



APSEZL/EnvCell/2016-17/039



Date: 28.11.2016

To

Additional Principal Chief Conservator of Forests (C),

Ministry of Environment, Forest and Climate Change,

Regional Office (WZ), E-5, Kendriya

Paryavaran Bhawan, Arera Colony,

Link Road No. - 3, Bhopal - 462 016.

E-mail: rowz.bpl-mef@nic.in

Sub : Half yearly Compliance report of Environment and CRZ Clearance for "Handling facility of General Cargo / LPG /Chemicals and their storage terminal at Navinal Island, Mundra taluka of Kutch district, Gujarat"

Ref : Environment and CRZ clearance granted to M/s Adani Ports & SEZ Limited vide letter dated 25th August, 1995 bearing no. J-16011/13/95-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 / CRZ Clearance for the period of April - 2016 to September - 2016 is enclosed here for your records. The stated information is also provided in form of a CD (soft copy).

Thank you,

Yours Faithfully,

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

Ennarasu Karunesan

Chief Executive Officer

Mundra & Tuna Port

Encl: As above

Copy to:

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

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Environmental Clearance Compliance Report

of



Multi-purpose Jetty and Storage
Facilities, Navinal Island,
Mundra, Dist. Kutch, Gujarat

of

Adani Ports and SEZ Limited
For

Period:

April-2016 to September-2016

Index

Sr. No.	Particulars	Page No.
1	Compliance Report	1-6
2	Annexures	
	Annexure - 1 Summary of Environment Monitoring Reports	7-50
	Annexure - 2 Green Belt Development and Mangrove Afforestation details	51-61
	Annexure - 3 GPCB Acknowledge of CC&A-Renewal Appl.	62
	Annexure - 4 Environment Cell Management Organogram	63
	Annexure - 5 Detail Budget for Environment Protection Measures	64
	Annexure - 6 Details on Skill Development Initiatives	65-67

Compliance Report

	Adani Ports and SEZ Limited	From : April'16 To : September'16
Status of the conditions stipulated in Environment and CRZ Clearance		

Half yearly Compliance report of Environment and CRZ Clearance for "Handling facility of General Cargo / LPG /Chemicals and their storage terminal at Navinal Island, Mundra taluka of Kutch district, Gujarat" issued vide letter no. J-16011/13/95-IA.III dated 25th August,1995

Sr. No.	Conditions	Compliance Status as on 30-09-2016
2(i)	All construction designs / drawings relating to various project activities should have the approval of the concerned State Government departments / Agencies.	Complied. Information has been already submitted to the Ministry of Environment, Forest & Climate Change & there is no further change.
2(ii)	To prevent discharge of bilge wastes, sewage and other liquid wastes from the oil tankers / ships into marine environment, adequate system for collection, treatment and disposal of liquid wastes including shore line installation and special hose connections for ships to allow for discharge of sewage must be provided.	Complied. - Ships berthing at Mundra Port comply with MARPOL regulations. - No discharge is allowed into marine environment inside port limits and APSEZL does not receive sewage/liquid waste from ship. - Oily sludge (a mixture of oil, water and dirt) is disposed through authorized recycler / re-processor. - Oily slop is being received at port and separated at Oil Water separation facility provided by APSEZL. Separated oil is being sold to authorize recycler, whereas waste water is being treated at effluent treatment plant.
2(iii)	The quality of treated effluents, solid wastes, emissions and noise levels etc. must confirm to the standards laid down by the competent authorities including the central and State Pollution Control Boards under the Environment (Protection) act, 1986 whichever are more stringent.	Complied. The quality of treated effluent, emission and noise level is being monitored regularly by a MoEF&CC/NABL accredited agency. Monitoring report for the period from April'16 to Sept.'16 is enclosed as Annexure-1.
2(iv)	Adequate provision for infrastructure facilities such as water supply, roads, sanitation etc. should be ensured so as to avoid environmental degradation in the surrounding areas. These facilities should be brought into existence during the construction phase and will remain in existence thereafter as part of the infrastructure build up in the area for local developmental purposes.	Complied. Construction activity is already completed. Adequate infrastructure facilities have been provided during construction phase and are presently available.

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Sr. No.	Conditions	Compliance Status as on 30-09-2016
2(v)	Adequate noise control measures should be ensured in various project activities and due to increase in the traffic which is likely to take place during construction and operational phases.	Complied. Following noise control measures are taken • All DG set are installed with acoustic enclosure. • Green Belt has been developed. • Traffic signage has been provided to reduce unnecessary blowing of horns.
2(vi)	The water quality parameters such as dissolved oxygen, ammonical nitrogen and other nutrients etc. should be measured at regular intervals to ensure adherence to the prescribed standards of water qualities. Suitable ground water monitoring should also be undertaken around the sludge lagoons and regular reports to be submitted to the Ministry for evaluation.	Complied. • Marine Water Quality is being regularly monitored at identified locations. Monitoring Report is enclosed as Annexure-1. • The waste water (if any) is being treated in ETP. Monitoring report of the treated effluent is enclosed as Annexure-1. • Sludge generated from ETP is being disposed off through authorized common TSDF facility at SEPPL/NECL. • The complete facility is on Navinal island and the area of ETP is paved therefore there is no possibility of contamination of water.
2(vii)	Adequate culverts should be provided for smaller creeks so that breeding grounds for crabs, mud snappers and other marine organisms are not cut off by road construction activities.	Complied. Construction activity is already completed. Details of culverts provided are submitted to the MoEF & CC along with half yearly compliance report April – 2013 to Sep – 2013.

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Sr. No.	Conditions	Compliance Status as on 30-09-2016
2(viii)	A hundred meter wide mangrove belt should be created all along the west of Navinal Creek till its junction up to new road. Green belt of 50 M width should also be provided all along the periphery of the plant site and along the roads, storage tanks etc. at 1500 trees per hectare. All details regarding the Mangrove belt and other afforestation work must be worked out in consultation with the State Forest Department, and details sent to the Ministry.	Complied. Details of the developed mangrove along the west of Navinal creek and green belt details are submitted to the MoEF & CC along with half yearly compliance report April – 2013 to Sep – 2013. Details on mangroves afforestation carried out by APSEZL till date is annexed as Annexure – 2 .
2(ix)	Arrangements should be made for ensuring fresh water availability for various project related activities. Special water harvesting programs should be undertaken in the project impact area. Details of these activities should be reported to the Ministry.	Complied. Details of the same are submitted to the Ministry of MoEF & CC along with half yearly compliance report April – 2013 to Sep – 2013.
2(x)	While filling the storage tanks, compatibility of the chemicals should be ensured for chemical safety. Since 5000 MT capacity is proposed to be created for cryogenic conditions, necessary HAZOP study should be initiated and submitted to the Ministry within three months. Calculations carried out on the basis of EFFECT MODEL for this storage should be rechecked for various accident scenarios. Keeping in view the safety aspects, Horton spheres of 1250 MT capacity each should be preferred.	Complied. Separate oil pipe lines and tanks have been provided for POL and Edible grade oil. Risk Estimation study was submitted to MoEF while processing EC application. The project of storage for product in cryogenic condition is under progress.
2(xi)	The measures suggested by the Gujarat State Pollution Control Board in February, 1995 while according "No Objection Certificate" should be strictly followed and authorization certificate required for converting NOC into "consent to operate" should be submitted within three months.	Complied. Consent to operate (CC&A) has been obtained from GPCB vide consent no. AWH 60840 valid till 17 th November, 2016. APSEZL have already applied for renewal of CC&A. Acknowledgement copy of CC&A-Renewal application is attached Annexure – 3 .

	Adani Ports and SEZ Limited	From : April'16 To : September'16
Status of the conditions stipulated in Environment and CRZ Clearance		

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Sr. No.	Conditions	Compliance Status as on 30-09-2016
2(xii)	For ensuring the acceptance of the project by the local people, a Resolution of the Official Panchayat of the Region should be obtained offering their concurrence in writing by the project proponents and submitted to the Ministry by 31st October, 1995.	Complied. Resolution from the Panchayat has been obtained and submitted to the Ministry of Environment, Forest & Climate Change on 31 st July, 2012.
2(xiii)	A permanent staff structure should be created with latest R&D facilities and suitable equipments for environmental and forestry activities through creation of Environmental cell. Adequate funds should be earmarked for this cell.	Complied. APSEZL has a well structured Environment Cell, staffed with qualified manpower for implementation of the Environmental Management Plan. Environment Cell Organogram is attached as Annexure – 4 . Separate budget for the Environment Protection measures is earmarked every year. All environmental and horticulture activities are considered at group level and budget allocation is also done accordingly. Detail break up of budget spent during April' 16 to Sept.'16 for Environment Protection measure attached as Annexure – 5 .
2(xiv)	Landsat imagery should be obtained on a continuous basis covering various seasons to study the change in the land use pattern due to the project and project related activities.	Complied. Project is in operation phase since many years and there is no change in the land use during the period from April'16 to Sept.'16.

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Sr. No.	Conditions	Compliance Status as on 30-09-2016
2(xv)	With a view to providing adequate job opportunities to local people, facilities for technical training and development of skills should be made available in consultation with the state Harbour Department, and to this end it must be ensured that there is allocation of adequate funds. The local people should be involved in the afforestation program proposed for the scheme to ensure public participation and success of vegetation programmes.	Complied. • Adani Skill development center, Mundra is providing skill development training to the locals. • Preference is given to local people for employment based on their qualification and experience. • Local personnel and horticulture experts are involved in the afforestation programs. • Mangrove afforestation and maintenance at Mundra is being done through active participation of local fishermen. • Details on skill development training imparted during period of April'16 to Sept.'16 by Adani Foundation are enclosed as Annexure – 6.
2(xvi)	Prior clearance must be taken under the Hazardous Chemicals (manufacture, import and storage) Rules 1989, as amended up to date, from the competent authority. Such clearance will have to be taken prior to the commissioning of the project.	Complied. Permission under MSIHC has been obtained and the details of the same have been submitted to MoEF & CC along with half yearly compliance report April – 2013 to Sep – 2013.
2(xvii)	A detailed progress report should be submitted to the Ministry on each of the conditions stipulated above in respect of the follow-up action taken every six months. The first of these two reports should be sent in by 31.3.1996.	Complied. Half yearly compliance report is being submitted regularly. Last half yearly compliance report for period Oct'15 to Mar'16 was submitted to MoEF & CC in soft as well as hard copy vide letter dated 26.05.2016.

	Adani Ports and SEZ Limited	From : April'16 To : September'16
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Sr. No.	Conditions	Compliance Status as on 30-09-2016
2(xviii)	Financial requirements for implementation of the above indicated environmental mitigative measures should be worked out and included in the total cost of the project. Provision for enhancing this allocation in future should also be made.	Complied. Separate budget for the Environment Protection measures is earmarked every year. All environmental and horticulture activities are considered at group level and budget allocation is also done accordingly. Detail break up of budget spent during April'16 to Sept.'16 for Environment Protection measure attached as Annexure - 5 .

	Adani Ports and Special Economic Zone Limited, Mundra.	From : April,16 To : September,16
Status of the conditions stipulated in Environment and CRZ Clearance		

ANNEXURE – 1



POLLUCON

LABORATORIES PVT. LTD.

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

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

"HALF YEARLY ENVIRONMENTAL MONITORING REPORT"

FOR

adaniTM

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

**MONITORING PERIOD:
OCTOBER 2015 TO MARCH 2016**

PREPARED BY:

Pollucon

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T 0820 - 821

ISO 9001:2008

ISO 14001:2004

OHSAS 18001:2007

H. T. Shah
Lab Manager



Dr. Arun Bajpai
Lab Manager (Q)

MARINE WATER MONITORING SUMMARY REPORT

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

SR. NO.	TEST PARAMETERS	UNIT	October 2015		November 2015		December 2015		January 2016		February 2016		March 2016		Test Method
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1	pH	--	8.08	8.19	8.14	8.18	7.96	8.04	8.02	8.08	8.13	8.17	8.07	8.0	IS3025(P11)83 Re.02
2	Temperature	°C	29	30	28	29	28	29	29	30	28	29	29	30	IS3025(P9)84R e.02
3	Total Suspended Solids	mg/L	24	18	16	22	18	20	18	24	18	20	14	20	IS3025(P17)84 Re.02
4	BOD (3 Days @ 27 °C)	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	IS 3025 (P44)1993Re.03 Edition2.1
5	Dissolved Oxygen	mg/L	5.6	5.0	5.0	4.6	5.6	5.2	5.2	4.4	5.2	4.8	5.4	4.4	IS3025(P38)89 Re.99
6	Salinity	ppt	40.54	41.17	39.80	41.08	41.40	41.80	39.72	41.13	39.78	40.08	40.28	40.98	APHA (22 nd Edition) 2550 B
7	Oil & Grease	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	APHA(22 nd Edition)5 520D
8	Nitrate as NO ₃	mg/L	0.67	0.73	0.63	0.72	0.50	0.73	0.64	0.7	0.64	0.70	0.32	0.51	IS3025(P34)88
9	Nitrite as NO ₂	mg/L	0.06	0.071	0.058	0.069	0.022	0.035	0.052	0.067	0.057	0.072	0.026	0.041	IS3025(P34)88 NEDA
10	Ammonical Nitrogen as NH ₃	mg/L	0.72	0.88	0.80	0.99	0.98	1.13	0.76	0.97	0.81	0.98	1.21	1.35	IS3025(P34)88 Cla.2.3
11	Phosphates as PO ₄	mg/L	0.63	0.78	0.75	0.83	0.04	0.1	0.02	0.04	0.73	0.81	0.81	0.96	APHA(22 nd Edition) 4500 C
12	Total Nitrogen	mg/L	1.45	1.69	1.47	1.77	1.6	1.91	1.463	1.73	1.51	1.75	1.56	1.91	IS3025(P34)88
13	Petroleum Hydrocarbon	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	PLPL-TPH
14	Total Dissolved Solids	mg/L	49870	50560	47580	48670	46980	47860	47480	48720	46850	47770	47580	48220	IS3025(P16)84 Re.02
15	COD	mg/L	29	38	9	19	19	24	10	20	9	14	19	33	APHA(22 nd Edition) 5520-D Open Reflux



H. T. Shah
Lab Manager




Dr. Arun Bajpai
Lab Manager (Q)

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16	Oxidisable Particular Organic Carbon	%	0.68	0.48	0.44	0.38	0.53	0.47	0.46	0.4	0.45	0.39	0.56	0.50	SOP – PLPL - 07
A	Flora and Fauna														
17	Primary productivity	mgC/L /day	2.02	0.90	1.91	0.42	2.70	1.46	2.91	1.84	2.02	0.22	2.13	0.33	APHA (22 nd Edi) 10200-J
B	Phytoplankton														
18.1	Chlorophyll	mg/m ³	1.81	0.42	2.18	0.53	2.67	0.90	2.30	0.70	2.69	0.45	2.70	0.45	APHA (22 nd Edi) 10200-H
18.2	Phaeophytin	mg/m ³	0.072	1.348	0.203	1.727	BDL*	1.030	0.091	1.868	0.948	2.121	0.95	2.125	APHA (22 nd Edi) 10200-H
18.3	Cell Count	Unit x 10 ³ /L	186	45	232	54	252	110	208	66	225	79	264	68	APHA (22 nd Edi) 10200-H
18.4	Name of Group Number and name of group species of each group	--	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	APHA (22 nd Edi) 10200-H
			Asterionell a sp.	Fragillaria sp.	Biddulphia sp.	Fragillaria sp.	Coscinodi scus sp.	Coscinodi scus sp.	Pinnularia sp.	Cocconeis sp.	Navicula sp.	Synedra sp.	Asterionell a sp.	Fragillaria sp.	
			Navicula sp.	Asterionell a sp.	Fragillaria sp.	Synedra sp.	Gomphon ema sp.	Nitzschia sp.	Gyrosigm a sp.	Navicula sp.	Coscinodi scus sp.	Nitzschia sp.	Biddulphia sp.	Coscinodi scus sp.	
			Nitzschia sp.	Coscinodi scus sp.	Gomphon ema sp.	Nitzschia sp.	Gyrosigm a sp.	Gomphon ema sp.	Biddulphia sp.	Fragillaria sp.	Thallasion ema sp.	Coscinodi scus sp.	Navicula sp.	Rhizosole nia sp.	
			Coscinodi scus sp.	Cyanophy ceae	Rhizosole nia sp.	Gomphon ema sp.	Pleurosig ma sp.	Skeletone ma sp.	Pinnularia sp.	Cyanophy ceae	Gomphon ema sp.	Fragillaria sp.	Synedra sp.	Biddulphia sp.	
			Rhizosole nia sp.	Oscillatori a sp.	Cymbella sp.	Cyanophy ceae	Navicula sp.	Thallasion ema sp.	Cyanophy ceae	Oscillatori a sp.	Pinnularia sp.	Tabellaria sp.	Nitzschia sp.	Navicula sp.	
			Pinnularia sp.	Spirulina sp.	Thallasiosi ra sp.	Spirulina sp.	Synedra sp.	Cyanophy ceae	Spirulina sp.	Spirulina sp.	Tabellaria sp.	Cyanophy ceae	Gomphon ema sp.	Synedra sp.	
			Amphipro ra sp.	Green Algae	Cyanophy ceae	Oscillatori a sp.	Pinnularia sp.	Microcysti s sp.	Green Algae	--	Synedra sp.	Oscillatori a sp.	Pleurosig ma sp.	Cyanophy ceae	
			Cyanophy ceae	Chlorella sp.	Anabaena sp.	Green Algae	Cyanophy ceae	Oscillatori a sp.	Spirogyra sp.	--	Asterionell a sp.	Green Algae	Rhizosole nia sp.	Oscillatori a sp.	
			Oscillatori a sp.	Spirogyra sp.	Oscillatori a sp.	Chlorella sp.	Oscillatori a sp.	Green Algae	--	--	Cyanophy ceae	Chlorella sp.	Fragillaria sp.	Green Algae	
			Anabaena sp.	--	Nostoc sp.	Hydrodict yon sp.	Nostoc sp.	Chlorella sp.	--	--	Spirulina sp.	Pediastru m sp.	Skeletone ma sp.	Chlorella sp.	
			Green Algae	--	Green Algae	--	Anabaena sp.	Pandorina sp.	--	--	Oscillatori a sp.	--	Cyanophy ceae	Hydrodict yon sp.	
			Hydrodict yon sp.	--	Chlorella sp.	--	Green Algae	Pediastru m sp.	--	--	Green Algae	--	Oscillatori a sp.	Pediastru m sp.	

