Petronet LNG Limited

GIDC Industrial Estate, Plot No. 7/A, Dahej,
Taluka : Vagra, Dist. Bharuch (Gujarat) - 392130 (India)
Tel. : 02641-300345 / 300405, Fax : 02641-300310 / 300306
www.petronetlng.com
CIN: L74899DL 1998PLC093073
GST No. : 24AAACP8148D1ZM

REF: PLL/DHJ/HSE/MoEF/2022/05

Date: 23rd July, 2022

To,
The Director (Environment)
Forests & Environment Department,
Government of Gujarat,
Block No. 14, 8th Floor, Sachivalaya,
Gandhinagar – 382 010

Subject: Half-yearly Compliance Report with respect to conditions stipulated by Ministry of Environment & Forests, Govt. of India and Department of Forests, Govt. of Gujarat for Installation of Terminal facilities to handle additional 10 MMTPA of LNG (Phase IIIA & Phase IIIB) at PLL Dahej, Gujarat by Petronet LNG Limited, Gujarat as on 30th June, 2022.

Ref : (a) F. No. 11-63/2011-IA-III Dated 26th February, 2014
(b) ENV-10-2013-71-E Dated 13th January, 2014
(c) F. No. 11-63/2011-IA-III Dated 04th Dec, 2020

Dear Sir,

The half yearly compliance report as on 30th June, 2022 with respect to conditions stipulated by Ministry of Environment & Forests, Govt. of India and Department of Forests, Govt. of Gujarat for Installation of Terminal facilities to handle additional 10 MMTPA of LNG (Phase IIIA & Phase IIIB) at Petronet LNG Limited, Gujarat is enclosed.

Thanking you,
Yours faithfully,
For Petronet LNG Limited

S B Singh
ED (Plant Head)

Encl.: As above

Copy to:-

Director,
Ministry of Env., Forest and Climate Change
Indira Paryavaran Bhawan,
Jorbagh Road,
New Delhi – 110 003

MoEF& CC
Integrated Regional office
Room No 407& 409
Sector 10A
A Wing Aranya Bhawan
Gandhinagar-382010

Unit Head - Bharuch Division
Gujarat Pollution Control Board
Paryavaran Bhavan, Sector-10 A
GANDHINAGAR – 382 010 (Gujarat)

Regional Officer
Gujarat Pollution Control Board
C-1\119\3, GIDC, Phase – 2 , Narmadanagar
Bharuch – 392015 (Gujarat)

HALF YEARLY COMPLIANCE REPORT TO (FOR THE PERIOD JAN 22 TO JUNE 22)
THE CONDITION MENTIONED IN MOE&F LETTER NO. F.No.11-63/2011-IA-III,
DATED: 26th February, 2014

&

LETTER NO. F.No.11-63/2011-IA-III DATED 04TH December 2020

(For Phase III Expansion) AS ON 30.06.2022

Point-wise compliance statement for the subject environmental clearance is as below:

	CONDITIONS	STATUS
7.	**Special Conditions:**	
i)	"Consent for Establishment" shall be obtained from State Pollution Control Board under Air and Water Act and a copy shall be submitted to the Ministry before start of any construction work at the site.	Complied. "Consent for Establishment" was obtained from GPCB vide their letter no. GPCB/BRCH/B-CCA611(2)/ ID-15479/222771 Dated 21.08.2014 and provisional order obtained for validity extension.
ii)	All the recommendations and conditions stipulated by the Gujarat Coastal Zone Management Authority vide letter no. ENV-10-2013-71-E dated 13.01.2014, shall be strictly complied with.	Complied and detail of compliance attach as Annexure-I.
iii)	The facility shall be constructed in accordance with the NFPA 59 A- Standard for the Production, storage and handling of liquefied Natural gas, OISD-194- Standard for Storage and handling of LNG, EN 1473 - Installation and equipment for LNG - Design of onshore installations and M.B.Lal Committee report.	Complied. The facilities designed and constructed as per NFPA59A, OISD 194,EN1473 and M B lal committee recommendation are incorporated. Attached Annexure IV Engineering design basis document for your reference The construction and commissioning of the Phase-IIIA facilities at Dahej completed and is operational since October, 2016 and Phase-IIIB1 Regasification facility at Dahej completed and is operational since June, 2019.
iv)	Precautionary measures shall be put in place to prevent leakage of LNG due to any disasters including tidal/ tsunami wave, seismic and other natural calamities. Disaster Management Plan shall put in place to manage emergencies.	Complied. The terminal is designed considering all the specified factors for safe operations. Existing Disaster Management Plan is updated accordingly. ERDMP plan is approved from DMI, Bhopal and valid

		till 29.12.2022 Attached Annexure V for DMI ERDMP certificate for your reference.
v)	Oil Spill Contingency Management Plan shall be put in place.	Complied. Oil spill contingency plan, is available.
vi)	Online sensor for load monitoring shall be provided, as committed.	Complied. Online stack monitoring instrument are installed for gas turbine stacks.
vii)	Temperature sensors, gas detectors, spill detectors shall be installed to take care of any type of spillage or leakage of the gas from the plant and the trucks.	Complied. These sensors placed as per design and as per F & G Mapping study for instant detection of any leakage in Phase-IIIA & Phase-IIIB1 Regasification Project. Attached Annexure VI F&G Study report Index page for your reference.
viii)	Project proponent shall explore training the local population with the help of training institutes like ITI etc, to make them suitable for employment in the facility.	Complied Petronet is working continuously for skill development of local people. PLL has recruited fair number of local people. For ancillary and support functions as security services, fire fighting and green belt maintenance etc. PLL is giving preference to local people.
ix)	All the recommendation of the EMP, Risk Assessment and Disaster Management Plan shall be complied within letter and spirit. All the mitigation measures submitted in the EMP/DMP report shall be prepared in a matrix format and the compliance for each mitigation plan shall be submitted to MOEF along with half yearly compliance report to MoEF-RO.	Complied ERDMP plan is updated and include Phase III expansion. All the recommendation of DMI, Bhopal are incorporated. ERDMP plan is approved from DMI, Bhopal and valid till 29.12.2022. Attached Annexure V for DMI ERDMP certificate for your reference.
x)	A separate Environment Monitoring Cell shall be set up especially for this plant and details shall be submitted to the Ministry prior to the commencement of operation.	Complied Environment Monitoring Cell is already set up in the existing plant and is being used for Environment Monitoring of expansion project and a brief report is being submitted to MoEF on half yearly basis. Detailed organogram of EMC is attached as Annexure-XII for your reference.

xi)	Construction activity shall be carried out strictly as per the provisions of CRZ Notification, 2011. No construction work other than those permitted in Coastal Regulation Zone Notification shall be carried out in Coastal Regulation Zone area.	Complied Construction activities was done as per CRZ Notification 2011. The construction and commissioning of the Phase-IIIA facilities at Dahej completed and is operational since October, 2016 and Phase-IIIB1 Regasification facility at Dahej completed and is operational since June, 2019.
xii)	No construction work other than those permitted in Costal Regulation Zone Notification shall be carried out in Coastal Regulation Zone area.	Complied CRZ Notification followed during construction phase however The construction and commissioning of the Phase-IIIA facilities at Dahej completed and is operational since October, 2016 and Phase-IIIB1 Regasification facility at Dahej completed and is operational since June, 2019.
xiii)	The project proponent shall set up separate environmental management cell for effective implementation of the stipulated environmental safeguards under the supervision of a Senior Executive.	Complied EMC is already setup in the company and it will be used for Environment Monitoring of expansion project. Detailed organogram of EMC is attached as Annexure-XII for your reference.
xiv)	The funds earmarked for environment management plan shall be included in the budget and this shall not be diverted for any other purposes.	Complied Funds earmarked for environment management plan is included in budget and being monitored regularly.
8.	**<u>General conditions:</u>**	
i)	Appropriate measures must be taken while undertaking digging activities to avoid any likely degradation of water quality.	Complied No digging activity effected the ground water quality during the construction. Ground water samples are taken and being monitors regularly.
ii)	Full support shall be extended to the officers of this Ministry/Regional Office at Bhopal by the project proponent during inspection of the project for monitoring purposes by furnishing full details and action plan including action taken reports in respect of mitigation measures and other environmental protection activities.	Complied Entry of GPCB and all government bodies are taken care for any inspection and all required information submitted as and when visited.

iii)	A Six-Monthly monitoring report shall need to be submitted by the project proponents to the Regional Office of this Ministry at Bhopal regarding the implementation of the stipulated conditions.	Complied MoEF & CRZ Half yearly compliance report submitted regularly. Last July 21 to December 2021 compliance report submitted on 22.01.2022.
iv)	Ministry of Environment & Forests or any other competent authority may stipulate any additional conditions or modify the existing ones, if necessary in the interest of environment and the same shall be complied with.	Complied
v)	The Ministry reserves the right to revoke this clearance if any of the conditions stipulated are not complied with the satisfaction of the Ministry.	Agree No Such case till date
vi)	In the event of a change in project profile or change in the implementation agency, a fresh reference shall be made to the Ministry of Environment and Forests.	Complied
vii)	The project proponents shall inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities and the date of start of land development work.	Complied Regional Office as well as the Ministry has been informed about the start of land development works vide our letter no. PLL/DHJ/MoEF/010 Dtd.12th May, 2014.
viii)	A copy of the clearance letter shall be marked to concerned Panchayat/local NGO, if any, from whom any suggestion/ representation has been made received while processing the proposal.	Complied The environment clearance was forwarded to concerned offices. A copy of inwards from such offices was submitted vide our letter no. PLL/DHJ/MoEF/011 Dt.13th May, 2014.
ix)	State Pollution Control Board shall display a copy of the clearance letter at the Regional Office, District Industries Center and Collector's Office/Tehsildar's office for 30 days.	Complied Copy of environment clearance was already forwarded to concerned offices.
9.	These stipulations would be enforced among others under the provisions of Water (Prevention and Control of Pollution) Act 1974, the Air (Prevention and Control of Pollution) Act 1981, the Environment (Protection) Act, 1986, the Public Liability (Insurance) Act, 1991 and EIA Notification 1994, including the amendments and rules made thereafter.	Complied Mention Environment act and Rules are followed. PLI Policy renewed for one year w.e.f 02.06.22. Attached Annexure VIII for PLI policy

10.	All other statutory clearances such as the approvals for storage of diesel from Chief Controller of Explosives, Fire Department, Civil Aviation Department, Forest Conservation Act, 1980 and Wildlife (Protection) Act, 1972 etc. shall be obtained, as applicable by project proponents from the respective competent authorities.	Complied Applicable clearances from following authorities obtained, a copy of same was submitted vide our letter no. PLL/DHJ/MoEF/011 Dt.13th May, 2014: 1. PESO in principle approval obtained vide letter dated 10/10/2012 [PV(WC)S-784/GJ-II] and letter Dt 19/03/2014[PV(WC)S-784/GJ-II]. 2. Forest Dept. Approval obtained vide letter dated 30/10/2013, No.FCA-1013/10-13/11/SF-31-F.
11.	The project proponent shall advertise in at least two local Newspapers widely circulated in the region, one of which shall be in the vernacular language informing that the project has been accorded Environmental and CRZ Clearance and copies of clearance letters are available with the State Pollution Control Board and may also be seen on the website of the Ministry of Environment and Forests at http://www.envfor.nic.in. The advertisement should be made within 10 days from the date of receipt of the Clearance letter and a copy of the same should be forwarded to the Regional office of this Ministry at Bhopal.	Complied A Public Notice was advertized in the local newspapers in English and Gujarati languages. A copy of same was submitted vide our letter no. PLL/DHJ/MoEF/011 Dtd.13th May, 2014. Sandesh Gujarati newspaper dated 07.03.2014 and Times of India English Newspaper dated 07.03.2014 A copy of this notice is already forwarded to RO, Bhopal vide letter PLL/DHJ/MoEF/2014/007 dated 07.03.2014.
12.	This Clearance is subject to final order of the Hon'ble Supreme Court of India in the matter of Goa Foundation Vs. Union of India in Writ Petition (Civil) No.460 of 2004 as may be applicable to this project.	Agree
13.	Any appeal against this clearance shall lie with the National Green Tribunal, if preferred, within a period of 30 days as prescribed under Section 16 of the National Green Tribunal Act, 2010.	Agree No Such case till date
14.	Status of compliance to the various stipulated environmental conditions and environmental safeguards will be uploaded by the project proponent in its website.	Complied Six monthly compliance are uploaded at company website www.petronetlng.com Attached Annexure IX for screen shot of website
15.	A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, Zilla Parisad/ Municipal Corporation, Urban Local Body and the Local NGO, if any, from whom suggestions/	Complied Refer reply to 8 (viii).

