656	1612	1488	2100	APHA 23rd Ed.,2017,2540- C
6.	COD	mg/L	72.2	76.2	72.4	76.4	71.1	100	IS 3025(Part 58)2006
7.	BOD (3 days at 27 ^{0}C)	mg/L	18	19	18	17	22	30	IS 3025(Part 44)1993Amd.01
8.	Chloride (as Cl) $^-$	mg/L	450.1	422.4	464.2	478.2	478.6	600	IS 3025(PART 32) 1988
9.	Oil & Grease	mg/L	BDL(MDL:2.0)	BDL(MDL:2.0)	BDL(MDL:2.0)	BDL(MDL:2.0)	BDL(MDL:2.0)	10	IS 3025(Part39)1991, Amd. 2
10.	Sulphate (as SO_4)	mg/L	229.3	214.4	228.6	232.4	129.4	1000	IS 3025(Part 24)1986
11.	Ammonical Nitrogen	mg/L	8.88	7.44	8.12	7.84	25.4	50	IS 3025(Part 34)1988,
12.	Phenolic Compound	mg/L	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	1	IS 3025(Part 43)1992, Amd.2
13.	Copper as Cu	mg/L	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	**3**	IS 3025(Part 42)1992amd.01,
14.	Lead as Pb	mg/L	BDL(MDL:0.01)	BDL(MDL:0.01)	BDL(MDL:0.01)	BDL(MDL:0.01)	BDL(MDL:0.01)	0.1	APHA 23rd Ed.,2017,3111-B

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SR.NO.	TEST PARAMETERS	UNIT	LIQUID TERMINAL					GPCB Limit	TEST METHOD
			NOVEMBER 2021	DECEMBER 2021	JANUARY 2022	FEBRUARY 2022	MARCH 2022		
			22/11/2021	20/12/2021	20/01/2022	28/02/2022	23/03/2022		
15.	Sulphide as S	mg/L	0.14	0.16	0.28	0.34	0.28	2	APHA 23rd Ed.,2017,4500 S^{-2} F
16.	Cadmium as Cd	mg/L	BDL(MDL:0.003)	BDL(MDL:0.003)	BDL(MDL:0.003)	BDL(MDL:0.003)	BDL(MDL:0.003)	2	APHA 23rd Ed.,2017,3111-B
17.	Fluoride as F	mg/L	0.34	0.41	0.46	0.46	0.98	2	APHA 23rd Ed.,2017,4500 F, D
18.	Residual Chlorine	mg/L	--	0.6	0.72	0.68	0.62	0.5 Min.	APHA 23rd Ed.,2017,4500-Cl-B
19.	Percent Sodium	%	--	--	--	--	44.18	60	By Calculation
20.	Sodium Absorption ratio	--	--	--	--	--	5.1	26	By Calculation

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RESULTS OF DRINKING WATER -OUTLET POINT

SR.NO.	TEST PARAMETERS	UNIT	WTP INSIDE PORT					Acceptable Limit as per IS: 10500:2012	TEST METHOD
			NOVEMBER 2021	DECEMBER 2021	JANUARY 2022	FEBRUARY 2022	MARCH 2022		
			22/11/2021	20/12/2021	19/01/2022	28/02/2022	23/03/2022		
1.	pH @ 25 ° C	-	8.13	7.94	8.08	8.14	7.94	**6.5 – 8.5**	IS 3025(Part 11)1983
2.	Colour	Pt. Co. Scale	<5	<5	<5	<5	<5	**5 Max.**	IS 3025(Part 4)1983
3.	Odour	--	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	**Agreeable**	IS 3025(Part 5)1983
4.	Turbidity	NTU	0.1	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	**1 Max.**	IS 3025(Part 10)1984
5.	Total Dissolved Solids	mg/L	496	484	478	468	458	**500 Max.**	IS 3025(PART 16) 1984
6.	Total Suspended Solid	mg/L	BDL(MDL:4.0)	BDL(MDL:4.0)	BDL(MDL:4.0)	BDL(MDL:4.0)	BDL(MDL:4.0)	--	APHA 23rd ED2017,2540 –D
7.	Total Hardness as $CaCO_3$	mg/L	89.2	98	99.9	104.5	101.2	**200 Max.**	IS 3025(Part 21)2009, Amd.1
8.	Calcium as Ca	mg/L	17.1	25.9	20.4	20.6	19.9	**75 Max.**	APHA 23rd ED2017,3500 Ca.B)
9.	Magnesium as Mg	mg/L	11.3	8.1	11.9	12.9	12.5	**30 Max.**	APHA 23rd ED2017,3500 Mg.B
10.	Chloride as Cl^-	mg/L	174.2	240	221.8	194.8	197.7	**250 Max.**	IS 3025(PART 32) 1988
11.	Sulphate as SO_4^{-2}	mg/L	36.9	38.1	40.2	41.4	44.2	**200 Max.**	IS 3025(Part 24)1986
12.	Nitrate as NO_3	mg/L	0.52	0.11	0.12	0.14	0.2	**45 Max.**	(APHA 23rd ED2017,4500NO3B)
13.	Fluoride as F	mg/L	0.54	0.12	0.12	0.14	0.16	**1.0 Max.**	IS 3025(PART 60) 2008
14.	M. Alkalinity	mg/L	109.2	72	76.7	76.7	115	**200 Max.**	IS 3025(Part 23)1986, Amd.2
15.	Iron (as Fe)	mg/L	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	**0.3 Max.**	IS 3025(PART 53) 2003

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SR.NO.	TEST PARAMETERS	UNIT	WTP INSIDE PORT					Acceptable Limit as per IS: 10500:2012	TEST METHOD
			NOVEMBER 2021	DECEMBER 2021	JANUARY 2022	FEBRUARY 2022	MARCH 2022		
			22/11/2021	20/12/2021	19/01/2022	28/02/2022	23/03/2022		
16.	Temperature	° C	29	29.8	29.7	29.9	30	--	IS 3025(Part 9)1984
17.	P. Alkalinity	mg/L	BDL(MDL:4.0)	BDL(MDL:4.0)	BDL(MDL:4.0)	BDL(MDL:4.0)	BDL(MDL:4.0)	**200 Max.**	IS 3025(Part 23)1986, Amd.2
18.	Ca Hardness as $CaCO_3$	mg/L	42.68	64.7	51	51.3	49.68	--	APHA 23rd Ed.,2017,3500 Ca.B)
19.	Electrical Conductivity	µS/cm	751	733	724	709	694	--	IS: 3025 (Part 14):2013
20.	Residual Free Chlorine	mg/L	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	**0.2 Min.**	APHA 23rd Ed.,2017,4500-Cl-G, DPD ,Colorimetric
21.	Langelier Saturation Index (LSI)	--	0.08	-0.26	-0.19	-0.13	-0.16	--	By Calculation
22.	Total Coliform	/100ml	Absent	Absent	Absent	Absent	Absent	Absent	APHA 23rd Ed.2017,9221-B
23.	E. coli	/100ml	Absent	Absent	Absent	Absent	Absent	Absent	IS :1622 1981

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RESULTS OF INLET WATER

SR.NO.	TEST PARAMETERS	UNIT	RM PLANT					TEST METHOD
			NOVEMBER 2021	DECEMBER 2021	JANUARY 2022	FEBRUARY 2022	MARCH 2022	
			30/11/2021	20/12/2021	19/01/2022	28/02/2022	23/03/2022	
1.	pH @ 25 ° C	-	7.29	7.97	8.12	8.18	7.53	IS 3025(Part 11)1983
2.	Colour	Pt. Co. Scale	<5	<5	<5	<5	<5	IS 3025(Part 4)1983
3.	Odour	--	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	IS 3025(Part 5)1983
4.	Turbidity	NTU	0.1	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	IS 3025(Part 10)1984
5.	Total Dissolved Solids	mg/L	560	492	492	486	494	IS 3025(PART 16) 1984
6.	Total Suspended Solid	mg/L	BDL(MDL:4.0)	BDL(MDL:4.0)	BDL(MDL:4.0)	BDL(MDL:4.0)	BDL(MDL:4.0)	APHA 23rd ED2017,2540 –D
7.	Total Hardness as $CaCO_3$	mg/L	13.6	86.2	90.2	102.6	33.1	IS 3025(Part 21)2009, Amd.1
8.	Calcium as Ca	mg/L	3.1	22	18.1	20.6	8.1	APHA 23rd ED2017,3500 Ca.B)
9.	Magnesium as Mg	mg/L	BDL (MDL:2.0)	7.6	10.9	12.5	3.1	APHA 23rd ED2017,3500 Mg.B
10.	Chloride as Cl^-	mg/L	180.9	235.7	231.8	223.3	318.2	IS 3025(PART 32) 1988
11.	Sulphate as SO_4^{-2}	mg/L	44.2	42.8	42.4	44.4	14.7	IS 3025(Part 24)1986
12.	Nitrate as NO_3	mg/L	0.44	0.10	0.14	0.16	0.10	APHA 23rd ED2017,4500NO3B
13.	Fluoride as F	mg/L	0.53	BDL(MDL:0.1)	BDL(MDL:0.1)	0.12	0.1	IS 3025(PART 60) 2008
14.	M. Alkalinity	mg/L	93.1	57.6	53.1	53.1	53.1	IS 3025(Part 23)1986, Amd.2
15.	Iron (as Fe)	mg/L	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	IS 3025(PART 53) 2003

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SR.NO.	TEST PARAMETERS	UNIT	RM PLANT					TEST METHOD
			NOVEMBER 2021	DECEMBER 2021	JANUARY 2022	FEBRUARY 2022	MARCH 2022	
			30/11/2021	20/12/2021	19/01/2022	28/02/2022	23/03/2022	
16.	Temperature	° C	29	30.1	29.9	30	30.1	IS 3025(Part 9)1984
17.	P. Alkalinity	mg/L	BDL(MDL:4.0)	BDL(MDL:4.0)	BDL(MDL:4.0)	BDL(MDL:4.0)	BDL(MDL:4.0)	IS 3025(Part 23)1986, Amd.2
18.	Ca Hardness as $CaCO_3$	mg/L	7.8	54.9	45.1	51.3	20.2	APHA 23rd Ed.,2017,3500 Ca.B)
19.	Electrical Conductivity	µS/cm	848	752	745	736	748	IS: 3025 (Part 14):2013
20.	Residual Free Chlorine	mg/L	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	APHA 23rd Ed.,2017,4500-Cl-G, DPD, Colorimetric
21.	Langelier Saturation Index (LSI)	--	1.1	--	--	--	--	By Calculation
22.	Total Coliform	/100ml	Absent	Absent	Absent	Absent	Absent	APHA 23rd Ed.2017,9221-B
23.	E. coli	/100ml	Absent	Absent	Absent	Absent	Absent	IS :1622 1981

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RESULTS OF OUTLET WATER

SR.NO.	TEST PARAMETERS	UNIT	RM PLANT					Acceptable Limit as per IS: 10500:2012	TEST METHOD
			NOVEMBER 2021	DECEMBER 2021	JANUARY 2022	FEBRUARY 2022	MARCH 2022		
			30/11/2021	20/12/2021	19/01/2022	28/02/2022	23/03/2022		
1.	pH @ 25 ° C	-	7.22	8.12	8.16	7.98	7.84	**6.5 – 8.5**	IS 3025(Part 11)1983
2.	Colour	Pt. Co. Scale	<5	<5	<5	<5	<5	**5 Max.**	IS 3025(Part 4)1983
3.	Odour	--	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	**Agreeable**	IS 3025(Part 5)1983
4.	Turbidity	NTU	0.1	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	**1 Max.**	IS 3025(Part 10)1984
5.	Total Dissolved Solids	mg/L	470	498	498	492	444	**500 Max.**	IS 3025(PART 16) 1984
6.	Total Suspended Solid	mg/L	BDL(MDL:4.0)	BDL(MDL:4.0)	BDL(MDL:4.0)	BDL(MDL:4.0)	BDL(MDL:4.0)	--	APHA 23rd ED2017,2540 –D
7.	Total Hardness as $CaCO_3$	mg/L	13.6	90.2	101.9	115.9	90.2	**200 Max.**	IS 3025(Part 21)2009, Amd.1
8.	Calcium as Ca	mg/L	2.3	24.4	21.2	22.8	19.9	**75 Max.**	APHA 23rd ED2017,3500 Ca.B)
9.	Magnesium as Mg	mg/L	0.7	7.1	11.9	14.3	9.8	**30 Max.**	APHA 23rd ED2017,3500 Mg.B
10.	Chloride as Cl^-	mg/L	214.2	246.8	237	242.3	313.4	**250 Max.**	IS 3025(PART 32) 1988
11.	Sulphate as SO_4^{-2}	mg/L	38.6	45.4	51.4	52.8	6.5	**200 Max.**	IS 3025(Part 24)1986
12.	Nitrate as NO_3	mg/L	0.38	0.1	0.16	0.22	0.1	**45 Max.**	(APHA 23rd ED2017,4500NO3B)
13.	Fluoride as F	mg/L	0.44	BDL(MDL:0.1)	BDL(MDL:0.1)	0.11	0	**1.0 Max.**	IS 3025(PART 60) 2008
14.	M. Alkalinity	mg/L	103.5	76.8	82.6	82.6	114.9	**200 Max.**	IS 3025(Part 23)1986, Amd.2
15.	Iron (as Fe)	mg/L	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	**0.3 Max.**	IS 3025(PART 53) 2003

Continue…

SR.NO.	TEST PARAMETERS	UNIT	RM PLANT					Acceptable Limit as per IS: 10500:2012	TEST METHOD
			NOVEMBER 2021	DECEMBER 2021	JANUARY 2022	FEBRUARY 2022	MARCH 2022		
			30/11/2021	20/12/2021	19/01/2022	28/02/2022	23/03/2022		
16.	Temperature	° C	29	30.1	29.9	30.1	30.1	--	IS 3025(Part 9)1984
17.	P. Alkalinity	mg/L	BDL(MDL:4.0)	BDL(MDL:4.0)	BDL(MDL:4.0)	BDL(MDL:4.0)	BDL(MDL:4.0)	**200 Max.**	IS 3025(Part 23)1986, Amd.2
18.	Ca Hardness as $CaCO_3$	mg/L	5.8	60.8	52.9	57	49.7	--	APHA 23rd Ed.,2017,3500 Ca.B)
19.	Electrical Conductivity	µS/cm	712	761	755	748	670	--	IS: 3025 (Part 14):2013
20.	Residual Free Chlorine	mg/L	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	**0.2 Min.**	APHA 23rd Ed.,2017,4500-Cl-G, DPD ,Colorimetric
21.	Langelier Saturation Index (LSI)	--	1.9	-0.07	-0.06	-0.21	-0.26	--	By Calculation
22.	Total Coliform	/100ml	Absent	Absent	Absent	Absent	Absent	**Absent**	APHA 23rd Ed.2017,9221-B
23.	E. coli	/100ml	Absent	Absent	Absent	Absent	Absent	**Absent**	IS :1622 1981

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RESULTS OF BORE HOLE WATER

SR.NO.	TEST PARAMETERS	UNIT	Pump House-1	Pump House-2	Pump House-3	Near Control room	Near ETP	TEST METHOD
			26/03/2022	26/03/2022	26/03/2022	26/03/2022	26/03/2022	
1.	pH @ 25 ° C	--	8.17	7.85	8.06	7.96	7.60	IS 3025(Part 11)1983
2.	Salinity	ppt	3.83	0.95	1.18	0.97	11.85	APHA 23rd Ed.,2017,2520 B
3.	Oil & Grease	mg/L	BDL (MDL:2.0)	BDL (MDL:2.0)	BDL (MDL:2.0)	BDL (MDL:2.0)	BDL (MDL:2.0)	IS 3025(Part39)1991, Amd. 2
4.	Hydrocarbon	mg/L	N.D.	N.D.	N.D.	N.D.	N.D.	GC/GCMS
5.	Lead as Pb	mg/L	0.056	0.064	0.036	0.048	0.038	IS 3025 (PART 47) 1994
6.	Arsenic as As	mg/L	BDL(MDL:0.01)	BDL(MDL:0.01)	BDL(MDL:0.01)	BDL(MDL:0.01)	BDL(MDL:0.01)	APHA 23rd Ed.,2017,3114-C
7.	Nickel as Ni	mg/L	BDL(MDL:0.02)	BDL(MDL:0.02)	BDL(MDL:0.02)	BDL(MDL:0.02)	BDL(MDL:0.02)	IS 3025 (PART 54) 2003
8.	Total Chromium as Cr	mg/L	BDL(MDL:0.05)	0.084	BDL(MDL:0.05)	BDL(MDL:0.05)	0.092	IS 3025 (PART 52) 2003
9.	Cadmium as Cd	mg/L	BDL(MDL:0.003)	BDL(MDL:0.003)	BDL(MDL:0.003)	BDL(MDL:0.003)	BDL(MDL:0.003)	IS 3025(PART 41) 1992
10.	Mercury as Hg	mg/L	BDL(MDL:0.001)	BDL(MDL:0.001)	BDL(MDL:0.001)	BDL(MDL:0.001)	BDL(MDL:0.001)	APHA 23rd Ed.,2017, 3112-B
11.	Zinc as Zn	mg/L	0.154	0.282	0.194	0.236	0.211	IS 3025(PART 49) 1994
12.	Copper as Cu	mg/L	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	IS 3025 (PART 42) 1992
13.	Iron as Fe	mg/L	0.38	0.94	0.86	0.91	1.12	IS 3025(PART 53) 2003
14.	Insecticides/Pesticides	µg/L	Absent	Absent	Absent	Absent	Absent	USEPA 8081 B
15.	Depth of Water Level from Ground Level	meter	1.90	2.10	1.95	2.10	2.15	--

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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	NOVEMBER 2021		DECEMBER 2021		JANUARY 2022		FEBRUARY 2022		MARCH 2022		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1.	pH	--	8.00	7.81	7.98	7.92	8.03	7.99	8.12	8.02	8.08	7.98	IS 3025 (Part11)1983
2.	Temperature	°C	30	30	29.8	29.7	29.9	29.7	30.1	30	30.2	30.1	IS 3025 (Part 9)1984
3.	Total Suspended Solids	mg/L	120	84	116	102	108	98	112	106	118	111	APHA 23rd Ed.,2017,2540- D
4.	BOD (3 Days @ 27°C)	mg/L	2.7	BDL MDL:1.0	2.6	BDL MDL:1.0	3.1	BDL MDL:1.0	2.8	BDL MDL:1.0	2.1	BDL MDL:1.0	IS 3025(Part 44)1993Amd.01
5.	Dissolved Oxygen	mg/L	6.7	6.5	6.1	5.9	6.2	6.1	6.1	6	6	5.9	APHA 23rd Ed.,2017,4500-O, B
6.	Salinity	ppt	35	33.4	35.41	35.64	35.38	35.94	35.28	35.82	34.89	35.14	By Calculation
7.	Oil & Grease	mg/L	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	IS 3025(Part39) 1991, Amd. 2
8.	Nitrate as NO_3	µmol/L	2.59	1.7	2.59	2.16	3.02	2.15	2.37	2.15	2.59	2.15	APHA 23rd Ed., 2017,4500 NO3-B
9.	Nitrite as NO_2	µmol/L	BDL MDL:0.4	BDL MDL:0.4	0.077	0.064	0.095	0.086	0.11	0.103	0.121	0.112	APHA 23rd Ed.,2017,4500NO_2B
10.	Ammonical Nitrogen as NH_3	µmol/L	11.34	10.4	7.32	6.89	3.23	3.02	1.94	1.51	2.33	2.15	APHA 23rd Ed., 2017,4500- NH3 B
11.	Phosphates as PO_4	µmol/L	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	APHA 23rd Ed.,2017,4500-P, D
12.	Total Nitrogen	µmol/L	24.6	23.7	15.51	14.22	9.7	9.05	4.01	3.19	5.34	5.17	APHA 23rd Ed., 2017,4500 NH3 - B
13.	Petroleum Hydrocarbon	µg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	APHA 23rd ED,2017,5520 F
14.	Total Dissolved Solids	mg/L	36820	31828	37360	37412	36844	36902	36124	36684	35894	36544	APHA 23rd Ed.,2017, 2540- C
15.	COD	mg/L	12.3	8.2	20.1	16.1	24.4	20.4	12.05	8.03	8.11	N.D.	APHA 23rd Ed.,2017, 5220-B

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

SR. NO.	TEST PARAMETERS	UNIT	NOVEMBER 2021		DECEMBER 2021		JANUARY 2022		FEBRUARY 2022		MARCH 2022		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
A	Phytoplankton												
1.	Chlorophyll	mg/m³	2.87	2.45	2.44	2.63	2.58	2.47	2.38	2.89	2.2	2.36	APHA (23rd Ed. 2017)10200 H
2.	Phaeophytin	mg/m³	0.98	0.86	0.52	0.74	0.69	0.81	0.71	0.78	0.36	0.63	APHA (23rd Ed. 2017)10200 H
3.	Cell Count	No. x 10³/L	153	76	109	69	110	71	154	90	148	100	APHA (23rd Ed. 2017)10200 F
4	Name of Group Number and name of group species of each group	--	*Pleurosigma*	*Biddulphia*	*Biddulphia*	*Cyclotella*	*Rhizosolenia*	*Coscinodiscus*	*Pleurosigma*	*Cyclotella*	*Rhizosolenia*	*Biddulphia*	APHA (23rd Ed. 2017)10200 F
			Cyclotella	*Diplotella*	*Fragillaria*	*Pinnularia*	*Fragillaria*	*Pinnularia*	*Cyclotella*	*Pinnularia*	*Fragillaria*	*Fragillaria*	
			Ceratium	*Odontella*	*Odentella*	*Skeletonema*	*Cyclotella*	*Thalassiothrix*	*Ceratium*	*Skeletonema*	*Thalassiothrix*	*Odentella*	
			Skeletonema	*Dinophysis*	*Grammatophora*	*Thallassiosira*	*Grammatophora*	*Ceratium*	*Skeletonema*	*Thallassiosira*	*Grammatophora*	*Grammatophora*	
			Thallassiosira	*Surirella*	*Melosira*	*Thalassionema*	*Melosira*	*Thalassionema*	*Thallassiosira*	*Thalassionema*	*Ceratium*	*Melosira*	

B	Zooplankton							
1	Abudance(Population)	noX103/ 100 m3	29	32	28	36	30	APHA (23rd Ed. 2017)10200 G
2	Name of Group Number and name of group species of each group		*Copepods*	*Copepods*	*Siphonephora*	*Egg(Fish and Shrimps)*	*Egg(Fish and Shrimps)*	
			Decapoda	*Decapoda*	*Decapoda*	*Oikoplura*	*Oikoplura*	
			Gastropos Larvae	*Crustacean*	*Crustacean*	*Crustacean Larvae*	*Crustacean Larvae*	
			Egg(Fish and Shrimps)	*Egg(Fish and Shrimps)*	*Egg(Fish and Shrimps)*	*Crustacean*	*Crustacean*	
			Bivalve Larvae	*Oikoplura*	*Bivalve Larvae*	*Bivalve Larvae*	*Bivalve Larvae*	
3	Total Biomass	ml/100 m³	15.47	14.63	15.32	14.23	15.63	

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CIN:U73100GJ2007PTC051463

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

SR. NO.	TEST PARAMETERS	UNIT	NOVEMBER 2021		DECEMBER 2021		JANUARY 2022		FEBRUARY 2022		MARCH 2022		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
C	Microbiological												
1	Total Bacterial Count	CFU/ml	220		230		212		202		198		APHA 23rd Ed.2017,9215-C
2	Total Coliform	/100ml	32		68		40		54		42		APHA 23rd Ed.2017,9222-B
3	Ecoli	/100ml	25		35		28		12		18		IS :15185:2016
4	Enterococcus	/100ml	10		21		19		11		12		IS:15186:2002
5	Salmonella	/100ml	Absent		Absent		Absent		Absent		Absent		IS:15187:2016
6	Shigella	/100ml	Absent		Absent		Absent		Absent		Absent		APHA 23rd Ed.2017,9260-E
7	Vibrio	/100ml	Absent		Absent		Absent		Absent		Absent		IS: 5887 (Part V):1976

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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	NOVEMBER 2021	DECEMBER 2021	JANUARY 2022	FEBRUARY 2022	MARCH 2022	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
1.	Organic Matter	%	2.15	1.54	1.12	0.94	0.81	IS: 2720 (Part 22):1972 RA.2015, Amds.1
2.	Phosphorus as P	µg/g	544.3	560.7	544.2	496.4	542.2	IS: 10158 :1982, RA.2009 Method B
3.	Texture	--	Sandy	Sandy	Sandy	Sandy	Sandy	Lab SOP No. UERL/CHM/LTM/108
4.	Petroleum Hydrocarbon	µg/g	N.D.	N.D.	N.D.	N.D.	N.D.	APHA 23rd ED,2017,5520 F
5.0	Heavy Metals							
5.1	Aluminum as Al	%	1.62	1.86	2.12	2.36	2.68	IS3025(Part 55)2003
5.2	Total Chromium as Cr+3	µg/g	19	31	33.4	55.4	64.4	EPA 3050B/7190 (Extraction &Analytical Method): 1986
5.3	Manganese as Mn	µg/g	360.13	412.6	428.8	488.6	512.4	EPA 3050B/7460 (Extraction &Analytical Method): 1986
5.4	Iron as Fe	%	1.52	1.85	2.24	2.64	2.89	EPA 3050B/7380 (Extraction &Analytical Method): 1986
5.5	Nickel as Ni	µg/g	21.14	22.25	26.31	28.62	30.12	EPA 3050B/7520 (Extraction &Analytical Method): 1986
5.6	Copper as Cu	µg/g	16.61	16.52	15.84	20.25	25.41	EPA 3050B /7210 (Extraction &Analytical Method):1986
5.7	Zinc as Zn	µg/g	31.7	40.2	44.4	60.2	66.85	EPA 3050B/7950 (Extraction &Analytical Method): 1986
5.8	Lead as Pb	µg/g	5.88	5.46	6.12	5.16	4.86	EPA 3050B /7420 (Extraction &Analytical Method):1986
5.9	Mercury as Hg	µg/g	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	EPA 7471B (Extraction &Analytical Method) :2007

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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	NOVEMBER 2021	DECEMBER 2021	JANUARY 2022	FEBRUARY 2022	MARCH 2022	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
D	Benthic Organisms							
1	Macrobenthos	--	*Bivalves*	*Decapod Larvae*	*Decapod Larvae*	*Isopods*	*Bivalves*	APHA (23rd Ed. 2017)10500 C
			Gastropods	*Gastropods*	*Sipunculids*	*Sipunculids*	*Nemertine*	
			Polychates	*Isopods*	*Isopods*	*Isopods*	*Isopods*	
			Decapod Larvae	*Amphipods*	*Amphipods*	*Gastropods*	*Gastropods*	
2	MeioBenthos	--	*Turbellarians*	*Herpectacoids*	*Herpectacoids*	*Turbellarians*	*Foraminiferan*	
			Nematods	*Polychates*	*Foraminiferan*	*Polychates*	*Herpectacoids*	
3	Population	no/m²	281	279	305	299	*342*	

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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	NOVEMBER 2021		DECEMBER 2021		JANUARY 2022		FEBRUARY 2022		MARCH 2022		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1.	pH	--	7.97	7.93	7.96	7.86	8.11	8.07	8.06	7.98	8.11	8.02	IS 3025 (Part11)1983
2.	Temperature	°C	30	30	30	29.8	29.8	29.7	29.9	29.7	30.1	30	IS 3025 (Part 9)1984
3.	Total Suspended Solids	mg/L	112	76	118	94	112	102	118	106	116	109	APHA 23rd Ed.,2017,2540- D
4.	BOD (3 Days @ 27°C)	mg/L	2.2	BDL MDL:1.0	2.8	BDL MDL:1.0	2.6	BDL MDL:1.0	2.9	BDL MDL:1.0	3.1	BDL MDL:1.0	IS 3025(Part 44)1993Amd.01
5.	Dissolved Oxygen	mg/L	6.7	6.4	5.9	5.7	6	5.9	5.9	5.8	5.8	5.7	APHA 23rd Ed.,2017,4500-O, B
6.	Salinity	ppt	34.1	33.6	35.11	35.36	35.88	36.12	35.64	36.16	35.43	35.98	By Calculation
7.	Oil & Grease	mg/L	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	IS 3025(Part39) 1991, Amd. 2
8.	Nitrate as NO_3	µmol/L	2.2	2.6	2.59	2.59	2.15	1.72	2.84	2.37	3.02	2.59	APHA 23rd Ed., 2017,4500 NO3-B
9.	Nitrite as NO_2	µmol/L	BDL MDL:0.4	BDL MDL:0.4	0.073	0.068	0.108	0.103	0.129	0.121	0.112	0.108	APHA 23rd Ed.,2017,4500NO_2B
10.	Ammonical Nitrogen as NH_3	µmol/L	10.3	9.5	6.89	5.17	3.66	3.45	2.15	1.94	3.02	2.59	APHA 23rd Ed., 2017,4500- NH3 B
11.	Phosphates as PO_4	µmol/L	0.5	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	APHA 23rd Ed.,2017,4500-P, D
12.	Total Nitrogen	µmol/L	25.3	23.6	14.22	10.77	10.99	10.34	4.44	4.01	6.94	5.95	APHA 23rd Ed., 2017,4500 NH3 - B
13.	Petroleum Hydrocarbon	µg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	APHA 23rd ED,2017,5520 F
14.	Total Dissolved Solids	mg/L	31716	37340	37128	37392	37406	37742	36822	37128	36524	37192	APHA 23rd Ed.,2017, 2540- C
15.	COD	mg/L	10.3	6.3	16.1	12.1	16.3	12.2	16.06	12.05	16.22	12.17	APHA 23rd Ed.,2017, 5220-B

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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	NOVEMBER 2021		DECEMBER 2021		JANUARY 2022		FEBRUARY 2022		MARCH 2022		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
A	Phytoplankton												
1.	Chlorophyll	mg/m³	2.67	2.32	2.88	2.39	2.74	2.98	2.68	2.56	3.21	2.87	APHA (23rd Ed. 2017)10200 H
2.	Phaeophytin	mg/m³	0.87	0.94	0.78	0.69	0.85	0.84	0.59	0.7	0.84	0.69	APHA (23rd Ed. 2017)10200 H
3.	Cell Count	No. x 10^3/L	137	76	132	84	125	90	106	102	120	130	APHA (23rd Ed. 2017)10200 F
4	Name of Group Number and name of group species of each group	--	*Cyclotella*	*Ceratium*	*Odentella*	*Diploneis*	*Odentella*	*Odentella*	*Cyclotella*	*Melosira*	*Pinnularia*	*Melosira*	APHA (23rd Ed. 2017)10200 F
			Fragillaria	*Melosira*	*Cyclotella*	*Rhizosolenia*	*Cyclotella*	*Grammatophora*	*Fragillaria*	*Pinnularia*	*Biddulphia*	*Pinnularia*	
			Diniphysis	*Nitzschia*	*Pinnularia*	*Nitzschia*	*Pinnularia*	*Biddulphia*	*Diniphysis*	*Skeletonema*	*Navicula*	*Skeletonema*	
			Thallassiosira	*Dinophysis*	*Biddulphia*	*Cyclotella*	*Biddulphia*	*Cyclotella*	*Thallassiosira*	*Thallassiosira*	*Thallassiosira*	*Thallassiosira*	
			Skeletonema	*Pleurosigma*	*Thallassiosira*	*Pleurosigma*	*Thallassiosira*	*Thallassiosira*	*Skeletonema*	*Thalassionema*	*Skeletonema*	*Thalassionema*	
B	Zooplankton												
1	Abudance(Population)	noX103 / 100 m3	39		25		31		41		38		APHA (23rd Ed. 2017)10200 G
2	Name of Group Number and name of group species of each group		*Copepods nauplii*		*Oikoplura*		*Oikoplura*		*Crustacean*		*Egg(Fish and Shrimps)*		
			Decapoda		*Copepods*		*Copepods*		*Siphonephora*		*Oikoplura*		
			Copepods		*Crustacean Larvae*		*Crustacean Larvae*		*Crustacean*		*Crustacean Larvae*		
			Crustacean		*Crustacean*		*Crustacean*		*Oikoplura*		*Crustacean*		
			Bivalve Larvae		*Bivalve Larvae*		*Bivalve Larvae*		*Bivalve Larvae*		*Bivalve Larvae*		
3	Total Biomass	ml/100 m³	17.50		15.26		16.21		17.52		16.45		

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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	NOVEMBER 2021		DECEMBER 2021		JANUARY 2022		FEBRUARY 2022		MARCH 2022		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
C	Microbiological												
1	Total Bacterial Count	CFU/ml	110		254		190		176		126		APHA 23rd Ed.2017,9215-C
2	Total Coliform	/100ml	50		50		42		33		42		APHA 23rd Ed.2017,9222-B
3	Ecoli	/100ml	32		19		32		24		21		IS :15185:2016
4	Enterococcus	/100ml	12		9		12		8		15		IS:15186:2002
5	Salmonella	/100ml	Absent		Absent		Absent		Absent		Absent		IS:15187:2016
6	Shigella	/100ml	Absent		Absent		Absent		Absent		Absent		APHA 23rd Ed.2017,9260-E
7	Vibrio	/100ml	Absent		Absent		Absent		Absent		Absent		IS: 5887 (Part V):1976

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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	NOVEMBER 2021	DECEMBER 2021	JANUARY 2022	FEBRUARY 2022	MARCH 2022	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
1.	Organic Matter	%	0.9	0.94	0.82	0.72	0.59	IS: 2720 (Part 22):1972 RA.2015, Amds.1
2.	Phosphorus as P	µg/g	606.5	610.21	586.4	602.1	584.3	IS: 10158 :1982, RA.2009 Method B
3.	Texture	--	Sandy	Sandy	Sandy	Sandy	Sandy	Lab SOP No. UERL/CHM/LTM/108
4.	Petroleum Hydrocarbon	µg/g	N.D.	N.D.	N.D.	N.D.	N.D.	APHA 23rd ED,2017,5520 F
5.0	Heavy Metals							
5.1	Aluminum as Al	%	1.22	1.66	1.84	2.12	2.38	IS3025(Part 55)2003
5.2	Total Chromium as Cr+3	µg/g	16.07	15.86	17.85	48.6	55.6	EPA 3050B/7190 (Extraction &Analytical Method): 1986
5.3	Manganese as Mn	µg/g	361.51	355.2	384.4	444.2	462.4	EPA 3050B/7460 (Extraction &Analytical Method): 1986
5.4	Iron as Fe	%	1.18	1.78	2.04	2.22	2.41	EPA 3050B/7380 (Extraction &Analytical Method): 1986
5.5	Nickel as Ni	µg/g	19.41	18.15	19.14	26.21	31.22	EPA 3050B/7520 (Extraction &Analytical Method): 1986
5.6	Copper as Cu	µg/g	11.14	12.1	14.21	22.31	28.33	EPA 3050B /7210 (Extraction &Analytical Method):1986
5.7	Zinc as Zn	µg/g	34.44	31.7	29.82	36.84	40.24	EPA 3050B/7950 (Extraction &Analytical Method): 1986
5.8	Lead as Pb	µg/g	3.51	3.14	3.56	3.42	3.12	EPA 3050B /7420 (Extraction &Analytical Method):1986
5.9	Mercury as Hg	µg/g	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	EPA 7471B (Extraction &Analytical Method) :2007

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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	NOVEMBER 2021	DECEMBER 2021	JANUARY 2022	FEBRUARY 2022	MARCH 2022	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
D	Benthic Organisms							
1	Macrobenthos	--	*Decapod Larvae*	--	*Gastropods*	*Sipunculids*	*Gastropods*	APHA (23rd Ed. 2017)10500 C
			Gastropods	--	Decapods Larvae	Decapods Larvae	Decapods Larvae	
			Isopods	--	*Amphipods*	*Amphipods*	*Amphipods*	
			Amphipods	--	*Isopods*	*Isopods*	*Sipunculids*	
2	MeioBenthos	--	*Herpectacoids*	--	*Polychates*	*Foraminiferan*	*Polychates*	
			Polychates	--	*Herpectacoids*	*Herpectacoids*	*Herpectacoids*	
3	Population	no/m²	325	--	296	303	269	

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

SR. NO.	TEST PARAMETERS	UNIT	NOVEMBER 2021		DECEMBER 2021		JANUARY 2022		FEBRUARY 2022		MARCH 2022		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1.	pH	--	7.83	7.92	7.94	7.9	7.98	7.94	8.14	8.04	8.09	7.94	IS 3025 (Part11)1983
2.	Temperature	°C	30	30	29.9	29.8	29.9	29.8	30	29.9	30.1	30	IS 3025 (Part 9)1984
3.	Total Suspended Solids	mg/L	116	88	104	78	92	82	114	96	122	108	APHA 23rd Ed.,2017,2540- D
4.	BOD (3 Days @ 27°C)	mg/L	2.8	BDL MDL:1.0	2.7	BDL MDL:1.0	3	BDL MDL:1.0	2.9	BDL MDL:1.0	3	BDL MDL:1.0	IS 3025(Part 44)1993Amd.01
5.	Dissolved Oxygen	mg/L	6.6	6.4	5.9	5.8	6	5.9	6.1	6	6	5.9	APHA 23rd Ed.,2017,4500-O, B
6.	Salinity	ppt	35.2	35.4	35.97	36.24	36.04	36.32	35.88	36.12	36.18	36.29	By Calculation
7.	Oil & Grease	mg/L	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	IS 3025(Part39) 1991, Amd. 2
8.	Nitrate as NO_3	µmol/L	2.2	2.2	2.16	2.16	2.59	2.15	2.59	2.37	3.45	3.02	APHA 23rd Ed., 2017,4500 NO3-B
9.	Nitrite as NO_2	µmol/L	BDL MDL:0.4	BDL MDL:0.4	0.081	0.068	0.142	0.129	0.151	0.138	0.138	0.129	APHA 23rd Ed.,2017,4500NO_2B
10.	Ammonical Nitrogen as NH_3	µmol/L	12.6	11.8	6.89	4.74	4.09	3.88	3.36	2.54	2.8	2.33	APHA 23rd Ed., 2017,4500- NH3 B
11.	Phosphates as PO_4	µmol/L	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	APHA 23rd Ed.,2017,4500-P, D
12.	Total Nitrogen	µmol/L	26.1	24.9	14.65	11.21	12.28	11.64	6.94	5.26	6.94	5.34	APHA 23rd Ed., 2017,4500 NH3 - B
13.	Petroleum Hydrocarbon	µg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	APHA 23rd ED,2017,5520 F
14.	Total Dissolved Solids	mg/L	36064	32952	35412	36164	36202	36844	35944	36438	36124	36748	APHA 23rd Ed.,2017, 2540- C
15.	COD	mg/L	12.3	8.2	8	4	8.2	4.1	20.08	16.06	16.22	8.11	APHA 23rd Ed.,2017, 5220-B

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

SR. NO.	TEST PARAMETERS	UNIT	NOVEMBER 2021		DECEMBER 2021		JANUARY 2022		FEBRUARY 2022		MARCH 2022		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
A	Phytoplankton												
1.	Chlorophyll	mg/m³	2.34	2.21	2.89	2.45	2.71	2.65	2.44	2.35	2.54	2.45	APHA (23rd Ed. 2017)10200 H
2.	Phaeophytin	mg/m³	0.87	0.82	0.96	0.65	0.82	0.75	0.69	0.56	0.86	0.78	APHA (23rd Ed. 2017)10200 H
3.	Cell Count	No. x 10³/L	125	70	102	71	121	68	115	74	106	98	APHA (23rd Ed. 2017)10200 F
4	Name of Group Number and name of group species of each group	--	*Navicula* *Cyclotella* *Pinnularia* *Skeletonema* *Thallassiosira*	*Surirella* *Rhizosolenia* *Nitzschia* *Thalassionema* *Pleurosigma*	*Pinnularia* *Biddulphia* *Navicula* *Thallassiosira* *Skeletonema*	*Coscinodiscus* *Diploneis* *Rhizosolenia* *Dinophysis* *Thalassionema*	*Pinnularia* *Biddulphia* *Navicula* *Thallassiosira* *Skeletonema*	*Coscinodiscus* *Pinnularia* *Rhizosolenia* *Dinophysis* *Thalassionema*	*Coscinodiscus* *Diploneis* *Rhizosolenia* *Dinophysis* *Thalassionema*	*Surirella* *Rhizosolenia* *Nitzschia* *Thalassionema* *Pleurosigma*	*Cyclotella* *Pinnularia* *Skeletonema* *Thallassiosira* *Thalassionema*	*Surirella* *Rhizosolenia* *Nitzschia* *Thalassionema* *Pleurosigma*	APHA (23rd Ed. 2017)10200 F
B	Zooplankton												
1	Abudance(Population)	noX103 / 100 m3	21		22		32		29		30		APHA (23rd Ed. 2017)10200 G
2	Name of Group Number and name of group species of each group		*Copepods nauplii* *Oikoplura* *Crustacean Larvae* *Crustacean* *Egg(Fish aNot Detected Shrimps)*		*Copepods* *Bivalve Larvae* *Crustacean* *Egg(Fish and Shrimps)* *Siphonephora*		*Copepods* *Crustacean* *Siphonephora* *Egg(Fish and Shrimps)* *Oikoplura*		*Copepods nauplii* *Decapoda* *Copepods* *Crustacean* *Bivalve Larvae*		*Oikoplura* *Copepods* *Crustacean Larvae* *Crustacean* *Bivalve Larvae*		
3	Total Biomass	ml/100 m³	18.0		12.48		13.62		14		13.95		

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

SR. NO.	TEST PARAMETERS	UNIT	NOVEMBER 2021		DECEMBER 2021		JANUARY 2022		FEBRUARY 2022		MARCH 2022		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
C	Microbiological												
1	Total Bacterial Count	CFU/ml	290		190		152		160		210		APHA 23rd Ed.2017,9215-C
2	Total Coliform	/100ml	68		42		51		49		36		APHA 23rd Ed.2017,9222-B
3	Ecoli	/100ml	46		26		23		31		26		IS :15185:2016
4	Enterococcus	/100ml	20		16		20		26		19		IS:15186:2002
5	Salmonella	/100ml	Absent		Absent		Absent		Absent		Absent		IS:15187:2016
6	Shigella	/100ml	Absent		Absent		Absent		Absent		Absent		APHA 23rd Ed.2017,9260-E
7	Vibrio	/100ml	Absent		Absent		Absent		Absent		Absent		IS: 5887 (Part V):1976

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RESULTS OF SEDIMENT ANALYSIS [M3 EAST OF BOCHAISLANOT DETECTED - N 22°46'530" E 069°41'690"]

SR. NO.	TEST PARAMETERS	UNIT	NOVEMBER 2021	DECEMBER 2021	JANUARY 2022	FEBRUARY 2022	MARCH 2022	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
1.	Organic Matter	%	2.34	1.52	1.16	0.96	0.72	IS: 2720 (Part 22):1972 RA.2015, Amds.1
2.	Phosphorus as P	µg/g	496.7	545.6	564.2	544.3	591.2	IS: 10158 :1982, RA.2009 Method B
3.	Texture	--	Sandy	Sandy	Sandy	Sandy	Sandy	Lab SOP No. UERL/CHM/LTM/108
4.	Petroleum Hydrocarbon	µg/g	N.D.	N.D.	N.D.	N.D.	N.D.	APHA 23rd ED,2017,5520 F
5.0	Heavy Metals							
5.1	Aluminum as Al	%	1.48	1.69	1.94	2.44	2.56	IS3025(Part 55)2003
5.2	Total Chromium as Cr+3	µg/g	17.74	32	31.8	62.1	74.23	EPA 3050B/7190 (Extraction &Analytical Method): 1986
5.3	Manganese as Mn	µg/g	222.95	260.4	255.2	312.2	344.4	EPA 3050B/7460 (Extraction &Analytical Method): 1986
5.4	Iron as Fe	%	1.42	1.72	2.21	2.36	2.48	EPA 3050B/7380 (Extraction &Analytical Method): 1986
5.5	Nickel as Ni	µg/g	19.4	20.84	24.85	30.24	34.51	EPA 3050B/7520 (Extraction &Analytical Method): 1986
5.6	Copper as Cu	µg/g	15.66	15.92	18.96	26.1	30.22	EPA 3050B /7210 (Extraction &Analytical Method):1986
5.7	Zinc as Zn	µg/g	36.09	42.2	44.78	52.66	56.85	EPA 3050B/7950 (Extraction &Analytical Method): 1986
5.8	Lead as Pb	µg/g	5.43	5.12	6.14	5.56	4.98	EPA 3050B /7420 (Extraction &Analytical Method):1986
5.9	Mercury as Hg	µg/g	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	EPA 7471B (Extraction &Analytical Method) :2007

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RESULTS OF SEDIMENT ANALYSIS [M3 EAST OF BOCHAISLANOT DETECTED - N 22°46'530" E 069°41'690"]

