



03/HSE/ENV/202/04  
06.12.2019

The Additional Principal Chief conservator of Forests (C)  
Ministry of Environment, Forest & Climate Change  
4th Floor, E&F Wings, Kendriya sadan, Koramangala, Bangalore-560 034

Dear Sir,

**Sub: Submission of Half yearly compliance report – Environmental Clearance issued by the Ministry of Environment, Forests and Climate Change.**

**Ref:** EC No: J-11011/369/2005-IA II (I) dated 2<sup>nd</sup> February 2006, granting environmental clearance for Capacity Expansion cum Modernisation Project (Phase-II).

Please find enclosed the compliance report on the various conditions laid down by MoEF &CC, pertaining to the half year period from 1<sup>st</sup> April, 2019 to 30<sup>th</sup> September, 2019 for the Project mentioned in above reference.

Thanking you

Very truly yours  
For BPCL Kochi Refinery

  
**Babu Joseph**  
**Chief General Manager (HSE)**

Encl: 1. Six Monthly Compliance Report  
2. Annexure -I, Emission Details  
3. Annexure -II, Ambient Air Details  
4. Annexure - III, Quality of Effluent discharged  
5. Annexure – IV, CREP compliance  
6. Annexure V, Bore well Analysis Report.

Cc:

**1. The Member Secretary**  
**Central Pollution Control Board**  
**Parivesh Bhawan**  
**East Arjun Nagar**  
**Delhi - 110 032**

**2. The Member Secretary**  
**Kerala State Pollution Control Board**  
**Plamoodu Junction**  
**Pattom Palace**  
**Thiruvananthapuram - 695 004**

पोस्ट बैग नं: 2, अम्बलमुगल - 682 302, एरणाकुलम जिला, केरल, दूरभाष: 0484 - 2722061 - 69 फैक्स: 0484 - 2720961 / 2721094  
पंजीकृत कार्यालय: भारत भवन, 4 & 6, करीमभाय रोड, बेल्लर्ड इस्टेट, पी. बी. नं. 688 मुंबई - 400 001

**COMPLIANCE STATUS OF ENVIRONMENTAL CLEARANCE CONDITIONS FOR CAPACITY EXPANSION CUM MODERNISATION PROJECT (PHASE-II) ACCORDED BY J-11011/369/2005-IA II(I) DATED 2ND FEBRUARY 2006**

**Status of the project:** Project commissioned in 2010-11

SI No	Conditions	Status as on 30.09.2019
<b>A.</b>	<b>SPECIFIC CONDITIONS</b>	
1.	<p>The gaseous emissions from various process units shall conform to the standards prescribed by the concerned authorities from time to time. The KSPCB may specify more stringent standards for the relevant parameters keeping in view the nature of the industry and its size and location. At no time, the emissions levels should go beyond the prescribed standards. In the event of failure of any pollution control system adopted by the unit, the respective unit should not be restarted until the control measures are rectified to achieve the desired efficiency.</p>	<p>BPCL Kochi Refinery is conforming to all relevant standards &amp; limits on gas emissions, prescribed by statutory authorities.</p>
2.	<p>On-line continuous monitoring facilities shall be provided on all the stacks of adequate height as per CPCB guidelines. SO<sub>2</sub>, CO, HC, NO<sub>x</sub> etc. shall be maintained within the CPCB limits.</p> <p>Low sulphur fuels shall be used for heaters. Sulphur Recovery Unit (SRU) shall be installed and SO<sub>2</sub> emissions from the plant shall not exceed existing 1607 kg/h and further efforts shall be made to further reduce SO<sub>2</sub> emissions. Low NO<sub>x</sub> burners shall be installed to control the NO<sub>x</sub> emissions.</p>	<p>Online continuous monitoring facilities are provided on all operational stacks.</p> <p>SO<sub>2</sub>, CO, NO<sub>x</sub>, PM, H<sub>2</sub>S and Ni/Vanadium are being monitored as per consent and are within limits</p> <p>BPCL Kochi Refinery is using desulphurised fuel gas and low sulphur fuel oil (Sulphur content less than 1%) in its heaters and boilers.</p> <p>Total SO<sub>2</sub> emission from the refinery is within the limit of 1518 kg/h.</p> <p>For reducing the sulphur content of fuel gas used in heaters, sulphur recovery unit (SRU) of capacity 80 TPD, has been installed as part of CEMP Phase-II project.</p> <p>Heaters and boilers installed as part of CEMP Phase-II project are provided with low NO<sub>x</sub> burners.</p>

SI No	Conditions	Status as on 30.09.2019
3.	Continuous ambient air quality monitoring stations for SO <sub>2</sub> , SPM, HC shall be installed in all the 4 directions in consultation with the KSPCB. Data shall be regularly monitored and records maintained and report submitted to the Ministry/CPCB/KSPCB once in six months.	In consultation with KSPCB, the refinery has installed CAAQMS stations in all the four directions. Data on ambient air quality for the period from April 1st 2019 to March 30th 2019 is attached as <b>Annexure-II</b> .
4.	As indicated in the EIA/EMP reports, out of total 1700 m <sup>3</sup> /d industrial effluent generated, 360 m <sup>3</sup> /d sour water will be recycled in the plant after stripping of Ammonia and Hydrogen Sulphide and will be used for desalting of crude in desalters and as wash water in air fin condensates etc. Besides, 300 kl/d, treated waste water will be used for fire fighting, process area cleaning, cooling water make up and for green belt development. Remaining treated effluent will be discharged to Chitrapuzha river after conforming to the prescribed standards. Generation of waste water shall be reduced by installation of sour water stripper unit; use of closed blow down system for all hydrocarbon liquid discharge from the process units, proper segregation and collection of various effluents; paving the process area to avoid contamination of soil, ground water, comprehensive waste water management etc.	<p>A new Sour water Stripping unit (SWS) of capacity 412.8 m<sup>3</sup>/d was installed along with the project. The stripped water is recycled in the plant. Stripped water is used in Desalters in crude units</p> <p>Closed blow down (CBD) system is provided in all units.</p> <p>Proper collection /segregation facilities are installed for effluent streams. Process area paving is also carried out.</p> <p>The effluent treatment plant (ETP) put up as part of CEMP-Phase II project is running continuously. The treated effluent discharge discharged to Chithrappuzha conforms to the standards. Treated water is recycled through RO based DM plant, 300 KL/day of this treated effluent is being used for fire fighting, process area cleaning and green belt development.</p> <p>Process areas are paved to avoid contamination of the soil.</p>
5.	No ground water contamination in and around factory premises shall be ensured by making all the underground lines carrying hydrocarbons, closed drainage system, storage tank etc. leak proof in order to avoid any leakages. Regular monitoring of ground water in and around factory premises shall be carried out by installing piezometer wells and six monthly reports shall be submitted to the Regional Office of this Ministry at Bangalore/CPCB/KSPCB.	<p>Around sixty borewells are dug inside the refinery premises and the water sample from the wells are monitored regularly, to assess the ground water quality, 14 nos of Piezometer wells are also provided for the same.</p> <p>Hydrocarbon storage tanks are provided with MS plates at the bottom to avoid leaching of oil to land. Moreover LDPE lining is also provided on the tank pad of new tanks as an additional precaution to prevent oil seepage to underground water. In addition, closed drainage system is provided for all storage tanks, to avoid any possible land/ ground water contamination during tank draining.</p>