	representations, if any, were received while processing the proposal. The clearance letter shall also be put on the website of the company by the proponent.	The Environment and CRZ Clearance is already uploaded at company website www.petronetlng.com.
16.	The proponent shall upload the status of compliance of the stipulated Clearance conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of MoEF, the respective Zonal Office of CPCB and the SPCB	Complied. The Environment and CRZ Clearance compliance status is already uploaded at company website www.petronetlng.com. The monitored reports are regularly sent to MoEF RO, Bhopal with copy to GPCB & CPCB.
17.	The environmental statement for each financial year ending 31st March in Form-V as is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of Clearance conditions and shall also be sent to the respective Regional Offices of MoEF by e-mail.	Complied The Form-V is being updated on company website and sent to MoEF Regional Office by e-mail. Attached Annexure VII for Environment statement
	Condition Mention in LETTER NO. F.No.11-63/2011-IA-III dated 04TH December 2020	
6i	Marine ecological monitoring and its mitigation measures for protection of phytoplankton, zooplanktons, macrobenthos, estuaries, sea grass, algae, sea, weeds, crustacean, fishes mangroves and migratory birds etc. shall be undertaken through a reputed university/institute with financial support as desired. Six monthly report of the studies to be provided to the regional office of MoEFCC.	Complied Marine ecological study conducted in December,2021 by GPCB authorized vendor. Attached Annexure XI for Marine ecological study report.
7	The MoEFCC has considered the proposal based on the recommendation of the Expert Appraisal Committee and hereby decided to accord extension of validty of EC of aforementioned project issued by the Ministry vide letter No -11-63/2011-IA-III dated 26th February 2014 for period of thre years i.e up to 25th February 2024 under the EIA Notification 2006 as amended subject to strict compliance of all conditions specified in the EC letter and in addition to additional condition prescribed by the EAC.	Complied All previous EC conditions are Complied. Half yearly compliance report submitted regularly.

ANNEXURE-I

Compliance to conditions as conveyed by Department of Forests & Environment, Govt. of Gujarat, Letter No. ENV-10-2013-71-E dated 13th January, 2014 as on 30.06.2022

Point-wise compliance statement for the subject environmental clearance is as below:

SR. NO.	CONDITIONS	STATUS
1	The provisions of the CRZ notification of 2011 shall be strictly adhered to by the PLL	Complied CRZ Notification 2011 followed strictly.
2	PLL shall have to comply with all the Standards/norms prescribed by the Central Pollution Control Board for this project	Complied CPCB and GPCB norms are followed Monthly Environment monitoring done through GPCB approved agency and all measured parameters are under the limit. **Attached Annexure II for Environment monitoring data**
3	PLL shall have to revise the Emergency Preparedness plan in close coordination with District Authority prior to Commissioning of expansion project.	Complied ERDMP plan is updated and include Phase III expansion. All the recommendation of DMI, Bhopal are incorporated. ERDMP plan is approved from DMI, Bhopal and valid till 29.12.2022. **Attached Annexure V for DMI ERDMP certificate for your reference.**
4	All the recommendations and suggestions given by the VIMTA LABS in their Comprehensive Environment Management Plan shall be implemented strictly by the PLL	Complied. Company has adopted and followed best Environment Management practices to minimizing the impact on environment. Company has ISO 14001/9001/45001 certificate.

5	The construction debris and sewage generated during the construction phase shall not be discharged into the creek, sea, estuary or into the CRZ area. The debris shall be removed from the construction site immediately after the construction is over and shall be disposed off as per the guidance of the GPCB.	Complied No debris discharged into the creek, sea or into CRZ area during construction phase.
6	The construction camps shall be located outside the CRZ area and the construction labours shall be provided with the necessary amenities, including sanitation, water supply and fuel and it shall be ensured that the environmental conditions are not deteriorated by the construction labours	Complied Construction camp set outside the CRZ area and all required welfare services are provided.
7	The groundwater shall not be tapped to meet with the water requirements during construction or operation phase in any case.	Complied Ground water was not used during the construction phase as well as operation phase.
8	A Disaster Management Plan to meet with any eventualities that may arise during construction and/or operation phase shall be prepared implemented.	Complied ERDMP plan is updated and include Phase III expansion. All the recommendation of DMI, Bhopal are incorporated. ERDMP plan is approved from DMI, Bhopal and valid till 29.12.2022. **Attached Annexure V for DMI ERDMP certificate for your reference.**
9	Necessary permissions/Clearances from different departments/ agencies under different laws/ acts shall be obtained before commencing any enabling activities.	Complied Applicable clearances from following authorities obtained, a copy of same was submitted vide our letter no. PLL/DHJ/MoEF/011 Dt.13th May, 2014: 1. PESO in principle approval obtained vide letter dated 10/10/2012 [PV(WC)S-784/GJ-II] and letter Dt 19/03/2014[PV(WC)S-784/GJ-II]. Forest Dept. Approval obtained vide letter dated

		30/10/2013, No.FCA-1013/10-13/11/SF-31-F.
10	A separate Environmental Cell with qualified personnel shall be created to implement the Environmental Management Plan and a separate budget shall be provided for this purpose.	Complied EMC is already setup in the company and it will be used for Environment Monitoring of expansion project. Detailed organogram of EMC is attached as Annexure-XII for your reference.
11	The cost of the external agency that may be appointed by this department for supervision / monitoring of the project activities during construction/ operational phases shall be borne by the PLL.	Agree PLL agree to born cost of external agency appointed by this department
12	Massive greenbelt development program including the mangrove plantation in 100 ha. shall be carried out in consultation with the Gujarat Ecology Commission/ Forest Department by PLL.	Complied PLL has completed 100 ha. Mangrove Plantation in consultation with Forest Department.
13	A large scale socio-economic upliftment program in consultation with the District Collector/ DDO shall be carried out. A separate budget shall be provided for this purpose and details be furnished to this Department from time to time.	Complied. Please Refer Attached **Annexure III** for detail.
14	Environmental Audit report shall be submitted every year. The report shall also cover the change in the coastal and marine environment enroute the proposed rerouted pipeline and due to commissioning of the proposed activities.	Complied
15	A six monthly progress reports regarding the compliance of the conditions shall be submitted to this department.	Complied.
16	Any additional condition that may be imposed by the Ministry of Environment and Forests, Government of India/This department from time to time shall have to be complied with by the PLL	Complied No such case till date

ANNEXURE - II - ENVIROMENT DATA

AMBIENT AIR QUALITY STATUS REPORT

All units are in $\mu g/m^3$.

Sr.no.	Month	PM10		PM2.5		SOx		NOx		HC as Methane CH_4	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
	NAAQ norms	100 $\mu g/m^3$		60 $\mu g/m^3$		80 $\mu g/m^3$		80 $\mu g/m^3$		Absent	
1	Jan-22	66.00	88.00	16.00	32.00	10.50	19.60	14.50	22.60	BDL	BDL
2	Feb-22	64.00	88.00	17.00	34.00	11.10	18.90	11.40	22.40	BDL	BDL
3	Mar-22	71.00	88.00	18.00	33.00	10.20	18.70	12.50	22.60	BDL	BDL
4	Apr-22	72.00	88.00	21.00	33.00	11.50	18.90	14.10	22.40	BDL	BDL
5	May-22	74.00	88.00	21.00	34.00	10.30	19.60	14.20	22.40	BDL	BDL
6	Jun-22	71.00	86.00	21.00	33.00	11.60	19.40	13.50	22.40	BDL	BDL
7	Jul-22										
8	Aug-22										
9	Sep-22										
10	Oct-22										
11	Nov-22										
12	Dec-22										
	Range (Jan-22 to June 22)	64-88		16-34		10.2-19.6		11.4-22.6		BDL	

STACK EMISSION AIR QUALITY STATUS REPORT

Sr.no.	Month	GTG		
		SPM	SO_X	NO_X
GPCB norms		150 mg/NM^3	100 ppm	50 ppm
1	Jan-22	Not monitored due to non operational GTGs		
2	Feb-22	Not monitored due to non operational GTGs		
3	Mar-22	Not monitored due to non operational GTGs		
4	Apr-22	Not monitored due to non operational GTGs		
5	May-22	Not monitored due to non operational GTGs		
6	Jun-22	BDL	BDL	15.30
7	Jul-22			
8	Aug-22			
9	Sep-22			
10	Oct-22			
11	Nov-22			
12	Dec-22			
	Range (Jan-22 to June-22)	BDL	BDL	15.30

BDL: Below Detection Level.

NOISE LEVEL REPORT

Sr.no.	Location	Unit	Limit	Jan-22		Feb-22		Mar-22		Apr-22		May-22		Jun-22		Jul-22		Aug-22		Sep-22		Oct-22		Nov-22		Dec-22	
				L_{day}	L_{night}	L_{day}	L_{night}	L_{day}	L_{night}	L_{day}	L_{night}	L_{day}	L_{night}	L_{day}	L_{night}	L_{day}	L_{night}	L_{day}	L_{night}	L_{day}	L_{night}	L_{day}	L_{night}	L_{day}	L_{night}	L_{day}	L_{night}
1	North	decibel	Day-75 db Night-70db	72	51	73	55	72	56	71	54	74	58	72	56												
2	East	decibel	Day-75 db Night-70db	66	54	68	54	71	51	67	56	72	55	68	54												
3	West	decibel	Day-75 db Night-70db	71	52	74	56	73	54	68	52	69	52	70	55												
4	South	decibel	Day-75 db Night-70db	69	56	71	51	74	52	72	55	71	54	73	58												

GROUND WATER QUALITY STATUS REPORT

Sr.no.	Parameter	Unit	Mar-22		Jun-22		Sep-22		Dec-22	
			GW1	GW2	GW1	GW2	GW1	GW2	GW1	GW2
1	Temperature	*C	29	29	30	30				
2	PH	-	8.5	8.52	9.13	9.13				
3	Total Dissloved Solids (TDS)	mg/L	3220	3290	2410	2800				
4	Chlorides as CL	mg/L	749.8	599.8	459.8	719.7				
5	Sulphate as SO4	mg/L	330	337	309.8	182.6				
6	BOD (5 days @ 20°C)	mg/L	5	6	BDL	BDL				
7	COD	mg/L	20.2	24.3	BDL	BDL				
8	Oil & Grease	mg/L	BDL	BDL	BDL	BDL				
9	Phenolic Compound	mg/L	BDL	BDL	BDL	BDL				
10	Zinc as Zn	mg/L	BDL	BDL	BDL	BDL				
11	Total Chromium as Cr+3	mg/L	BDL	BDL	BDL	BDL				
12	Lead as Pb	mg/L	BDL	BDL	BDL	BDL				
13	Cyanide as CN	mg/L	BDL	BDL	BDL	BDL				
14	Flouride as F	mg/L	1.35	2.3	2.14	2.12				
15	Copper as Cu	mg/L	BDL	BDL	BDL	BDL				
16	Insecticide	mg/L	Absent	Absent	Absent	Absent				
17	Pesticide	mg/L	BDL	BDL	BDL	BDL				
18	Mercury as Hg	mg/L	BDL	BDL	BDL	BDL				
	ND*: Not detected									

MARINE WATER QUALITY STATUS REPORT

Sr.no.	Parameter	Unit	Mar-22	Jun-22	Sep-22	Dec-22
			MW	MW	MW	MW
1	Temperature	*C	29	30		
2	PH	-	7.62	8.06		
3	Color	Co-pt	60	50		
4	Total Suspended Solids	mg/L	842	1380		
5	Total Dissloved Solids (TDS)	mg/L	32160	30164		
6	Chlorides as CL	mg/L	19393.9	18344.3		
7	Sulphate as SO4	mg/L	2860	2986		
8	BOD (5 days @ 20°C)	mg/L	40	36		
9	COD	mg/L	131.3	125.4		
10	Oil & Grease	mg/L	BDL	BDL		
11	Phenolic Compound	mg/L	BDL	BDL		
12	Zinc as Zn	mg/L	0.096	0.106		
13	Total Chromium as Cr+3	mg/L	0.077	0.089		
14	Lead as Pb	mg/L	BDL	BDL		
15	Cyanide as CN	mg/L	BDL	BDL		
16	Flouride as F	mg/L	1.34	2.8		
17	Copper as Cu	mg/L	BDL	BDL		
18	Insecticide	mg/L	N.D.	N.D.		
19	Pesticide	mg/L	BDL	BDL		
20	Mercury as Hg	mg/L	BDL	BDL		
21	Hexavalent Chromium as Cr+6	mg/L	BDL	BDL		
22	Nickel as Ni	mg/L	0.084	0.077		
	ND*: Not detected					

ANNEXURE –III

CSR DETAILS

PLL has constructed a temple at the site for the local people and has contributed towards infrastructure in the area for roads and drinking water.

