



03/E&E/202/04
01.12.2017

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: MoE&F's letter No: J-11011/369/2005-IA II(I) dated 2nd 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 April 1st, 2017 to September 30th, 2017 for the Project mentioned in above reference.

Thanking you

Very truly yours
For BPCL Kochi Refinery

Damien Gracious K.D
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, Borewell 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

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 30.09.2017
A.	SPECIFIC CONDITIONS	
1.	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.	BPCL Kochi Refinery is conforming to all relevant standards & limits on gas emissions, prescribed by statutory authorities.
2.	<p>On-line continuous monitoring facilities shall be provided on all the stacks of adequate height as per CPCB guidelines. SO₂, CO, HC, NO_x 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 SO₂ emissions from the plant shall not exceed existing 1607 kg/h and further efforts shall be made to further reduce SO₂ emissions. Low NO_x burners shall be installed to control the NO_x emissions.</p>	<p>Online continuous monitoring facilities are provided on all operational stacks.</p> <p>SO₂, CO, NO_x, PM, H₂S 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 SO₂ 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_x burners.</p>
3.	Continuous ambient air quality monitoring stations for SO ₂ , SPM, HC	In consultation with KSPCB, the refinery has installed five continuous AAQMS stations.

SI No	Conditions	Status as on 30.09.2017
	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.	Online datas are being continuously transferred to CPCB from all the AAQMS stations. Data on ambient air quality for the period from April 2017 to September 2017 is attached as Annexure-II .
4.	As indicated in the EIA/EMP reports, out of total 1700 m ³ /d industrial effluent generated, 360 m ³ /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 m³/d is installed. 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. 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, in order to assess the ground water quality. 14 nos of Piezometer wells are also provided.</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>
6.	The domestic waste water shall be treated in the sewage treatment plant	STP of 250 m ³ /day capacity has been installed and running continuously for treating the domestic

SI No	Conditions	Status as on 30.09.2017
	and treated waste water conforming to the standards for land application shall be reused for green belt development.	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).	BPCL Kochi Refinery has implemented a scheme for recovery of oil from oily sludge. The oil recovery process consists of a series of physical and chemical separation processes. The oil recovered is reprocessed in the refinery process units. Bio remediation is carried out through TERI Spent catalyst is disposed by either returning to the original supplier or selling to the recycler or is disposed in secured land fill. ETP Chemical sludge is disposed in secured landfill. Bio sludge from effluent treatment plant is used as manure.
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 are being planted.
11.	Occupational health surveillance of the	Complied.

SI No	Conditions	Status as on 30.09.2017
	workers shall be done on a regular basis and records maintained as per the Factories Act.	
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 ³ /MT of crude shall be strictly followed.	Complied. The discharge of treated effluent was 0.183 m ³ /MT of crude for the half year period from April 2017 to September 2017.
B.	GENERAL CONDITIONS:	
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.
3.	Adequate AAQMS should be established in the downward direction as well as where maximum ground level concentration of SPM, SO ₂ and NO _x 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>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 2017 to September 2017 is attached as Annexure-II.</p> <p>Data on stack emissions during the half yearly period from April 2017 to September 2017 is attached as Annexure- I.</p>
4.	The overall noise levels in and around	Complied.

SI No	Conditions	Status as on 30.09.2017
	<p>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>	
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>	Complied.
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>	Complied.
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&F at http://envfor.nic.in. 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</p>	<p>The final approval for the implementation of the project was obtained on 27.04.06. The same was informed MoE&F vide letter No. 10/MPT/CEMP-II/04 dated 18th May, 2006.</p>

SI No	Conditions	Status as on 30.09.2017
	concerned authorities and the date of commencing the land development work.	The project has been commissioned.

DATA ON STACK EMISSIONS FROM BPCL KOCHI REFINERY.