SI No	Conditions	Status as on 30.09.2019
6.	The domestic waste water shall be treated in the sewage treatment plant and treated waste water conforming to the standards for land application shall be reused for green belt development.	STP of 250 m <sup>3</sup> /day capacity has been installed and running continuously for treating the domestic waste water. The treated effluent is being used for green belt development.
7.	Regular monitoring of the quality of effluent discharged and at river water intake point shall be ensured to ensure no pollution of the Chitrapuzha river.	Quality of effluent discharged into the Chitrapuzha river is analysed and monitored on a regular basis to ensure no pollution of the Chitrapuzha river. The river water intake to refinery is located at Periyar river and the quality of the same is also monitored.
8.	In-plant control measures for checking fugitive emissions from spillage/raw materials handling etc. should be provided. Proper maintenance of equipments shall be ensured to reduce fugitive emissions.	Closed Blow Down (CBD) systems are provided in all process plants to enable closed loop recycling of all hydrocarbon drains, without fugitive emissions. Double seal floating roof are provided for all the Crude tanks Hydro carbon detectors are provided as per requirement. Proper maintenance of equipment (including preventive maintenance) is carried out on a regular basis.
9.	Solid waste generated in the form of oil sludge, chemical sludge, catalyst, spent molecular sieves and bio-sludge shall be properly treated / reprocessed / reused or properly disposed off. Spent catalyst, a hazardous waste shall either be sent back to supplier(s) for reprocessing or disposed off in the secured landfill. Oil sludge shall be subjected to maximum recovery followed by bio-remediation. Bio-sludge for ETP shall be used as manure after ensuring all the parameters within the permissible limits whereas chemical sludge from ETP shall be collected and disposed in Secured Landfill (SLF).	Post IREP, ETP sludge is processed in DCU. Oily sludge to the maximum possible is processed in DCU. BPCL Kochi Refinery has implemented a scheme for recovery of oil from oily sludge, solids after oil recovery is bio remediated/ disposed in TSDF. Spent catalyst is disposed by either returning to the original supplier or selling to the recycler or is disposed in secured land fill.  Bio sludge from effluent treatment plant is used as manure.

Sl No	Conditions	Status as on 30.09.2019
10.	Green belt of adequate width and density shall be provided to mitigate the effects of fugitive emissions all around the plant. Green belt shall be developed in 116 hectares out of total 461.7 hectares land with local species in consultation with the DFO and as per the CPCB guidelines.	A full-fledged greenbelt is developed and maintained in the refinery premises.  Part of green belt has been disturbed for IREP construction. As part of IREP project, 25000 saplings have been planted and more are being added.
11.	Occupational health surveillance of the workers shall be done on a regular basis and records maintained as per the Factories Act.	Complied.
12.	As committed in the EIA/EMP report, the company shall earmark Rs.78.30 crores for environment protection measures and Rs.51.00 crores for community development activities.	Complied.
13.	All the other recommendations made in the Charter on Corporate Responsibility for Environment Protection (CREP) for the Refinery sector shall be implemented. CREP guidelines regarding discharge of treated effluent within 0.4 m <sup>3</sup> /MT of crude shall be strictly followed.	Complied. The discharge of treated effluent was 0.22 m <sup>3</sup> /MT of crude for the half year period from April 2019 to September 2019.
<b>B.</b>	<b>GENERAL CONDITIONS:</b>	
1.	The project authorities must strictly adhere to the stipulations made by the KSPCB and the State Government.	Complied.
2.	No expansion or modification in the plant shall be carried out without prior approval of the Ministry of Environment & Forests.	Complied.

Sl No	Conditions	Status as on 30.09.2019
3.	<p>Adequate AAQMS should be established in the downward direction as well as where maximum ground level concentration of SPM, SO<sub>2</sub> and NO<sub>x</sub> are anticipated in consultation with the KSPCB. Data on ambient air quality, fugitive emission and stack emissions shall be regularly submitted to this Ministry including its Regional Office at Bangalore and KSPCB once in six months.</p>	<p>In consultation with KSPCB, the refinery has installed five continuous AAQMS stations.</p> <p>Online data are being continuously transferred to CPCB from all AAQMS stations.</p> <p>Data on ambient air quality during the half yearly period from April 2019 to September 2019 is attached as <b>Annexure-II</b>.</p> <p>Data on stack emissions during the half yearly period from April 2019 to September 2019 is attached as <b>Annexure- I</b>.</p>
4.	<p>The overall noise levels in and around the plant area should be kept well within the standards (85 dBA) by providing noise control measures including acoustic hoods, silencers, enclosures etc. on all sources of noise generation. The ambient noise levels should conform to the standards prescribed under EPA Rules, 1989 viz 75 dBA (daytime) and 70 dBA (night time).</p>	<p>Complied.</p>
5.	<p>The project authorities shall provide adequate funds (both recurring and non-recurring) to implement the conditions stipulated by the Ministry of Environment and Forests as well as the State Government along with the implementation schedule for all the condition stipulated herein.</p> <p>The funds so provided should not be diverted for any other purposes.</p>	<p>Complied.</p>
6.	<p>The Regional Office of this Ministry at Bangalore/CPCB/ KSPCB will monitor the stipulated conditions. A six monthly compliance report and the monitored data along with statistical interpretation should be submitted to them regularly.</p>	<p>Complied.</p>

