Indian oil Corporation Limited
Gujarat Refinery

IndianOil

GUJARAT REFINERY
Where growth is essence of life

Ref: HSE/GPCB/2017

Date: 26.09.17.

The Member Secretary
Gujarat Pollution Control Board
Paryavaran Bhavan
Sector 10-A,
Gandhinagar – 382 010.

Sub: Environment Statement for the year 2016-17

Dear Sir,

Pleased find enclosed, the Environment Statement of Gujarat Refinery for the financial year ending 31st March 2017. The report has been compiled as per Form-V of Central Pollution Control Board.

Thanking you,

Yours faithfully,

(I. Daniel Raj)
Chief Manager (HSE)
Gujarat Refinery

आई. डेनिय[illegible] राज
I. [illegible] Raj
वरि. प्रबंधक, पर्यावरण)
Ch[illegible] Safety, Environment)
[illegible].सी.एल., वडोदरा.
[illegible] Refinery, IOCL, Vadodara.

Encl: As above.

CC: **The Regional Officer**
Gujarat Pollution Control Board
GERI Compound, Race Course
Baroda–390007.

FORM – V
(See Rule 14)

From:
Gujarat Refinery
Indian Oil Corporation Limited
PO : Jawaharnagar
Vadodara – 391 320
Gujarat

To,
Gujarat Pollution Control Board
Paryavaran Bhavan
Sector 10-A
Gandhinagar – 382 010.

Environmental statement for the financial year ending on 31st Mar'17.

PART – A

i)	Name & address of the owner/ Occupation of the industry, Operation or process.	Shri Sudhir Kumar Executive Director Gujarat Refinery PO: Jawaharnagar Baroda – 391 320.
ii)	Industry category	Primary
iii)	Production capacity	13.7 million metric tons of crude oil per annum.
iv)	Year of establishment	1965
v)	Date of the last Environmental Statement submitted.	19th Sep'16

PART – B

Water and Raw Material Consumption			
		2015-16	**2016-17**
		Water consumption,m3/day	Water consumption,m3/day
1	Process/Service	4858.1	5435
2	Cooling	9127.0	7806
3	Domestic (Refineries area only)	6609.5	6846
4	DM Plant	16930	9630
5	Fire water from freshwater	103	2947
	TOTAL	**37627**	**32664**

Process water consumption per unit of crude processed	
2015-16	**2016-17**
1.0 M^3 per MT of crude	0.92 M3 per MT of crude

(2) Raw Material Consumption			
SN	**Name of Raw material**	**2015-16, MT**	**2016-17, MT**
1	Crude Oil	13819915	13936189
2	Methanol	8976	10666
3	Benzene	17539	46307

Name of Products :

List of products are enclosed below:

Name of the products	Yield (MT) , (15-16)	Yield (MT) , (16-17)
Liquefied Petroleum Gas	554300	480740
Butene-II	-	-
Benzene	-	-
Toluene	--103	0
Naphtha	762000	547140
MTBE	0	-453
Motor Spirit (MS)	1783406	991810
Food Grade Hexane (FGH)	135	0
Motor Turpentine Oil (MTO)	86	0
Aviation Turbine Fuel (ATF)	400207	349938
Superior Kerosene	776150	575672
LABFS	0	458128
LAB	99801	139473
n-paraffin	-	-
Light Aluminum Rolling Oil (LARO)	-	-
PD Oil	-	-
IOC Residue 96	-	-
ISO-SOI-90	-	-
HSD	7060488	7107730
LDO	18219	15177
LSHS	-	-
VGO	-	-
Furnace Oil	456082	408205
Bitumen	366865	443118
Sulphur	101736	100951

PART – C

Pollutants discharged to environment / unit of output
(Parameters as specified in the consent issued)

Pollutants For Effluent	Quantity of Pollutants Discharged (Kg/day)	Concentration of pollutants in discharges (mg/lit)	Percentage of variation from prescribed standards with Reasons
Oil	18	5	Always remained within prescribed limits.
Phenol	2.52	0.7	-- do --
BOD	43.2	12	-- do --
Sulfide	2.52	0.7	-- do -
TSS	50.4	14	-- do --