Community development and welfare measures are taken. Village Luwara has been jointly adopted along with another nearby industry, as directed by PCPIR Welfare Society. Separate fund allocated for CSR.
Some of the schemes completed/under progress are Health Center (construction & operation), drainage and provision of street lights at Village Luwara. Rupees 75 lakh contributed to PCPIR Welfare Society. Two ladies from Luwara village sponsored for nursing course at Vidhyadeep Community college, Bharuch. Sponsored construction of Sanitation scheme at village Muller. Active participation in other Government initiated community development programs.

Installed 10 nos. Emergency solar lighting at prominent places in village Luwara. Donated Rs.1 lac for Bharuch District Civic centre development. Participated in Govt. scheme on KanyaKelvani. Installation of drainage crossings to remove accumulated water at 4 locations within the village Luvara at a cost of Rs. 0.8 lacs.Construction of approach road in village Lakhigaon, Dahej.

PLL has sponsored 'Mataria Talav drinking water project' of the Bharuch Municipality Corporation. This project is for the supply of sweet drinking water from the Narmada River to the residents of Bharuch city. MD&CEO handed over cheque for Rs. 25 Lacs to the Collector, Bharuch on 13/06/2011 and further, PLL added Rs. 20 Lacs for the 'MatariaTalav drinking water project'

PLL installed 50 nos. Emergency solar lighting at prominent places in village Luwara& 10 nos. Emergency solar lighting at prominent places in village Lakhigam of Vagra Taluka in Bharuch District. Provided School Bus to Primary School at Lakhigam Village and also running Primary Health Center at Luvara Village. PLL constructed Bus-stand and extended Gram Panchayat Bhavan building at Luvara Village.

PLL installed 25 Nos. of Solar lights at prominent places in village Lakhigam and Luwara. Contributed Rs. 20 Lakhs in Akshay Patra mid-day meal scheme at villages in and around Dahej location. Also, contributed Rs. 10.00 Lakhs in Gujarat Lion Conservation Society towards procurement of Vehicle.

Primary health services to Luvara village, Gynec health and Pulse Polio campaign (Pakhajan PHC). PLL supported noble cause of Construction of Storm water drainage at Shravan Chokdi to Jambusar by pass (over bridge) in Bharuch. This project is executed under District Collector office.

Request from CDHO (Chief District Health Officer) was received to participate in various health initiatives. PLL agreed during meeting with DM to provide the ambulance for PHC, Pakhajan Village of Vagra Taluka. PLL is supporting Luvara School for reference books, uniform, school picnic and creating awareness on environment, health, safety and security aspects through various programs regularly, rewarding bright students etc. PLL celebrated Shala Pravesh Utsav at Luvara School and distributed tool box to children.

Bharuch has problem of solid waste management and garbage disposal. To improve on cleanliness of the town, PLL is supporting initiative of GREEN BHARUCH CLEAN BHARUCH by donating two dumper placer worth Rs. 23.94 Lakh.

Due to delay in recruitment of teachers, primary schools in and around Dahej has 40% teaching staff. To support education by deploying young educated teachers, PLL sponsored 14 teachers in 4 schools of villages of Dahej, Lakhigam and Luvara.

PLL constructed 11hosues of homeless tribes in Luvara village at a cost of 25 Lakh. PLL initiated drive to make Luvara open defecation free by sponsoring toilets for 172 houses at a cost of Rs. 17.2 Lakh.

As a part of initiate for Swachh Bharat Abhiyan, PLL constructed five toilet blocks for school at Lakhigam, Luvara, Ambetha, Jageshwar & Dahej. Also, PLL has constructed 91 Toilet blocks at an estimated expenditure of Rs. 172 Lakhs for various schools in fifteen district of Assam in co-ordination with Rashtriya Madhiyamik Siksha Abhiyan (RMSA).

Cancer screening done (Pep and Breast) for female above 18 years at Luvara village. Establishment of equipment for Ultra Sonography Ward done at General/Civil Hospital, Bharuch. Motivational Awards (Academics and punctuality), School kit and reference books given for Luvara School students. Nutrition and clothing kit (105 nos.) was given to under nourished baby and mother.

PLL has sponsored Drawing competition, Educational tour and uniform distribution at Primary School Luvara. PLL sponsored Medical Equipment such as Eye sight testing, ECG Machine, Spirometer, Pulse Oxymeter etc. to Luvara Primary Health Centre. PLL also celebrated Swatch Bharat Pakhwada during 16th June, 2016 to 30th June, 2016 in co-ordination and consultation with neighboring villages, communities, schools etc.

The launch of Project Vidhyagam was organized in Luwara Primary School wherein a classroom library for std. 7 & 8 students is setup. About 130 books (syllabus and general reading including comics, biographies, story books, general knowledge, science fiction in Gujarati, Hindi and English language) has been kept in the library. The idea behind this project is that students develop interest in reading and thus studying. The PLL Disha Ladies Club organized for food and distribution of educational kits for 65 girls in the Orphanage in Bharuch on 11th Sept 2016. A focused group discussion on importance of hygiene and cleanliness was organized by Ladies club members as well.

Roofing item worth Rs. 2 Lacs was provided to the Gram Panchayat Office of Luwara Village for construction of house for 10 tribal families living below the poverty line. This material consisted of cement roof, channel, and hooks. It is expected that the construction of houses will be done by mid-January 2017.

Petronet LNG Limited celebrated the World Sight Day on 13th October 2016 by organizing the Eye Screening Camp for contractual labor at the company premises. The camp was organized in association with Wockhardt Foundation and about 200 labor and 60 employees participated in the same. During the camp; 125 specs and 60 unit of drops were distributed to beneficiaries based on assessment by Doctors.

On the occasion of 147th birth anniversary of Father of Nation Shri Mahatma Gandhi Health and Hygiene talk, Swachhta Selfie Campaign, Drawing Competition at Govt. High School, Lakhigam and other activities were organized as part of Swachh Bharat Abhiyaan.

It is observed that there is a shortage of regular teachers in local schools and severely hampering the quality of education of poor children in schools. To mitigate this problem, PLL has started supporting para teachers in local school and ensuring improvement in quality of education in local schools.

PLL CSR team participated in world school day celebration on 23 March, 2017. As a part of celebration PLL has distributed Uniforms to Std. 8th Students. It was decided to provide two pair of uniforms to all students in school. The uniforms were prepared by Sardar Mahila Vikas Mandal a group of tribal women for employment generation and livelihood opportunity. PLL provided work order worth of Rs. 2,23,980/-

As the students studying in primary schools are coming from BPL and poor families, most of the families are not able to afford educational tours for their children. Every year school is organizing such tour sponsored by PLL. Students will get exposures to various places and gain experience. About 150 students get benefit of this tour and

places covered like Dwarka, Somnath, Porbandar, Smruti Mandir, Naheru Planetorium, Sasan Gir etc.

PLL had sponsored community mass marriage of weaker community, participated in Shala Pravesh Utsav 2017, planted 150 of trees in nearby villages, distributed food packages during water logging observed at nearby villages, supported empowerment of Special children, engaged contractor for repair and maintenance of Toilets in nearby School, arranged cessions for awareness on solid waste management at school.

PLL supported 10th Special Olympics, Bharuch in January, 2018, sponsored project "Kaushal Setu" Skill Development Program with CIPET, Ahmedabad and trained 100 underprivileged youth, supported educational tour for Primary School of Luvara Village, provided para-teachers at school of nearby villages, sponsored community mass marriage of weaker community, supported "Startup Village" project towards Rural Youth Entrepreneurship Development Program, Supporting Swachh Bharat Abhiyan by District Administration Bharuch (Heritage Walk).

PLL signed MoA with Samagra Shiksha Abhiyan, Department of Education, Govt. of Gujarat on 23rd Jan. 2019 at Govt. Primary School, Luvara village for the Development of Primary School at Luvara Village. PLL supported District Level Special Olympics Games which was organized on 23rd February 2019. Around 250 special children, 150 volunteers including PLL volunteers and coaches participated during the event.

(July, 2019 to Dec. 2019)

PLL has signed MoU with ALIMCO to provide Aids and Equipment to disables of Bharuch District. PLL has signed MoU with Wockhardt Foundation to run Mobile Medical Unit (MMU) in nearby villages of PLL plant area. PLL has signed MoU with NHFDC to provide skill training to disable youth of Bharuch District. PLL has supported relief camp for affected community near Lakhigam during monsoon season.

(Jan.2020 to June 2020)

PLL has conducted assessment camps at Jambusar and Vagra Taluka of Bharuch Distrcit to Aids and Equipment to disables. Kaushal Setu Skill Training with CIPET Ahmedabad 78 candidates have complated the training and 90% of them got job with the salary range of Rs. 9000 to Rs. 12000. PLL has conducted District Level Special Olympics in parnership with Kalrav Trusy Bharuch and Special Olympics, Gujarat. As a part of COVID-19 pendemic response, PLL has contributed Rs. 34.00 lakhs to

Distrcit Health Office, Bharuch to proqure PPE Kits, Masks and Senitise materils for COVID-19 worriers. PLL has provides 4300 nos. of Ration kits worth of Rs. 25.00 lakhs to Migrant Labours, and Poor Families of nearby villages. Petronet LNG Limited (PLL) under its CSR initiatives aims at distributing 1,00,000 face masks to the migrant labor communities, slum dwellers, nearby hospitals, local police authorities & Government Offices to combat COVID-19 in the Bhaurch District of Gujarat.

(July 2020 to December 2020)

PLL has supported Construction of Priamry School, at Luvara village worth of Rs. 1,71 Crore. Construction is about to complete by March, 2021. PLL has distributed aids and equipment to about 250 disable beneficiaries at Jambusar and Vagra Taluka of Bharuch District. As a part of COVID-19 pandemic response, in addition to supporting District Health Office (CDHO) and Distributing Rations Kits to to Migrant Labours, and Poor Families of nearby villages, PLL has prepared 1,00,000 cotton masks through Women SHGs of Bharuch Distrcit. About 80 women got indirect employment during pandemic through this initiative. These masks were distributed among local communities of nearby villages, health workers, labour community, Nagarpalika Sawachhta Karmchari, Special Children and their families, Vegetable vendors, Local Police authorities, Government Offices, Security Guards, PLL employees also participated in mask distribution initiative. These masks were made of Cotton considering it environment aspect for reusable and bio-degradable properties.

(January, 2021 to June, 2021)

PLL/PLF has signed agreement with Wockhardt Foundation to run Mobile Medical Unit (MMU) in nearby villages of PLL plant area. This MMU is providing its services to nearby villages like Lakhigam, Navi Nagari, Luvara, Jageshwar, Ambetha. More than 5500 patients have been benefited during last six months. PLL/PLF has signed agreement with NHFDC to provide skill training to disable youth of Bharuch District. First batch of 30 candidate started from April, 2021. . PLL/PLF has signed agreement with MOKSHDA to install environment friendly green crematorium system to reduce excessive use of wood. The works are under progress, Construction of Govt. Primary School at Luvara village with 12 classrooms and modern amenities worth of Rs .1.71 Crs. and Construction of 24 Nos. of widow quarters for BSF worth of Rs. 5.87 Crs. are going to completed by end of July, 2021. PLL/PLF skill training partner CIPET, Ahmedabad has completed skill training of 75 candidates and remaining 25 candidates are under progress. Candidate have secured job of Rs. 10,000 per month to Rs. 15,000 per month post completion of training programme. Most of the CSR projects got delayed due COVID-19 restrictions.

