भारत पेट्रोलियम कॉर्पोरेशन लिमिटेड
भारत सरकार का उपक्रम
कोच्चि रिफ़ाइनरी

BHARAT PETROLEUM CORPORATION LIMITED
A Govt. of India Enterprise
Kochi Refinery

03/ENV/202/04
04.06.2018

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 of IREP Project on Environmental Clearance issued by the Ministry of Environment, Forests and Climate Change.

Ref: EC Nos.J-11011/341/2011-IA II(I) dt. 22.11.2012; and Amendment dated 23rd May 2014 issued to the "IREP Project of M/s Bharat Petroleum Corporation Ltd, Kochi at Ambalamugal".

Please find enclosed the compliance reports on the various conditions laid down by MoEF &CC, pertaining to the half year period from October 1st, 2017 to March 31st, 2018 for the subject project.

Thanking you
Very truly yours
For BPCL Kochi Refinery

Damien Gracious K. D
Chief General Manager (HSE)

Encl: 1.Status: Six monthly compliance 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

S.No. as per Env.Ltr.No. J-11011/341/2011-IA II (I), Dtd.: 22/11/12	COMMENTS	Compliance Status
SPECIFIC CONDITIONS:		
I	Compliance to all the environmental conditions stipulated in the environmental clearance letter nos. J-11011/32/90-IA.II dated 20th August, 1991 J-11011/78/1996-IA.II (I) dated 5th March, 1997 and J-11011/238/2008-IA.II (I) dated 18th February, 2009 shall be satisfactorily implemented and compliance reports submitted to the Ministry's Regional Office at Bangalore.	Complied.
ii	M/s BPCL shall comply with new standards/norms for Oil Refinery Industry notified under the Environment (Protection) Rules, 1986 vide G.S.R. 186 (E) dated 18th March, 2008.	Complied.
iii	Adequate stack height shall be provided to heaters, furnaces, VGO, HSD and utility boilers as per CPCB/Kerala State Pollution Control Board (KSPCB) guidelines to disperse gases emissions into the atmosphere. Low NOx burners shall be provided to Heaters/furnaces with on-line analyzers. Low sulphur fuel shall be used.	Complied.
iv	Continuous on-line stack monitoring for SO_2, NOx and CO of all the stacks shall be carried out.	Online connectivity established to KSPCB. Connectivity to CPCB work initiated. Consent to operate received on 24.10.2017.
v	The process emissions [SO_2 NOx, HC (Methane & Non-methane)] VOCs and Benzene from various units shall conform to the standards prescribed under the Environment (Protection) Act. At no time, the emission levels shall go beyond the stipulated standards. In the event of failure of pollution control system(s) adopted by the unit, the unit shall be immediately put out of operation and shall not	Complied. Complied.

S.No. as per Env.Ltr.No. J-11011/341/2011-IA II (I), Dtd.: 22/11/12	COMMENTS	Compliance Status
	be restarted until the desired efficiency of the pollution control device has been achieved.	
vi	Leak detection and repair programme shall be prepared and implemented to control HC/VOC emissions. Focus shall be given to prevent fugitive emissions for which preventive maintenance of pumps, valves, pipelines are required. Proper maintenance of mechanical seals of pumps and valves shall be given. A preventive maintenance schedule for each unit shall be prepared and adhered to. Fugitive emissions of HC from product storage tank yards etc. must be regularly monitored. Sensors for detecting HC leakage shall be provided at strategic locations.	Complied.
vii	SO_2 emissions after expansion from the plant shall not exceed 1518 kg/hr and further efforts shall be made for reduction of SO_2 load through use of low sulphur fuel. Sulphur recovery units shall be installed for control of H_2S emissions. The overall sulphur recovery efficiency of Sulphur Recovery Unit with tail gas treating shall not be less than 99.9%. (The SO2 emission was reduced from 1582 Kg/Hr to 1518 based on the EC amendment dated 23.05.2014).	Complied. Complied. The SO2 emission after IREP commissioning is 1518Kg/h.
viii	As proposed, record of Sulphur balance shall be maintained at the Refinery as part of the environmental data on regular basis. The basic component of sulphur balance include sulphur input through feed (sulphur content in crude oil), sulphur output from Refinery through products, byproduct (elemental sulphur), atmospheric emissions etc.	Complied.
ix	Flare gas recovery system shall be installed.	Installed in February 2018.
x	Ambient air quality monitoring stations [PM_{10}, $PM_{2.5}$, SO_2,, NOx, H_2S, mercaptan, non-methane-HC and Benzene] shall be set up in the	Complied.

S.No. as per Env.Ltr.No. J-11011/341/2011-IA II (I), Dtd.: 22/11/12	COMMENTS	Compliance Status
	complex in consultation with Kerala State Pollution Control Board, based on occurrence of maximum ground level concentration and down-wind direction of wind. The monitoring network must be decided based on modeling exercise to represent short term GLCs.	
xi	Ambient air quality data shall be collected as per NAAQES standards notified by the Ministry on 16th November, 2009 and trend analysis w.r.t. past monitoring results shall also be carried out. Adequate measures based on the trend analysis shall be taken to improve the ambient air quality in the project area.	Complied.
xii	The gaseous emissions from DG set shall be dispersed through adequate stack height as per CPCB standards. Acoustic enclosure shall be provided to the DG sets to mitigate the noise pollution. Besides, acoustic enclosure/silencer shall be installed wherever noise levels exceed the limit.	Complied.
xiii	Total water requirement from River Periyar after expansion shall not exceed 3083.3 m^3/hr and prior permission shall be obtained from the competent authority. Industrial effluent generation will be 1400 m^3/hr and treated in the effluent treatment plant. Treated effluent shall be recycled/reused within the factory premises and remaining treated effluent shall be discharged into Chitrapuzha River after conforming to the standards prescribed for the effluent discharge and obtaining permission from the KSPCB, which shall not exceed 410 m^3/hr. Domestic sewage shall be treated in sewage treatment plant (STP).	Complied. Complied.
xiv	All the effluents after treatment shall be routed to a properly line guard pond for equalization and final control. In the guard pond,	Provided and relocation being explored in

S.No. as per Env.Ltr.No. J-11011/341/2011-IA II (I), Dtd.: 22/11/12	COMMENTS	Compliance Status
	automatic monitoring system for flow rate, pH and TOC shall be provided.	consultation with KSPCB/CPCB.
xv	Oil catchers/oil traps shall be provided at all possible locations in rain/storm water drainage system inside the factory premises.	Provided.
xvi	A study shall be conducted to identify the source of odour and remedial measures to control the odour problem shall be taken. Study report shall be submitted to the Ministry's Regional office at Bangalore within 6 months from the date of issue of this letter.	Complied.
xvii	Improvement in the sludge handling area is required and scheme for final disposal of sludge shall be prepared and submitted to the Ministry's Regional office at Bangalore.	Sludge handling area housekeeping improved and Final sludge disposal scheme submitted.
xviii	Oily sludge shall be disposed off into Coker. Annual Oily sludge generation and disposal data shall be submitted to the Ministry's Regional Office and CPCB.	Oily sludge is disposed in Delayed Coker Unit (DCU). Annual sludge generation and disposal data being submitted to Regional Office and CPCB.
xix	The Company should strictly comply with the rules and guidelines under Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 as amended in October, 1994 and January, 2000. Hazardous waste should be disposed of as per Hazardous Waste (Management, Handling and Trans-boundary Movement) Rules, 2008 and amended time to time.	Complied.
xx	The membership of common TSDF should be obtained for the disposal of hazardous waste. Copy of authorization or membership of TSDF should be submitted to Ministry's Regional Office at Bangalore. Chemical/inorganic sludge shall be sent to treatment storage disposal facility (TSDF) for hazardous waste. Spent catalyst shall be sent to authorized recyclers/re-processors.	BPCL-KR has entered into a waste disposal agreement with M/s Kerala Enviro Infrastructure Limited to dispose off all wastes including hazardous waste. Spent catalyst is being sent to authorized recyclers/re-processors / disposal agencies.