Sl No	Conditions	Status as on 30.09.2019
7.	<p>The company shall inform the public that the project has been accorded environmental clearance by the Ministry and copies of the clearance letter are available with the KSPCB / Committee and may also be seen at Website of the MoE&amp;F at <a href="http://envfor.nic.in">http://envfor.nic.in</a>. This should be advertised within seven days from the date of issue of the clearance letter at least in two local newspapers that are widely circulated in the region of which one shall be in the vernacular language of the locality concerned and a copy of the same should be forwarded to the Regional Office.</p>	Complied.
8.	<p>The project authorities 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 commencing the land development work.</p>	<p>The final approval for the implementation of the project was obtained on 27.04.06. The same was informed MoE&amp;F vide letter No. 10/MPT/CEMP-II/04 dated 18<sup>th</sup> May, 2006.</p> <p>The project has been commissioned.</p>

DATA ON STACK EMISSIONS FROM BPCL KOCHI REFINERY																		
PERIOD APRIL 2019 TO SEPTEMBER 2019																		
SL.NO.	STACK NO. UNIT	NO. OF SAMPLES ANALYSED	PERMITTED EMISSION Nm <sup>3</sup> /hr	SULPHUR DIOXIDE mg/Nm <sup>3</sup>			EMISSION RATE Nm <sup>3</sup> /hr			PARTICULATE MATTER mg/Nm <sup>3</sup>				PERCENTAGE COMPLIANCE		REMA RKS		
				MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG	SPCB	MOE&F				
1	KH1B	6	45000	232.5	816.7	535.0	7846.0	23504.0	18222.0	7.1	44.0	21.5	100	100				
2	NH2/HH1	6	102000	29.4	275.7	113.2	7368.3	7775.0	7521.1	10.6	29.1	20.7	"	"				
3	FH1	6	25000	20.0	501.0	197.4	20539	22967	21753	9.4	45.0	21.5	100	100				
4	FH3/COB	6	150000	14.4	471.0	294.8	78430	104120	89281.7	11.4	63.0	27.2	100	100				
5	UB10	6	136000	521.0	536.0	528.5	54381.8	65987.2	58368.1	11.7	46.0	24.8						
6	UB9	6	70000	646.0	987.8	779.1	33408.1	44084.9	40101.2	19.8	63.6	39.4	100	100				
7	DSX 002	2	35000	659.0	993.0	826.0	32442	32685	32563.5	25	37	31	"	"				
8	DHH11	2	82500	SD													"	"
9	DDH1	5	27000	67.7	748.0	364.3	12101.14	28035	18715.9	5.0	54.0	17.8	"	"				
10	CH21	6	130000	319.5	623.0	474.8	79652.61	115596	95525.4	14.5	58.0	37.3	"	"				
11	CH22	6	35000	212.4	612.0	387.1	21360.0	37100.0	30932.3	31.5	45.1	37.7	"	"				
12	UB7	2	150000	374.0	382.0	378.0	58911.25	141557	88450.3	12.9	56	33.9	"	"				
13	CPP/HRSG	5	277900	546.0	571.0	558.5	53470.9	209741	114978.1	1.4	48.0	17.1	100	100				
14	BITUROX	6	23000	613.0	624.0	618.5	11757	11901	11829	32	62.5	48.0	"	"				
15	CH223	6	51000	85.6	596.0	296.0	31091.41	49731	38719.12	15.9	57.5	41.6	100	100				
16	GT2 HRSG	4	427000	129.0	180.0	154.5	158182	208099	180781.7	38.0	51.0	46.9	"	"				
17	UB11	6	158000	397.7	640.3	492.4	79003	94511.61	84557.98	42.7	61.8	50.0	"	"				



## Annexure - I (continued)

## DATA ON STACK EMISSIONS FROM BPCL KOCHI REFINERY

PERIOD APRIL 2019 TO SEPTEMBER 2019

SL.NO.	STACK NO. UNIT	NO. OF SAMPLES ANALYSED	PERMITTED EMISSION Nm <sup>3</sup> /hr	SULPHUR DIOXIDE mg/Nm <sup>3</sup>			EMISSION RATE Nm <sup>3</sup> /hr			PARTICULATE MATTER mg/Nm <sup>3</sup>				PERCENTAGE COMPLIANCE		REMA RKS
				MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG	SPCB	MOE&F		
18	MHT CCR	5	118000	9.1	690.0	289.1	87458.7	111189	96629.3	6.1	45.0	19.6	"	"	"	
19	VHH02	4	72000	42.1	705.0	314.9	60696	62605	61650.5	10.6	53.0	24.7	"	"	"	
20	DSX 301	5	22000	776.0	1123.0	995.0	10900.0	13547.0	12436.7	14.4	37.3	23.5	"	"	"	
21	UB 8	6	70000	740.2	863.5	786.5	26579	44565.4	35301.2	11.5	70.3	46.8	"	"	"	
22	SRU III TRAIN A	2	92500	413	489	451	89443	89560	89501.5	5.1	31.0	12.8	"	"	"	
23	SRU III TRAIN B	2	92500	529	537	533	88388	89607	88997.5	7.6	37.0	24.7	"	"	"	
24	CDU III	1	254000	191.2	799.0	499.2	186771	251276	225060.	8.6	35.0	22.2	"	"	"	
25	DHDT	1	59000	23.8	192.0	114.9	25110.5	56674	38853.7	1.5	19.0	9.8	"	"	"	
26	VGO HDT	2	55000	17.4	779.3	407.0	20373.7	54424	39726.1	20.4	38.8	28.7	100	100	"	
27	PFCCU HEATER	2	22400	21.0	100.7	37.1	8615.40	22245	15618.1	19.0	31.5	23.8	"	"	"	
28	PFCCU REGENERATOR	2	235250	5.2	68.7	37.8	138495	205723	170440	11.5	32.0	24.9	"	"	"	
29	DCU-1	1	80000	29.9	41	35.6	36177.2	79633	65300.5	3.1	4	3.7	"	"	"	
30	DCU-2	2	80000	29	35	32.0	43959.5	79389	67424.4	3.0	4	3.6	100	100	"	
31	HRSG-3	2	1095907	1.8	316.0	84.6	136397.5	158127	146553.9	1.2	21.6	6.4	"	"	"	
32	HRSG-4	2	1095907	1.9	2.5	2.1	127100	378266	262131	3.0	3.7	3.4	"	"	"	
33	HRSG-5	1	1095907	12.5	22.5	17.3	111342	186887.3	138010.9	2.0	7.0	3.0	"	"	"	
34	UB 12	1	246744	91.0	299.5	164.6	112457	142860.5	126128.5	1.3	1.8	1.5	"	"	"	
35	UB 13	1	246744	53.1	235.7	120.1	19503.1	145434	112950.9	2.9	4.9	4.1	"	"	"	