H. T. Shah
Lab Manager



Dr. ArunBajpai
Lab Manager (Q)

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

			Chlorella sp.	--	Hydrodictyon sp.	--	Ankistrodesmus sp.	--	--	--	Hydrodictyon sp.	--	Green Algae	--	
			Volvox sp.	--	Pediastrum sp.	--	Chlorella sp.	--	--	--	Chlorella sp.	--	Chlorella sp.	--	
			--	--	--	--	Pandorina sp.	--	--	--	--	--	Pediastrum sp.	--	
					--	--	Ulothrix sp.	--	--	--	--	--	Scenedesmus sp.	--	
C	Zooplanktons														
19.1	Abundance (Population)	no/m ²	275	100	240	80	425	150	170	40	275	100	167	33	APHA (22 nd Edi) 10200-G
19.2	Name of Group Number and name of group species of each group	--	Copepods	Copepods	Copepods	Polychaetes Worms	Copepods	Echinoderms	Isopods	Polychaetes Worms	mysids	Nematodes	Polychaete worms	Polychaete worms	APHA (22 nd Edi) 10200-G
			Crustaceans	Platelmiths	Decapods	Crustaceans	Decapods	Rotifers	Gastropods	Crustaceans	Polychaete worms	Gastropods	Echinoderms	--	
			Cyclops	Crustaceans	Ostracods	Gastropods	Gastropods	Barnacles	Decapods	Platelmiths	Gastropods	--	Decapods	--	
			Decapods	--	Crustaceans	--	Polychaete worms	--	Nauplius larvae	Rotifers	Nauplius larvae	--	Isopods	--	
			Gastropods	--	Krill	--	Cyclops	--	--	--	Decapods	--	Mysids	--	
			Rotifers	--	Barnacles	--	--	--	--	--	--	--	--	--	
			--	--	--	--	--	--	--	--	--	--	--	--	
19.3	Total Biomass	ml/100 m ³	91	18	87.8	8.4	76.3	12.1	55	7	97	17	96.87	2.14	APHA (22 nd Edi) 10200-G
D	Microbiological Parameters														
20.1	Total Bacterial Count	CFU/ml	1840	1580	1480	1020	1780	1520	1390	1120	1490	1030	1690	1510	IS 5402:2002
20.2	Total Coliform	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	APHA(22 nd Edi)9 221-D
20.3	Ecoli	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS:1622:1981Ed i.2.4(2003-05)
20.4	Enterococcus	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS : 15186 :2002
20.5	Salmonella	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS : 5887 (P-3)
20.6	Shigella	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS : 1887 (P-7)
20.7	Vibrio	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS : 5887 (P-5)



H. T. Shah
Lab Manager




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Lab Manager (Q)

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

SR. NO.	TEST PARAMETERS	UNIT	October 2015	November 2015	December 2015	January 2016	February 2016	March 2016	Test Method
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
1	Organic Matter	%	0.62	0.50	0.48	0.57	0.52	0.51	FCO:2007
2	Phosphorus as P	mg/kg	144	127	140	131	119	137	APHA(22 nd Eti) 4500 C
3	Texture	--	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	--
4	Petroleum Hydrocarbon	mg/kg	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	PLPL-TPH
5	Heavy Metals								
5.1	Aluminum as Al	%	5.59	4.85	5.05	4.90	4.85	5.23	AAS APHA 3111 B
5.2	Total Chromium as Cr ⁺³	mg/kg	188	200	189	193	209	177	AAS 3111B
5.3	Manganese as Mn	mg/kg	860	689	709	702	687	919	AAS APHA 3111 B
5.4	Iron as Fe	%	2.12	4.07	3.95	4.68	4.07	2.79	AAS APHA(22 nd Eti)3111 B
5.5	Nickel as Ni	mg/kg	50	51.96	52.09	52.06	51.87	57.97	AAS APHA(22 nd Eti)3111 B
5.6	Copper as Cu	mg/kg	32	37.96	39.13	39.73	37.45	36.01	AAS APHA(22 nd Eti)3111 B
5.7	Zinc as Zn	mg/kg	139	143	137	140	144	155	AAS APHA(22 nd Eti)3111 B
5.8	Lead as Pb	mg/kg	1.18	1.54	1.63	1.50	1.60	1.68	AAS APHA(22 nd Eti)3111 B
5.9	Mercury as Hg	mg/kg	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	AAS APHA- 3112 B
6	Benthic Organisms								
6.1	Macrobenthos	--	Polychaete worms Isopods Decapods Mysids	Polychaete worms Mysids Decapods	Polychaete worms Echinoderms Mysids Isopods	Polychaete worms Echinoderms Decapods Mysids	Polychaete worms Mysids Isopods	Prawns Mysids Decapods Echinoderms	APHA (22 nd Edi) 10500-C
6.2	MeioBenthos	--	Copepods Ostracodes	Foraminiferans Nematodes Ciliates	Nematodes Hydrozoans	Nematodes Ciliates	Nematodes	Nematodes Ciliates	APHA (22 nd Edi) 10500-C
2	Population	no/m ²	440	357	440	396	314	385	APHA (22 nd Edi) 10500-C



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Lab Manager (Q)

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

SR. NO.	TEST PARAMETERS	UNIT	October 2015		November 2015		December 2015		January 2016		February 2016		March 2016		Test Method
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1	pH	--	8.20	8.32	7.81	7.74	7.99	8.03	7.77	7.59	7.89	8.08	7.98	8.05	IS3025(P11)83 Re.02
2	Temperature	°C	29	30	28	29	28	29	29	30	29	30	29	30	IS3025(P9)84R e.02
3	Total Suspended Solids	mg/L	20	28	20	30	22	40	22	34	18	24	18	20	IS3025(P17)84 Re.02
4	BOD (3 Days @ 27 °C)	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	IS 3025 (P44)1993Re.0 3Edition2.1
5	Dissolved Oxygen	mg/L	5.6	4.8	5.2	4.8	5.4	5	5	4.6	5.6	4.6	5.4	4.8	IS3025(P38)89 Re.99
6	Salinity	ppt	40.81	41.62	41.5	42.8	42.6	43.5	42.36	43.12	39.5	40.72	41.82	42.26	APHA (22 nd Edi) 2550 B
7	Oil & Grease	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	APHA(22 nd Edi)5 520D
8	Nitrate as NO ₃	mg/L	0.535	0.76	0.46	0.67	0.67	0.89	0.49	0.704	0.61	0.671	0.525	0.633	IS3025(P34)88
9	Nitrite as NO ₂	mg/L	0.064	0.043	0.027	0.056	0.069	0.049	0.029	0.059	0.047	0.034	0.029	0.059	IS3025(P34)88 NEDA
10	Ammonical Nitrogen as NH ₃	mg/L	0.342	0.480	0.47	0.530	0.42	0.53	0.503	0.61	0.379	0.444	0.465	0.535	IS3025(P34)88 Cla.2.3
11	Phosphates as PO ₄	mg/L	0.166	0.152	0.306	0.23	0.041	0.048	0.316	0.268	0.245	0.154	0.312	0.26	APHA(22 nd Edi) 4500 C
12	Total Nitrogen	mg/L	0.941	1.283	0.95	1.256	1.15	1.46	1.022	1.368	1.036	1.149	1.019	1.227	IS3025(P34)88
13	Petroleum Hydrocarbon	mg/L	1.0	BDL*	1.2	BDL*	1.0	BDL*	0.8	BDL*	0.8	BDL*	0.17	BDL*	PLPL-TPH
14	Total Dissolved Solids	mg/L	49220	49630	36700	38100	43920	46750	37460	38380	46860	47280	48360	49250	IS3025(P16)84 Re.02
15	COD	mg/L	14	16	19	22	14	19	17	20	9	14	14	19	APHA(22 nd Edi) 5520-D Open Reflux
16	Oxidisable Particular Organic	%	0.83	0.34	0.38	0.52	0.8	0.3	0.4	0.5	0.55	0.43	0.6	0.5	SOP – PLPL - 07



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	Carbon														
A	Flora and Fauna														
17	Primary productivity	mgC/L/day	1.80	0.76	2.25	0.45	3.15	0.90	2.76	0.245	2.70	0.67	1.688	0.585	APHA (22 nd Edi) 10200-J
B	Phytoplankton														
18.1	Chlorophyll	mg/m ³	1.789	0.481	1.922	0.641	2.210	0.720	1.644	0.246	2.964	0.828	2.964	0.134	APHA (22 nd Edi) 10200-H
18.2	Phaeophytin	mg/m ³	0.547	1.314	0.134	1.300	0.045	1.350	0.096	1.282	BDL*	1.303	BDL*	1.493	APHA (22 nd Edi) 10200-H
18.3	Cell Count	Unit x 10 ³ /L	163	40	152	38	190	44	174	52	236	68	214	45	APHA (22 nd Edi) 10200-H
18.4	Name of Group Number and name of group species of each group	--	Bacillariophyceae	Bacillariophyceae	Bacillariophyceae	Bacillariophyceae	Bacillariophyceae	Bacillariophyceae	Bacillariophyceae	Bacillariophyceae	Bacillariophyceae	Bacillariophyceae	Bacillariophyceae	Bacillariophyceae	APHA (22 nd Edi) 10200-H
			Navicula sp.	Tabellaria sp.	Asterionella sp.	Thalassiosira sp.	Asterionella sp.	Fragillaria sp.	Rhizosolenia sp.	Nitzschia sp.	Navicula sp.	Synedra sp.	Achnanthes sp.	Amphora sp.	
			Nitzschia sp.	Amphora sp.	Ceratoceros sp.	Pinnularia sp.	Cymbella sp.	Coscinodiscus sp.	Coscinodiscus sp.	Biddulphia sp.	Coscinodiscus sp.	Fragillaria sp.	Amphora sp.	Biddulphia sp.	
			Gyrodinium sp.	Melosira sp.	Cymbella sp.	Synedra sp.	Pleurosigma sp.	Cocconeis sp.	Gomphonema sp.	Navicula sp.	Pinnularia sp.	Thalassiosira sp.	Biddulphia sp.	Cyclotella sp.	
			Cocconeis sp.	Diploneis sp.	Pinnularia sp.	Tabellaria sp.	Skeletonema sp.	Cymbella sp.	Cymbella sp.	Pleurosigma sp.	Fragillaria sp.	Coscinodiscus sp.	Cocconeis sp.	Nitzschia sp.	
			Surirella sp.	Cyanophyceae	Thalassiosira sp.	Cyanophyceae	Thalassiosira sp.	Navicula sp.	Synedra sp.	Cyanophyceae	Tabellaria sp.	Green Algae	Melosira sp.	Pinnularia sp.	
			Pinnularia sp.	Anabaena sp.	Skeletonema sp.	Microcystis sp.	Tabellaria sp.	Cyanophyceae	Tabellaria sp.	Bacillariophyceae	Pleurosigma sp.	Pandorina sp.	Synedra sp.	Skeletonema sp.	
			Ceratoceros sp.	Microcystis sp.	Cyanophyceae	Oscillatoria sp.	Fragillaria sp.	Anabaena sp.	Cyanophyceae	Anabaena sp.	Achnanthes sp.	--	Nitzschia sp.	Green Algae	
			Mastagloia sp.	Green Algae	Microcystis sp.	Green Algae	Cyanophyceae	Oscillatoria sp.	Oscillatoria sp.	Microcystis sp.	Skeletonema sp.	--	Coscinodiscus sp.	Ankistrodesmus sp.	
			Cyanophyceae	Volvox sp.	Oscillatoria sp.	Ulothrix sp.	Microcystis sp.	Nostoc sp.	Microcystis sp.	Green Algae	Synedra sp.	--	Green Algae	Chlorella sp.	
			Microcystis sp.	Spirogyra sp.	Spirulina sp.	Chlorella sp.	Oscillatoria sp.	Green Algae	Green Algae	Spirogyra sp.	Cyanophyceae	--	Chlorella sp.	Pandorina sp.	
			Oscillatoria sp.	--	Green Algae	--	Green Algae	Chlorella sp.	Pandorina sp.	Scenedesmus sp.	Oscillatoria sp.	--	Ulothrix sp.	Cyanophyceae	
			Green Algae	--	Chlorella sp.	--	Ankistrodesmus sp.	Pandorina sp.	Ulothrix sp.	--	Microcystis sp.	--	Volvox sp.	Anabaena sp.	
			Ulothrix sp.	--	Hydrodictyon sp.	--	Chlorella sp.	Scenedesmus sp.	Volvox sp.	--	Green Algae	--	Cyanophyceae	Oscillatoria sp.	


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			Oedogonium sp.	--	Pediastrum sp.	--	Pediastrum sp.	--	--	--	Volvox sp.	--	Microcystis sp.	--	
			Spirogyra sp.	--	--	--	Volvox sp.	--	--	--	Pandorina sp.	--	Nostoc sp.	--	
					--	--					Pediastrum sp.	--	Spirulina sp.	--	
C	Zooplanktons														
19.1	Abundance (Population)	no/m ²	225	75	233	50	320	120	214	66	252	25	250	33	APHA (22 nd Edi) 10200-G
19.2	Name of Group Number and name of group species of each group	--	Copepods	Crustaceans	Copepods	Copepods	Copepods	Ostracods	Copepods	Crustaceans	Nematodes	Gastropods	Echinoderms	Copepods	APHA (22 nd Edi) 10200-G
			Polychaetes	Siphonophores	Decapods	Polychaetes Worms	Krill	Crustaceans	Polychaetes	Siphonophores	Decapods	--	Rotifers	Nematodes	
			Ostracods	--	Polychaetes Worms	Decapods	Molluscs	--	Ostracods	--	Echinoderms	--	Decapods	--	
			Rotifers	--	Ostracods	--	Snails	--	Rotifers	--	Foraminiferans	--	Ostracods	--	
			Gastropods	--	Crustaceans	--	Rotifers	--	Gastropods	--	--	--	Crustaceans	--	
			Decapods	--	--	--			Decapods	--			Gastropods	--	
19.3	Total Biomass	ml/100 m ³	89	11	92.5	8.4	79.6	11	64	08	88	34	112	28.5	APHA (22 nd Edi) 10200-G
D	Microbiological Parameters														
20.1	Total Bacterial Count	CFU/ml	1790	1410	1660	1140	1580	1370	1720	1350	1800	1470	2010	1780	IS 5402:2002
20.2	Total Coliform	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	APHA(22 nd Edi)9221-D
20.3	Ecoli	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS:1622:1981Ed i.2.4(2003-05)
20.4	Enterococcus	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS : 15186 :2002
20.5	Salmonella	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS : 5887 (P-3)
20.6	Shigella	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS : 1887 (P-7)
20.7	Vibrio	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS : 5887 (P-5)



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

SR. NO.	TEST PARAMETERS	UNIT	October 2015	November 2015	December 2015	January 2016	February 2016	March 2016	Test Method
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
1	Organic Matter	%	0.682	0.46	0.67	0.503	0.476	0.545	FCO:2007
2	Phosphorus as P	mg/kg	169	156	157	150	155	161	APHA(22 nd Edi) 4500 C
3	Texture	--	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	--
4	Petroleum Hydrocarbon	mg/kg	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	PLPL-TPH
5	Heavy Metals								
5.1	Aluminum as Al	%	5.39	5.40	5.21	5.0	5.19	5.43	AAS APHA 3111 B
5.2	Total Chromium as Cr ⁺³	mg/kg	137	162	145	157	163	111	AAS 3111B
5.3	Manganese as Mn	mg/kg	705	599	807	545	597	758	AAS APHA 3111 B
5.4	Iron as Fe	%	2.21	1.98	2.07	2.21	1.98	2.19	AAS APHA(22 nd Edi)3111 B
5.5	Nickel as Ni	mg/kg	38.77	24.4	36.64	28.15	24.28	53.97	AAS APHA(22 nd Edi)3111 B
5.6	Copper as Cu	mg/kg	109	50.54	80.91	52.59	50.81	41.78	AAS APHA(22 nd Edi)3111 B
5.7	Zinc as Zn	mg/kg	138	142	119	139	143	154	AAS APHA(22 nd Edi)3111 B
5.8	Lead as Pb	mg/kg	1.32	1.38	1.11	1.33	1.38	2.28	AAS APHA(22 nd Edi)3111 B
5.9	Mercury as Hg	mg/kg	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	AAS APHA- 3112 B
6	Benthic Organisms								
6.1	Macrobenthos	--	Polychaete worms Amphipods Decapods Krill	Echinoderms Polychaete worms Isopods	Echinoderms Isopods Decapods	Isopods Decapods Echinoderms	Mysids Echinoderms Isopods	Polychaete Worms Crabs Isopods Decapods	APHA (22 nd Edi) 10500-C
6.2	MeioBenthos	--	Nematodes Foraminiferans Hydrozoa	Foraminiferans Copepods Nematodes Bryozoans	Foraminiferans Copepods Ciliates	Foraminiferans Hydrozoa	Foraminiferans Bryozoans	Nematodes Bryozoans	APHA (22 nd Edi) 10500-C
2	Population	no/m ²	503	433	397	518	440	433	APHA (22 nd Edi) 10500-C



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

SR. NO.	TEST PARAMETERS	UNIT	November 2015		January 2016		February 2016		March 2016		Test Method
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1	pH	--	7.77	8.18	7.83	8.2	7.8	8.22	8.0	7.88	IS3025(P11)83Re.02
2	Temperature	°C	28	29	29	30	28	29	29	30	IS3025(P9)84Re.02
3	Total Suspended Solids	mg/L	20	24	22	26	20	23	24	28	IS3025(P17)84Re.02
4	BOD (3 Days @ 27 °C)	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	IS 3025 (P44)1993Re.03Edition2.1
5	Dissolved Oxygen	mg/L	5.2	4.8	5.6	4.6	5.18	4.8	5.4	4.8	IS3025(P38)89Re.99
6	Salinity	ppt	41.1	42.7	41.6	42.5	41.0	42.6	42.84	43.06	APHA (22 nd Edi) 2550 B
7	Oil & Grease	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	APHA(22 nd Edi)5520D
8	Nitrate as NO ₃	mg/L	0.32	0.43	0.37	0.45	0.305	0.442	0.355	0.432	IS3025(P34)88
9	Nitrite as NO ₂	mg/L	0.016	0.025	0.013	0.023	0.015	0.025	0.02	0.025	IS3025(P34)88 NEDA
10	Ammonical Nitrogen as NH ₃	mg/L	0.6	0.69	0.58	0.67	0.592	0.69	0.819	0.93	IS3025(P34)88Cla.2.3
11	Phosphates as PO ₄	mg/L	0.58	0.73	BDL*	BDL*	0.577	0.731	0.558	0.78	APHA(22 nd Edi) 4500 C
12	Total Nitrogen	mg/L	0.92	1.14	0.913	1.143	0.912	1.151	1.194	1.388	IS3025(P34)88
13	Petroleum Hydrocarbon	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	PLPL-TPH
14	Total Dissolved Solids	mg/L	50890	51360	51500	51110	50280	51480	51066	51580	IS3025(P16)84Re.02
15	COD	mg/L	14	28	16	30	9	28	24	28	APHA(22 nd Edi) 5520-D Open Reflux
16	Oxidisable Particular Organic Carbon	%	0.3	0.2	0.27	0.19	0.3	0.2	0.32	0.22	SOP – PLPL - 07
A	Flora and Fauna										
17	Primary productivity	mgC/L/day	2.13	0.67	1.96	0.55	1.8	0.11	2.63	0.45	APHA (22 nd Edi) 10200-J
B	Phytoplankton										
18.1	Chlorophyll	mg/m ³	2.296	0.507	1.560	0.118	3.02	0.401	2.77	0.401	APHA (22 nd Edi) 10200-H