S.No. as per Env.Ltr.No. J-11011/341/2011-IA II (I), Dtd.: 22/11/12	COMMENTS	Compliance Status
xxi	Proper oil spillage prevention management plan shall be prepared to avoid spillage/leakage of oil/petroleum products and ensure regular monitoring.	BPCL–KR is having an oil spillage contingency plan for SBM. Inside the refinery complex, adequate facilities are maintained to prevent and contain oil spillage.
xxii	The company shall strictly follow all the recommendation mentioned in the Charter on Corporate Responsibility for Environmental protection (CREP).	Will be complied.
xxiii	To prevent fire and explosion at oil and gas facility, potential ignition sources shall be kept to a minimum and adequate separation distance between potential ignition sources and flammable materials shall be in place.	Complied as per OISD guidelines.
xxiv	Green belt shall be developed at least in 33% of the plant area in and around the plant premises to mitigate the effects of fugitive emissions all around the plant as per the CPCB guidelines in consultation with DFO. Thick green belt with suitable plant species shall be developed around unit. Selection of plant species shall be as per the CPCB guidelines.	BPCL-KR is developing Green Belt as required.
xxv	Company shall prepare project specific environmental manual and a copy shall be made available at the project site for the compliance.	Complied
xxvi	All the recommendations mentioned in the rapid risk assessment report, disaster management plan and safety guidelines shall be implemented.	Complied
xxvii	All the issues raised and commitment made during the public hearing/consultation meeting held on 14th February 2012.....	All feasible and applicable concerns addressed.
xxviii	Company shall adopt Corporate Environment Policy as per the Ministry's O.M. No. J-11013/41/2006-IA.II(I) dated 26th April, 2011	BPCL as a Corporation is having a Corporate HSSE Policy which includes Environment also.

S.No. as per Env.Ltr.No. J-11011/341/2011-IA II (I), Dtd.: 22/11/12	COMMENTS	Compliance Status
	and implemented.	
xxix	Provision shall be made for the housing of construction labour within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, Safe drinking water, medical health care, crèche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.	Complied.
GENERAL CONDITIONS:		
i	The project authorities must strictly adhere to the stipulations made by the State Pollution Control Board (SPCB), State Government and any other statutory authority.	BPCL-KR will adhere to the stipulations made by KSPCB, State Govt and other statutory bodies.
ii	No further expansion or modification in the project shall be carried out without prior approval of the Ministry of Environment & Forests. In case of deviations or alterations in the project proposal from those submitted to this Ministry for clearance, a fresh reference shall be made to the Ministry to assess the adequacy of conditions imposed and to add additional environmental protection measures required, if any.	BPCL-KR had sought some amendments to the EC conditions from MoE&F. MoE&F has accorded the EC amendment on 23rd May 2014.
iii	The project authorities must strictly comply with the rules and regulations under manufacture, Storage and import of Hazardous Chemical Rules, 2000 as amended subsequently. Prior approvals from Chief Inspectorate of Factories, Chief Controller of Explosives, Fire Safety Inspectorate etc. must be obtained, wherever applicable.	BPCL-KR has obtained approvals from Chief Inspectorate of Factories, Chief Controller of Explosives, Fire Safety Inspectorate etc. BPCL-KR complied the rules and regulations under manufacture, Storage and import of Hazardous Chemical Rules, 2000.
iv	The overall noise levels in and around the plant area shall be kept well within the standards by providing noise control measures including acoustic hoods, silencers, enclosures etc. on all sources of	The overall noise level will be limited at the fence as prescribed under EPA rules.

S.No. as per Env.Ltr.No. J-11011/341/2011-IA II (I), Dtd.: 22/11/12	COMMENTS	Compliance Status
	noise generation. The ambient noise levels shall conform to the standards prescribed under EPA Rules, 1989 viz. 75 dBA (day time) and 70 dBA (night time).	
v	A separate Environmental Management Cell equipped with full fledged laboratory facilities must be set up to carry out the environmental management and monitoring functions.	BPCL-KR is having a separate Environment Management cell to carry out environmental management and monitoring functions. We have well equipped Centralised Quality Control Laboratory.
vi	Adequate funds shall be earmarked towards capital cost and recurring cost/annum for environment pollution control measures and shall be used 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 conditions stipulated herein. The funds so provided shall not be diverted for any other purposes.	BPCL-KR has earmarked adequate funds for environment pollution control measures.
vii	The Regional Office of this Ministry/Central Pollution Control Board/State Pollution Control Board will monitor the stipulated conditions. A six monthly compliance report and the monitored data along with statistical interpretation shall be submitted to them regularly.	Six monthly compliance reports are being submitted by BPCL-KR as per the requirement.
viii	A copy of clearance letter shall be sent by the proponent to concerned Panchayat, Zila Parishad/Municipal Corporation, Urban Local Body and the local NGO, if any, from whom suggestions/representations, if any, were received while processing the proposal. The clearance letter shall also be put on the web site of the Company by the proponent.	BPCL-KR has complied with this condition.
ix	The project proponent shall upload the status of compliance of the	Six monthly compliance reports are being

S.No. as per Env.Ltr.No. J-11011/341/2011-IA II (I), Dtd.: 22/11/12	COMMENTS	Compliance Status
	stipulated environment clearance conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of the MOEF, the respective Zonal Office of CPCB and the SPCB. The criteria pollutant levels namely; PM10, PM2.5, SO2, NOx, HC (Methane of Non-methane), VOCs (ambient levels as well as stack emissions) or critical sectoral parameters, indicated for the projects shall be monitored and displayed at a convenient location near the main gate of the company in the public domain.	submitted by BPCL-KR after receipt of the Environmental Clearance for the IREP project. The same will be sent to the Regional Office of MoEF and also uploaded in the website. The criteria pollutant levels namely; PM10, PM2.5, SO2, NOx, HC (Methane of Non-methane), VOCs (ambient levels as well as stack emissions) or critical sectoral parameters, indicated for the projects shall be monitored and displayed at a convenient location near the main gate of the company in the public domain.
x	The project proponent shall also submit six monthly reports on the status of the compliance of the stipulated environmental conditions including results of monitored data (both in hard copies as well as by e-mail) to the Regional Office of MOEF, the respective Zonal Office of CPCB and the SPCB. The Regional Office of this Ministry/CPCB/SPCB shall monitor the stipulated conditions.	Six monthly compliance reports are being submitted by BPCL-KR after receipt of the Environmental Clearance for the IREP project. The same will be sent to the Regional Office of MoEF and also uploaded in the website.
xi	The environmental statement for each financial year ending 31st March in Form-V as is mandated to be submitted by the Project proponent to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of environmental conditions and shall also be sent to the respective Regional Offices of the MOEF by e-mail.	Complied.
xii	The project proponent 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 SPCB and may also be	BPCL-KR has complied with this condition.