**AMBIENT AIRQUALITY DATA FOR THE HALF YEAR PERIOD  
APRIL 2019- SEPTEMBER 2019**

MARKETING							
PARAMETER	UNIT	April-19	May-19	Jun-19	Jul-19	Aug-19	Sept-19
SO <sub>2</sub>	µg/m <sup>3</sup>	9	6.4	6.2	6.8	2.8	5.2
NO <sub>x</sub>	µg/m <sup>3</sup>	28.5	25.5	23.1	26.8	26.3	24.7
NH <sub>3</sub>	ug/m <sup>3</sup>	3.5	3.1	3.1	6.4	7.9	6.3
CO	mg/m <sup>3</sup>	0.7	3.9	0.60	0.6	0.2	0.3
Benzene	µg/m <sup>3</sup>	1.1	1.2	0.60	0.50	0.8	0.6
Methane	ppm	0.6	0	0	0	0	0
NMHC	ppm	1.9	0.10	0.10	0.10	0.14	0
PM 10	µg/m <sup>3</sup>	89	79.5	46.4	39.2	32.7	32.5
PM 2.5	µg/m <sup>3</sup>	37	31.2	19.2	20.0	18.2	18.4

COLONY							
PARAMETER	UNIT	April-19	May-19	Jun-19	Jul-19	Aug-19	Sept-19
SO <sub>2</sub>	µg/m <sup>3</sup>	30.1	3.5	3.9	4.5	4.7	5.3
NO <sub>x</sub>	µg/m <sup>3</sup>	22.2	19	24.8	21.1	20.5	19.2
NH <sub>3</sub>	µg/m <sup>3</sup>	7.6	23.7	16.2	11.2	5.9	4.8
CO	mg/m <sup>3</sup>	0.4	0.4	0.4	0.5	0.6	0.7
Benzene	µg/m <sup>3</sup>	0.1	0.4	0.5	0.3	0.1	0.2
Methane	ppm	2.6	1.8	1.8	1.9	0.8	0.6
NMHC	ppm	1.7	1.1	1.1	1.0	0.8	1.2
PM 10	µg/m <sup>3</sup>	63.6	62.6	35.5	30.7	26.1	30.2
PM 2.5	µg/m <sup>3</sup>	34.5	27.8	15.6	14.5	13.2	14.2

**AMBIENT AIRQUALITY DATA FOR THE HALF YEAR PERIOD  
APRIL 2019- SEPTEMBER.**

DHDS							
PARAMETER	UNIT	April-19	May-19	Jun-19	Jul-19	Aug-19	Sept-19
SO2	µg/m3	4.7	61.3	40.5	68.1	27.9	34.8
NOx	µg/m3	21.7	21.7	21.5	20.8	19.1	17.7
NH3	µg/m3	3.6	3.2	2	2.1	0.9	0.7
CO	mg/m3	1.6	1.6	1.6	1.4	1.4	1.4
Benzene	µg/m3	0.3	2.2	0.3	0.10	0.10	0.1
Methane	ppm	0	0.60	0	0	0	0
NMHC	ppm	0	0.3	0	0	0	0
PM 10	µg/m3	64	74	43.2	37.3	31.7	35.3
PM 2.5	µg/m3	33.6	29.7	17	17	14.7	15.9

CISF_TOWNSHIP							
PARAMETER	UNIT	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19
SO2	µg/m3	40	47.4	43.2	14.9	16.2	4
NOx	µg/m3	16.1	18.4	15.5	17.8	15.6	19.9
NH3	µg/m3	0.7	6	6.3	11.7	8.5	10.9
CO	mg/m3	0.8	0.9	0.80	0.6	0.70	0.7
Benzene	µg/m3	2.1	1.4	2.6	2.3	4.6	1.3
Methane	ppm	61.3	0	0.15	0.40	0	0
NMHC	ppm	2.5	2.0	1.5	1.5	0	0
PM 10	µg/m3	70.5	64.9	39.9	40	35.9	39.5

**AMBIENT AIRQUALITY DATA FOR THE HALF YEAR PERIOD  
APRIL 2019- SEPTEMBER-2019**

PARAMETER	UNIT	NHT CCR					
		April-19	May-19	Jun-19	Jul-19	Aug-19	Sept-19
SO <sub>2</sub>	µg/m <sup>3</sup>	5.5	2	0.5	9.1	11.20	12.5
NO <sub>x</sub>	µg/m <sup>3</sup>	9.0	8	27.5	13.1	17.0	8.4
NH <sub>3</sub>	µg/m <sup>3</sup>	4.1	7	72.3	16.6	26.2	109.3
CO	mg/m <sup>3</sup>	0.7	0.9	0.9	1.0	0.8	0.5
Benzene	µg/m <sup>3</sup>	0	0	0	0	0	0
Methane	ppm	3	2.6	2.8	1.4	1.2	1.4
NMHC	ppm	0.3	0.3	0.2	0.30	0.6	0.6
PM 10	µg/m <sup>3</sup>	36.5	50.5	43.3	45.9	39.9	33.5
PM 2.5	µg/m <sup>3</sup>	11.8	8.8	6.7	7.2	6.9	12.4