Annexure -I

Period April to September 2017

SL NO	STACK NO UNIT	NO OF SAMPLES ANALYSED	PERMITTED EMISSION Nm3/HR	STATUTORY STIPULATIONS SPCB		SULPHUR DIOXIDE mg/Nm3			EMISSION RATE Nm3/hr			PARTICULATE MATTER mg/Nm3			PERCENT COMPLIANCE		REMARKS
				SPCB	MOE&F	MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG	SPCB	MOE&F	
1	CH1A/B	0	130000														
2	KHIB	2	45000			861	893	877	22774	23165	22970	52	65	64	100%	100%	
3	NH2	2	102000			789	802	796	45167	47239	46203	60	70	65	"	"	
4	DH1	0	70000														
5	FH1	6	25000			546	592	579	21312	24174	22824	30	72	55	"	"	
6	UB6	1	85000			893	893	893	63868	63868	63868	89	89	89	"	"	
7	FH3	5	150000			873	917	886	81200	109774	93667	45	74	61	100%	100%	
8	EH1	4	75000														
9	UB10	5	136000			632	720	693	44883	48109	46313	40	45	41	100%	100%	
10	UB9	6	70000			814	1015	957	26942	35814	31857	50	76	57	"	"	
11	DSX 0002	6	35000			1138	1248	1189	29014	34532	32267	25	58	39	"	"	
12	DHX-11	0	82500														
13	DDH-01	4	27000			819	836	827	24213	25297	24520	78	87	81	100%	100%	
14	CH21	5	130000			745	816	792	97789	114941	105774	45	52	50	"	"	
15	CH22	5	35000			734	805	782	26483	33562	30337	59	76	66	"	"	
16	UB07	5	150000			568	582	575	98823	131420	122213	56	60	58	"	"	
17	UB3	0	44000														
18	CPP/HRSG1	5	277900			585	612	599	186575	197806	193634	53	56	55	100%	100%	
19	Biturox	5	23000			764	814	793	15781	18753	17228	42	48	44			
20	DHH01	0	5000														
21	UB4/5	0	140000														
22	CH223	5	51000			678	736	717	44948	47824	46114	50	55	54	100%	100%	
23	GT2 HRSG	6	427000			115	394	328	157024	183722	169972	56	68	63	"	"	
24	UB11	6	158000			605	854	684	72566	85052	76901	60	77	67	"	"	
25	NHT/CCR	2	118000			855	861	858	101129	115435	108282	70	80	75	"	"	
26	VHH02	6	72000			561	1043	710	43258	66370	57886	55	70	64	"	"	
27	DSX 301	6	22000			1098	1268	1180	13109	14837	14239	53	75	66			
28	UB8	5	70000			785	931	889	27965	36222	31237	46	68	62			

**AMBIENT AIRQUALITY DATA FOR THE HALF YEAR PERIOD
APRIL 2017 - SEPTEMBER 2017**

ACTP							
Station	Parameter	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17
SO2	ug/m3	24	29	23	3.0	3.0	4.4
NOx	ug/m3	19.0	20.0	25	26	27	30.7
NH3	ug/m3	0.04	0.02	7.0	6.0	4.0	0.01
CO	ug/m3	0.67	0.9	0.6	0.3	0.27	0.28
Benzene	ug/m3	0.01	0.03	0.02	1.6	0.18	0.74
Methane	ug/m3	0.39	0.7	0.3	0.04	0.1	0.1
NMHC	ug/m3	0.3	0.41	0.2	0.7	4.4	0.01
PM 10	ug/m3	92.0	53.0	31.5	44.0	37.0	9.1
PM 2.5	ug/m3	41.0	30.0	17.0	22.0	19.0	4.8

COL							
Parameter	unit	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17
SO2	ug/m3	14.7	14.7	16.0	17.0	13.0	7.0
NOx	ug/m3	21.7	21.7	31.0	27.0	22.0	12.0
NH3	ug/m3	16.2	16.2	11.0	6.0	4.0	3.0
CO	mg/m3	0.9	0.9	1.0	1.0	0.8	0.35
Benzene	ug/m3	0.1	0.1	0.00	0.06	0.6	1.3
Methane	ug/m3	0.01	0.01	0.01	0.01	0.03	0.1
NMHC	ug/m3	0.04	0.04	0.01	0.01	0.05	0.13
PM 10	ug/m3	75.6	75.6	29.0	34.0	33.0	32.0
PM 2.5	ug/m3	37.0	37.0	15.0	17.0	15.0	14.0