SR. NO.	TEST PARAMETERS	UNIT	NOVEMBER 2021	DECEMBER 2021	JANUARY 2022	FEBRUARY 2022	MARCH 2022	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
D	Benthic Organisms							
1	Macrobenthos	--	*Sipunculids*	*Bivalves*	*Amphipods*	*Nemertine*	*Amphipods*	APHA (23rd Ed. 2017)10500 C
			Nemertine	*Nemertine*	*Decapod Larvae*	*Decapod Larvae*	*Decapod Larvae*	
			Isopods	*Isopods*	*Isopods*	*Isopods*	*Isopods*	
			Amphipods	*Gastropods*	*Gastropods*	*Gastropods*	*Gastropods*	
2	MeioBenthos	--	*Foraminiferan*	*Foraminiferan*	*Foraminiferan*	*Foraminiferan*	*Foraminiferan*	
			Nematods	*Herpectacoids*	*Herpectacoids*	*Polychates*	*Herpectacoids*	
3	Population	no/m²	313	290	330	263	*256*	

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RESULTS OF MARINE WATER [M4 JUNA BANOT DETECTEDAR N 22°47'577" E 069°43'620"]

SR. NO.	TEST PARAMETERS	UNIT	NOVEMBER 2021		DECEMBER 2021		JANUARY 2022		FEBRUARY 2022		MARCH 2022		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1.	pH	--	7.97	7.5	7.82	7.78	7.99	7.93	8.06	8.01	8.14	8.06	IS 3025 (Part11)1983
2.	Temperature	°C	30	30	29.9	29.8	30	29.9	30.1	30	30.2	30.1	IS 3025 (Part 9)1984
3.	Total Suspended Solids	mg/L	122	96	134	106	118	104	102	84	114	98	APHA 23rd Ed.,2017,2540- D
4.	BOD (3 Days @ 27°C)	mg/L	3.1	BDL MDL:1.0	2.7	BDL MDL:1.0	3.1	BDL MDL:1.0	2.8	BDL MDL:1.0	3.2	BDL MDL:1.0	IS 3025(Part 44)1993Amd.01
5.	Dissolved Oxygen	mg/L	6.5	6.3	6	5.8	6.1	6	6.1	6	6.2	6.1	APHA 23rd Ed.,2017,4500-O, B
6.	Salinity	ppt	36.1	36.3	35.85	36.06	35.94	36.12	36.14	36.46	35.86	36.21	By Calculation
7.	Oil & Grease	mg/L	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	IS 3025(Part39) 1991, Amd. 2
8.	Nitrate as NO_3	µmol/L	2.2	1.3	2.59	2.16	3.02	2.59	3.23	2.8	3.02	2.59	APHA 23rd Ed., 2017,4500 NO3-B
9.	Nitrite as NO_2	µmol/L	BDL MDL:0.4	BDL MDL:0.4	0.06	BDL (MDL:0.04)	0.129	0.121	0.099	0.095	0.121	0.112	APHA 23rd Ed.,2017,4500NO_2B
10.	Ammonical Nitrogen as NH_3	µmol/L	10.6	10.2	6.89	5.6	3.66	3.23	3.62	3.36	3.23	3.02	APHA 23rd Ed., 2017,4500- NH3 B
11.	Phosphates as PO_4	µmol/L	1.1	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	APHA 23rd Ed.,2017,4500-P, D
12.	Total Nitrogen	µmol/L	24.3	23.3	14.22	12.07	10.99	9.7	7.41	6.94	7.46	6.94	APHA 23rd Ed., 2017,4500 NH3 - B
13.	Petroleum Hydrocarbon	µg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	APHA 23rd ED,2017,5520 F
14.	Total Dissolved Solids	mg/L	32184	36108	34636	35440	35222	35984	35864	36534	35712	36310	APHA 23rd Ed.,2017, 2540- C
15.	COD	mg/L	14.3	8.2	12.1	8	28.5	24.4	20.08	16.06	24.34	20.28	APHA 23rd Ed.,2017, 5220-B

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RESULTS OF MARINE WATER [M4 JUNA BANOT DETECTEDAR N 22°47'577" E 069°43'620"]

SR. NO.	TEST PARAMETERS	UNIT	NOVEMBER 2021		DECEMBER 2021		JANUARY 2022		FEBRUARY 2022		MARCH 2022		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
A	Phytoplankton												
1.	Chlorophyll	mg/m³	2.74	2.53	2.84	2.42	2.41	2.36	2.74	2.59	2.54	2.75	APHA (23rd Ed. 2017)10200 H
2.	Phaeophytin	mg/m³	0.89	0.92	0.93	0.73	0.53	0.74	0.63	0.66	0.86	0.65	APHA (23rd Ed. 2017)10200 H
3.	Cell Count	No. x 10³/L	120	71	121	63	132	71	142	87	132	98	APHA (23rd Ed. 2017)10200 F
4	Name of Group Number and name of group species of each group	--	*Cyclotella*	*Coscinodiscus*	*Rhizosolenia*	*Melosira*	*Rhizosolenia*	*Dinophysis*	*Cyclotella*	*Ceratium*	*Diploneis*	*Ceratium*	APHA (23rd Ed. 2017)10200 F
			Fragillaria	*Diploneis*	*Fragillaria*	*Pinnularia*	*Fragillaria*	*Coscinodiscus*	*Fragillaria*	*Melosira*	*Rhizosolenia*	*Melosira*	
			Navicula	*Nitzschia*	*Thalassiothrix*	*Skeletonema*	*Thalassiothrix*	*Cyclotella*	*Navicula*	*Nitzschia*	*Nitzschia*	*Nitzschia*	
			Thallassiosira	*Dinophysis*	*Grammatophora*	*Thallassiosira*	*Grammatophora*	*Thallassiosira*	*Thallassiosira*	*Dinophysis*	*Cyclotella*	*Dinophysis*	
			Skeletonema	*Thalassionema*	*Ceratium*	*Thalassionema*	*Ceratium*	*Thalassionema*	*Skeletonema*	*Pleurosigma*	*Pleurosigma*	*Pleurosigma*	
B	Zooplankton												
1	Abudance(Population)	noX103 / 100 m3	36		27		22		30		36		APHA (23rd Ed. 2017)10200 G
2	Name of Group Number and name of group species of each group		*Crustacean*		*Egg(Fish and Shrimps)*		*Egg(Fish and Shrimps)*		*Egg(Fish and Shrimps)*		*Crustacean*		
			Oikoplura		*Oikoplura*		*Oikoplura*		*Oikoplura*		*Oikoplura*		
			Crustacean Larvae		*Crustacean Larvae*		*Crustacean Larvae*		*Crustacean Larvae*		*Crustacean Larvae*		
			Oikoplura		*Crustacean*		*Crustacean*		*Crustacean*		*Oikoplura*		
			Bivalve Larvae		*Bivalve Larvae*		*Bivalve Larvae*		*Bivalve Larvae*		*Bivalve Larvae*		
3	Total Biomass	ml/100 m³	14.08		14.12		15.36		15.32		14.35		

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RESULTS OF MARINE WATER [M4 JUNA BANOT DETECTEDAR N 22°47'577" E 069°43'620"]

SR. NO.	TEST PARAMETERS	UNIT	NOVEMBER 2021		DECEMBER 2021		JANUARY 2022		FEBRUARY 2022		MARCH 2022		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
C	Microbiological												
1	Total Bacterial Count	CFU/ml	228		248		220		198		186		APHA 23rd Ed.2017,9215-C
2	Total Coliform	/100ml	69		46		35		32		40		APHA 23rd Ed.2017,9222-B
3	Ecoli	/100ml	23		30		29		21		19		IS :15185:2016
4	Enterococcus	/100ml	31		22		15		14		9		IS:15186:2002
5	Salmonella	/100ml	Absent		Absent		Absent		Absent		Absent		IS:15187:2016
6	Shigella	/100ml	Absent		Absent		Absent		Absent		Absent		APHA 23rd Ed.2017,9260-E
7	Vibrio	/100ml	Absent		Absent		Absent		Absent		Absent		IS: 5887 (Part V):1976

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RESULTS OF SEDIMENT ANALYSIS [M4 JUNA BANOT DETECTEDAR N 22°47'577" E 069°43'620"]

SR. NO.	TEST PARAMETERS	UNIT	NOVEMBER 2021	DECEMBER 2021	JANUARY 2022	FEBRUARY 2022	MARCH 2022	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
1.	Organic Matter	%	0.6	0.55	0.62	0.44	0.48	IS: 2720 (Part 22):1972 RA.2015, Amds.1
2.	Phosphorus as P	µg/g	584.1	602.4	620.4	634.1	602.2	IS: 10158 :1982, RA.2009 Method B
3.	Texture	--	Sandy	Sandy	Sandy	Sandy	Sandy	Lab SOP No. UERL/CHM/LTM/108
4.	Petroleum Hydrocarbon	µg/g	N.D.	N.D.	N.D.	N.D.	N.D.	APHA 23rd ED,2017,5520 F
5.0	Heavy Metals							
5.1	Aluminum as Al	%	1.49	2.03	2.28	2.54	2.86	IS3025(Part 55)2003
5.2	Total Chromium as Cr+3	µg/g	11.86	18.4	22.8	36.2	42.92	EPA 3050B/7190 (Extraction &Analytical Method): 1986
5.3	Manganese as Mn	µg/g	234.64	270.3	310.4	334.2	351.4	EPA 3050B/7460 (Extraction &Analytical Method): 1986
5.4	Iron as Fe	%	1.43	1.98	2.35	2.42	2.68	EPA 3050B/7380 (Extraction &Analytical Method): 1986
5.5	Nickel as Ni	µg/g	15.14	18.69	22.46	33.24	38.22	EPA 3050B/7520 (Extraction &Analytical Method): 1986
5.6	Copper as Cu	µg/g	9.02	11.28	14.74	19.28	23.45	EPA 3050B /7210 (Extraction &Analytical Method):1986
5.7	Zinc as Zn	µg/g	19.57	24.1	25.5	32.14	38.94	EPA 3050B/7950 (Extraction &Analytical Method): 1986
5.8	Lead as Pb	µg/g	5.33	4.89	5.14	4.86	4.65	EPA 3050B /7420 (Extraction &Analytical Method):1986
5.9	Mercury as Hg	µg/g	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	EPA 7471B (Extraction &Analytical Method) :2007

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RESULTS OF SEDIMENT ANALYSIS [M4 JUNA BANOT DETECTEDAR N 22°47'577" E 069°43'620"]

SR. NO.	TEST PARAMETERS	UNIT	NOVEMBER 2021	DECEMBER 2021	JANUARY 2022	FEBRUARY 2022	MARCH 2022	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
D	Benthic Organisms							
1	Macrobenthos	--	*Bivalves*	*Gastropods*	*Gastropods*	*Gastropods*	*Gastropods*	APHA (23rd Ed. 2017)10500 C
			Gastropods	Decapods Larvae	Decapods Larvae	Decapods Larvae	Decapods Larvae	
			Amphipods	*Amphipods*	*Amphipods*	*Amphipods*	*Amphipods*	
			Sipunculids	*Sipunculids*	*Sipunculids*	*Sipunculids*	*Sipunculids*	
2	MeioBenthos	--	*Nematods*	*Polychates*	*Turbellarians*	*Turbellarians*	*Turbellarians*	
			Herpectacoids	*Herpectacoids*	*Herpectacoids*	*Herpectacoids*	*Herpectacoids*	
3	Population	no/m²	363	374	298	270	321	

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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	NOVEMBER 2021		DECEMBER 2021		JANUARY 2022		FEBRUARY 2022		MARCH 2022		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1.	pH	--	6.78	8.08	7.9	7.86	7.86	7.81	7.92	7.84	7.99	7.89	IS 3025 (Part11)1983
2.	Temperature	°C	30	30	29.8	29.7	29.9	29.8	29.9	29.8	30	29.9	IS 3025 (Part 9)1984
3.	Total Suspended Solids	mg/L	114	82	122	104	138	116	126	114	104	92	APHA 23rd Ed.,2017,2540- D
4.	BOD (3 Days @ 27°C)	mg/L	3.0	BDL MDL:1.0	2.6	BDL MDL:1.0	2.9	BDL MDL:1.0	2.6	BDL MDL:1.0	2.4	BDL MDL:1.0	IS 3025(Part 44)1993Amd.01
5.	Dissolved Oxygen	mg/L	6.6	6.5	6	5.9	6.2	6.1	6.1	6	6	5.9	APHA 23rd Ed.,2017,4500-O, B
6.	Salinity	ppt	35.5	35	35.67	35.88	35.55	35.72	35.62	35.89	35.55	35.92	By Calculation
7.	Oil & Grease	mg/L	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	IS 3025(Part39) 1991, Amd. 2
8.	Nitrate as NO_3	µmol/L	2.2	1.3	2.59	2.16	2.59	2.15	3.02	2.84	2.59	2.15	APHA 23rd Ed., 2017,4500 NO3-B
9.	Nitrite as NO_2	µmol/L	BDL MDL:0.4	BDL MDL:0.4	0.064	0.056	0.151	0.142	0.134	0.121	0.147	0.138	APHA 23rd Ed.,2017,4500NO_2B
10.	Ammonical Nitrogen as NH_3	µmol/L	11.2	10.2	6.46	6.03	4.09	3.97	1.72	1.51	3.45	3.22	APHA 23rd Ed., 2017,4500- NH3 B
11.	Phosphates as PO_4	µmol/L	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	APHA 23rd Ed.,2017,4500-P, D
12.	Total Nitrogen	µmol/L	25.1	24.4	13.36	12.49	12.28	11.9	3.53	3.19	7.93	7.46	APHA 23rd Ed., 2017,4500 NH3 - B
13.	Petroleum Hydrocarbon	µg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	APHA 23rd ED,2017,5520 F
14.	Total Dissolved Solids	mg/L	34940	36916	35736	35812	35248	35946	35566	36242	35248	35890	APHA 23rd Ed.,2017, 2540- C
15.	COD	mg/L	14.3	8.2	8	4	20.4	16.3	16.06	12.05	12.17	8.11	APHA 23rd Ed.,2017, 5220-B

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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	NOVEMBER 2021		DECEMBER 2021		JANUARY 2022		FEBRUARY 2022		MARCH 2022		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
A	Phytoplankton												
1.	Chlorophyll	mg/m³	2.79	2.58	2.74	2.22	2.65	2.32	2.7	2.41	2.7	2.39	APHA (23rd Ed. 2017)10200 H
2.	Phaeophytin	mg/m³	0.70	0.83	0.69	0.88	0.59	0.72	0.5	0.56	0.68	0.58	APHA (23rd Ed. 2017)10200 H
3.	Cell Count	No. x 10³/L	118	74	102	66	112	72	100	63	68	74	APHA (23rd Ed. 2017)10200 F
4	Name of Group Number and name of group species of each group	--	*Biddulphia*	*Cyclotella*	*Grammatophora*	*Coscinodiscus*	*Grammatophora*	*Coscinodiscus*	*Biddulphia*	*Skeletonema*	*Biddulphia*	*Skeletonema*	APHA (23rd Ed. 2017)10200 F
			Fragillaria	*Pinnularia*	*Dinophysis*	*Thalassionema*	*Dinophysis*	*Thalassionema*	*Fragillaria*	*Diplotella*	*Fragillaria*	*Diplotella*	
			Odentella	*Skeletonema*	*Navicula*	*Rhizosolenia*	*Navicula*	*Rhizosolenia*	*Odentella*	*Odontella*	*Odentella*	*Odontella*	
			Grammatophora	*Thallassiosira*	*Fragillaria*	*Dinophysis*	*Skeletonema*	*Fragillaria*	*Grammatophora*	*Dinophysis*	*Grammatophora*	*Dinophysis*	
			Melosira	*Thalassionema*	*Biddulphia*	*Skeletonema*	*Biddulphia*	*Skeletonema*	*Melosira*	*Surirella*	*Melosira*	*Surirella*	
B	Zooplankton												
1	Abudance(Population)	noX103 / 100 m3	24		35		41		52		29		APHA (23rd Ed. 2017)10200 G
2	Name of Group Number and name of group species of each group		*Copepods*		*Crustacean*		*Crustacean*		*Oikoplura*		*Copepods nauplii*		
			Decapoda		*Siphonephora*		*Siphonephora*		*Crustacean*		*Decapoda*		
			Crustacean		*Crustacean*		*Crustacean*		*Crustacean Larvae*		*Copepods*		
			Egg(Fish and Shrimps)		*Oikoplura*		*Oikoplura*		*Crustacean*		*Crustacean*		
			Oikoplura		*Bivalve Larvae*		*Egg(Fish and Shrimps)*		*Bivalve Larvae*		*Bivalve Larvae*		
3	Total Biomass	ml/100 m³	15.21		15.62		16.24		18.23		16.75		

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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	NOVEMBER 2021		DECEMBER 2021		JANUARY 2022		FEBRUARY 2022		MARCH 2022		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
C	Microbiological												
1	Total Bacterial Count	CFU/ml	280		274		250		236		186		APHA 23rd Ed.2017,9215-C
2	Total Coliform	/100ml	74		50		36		28		30		APHA 23rd Ed.2017,9222-B
3	Ecoli	/100ml	26		36		29		18		22		IS :15185:2016
4	Enterococcus	/100ml	30		26		24		11		10		IS:15186:2002
5	Salmonella	/100ml	Absent		Absent		Absent		Absent		Absent		IS:15187:2016
6	Shigella	/100ml	Absent		Absent		Absent		Absent		Absent		APHA 23rd Ed.2017,9260-E
7	Vibrio	/100ml	Absent		Absent		Absent		Absent		Absent		IS: 5887 (Part V):1976

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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	NOVEMBER 2021	DECEMBER 2021	JANUARY 2022	FEBRUARY 2022	MARCH 2022	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
1.	Organic Matter	%	0.46	0.48	0.44	0.53	0.46	IS: 2720 (Part 22):1972 RA.2015, Amds.1
2.	Phosphorus as P	µg/g	625.8	602.2	623.1	588.2	542.4	IS: 10158 :1982, RA.2009 Method B
3.	Texture	--	Sandy	Sandy	Sandy	Sandy	Sandy	Lab SOP No. UERL/CHM/LTM/108
4.	Petroleum Hydrocarbon	µg/g	N.D.	N.D.	N.D.	N.D.	N.D.	APHA 23rd ED,2017,5520 F
5.0	Heavy Metals							
5.1	Aluminum as Al	%	0.89	1.26	1.64	1.98	2.29	IS3025(Part 55)2003
5.2	Total Chromium as Cr+3	µg/g	5.02	12.2	16.8	24.1	30.44	EPA 3050B/7190 (Extraction &Analytical Method): 1986
5.3	Manganese as Mn	µg/g	209.11	240.2	256.4	288.2	342.1	EPA 3050B/7460 (Extraction &Analytical Method): 1986
5.4	Iron as Fe	%	0.67	1.22	1.84	2.03	2.34	EPA 3050B/7380 (Extraction &Analytical Method): 1986
5.5	Nickel as Ni	µg/g	9.44	11.25	12.11	22.42	31.11	EPA 3050B/7520 (Extraction &Analytical Method): 1986
5.6	Copper as Cu	µg/g	3.81	4.05	4.24	9.24	12.24	EPA 3050B /7210 (Extraction &Analytical Method):1986
5.7	Zinc as Zn	µg/g	8.03	10.2	12.4	16.94	22.68	EPA 3050B/7950 (Extraction &Analytical Method): 1986
5.8	Lead as Pb	µg/g	4.13	4.06	4.63	4.44	3.94	EPA 3050B /7420 (Extraction &Analytical Method):1986
5.9	Mercury as Hg	µg/g	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	EPA 7471B (Extraction &Analytical Method) :2007

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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	NOVEMBER 2021	DECEMBER 2021	JANUARY 2022	FEBRUARY 2022	MARCH 2022	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
D	Benthic Organisms							
1	Macrobenthos	--	*Decapod Larvae*	*Decapod Larvae*	*Decapod Larvae*	*Gastropods*	Decapods Larvae	APHA (23rd Ed. 2017)10500 C
			Gastropods	*Nemertine*	*Nemertine*	*Polychates*	*Polychates*	
			Bivalves	*Bivalves*	*Isopods*	*Isopods*	*Isopods*	
			Amphipods	*Amphipods*	*Amphipods*	*Amphipods*	*Amphipods*	
2	MeioBenthos	--	*Herpectacoids*	*Nematods*	*Herpectacoids*	*Turbellarians*	*Turbellarians*	
			Polychates	*Polychates*	*Foraminiferan*	*Foraminiferan*	*Foraminiferan*	
3	Population	no/m²	383	358	324	356	220	

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

SR. NO.	TEST PARAMETERS	UNIT	NOVEMBER 2021		DECEMBER 2021		JANUARY 2022		FEBRUARY 2022		MARCH 2022		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1.	pH	--	7.3	7.97	7.99	7.93	8.14	8.09	8.09	8.02	8.16	8.04	IS 3025 (Part11)1983
2.	Temperature	°C	30	29	30	29.8	29.9	29.8	30	29.9	30.1	30	IS 3025 (Part 9)1984
3.	Total Suspended Solids	mg/L	112	92	118	94	128	112	136	118	128	112	APHA 23rd Ed.,2017,2540- D
4.	BOD (3 Days @ 27°C)	mg/L	2.2	BDL MDL:1.0	2.7	BDL MDL:1.0	2.9	BDL MDL:1.0	3.1	BDL MDL:1.0	2.1	BDL MDL:1.0	IS 3025(Part 44)1993Amd.01
5.	Dissolved Oxygen	mg/L	6.4	6.3	5.9	5.7	6.2	6.1	6.1	6	6	5.9	APHA 23rd Ed.,2017,4500-O, B
6.	Salinity	ppt	34.5	35.8	35.93	36.28	35.44	35.74	35.21	35.53	35.34	35.88	By Calculation
7.	Oil & Grease	mg/L	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	IS 3025(Part39) 1991, Amd. 2
8.	Nitrate as NO_3	µmol/L	1.7	1.3	2.59	2.16	3.02	2.59	2.59	2.37	3.88	3.45	APHA 23rd Ed., 2017,4500 NO3-B
9.	Nitrite as NO_2	µmol/L	BDL MDL:0.4	BDL MDL:0.4	0.064	0.056	0.121	0.112	0.129	0.108	0.155	0.147	APHA 23rd Ed.,2017,4500NO_2B
10.	Ammonical Nitrogen as NH_3	µmol/L	10.3	9.5	4.74	4.31	3.97	3.53	2.54	2.15	4.31	3.66	APHA 23rd Ed., 2017,4500- NH3 B
11.	Phosphates as PO_4	µmol/L	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	APHA 23rd Ed.,2017,4500-P, D
12.	Total Nitrogen	µmol/L	23.3	22.5	9.91	9.05	11.9	10.6	5.26	4.44	9.91	8.45	APHA 23rd Ed., 2017,4500 NH3 - B
13.	Petroleum Hydrocarbon	µg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	APHA 23rd ED,2017,5520 F
14.	Total Dissolved Solids	mg/L	33908	33416	36528	36996	36508	37022	35428	36334	35625	36107	APHA 23rd Ed.,2017, 2540- C
15.	COD	mg/L	10.5	6.3	16.1	12.1	12.2	8.2	8.03	4.02	8.11	4.06	APHA 23rd Ed.,2017, 5220-B

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

SR. NO.	TEST PARAMETERS	UNIT	NOVEMBER 2021		DECEMBER 2021		JANUARY 2022		FEBRUARY 2022		MARCH 2022		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
A	Phytoplankton												
1.	Chlorophyll	mg/m³	2.9	2.45	2.69	2.12	2.69	2.42	2.71	2.56	2.87	2.44	APHA (23rd Ed. 2017)10200 H
2.	Phaeophytin	mg/m³	0.75	0.86	0.78	0.92	0.61	0.89	0.75	0.64	0.9	0.75	APHA (23rd Ed. 2017)10200 H
3.	Cell Count	No. x 10^3/L	115	73	146	84	136	78	123	85	132	70	APHA (23rd Ed. 2017)10200 F
4	Name of Group Number and name of group species of each group	--	*Odentella*	*Diploneis*	*Pleurosigma*	*Skeletonema*	*Surirella*	*Skeletonema*	*Odentella*	*Diploneis*	*Odentella*	*Diploneis*	APHA (23rd Ed. 2017)10200 F
			Cyclotella	*Rhizosolenia*	*Cyclotella*	*Diplotella*	*Cyclotella*	*Biddulphia*	*Cyclotella*	*Rhizosolenia*	*Cyclotella*	*Rhizosolenia*	
			Pinnularia	*Nitzschia*	*Biddulphia*	*Odontella*	*Biddulphia*	*Odontella*	*Pinnularia*	*Nitzschia*	*Pinnularia*	*Nitzschia*	
			Biddulphia	*Cyclotella*	*Skeletonema*	*Dinophysis*	*Skeletonema*	*Pleurosigma*	*Biddulphia*	*Cyclotella*	*Biddulphia*	*Cyclotella*	
			Thallassiosira	*Pleurosigma*	*Thallassiosira*	*Surirella*	*Thallassiosira*	*Surirella*	*Thallassiosira*	*Pleurosigma*	*Thallassiosira*	*Pleurosigma*	
B	Zooplankton												
1	Abudance(Population)	noX103 / 100 m3	31		26		30		32		41		APHA (23rd Ed. 2017)10200 G
2	Name of Group Number and name of group species of each group		*Oikoplura*		*Copepods*		*Crustacean Larvae*		*Egg(Fish and Shrimps)*		*Copepods*		
			Crustacean		*Decapoda*		*Crustacean*		*Oikoplura*		*Decapoda*		
			Crustacean Larvae		*Gastropos Larvae*		*Gastropos Larvae*		*Crustacean Larvae*		*Crustacean*		
			Crustacean		*Egg(Fish and Shrimps)*		*Egg(Fish and Shrimps)*		*Crustacean*		*Egg(Fish and Shrimps)*		
			Bivalve Larvae		*Bivalve Larvae*		*Bivalve Larvae*		*Bivalve Larvae*		*Oikoplura*		
3	Total Biomass	ml/100 m³	14.9		14.32		14.52		15.63		17.25		

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

SR. NO.	TEST PARAMETERS	UNIT	NOVEMBER 2021		DECEMBER 2021		JANUARY 2022		FEBRUARY 2022		MARCH 2022		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
C	Microbiological												
1	Total Bacterial Count	CFU/ml	298		150		186		148		158		APHA 23rd Ed.2017,9215-C
2	Total Coliform	/100ml	60		23		35		40		33		APHA 23rd Ed.2017,9222-B
3	Ecoli	/100ml	49		13		25		26		21		IS :15185:2016
4	Enterococcus	/100ml	24		7		10		12		18		IS:15186:2002
5	Salmonella	/100ml	Absent		Absent		Absent		Absent		Absent		IS:15187:2016
6	Shigella	/100ml	Absent		Absent		Absent		Absent		Absent		APHA 23rd Ed.2017,9260-E
7	Vibrio	/100ml	Absent		Absent		Absent		Absent		Absent		IS: 5887 (Part V):1976

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Mr. Nitin Tandel
Technical Manager

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

SR. NO.	TEST PARAMETERS	UNIT	NOVEMBER 2021		DECEMBER 2021		JANUARY 2022		FEBRUARY 2022		MARCH 2022		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1.	pH	--	7.95	7.9	7.8	7.77	7.98	7.92	7.99	7.91	8.12	8.02	IS 3025 (Part11)1983
2.	Temperature	°C	29	30	29.9	29.8	30	29.9	30.1	30	30.2	30.1	IS 3025 (Part 9)1984
3.	Total Suspended Solids	mg/L	108	80	112	104	108	92	122	98	104	88	APHA 23rd Ed.,2017,2540- D
4.	BOD (3 Days @ 27°C)	mg/L	2.8	BDL MDL:1.0	2.9	BDL MDL:1.0	3.2	BDL MDL:1.0	3.1	BDL MDL:1.0	2.4	BDL MDL:1.0	IS 3025(Part 44)1993Amd.01
5.	Dissolved Oxygen	mg/L	6.5	6.3	5.8	5.7	5.9	5.8	6.1	6	6.2	6.3	APHA 23rd Ed.,2017,4500-O, B
6.	Salinity	ppt	36.7	35.4	35.11	35.63	35.26	35.56	35.18	35.62	35.14	35.58	By Calculation
7.	Oil & Grease	mg/L	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	IS 3025(Part39) 1991, Amd. 2
8.	Nitrate as NO_3	µmol/L	2.2	1.7	2.59	2.59	2.59	2.15	2.37	2.15	2.59	2.15	APHA 23rd Ed., 2017,4500 NO3-B
9.	Nitrite as NO_2	µmol/L	BDL MDL:0.4	BDL MDL:0.4	0.064	0.047	0.108	0.103	0.099	0.095	0.121	0.112	APHA 23rd Ed.,2017,4500NO_2B
10.	Ammonical Nitrogen as NH_3	µmol/L	12.3	11.2	4.74	4.31	5.17	4.74	3.62	3.63	4.09	3.66	APHA 23rd Ed., 2017,4500- NH3 B
11.	Phosphates as PO_4	µmol/L	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	APHA 23rd Ed.,2017,4500-P, D
12.	Total Nitrogen	µmol/L	25.5	24.6	9.91	9.48	12.93	11.85	7.41	6.94	9.44	8.45	APHA 23rd Ed., 2017,4500 NH3 - B
13.	Petroleum Hydrocarbon	µg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	APHA 23rd ED,2017,5520 F
14.	Total Dissolved Solids	mg/L	37168	32908	37604	37724	37124	37644	36594	37164	36424	37128	APHA 23rd Ed.,2017, 2540- C
15.	COD	mg/L	12.3	8.2	12.1	8	8.2	4.1	12.05	8.03	20.28	12.17	APHA 23rd Ed.,2017, 5220-B

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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	NOVEMBER 2021		DECEMBER 2021		JANUARY 2022		FEBRUARY 2022		MARCH 2022		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
A	Phytoplankton												
1.	Chlorophyll	mg/m³	2.92	2.38	2.54	2.42	2.36	2.39	2.89	2.45	3.02	2.69	APHA (23rd Ed. 2017)10200 H
2.	Phaeophytin	mg/m³	0.87	0.74	0.79	0.8	0.58	0.81	0.77	0.9	1.1	0.86	APHA (23rd Ed. 2017)10200 H
3.	Cell Count	No. x 10^3/L	108	68	129	85	106	70	96	88	142	110	APHA (23rd Ed. 2017)10200 F
4	Name of Group Number and name of group species of each group	--	*Pinnularia*	*Coscinodiscus*	*Cyclotella*	*Ceratium*	*Cyclotella*	*Ceratium*	*Pinnularia*	*Coscinodiscus*	*Pinnularia*	*Coscinodiscus*	APHA (23rd Ed. 2017)10200 F
			Biddulphia	*Diploneis*	*Fragillaria*	*Melosira*	*Fragillaria*	*Skeletonema*	*Biddulphia*	*Diploneis*	*Biddulphia*	*Diploneis*	
			Navicula	*Rhizosolenia*	*Diniphysis*	*Nitzschia*	*Melosira*	*Coscinodiscus*	*Navicula*	*Rhizosolenia*	*Navicula*	*Rhizosolenia*	
			Thallassiosira	*Dinophysis*	*Thallassiosira*	*Dinophysis*	*Thallassiosira*	*Dinophysis*	*Thallassiosira*	*Dinophysis*	*Thallassiosira*	*Dinophysis*	
			Skeletonema	*Thalassionema*	*Skeletonema*	*Pleurosigma*	*Skeletonema*	*Pleurosigma*	*Skeletonema*	*Thalassionema*	*Skeletonema*	*Thalassionema*	
B	Zooplankton												
1	Abudance(Population)	noX103 / 100 m3	18		34		25		36		42		APHA (23rd Ed. 2017)10200 G
2	Name of Group Number and name of group species of each group		*Copepods*		*Copepods nauplii*		*Copepods nauplii*		*Copepods nauplii*		*Copepods nauplii*		
			Bivalve Larvae		*Decapoda*		*Crustacean Larvae*		*Crustacean Larvae*		*Crustacean Larvae*		
			Crustacean		*Copepods*		*Copepods*		*Copepods*		*Copepods*		
			Egg(Fish and Shrimps)		*Crustacean*		*Crustacean*		*Crustacean*		*Crustacean*		
			Siphonephora		*Bivalve Larvae*		*Oikoplura*		*Oikoplura*		*Oikoplura*		
3	Total Biomass	ml/100 m³	10.6		16.23		15.85		13.25		15.55		

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

C	Microbiological							
1	**Total Bacterial Count**	**CFU/ml**	**250**	**142**	**174**	**200**	**244**	**APHA 23rd Ed.2017,9215-C**
2	**Total Coliform**	**/100ml**	**38**	**45**	**40**	**29**	**36**	**APHA 23rd Ed.2017,9222-B**
3	**Ecoli**	**/100ml**	**21**	**21**	**31**	**22**	**29**	**IS :15185:2016**
4	**Enterococcus**	**/100ml**	**29**	**6**	**9**	**10**	**18**	**IS:15186:2002**
5	**Salmonella**	**/100ml**	**Absent**	**Absent**	**Absent**	**Absent**	**Absent**	**IS:15187:2016**
6	**Shigella**	**/100ml**	**Absent**	**Absent**	**Absent**	**Absent**	**Absent**	**APHA 23rd Ed.2017,9260-E**
7	**Vibrio**	**/100ml**	**Absent**	**Absent**	**Absent**	**Absent**	**Absent**	**IS: 5887 (Part V):1976**

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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	NOVEMBER 2021	DECEMBER 2021	JANUARY 2022	FEBRUARY 2022	MARCH 2022	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
1.	Organic Matter	%	0.67	0.52	0.54	0.56	0.49	IS: 2720 (Part 22):1972 RA.2015, Amds.1
2.	Phosphorus as P	µg/g	563.7	588.2	602.4	542.2	562.2	IS: 10158 :1982, RA.2009 Method B
3.	Texture	--	Sandy	Sandy	Sandy	Sandy	Sandy	Lab SOP No. UERL/CHM/LTM/108
4.	Petroleum Hydrocarbon	µg/g	N.D.	N.D.	N.D.	N.D.	N.D.	APHA 23rd ED,2017,5520 F
5.0	Heavy Metals							
5.1	Aluminum as Al	%	1.12	1.38	1.69	1.88	2.29	IS3025(Part 55)2003
5.2	Total Chromium as Cr+3	µg/g	9.49	15.4	18.8	26.1	33.94	EPA 3050B/7190 (Extraction &Analytical Method): 1986
5.3	Manganese as Mn	µg/g	294.27	318.4	312.4	341.1	402.1	EPA 3050B/7460 (Extraction &Analytical Method): 1986
5.4	Iron as Fe	%	1	1.42	1.98	2.14	2.36	EPA 3050B/7380 (Extraction &Analytical Method): 1986
5.5	Nickel as Ni	µg/g	12.99	12.01	12.84	18.36	22.68	EPA 3050B/7520 (Extraction &Analytical Method): 1986
5.6	Copper as Cu	µg/g	7.85	8.01	8.44	12.28	16.88	EPA 3050B /7210 (Extraction &Analytical Method):1986
5.7	Zinc as Zn	µg/g	17.74	18.9	19.4	28.97	36.84	EPA 3050B/7950 (Extraction &Analytical Method): 1986
5.8	Lead as Pb	µg/g	6.36	5.85	6.14	5.68	5.14	EPA 3050B /7420 (Extraction &Analytical Method):1986
5.9	Mercury as Hg	µg/g	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	EPA 7471B (Extraction &Analytical Method) :2007

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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	NOVEMBER 2021	DECEMBER 2021	JANUARY 2022	FEBRUARY 2022	MARCH 2022	TEST METHOD
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
D	Benthic Organisms							
1	Macrobenthos	--	*Sipunculids*	*Bivalves*	*Isopods*	*Isopods*	*Decapod Larvae*	APHA (23rd Ed. 2017)10500 C
			Decapod Larvae	*Gastropods*	*Gastropods*	*Gastropods*	*Gastropods*	
			Gastropods	*Polychates*	*Polychates*	*Polychates*	*Isopods*	
			Amphipods	*Decapod Larvae*	*Decapod Larvae*	*Decapod Larvae*	*Amphipods*	
2	MeioBenthos	--	*Foraminiferan*	*Turbellarians*	*Turbellarians*	*Turbellarians*	*Herpectacoids*	
			Nematods	*Nematods*	*Foraminiferan*	*Foraminiferan*	*Polychates*	
3	Population	no/m²	462	268	274	274	396	

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

SR. NO.	TEST PARAMETERS	UNIT	NOVEMBER 2021		DECEMBER 2021		JANUARY 2022		FEBRUARY 2022		MARCH 2022		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1.	pH	--	7.78	8.03	7.99	7.93	7.86	7.78	7.92	7.87	8.11	8.04	IS 3025 (Part11)1983
2.	Temperature	°C	29	29	29.8	29.7	30	29.9	30	29.9	30.1	30	IS 3025 (Part 9)1984
3.	Total Suspended Solids	mg/L	116	94	134	106	124	102	144	118	136	114	APHA 23rd Ed.,2017,2540- D
4.	BOD (3 Days @ 27°C)	mg/L	2.8	BDL MDL:1.0	2.7	BDL MDL:1.0	3.1	BDL MDL:1.0	3	BDL MDL:1.0	3.3	BDL MDL:1.0	IS 3025(Part 44)1993Amd.01
5.	Dissolved Oxygen	mg/L	6.4	6.2	5.8	5.7	6.1	6	6.2	6.1	6.1	6	APHA 23rd Ed.,2017,4500-O, B
6.	Salinity	ppt	35.8	35.8	35.41	35.63	35.58	36.04	35.66	35.94	35.28	35.77	By Calculation
7.	Oil & Grease	mg/L	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	IS 3025(Part39) 1991, Amd. 2
8.	Nitrate as NO_3	µmol/L	1.7	1.3	2.59	2.16	2.15	1.72	3.45	3.23	3.02	2.59	APHA 23rd Ed., 2017,4500 NO3-B
9.	Nitrite as NO_2	µmol/L	BDL MDL:0.4	BDL MDL:0.4	0.081	0.068	0.121	0.108	0.138	0.129	0.112	0.108	APHA 23rd Ed.,2017,4500NO_2B
10.	Ammonical Nitrogen as NH_3	µmol/L	10.6	9.7	5.17	4.74	3.36	3.19	4.05	3.62	4.31	4.09	APHA 23rd Ed., 2017,4500- NH3 B
11.	Phosphates as PO_4	µmol/L	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	APHA 23rd Ed.,2017,4500-P, D
12.	Total Nitrogen	µmol/L	24.1	22.9	12.07	9.91	8.4	7.97	8.36	7.41	9.91	9.44	APHA 23rd Ed., 2017,4500 NH3 - B
13.	Petroleum Hydrocarbon	µg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	APHA 23rd ED,2017,5520 F
14.	Total Dissolved Solids	mg/L	36964	37992	35444	35740	36122	36566	36844	37386	37246	37990	APHA 23rd Ed.,2017, 2540- C
15.	COD	mg/L	12.3	6.2	12.1	8	16.3	12.2	8.03	4.02	28.39	16.22	APHA 23rd Ed.,2017, 5220-B

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

SR. NO.	TEST PARAMETERS	UNIT	NOVEMBER 2021		DECEMBER 2021		JANUARY 2022		FEBRUARY 2022		MARCH 2022		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
A	Phytoplankton												
1.	Chlorophyll	mg/m³	2.76	2.31	2.25	2.36	2.63	2.52	2.76	2.4	2.97	2.76	APHA (23rd Ed. 2017)10200 H
2.	Phaeophytin	mg/m³	0.85	0.80	0.69	0.91	0.56	0.86	0.66	0.71	0.98	0.36	APHA (23rd Ed. 2017)10200 H
3.	Cell Count	No. x 10^3/L	115	70	135	68	124	72	130	56	125	86	APHA (23rd Ed. 2017)10200 F
4	Name of Group Number and name of group species of each group	--	*Rhizosolenia*	*Melosira*	*Navicula*	*Surirella*	*Navicula*	*Surirella*	*Rhizosolenia*	*Navicula*	*Rhizosolenia*	*Navicula*	APHA (23rd Ed. 2017)10200 F
			Fragillaria	*Pinnularia*	*Cyclotella*	*Rhizosolenia*	*Cyclotella*	*Grammatophora*	*Fragillaria*	*Cyclotella*	*Fragillaria*	*Cyclotella*	
			Thalassiothrix	*Skeletonema*	*Pinnularia*	*Nitzschia*	*Pinnularia*	*Nitzschia*	*Thalassiothrix*	*Pinnularia*	*Thalassiothrix*	*Pinnularia*	
			Grammatophora	*Thallassiosira*	*Skeletonema*	*Thalassionema*	*Skeletonema*	*Thalassionema*	*Grammatophora*	*Skeletonema*	*Grammatophora*	*Skeletonema*	
			Ceratium	*Thalassionema*	*Thallassiosira*	*Pleurosigma*	*Thallassiosira*	*Dinophysis*	*Ceratium*	*Thallassiosira*	*Ceratium*	*Thallassiosira*	
B	Zooplankton												
1	Abudance(Population)	noX10 3/ 100 m3	38		28		21		28		29		APHA (23rd Ed. 2017)10200 G
2	Name of Group Number and name of group species of each group		*Egg(Fish aNot Detected Shrimps)*		*Copepods nauplii*		*Copepods nauplii*		*Copepods nauplii*		*Copepods nauplii*		
			Oikoplura		*Oikoplura*		*Oikoplura*		*Oikoplura*		*Oikoplura*		
			Crustacean Larvae		*Crustacean Larvae*		*Crustacean Larvae*		*Crustacean Larvae*		*Crustacean Larvae*		
			Crustacean		*Crustacean*		*Crustacean*		*Crustacean*		*Crustacean*		
			Bivalve Larvae		*Egg(Fish and Shrimps)*		*Bivalve Larvae*		*Bivalve Larvae*		*Bivalve Larvae*		
3	Total Biomass	ml/100 m³	13.62		16.56		13.24		14.36		13.56		

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

C			Microbiological					
1	Total Bacterial Count	CFU/ml	210	252	290	222	290	APHA 23rd Ed.2017,9215-C
2	Total Coliform	/100ml	62	54	62	50	48	APHA 23rd Ed.2017,9222-B
3	Ecoli	/100ml	27	36	38	26	33	IS :15185:2016
4	Enterococcus	/100ml	19	12	22	20	24	IS:15186:2002
5	Salmonella	/100ml	Absent	Absent	Absent	Absent	Absent	IS:15187:2016
6	Shigella	/100ml	Absent	Absent	Absent	Absent	Absent	APHA 23rd Ed.2017,9260-E
7	Vibrio	/100ml	Absent	Absent	Absent	Absent	Absent	IS: 5887 (Part V):1976

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

SR. NO.	TEST PARAMETERS	UNIT	NOVEMBER 2021		DECEMBER 2021		JANUARY 2022		FEBRUARY 2022		MARCH 2022		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1.	pH	--	7.93	8.01	7.97	7.92	7.94	7.88	7.98	7.89	7.96	7.91	IS 3025 (Part11)1983
2.	Temperature	°C	29	29	30	29.9	30	29.9	30.1	30	30.2	30.1	IS 3025 (Part 9)1984
3.	Total Suspended Solids	mg/L	120	92	136	84	111	102	128	106	110	98	APHA 23rd Ed.,2017,2540- D
4.	BOD (3 Days @ 27°C)	mg/L	3.2	BDL MDL:1.0	2.8	BDL MDL:1.0	3.2	BDL MDL:1.0	2.9	BDL MDL:1.0	3	BDL MDL:1.0	IS 3025(Part 44)1993Amd.01
5.	Dissolved Oxygen	mg/L	6.6	6.5	5.9	5.7	6.1	6	6.2	6.1	5.9	5.9	APHA 23rd Ed.,2017,4500-O, B
6.	Salinity	ppt	35.7	35.4	35.89	35.93	35.74	36.11	35.54	35.82	35.62	36.04	By Calculation
7.	Oil & Grease	mg/L	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	BDL MDL:2.0	IS 3025(Part39) 1991, Amd. 2
8.	Nitrate as NO_3	µmol/L	1.7	1.3	2.59	2.16	3.02	2.59	3.23	3.02	2.59	2.15	APHA 23rd Ed., 2017,4500 NO3-B
9.	Nitrite as NO_2	µmol/L	BDL MDL:0.4	BDL MDL:0.4	0.073	0.056	0.112	0.103	0.125	0.121	0.112	0.108	APHA 23rd Ed.,2017,4500NO_2B
10.	Ammonical Nitrogen as NH_3	µmol/L	11.0	10.3	4.7	4.31	3.97	3.53	3.36	2.54	3.45	3.23	APHA 23rd Ed., 2017,4500- NH3 B
11.	Phosphates as PO_4	µmol/L	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	BDL MDL:0.4	APHA 23rd Ed.,2017,4500-P, D
12.	Total Nitrogen	µmol/L	24.6	24.0	10.34	9.91	9.91	8.84	6.94	5.26	7.93	7.46	APHA 23rd Ed., 2017,4500 NH3 - B
13.	Petroleum Hydrocarbon	µg/L	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	APHA 23rd ED,2017,5520 F
14.	Total Dissolved Solids	mg/L	29104	37556	35932	36108	36216	36884	35648	36188	36244	36932	APHA 23rd Ed.,2017, 2540- C
15.	COD	mg/L	14.4	8.2	12.1	8	20.4	16.3	12.05	8.03	16.22	8.11	APHA 23rd Ed.,2017, 5220-B