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18.2	Phaeophytin	mg/m ³	BDL*	1.549	0.524	2.48	BDL*	1.794	BDL*	2.141	APHA (22 nd Edi) 10200-H
18.3	Cell Count	Unit x 10 ³ /L	241	58	182	22	284	63	199	35	APHA (22 nd Edi) 10200-H
18.4	Name of Group Number and name of group species of each group	--	Bacillariophyceae	Bacillariophyceae	Bacillariophyceae	Bacillariophyceae	Bacillariophyceae	Bacillariophyceae	Bacillariophyceae	Bacillariophyceae	APHA (22 nd Edi) 10200-H
			Biddulphia sp.	Cyclotella sp.	Coscinodiscus sp.	Fragillaria sp.	Navicula sp.	Fragillaria sp.	Nitzschia sp.	Nitzschia sp.	
			Cheateocerosus sp.	Nitzschia sp.	Synedra sp.	Pinnularia sp.	Nitzschia sp.	Navicula sp.	Navicula sp.	Navicula sp.	
			Cyclotella sp.	Skeletonema sp.	Nitzschia sp.	Navicula sp.	Synedra sp.	Coscinodiscus sp.	Coscinodiscus sp.	Fragillaria sp.	
			Fragillaria sp.	Melosira sp.	Thallasiosira sp.	Gyrosigma sp.	Coscinodiscus sp.	Gyrosigma sp.	Pinnularia sp.	Gyrosigma sp.	
			Rhizosolenia sp.	Gyrosigma sp.	Rhizosolenia sp.	Cyanophyceae	Skeletonema sp.	Synedra sp.	Thallasiosira sp.	Pinnularia sp.	
			Thallasiosira sp.	Cyanophyceae	Tabellaria sp.	Spirulina sp.	Asterionella sp.	Cyanophyceae	Cyclotella sp.	Synedra sp.	
			Tabellaria sp.	Oscillatoria sp.	Cyanophyceae	Oscillatoria sp.	Gomphonema sp.	Nostoc sp.	Gomphonema sp.	Green Algae	
			Cyanophyceae	Green Algae	Pediastrum sp.	Green Algae	Pinnularia sp.	Green Algae	Fragillaria sp.	pediastrum sp.	
			Microcystis sp.	Pandorina sp.	Hydrodictyon sp.	Chlorella sp.	Cyanophyceae	Pandorina sp.	Green Algae	Chlorella sp.	
			Nostoc sp.	Scenedesmus sp.	Green Algae	Desmids	Oscillatoria sp.	Volvox sp.	Ankistrodesmus sp.	Cyanophyceae	
			Spirulina sp.	--	Spirogyra sp.	--	Microcystis sp.	--	Chlorella sp.	Oscillatoria sp.	
			Green Algae	--	Chlorella sp.	--	Green Algae	--	Pandorina sp.	--	
			Chlorella sp.	--	Nostoc sp.	--	Ankistrodesmus sp.	--	Cyanophyceae	--	
			Hydrodictyon sp.	--	--	--	Hydrodictyon sp.	--	Oscillatoria sp.	--	
			Pediastrum sp.	--	--	--	--	--	Lyngbya sp.	--	
			--	--	--	--	--	--	--	--	
C	Zooplanktons										



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19.1	Abundance (Population)	no/m ²	233	67	216	28	217	68	125	25	APHA (22 nd Edi) 10200-G
19.2	Name of Group Number and name of group species of each group	--	Copepods	Copepods	Ctenophores	Nematodes	Polychaete worms	mysids	Decapods	Nematodes	APHA (22 nd Edi) 10200-G
			Decapods	polychaete worms	Rotifers	polychaete worms	Decapods	Nematodes	Mysids	Echinoderms	
			Ostracods	--	Mysids	Copepods	Nematodes	Decapods	Bivalves	--	
			Chaetognaths	--	Bivalves	--	Echinoderms	--	Rotifers	--	
			Ctenophores	--	--	--	--	--	--	--	
			Krill	--	--	--	--	--	--	--	
			Cyclops	--	--	--	--	--	--	--	
19.3	Total Biomass	ml/100 m ³	96.5	8.9	84	7.6	86	21	42.54	3.04	APHA (22 nd Edi) 10200-G
D											
20.1	Total Bacterial Count	CFU/ml	1640	1120	1590	1220	1630	1100	1720	1560	IS 5402:2002
20.2	Total Coliform	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	APHA(22 nd Edi)9221-D
20.3	Ecoli	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS:1622:1981Edi.2.4(2003-05)
20.4	Enterococcus	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS : 15186 :2002
20.5	Salmonella	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS : 5887 (P-3)
20.6	Shigella	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS : 1887 (P-7)
20.7	Vibrio	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS : 5887 (P-5)



H. T. Shah
Lab Manager




Dr. Arun Bajpai
Lab Manager (Q)

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

SR. NO.	TEST PARAMETERS	UNIT	November 2015	January 2016	February 2016	March 2016	Test Method
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
1	Organic Matter	%	0.60	0.57	0.586	0.542	FCO:2007
2	Phosphorus as P	mg/kg	146	140	141	152	APHA(22 nd Edi) 4500 C
3	Texture	--	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	--
4	Petroleum Hydrocarbon	mg/kg	BDL*	BDL*	BDL*	BDL*	PLPL-TPH
5	Heavy Metals						
5.1	Aluminum as Al	%	5.20	5.40	5.39	5.45	AAS APHA 3111 B
5.2	Total Chromium as Cr ⁺³	mg/kg	160	168	165	141	AAS 3111B
5.3	Manganese as Mn	mg/kg	810	850	819	905	AAS APHA 3111 B
5.4	Iron as Fe	%	2.22	2.3	2.23	2.13	AAS APHA(22 nd Edi)3111 B
5.5	Nickel as Ni	mg/kg	54	58	54.58	50.55	AAS APHA(22 nd Edi)3111 B
5.6	Copper as Cu	mg/kg	34.0	32.0	34.2	35.8	AAS APHA(22 nd Edi)3111 B
5.7	Zinc as Zn	mg/kg	136	130	133	135	AAS APHA(22 nd Edi)3111 B
5.8	Lead as Pb	mg/kg	1.32	1.29	1.33	17.98	AAS APHA(22 nd Edi)3111 B
5.9	Mercury as Hg	mg/kg	BDL*	BDL*	BDL*	BDL*	AAS APHA- 3112 B
6	Benthic Organisms						
6.1	Macrobenthos	--	Echinoderms Polychaete worms Isopods Decapods	Polychaete worms Bivalves Echinoderms Decapods	Polychaete worms Mysids	Crabs Amphipods Echinoderms	APHA (22 nd Edi) 10500-C
6.2	MeioBenthos	--	Ostracods	Ctenophores	Nematodes Ostracods Foraminiferans	Ostracods Foraminiferans	APHA (22 nd Edi) 10500-C
2	Population	no/m ²	377	368	317	337	APHA (22 nd Edi) 10500-C



H. T. Shah
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Dr. Arun Bajpai
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RESULTS OF MARINE WATER [M4 JUNA BANDAR N 22°47'577" E 069°43'620"]

SR. NO.	TEST PARAMETERS	UNIT	October 2015		November 2015		December 2015		January 2016		February 2016		March 2016		Test Method
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1	pH	--	7.98	8.13	7.98	8.14	8.01	8.12	7.69	8.17	7.99	8.17	7.92	8.03	IS3025(P11)83R e.02
2	Temperature	°C	29	30	29	30	29	30	28	29	29	30	29	30	IS3025(P9)84Re.02
3	Total Suspended Solids	mg/L	24	30	19	22	16	20	20	24	20	22	26	28	IS3025(P17)84R e.02
4	BOD (3 Days @ 27 °C)	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	IS 3025 (P44)1993Re.03 Edition2.1
5	Dissolved Oxygen	mg/L	5.8	4.8	5.2	4.4	5.4	4.8	5	4.6	5.2	4.4	5.66	5.24	IS3025(P38)89R e.99
6	Salinity	ppt	39.82	40.54	42.8	43.4	42.2	43.6	42.2	43	42.6	43.2	42.66	43.18	APHA (22 nd Edi) 2550 B
7	Oil & Grease	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	APHA(22 nd Edi)55 20D
8	Nitrate as NO ₃	mg/L	0.36	0.39	0.46	0.55	0.33	0.2	0.49	0.6	0.47	0.56	0.32	0.18	IS3025(P34)88
9	Nitrite as NO ₂	mg/L	0.051	0.065	0.054	0.07	0.059	0.077	0.052	0.067	0.054	0.07	0.056	0.084	IS3025(P34)88 NEDA
10	Ammonical Nitrogen as NH ₃	mg/L	0.702	0.776	0.74	0.82	0.91	1.15	0.72	0.8	0.74	0.879	0.95	1.117	IS3025(P34)88CI a.2.3
11	Phosphates as PO ₄	mg/L	0.248	0.352	0.18	0.17	0.02	0.11	0.068	0.089	0.168	0.159	0.086	0.095	APHA(22 nd Edi) 4500 C
12	Total Nitrogen	mg/L	1.12	1.238	1.254	1.44	1.3	1.42	1.262	1.467	1.266	1.513	1.33	1.385	IS3025(P34)88
13	Petroleum Hydrocarbon	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	PLPL-TPH
14	Total Dissolved Solids	mg/L	46890	48030	53670	54820	52990	54280	52910	54310	52990	53640	52670	53880	IS3025(P16)84R e.02
15	COD	mg/L	24	28	14	18	14	19	16	20	14	19	19	24	APHA(22 nd Edi) 5520-D Open Reflux
16	Oxidisable Particular Organic Carbon	%	0.82	0.46	0.82	0.38	0.8	0.43	0.8	0.36	0.8	0.36	0.63	0.47	SOP – PLPL - 07
A	Flora and Fauna														
17	Primary productivity	mgC/L /day	1.688	0.788	2.36	0.563	3.03	1.46	2.852	0.844	2.13	0.563	2.138	0.428	APHA (22 nd Edi) 10200-J
B	Phytoplankton														



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18.1	Chlorophyll	mg/m ³	1.789	0.587	1.816	0.721	2.48	0.69	1.692	0.505	3.204	0.721	3.2	0.721	APHA (22 nd Edi) 10200-H
18.2	Phaeophytin	mg/m ³	0.23	1.207	0.24	1.03	BDL*	1.36	0.34	1.190	ND	1.615	BDL*	1.61	APHA (22 nd Edi) 10200-H
18.3	Cell Count	Unit x 10 ³ /L	189	41	214	68	326	82	192	48	296	76	201	44	APHA (22 nd Edi) 10200-H
18.4	Name of Group Number and name of group species of each group	--	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	APHA (22 nd Edi) 10200-H
			Pleurosigm a sp.	Navicula sp.	Asterionell a sp.	Coscinodis cus sp.	Amphora sp.	Cymbella sp.	Pleurosig ma sp.	Navicula sp.	Navicula sp.	Synedra sp.	Nitzschia sp.	Synedra sp.	
			Coscinodis cus sp.	Nitzschia sp.	Biddulphia sp.	Pleurosigm a sp.	Asterionell a sp.	Fragillaria sp.	Coscinodis cus sp.	Nitzschia sp.	Synedra sp.	Melosira sp.	Synedra sp.	Navicula sp.	
			Nitzschia sp.	Fragillaria sp.	Gomphone ma sp.	Nitzschia sp.	Coscinodis cus sp.	Melosira sp.	Nitzschia sp.	Fragillaria sp.	Coscinodis cus sp.	Fragillaria sp.	Coscinodis cus sp.	Biddulphia sp.	
			Thallasion ema sp.	Pinnularia sp.	Rhizosoleni a sp.	Fragillaria sp.	Fragillaria sp.	Nitzschia sp.	Thallasion ema sp.	Pinnularia sp.	Thallasiosir a sp.	Navicula sp.	Navicula sp.	Gomphone ma sp.	
			Pinnularia sp.	Cyanophyc eae	Pinnularia sp.	Navicula sp.	Gomphone ma sp.	Cyanophyc eae	Pinnularia sp.	Cyanophy ceae	Asterionell a sp.	Coscinodis cus sp.	Thallasiosir a sp.	Skeletone ma sp.	
			Cyanophyc eae	Anabaena sp.	Skeletone ma sp.	Cyanophyc eae	Skeletone ma sp.	Oscillatoria sp.	Cyanophy ceae	Anabaena sp.	Fragillaria sp.	Cyanophyc eae	Surirella sp.	Pleurosigm a sp.	
			Oscillatoria sp.	Oscillatoria sp.	Nitzschia sp.	Anabaena sp.	Cyclotella sp.	Microcystis sp.	Oscillatori a sp.	Oscillatori a sp.	Gomphone ma sp.	Nostoc sp.	Cymbella sp.	Rhizosoleni a sp.	
			Spirulina sp.	Green Algae	Navicula sp.	Oscillatoria sp.	Cyanophyc eae	Nostoc sp.	Spirulina sp.	Green Algae	Melosira sp.	Green Algae	Biddulphia sp.	Green Algae	
			Green Algae	Ankistrode smus sp.	Cocconeis sp.	Spirulina sp.	Microcystis sp.	Green Algae	Green Algae	Ankistrod esmus sp.	Skeletone ma sp.	Chlorella sp.	Green Algae	Chlorella sp.	
			Chlorella sp.	Pandorina sp.	Cyanophyc eae	Green Algae	Oscillatoria sp.	Chlorella sp.	Chlorella sp.	Pandorina sp.	Cyanophyc eae	--	Ankistrode smus sp.	Scenedes mus sp.	
			Volvox sp.	--	Oscillatoria sp.	Oedogoni m sp.	Green Algae	Hydrodicty on sp.	Volvox sp.	--	Microcystis sp.	--	Hydrodicty on sp.	Ulothrix sp.	
			Ankistrode smus sp.	--	Anabaena sp.	Pediastrum sp.	Ankistrode smus sp.	Scenedes mus sp.	Ankistrod esmus sp.	--	Oscillatoria sp.	--	Pandorina sp.	--	
			Ulothrix sp.	--	Green Algae	--	Chlorella sp.	Volvox sp.	Ulothrix sp.	--	Green Algae	--	Cyanophyc eae	--	
			--	--	Ankistrode smus sp.	--	Pandorina sp.	--	--	--	Volvox sp.	--	Microcystis sp.	--	
			--	--	Oedogoni m sp.	--	Scenedes mus sp.	--	--	--	Pediastrum	--	Oscillatoria	--	



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					m sp.		mus sp.				sp.		sp.		
					Pediastrum sp.	--					--	--	Spirulina sp.	--	
C	Zooplanktons														
19.1	Abundance (Population)	no/m ²	350	75	275	50	300	160	310	68	267	50	333	100	APHA (22 nd Edi) 10200-G
19.2	Name of Group Number and name of group species of each group	--	Copepods	Copepods	Ctenophores	Copepods	Copepods	Crustaceans	Cyclops	Decapods	Gastropods	Polychaete worms	Chaetognathes	Copepods	APHA (22 nd Edi) 10200-G
			Krill	Decapods	Ostracods	Decapods	Polychaete worms	Gastropods	Copepods	Polychaete worms	Nematodes	Nematodes	Gastropods	Mysids	
			Decapods	--	Gastropods	--	Crustaceans	Nematodes	Nematodes	Ostracods	Echinoderms		Crustaceans	Crustaceans	
			Chaetognathes	--	Decapods	--	Nematodes	--	--	--	mysids		Copepods	Nematodes	
			Cyclops	--	Polychaete worms	--	Mysids	--	--	--			Nematodes	--	
			Rotifers	--	--	--	Rotifers	--	--				--	--	
			Ctenophores	--	--	--									
19.3	Total Biomass	ml/100 m ³	97	8.2	97.4	7.8	62.4	7.4	110	10.8	44	11	102	42.5	APHA (22 nd Edi) 10200-G
D	Microbiological Parameters														
20.1	Total Bacterial Count	CFU/ml	2130	1870	1560	1220	1700	1580	1610	1280	1530	1210	1740	1620	IS 5402:2002
20.2	Total Coliform	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	APHA(22 nd Edi)92 21-D
20.3	Ecoli	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS:1622:1981Edi .2.4(2003-05)
20.4	Enterococcus	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS : 15186 :2002
20.5	Salmonella	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS : 5887 (P-3)
20.6	Shigella	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS : 1887 (P-7)
20.7	Vibrio	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS : 5887 (P-5)



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RESULTS OF SEDIMENT ANALYSIS [M4 JUNA BANDAR N 22°47'577" E 069°43'620"]

SR. NO.	TEST PARAMETERS	UNIT	October 2015	November 2015	December 2015	January 2016	February 2016	March 2016	Test Method
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
1	Organic Matter	%	0.46	0.51	0.42	0.63	0.52	0.42	FCO:2007
2	Phosphorus as P	mg/kg	178	192	175	150	194	166	APHA(22 nd Edi) 4500 C
3	Texture	--	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	--
4	Petroleum Hydrocarbon	mg/kg	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	PLPL-TPH
5	Heavy Metals								
5.1	Aluminum as Al	%	5.19	5.08	5.41	5.62	5.09	5.28	AAS APHA 3111 B
5.2	Total Chromium as Cr ⁺³	mg/kg	165	146	119	129	147	144	AAS 3111B
5.3	Manganese as Mn	mg/kg	885	798	856	809	795	910	AAS APHA 3111 B
5.4	Iron as Fe	%	2.4	2.82	1.75	2.66	2.87	2.54	AAS APHA(22 nd Edi)3111 B
5.5	Nickel as Ni	mg/kg	49.97	52	57.99	44.19	53.98	54	AAS APHA(22 nd Edi)3111 B
5.6	Copper as Cu	mg/kg	43.97	48	43.98	40.22	48.97	60	AAS APHA(22 nd Edi)3111 B
5.7	Zinc as Zn	mg/kg	166	190	160	189	190	170	AAS APHA(22 nd Edi)3111 B
5.8	Lead as Pb	mg/kg	1.96	1.88	1.87	0.91	1.88	2.0	AAS APHA(22 nd Edi)3111 B
5.9	Mercury as Hg	mg/kg	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	AAS APHA- 3112 B
6	Benthic Organisms								
6.1	Macrobenthos	--	Echinoderms Decapods Isopods	Polychaete worms Echinoderms Isopods	Echinoderms Mysids Isopods	Echinoderms Polychaete worms Mysids	Decapods Echinoderms Isopods	Polychaete Worms Crabs Anthozoans	APHA (22 nd Edi) 10500-C
6.2	MeioBenthos	--	Nematodes Foraminiferans	Nematodes Foraminiferans	Nematodes Foraminiferans Hydrozoa	Nematodes Foraminiferans Ciliates	Hydrozoa Nematodes	Copepods Ciliates	APHA (22 nd Edi) 10500-C
2	Population	no/m ²	314	314	433	481	385	440	APHA (22 nd Edi) 10500-C