**TREATED EFFLUENT QUALITY DATA FOR THE HALF YEAR PERIOD  
April 2019 - September 2019**

<b>Effluent Monitoring Station - Out Let A</b>							
<b>Month</b>	<b>PARAMETERS</b>						
	<b>Oil &amp; Grease</b>	<b>Phenols</b>	<b>Sulphides</b>	<b>TSS</b>	<b>BOD</b>	<b>COD</b>	<b>pH</b>
	mg/l	mg/l	mg/l	mg/l	(3 DAYS @27 C) mg/l	mg/l	
Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.
April-19	<4	0.20	0.4	10	14	58	7.1
May-19	<4	0.17	0.4	10.4	13	75	7.4
June-19	<4	0.14	0.4	10.7	13	51	7.3
July-19	<4	0.13	0.4	10.3	14	53	7.5
Aug-19	<4	0.11	0.4	10.9	14	44	7.5
Sept-19	<4	0.10	0.4	10.5	14	43	7.4
<b>Consented Limit</b>	<b>5</b>	<b>0.35</b>	<b>0.5</b>	<b>20</b>	<b>15</b>	<b>125</b>	<b>6.5-8</b>

**TREATED EFFLUENT QUALITY DATA FOR THE HALF YEAR PERIOD  
April 2019 - September 2019**

<b>Effluent Monitoring Station-Outlet B</b>				
<b>Parameters</b>	<b>pH</b>	<b>TSS</b>	<b>Oil &amp; Grease</b>	<b>BOD (3 days @ 27 C)</b>
<b>Unit</b>		<b>ppm</b>	<b>ppm</b>	<b>ppm</b>
<b>Month</b>	<b>Avg.</b>	<b>Avg.</b>	<b>Avg.</b>	<b>Avg.</b>
April-19	7.4	<1	<4	8
May-19	7.3	<1	<4	8
June-19	7.4	<1	<4	10.5
July-19	7.6	<1	<4	8
Aug-19	7.2	<1	<4	7.4
Sept-19	7.0	<1	<4	7.5
<b>Consented Limit</b>	<b>6.5-8.0</b>	<b>100</b>	<b>5</b>	<b>30</b>



**INDHARAT PETROLEUM CORPORATION LIMITED - KOCHI REFINERY**

**QUALITY CONTROL**

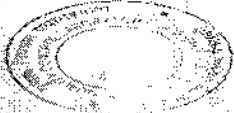
File No: KR.TECH.QC.16 (PINK WARD)

Sample Name: **Drain Oil**  
Date of Sample: **17 May 2019**  
Date of Analysis: **17 May 2019 - 18 May 2019**

Sl.No.	Parameters	Unit	Method	Result	Max Acceptable limit
1	<b>Oil</b>	mg/L	IS:3025 (Pt.39)	ND	ND
<b>METALS</b>					
2	Silver as Ag	mg/L	IS:3025 Annex	BDL(MDL-0.1)	0.1
3	Aluminium as Al	mg/L	IS:3025 (Pt.35)	BDL(MDL-0.02)	0.01
4	Barium as Ba	mg/L	IS:3025 (Pt.57)	BDL(MDL-0.05)	0.05
5	Bismuth as Bi	mg/L	IS:3025 Annex	BDL(MDL-0.5)	0.7
6	Calcium as Ca	mg/L	IS:3025 (Pt.40)	42.9	75.0
7	Calcium as Ca	mg/L	IS:3025 (Pt.31)	BDL(MDL-0.005)	0.004
8	Chromium as Cr	mg/L	IS:3025 (Pt.52)	BDL(MDL-0.05)	0.05
9	Copper as Cu	mg/L	IS:3025 (Pt.47)	BDL(MDL-0.05)	0.06
10	Iron as Fe	mg/L	IS:3025 (Pt.43)	BDL(MDL-0.08)	0.2
11	Magnesium as Mg	mg/L	IS:3025 (Pt.46)	5.7	30
12	Manganese as Mn	mg/L	IS:3025 (Pt.53)	0.1(MDL-0.1)	0.1
13	Nickel as Ni	mg/L	IS:3025 (Pt.54)	BDL(MDL-0.02)	0.02
14	Molybdenum as Mo	mg/L	IS:3025 (Pt.55)	BDL(MDL-0.05)	0.07
15	Lead as Pb	mg/L	IS:3025 (Pt.42)	BDL(MDL-0.01)	0.01
16	Zinc as Zn	mg/L	IS:3025 (Pt.41)	1.8(MDL-0.05)	5
17	Arsenic as As	mg/L	IS:3025 (Pt.37)	BDL(MDL-0.07)	0.01
18	Mercury as Hg	mg/L	IS:3025 (Pt.48)	BDL(MDL-0.001)	0.001
19	Selenium as Se	mg/L	IS:3025 (Pt.56)	BDL(MDL-0.01)	0.01
20	Antimony as Sb	mg/L	IS:3025 (Pt.58)	BDL(MDL-0.05)	0.06

ND: Minimum detection limit

BDL: Below detection limit.



*[Signature]*  
**SENIOR MANAGER (QC)**  
Chachappan CM

## CORPORATE RESPONSIBILITY FOR ENVIRONMENTAL PROTECTION (CREP)

## PROGRESS REPORT ON ACTION POINTS

Sl. No.	Task	Remarks/Status
1	All the refineries provide on line emission and effluent monitoring systems and give linkages to SPCB and CPCB server and detailed note shall be submitted by individual refineries indicating number of sensors, make and type etc.	Online connectivity of all five AAQMS given and intimated to CPCB/KSPCB. Total 940 No's of Hydrocarbon (HC) detectors, 280 No's of Hydrogen sulphide (H <sub>2</sub> S) detectors and 42 No's of Hydrogen (H <sub>2</sub> ) detectors are installed at different locations of refinery including product loading, storage tank farms and process plants etc. Most of sensors are made up of M/s Honeywell. HC sensors belong to Infra-red type and H <sub>2</sub> S/H <sub>2</sub> sensors belong to electrochemical type.
2	The refineries shall submit action plan to achieve zero discharge (except once through cooling water in coastal region) within three months.	As part of integrated Refinery cum expansion project (IREP), an integrated ETP has been setup and the treated effluent is routed to RO plant for further processing and recycling water as DM water
3	The HSE department of refineries shall co-ordinate with marketing divisions for submission of note on evaporation during loading, leakage possibilities, steps taken for fire safety, management of oily sludge	HSE department of BPCL has initiated coordination and various measures to control evaporation during loading, leakage, fire safety, management of oily sludge etc. It includes vapour recovery system, bottom loading, fugitive emission survey, LDAR etc. Separate scheme is adopted for the management of oily sludge which includes centrifuging, oil recovery and bio-remediation.
4	The refineries who have not completed the task of providing low NO <sub>x</sub> burners shall complete within six month and submit completion note without further delay.	All the heaters under CEMP phase-II/IREP have been provided with low NO <sub>x</sub> burners.