S.No. as per Env.Ltr.No. J-11011/341/2011-IA II (I), Dtd.: 22/11/12	COMMENTS	Compliance Status
	seen at website of the Ministry of Environment and Forests at http:/envfor.nic.in. This shall 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 the copy of the same shall be forwarded to the Regional Office.	
xiii	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.	The Board approval for pre-project activities for the IREP project was obtained on 31.01.2011 and capital approval was obtained by the Board on 31.03.2012. Land development work commenced in line with the above approval.

Annexure - 1

IREP STACK MONITORING DATA
October 2017- March 2018

SL. NO.	STACK NO. UNIT	NO. OF SAMPLES ANALYSED	PERMITTED EMISSION Nm3/hr	STATUTORY STIPULATION SPCB	SULPHUR DIOXIDE mg/Nm3			EMISSION RATE Nm3/hr			PARTICULATE MATTER mg/Nm3			PERCENTAGE COMPLIANCE		REMARKS
					MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG	SPCB	MOE&F	
1	SRU III TRAIN A	1	92500	S Rec 99.9%	633.57	633.57	633.57	91120	91120	91120	-	-	-	"	"	
2	SRU III TRAIN B	1	92500		613.4	613.4	613.4	91969	91969	91969	-	-	-	"	"	
3	CDU III	0	254000		SHUTDOWN											
4	DHDT	0	59000	SO_2 - 850mg/Nm^3	SHUTDOWN											
5	VGO HDT	1	55000	PM- 50mg/Nm^3	742.03	742.03	742.03	113034	113034	113034	38.99	38.99	38.99	100	100	
6	PFCCU HEATER	1	22400		17.02	17.02	17.02	24882	24882	24882	35.96	35.96	35.96	"	"	
7	PFCCU REGENERATOR	1	235250		55.68	55.68	55.68	81700	81700	81700	43.99	43.99	43.99	"	"	
8	DCU-1	0	80000													
9	DCU-2	1	80000		480.53	480.53	480.53	79993	79993	79993	30.99	30.99	30.99	100	100	
10	HRSG-3	1	1095907		394.92	394.92	394.92	159013	159013	159013	27.26	27.26	27.26	"	"	
11	HRSG-4	1	1095907		408.67	408.67	408.67	137251	137251	137251	28.38	28.38	28.38	"	"	
12	HRSG-5	0	1095907		SHUTDOWN											
13	UB 12	0	246744		SHUTDOWN											
14	UB 13	0	246744		SHUTDOWN											

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BHARAT PETROLEUM CORPORATION LIMITED
A Govt. of India Enterprise
Kochi Refinery

03/ENV/202/04
04.06.2018

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-16011/38/2003-IA-III 12.8.2004 issued to the project "Development of crude oil Receipt facilities (CORE), Facilities include Single point Mooring, Submarine Pipe line from SPM to Shore Tank Farm, STF and Pipe line from STF to KRL for M/s Bharat Petroleum Corporation Ltd, Kochi Refinery (Formerly Kochi Refinery)"

With reference to the above we would like to appraise the following points.

1. The project has been commissioned in 2006.
2. The crude oil receipt facilities are for receiving crude at Single point mooring facility and transporting the crude oil to refinery storage tanks. This facility does not have any other operation other than transport of crude oil into refinery tanks. Hence there is no continuous emission/effluent generation from this facility.

Please find enclosed the compliance reports on the various conditions laid down by MoEF &CC, pertaining to the half year period from October 1st, 2017 to March 31st, 2018 for the Project mentioned in the Ref. 2 above. The data on ambient and storm water details for the above said period are given as Annexure-I.

Thanking you,

Very truly yours
For BPCL Kochi Refinery

Damien Gracious
Chief General Manager (HSE)
Encl: 1. Six Monthly Compliance Report
2. Annexure -1: Ambient Air Details & Quality of Storm water

Cc:

1. The Member Secretary
Central Pollution Control Board
Parivesh Bhawan, Delhi 110032

2. The Member Secretary
Kerala State Pollution Control Board
Plamoodu Junction, Trivandrum

COMPLIANCE STATUS OF ENVIRONMENTAL CLEARANCE CONDITIONS FOR CRUDE OIL RECIEPT FACILITIES (CORE), FACILITIES INCLUDE SINGLE POINT MOORING, SUBMARINE PIPE LINE FROM SPM TO SHORE TANK FARM, STF AND PIPE LINE FROM STF TO KRL FOR M/S KOCHI REFINERIES LTD. ACCORDED BY J-16011/38/2003-IA-III DT.12.8.2004

Status of the project: Project commissioned in 2006

Sl. No.	Condition	Status/Remarks
(i)	All the conditions stipulated by Kerala Pollution Control Board vide letter No. PCB/CE/EK/595/2003 dated 05.12.03 shall be effectively implemented.	Complied.
(ii)	All the conditions stipulated by Forest & Environment Department, Govt. of Kerala vide their letter No. 65/B1/2004/CZMA dated 31.03.04 shall be effectively implemented. The project shall be implemented in such a manner that no portion of the project site should be located in CRZ-I(i) and no damage is caused to the mangroves or other sensitive coastal eco-systems due to project activities.	Complied.
(iii)	It shall be ensured that there is no displacement of people, houses or fishing activity as a result of the project.	Complied
(iv)	It shall be ensured that due to the project, there is no adverse impact on the drainage of the area and recharge of groundwater. No groundwater should be tapped in the project area falling in Coastal Regulation Zone.	Complied
(v)	The project proponents must make necessary arrangements for disposal of solid wastes and for the treatment of effluents/liquid wastes. It must be ensured that the effluents/liquid wastes are not discharged into the backwater.	Normally there is no liquid effluent generation from the facility. An ETP is set up to handle effluents generated if any. Oily sludge generated in the crude tanks is subjected to oil recovery.