(July, 2021 to December, 2021)

PLL/PLF has signed agreement with Wockhardt Foundation to run Mobile Medical Unit (MMU) in nearby villages of PLL plant area. This MMU is providing its services to nearby villages like Lakhigam, Navi Nagari, Luvara, Jageshwar, Ambetha. More than 8500 patients have been benefited during last six months. PLL/PLF has signed agreement with NHFDC to provide skill training to disable youth of Bharuch District. First batch of 30 candidate started from April, 2021 and second batch of 20 candidates started in August, 2021 and both batches have been completed during December, 2021. PLL/PLF has signed agreement with MOKSHDA to install environment friendly green crematorium system to reduce excessive use of wood. The works are under progress, Construction of Govt. Primary School at Luvara village with 12 classrooms and modern amenities worth of Rs .1.71 Crs. and Construction of 24 Nos. of widow quarters for BSF widow's worth of Rs. 5.87 Crs. are completed. PLL/PLF skill training partner CIPET, Ahmedabad has completed skill training of 93/100 candidates. Candidate have secured job of Rs. 10,000 per month to Rs. 15,000 per month post completion of training programme. PLL has signed agreement with Bharuch Nagarpalika to provide support for Disaster Management and Swachh Bharat Abhiyan, Bharuch Nagarpalika would procure one fire tender and Road sweeping machine with the financial support of Rs. 1.93 Cr. under PLL CSR Initiatives. PLL has signed an agreement with Gujarat CSR Authority (GCSRA) for construction of Panchayat Bhavan at Lakhigam village. PLL has supported Development of Green Zone beneath newly constructed flyover bridge at Bharuch City.

(January, 2022- June, 2022)

PLL/PLF has signed agreement with Wockhardt Foundation to run Mobile Medical Unit (MMU) in nearby villages of PLL plant area. This MMU-1 is providing its services to nearby villages like Lakhigam, Navi Nagari, Luvara, Jageshwar, Ambetha. More than 15000 patients have been benefited during last six months. PLL/PLF has signed agreement with NHFDC to provide skill training to disable youth of Bharuch District. First batch of 30 candidate started from April, 2021 and second batch of 20 candidates started in August, 2021 and both batches have been completed during December, 2021.This project benefited 50 disable persons with computer skill, Certificate distribution held during June, 2022. PLL/PLF has signed agreement with MOKSHDA to install environment friendly green crematorium system to reduce excessive use of wood. The works are under progress, Construction of Govt. Primary School at Luvara village with 12 classrooms and modern amenities worth of Rs .1.71 Crs. and Construction of 24 Nos. of widow quarters for BSF widow's worth of Rs. 5.87 Crs. are completed. PLL/PLF skill training partner CIPET, Ahmedabad has completed skill training of 93/100 candidates. Candidate have secured job of Rs. 10,000 per month to Rs. 15,000 per month post completion of training programme.

PLL has singed a new agreement with CIPET, Ahmedabad to train 400 candidates in CNC Machine and Plastic Product Manufacturing. First batch of 50 candidate enrolled and initiated. PLL has signed agreement with Bharuch Nagarpalika to provide support for Disaster Management and Swachh Bharat Abhiyan, Bharuch Nagarpalika would procure one fire tender and Road sweeping machine with the financial support of Rs. 1.93 Cr. under PLL CSR Initiatives. PLL has signed an agreement with Gujarat CSR Authority (GCSRA) for construction of Panchayat Bhavan at Lakhigam village with financial support of Rs. 1.13 Crs.. PLL has supported Development of Green Zone beneath newly constructed flyover bridge at Bharuch City with financial support of Rs. 5.00 lakhs. PLL has supported development of Sports facility by Police Department, Bharuch with financial support of Rs. 5.00 lakh. PLL has supported Medical Equipments to Kasturba Hospital, Seva Rural Jhagadia with financial support of Rs. 5.00 lakh. PLL has provided support to Seva Yagaya Samiti for Strengthening of Facilities for Orphan/destitute Old Age Patients at Civil Hospital, Bharuch for Rs. 5.00 lakh. PLL has partnered with National Youth Foundation to Support for School Health Check-Up Program' at 48 Schools of Vagra Taluka, Dist. Bharuch Gujarat for Rs. 19.92 lakh.

Development of Primary School at Luvara Village	
	
Construction of Panchayat Bhavan at Lakhigam	

Flood Relief Activities

Volunteer Service by PLL Apprentice

Assessment and Distribution of Aids and Equipments by ALIMCO

Distribution of Ration Kit to Contract Labour Community around PLL Dahej Terminal during COVID-19 outbreak.

Distribution of Cotton Mask made by women welfare NGOs to prevent infection of COVID-19

Mobile Health Unit (MHU) (Wockhardt Foundation)

Distribution of PPE Kits and Masks in partnership with Rotary Club of Pune and Dahej

ANNEXURE IV

ENGINEERING DESIGN BASIS (STATIC EQUIPMENT)

PROJECT: LNG TERMINAL AT DAHEJ

CLIENT: M/s PLL

JOB NO.: A324

(EIL) **(PLL)**

Rev. No	Date	Purpose	Prepared by	Checked by	Approved by
0	07.09.2012	ISSUED AFTER CLIENT COMMENTS INCORPORATED	RS	TG	RKT
A	25-05-2012	ISSUED FOR CLIENT'S COMMENTS/APPROVAL	RS	TG	RKT

CONTENTS

1.0 REFERENCED PUBLICATIONS

a) **Codes and Standards:**

The following codes and standards in their latest edition including latest addenda as on the date of first issue of this design basis shall be followed unless otherwise specified in the requisition for the design, fabrication, inspection and testing of Vessels, Double Wall Storage Tanks, Air coolers & heat exchangers:

ASME SEC. VIII DIV.1	For Pressure Vessels, Heat Exchangers
ASME SEC. II	For material specification
ASTM	For material specification
ASME SEC. V	Non Destructive Examination
ASME SEC. IX	For welding
ASME B31.3	Process piping
BS EN 14620 PART I TO V	Flat bottom, vertical, cylindrical tanks for storage of refrigerated, liquefied gases with operating temperatures between 0° C and (-) 165° C
BS 8110 + Amendements	Structural use of concrete
BS EN 1473	Installation and equipment for LNG-design of onshore installations
API 620	For Low Pressure Storage Tanks
API 2000	Venting atmospheric and low pressure storage tanks, Non refrigerated and refrigerated
API 2003	Protection against ignitions arising out of static, lightning & stray currents
API 678	Accelerometer Based Vibration Monitoring System – Reaffirmed (1987)
API 2550	Standard Methods for Measurements and calibration of upright cylindrical tanks
ACI 373	Design & construction of circular prestressed concrete structures

ACI 305R	Hot weather concrete
ASTM 549	Perlite loose fill insulation
NFPA 59A	Production, storage & handling of LNG
NFPA 70	National Electric Code
NFPA 780	Standard for Installation of Lightning protection system
FIP recommandations	Acceptance and application of post tensioning system
PI-201-77	Compacted density
OISD 194	Standard for the storage and handling of LNG
IS: 875/SITE DATA	For wind load consideration
IS: 1893/SITE DATA	For seismic design consideration
ASME B 16.5	Steel Pipe flanges and pipe fittings
ASME B 16.47	For large diameter flanges
ASME B 16.20/ B 16.21	For gaskets
TEMA Class R	For shell and tube Exchanger
API 661	For Air Cooled Exchanger
IS 800	For Air Cooled Exchanger Structural Design

b) **Statutory Provisions:**

National laws and statutory provisions together with any local by-laws for the state shall be complied with. Static and Mobile Pressure Vessel (SMPV) rules and OISD norms as applicable shall also be complied with.

2.0 DESIGN PHILOSOPHY / GENERAL CRITERIA

Equipment shall be designed in compliance with the latest design code requirements and applicable standards/ specifications. All design calculations shall be performed considering all applicable loads for erection, operating and hydro test conditions.

2.1 Full Containment with Prestressed Concrete Outer Tank Wall

The storage tanks are to be above ground, flat bottom, and vertical full containment Prestressed cylindrical type. The under face of the concrete slab shall be minimum two meter above the ground, contractor for Storage Tank during detail engineering shall work out the actual height of the concrete slab.

A concrete outer tank and a roof constructed of reinforced concrete with carbon steel vapor barriers on the inside of the wall & base slab.

DISASTER MANAGEMENT INSTITUTE (DMI), BHOPAL

(An ISO 17020:2012 Accredited Institute)

ERDMP CERTIFICATE

This certificate has been awarded to

M/s Petronet LNG Limited
GIDC Industrial Estate, Plot No. 7/A,
Dahej Dist. Bharuch (Gujrat) 392130 (India)

n recognition of the entity's *"Emergency Response & Disaster Management Plan"* which complies with the requirements of

PNGRB Notification G.S.R. 39(E) PNGRB "Codes of Practices for Emergency Response and Disaster Management Plan (ERDMP) Regulations, 2010"

Issued by:

Dr. Rakesh Dubey
Director

Certificate Number:
1615/ERDMP-126/Petronet LNG Limited/ Gujrat/2018-19

Date of Issue
30.12.2019

Expiry Date:
29.12.2022

ANNEXURE V

ANNEXURE VI

F&G Mapping Study

PROJECT NAME : DAHEJ EXPANSION PHASE – IIIA
LNG REGASIFICATION FACILITIES

OWNER : PETRONET LNG LTD

AP

AP

TOYO ENGINEERING
Consortium of TEIL & TEC

TABLE OF CONTENTS

ANNEXURE VII
O/C

Petronet LNG Limited
GIDC Industrial Estate, Plot No. 7/A, Dahej,
Taluka : Vagra, Dist. Bharuch (Gujarat) - 392130 (India)
Tel. : 02641 - 670200 / 257
www.petronetlng.com
CIN: L74899DL 1998PLC093073
GST No. : 24AAACP8148D1ZM

Ref.: PLL/DHJ/HSE/GPCB/2022/15 Date: May 28, 2022

GPCB XGN ID: 15479

To,

Gujarat Pollution Control Board
Paryavaran Bhavan
Sector-10 A
GANDHINAGAR – 382 010

Sub: Environmental Statement for the financial year April 2021 to March 2022

Dear Sir,

Enclosed Please find Environmental Statement (FORM – V) for the financial year April 2021 to March 2022 for your kind perusal.

Thanking you,

Yours faithfully,
For Petronet LNG Limited

S B Singh
ED (Plant Head)

S B Singh
ED (Plant Head)
Petronet LNG Limited,
Dahej Terminal-392130

Encl: As above

Copy to:
Gujarat Pollution Control Board, Bharuch

30/5/22
Part Received
Gujarat Pollution Control Board
BHARUCH

Regd. Off.:
World Trade Centre, First Floor, Babar Road,
Barakhamba Lane, New Delhi-110 011 (INDIA)
Tel : 011 - 23472525, 23411411 Fax : 23472550

Kochi Site :
Survey No. 347, Puthuvypu
P.O. 682508, Kochi (INDIA)
Tel.: 0484-2502268

FORM-V
ENVIRONMENTAL STATEMENT
(See rule 14)

Environmental Statement for the financial year ending with **31st March 2022**

PART - A

i. Name and address of the owner/occupier of the industry operation or process:

Mr. S B Singh
ED (Plant Head)
M/s Petronet LNG Limited
Plot.7/A, GIDC Industrial Estate
Dahej, Taluka Vagra
Dist. Bharuch – 392130
Ph. 02641-670299/201

ii. Industry category Primary-(STC Code) Secondary-(STC Code)

Not Applicable.

iii. Production capacity – Dahej Unit.

17.5 MMTPA (Million Metric Tons per Annum) Regasification Capacity

Receipt of LNG through Ship, storage, Regasification and Despatch of Natural Gas and LNG through tanker

iv. Year of establishment: **2nd April, 1998**

v. Date of the last environmental statement submitted: **22nd April 2021**

PART - B

Water and Raw Material Consumption:

i. Water consumption in m^3/d:

Process : Nil
Cooling : Nil
Domestic : 21.2 m^3/day

Name of Products	Process water consumption per unit of product output	
	During the previous financial year	During the current financial year
1. Regasified Liquefied Natural gas (RLNG)	Nil	Nil

ii. Raw material consumption:

Name of raw materials*	Name of Products	Consumption of raw material per unit of output	
		During the previous financial year (F.Y. 2020-21)	During the current financial year (F.Y. 2021-22)
1. Liquefied Natural Gas (LNG)	RLNG	15.558 MMTPA 21353.55 MMSCM of send out RLNG	14.4135 MMTPA 19873.68 MMSCM of send out RLNG
MMSCM = Million Metric Standard Cubic Meter MMTPA = Million Metric Ton per Annum			

* Industry may use codes if disclosing details of raw material would violate contractual Obligations, otherwise all industries have to name the raw materials used.