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

SR. NO.	TEST PARAMETERS	UNIT	NOVEMBER 2021		DECEMBER 2021		JANUARY 2022		FEBRUARY 2022		MARCH 2022		TEST METHOD
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
A	Phytoplankton												
1.	Chlorophyll	mg/m³	2.89	2.34	2.6	2.44	2.45	2.87	2.62	2.9	2.74	2.82	APHA (23rd Ed. 2017)10200 H
2.	Phaeophytin	mg/m³	0.91	0.95	0.79	0.87	0.81	0.69	0.73	0.84	0.93	0.65	APHA (23rd Ed. 2017)10200 H
3.	Cell Count	No. x 10^3/L	110	63	118	78	120	92	111	89	106	96	APHA (23rd Ed. 2017)10200 F
4	Name of Group Number and name of group species of each group	--	*Grammatophora*	*Coscinodiscus*	*Cyclotella*	*Coscinodiscus*	*Cyclotella*	*Coscinodiscus*	*Grammatophora*	*Coscinodiscus*	*Grammatophora*	*Coscinodiscus*	APHA (23rd Ed. 2017)10200 F
			Dinophysis	*Thalassionema*	*Fragillaria*	*Diploneis*	*Fragillaria*	*Melosira*	*Dinophysis*	*Thalassionema*	*Dinophysis*	*Thalassionema*	
			Navicula	*Rhizosolenia*	*Navicula*	*Nitzschia*	*Navicula*	*Surirella*	*Navicula*	*Rhizosolenia*	*Navicula*	*Rhizosolenia*	
			Fragillaria	*Dinophysis*	*Thallassiosira*	*Dinophysis*	*Thallassiosira*	*Dinophysis*	*Fragillaria*	*Dinophysis*	*Fragillaria*	*Dinophysis*	
			Biddulphia	*Skeletonema*	*Skeletonema*	*Thalassionema*	*Skeletonema*	*Thalassionema*	*Biddulphia*	*Skeletonema*	*Biddulphia*	*Skeletonema*	
B	Zooplankton												
1	Abudance(Population)	noX103 / 100 m3	29		31		45		33		28		APHA (23rd Ed. 2017)10200 G
2	Name of Group Number and name of group species of each group		*Crustacean*		*Crustacean*		*Copepods*		*Copepods*		*Egg(Fish and Shrimps)*		
			Siphonephora		*Oikoplura*		*Oikoplura*		*Bivalve Larvae*		*Oikoplura*		
			Crustacean		*Crustacean Larvae*		*Crustacean Larvae*		*Crustacean*		*Crustacean Larvae*		
			Oikoplura		*Oikoplura*		*Oikoplura*		*Egg(Fish and Shrimps)*		*Crustacean*		
			Bivalve Larvae		*Bivalve Larvae*		*Bivalve Larvae*		*Siphonephora*		*Bivalve Larvae*		
3	Total Biomass	ml/100 m³	13.96		15.62		17.23		16.98		14.86		

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

C					Microbiological			
1	Total Bacterial Count	CFU/ml	290	200	232	214	200	APHA 23rd Ed.2017,9215-C
2	Total Coliform	/100ml	74	26	30	12	29	APHA 23rd Ed.2017,9222-B
3	Ecoli	/100ml	55	19	21	6	10	IS :15185:2016
4	Enterococcus	/100ml	34	6	11	4	9	IS:15186:2002
5	Salmonella	/100ml	Absent	Absent	Absent	Absent	Absent	IS:15187:2016
6	Shigella	/100ml	Absent	Absent	Absent	Absent	Absent	APHA 23rd Ed.2017,9260-E
7	Vibrio	/100ml	Absent	Absent	Absent	Absent	Absent	IS: 5887 (Part V):1976

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Results of Ambient Air Quality Monitoring

Name of Location		CT3 RMU-2						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
1.	01-11-2021	88.45	46.25	21.87	33.45	0.32	NOT DETECTED	NOT DETECTED
2.	02-11-2021	83.45	45.23	20.14	31.27	0.45	NOT DETECTED	NOT DETECTED
3.	08-11-2021	89.12	47.24	22.54	32.45	0.23	NOT DETECTED	NOT DETECTED
4.	09-11-2021	78.54	39.32	18.65	30.21	0.36	NOT DETECTED	NOT DETECTED
5.	15-11-2021	87.21	44.16	23.45	28.27	0.17	NOT DETECTED	NOT DETECTED
6.	16-11-2021	83.40	47.85	22.15	29.45	0.25	NOT DETECTED	NOT DETECTED
7.	22-11-2021	85.62	36.73	17.90	26.72	0.17	NOT DETECTED	NOT DETECTED
8.	23-11-2021	71.80	32.45	23.34	28.54	0.09	NOT DETECTED	NOT DETECTED
9.	29-11-2021	88.34	36.53	21.87	27.19	0.17	NOT DETECTED	NOT DETECTED
10.	30-11-2021	85.21	33.45	18.24	25.21	0.24	NOT DETECTED	NOT DETECTED
11.	05-12-2021	75.21	40.25	18.76	30.25	0.25	NOT DETECTED	NOT DETECTED
12.	06-12-2021	80.25	42.19	23.67	34.22	0.62	NOT DETECTED	NOT DETECTED
13.	13-12-2021	89.45	45.32	25.44	36.17	0.40	NOT DETECTED	NOT DETECTED
14.	14-12-2021	86.25	45.32	25.44	36.17	0.40	NOT DETECTED	NOT DETECTED
15.	20-12-2021	90.00	41.39	25.14	34.21	0.25	NOT DETECTED	NOT DETECTED
16.	21-12-2021	83.44	44.52	28.14	35.72	0.45	NOT DETECTED	NOT DETECTED

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Name of Location		CT3 RMU-2						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
17.	27-12-2021	78.21	40.25	23.45	32.10	0.23	NOT DETECTED	NOT DETECTED
18.	28-12-2021	70.43	37.81	25.12	30.33	0.10	NOT DETECTED	NOT DETECTED
19.	03-01-2022	88.25	37.21	17.85	27.84	0.80	NOT DETECTED	NOT DETECTED
20.	04-01-2022	76.54	32.21	15.23	23.49	1.14	NOT DETECTED	NOT DETECTED
21.	10-01-2022	83.45	40.15	21.20	29.25	1.20	NOT DETECTED	NOT DETECTED
22.	11-01-2022	87.20	47.23	28.35	34.52	0.85	NOT DETECTED	NOT DETECTED
23.	17-01-2022	85.23	45.12	25.44	31.29	1.00	NOT DETECTED	NOT DETECTED
24.	18-01-2022	88.25	47.21	21.29	35.42	1.15	NOT DETECTED	NOT DETECTED
25.	24-01-2022	87.65	46.23	32.45	39.18	0.95	NOT DETECTED	NOT DETECTED
26.	25-01-2022	85.52	47.85	28.96	34.55	0.75	NOT DETECTED	NOT DETECTED
27.	31-01-2022	80.78	48.75	33.23	38.78	1.25	NOT DETECTED	NOT DETECTED
28.	03-02-2022	89.23	44.12	36.23	41.19	0.45	2.17	NOT DETECTED
29.	07-02-2022	85.34	39.28	30.15	38.25	1.19	4.12	NOT DETECTED
30.	10-02-2022	76.33	43.29	28.17	37.25	1.35	3.14	NOT DETECTED
31.	14-02-2022	82.55	45.67	36.29	42.18	1.12	NOT DETECTED	NOT DETECTED
32.	16-02-2022	88.25	47.38	34.25	39.23	1.00	1.29	NOT DETECTED
33.	21-02-2022	85.23	45.68	37.22	42.18	1.23	3.14	NOT DETECTED

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Name of Location		CT3 RMU-2						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
34.	23-02-2022	88.76	46.21	33.15	40.15	1.00	1.45	NOT DETECTED
35.	28-02-2022	79.45	40.15	38.15	42.16	1.18	2.25	NOT DETECTED
36.	03-03-2022	83.46	37.89	34.56	42.20	1.25	4.15	NOT DETECTED
37.	07-03-2022	80.45	41.45	27.15	37.89	1.00	3.17	NOT DETECTED
38.	10-03-2022	84.56	40.18	25.19	35.18	1.00	5.12	NOT DETECTED
39.	14-03-2022	87.15	40.23	32.45	40.25	1.34	2.35	NOT DETECTED
40.	17-03-2022	85.12	48.15	40.18	42.36	1.00	2.00	NOT DETECTED
41.	21-03-2022	87.13	39.15	35.17	40.19	1.18	2.87	NOT DETECTED
42.	24-03-2022	88.21	46.78	30.18	42.35	1.20	3.42	NOT DETECTED
43.	28-03-2022	84.52	43.45	35.22	40.17	1.15	3.00	NOT DETECTED
44.	30-03-2022	85.64	46.75	39.45	44.38	1.00	2.18	NOT DETECTED
Permissible Value as per NAAQMS		**100.0**	**60.0**	**80.0**	**80.0**	**2.0**	**---**	**5.0**
Test Method		**IS - 5182, Part- 23**	**UERL/AIR/ SOP/11**	**IS - 5182, Part - 2**	**IS - 5182, Part - 6**	**IS - 5182, Part - 10**	**Gas analyzer**	**IS – 5182, Part – 11**

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Results of Ambient Air Quality Monitoring

Location Name		Near Fire Station						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
1.	01-11-2021	68.76	28.75	12.34	25.67	0.16	NOT DETECTED	NOT DETECTED
2.	02-11-2021	73.45	22.45	17.34	23.45	0.20	NOT DETECTED	NOT DETECTED
3.	08-11-2021	58.93	20.18	15.21	21.25	0.15	NOT DETECTED	NOT DETECTED
4.	09-11-2021	66.45	25.23	13.70	20.34	0.11	NOT DETECTED	NOT DETECTED
5.	15-11-2021	60.23	23.48	15.44	23.45	0.18	NOT DETECTED	NOT DETECTED
6.	16-11-2021	72.35	27.89	17.25	27.67	0.07	NOT DETECTED	NOT DETECTED
7.	22-11-2021	65.81	25.45	15.98	24.36	0.09	NOT DETECTED	NOT DETECTED
8.	23-11-2021	69.23	27.21	12.34	20.25	0.14	NOT DETECTED	NOT DETECTED
9.	29-11-2021	58.74	22.35	14.56	21.34	0.19	NOT DETECTED	NOT DETECTED
10.	30-11-2021	67.25	26.78	15.35	24.23	0.16	NOT DETECTED	NOT DETECTED
11.	05-12-2021	74.53	37.85	19.86	31.28	0.25	NOT DETECTED	NOT DETECTED
12.	06-12-2021	86.12	40.15	21.45	34.15	0.20	NOT DETECTED	NOT DETECTED
13.	13-12-2021	80.55	36.78	19.55	31.27	0.23	NOT DETECTED	NOT DETECTED
14.	14-12-2021	78.23	35.56	21.26	34.23	0.25	NOT DETECTED	NOT DETECTED
15.	20-12-2021	87.45	41.35	23.67	37.13	0.25	NOT DETECTED	NOT DETECTED
16.	21-12-2021	82.15	39.21	22.53	34.80	0.14	NOT DETECTED	NOT DETECTED

Continue…

Location Name		Near Fire Station						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
17.	27-12-2021	71.23	35.42	14.89	32.67	0.10	NOT DETECTED	NOT DETECTED
18.	28-12-2021	65.23	30.21	11.45	28.34	0.05	NOT DETECTED	NOT DETECTED
19.	03-01-2022	88.23	35.23	12.34	25.34	0.85	NOT DETECTED	NOT DETECTED
20.	04-01-2022	71.23	31.20	16.73	31.26	0.45	NOT DETECTED	NOT DETECTED
21.	10-01-2022	75.24	36.55	14.65	28.47	0.75	NOT DETECTED	NOT DETECTED
22.	11-01-2022	84.56	45.67	12.34	35.32	1.00	NOT DETECTED	NOT DETECTED
23.	17-01-2022	83.40	40.23	17.23	34.31	0.95	NOT DETECTED	NOT DETECTED
24.	18-01-2022	85.54	45.21	15.26	35.33	0.82	NOT DETECTED	NOT DETECTED
25.	24-01-2022	88.24	39.22	18.24	29.45	1.04	NOT DETECTED	NOT DETECTED
26.	25-01-2022	75.25	44.53	15.35	31.25	1.12	NOT DETECTED	NOT DETECTED
27.	31-01-2022	86.12	47.25	17.36	33.25	0.96	NOT DETECTED	NOT DETECTED
28.	03-02-2022	83.20	35.67	23.18	31.45	1.24	1.76	NOT DETECTED
29.	07-02-2022	89.23	39.23	21.18	36.23	0.76	2.15	NOT DETECTED
30.	10-02-2022	86.34	42.45	24.15	37.25	0.34	NOT DETECTED	NOT DETECTED
31.	14-02-2022	84.15	47.34	21.29	38.19	1.00	3.15	NOT DETECTED
32.	16-02-2022	87.34	40.15	23.19	39.17	0.55	1.27	NOT DETECTED
33.	21-02-2022	83.45	43.67	20.16	35.23	1.05	2.15	NOT DETECTED

Continue…

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Location Name		Near Fire Station						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
34.	23-02-2022	81.89	45.20	24.19	36.27	1.00	NOT DETECTED	NOT DETECTED
35.	28-02-2022	87.45	48.35	26.17	34.12	1.25	2.18	NOT DETECTED
36.	03-03-2022	85.63	30.27	28.95	37.25	1.34	2.34	NOT DETECTED
37.	07-03-2022	85.20	42.35	25.12	34.90	1.20	5.12	NOT DETECTED
38.	10-03-2022	82.14	45.67	32.18	40.23	1.15	2.10	NOT DETECTED
39.	14-03-2022	87.15	48.45	30.17	37.52	1.20	1.78	NOT DETECTED
40.	17-03-2022	85.12	39.56	28.44	39.16	1.30	2.45	NOT DETECTED
41.	21-03-2022	80.47	43.44	25.62	35.61	1.25	3.10	NOT DETECTED
42.	24-03-2022	86.35	40.17	30.16	37.83	1.20	2.87	NOT DETECTED
43.	28-03-2022	81.93	39.35	25.21	35.19	1.15	2.00	NOT DETECTED
44.	30-03-2022	88.45	42.34	30.27	41.25	1.26	3.15	NOT DETECTED
Permissible Value as per NAAQMS		**100.0**	**60.0**	**80.0**	**80.0**	**2.0**	**---**	**5.0**
Test Method		**IS - 5182, Part- 23**	**UERL/AIR/ SOP/11**	**IS - 5182, Part - 2**	**IS - 5182, Part - 6**	**IS - 5182, Part - 10**	**Gas analyzer**	**IS – 5182, Part – 11**

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Results of Ambient Air Quality Monitoring

Location Name		ADANI PORT – TUG Berth 600 KL Pump House						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
1.	01-11-2021	71.55	37.51	8.76	17.23	0.25	NOT DETECTED	NOT DETECTED
2.	02-11-2021	78.43	32.44	9.15	15.32	0.17	NOT DETECTED	NOT DETECTED
3.	08-11-2021	60.35	26.75	8.15	18.43	0.29	NOT DETECTED	NOT DETECTED
4.	09-11-2021	68.23	30.15	12.34	19.21	0.12	NOT DETECTED	NOT DETECTED
5.	15-11-2021	65.21	28.23	10.25	17.54	0.09	NOT DETECTED	NOT DETECTED
6.	16-11-2021	76.75	31.24	9.18	15.28	0.23	NOT DETECTED	NOT DETECTED
7.	22-11-2021	65.44	26.75	8.12	16.23	0.15	NOT DETECTED	NOT DETECTED
8.	23-11-2021	56.84	21.85	10.21	18.25	0.18	NOT DETECTED	NOT DETECTED
9.	29-11-2021	62.17	24.64	13.44	21.26	0.05	NOT DETECTED	NOT DETECTED
10.	30-11-2021	68.14	27.85	10.45	17.26	0.08	NOT DETECTED	NOT DETECTED
11.	05-12-2021	54.35	42.36	12.34	24.56	0.14	NOT DETECTED	NOT DETECTED
12.	06-12-2021	69.21	40.56	10.15	22.18	0.25	NOT DETECTED	NOT DETECTED
13.	13-12-2021	62.56	37.65	12.42	26.30	0.15	NOT DETECTED	NOT DETECTED
14.	14-12-2021	76.15	42.85	14.56	27.16	0.20	NOT DETECTED	NOT DETECTED
15.	20-12-2021	81.25	45.18	12.65	25.11	0.15	NOT DETECTED	NOT DETECTED
16.	21-12-2021	71.54	40.17	8.15	23.12	0.15	NOT DETECTED	NOT DETECTED

Continue…

Location Name		ADANI PORT – TUG Berth 600 KL Pump House						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
17.	27-12-2021	64.32	34.51	10.25	25.22	0.18	NOT DETECTED	NOT DETECTED
18.	28-12-2021	60.34	28.76	8.15	20.15	0.15	NOT DETECTED	NOT DETECTED
19.	03-01-2022	87.21	45.62	13.45	21.35	0.56	NOT DETECTED	NOT DETECTED
20.	04-01-2022	78.23	41.23	11.50	25.67	0.10	NOT DETECTED	NOT DETECTED
21.	10-01-2022	58.92	38.90	16.78	22.35	1.05	NOT DETECTED	NOT DETECTED
22.	11-01-2022	84.53	46.75	12.25	30.21	0.80	NOT DETECTED	NOT DETECTED
23.	17-01-2022	81.80	44.67	10.35	36.44	0.54	NOT DETECTED	NOT DETECTED
24.	18-01-2022	85.64	48.25	17.23	30.17	0.23	NOT DETECTED	NOT DETECTED
25.	24-01-2022	89.45	49.12	15.24	28.56	1.07	NOT DETECTED	NOT DETECTED
26.	25-01-2022	85.21	43.20	13.25	21.44	0.84	NOT DETECTED	NOT DETECTED
27.	31-01-2022	77.23	49.21	10.25	32.45	0.96	NOT DETECTED	NOT DETECTED
28.	03-02-2022	86.23	45.23	27.15	34.13	0.87	2.15	NOT DETECTED
29.	07-02-2022	76.45	40.25	21.28	29.26	0.35	NOT DETECTED	NOT DETECTED
30.	10-02-2022	89.21	46.10	24.39	30.15	1.14	3.45	NOT DETECTED
31.	14-02-2022	85.23	45.12	20.18	28.77	1.15	1.76	NOT DETECTED
32.	16-02-2022	87.45	47.18	23.10	35.14	0.95	NOT DETECTED	NOT DETECTED
33.	21-02-2022	84.14	42.95	25.19	32.19	1.52	NOT DETECTED	NOT DETECTED

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Location Name		ADANI PORT – TUG Berth 600 KL Pump House						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
34.	23-02-2022	88.24	44.12	19.44	32.16	1.00	2.34	NOT DETECTED
35.	28-02-2022	85.45	42.82	26.15	35.18	1.14	4.12	NOT DETECTED
36.	03-03-2022	89.65	45.78	31.16	39.18	1.23	4.25	NOT DETECTED
37.	07-03-2022	84.32	42.62	26.23	35.12	1.00	1.87	NOT DETECTED
38.	10-03-2022	82.34	40.95	29.15	39.17	1.44	2.10	NOT DETECTED
39.	14-03-2022	88.14	45.67	32.17	41.23	1.20	3.45	NOT DETECTED
40.	17-03-2022	84.56	43.78	27.34	38.66	1.00	2.65	NOT DETECTED
41.	21-03-2022	81.90	45.78	25.17	35.90	1.80	5.12	NOT DETECTED
42.	24-03-2022	88.35	47.91	32.15	40.83	1.25	4.74	NOT DETECTED
43.	28-03-2022	85.43	44.78	30.62	37.90	1.30	3.23	NOT DETECTED
44.	30-03-2022	88.23	43.26	28.15	39.22	1.00	6.15	NOT DETECTED
Permissible Value as per NAAQMS		**100.0**	**60.0**	**80.0**	**80.0**	**2.0**	**---**	**5.0**
Test Method		**IS - 5182, Part- 23**	**UERL/AIR/ SOP/11**	**IS - 5182, Part - 2**	**IS - 5182, Part - 6**	**IS - 5182, Part - 10**	**Gas analyzer**	**IS – 5182, Part – 11**

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Results of Ambient Air Quality Monitoring

Location Name		PUB / Adani House						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
1.	01-11-2021	57.23	23.45	11.23	20.15	0.15	NOT DETECTED	NOT DETECTED
2.	02-11-2021	62.34	25.67	15.23	21.34	0.18	NOT DETECTED	NOT DETECTED
3.	08-11-2021	54.50	22.34	12.17	18.76	0.11	NOT DETECTED	NOT DETECTED
4.	09-11-2021	52.34	20.17	11.21	19.35	0.18	NOT DETECTED	NOT DETECTED
5.	15-11-2021	61.78	24.54	12.35	17.65	0.07	NOT DETECTED	NOT DETECTED
6.	16-11-2021	70.23	27.85	14.18	22.35	0.15	NOT DETECTED	NOT DETECTED
7.	22-11-2021	56.72	21.36	15.23	23.15	0.20	NOT DETECTED	NOT DETECTED
8.	23-11-2021	64.23	24.78	11.72	18.23	0.13	NOT DETECTED	NOT DETECTED
9.	29-11-2021	60.23	21.54	13.25	19.45	0.11	NOT DETECTED	NOT DETECTED
10.	30-11-2021	53.57	18.94	12.43	17.32	0.08	NOT DETECTED	NOT DETECTED
11.	05-12-2021	60.23	28.83	7.84	25.67	0.05	NOT DETECTED	NOT DETECTED
12.	06-12-2021	73.45	32.45	8.15	28.11	0.23	NOT DETECTED	NOT DETECTED
13.	13-12-2021	65.24	30.18	15.24	26.15	0.15	NOT DETECTED	NOT DETECTED
14.	14-12-2021	86.15	33.45	13.17	28.15	0.20	NOT DETECTED	NOT DETECTED
15.	20-12-2021	76.23	30.15	15.14	25.89	0.05	NOT DETECTED	NOT DETECTED
16.	21-12-2021	68.23	25.43	12.38	27.15	0.12	NOT DETECTED	NOT DETECTED

Continue…

Location Name		PUB / Adani House						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
17.	27-12-2021	60.21	23.48	14.17	25.13	0.10	NOT DETECTED	NOT DETECTED
18.	28-12-2021	56.32	20.25	10.50	20.15	0.10	NOT DETECTED	NOT DETECTED
19.	03-01-2022	83.23	29.67	9.12	21.23	0.75	NOT DETECTED	NOT DETECTED
20.	04-01-2022	56.70	25.43	13.21	20.15	0.55	NOT DETECTED	NOT DETECTED
21.	10-01-2022	75.24	28.21	11.23	25.23	1.03	NOT DETECTED	NOT DETECTED
22.	11-01-2022	80.23	23.45	10.25	24.25	0.34	NOT DETECTED	NOT DETECTED
23.	17-01-2022	81.56	27.12	14.56	27.21	0.15	NOT DETECTED	NOT DETECTED
24.	18-01-2022	86.24	28.94	16.24	31.45	0.84	NOT DETECTED	NOT DETECTED
25.	24-01-2022	75.24	21.35	12.68	33.20	0.52	NOT DETECTED	NOT DETECTED
26.	25-01-2022	83.45	26.75	17.23	27.34	0.34	NOT DETECTED	NOT DETECTED
27.	31-01-2022	85.56	32.45	15.44	25.67	0.75	NOT DETECTED	NOT DETECTED
28.	03-02-2022	85.77	34.56	15.78	25.18	0.87	NOT DETECTED	NOT DETECTED
29.	07-02-2022	89.21	30.18	19.21	32.95	1.05	2.45	NOT DETECTED
30.	10-02-2022	88.45	35.81	16.25	29.17	0.65	NOT DETECTED	NOT DETECTED
31.	14-02-2022	85.76	37.25	16.36	28.35	0.89	NOT DETECTED	NOT DETECTED
32.	16-02-2022	88.34	34.23	19.25	28.79	0.23	3.12	NOT DETECTED
33.	21-02-2022	83.45	36.12	21.18	29.34	1.00	1.97	NOT DETECTED

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Location Name		PUB / Adani House						
Sr. No.	Date of Monitoring	Parameter with Results						
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	HC µg/m³	Benzene µg/m³
34.	23-02-2022	84.64	39.12	17.25	31.29	0.85	NOT DETECTED	NOT DETECTED
35.	28-02-2022	86.77	32.00	23.19	34.95	0.68	2.15	NOT DETECTED
36.	03-03-2022	82.15	27.00	12.45	20.45	0.05	1.15	NOT DETECTED
37.	07-03-2022	75.62	29.14	17.21	27.18	1.00	2.10	NOT DETECTED
38.	10-03-2022	85.67	31.18	20.14	30.18	1.13	1.76	NOT DETECTED
39.	14-03-2022	84.54	29.12	18.77	27.15	0.75	1.23	NOT DETECTED
40.	17-03-2022	78.32	35.84	21.34	28.91	0.90	2.10	NOT DETECTED
41.	21-03-2022	77.35	30.48	16.93	25.62	1.14	1.52	NOT DETECTED
42.	24-03-2022	85.34	36.75	20.16	27.85	0.75	1.00	NOT DETECTED
43.	28-03-2022	88.23	34.52	21.15	28.92	0.90	1.43	NOT DETECTED
44.	30-03-2022	85.34	30.92	24.56	30.25	0.75	1.95	NOT DETECTED
Permissible Value as per NAAQMS		**100.0**	**60.0**	**80.0**	**80.0**	**2.0**	**---**	**5.0**
Test Method		**IS - 5182, Part- 23**	**UERL/AIR/ SOP/11**	**IS - 5182, Part - 2**	**IS - 5182, Part - 6**	**IS - 5182, Part - 10**	**Gas analyzer**	**IS – 5182, Part – 11**

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Results of Noise Level Monitoring

Location Name		CT3 RMU-2				
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) - Day Time				
		15-11-2021	14-12-2021	06-01-2022	01-02-2022	18-03-2022
1	06:00 to 07:00	55.4	65.5	62.34	64.34	63.17
2	07:00 to 08:00	61.6	63.5	65.78	66.12	65.18
3	08:00 to 09:00	62.5	66.9	68.14	69.84	66.2
4	09:00 to 10:00	65.4	67.5	68.35	68.75	63.5
5	10:00 to 11:00	61.9	68.6	67.51	69.23	67.5
6	11:00 to 12:00	63.4	61.5	65.23	68.21	69.71
7	12:00 to 13:00	67.8	66.4	67.12	69.65	68.2
8	13:00 to 14:00	68.3	68.9	65.15	68.73	67.21
9	14:00 to 15:00	68.1	66.7	62.18	66.19	65.48
10	15:00 to 16:00	69.4	67.5	67.12	68.45	67.42
11	16:00 to 17:00	69.5	68.1	65.4	67.7	68.5
12	17:00 to 18:00	66.2	68.5	64.5	66.2	69.74
13	18:00 to 19:00	61.8	66.9	62.19	65.69	64.26
14	19:00 to 20:00	60.7	62.5	60.15	67.34	66.83
15	20:00 to 21:00	66.5	63.3	65.1	65.3	64.33
16	21:00 to 22:00	63.5	58.9	61.15	63.45	62.14
Day Time		<75 dB (A)				

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Location Name		CT3 RMU-2				
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) – Night Time				
		15-11-2021	14-12-2021	06-01-2022	01-02-2022	18-03-2022
1	22:00 to 23:00	60.5	61.3	60.28	62.67	63.54
2	23:00 to 24:00	63.4	59.7	61.25	63.28	64.52
3	24:00 to 01:00	62.8	60.6	58.25	61.64	62.68
4	01:00 to 02:00	62.5	60.5	55.15	60.75	61.28
5	02:00 to 03:00	60.5	56.7	59.25	61.55	60.98
6	03:00 to 04:00	61.3	63.5	60.15	62.78	61.27
7	04:00 to 05:00	60.6	62.8	57.15	63.45	64.82
8	05:00 to 06:00	62.4	64.5	58.5	62.19	63.12
Night Time		<70 dB (A)				

Test Method	IS: 9989 : 1981

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Results of Noise Level Monitoring

Location Name		Near Fire Station				
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) - Day Time				
		16-11-2021	07-12-2021	07-01-2022	08-02-2022	02-03-2022
1	06:00 to 07:00	63.1	61.8	60.1	61.23	62.85
2	07:00 to 08:00	66.7	63.8	61.25	63.45	64.51
3	08:00 to 09:00	68.2	66.7	62.45	64.56	65.78
4	09:00 to 10:00	64.9	65.3	66.75	68.92	69.81
5	10:00 to 11:00	69.1	66.7	63.23	67.4	66.21
6	11:00 to 12:00	66.8	62.9	61.25	66.23	67.35
7	12:00 to 13:00	65.2	64.2	62.15	65.29	66.74
8	13:00 to 14:00	64.4	62.5	63.15	67.24	68.31
9	14:00 to 15:00	60.5	63.6	60.28	66.18	65.1
10	15:00 to 16:00	62.3	60.6	61.15	62.45	64.22
11	16:00 to 17:00	61.5	63.5	63.45	65.14	64.27
12	17:00 to 18:00	58.5	60.5	66.34	67.29	66.87
13	18:00 to 19:00	59.2	58.5	61.25	64.25	65.46
14	19:00 to 20:00	58.5	58.3	60.25	63.45	62.87
15	20:00 to 21:00	60.3	59.5	57.84	60.23	61.32
16	21:00 to 22:00	58.9	58.5	56.52	58.45	59.76
Day Time		**<75 dB (A)**				

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Location Name		**Near Fire Station**				
Sr. No.	**Sampling Date and Time**	**Noise Level Leq. dB(A) - Night Time**				
		16-11-2021	**07-12-2021**	**07-01-2022**	**08-02-2022**	**02-03-2022**
1	22:00 to 23:00	57.9	58.2	60.24	57.15	56.27
2	23:00 to 24:00	61.6	57.5	63.18	58.15	57.32
3	24:00 to 01:00	60.3	57.5	61.15	58.44	59.51
4	01:00 to 02:00	61.9	56.8	60.15	56.45	55.23
5	02:00 to 03:00	60.6	56.9	60.2	52.34	53.21
6	03:00 to 04:00	56.8	55.4	58.45	55.67	56.75
7	04:00 to 05:00	60.9	57.8	61.25	56.89	55.21
8	05:00 to 06:00	59.4	60.2	60.2	58.23	57.34
Night Time		**<70 dB (A)**				

Test Method	**IS: 9989 : 1981**

GUJARAT VAPI.

Nikunj D. Patel
(Chemist)

Jaivik S. Tandel
(Manager - Operations)

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Near G.I.D.C. Office, Char Rasta,
Vapi-396 195, Gujarat, India.
Phone : +91 260 2433966 / 2425610
Email : response@uerl.in Website : www.uerl.in

Results of Noise Level Monitoring

Location Name		ADANI PORT – TUG Berth 600 KL Pump House				
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) - Day Time				
		15-11-2021	13-12-2021	05-01-2022	07-02-2022	03-03-2022
1	06:00 to 07:00	61.6	63.4	61.18	63.78	64.23
2	07:00 to 08:00	65.2	66.9	63.23	66.21	67.28
3	08:00 to 09:00	63.9	65.5	61.15	64.92	65.31
4	09:00 to 10:00	65.5	69.6	67.84	66.25	67.33
5	10:00 to 11:00	63.5	65.2	64.69	65.23	64.21
6	11:00 to 12:00	67.6	66.5	65.66	68.14	69.74
7	12:00 to 13:00	68.6	69.5	68.14	69.15	68.31
8	13:00 to 14:00	65.5	69.2	67.15	66.25	65.93
9	14:00 to 15:00	69.4	69.4	69.15	65.23	64.12
10	15:00 to 16:00	69.2	69.5	66.25	67.39	68.46
11	16:00 to 17:00	68.7	69.5	68.14	69.45	67.5
12	17:00 to 18:00	68.3	68.2	62.44	65.18	66.32
13	18:00 to 19:00	65.1	69.5	67.12	68.35	67.31
14	19:00 to 20:00	62.4	65.5	69.15	66.54	65.43
15	20:00 to 21:00	60.7	61.5	67.23	63.45	62.14
16	21:00 to 22:00	62.4	64.5	61.25	62.93	63.14
Day Time		<75 dB (A)				

Continue…

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Results of Noise Level Monitoring

Location Name		ADANI PORT – TUG Berth 600 KL Pump House				
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) - Night Time				
		15-11-2021	13-12-2021	05-01-2022	07-02-2022	03-03-2022
1	22:00 to 23:00	62.6	61.5	60.24	61.76	60.78
2	23:00 to 24:00	63.7	62.5	63.18	62.3	63.42
3	24:00 to 01:00	60.5	62.3	61.15	60.45	59.44
4	01:00 to 02:00	62.4	62.5	60.15	58.96	57.32
5	02:00 to 03:00	61.5	61.6	60.2	55.37	54.28
6	03:00 to 04:00	61.5	60.3	58.45	57.24	56.39
7	04:00 to 05:00	62.9	64.4	61.25	60.35	61.28
8	05:00 to 06:00	60.5	61.8	60.2	61.86	62.53
Day Time		<70 dB (A)				

Test Method	IS: 9989 : 1981

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Results of Noise Level Monitoring

Location Name		PUB/Adani House				
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) - Day Time				
		16-11-2021	06-12-2021	18-01-2022	15-02-2022	09-03-2022
1	06:00 to 07:00	62.5	62.8	61.23	59.45	60.1
2	07:00 to 08:00	63.5	63.5	62.54	60.14	61.86
3	08:00 to 09:00	64.9	64.5	63.4	66.83	65.91
4	09:00 to 10:00	65.8	66.9	65.23	64.2	63.28
5	10:00 to 11:00	67.8	66.5	63.21	67.16	68.72
6	11:00 to 12:00	69.6	66.7	64.35	65.34	66.32
7	12:00 to 13:00	68.2	68.5	67.34	64.56	65.97
8	13:00 to 14:00	67.8	65.5	66.23	62.75	63.12
9	14:00 to 15:00	66.8	62.6	61.23	60.45	59.54
10	15:00 to 16:00	65.4	63.5	65.23	63.46	62.38
11	16:00 to 17:00	65.1	66.7	67.2	65.29	66.39
12	17:00 to 18:00	60.5	62.4	63.22	66.21	67.31
13	18:00 to 19:00	60.8	61.5	62.45	65.21	66.79
14	19:00 to 20:00	67.3	60.5	61.23	62.3	63.21
15	20:00 to 21:00	61.9	60.3	59.87	58.45	59.54
16	21:00 to 22:00	62.5	60.1	58.75	57.19	58.42
Day Time		<75 dB (A)				

Continue…

UniStar
Environment and Research Labs Pvt. Ltd.

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MoEF&CC (GOI) Recognized Environmental Laboratory under the EPA-1986 (12.01.2020 to17.03.2023) | QCI-NABET Accredited EIA Consultant Organization | GPCB Recognized Environmental Auditor (Schedule-II) | ISO 9001:2015 Certified Company | ISO 45001:2018 Certified Company

Results of Noise Level Monitoring

Location Name		PUB/Adani House				
Sr. No.	Sampling Date and Time	Noise Level Leq. dB(A) - Night Time				
		16-11-2021	06-12-2021	18-01-2022	15-02-2022	09-03-2022
1	22:00 to 23:00	62.8	60.3	57.34	56.24	57.17
2	23:00 to 24:00	63.1	60.2	60.23	58.25	59.64
3	24:00 to 01:00	62.5	62.5	59.25	57.25	58.43
4	01:00 to 02:00	61.5	60.4	58.34	55.21	56.34
5	02:00 to 03:00	60.6	60.4	57.64	54.59	53.76
6	03:00 to 04:00	60.6	60.2	57.45	58.69	59.73
7	04:00 to 05:00	64.3	62.3	58.23	59.23	58.21
8	05:00 to 06:00	63.6	62.3	59.25	57.38	56.24
Day Time		<70 dB (A)				

Test Method	IS: 9989 : 1981

Nikunj D. Patel
(Chemist)

Jaivik S. Tandel
(Manager - Operations)

Results of Stack Monitoring

Sr. No.	Parameter	Unit	Hot Water System-1 (Liquid Terminal)	Hot Water System-2 (Liquid Terminal)	Thermic Fluid Heater (Bitumin-1)	Thermic Fluid Heater (Bitumin-2)	GPCB LIMIT	Method of Test
Oct-21								
1	Particulate Matter	mg/Nm^3	30.61		26.74		**150**	**IS 11255 (Part - 1)**
2	Sulfur Dioxide as SO_2	ppm	5.55		4.45		**100**	**IS 11255 (Part - 2)**
3	Oxides of Nitrogen as NO_X	ppm	34.62		29.37		**50**	**IS 11255 (Part - 7)**
Nov-21								
1	Particulate Matter	mg/Nm^3	32.45	31.45	21.34	18.10	**150**	**IS 11255 (Part - 1)**
2	Sulfur Dioxide as SO2	ppm	5.76	6.15	4.56	4.25	**100**	**IS 11255 (Part - 2)**
3	Oxides of Nitrogen as NOX	ppm	29.54	27.10	25.12	21.45	**50**	**IS 11255 (Part - 7)**
Dec-21								
1	Particulate Matter	mg/Nm^3	30.12	28.76	24.56	20.23	**150**	**IS 11255 (Part - 1)**
2	Sulfur Dioxide as SO_2	ppm	6.12	5.50	5.12	5.11	**100**	**IS 11255 (Part - 2)**
3	Oxides of Nitrogen as NO_X	ppm	27.15	28.15	26.18	18.76	**50**	**IS 11255 (Part - 7)**
Jan-22								
1	Particulate Matter	mg/Nm^3		25.10	21.23		**150**	**IS 11255 (Part - 1)**
2	Sulfur Dioxide as SO_2	ppm		9.26	5.45		**100**	**IS 11255 (Part - 2)**
3	Oxides of Nitrogen as NO_X	ppm		25.60	23.25		**50**	**IS 11255 (Part - 7)**

Continue…

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Sr. No.	Parameter	Unit	Hot Water System-1 (Liquid Terminal)	Hot Water System-2 (Liquid Terminal)	Thermic Fluid Heater (Bitumin-1)	Thermic Fluid Heater (Bitumin-2)	GPCB LIMIT	Method of Test
Feb-22								
1	Particulate Matter	mg/Nm^3	21.44		18.36		**150**	**IS 11255 (Part - 1)**
2	Sulfur Dioxide as SO_2	ppm	7.23		6.19		**100**	**IS 11255 (Part - 2)**
3	Oxides of Nitrogen as NO_X	ppm	20.18		22.52		**50**	**IS 11255 (Part - 7)**
Mar-22								
1	Particulate Matter	mg/Nm^3	19.45	21.3	16.53		**150**	**IS 11255 (Part - 1)**
2	Sulfur Dioxide as SO_2	ppm	6.48	7.5	5.85		**100**	**IS 11255 (Part - 2)**
3	Oxides of Nitrogen as NO_X	ppm	21.35	22.1	20.90		**50**	**IS 11255 (Part - 7)**

Nikunj D. Patel
(Chemist)

GUJARAT VAPI.

Jaivik S. Tandel
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Results of Stack Monitoring

Sr. No.	Parameter	Unit	D.G. Set-6, 7 & 8 (1250 KVA - CT2) Common Stack	D.G. Set-9 (1500 KVA - CT3)	D.G. Set-10 (1500 KVA - CT3)	D.G. Set-11 (1500 KVA - CT3)	GPCB LIMIT	Method of Test
			Feb-22					
			26-02-2022	26-02-2022	26-02-2022	26-02-2022		
1	Particulate Matter	mg/Nm^3	24.8	18.64	18.35	20.4	150	IS 11255 (Part - 1)
2	Sulfur Dioxide as SO_2	ppm	7.13	9.3	6.8	7.5	100	IS 11255 (Part - 2)
3	Oxides of Nitrogen as NO_X	ppm	38.25	34.5	29.5	33.1	50	IS 11255 (Part - 7)
Sr. No.	Parameter	Unit	D.G. Set-12 (1500 KVA) - CT4	D.G. Set-13 (1500 KVA) - CT4	D.G. Set-14 (1500 KVA) - CT4	D.G. Set-1 (500 KVA) - DG House - MPT	GPCB LIMIT	Method of Test
			Mar-22					
			05-03-2022	05-03-2022	05-03-2022	09-03-2022		
1	Particulate Matter	mg/Nm^3	21.38	24.1	19.26	16.75	150	IS 11255 (Part - 1)
2	Sulfur Dioxide as SO_2	ppm	6.1	7.13	6.74	5.13	100	IS 11255 (Part - 2)
3	Oxides of Nitrogen as NO_X	ppm	31.23	33.48	30.13	26.75	50	IS 11255 (Part - 7)
Sr. No.	Parameter	Unit	D.G. Set-2 (500 KVA) - DG House - MPT	D.G. Set-3 (500 KVA) - DG House - MPT	D.G. Set-4 (500 KVA) - DG House - MPT	D.G. Set-5 (500 KVA) - DG House - MPT	GPCB LIMIT	Method of Test
			Mar-22					
			09-03-2022	09-03-2022	09-03-2022	09-03-2022		
1	Particulate Matter	mg/Nm^3	20.49	16.78	20.35	21.34	150	IS 11255 (Part - 1)
2	Sulfur Dioxide as SO_2	ppm	6.34	5.1	6.15	6.8	100	IS 11255 (Part - 2)
3	Oxides of Nitrogen as NO_X	ppm	33.25	26.43	30.37	30.15	50	IS 11255 (Part - 7)

GUJARAT VAPI.

Nikunj D. Patel
(Chemist)

Jaivik S. Tandel
(Manager - Operations)

Annexure – 7

Cost of Environmental Protection Measures

Sr. No.	Activity	Cost incurred (INR in Lacs)			Budgeted Cost (INR in Lacs)
		2019 – 20	2020 – 21	2021 – 22	2021 – 22
1.	Environmental Study / Audit and Consultancy	0.33	6.2	6.82	7.0
2.	Legal & Statutory Expenses	0.84	10.58	10.52	12.0
3.	Environmental Monitoring Services	21.74	19.17	14.31	20.0
4.	Hazardous / Non-Hazardous Waste Management & Disposal	108.43	83.55	107.09	114.10
5.	Environment Days Celebration and Advertisement / Business development	1.5	5.3	4.04	7.0
6.	Treatment and Disposal of Bio-Medical Waste	1.62	2.09	2.14	2.04
7.	Mangrove Plantation, Monitoring & Conservation	Nil	32.59	53.6	53.6
8.	Other Horticulture Expenses	734.18	689	921	921
9.	O&M of Sewage Treatment Plant and Effluent Treatment Plant (including STP, ETP of Port & SEZ & Common Effluent Treatment Plant)	110.18	148.49	252.27	299.5
10.	Expenditure of Environment Dept. (Apart from above head)	105.13	89.11	149.8	85.35
	Total	**1083.95**	**1086.08**	**1371.79**	**1521.59**

Annexure – 8

O/C

adani
Ports and Logistics

PCB ID: 17739

APSEZL/EnvCell/2021-22/108 Date: 11/03/2022

To
The Regional Officer,
Regional Office GPCB (Kutch-East)
Gandhidham, 370201

Sub : Submission of compliance to observation/suggestion/instruction made by GPCB officials during inspection.

Reference : GPCB Inspection letter dated 07.03.2022, PCB ID: 17739.

Respected Sir,

With reference to the above-mentioned subject, M/s. Adani Ports and Special Economic Zone Limited (APSEZL) hereby submitting the compliance details w.r.t. your observations as below:

Sr. No.	Inspection Remarks	Compliance
1.	Submit necessary compliance/ time bound plan for installation of Retro-fitting emission control device in to DG sets which having capacity of 125 and above as per Board Circular dated 27.08.2021.	APSEZ is already in process to check the feasibility for installation of Retro-fitting emission control device into DG sets which having capacity more than 125 KVA in line with GPCB circular dated 27th Aug, 2021. In view of the same, we coordinated all the agencies mentioned in the circular. As per communication received from IOCL, they mentioned that procedure for Testing Emission Compliance of Retro-fit emission Control Devise for D.G. Set is under finalization by CPCB. However, VRDE has not certified any vendors for emission control devices for retro fitment of D.G. Sets. Details are attached herewith as **Annexure – 1**. APSEZ will initiate for installation of Retro-fitting emission control device into DG sets above 125 KVA capacities once the Products / Technologies / Certified Vendors / Agencies to meet the subject emission criteria by CPCB.
2.	Submit the SOP details for loading & unloading of fly ash.	APSEZ is handling only Dry Fly Ash in packed jumbo bags. The SOP for loading & unloading of fly ash is attached as **Annexure – 2**.