Other parameters for effluents (other than mentioned above) are given below

Parameters	Limit(mg/l) except pH)	Typical value(mg/l, except pH)	Percentage of variation from prescribed standards with Reasons
pH	6.5—8.5	7.6	Well within limit
Ammonical Nitrogen	50	2.15	-- do --
Cyanides	0.2	B.D.L	--
Total chromium	2	0.03	Well within limit
Hexavalent chromium	0.1	B.D.L	-- do --
Zinc	5	0.55	-- do --
Fluoride as F	1.5	0.79	--
Mercury as Hg	0.01	B.D.L	--
Copper as Cu	3	0.04	Well within limit
Lead as Pb	0.1	0.03	-- do --
Nickel as Ni	3	0.22	-- do --

S.N.	Stack	Fuel burnt (type with %)		Concentration in mg / Nm3 unless stated			
				SO_2		NO_X	
				Limit	Actual	Limit	Actual
		FUEL OIL %	FUEL GAS %	mg/m3	mg/m3	mg/m3	mg/m3
1	AU-I F-1	81.2	18.8	699.6	160.5	331.2	93.2
2	AU-I F-2	81.2	18.8	699.6	122.1	331.2	73.1
3	AU-I F-3	81.2	18.8	699.6	97.4	331.2	76.7
4	AU-I F-4	81.2	18.8	699.6	112.2	331.2	77.6
5	AU-I F-5	81.2	18.8	699.6	110.6	331.2	81.7
6	AU-II F-1	73.6	26.4	638.8	130.7	323.6	95.2
7	AU-II F-2	73.6	26.4	638.8	115.6	323.6	76.9
8	AU-II F-3	73.6	26.4	638.8	111.2	323.6	76.6
9	AU-II F-4	73.6	26.4	638.8	62.3	323.6	50
10	AU-II F-5	73.6	26.4	638.8	95	323.6	69.1
11	CRU 21 -F-01	39.8	60.2	368.4	95	289.8	89.2
12	CRU 21-F-02	39.8	60.2	368.4	96.2	289.8	73.6
13	CRU 22-F-01	39.8	60.2	368.4	92.1	289.8	71.1
14	CRU F1	16.1	83.9	178.8	50.2	266.1	65.8
15	AU-III F-2	64.7	35.3	567.6	129.2	314.7	77.8
16	AU-III F-3	64.7	35.3	567.6	109	314.7	64.9
17	MSQ 15 F-01-04	0	100	50.0	16.8	250.0	69.4
18	MSQ 14 F01	0	100	50.0	18.9	250.0	72.1
19	MSQ 15 F05	0	100	50.0	24.6	250.0	79
20	MSQ 15 F01	0	100	50.0	35.6	250.0	69.3
21	LAB Hot oil 2063 F-01	53.7	46.3	479.6	390	303.7	81.4
22	LAB 2061 F-001	53.7	46.3	479.6	176.9	303.7	51
	LAB 2071 F-01	0	0	50.0	0	250.0	0
23	UDEX	0	100	50.0	82.1	250.0	81.5
24	AU-5	60.8	39.2	536.4	150.3	310.8	82.8
25	FPU-1	63.6	36.4	558.8	114.4	313.6	69.6
26	FCC Charge	0	100	50.0	75.9	250.0	90.6