PART – C

Pollution discharged to environment/unit of output:
(Parameter as specified in the consent issued)

Pollutants	Quantity of Pollutants discharged (mass/day)	Concentration of Pollutants discharged (mass/volume)	Percentage of variation from prescribed standards with reasons.
(a) Water (b) Air (Stack emissions from Gas Turbine Generator)	No effluents generated ----	Not Applicable SPM : BDL** SOx : BDL NOx : 21.4 ppm	Not Applicable Concentration of pollutants discharged is well within the GPCB norms.

** BDL= Below detection limit

PART - D
HAZARDOUS WASTES

(as specified under Hazardous and Other Wastes (Management & Trans boundary Rules,2016)

Hazardous Wastes (Disposed)	Total Quantity (Kg)	
	During the previous financial year (F.Y. 2020-21)	During the current financial year (F.Y. 2021-22)
1. From Process	Nil	Nil
2. From Pollution Control Facilities	Nil	Nil
3. Used oil	10,500 Liters	2725 Liters
4. Waste Residue containing Oil	846.3 Kgs	967 Kgs
5. Insulation Waste	Nil	Nil
6. Paint Waste	1160 Kgs	Nil
7. Contaminated Empty barrels and drums	Nil	73 Nos (400 Kgs)

PART- E

SOLID WASTES

Solid Wastes	Total Quantity (Kg)	
	During the previous financial year (F.Y. 2020-21)	During the current financial year (F.Y. 2021-22)
a. From process	Nil	Nil
b. From Pollution Control Facility	Nil	Nil
c. (1) Quantity recycled or re-utilized within the unit.	Nil	Nil
(2) Sold :	Nil	Nil
(3) Disposed: a) E Waste	1090 Kg	2370 Kg

PART – F

Please specify the characteristics (in terms of concentration and quantum) of hazardous as well as solid wastes and indicate disposal practice adopted for both these categories of wastes.

Hazardous waste : 1. Used oil 2725 Liters (Disposal through GPCB approved Recycler/ Preprocessor, M/s R.K. steel, Bharuch)

Solid Waste : 1. Waste residue containg oil(Cotton waste) of 967 Kgs dispossed to approved incineration site of M/s Bharuch Enviro Infrastructure (BEIL) , Dahej for incineration process.

2. 73 Nos (400Kg) Contaminated Empty barrels and drums are send to approved decontamination facility of M/s Vikas Enterprise.

E-Waste : Total 2370 Kg E - waste dispossed to GPCB approved agency , M/s Earth E Waste Managemnet Pvt. Ltd. , Surat

Lead Acid Batteries: Total 162 nos batteries are disposed off through supplier buy back system under Batteries (Management and Handling) Amendment Rules, 2010. Details are as follows.

Sr No	Date	Description	Quantity (Nos)	Agency
1	13.04.2021	Exide Battery	05	SURYA POWER BATTERY
2	13.04.2021	Amaron Battery	03	SURYA POWER BATTERY
3	21.10.2021	Exide Battery	34	UMA Battery
4	21.10.2021	SMF Battery	84	UMA Battery
5	29.11.2021	Lead acid battery	36	Deccan Sales & Service

PART – G

Impact of the pollution control measures taken on conservation of natural resources and consequently on the cost of production.

Regular Environmental monitoring is carried out through GPCB approved agency. (M/s. Unistar Environment & Research Labs Pvt. Ltd, Vapi) and monitored results are well within the consent limit

PART – H

Additional measures/investment proposal for environmental protection including abatement of pollution.

The total Green Belt area approximately 1,66,000 Sq. meters has been allocated in and around periphery wall. Whereas, PH-I & PH-II green belt has been developed and maintained and the PH-III green belt (57,000 Sqm) area development has been initiated. In addition to this, the total lawns/ green cover developed & maintained till date is 30000 Sq.m.

S.No	Financial Year	Amount Spent (Rs. In Lacs)	Purpose of Investment
1	2009-10	33.22	Development & maintenance of Green belt and Mangrove Plantation during the year.
2	2010-11	55.00	Development & maintenance of Green belt and Mangrove Plantation during the year.
3	2011-12	93.31	Development & maintenance of Green belt and Mangrove Plantation during the year.
4	2012-13	109.57	Development & maintenance of Green belt and Mangrove Plantation during the year.
5	2013-14	95.20	Development & maintenance of Green belt and Mangrove Plantation during the year.
6	2014-15	88.83	Development & maintenance of Green belt and Mangrove Plantation during the year.
7	2015-16	42.20	Development & maintenance of Green belt and Mangrove Plantation during the year.
8	2016-17	77.96	Development & maintenance of Green belt and Mangrove Plantation during the year.
9	2017-18	71.08	Development & maintenance of Green belt during the year.
10	2018-19	60.93	Development & maintenance of Green belt during the year.
11	2019-20	51.11	Development & maintenance of Green belt during the year.
12	2020-21	78.96	Development, maintenance of Green belt & related to STP project during the year.
13	2021-22	76.26	Development & maintenance of Green belt during the year.
		155.34	STP Installation
	Total	1088.97 Lakh	

PART- I

Any other particulars for improving the quality of the environment.

Total 1150 ha. Mangrove Plantation undertaken along the Gujarat Coast till date as furnished below:

S.No	Financial Year	Covered Area	Location	Consultation with Forest Department/ GEC
1	2009-10	50 ha.	NadaVillage, Jambusar, Bharuch	Gujarat Ecology Commission (GEC), Govt. of Gujarat
2	2010-11	100 ha.	AnkalvaVillage, Hansot, Bharuch	Gujarat Ecology Commission (GEC) , Govt. of Gujarat
3	2011-12	200 ha.	AnkalvaVillage, Hansot, Bharuch	Gujarat Ecology Commission (GEC) , Govt. of Gujarat
4	2012-13	200 ha. 100 ha.	AnkalvaVillage, Hansot, Bharuch RoniyaBhatha, Nr. Nirma, Bhavanagar	Gujarat Ecology Commission (GEC) , Govt. of Gujarat Bhavnagar Forest Division, Govt. of Gujarat
5	2013-14	200 ha.	RoniyaBhatha, Nr.Lock Gate, Bhavanagar	Bhavnagar Forest Division, Govt. of Gujarat
6	2014-15	200 ha.	RoniyaBhatha, Nr.Lock Gate, Bhavanagar	Bhavnagar Forest Division, Govt. of Gujarat
7	2014-15	50 ha.	Kentiyajal, Hansot Bharuch	Bharuch Forest Sub-Division, Govt. of Gujarat
8	2016-17	50 ha.	Gadula Village, Talaja Taluka, Mahuva, Bhavnagar	Bhavnagar Forest Division, Govt. of Gujarat
	Total	**1150 ha.**		

(Signature of person carrying out an industry – operation or process)

Name: Mr. S B Singh
Designation: ED (Plant Head)
Address: M/s Petronet LNG Limited,
Plot.7/A, GIDC Industrial Estate
Dahej, Taluka Vagra
Bharuch – 392130
Ph. 02641-670299/201

S B Singh
ED (Plant Head)
Petronet LNG Limited,
Dahej Terminal-392130

ANNEXURE VIII

SBI general INSURANCE
SURAKSHA AUR BHAROSA DONO

To,
PETRONET LNG LIMITED
First Floor, World Trade Centre, Babar Road Barakhamba Lane,
New Delhi,
Delhi - 110001,
India.
Contact No. : +91-9654182826

Date: 03/06/2022

Subject: Policy Number: : 0000000028749377

Dear Customer,

Welcome to SBI General. Thank you for choosing SBI General's Public Liability Insurance Act Policy. We are delighted to have you as our esteemed Customer.

We enclose the following documents pertaining to your Policy:

- Policy Schedule
- Policy Clauses & Wordings
- Grievance Redressal Letter

We have taken care that the documents reflect details of risk and cover as proposed by you. We request you to verify and confirm that the documents are in order. Please ensure safety of these documents as they form part of our contract with you. For all your future correspondence you may have with us, kindly quote your Customer ID and Policy Number.

Your Customer ID : 0000000047519696

Your Policy Number : : 0000000028749377

The Postal Address of your SBI General Branch that will service you in future is:

SBI General Insurance Company Limited
Punj Essen House,Sixth Floor,Level-6 , 17-18,
Nehru Place,New Delhi - 110019,
Delhi - 110019,
India.

In case of any queries or suggestions, please do not hesitate to get in touch with us. You can contact us at customer.care@sbigeneral.in or call our Customer Care Number **1800-102-1111, 1800-22-1111**

We look forward to a continuing and mutually beneficial relationship.

Yours sincerely,

Authorized Signatory

SBI general INSURANCE

SURAKSHA AUR BHAROSA DONO

SBI general INSURANCE
SURAKSHA AUR BHAROSA DONO

PUBLIC LIABILITY INSURANCE ACT POLICY (CLAIMS MADE)

SCHEDULE

Policy No: **: 0000000028749377**	**Servicing Branch Office:** SBI General Insurance Company Ltd. Punj Essen House,Sixth Floor,Level-6, 17-18,Nehru Place,New Delhi - 110019, Delhi-110019,India.	**Issue Date:** **03/06/2022**

Intermediary Details:

Intermediary Name	SBI General Insurance Direct Code	
Intermediary Code	0061174	
Intermediary Contact Details	Mobile No. NA	Landline No. +91-22-18002211

Insured Details:

Insured Name and Address	**PETRONET LNG LIMITED** First Floor, World Trade Centre, Babar Road Barakhamba Lane, New Delhi, Delhi - 110001, India
Additional Insured if any	None
Business of the Insured	Develop, Construct, Own and Operate Liquefied Natural Gas (LNG) Regasification Terminals
Turnover declared by the Insured	Rs. 4,76,09,00,00,000
Paid up Capital of the Insured	Rs. 1,500 CRORE
Coinsurance Details	Our Share : 100%

Cover Details:

Policy Period	**From:** 02/06/2022 (00:00) **To:** 01/06/2023 (Midnight)
Retroactive date	02/06/2004
Territorial Scope	India
Jurisdiction	India
Limit of Indemnity	
Aggregate One Year (AOY)	Rs. 15,00,00,000
Any One Accident (AOA)	Rs. 5,00,00,000
Compulsory Excess	Nil

SBI general INSURANCE
SURAKSHA AUR BHAROSA DONO

PUBLIC LIABILITY INSURANCE ACT POLICY (CLAIMS MADE)

Attached to and forming part of the Schedule to the Policy No. : 0000000028749377

Particulars of Premises Insured	
No. of Premises Insured	1
Address of the Premises Insured	Dahej, State of Gujarat - 392130 and Kochi, State of Kerala – 682508

Additional Conditions: Cover provided herein is subject to the following additional Conditions and attached Clauses / Endorsements / Warranties:

Terms & Conditions as per Public Liability Insurance Act, 1991

The Primary Exclusions under the Policy are:
1. arising out of wilful or intentional non-compliance of any Statutory Provisions
2. in respect of fines, penalties, punitive and/or exemplary damages
3. arising under any other legislation except in so far as is provided for in section 8 sub-section (1) and (2) of the Act.
4. arising out of damage to property owned, leased or hired or under hire purchase or on loan to the Insured or otherwise in the Insured Owner's control, care or custody.
5. directly or indirectly occasioned by, happening through or in consequence of war, invasion, act of foreign enemy, hostilities (whether war be declared or not), civil war, rebellion, revolution, insurrection or military or usurped power.
6. directly or indirectly caused by or contributed to by
(a) ionising radiation or contamination by radioactivity from any nuclear fuel or from any nuclear waste from the combustion of nuclear fuel.
(b) the radioactive, toxic, explosive or other hazardous properties of any explosive nuclear assembly or nuclear component thereof.

SBI general INSURANCE

SURAKSHA AUR BHAROSA DONO

PUBLIC LIABILITY INSURANCE ACT POLICY (CLAIMS MADE)

Attached to and forming part of the Schedule to the Policy No. : 0000000028749377

Premium Computation:

Particulars	Amount (Rs)
Gross Premium	**18,349.00**
Taxes as applicable	3,302.82
Contribution to Environment Relief Fund	18,349.00
Final Premium	**40,001.00**

Collection Details: Receipt No. 25710898 **Receipt Date 01/06/2022**

P.S. If premium paid through cheque, the policy is void ab initio in case of dishonour of cheque.

