KR.HSE.ENV.05.HSSE.HECCR/01/2022/ J-11011/341/2011-IA-II (I)
15.06.2022

To
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 (MoEF & CC)

Ref: EC Nos.J-11011/341/2011-IA-II (I) dated **22.11.2012;** and Amendment dated **23.05.2014** issued to the **"Integrated Refinery Expansion Project (IREP)** 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 **1st October 2021 to 31st March 2022** for the said project.

Thanking you,
Very truly yours
For BPCL Kochi Refinery.

Ramachandran. M.K
General Manager in Charge (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 Bore-well Analysis Report.
6. Annexure - V Noise Surveillance Data.
7. Annexure - VI Health Surveillance Data.
8. Annexure - VII CREP Compliance

CC:

1.
The Member Secretary
Central Pollution Control Board
Parivesh Bhawan
East Arjun Nagar, New Delhi- 110032

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

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

Post Bag No.: 2, Ambalamugal - 682 302, Ernakulam Dist., Kerala,Phone: 0484 - 2722061-69 Fax: 2720961 / 2721094
Registered Office: Bharat Bhavan, 4 & 6, Currimbhoy Road, Ballard Estate, P.B. No. 688, Mumbai - 400 001

Compliance Status of Environmental Clearance conditions for installation of "Integrated Refinery Expansion Project (IREP) at BPCL – Kochi Refinery project accorded by J-11011/341/2011-IA-II (I) dated **22.11.2012**; and Amendment dated **23.05.2014.**

Status of the project: Project commissioned in 2016		
	COMMENTS	**Compliance Status as on 31.03.2022**
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 analysers. 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.	Complied.
v	The process emissions [SO, 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 be restarted until the desired efficiency of the pollution control device has been achieved.	Complied. Complied.
vi	Leak detection and repair program shall be prepared and implemented to control HC/VOC emissions. Focus shall be given to prevent fugitive emissions for which preventive maintenance of	Complied. 948 no of Hydrocarbon detectors are installed at different locations of refinery.

	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.	
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 Kg/Hr. based on the EC amendment dated 23.05.2014).	Complied. Now the SOx emission limit has been revised to 1579 kg/hr. as per latest MSB Project EC.
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, by-product (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 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.	Complied.
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	Complied.

	shall be taken to improve the ambient air quality in the project area.	
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. DG set are used only in the extreme emergency(for lighting)
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, automatic monitoring system for flow rate, pH and TOC shall be provided.	Complied.
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 odor and remedial measures to control the odor 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 disoosal 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.	Complied.

	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. Reports are being submitted to KSPCB on monthly basis.
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 authorize recyclers/re-processors.	BPCL-KR has entered into a waste disposal agreement with M/s Kerala Enviro Infrastructure Limited to dispose hazardous waste. Spent catalyst is being sent to authorized recyclers/re-processors / disposal agencies.
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 SPM. 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).	Complied. Attached annexure - VII
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 having a total area of 1344 acres of land (including the new projects MSBP / PDPP). In this, Plant area accounts (including offsite, Pipe rack, Buildings, Roads) for 909.01 acres. The statutory requirement of green belt as specified in Environmental Clearance is 33% of the plant area. Hence the green

		cover requirement is 300 acres. Based on latest survey done we are having a total green cover of 315 acres which is well above required 300 acres required as per EC conditions.
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 and implemented.	BPCL as a Corporation is having a Corporate HSSE Policy which includes Environment also.
xxix	Provision shall be made for the housing of construction labor 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,	BPCL-KR has obtained approvals from Chief Inspectorate of Factories, Chief Controller of Explosives, Fire Safety

	2000 as amended subsequently. Prior approvals from Chief Inspectorate of Factories, Chief Controller of Explosives, Fire Safety Inspectorate etc. must be obtained, wherever applicable.	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 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).	The overall noise level will be limited at the fence as prescribed under EPA rules
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 Centralized Quality Control Laboratory also to support monitoring.
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 stipulated environment	Six monthly compliance reports are being submitted by BPCL-KR after receipt of the

	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 sectorial 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.	Environmental Clearance for the IREP project. The same will be sent to the Regional Office of MoEF &CC and also uploaded in the website. The criteria pollutant levels namely; PM10, PM2.5, SO2, NOx, HC (Methane / Non-methane), VOCs (ambient levels as well as stack emissions) or critical sectorial 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&CC 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 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	BPCL-KR has complied with this condition.