	Heater						
27	CO Boiler	100	0	850.0	112.6	350.0	102
28	HGU-1	0	100	50.0	36.6	250.0	74.4
	HGU-1	0	100	50.0	0	250.0	0
29.	HGU-2	6.3	93.7	100.4	0	256.3	0
	HGU-2	6.3	93.7	100.4	0	256.3	0
30	HGU-3	0	100	50.0	28.9	250.0	67.7
31	HGU-3	0	100	50.0	36.4	250.0	64.5
32	HCU 1&2	53.5	46.5	478.0	345.9	303.5	88.3
33	HCU 3&4	53.5	46.5	478.0	343.8	303.5	93.8
34	FPU-2 03FF 001	84	16	722.0	331.5	334.0	91.4
35	AU-IV	71.1	28.9	618.8	164.5	321.1	93.8
36	VDU	73.1	26.9	634.8	308.9	323.1	83
37	VBU	0	100	50.0	0	250.0	0
38	CDU-E	71.1	28.9	618.8	308.9	321.1	81
39	CDU-W	71.1	28.9	618.8	126.5	321.1	82
40	BBU F-1	21.9	78.1	225.2	81.5	271.9	62.8
41	BBU F-2	21.9	78.1	225.2	71.5	271.9	66.3
42	TPS -B1	87.5	12.5	750.0	142.3	337.5	99.6
	TPS -B2	87.5	12.5	750.0	118.9	337.5	97
	TPS -B3	87.5	12.5	750.0	91.2	337.5	78.1
	TPS -B4	87.5	12.5	750.0	139.6	337.5	77.1
43	HRSG-1 CGP-I	0	100	50.0	15.4	250.0	49.2
44	HRSG-2 CGP-I	0	100	50.0	18.3	250.0	51.9
45	HRSG -3 CGP-I	0	100	50.0	15.1	250.0	45.3
46	HRSG-4 CGP-II	0	100	50.0	15.6	250.0	42.5
47	HRSG-5 CGP-II	0	100	50.0	13.1	250.0	33.6
48	DHDS	0	100	50.0	72.3	250.0	89.5
49	DHDT	0	100	50.0	33.5	250.0	62.8
50	ISOM F-01	0	100	50.0	44.6	250.0	76.3
	ISOM F-02	0	100	50.0	0	250.0	0
51	SRU-I	0	100	50.0	0	250.0	0
52	SRU-II	0	100	50.0	0	250.0	0
53	SRU-III	0	100	50.0	143.2	250.0	85.7
54	VGO _HDT F01	0	100	50.0	109	250.0	85.5
	VGO _HDT F02	0	100	50.0	0	250.0	0
55	DCU F01	29	71	282.0	85.1	279.0	88.5

56	DCU F02	29	71	282.0	75.8	279.0	55.1

NB: The limits mentioned for fuel oil and fuel gas are based on CPCB standards.

PART – D

HAZARDOUS WASTES

As specified under hazardous wastes (management and handling) Rules,2008

SL.NO	Hazardous waste	2015-16 (MT)	2016-17 (MT)
a	From Tank Bottom	1125	1250
b	From CETP		
c	Spent Catalyst	568.3	684
d	No. of Ethyl Mercaptan Drums/Empty Drums	4590	4117

PART – E

SL.NO	Solid wastes	2015-16 (MT)	2016-17 (MT)
a	From Process	Nil	Nil
b	From Pollution Control Facility (Bio-Sludge)	-	-
1	Quantity recycled or reutilized within unit	Nil	Nil
2	Solid (bio-sludge) Disposed (in green belts as manure)	600	6000

PART – F

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

1. Oily Wastes:

Characteristics of oily sludge are tabulated below:

Sr. No.	Parameters	Value.
1	Sediment (%)	66
2	Total Halogens (PPM)	NA
3	Polynuclear aromatic Hydrocarbon (PAH), %	Absent
4	Polychlorinated biphenyls (PCB)	Absent
5	Heavy metals, mg/kg	
	Cadmium	BDL
	Chromium	0.07
	Nickel	0.001
	Lead	BDL
	Arsenic	0.01

Presently M/s Plant Tech Mid continental Pvt. Ltd. has been engaged for processing of oily sludge for recovery of oil. A sludge processing Unit (SPU) was installed by the Vendor which process oily sludge on continuous basis. SPU basically uses Tricantor which separates Oil, Water and sludge. Oily sludge after heating with steam fed to unit and some solvent like slop oil is added for better mixing. This residual sludge after oil recovery is bio remediated.

Gujarat Refinery has Oily waste is treated in the refinery premises by bioremediation. It is bacteriological treatment with Oilivorous-S developed jointly by IOCL,R&D and The Energy & Resources Institute (TERI), New Delhi. In this process, oily waste is converted into harmless components like CO_2, Water and fatty acid.