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

SR. NO.	TEST PARAMETERS	UNIT	October 2015		November 2015		December 2015		January 2016		February 2016		March 2016		Test Method
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1	pH	--	8.02	8.11	7.87	7.7	8.02	8.17	7.45	7.32	7.72	7.88	8.03	7.89	IS3025(P11)83R e.02
2	Temperature	°C	29	30	29	30	28	29	28	29	29	30	29	30	IS3025(P9)84Re.02
3	Total Suspended Solids	mg/L	24	32	18	24	12	16	20	26	19	25	18	22	IS3025(P17)84R e.02
4	BOD (3 Days @ 27 °C)	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	IS 3025 (P44)1993Re.03 Edition2.1
5	Dissolved Oxygen	mg/L	5.8	4.6	5.6	4.6	5.2	4.8	5.4	4.4	5.6	4.4	5.8	5.2	IS3025(P38)89R e.99
6	Salinity	ppt	38.2	39.37	39.55	40.8	40.6	41.2	40.12	41.06	39.5	40.72	38.18	38.26	APHA (22 nd Edi) 2550 B
7	Oil & Grease	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	APHA(22 nd Edi)55 20D
8	Nitrate as NO ₃	mg/L	0.627	0.704	0.616	0.677	0.64	0.69	0.582	0.628	0.625	0.686	0.587	0.633	IS3025(P34)88
9	Nitrite as NO ₂	mg/L	0.047	0.039	0.047	0.035	0.047	0.031	0.044	0.03	0.461	0.034	0.032	0.022	IS3025(P34)88 NEDA
10	Ammonical Nitrogen as NH ₃	mg/L	0.277	0.397	0.378	0.443	0.3	0.4	0.396	0.465	0.386	0.444	0.447	0.558	IS3025(P34)88Cl a.2.3
11	Phosphates as PO ₄	mg/L	0.158	0.171	0.247	0.157	0.026	0.096	0.158	0.048	0.259	0.154	0.304	0.136	APHA(22 nd Edi) 4500 C
12	Total Nitrogen	mg/L	0.951	1.14	1.041	1.155	1	1.12	1.022	1.123	1.474	1.164	1.066	1.213	IS3025(P34)88
13	Petroleum Hydrocarbon	mg/L	2	BDL*	0.8	BDL*	0.6	BDL*	0.6	BDL*	BDL*	BDL*	3.8	BDL*	PLPL-TPH
14	Total Dissolved Solids	mg/L	47860	48320	36800	37300	44260	45590	37330	37530	46860	48220	47560	48110	IS3025(P16)84R e.02
15	COD	mg/L	14	19	9	14	9	19	10	16	9	14	10	19	APHA(22 nd Edi) 5520-D Open Reflux
16	Oxidisable Particular Organic Carbon	%	0.58	0.46	0.56	0.42	0.58	0.46	0.6	0.4	0.53	0.43	0.64	0.5	SOP – PLPL - 07
A	Flora and Fauna														
17	Primary productivity	mgC/L /day	1.463	0.788	1.688	0.563	1.57	0.45	1.913	0.338	2.13	0.563	2.11	0.36	APHA (22 nd Edi) 10200-J
B	Phytoplankton														



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18.1	Chlorophyll	mg/m ³	1.922	0.721	1.816	0.614	2.08	0.9	2.27	0.98	2.77	0.163	2.77	0.163	APHA (22 nd Edi) 10200-H
18.2	Phaeophytin	mg/m ³	0.134	0.737	0.614	1.274	0.179	0.98	BDL*	0.84	BDL*	BDL*	BDL*	BDL*	APHA (22 nd Edi) 10200-H
18.3	Cell Count	Unit x 10 ³ /L	196	52	145	32	222	58	159	62	195	35	245	38	APHA (22 nd Edi) 10200-H
18.4	Name of Group Number and name of group species of each group	--	Bacillarioph yceae	Bacillarioph yceae	Bacillarioph yceae	Bacillarioph yceae	Bacillarioph yceae	Bacillarioph yceae	Bacillarioph yceae	Bacillarioph yceae	Bacillarioph yceae	Bacillarioph yceae	Bacillarioph yceae	Bacillarioph yceae	APHA (22 nd Edi) 10200-H
			Gomphone ma sp.	Asterionella sp.	Amphipror a sp.	Coscinodis cus sp.	Navicula sp.	Navicula sp.	Navicula sp.	Coscinodis cus sp.	Navicula sp.	Nitzschia sp.	Navicula sp.	Fragillaria sp.	
			Pleurosigma sp.	Cyclotella sp.	Biddulphia sp.	Nitzschia sp.	Synedra sp.	Fragillaria sp.	Nitzschia sp.	Nitzschia sp.	Nitzschia sp.	Navicula sp.	Synedra sp.	Asterionell a sp.	
			Nitzschia sp.	Cymbella sp.	Pleurosig ma sp.	Pleurosig ma sp.	Nitzschia sp.	Gomphone ma sp.	Fragillaria sp.	Fragillaria sp.	Synedra sp.	Fragillaria sp.	Asterionell a sp.	Coscinodis cus sp.	
			Synedra sp.	Gyrosigma sp.	Skeletone ma sp.	Navicula sp.	Coscinodis cus sp.	Pleurosig ma sp.	Coscinodis cus sp.	Thallasion ema sp.	Coscinodis cus sp.	Rhizosolen ia sp.	Coscinodis cus sp.	Melosira sp.	
			Rhizosoleni a sp.	Pinnularia sp.	Pinnularia sp.	Gomphone ma sp.	Thallasion ema sp.	Coscinodis cus sp.	Thallasion ema sp.	Navicula sp.	Biddulphia sp.	Pleurosig ma sp.	Fragillaria sp.	Pinnularia sp.	
			Surirella sp.	Cocconeis sp.	Cocconeis sp.	Cyanophyc eae	Pleurosig ma sp.	Cyanophyc eae	Skeletone ma sp.	Green Algae	Rhizosolen ia sp.	Cyanophyc eae	Pinnularia sp.	Skeletone ma sp.	
			Tabellaria sp.	Green Algae	Cyclotella sp.	Oscillatori a sp.	Cyclotella sp.	Oscillatori a sp.	Green Algae	Ankistrode smus sp.	Thallasiosi ra sp.	Oscillatori a sp.	Skeletone ma sp.	Cyanophyc eae	
			Biddulphia sp.	Oedogoni m sp.	Cyanophyc eae	Green Algae	Skeletone ma sp.	Lyngbya sp.	Chlorella sp.	Chlorella sp.	Cheatocer ous sp.	Microcystis sp.	Tabellaria sp.	Anabaena sp.	
			Cyanophyce ae	Hydrodictyo n sp.	Anabaena sp.	Pandorina sp.	Cyanophyc eae	Green Algae	Pandorina sp.	Cyanophyc eae	spirulines sp.	Green Algae	Cocconeis sp.	Spirulina sp.	
			Microcystis sp.	Scenedesm us sp.	Oscillatori a sp.	--	Anabaena sp.	Chlorella sp.	Cyanophyc eae	Oscillatori a sp.	Cyanophyc eae	Pandorina sp.	Gomphone ma sp.	Oscillatori a sp.	
			Oscillatoria sp.	--	Spirulina sp.	--	Nostoc sp.	Pediastru m sp.	Microcystis sp.	--	Melosira sp.	--	Cyanophyc eae	Green Algae	
			Green Algae	--	Green Algae	--	Oscillatori a sp.	Pandorina sp.	Oscillatori a sp.	--	Oscillatori a sp.	--	Microcystis sp.	Chlorella sp.	
			Chlorella sp.	--	Ankistrode smus sp.	--	Green Algae	--	Nostoc sp.	--	Green Algae	--	Oscillatori a sp.	Pandorina sp.	
			Ulothrix sp.	--	Chlorella sp.	--	Ankistrode smus sp.	--			Chlorella sp.	--	Spirulina sp.	Pediastru m sp.	
			Scenedesm	--	Pediastru	--	Pandorina	--			Scenedes	--	Green	--	


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			us sp.		m sp.		sp.				mus sp.		Algae		
				--	Volvox sp.	--	Scenedes mus sp.	--			Pandorina sp.	--	Ankistrode smus sp.	--	
C	Zooplanktons														
19.1	Abundance (Population)	no/m ²	250	50	200	50	275	100	180	40	188	56	283	67	APHA (22 nd Edi) 10200-G
19.2	Name of Group Number and name of group species of each group	--	Copepods	Gastropods	Copepods	Polychaete worms	Nematode s	Decapods	Decapods	Copepods	Gastropod s		Copepods	Gastropod s	APHA (22 nd Edi) 10200-G
			Krill	Polychaetes Worms	Decapods	Gastropod s	Gastropod s	Cyclops	Crustacea ns	Decapods	Echinoder ms	Gastropod s	Polychaete worms	Polychaete worms	
			Polychaetes Worms	--	Ostracods	--	Crustacea ns	Nematode s	Isopods	--	Krill	Decapods	Gastropod s	--	
			Siphonophores	--	Gastropod s	--	Mysids	--	Polychaete worms	--	Cyclops		Crustacea ns	--	
			Rotifers	--	Crustacea ns	--			Gastropod s	--	Polychaete worms		Mysids	--	
			Cyclops	--	--	--	--	--	--	--			--	--	
			--	--	--	--	--	--	--	--					
19.3	Total Biomass	ml/100 m ³	75	15	85	0.7	45.2	7.4	89.5	2.4	48	3.5	116	63.5	APHA (22 nd Edi) 10200-G
D	Microbiological Parameters														
20.1	Total Bacterial Count	CFU/ml	1650	1370	1740	1480	1620	1430	1680	1420	1700	1400	1890	1420	IS 5402:2002
20.2	Total Coliform	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	APHA(22 nd Edi)92 21-D
20.3	Ecoli	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS:1622:1981Edi .2.4(2003-05)
20.4	Enterococcus	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS : 15186 :2002
20.5	Salmonella	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS : 5887 (P-3)
20.6	Shigella	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS : 1887 (P-7)
20.7	Vibrio	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS : 5887 (P-5)



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

SR. NO.	TEST PARAMETERS	UNIT	October 2015	November 2015	December 2015	January 2016	February 2016	March 2016	Test Method
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	
1	Organic Matter	%	0.701	0.64	0.629	0.73	0.65	0.619	FCO:2007
2	Phosphorus as P	mg/kg	189	180	162	189	181	163	APHA(22 nd Edi) 4500 C
3	Texture	--	Sandy	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	--
4	Petroleum Hydrocarbon	mg/kg	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	PLPL-TPH
5	Heavy Metals								
5.1	Aluminum as Al	%	5.6	5.79	5.61	5.17	5.77	5.66	AAS APHA 3111 B
5.2	Total Chromium as Cr ⁺³	mg/kg	120	119	121	89.98	117	112	AAS 3111B
5.3	Manganese as Mn	mg/kg	760	729	745	687	728	822	AAS APHA 3111 B
5.4	Iron as Fe	%	2.45	2.41	2.32	2.57	2.4	2.9	AAS APHA(22 nd Edi)3111 B
5.5	Nickel as Ni	mg/kg	48.32	48.21	47.57	50.33	48.18	44.88	AAS APHA(22 nd Edi)3111 B
5.6	Copper as Cu	mg/kg	52.52	54.52	49.82	56.37	54.48	32.76	AAS APHA(22 nd Edi)3111 B
5.7	Zinc as Zn	mg/kg	166	179	167	183	178	173	AAS APHA(22 nd Edi)3111 B
5.8	Lead as Pb	mg/kg	2.02	2.02	2.06	1.9	2.04	1.66	AAS APHA(22 nd Edi)3111 B
5.9	Mercury as Hg	mg/kg	BDL*	BDL*	BDL*	BDL*	ND	BDL*	AAS APHA- 3112 B
6	Benthic Organisms								
6.1	Macrobenthos	--	Echinoderms Decapods Isopods Chaetognaths	Isopods Polychaete worms Echinoderms	Crabs Bivalves Echinoderms	Echinoderms Crustaceans Molluscs	Polychaete worms Mysids Decapods	Echinoderms Crabs Bivalves	APHA (22 nd Edi) 10500-C
6.2	MeioBenthos	--	Gastrotriches Bryozoans Ostracodes	Bryozoans Copepods	Hydrozoa Nematodes	Copepods Foraminiferans	Ciliates Nematodes	Foraminiferans Copepods Hydrozoa	APHA (22 nd Edi) 10500-C
2	Population	no/m ²	337	440	377	387	440	503	APHA (22 nd Edi) 10500-C



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

SR. NO.	TEST PARAMETERS	UNIT	October 2015		November 2015		December 2015		January 2016		February 2016		March 2016		Test Method
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1	pH	--	7.94	8.08	7.94	7.66	8.02	8.13	7.80	7.44	7.66	7.94	8.03	8.07	IS3025(P11)83R e.02
2	Temperature	°C	29	30	30	31	28	29	30	30	30	31	29	30	IS3025(P9)84Re.02
3	Total Suspended Solids	mg/L	14	16	16	22	17	23	14	20	16	24	16	20	IS3025(P17)84R e.02
4	BOD (3 Days @ 27 °C)	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	IS 3025 (P44)1993Re.03 Edition2.1
5	Dissolved Oxygen	mg/L	5.8	4.6	5.4	4.8	5.2	4.6	5.2	4.6	5.4	4.6	5.4	4.8	IS3025(P38)89R e.99
6	Salinity	ppt	39.37	40.18	38.19	39.3	38.42	39.26	38.68	39.71	38.2	39.3	38.22	38.86	APHA (22 nd Edi) 2550 B
7	Oil & Grease	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	APHA(22 nd Edi)55 20D
8	Nitrate as NO ₃	mg/L	0.616	0.857	0.46	0.75	0.52	0.78	0.413	0.674	0.457	0.747	0.355	0.479	IS3025(P34)88
9	Nitrite as NO ₂	mg/L	0.067	0.053	0.026	0.021	0.037	0.49	0.029	0.024	0.028	0.021	0.015	0.028	IS3025(P34)88 NEDA
10	Ammonical Nitrogen as NH ₃	mg/L	0.203	0.342	0.22	0.38	0.15	0.31	0.232	0.4	0.213	0.388	0.335	0.577	IS3025(P34)88CI a.2.3
11	Phosphates as PO ₄	mg/L	0.545	0.446	0.17	0.162	0.19	0.17	0.267	0.082	0.168	0.159	0.263	0.285	APHA(22 nd Edi) 4500 C
12	Total Nitrogen	mg/L	0.886	1.252	0.707	1.15	0.71	1.59	0.674	1.098	0.696	1.156	0.705	1.084	IS3025(P34)88
13	Petroleum Hydrocarbon	mg/L	1.4	BDL*	2.2	BDL*	1	BDL*	1.8	BDL*	2.2	BDL*	BDL*	BDL*	PLPL-TPH
14	Total Dissolved Solids	mg/L	44020	44680	46800	33500	46930	47460	46400	47020	44660	45120	43708	44260	IS3025(P16)84R e.02
15	COD	mg/L	24	14	28	24	24	19	22	18	28	24	24	28	APHA(22 nd Edi) 5520-D Open Reflux
16	Oxidisable Particular Organic Carbon	%	0.48	0.8	0.76	0.58	0.82	0.52	0.64	0.4	0.76	0.58	0.638	0.472	SOP – PLPL - 07
A	Flora and Fauna														
17	Primary productivity	mgC/L /day	2.138	0.563	1.913	0.787	1.91	0.56	2.02	0.675	1.575	0.787	1.98	0.383	APHA (22 nd Edi) 10200-J
B	Phytoplankton														


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18.1	Chlorophyll	mg/m ³	2.00	0.507	2.296	0.988	1.22	0.26	2.75	0.74	2.67	0.481	2.11	0.500	APHA (22 nd Edi) 10200-H
18.2	Phaeophytin	mg/m ³	0.053	1.287	BDL*	0.9	0.75	1.39	BDL*	1.14	ND	1.83	BDL*	2.09	APHA (22 nd Edi) 10200-H
18.3	Cell Count	Unit x 10 ³ /L	202	56	184	48	180	20	147	34	268	55	274	71	APHA (22 nd Edi) 10200-H
18.4	Name of Group Number and name of group species of each group	--	Bacillariophyceae	Bacillariophyceae	Bacillariophyceae	Bacillariophyceae	Bacillariophyceae	Bacillariophyceae	Bacillariophyceae	Bacillariophyceae	Bacillariophyceae	Bacillariophyceae	Bacillariophyceae	Bacillariophyceae	APHA (22 nd Edi) 10200-H
			Biddulphia sp.	Fragillaria sp.	Gyrosigma sp.	Achnanthes sp.	Asterionella sp.	Nitzschia sp.	Gomphonema sp.	Biddulphia sp.	Navicula sp.	Gyrosigma sp.	Biddulphia sp.	Fragillaria sp.	
			Navicula sp.	Biddulphia sp.	Cheatecerous sp.	Biddulphia sp.	Navicula sp.	Fragillaria sp.	Nitzschia sp.	Cocconeis sp.	Synedra sp.	Achnanthes sp.	Melosira sp.	Nitzschia sp.	
			Fragillaria sp.	Pleurosigma sp.	Fragillaria sp.	Cheatecerous sp.	Synedra sp.	Rhizosolenia sp.	Navicula sp.	Rhizosolenia sp.	Gomphonema sp.	Navicula sp.	Pinnularia sp.	Navicula sp.	
			Cymbella sp.	Thalassiosira sp.	Pinnularia sp.	Cocconeis sp.	Rhizosolenia sp.	Coscinodiscus sp.	Fragillaria sp.	Coscinodiscus sp.	Skeletonema sp.	Synedra sp.	Tabellaria sp.	Tabellaria sp.	
			Rhizosolenia sp.	Pinnularia sp.	Nitzschia sp.	Rhizosolenia sp.	Melosira sp.	Cyclotella sp.	Coscinodiscus sp.	Navicula sp.	Thalassiosira sp.	Coscinodiscus sp.	Nitzschia sp.	Coscinodiscus sp.	
			Coscinodiscus sp.	Cyanophyceae	Pleurosigma sp.	Cyanophyceae	Skeletonema sp.	Rhizosolenia sp.	Asterionella sp.	Nitzschia sp.	Skeletonema sp.	Cyanophyceae	Navicula sp.	Asterionella sp.	
			Skeletonema sp.	Oscillatoria sp.	Cyanophyceae	Microcystis sp.	Coscinodiscus sp.	Cyanophyceae	Green Algae	Green Algae	Cyanophyceae	Oscillatoria sp.	Coscinodiscus sp.	Pinnularia sp.	
			Asterionella sp.	Spirulina sp.	Microcystis sp.	Oscillatoria sp.	Cyanophyceae	Oscillatoria sp.	Chlorella sp.	Chlorella sp.	Microcystis sp.	Green Algae	Skeletonema sp.	Cyanophyceae	
			Green Algae	Lyngbya sp.	Oscillatoria sp.	Nostoc sp.	Oscillatoria sp.	Nostoc sp.	Pandorina sp.	Ankistrodesmus sp.	Oscillatoria sp.	Volvox sp.	Fragillaria sp.	Oscillatoria sp.	
			Ankistrodesmus sp.	--	Spirulina sp.	Green Algae	Nostoc sp.	Green Algae	Cyanophyceae	Cyanophyceae	Green Algae	--	Cyanophyceae	Nostoc sp.	
			Chlorella sp.	--	Green Algae	Pandorina sp.	Green Algae	Chlorella sp.	Oscillatoria sp.	Microcystis sp.	Chlorella sp.	--	Microcystis sp.	Green Algae	
			Pandorina sp.	--	Ankistrodesmus sp.	Spirogyra sp.	Ankistrodesmus sp.	Hydrodictyon sp.	Spirulina sp.	--	--	--	Oscillatoria sp.	Chlorella sp.	
			Desmids	--	Pediastrum sp.	--	Chlorella sp.	Pediastrum sp.	--	--	--	--	Spirulina sp.	Pandorina sp.	
			Cosmarium sp.	--	--	--	Pandorina sp.	Pandorina sp.	--	--	--	--	Green Algae	--	
			Closterium	--	--	--	Scenedes	--	--	--	--	--	Chlorella	--	