	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

DATA ON STACK EMISSIONS FROM BPCL KOCHI REFINERY (iREP Units)														
PERIOD - 1st October. 2021 to 31st March 2022														
Sl. no.	STACK / UNIT	No. of samples analysed	Permitted emission Nm3/hr.	Particulate matter mg/Nm3			Sulphur dioxide mg/Nm3			Emission rate Nm3/hr.			Percentage compliance	
				min	max	Avg.	min	max	avg	min	max	avg	SPCB	MoEF
1	SRU III Train A	6	92500	0	0.00	0.0	419.36	1080.49	653.3	87775	91256	89833	100	100
2	SRU III Train B	6	92500	0	0.00	0.0	417.63	1125.81	703.3	86361	253138	89838	100	100
3	CDU III	6	254000	36.29	48.07	41.5	161.57	345.97	240.4	236044	58770	249022	100	100
4	DHDT	6	59000	20.15	32.93	26.5	71.24	104.45	85.7	53115	54641	55920	100	100
5	VGO-HDT	6	55000	28.35	41.15	34.5	23.67	33.66	27.9	52764	22362	53783	100	100
6	PFCCU Heater	6	22400	22.61	32.96	27.8	38.47	53.60	45.2	20585	180120	21762	100	100
7	PFCCU. Regnrtr	6	235250	20.26	29.71	25.5	48.07	63.56	58.1	151261	78628	166931	100	100
8	DCU- I	5	80000	3.27	3.69	3.5	21.72	36.48	27.5	71978	78245	76522	100	100
9	DCU -2	6	80000	2.84	3.62	3.2	23.72	34.22	29.7	72934	161535	76114	100	100
10	HRSG 3	5	1095907	21.86	29.06	25.3	38.98	75.61	59.5	154685	153654	158683	100	100
11	HRSG 4	6	1095907	24.05	38.81	32.1	83.11	282.54	201.3	129389	153797	144273	100	100
12	HRSG-5	6	1095907	26.95	44.81	34.4	58.67	140.26	103.8	139828	134958	147721	100	100
13	UB12	4		20.29	32.44	24.8	39.24	65.52	50.2	124881	128821	128678	100	100
14	UB 13	4		19.84	35.12	26.6	31.06	85.39	48.7	107336	128821	119577	100	100

Annexure - III

TREATED EFLUENT QUALITY DATA FOR THE HALF YEAR PERIOD

1st October 2021 to 31st March 2022

Effluent _ Outlet - A (monthly average value)								
Parameter	limit	unit	Oct. 21	Nov. 21	Dec. 21	Jan. 22	Feb 22	Mar. 22
pH	6 - 8.5		7.45	7.38	7.43	7.46	7.38	7.58
TSS	100	ppm	12.16	11.96	12.2	12.4	11.77	12.5
Oil & Grease	5	ppm	3.32	3.42	3.3	3.27	3.3	3.33
BOD (3 day @27 C.)	15	ppm	13.13	10.09	9	9.7	11.2	10.26
Phenol	0.35	ppm	0.19	0.2	0.19	0.17	0.16	0.15
Sulphides	0.5	ppm	0.41	0.4	0.4	0.4	0.4	0.38
COD	125	ppm	54.36	37.48	32.9	31.9	43.06	37.6
Effluent _ Outlet - B (monthly average value)								
Parameter	limit	unit	Oct. 21	Nov. 21	Dec. 21	Jan. 22	Feb 22	Mar. 22
pH	6 - 8.5		7.1	7.25	7.4	7.1	7.2	7.2
TSS	100	ppm	17	16	13	17.5	13.5	13
Oil & Grease	5	ppm	3.45	3.45	3.25	3.25	3.1	3.2
BOD (3 day @27 C.)	30	ppm	12.4	12.25	12	11.5	11	8.5