DHDS							
Parameter	unit	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17
SO2	ug/m3	45.0	38.0	40.0	39.0	39.0	42.0
NOx	ug/m3	14.0	12.0	9.3	15.0	15.0	14.5
NH3	ug/m3	0.01	0.01	0.1	0.3	0.3	1.6
CO	mg/m3	0.3	1.4	0.8	1.2	1.2	1.01
Benzene	ug/m3	0.01	0.01	0.01	0.3	0.14	0.5
Methane	ug/m3	0.01	0.01	0.01	0.01	0.01	1.2
NMHC	ug/m3	1.7	0.1	0.01	0.01	0.01	0.06
PM 10	ug/m3	61.0	43.0	21.0	25.0	25.0	25.0
PM 2.5	ug/m3	33.0	26.0	15.0	19.0	11.0	16.0

WAGON LOADING							
Parameter	unit	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17
SO2	ug/m3	12.0	9.2	23.0	35.0	39.0	5.3
NOx	ug/m3	8.8	12.0	10.0	9.3	9.0	10.0
NH3	ug/m3	9.3	11.0	9.0	11.0	8.0	8.0
CO	mg/m3	0.6	1.3	1.0	1.0	1.2	1.1
Benzene	ug/m3	0.01	0.01	0.01	0.01	0.14	1.71
Methane	ug/m3	0.73	0.28	0.01	0.01	0.01	0.01
NMHC	ug/m3	0.94	0.26	0.03	0.02	0.01	0.01
PM 10	ug/m3	79.0	54.0	36.0	46.0	43.0	52.0
PM 2.5	ug/m3	33.0	26.0	16.0	18.0	15.0	17.0

NHT CCR							
Parameter	unit	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17
SO2	ug/m3	18.0	35.0	16.1	37.6	Cable fault	Cable fault
NOx	ug/m3	22.0	22.0	23.7	7.4	-	-
NH3	ug/m3	110.0	67.0	62.6	103.2	-	-
CO	ug/m3	1.3	1.7	1.65	0.5	-	-
Benzene	ug/m3	0.0	0.0	0.0	0.0	-	-
Methane	ug/m3	1.4	1.65	2.7	2.8	-	-
NMHC	ug/m3	1.5	1.5	0.27	0.2	-	-
PM 10	ug/m3	62	45.0	40.0	29.1	-	-
PM 2.5	ug/m3	25	16.0	18.0	20.8	-	-

**TREATED EFFLUENT QUALITY DATA FOR THE HALF YEAR PERIOD
April 2017 - September 2017**

Effluent Monitoring Station - Out Let A							
Parameters	Oil & Grease	Phenols	Sulphides	TSS	BOD (3 DAYS @ 27 C)	COD	pH
Unit	ppm	ppm	ppm	ppm	ppm	ppm	
Month	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.
Apr-17	1.25	0.13	0.5	12.7	13.9	42.97	7.4
May-17	1.32	0.16	0.49	14.9	13.9	44.42	7.4
Jun-17	1.62	0.16	0.49	12.97	13.43	42.7	7.6
Jul-17	1.49	0.15	0.46	12.26	13.54	41.87	7.4
Aug-17	1.15	0.13	0.45	7.52	14	43.48	7
Sep-17	1.26	0.14	0.45	7.1	13.93	40.93	7.08
Consented Limit	5	0.35	0.5	20	15	125	6.5-8

**TREATED EFFLUENT QUALITY DATA FOR THE HALF YEAR PERIOD
April 2017 – September 2017**

Effluent Monitoring Station-Outlet B			
Parameters	Oil & Grease	TSS	BOD (3 days @ 27 C)
Unit	ppm	ppm	ppm
Month	Avg.	Avg.	Avg.
Apr-17	6	22	15
May-17	8.5	25.3	13.5
Jun-17	1.64	22.6	13.2
Jul-17	1.3	30.5	14
Aug-17	1.3	14	12
Sep-17	1.5	14	13
Consented Limit	10	100	30