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			sp.				mus sp.						sp.		
			--	--	--	--			--	--	--	--	Ankistrode smus sp.	--	
C	Zooplanktons														
19.1	Abundance (Population)	no/m ²	300	125	140	60	175	50	160	80	150	75	317	33	APHA (22 nd Edi) 10200-G
19.2	Name of Group Number and name of group species of each group	--	Copepods	Polychaetes Worms	Copepods	Polychaete worms	Echinoder ms	Bivalves	Mysids	Polychaete s Worms	Polychaete worms	Nematode s	Copepods	Snails	APHA (22 nd Edi) 10200-G
			Crustacea ns	Chaetognat hes	Decapods	Ostracods	Nematode s	Decapods	Isopods	Echinoder ms	Nematode s	Polychaete worms	Decapods	Echinoder ms	
			Decapods	--	Ostracods	Decapods	Isopods	Nematode s	Echinoder ms	--	Hydrozoan s		Gastropod s	--	
			Polychaete s	--	Ctenophor es	--	Decapods	--	Gastropod s	--	Echinoder ms		Echinoder ms	--	
			Krill	--	Gastropod s	--	Gastropod s	--	--	--			Foraminife rans	--	
			Ostracods	--	--	--		--	--	--			--	--	
			Crustacea ns	--	--	--		--	--	--					
			Rotifers	--				--	--	--					
19.3	Total Biomass	ml/100 m ³	101	46	82.5	7.4	48.52	8.72	99.6	3.9	91.2	3.5	139	4.68	APHA (22 nd Edi) 10200-G
D	Microbiological Parameters														
20.1	Total Bacterial Count	CFU/ml	1970	1680	1680	1260	1890	1600	1520	1290	1670	1250	2050	1900	IS 5402:2002
20.2	Total Coliform	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	APHA(22 nd Edi)92 21-D
20.3	Ecoli	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS:1622:1981Edi .2.4(2003-05)
20.4	Enterococcus	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS : 15186 :2002
20.5	Salmonella	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS : 5887 (P-3)
20.6	Shigella	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS : 1887 (P-7)
20.7	Vibrio	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS : 5887 (P-5)



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

SR. NO.	TEST PARAMETERS	UNIT	November 2015	Test Method
			SEDIMENT	
1	Organic Matter	%	0.6	FCO:2007
2	Phosphorus as P	mg/kg	143	APHA(22 nd Eti) 4500 C
3	Texture	--	Sandy Loam	--
4	Petroleum Hydrocarbon	mg/kg	BDL*	PLPL-TPH
5	Heavy Metals			
5.1	Aluminum as Al	%	5.34	AAS APHA 3111 B
5.2	Total Chromium as Cr ⁺³	mg/kg	134	AAS 3111B
5.3	Manganese as Mn	mg/kg	790	AAS APHA 3111 B
5.4	Iron as Fe	%	2.48	AAS APHA(22 nd Eti)3111 B
5.5	Nickel as Ni	mg/kg	43.1	AAS APHA(22 nd Eti)3111 B
5.6	Copper as Cu	mg/kg	42	AAS APHA(22 nd Eti)3111 B
5.7	Zinc as Zn	mg/kg	188	AAS APHA(22 nd Eti)3111 B
5.8	Lead as Pb	mg/kg	1.08	AAS APHA(22 nd Eti)3111 B
5.9	Mercury as Hg	mg/kg	BDL*	AAS APHA- 3112 B
6				
6.1	Macrobenthos	--	Polychaete worms Echinoderms Isopods	APHA (22 nd Edi) 10500-C
6.2	MeioBenthos	--	Nematodes Foraminiferans Copepods	APHA (22 nd Edi) 10500-C
2	Population	no/m ²	385	APHA (22 nd Edi) 10500-C



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RESULTS OF MARINE WATER [M8 RIGHT SIDE OF BOCHA CREEK N 22°45'98" E 069°43'119"]

SR. NO.	TEST PARAMETERS	UNIT	October 2015		November 2015		December 2015		January 2016		February 2016		March 2016		Test Method
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1	pH	--	8.1	8.16	8.02	8.23	8.03	8.28	7.78	8.02	8.04	8.24	8.08	8.04	IS3025(P11)83Re.02
2	Temperature	°C	29	30	28	29	28	29	29	30	28	29	29	30	IS3025(P9)84Re.02
3	Total Suspended Solids	mg/L	18	22	20	28	22	26	22	30	22	30	18	22	IS3025(P17)84Re.02
4	BOD (3 Days @ 27 °C)	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	IS 3025 (P44)1993Re.03 Edition2.1
5	Dissolved Oxygen	mg/L	5.6	4.8	5.6	4.8	5.4	4.6	5.4	4.6	5.6	4.8	5.8	4.4	IS3025(P38)89Re.99
6	Salinity	ppt	39.82	40.54	44.6	45.8	43.96	44.88	44.2	45.6	44.4	45.6	43.94	44.28	APHA (22 nd Edi) 2550 B
7	Oil & Grease	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	APHA(22 nd Edi)55 20D
8	Nitrate as NO ₃	mg/L	0.443	0.52	0.54	0.66	0.33	0.58	0.52	0.64	0.564	0.655	0.556	0.602	IS3025(P34)88
9	Nitrite as NO ₂	mg/L	0.497	0.638	0.02	0.029	0.032	0.022	0.019	0.025	0.021	0.03	0.037	0.051	IS3025(P34)88 NEDA
10	Ammonical Nitrogen as NH ₃	mg/L	0.684	0.748	0.62	0.7	0.59	0.52	0.6	0.65	0.062	0.703	0.819	0.95	IS3025(P34)88Cl a.2.3
11	Phosphates as PO ₄	mg/L	0.447	0.479	0.19	0.15	0.027	0.041	0.048	0.089	0.19	0.15	0.844	0.903	APHA(22 nd Edi) 4500 C
12	Total Nitrogen	mg/L	1.624	1.906	1.18	1.389	0.96	1.13	1.1	1.272	1.205	1.388	1.412	1.603	IS3025(P34)88
13	Petroleum Hydrocarbon	mg/L	0.4	BDL*	1	BDL*	0.88	BDL*	1.2	BDL*	1	BDL*	2	BDL*	PLPL-TPH
14	Total Dissolved Solids	mg/L	43460	45020	51990	53890	48830	49690	52090	54680	50890	52760	52540	53020	IS3025(P16)84Re.02
15	COD	mg/L	19	24	18	24	19	24	20	22	19	28	28	33	APHA(22 nd Edi) 5520-D Open Reflux
16	Oxidisable Particular Organic Carbon	%	0.38	0.24	0.48	0.62	0.63	0.76	0.46	0.6	0.48	0.64	0.63	0.44	SOP – PLPL - 07
A	Flora and Fauna														
17	Primary productivity	1.19	0.45	1.35	0.338	1.12	0.33	1.236	0.348	1.688	0.45	2.813	0.495	1.193	APHA (22 nd Edi) 10200-J


H. T. Shah
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		3													
B	Phytoplankton														
18.1	Chlorophyll	mg/m ³	1.842	0.614	1.762	0.614	1.73	0.61	2.016	0.598	1.602	0.214	1.549	0.506	APHA (22 nd Edi) 10200-H
18.2	Phaeophytin	mg/m ³	0.12	1.199	0.294	1.33	0.97	1.64	0.14	2.06	1.03	1.78	0.844	2.366	APHA (22 nd Edi) 10200-H
18.3	Cell Count	Unit x 10 ³ /L	178	32	220	51	188	31	164	30	212	45	236	54	APHA (22 nd Edi) 10200-H
18.4	Name of Group Number and name of group species of each group	--	Bacillariophyceae	Bacillariophyceae	Bacillariophyceae	Bacillariophyceae	Bacillariophyceae	Bacillariophyceae	Bacillariophyceae	Bacillariophyceae	Bacillariophyceae	Bacillariophyceae	Bacillariophyceae	Bacillariophyceae	APHA (22 nd Edi) 10200-H
			<i>Biddulphia sp.</i>	<i>Nitzschia sp.</i>	<i>Asterionella sp.</i>	<i>Fragilaria sp.</i>	<i>Asterionella sp.</i>	<i>Fragilaria sp.</i>	<i>Asterionella sp.</i>	<i>Biddulphia sp.</i>	<i>Navicula sp.</i>	<i>Skeletonema sp.</i>	<i>Asterionella sp.</i>	<i>Navicula sp.</i>	
			<i>Pinnularia sp.</i>	<i>Pinnularia sp.</i>	<i>Gyrodinium sp.</i>	<i>Gomphonema sp.</i>	<i>Biddulphia sp.</i>	<i>Nitzschia sp.</i>	<i>Nitzschia sp.</i>	<i>Navicula sp.</i>	<i>Gyrodinium sp.</i>	<i>Synedra sp.</i>	<i>Biddulphia sp.</i>	<i>Nitzschia sp.</i>	
			<i>Thalassiosira sp.</i>	<i>Fragilaria sp.</i>	<i>Pinnularia sp.</i>	<i>Navicula sp.</i>	<i>Nitzschia sp.</i>	<i>Biddulphia sp.</i>	<i>Navicula sp.</i>	<i>Thalassiosira sp.</i>	<i>Skeletonema sp.</i>	<i>Navicula sp.</i>	<i>Navicula sp.</i>	<i>Biddulphia sp.</i>	
			<i>Ceratoceros sp.</i>	<i>Thalassiosira sp.</i>	<i>Synedra sp.</i>	<i>Nitzschia sp.</i>	<i>Rhizosolenia sp.</i>	<i>Navicula sp.</i>	<i>Synedra sp.</i>	<i>Nitzschia sp.</i>	<i>Coscinodiscus sp.</i>	<i>Coscinodiscus sp.</i>	<i>Nitzschia sp.</i>	<i>Melosira sp.</i>	
			<i>Asterionella sp.</i>	<i>Cyclotella sp.</i>	<i>Skeletonema sp.</i>	<i>Skeletonema sp.</i>	<i>Thalassiosira sp.</i>	<i>Cyanophyceae</i>	<i>Asterionella sp.</i>	<i>Cyclotella sp.</i>	<i>Pinnularia sp.</i>	<i>Cyanophyceae</i>	<i>Rhizosolenia sp.</i>	<i>Green Algae</i>	
			<i>Cyanophyceae</i>	<i>Green Algae</i>	<i>Tabellaria sp.</i>	<i>Cyanophyceae</i>	<i>Skeletonema sp.</i>	<i>Oscillatoria sp.</i>	<i>Green Algae</i>	<i>Green Algae</i>	<i>Pleurosigma sp.</i>	<i>Nostoc sp.</i>	<i>Skeletonema sp.</i>	<i>Chlorella sp.</i>	
			<i>Anabaena sp.</i>	<i>Pandorina sp.</i>	<i>Gomphonema sp.</i>	<i>Oscillatoria sp.</i>	<i>Cyclotella sp.</i>	<i>Microcystis sp.</i>	<i>Pandorina sp.</i>	<i>Chlorella sp.</i>	<i>Cyanophyceae</i>	<i>Oscillatoria sp.</i>	<i>Tabellaria sp.</i>	<i>Volvox sp.</i>	
			<i>Microcystis sp.</i>	<i>Chlorella sp.</i>	<i>Cyanophyceae</i>	<i>Spirulina sp.</i>	<i>Cyanophyceae</i>	<i>Nostoc sp.</i>	<i>Cyanophyceae</i>	<i>Scenedesmus sp.</i>	<i>Microcystis sp.</i>	--	<i>Synedra sp.</i>	<i>Cyanophyceae</i>	
			<i>Spirulina sp.</i>	<i>Ulothrix sp.</i>	<i>Oscillatoria sp.</i>	<i>Green Algae</i>	<i>Anabaena sp.</i>	<i>Green Algae</i>	<i>Spirulina sp.</i>	--	<i>Oscillatoria sp.</i>	--	<i>Green Algae</i>	<i>Oscillatoria sp.</i>	
			<i>Green Algae</i>	<i>Volvox sp.</i>	<i>Oedogonium sp.</i>	<i>Pandorina sp.</i>	<i>Oscillatoria sp.</i>	<i>Chlorella sp.</i>	<i>Microcystis sp.</i>	--	<i>Green Algae</i>	--	<i>Pandorina sp.</i>	<i>Lyngbya sp.</i>	
			<i>Scenedesmus sp.</i>	--	<i>Green Algae</i>	<i>Scenedesmus sp.</i>	<i>Nostoc sp.</i>	<i>Hydrodictyon sp.</i>	<i>Anabaena sp.</i>	--	<i>Chlorella sp.</i>	--	<i>Chlorella sp.</i>	--	
			--	--	<i>Hydrodictyon sp.</i>	--	<i>Green Algae</i>	<i>Pandorina sp.</i>	--	--	<i>Pediastrum sp.</i>	--	<i>Scenedesmus sp.</i>	--	
			--	--	<i>Pandorina</i>	--	<i>Ankistrode</i>	--	--	--	<i>Ankistrode</i>	--	<i>Cyanophyceae</i>	--	



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					<i>sp.</i>		<i>smus sp.</i>				<i>smus sp.</i>		<i>eae</i>		
			--	--	<i>Pediastrum sp.</i>	--	<i>Pandorina sp.</i>	--	--	--	--	--	<i>Nostoc sp.</i>	--	
			--	--	--	--	<i>Pediastrum sp.</i>	--	--	--	--	--	<i>Spirulina sp.</i>	--	
			--	--	--	--	<i>Ulothrix sp.</i>	--	--	--	--	--	--	--	
C	Zooplanktons														
19.1	Abundance (Population)	no/m ²	375	50	280	100	200	80	398	67	240	80	300	67	APHA (22 nd Edi) 10200-G
19.2	Name of Group Number and name of group species of each group	--	Copepods	Ostracods	Copepods	Copepods	Decapods	Nematode s	Echinoder ms	Molluscans	Gastropod s	Polychaete worms	Copepods	Echinoder ms	APHA (22 nd Edi) 10200-G
			Krill	Decapods	Decapods	Decapods	Ostracods	Mysids	Decapods	Decapods	Nematode s	Nematode s	Gastropod s	Gastropod s	
			Isopods	--	Ostracods	Isopods	Krill	Barnades	Copepods	--	Decapods	Molluscans	Polychaete worms	--	
			Decapods	--	Rotifers	--	Crustacean s	--	Isopods	--	mysids	--	Foraminife rans	--	
			Crustacean s	--	Ctenophor es	--	Echinoder ms	--	Gastropod s	--	--	--	<i>Barnades</i>	--	
			Rotifers	--	Chaetogna thes	--			--	--			--	--	
			Chaetognat hes	--	--	--									
19.3	Total Biomass	ml/100 m ³	78	22	83.8	5.7	68.9	9	55	10	78	3.6	126	4.59	APHA (22 nd Edi) 10200-G
D	Microbiological Parameters														
20.1	Total Bacterial Count	CFU /ml	1540	1220	1860	1340	1690	1500	1750	1280	1820	1350	1650	1750	IS 5402:2002
20.2	Total Coliform	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	APHA (22 nd Edi) 9221-D
20.3	Ecoli	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS:1622:1981Edi .2.4(2003-05)
20.4	Enterococcus	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS : 15186 :2002
20.5	Salmonella	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS : 5887 (P-3)
20.6	Shigella	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS : 1887 (P-7)
20.7	Vibrio	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS : 5887 (P-5)



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

SR. NO.	TEST PARAMETERS	UNIT	October 2015 SEDIMENT	November 2015 SEDIMENT	December 2015 SEDIMENT	January 2016 SEDIMENT	February 2016 SEDIMENT	March 2016 SEDIMENT	Test Method
1	Organic Matter	%	0.569	0.53	0.51	0.52	0.579	0.462	FCO:2007
2	Phosphorus as P	mg/kg	170	200	170	198	202	165	APHA(22 nd Edi) 4500 C
3	Texture	--	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	--
4	Petroleum Hydrocarbon	mg/kg	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	PLPL-TPH
5	Heavy Metals								
5.1	Aluminum as Al	%	5.33	5.00	5.09	5.6	5.01	5.25	AAS APHA 3111 B
5.2	Total Chromium as Cr ⁺³	mg/kg	87.99	98	101	102	98.57	93.99	AAS 3111B
5.3	Manganese as Mn	mg/kg	735	880	829	770	879	747	AAS APHA 3111 B
5.4	Iron as Fe	%	2.13	2.8	2.42	2.6	2.87	2.27	AAS APHA(22 nd Edi)3111 B
5.5	Nickel as Ni	mg/kg	38.98	50	43.98	48	51.97	32.94	AAS APHA(22 nd Edi)3111 B
5.6	Copper as Cu	mg/kg	43.97	54	47.98	52	54.58	46.41	AAS APHA(22 nd Edi)3111 B
5.7	Zinc as Zn	mg/kg	162	160	48.57	174	162	154	AAS APHA(22 nd Edi)3111 B
5.8	Lead as Pb	mg/kg	1.99	2.2	147	1.8	2.27	2.02	AAS APHA(22 nd Edi)3111 B
5.9	Mercury as Hg	mg/kg	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	AAS APHA- 3112 B
6	Benthic Organisms								
6.1	Macrobenthos	--	Echinoderms Decapods Isopods	Mysids Isopods Echinoderms Polychaete worms	Polychaete worms Echinoderms Decapods Isopods	Crabs Ostracods Gastrotriches	Polychaete worms Mysids	Polychaete Worms Echinoderms Crabs	APHA (22 nd Edi) 10500-C
6.2	MeioBenthos	--	Gastrotriches Copepods Ostracodes	Copepods Ostracods Ciliates	Nematodes Foraminiferans	Isopods Nematodes Decapods	Nematodes Ostracods Foraminiferans	Nematodes Hydrozoa	APHA (22 nd Edi) 10500-C
2	Population	no/m ²	503	317	385	508	318	433	APHA (22 nd Edi) 10500-C



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RESULTS OF MARINE WATER [M11 MPT T1 JETTY N 22°42'27" E 069°43'450"]