AMBIENT AIRQUALITY DATA FOR THE HALF YEAR PERIOD
1st October 2021 to 31st March 2022

AAQMS - Marketing							
Parameter	unit	Oct. 21	Nov. 21	Dec. 21	Jan. 22	Feb 22	Mar. 22
SO2	µg/m3	28.04	11.96	22.92	13.30	16.22	15.05
NOx	µg/m3	6.21	2.31	2.16	2.98	3.80	2.45
NH3	ug/m3	0.61	0.00	0.00	0.67	0.92	0.62
CO	mg/m3	0.76	0.43	0.52	0.66	0.75	0.55
Benzene	µg/m3	0.15	0.35	0.49	0.60	0.45	0.31
Methane	ppm	0.00	0.00	0.00	0.00	0.00	0.00
NMHC	ppm	0.00	0.00	0.00	0.00	0.00	0.00
PM 10	µg/m3	60.38	32.50	35.62	29.38	32.00	38.48
PM 2.5	µg/m3	31.87	16.46	17.22	13.92	15.31	21.14

AAQMS - Colony							
Parameter	unit	Oct. 21	Nov. 21	Dec. 21	Jan. 22	Feb 22	Mar. 22
SO2	µg/m3	6.85	4.24	5.02	10.40	13.20	9.91
NOx	µg/m3	8.07	8.74	20.18	17.44	14.76	18.04
NH3	ug/m3	5.44	6.38	26.83	18.70	11.24	9.98
CO	mg/m3	0.28	0.14	0.12	0.16	0.14	0.15
Benzene	µg/m3	0.23	0.18	0.18	0.02	0.01	0.16
Methane	ppm	0.00	0.00	0.00	0.00	0.00	0.00
NMHC	ppm	0.00	0.00	0.00	0.00	0.00	0.00
PM 10	µg/m3	53.62	30.11	35.78	27.54	28.90	37.92
PM 2.5	µg/m3	30.99	15.61	14.99	11.57	14.22	18.68

DHDS							
Parameter	unit	Oct. 21	Nov. 21	Dec. 21	Jan. 22	Feb 22	Mar. 22
SO2	µg/m3	31.63	22.22	16.27	22.46	17.36	27.53
NOx	µg/m3	6.62	5.97	7.01	7.94	8.45	8.70
NH3	ug/m3	5.30	3.21	2.07	0.48	0.00	0.00
CO	mg/m3	0.90	0.70	0.67	0.68	0.80	0.97
Benzene	µg/m3	0.00	0.01	0.01	0.01	0.01	0.01
Methane	ppm	1.95	1.95	0.04	0.00	0.07	0.05
NMHC	ppm	0.03	0.07	0.02	0.02	0.00	0.00
PM 10	µg/m3	51.34	24.41	33.03	23.24	25.34	31.83
PM 2.5	µg/m3	29.59	14.15	16.91	13.17	14.89	19.08

AMBIENT AIRQUALITY DATA FOR THE HALF YEAR PERIOD
1st October 2021 to 31st March 2022

AAQMS - Marketing							
Parameter	unit	Oct. 21	Nov. 21	Dec. 21	Jan. 22	Feb 22	Mar. 22
SO2	µg/m3	28.04	11.96	22.92	13.30	16.22	15.05
NOx	µg/m3	6.21	2.31	2.16	2.98	3.80	2.45
NH3	ug/m3	0.61	0.00	0.00	0.67	0.92	0.62
CO	mg/m3	0.76	0.43	0.52	0.66	0.75	0.55
Benzene	µg/m3	0.15	0.35	0.49	0.60	0.45	0.31
Methane	ppm	0.00	0.00	0.00	0.00	0.00	0.00
NMHC	ppm	0.00	0.00	0.00	0.00	0.00	0.00
PM 10	µg/m3	60.38	32.50	35.62	29.38	32.00	38.48
PM 2.5	µg/m3	31.87	16.46	17.22	13.92	15.31	21.14