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.	All stacks are provided with SO _x , NO _x , CO & PM analyzers.
2	The refineries shall submit action plan to achieve zero discharge (except once through cooling water in coastal region) within three months.	Zero discharge was proposed for the refinery during the present expansion project IREP. Due to the non-feasibility of the said recommendation owing to the high volumes of liquid that are required to be evaporated for achieving zero discharge making it highly energy intensive and causing high green house gas emission, the above proposal was dropped. MoEF clearance was accorded for the project on the condition that as such the project shall be "zero discharge" and the effluent generation from the entire refinery shall be limited to the present level.
3	The SHE 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	A centralized decision being awaited.
4	The refineries who have not completed the task of providing low NO _x burners shall complete within six month and submit completion note without further delay.	All the new come up with CEMP phase-II have been provided with low NO _x burners. The left out low duty two number heaters are expecting a revamp during the next project and one boiler burner replacement is under tendering process.

CORPORATE RESPONSIBILITY FOR ENVIRONMENTAL PROTECTION (CREP)

Status as on 30st September 2017

1. Air Pollution Management		
a)	All the Refineries located in the critically polluted areas, identified by CPCB, will submit an action plan for phase wise reduction of SO ₂ emission from the present level:	<p>BPCL Kochi Refinery comes under severely polluted cluster. KR meets its total SO₂ norm of 1518 kg/hr from the complex.</p> <p>It contributes to net reduction in SO₂ emission by producing Euro- III and Euro – IV MS and Diesel.</p> <p>Following steps are taken to reduce SO₂ emissions from the refinery.</p> <ul style="list-style-type: none"> • Modifications to plant fuel system to facilitate usage of low sulphur as liquid fuel. • Amine treatment of fuel gas • Sulphur Recovery Units with 99.9% efficiency as part of IREP. • Low Pressure Amine treatment of vacuum column vent
b)	Future Refineries will have sulphur recovery with minimum 99% efficiency	SRUs have more than 99% efficiency. New SRU have 99.9% efficiency.
c)	Road map to improve the efficiency of SRU:	SRUs have more than 99% efficiency hence Not applicable.
d)	With regard to NO _x emission, the new Refineries / process units will install low NO _x burners. For retrofitting of low NO _x burners in existing units the same expert committee will suggest the strategies and action plan within six months:	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 _x type burners. We have installed low NO _x burners for ten heaters in the existing Refinery. Moreover, all the new process heaters and steam boiler(total six numbers) installed as part of capacity expansion cum modernisation project, CEMP - Phase II and IREP have been provided with low NO _x burners.
e)	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>Following provisions exists for VOC control</p> <ul style="list-style-type: none"> a) Mechanical seals for pumps b) Submerged filling in product loading gantries. c) Closed blow down system for the process plants. d) Floating roof tanks for volatile product storage. e) Conversion of floating roof tanks to double seal arrangement. f) Closed loop sampling system in process plants. g) Covered facilities for oily effluent storage h) VOC control systems has been installed in ETP-4 and ETP V for treatment of VOC vapours generated in the effluent treatment area.