SR. NO.	TEST PARAMETERS	UNIT	October 2015		November 2015		December 2015		January 2016		February 2016		March 2016		Test Method
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1	pH	--	8.02	8.11	7.91	7.66	8.02	8.33	7.62	7.27	7.66	7.91	7.89	7.93	IS3025(P11)83R e.02
2	Temperature	°C	29	30	29	30	29	30	28	29	29	30	29	30	IS3025(P9)84Re.02
3	Total Suspended Solids	mg/L	14	20	18	22	19	25	20	24	19	23	14	22	IS3025(P17)84R e.02
4	BOD (3 Days @ 27 °C)	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	IS 3025 (P44)1993Re.03 Edition2.1
5	Dissolved Oxygen	mg/L	5.8	4.8	5.2	4.6	5.8	4.8	5.6	4.8	5	4.4	5.8	5	IS3025(P38)89R e.99
6	Salinity	ppt	40.3	41.6	41.7	42.53	39.88	40.98	42.1	42.93	41.6	42.54	42.38	42.88	APHA (22 nd Edi) 2550 B
7	Oil & Grease	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	APHA(22 nd Edi)55 20D
8	Nitrate as NO ₃	mg/L	0.474	0.673	0.81	0.93	0.67	0.87	0.689	0.903	0.793	0.915	0.649	0.943	IS3025(P34)88
9	Nitrite as NO ₂	mg/L	0.027	0.049	0.077	0.08	0.079	0.081	0.08	0.085	0.075	0.078	0.041	0.053	IS3025(P34)88 NEDA
10	Ammonical Nitrogen as NH ₃	mg/L	0.64	0.64	0.41	0.581	0.69	0.79	0.489	0.605	0.407	0.574	0.558	0.689	IS3025(P34)88Cl a.2.3
11	Phosphates as PO ₄	mg/L	0.279	0.361	0.78	0.88	0.075	0.089	0.083	0.144	0.777	0.868	0.095	0.108	APHA(22 nd Edi) 4500 C
12	Total Nitrogen	mg/L	1.141	1.369	1.29	1.59	1.45	1.74	1.258	1.593	1.275	1.567	1.248	1.685	IS3025(P34)88
13	Petroleum Hydrocarbon	mg/L	0.2	BDL*	2.2	BDL*	1.8	BDL*	1.7	BDL*	2.1	BDL*	BDL*	BDL*	PLPL-TPH
14	Total Dissolved Solids	mg/L	47980	49710	33800	35000	40830	42620	34120	35330	48150	49630	51590	51620	IS3025(P16)84R e.02
15	COD	mg/L	14	18	22	24	24	28	18	20	20	24	14	19	APHA(22 nd Edi) 5520-D Open Reflux
16	Oxidisable Particular Organic Carbon	%	0.44	0.62	0.94	0.44	0.78	0.49	0.88	0.4	0.9	0.4	0.696	0.472	SOP – PLPL - 07
A	Flora and Fauna														
17	Primary productivity	mgC/L /day	1.913	0.563	2.58	0.338	2.47	0.33	2.172	0.666	1.91	0.45	2.363	0.63	APHA (22 nd Edi) 10200-J
B	Phytoplankton														



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18.1	Chlorophyll	mg/m ³	1.816	0.908	2.216	0.561	2.35	0.32	2.584	0.489	2.67	0.24	2.67	0.24	APHA (22 nd Edi) 10200-H
18.2	Phaeophytin	mg/m ³	0.24	1.148	BDL*	1.103	BDL*	1.86	0.12	0.998	0.04	1.909	0.04	1.9	APHA (22 nd Edi) 10200-H
18.3	Cell Count	Unit x 10 ³ /L	210	63	210	53	314	162	246	72	276	65	251	46	APHA (22 nd Edi) 10200-H
18.4	Name of Group Number and name of group species of each group	--	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	APHA (22 nd Edi) 10200-H
			Nitzschia sp.	Synedra sp.	Asterionell a sp.	Biddulphia sp.	Navicula sp.	Fragillaria sp.	Skeleton ma sp.	Biddulphia sp.	Asterionell a sp.	Fragillaria sp.	Navicula sp.	Nitzschia sp.	
			Navicula sp.	Gyrosigma sp.	Coscinodis cus sp.	Cocconeis sp.	Nitzschia sp.	Gomphone ma sp.	Synedra sp.	Pinnularia sp.	Navicula sp.	Nitzschia sp.	Asterionell a sp.	Rhizosolen ia sp.	
			Cymbella sp.	Thallasiosi ra sp.	Gomphone ma sp.	Fragillaria sp.	Coscinodis cus sp.	Asterionell a sp.	Navicula sp.	Pleurosigm a sp.	Synedra sp.	Asterionell a sp.	Skeleton ma sp.	Pleurosigm a sp.	
			Cymbella sp.	Pinnularia sp.	Pinnularia sp.	Synedra sp.	Fragillaria sp.	Rhizosolen ia sp.	Rhizosolen ia sp.	Green Algae	Coscinodis cus sp.	Navicula sp.	Rhizosolen ia sp.	Skeleton ma sp.	
			Gomphone ma sp.	Navicula sp.	Thallasion ema sp.	Cyanophyc eae	Gomphone ma sp.	Cyanophyc eae	Coscinodis cus sp.	Pandorina sp.	Nitzschia sp.	Gyrosigma sp.	Cymbella sp.	Fragillaria sp.	
			Coscinodis cus sp.	Nitzschia sp.	Fragillaria sp.	Microcystis sp.	Skeleton ma sp.	Microcystis sp.	Gomphone ma sp.	Pediastru m sp.	Cymbella sp.	Cyanophyc eae	Thallasiosi ra sp.	Cyanophyc eae	
			Rhizosolen ia sp.	Green Algae	Cyanophyc eae	Oscillatoria sp.	Rhizosolen ia sp.	Oscillatoria sp.	Green Algae	Cyanophyc eae	Skeleton ma sp.	Oscillatoria sp.	Cyclotella sp.	Oscillatoria sp.	
			Green Algae	Ulothrix sp.	Anabaena sp.	Green Algae	Cyanophyc eae	Nostoc sp.	Spirogyra sp.	Lyngbya sp.	Cyanophyc eae	Microcystis sp.	Cyanophyc eae	Spirulina sp.	
			Scenedes mus sp.	Chlorella sp.	Oscillatoria sp.	Hydrodicty on sp.	Anabaena sp.	Green Algae	Hydrodicty on sp.	Microcystis sp.	Oscillatoria sp.	--	Anabaena sp.	Green Algae	
			Hydrodicty on sp.	--	Spirulina sp.	Pandorina sp.	Microcystis sp.	Chlorella sp.	Scenedes mus sp.	--	Microcystis sp.	--	Microcystis sp.	Ankistrode smus sp.	
			Spirogyra sp.	--	Green Algae	Pediastru m sp.	Oscillatoria sp.	Pandorina sp.	Desmids	--	Nostoc sp.	--	Nostoc sp.	Scenedes mus sp.	
			Desmids	--	Ankistrode smus sp.	--	Green Algae	Pediastru m sp.	Cosmariu m sp.	--	Green Algae	--	Green Algae	--	
			Cosmariu m sp.	--	Chlorella sp.	--	Ankistrode smus sp.	--	--	--	Chlorella sp.	--	Chlorella sp.	--	
			--	--	Hydrodicty on sp.	--	Chlorella sp.	--	--	--	Pediastru m sp.	--	Pandorina sp.	--	
			--	--	--	--	Hydrodicty	--	--	--	Ulothrix	--	--	--	


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							on sp.				sp.				
			--	--	--	--	Volvox sp.	--	--	--	Scenedes mus sp.	--	--	--	
C	Zooplanktons														
19.1	Abundance (Population)	no/m ²	250	100	250	75	367	100	208	80	250	75	183	50	APHA (22 nd Edi) 10200-G
19.2	Name of Group Number and name of group species of each group	--	Chaetognathes	Gastropods	Copepods	Copepods	Polychaete worms	Nematodes	Copepods	Decapods	Polychaete worms	Gastropods	183	50	APHA (22 nd Edi) 10200-G
			Krill	Decapods	Decapods	Polychaete worms	Echinoderms	Gastropods	Gastropods	Ostracods	Echinoderms	Echinoderms	Copepods	Copepods	
			Ostracods	Nematodes	Polychaete worms	Gastropods	Amphipods	--	Crustaceans	--	Molluscs	--	Ostracods	Decapods	
			Cyclops	--	Ctenophores	--	Krill	--	Cyclops	--	mysids	--	Echinoderms	Gastropods	
			Crustaceans	--	Krill	--	--	--	Polychaetes	--	--	--	Molluscs	--	
			Polychaetes	--	Crustaceans	--	--	--	--	--	--	--	Rotifers	--	
19.3	Total Biomass	ml/100 m ³	79.6	21	82.9	10.4	80.24	12.1	89	26	79	23	124	19.6	APHA (22 nd Edi) 10200-G
D	Microbiological Parameters														
20.1	Total Bacterial Count	CFU/ml	1820	1690	1860	1440	1840	1680	1820	1580	1850	1430	2120	2440	IS 5402:2002
20.2	Total Coliform	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	APHA(22 nd Edi)92 21-D
20.3	Ecoli	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS:1622:1981Edi .2.4(2003-05)
20.4	Enterococcus	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS : 15186 :2002
20.5	Salmonella	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS : 5887 (P-3)
20.6	Shigella	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS : 1887 (P-7)
20.7	Vibrio	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS : 5887 (P-5)



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

SR. NO.	TEST PARAMETERS	UNIT	October 2015		November 2015		December 2015		January 2016		February 2016		March 2016		Test Method
			SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	SURFACE	BOTTOM	
1	pH	--	7.89	8.16	7.82	7.74	7.92	8.02	7.36	7.3	7.74	7.82	7.93	7.89	IS3025(P11)83Re.02
2	Temperature	°C	29	30	28	29	28	29	29	30	28	29	29	30	IS3025(P9)84Re.02
3	Total Suspended Solids	mg/L	20	24	24	30	20	26	20	26	20	24	16	20	IS3025(P17)84Re.02
4	BOD (3 Days @ 27 °C)	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	IS 3025 (P44)1993Re.03E dition2.1
5	Dissolved Oxygen	mg/L	5.8	4.8	5.2	4.8	5.2	4.8	5	4.6	5.2	4.8	5.6	4.4	IS3025(P38)89Re.99
6	Salinity	ppt	40.12	41.08	41.7	42.3	39.6	40.2	41.3	42.1	41.6	42.2	41.58	42.22	APHA (22 nd Edi) 2550 B
7	Oil & Grease	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	APHA(22 nd Edi)55 20D
8	Nitrate as NO ₃	mg/L	0.474	0.581	0.508	0.61	0.56	0.7	0.612	0.689	0.503	0.625	0.355	0.51	IS3025(P34)88
9	Nitrite as NO ₂	mg/L	0.044	0.068	0.075	0.097	0.084	0.09	0.07	0.089	0.072	0.097	0.069	0.092	IS3025(P34)88 NEDA
10	Ammonical Nitrogen as NH ₃	mg/L	0.591	0.702	0.81	0.9	0.5	0.59	0.838	0.931	0.814	0.889	0.689	0.707	IS3025(P34)88CI a.2.3
11	Phosphates as PO ₄	mg/L	0.117	0.139	0.16	0.189	0.13	2.03	0.063	0.062	0.15	0.186	0.158	0.181	APHA(22 nd Edi) 4500 C
12	Total Nitrogen	mg/L	1.1	1.351	1.39	1.607	1.15	1.39	1.52	1.709	1.389	1.61	1.113	1.309	IS3025(P34)88
13	Petroleum Hydrocarbon	mg/L	BDL*	BDL*	1.8	BDL*	1.2	BDL*	1.4	BDL*	1.7	BDL*	BDL*	BDL*	PLPL-TPH
14	Total Dissolved Solids	mg/L	47980	48710	38400	35500	47290	48260	38030	36380	45980	46720	48810	49690	IS3025(P16)84Re.02
15	COD	mg/L	24	28	19	24	14	24	18	22	19	24	24	28	APHA(22 nd Edi) 5520-D Open Reflux
16	Oxidisable Particular Organic Carbon	%	0.74	0.4	0.7	0.38	0.63	0.41	0.63	0.37	0.71	0.39	0.48	0.32	SOP – PLPL - 07
A	Flora and Fauna														
17	Primary productivity	mgC/L/day	2.138	0.338	2.25	0.788	2.25	0.22	1.762	5.8	2.47	0.9	2.31	0.54	APHA (22 nd Edi) 10200-J
B	Phytoplankton														


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18.1	Chlorophyll	mg/m ³	1.896	0.534	2.163	0.454	1.3	0.64	1.672	0.444	2.51	0.481	2.57	0.49	APHA (22 nd Edi) 10200-H
18.2	Phaeophytin	mg/m ³	0.142	1.428	BDL*	1.602	0.74	1.11	0.236	1.182	0.22	1.83	0.219	1.83	APHA (22 nd Edi) 10200-H
18.3	Cell Count	Unit x 10 ³ /L	208	60	223	62	178	70	218	54	286	38	228	51	APHA (22 nd Edi) 10200-H
18.4	Name of Group Number and name of group species of each group	--	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	Bacillariop hyceae	APHA (22 nd Edi) 10200-H
			Amphipror a sp.	Navicula sp.	Asterionell a sp.	Biddulphia sp.	Asterionell a sp.	Fragillaria sp.	Nitzschia sp.	Navicula sp.	Navicula sp.	Synedra sp.	Asterionell a sp.	Fragillaria sp.	
			Navicula sp.	Synedra sp.	Cocconeis sp.	Cocconeis sp.	Biddulphia sp.	Nitzschia sp.	Pinnularia sp.	Melosira sp.	Synedra sp.	Nitzschia sp.	Navicula sp.	Navicula sp.	
			Nitzschia sp.	Melosira sp.	Fragillaria sp.	Gyrosigma sp.	Coscinodis cus sp.	Skeletone ma sp.	Synedra sp.	Coscinodis cus sp.	Cyclotella sp.	Coscinodis cus sp.	Nitzschia sp.	Thallasiosi ra sp.	
			Fragillaria sp.	Cheatocer ous sp.	Pinnularia sp.	Pinnularia sp.	Gyrosigma sp.	Asterionell a sp.	Gomphon ema sp.	Fragillaria sp.	Pleurosig ma sp.	Fragillaria sp.	Gomphon ema sp.	Coscinodis cus sp.	
			Pinnularia sp.	Coscinodis cus sp.	Rhizosolen ia sp.	Thallasiosi ra sp.	Nitzschia sp.	Cyanophy ceae	Thallasiosi ra sp.	Skeletone ma sp.	Skeletone ma sp.	Tabellaria sp.	Gyrosigma sp.	Nitzschia sp.	
			Synedra sp.	Rhizosolen ia sp.	Skeletone ma sp.	Cyanophy ceae	Rhizosolen ia sp.	Oscillatori a sp.	Amphipror a sp.	Asterionell a sp.	Fragillaria sp.	Cyanophy ceae	Rhizosolen ia sp.	Pleurosig ma sp.	
			Skeletone ma sp.	Green Algae	Thallasione ma sp.	Microcystis sp.	Thallasiosi ra sp.	Nostoc sp.	Skeletone ma sp.	Green Algae	Cheatocer ous sp.	Oscillatori a sp.	Skeletone ma sp.	Cyanophy ceae	
			Biddulphia sp.	Pandorina sp.	Cyanophyc eae	Green Algae	Cyanophyc eae	Green Algae	Biddulphia sp.	Ankistrode smus sp.	Biddulphia sp.	Green Algae	Fragillaria sp.	Oscillatori a sp.	
			Cyanophy ceae	Ulothrix sp.	Oscillatori a sp.	Chlorella sp.	Microcystis sp.	Chlorella sp.	Cyanophy ceae	Volvox sp.	Rhizosolen ia sp.	Chlorella sp.	Cyanophy ceae	--	
			Anabaena sp.	Volvox sp.	Nostoc sp.	Hydrodicty on sp.	Oscillatori a sp.	Pandorina sp.	Oscillatori a sp.	--	Cyanophy ceae	Pediastru m sp.	Oscillatori a sp.	--	
			Oscillatori a sp.	--	Microcystis sp.	Pandorina sp.	Nostoc sp.	Ankistrode smus sp.	Green Algae	--	Spirulina sp.	--	Microcystis sp.	--	
			Nostoc sp.	--	Green Algae	--	Green Algae	--	Volvox sp.	--	Oscillatori a sp.	--	Green Algae	--	
			Green Algae	--	Ankistrode smus sp.	--	Ankistrode smus sp.	--	Chlorella sp.	--	Green Algae	--	Chlorella sp.	--	
			Chlorella sp.	--	Chlorella sp.	--	Chlorella sp.	--	--	--	Hydrodicty on sp.	--	Pandorina sp.	--	
			Ulothrix	--	Hydrodicty	--	Pediastru	--			Chlorella	--	Scenedes	--	



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			sp.		on sp.		m sp.				sp.		mus sp.		
			Ankistrodesmus sp.	--	--	--	Scenedesmus sp.	--			--	--	--	--	
							Volvox sp.	--					--	--	
C	Zooplanktons														
19.1	Abundance (Population)	no/m ²	300	125	280	60	250	50	290	116	275	100	267	17	APHA (22 nd Edi) 10200-G
19.2	Name of Group Number and name of group species of each group	--	Copepods	Polychaetes	Copepods	Ctenophores	Polychaete worms	Copepods	Mud skipper	Snails	mysids	Nematodes	Polechaete worms	Gastropods	APHA (22 nd Edi) 10200-G
			Nematodes	Chaetognaths	Ctenophores	Copepods	Echinoderms	Molluscs	Bivalves	Copepods	Polychaete worms	Gastropods	Crustaceans	--	
			Decapods	Copepods	Krill	--	Amphipods	--	Nematodes	--	Gastropods	--	Molluscs	--	
			Hydrodod	--	Daphnia	--	Isopods	--	Hydrodod	--	Nauplius larvae	--	Decapods	--	
			Gastropods	--	Ostracods	--	Decapods	--	Ostracods	--	Decapods	--	Copepods	--	
			Ostracods	--	Gastropods	--			Gastropods	--			Gastropods	--	
			--	--	--	--			--	--					
19.3	Total Biomass	ml/100 m ³	86.9	6.2	91.2	10.8	10.24	30.1	80.6	8.4	97	17	132	3.24	APHA (22 nd Edi) 10200-G
D	Microbiological Parameters														
20.1	Total Bacterial Count	CFU/ml	1550	1230	1720	1360	1500	1310	1840	1580	1490	1030	2780	1820	IS 5402:2002
20.2	Total Coliform	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	APHA(22 nd Edi)92 21-D
20.3	Ecoli	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS:1622:1981Edi. 2.4(2003-05)
20.4	Enterococcus	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS : 15186 :2002
20.5	Salmonella	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS : 5887 (P-3)
20.6	Shigella	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS : 1887 (P-7)
20.7	Vibrio	/ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	IS : 5887 (P-5)



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Lab Manager (Q)