2. Spent catalyst:

Spent catalyst is generated from refinery processes due to its deactivation. Authorization is obtained from Gujarat Pollution Control Board to dispose the spent catalysts to the secured landfill developed by Nandesari Environment Control Limited (NECL) at Nandesari.
Also MoEF approved agency was lined up for complete disposal of catalyst for metal recovery.

3. Bio-sludge:

At present, bio-sludge is dried in sludge drying beds after centrifuging. This dried bio-sludge is used as manure in green belt.
Characteristics of bio-sludge are tabulated below:

Sl No.	Parameter	Value
1	Nitrogen	1.72
2	Phosphorus (P2O5)	0.61
3	Potash (K2O)	0.26
4	Organic Matter	92.95
5	Fe	24.20
6	Mn	0.27
7	Zn	16.50
8	Cu	0.26
9	Cd	0.16
10	Co	B.D.L
11	Ni	0.51
12	Cr	0.08
13	Pb	0.17

PART – G

(Impact of the pollution control measures on conservation of natural resources and consequently on the cost of production)

1. Treated effluent from CETP is mostly recycled (up to 95 %) to Refinery processes and rest is sent to VECL. After commissioning of RO Plant, CETP treated water is totally diverted to RO Plant. Permeate from RO is used in DM plants and the remaining in cooling towers and firewater network. RO Reject after proper dilution is discharged via VECL. The reuse from RO Plant is around 88% and the remaining 12%(120-150 m3/hr) is discharged via VECL.

2. Bioremediation of oily sludge by cultured bacteria developed by IOCL (R&D) and The Energy & Resources Institute (TERI) is being done continuously. This eco-friendly disposal of oily waste solved the long pending disposal problem. Bioreactor for fast confined space bioremediation is presently being used for bioremediation of oily sludge.

3. Spent Caustic Treatment Plant with state-of-the-art technology was set up in Gujarat Refinery CETP, where reactive sulfide is converted into less harmful

soluble sulfate by wet-air-oxidation process. This facility has reduced the generation of chemical waste in the Gujarat Refinery.

4. For removal of H_2S from the fuel source itself, Refinery has set up amine treating units for fuel gas. MDEA is being used for absorbing H_2S from the fuel gas. H_2S from the rich amine is being stripped off in amine regenerator.

A sulfur recovery unit uses off gas from amine regeneration unit as feed and converts gaseous H_2S into liquid elemental sulfur, thereby reducing SO_2 emission from the refinery.

5. Methyl Tertiary Butyl Ether (MTBE) plant for addition of MTBE in MS in place of TEL for boosting octane number has been set up.

6. Side entry mixers and also jet mixers have been installed in crude oil tanks for reduction of tank bottom sludge in the crude oil. The oily sludge of crude oil tanks is now treated by Blabo Process, where the oil extracted from bottom sludge is reused & processed in Refinery and the solid waste having less than five (05) % oil is bio-remediated.

7. Loss prevention and energy conservation measures:

- Installation of combustion control system in furnaces for reduction of excess air in order to increase the efficiency of furnaces which in turn reduces fuel consumption.
- All lighter product tanks are provided with floating roofs to minimize the evaporation loss. Lighter product tanks have also been provided with Secondary seals.
- By optimum utilization of Hydrogen generation capacity and consumption, one Hydrogen unit was stopped.
- By optimum utilization of HRSG steam generation capacity and consumption of HP/MP steam, one Boiler was stopped.

PART – H

(Additional investment proposal for environmental protection including abatement of pollution) scheme approved / job in progress:

1) Revamp of existing units under Resid Upgradation Project (RUP) is being carried out to supply fuel of BS-IV standards.

2) To reduce effluent load @ 200 M3/hr in CETP, nine numbers of schemes for diversion of gland cooling water from all sources within the Refinery to nearby Cooling tower instead of to OWS/CETP have been implemented and all are functioning well. (CRU, AU-5, Udex, MTBE, MSQ, FPU-II, HGU-I, GRE, GRSPF).