Consolidated Stamp Duty paid Rs. 0.50/- towards Insurance Policy Stamps vide Order No. LOA/CSD/323/2022/(Validity Period Dt.18/04/2022 to Dt. 14/04/2023)/1652 Date:- 13/04/2022 Dated 2022-05-05 11:20:06.0 of General Stamps Office Mumbai.

Signed at : Mumbai		**For SBI General Insurance Company Limited**
Date : 03/06/2022		**Signatory**

GSTIN : 07AAMCS8857L1ZE

Important Note:

Please examine this Policy including its attached Schedules/ Annexure if any. In the event of any discrepancy please contact the office of the Company immediately, it being noted that this Policy shall be otherwise considered as being entirely in order.

Please refer the Claims Settlement & Grievance Redressal procedure document attached herein for ready reference

Annexure IX Upload of Half Yearly Returns on Company Website

Screen Reader Access | Follow @PetronetLNGLtd | Follow @PetronetLNGLtd

Search A+ A A-

Company | Natural Gas | Terminals | CSR | Media Centre | Investor Centre | Careers | Tender | Customers

DAHEJ LNG TERMINAL

The Company had set up South East Asia's first LNG Receiving and Regasification Terminal with an original nameplate capacity of 5 MMTPA at Dahej, Gujarat. The infrastructure was developed in the shortest possible time and at a benchmark cost. The capacity of the terminal has been expanded in phases which is currently 17.5 MMTPA. The terminal has 6 LNG storage tanks and other vaporization facilities. The terminal is meeting around 40% of the total gas demand of the country.

The terminal has two LNG Jetties at Dahej. While the first jetty can handle berthing of up to Q-Flex vessels, the second jetty can handle berthing of up to Q-Max vessels

Dahej terminal has received more than 2200 cargoes. The terminal is also offering tolling services to Offtakers & Bulk customers. To cater the small customers who are not having gas pipeline connectivity, Dahej is supplying LNG to such customers which is transported through cryogenic trucks.

PLL Dahej is first terminal to start loading of LNG in trucks for supply of LNG to the areas where pipelines have not reached and today has 04 truck loading bays and hub for development of Small Scale LNG business.

- Environment statement (Form-V) for the FY 2021-22

- Annual Report (Form - IV) as per Bio Medical Waste Management Rules 2016 for CY 2021

- Annual Report (Form - IV) as per Bio Medical Waste Management Rules 2016
- Environmental Statement (Form - V) for the FY 2020-21

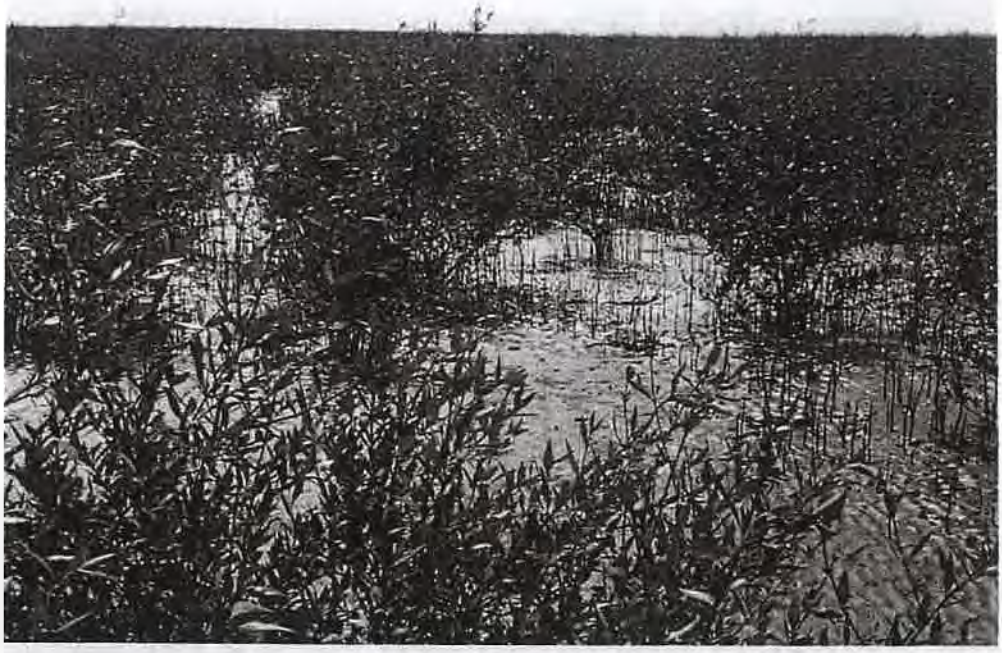
- Environmental and CRZ clearance for Installation of Terminal facilities to handle 10 MMTPA of additional LNG at PLL Dahej
- Environmental Statement (Form - V) for the FY 2018-19

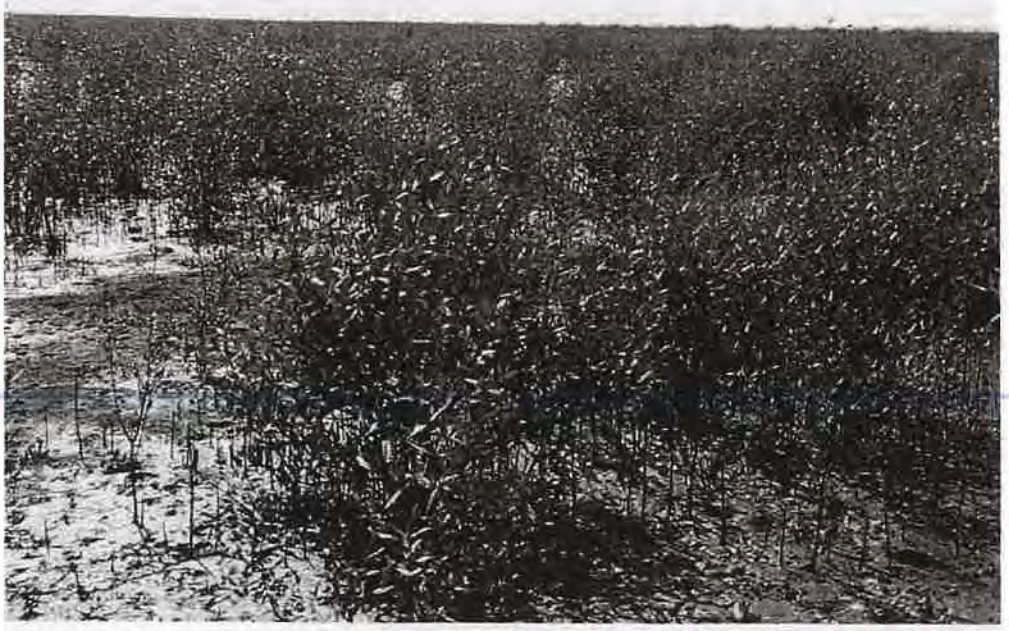
MoEF & CRZ Compliance Report

Description	Status Report
Half yearly MoEF & CRZ compliance report for Standby Jetty	31.12.2021
Half yearly MoEF & CRZ compliance report for Phase III	31.12.2021
Half yearly MoEF & CRZ compliance report for Phase II	31.12.2021
Half yearly MoEF & CRZ compliance report for Phase I	31.12.2021
Half yearly MoEF & CRZ compliance report for Standby Jetty	30.06.2021
Half yearly MoEF & CRZ compliance report for Phase III	30.06.2021

ANNEXURE X

Mangroves planted in 50 ha. area at NADA Coast during 2009-10





Mangroves planted in 100 ha. area at Ankalva Coast during 2010-11

Mangroves planted in 200 ha. area at Ankalva Coast during 2011-12

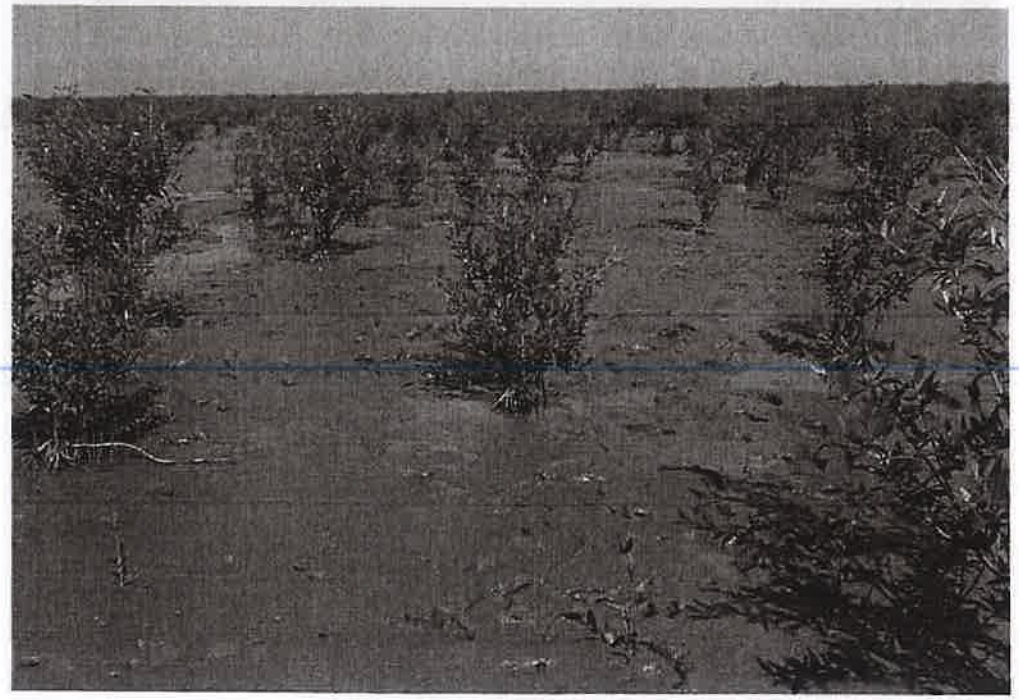
Mangroves planted in 200 ha. area at Ankalva Coast during 2012-13

Mangroves planted in 100 ha. area at Bhavnagar Coast during 2012-13

Mangroves planted in 200 ha. area at Bhavnagar Coast during 2013-14

Mangroves planted in 200 ha. area at Bhavnagar Coast during 2014-15

Mangroves planted in 50 ha. area at at Kentiyajal Coast during 2014-15



Mangroves planted in 50 ha. area at Gadhula, Talaja Coast during 2016-17

ANNEXURE XI

Petronet LNG Limited

Marine Ecological Monitoring report at Offshore, Dahej

December 2021

Kadam

Environmental Consultants

www.kadamenviro.com

Environment for Development

E: kadamenviro@kadamenviro.com; T:+91-265-6131000

Petronet LNG Limited

Marine Ecological Monitoring report at Offshore, Dahej

QUALITY CONTROL							
Name of Publication	Marine Ecological Monitoring report at Offshore, Dahej						
Project Number	2150108144	Issue No.	1	**Revision No.**	0	**Released**	December 2021
Prepared by	Manali Rathod			**Released by**	Mitali Khuman		

TABLE OF CONTENTS

LIST OF TABLES

1 INTRODUCTION

1.1.1 Field Sampling

Water samples are collected at 8 different locations including subtidal and Intertidal region. Water sample were collected at the surface, Middle and bottom at all sub-tidal stations to study the physic-chemical characteristics of the samples. Samples of sediment is also collected at 8 sampling station for chemical analysis.

Samples for physical and chemical water quality has been collected at 8 locations for 3 different depth (Surface, middle and Bottom). Water Samples to identify biological characteristic (Chlorophyll, Phytoplankton and Zooplankton) and sediment sample to identify benthos diversity has been collected at 8 different locations.

Sediments samples has been collected from 8 different locations to study the physical, chemical and biological characteristics.

Field sampling was carried out during post-monsoon season i.e. November 2021.