## CORPORATE RESPONSIBILITY FOR ENVIRONMENTAL PROTECTION (CREP)

**Status as on 30<sup>th</sup> September 2019**

<b>1. Air Pollution Management</b>		
a)	<p>All the Refineries located in the critically polluted areas, identified by GPCB, will submit an action plan for phase wise reduction of SO<sub>2</sub> emission from the present level:</p>	<p>BPCL Kochi Refinery comes under severely polluted cluster. KR meets its total SO<sub>2</sub> norm of 1518 kg/hr from the complex.</p> <p>It contributes to net reduction in SO<sub>2</sub> emission by producing Euro- III and Euro – IV MS and Diesel. Following steps are taken to reduce SO<sub>2</sub> emissions from the refinery.</p> <ul style="list-style-type: none"> <li>• Modifications to plant fuel system to facilitate usage of low sulphur as liquid fuel.</li> <li>• Amine treatment of fuel gas</li> <li>• Sulphur Recovery Units with 99.9% efficiency as part of IREP.</li> <li>• Low Pressure Amine treatment of vacuum column vent .</li> <li>• Employing Biturox technology for Bitumen production, where off gas is incinerated and further treated.</li> </ul>
b)	<p>Future Refineries will have sulphur recovery with minimum 99% efficiency</p>	<p>SRUs have more than 99% efficiency. New SRU have 99.9% efficiency.</p>
c)	<p>Road map to improve the efficiency of SRU:</p>	<p>BPCL Kochi refinery is exploring the possibility of Oxygen enrichment technology for enhancing the efficiency of SRU and detailed engineering is in progress.</p>
d)	<p>With regard to NO<sub>x</sub> emission, the new Refineries / process units will install low NO<sub>x</sub> burners. For retrofitting of low NO<sub>x</sub> burners in existing units the same expert committee will suggest the strategies and action plan within six months:</p>	<p>The expert committee, during their visit to Kochi Refinery, had suggested replacing the burners in heaters with more than 10 million Kcal/hr duty with low NO<sub>x</sub> type burners. We have installed low NO<sub>x</sub> burners for ten heaters in the existing Refinery. Moreover, all the new process heaters and steam boilers (total six numbers) installed as part of capacity expansion cum modernization project, CEMP - Phase II and IREP have been provided with low NO<sub>x</sub> burners.</p>
e)	<p>The Expert Committee will also suggest an action plan, within 6 months, for control and monitoring of hydrocarbon loss and VOC emissions, leak detection and repair (LDAR) programme and vapour recovery systems (for loading and unloading operations within Refineries only):</p>	<p>Following provisions exists for VOC control</p> <ul style="list-style-type: none"> <li>a). Provision of mechanical seals on pumps for leak free operation.</li> <li>b) Use of submerged filling in product loading gantries.</li> <li>c) Closed blow down system for process plants.</li> <li>d) Floating roof tanks for volatile product storage.</li> <li>e) Conversion of floating roof tanks to double seal arrangement.</li> <li>f) Closed loop sampling system in process plants.</li> <li>g) Covered facility for oily effluent storage.</li> </ul>



		<p>h) VOC control system is in place in new ETPs for treatment of VOCs generated during in the effluent treatment area.</p> <p>i) 940 No's of HC detectors, 280 No's of H2S detectors and 42 No's of H2 detectors are installed at different locations of refinery including product loading, storage tank farms and process plants etc.</p> <p>j) Benzene monitoring is carried out using "dragger" chip technique in the aromatic recovery unit on a daily basis.</p> <p>k) Five ambient air quality monitoring stations (AAQMS) are working online to monitor the ambient air quality on continuous basis. They provide eleven ambient air quality parameters, including hydrocarbons and the data is transferred online to CPCB/KSPCB.</p> <p>l) Vapour recovery system is implemented in ISOM Naphtha tank farm</p> <p>m) New Vapour recovery system is being implemented for Benzene &amp; Toluene</p>
f)	The flare losses to be minimized and monitored regularly	<p>Flare losses are monitored continuously through flare meters installed in the process units on a daily basis and are reviewed at the senior management level</p> <p>Further, the fuel gas flow to the pilot burner is maintained at the minimum level required to sustain the pilot flame.</p> <p>Various process schemes implemented to reduce flaring.</p> <p>Advanced process control (APC) system was implemented in hydrogen network for decreasing hydrogen flaring.</p> <p>Flare Gas recovery system is installed as part of IREP project and commissioned by December 2017 end.</p>
g)	Refineries will install continuous emission monitoring systems for SO2 and NOx in major stacks. Action plan for this will be submitted within six months	<p>Kochi Refinery has provided continuous SO<sub>2</sub> and NO<sub>x</sub> analyzing system for all the heater/boiler stacks and is connected to the CPCB.</p>
h)	Refineries will also monitor total HC and Benzene in the premises (particularly in loading / unloading operations and ETP). The status and action plan will be submitted within six months	<p>18 No's of HC detectors are installed in the truck loading/wagon loading area. 2 No's of HC detectors and 2 No's of H2S detectors are installed in ETP-V area.</p> <p>Benzene monitoring is carried out using "dragger" chip technique in the aromatic recovery unit on a daily basis.</p> <p>5 No's of ambient air quality monitoring stations (AAQMS) are installed at the peripheries of the refinery to enable close monitoring of ambient air quality near the refinery. The ambient air quality information is also communicated to general public through an electronic display board.</p>

**2. Waste Water Management:**

a)	<p>Refineries will prepare an action plan for conservation of water resources and maximizing reuse / recycle of treated effluent within six months. The treated effluent discharge quantity will be limited to 0.4 m<sup>3</sup>/tons (for 90% of time) except for the monsoon season:</p>	<p>The discharge of treated water from Kochi refinery is 0.22 m<sup>3</sup> /tonne of crude processed. Steam condensate in the process plants is being recycled back to the boilers as feed water for the steam generation, there by resulting in reduction in the fresh water consumption. Approximately 200-250 KL/h steam condensate is being recycled to steam boilers in the refinery. The stripped water from the stripped water units is recycled as make up water to the desalting process in the crude unit. 70-100 KL/h of liquid effluent generation is avoided by recycle. Treated effluent water from the wastewater treatment plants are recycled in RO plant</p>
b)	<p>Oil spill response facilities at Coastal Refineries will be in position within two years:</p>	<p>Oil spill response (OSR) facility at Cochin port is already in place. Additionally, BPCL Kochi refinery has procured oil containment booms as part of SBM facilities commissioning to augment the capabilities of oil spill response related facilities. We have also conducted a mock drill to build confidence for the safe operation of SBM facilities with the help of port trust/coast guard personnel. It was decided to further strengthen the oil spill response facilities at Cochin port through purchase and installation of additional equipment and the major share of the investment was shouldered by BPCL Kochi refinery. Advance payment has been released to Cochin port trust for procurement of equipment.</p>