U.W.P
21/03/2022

Gujarat Pollution Control Board
Head Office
Sector No.-10-A,
Gandhinagar-382010

Adani Ports and Special Economic Zone Ltd
Adani House,
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CIN: L63090GJ1998PLC034182

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adani

Ports and Logistics

<table>
<tr><th>Sr. No.</th><th>Inspection Remarks</th><th>Compliance</th></tr>
<tr><td>3.</td><td>To submit the vessel wise details of fly ash (dry & wet) exported during last one year.</td><td>APSEZ has exported only Dry fly ash in packed Jumbo Bags and vessel wise exported fly ash details for last one year is mentioned as below:
<table>
<tr><th>Sr. No.</th><th>Vessels Details</th><th>Month</th><th>Commodity</th><th>Exported Qty. (MT)</th></tr>
<tr><td>1.</td><td>MV ERISORT</td><td>March-2021</td><td rowspan="2">FLY ASH</td><td>16500</td></tr>
<tr><td>2.</td><td>MV NORD MELBOURNE</td><td>Feb-2022</td><td>8284</td></tr>
<tr><td colspan="4">Total</td><td>24784</td></tr>
</table>
</td></tr>
</table>

Sir, kindly consider our compliance against the given written instructions and acknowledge the same.

Thank you
Yours Faithfully,

For, Adani Ports and Special Economic Zone Limited

Bhagwat Swaroop Sharma
Head – Environment

Encl: As above

Copy to:
The Unit Head,
GPCB – Head Office,
Paryavaran Bhavan Sector 10 A,
Gandhi Nagar 382010.

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Radheshyam Singh

From: MURALIDHARAN M (MR.)(□□ □□□□□□□□) <MURALIDHARANM@INDIANOIL.IN>
Sent: Thursday, September 16, 2021 5:00 PM
To: Nandan Kumar
Cc: MITTAL NEERAJ (MR.)(□□□□ □□□□□□); JAIN AVINASH (MR.) (□□□□□□ □□□)
Subject: RE: Retrofitting of emission control devices/equipment in DG sets with capacity of 125 KVA and above as per GPCB circular

Importance: High

Dear Sir/Madam,

This has reference to your query dt. 15.09.2021 on the subject.

On the issue we understand that the document on System and Procedure for Testing Emission Compliance of Retro-fit Emission Control Devices (RECD) for DG Set Engines upto Gross Mechanical Power 800 kW is under finalization by CPCB. The Products / Technologies / Certified Vendors /Agencies to meet the subject emission criteria through retrofitting is expected to be finalized upon publication of the System and Procedure by CPCB.

You are requested to keep track of further developments accordingly.

धन्यवाद और भवदीय/Thanks and Regards,

एम. मुरलीधरन / M. Muralidharan,
मुख्य प्रबंधक (टीपीएफ)/ Chief Manager (TPF),
इंडियन ऑयल कॉर्पोरेशन लिमिटेड / Indian Oil Corporation Ltd,
अनुसंधान एवं विकास केंद्र / Research & Development Centre
सेक्टर -13, फरीदाबाद / Sector -13, Faridabad - 121007
दूरभाष न / Telephone No. – 91-129-2294591, 91-9868246525 (मोबाइल / Mobile)

From: Nandan Kumar
Sent: Wednesday, September 15, 2021 10:36:33 AM (UTC+05:30) Chennai, Kolkata, Mumbai, New Delhi
To: INFO RND IOCL
Cc: Harsh Yadav
Subject: FW: Retrofitting of emission control devices/equipment in DG sets with capacity of 125 KVA and above as per GPCB circular

Dear Sir,

Gujarat Pollution Control board (GPCB) issued a circular (attached for reference) for the industries of Gujarat to Retrofit of emission control devices/equipment in DG sets with capacity of 125 KVA and above. As mentioned in circular, your organization is one of the 5 organizations in the list of recognized/approved agency.

Request you to kindly guide us that how can we avail the services for retrofitting and testing of DG sets as per attached circular through your organization.

With regards,
Nandan Kumar
Dy.Manager – HSE (Environment) | Adani Hazira Port Ltd
Mob +91 6359897581 | (Extn : 61531) | nandan.kumar@adani.com | www.adani.com
At & PO - Hazira, Choryasi, Surat 394 270, Gujarat, India

भारत सरकार,
रक्षा मंत्रालय
रक्षा अनुसंधान तथा विकास संगठन
वाहन अनुसंधान तथा विकास स्थापन
वाहन नगर डाकघर
अहमदनगर - 414 006 (महाराष्ट्र)

GOVERNMENT OF INDIA
MINISTRY OF DEFENCE
DEFENCE RESEARCH & DEV ORGN
VEHICLES RESEARCH & DEV ESTT
VAHAN NAGAR P.O.
AHMEDNAGAR- 414 006
(MAHARASHTRA)

Phone : 0241-2544004 FAX : 0241-2548410 e Mail : director@vrde.drdo.in

E-mail: nandan.kumar@adani.com

No. VRDE/NCAT/EMN/GEN EMAIL/8289 Date: 28 Sept 2021

To,
Adani Hazira Port Ltd
Hazira,Choryasi,Surat 394270
Gujarat

Kind attention: Mr.Nandan Kumar (Dy. Manager)

Subject: -Retrofitting of Emission Control Devices/Equipments in DC sets with Capacity of 125kVA and above

Ref: -Your e-mail dated 15th Sep 2021

With the reference of above subject, it is to inform that as on date VRDE does not have a necessary testing facility (Engine Dynamometer and Raw Emission analyser) to test Diesel Generator sets and its retro fitment devices. So far VRDE has not certified any vendors for emission control devices for retro fitment of DG sets. Hence you are kindly requested to contact the Original Equipment Manufacturer (OEM) of DG sets or any other certification agency as directed by Central Pollution Control Board (CPCB) for further information.

Sc 'G'
(G R M RAO)
For DIRECTOR VRDE

Dry Cargo	adani Ports and Logistics **Title: Export Bag to Bag**	**Doc. No. : DC/OPS/PROC/05** **Rev. No. : 03** **Rev. Date : 07/01/2019** **Page No. : 1 of 6**

1.0 Purpose : Cargo received and exported in bagged cargo.

2.0 Scope : **In Scope -** This procedure is applicable to all commodities received and Exported in Bagged form
a) Sugar in Bags
b) Bentonite in Jumbo Bags
c) Fly Ash in Jumbo Bags
d) Any Others

Out of Scope - NA

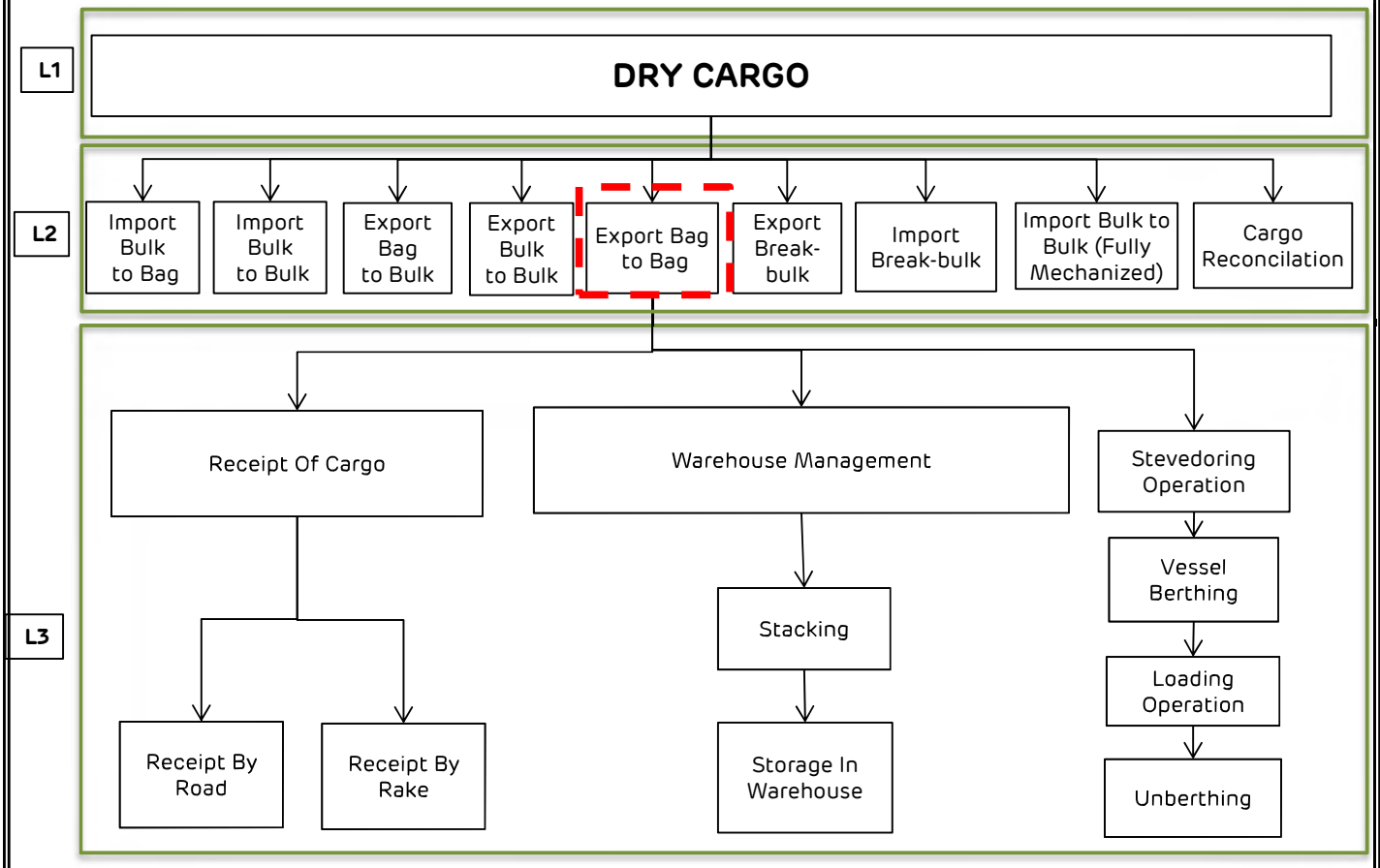
3.0 Reference : ISO 9001:2015 Standards
ISO 14001:2015 Standards
ISO 45001:2018 Standards
ISO 50001:2018 Standards
IMS Apex Manual

4.0 Responsibility :

1) The overall responsibility and authority for establishing, maintaining and updating this process lies with Head - Dry Cargo - Port and save energy wherever possible.

2) The overall responsibility for implementing this process lies with all HOSs.

5.0 Process Map :



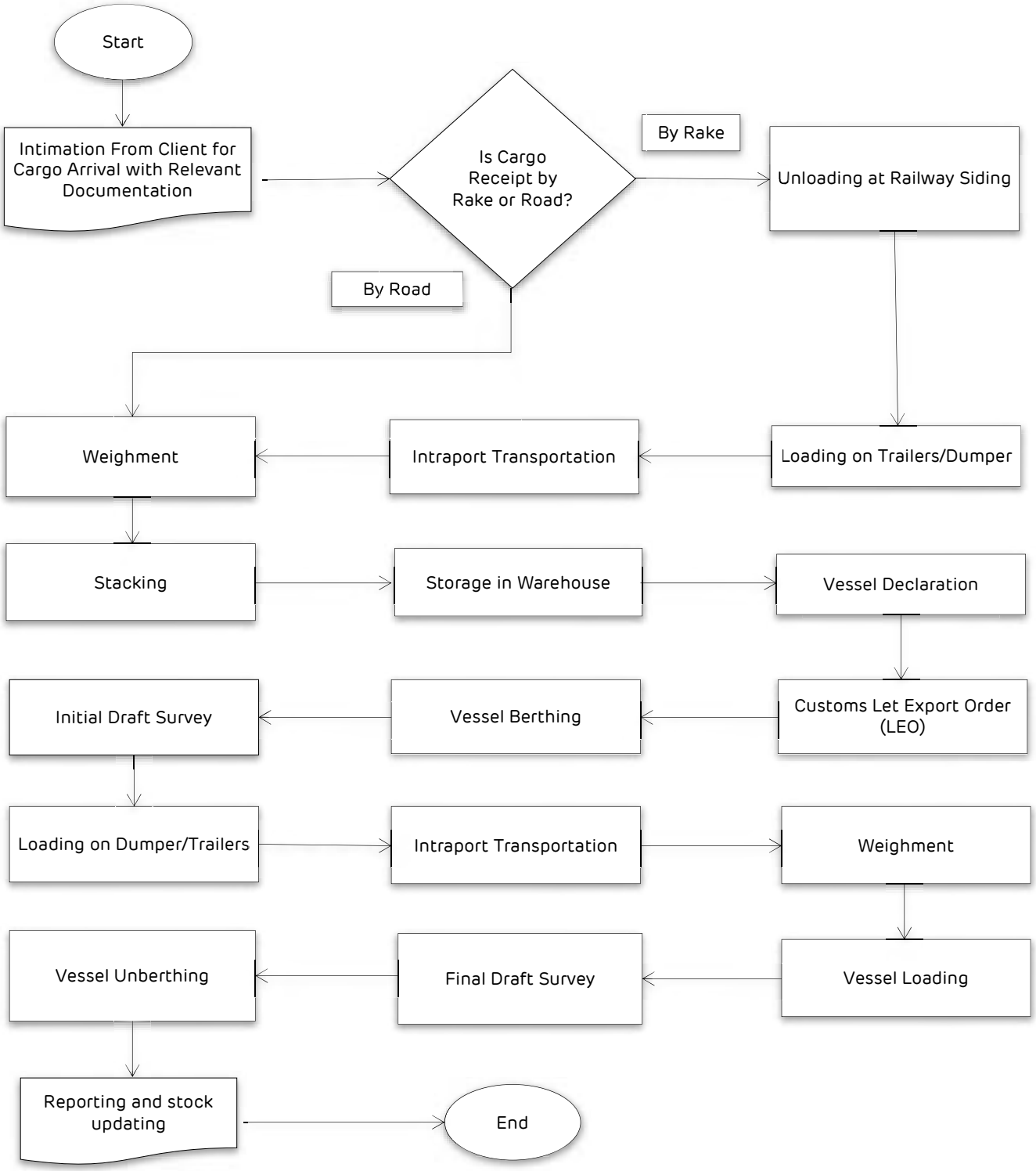
6.0 SIPOC Framework :

Proc Tag	Supplier	Input	Process	Output	Customer
6.1	Back-Up	Equipment / labor	Receipt – By Road	Cargo Unloading & Stacking	Back-Up
6.2	Back-Up	Dumper/ Truck / Trailer/ Equipment/ Labor	Receipt – By Rake	Cargo Unloading, Transportation & Stacking	Back-Up
6.3	Back-Up	Dumper/ Truck/ Trailer/ Equipment	Transportation to Jetty	Vessel Feeding	Stevedores
6.4	Stevedores	Cranes / Equipment / Gears	Vessel Loading	Cargo loading	Client

7.0 Key Performance Indicator :

1 Commodity wise per ton handling cost
2 Monthly vessel closer report for permitted cargo handling loss
3 Discharge Quantity as per internal benchmark
4 % cases where rake went to demurrage

8.0 Process Flow Diagram :



9.0 Procedure / Activity / Work Element / Task :

Sr.No.	Activity	Document Reference	Responsibility
9.1	**Receipt Operation - By road**		
9.1.1	Carting permission received from custom house agent.	Carting Permission File	DC Documentation section
9.1.2	Documentation centre generates Export Application number (EA) on system.	APMS	DC Documentation section
9.1.3	Driver submits delivery documents to dry cargo main gate supervisor and receives Gate Pass along with number.	Invoice/ Delivery Challan/ Lorry receipt	Dry cargo Supervisor at Port main gate
9.1.4	Driver gets gate entry slip from security dept.	PEP	Concern Supervisor
9.1.5	Driver shows Gate pass(PEP) to the security and security dept. does entry in APMS with actual entry time of the vehicle in port.	PEP	Port security
9.1.6	Vehicle approaches to allocated yard for unloading the cargo and gets signature from the nominated supervisor and surveyor.	PEP	Dry Cargo Backup Supervisor
9.1.7	Cargo receipt operation as per the work instruction.	WI Matrix	Dry Cargo Backup Supervisor
9.1.8	After unloading, the vehicle moves through the same weighbridge/out gate.	NA	Weighbridge Operator
9.1.9	Driver submits the PEP to security supervisor for exit and receives stamp from the security supervisor near main gate.	PEP	Dry Cargo Backup Supervisor
9.2	**Receipt Operation - By Rake**		
9.2.1	Intimation from client and receipt of RR.	RR	FCC/Railway Siding In charge
9.2.2	Cargo receipt operation as per WI.	WI Matrix	FCC/Railway Siding In charge
9.3	**Storage Operation**		
9.3.1	The warehouse is planned & prepared to receive the cargo arrivals.	MOM -planning	Backup Shift In charge
9.3.2	Cargo unloaded at designated warehouse for storage as per dry cargo work instruction.	WI Matrix	Dry Cargo Backup Supervisor
9.4	**Vessel operation**		
9.4.1	Port concern authority receives vessel inward declaration from Ship's Agent.	Email / APMS	DC Documentation section
9.4.2	Detailed vessel planning is done before arrival/ berthing the vessel. The Receiver, contractor, surveyor in-charge, Stevedoring Head & the concerned commodity manager.	MOM - Vessel planning	Stevedoring Section

9.0 Procedure / Activity / Work Element / Task :

Sr.No.	Activity	Document Reference	Responsibility
	To ensure realization of payment / concurrence by marketing or authorized person before vessel berthing.	N/A	Dry Cargo HOD
9.4.3	Documentation Centre receives shipping bill with LEO from CHA & in turn, informs Stevedoring Section of receipt.	Shipping Bill	Stevedoring Documentation
9.4.4	Vessel is cleared for loading. DC Supervisor is informed using VHF or Mobile Phone.	NA	Dry Cargo Stevedoring Supervisor
9.4.5	Vessel loading operation as per dry cargo work instruction.	WI Matrix	Stevedoring Supervisor
9.4.6	Communication of vessel performance to all concerned persons through mobile alert for dynamic course correction at every 2 hours.	APMS	Stevedoring shift in charge
9.4.7	Capturing of vessel performances data for the interval of 2 hours to be entered into the system at a pre defined interval by each port.	APMS	Stevedoring shift in charge
9.4.8	Daily ship working reports are prepared as per draught figures and surveyors tally sheets.	Daily Working Report	Stevedoring Supervisor
9.4.9	Cargo completion & Sailing documents that required to be signed by the Vessel's Master prior to vessel sailing: Statement of Facts Stevedoring Certificate No damage certificate to ship Equipment utilization on board if any Cargo damage statement, if any Cargo Loss on board certificate, if any Mates receipt. No stevedore staff on board.	Vessel Documents	Stevedoring Supervisor
9.4.10	Inform port concern authority, Stevedoring Section and Commodity Manager of completion of loading and receipt of documents.	Vessel Documents	Stevedoring Supervisor
9.4.11	Gangs off the ship, equipment's released and jetty cleared, marine is informed regarding completion of cargo and documentation over phone. Vessel agents file outward pilot memo.	Outward Pilot Memo	Stevedoring Supervisor
9.4.12	Categorization of vessels on the basis of performance Overachieved target Achieved target Under achieved target.	WI Matrix	Respective HOS

9.0 Procedure / Activity / Work Element / Task :

Sr.No.	Activity	Document Reference	Responsibility
9.4.13	Root cause analysis of underachieving vessels and generation of reports for future reference.	RCA Sheet	Respective HOS
9.4.14	Documentation centre receives copy of EGM from IBC Marine.	EGM	DC Documentation section

10.0 Risk & Control :

1) Refer Operational/ Business Risk Register
2) Refer Safety Risk Assessment - HIRAC book
3) Refer Aspect Register & Significance Analysis
4) Refer Significant Energy using Products/Equipments SWOT Analysis

11.0 Records :

Sr. No.	Record Title	Record No.	File Name / No.	Location	Maintained By	Retention Period
1	Carting Permission	-	-	DC office	Online APMS	3 Years
2	Transport Authorization (Soft Copy)	-	-	DC office	Online APMS	3 Years
3	Vessel Completion Documents	-	-	DC office	Online APMS	3 Years
4	Surveyors tally report	-	-	DC office	Online APMS	3 Years
5	Client wise reconciliation	-	-	DC office	Online APMS	3 Years

12.0 Note : NIL

Annexure – 9

Compliance Report of CIA Study Environment Management Plan

S. No.	Identified environmental and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitude1	Environment management plans adopted or being adopted by APSEZ as per permits, clearances, applicable regulations and guidelines etc.	Additional Risk Mitigation Measures/ESMP	Responsible agency	Timeframe for implementation	Compliance
1	**Land Use Change**						
1.1	It is predicted that the built up land in the rural areas would increase by an order 50% from the baseline 2015. New settlements near the SEZ area might create slums. Unorganized urban development leading to poor sanitation and proliferation	Level - 1	APSEZ has developed two townships (Shantivan and Samudra) presently accommodating 1668 households. Necessary permissions from concerned authorities were already obtained for the development of townships and Associated infrastructure facilities.	The existing townships will be expanded to accommodate about 4 lakh people when the APSEZ is fully developed.	APSEZ	As and when Required	APSEZ has developed two townships (Shantivan and Samudra) accommodating 2057 households and associated infrastructure facilities. Accommodation is made available for all interested employees working within Adani group & SEZ industries. Out of which 97.4% Occupancies are accommodated within the townships and rest are available for employees working within APSEZ. At present 65 nos. of industries (processing & non-processing) are present within the SEZ (51 nos. are in operation). Township facilities are also made by some of SEZ industries within Mundra town for their employees with basic infrastructure facilities and requirements. Most of the employees working in SEZ industries are residing in Mundra township having all basic requirements and associated facilities. The existing social infrastructure facilities are adequate for present development at APSEZ. The existing townships with associated facilities will be

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	of vectors and disease.						expanded as per requirement. APSEZ has also been granted permission for receiving domestic sewage @ 2.5 MLD from Mundra village (which was earlier discharged into open area within Mundra region) in to wastewater treatment plant for treatment and disposal. APSEZ has already started receiving of domestic sewage from Mundra, which abates the poor sanitation and unhygienic condition within Mundra region. Total project cost for laying domestic sewage underground pipeline with other associated facilities from Mundra to APSEZ is 362 Lacs.
1.2	Once the project is fully developed, due to increase in built up land in the APSEZ area, there will be an increase in the storm water runoff from the facility.	Level-1	The study area experiences scanty rainfall less than 400 mm/year. Considering the natural gradient, ASPEZ have designed and implemented storm water	Technical feasibility study can be carried out to explore the possibility of developing storm water collection ponds to utilize maximum possible storm water runoff for dust suppression in the coal yard areas during non-rainy days.	APSEZ	Technical Study - one time, Implementation - Continual process	Presently, ~51% of the total SEZ is developed. Based on technical studies, At present all existing coal yards are designed with drain, for collection of water during water sprinkling and rainfall, which is carried away to dump pond. Supernatant water from dump pond is being collected and used for dust suppression activities or after sedimentation, discharged to sea. Details of drain and dump pond has been submitted in along with EC compliance report (Oct 19 to March 20). Analysis of said water discharging into sea during monsoon season is being carried out (twice in a year during monsoon) through NABL / MoEF&CC accredited laboratory. Analysis report of the same shows there is

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			drains in the existing facility to meet the peak daily rainfall of 440 mm/hr. Hence flooding of water in the neighboring areas is not envisaged.				no any contamination. The report is attached herewith as **Annexure – i**. During compliance period FY 2021-22, the maximum recorded rain fall was **5.6 mm/hr** observed, which was much less than the design capacity of existing storm water drainage system. So our existing storm water management facility is adequate to handle the storm water runoff from the area. Hence flooding of water in the neighboring areas is not envisaged.
			As per the directions given in the environmental clearance issued for the proposed Multi-Product SEZ and CRZ clearance for Desalination, sea water intake, outfall	The channel depth in all the natural streams shall be maintained to accommodate peak flood flow during the monsoon and periodical de-silting activities in the natural steams passing through the APSEZ area	APSEZ, District Administration* and Irrigation department	As and When Required	Presently there is no Desalination plant, sea water intake and outfall facility developed as part of EC & CRZ clearance of Multiproduct SEZ. The project will be designed and implemented as per requirement without disturbing the natural flow of rainwater in all the seasonal streams.

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			facility and pipeline project, the master plan of the project was designed and being implemented without disturbing the natural flow of rainwater in all the seasonal streams.				
1.3	Due to conservation and protection of mangroves in the designated conservation area, it has been predicted	Positive Impact with ecological benefits	In addition to conservation of the identified 1254 ha mangrove areas around Mundra port and SEZ, APSEZ has taken up large scale	APSEZ will continue mangrove afforestation as per the commitment made with concerned regulatory authority	APSEZ	Short Term	APSEZ has carried out mangrove afforestation in 3140 ha. area across the coast of Gujarat till date. Total expenditure for the same till date is INR 847.8 lakh. No further mangrove afforestation is pending w.r.t. commitment made with concerned regulatory authority for APSEZ, Mundra project. As per study conducted by NCSCM, Chennai in 2017, mangrove cover in and around APSEZ, Mundra has increased from 2094 Ha to 2340 ha (as compared between 2011 to 2017). The analysis has shown an

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	that the current mangrove footprint area would marginally increase in next 15 years due to natural growth. This will enhance the overall biodiversity in the local coastal eco-system.		mangrove afforestation activities in an area of more than 2800 ha at various locations across the coast of Gujarat state in consultation with various organizations				overall growth of 246 ha. The cost for said study was INR 3.15 Cr. Recently study was carried out in the year 2019 and based on that there is an increase of mangrove cover between **March 2017 (Total 2340) and September 2019** with an extent of **256 Ha (Total 2596 Ha Area)** which is about **10.94%** rise in growth rate, also It reveals that the mangrove and the tidal system in the creeks remained undisturbed over this period. Hence, there is an overall growth of mangroves in creeks in and around APSEZ, Mundra is **502 Ha** between 2011 and 2019. Analysis of data between categories indicated that there was an **increase in dense mangroves** along with the conversion of scattered into sparse, that shows the growth of mangroves in a progressive direction. As a part of GCZMA recommendations and NCSCM mangrove conservation action plan, APSEZ has undertaken following activities.

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Sr. No.	Recommendations	Compliance
1.	Mangrove mapping and monitoring in and around APSEZ	• APSEZ entrusted NCSCM, Chennai to carry out Monitoring of mangrove distribution in creeks in and around APSEZ and shoreline changes in Bocha island. • As a part of this study, overall growth of mangroves in the creeks in and around APSEZ was assessed comparing Google earth images of 2017 & 2019 and it is observed that there was increase in mangrove cover between March 2017 and September 2019 to the extent of 256 Ha, which is about 10.7%. • This suggests that the mangroves and the tidal system in the creeks remain undisturbed over this period. Analysis of data between categories indicated that there was an increase in dense mangroves and also conversion of scattered to sparse which also shows

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									that the growth of mangroves in a progressive direction. • Hence, there is an overall growth of mangroves in creeks in and around APSEZ, Mundra is 502 Ha between 2011 and 2019. • The cost of the said study was INR 23.56 Lacs incurred by APSEZ.
							2.	Tidal observation in creeks in and around APSEZ	• APSEZ carried out the tidal observations at locations similar to 2017 in Kotdi, Baradimata, Navinal, Bocha and Khari creeks under the guidance of NCSCM. • The observed tidal ranges indicate that the creeks experience normal tidal ranges, adequate for the growth of mangroves. • The cost of the said activity was INR 1.0 Lacs.
							3.	Removal of Algal and Prosopis growth from mangrove areas	• Algal and Prosopis growth monitoring was done in and around mangrove area and algal encrustation was found in some of the mangrove areas, which has been removed manually. • Algal & Prosopis removal from Mangrove area for

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									FY 2021-22- The cost of the said activity was INR 2.8 Lacs incurred by APSEZ. Please refer attached **Annexure – 1** for Report of Algal removal work in mangrove area.
							4.	Awareness of mangroves importance in surrounding communities	• Adani Foundation – CSR Arm of Adani group has done awareness camps/activities created in the community regarding importance of mangroves. • Adani Foundation provides Good Quality dry and green fodder to 24 Villages. Project is covering total 14116 Cattels / 3008 farmers and hence enhancing cattle productivity. Dry Fodder 895398 Kg Green –2425230 Kg. • Adani Foundation has also provided 117.11 lacs kg Dry Fodder and 89.00 lacs kg Green fodder in 29 villages of Mundra and Anjar Block to support the resource dependent villagers, to avoid their dependency on mangroves. The expenditure

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							for fodder supporting activities was approx. 206.11 Lacs during FY 2021-22. • Village Gauchar land development for the fodder cultivation to made fodder sustain village & Avail green fodder in scarcity phase. With the support of Gauchar Seva Samiti Grassland development in Siracha – 85 Acre & Zarpara – 25 Acre done which resulted in total production of 82 ton. • Other than this dedicated security guard with gate system deployed by APSEZ across the coastal area and no any unauthorized persons allowed within coastal as well as mangrove areas. • Refer CSR report attached as **Annexure – 2**. Other than this Adani Foundation – CSR Arm of Adani Group at Mundra-Kutch has initiated multi-species plantation of mangroves in Luni village in association with GUIDE, Gujarat. During 2018-2019 (Phase-I) multi-species mangrove plantation was carried out in 10 ha, during Phase-II (2019-2020) it was 02 ha and during Phase III (2020-2021) it is 01 ha. During current FY 2021-22, 03 ha area coastal stretches have been planted with mangrove species. Total 16 Ha. multi-species mangrove

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							plantation has been carried out till March-22 association with M/s. GUIDE, Gujarat.
1.4	Development activities along the coast might cause certain changes in hydro-dynamic characteristics along the shoreline. Shoreline of any area also can be influenced by storm surges and other natural processes.		Detailed hydro-dynamic modelling and shoreline change prediction for a fully developed APSEZ facility has been studied. The study reveals that the erosion and accretion in the study area at the end of 15th year will be within the designated criteria of ±	It is recommended to map the coastal morphology (Shoreline) at least once in three years	APSEZ	Continual Process	Shore line change study was carried out by M/s. Chola MS, Chennai (NABET accredited consultant) as a part of Waterfront Development Project – Expansion EIA study. The summary of the said study is as below. To estimate the shoreline change due to the earlier approved waterfront development plan, a historical shoreline change assessment has been undertaken using the satellite imagery for a period of 2008 to 2018. In order to avoid any major errors in estimating the shoreline, the satellite data for similar tidal condition was considered for 2008, 2013 and 2018. AMBUR Methodology was used to study the historical analysis 10km radius stretch of shoreline on either side of the APSEZ project boundary has been considered for assessing the historical shoreline change scenario. The baseline shoreline change assessment depicts the influence of both natural causes and also possible changes in the shore due to various development activities in the study area during the designated period. For the purpose of this study, shoreline on left side of APSEZ is termed as West Side Shoreline and that of the right side as East Side Shoreline for ease of recognition.

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			0.5 m/year. which reconfirms that the waterfront development activities of APSEZ would pose insignificant impact on the Mundra shoreline.				The maximum accretion and erosion rate of the west side shoreline over a period of 10 years during the year 2008 – 2018 are observed to be 4.78 m/yr and 1.93 m/yr respectively. The maximum accretion and erosion rate of the east side shoreline over a period of 10 years during the year 2008 – 2018 are observed to be 05 m/yr and 0.82 m/yr respectively. APSEZ has already awarded work to the agency namely M/s. Gujarat Institute of Desert Ecology, Bhuj for carrying out Shoreline Change Assessment Study for Mundra region vide P.O. No. 4802013270 dated 30.03.2022. The cost of said study is INR 1,739,320 Lacs. The said study is under progress.
2	**Regional Traffic Management Plan**						
2.1	The projected traffic data as per the EIA Report of Multi-Product Special Economic Zone, the peak vehicular	Level-1	As per the master plan of APSEZ, eight artillery roads will be connected to either state highway or national highway for evacuating the goods	Additional road as per master plan will be built in future based on the overall progress of the project. Currently about 25% of cargo from APSEZ is transported by Rail and the	APSEZ	As and When Required	Presently, ~51% of the total SEZ is developed. Based on technical studies, Existing road/rail/conveyer infrastructure facilities are adequate to evacuate the existing cargo. Further, APSEZ's cargo evacuation through rail / conveyer / pipeline has increased to ~38.36 %, thereby reducing the usage of road. Additional road facilities will be built as per master plan considering future development. The facilities for transportation of cargo other than

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	traffic from the port and SEZ operations (including supporting facilities and colony) could be in the order of 18,300 and 10,400 vehicles per day respectively. There could be a possible increase in traffic congestions on village-highway intersections and road		from APSEZ. None of these roads are passing through settlements, thereby avoiding traffic Congestions in the respective villages. The carrying capacity of the eight artillery roads connecting APSEZ is estimated to be about 16,000 PCU/hr as against the envisaged peak traffic volume of	same will be enhanced to 40% when the facility is fully developed in future. This will further reduce the traffic volumes on the regional road network.			road will be enhanced considering future development, which will reduce the traffic volumes on the regional road Network.

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	accidents.		4,500 PCU/hr. Out of eight artillery roads considered in APSEZ master plan, seven roads were already developed and functional.				
			APSEZ has been imparting Driver Training Programs to all their contractors to enhance awareness on road safety.	APSEZ can undertake technical feasibility of implementing Intelligent Transport System (ITS) for the freight carriers associated with their development activities.	APSEZ & GSRDC*	Long Term	APSEZ is being imparting the regular in-house classroom and on-job training to all drivers and employees on below topics: ✓ ✓ Basic induction Training for drivers ✓ ITV Driver Training ✓ ITV Driver Induction for Supervisor ✓ Defensive Driving for LMV & HMV ✓ Defensive Driving & BBS ✓ Driver Assessment ✓ Road accident & rescue ✓ Traffic Management & Road Signage ✓ Driving safety training ✓ RORO Driver training

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							✓ Road Safety ✓ Defensive Driving & Emergency Action Plan ✓ Drivers Responsibilities & Safe driving ✓ Emergency Rescue (Vehicle) Training Approx. 1448 Participants (On roll and contractual manpower) were benefitted from above trainings in compliance period Oct 21 to Mar 22. The same will be continued in future also. APSEZ has also implemented the Remote traffic management system (RTMS) to manage the traffic movements and capturing the violations to further improve the system. Following steps were taken by APSEZ to reduce the accidents. ✓ Handling and escorting of the ODC for ensuring the smooth movement on the roads. ✓ Traffic Awareness programs for the drivers and regular briefing of the drivers in the parking areas. ✓ Incident handling and root cause analysis for taking necessary action in order to avoid such incidents. ✓ BAC checks for the drivers in order to identify the intoxicated drivers and necessary action is being taken against them. ✓ Water spray drive at gates are being conducted on regular basis during night hours to avoid doziness by the driver while driving.

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							✓ RTMS devices are being installed at 08 critical locations in order to capture speed violations and enforcing road safety regulations. ✓ Display of traffic signages and lane markings on road in coordination with the Civil team for ensuring road safety rules are being followed by the road users. ✓ We have approx. 100+ cameras which are being utilized for monitoring of traffic movement through CCTV and timely response in order to avoid any congestion and during traffic incidents. ✓ Regular traffic checks by Traffic Marshalls in order to ensure road safety rules (Wearing seat belt/Wearing helmet/Carrying driving license/Speed checks/Documents) is being followed by the drivers. ✓ Installation of Road furniture's (Cones/Water filled barriers/Cats eye/Spring Posts/Jersey Barriers) for lane segregation, Channelizing the traffic, at Junctions and indicating Caution for the road users.
3	**Water resources Management and sewage treatment & disposal Plan**						
3.1	For a fully developed APSEZ facility, water demand will be in the	No-Impact	APSEZ is meeting the current water demand through Narmada	As per the master plan and permissions granted under EC, APSEZ will be developing progressively	APSEZ	As and When Required	Currently there are two fresh water sources available with APSEZ. **Desalination Plant** – 47 MLD **Narmada water through GWIL** – 9 MLD (sanctioned capacity). Current water demand for APSEZ along with SEZ

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	order of 4,30,000 m3/day (430 MLD). APSEZ will be sourcing majority of the water from the captive desalination plants, which will be developed in progressive manner.		water supply scheme and 47 MLD captive desalination plant at site. Necessary water allocation from concerned authorities was obtained and the same will be renewed from time to time as per the directions of state government.	4,50,000 m3/day (450 MLD) of desalination plants to meet the future demand. Hence stress on regional water resources due to these developmental projects will be less significant.			industries including Adani Power Plant is an avg. of 28 MLD. So presently, these sources are adequate to fulfill the current freshwater requirement of entire APSEZ including member units. The desalination plant of additional capacities will be installed on modular basis considering future requirement of APSEZ.
3.2	Existing water demand in the Mundra taluk is estimated	Level-2	Adani Foundation has been contributing to various watershed	Adani Foundation is planning to implement the various water resource	APSEZ and CGWB*	Long Term	Water needs of APSEZ is being met through existing Desalination Plant of APSEZ and GWIL which may be further enhanced on modular basis, At present Ground water is not utilized for any activities within APSEZ. However various works are being carried out by Adani

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	as 8500 m3/day (@55 lpcd) and the potable and sanitation water needs would increase to 37,000 m3/day (@125 lpcd) in future when the area is fully grown into larger municipality due to induced economic growth. Water demand of the local communities is met through		development projects in the Mundra region to enhance ground water resources in the area. Adani Foundation has contributed about Rs. 300 Lakhs so far for the development of 18 check dams.	conservation programs in next ten years under various schemes.			Foundation continuously under Water Conservation Work to achieve water security in Mundra region by Adani Foundation. Following works are carried out as a part of water conservation work since April – 2018. Water conservation Projects i.e. Roof Top Rain Water Harvesting, Desilting of Check dams, Bore Well Recharge and Pond deepening were taken up in past years, review and monitoring of all water harvesting structures had been taken up. To make connections between human actions and the level of biological diversity found within a habitat and/or ecosystem, this year Adani Foundation launch project "Sanrakshan" in coordination with GUIDE and Sahjeevan. Since, 10 years considerable Water Conservation Work carried out in Mundra Taluka. Due to satisfactory rain in current year 1.11 mtr ground water table increased as per increased in coastal belt of Mundra as per Government Figures. **Our water conservation work is as below.** • A large number of water harvesting structure (Total 21 Nos. of check dams and Augmentation of 2 check dams (1 Check dam current year). • Ground recharge activities (pond deepening work for more than 56 ponds) individually and 26 ponds

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	Narmada water supply system to some extent, but largely depending on the ground water in the study area. Mundra block is reported to be a safe ground block as on date. Due to influx of people and rapid urbanization due to the economic development, there could be						under Sujlam Suflam Jal Abhiyan were built leading to a significant increase in water table and higher returns to the farmers. • Pond deepening and bund strengthen of Rampar village pond increase water storage capacity • Roof Top Rain Water Harvesting 115 Nos. (50 Nos current FY 2021-22) which is having 10,000 litre storage which is sufficient for one year drinking water purpose for 5 people family. • Recharge Borewell 189 Nos (83 Nos current FY 2021-22) which is best ever option to. • Drip Irrigation 1158 Farmers (180 formers are supported with 15% of amount of total cost for maximum 4.0 lac. in current FY 2021-22) • Bund construction on way of Nagmati River could save more than 575 MCFT water quantity which recharged in ground due to which borewell depth decreased by 50-100 Ft in Zarpara, Bhujpur and Navinal Vadi Vistar. • Luni Pond Bund Repairing Work is completed. With the objective of to preserve the rainwater to reduce the impact of salinity and recharge the ground water (the main source of water) to facilitate the Agricultural activities as well as for drinking water. Adani foundation has spent approx. INR 6047.05 lakhs from April – 2018 to Mar – 2022 for CSR activities which also includes water conservation projects as

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	some stress on the ground water resources in future.						mentioned above.
3.3	It is estimated that about 60,000 m3/day (60 MLD) of sewage will be generated from the APSEZ facility when the project is fully developed.	No Impact	Seven sewage treatment plants with an aggregate capacity of 3.1 MLD have already built at APSEZ. Treated sewage is utilized for greenbelt development and sewage is not discharged into either seasonal natural streams or marine	APSEZ is permitted to develop decentralized sewage treatment plants of total 62 MLD capacities. Existing sewage treatment facilities will be augmented progressively based on the development at APSEZ in future. Similar to existing practices, treated sewage will be utilized for greenbelt	APSEZ	As and When Required	Current installed capacity of wastewater treatment plants is 6.05 MLD (ETP, STPs & CETP) for treatment of effluent & sewage generated at various locations of APSEZ excluding wastewater treatment plants installed within induvial member units. Out of 51, only 4 operational industries within the SEZ are sending their partially treated industrial as well as domestic effluent to the CETP confirming to CETP inlet norms for further treatment and final disposal. Other SEZ industries have their own STPs / ETPs for treatment of wastewater generated from their industrial operation and discharging the treated water on land for horticulture purpose within their premises as per specific permission granted by SPCB. APSEZ also granted permission to treat 2.5 MLD of sewage generated from Mundra village through CETP and STP. Presently avg. 2.03 MLD of wastewater (in to ETP, STPs & CETP) is treated and being utilized on land for horticulture purpose within APSEZ premises during

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			environment.	development.			October'21 to March'22. Existing wastewater treatment plants are adequate to treat and handle the total effluent / sewage load considering current development. Existing wastewater treatment facilities will be augmented, or new plants will be developed on modular basis considering future requirement.
4	**Air quality management Plan**						
4.1	Although all the regulated activities in the study area will be adopting promulgated emission norms, total air emission mass discharge from the study area would increase.	Level-2	APSEZ and other thermal power plants have obtained valid consent to operate and have been operating the facilities as per the emission norms stipulated in respective consent orders.	All existing and new industrial establishments will obtain requisite consents from GPCB and adhere to the stipulated emission norms regulations and guidelines issued by authorities from time to time.	APSEZ And Other Industries	Continual Process	APSEZ has been granted requisite permissions from the concerned authorities with stipulated norms for air emission (flue gas as well as ambient air). Ambient Air Quality monitoring is being carried out by NABL accredited and MoEF&CC authorized agency namely M/s. Pollucon Laboratories Pvt. Ltd. Surat and Unistar Environment and Research Labs Pvt. Ltd., Vapi for APL as per NAAQ standards, 2009. Stack emission monitoring is also being carried out on regular basis. Reports of the same are being submitted to the concerned authorities on regular basis. Adani power plant has installed continuous emission and air quality monitoring instruments as per CPCB Directive and submitting the reports also. Another power plant of CGPL is outside APSEZ area. The AAQM summary for last six months (Oct'21 to

<table>
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<tr><td></td><td></td><td></td><td>APSEZ and other two power plants are monitoring the ambient air quality on regular intervals as per GPCB/CPCB guidelines and the data is analyzed and presented to GPCB on monthly basis. Both the thermal power plants located within the study area have installed continuous emission and</td><td></td><td></td><td></td><td>Mar'22) are as below.

Locations: 18 Nos. (APSEZ – 13 + APL – 5 including 4 villages)
Frequency: Twice in a week
<table>
<tr><th>Parameter</th><th>Unit</th><th>Max</th><th>Min</th><th>Average</th><th>Perm. Limit$</th></tr>
<tr><td>PM_{10}</td><td>µg/m³</td><td>95.43</td><td>40.36</td><td>69.15</td><td>100</td></tr>
<tr><td>$PM_{2.5}$</td><td>µg/m³</td><td>55.39</td><td>14.56</td><td>30.77</td><td>60</td></tr>
<tr><td>SO_2</td><td>µg/m³</td><td>44.16</td><td>5.11</td><td>17.29</td><td>80</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>NO_2</td><td>µg/m³</td><td>47.15</td><td>7.15</td><td>24.70</td><td>80</td></tr>
</table>
$ as per NAAQ standards, 2009
Values recorded confirms to the stipulated standards.

Approx. INR 14.31 Lakhs is spent by APSEZ for environmental monitoring activities during the FY 2021-22, which also includes ambient air quality monitoring for overall APSEZ, Mundra.