Sl. No.	Condition	Status/Remarks
(vi)	The camps of labour shall be kept outside the Coastal Regulation Zone area. Proper arrangements for cooking fuel shall be made for the labour during construction phase so as to ensure that mangroves are not cut /destroyed for this purpose.	Complied during the project construction phase.
(vii)	Regular drills should be conducted to check the effectiveness of the on-site Disaster Management Plan. The recommendations made in the Environmental Management Plan and Disaster Management Plan, as contained in the Environmental Impact Assessment and Risk Analysis reports of the project, shall be effectively implemented and adequate budgetary provisions may be made for the same. Details in this regard may be furnished to this Ministry.	Regular Drills are being conducted. Fire Emergency drill once in every month and mock drill on-site in every six months. Recommendations of the EIA and Risk analysis reports have been implemented
(viii)	The entire stretch of the pipelines shall be buried underground except at the booster pumping station, which will be properly fenced and the station would be manned round the clock. The buried lines will be protected with anticorrosive coal tar based coating. The coating will be tested by high voltage detector in accordance with prescribed standards.	Pipe lines are laid underground with CTE /3 LP coating. Further, these buried pipe lines are provided Cathodic protection and regular monitoring of the voltage is being done. Crude in transit storage and booster pump facilities are manned round the clock.
(ix)	Markers shall be installed at every 30 m to indicate the position of the line.	Complied
(x)	The smooth and safe operation of the system will be ensured by incorporating a computerized SCADA (Supervisory Control and Data Acquisition) system.	Computerized control system implemented.
(xi)	There should be display boards at critical locations along the pipeline viz. road/rail/river crossings giving emergency instructions as well as contact details of Kochi Refineries Limited.	Complied
(xii)	During operation phase, proper precautions should be taken to avoid any oil spills and no oily wastes shall be discharged into the water bodies.	Proper precautions are taken to avoid any oil discharge in to water bodies.

Sl. No.	Condition	Status/Remarks
(xiii)	It shall be ensured that the mangroves along with proposed alignment of the pipeline, if any shall not be adversely affected due to the project.	Ensured.
(xvi)	Storage of petroleum products shall be permitted within the provisions of the CRZ Notification, 1991 and its subsequent amendments.	Complied
(xv)	The impact of oceanographic parameters on the sub-sea pipeline such as buckling, slope stability, prediction of marine growth, local bad effects, pipeline spanning, liquefaction, etc. shall be studied.	It was taken care during the pipeline design by M/s. INTEC, Malaysia, based on Geo-technical studies and the subsea pipe lines were laid incorporating all these safe guards.

Annexure - 1

AMBIENT AIR QUALITY DATA FOR THE HALF YEAR PERIOD OCTOBER 2017- MARCH 2018

AMBIENT AIR QUALITY MONITORING STATION							
STF AAQMS 1							
COMPONENT	UNIT	MONTH					
		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18
SO_2	ug/m^3	2.25	1.87	1.97	3.46	2.86	1.68
PM_{10}	ug/m^3	66.88	68.39	71.64	93.94	87.03	57.31
$PM_{2.5}$	ug/m^3	23.63	41.63	51.18	67.10	60.73	41.19

AMBIENT AIR QUALITY MONITORING STATION							
STF AAQMS 2							
COMPONENT	UNIT	MONTH					
		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18
SO_2	ug/m^3	1.98	2.16	3.44	4.49	3.96	1.60
PM_{10}	ug/m^3	38.31	59.28	73.15	90.86	84.53	60.89
$PM_{2.5}$	ug/m^3	27.35	45.4	56.88	70.53	61.56	44.25

AMBIENT AIR QUALITY MONITORING STATION							
STF AAQMS 3							
COMPONENT	UNIT	MONTH					
		Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18
SO_2	ug/m^3	5.92	4.62	3.65	4.26	5.01	2.80
PM_{10}	ug/m^3	37.78	58.42	69.24	92.26	82.83	71.35
$PM_{2.5}$	ug/m^3	29.64	50.87	61.24	81.85	72.20	43.46

STF STORM WATER QUALITY DATA FOR THE HALF YEARLY PERIOD OCTOBER 2017 - MARCH 2018

EFFLUENT MONITORING STATION STORM WATER-STF							
MONTH	pH	Suspended Solids	BOD 3 days at 27°C	Phenolic Compds	Sulphides (as S)	Oil & Grease	COD
		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
	Avg	Avg	Avg	Avg	Avg	Avg	Avg
Oct-17	8.2	15	12	0.12	0.5	1.9	72
Nov-17	8.2	11	14	0.1	0.4	1.2	68
Dec-17	8	8	15	0.11	0.4	1.3	65
Jan-18	8.1	8	14	0.1	0.4	1.6	60
Feb-18	8.2	6	14	0.1	0.4	1.5	65
Mar-18	8.3	6	14	0.1	0.4	2.4	75
permissible limits	6.0-8.5	20	15	0.35	20	5	125

भारत पेट्रोलियम कॉर्पोरेशन लिमिटेड
भारत सरकार का उपक्रम
कोच्चि रिफ़ाइनरी

BHARAT PETROLEUM CORPORATION LIMITED
A Govt. of India Enterprise
Kochi Refinery

03/ENV/202/04
04.06.2018

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 on Environmental Clearance issued by the Ministry of Environment, Forests and Climate Change.

Ref: EC No.J-11011/32/90-IA-II dt. 20.8.91 issued to our Project "Capacity expansion of M/s Bharat Petroleum Corporation Ltd, Kochi Refinery (Formerly Cochin Refineries Ltd.) from 4.5 to 7.5 MMTPA at Ambalamugal".

Please find enclosed the compliance reports on the various conditions laid down by MoEF &CC, pertaining to the half year period from October 1st, 2017 to March 31st, 2018 for the subject project.

The data on emission, ambient air, effluent, CREP recommendations, details of land balance, ground water usage, green belt, solid waste management, rain water harvesting, solar power generation and details of environment management cell being common to all the ECs granted in Kochi Refinery premises, the same are enclosed as part of EC for CEMP-II accorded vide MoEF&CC letter J-11011/369/2005-IA II(I) dated 2nd February 2006.

Thanking you
Very truly yours

For BPCL Kochi Refinery

Damien Gracious K.D
Chief General Manager (HSE)
Encl: 1.Six Monthly Compliance 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 PROJECT ACCORDED BY J-11011/32/90-IA.II DTD.20/08/1991

Status of the project: Project commissioned in 1994

Sl. No.	Stipulations of MoEF & CC	Status as on 31.03.2018
1	The project authorities must strictly adhere to the stipulations laid down by the State Pollution Control Board and the State Government and a comprehensive EIA report must be submitted within two months.	Complied.
2	Any expansion of the plant, either with the existing product mix or new products can be taken up only with the prior approval of this Ministry.	Complied.
3	The present policy of crude mix refining strategy of minimum 50% Indian crude including B.H and 50% of imported crude should be maintained and implemented under normal conditions.	Capacity is 15.5 MMTPA and crude mix is chosen to improve the gross refining margin of the refinery within the consented conditions of production and emission/effluent norms.
4	Sulphur Recovery Unit with more than 90% Sulphur recovery should be installed and commissioned before the expansion project is completed and precautions for its continuous operation must be taken. Techno-economic feasibility study for additional stand –by 'S' recovery system may be initiated after the installation of first unit.	Sulphur Recovery Unit with more than 90% sulphur recovery commissioned during March 1995. Additional Sulphur Recovery unit has been commissioned as part of DHDS project.
5	Only LSHS should be used in boilers. The additional capacity for heaters, utility furnace must be based on LSHS use only. Low NOx burners should be used to avoid gaseous formation of NOx.	Complied.
6	The gaseous emissions from various process units should conform to the standards prescribed by the concerned authorities from time to time. At no time the emission level should go beyond the stipulated standards. In the event of the failure of any pollution control system adopted by the unit, the respective unit should be put out of operation immediately and should not be restarted until the control measures are rectified to achieve the desired efficiency.	Complied.
7	Adequate number (a minimum of 7) of air quality monitoring stations should be set up in the down-wind direction as well as where	As per letter No. J-11011/32/90-IA. II dated 19.05.1992. CRL was directed to put up 4 Nos. of AAQMS. Based on wind rose