2 BIOLOGICAL PARAMETER

Establishment of biological status of an aquatic ecosystem is an essential pre-requisite to assess the impacts of existing as well as proposed developments in the surrounding region. While considering assessment of aquatic environmental changes and its implications, it must be realized that, despite many changes it may cause in the physico-chemical properties of the water body and bed sediment, the ultimate consequences are inevitably of a biological nature. Hence, the investigations of an ecosystem and particularly of its communities constitute an important part of any ecological assessment study. This can be achieved by selecting a few reliable parameters from a complex community structure. These communities Comprise of planktonic organisms which are microscopic and drift with the water currents. They are classified into Phytoplankton and Zooplankton on the basis of their trophic status. Phytoplankton includes all the producer level organisms such as algae, some photosynthetic bacteria which traps sunlight and in presence of CO_2 by a process called photosynthesis, synthesizes energy releasing O_2 in the water body, such transfer of energy from the primary sources through a series of organisms is defined as the food chain. Thus Phytoplankton are major source of productivity in water body can live only in photic zone, where maximum light penetration occurs; whereas Zooplanktons are organisms depending on the Phytoplankton for their existence, can be called as secondary producers since being consumed by higher level of organisms such as fishes etc. Biotic community also include bottom dwelling organisms e.g. Annelids, arthropods, molluscs etc. Benthic organisms being sedentary animals associated with the bed, provide information regarding the integrated effects of stress, if any, and hence are good indicators of early warning of potential damage. The benthic biotic environment, which supports a great composition of floral and faunal community, is defined as "all of bottom terrain from the wave-washed shoreline of flood-tide level to the greatest deeps" (Sverdrup et al, 1942).

2.1 Sampling Procedure

2.1.1 Pigments

The pigments were analysed from known volume of water which was filtered through 0.45 µm filter paper. The filter paper was extracted with 90% acetone. For estimation of chlorophyll and phaeophytin, the acetone extract was spectrophotometrically analysed between 630 and 750nm before and after dilute acid treatment. The pigment concentration was calculated using following formula.

$$\text{Cholorophyll a } (C_a) = 11.85\left(\text{Absorbance}_{664} - 1.54(\text{Absorbance}_{647})\right) - 0.08(\text{Absorbance}_{630})$$

$$\text{Chlorophyll a } (\text{mg/L}) = \frac{C_a \times \text{Volume of acetone extract}}{\text{Volum eof sample}}$$

Where 664b and 665a are the absorbance values of the acetone extract before and after acidification, respectively.

2.1.2 Phytoplankton

The phytoplankton samples were collected from the surface of the water column during high tide at all stations by using clean plastic bucket. Hundred liters of seawater sample was concentrated to 250 mL by filtering through plankton net (20 µm pore size). The concentrated samples were immediately preserved by adding 0.5 mL of 5% buffer formaldehyde and 2 mL of Lugol's iodine at the site itself. In the laboratory the samples were concentrated by using centrifuge and made up to the final volume of 25 ml. Finally concentrated samples were preserved in 5% formalin prepared in seawater. These samples were subjected to qualitative and quantitative

analysis of phytoplankton. For the quantitative estimation, Sedgwick Rafter counting cell was used and for qualitative identification microscopic examination was followed. The standard monographs and other published literature were used for identification (*Husted, 1930; Peragallo, 1965*).

2.1.3 Zooplankton

Zooplankton samples were collected with the help of horizontal haul and in this type of haul at least 30-40 m of towing ropes of the net is gradually paid out as vessel moves in slow speed taking a wide circle in such a way that at least some part of the net ring is visible above water. The depressor is not needed in this type of haul.

After the net comes fully out of the water it may be washed from outside by jetting seawater to bring down all the plankton into the collecting bucket. The washing will also help to removal of mesh-clogging materials so that the net will remain unclogged after every operation. After all the excess water is drained off from the net and through the window of the collecting bucket, the bucket is carefully removed from the net and the plankton, along with the water is poured into a wide mouthed polythene bottle of 500ml capacity up to 3/4th full. Enough concentrated formaldehyde solution to make the medium 5% strong may be added to the plankton immediately after collection.

One of the requirements in quantitative plankton investigation is to know the volume of water filtered. The calculation is based on the length of tow and the mouth area of the net.

2.1.4 Benthos

Macro benthic samples were collected with the help of Grab Sampler. Quantitative samples of the animals inhabiting intertidal sediments are usually taken by (Mouth area size 0.0625 m2) grab. The grab, which is lowered vertically from the stationary boat, capture the epi-fauna and infauna down to the depth excavated by the grab.

Van veen Grab is a small version of the grab used commercially for sand mining, unloading coal, etc. it consist of two buckets hinged together, which are held in the open position while being lowered. When on the bottom, the lowering rope slackens, allowing a release to operate so that on hauling up the two buckets close together before the grab leaves the bottom.

This sample is washed in a container of filtered sea water and sieved through (mesh size 0.5 mm) and the entire content were first stained in Rose Bengal and then preserved in formaldehyde. This will be a survey & study of quantitative distribution of fauna depending on a particular substratum, i.e. rocky fauna, muddy fauna, faunal of algal and grass beds and epi-fauna on sedentary organism.

2.2 Method of Analysis

Table 2-1: Method of Analysis for biological parameters

Sr. No.	Specific Test Performed	Test Method specification against which tests are performed
1	Chlorophyll	APHA: 10200 F (23rd Edition)
2	Phytoplankton	APHA: 10200 F (23rd Edition)
3	Zooplankton	APHA: 10200 G, I (23rd Edition)
4	Benthos	APHA: 10500 (23rd Edition)

2.3 Results of Biological parameters

The results of Chlorophyll, Phytoplankton, Zooplankton and Benthos are given below.

Table 2-2: Pigments in high tide (Surface water) in Marine water

Sr. no	Parameters	Unit	High tide							
			Surface water							
			ST1	ST2	ST3	ST4	IT1	IT2	IT3	IT4
1	Chlorophyll-a	mg/m³	1.0	1.3	0.9	1.0	0.8	0.9	1.1	1.3
2	Phaeophytin	mg/m³	0.7	0.8	0.6	0.7	0.5	0.6	0.4	0.5

Table 2-3: Pigments in high tide (Middle water) in Marine water

Sr. no	Parameters	Unit	High tide							
			Middle water							
			ST1	ST2	ST3	ST4	IT1	IT2	IT3	IT4
1	Chlorophyll-a	mg/m³	0.8	1.0	0.7	1.1	-	-	-	-
2	Phaeophytin	mg/m³	0.5	0.4	0.3	0.6	-	-	-	-

Table 2-4: Pigments in high tide (Bottom water) in Marine water

Sr. no	Parameters	Unit	High tide							
			Bottom water							
			ST1	ST2	ST3	ST4	IT1	IT2	IT3	IT4
1	Chlorophyll-a	mg/m³	0.9	0.8	0.6	0.7	-	-	-	-
2	Phaeophytin	mg/m³	0.4	0.3	0.2	0.3	-	-	-	-

Table 2-5: Cell count (No x 10^3/Lit) of phytoplankton

Station	Cell Count (No x 10^3/Lit)	Total Genera (No.)	Genera
ST1	24.8	7	*Odontella sp., Coscinodiscus sp., Melosira sp., Planktoniella sp., Nitzschia, Thalassiothrix sp., Dinophysis sp.*
ST2	27.3	7	*Coscinodiscus sp., Nitzschia, Navicula, Thalassiothrix sp., Melosira sp., Planktoniella sp., Diatom*
ST3	20.2	8	*Coscinodiscus sp., Nitzschia, Planktoniella sp., Chaetoceros, Melosira sp., Thalassiothrix sp. Diatom, Rhizosolenia sp.*
ST4	20.0	7	*Coscinodiscus sp., Nitzschia, Pleurosigma sp., Melosira sp., Thalassiothrix sp., Diatom, Navicula sp.*
IT1	22.5	9	*Coscinodiscus sp., Nitzschia, Melosira sp., Thalassiothrix sp., Ceratium sp., Chaetoceros sp., Amphiprora sp., Planktoniella sp., Odontella sp.*
IT2	25.7	8	*Thalassiothrix sp., Coscinodiscus sp., Nitzschia, Melosira sp., Amphiprora sp., Navicula sp., Chaetoceros sp., Planktoniella sp.*
IT3	20.6	9	*Coscinodiscus sp., Pleurosigma sp., Melosira sp., Diatom, Navicula sp., Nitzschia, Thalassiothrix sp., Chaetoceros sp., Ceratium sp.*
IT4	21.7	6	*Coscinodiscus sp., Chaetoceros sp., Melosira sp., Odontella sp., Thalassiothrix sp., Amphiprora sp., Nitzschia*
N.B. Low tide sample were not collected due low water			

Table 2-6:Standing Stock of Zooplankton

Station	Biomass (ml/100m³)	Population (No x 10³/Lit)	Total Group (No.)	Major Groups
ST1	5.0	21.6	5	Calanoida, Nauplius larvae, Cyclopoida, Tintinnid, Fish larvae,
ST2	5.3	23.2	6	Cyclopoida, Tintinnid, Nauplius larvae, Calanoida, Herpacticoida, Fish larvae
ST3	5.7	22.7	8	Tintinnid, Calanoida, Cyclopoida, Crustacean larvae, Nauplius larvae, Sagitta sp. (Chaetognatha), Fish larvae, Polychaete larvae
ST4	4.8	21.3	6	Tintinnid, Calanoida, Nauplius larvae, Sagitta sp. (Chaetognath), Fish larvae,
IT1	4.1	22.4	5	Cyclopoida, Calanoida, Tintinnid, Nauplius larvae, Fish larvae
IT2	4.0	20.3	6	Calanoida, Cyclopoida, Fish larvae, Tintinnid, Nauplius larvae, Crustacean larvae,
IT3	4.6	22.4	8	Tintinnid, Calanoida, Sagitta sp. (Chaetognatha), Cyclopoida, Copepods, Nauplius larvae, Fish larvae, Polychaete larvae
IT4	4.2	22.2	7	Fish larvae, Tintinnid, Calanoida, Nauplius larvae, Sagitta sp. (Chaetognatha), Polychaete larvae, Crustacean larvae
N.B. Low tide saple were not collected due to low water level				

Table 2-7: Standing Stock of Sub tidal Macro benthos

Station	Biomass (gm/m²)	Population (no./m²)	Total Group (No.)	Major Groups
ST1	1.3	360	4	*Bivalve, Gastropod, polychaeta, Foraminifera*
ST2	1.0	380	3	*Bivalve, Gastropod, Amphipods*
ST3	1.8	426	4	*Bivalve, polychaeta, Gastropod, Foraminifera*
ST4	1.4	364	2	*Bivalve, Gastropod*
IT1	1.6	350	3	*Bivalve, Gastropod, Amphipods*
IT2	1.5	320	3	*Bivalve, polychaeta, Foraminifera*
IT3	1.4	402	4	*Gastropod, Bivalve, Polychaeta, Foraminifera*
IT4	1.2	382	3	*Foraminifera, Bivalve, Gastropod*
N.B. Low tide saple were not collected due to low water level				

2.4 Conclusion of Marine Biological Analysis

In the present study the chlorophyll-a concentration was recorded in the coastal water varied between 0.6 and 1.3 mg/m³. In surface water chlorophyll-a recorded in range between 0.4 to 0.8 mg/m³ and in middle water 0.7 to 1.1 mg/m³ were recorded as well as on bottom water 0.6 to 0.9 mg/m³ were recorded. In surface water sample the concentration of chlorophyll-a slightly higher than the middle and bottom water sample, which is indicating good photosynthetic activity of phytoplankton on the surface.

The concentration of phaeophytin varies from 0.2 to 0.8 mg/m³ in all sampling locations.

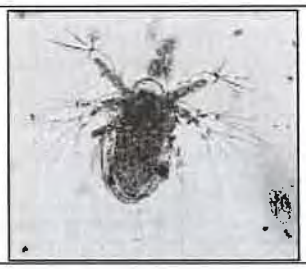
The phytoplankton sample were collected at eight different locations including sub-tidal and intertidal region at surface water with the help of phytoplankton net. Phytoplankton cell count varies from 20.0 No x 10^3/Lit to 27.3 No x 10^3/Lit in which the highest cell count was observed at station 2 (ST2) whereas lowest population observed at station 4 (ST4). The common phytoplankton genera are *Coscinodiscus, Melosira sp., Nitzschia and Thalassiothrix sp.*

The zooplankton sample were collected at eight different locations at surface water with the help of zooplankton net. Zooplankton standing stock biomass varies between 4.0 ml/100m^3 to 5.7 ml/100m^3 in which the highest biomass was recorded at Station ST3 (ST3) during high tide whereas lowest at biomass was recorded at Station IT2 (IT2). The zooplankton population varies in range between 20.2 No x 10^3/L to 23.2 No x 10^3/L were observed. The highest population also recorded at Station ST2 (ST2). The common zooplankton group is Calanoida, Tintinnid, Fish larvae and Nauplius larvae observed in the present study.