Other industries located within the SEZ have obtained requisite permissions from the competent authorities for their respective plant and they also carried out environmental monitoring within their premises to comply with the permission granted. The same has</td></tr>
</table>

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			air quality monitoring instruments as per CPCB directive.				been ensured by APSEZ as well as SPCB during their regular visits. APSEZ carries out regular visits/inspections of member industries within SEZ and last visit was conducted during Jan to March' 2022 for EMS & compliance verification. During compliance verification, it was verified that monitoring of air emission was well within the permissible standards based on analysis reports. Same will be continued in future also. The monitoring reports of industries within SEZ are also being submitted to the regulatory authorities as a part of half yearly Compliance report of EC for Multi-Product SEZ.
				A common air quality management committee may be framed under the guidance of the State Pollution Control Board and district administration to manage regional level emission inventory data	APSEZ and Other Industries, Stakeholders, District Administration and GPCB*	Long Term And Continual	APSEZ will co-operate and comply with the directions from concerned regulatory authorities for air quality management within APSEZ area. However, at present, APSEZ has formed Internal Environment Monitoring Committee, involving officials from APSEZ, Adani Power Limited and other SEZ member units with following role and responsibilities: • Identification of sources of air & noise emission and its dispersion in surrounding villages • Remedial measures to eliminate, control, reduce or capture air & noise emission • Identify available resource to abate the air and noise emission

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				that can help to manage regional level air quality management goals.			• Required additional resources for control of air and noise emission • Drinking water and its testing of all the available fresh water sources in surrounding villages • Identify any surrounding villages affected by organization's improper waste disposal mechanism. Last committee meeting was conducted on dated 23rd March 2022, and below was the point of discussion for way forward. • Brief introduction about the Environment Management Plan (EMP) • All members conveyed his environment management practices, issue & suggestions • Discussed about the various ways to improve existing practice to control the emission in terms of Air, Water and Noise. • Discussed about the proper management of the canteen waste. • Discussed about the cleaning of outside of the SEZ units. • Discussed about the management of rain water & proper cleaning of the common storm water drainage system. • Discussed about proper segregation & disposal of solid waste material.

S. No.	Identified environmental and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitude1	Environment management plans adopted or being adopted by APSEZ as per permits, clearances, applicable regulations and guidelines etc.	Additional Risk Mitigation Measures/ESMP	Responsible agency	Timeframe for implementation	Compliance
							• Discussed about to increase more green belt area inside plant premises of SEZ units APSEZ and all the industries within SEZ are in compliance to NAAQS and same is being ensured by APSEZ. The monitoring reports of industries within SEZ are being submitted to the regulatory authorities as part of half yearly Compliance report of EC for Multi-Product SEZ.
4.2	Release of particulate emissions from handling and storage of coal at the port and power plants would influence PM10 and PM2.5 concentration in the background air. This could pose some health	Health Impact	APSEZ has been implementing the following management plan to control emissions as per the applicable regulations and similar practices will be adopted in future: Entire bulk material handling facilities are	All industries located in the APSEZ shall adhere to the emissions norms and minimum stack height guidelines issued by CPCB and consent to operate issued by Gujarat Pollution Control Board from time to time.	APSEZ and Other Industries	Continual Process	Following safeguard measures are taken by APSEZ for abatement of dust emissions. • Adequate stack heights to the Boilers, D.G. Sets, TFHs & HWGs for proper dispersion of pollutants within APSEZ • Using of liquid & Gaseous fuels instead of solid fuels in Boilers, Thermic fluid heaters and hot water generators. • Regular sprinkling on road and other open area • Regular cleaning of roads • Dry fog Dust Suppression System (DSS) in hopper, transfer towers and conveyor belts • Use of water mist canon • Closed type conveyor belts • Regular sprinkling on coal heaps • Covering other types of dry bulk cargo heaps • Installation of wind breaking wall • Development of greenbelt along the periphery of

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<tr><td></td><td>impacts such as asthma and COPD etc. among the local communities.</td><td></td><td>mechanized. Regular water sprinkling on road and other open areas, regular cleaning of roads, dry fog dust suppression systems (DSS) in hoppers, transfer towers and conveyor belts, use of water mist canon, covered conveyor belts, regular sprinkling on coal heaps,</td><td></td><td></td><td></td><td>the storage yards/back up area
• Mechanized handling system for coal and other dry bulk cargo
• Wagon loading and truck loading through closed silo

Adequate air pollution control measures like ESPs, FGDs, Bag Filters, etc. and adequate stack heights provisions are implemented within the thermal power plant.

The stack monitoring summary for last six months (Oct'21 to Mar'22) are as below.

Total Nos. of Stacks: 23 Nos.
Frequency: Monthly / Half Yearly
<table>
<tr><th>Parameter</th><th>Unit</th><th>GPCB Limit</th><th>Min</th><th>Max</th><th>Average</th></tr>
<tr><td>PM</td><td>mg/ Nm^3</td><td>150</td><td>16.30</td><td>22.40</td><td>18.95</td></tr>
<tr><td>SO_2</td><td>Ppm</td><td>100</td><td>4.25</td><td>6.50</td><td>5.86</td></tr>
<tr><td>NO_x</td><td>ppm</td><td>50</td><td>18.76</td><td>30.80</td><td>28.23</td></tr>
</table>
Values recorded confirms to the stipulated standards.

Approx. INR 14.31 Lakhs is spent by APSEZ for environmental monitoring activities during the FY 2021-22, which also includes stack monitoring for overall APSEZ, Mundra.</td></tr>
</table>

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							All other industries located within SEZ are adhere to provide adequate stack height and pollution control measures for proper dispersion of pollutants as per respective permissions granted by the board. The same is being inspected and ensured by APSEZ as well as SPCB officials on regular basis.
			covering of other types of dry bulk cargo heaps by protective materials, installation of wind breaking wall, development of greenbelt along the periphery of the storage yards/back up area and mechanized handling system for	An internal Coal Dust Management Working Group shall be formed by APSEZ to effectively co-ordinate the approach to coal dust management and monitoring	APSEZ and Other Industries, Concerned Stake holders, District Administration*	Long Term	As mentioned above, presently, APSEZ has formed Internal Environment Monitoring Committee, involving Officials of APSEZ, Adani Power Limited & other member units, with specific role and responsibilities as defined above. The dry cargo is being handled by mechanized system and transported by covered conveyer system, trucks and rail wagons. Wind breaking wall is provided around the coal storage yards of APSEZ as well as Adani Power Plant. Adequate air pollution control measures like ESPs, FGDs, Bag Filters, etc. and adequate stack heights provisions within the thermal power plant for proper dispersion of pollutants. Green belt / plantation is provided around the periphery of dry cargo storage area and regular water sprinkling is also being done to abate the dust emission from coal hips.

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			coal and other dry bulk cargo and Wagon loading and truck loading through closed silo. Both thermal power plants in the study area have installed electrostatic precipitators on the boilers and are meeting the emission norms as per the respective ECs granted. Due to installation of tall stacks as per CPCB guidelines				Last committee meeting was conducted on dated 23rd March 2022, and below were the point of discussion for way forward. • Brief introduction about the Environment Management Plan (EMP) • All members conveyed his environment management practices, issue & suggestions • Discussed about the various ways to improve existing practice to control the emission in terms of Air, Water and Noise. • Discussed about the proper management of the canteen waste. • Discussed about the cleaning of outside of the SEZ units. • Discussed about the management of rain water & proper cleaning of the common storm water drainage system. • Discussed about proper segregation & disposal of solid waste material. • Discussed about to increase more green belt area inside plant premises of SEZ units

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			and EC conditions, the relative air pollution impacts due to release of emissions from two power plants is insignificant.				
4.3	Ships are one of the significant sources of SO2 and NOX emissions in the study area. Marine diesel engines on the ships often utilize fuel oils that might contain higher	Level-2	A Standard Operating Procedure (SOP) has be developed to be included as a part of APSEZ environment management plan to verify that all ships anchored at	The current global limit for Sulphur content of ships fuel oil is 3.5 % m/m (mass by mass). According to MARPOL, the new global cap on sulphur in the marine vessel fuels will be 0.50% m/m by the 1st January 2025. APSEZ should	APSEZ and Ship Owners	Long Term	The ships coming to the APSEZ is complying with MARPOL and other shipping rules and regulations. APSEZ has already started providing shore power supply to the tugs (11 Nos.), dredgers (2 Nos.) and barges (1 No.). The feasibility of shore power will be explored and implemented on large scale for the visiting vessels to reduce idling stage ship emissions.

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	sulphur content. As per the international best practices, these marine diesel engines are designed to meet MARPOL regulations with NOX emissions less than 14.4 gram/Kwhr of engine. Due to lower stack heights of the marine diesel engine, ship emissions often gets		the port are adopting the MARPOL4 regulations.	explore the possibility of providing shore power to the ships at the port to reduce idling stage ship emissions.			

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	dispersed in the local environment and might pose risk of fumigation during the early morning and evening hours due to atmospheric inversion break-up periods.						
4.4	Road vehicle emissions will be other major contributors to the air pollution in the region	Level-2	Not Applicable	Due to implementation of Bharat VI fuels (MoEF&CC)6 in near future the vehicular and diesel engine emissions will be reduced by about 50% from the current national levels. APSEZ should develop a	APSEZ and All Industries	Short Term	Presently, cargo evacuation through rail / conveyer / pipeline has increased to ~38.36 %, thereby reducing the usage of road. Vehicles having valid PUC certificate are only being allowed to enter within APSEZ area. In future, APSEZ will also explore the feasibility of using Electric Vehicles for internal cargo movement.

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	when the facility is fully developed.			robust contractor environmental policy to ensure that Bharat Stage VI emission norms are adopted by all their contractors and sub-contractors.			
5	**Noise emissions**						
5.1	Noise emissions are envisaged from port operations, industrial operations and power plants in the study area. Any increase in	Level-1	Due to adoption of various mechanized operations at the waterfront development, the noise emissions from the port cargo handling will be minimal. An adequate	APSEZ, all the tenant industries and facilities within APSEZ are required to undertake noise monitoring at their facilities to demonstrate the compliance with the Noise level standards. Continuous noise recording units can be installed	APSEZ	Continual Process	Below Safeguard measures are already taken for abatement of noise emissions. • Development of greenbelt along the periphery of the operational area. • D.G. Sets having Acoustic enclosures. • Maintenance of plant machineries and equipment's on regular frequency. Noise monitoring is being carried out by NABL accredited and MoEF&CC authorized agency namely M/s. Pollucon Laboratories Pvt. Ltd. Surat and Unistar Environment and Research Labs Pvt. Ltd., Vapi as per permission granted and reports are being submitted to the concerned authorities on regular basis.

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<tr><td></td><td>noise levels beyond three decibels from the background levels would be perceived as noise nuisance (USEPA)7.</td><td></td><td>greenbelt is being developed by APSEZ to further reduce any residual impacts due to noise emissions from the facility.
Periodic noise level monitoring programs were adopted by APSEZ.
Predicted noise levels were found to be well within the designated noise standards for Industrial</td><td>by APSEZ at facility boundary to address the community grievances, when ever required. To assess the overall site wide compliance and also to address any community grievances related to noise issues due to operation of APSEZ facilities.</td><td></td><td></td><td>The noise monitoring summary for last six months (Oct'21 to Mar'22) are as below.

Locations: 13 Nos.
Frequency: Once in a month (24 hourly)
<table><tr><th>Noise</th><th>Unit</th><th>Leq Max</th><th>Leq Min</th><th>Leq Avr.</th><th>Leq Perm. Limit$</th></tr><tr><td>Day Time</td><td>dB(A)</td><td>72.90</td><td>53.25</td><td>64.35</td><td>75</td></tr><tr><td>Night Time</td><td>dB(A)</td><td>67.80</td><td>48.28</td><td>59.26</td><td>70</td></tr></table>$ as per GPCB standards

Approx. INR 14.31 Lakhs is spent by APSEZ for environmental monitoring activities during the FY 2021-22, which also includes noise monitoring for overall APSEZ, Mundra.

All the results are well within the standards. From this it can be inferred that there no impacts on the surrounding community.

All other industries located in the APSEZ are adhere to monitor and control the ambient noise level as per permission granted by SPCB and same is being confirmed by APSEZ as well as SPCB on regular basis.

Further, till date APSEZ has not received any</td></tr>
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			facilities.				grievances/notice for noise issues from any of the stakeholders.
				In order to address the public grievances related to noise from the facility, an internal Noise Management Committee can be formed by APSEZ to investigate the root cause and to develop and implement noise mitigation plans in the specific zones.	APSEZ	Continual Process	As mentioned above, presently, APSEZ has formed Internal Environment Monitoring Committee, involving Officials of APSEZ, Adani Power Limited & other member units, having role and responsibilities as defined above. Last committee meeting was conducted on dated 23rd March 2022, and below were the point of discussion for way forward. • Brief introduction about the Environment Management Plan (EMP) • All members conveyed his environment management practices, issue & suggestions • Discussed about the various ways to improve existing practice to control the emission in terms of Air, Water and Noise. • Discussed about the proper management of the canteen waste. • Discussed about the cleaning of outside of the SEZ units. • Discussed about the management of rain water & proper cleaning of the common storm water drainage system. • Discussed about proper segregation & disposal of solid waste material.

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							• Discussed about to increase more green belt area inside plant premises of SEZ units No grievance received for noise related issues, and it is observed that ambient noise level are well within the permissible standards.
6	**Surface water quality (Terrestrial and Marine)**						
6.1	In general, release of untreated wastewater from industrial facilities would pose threat to water quality of streams, estuaries and marine water bodies.	Level -1	As per the master plan of APSEZ, 67 MLD of wastewater is expected to be generated from the fully developed project scenario, for which necessary permissions to set up decentralized CETPs of various capacities are already obtained.	As per the master plan of APSEZ, the existing CETP shall be augmented to 67 MLD in progressive manner based on the future demand. The facility should limit the marine discharge of treated industrial wastewater to 16 MLD as per the permits. Remaining treated wastewater shall be utilized for horticulture	APSEZ	As and When Required	APSEZ has installed Common Effluent Treatment Plant (CETP) having 2.5 MLD capacities for treatment of partially treated effluent and sewage generated from industries within SEZ. Currently, CETP receives 669 KLD (Avg.) hydraulic load and considering the current development scenario, existing CETP is adequate to treat and handle the total effluent load coming from industries within SEZ. Out of 51 only 4 industries within SEZ are sending their partially treated industrial as well as domestic effluent to the CETP confirming CETP inlet norms for further treatment and final disposal. Other industries within SEZ have their own STPs / ETPs for treatment of wastewater generated from their industrial operation and discharging the treated water on land for horticulture purpose within their premises as per permission granted by SPCB. The capacities of CETP will be enhanced on modular basis as per future requirement.

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			Presently a CETP capacity of 2.5 MLD is in place. Presently member units treat their effluents to meet the CETP inlet norms and then send it to CETP. Treated wastewater from CETP meets the stipulated discharge norms for utilization for greenbelt development within the APSEZ areas.	purpose.			Presently avg. 2.03 MLD (from CETP, ETP & STPs) of treated water is being utilized on land for horticulture purpose within APSEZ premises during period Oct'21 to Mar'22 and no discharge is made to any other source.
			Online	Efforts shall be		Based on	Online continuous effluent monitoring system installed

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			wastewater quality monitoring systems are installed at CETP to ensure quality of treated effluent meets the requisite discharge norms. No wastewater from CETP is discharged into natural bodies as on date..	made to recycle complete treated wastewater for port operations and industrial operations of APSEZ in future based on a detailed techno-economic feasibility study.	APSEZ	outcome Techno-feasibility Study	at the discharge point of CETP to track any deviation from discharge norms. Presently entire quantity of treated water from CETP is used for gardening / horticulture purpose within APSEZ premises.
			Runoff during monsoon from coal storage yards is collected in sedimentatio	Storm water runoff from the facility during the first rain shall be sampled and analyzed for the presence of heavy metals or	APSEZ	Continual	There are provision of drains around coal stack yard to carry to runoff water to dump ponds. This water is either used for dust suppression or after sedimentation (to remove residual dust), is allowed disposal to sea. Presently Marine monitoring is being carried out once in a month by NABL and MoEF&CC accredited agency namely M/s. Pollucon Laboratories Pvt. Ltd. Surat and

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<tr><th>S. No.</th><th>Identified environmental and social impacts for the fully developed scenario (year 2030)</th><th>Type of Impact & Magnitude1</th><th>Environment management plans adopted or being adopted by APSEZ as per permits, clearances, applicable regulations and guidelines etc.</th><th>Additional Risk Mitigation Measures/ESMP</th><th>Responsible agency</th><th>Timeframe for implementation</th><th>Compliance</th></tr>
<tr><td></td><td></td><td></td><td>n ponds (dump pond) to remove any residual dust particulates for further disposal into sea</td><td>other criteria pollutants to adopt corrective and preventive actions to protect the marine water quality.
All red and hazard category industry within APSEZ shall adopt spill prevention and control program and no effluents shall be discharged into storm water-drains.</td><td></td><td></td><td>Unistar Environment and Research Labs Pvt. Ltd., Vapi for APSEZ & APL both. The analysis reports of the same are being submitted to the concerned authorities on regular basis.

The marine water quality monitoring summary for last six months (Oct'21 to Mar'22) is as per below.

Locations: 14 Nos. (APSEZ – 9 + APL – 5)
Frequency: Once in a Month / Half Yearly
<table>
<tr><th rowspan="2">TEST PARAMETERS</th><th rowspan="2">UNIT</th><th colspan="3">Cumulative Surface</th><th colspan="3">Cumulative Bottom</th></tr>
<tr><th>Min</th><th>Max</th><th>Average</th><th>Min</th><th>Max</th><th>Average</th></tr>
<tr><td>pH</td><td>--</td><td>7.3</td><td>8.26</td><td>8.02</td><td>7.5</td><td>8.21</td><td>8.03</td></tr>
<tr><td>BOD</td><td>mg/L</td><td>2.1</td><td>5.9</td><td>4.09</td><td>0</td><td>5.8</td><td>2.79</td></tr>
<tr><td>TSS</td><td>mg/L</td><td>24</td><td>144</td><td>70.45</td><td>30</td><td>118</td><td>64.34</td></tr>
<tr><td>DO</td><td>mg/L</td><td>5.3</td><td>6.7</td><td>5.92</td><td>4.9</td><td>6.5</td><td>5.61</td></tr>
<tr><td>Salinity</td><td>ppt</td><td>34.1</td><td>36.7</td><td>35.75</td><td>33.4</td><td>37.3</td><td>36.24</td></tr>
<tr><td>TDS</td><td>mg/L</td><td>29104</td><td>37604</td><td>35921</td><td>31828</td><td>37992</td><td>36488</td></tr>
<tr><td>Temperature</td><td>oC</td><td>29</td><td>30.2</td><td>30</td><td>29</td><td>30.1</td><td>30</td></tr>
</table></td></tr>
</table>

S. No.	Identified environmental and social impacts for the fully developed scenario (year 2030)	Type of Impact & Magnitude1	Environment management plans adopted or being adopted by APSEZ as per permits, clearances, applicable regulations and guidelines etc.	Additional Risk Mitigation Measures/ESMP	Responsible agency	Timeframe for implementation	Compliance
							Approx. INR 14.31 Lakhs is spent by APSEZ for environmental monitoring activities during the FY 2021-22, which also includes noise monitoring for overall APSEZ, Mundra.
			Detailed marine hydrodynamic modelling studies revealed that the current and proposed dredged soil disposal practices, sea water intake and outfall facilities and desalination plant outfall etc have shown insignificant impact on the marine	Good dredging practices shall be adopted by APSEZ: (i).Improving the dredging accuracy (ii).Improving onboard automation and monitoring, (iii). Reduce spill and loss, (iv). evaluating the need for installing silt screens near mangrove areas during the dredging phase operations, (v). Environment friendly dredging activities can be	APSEZ	Long Term	No capital dredging has been done, since Apr 2015. Dredged material generated during maintenance dredging is being disposed at designated locations within deep sea as identified by NIO. Dredging Management plan is adopted for carrying out dredging and management of dredge material. Presently there are 3 nos. (2 Nos. Cutter suction + 1 No. Trailer suction) of dredgers are in operation for dredging. Marine monitoring is being carried out once in a month by NABL and MoEF&CC accredited agency namely M/s. Pollucon Laboratories Pvt. Ltd. Surat and Unistar Environment and Research Labs Pvt. Ltd., Vapi. The analysis reports of the same are being submitted to the concerned authorities on regular basis. Summary of marine water for the last six months is as mentioned above. The same practice will be continued in future also as per direction by MoEF&CC as well as GPCB.

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			eco-system. As part of the comprehensive environmental monitoring program, APSEZ has been adopting marine water and sediment quality monitoring on monthly basis.	undertaken in such a way that the overall turbidity levels near the mangrove and ecologically sensitive zones shall not exceed 100 NTU or 200 mg/l of TSS (10% lethal level of fish) Existing marine monitoring program shall be continued as per the directions of MoEF&CC and GPCB.			Monitoring will be focused near ecological sensitive area in case of need to carryout capital dragging near such areas.
7	**Groundwater quality and salinity ingress**						
7.1	While Mundra block is enjoying safe ground water status as on date	Level-2	APSEZ is not utilizing ground water for any type of use. APSEZ is meeting the	A dedicated desalination plant of capacity 4,50,000 m3/day (450 MLD) will be developed in progressive	APSEZ	As and When Required	Present source of water for various project activities is desalination plant of APSEZ and/or Narmada water through Gujarat Water Infrastructure Limited and same is sufficient to meet the present water demand. APSEZ does not draw any ground water.

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	(based on the data published by CGWB), due to induced economic and population growth, use of ground water resources by the local people might increase in Mundra region. This might increase the TDS and chloride levels in the ground water in future.		current water demand through Narmada water supply scheme and 47 MLD captive desalination plant at site.	manner to meet the APSEZ requirements.			The desalination plant of additional capacities will be installed on modular basis considering future development and requirement.
7.	Due to	Level-2	Ground	The Govt. of			APSEZ will co-operate and comply with the directions

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2	induced growth in the region, pressure on the available ground water source would increase and this could pose some threat to salinity ingress.		water is not drawn by APSEZ for its operations. Natural streams (seasonal rivers) passing through the APSEZ area will not be disturbed, the micro-watershed in the area will not be disturbed. Due to the above reasons, the possibility of salinity ingress due to APSEZ development is not envisaged.	Gujarat, Narmada, Water Resources, Water Supply & Kalpsar Dept.,(WRD)12 has been implementing various salinity ingress prevention projects	District Administration*	Long Term	from concerned regulatory authorities. APSEZ does not draw any ground water for the fresh water requirement. However, Adani Foundation – CSR arm of Adani Group has carried out rainwater harvesting activities in the nearby villages for benefit of the locals. Water conservation Projects i.e. Roof Top Rain Water Harvesting, Desilting of Check dams, Bore Well Recharge and Pond deepening were taken up in past years, review and monitoring of all water harvesting structures had been taken up. To make connections between human actions and the level of biological diversity found within a habitat and/or ecosystem, this year Adani Foundation launch project "Sanrakshan" in coordination with GUIDE and Sahjeevan. Since, 10 years considerable Water Conservation Work carried out in Mundra Taluka. Due to satisfactory rain in current year 1.11 mtr ground water table increased as per increased in coastal belt of Mundra as per Government Figures. **Our water conservation work is as below.**

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			Mundra and Anjar blocks fall under fresh water to medium salinity zones. It can be observed that little variation was observed in the ground water salinity levels from year 2013 to 2016 across the Mundra and Anjar blocks. This aspect confirms that the overall salinity ingress from the shore into the land due to				• Augmentation of 2 check dams (1 Check dam current year). • Ground recharge activities (pond deepening work for more than 56 ponds) individually and 26 ponds under Sujlam Suflam Jal Abhiyan were built leading to a significant increase in water table and higher returns to the farmers. • Pond deepening and bund strengthen of Rampar village pond increase water storage capacity • Roof Top Rain Water Harvesting 115 Nos. (50 Nos current FY 2021-22) which is having 10,000 litre storage which is sufficient for one year drinking water purpose for 5 people family. • Recharge Borewell 189 Nos (83 Nos current FY 2021-22) which is best ever option to. • Drip Irrigation 1158 Farmers (180 formers are supported with 15% of amount of total cost for maximum 4.0 lac. in current FY 2021-22) • Bund construction on way of Nagmati River could save more than 575 MCFT water quantity which recharged in ground due to which borewell depth decreased by 50-100 Ft in Zarpara, Bhujpur and Navinal Vadi Vistar. • Luni Pond Bund Repairing Work is completed. With the objective of to preserve the rainwater to reduce the impact of salinity and recharge the ground water (the main source of water) to facilitate the Agricultural activities as well as for drinking water.

<table>
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<tr><td></td><td></td><td></td><td>existing APSEZ facilities and power plant outfalls are less significant.</td><td></td><td></td><td></td><td>Narmada Water Resources, Water Supply & Kalpsar Dept., (WRD)1 has been implementing various salinity ingress prevention projects. Under Sardar Sarovar canal project, Govt. of Gujarat has proposed to implement about 8200 Km stretch of water canal and the project is at various stages of implementation. Under this project about 112,000 ha of land in about 180 villages will be benefitted with irrigation needs. This will significantly reduce the pressure on the ground water resources in the region.</td></tr>
<tr><td></td><td></td><td></td><td></td><td>While the individual industries in the study area will continue to undertake ground water quality monitoring as per the environmental clearances issued for the</td><td>All Concerned Stakeholders, District Administration and CGWB*</td><td>Continual Process</td><td>APSEZ (9 Locations – half yearly) & Adani Power Ltd. (5 Locations – quarterly) is carrying out ground water sampling and reports of the same are being submitted to the regulatory authorities on regular basis.

The summary of APSEZ ground water quality monitoring for last six months (Oct'21 to Mar'22) are as below.
Nos. of Location: 09
<table>
<tr><th>Parameters</th><th>Unit</th><th>Min</th><th>Max</th><th>Average</th></tr>
<tr><td>pH @ 25 ° C</td><td>--</td><td>7.37</td><td>8.17</td><td>7.78</td></tr>
<tr><td>Salinity</td><td>ppt</td><td>0.95</td><td>11.85</td><td>3.95</td></tr>
<tr><td>Oil & Grease</td><td>mg/L</td><td>ND*</td><td>ND*</td><td>ND*</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>S. No.</th><th>Identified environmental and social impacts for the fully developed scenario (year 2030)</th><th>Type of Impact & Magnitude1</th><th>Environment management plans adopted or being adopted by APSEZ as per permits, clearances, applicable regulations and guidelines etc.</th><th>Additional Risk Mitigation Measures/ESMP</th><th>Responsible agency</th><th>Timeframe for implementation</th><th>Compliance</th></tr>
<tr><td></td><td></td><td></td><td></td><td>respective projects, a regional level ground water conservation action committee can be formed under the guidance of state ground water board and district Administration.</td><td></td><td></td><td>
<table>
<tr><td>Hydrocarbon</td><td>mg/L</td><td>ND*</td><td>ND*</td><td>ND*</td></tr>
<tr><td>Lead as Pb</td><td>mg/L</td><td>0.04</td><td>0.08</td><td>0.05</td></tr>
<tr><td>Arsenic as As</td><td>mg/L</td><td>ND*</td><td>ND*</td><td>ND*</td></tr>
<tr><td>Nickel as Ni</td><td>mg/L</td><td>0.07</td><td>0.17</td><td>0.10</td></tr>
<tr><td>Total Chromium as Cr</td><td>mg/L</td><td>0.07</td><td>0.09</td><td>0.08</td></tr>
<tr><td>Cadmium as Cd</td><td>mg/L</td><td>0.10</td><td>0.10</td><td>0.10</td></tr>
<tr><td>Mercury as Hg</td><td>mg/L</td><td>ND*</td><td>ND*</td><td>ND*</td></tr>
<tr><td>Zinc as Zn</td><td>mg/L</td><td>0.15</td><td>0.39</td><td>0.25</td></tr>
<tr><td>Copper as Cu</td><td>mg/L</td><td>ND*</td><td>ND*</td><td>ND*</td></tr>
<tr><td>Iron as Fe</td><td>mg/L</td><td>0.11</td><td>1.12</td><td>0.67</td></tr>
<tr><td>Insecticides/Pesticides</td><td>µg/L</td><td>Absent</td><td>Absent</td><td>Absent</td></tr>
<tr><td>Depth of Water Level from Ground Level</td><td>meter</td><td>1.80</td><td>2.15</td><td>1.99</td></tr>
</table>
* ND – Not Detectable

Approx. INR 14.31 Lakhs is spent by APSEZ for environmental monitoring activities during the FY 2021-22, which also includes noise monitoring for overall APSEZ, Mundra.

The freshwater requirement of all the industries within SEZ is being satisfied through APSEZ. All the industries are encouraged to monitor ground water quality as per the permissions granted by competent authorities.

As mentioned above, presently, APSEZ has formed Internal Environment Monitoring Committee, involving Officials of APSEZ, Adani Power Limited and other</td></tr>
</table>

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							member units, having role and responsibilities as defined above. APSEZ will co-operate and comply with the directions from concerned regulatory authorities for ground water management.
8	**Waste Management**						
8.1	Solid waste will be generated from industrial activities of APSEZ and other permitted facilities in the study area including Mundra town. These wastes would contain recyclable material, constructio	Level-2	APSEZ has been adopting Zero waste Initiatives and the entire waste generated from existing operations is segregated and disposed to recycling vendors, thereby APSEZ has achieved zero landfill status as on date.	APSEZ will continue to adopt Zero Waste Initiative and wastes will be segregated at source and disposed to various recycling vendors, co-processing in cement plants. This initiative helps not only to reduce the waste to landfill significantly, but also to recycle the materials there by avoiding ecological	APSEZ	Continual Process	Presently APSEZ has implemented Zero waste Initiatives as per 5R (Reduce, Reuse, Recycle, Recover & Reprocess) principles of waste management. At present, APSEZ has developed material recovery facility for 6.0 TPD capacities. A well-established system for segregation of dry & wet waste is in place. All wet waste (Organic waste) is being segregated & utilized for compost manufacturing and/or biogas generation for cooking purpose. The compost is further used by in house horticulture team for greenbelt development. Whereas dry recyclable waste is being sorted in various categories. Presently manual sorting is being done for sorting of different types of solid waste. Segregated recyclable materials such as Paper, Plastic, Cardboard, PET Bottles, Glass etc. are then sent to respective recycling units, whereas remaining non-recyclable waste is bailed and sent to cement plants for Co-processing as RDF (Refused Derived Fuel). The same practice will be continued in future also. APSEZ has also been recognized for Zero Waste to Landfill certification from reputed organization.

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	n debris, organic waste, inert material and e-waste etc. In the absence of any organized source segregation programs and material recycling strategies and infrastructure facilities, these wastes will enter into environment and would pose long term health impacts.			impacts.			APSEZ, Mundra is certified for Zero Waste to Landfill management system (ZWTL MS 2020) by TUVRheinland India Pvt. Ltd. (valid up to 31.05.2024). APSEZ, Mundra has also been certified as Single Use Plastic (SUP) Free Port by Confederation of Indian Industry (CII) (valid up to 25.05.2022). Details of the same were submitted as part of compliance report submission for the duration of Apr'21 to Sep'21. APSEZ will continue proper solid waste management in his operational area.
			APSEZ has made a	The existing waste			

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8.2	Considering an average solid waste generation of 0.25 Kg/person/day, the estimated solid waste from facilities within APSEZ will be in the order of 100 TPD (36,500 TPA).	Level-2	provision for central waste management facilities within the existing site based on the future needs. As part of the Zero Waste Initiatives, no landfill facilities will be installed at APSEZ.	segregation and material recycling facilities will be augmented to dispose safely the wastes generated from APSEZ areas. Solid Waste Management Program shall be adopted and implemented as per Municipal Solid Waste Management Rules 2016 and Construction Waste Management Rules 2016	APSEZ	Continual Process	Industries located within the SEZ area are also complying with the waste management rules stipulated by statutory authorities and same is also being confirmed by APSEZ as well SPCB on regular basis.
8.3	About 35 TPD (13,000 TPA) of solid waste would be	Level-2	As per the MSW Rules 2016 all the industrial facilities and	Solid Waste Management Program shall be adopted and implemented as per Municipal	All Industries	Continual Process	

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	generated from the proposed industrial areas located outside the APSEZ area.		SEZs are required to adopt waste segregation facilities at the respective properties and non-recyclable waste shall be disposed to landfill sites.	Solid Waste Management Rules 2016 and Construction Waste Management Rules 2016			
9	**Ecological aspects (terrestrial and marine)**						
9.1	About 1576 ha of shrub forest land contiguous to APSEZ area is applied for	Level -1	It is noted that the designated forest land is free from any native vegetation and comprises of	APSEZ has approached concerned authorities for diversion of designated forest land. Suitable compensatory afforestation plan shall be	APSEZ/State Forest Department*	Long Term	Stage – 1 forest Clearance for about 1576.81 Ha Forest land has been obtained. Presently APSEZ is in the process of compliance to the stage – 1 Forest Clearance conditions, for further submitting to Govt. authorities for issuance of Stage-2 Forest Clearance.

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	land diversion for various developmental activities. This might have certain level of changes in the biodiversity in the study area.		Prosopis juliflora. It is also noted that no endangered species are present at the shrub forests that are applied for land diversion. It is also noted that no forest produce is reported from this designated forest land parcel due to lack of economic importance of plant species reported in	adopted based on the recommendations and directions of the concerned authorities. Due to adoption of compensatory afforestation program through a scientific manner, the overall ecological footprint in the district will be increased. Due to plantation of native tree species as part of greenbelt development, the overall biodiversity of the region will increase considerably when the project is fully			

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			the shrub forest. It is also noted that no tribal lands are located in the designated forest land parcel. Hence there will not be any change in biodiversity due to the proposed diversion.	developed.			
9.2	Mangrove conservation areas are located adjacent to the APSEZ area.	Level -1	No development activities will be undertaken within mangrove conservation areas.	Mangrove footprint and health status shall be monitored annually	APSEZ	Continual Process	As per study conducted by NCSCM in 2017, mangrove cover in and around APSEZ, Mundra has increased from 2094 Ha to 2340 ha (as compared between 2011 to 2017). The analysis has shown an overall growth of 246 ha. The cost for said study was INR 3.15 Cr. Recently study was carried out in the year 2019 and based on that there is an increase of mangrove cover between **March 2017 (Total 2340) and September**

<table>
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<tr><td></td><td>Accidental discharges of industrial effluents into the marine environment would pose certain ecological risk.</td><td></td><td>APSEZ has taken up large scale mangrove afforestation activities in an area of more than 2800 ha at various locations across the coast of Gujarat state in consultation with various organizations
The Adani Foundation introduced 'Mangrove Nursery Development and Plantation' scheme in</td><td></td><td></td><td></td><td>2019 with an extent of 256 Ha (Total 2596 Ha Area) which is about 10.94% rise in growth rate, also It reveals that the mangrove and the tidal system in the creeks remained undisturbed over this period.

Hence, there is an overall growth of mangroves in creeks in and around APSEZ, Mundra is 502 Ha between 2011 and 2019.

Analysis of data between categories indicated that there was an increase in dense mangroves along with the conversion of scattered into sparse, that shows the growth of mangroves in a progressive direction.

As a part of GCZMA recommendations and NCSCM mangrove conservation action plan, APSEZ has undertaken following activities.
<table>
<tr><th>Sr. No.</th><th>Recommendations</th><th>Compliance</th></tr>
<tr><td>1.</td><td>Mangrove mapping and monitoring in and around APSEZ</td><td>• APSEZ entrusted NCSCM, Chennai to carry out Monitoring of mangrove distribution in creeks in and around APSEZ and shoreline changes in Bocha island.</td></tr>
</table></td></tr>
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			the area as an alternative income generating activity for the people of the region.						• As a part of this study, overall growth of mangroves in the creeks in and around APSEZ was assessed comparing Google earth images of 2017 & 2019 and it is observed that there was increase in mangrove cover between March 2017 and September 2019 to the extent of 256 Ha, which is about 10.7%. • This suggests that the mangroves and the tidal system in the creeks remain undisturbed over this period. Analysis of data between categories indicated that there was an increase in dense mangroves and also conversion of scattered to sparse which also shows that the growth of mangroves in a progressive direction. • Hence, there is an overall growth of mangroves in creeks in and around APSEZ, Mundra is 502 Ha between 2011 and 2019. • The cost of the said study was INR 23.56 Lacs incurred by APSEZ.

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							2.	Tidal observation in creeks in and around APSEZ	• APSEZ carried out the tidal observations at locations similar to 2017 in Kotdi, Baradimata, Navinal, Bocha and Khari creeks under the guidance of NCSCM. • The observed tidal ranges indicate that the creeks experience normal tidal ranges, adequate for the growth of mangroves. • The cost of the said activity was INR 1.0 Lacs.
							3.	Removal of Algal and Prosopis growth from mangrove areas	• Algal and Prosopis growth monitoring was done in and around mangrove area and algal encrustation was found in some of the mangrove areas, which has been removed manually. • Algal & Prosopis removal from Mangrove area for FY 2021-22- The cost of the said activity was INR 2.8 Lacs incurred by APSEZ. Please refer attached **Annexure – 1** for Report of Algal removal work in mangrove area.
							4.	Awareness of mangroves	• Adani Foundation – CSR Arm of Adani group has done

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								importance in surrounding communities	awareness camps/activities created in the community regarding importance of mangroves. • Adani Foundation provides Good Quality dry and green fodder to 24 Villages. Project is covering total 14116 Cattels / 3008 farmers and hence enhancing cattle productivity. Dry Fodder 895398 Kg Green –2425230 Kg. • Adani Foundation has also provided 117.11 lacs kg Dry Fodder and 89.00 lacs kg Green fodder in 29 villages of Mundra and Anjar Block to support the resource dependent villagers, to avoid their dependency on mangroves. The expenditure for fodder supporting activities was approx. 206.11 Lacs during FY 2021-22. • Village Gauchar land development for the fodder cultivation to made fodder sustain village & Avail green fodder in scarcity phase. With the support of Gauchar Seva Samiti Grassland development in Siracha – 85

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							Acre & Zarpara – 25 Acre done which resulted in total production of 82 ton. • Other than this dedicated security guard with gate system deployed by APSEZ across the coastal area and no any unauthorized persons allowed within coastal as well as mangrove areas. • Refer CSR report attached as **Annexure – 2**. Other than this Adani Foundation – CSR Arm of Adani Group at Mundra-Kutch has initiated multi-species plantation of mangroves in Luni village in association with GUIDE, Gujarat. During 2018-2019 (Phase-I) multi-species mangrove plantation was carried out in 10 ha, during Phase-II (2019-2020) it was 02 ha and during Phase III (2020-2021) it is 01 ha. During current FY 2021-22, 03 ha area coastal stretches have been planted with mangrove species. Total 16 Ha. multi-species mangrove plantation has been carried out till March-22 association with M/s. GUIDE, Gujarat. Mangrove plantation done at Luni sea coast with fisher folk community during World Environment Day Celebration. Web talk show was organized on the occasion of "World Mangrove days On Multi species Mangrove bio diversity with Joint effort of GUIDE and Adani Foundation, Mundra. 8th June is celebrated as

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							world ocean day. Adani foundation had celebrated the world ocean day by coastal cleaning activity at Juna Bandar, Luni Bandar and Bavadi Bandar. Mangroves nursery is developed in a Khari creek behind IOCL & 125000 Nos. of new saplings were planted in creek area by APSEZ.
9.3	Outfall from the thermal power plants desalination and CETP would pose certain level of impact on the marine environment.	Level-1	A detailed marine hydro-dynamic and dispersion modelling of the study area indicates that the background temperature and salinity at mangrove conservation area will not increase from the prevailing background levels as the	All approved marine outfalls shall be monitored for salinity, temperature and other designated parameters as per consent to establish issued by GPCB. Existing marine environmental monitoring program shall be continued.	APSEZ and Concerned Industry	Continual Process	Presently marine monitoring is being carried out by the Adani power plant at the marine outfall locations and reports are being submitted to the concerned authorities on regular basis. APSEZ is carrying out Marine monitoring once in a month at 9 locations in deep sea by NABL and MoEF&CC accredited agency namely M/s. Pollucon Laboratories Pvt. Ltd. Surat and Unistar Environment and Research Labs Pvt. Ltd., Vapi. The analysis reports of the same are being submitted to the concerned authorities on regular basis. Adani power plant is also doing marine water quality at 5 locations (2 locations at outfall location) in deep sea by NABL and MoEF&CC accredited agency namely M/s. Unistar Environment & Research Labs Pvt. Ltd. The analysis reports of the same are being submitted to the concerned authorities on regular basis. The summary of marine water quality is shown above. The comparison of marine water results between CIA

<table>
<tr><th>S. No.</th><th>Identified environmental and social impacts for the fully developed scenario (year 2030)</th><th>Type of Impact & Magnitude1</th><th>Environment management plans adopted or being adopted by APSEZ as per permits, clearances, applicable regulations and guidelines etc.</th><th>Additional Risk Mitigation Measures/ESMP</th><th>Responsible agency</th><th>Timeframe for implementation</th><th>Compliance</th></tr>
<tr><td></td><td></td><td></td><td>outfalls are located far away. APSEZ and respective power plants in the study area have been monitoring the marine water quality status on monthly basis for the stipulated environmental and ecological parameters.</td><td></td><td></td><td></td><td>and current monitoring data are as below.
<table><tr><th rowspan="2">Parameter</th><th rowspan="2">Unit</th><th colspan="2">Max</th><th colspan="2">Min</th></tr><tr><th>CIA</th><th>Present</th><th>CIA</th><th>Present</th></tr><tr><td>Temp.</td><td>^{0}C</td><td>30.2</td><td>30</td><td>28</td><td>29</td></tr><tr><td>Salinity</td><td>ppt</td><td>41.8</td><td>37.3</td><td>34.9</td><td>36.3</td></tr></table>
As per above results, it can be seen that there is no major deviation in the concentration of parameters and thus indicates that impacts are insignificant.</td></tr>
<tr><td>9.4</td><td>Terrestrial Ecology: Study area doesn't have any notified national</td><td>Level-1</td><td>APSEZ has developed greenbelt in an area of 550ha as against the committed area of</td><td>The compensatory afforestation area to be monitored annually to check the</td><td>APSEZ</td><td>Continual Process</td><td>APSEZ has developed its own "Dept. of Horticulture" which is taking measures/ steps for terrestrial plantation/greenbelt development. APSEZ, Individual SEZ Industries and Adani Power Plant has developed more than 700 Ha. area as greenbelt within the APSEZ area including SEZ industries & Adani Power Plant.

Dedicated horticulture department is maintaining and</td></tr>
</table>

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	parks or ecological sanctuaries. Since the area falls under dry deciduous shrubs. Due to scanty rains in the area, the overall natural green-cover/vegetation in the area is very small.		430ha. A dedicatenursery is set up to promote plantation. APSEZ have undertaken a plantation with about 9.6 Lakh fully grown trees.	survival rate of the plantation.			monitoring the terrestrial green belt development on regular basis to check the survival rate of plantation. Total expenditures of the horticulture dept. of APSEZ during the FY 2021-22 within APSEZ is INR 921 lakhs.
10	**Socio-economic aspects**						
10.1	Population growth in the Mundra region was reported to be in the order of 85% during the past decade	Level-1	Dedicated townships are developed within APSEZ area with necessary community infrastructures such as	The existing townships will be expanded to accommodate about 4lakh people when the project activity is fully developed.	APSEZ	As and When Required	APSEZ has developed two townships (Shantivan and Samudra) accommodating 2057 households and associated infrastructure facilities. Accommodation is made available for all interested employees working within Adani group & SEZ industries. Out of which 97.4% Occupancies are accommodated within the townships and rest are available for employees working within APSEZ.