	maximum ground level concentration is anticipated. Stack emission should be monitoring by monitoring unit. The data on stack emission should be submitted to the State Pollution Control Board once in three months and to this Ministry once in six months along with the statistical analysis. The air quality monitoring stations should be selected on the basis of modelling exercise to represent the short term ground level construction.	pattern at CRL and modelling exercise conducted, 3 AAQMS were found to be sufficient for monitoring the pollutants from CRL. KSPCB's approval was obtained to put up these 3 stations in CRL premises. 3 Nos. of AAQMS had been installed along with a Data Acquisition Centre and was commissioned in August 1997. Post CEMP- II project, commissioned in 2010 – 2011, BPCL KR has 5 AAQMS stations. The data from all the five AAQMS stations are being uploaded to CPCB servers. The data from AAQMS are being provided along with CEMP II clearance accorded vide MoEF&CC letter J-11011/369/2005-IA II(I) dated 2nd February 2006 to KSPCB and MoEF&CC as per the recommended time interval. Stack emission data attached as Annexure I.
8	Fugitive emissions should be regularly monitored and adequate provision should be made for the same.	Complied.
9	Fugitive emission of HC from storage tanks should be minimized by adopting the following measures: a) Provision of Floating Roof Tanks for volatile products b) Replacement of gland packing of pumps by means of mechanical seals. c) Use of submerged filling in product loading gantries	Complied. All the pumps except pumps in heavy oil or water service are provided with mechanical seals. Complied.
10	There should be no change in the stack design without the approval of the State Pollution Control Board. Alternate Pollution Control System and proper design in the stack should be provided to take care of excess emissions due to failure in any system of the plant.	Complied
11	Total raw water consumption (industrial as well as township) should not exceed the present level (i.e.16,800 m3/day)	Complied.
12	The project authorities must recycle waste water to the maximum extent possible. The present practice of ETP effluent discharged into water logged areas should not be continued. The liquid effluent coming out of the plant should meet the stipulated standards and disposed through the channel only into the	Complied.

	outfall point in Chitrapuzha river to be identified by the State Pollution Control Board. Flow of oil and grease into biological system should be avoided. Waste stream segregator should be installed before ETP.	
13	Adequate number of effluent quality (oil & grease, COD, BOD, Suspended solids, phenols, sulphides, pH and flow) monitoring stations must be set up in consultation with State Pollution Control Board	Complied
14	No oily sludge should be generated and stored as was being done in the past.	As part of IREP project, BPCL-KR has commissioned a Delayed Coker Unit (DCU). Sludge generated is processed in this DCU.
15	The project authority should prepare a well designed scheme for solid and hazardous wastes disposal generated from CRL, taking into account the suggestions made by consultants in the EIA report. The plan for disposal duly approved from the State Pollution Control Board should be submitted to the Ministry within six months and adequate space should be provided for it, as far as possible on the premises itself.	Scheme for solid and hazardous waste disposal was approved by KSPCB. Scheme was subsequently submitted to MoE&F in March 1993. BPCL Kochi Refinery has implemented a scheme for recovery of oil from oily sludge. The oil recovery process consists of a series of physical separation processes. The oil recovered is reprocessed in the refinery process units. Bio remediation is carried out through TERI suggested methods. 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.
16	Green belt, 500 meters wide, as recommended by the consultants in their report should be developed and maintained. The treated effluent conforming to the standard should be used for green belt development plan taking into account attenuation factors, soil characteristics etc. should be prepared and submitted to this Ministry within 6 months.	Complied.
17	Relocate LPG spheres so that risk due to these remains within the plant area	As it was not feasible to relocate the LPG spheres, it had been desired by MoE&F to acquire land in the adjoining area where impact will be more. Accordingly, the adjoining land of 63 acres had been acquired by CRL that has been occupied by IOC, HPC and BPC

		area. Further, LPG spheres are progressively being replaced with mounded storages.
18	A detailed risk analysis study based on Maximum Credible Accident Analysis should be done and submitted to this Ministry once the process design / technology and lay out is frozen. Based on this, a Disaster Management Plan has to be prepared and after approval by the concerned Nodal Agency, should be submitted to this Ministry within six months.	Risk analysis study had been conducted and was submitted to MoEF &CC in October 1991. Disaster Management Plan was submitted to MoEF &CC in February 1992.
19	Feasibility of using 20 tonner truck may be studied / assessed wherever road transport is being envisaged and report submitted to this Ministry in three months.	20 Tonner trucks are utilised wherever feasible.
20	The project authority must set up laboratory facilities for collection and analysis of samples under the supervision of competent technical personnel, who will directly report to the Chief Executive.	Complied
21	A Separate Environmental Management Cell with suitably qualified people to carry out various functions should be set up under the control of Senior Executive, who will report directly to the Head of the organization.	Already exists.
22	The funds earmarked for the environmental protection measures should not be diverted for other purposes and year-wise expenditure should be reported this Ministry.	Complied with. An estimated amount of Rs.74/- crores have been spent during implementation of Capacity Expansion Project towards environmental protection measures.

भारत पेट्रोलियम कॉर्पोरेशन लिमिटेड
भारत सरकार का उपक्रम
कोच्चि रिफ़ाइनरी

BHARAT PETROLEUM CORPORATION LIMITED
A Govt. of India Enterprise
Kochi Refinery

03/ENV/202/04
04.06.2018

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 on Environmental Clearance issued by the Ministry of Environment, Forests and Climate Change

Ref: EC No.J-11011/78/96-IA-II dt. 5.3.97 issued to our Project "Installation of Diesel Hydro De-Sulphurisation (DHDS) project M/s Bharat Petroleum Corporation Ltd, Kochi Refinery (Formerly Cochin Refineries Ltd)"

Please find enclosed the compliance reports on the various conditions laid down by MoEF &CC, pertaining to the half year period from October 1st, 2017 to March 31st, 2018 for the subject project.