**3. Solid Waste Management : Refineries will explore new technologies for reduction in the generation of oily sludge. Strategy and action plan for liquidation of existing sludge will be submitted within six months**

To reduce the sludge generation, Kochi Refinery follows the following best practices:

- ETP oily sludge is processed continuously in DCU. The oily sludge generated from tank cleaning is also processed in DCU.
- Any excess sludge generated have the provision for oil recovery through centrifuging.
- Switching of service of storage tanks between different crude oils (high wax and low wax) ensures minimum formation of sludge at the bottom of storage tanks.
- Use side entry mixers in the crude oil tank

**4. Refineries will carry out monitoring and survey to assess HC loss and concentration of VOC in Ambient Air / Waste Water Treatment Plant.**

a. BPCL Kochi refinery has implemented leak detection and repair (LDAR) program using portable hydrocarbon detector instrument. These programs are carried out on a quarterly basis on a large number of valves, flanges etc.in process units and offsite areas. The leaks identified are attended to by maintenance crew immediately and are monitored on regular basis.

b. Secondary seals have been provided in 53 storage tanks storing volatile hydrocarbons to reduce fugitive hydrocarbon emissions.

c. HC detectors are installed in sufficient numbers at the storage tank farm areas, process plants, product loading areas and LPG bottling plants in order to identify any hydrocarbon leaks immediately.

d. Benzene monitoring is carried out using "dragger" chip technique in the aromatic recovery unit on daily basis.

e. Five ambient air quality monitoring stations (AAQMS) are working online to monitor the ambient air quality on continuous basis. They provide eleven ambient air quality parameters, including hydrocarbons and the data is transferred online to CPCB/KSPCB. The ambient air quality information is also communicated to public through an electronic display board.

f. Pressure relief valves for column and vessel are routed to flare to avoid fugitive emission during emergencies.

#### **5. Refineries will assess the quantity of flare gas (install the measurement system if the same is not possible)**

a. At BPCL Kochi refinery, flare losses are monitored continuously from different process units and are reviewed at the senior management level on a daily basis. Flare meters are installed in the process units for this purpose.

Further, the fuel gas flow to the pilot burner is maintained at the minimum level required to sustain the pilot flame.

Various process schemes implemented to reduce flaring

Advanced process control (APC) system was implemented in Hydrogen network for decreasing hydrogen flaring.

Flare gas recovery system is installed as part of IREP project and it can recovery around 1.2 TPH flare gas to fuel gas system.

#### **6. Assessment of Potential leakages from petroleum storage tanks**

Inspection of petroleum storage tanks is being carried out by following API 653 standard, OISD standard 129 and other relevant standards. Maintenance work is carried out as per the standard procedure when tank is taken for the outage.

Total 60 No's of bore wells have been constructed at various locations inside the refinery in order to monitor the ground water for any hydrocarbon leakages from the refinery storage tanks and processing plants. The ground water samples from the bore wells are tested periodically for presence of hydrocarbons. In addition, 14 piezometer wells have been installed for monitoring of ground water quality.

#### **7. Cleaner Technology options and information to be provided to CPCB**

1. Clean technologies adopted to combat Air Pollution includes:

1. BPCL Kochi refinery has consistently met all deadlines for up gradation of auto fuel quality, set by the Government of India. KR is producing MS and HSD of BS IV norms and further technological up gradation is being implemented to produce MS&HSD of Euro VI quality by April 2020.

2. Hydro desulphurization of feed stock to fluid catalytic cracking unit (FCCU)

3. Modifications in plant fuel system facilitate to usage of low sulfur Bombay high vacuum residue as liquid fuel, to lower sulfur dioxide emissions during processing of crude.

4. Amine treatment of fuel gas for removal hydrogen sulfide to produce sweet fuel gas.

5. Installation five trains of sulfur recovery unit with more than 99.9% recovery.

6. Low pressure amine treatment of vacuum column vent gas. This is a unique environmental protection technology developed by BPCL KR for removing toxic hydrogen sulfide gas produced during vacuum distillation process. This technology has been developed exclusively with in-house expertise. The uniqueness of the technology lies in the fact that the process for hydrogen sulfide removal is carried out under extremely low pressure drop conditions.

7. Desulphurization of low pressure gas from crude unit overhead and kerosene unit fractionator utilizing amine absorption.

8. Reduction furnace for conversion of ammonia stream to nitrogen in order to reduce NOx emissions.

9. State of the art Biturox Technology has been adopted for production of Bitumen without any harmful emission. Unlike the traditional bitumen blowing technology, this technology helps for no odour or pollutants emissions. The off gases generated is subjected to incineration and caustic scrubbing in this technique. The waste water stream generated is also oxidized, thereby resulting in zero BOD for effluent. The fresh water consumption is also significantly reduced by the adoption of this technique.
10. An electrostatic precipitator has been installed downstream of CO boiler for minimizing particulate matter emission from FCCU regenerator flue gases. As part of PFCCU (part of IREP project) we have installed a tertiary cyclone separator and another ESP (Electrostatic precipitator) for particulate capture.
11. Closed loop sampling system in process plants.
12. Flare gas recovery system is installed as part of IREP project to recover around 1.2 TPH flare gas to fuel gas system

b) Clean technologies adopted to improve effluent water quality:

1. We have 4 effluent treatment plants catering to the different process units.
2. Installation of 5 numbers of sour water strippers and recycling of stripped water in process units.
3. Provision of two stage API oil separation system for effluent streams.
4. Spent caustic treatment utilizing H<sub>2</sub>O<sub>2</sub> and air oxidation methods for treatment in an environment friendly way.
5. Closed drainage system for tank farm drains.
6. Two stage biological treatment system for effluent streams including tricking filter and activated sludge process, automated Chemostat Treatment and sequential batch reactor.(SBR)
7. Hydrogen Peroxide is utilized in our ETP's instead of FeCl<sub>3</sub> to avoid chemical sludge formation.
8. Chemical de-contamination technique is being adopted at BPCL KR during turnarounds. The vessels, columns etc. are decontaminated using specially formulated chemical which is environment friendly, non-hazardous and fully biodegradable. The Hydrocarbons are recovered in the form of slop after de-emulsification process.

c) Clean technologies implemented for optimal solid waste management

Mechanical oil recovery system for oil recovery from oily sludge.  
Post IREP ETP sludge is processed in DCU.