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	(2001-2011). Further expansion of the urban area could be possible due to induced economic growth in the region. Increase in population will have a additional need for public infrastructure in the region.		hospital, school, recreational facilities, sewage treatment and waste collection facilities. Adani Foundation has been undertaking various CSR programs under the principal themes such as education, community health, sustainable livelihood and rural infrastructure. About Rs. 97 Cr has been spent on various CSR activities in				At present 51 nos. of industries (processing & non-processing) are operating within the SEZ. Township facilities are also made by SEZ industries within Mundra town for their employees having basic infrastructure facilities and requirements. Most of the employees working in SEZ industries are residing in Mundra township having all basic requirements and associated facilities. The existing social infrastructure facilities are adequate to accommodate the people considering present APSEZ development. The existing townships with associated facilities will be expanded as per requirement. Other infrastructure facilities have been developed for people are as follows. • Multi-Specialty Hospital • School • Commercial complex • Religious place APSEZ is actively working with local community (including fishermen community) around the project area and provides required support for their livelihood and other concerns through the CSR arm – Adani Foundation in the main five persuasions is mentioned below. • Community Health • Sustainability Livelihood – Fisher Folk

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			the Mundra region since 2010. Similar community development programs (based on need based assessment) will be continued in future as well with allocation of appropriate budget.				• Education • Rural Infrastructures Adani foundation has spent approx. INR 6470.23 lakhs from April – 2018 to March – 2022 for CSR activities which also includes cost of rural infrastructure projects. Major works carried out since April 2018 as a part of CSR activities are as below. • Pond Deepening work at Vadala & Mota Bhadiya • Artificial recharge borewell in Borana, Mangara & Dhrub village. • 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. • Construction of 45 Toilet block and proper bathing place for labours. • RO Plant – Samaghogha, Siracha village & Vallabh Vidyalaya at Mundra • Basic sanitation facility (18 Nos) at Balvadi, medical centre and retiring places at labour settlements • Ground recharge activities (pond deepening work for more than 56 ponds) individually and 26 ponds under Sujlam Suflam Jal Abhiyan were built leading to a significant increase in water table and higher returns to the farmers. • Roof Top Rain Water Harvesting 115 Nos. (50 Nos current FY 2021-22) which is having 10,000 litre storage which

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							is sufficient for one year drinking water purpose for 5 people family. • Recharge Borewell 189 Nos (83 Nos current FY 2021-22) which is best ever option to. • Drip Irrigation 1158 Farmers (180 formers are supported with 15% of amount of total cost for maximum 4.0 lac. in current FY 2021-22) • Participatory Ground Water Management in ten villages with holistic approach for Kankavati Sandstone Aquifer Programme. • Bund construction on way of Nagmati River could save more than 575 MCFT water quantity which recharged in ground due to which bore well depth decreased by 50-100 Ft in Zarpara, Bhujpur and Navinal Vadi Vistar. • Development of Prisha Park at Mundra. • Pond Bund strengthening at Zarpara Village • Approach Road Restoration at all Fisher folk vasahat. • Garden Development at Primary School Rampar village • Shed Development at Shukhpurvah Mundra • Under Gram Utthan Project, Adani Foundation is supporting home biogas to farmers to Uthhan Villages phase wise. Current year supported **223 home biogas** in Dhrub, Zarpara and Navinal Villages. • Adani Foundation at Mundra-Kachchh has initiated multi-species plantation of mangroves in Kachchh in association with GUIDE. During 2018-2019 (Phase-I) multi-species mangrove plantation was carried out in 10 ha, during Phase-II (2019-2020) it was 02 ha and during Phase III (2020-2021) it is 01 ha. During current FY 2021-22, 03 ha area coastal stretches have been planted with mangrove species. Total 16 Ha. multi-species mangrove

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							plantation has been carried out till March-22 association with M/s. GUIDE, Gujarat. • Sea Weed Culture - A pilot cultivation facility (5 KL tanks in 6 nos) for the farming of different economically important seaweeds in the tanks on the onshore has been established and commenced the cultivation trials with red sea weeds Kappaphycus alvarezii, Gracilaria dura and green sea weed Ulva. The initial trials have given very promising results and harvested 6-7 times the seeded material in a 40-45 days cultivation period. • 50 RRWHS structure have been completed • 83 Bore-well recharging activity is completed. • Development Approach road Prasala vadi vistar Gogan Pachim at Zarpara • Earthen bund Repairing work at Pond, Luni. • Pre-monsoon activity Approach repairing, Village Pond Lake strengthen, and river cleaning (babul cutting) work is ongoing in Various Villages • Approach Road repairing at Various Fishermen Vasahat (ARC). Similar community development programs (based on need based assessment) will be continued in future as well with allocation of appropriate budget.
10.2	The overall sex ratio was found to reduce by 28% in the Mundra taluk	Level-2	Adani foundation is taking up several girl	Suitable regional level awareness programs on the girl child protection and encouragement	APSEZ, Other development projects and District Administration*	Long Term	Major works carried out since April 2018 as a part of CSR activities to create awareness about girl child protection are as below. • The Adani Foundation provided scholarship support to motivation and encouragement of

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	(study area) during the period 2001 - 2011. This could be attributed to increase in influx of working men in the region due to rapid economic development. Similar trend might continue in future due to induced economic growth in the region.		child education programs as part of CSR activities to create awareness about girl child protection.	programs in line with state and national policies shall be adopted under Corporate Social Responsibility programs in association with district authorities.			fishermen boys and girls for higher education under this program. APSEZ provide 100% fees support to girls as a scholarship. • Uthhan Project promotes girl child education, Creating awareness through various Govt schemes i.e. Vahali Dikri Yojana, Sukanya Samriddhi Yojana etc. till date covered more than 1200 girl child to get benefit out of it. • Separate sanitation facilities for girl child in schools. • Suposhan Project focus on adolescent and Reproductive age women nutrition part. Till date covered more than 12500 women and 8700 adolescents under this Project and brought them to considerable status. • Beti Vadhavo Programme was organized in 32 Villages in the presence of Village Sarpanch and other leaders in year 2017-18. We explained people about the various topics i.e. importance of girl child, Sex Ratio, Gender Equality and laws regarding Child abortion. This initiative was well accepted by community and we have observed a visible change in their mindset. We have facilitated 560 daughters with Kit (Small Bed sheet, Mosquito net, Soap and Cream with nutritious food for mother) To create awareness about health, personal hygiene, child education and nutritional diet in fishermen community, various awareness programs have been organized.

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							• During the year various activity like, Covid-19 awareness in village & Slum Area, Menstrual Hygiene Day, Breastfeeding Week, National Deworming Day, National Nutrition Month had been celebrated. • Project Suposhan is initiated with the Motive Curb malnutrition amongst Children, Adolescent girls and Women in our CSR villages. ✓ 100 beneficiaries covered in Menstrual Hygiene Day - with slogan called "RED-ACHHA HAI" ✓ 204 beneficiaries covered in Breastfeeding Week ✓ 320 beneficiaries covered in National Deworming Day ✓ 20 villages covered in celebration of NATIONAL NUTRITION MONTH ✓ 42 FAMILY COUNSELLING ✓ 2059 Women participated in celebration of Women's Day week. • To reduce malnutrition and anemia 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. • SuPoshan Thanksgiving program was organized. In this webinar DDO, CDPO Mundra and other dignitiaries remained present and appreciated the

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							efforts to overcome malnourishment in Mundra and Bitta. • The National girl child day was celebrated with ICDC Department with Vahli Dikri Yojna form filling, paediatric health camp and Baby health kit distribution at Mundra. Mrs. Ashaben-CDPO Mundra was remain present in this event. Total 61 forms has received approval letter from GOG and 15 forms filled upon the same day. • Adani Foundation is working with 15 Self help group and supporting to develop entrepreneur skills to become self reliant, sourcing more than 350 women to absorb in various job –this will give them identity, confidence and right to speak in any decision for home, village and working area. About INR 6470.23 lakhs has been spent on various CSR activities in the Mundra region since April 2018 to till Mar 2022 including cost of community health and education for woman and girl child.
10.4	Due to economic growth leading to rapid urbanization, which prompts the need for	Level-2	Adani hospitals, Mundra is setup by Adani group near Samudra township with a goal to provide primary and	APSEZ will explore other possibilities to augment the primary and secondary healthcare facilities in future depending on the growth scenario at	APSEZ	Long Term	Adani hospitals (Multi-specialty), Mundra is having 110 bed facility and same is setup by Adani group near Samudra township. Primary health center and community health center are in place within the Mundra taluka. Other than this Adani foundation is doing various activities as part of community health. The details of last year are as below.

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	healthcare facilities in the region. For an influx of 6 lakh people from APSEZ operations and additional 3 Lakh from induced growth by the year by 2030 (fully developed scenario), total hospitals facilities with about 540 beds would be required.		secondary health care services to Adani group employees and the local populace of Mundra. The existing 100 bed Adani hospital at Mundra has been catering the services ranging from wellness and preventative care.	APSEZ development.			Adani foundation has spent approx. INR 6470.23 lakhs from April – 2018 to Mar – 2022 for CSR activities cost including cost of community health. • Mobile Heath Care Units and Rural Clinics • 12 Rural Clinics • 09 villages of Mundra, 03 villages of Anjar & Mandvi block has benefited by rural clinic service. • Support to 1409 vulnerable patients • 31 villages covered, with 94 types of general and lifesaving medicines through Mobile healthcare unit • 57420 patients direct & 193661 patient indirect benefited during FY 2021-22 • 344 patients are directly/indirectly benefitted by Dialysis support at various times with nominal charges at Adani Hospital. • 05 patient with critical & severe condition has been supported for dialysis various time with nominal charges • 1409 –Economically Challenged patients have been supported for operation, OPD, IPD, Medicines and lab-test. • For Preventive health care General and multispecialty camps Pediatric camp, General Health camps in 9 villages and Super specialist camp which benefitted more than 1100 patients of Mundra Taluka. • 154 Widows, Senior Citizens and Handicapped people linked with Government pension scheme • 34 senior Citizens linked up with Ayushman Yojana and 67 Senior Citizens were referred to GKGH Bhuj for chronic illness.

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							Other than this, Adani Foundation has also worked for fight against COVID – 19 pandemic situations for last two years. Present Hospital facilities are adequate to avail the medical treatment for Mundra region considering present development. Other Occupational Health centres, primary health centres and community health centres are also in place in Mundra to take care the people residing in Mundra. Adani group is also operating high quality health care services to the people of Kutch at G. K. General Hospital, Bhuj having 750 beds facilities on public private partnership (PPP) model, which is 60 km far from Mundra. APSEZ will explore other possibilities to augment the primary and secondary healthcare facilities in future depending on the future development at APSEZ.
10.5	Due to rapid economic development in the region, several employment opportunities can be generated to the local people.		APSEZ has been giving preferences to people from Gujarat for providing employment opportunities based on eligibility and skills.	APSEZ is committed to provide support for fishermen livelihood activities and has submitted a detailed 5 years plan to MoEF&CC	APSEZ	Short Term	Following support provided during this compliance period as a fisherfolk livelihood. • 1031 families has benefitted by water supply at nine fisher folk vasahats under Machhimar Ajivika Uparjan Yojana. • Engage more than 500 fisher folk youth in Skill Development Training to provide consistent scope of income. • 11604 fisherfolk direct or indirect benefitted with Education, Mangrove, Water and Livelihood.

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	When the area is fully developed by the end of 2030, the working population of the Mundra taluk would increase from current level of 55,000 to as high as 4,00,000, which will be 45% of the total envisaged population in Mundra Taluk by the end of 2030.		In Mundra, special programmes have been conducted by Adani Foundation to enhance the employability of youth from fisherfolk communities. Based on the need assessment results, several livelihood options have been introduced by the Adani Skill Development Centre, Mundra. In these centres, youth can join and get vocational training for a number of	with a total budget of Rs.13.5 Cr.			• Average 75 KL of water was supplied to 676 households at 5 fisherman vasahat on a daily basis under Machhimar Shudhh Jal Yojana and other 4 fisherman vasahat has linkaged with Narmada water through GWIL and Mundra Gram Panachayat from which 355 households get benefited. • 11 Fisher Youth were interviewed among that 5 have been selected. Our target is to support 60+ Fisherman in alternative livelihood till March 2022. • Facilitation of Pagadiya Welfare scheme & boat license sanction letter to 06 Fishermen. Till date 59 Form has been submitted to fisheries department, Bhuj for pagadiya and boat License. • During the Taukate cyclone fishermen family had been shifted to safe Places As well as support to disaster management team for advance preparation. • To promote Natural farming Adani Foundation has originated cow-based farming initiative with interconnected techniques which can increase farmer yield. • Survey and identification of farmers to adopt Natural farming-Total 150 Farmers were selected ascriteriain first phase of the Project • 23 wormicompost unit have been set-up. Which is facilitated through Government with farmer Contribution.

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			technical and non-technical skills. An industrial Training Institute is set up at APSEZ, Mundra, to enhance the skill levels of the local youth to maximum possible extent.				• 150 Farmers have started to preparing Jiva Mrut & Gaukrupa Amrutam Bio-fertilizer and using in agricrop. Series of Training is arranged by ATMA and Adani Foundation. • Four Farmers Groups is registered with ATMA–Agricultural technology management Agency–it will leverage Government schemes. • Adani Foundation has also provided 117.11 lacs kg Dry Fodder and 89.00 lacs kg Green fodder in 29 villages of Mundra and Anjar Block to support the resource dependent villagers, to avoid their dependency on mangroves. The expenditure for fodder supporting activities was approx. 206.11 Lacs during FY 2021-22. • Adani Foundation provides Good Quality dry and green fodder to 24 Villages. Project is covering total 14116 Cattels / 3008 farmers and hence enhancing cattle productivity. Dry Fodder 895398 Kg Green –2425230 Kg. • Fodder Cultivation-To made fodder sustain villages -25 Acre Gauchar land of Siracha village is being cultivated for the same. • Current year for the dates Packaging and Marketing, KKPC Started to sell 10 Kg capacity packaging Box at Minimum Profit Margin At Rs.29/Boxes which resulted in turn over of Rs. 24 Lacs with Profit of 1 Lac. This initiative has supported more than 1800 farmers indirectly.

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							• Dragon fruit farming is on going by Five farmers each farmer is doing in 2 Acre farm –Total 11000 plants. • Skill Development and Income Generation –Adani Foundation is working with 15 Self help group and supporting to develop entrepreneur skills to become self reliant, sourcing more than 350 women to absorb in various job. APSEZ is carrying out various initiatives specific to the Fisherfolk community which includes: • Vidya Deep Yojana • Vidya Sahay Yojana – Scholarship Support • Adani Vidya Mandir • Fisherman Approach in SEZ • Machhimar Arogya Yojana • Machhimar Kaushalya Vardhan Yojana • Machhimar Sadhan Sahay Yojana • Machhimar Awas Yojana • Machhimar Shudhh Jal Yojana • Sughad Yojana • Machhimar Akshay kiran Yojana • Machhimar Suraksha Yojana • Machhimar Ajivika Uparjan Yojana • Bandar Svachhata Yojana These initiatives are planned for the period 2016 – 2021 with a committed expense of INR 13.5 Cr as

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							submitted earlier in detail in the report namely "Silent Transformation of Fisher folk at Mundra", . Till, Mar'22 approx. 11.53 Cr. INR, has already been spent in support for fishermen livelihood activities.

Annexure – i

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TEST REPORT

Report No.	**URC /21/12/Water/APL-0001**		
Name & Address of Customer	**M/S. ADANI PORTS & SPECIAL ECONOMIC ZONE LTD. (WFDP-West Port)** PLOT NO: - NAVINAL ISLAND, Village - MUNDRA, Tal. – Bhuj, DIST. - KUTCH - 370421.	Date of Report	**18/12/2021**
		Customer's Ref.	**As Per W.O.**
Sample Details	**Pond Water**	Location	**Nr.ATT-2A**
Sample Qty.	**5 Lit.**	Appearance	**Colorless**
Sampling Date	**10/12/2021**	Sample Received Date	**11/12/2021**
Test Started Date	**11/12/2021**	Test Completion Date	**17/12/2021**
Sampled By	**UERL Lab**	Sampling Method	**UERL/CHM/SOP/116**
UERL Lab ID. No.	**21/12/Water/APL-0001**		

TEST RESULTS:

Sr. No.	Parameters	Test Method Permissible	Unit of Measurement	Results
1.	Colour	IS 3025(Part 4)	Pt. Co. Scale	5.0
2.	Odour	IS 3025(Part 5)1983	--	Agreeable
3.	Total Suspended Solids	APHA 23rd Ed.,2017,2540 –D	mg/L	28
4.	pH @ 25 ° C	APHA 23rd Ed.,2017,4500-H^+B	--	7.39
5.	Temperature	IS 3025(Part 9)1984	^{0}C	29.6
6.	Oil & Grease	IS 3025(Part39)1991, Amd. 2	mg/L	BDL(MDL:2.0)
7.	Total Residual Chlorine	IS 3025(Part 26)1986,	mg/L	BDL(MDL:0.1)
8.	Ammonical Nitrogen	IS 3025(Part 34)1988,	mg/L	2.12
9.	BOD (3 days at 27 ^{0}C)	IS 3025(Part 44)1993Amd.01	mg/L	5
10.	COD	IS 3025(Part 58)2006	mg/L	30.1
11.	Arsenic (as As)	APHA 23rd Ed.,2017,3114-C	mg/L	BDL(MDL:0.01)
12.	Mercury (as Hg)	APHA 23rd Ed.,2017, 3112-B	mg/L	BDL(MDL:0.001)
13.	Lead (as Pb)	IS 3025 (PART 47) 1994	mg/L	BDL(MDL:0.01)
14.	Cadmium (as Cd)	IS 3025(PART 41) 1992	mg/L	BDL(MDL:0.003)
15.	Hexavalent Chromium	APHA 23rd Ed.,2017,3500CrB	mg/L	BDL(MDL:0.05)
16.	Total Chromium (as Cr)	IS 3025 (PART 52) 2003	mg/L	BDL(MDL:0.05)
17.	Copper (as Cu)	IS 3025 (PART 42) 1992	mg/L	BDL(MDL:0.05)
18.	Zinc (as Zn)	IS 3025(PART 49) 1994	mg/L	BDL(MDL:0.05)

Note: This report is subject to terms and conditions mentioned overleaf.

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TEST REPORT

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Sample Qty.	**5 Lit.**	Appearance	**Colorless**
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Test Started Date	**11/12/2021**	Test Completion Date	**17/12/2021**
Sampled By	**UERL Lab**	Sampling Method	**UERL/CHM/SOP/116**
UERL Lab ID. No.	**21/12/APL-0001**		

TEST RESULTS:

Sr. No.	Parameters	Test Method Permissible	Unit of Measurement	Results
19.	Selenium (as Se)	IS 3025(Part 56)2003	mg/L	BDL(MDL:0.01)
20.	Nickel (as Ni)	APHA 23rd Ed.,2017,3111-B	mg/L	BDL(MDL:0.02)
21.	Cyanide (as CN)	IS 3025(Part 27)1986	mg/L	BDL(MDL:0.05)
22.	Fluoride (as F)	IS 3025(PART 60) 2008	mg/L	0.56
23.	Dissolved Phosphate (as P)	APHA 23rd Ed.,2017,4500-P, D	mg/L	0.14
24.	Sulphide as S	APHA 23rd Ed.,2017,4500 S^{-2} F	mg/L	BDL(MDL:0.05)
25.	Phenolic Compound	IS 3025(Part 43)1992, Amd.2	mg/L	BDL(MDL:0.01)
26.	Bio Assay test (%)	IS:6582-1971	%	90 % survival of fish after 96 hrs. in 100% effluent
27.	Manganese (as Mn)	APHA 23rd Ed.,2017, 3500 Mn B	mg/L	BDL(MDL:0.1)
28.	Iron (as Fe)	IS 3025(PART 53) 2003	mg/L	0.113
29.	Vanadium (as V)	APHA 23rd Ed.2017-3500 – V	mg/L	N.D.
30.	Nitrate (as NO3-N)	APHA 23rd Ed.,2017,4500 NO3-B	mg/L	0.14

Remarks: BDL= Below Detection Limit, **MDL** = Minimum Detection Limit

Opinion & Interpretation (If required):

*******End of Report *******

Checked By
(Nilesh C. Patel)
(Sr. Chemist)

Authorized By
(Nitin B. Tandel)
(Technical Manager)

UERL/CHM/F–2/05

Note: This report is subject to terms and conditions mentioned overleaf.

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TEST REPORT

Report No.	**URC /21/12/Water/APL-0002**		
Name & Address of Customer	**M/S. ADANI PORTS & SPECIAL ECONOMIC ZONE LTD. (WFDP-West Port)** PLOT NO: - NAVINAL ISLAND, Village - MUNDRA, Tal. – Bhuj, DIST. - KUTCH - 370421.	Date of Report	**18/12/2021**
		Customer's Ref.	**As Per W.O.**
Sample Details	**Pond Water**	Location	**Nr.ATT-4**
Sample Qty.	**5 Lit.**	Appearance	**Colorless**
Sampling Date	**10/12/2021**	Sample Received Date	**11/12/2021**
Test Started Date	**11/12/2021**	Test Completion Date	**17/12/2021**
Sampled By	**UERL Lab**	Sampling Method	**UERL/CHM/SOP/116**
UERL Lab ID. No.	**21/12/Water/APL-0002**		

TEST RESULTS:

Sr. No.	Parameters	Test Method Permissible	Unit of Measurement	Results
1.	Colour	IS 3025(Part 4)	Pt. Co. Scale	5.0
2.	Odour	IS 3025(Part 5)1983	--	Agreeable
3.	Total Suspended Solids	APHA 23rd Ed.,2017,2540 –D	mg/L	24
4.	pH @ 25 ° C	APHA 23rd Ed.,2017,4500-H^+B	--	7.53
5.	Temperature	IS 3025(Part 9)1984	^{0}C	29.7
6.	Oil & Grease	IS 3025(Part39)1991, Amd. 2	mg/L	BDL(MDL:2.0)
7.	Total Residual Chlorine	IS 3025(Part 26)1986,	mg/L	BDL(MDL:0.1)
8.	Ammonical Nitrogen	IS 3025(Part 34)1988,	mg/L	2.18
9.	BOD (3 days at 27 ^{0}C)	IS 3025(Part 44)1993Amd.01	mg/L	5
10.	COD	IS 3025(Part 58)2006	mg/L	34.2
11.	Arsenic (as As)	APHA 23rd Ed.,2017,3114-C	mg/L	BDL(MDL:0.01)
12.	Mercury (as Hg)	APHA 23rd Ed.,2017, 3112-B	mg/L	BDL(MDL:0.001)
13.	Lead (as Pb)	IS 3025 (PART 47) 1994	mg/L	BDL(MDL:0.01)
14.	Cadmium (as Cd)	IS 3025(PART 41) 1992	mg/L	BDL(MDL:0.003)
15.	Hexavalent Chromium	APHA 23rd Ed.,2017,3500CrB	mg/L	BDL(MDL:0.05)
16.	Total Chromium (as Cr)	IS 3025 (PART 52) 2003	mg/L	BDL(MDL:0.05)
17.	Copper (as Cu)	IS 3025 (PART 42) 1992	mg/L	BDL(MDL:0.05)
18.	Zinc (as Zn)	IS 3025(PART 49) 1994	mg/L	BDL(MDL:0.05)

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TEST REPORT

Report No.	**URC /21/12/APL-0002**		
Name & Address of Customer	**M/S. ADANI PORTS & SPECIAL ECONOMIC ZONE LTD. (WFDP-West Port)** PLOT NO: - NAVINAL ISLAND, Village - MUNDRA, Tal. – Bhuj, DIST. - KUTCH - 370421.	Date of Report	**18/12/2021**
		Customer's Ref.	**As Per W.O.**
Sample Details	**Pond Water**	Location	**Nr.ATT-4**
Sample Qty.	**5 Lit.**	Appearance	**Colorless**
Sampling Date	**10/12/2021**	Sample Received Date	**11/12/2021**
Test Started Date	**11/12/2021**	Test Completion Date	**17/12/2021**
Sampled By	**UERL Lab**	Sampling Method	**UERL/CHM/SOP/116**
UERL Lab ID. No.	**21/12/APL-0002**		

TEST RESULTS:

Sr. No.	Parameters	Test Method Permissible	Unit of Measurement	Results
19.	Selenium (as Se)	IS 3025(Part 56)2003	mg/L	BDL(MDL:0.01)
20.	Nickel (as Ni)	APHA 23rd Ed.,2017,3111-B	mg/L	BDL(MDL:0.02)
21.	Cyanide (as CN)	IS 3025(Part 27)1986	mg/L	BDL(MDL:0.05)
22.	Fluoride (as F)	IS 3025(PART 60) 2008	mg/L	0.49
23.	Dissolved Phosphate (as P)	APHA 23rd Ed.,2017,4500-P, D	mg/L	0.16
24.	Sulphide as S	APHA 23rd Ed.,2017,4500 S^{-2} F	mg/L	BDL(MDL:0.05)
25.	Phenolic Compound	IS 3025(Part 43)1992, Amd.2	mg/L	BDL(MDL:0.01)
26.	Bio Assay test (%)	IS:6582-1971	%	90 % survival of fish after 96 hrs. in 100% effluent
27.	Manganese (as Mn)	APHA 23rd Ed.,2017, 3500 Mn B	mg/L	BDL(MDL:0.1)
28.	Iron (as Fe)	IS 3025(PART 53) 2003	mg/L	0.121
29.	Vanadium (as V)	APHA 23rd Ed.2017-3500 – V	mg/L	N.D.
30.	Nitrate (as NO3-N)	APHA 23rd Ed.,2017,4500 NO3-B	mg/L	0.12

Remarks: BDL= Below Detection Limit, **MDL** = Minimum Detection Limit

Opinion & Interpretation (If required):

*********End of Report *********

Checked By
(Nilesh C. Patel)
(Sr. Chemist)

Authorized By
(Nitin B. Tandel)
(Technical Manager)

UERL/CHM/F–2/05

Note: This report is subject to terms and conditions mentioned overleaf.

Annexure – 10

OIL SPILL CONTINGENCY RESPONSE PLAN TIER 1

(To be used in conjuction 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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When the controlled copy holder ceases to be the authorized recipient of this document, the document should be returned to the HOD (Marine), Mundra Office.

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.

The holder of the control copy shall ensure that the persons working under him, who are responsible for any activity described in this document are made aware of such responsibility. These persons shall be given this document to read and as acknowledgment of having read shall sign the **OSCRP – Section 01 Record of Circulation** page of this document.

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DISTRIBUTION LIST OF OIL SPILL CONTINGENCY RESPONSE PLAN			
SN.	**Issued To**	**Copy No.**	**Date of Issue**
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5.	Auditor's Copy	05	01/01/2014
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AMENDMENT RECORD SHEET							
Sr. No.	**Section**	**Sub-section**	**Page No.**	**Revision No.**	**Revision Date**	**Description of Revision**	**Approved**
1.	Annex 3		75			Location of Oil Spill Equipment mentioned	Approved
2.	Annex 15		91			List of recycler approved by state of Gujarat	Approved
3.			96			Contingency Planning Compliance Checklist	Approved
4	Annex 16		92		29.08.2017	List of agency for support & guidance for rescue & rehabilitation of oiled bird & mangroves management during oil spill	Approved
5	03	3.6	45		29.08.2017	Additional information added	Approved
6	02	2.6	26		01.10.2018	Shore line resources updated	Approved
7	Annex 3		75		01.10.2018	Tug details updated	Approved
8	Annex 4		78		01.10.2018	Contact details of APSEZ personnel updated	Approved
9	Annex 4		79		01.10.2019	Contact details of APSEZ personnel updated	Approved
10	Annex 3		75		01.10.2020	Tug details updated	Approved
11	Annex 4		78		01.10.2020	Contact details of APSEZ personnel updated	Approved
12	Annex 3		75		01.11.2021	Tug details updated	Approved
13	Annex 4		78		01.11.2021	Contact details of APSEZ personnel updated	Approved

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

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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

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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

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6.1 Incident control room and facilities
6.2 Field communications equipment
6.3 Reports, manuals, maps, charts and incident logs

Action and operations

7 Initial procedures

7.1 Notification of oil spill to concerned authorities,
7.2 Preliminary estimate of response tier
7.3 Notifying key team members and authorities
7.4 Manning Control Room
7.5 Collecting information (oil type, sea / wind forecasts, aerial surveillance, beach reports)
7.6 Estimating fate of slick (24, 48, 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
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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.
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

Annexures

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.

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.

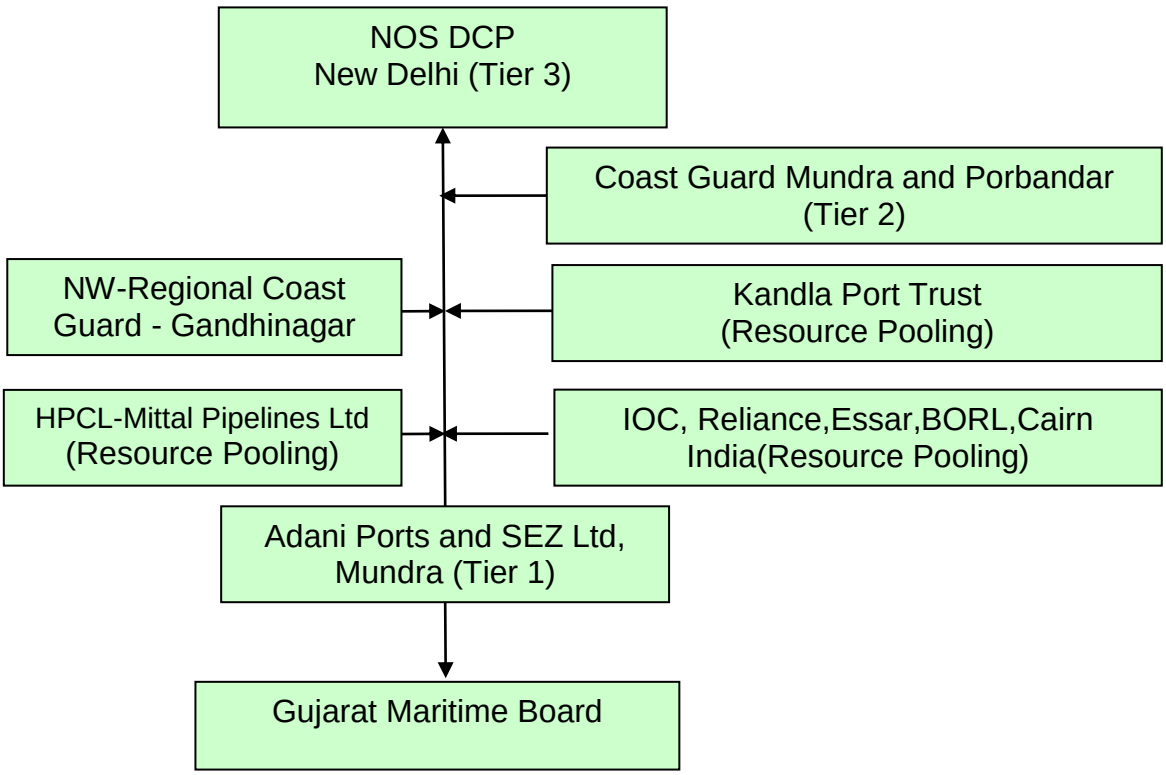
Emergency Response Team

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 organizations 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.

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)

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 cascadable 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.

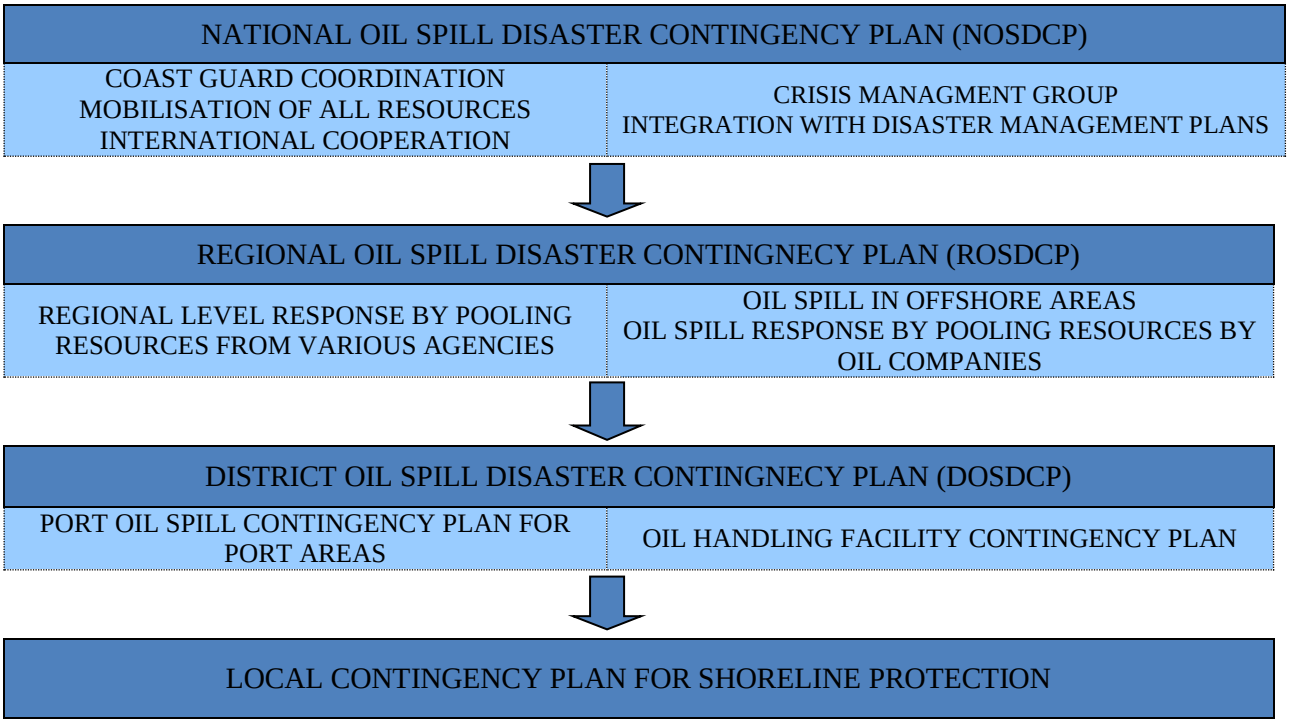


Figure 1 - Contingency Plan hierarchy

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, minimize 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
ISTRICT OIL SPILL CONTINGN

2 Risk Assessment

The number of vessels calling annually at APSEZL is more than 3000 including Chemical, Gas 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).

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 m^3/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 m^3/hr and 10000 m^3/hr. In the present study, the maximum pumping rate of 10000m^3/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 m^3/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 m^3/hr to10000 m^3/hr. In the present study, to assess the maximum risk, pumping rate of 10000 m^3/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/cm^2 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/cm^2 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 (m^3/s)

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 kg/cm^2 = 65 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 t + 5% of pipeline volume of oil in t (0.05 x 7622 =381 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.

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

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 is 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.

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**	▪	▪	•

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: o 20 Tons of HSD oil due to Tug Impact (HSD) o 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: o 20 Tons of HSD oil due to Tug Impact o 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	▪	▪	•

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
- Other HNS Substances

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 $070^0 – 250^0$ at an average rate of 3 kts and 4-5 kts during spring tides.

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 340ºC (645ºF), and at least 95% of the hydrocarbon fractions, by volume, distill at a temperature of 370ºC (700ºF) 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 larges 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.

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 arte 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.

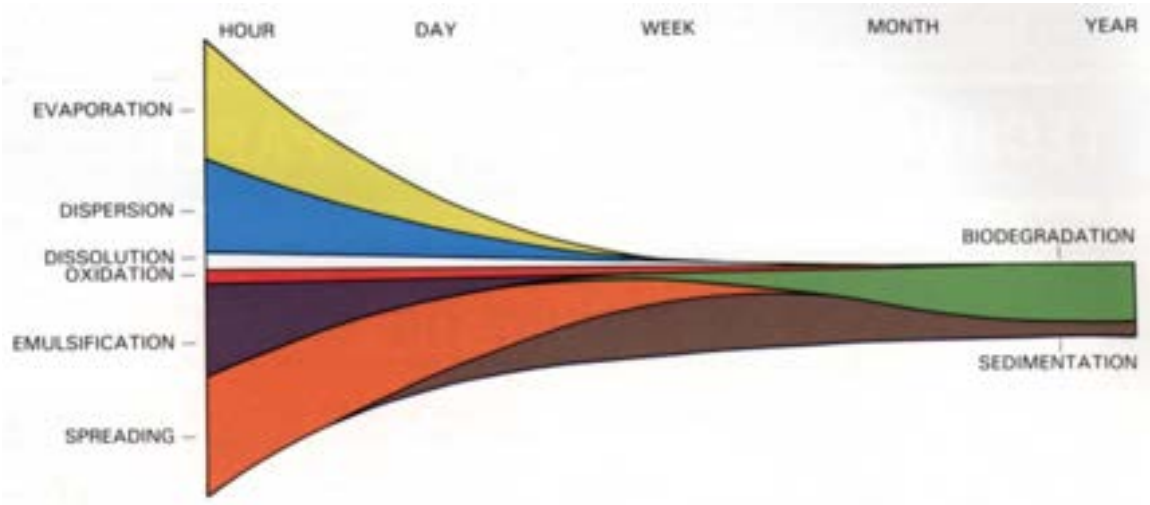
f) **Sedimentation**: Very few oils are sufficiently heavy to sink in sea water. However, the weathered residue gets mixed up with the suspended substances in water and may sink. This process becomes significant when water-in-oil emulsions attain specific gravity near to one and therefore need very little 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

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.

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 500^2 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.

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, this 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 70^0 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.

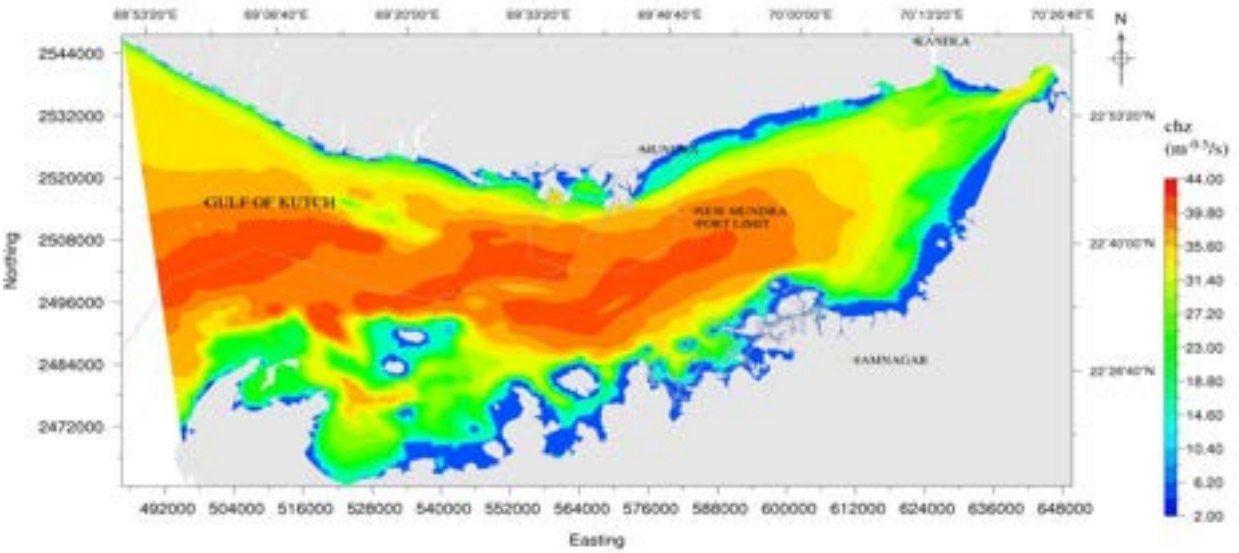


Fig.A1.4 Chezy's coefficient

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

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 raise 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 m3 / hr)	05 nos.
Sorbent Boom Pack(12.5cm x 4 M)	500 mtr
Slurry Pump (60 m3 / 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.

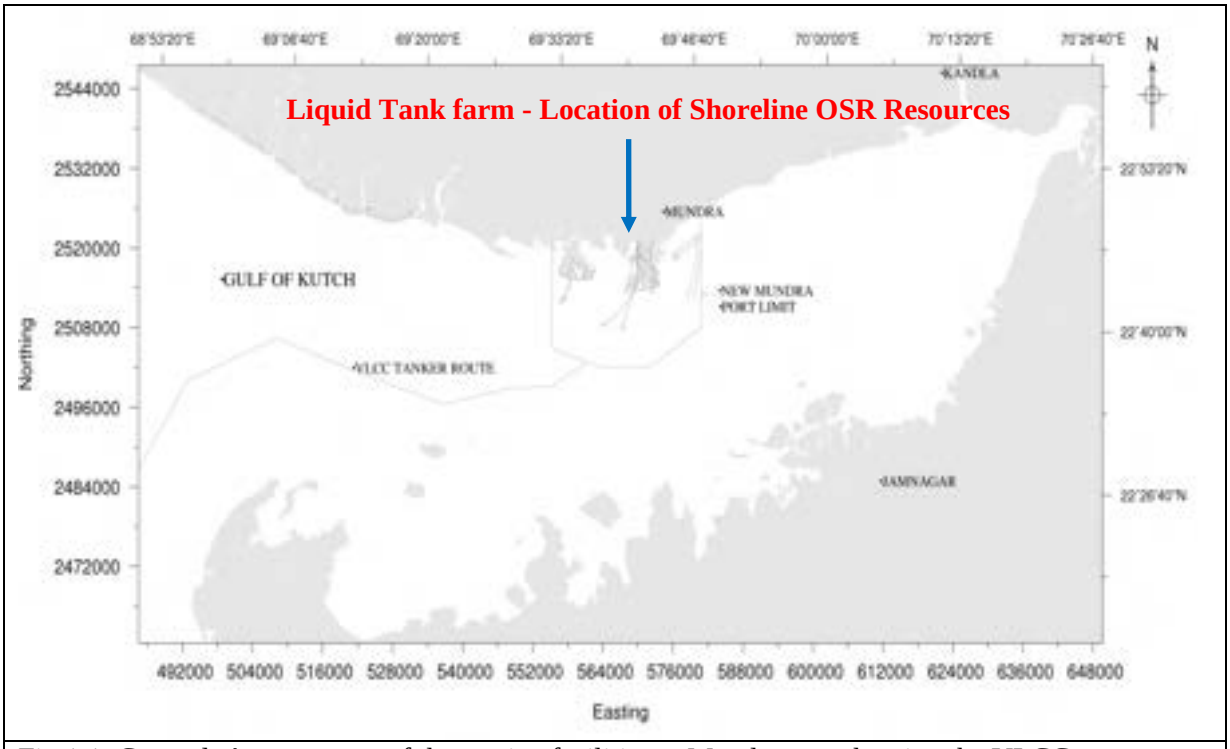


Fig.1.1 :General Arrangement of the marine facilities at Mundra port showing the VLCC route and facilities within the new Mundra port limit considered for carrying out the oil spill risk assessment studies.

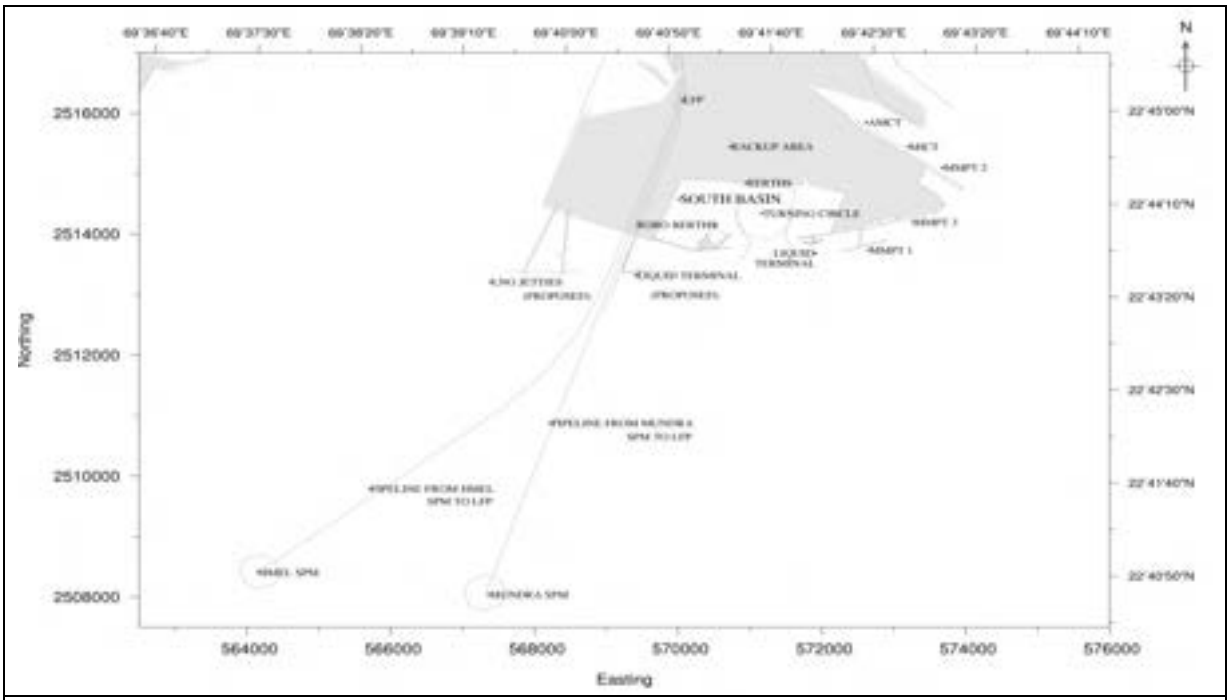


Fig1.2: Zoomed up portion of the South Basin showing the berths, turning circle, LNG jetty and existing berths as well as SPMs.