RESULTS OF ETP WATER OUTLET

SR. NO.	PARAMETERS	UNIT	Liquid Terminal ETP Outlet						TEST METHOD
			Oct- 15	Nov-15	Dec-15	Jan-16	Feb-16	March-16	
1	Colour	Co-pt	30	40	50	30	30	20	IS3025(P4)83Re.02
2	pH	--	7.03	7.78	7.6	7.2	7.13	7.43	IS3025(P11)83Re.02
3	Temperature	°C	30	29	29	30	30	29	IS3025(P9)84Re.02
4	Total Suspended Solids	mg/L	42	22	22	34	48	20	IS3025(P17)84Re.02
5	Total Dissolved Solids	mg/L	1733	1057	1029	976	982	987	IS3025(P16)84Re.02
6	COD	mg/L	96	82	93	85	90	27	APHA(22 nd Edi) 5520-D Open Reflux
7	BOD (3 Days @ 27 °C)	mg/L	16	26	24	22	32	BDL*	IS 3025 (P44)1993Re.03Edition2.1
8	Chloride as Cl	mg/L	559	336	337	385	523	335	IS3025(P32)88Re.99
9	Oil & Grease	mg/L	1.8	0.6	0.6	0.8	BDL*	BDL*	APHA(22 nd Edi)5520D
10	Sulphate as SO ₄	mg/L	46.63	102	57.77	302	298	96.31	APHA(22 nd Edi)4500 SO ₄ E
11	Ammonical Nitrogen as NH ₃	mg/L	5.4	1.92	2.83	2.88	2.64	1.86	IS3025(P34)88Cla.2.3
12	% Sodium as Na	%	41.99	40.12	38.65	45.34	30.92	46.93	AAS APHA(22 nd Edi) 3500 NA B/ Flame Photometer
13	Nickel as Ni	mg/L	0.022	0.016	0.012	0.02	0.022	0.012	AAS APHA(22 nd Edi)3111 B
14	Phenolic Compound	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	IS3025(P43)92Re.03
15	SAR	--	BDL*	1.63	1.74	2.92	1.23	3.29	By Calculation
16	Total Chromium as Cr ⁺³	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	AAS 3111B
17	Hexavalent Chromium as Cr ⁺⁶	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	APHA(22 nd Edi)3500Cr B Colorimetric method
18	Copper as Cu	mg/L	0.018	0.013	0.013	0.014	0.015	0.014	AAS APHA(22 nd Edi)3111 B
19	Lead as Pb	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	AAS APHA(22 nd Edi)3111 B
20	Sulphide as S	mg/L	BDL*	BDL*	BDL*	BDL*	< 0.1	BDL*	APHA(22 nd Edi) 4500-S
21	Mercury as Hg	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	AAS APHA- 3112 B
22	Zinc as Zn	mg/L	0.051	0.054	0.036	0.053	0.05	0.028	AAS APHA(22 nd Edi)3111 B
23	Cadmium as Cd	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	AAS APHA(22 nd Edi)3111 B
24	Cyanide as CN	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	APHA(22 nd Edi)4500CN E
25	Arsenic as As	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	AAS APHA 3114 B
26	Fluoride as F	mg/L	0.44	0.58	BDL*	0.56	0.49	0.22	APHA(22 nd Edi) 4500 F D SPANDS
27	Insecticides/Pesticides	mg/L	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	GC MS

*Below detection limit



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RESULT OF AMBIENT AIR QUALITY MONITORING

Location & Parameter	Unit	Oct- 15	Nov-15	Dec-15	Jan-16	Feb-16	March-16	Test Method
T1 TERMINAL								
Respirable Particulate Matter (PM ₁₀)	µg/m ³	79.74	81.90	85.41	82.31	82.20	77.24	IS:5182(P23):Gravimetric CPCB - Method (Vol.I,May-2011)
Particulate Matter (PM _{2.5})	µg/m ³	37.95	39.14	44.81	39.56	45.35	41.75	Gravimetric- CPCB - Method (Vol.I,May-2011)
Sulphur Dioxide as SO ₂	µg/m ³	12.52	12.77	16.60	13.20	15.45	14.79	IS:5182(PII):Improved West and Gaeke
Oxides of Nitrogen as NO ₂	µg/m ³	28.26	30.53	30.84	31.95	26.75	31.08	IS:5182(PVI): Jacob & Hochheiser modified (NaOH-NaAsO ₂) Method
Carbon Monoxide as CO	mg/m ³	0.46	0.39	0.51	0.50	0.55	0.67	NDIR Digital Gas Analyzer
Hydrocarbon as CH ₄	mg/m ³	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	SOP: HC: GC/GCMS/Gas analyzer
Benzene as C ₆ H ₆	µg/m ³	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	IS 5182 (Part XI):2006/CPCB Method
NEAR FIRE STATION								
Respirable Particulate Matter (PM ₁₀)	µg/m ³	83.33	83.42	81.68	83.31	78.73	71.31	IS:5182(P23):Gravimetric CPCB - Method (Vol.I,May-2011)
Particulate Matter (PM _{2.5})	µg/m ³	41.91	40.77	42.02	40.98	39.57	34.11	Gravimetric- CPCB - Method (Vol.I,May-2011)
Sulphur Dioxide as SO ₂	µg/m ³	14.53	15.57	16.53	16.89	19.25	15.46	IS:5182(PII):Improved West and Gaeke
Oxides of Nitrogen as NO ₂	µg/m ³	30.95	33.18	31.73	33.57	29.11	31.84	IS:5182(PVI): Jacob & Hochheiser modified (NaOH-NaAsO ₂) Method
Carbon Monoxide as CO	mg/m ³	0.34	0.27	0.28	0.38	0.41	0.51	NDIR Digital Gas Analyzer
Hydrocarbon as CH ₄	mg/m ³	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	SOP: HC: GC/GCMS/Gas analyzer
Benzene as C ₆ H ₆	µg/m ³	BDL*	BDL*	BDL*	BDL*	BDL*	2.32	IS 5182 (Part XI):2006/CPCB Method
PUB /ADANI HOUSE								
Respirable Particulate Matter (PM ₁₀)	µg/m ³	71.81	72.95	80.57	67.28	70.98	68.38	IS:5182(P23):Gravimetric CPCB - Method (Vol.I,May-2011)
Particulate Matter (PM _{2.5})	µg/m ³	34.12	37.13	41.44	31.52	33.93	34.21	Gravimetric- CPCB - Method (Vol.I,May-2011)
Sulphur Dioxide as SO ₂	µg/m ³	12.78	12.82	12.02	12.12	12.59	12.35	IS:5182(PII):Improved West and Gaeke
Oxides of Nitrogen as NO ₂	µg/m ³	29.02	31.31	23.12	30.17	27.18	30.31	IS:5182(PVI): Jacob & Hochheiser modified (NaOH-NaAsO ₂) Method
Carbon Monoxide as CO	mg/m ³	0.35	0.39	0.41	0.64	0.60	0.77	NDIR Digital Gas Analyzer
Hydrocarbon as CH ₄	mg/m ³	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	SOP: HC: GC/GCMS/Gas analyzer
Benzene as C ₆ H ₆	µg/m ³	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	IS 5182 (Part XI):2006/CPCB Method



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RESULT OF AMBIENT AIR QUALITY MONITORING

Location & Parameter	Unit	Oct- 15	Nov-15	Dec-15	Jan-16	Feb-16	March-16	Test Method
AIR STRIP								
Respirable Particulate Matter (PM ₁₀)	µg/m ³	67.92	77.19	75.31	67.92	72.08	72.15	IS:5182(P23):Gravimetric CPCB - Method (Vol.I,May-2011)
Particulate Matter (PM _{2.5})	µg/m ³	34.52	36.13	34.53	34.52	34.94	34.57	Gravimetric- CPCB - Method (Vol.I,May-2011)
Sulphur Dioxide as SO ₂	µg/m ³	13.65	12.67	13.92	13.65	14.15	10.57	IS:5182(PII):Improved West and Gaeke
Oxides of Nitrogen as NO ₂	µg/m ³	29.43	22.45	27.20	29.43	31.75	24.49	IS:5182(PVI): Jacob & Hochheiser modified (NaOH-NaAsO ₂) Method
Carbon Monoxide as CO	mg/m ³	0.36	0.21	0.29	0.36	0.31	0.34	NDIR Digital Gas Analyzer
Hydrocarbon as CH ₄	mg/m ³	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	SOP: HC: GC/GCMS/Gas analyzer
Benzene as C ₆ H ₆	µg/m ³	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	IS 5182 (Part XI):2006/CPCB Method
NEAR SHANTIVAN COLONY'S STP								
Respirable Particulate Matter (PM ₁₀)	µg/m ³	66.57	68.29	68.41	75.72	71.88	72.86	IS:5182(P23):Gravimetric CPCB - Method (Vol.I,May-2011)
Particulate Matter (PM _{2.5})	µg/m ³	34.04	31.99	32.98	36.20	34.10	35.07	Gravimetric- CPCB - Method (Vol.I,May-2011)
Sulphur Dioxide as SO ₂	µg/m ³	13.80	13.15	15.02	13.53	14.93	15.46	IS:5182(PII):Improved West and Gaeke
Oxides of Nitrogen as NO ₂	µg/m ³	26.47	28.38	31.06	29.78	31.00	28.93	IS:5182(PVI): Jacob & Hochheiser modified (NaOH-NaAsO ₂) Method

Note: Monthly average is calculated from result of 24 hourly & twice in a week monitoring.



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RESULT OF STACK MONITORING

SR. NO.	TEST PARAMETERS	Unit	Std. Limit	Thermic Fluid Heater (Bitumen)	Hot Water System-1 (Liquid Terminal)	*Hot Water System-2 (Liquid Terminal)	Test Method
Oct- 2015							
1	Particulate Matter	mg/Nm ³	150	#	23.52	32.39	IS:11255 (Part-I):1985
2	Sulfur dioxide	ppm	100	#	7.68	3.73	IS:11255 (Part-II):1985
3	Oxides of Nitrogen	ppm	50	#	31.36	36.03	IS:11255 (Part-VII):2005
Nov-2015							
1	Particulate Matter	mg/Nm ³	150	30.22	36.80	25.46	IS:11255 (Part-I):1985
2	Sulfur dioxide	ppm	100	4.35	5.77	6.41	IS:11255 (Part-II):1985
3	Oxides of Nitrogen	ppm	50	33.07	35.42	31.61	IS:11255 (Part-VII):2005
Dec-2015							
1	Particulate Matter	mg/Nm ³	150	18.24	29.53	24.51	IS:11255 (Part-I):1985
2	Sulfur dioxide	ppm	100	3.27	8.58	7.93	IS:11255 (Part-II):1985
3	Oxides of Nitrogen	ppm	50	32.34	39.07	35.57	IS:11255 (Part-VII):2005
Jan-2016							
1	Particulate Matter	mg/Nm ³	150	23.53	18.48	19.49	IS:11255 (Part-I):1985
2	Sulfur dioxide	ppm	100	4.55	6.82	9.62	IS:11255 (Part-II):1985
3	Oxides of Nitrogen	ppm	50	28.90	33.97	39.17	IS:11255 (Part-VII):2005
Feb-2016							
1	Particulate Matter	mg/Nm ³	150	19.52	15.55	26.83	IS:11255 (Part-I):1985
2	Sulfur dioxide	ppm	100	5.69	8.37	7.30	IS:11255 (Part-II):1985
3	Oxides of Nitrogen	ppm	50	34.50	30.64	25.66	IS:11255 (Part-VII):2005
March-2016							
1	Particulate Matter	mg/Nm ³	150	15.75	12.82	20.76	IS:11255 (Part-I):1985
2	Sulfur dioxide	ppm	100	3.49	6.82	4.73	IS:11255 (Part-II):1985
3	Oxides of Nitrogen	ppm	50	29.32	38.65	33.23	IS:11255 (Part-VII):2005

Monitoring was not done. Stack was under maintenance.

*Below detection limit

Results on 11 % O₂ Correction when Oxygen is greater than 11 %.



H. T. Shah
Lab Manager




Dr. Arun Bajpai
Lab Manager (Q)

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

RESULT OF DG STACK MONITORING

October- 2015								
		D.G. Set-1 (500 KVA)	D.G. Set-2 (500 KVA)	D.G. Set-3 (500 KVA)	D.G. Set-4 (500 KVA)	D.G. Set-5(500 KVA)	D.G. Set-6, 7 & 8 (1250 KVA, each)	
TEST PARAMETER	UNIT	09/10/2015	09/10/2015	09/10/2015	09/10/2015	10/10/2015	06/10/2015	METHOD OF MEASUREMENT
Particulate Matter	mg/Nm ³	22.81	27.50	39.50	19.53	17.62	42.41	IS:11255 (Part-I):1985
Sulphur Dioxide	ppm	7.59	4.51	5.60	7.46	8.67	4.38	IS:11255 (Part-II):1985
Oxide of Nitrogen	ppm	34.53	37.60	30.41	39.38	33.55	36.49	IS:11255 (Part-VII):2005
January- 2016								
		D.G. Set-1 (500 KVA)	D.G. Set-2 (500 KVA)	D.G. Set-3 (500 KVA)	D.G. Set-4 (500 KVA)	D.G. Set-5(500 KVA)	D.G. Set-6, 7 & 8 (1250 KVA, each)	
TEST PARAMETER	UNIT	16/01/2016	16/01/2016	16/01/2016	16/01/2016	16/01/2016	15/01/2016	METHOD OF MEASUREMENT
Particulate Matter	mg/Nm ³	13.55	22.51	32.53	26.84	24.24	30.62	IS:11255 (Part-I):1985
Sulphur Dioxide	ppm	5.73	6.63	8.47	4.47	6.46	9.52	IS:11255 (Part-II):1985
Oxide of Nitrogen	ppm	39.23	31.36	35.21	33.46	39.77	29.45	IS:11255 (Part-VII):2005

*DG sets are used as standby ,so stack monitoring is done on quarterly basis.Results on 11 % O₂ Correction when Oxygen is greater than 11 % ,

BDL* : Below Detection Limit



H. T. Shah
Lab Manager




Dr. Arun Bajpai
Lab Manager (Q)

**RESULTS OF STACK MONITORING**

SR. NO.	TEST PARAMETERS	Unit	D.G. Set-1* (1500 KVA)	D.G. Set-2* (1500 KVA)	D.G. Set-3* (1500 KVA)	Test Method
			April - 16			
1	Particulate Matter	mg/Nm ³	23.63	34.50	30.71	IS:11255 (Part-I):1985
2	Sulfur dioxide	ppm	7.63	9.59	6.53	IS:11255 (Part-II):1985
3	Oxides of Nitrogen	ppm	38.42	32.44	39.99	IS:11255 (Part-VII):2005

*DG sets are used as standby, so stack monitoring is done on quarterly basis.
Results on 11 % O₂ Correction when Oxygen is greater than 11 %

H. T. Shah
Lab Manager



Dr. Arun Bajpai
Lab Manager (Q)

RESULTS OF NOISE LEVEL MONITORING

RESULTS OF NOISE LEVEL MONITORING [DAY TIME]

Noise level in dB (A) Leq - Average								Limits in dB (A) Leq
Sr. No.	Location Name	Oct- 15	Nov-15	Dec-15	Jan-16	Feb-16	March-16	
1	T1 Terminal	55.4	67.6	67.3	67.5	65.6	64.6	75 dB (A) Leq
2	Near Fire Station	63.9	59.3	69.1	61.9	61.2	66.8	
3	PUB/Adani House	63.7	61.0	65.9	62.1	62.7	64.9	
4	Airstrip	54.5	49.6	61.5	46.4	46.3	44.4	
5	Near Shantivan STP	60.4	62.5	62.4	59.6	59.4	63.5	

RESULTS OF NOISE LEVEL MONITORING [NIGHT TIME]

Noise level in dB (A) Leq - Average								Limits in dB (A) Leq
Sr. No.	Location Name	Oct- 15	Nov-15	Dec-15	Jan-16	Feb-16	March-16	
1	T1 Terminal	51.7	61.1	56.1	62.5	60.7	62.2	70 dB (A) Leq
2	Near Fire Station	59.1	57.7	56.3	57.7	55.6	64.7	
3	PUB/Adani House	59.0	55.3	54.5	53.8	54.2	58.8	
4	Airstrip	51.4	44.3	48.1	45.4	45.7	37.0	
5	Near Shantivan STP	58.2	59.0	55.3	53.9	54.8	55.9	



H. T. Shah
Lab Manager




Dr. Arun Bajpai
Lab Manager (Q)

RESULTS OF NOISE LEVEL MONITORING

Result of Noise level monitoring [Day Time]

SR. NO.	Name of Location	CT-3 DG HOUSE					
		Result [Leq dB(A)]					
	Sampling Date & Time	April-16	May-16	June-16	July-16	August-16	September-16
1	6:00-7:00	58.4	69.4	60.8	63.1	58.6	62.4
2	7:00-8:00	57.0	72.4	63.4	61.4	62.4	68.7
3	8:00-9:00	63.4	71.4	68.4	62.4	60.2	65.4
4	9:00-10:00	65.4	68.4	70.8	62.8	65.4	70.4
5	10:00-11:00	61.7	65.2	69.8	65.9	70.2	70.9
6	11:00-12:00	66.8	72.4	73.4	63.4	65.5	68.4
7	12:00-13:00	61.1	70.4	71.4	66.5	67.2	66.3
8	13:00-14:00	63.4	74.1	68.1	63.4	69.7	65.4
9	14:00-15:00	64.8	70.1	63.4	69.4	69.8	63.4
10	15:00-16:00	68.7	71.4	65.8	69.1	64.2	65.4
11	16:00-17:00	65.4	70.5	68.1	70.5	64.2	62.8
12	17:00-18:00	69.8	68.4	62.4	70.8	67.2	68.7
13	18:00-19:00	67.1	65.4	64.8	66.4	63.2	66.9
14	19:00-20:00	63.4	62.4	63.4	64.2	63.4	68.4
15	20:00-21:00	62.7	65.7	68.1	62.8	65.4	64.5
16	21:00-22:00	65.1	67.1	65.9	62.4	62.1	62.1
Day Time Limit*		75 Leq dB(A)					

Result of Noise level monitoring [Night Time]

SR. NO.	Name of Location	CT-3 DG HOUSE					
		Result [Leq dB(A)]					
	Sampling Date & Time	April-16	May-16	June-16	July-16	August-16	September-16
1	22:00-23:00	63.1	68.4	67.1	63.1	65.4	62.8
2	23:00-00:00	61.4	65.2	62.5	60.4	60.2	62.4
3	00:00-01:00	65.1	62.7	65.8	58.7	63.5	65.4
4	01:00-02:00	62.4	67.8	68.4	60.4	69.4	68.7
5	02:00-03:00	68.4	69.1	63.4	60.7	65.4	61.4
6	03:00-04:00	63.4	69.8	61.0	59.8	58.2	65.4
7	04:00-05:00	69.4	68.1	65.3	62.7	59.4	64.1
8	05:00-06:00	63.4	65.8	63.8	60.7	62.4	61.8
Night Time Limit*		70 Leq dB(A)					


H. T. Shah
Lab Manager




Dr. Arun Bajpai
Lab Manager (Q)

MINIMUM DETECTION LIMIT [MDL]

Water parameter(mg/L)		
Sr. No.	Test parameter	MDL
1	Total Suspended Solids	1
2	Oil & Grease	1
3	BOD	10
4	COD	5
5	Total Dissolved Solids	3
6	Sulphate	0.3
7	Ammonical Nitrogen	0.05
8	Nickel	0.01
9	Phenolic Compound	0.001
10	Fluoride	0.01
11	Copper	0.013
12	Sulphide	0.01
13	Cyanide	0.0001
14	Residual Chlorine	0.1
15	Boron	0.02
16	Insecticides/Pesticides	0.01
17	Nitrate Nitrogen	0.15
18	Phosphorous	0.15
19	Petroleum Hydrocarbon	0.01
20	Lead	0.005
21	Mercury	0.0005
22	Zinc	0.022
23	Cadmium	0.001
24	Arsenic	0.00015
Sediment parameter(mg/kg)		
1	Petroleum Hydrocarbon	0.2

Stack parameter		
Sr. No.	Test parameter	MDL
1	Particulate Matter (mg/Nm ³)	10
2	Sulphur Dioxide(ppm)	1.52
3	Oxides of Nitrogen (ppm)	2.65