1. In-situ recovery of oil from crude tank bottom sludge.
2. BPCL Kochi refinery constructed two secured landfills for the safe disposal of hazardous solid wastes as per the standard norms laid down by CPCB. The first landfill pit has a capacity of 590m<sup>3</sup> and is dedicated to the disposal of FCC catalyst fines and spent molecular sieves. The second land fill pit with a capacity of 390 m<sup>3</sup> is dedicated for the disposal of sludge from effluent treatment plants.
3. Installation of bio gas plant of capacity 1 T/day to convert canteen food waste into gas for use in canteen. The plant is developed based on the NISARGRUNA technology developed by Bhabha Atomic Research Centre. (BARC)
4. We have entered into an agreement with KEIL for disposing solid hazardous wastes at their TSDF facility.
5. Wherever possible, spent catalyst containing recoverable metals are disposed /sold to authorized recyclers.
6. Paper waste recycling programme to dispose old paper waste for new printable A4 paper.
7. A centralized solid waste segregation and management facility is conceptualized. This Facility will act as a single point for collection, storage, treatment and evacuation of all types of wastes generated inside BPCL KR in an ecofriendly manner.

## **GREEN COVER AT KOCHI REFINERY**

BPCI, Kochi Refinery always gives highest priority for environmental care and its protection. Green cover is an essential ingredient for conservation of biodiversity, retention of soil moisture, recharge of ground water and for maintaining pleasant micro climate of the region. Green cover developed also helps for absorbing pollutants if any and also for dust suppression apart from improved aesthetics. Kochi Refinery maintains inside an Eco park in an area of 5.5 acres housing mostly herbal plants/trees. Three butterfly parks developed inside KR for attracting butterflies is another added attraction. Large scale afforestation activities are also undertaken year after year in KR to add the green cover for the well-being of our Mother Nature. Huge rain water harvesting pond developed in an area of 20 acres helps for recharging the ground water table in nearby areas. As part of the recently commissioned IREP project, around 25,000 saplings were planted from 5<sup>th</sup> June 2017 onwards. Green cover in Kochi Refinery as of now comes to more than 170 Acres. Around 40 acres of land out of the acquired land has been identified for developing additional green cover at the ongoing PDPP project site.

<b>Health Surveillance Data (01/04/2019 to 30/09/2019)</b>		
1	No of persons undergone comprehensive health check up	<b>299</b>
3	No of people undergone comprehensive blood testing	<b>1005</b>
4	No of employees undergone statutory eye check-up (%)	<b>78</b>
5	No of employees of Aromatic Recovery Unit who have undergone statutory urine check-up.	<b>10</b>
6	Number of Contract Employees covered under Statutory Health check-up Plan.	<b>156</b>
7	Diabetic Clinic	<b>2</b>
8	Cardiac Clinic	<b>2</b>

**NOISE SURVEILLANCE DATA  
(01/04/2019 to 30/09/2019)**

**NOISE LEVEL AT VARIOUS LOCATIONS NEAR THE BOUNDARY WALL INSIDE  
REFINERY**

Sl No.	Area	Average Noise Level (dBA)
1	NEAR T T GATE	61
2	DHDS - TOWER NO:1	59
3	REAR SIDE OF DHDS FIRE STATION	62
4	NEAR CHALIKKARA GATE	64
6	EAST OF MS BLOCK	63
7	NEAR NHT-CCR AAQMS	61
8	SOUTH OF DHDS FLARE	61
9	REAR SIDE OF PIBU OFFICE	59
10	NEAR IREP GATE	66
11	BEHIND IREP SITE OFFICE	66

**NOTE: Noise level limit in Residential area = 55 dBA.  
All the values are taken near the boundary wall inside refinery and they are within stipulated allowed limits.**

*With the reference of Environmental clearance for the project of Expansion-cum-modernization of refinery unit (CEMP-II), as committed in the EIA/EMP report, the company shall earmark Rs: 78.30 crores for environment protection measures and Rs: 51.00 crores for community development activities.*

**Environment Protection Measures:**

The allocated amount of Rs: 78.3 crores spent for various Investments on Environment management associated with CEMP-II as per commitment in Environment Management Plan (EMP) were:

- Sour water stripper unit
- Waste water treatment system
- Fire protection system
- Stacks for wide dispersion of pollutants
- Stack gas monitoring (online facilities)
- Land acquisition for safety of the surrounding environment
- Green belt development and mi

**Community Development Activates:**

The Various Community Development Activities associated with CEMP II were carried out under the following categories.

- ◆ **Education**
- ◆ **Water Management**
- ◆ **Health Care**
- ◆ **Community Development**
- ◆ **Support for Local Programs**

**Some of the major activities carried out are as below:**

- a) Rejuvenation of neighboring Thanneerchal Lake in Tripunithura.
- b) Support for Gas Fired Crematoriums in Grama Panchayats.
- c) House for poor (Urban & Rural) : Vadavucode Puthencruz & Thiruvaniyoor Grama Panchayats and Kochi Corporation.
- d) Construction/Renovation of Primary Health Centers.
- e) Construction/renovation of Anganwadis.
- f) Construction/renovation of class rooms in Govt. Schools.
- g) Support for *Kudumbasree* Units – Building, vehicle for waste collection.
- h) Promotion of science education in Govt. Schools.
- i) Installation of Traffic Signal Systems at various junctions.
- j) Development/renovation/repair of rural roads.
- k) Up-keeping of public utilities & heritage monuments.
- l) Support for Special Schools.
- m) Setting up of Public toilets.
- n) Rural lighting projects.