		<p>i) Continuous Flare losses monitoring.</p> <p>j) "Gas Leak Surveyor" is extensively used to check the leaking valves, glands etc.</p> <p>k) 447 numbers of hydrocarbon detectors and 62 numbers of hydrogen sulphide detectors are installed at different locations of refinery including product loading, storage tank farms, process plants etc.</p> <p>l) Benzene monitoring using "Drager" chip in the Aromatic Recovery Unit</p> <p>m) Five numbers of online ambient air quality monitoring stations (AAQMS)</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 commissioning expected by December 2017 end.</p>
g)	Refineries will install continuous emission monitoring systems for SO ₂ and NO _x in major stacks. Action plan for this will be submitted within six months	Kochi Refinery has provided continuous SO ₂ and NO _x analyzing system for all the heater/boiler stacks above 10 million.
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>Eighteen hydrocarbon detectors are installed in the truck loading area.</p> <p>Benzene monitoring is carried out using "Drager" chip technique in the Aromatic Recovery Unit on a daily basis.</p> <p>Five online ambient air quality monitoring stations (AAQMS) are installed</p>
2. Waste Water Management:		
a)	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 ³ /tonne (for 90% of time) except for the monsoon season:	The discharge of treated water from Kochi Refinery is 0.270 m ³ / tonne of crude processed for the year half year April 2017– September 2017.
b)	Oil spill response facilities at Coastal Refineries will be in position within two years:	Oil spill response (OSR) facility at Cochin Port Trust (CPT) is already in place. Additionally, BPCL Kochi refinery has procured oil containment booms as a part of Single Point Mooring (SPM) facilities commissioning to augment the capabilities of oil spill response related facilities. We also conduct mock drills to build confidence for the safe operations of

	SPM facilities with the help of Port Trust / Coast Guard personnel. BPCL KR has committed Rs.4,94,56,355/- for the above purpose.
--	--

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:

- 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 of side entry mixers in crude oil tanks.

Kochi Refinery has engaged M/s SB Industries to process the oily sludge in the Refinery. The oil recovery process consists of a series of physical separation processes. Removal of free water is achieved through settling. The sediments are removed through screening followed by centrifuging. The oil recovered is reused. Sludge generated in ETP's is being processed in Delayed Coker Unit.

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.
- b. Secondary seals have been provided in 53 storage tanks storing volatile hydrocarbons
- c. Hydrocarbon detectors at the storage tank farm areas, process plants, product loading areas.
- d. Benzene monitoring is carried out using "Drager" chip technique in the Aromatic Recovery Unit on a daily basis.
- e. Five online ambient air quality monitoring stations (AAQMS)
- f. Pressure relief valves for columns 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)

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

Further, the fuel gas flow to the pilot burner is maintained at the minimum level required to sustain the pilot flame. Flare Gas Recovery System for IREP Units is also under commissioning.

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.

Sixty bore wells and 14 piezometer wells are provided and are regularly monitored.

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

a) Clean technologies adopted to combat Air Pollution includes:

- I. Capable for production of MS and HSD of Euro IV/EuroVI equivalent quality is currently in continuous operation.
- II. Hydro desulphurisation of feed stock to the fluid catalytic cracking unit (FCCU).
- III. Modifications to plant fuel system to facilitate usage of low sulphur Bombay High Vacuum Residue as liquid fuel.
- IV. Amine treatment of fuel gas for removal of hydrogen sulphide, thereby producing sweet fuel gas.
- V. Installation of three trains of Sulphur Recovery Unit with more than 99% recovery. SRU with 99.9% recovery installed as part of IREP project.

- VI. Low pressure amine treatment of vacuum column vent gas.. The uniqueness of the technology lies in the fact that the process for hydrogen sulphide removal is carried out under extremely low pressure drop conditions.
- VII. Desulphurization of low pressure gas from crude unit overhead and kerosene unit fractionator utilizing amine absorption.
- VIII. Reduction furnace in SRUs for conversion of ammonia stream to nitrogen in order to reduce NOx emissions.
- IX. In place of the traditional bitumen blowing unit for bitumen production, state of the art Biturox Technology has been adopted for production of various grades of Bitumen. Unlike the traditional bitumen blowing technology, the new technology results in no odour or pollutant emissions, since the offgas generated is subjected to incineration and caustic scrubbing. The waste water stream generated is also oxidized, thereby resulting in zero BOD in effluent. The fresh water consumption of the unit is also significantly reduced compared to the old unit.
- X. Five online ambient air quality monitoring stations in operation.
- XI. 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).
- XII. Closed loop sampling system in process plants.

b) Clean technologies adopted to improve effluent water quality:

- I. Four effluent treatment plants catering to the different process units.
- II. Installations of five numbers of sour water strippers and recycle of stripped water in process units.
- III. Provision of two stage API Oil Separation System for effluent streams.
- IV. Spent caustic treatment utilizing hydrogen peroxide and air oxidation methods in an environment friendly process.
- V. Closed drainage system for tank farm drains.
- VI. Two stage biological treatment system for effluent streams including tricking filter and activated sludge process, Automated Chemostat Technology and Sequential Batch reactor.
- VII. Hydrogen Peroxide is utilized in our ETP's instead of FeCl_3 to avoid chemical sludge formation.
- VIII. 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:

- I. Mechanical oil recovery system for oil recovery from oily sludge.
- II. In-situ recovery of oil from crude tank bottom sludge.
- III. 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 590 m^3 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^3 is dedicated for the disposal of sludge from effluent treatment plants.
- IV. 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.

V. We have entered into an agreement with KEIL for disposing solid hazardous wastes in their facility.

VI. Wherever possible, spent catalyst containing recoverable metals are disposed of by sale to authorized recyclers.



COCHIN TEST HOUSE

ANALYTICAL SERVICES & TESTING LABORATORY

V / 78, Kollanpady, Murungaliparambu Road, Irumpanam P.O., Kochi - 682 309
 Mob.: 9446332556, 9387381780, 9846551014, Tel. : 0484 - 2782672
 E-mail: cochintesthouse1@gmail.com, Web : ww.cochintesthouse.in

Laboratory Approved by Kerala State Pollution Control Board

TEST REPORT

Page 1 of 1

Report No : CTH/LR/17/NN/1457

Issue Date : October 26, 2017

Name and Address of customer : M/s.BPCL Kochi Refinery,
 Ambalamugal.
 Sample Drawn By : Cochin Test House
 Sample code : 17/NN/1457
 Date of receipt of sample : 16.10.2016
 Dates of Analysis : 16.10.2016 – 25.10.2016
 Description of the sample by the customer : Bore Well Water from 14
 Test required: For the parameters listed below, as per Drinking water specification IS 10500: 1991

Sl.No.	Parameters	Unit	Method	Result	Desirable Limit
1	Mercury as Hg	mg/l	APHA:22 nd Ed.2012-3112 B	BDL(MDL – 0.001)	0.001
2	Arsenic as As	mg/l	APHA:22 nd Ed.2012-3114 C	BDL(MDL – 0.01)	0.05
3	Lead as Pb	mg/l	APHA:22 nd Ed.2012-3111 C	BDL(MDL – 0.05)	0.05
4	Copper as Cu	mg/l	APHA:22 nd Ed.2012-3111 C	BDL(MDL – 0.05)	0.05
5	Chromium as Cr ⁶⁺	mg/l	APHA:22 nd Ed.2012-3111 C	BDL(MDL – 0.05)	0.05
6	Zinc as Zn	mg/l	APHA:22 nd Ed.2012-3111 B	BDL(MDL – 0.1)	5.0
7	Cadmium as Cd	mg/l	APHA:22 nd Ed.2012-3111 B	BDL(MDL – 0.01)	0.01
8	Manganese as Mn	mg/l	APHA:22 nd Ed.2012-3111 B	BDL(MDL – 0.1)	0.10
9	Cyanide ad CN	mg/l	IS:3025(Pt. 27)	BDL(MDL – 0.02)	0.05
10	Selenium as Se	mg/l	APHA:22 nd Ed.2012-3114 C	BDL(MDL – 0.01)	0.01
11	Nickel as Ni	mg/l	APHA:22 nd Ed.2012-3111 C	BDL(MDL – 0.01)	0.02

BDL- Below Detection Limit; MDL-Minimum Detection Limit.

End of Report



[Signature]
 Verified By

[Signature]
 K.P. Yacob
 Authorised Signatory
 Chemical
 COCHIN TEST HOUSE

NOTE : This test results relate only to the sample submitted for analysis.

The test report shall not be reproduced except in full without the written approval of the laboratory.