In the benthic organism, highest population and biomass was recorded at location ST3 in sub-tidal region. A common benthos group which is observed at all locations is gastropods, bivalve and foraminifera.

Photograph 2-1: Observed Zooplankton, Phytoplankton and Benthos

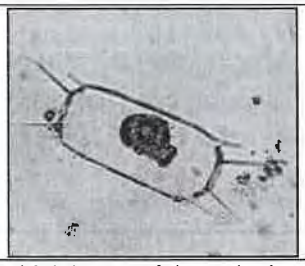
Nauplius larvae (Zooplankton)



Calanoida sp. (Zooplankton)

Copepod (Zooplankton)

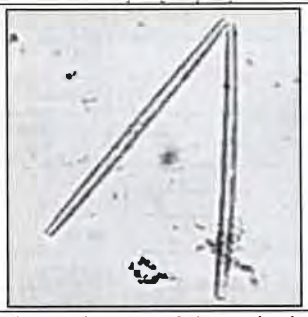
Tintinnid (Zooplankton)



Biddulphia sp. (Phytoplankton)

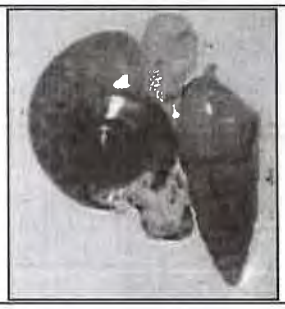
Chaetoceros sp. (Phytoplankton)

Coscinodiscus sp. (Phytoplankton)

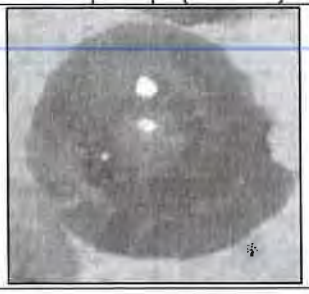


Thalassiothrix sp. (Phytoplankton)

Rhizosolenia sp. (*Phytoplankton*)



Gastropod sp. (Benthos)



Foraminifera (Benthos)

3 PHYSICO-CHEMICAL PARAMETERS

3.1 Sampling Procedure

Samples were collected with the help of Niskin Sampler from the different sampling locations.

Table 3-1: Method of Analysis for water parameter

Sr. No.	Specific Test Performed	Test Method specification against which tests are performed
1	pH	APHA: (4500-H+) 23nd Edition
2	Temperature	APHA: (2550- B) 23nd Edition
3	Suspended Solids	APHA: (2540 D) 23nd Edition
4	Salinity	APHA: (4500 Cl B) 23nd Edition
5	Dissolved oxygen	APHA: (4500 O- C) 23nd Edition
6	BOD	IS 3025 (PART-44)
7	Total Phosphorus	APHA: (4500 P-D)23nd Edition
8	Total Nitrogen	IS 3025 (PART-34)
9	Nitrate nitrogen	IS 3025 (PART-34)
10	Ammonical Nitrogen	IS : 3025 (PP 34)
11	Nitrite	IS 3025 (PART-34)
12	Alkalinity	APHA: (2320 B) 23nd Edition
13	Turbidity	APHA: (2130 B) 23nd Edition
14	Calcium Carbonate	APHA: (3500-Ca B) 23nd Edition

Table 3-2: Method of Analysis for sediment parameter

Sr. No.	Parameter	Test Method specification against which tests are performed
1	Texture	IS 2720 IV (Hydrometer Method)
2	Total Organic Carbon	Combustion Method
3	Sulphur	Bomb Calorimeter Method
4	Phosphoros	IS10158(Part 2):1973
5	Aluminium	EPA-3050B/APHA 3500 Al-B
6	Barium	EPA-3050B
7	Chromium	EPA-3050B
8	Manganese	EPA-3050B
9	Iron	EPA-3050B
10	Cobalt	EPA-3050B
11	Nickel	EPA-3050B
12	Copper	EPA-3050B
13	Zinc	EPA-3050B
14	Cadmium	EPA-3050B
15	Mercury	APHA: (3500 Hg) 23rd Edition
16	Lead	EPA-3050B
17	Phenol	APHA: (5530 D) 23rd Edition

APHA: American Public Health Association

3.2 Results of Marine water quality

Table 3-3: Chemical Analysis of Marine Water Sample

S.No.	Parameters	Unit (SI)	Level	ST1	ST2	ST3	ST4	IT1	IT2	IT3	IT4
1	PH	-	S	7.56	7.62	7.42	7.65	7.62	7.70	7.70	7.67
			M	7.57	7.61	7.53	7.60	-	-	-	
			B	7.67	7.70	7.52	7.67	-	-	-	-
2	Temperature	oC	S	26.2	26.4	26.1	26.8	26.5	26.5	26.8	26.3
			M	26.1	26.3	26.2	26.4	-	-	-	-
			B	26.4	26.2	26.5	26.2	-	-	-	-
3	Suspended Solids	mg/L	S	25	29	24	26	24	29	22	27
			M	28	34	32	33	-	-	-	-
			B	32	38	26	35	-	-	-	-
4	Salinity	mg/L	S	35262	36496	38788	40199	40904	41902	43020	38788
			M	36320	36496	40199	36496	-	-	-	-
			B	36496	36320	36496	33147	-	-	-	-
5	Dissolved oxygen	mg/L	S	4.4	4.3	4.7	5.1	5	5.1	5.2	5.1
			M	3.6	3.8	3.6	3.8	-	-	-	-
			B	3.8	3.9	3.8	3.7	-	-	-	-
6	BOD	mg/L	S	3.6	3.0	3	4	3.6	4.0	3.8	4.1
			M	2.8	2.6	2.8	3.8	-	-	-	-
			B	2.2	2.1	2.0	2.6	-	-	-	-
7	Total Phosphorus	mg/L	S	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
			M	<0.02	<0.02	<0.02	<0.02	-	-	-	-
			B	<0.02	<0.02	<0.02	<0.02	-	-	-	-
8	Total Nitrogen	mg/L	S	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
			M	<0.1	<0.1	<0.1	<0.1	-	-	-	-
			B	<0.1	<0.1	<0.1	<0.1	-	-	-	-

S.No.	Parameters	Unit (SI)	Level	ST1	ST2	ST3	ST4	IT1	IT2	IT3	IT4
9	Nitrate nitrogen	mg/L	S	ND	ND	ND	ND	ND	ND	ND	ND
			M	ND	ND	ND	ND	-	-	-	-
			B	ND	ND	ND	ND	-	-	-	-
10	Ammonical Nitrogen	mg/L	S	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
			M	<0.05	<0.05	<0.05	<0.05	-	-	-	-
			B	<0.05	<0.05	<0.05	<0.05	-	-	-	-
11	Nitrite	mg/L	S	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
			M	<0.1	<0.1	<0.1	<0.1	-	-	-	-
			B	<0.1	<0.1	<0.1	<0.1	-	-	-	-
12	Alkalinity	mg/L	S	150	160	120	170	160	180	180	170
			M	120	140	130	130	-	-	-	-
			B	170	180	140	180	-	-	-	-
13	Turbidity	NTU	S	15	17	14	8	12	16	18	16
			M	18	20	16	12	-	-	-	-
			B	22	23	26	18	-	-	-	-
14	Calcium Carbonate	mg/L	S	1430	1635	1328	1737	1328	1124	1226	1839
			M	1328	1226	1226	1338	-	-	-	-
			B	1226	1430	1533	1635	-	-	-	-

Table 3-4: Chemical Analysis of Marine sediment sample

S. No.	Parameters	Unit (SI)	ST1	ST2	ST3	ST4	IT1	IT2	IT3	IT4
1	Texture	-	Loamy sand	Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sandy loam	Sand
2	Total Organic Carbon	%	0.51	0.59	0.53	0.46	0.46	0.56	0.51	0.43
3	Sulphur	%	0.23	0.22	0.24	0.58	0.43	0.13	0.08	0.08
4	Phosphorus	gm/kg	0.09	0.15	0.27	0.03	0.15	0.05	0.04	0.21
5	Aluminium	gm/kg	0.003	0.003	0.002	0.007	0.003	0.005	0.003	0.004
6	Barium	gm/kg	ND	ND	ND	ND	ND	ND	ND	ND
7	Chromium	gm/kg	ND	ND	ND	ND	ND	ND	ND	ND
8	Manganese	gm/kg	ND	ND	ND	ND	ND	ND	ND	ND
9	Iron	gm/kg	ND	ND	ND	ND	ND	ND	ND	ND
10	Cobalt	gm/kg	ND	ND	ND	ND	ND	ND	ND	ND
11	Nickel	gm/kg	0.010	0.013	0.011	0.009	0.010	0.011	0.012	0.010
12	Copper	gm/kg	0.008	0.010	0.009	0.014	0.011	0.009	0.010	0.012
13	Zinc	gm/kg	ND	ND	ND	ND	ND	ND	ND	ND
14	Cadmium	gm/kg	ND	ND	ND	ND	ND	ND	ND	ND
15	Mercury	gm/kg	ND	ND	ND	ND	ND	ND	ND	ND
16	Lead	gm/kg	ND	ND	ND	ND	ND	ND	ND	ND
17	Phenol	gm/kg	ND	ND	ND	ND	ND	ND	ND	ND

3.3 Conclusion

3.3.1 Chemical Analysis of Water Sample

- A pH at all sampling location was recorded from 7.52 to 7.70.
- Temperature at all sampling location was recorded from 26.1 to 26.8 °C.
- Suspended solid in water samples were recorded from 22 mg/l to 38 mg/l.
- Salinity in water samples were recorded from 33147 mg/l to 43020 mg/l.
- DO recorded in range between 3.8 mg/L to 5.2 mg/L and BOD recorded in range from 2 mg/L to 4.1 mg/L.
- Total phosphorous, Total nitrogen, ammonical nitrogen and nitrite concentration observed below detectable range.
- Alkalinity concentration observed in range between 120 mg/L to 180 mg/L.
- Calcium carbonate was recorded in range from 1124 mg/L to 1737 mg/L at all sampling location.
- Turbidity were recorded in range between 8 mg/L to 26 mg/L during present study.

3.3.2 Chemical Analysis of Sediment Sample

- Structure of sediment was mostly sandy loam type at all sampling locations.
- Total organic carbon was recorded in range between 0.43 to 0.59%, while Sulphur concentration was found in range from 0.08 to 0.58%.
- Phosphorous concentration observed in range between 0.03 to 0.27 gm/kg at all sampling location.
- Aluminium concentration found in range from 0.002 to 0.0077 gm/kg, while nickel and copper concentration recorded in range between 0.009 mg/kg to 0.013 mg/kg, 0.008 mg/kg to 0.014 mg/kg, respectively.
- Barium, Chromium, Iron, Cobalt, Cadmium, Zinc, Mercury, lead and phenol were not detectable at all sampling locations.

Photograph 3-1: Sampling Photographs

Trawling Net for plankton sample collection

Benthic sample washing and collection

Plankton sample collection

3.4 Avifaunal Diversity

Table 3-5: Systematic List of birds in the study area

S. No.	Scientific Name	Common Name	Schedule/ IUCN Category
1	*Aedeola grayii*	Pond Heron	IV
2	*Bulbulcus ibis*	Cattle Egret	IV
3	*Platalea leucorodia*	Spoonbill	IV
4	*Amauronis phoenicurus*	White breasted water hen	IV
5	*Vanellus indicus*	Red wattled lapwing	IV
6	*Tringa hypoleucos*	Common sandpiper	IV
7	*Clamator jacobinus*	Pied creasted Cuckoo	IV

3.5 Mangroves

Scattered patches of small size planted mangroves were observed opposite to light house during the study period and also patches of mangrove vegetation observed in the study area near the Ro-Ro ferry jetty as well as near the mouth of Narmada estuary.

Mangrove flora is dominated by *Avicennia species*. However, no mudflats sustaining dense growth of mangroves have been reported. Nearest mangroves patches were observed at distance of ~1 km in WN direction.

3.6 Team Members

Work presented in this report is done by KEC with active co-operation from Petronet LNG Limited., KEC team members include:

Member 1, Mitali Khuman (Ecologist)

Member 2, Manali Rathod (Ecologist)

Member 3, Sapna Amin (Lab – In-charge)

Member 4, Hiralal Prajapati (Monitoring Specialist)

Member 5, Anup Ojha (Monitoring Specialist)

The work was carried out under the overall guidance of Mr. Sameer Kadam (Director)

Annexure-XII

EMC Organogram – PLL, Dahej