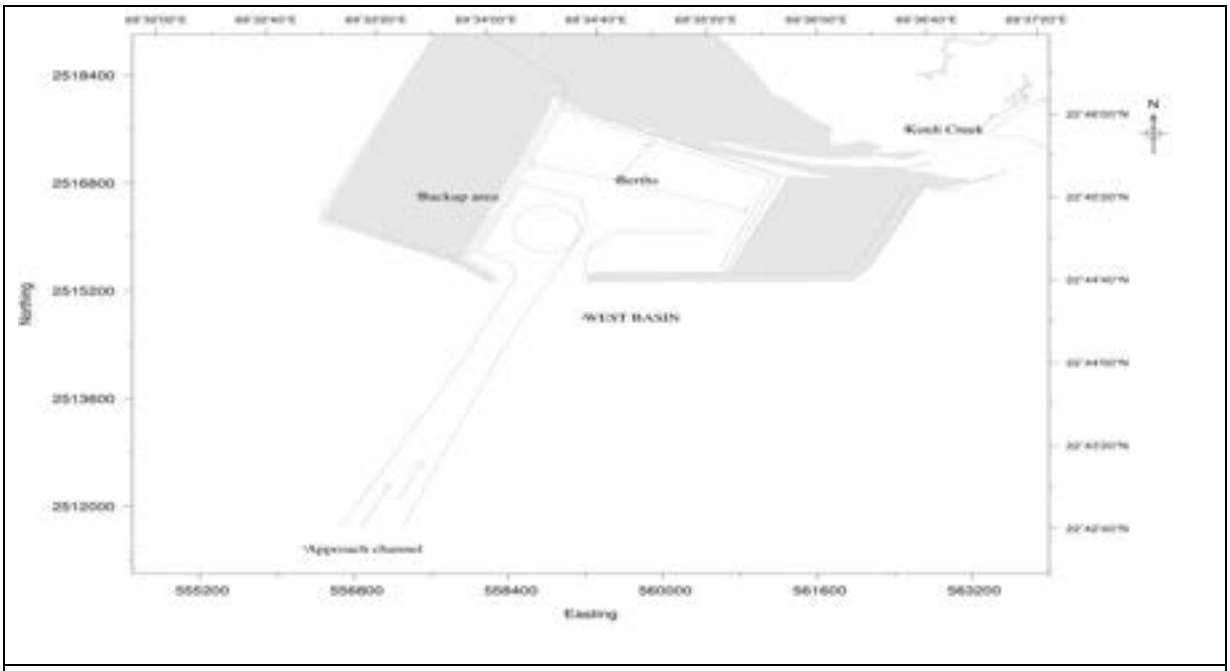


Fig.1.3 Zoomed up portion of the West Basin showing the berth locations and the approach channel for the vessels

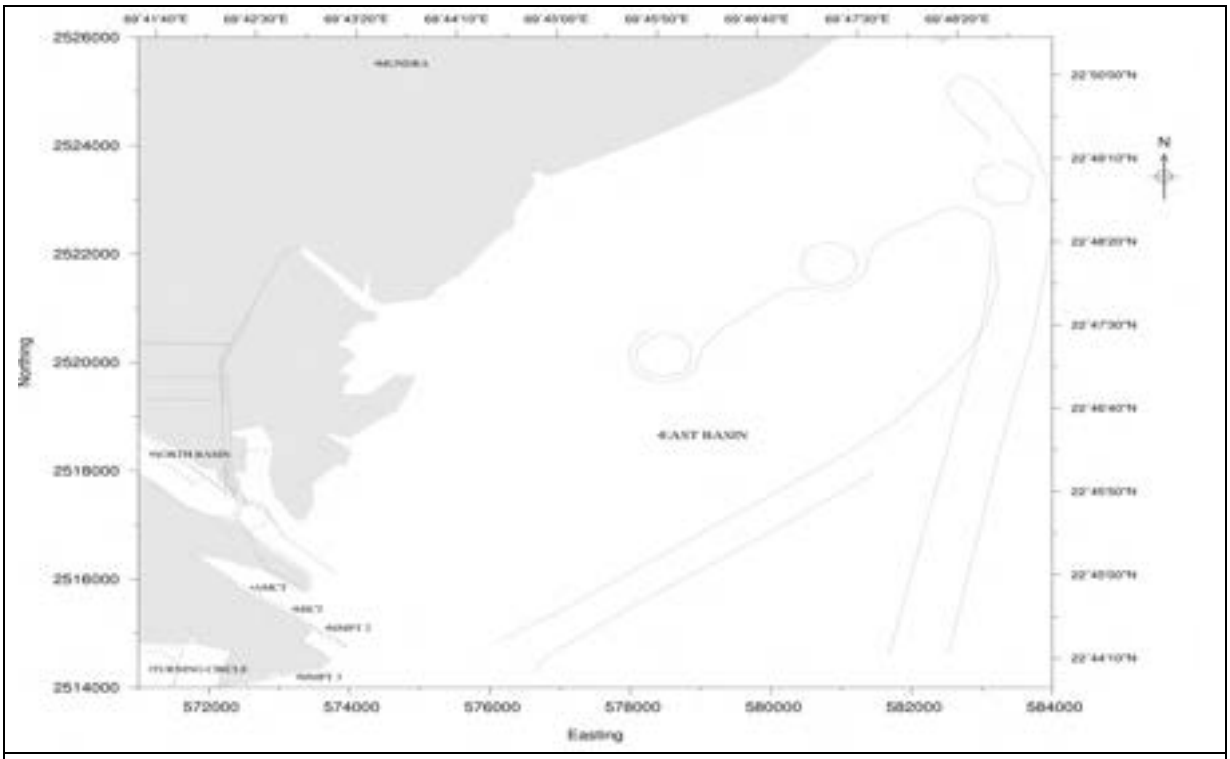


Fig.1.4 Zoomed up portion showing the East Basin & North Basin

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/m^3) 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 nox10^3/l; av 186 no x 10^3/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 nox10^3/l (av 329.4 no x 10^3/l) and generic diversity ranged from 12-25 no (av 19 no) (Table 8.4) off Vadinar.

Table 8.3: Average phytoplankton population density (no x 10^3/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 km^2. The mangrove area has increased in recent years due to extensive plantations made by the Forest Department. Mangrove cover and mudflat areas (km^2) in Jamnagar, Lalpur, Khambalia and Kalyanpur Talukas estimated based on satellite data are given in Table 8.4 below:

Table 8.4: Mangrove areas (km^2) 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

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	22º 26'42.6''N 69º 42' 07.8''E	*A. marina*	100	Sep-67 -38	0.5 - 3.5	<2.6 - 6	0 - 2
D2	22º 26' 50.5''N 69º 41' 52.9''E	*A. marina*	40	0 - 5 -2	0.5 - 1.5	<2.5 - 4	0 - 1
Vadinar (Dargah - south side; afforested area)							
D3	22º 26' 30.8''N 69º 42' 05.6''E	*A. marina*	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 m^2 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/m^2. 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 m^2 with an average of 50 plants/100 m^2. 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/m^2), 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.

Table 8.6: Distribution of mangroves at Narara

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

* no/500 m^2

As can be noticed in the above table, the plant density of *A.marina* varied from 20 - 130 plants/100 m^2 with a frequency of occurrence of 100% at Narara. The species like *Ceriops tagal* (7 plants/500 m^2) and *Rhizophora mucronata* (2 plants/500 m^2 - 3 plants/100 m^2) were rarely noticed. The locations N2 (85 plants/100 m^2) and N4 (80 plants/100 m^2) 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/m^2 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.

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	*Enteromorpha clathrata*	100	D
2	*Enteromorpha intestinalis*	100	D
3	*Caulerpa racemosa*	50	C
4	*Ulva fasciata*	100	D
5	*Ulva lactuta*	100	D
6	*Ulva reticulate*	90	D
7	*Codium elongatum*	30	O
8	*Sargassum ilicifolium*	45	C
9	*Sargassum tenerimmum*	60	CD
10	*Gracilaria corticata*	55	C
11	*Gracillaria verrucosa*	85	C
12	*Polysiphonia platycarpa*	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/100m^3 (av 3.3 ml/100m^3) and 2.2-722.7 x 10^3/100m^3 (av 39 x 10^3/100m^3), respectively while during October 2010 the zooplankton biomass and abundance ranged from 0.2 to 12.0 ml/100m^3 (av 3.5 ml/100m^3) and 2.5-157.8 x 10^3/100m^3 (av 48.4 x 10^3/100m^3) respectively suggesting normal secondary production off Vadinar during the monitoring period.

The average zooplankton biomass (ml/100m^3), population density (nox10^3/100m^3) 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/100$m^{3)}$ (B) Population density (nox10^3/100m^3) 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	2.5	3.5
	B	89.9	24.6	14.4	22.7	12.7	20.4	37.4
	C	17	15	12	16	13	16	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

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/m^2, av 2292 no/m^2) and biomass (0.1-37.2 g/m^2; wet wt, av. 9.2 g/m^2; 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/m^2 (av 1185 no/m^2) and biomass from 0-67.8 g/m^2; wet wt (av. 14.6 g/m^2; 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/m^2) (B) Population density (no/m^2) 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/m^2; av 8.0 g/m^2 wet wt) and population density (150-8925 no/m^2; av 1902 no/m^2) during April 2010. In October 2010 the biomass ranged from 0.3 – 23.9 g/m^2 (av 7.1 g/m^2; wet wt) and population density ranged from 125-14975 no/m^2 (av 2282 no/m^2) The current data is listed (April 2010 – Oct 2010) in Table 8.10.

Table 8.10 Average of subtidal macrobenthos off Vadinar during April 2010 to October 2010, (A) Biomass (g/m^2) (B) Population density (no/m^2) 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.

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.

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.

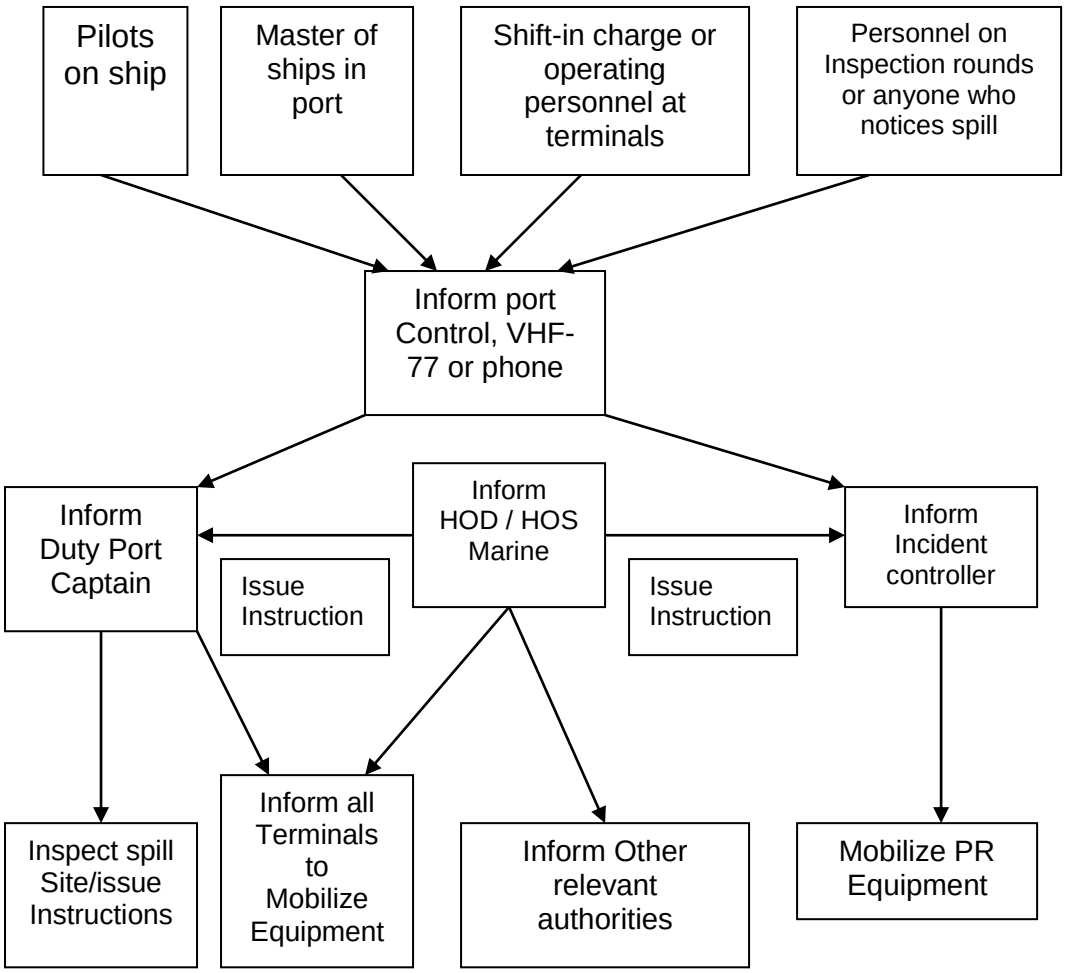
3.3 Oil spill response in offshore zones

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.

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.

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 causalities 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

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.

- 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 / Duty Marine Control officer)

- 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

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)

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.

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.

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.

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:

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 socked 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 socked birds to transfer from affected area to treatment facility center.

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:-

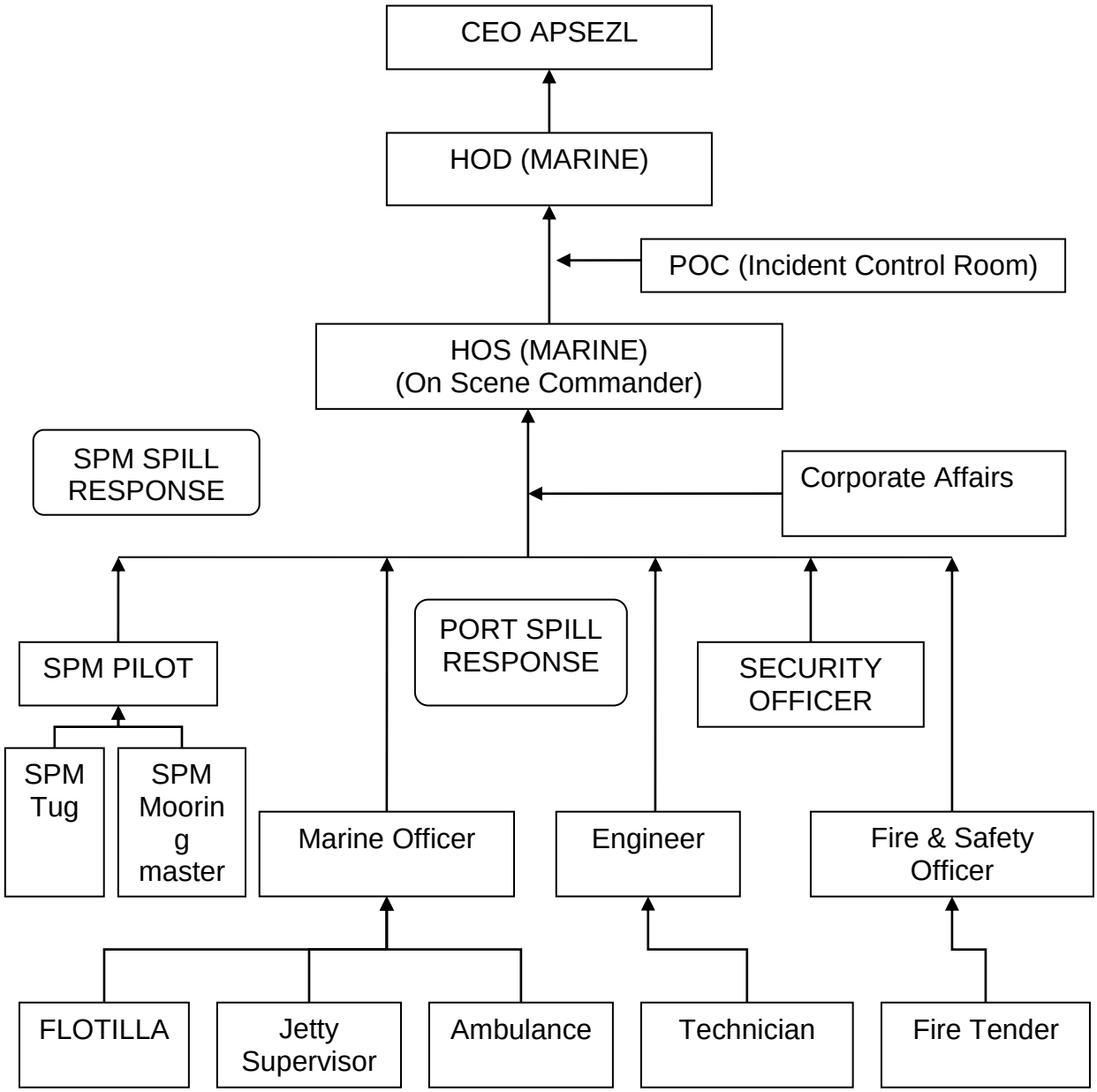
- Protective clothing for everybody (including boots and gloves), spare clothing.
- Cleaning material, rags, soap, detergents, and brushes.
- Equipment to clean clothes, machinery, etc., with jets of hot water.
- Plastic bags (heavy duty) for collecting oily debris.
- Heavy duty plastic sheets for storage 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.

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



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 - 28
IMO Level-2 - 04

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

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.

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.

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

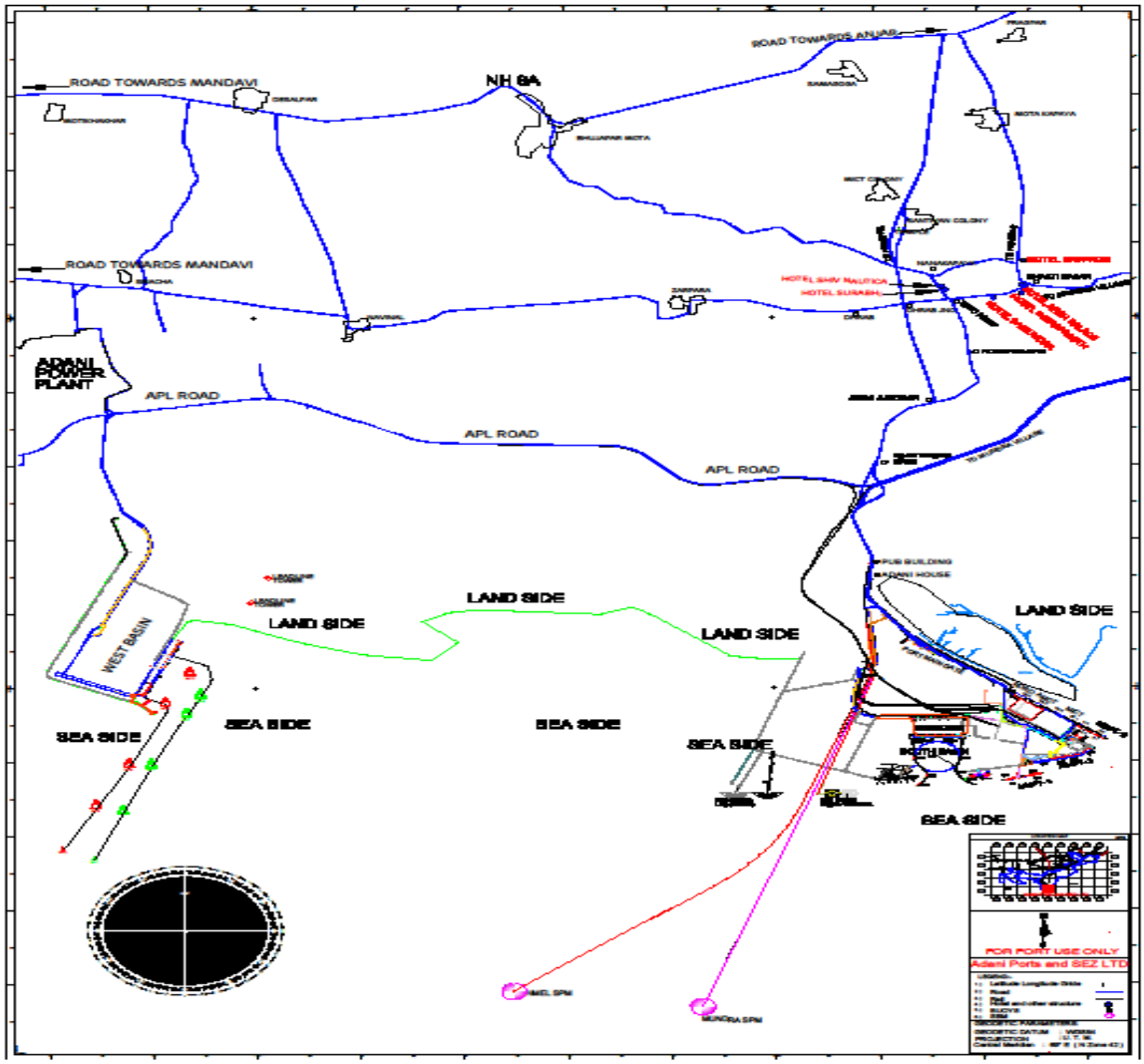
A complete spill response report will be produced by the Marine manager providing comprehensive and all-inclusive details of the circumstances leading to the spill, initial response and consequent affect of the same, subsequent follow up, effect of prevailing weather, adverse situations, safety issues,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

Data Directory

Maps / Charts

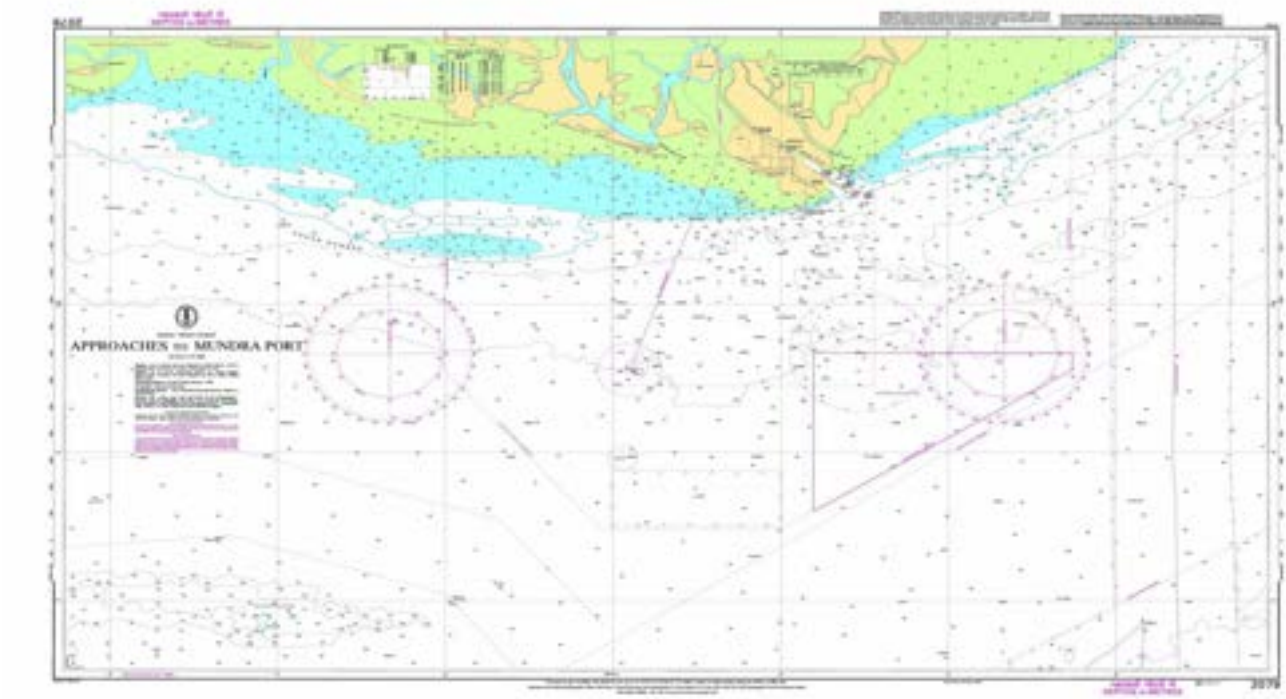
1. Coastal facilities, access roads, hotels etc.

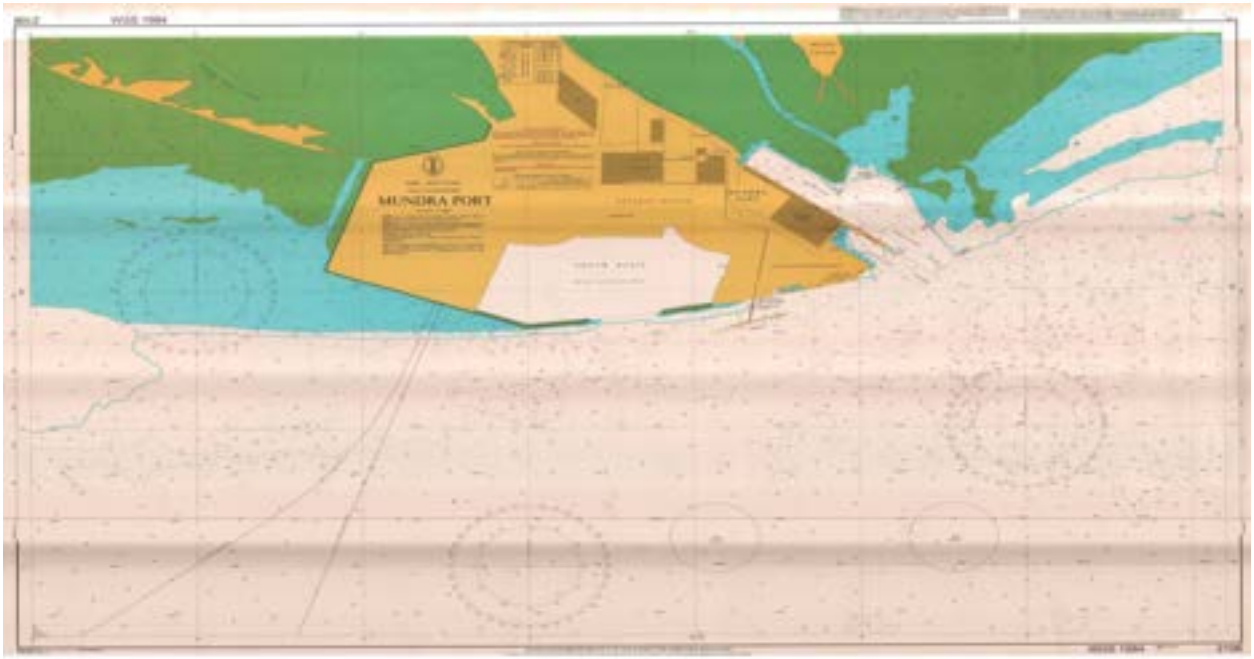


Telephones: Detailed in Annexure **4**

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






WGS 1984
MUNDRA PORT
WEST BASIN
WGS 1984
2107

3. Risk locations and probable fate of oil

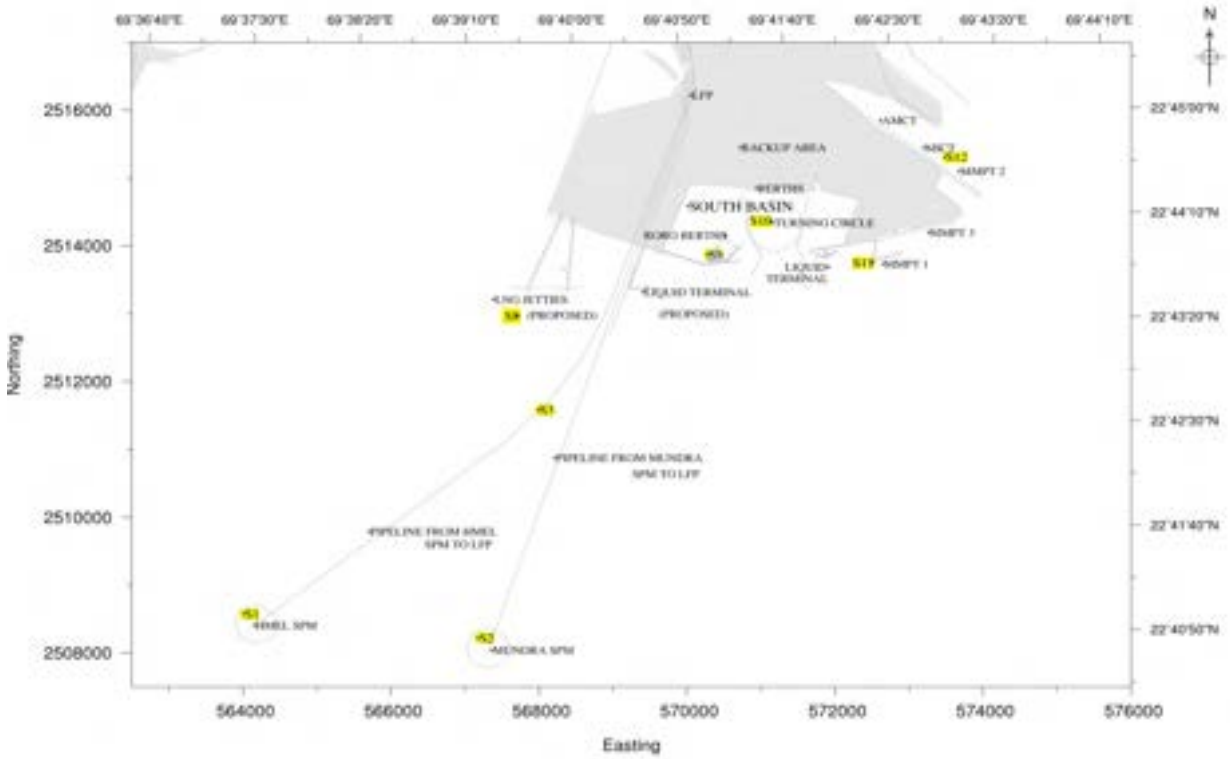


Fig.1: General layout of the Mundra port facilities of APSEZL showing the location of Spill Points for SPMs, South Basin berths, LNG jetty and existing berths

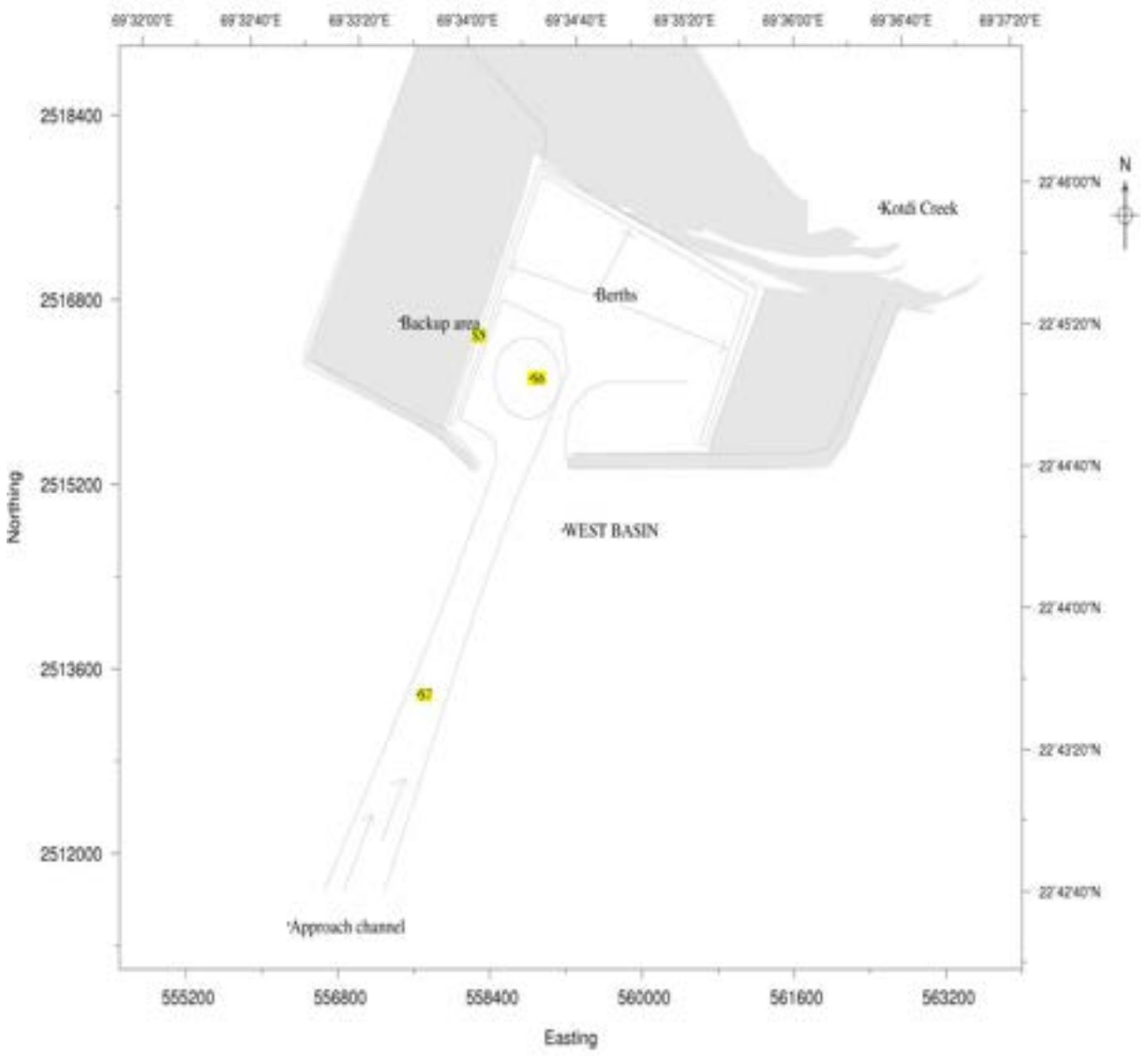


Fig.2: Zoomed up portion of Mundra port facilities of APSEZL showing the location of Spill Points for West Basin

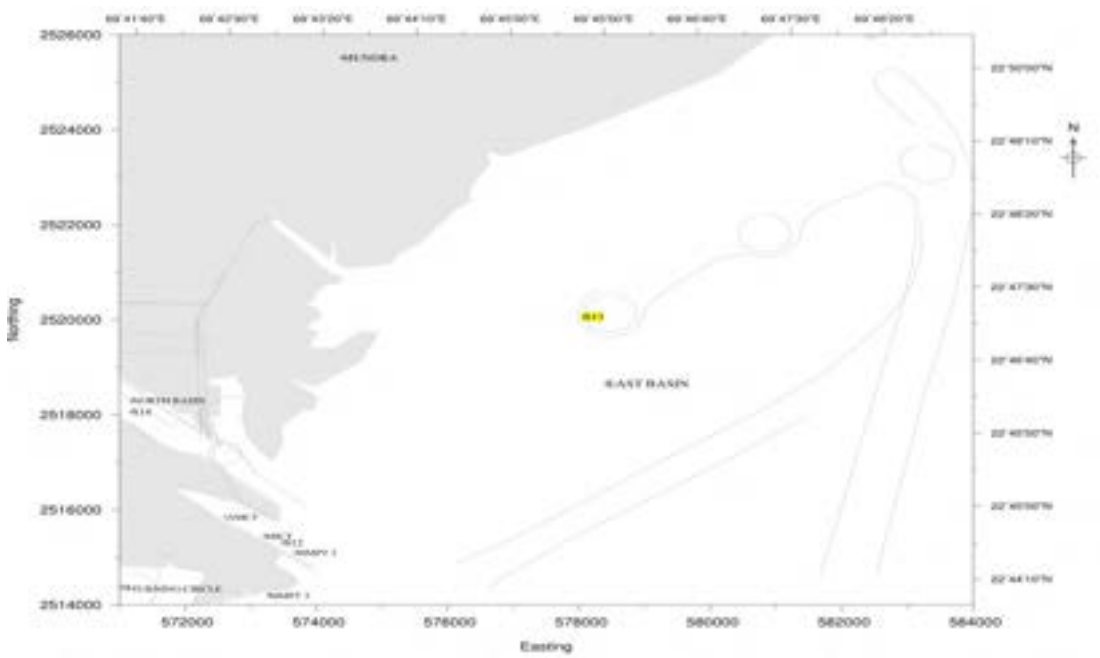
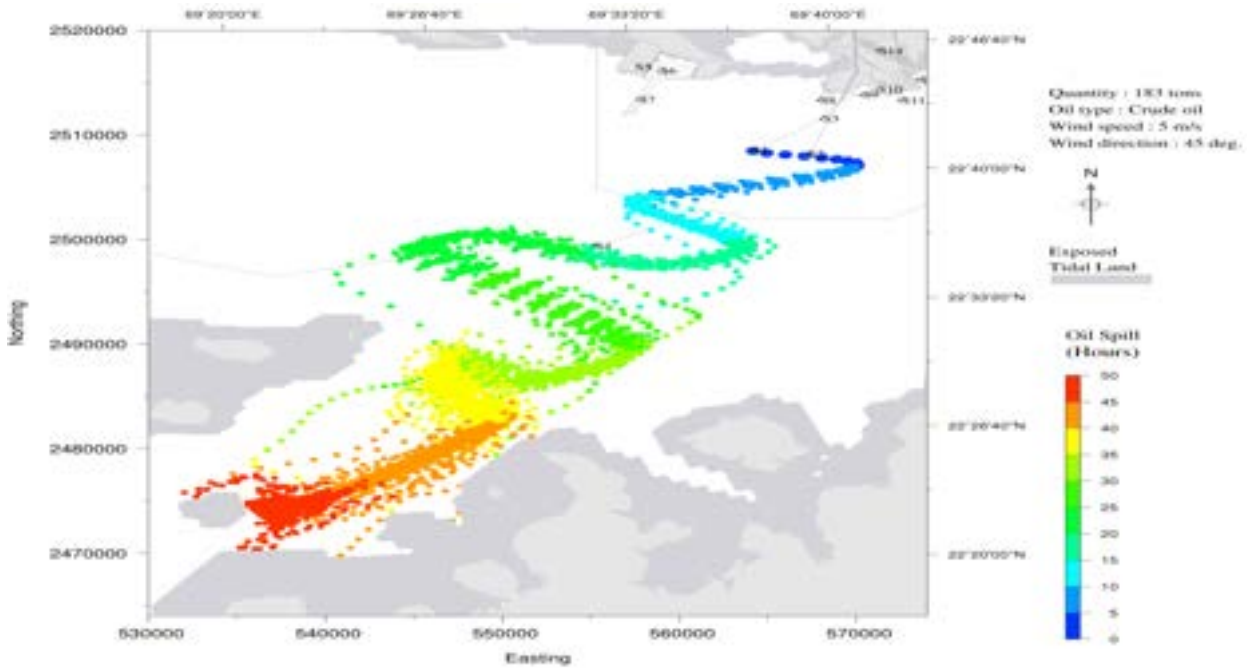
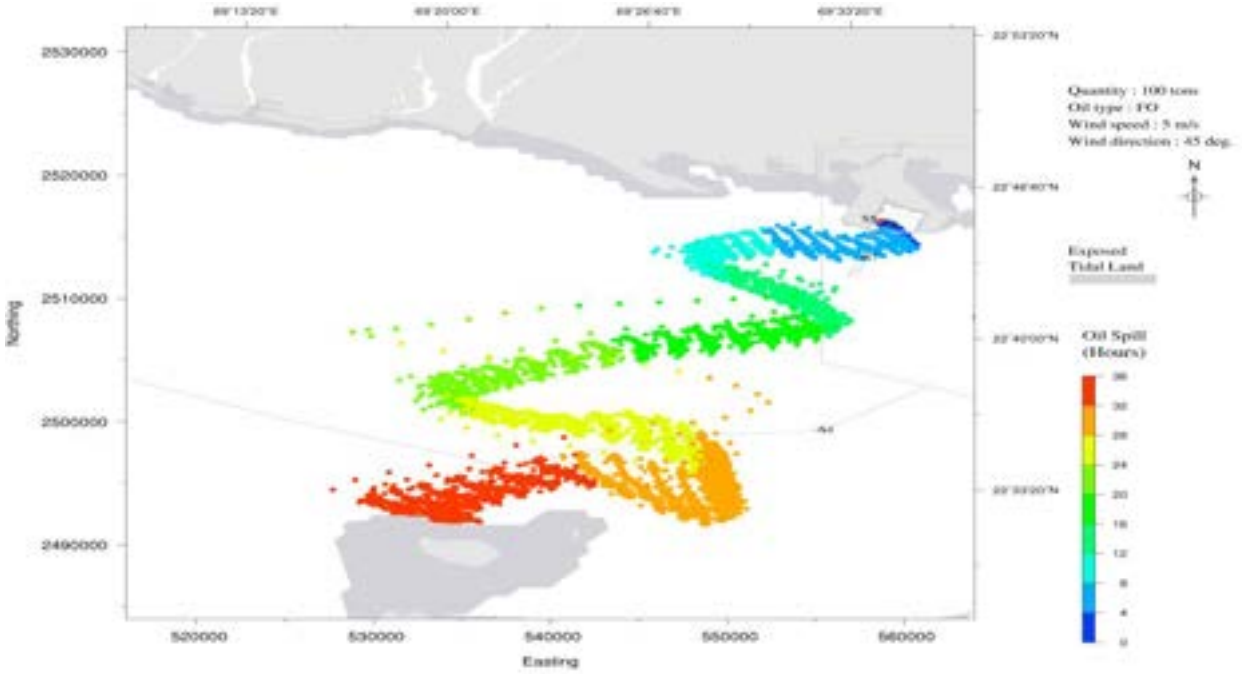


Fig.3: Zoomed up portion of Mundra port facilities of APSEZL showing the location of Spill Points for North Basin & East Basin



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



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

Oil and Waste Storage / Disposal sites

Oil and Waste storage / Disposal tank No. 46, 109 and 110 are available within Liquid Tank farm.

Sensitivity Maps/ Atlas

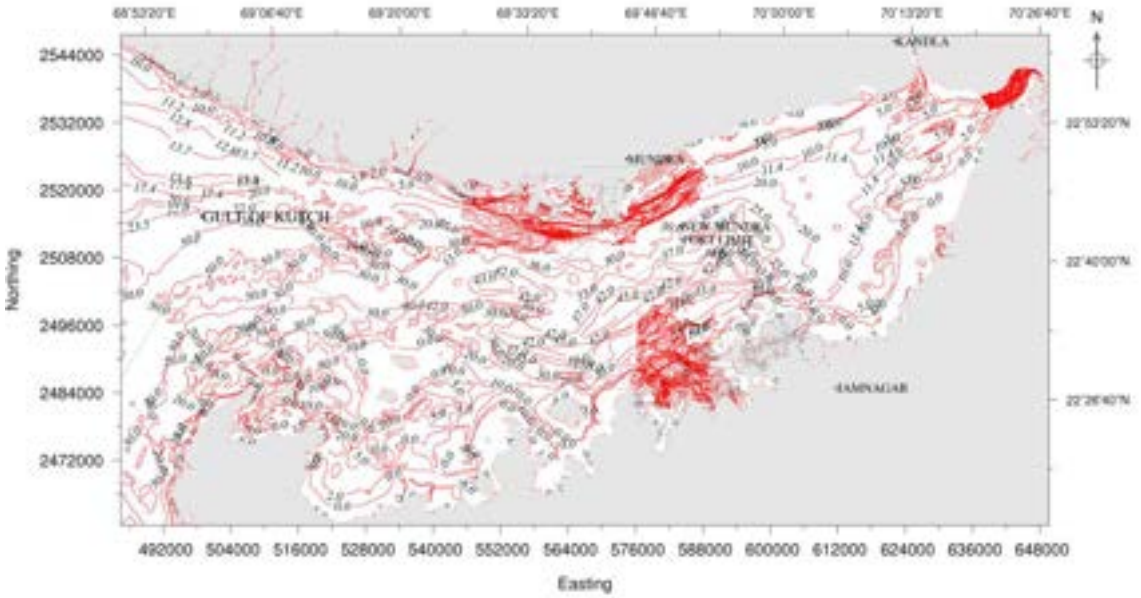


Fig.A1.1 Terrain features of study domain.