3) LDAR programme is in practice to reduce HC loss.

4) Two Rain harvesting schemes commissioned during the Financial year 2016-17. It is also proposed to install more rain harvesting schemes in Refinery Township.

5) Commissioning job of RO plant at CETP has been completed. CETP treated water is utilized in RO plant and RO Permeate is mainly used in DM Plant. Overall reuse from RO plant is around 88%.

6) To arrest oil at source, various measures such as installing no. of oil catchers at strategic locations, are being taken. Two oil catchers are installed during the reporting period. 26 plate type oil catchers had also been installed inside the process unit area as well as at other strategic locations of Open channel.

7) Online AAQMS data to CPCB server has been commissioned in Apr'13.Online Stack data to CPCB Server linking job also completed in Sep'13.Installation and online connectivity with CPCB as well as GPCB server for PM& CO analyzers in all stacks as per CPCB guidelines has been completed on 30th June, 2016.

8) For the year 2016-17, 6569 trees were planted in and around Gujarat Refinery to sequester the carbon dioxide generated and made the major events organized during the year 16-17 Carbon Neutral Event.

New schemes/projects, which were completed during the year:

1. Comprehensive water treatment programme has been started since Apr'14.Presently, the job is carried out by M/s. Ion Exchange Pvt Ltd.

2. Scheme for routing of Tekra water to downstream of MOV of Open channel at CETP helping in reduction of load in storm water channel has been implemented.

3. Scheme for separation of Guard Pond discharge headers for facilitating flexibility for maintenance, without taking shutdown of CETP has been completed.

4. All the five CETP PSF filter media were replaced with new media. These filters are now having been taken in line improving CETP treated effluent quality. Media of all five ACFs are also under process of replacement.

5. Scheme for provision of separate backwash header of PSFs and ACFs to minimize fresh water consumption at Cooling Towers due to pressure fluctuations has been completed.

6. Scheme for routing of DAF sludge to thickener was implemented with an aim to reduce sludge load in lagoons.

7. Online analyzers have been installed for the first time at the treated effluent discharge of CETP plant at Gujarat Refinery. The data depicting quality of treated effluent analyzers for parameters like pH, Oil, TSS, BOD, COD, Sulphide is instrumental in continuous monitoring of CETP operation and taking pro-active actions/measures whenever deemed necessary. Besides, the data has also been connected directly with State Pollution Control Board/ Central Pollution Control Board servers.

PART – I

(Any other particulars for improving the quality of the environment)

1) Environment Management System at Gujarat Refinery is at par with International standard. For effective environment management system, refinery declared an environment policy, which aims to comply & excel the statutory limit and norms of pollution control & prevention.

The efforts of the refinery towards environment management system was recognized by internationally reputed third party M/s DNV, Netherland and certified with the prestigious ISO-14001 certificate on 3rd July, 1997. In every six months surveillance audit is conducted to verify whether the system meets the standard. Recently, periodic Audit has been done in May'16. Gujarat Refinery has been recertified for OHSAS 18001: 2007, ISO-14001:2004 & ISO-9001:2008 on Nov'13. It is valid up to 8th Dec'016 which will be further revalidated

2) Gujarat Refinery recognizes the importance of a structured and comprehensive mechanism to ensure that the refinery activities and products do not cause adverse effects on the environment. Thus, yearly environment audit is being conducted by GPCB approved schedule –I auditors.

3) World Environment Day, energy conservation fortnight were celebrated with involving employees contract labours and nearby villagers to inculcate awareness towards Environment and energy conservation.

Date: 26.09.2017

Name: I. Daniel Raj
Designation: CM (HSE)
Address: Gujarat Refinery
PO: Jawaharnagar
Vadodara-391320.

आई. डेनियल राज
I. Daniel Raj
वरि. प्रबंधक (स्वास्थ्य, सुरक्षा, पर्यावरण)
Sr. Manager (Health, Safety, Environment)
गु.रि.आई.ओ.सी.एल., वडोदरा.
Gujarat Refinery, IOCL, Vadodara.