AAQMS - Colony							
Parameter	unit	Oct. 21	Nov. 21	Dec. 21	Jan. 22	Feb 22	Mar. 22
SO2	µg/m3	6.85	4.24	5.02	10.40	13.20	9.91
NOx	µg/m3	8.07	8.74	20.18	17.44	14.76	18.04
NH3	ug/m3	5.44	6.38	26.83	18.70	11.24	9.98
CO	mg/m3	0.28	0.14	0.12	0.16	0.14	0.15
Benzene	µg/m3	0.23	0.18	0.18	0.02	0.01	0.16
Methane	ppm	0.00	0.00	0.00	0.00	0.00	0.00
NMHC	ppm	0.00	0.00	0.00	0.00	0.00	0.00
PM 10	µg/m3	53.62	30.11	35.78	27.54	28.90	37.92
PM 2.5	µg/m3	30.99	15.61	14.99	11.57	14.22	18.68

OHDS							
Parameter	unit	Oct. 21	Nov. 21	Dec. 21	Jan. 22	Feb 22	Mar. 22
SO2	µg/m3	31.63	22.22	16.27	22.46	17.36	27.53
NOx	µg/m3	6.62	5.97	7.01	7.94	8.45	8.70
NH3	ug/m3	5.30	3.21	2.07	0.48	0.00	0.00
CO	mg/m3	0.90	0.70	0.67	0.68	0.80	0.97
Benzene	µg/m3	0.00	0.01	0.01	0.01	0.01	0.01
Methane	ppm	3.95	1.95	0.04	0.00	0.07	0.05
NMHC	ppm	0.03	0.07	0.02	0.02	0.00	0.00
PM 10	µg/m3	51.34	24.41	33.03	23.24	25.34	31.83
PM 2.5	µg/m3	29.59	14.15	16.91	13.17	14.89	19.08

Bharat Petroleum

BHARAT PETROLEUM CORPORATION LIMITED
KOCHI REFINERY

HSE DEPARTMENT

KR.HSE.SAFE.05.SLMR.SKP **10.11.2021**

Sub: Noise level at Boundary Wall.

Noise level at various locations near the boundary wall inside the refinery was measured on 06.11.2021 at day time. The observed values are given below.

Sl. No.	Location	Sound level	Remarks
1.	South of tank YT-30 (Near to Parking)	55	-
2.	Near T T gate (PDPP gate)	59	-
3.	South of Project warehouse	57	-
4.	220 KV line crossing near rain water harvesting pond	54	-
5.	DHDS Tower No- 1	56	
6.	Rear side of DHDS fire station	55	-
7.	Near Chalikkara gate	57	-
8.	Near TK-25	53	
9.	East of MS Block	56	-
10.	South of DHDS Flare	59	-
11.	Near NHT-CCR-AAQMS (Near MSBP boundary)	58	
12.	West of tank YT-902(DHDS)	55	-
13.	Rear side of PIBU office(opp. IPTC)	51	-
14.	Bottling plant entrance from refinery(IPTC Road)	57	-
15.	North of LNG skid (GT-2 Road end)	59	-
16.	Near IREP gate	59	-
17.	DCU	60	-
18.	South of UB-12	61	-
19.	North of VGO labour amenity building	57	-
20.	Behind IREP site office	59	-
21.	Below Coke Conveyor area near railway gate(PWC 4)-offline	49	Conveyor Offline
22.	Below Coke Conveyor area near railway gate- RLS-1	47	Conveyor Offline
23.	Below Coke Conveyor area near outlet A –RLS-2	48	Conveyor Offline
24.	Drum Plant gate	57	-

10/11/2021

Sunil Kumar Pal
Manager (Safety)

To: DGM (F&S) (r) GM (HSE) I/C

BHARAT PETROLEUM CORPORATION LIMITED
KOCHI REFINERY

HSE DEPARTMENT

KR.HSE.SAFE.05.SLMR.SKP 05.02.2022

Sub: Noise level at Boundary Wall.