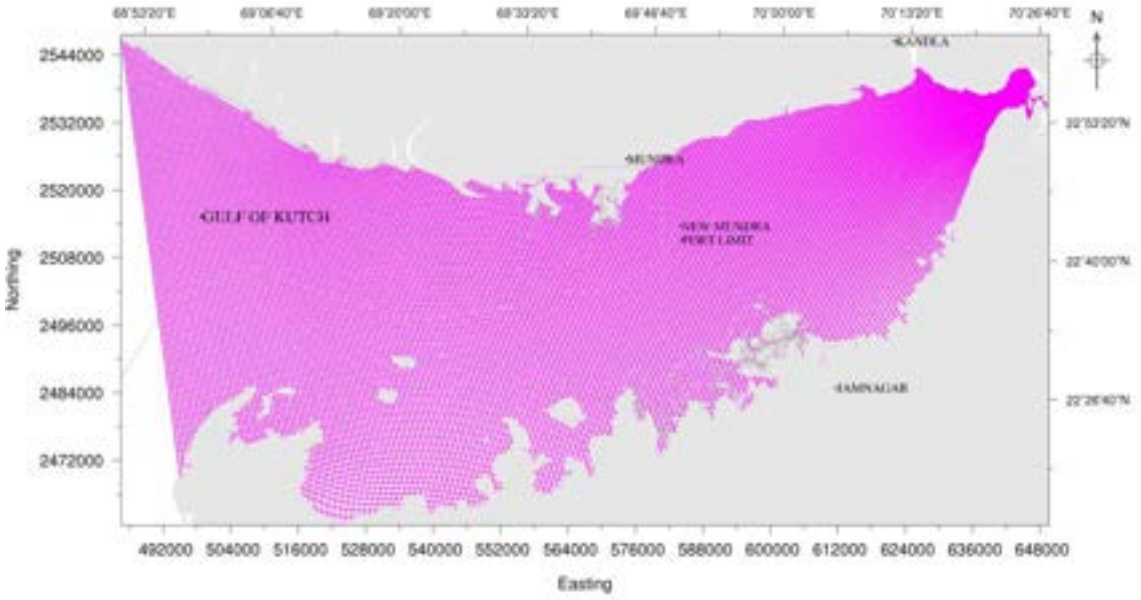


Fig.A1.2 Computational grid

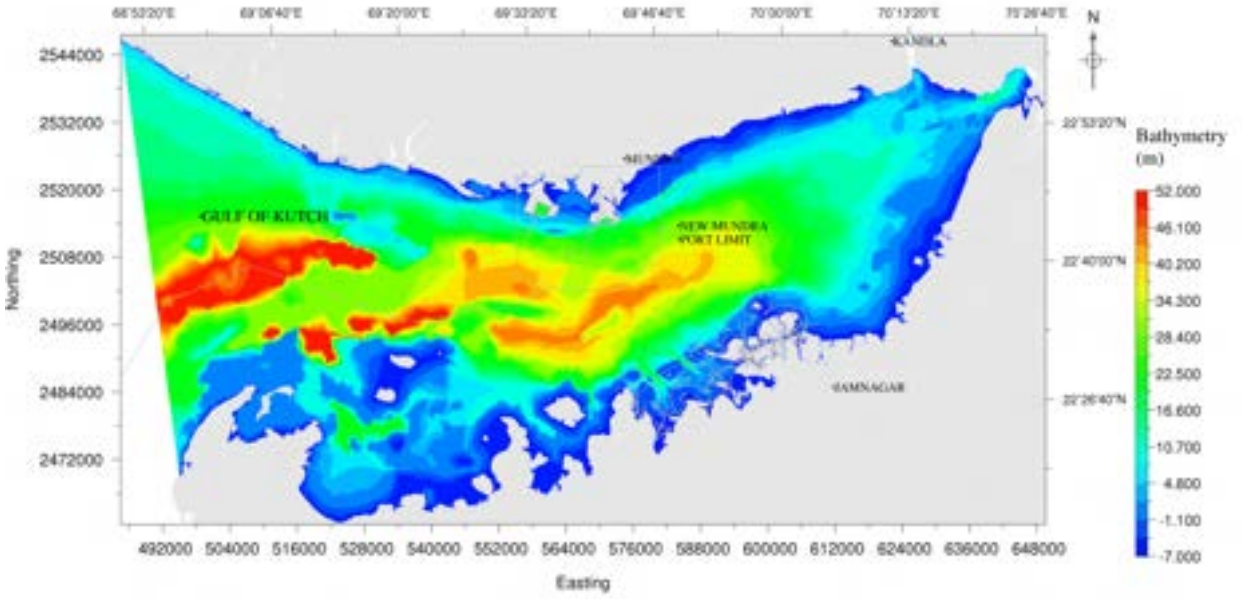


Fig.A1.3 Interpolated depth contours

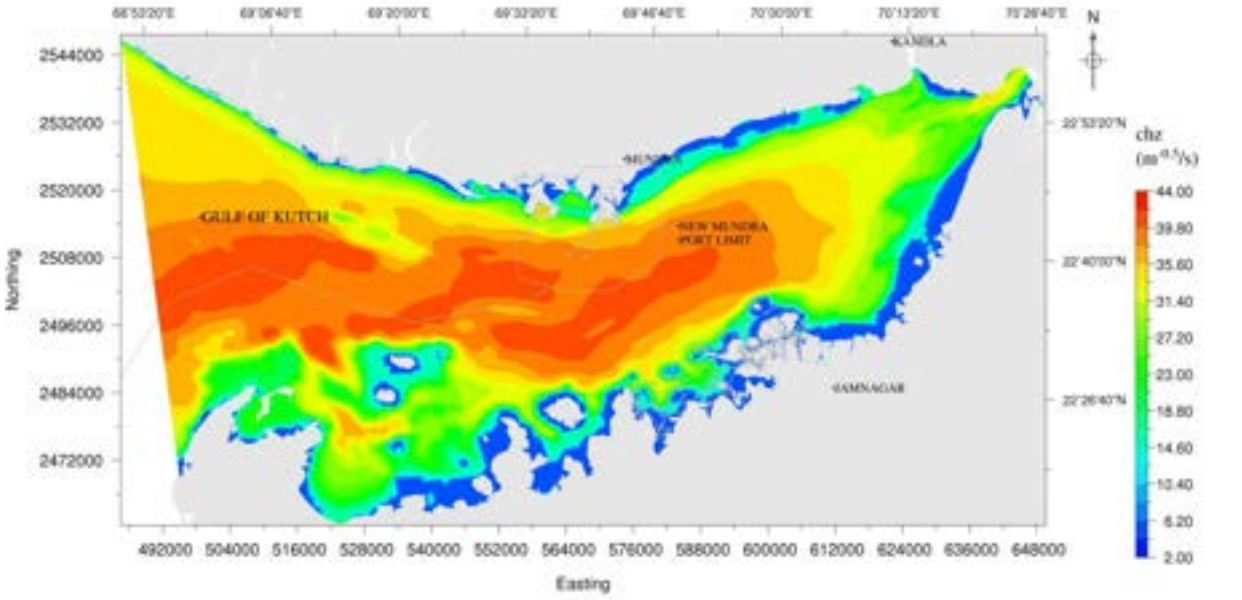


Fig.A1.4 Chezy's coefficient

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.

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

Sl. No	Chemical	Boiling Range (^oC)	Specific Heat of Liquid (J/Kg ^oK)	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 = > 260^0 C
Vapor pressure = < 0.1 psia at 21^0 C

(c) HSD
Sp. Gr = 0.86
Pour point = 6^0 C - 18^0 C
Vapor pressure = 2.12 to 26 mm Hg at 21^0 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 hydo-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^{o}C during 2005, it occasionally exceeds 40^{o}C. Rainfall alone forms the ultimate source of freshwater resource to the region. The average rainfall at Mundra is about 400 mm/year.

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 70E 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.

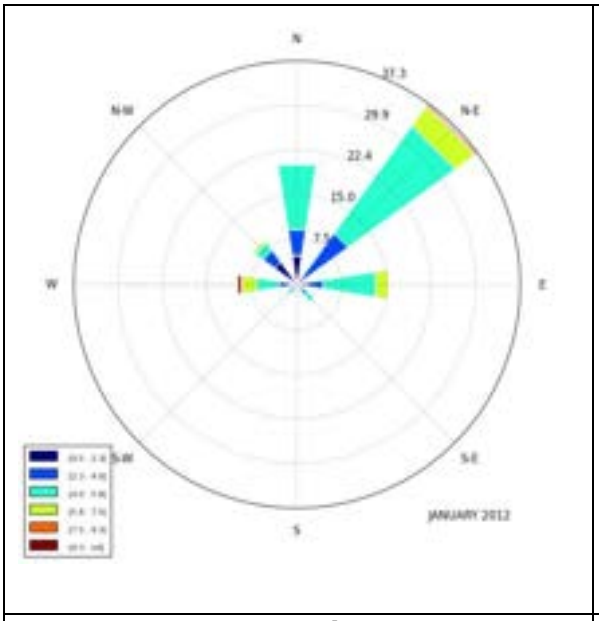


Fig.1.5 January 2012 winds

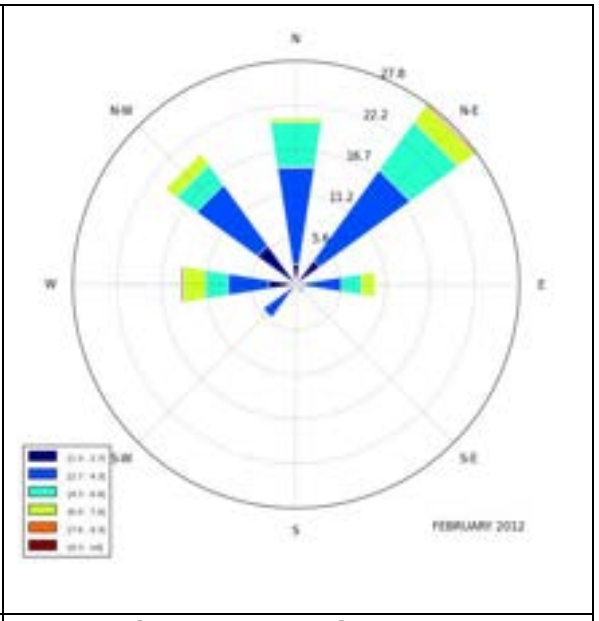


Fig.1.6 February 2012 winds

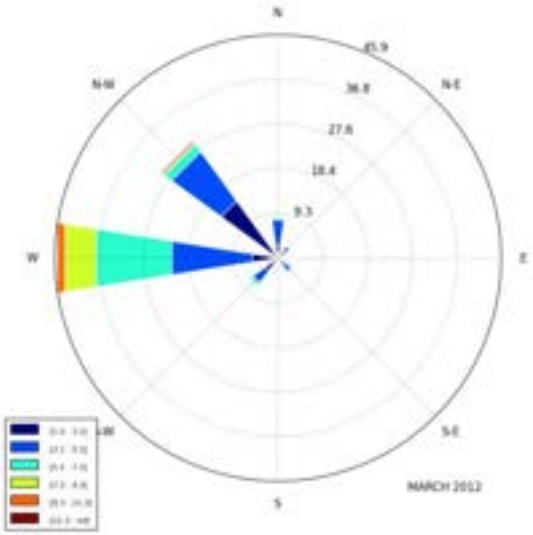


Fig.1.7 March 2012 winds

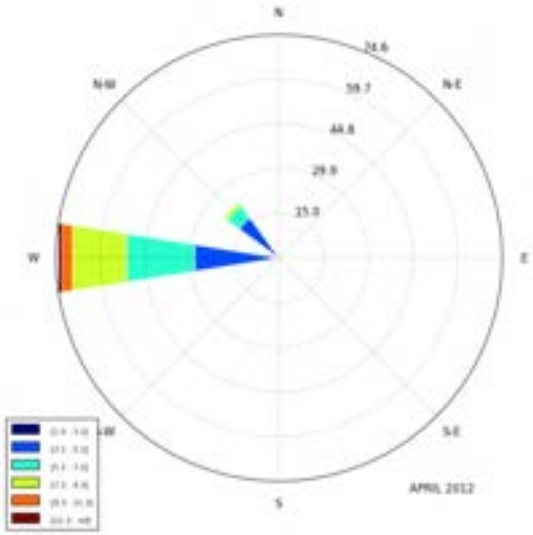


Fig.1.8 April 2012 winds

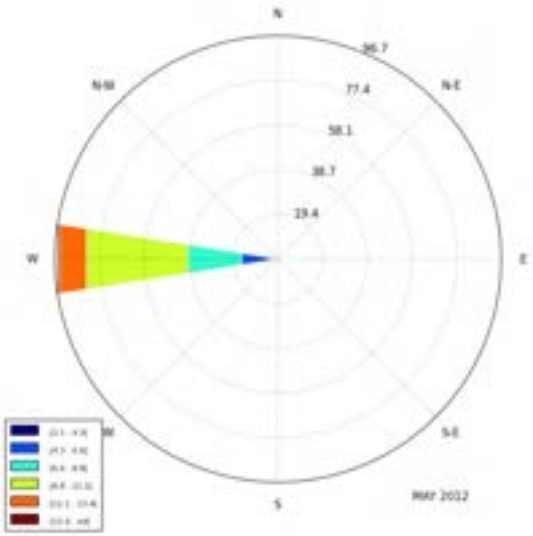


Fig.1.9 May 2012 winds

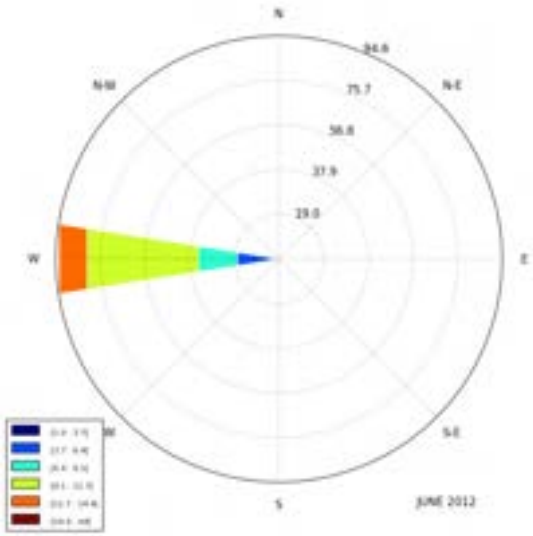


Fig.1.10 June 2012 winds

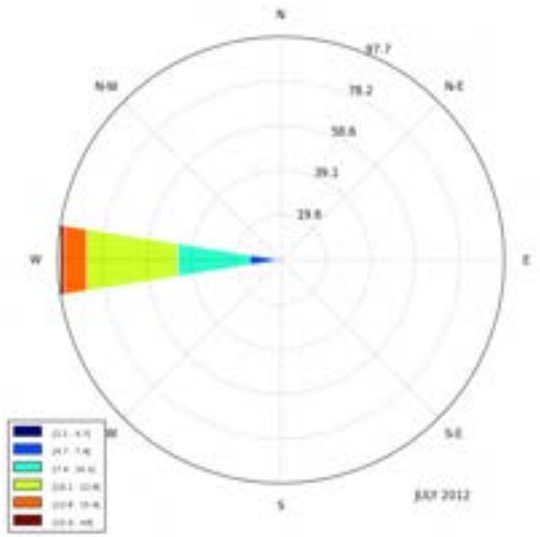


Fig.1.11 July 2012 winds

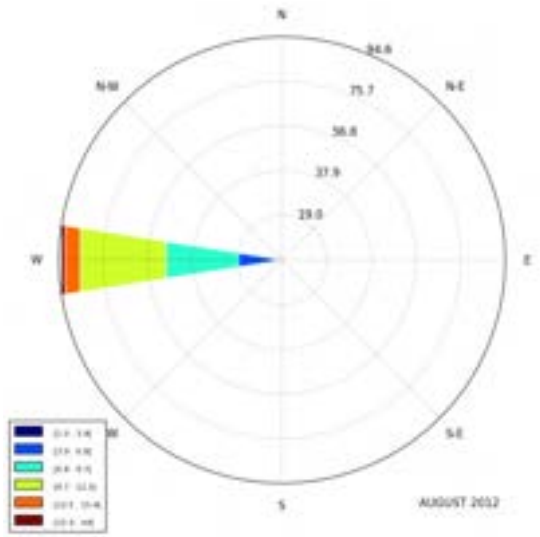


Fig.1.12 August 2012 winds

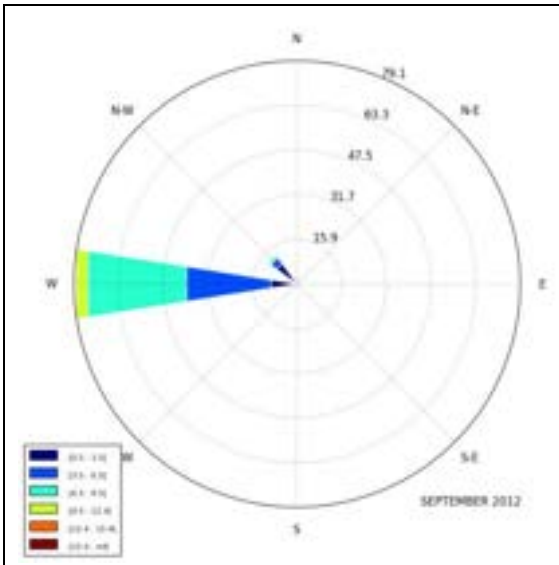


Fig.1.13 September 2012 winds

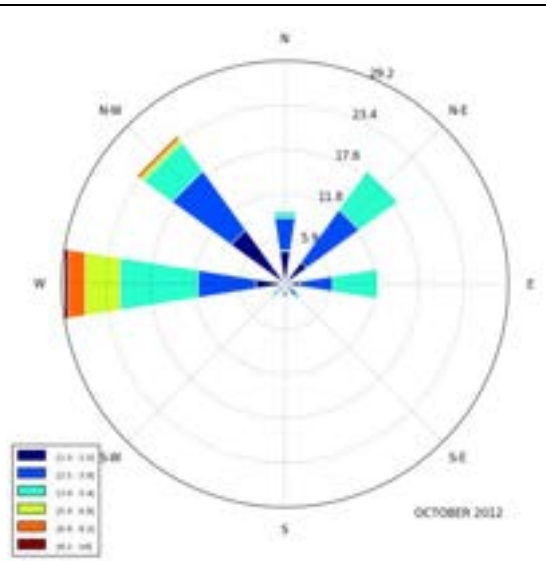


Fig.1.14 October 2012 winds

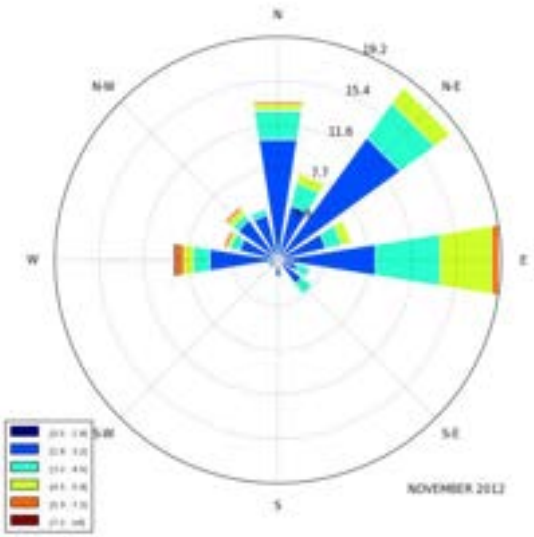


Fig.1.15 November 2012 winds

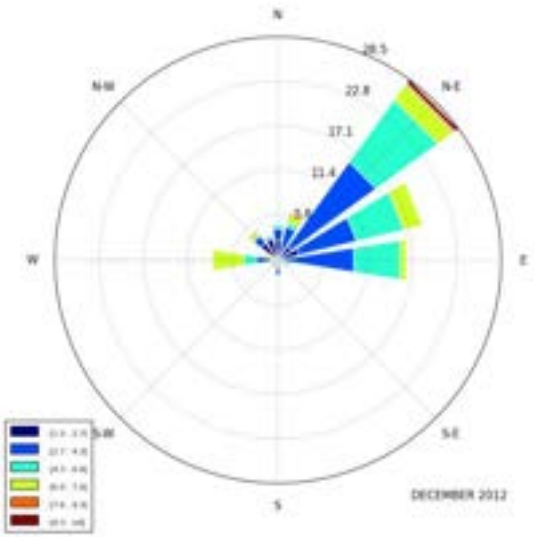


Fig.1.16 December 2012 winds

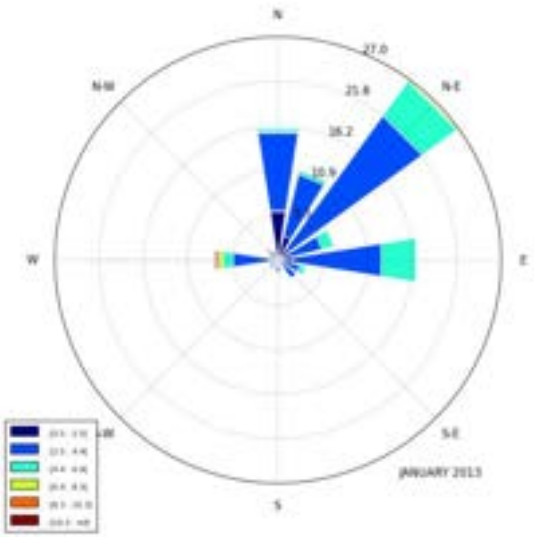


Fig.1.17 January 2013 winds

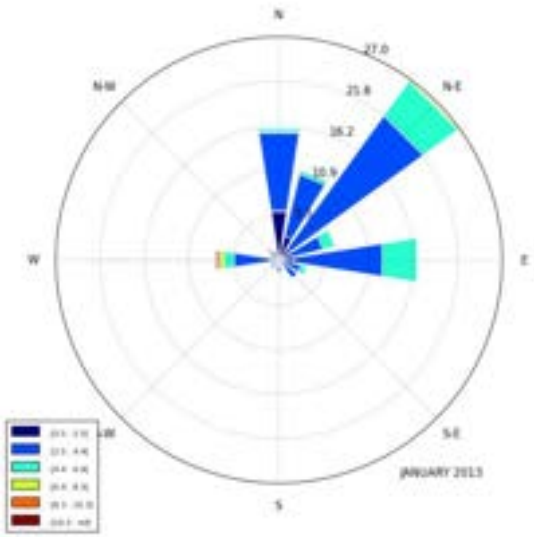


Fig.1.18 February 2013 winds
(Readings till Feb 18,2013)

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 (ºN)	Return Period (years)	Inshore Direction (ºN)	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

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^{o}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)

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		

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.

This FIR is to be followed by company's incident report also.

Following POLREP report to the Government through nearest CG information will also be required:

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)	

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 :

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. 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
Brahmini	ASD	2000 x 2	3000 ltr	2882 ltr	1200	65
Baitarni	ASD	2000 x 2	3000 ltr	2882 ltr	1200	65
Khushboo	Fixed screw	401 X 2	-	-	-	10

Dolphin No. 4, 7, 10, 11, 14, 15, 16, 17, 18, Brahmini and Baitarni are fitted with Oil Spill Dispersant boom and proportionate pump to mix OSD and Sea water as required. The tugs are also fitted with a fire curtain and remote controlled fire monitors.

All above eleven Tugs have class notation as Harbour Tugs and are certified to work within the Harbour limits only.
Reception Facility : 12" pipe line, connected to a slop tank at chemical tank farm.

Dolphin 11 has fire fighting system of 1200 m3/hr along with 20 ton lifting "A" frame and diving support facility.

Location of Oil Spill Equipment: The Oil Spill Equipment stored in SPM Store.

Resources / Equipment Available with APSEZL, Mundra

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(01CO2-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(10m³)	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.

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	079-23238346 / 23238363

		Chief Nautical Officer	079-23234716
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. Sachin Srivastava, Head – Marine	02838 - 255727	+91 6359883102
02	Capt. Divya Gupta, HOS-Marine	02838 – 255730	+91 6359631088
03	Capt. Rajat Garg. , HOS-Marine	02838- 255947	+91 6357160037
04	Mr. Sanjay Kewalramani, Head-Marine Technical	02838- 255844	91 9925150056
05	Mr. Yogesh Nandaniya, Manager-SPM	02838- 2562379	91 6359775168
06	Mr. Hari Govindan V	91-2838 - 285072	91 9879104805
07	Marine control, APSEZL	02838 – 255333 / 255761	91 9825228673
08	Port Operation center, APSEZL	02838 –255762	91 9825000949
09	Port security Control, APSEZL	02838 – 289322	91 9825000933
10	Head - Security, APSEZL		+91 9109988165
11	Head - Health, safety & Environment, APSEZL	02838 - 255718	+91 9884869471
12	Head - Fire Dept. APSEZL	02838 – 255857	91 7069083035
13	Occupational Health Centre	02838 - 255710	91 8980015070
14	Head-Admin Department	02838 – 255159	+91 8660183841

	Marine Officer/ SPM Mooring master	**ANNEXURE 5**
Responsibilities	• 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	*VHF Channel 73 / 77*
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	*Liaise with Terminal Shift Engineer*
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	

	MARINE MANAGER / On Scene Commander **ANNEXURE 6**	
Responsibilities	• 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	*Stopped or ongoing*
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	

	SPM Pilot	ANNEXURE 7
Responsibilities	• 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	□ Marine Control Room □ OSC □ 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	

	HOD – Marine	ANNEXURE 8
Responsibilities	• 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	

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

Emergency Response Log	**ANNEXURE 10**
Page Number:	**Date:**
Name:	**Position:**
Contact Number	**Signature:**

Time	Activity Completed:

Control Room Officer **HOD – Marine**

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
Aasgard	49	-28	2 @ 10°C	58	14
Arabian Super Light	51	-39	2 @ 20°C		
Cossack	48	-18	2 @ 20°C	51	18
Curlew	47	-13	2 @ 20°C	57	17
F3 Condensate	54	<-63	1 @ 10°C	81	0
Gippsland	52	-13	1.5 @ 20°C	63	8
Hidra	52	-62	2.5 @ 10°C	60	11
Terengganu condensate	73	-36	0.5 @ 20°C	>95	0
Wollybutt	49	-53	2@ 20°C	55	4
Gasoline	58		0.5 @ 15°C	100	0
Kerosene	45	-55	2 @ 15°C	50	0
Naptha	55		0.5 @ 15°C	100	0

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	E
Arabian Extra Light	38	-30	3 @ 15°C	26	39
Azeri	37	-3	8 @ 20°C	29	46
Brent	38	-3	7 @ 10°C	37	33
Draugen	40	-15	4 @ 20°C	37	32
Dukhan	41	-49	9 @ 15°C	36	33
Liverpool Bay	45	-21	4 @ 20°C	42	28
Sokol (Sakhalin)	37	-27	4 @ 20°C	45	21
Rio Negro	35	-5	23 @ 10°C	29	41
Umm Shaif	37	-24	10 @ 10°C	34	31
Zakum	40	-24	6@ 10°C	36	33
Marine Gas oil (MGO)	37	-3	5 @ 15°C		
High pour point >5°C					
Amna	36	19	Semi-solid	25	30
Beatrice	38	18	32 @ 15°C	25	35
Bintulu	37	19	Semi-solid	24	34
Escravos	34	10	9 @ 15°C	35	15
Sarir	38	24	Semi-solid	24	39
Statfjord	40	6	7 @ 10°C	38	32

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%

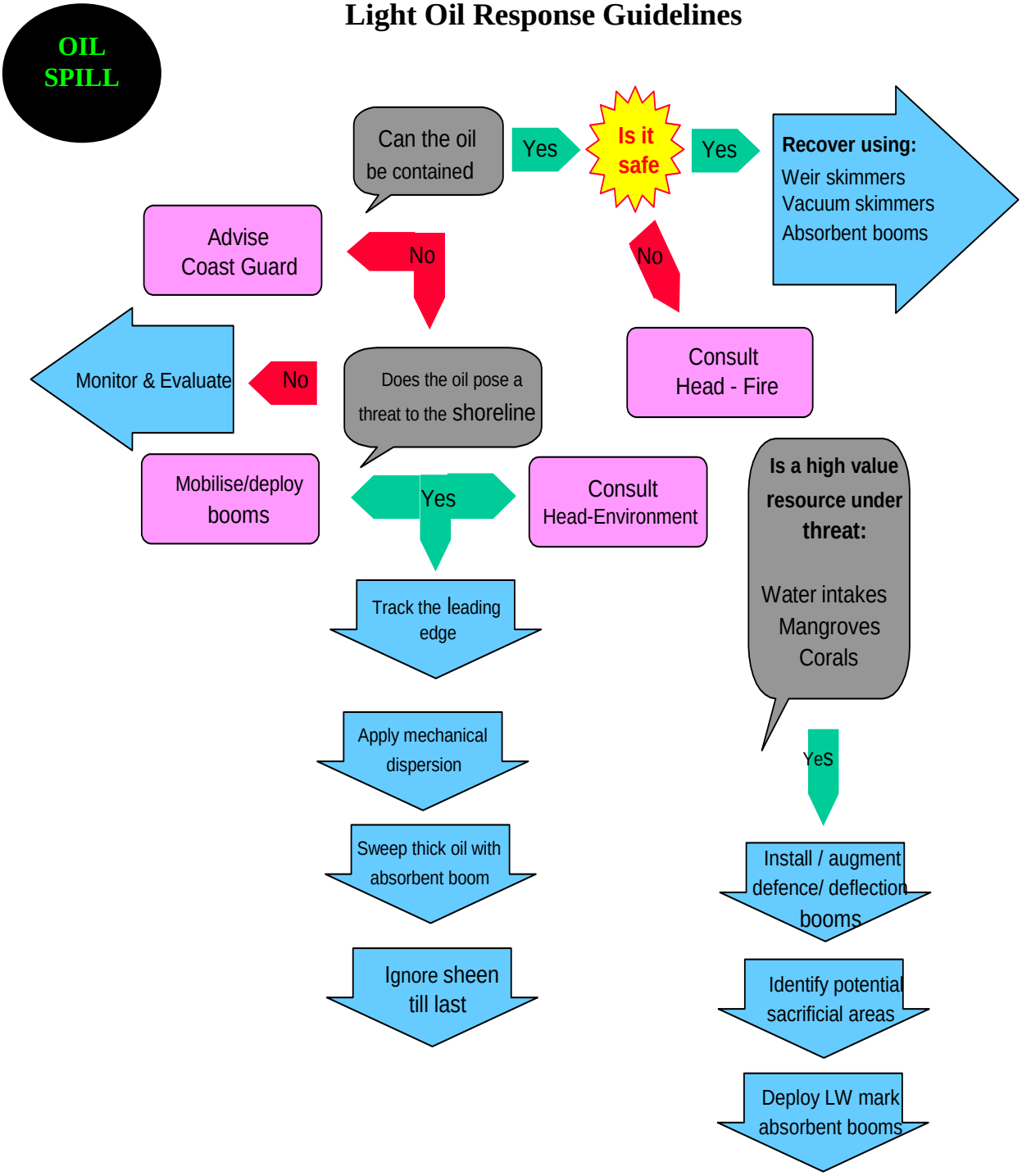
Low pour point <6°C	A	B	C	D	E
Alaska North Slope	28	-18	32 @ 15°C	32	41
Arabian Heavy	28	-40	55 @ 15°C	21	56
Arabian Medium	30	-21	25 @ 15°C	22	51
Arabian Light	33	-40	14 @ 15°C	25	45
Bonny Light	35	-11	25 @ 15°C	26	30
Iranian Heavy	31	-36	25 @ 15°C	24	48
Iranian Light	34	-32	15 @ 15°C	26	43
Khafji	28	-57	80 @ 15°C	21	55
Sirri	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					
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 4 oils

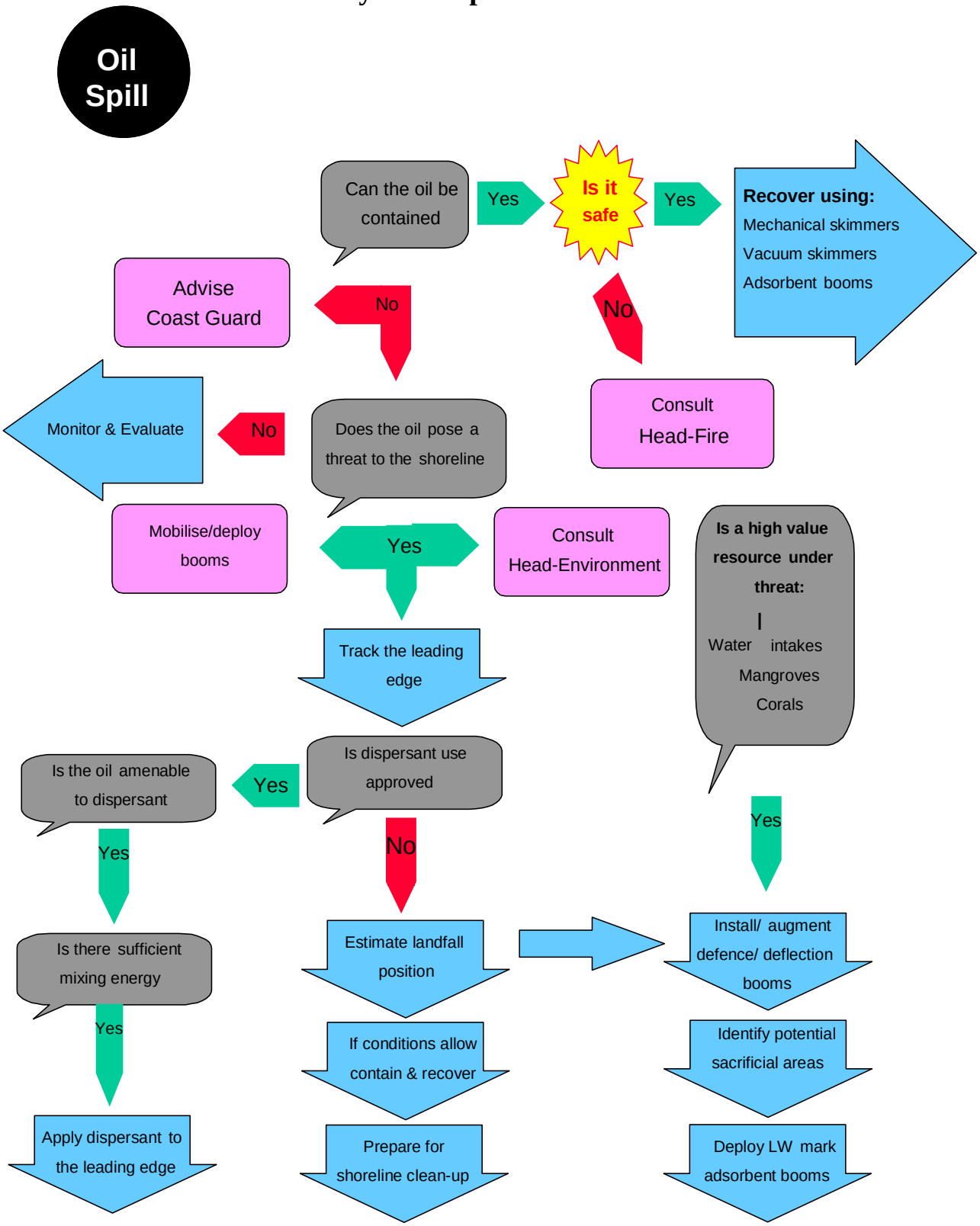
A: °API <17.5 (Specific gravity >0.95) or
B: Pour point >30°C
C: Viscosity @ 10–20°C: between 1500 CSt and semi-solid
D: % boiling below 200°C: less than 25%
E: % boiling above 370°C: greater than 30%

	A	B	C	D	E
Bachaquero 17	16	-29	5,000 @ 15°C	10	60
Boscan	10	15	Semi-solid	4	80
Cinta	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
Shengli	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		

Light Oil Response Guidelines



Heavy Oil Response Guidelines



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	☐ Open water	☐ Inshore water	☐ River / Creek	☐ Salt marsh	☐ Mudflats
	☐ Shoreline	☐ Sand	☐ Shingle	☐ Intake Channel	
6b. Use	☐ Commercial	☐ Industrial	☐ Public	☐ Government	☐ Recreational
	☐ Residential	☐ Other			

7. Site Hazards			
	☐ Boat safety	☐ Fire, explosion, in-situ burn	☐ Slips, trips and falls
	☐ Chemical hazards	☐ Heat stress	☐ Steam and hot water
	☐ Drum handling	☐ Helicopter operations	☐ Tides
	☐ Equipment operations	☐ Lifting	☐ Trenches, excavations
	☐ Electrical hazards	☐ Motor vehicles	☐ Visibility
	☐ Fatigue	☐ Noise	☐ Weather
	☐ Others	☐ Overhead/buried utilities	☐ Work near water
	☐	☐ Pumps and hoses	

8. Air Monitoring										
	☐ O_2		☐ LEL		☐ Benzene		☐ H_2S		☐ Other	

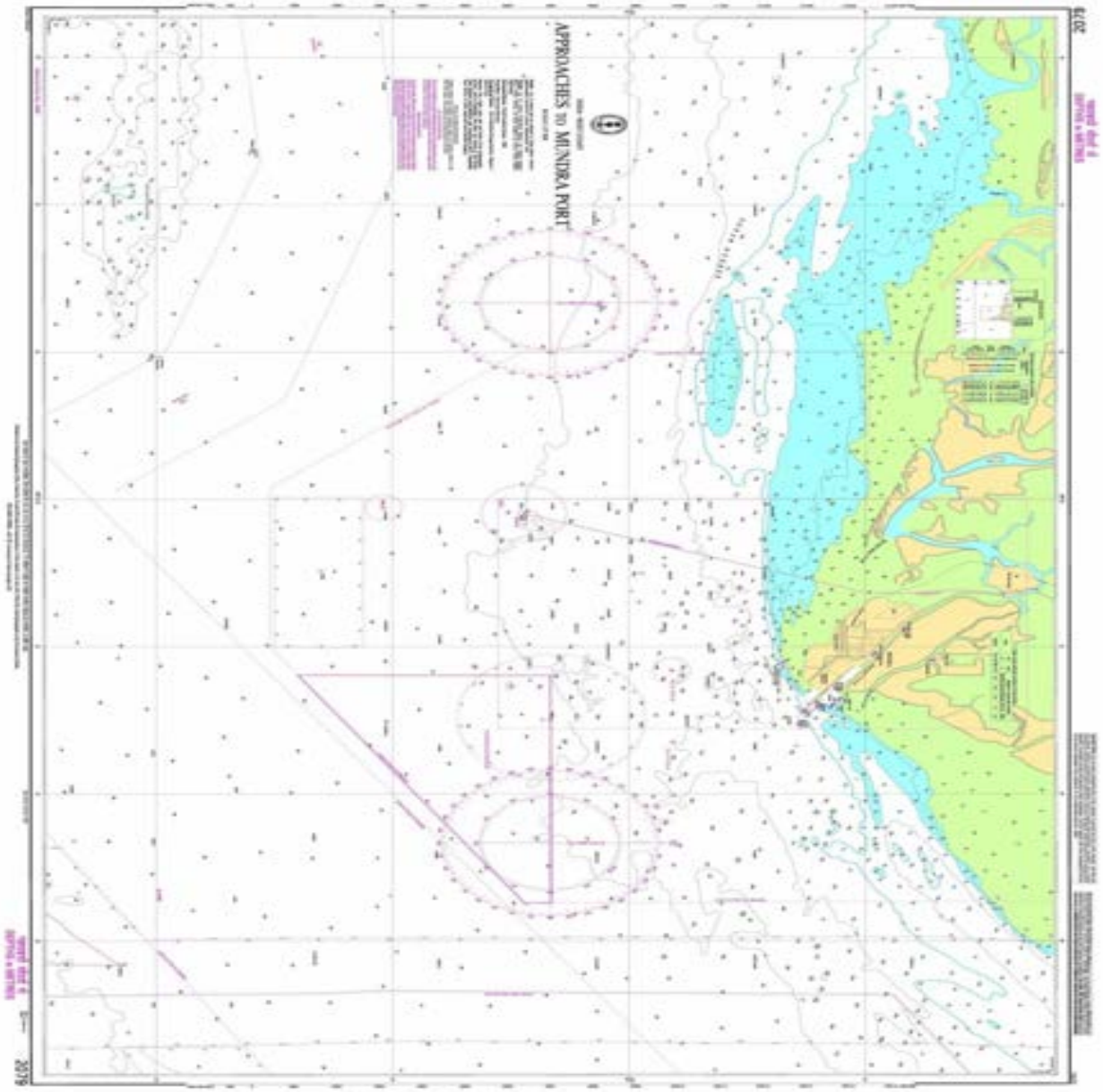
9. Personal Protective Equipment			
☐ Foot Protection		☐ Coveralls	
☐ Head Protection		☐ Impervious suits	
☐ Eye Protection		☐ Personal Floatation	
☐ Ear Protection		☐ Respirators	
☐ Hand Protection		☐ Other	

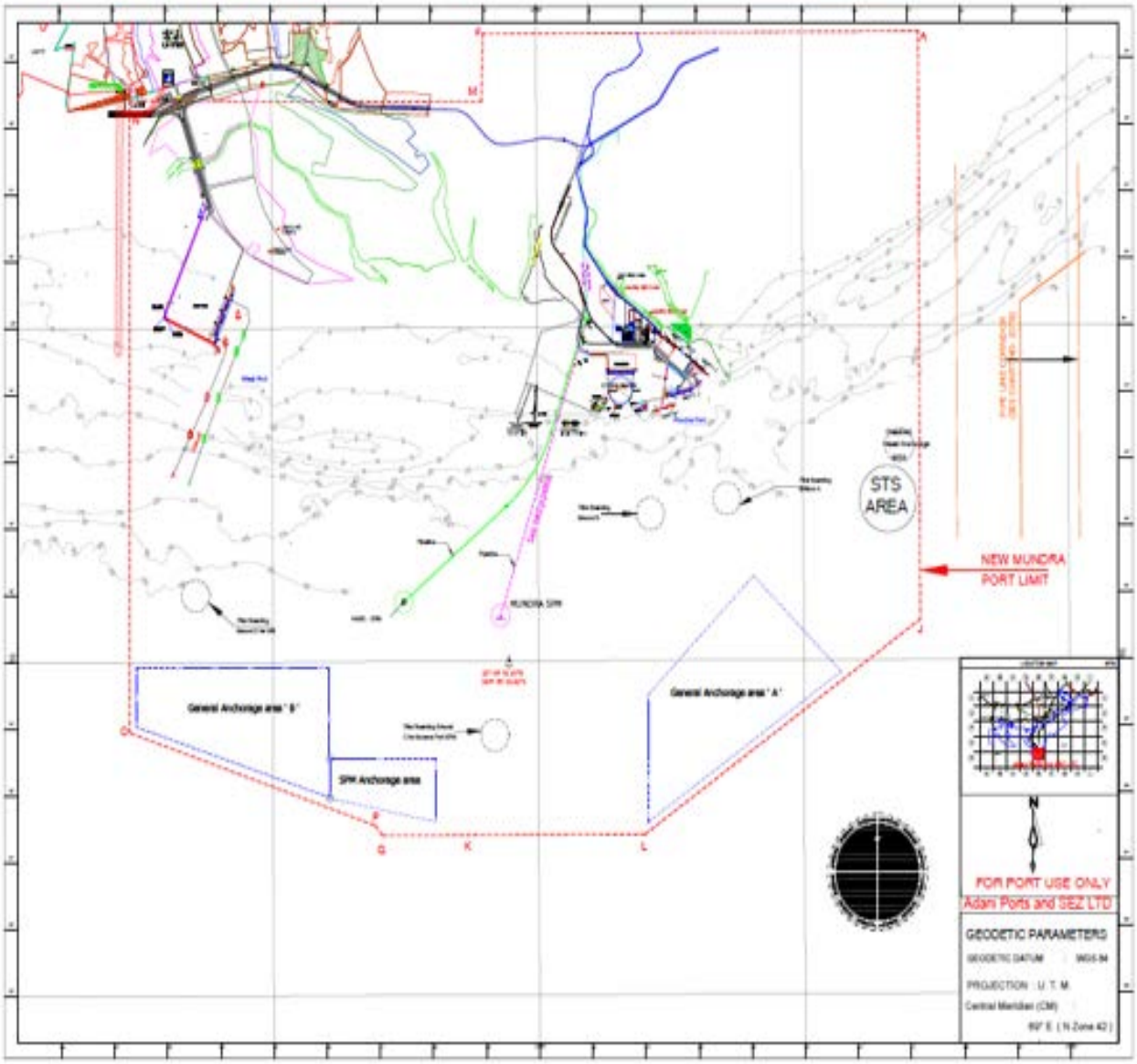
10. Site Facilities		
☐ Sanitation	☐ First Aid	☐ Decontamination

11. Contact details :			
☐ Doctor		Phone	
☐ Hospital		Phone	
☐ Fire		Phone	
☐ Police		Phone	
☐ Other		Phone	

12. Date Plan Completed	
13. Plan Completed by	

Indian Chart 2079	**ANNEXURE 14**




STS AREA
NEW MUNDRA PORT LIMIT
General Anchorage area " B "
SPM Anchorage area
General Anchorage area " A "
FOR PORT USE ONLY
Adani Ports and SEZ LTD
GEODETIC PARAMETERS

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)

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	Kalapoornasuri Karunadham Karunadham Hospital, At – Shedata, Bhuj, Kucth		(M) 9925020776	Rescue of oil socked birds / animals and medical treatment facility
3	Anchorwala Ahinshadham Bhagwan Mahavir Pashu Raksha Kendra, Pragpar, Mundra, Kutch.		Phone (02838) 22352	Rescue of oil socked 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 socked birds / animals and medical treatment facility

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

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:

Name: Capt. Sachin Srivastava

Designation: Head - Marine

Organization: Adani Ports and SEZ Ltd, Mundra

Place: Mundra

Date: 01 Nov 2021

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. OSCRP 2.2)**
2,	Whether risk assessment is done	Yes	**(Ref. OSCRP 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. OSCRP 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. OSCRP 2.4)**
6.	Whether all types of spills possible in the facility are considered including grounding, collision, fire, explosion, Rupture of hoses.	Yes	**(Ref. OSCRP 2.3 & 2.4)**
7	Please specify the list of oils considered for risk assessment	Yes	**(Ref. OSCRP 2.2)**
8	Whether the vulnerable areas are estimated by considering maximum loss scenario and weather condition	Yes	**(Ref OSCRP 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. OSCRP 2.6)**
10	Whether measures for reduction of identified high risk are included by reducing the consequences through spill mitigation measures	Yes	**(Ref. OSCRP 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. OSCRP 2.1 computational scenarios & 2.3)**
13	Whether prevention and mitigation measures are included in the plan	YES	**(Ref. OSCRP 4.0, 7.0, 8.0 & 9.0)**
14	Whether the spill may affect the shoreline.(length of the shoreline with coordinated)	Yes	**Ref. OSCRP 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. OSCRP 2.3)**
16	Whether sensitivity mapping has been carried out	Yes	**(Ref. OSCRP 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. OSCRP 2.5 & 2.6)**

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

			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 Annexture-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**

	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 belier

Date: 01 Nov 2021 Chief conservator /Installation manager

VERIFIED

Date: (District commander ICG)
or his representative

Date: (Regional commander ICG)
or his representative