Thanking you

Very truly yours
For BPCL Kochi Refinery

Damien Gracious K.D.
Chief General Manager (HSE)

Encl: 1.Six Monthly Compliance 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 INSTALLATION OF DIESEL HYDRO DESULPHURISATION (DHDS) PROJECT ACCORDED BY J-11011/78/96-IA-II DT. 5.3.97

Status of the project: Project commissioned in 2000

ITEM NO.	ITEM DESCRIPTION	STATUS AS ON 31.03.2018
1	All conditions stipulated by MoEF & CC while according approval for Capacity Expansion Project	Complied
2	No expansion or modernization of the Plant should be carried out without approval of the MoEF&CC	Complied.
3	The project authority must strictly adhere to the stipulations laid down by the Kerala State Pollution Control Board and the State Govt.	Complied
4	The total SO_2 emission from BPCL Kochi Refinery including DHDS Project should not exceed the norm of 1607 Kg./hr. (Refer MoEF&CC vide letter No.J-110/1/78/96.IA.II dated 9th February,1999)	Complied
5	The existing ETP should be adequately augmented or additional treatment facilities should be provided to accommodate the additional effluent load from DHDS project before commissioning the project to ensure that the treated effluent meets the MINAS standard.	New ETP has been commissioned along with the DHDS Project.
6	Time bound action plan for disposal of oil sludge / recovery of oil and design details of the solid waste disposal pit should be furnished to the Ministry within a period of 3 months.	Complied. A scheme for the recovery of oil from accumulated sludge has been implemented. All the accumulated sludge at that point of time was processed and currently there is no accumulated stock of oily sludge. Sludge is being processed in Delayed Coker Unit, which has been

		commissioned as part of IREP project. A secured landfill facility for storing hazardous wastes was commissioned in March, 2005.
7	SRU having an efficiency of more than 99% should be installed.	Complied.
8	The ground water quality should be monitored and the report should be submitted to the Ministry every six months.	Complied. Ground water quality report attached as **Annexure I**.

ANNEXURE I

COCHIN TEST HOUSE

ANALYTICAL SERVICES & TESTING LABORATORY

V / 73, Kolampady, Murungalparambu Road, Irumpanam P.O. Kochi - 682 309

Mob.: 9446332556, 9387381780, Tel : 0484 - 2782672

E-mail: cochintesthouse@gmail.com, Web : www.cochintesthouse.com

Laboratory Approved by Kerala State Pollution Control Board ('A' Grade)

TEST REPORTS

Report No : CTH/L3/17/MN/622 Issue Date : May 31, 2017

Name and Address of customer : M/S.BPCL Kochi Refinery, Ambalamugal.

Sample Drawn By : Cochin Test House

Sample code : 17/MN/622

Date of receipt of sample : 15.05.2017

Dates of Analysis : 15.05.2017 – 30.05.2017

Description of the sample by the customer : Bore Well No:14

Test required for the parameters listed below, as per Drinking water specification IS:10500: 2012

1	Mercury as Hg	mg/l	APHA:22nd Ed.2012-3112 B	BDL(MDL – 0.001)	0.001
2	Arsenic as As	mg/l	APHA:22nd Ed.2012-3114 C	BDL(MDL – 0.01)	0.01
3	Lead as Pb	mg/l	APHA:22nd Ed.2012-3111 C	BDL(MDL – 0.05)	0.05
4	Copper as Cu	mg/l	APHA:22nd Ed.2012-3111 C	BDL(MDL – 0.05)	0.05
5	Chromium as Cr	mg/l	APHA:22nd Ed.2012-3111 C	BDL(MDL – 0.05)	0.05
6	Zinc as Zn	mg/l	APHA:22nd Ed.2012-3111 B	BDL(MDL – 0.05)	5.0
7	Manganese as Mn	mg/l	APHA:22nd Ed.2012-3111 B	BDL(MDL – 0.1)	0.1
8	Cadmium as Cd	mg/l	APHA:22nd Ed.2012-3111 B	BDL(MDL – 0.01)	0.01
9	Cyanide as CN	mg/l	IS:3025(Pt. 27)	BDL(MDL – 0.02)	0.05
10	Selenium as Se	mg/l	APHA:22nd Ed.2012-3114 C	BDL(MDL – 0.01)	0.01
11	Nickel as Ni	mg/l	IS:3025	BDL(MDL- 0.02)	0.02

BDL- Below Detection Limit; MDL-Minimum Detection Limit

End of Report.

Verified By

COCHIN TEST HOUSE Kochi

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 quoted and reproduced [illegible]

भारत पेट्रोलियम कॉर्पोरेशन लिमिटेड
भारत सरकार का उपक्रम
कोच्चि रिफ़ाइनरी

BHARAT PETROLEUM CORPORATION LIMITED
A Govt. of India Enterprise
Kochi Refinery

03/ENV/202/04
04.06.2018

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 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 October 1st, 2017 to March 31st, 2018 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

Sl No	Conditions	Status as on 31.03.2018
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.	On-line continuous monitoring facilities shall be provided on all the stacks of adequate height as per CPCB guidelines. SO_2, CO, HC, NOx etc. shall be maintained within the CPCB limits. 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 NOx burners shall be installed to control the NOx emissions.	Online continuous monitoring facilities are provided on all operational stacks. SO2, CO, NOx, PM, H2S and Ni/Vanadium are being monitored as per consent and are within limits BPCL Kochi Refinery is using desulphurised fuel gas and low sulphur fuel oil (Sulphur content less than 1%) in its heaters and boilers. Total SO_2 emission from the refinery is within the limit of 1518 kg/h. 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. Heaters and boilers installed as part of CEMP Phase-II project are provided with low NOx burners.
3.	Continuous ambient air quality monitoring stations for SO2, SPM, HC	In consultation with KSPCB, the refinery has installed five continuous AAQMS stations.

Sl No	Conditions	Status as on 31.03.2018
	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 October 1st 2017 to March 31st 2018 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.	A new Sour water Stripping unit (SWS) of capacity 412.8 m^3/d is installed. The stripped water is recycled in the plant. Stripped water is used in Desalters in crude units Closed blow down (CBD) system is provided in all units. Proper collection /segregation facilities are installed for effluent streams. Process area paving is also carried out. 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. Process areas are paved to avoid contamination of the soil.
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.	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. 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.
6.	The domestic waste water shall be treated in the sewage treatment plant	STP of 250 m3/day capacity has been installed and running continuously for treating the domestic

Sl No	Conditions	Status as on 31.03.2018
	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 suggested procedures. Post IREP ETP sludge is processed in DCU. 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 have been planted.

Sl No	Conditions	Status as on 31.03.2018
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^3/MT of crude shall be strictly followed.	Complied. The discharge of treated effluent was 0.25 m^3/MT of crude for the half year period from October 2017 to March 2018.
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 NOx 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.	In consultation with KSPCB, the refinery has installed five continuous AAQMS stations. Online data are being continuously transferred to CPCB from all AAQMS stations. Data on ambient air quality during the half yearly period from October 2017 to March 2018 is attached as **Annexure-II**. Data on stack emissions during the half yearly period from October 2017 to March 2018 is attached as **Annexure- I.**

Sl No	Conditions	Status as on 31.03.2018
4.	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).	Complied.
5.	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. The funds so provided should not be diverted for any other purposes.	Complied.
6.	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.	Complied.
7.	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 MioE&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.	Complied.
8.	The project authorities shall inform the Regional Office as well as the Ministry,	The final approval for the implementation of the project was obtained on 27.04.06. The same was

Sl No	Conditions	Status as on 31.03.2018
	the date of financial closure and final approval of the project by the concerned authorities and the date of commencing the land development work.	informed MoE&F vide letter No. 10/MPT/CEMP-II/04 dated 18th May, 2006. The project has been commissioned.