Ambient Air Parameter		
1	Particulate Matter (PM ₁₀)	10
2	Particulate Matter (PM 2.5)	10
3	Sulphur Dioxide (SO ₂) (µg/m ³)	5
4	Oxides of Nitrogen (NO ₂) (µg/m ³)	5
5	Benzene as C ₆ H ₆ (µg/m ³)	2
6	Carbon Monoxide as CO (mg/m ³)	0.1
7	Hydrocarbon as CH ₄ (mg/m ³)	0.15
8	Hydrogen Sulphide (H ₂ S) (µg/m ³)	6



H. T. Shah
Lab Manager




Dr. Arun Bajpai
Lab Manager (Q)

	Adani Ports and Special Economic Zone Limited, Mundra.	From : April,16 To : September,16
Status of the conditions stipulated in Environment and CRZ Clearance		

ANNEXURE – 2

LOCATION	Total Green Zone Detail Till Up to Sep-2016				
	Area (In Ha.)	Trees (Nos.)	Palm (Nos.)	Shrubs (SQM)	Lawn (SQM)
SVC COLONY	59.991	27939.00	6965.00	49380.00	80069.00
PORT & NON SEZ	71.962	124946.00	18613.00	62986.78	58455.18
SEZ	86.715	137285.00	14224.00	214389.60	19627.03
MITAP	2.475	8168.00	33.00	1670.00	4036.00
WEST PORT	81.342	181827.00	50221.00	24112.00	22854.15
AGRO- PARK	7.523	17244.00	1332.00	5400.00	2121.44
SOUTH PORT	14.078	25150.00	3430.00	3882.00	4826.97
Samundra Township	36.083	29459.00	10505.00	20370.15	35071.67
Productive Farming (Vadala Foder)	15.690	19336.00	0.00	0.00	0.00
TOTAL (APSEZL)	375.86	571354.00	105323.00	382190.53	227061.44
		676677.00			

Mangrove Afforestation Detail

S. NO.	Location	FY	Area (Hectare)	Clearance Reference	Plantation/Gap Filling	Species
A.1	Mundra Port Area (Mundra, Kutch)		24.00	Environment Clearance - Mundra (J-16011/13/95-IA.III dated 25 August 1995)	Plantation	Avicennia marina
Total Plantation			24.00			
B.1	Mundra Port Area (Mundra, Kutch)		25.00	Environment Clearace - Mundra (J-16011/30/2003-IA.III dated 21 July 2004)	Plantation	Avicennia marina
Total Plantation			25.00			
C.1	Luni/Hamiramora (Mundra, Kutch)	2007-08	40.00	CRZ Recommendation - Mundra (Env-10-2005-222-P dated 12 October, 2006)	Plantation	Avicennia marina Rhizophora mucronata Ceriops tagal
C.2		2009-10	10.00		Gap Filling Work	
C.3		2010-11	10.00		Gap Filling Work	
C.4		2011-12	95.40		Plantation	
C.5		2012-13	25.40		Plantation	
C.6		2013-14-15	70.00		Gap Filling Work	
Total Plantation (C.1+C.4+C.5)			160.80			
D.1	Kukadsar (Mundra, Kutch)	2012-13	66.50	CRZ Recommendation - Mundra (Env-10-2005-222-P dated 12 October, 2006)	Plantation	Avicennia marina
D.2		2013-14	10.00		Gap Filling Work	Avicennia marina
Total Plantation (D.1)			66.50			
E.1	Forest Area (Mundra)	2011-12	50.00	Forest Clearance - Mundra (F.No. 8-2/1999-FC (pt) dated 27 February 2009)	Plantation	Avicennia marina
E.2		2012-13	248.00		Plantation	Avicennia marina
Total Plantation (E.1+E.2)			298.00			

S. NO.	Location	FY	Area (Hectare)	Clearance Reference	Plantation/Gap Filling	Species
F.1	Jangi village (Bhachau, Kutch)	2012-13	50.00	CRZ Recommendation - Mundra (Env-10-2005-222-P dated 12 October, 2006)	Plantation	Avicennia marina
F.2		2013-14	20.00		Gap Filling Work	Avicennia marina
Total Plantation (F.1)			50.00			
G.1	Jakhau Village (Abdasa, Kutch)	2007-08	40.10	CRZ Recommendation - Mundra (Env-10-2005-222-P dated 12 October, 2006)	Plantation	Avicennia marina Rhizophora mucronata Ceriops tagal
G.2		2008-09	10.00		Gap Filling Work	
G.3		2009-10	10.00		Gap Filling Work	
G.4		2011-12	50.00	Environment Clearance - Dahej (11-37/2007-IA-III dtd 11 November, 2008)	Plantation	
G.5		2013-14	20.00		Gap Filling Work	
G.6		2012-13	30.00		Gap Filling Work	
G.7		2012-13	20.50	CRZ Recommendation - Mundra (Env-10-2005-222-P dated 12 October, 2006)	Plantation	
G.8		2012-13	200.00	Environment Clearance - Mundra (10-47/2008-IA.III dtd. 12th Jan,2009)	Plantation	
G.9		2013-14-15	50.00		Gap Filling Work	
Total Plantation (G.1 + G.4 + G.7 + G.8)			310.60			
H.1	Sat Saida Bet (Kutch)	2014-15	250.00	Commitment with KPT for 250 Ha. - Tuna (By undertaking dated 3 June, 2013)	Plantation	Avicennia marina
H.2	Sat Saida Bet (Kutch)	2016-17	5.00	Commitment with KPT for 5 Ha. Bio-Diversity- Tuna.	In Progress.	Bio Diversity (Three Var.)
H.3	AKBTPL, Tuna Area	2016-17	30.00		Gap Filling Work-In Progress	Avicennia marina
Total Plantation			255.00			

S. NO.	Location	FY	Area (Hectare)	Clearance Reference	Plantation/Gap Filling	Species
I.1	Village Dandi (Navsari)	2006-07	200.00	CRZ Recommendation - Mundra (Env-10-2005-222-P dated 12 October, 2006)	Plantation	Avicennia marina Rhizophora mucronata Ceriops tagal
I.2		2007-08	100.00		Plantation	
I.3		2007-08	100.00	Environment Clearance - Dahej (11-37/2007-IA-III dtd 11 November, 2008)	Plantation	
I.4		2008-09	200.00	CRZ Recommendation - Mundra (Env-10-2005-222-P dated 12 October, 2006)	Plantation	
I.5		2010-11	200.00		Plantation	
Total Plantation (I.1 + I.2 + I.3 + I.4 + I.5)			800.00			
J.1	Village Talaza (Bhavnagar)	2011-12	50.00	Environment Clearance - Dahej (11-37/2007-IA-III dtd 11 November, 2008)	Plantation	Avicennia marina
J.2	Village Narmada (Bhavnagar)	2014-2015	250.00	CRZ Recommendation - Mundra (Env-10-2005-222-P dated 12 October, 2006)	Plantation	Avicennia marina
Total Plantation (J.1 + J.2)			300.00			
K.1	Village Malpur (Bharuch)	2012-13-14	200.00	CRZ Recommendation - Dahej ENV-10-2006-71-P dtd 29th May, 2007	Plantation	Avicennia marina
K.2	Village Kantiyajal (Bharuch)	2014-15	50.00	CRZ Recommendation - Hazira ENV-10-2012-30-E dtd 11th May,2012	Plantation	Avicennia marina
K.3	Village Devla Bharuch	2014-15	50.00		Plantation	Avicennia marina
K.4	Village Devla Bharuch	2015-16	100.00		Plantation	Avicennia marina
Total Plantation (K.1 + K.2 + K.3 + K.4)			400.00			
L.1	Village Tada Talav (Khambat, Anand)	2015-16	100.00	Environment and CRZ clearance - Mundra SEZ (10-138/2008/IA.III dated 15 July 2014)	Plantation	Avicennia marina
L.2	Village Tada Talav (Khambat, Anand)	2015-16	100.00		Plantation	Avicennia marina
Total Plantation (L.1 + L.2)			200.00			
G. Total (Plantation+ Gapfilling)			2889.90			

PHOTOGRAPHS SHOWING GREEN BELT AREA WITHIN APSEZ

❖ Within Adani Ports & SEZ





❖ Within Residential Township



❖ Within AMSIPL Premises









	Adani Ports and Special Economic Zone Limited, Mundra.	From : April,16 To : September,16
Status of the conditions stipulated in Environment and CRZ Clearance		

ANNEXURE – 3

Forwarding & Undertaking Letter from Industry

Application for consent for establishing / operation the industrial plant / plants under Section 21 of the Air (prevention & Control of Pollution) Act, 1981

Important This Document or its copy does "NOT" serve as a Supporting Document Proof of Industry's Submission of an
Note : Application for a NOC / Consent. This Letter does "NOT" ensure that the Application FEES has been paid.

Application Purpose : APSEZL is applying for CC&A-Renewal along with amendment in addition of few hazardous waste category and change in hazardous waste disposal mode of few category.

From : Adani Ports & Special Economic Zone Ltd., Category: RED / LARGE
PLOT NO: 169/P,
at-navinal island, mundra, kutch,
Mundra - 370421
Contact Person: Mr. Shailesh Parmar, Mob:9099002003, Ph:02838255187
DIST: Kutch East, TAL: Mundra, SIDC: MPSEZ

Print Date: 18/11/2016

PCB-ID : 17739
INWARD : 113691
Dt:22/09/2016

Scrutinized By: M. G. Barad, DEE(380)

To,
The Member Secretary,
Gujarat Pollution Control Board
Paryavaran Bhavan, Sector-10/A,
Gandhinagar - 382010

I / We here by Submitting application for CCA ,Inward No : 113691 ,Date : 22/09/2016 for COW(CCA-Renewal).

Applying For : A,W,H **Validity :** 5 Years **Grant By :** CHR

Air Sector : 10000~Large Scale Industry **Water Consumption :** 1634.110 klpd

Haz Sector : 5000~Large & Medium Scale **No of Plants :** 1 **Incenerator :** 0

<u>Investment</u>	<u>Air</u>	<u>Water</u>	<u>Hazardous</u>
3354.121 Crs	10000	20000	5000+10000
0 Rs	5 Years	5 Years	5 Years

Payable Fees : Air : 50000, Water : 100000, Haz : 75000

Paid Amount : 225000, DD No : HAXC4902778313, Dt: 11/17/2016, at AXC , ***

Query / Reply:

(1) Details of ww treatment of each ETP units with capacity (2) CCA compliance report is not opening, re-upload it (3) upload ltr of Recycling solutions (p) ltd for acceptance of various haz waste with name & quantity (4) upload detailed CR of CRZ clearance of 12.1.09 in detail & EC dated 14.7.2015 (5) source of water & its permission with quantity [02/10/2016-380]-Ok....(1) Upload RSPL letter as per quantity and category mentioned in your letter dated 3.9.2016 submitted to this office for 3 category, not common of 150 t for all (2) CR of EC dated 14.7.2015 and CR of CRZ dated 12.1.2009 is not uploaded in 000.pdf. please upload accordingly..... [14/10/2016-380]-OK...Please update ALL Haz waste categories alongwith adequate disposal mode of each category in Haz waste form [01/11/2016-380]-OK....Considering uploaded documents, your online application is accepted conditionally for paying necessary fees through online, submission of Hard copies and its verification of all uploaded relevant documents for CCA Renewal application [16/11/2016-380] *** Reply: We have1. Uploaded ETP details with each units and capacity in Tag c.ETP PDF.2. Re-uploaded CC&A Compliance Report in Tag u.CMP PDF.3. Uploaded letter of RSPL for acceptance of various hazardous waste in Tag d.MEM PDF.4. Uploaded EC/CRZ clearance dated 12.01.2009 in Tag 0.000 PDF.5. Uploaded source of water & its permission letter with quantity in tag gwa.GWA PDF. [03/10/2016]-While uploading CC&A Compliance report in Tag u.CMP, error found. Hence we have uploaded the same in Tag 0.000 PDF. [03/10/2016]-We have uploaded1. Waste Acceptance letter from RSPL regarding saparet waste quantity has been uploaded in Tag d.MEM PDF.2. EC / CRZ Clearance dated 15.07.2014 and 12.01.2009 compliance report has been uploaded in Tag 0.000 PDF. [18/10/2016]-We have updated all the hazardous waste category along with adequate disposal mode. [04/11/2016]-Ok we will pay the fees through online net banking and submit the hard copy of the application to the Regional Office. [17/11/2016]

Received
Gujarat Pollution Control Board
Regional Office
Kutch (East)
23-11-2016

Company's SEAL

1 (Through XGN)

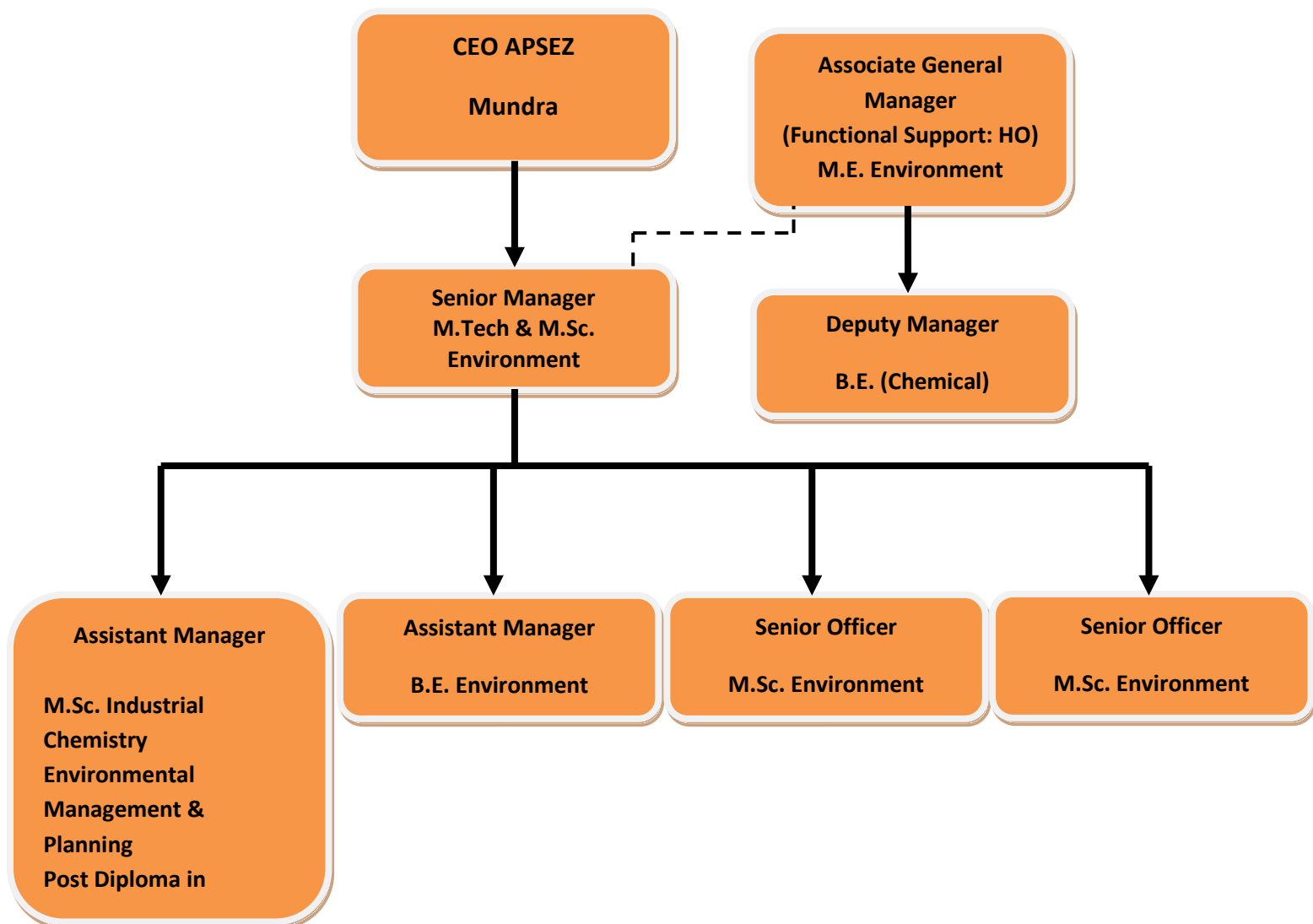
N I C

	Adani Ports and Special Economic Zone Limited, Mundra.	From : April,16 To : September,16
Status of the conditions stipulated in Environment and CRZ Clearance		

ANNEXURE – 4

Annexure – 4

Organogram of Environment Management Cell, APSEZ, Mundra



	Adani Ports and Special Economic Zone Limited, Mundra.	From : April,16 To : September,16
Status of the conditions stipulated in Environment and CRZ Clearance		

ANNEXURE – 5

ENVIRONMENTAL PROTECTION EXPENDITURES (April'16 to September'16)		
Sr. No.	Activity/ Category	Expenditure (INR) in Lacs
1.	Environmental Study / Audit and Consultancy	158.14
2.	Legal & Statutory Expenses	7.39
3.	Environmental Monitoring Services	15.48
4.	Hazardous Waste Management & Disposal	7.50
5.	Environment Day Celebration	6.54
6.	Treatment and Disposal of Bio-Medical Waste	0.69
7.	Mangrove Plantation	30.00
8.	Mangrove Monitoring & Conservation	20.26
9.	Horticulture Expenses	498.00
10.	O&M of Sewage Treatment Plant and Effluent Treatment Plant (including STP, ETP of Port & SEZ & Common Effluent Treatment Plant)	41.43
11.	Expenditure of Environment Dept. (Apart from above head)	112.47
Total Environmental Expenditures in Rs. (INR)		897.9

	Adani Ports and Special Economic Zone Limited, Mundra.	From : April,16 To : September,16
Status of the conditions stipulated in Environment and CRZ Clearance		

ANNEXURE – 6



Glimpse of Skill Development Initiatives by Adani Foundation

Adani Skill Development Center: Mundra

Along with computer related trainings, Stitching and Bagging training, Beauty Parlor and Mobile Repairing Training are also in full fledge at Nana Kapaya, Adani Ports, Zarpara and Mundra

Course wise status, 1st April 2016 to 30th September 2016					
Soft Skill training					
Sr. No.	Course Name	Location	Male	Female	No.of students
1	IT Basic Computer	ASDC Mundra	10	1	11
2	IT Basic Computer	ASDC Mundra	6	3	9
3	Tally Erp9.	ASDC Mundra	4	2	6
4	IT Basic Computer	ASDC Mundra	2	2	4
5	Vocation Training	Zarpara Gov.High School	59	36	95
6	Basic Computer-RTG student	ASDC Mundra	16	0	16
7	Basic Computer-RTG student	ASDC Mundra	8	0	8
		Total - A	105	44	149
Technical Training					
1	Mobile Repairing	ASDC Mundra	12	0	12
2	Stitching & Bagging Machine Operator	APSEZ	7	0	7
3	Beauty Parlour	Nana Kapaya	0	24	24
4	Beauty Parlour	ASDC Mundra	0	21	21
5	Checker Cum RTG Crane Operator	APSEZ	14	0	14
6	Tailoring	ASDC Mundra	0	18	18
7	Tailoring	ASDC Mundra	0	13	13
		Total - B	33	76	109
		Grand Total A + B =	138	120	258

Adani Skill Development Center: Mundra