DATA ON STACK EMISSIONS FROM BPCL KOCHI REFINERY

ANNEXURE 1

PERIOD OCTOBER 2017 TO MARCH 2018

SL. NO.	STACK NO. UNIT	NO. OF SAMPLES ANALYSED	PERMITTED EMISSION Nm3/hr	STATUTORY STIPULATION SPCB	SULPHUR DIOXIDE mg/Nm3			EMISSION RATE Nm3/hr			PARTICULATE MATTER mg/Nm3			PERCENTAGE COMPLIANCE		REMARKS
					MIN	MAX	AVG	MIN	MAX	AVG	MIN	MAX	AVG	SPCB	MOE&F	
1	KH1B	6	45000		725.37	823.13	786.61	19804	25000	22428.3	46	68	57.9	100	100	
2	NH2	6	102000	SO_2- 1700Mg/Nm^3	521.5	820.2	604.9	40700	58014	51002.17	61	67.8	64.3	"	"	
3	FH1	6	25000	PM- 100Mg/Nm^3	493.97	555.72	525.528	21294	24782	23366.8	48.8	59.9	54.6	100	100	
4	UB6	0	85000		SHUTDOWN											
5	FH3	6	150000		508.5	592.8	557	85701	150000	103553.3	53	82	71	100	100	
6	UB10	0	136000		SHUTDOWN											
7	UB9	6	70000		794.8	959.5	852.9	25584	32624	29296	47.9	60.2	53.8	100	100	
8	DSX 002	5	35000	S Rec 98.7%	1118	1250.97	1159.5	29229	33798	31747.8	41	48.7	44.6	"	"	
9	DHH11	2	82500		880.63	912.89	896.89	82438	82491	82464.5	51.89	55	53.45	"	"	
10	DDH1	5	27000		755.31	810.58	783.2	24282	26984	25730	72	76	74	"	"	
11	CH21	6	130000		618.6	753.03	688.9	84929	98667	93532.2	47	62.5	54.5	"	"	
12	CH22	6	35000		646.7	743.7	689.8	28602	33708	32708.67	47	56.3	50.6	"	"	
13	UB7	1	150000		302.81	302.81	302.81	132767	132767	132767	82	82	82	"	"	
14	CPP/HRSG	5	277900		569.71	581.94	576.4	176409	190732	183997.2	58	67	63.17	100	100	
15	BITUROX	6	23000		588.41	777.4	691.7	14849	18311	16389.7	31.7	54.9	43.6	"	"	
16	CH223	6	51000		610.6	690.5	642	47941	49877	49371.8	42	55.4	48.3	100	100	
17	GT2 HRSG	4	427000		119.2	141.1	126.9	159584	178593	170129.8	58.4	65.2	62.2	"	"	
18	UB11	6	158000		508.7	609.3	578.3	57437	82193	68553.17	48.3	58.06	54.9	"	"	
19	NHT CCR	5	118000		688.2	752	725.31	109584	114587	113029.6	49.5	57.9	54.2	"	"	
20	VHH02	4	72000		679	904.8	769.7	54457	57373	56092.75	58.5	62	60.6	"	"	
21	DSX 301	5	22000	S Rec 99.5%	993.8	1295.9	1140.2	13108	20135	16403	61	72.5	66.2	"	"	
22	UB 8	6	70000		819	930	876.9	24865	32595	28769.8	60.7	68.5	65.1	"	"	

AMBIENT AIRQUALITY DATA FOR THE HALF YEAR PERIOD OCTOBER 2017 - MARCH 2018

ACTP							
Parameter	Unit	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18
SO2	ug/m3	9.35	15.97	35.86	18.19	34.5	12.37
NOx	ug/m3	33.71	33.36	47.67	50.54	55.78	41.17
NH3	ug/m3	0.01	1.304	0.52	0.20	0.21	0.67
CO	ug/m3	0.465	0.8	0.84	0.94	0.9	0.8
Benzene	ug/m3	0.42	1.62	0.83	0.74	0.38	1.3
Methane	ug/m3	2.65	0.92	0.54	1	0.484	0.016
NMHC	ug/m3	6.074	0.594	0.55	0.51	0.75	1.45
PM 10	ug/m3	60.6	86.3	123.3	127.3	121.9	90.2
PM 2.5	ug/m3	32.1	50.5	57.1	75.4	71.2	49.5

COLONY							
Parameter	unit	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18
SO2	ug/m3	19.82	33.3	20.05	9.51	9.098	9.36
NOx	ug/m3	15.03	14.2	24.8	38.96	33.8	32.48
NH3	ug/m3	3.26	8.73	6.72	6.48	5.92	7.81
CO	mg/m3	0.55	0.79	0.7	0.85	0.86	0.96
Benzene	ug/m3	0.64	0.32	1.47	1.14	0.68	0.37
Methane	ug/m3	0.13	0.15	1.49	1.87	2.06	2.01
NMHC	ug/m3	0.17	0.27	0.24	0.15	0.12	0.09
PM 10	ug/m3	45.1	66.6	74	101	95.1	62.2
PM 2.5	ug/m3	26	45.8	50.1	75.3	70.4	51

DHDS							
Parameter	unit	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18
SO2	ug/m3	37.8	39.7	51.6	57.6	57.2	50.7
NOx	ug/m3	16.6	20.9	29.7	27.7	27.6	31.5
NH3	ug/m3	3.8	5.3	6.4	9.1	3.4	14.5
CO	mg/m3	0.93	1	1.195	1.21	0.79	0.77
Benzene	ug/m3	0.41	0.45	0.25	0.87	0.82	0.47
Methane	ug/m3	1.5	1.07	1.08	0.54	0.53	0.46
NMHC	ug/m3	0.041	0.047	0.086	0.127	0.128	0.373
PM 10	ug/m3	43.8	73.5	101.7	126.3	100.5	82.6
PM 2.5	ug/m3	24.7	43.5	54.3	73	64.1	45.8

WAGON LOADING							
Parameter	unit	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18
SO2	ug/m3		20.4	24.2	31.9	97	34
NOx	ug/m3		16.54	23.99	23.29	14.11	15.74
NH3	ug/m3		11.3	6.2	10.1	13.4	10.6
CO	mg/m3		0.97	1.14	1.416	0.95	0.95
Benzene	ug/m3		0.31	0.42	0.19	3.78	1.48
Methane	ug/m3		0	0	0	0	0
NMHC	ug/m3		0	0	0	0	0
PM 10	ug/m3		94.7	100.9	131.1	117.9	87.1
PM 2.5	ug/m3		49.5	49.1	69.3	63.3	45.3

NHT CCR							
Parameter	unit	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18
SO2	ug/m3	25	19.6	17.4	24.76	18.2	23.14
NOx	ug/m3	11.63	5.4	11.51	9.35	50.5	8.9
NH3	ug/m3	115.37	133.4	122.05	94.91	0.2	3.43
CO	ug/m3	0.44	0.4	0.56	0.52	0.94	0.43
Benzene	ug/m3	0	0	0	0	0.74	0
Methane	ug/m3	0.5	2.2	3.45	4.7	1	3.26
NMHC	ug/m3	2.1	3.3	4.5	5.45	0.51	4.06
PM 10	ug/m3	51	72	0	0	127.34	64.46
PM 2.5	ug/m3	26.35	30.6	47.4	61	75.36	24.5

Annexure – III

TREATED EFLUENT QUALITY DATA FOR THE HALF YEAR PERIOD October 2017 - March 2018

Effluent Monitoring Station - Out Let A							
Month	PARAMETERS						
	Oil & Grease mg/l	Phenols mg/l	Sulphides mg/l	TSS mg/l	BOD (3 DAYS @27 C) mg/l	COD mg/l	pH
	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.	Avg.
Oct-17	1.33	0.14	0.46	8.77	13.94	42.29	7.28
Nov-17	1.25	0.13	0.44	7.03	13.93	41.70	7.44
Dec-17	1.41	0.14	0.45	7.94	13.94	45.13	7.63
Jan-18	2.33	0.15	0.45	9.71	13.71	52.13	7.64
Feb-18	2.14	0.14	0.45	9.00	14.11	53.46	7.82
Mar-18	2.16	0.14	0.42	8.74	14.13	46.32	7.26
Consented Limit	**5**	**0.35**	**0.5**	**20**	**15**	**125**	**6.5-8**

TREATED EFFLUENT QUALITY DATA FOR THE HAF YEAR PERIOD October 2017 – March 2018

Effluent Monitoring Station-Outlet B			
Parameters	**Oil & Grease**	**TSS**	**BOD (3 days @ 27 C)**
Unit	**ppm**	**ppm**	**ppm**
Month	**Avg.**	**Avg.**	**Avg.**
Oct-17	1.1	12.75	13
Nov-17	1.16	7	12.4
Dec-17	1.3	11.25	9
Jan-18	1.325	7.5	9.75
Feb-18	1.575	8.25	11.5
Mar-18	4	11.4	13.8
Consented Limit	**10**	**100**	**30**

ANNEXURE IV

COCHIN TEST HOUSE

ANALYTICAL SERVICES & TESTING LABORATORY

V / 78, Kolanpady, Murinjakparambu Road, Irumpanam P.O., Kochi - 682 309

Mob.: 9446332556, 9387381780, Tel : 0484 - 2782672

E-mail: cochintesthouse@gmail.com, Web : ww.cochintesthouse.com

Laboratory Approved by Kerala State Pollution Control Board ('A' Grade)

TEST REPORTS

Report No : CTH/L2/17/MN/622 Issue Date : May 31, 2017

Name and Address of customer : M/S.BPCL Kochi Refinery, Ambalamugal.

Sample Drawn By : Cochin Test House

Sample code : 17/MN/622

Date of receipt of sample : 16.05.2017

Dates of Analysis : 16.05.2017 – 30.05.2017

Description of the sample by the customer : Bore Well No:14

Test required for the parameters listed below, as per Drinking water specification IS 10500: 2012

1	Mercury as Hg	mg/l	APHA:22nd Ed.2012-3112 B	BDL(MDL – 0.001)	0.001
2	Arsenic as As	mg/l	APHA:22nd Ed.2012-3114 C	BDL(MDL – 0.01)	0.01
3	Lead as Pb	mg/l	APHA:22nd Ed.2012-3111 C	BDL(MDL – 0.05)	0.05
4	Copper as Cu	mg/l	APHA:22nd Ed.2012-3111 C	BDL(MDL – 0.05)	0.05
5	Chromium as Cr	mg/l	APHA:22nd Ed.2012-3111 C	BDL(MDL – 0.05)	0.05
6	Zinc as Zn	mg/l	APHA:22nd Ed.2012-3111 B	BDL(MDL – 0.05)	5.0
7	Manganese as Mn	mg/l	APHA:22nd Ed.2012-3111 B	BDL(MDL – 0.1)	0.1
8	Cadmium as Cd	mg/l	APHA:22nd Ed.2012-3111 B	BDL(MDL – 0.01)	0.01
9	Cyanide as CN	mg/l	IS:3025(Pt. 27)	BDL(MDL – 0.02)	0.05
10	Selenium as Se	mg/l	APHA:22nd Ed.2012-3114 C	BDL(MDL – 0.01)	0.01
11	Nickel as Ni	mg/l	IS:3025	BDL(MDL- 0.02)	0.02

BDL- Below Detection Limit; MDL-Minimum Detection Limit. End of Report.

COCHIN TEST HOUSE Kochi

Verified By

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 ...

Annexure – V

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 SOx, NOx, 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.
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 NOx burners shall complete within six month and submit completion note without further delay.	All the heaters under CEMP phase-II have been provided with low NOx burners.

CORPORATE RESPONSIBILITY FOR ENVIRONMENTAL PROTECTION (CREP)

Status as on 31st March 2018

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 SO2 emission from the present level:	BPCL Kochi Refinery comes under severely polluted cluster. KR meets its total SO2 norm of 1518 kg/hr from the complex. It contributes to net reduction in SO2 emission by producing Euro- III and Euro – IV MS and Diesel. Following steps are taken to reduce SO2 emissions from the refinery. • 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 SRUs 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 NOx emission, the new Refineries / process units will install low NOx burners. For retrofitting of low NOx 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 NOx type burners. We have installed low NOx 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 NOx 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):	Following provisions exists for VOC control 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 faciltiies 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. i) Continuous Flare losses monitoring. j) "Gas Leak Surveyor" is extensively used to check the leaking valves, glands etc. k) 918 numbers of hydrocarbon detectors, 267 numbers of hydrogen sulphide detectors and 42 numbers hydrogen detectors are installed at different locations of refinery including product loading, storage tank farms,

		process plants etc. l)Benzene monitoring using "Drager" chip in the Aromatic Recovery Unit m) Five numbers of online ambient air quality monitoring stations (AAQMS)
f)	The flare losses to be minimized and monitored regularly	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. 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 commissioned by December 2017 end.
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	Kochi Refinery has provided continuous SO_2 and NOx 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	Eighteen hydrocarbon detectors are installed in the truck loading area. Two HC detectors and two hydrogen sulphide detectors are installed in ETP V area. Benzene monitoring is carried out using "Dragger" chip technique in the Aromatic Recovery Unit on a daily basis. Five online ambient air quality monitoring stations (AAQMS) are installed
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 m3/tonne (for 90% of time) except for the monsoon season:	The discharge of treated water from Kochi Refinery is 0.250 m^3 / tonne of crude processed for the year half year October 2017– March 2018.
b)	Oil spill response facilities at Coastal Refineries will be in position within two years:	Complied.
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.