Noise level at various locations near the boundary wall inside the refinery was measured on 02.02.2022 at daytime. The observed values are given below.

Sl. No.	Location	Sound level	Remarks
1.	South of tankYT-30 (Near to Parking)	53	-
2.	Near T T gate (PDPP gate)	57	-
3.	South of Project warehouse	55	-
4.	220 KV line crossing near rain water harvesting pond	52	-
5.	DHDS Tower No- 1	52	
6.	Rear side of DHDS fire station	53	-
7.	Near Chalikkara gate	55	-
8.	Near TK-25	51	
9.	East of MS Block	57	-
10.	South of DHDS Flare	57	-
11.	Near NHT-CCR-AAQMS (Near MSBP boundary)	58	
12.	West of tank YT-902(DHDS)	58	-
13.	Rear side of PIBU office(opp. IPTC)	54	-
14.	Bottling plant entrance from refinery(IPTC Road)	57	-
15.	North of LNG skid (GT-2 Road end)	55	-
16.	Near IREP gate	57	-
17.	DCU	59	-
18.	South of UB-12	61	-
19.	North of VGO labour amenity building	58	-
20.	Behind IREP site office	57	-
21.	Below Coke Conveyor area near railway gate(PWC 4)-offline	50	Conveyor Offline
22.	Below Coke Conveyor area near railway gate- RLS-1	52	Conveyor Offline
23.	Below Coke Conveyor area near outlet A –RLS-2	51	Conveyor Offline
24.	Drum Plant gate	58	-

Smit Kumar Pal
Manager (Safety)

To: DGM (F&S) (r) GM (HSE) I/C

QUALITY CONTROL DEPARTMENT
BPCL-KOCHI REFINERY, AMBALAMUGAL

BOREWELL WATER TEST REPORT

Bore well No. 9
Date of Sample: 09.10.2021
Date of Testing: 15.10.2021

KR.TECH.QC.26.DRINK.WATR

Sl No:	Test Parameters	Unit	Method	Result	Acceptable limit
5	pH	-	IS 3025 (P:11)	7.1	6.5 – 8.5
15	Oil	mg/L	IS 3025 (P:39)	nil	nil
	Metals				
16	Silver (as Ag)	mg/L	IS13428 Annexe J	BDL (MDL=0.005)	0.1 (Max)
17	Aluminium (as Al)	mg/L	IS 3025 (P:55)	BDL(MDL=0.002)	0.03 (Max)
18	Boron (as B)	mg/L	IS 3025 (P:57)	BDL(MDL=0.01)	0.5 (Max)
19	Barium (as Ba)	mg/L	IS13428 Annexe F	BDL(MDL=0.01)	0.7 (Max)
20	Calcium (as Ca)	mg/L	IS 3025 (P:40)	30	75 (Max)
21	Cadmium (as Cd)	mg/L	IS 3025 (P:41)	BDL(MDL=0.001)	0.003 (Max)
22	Chromium (as Cr)	mg/L	IS 3025 (P:52)	BDL(MDL=0.01)	0.05 (Max)
23	Copper (as Cu)	mg/L	IS 3025 (P:42)	BDL(MDL=0.01)	0.05 (Max)
24	Iron (as Fe)	mg/L	IS 3025 (P:53)	0.03	0.3 (Max)
25	Magnesium (as Mg)	mg/L	IS 3025 (P:46)	6.9	30 (Max)
26	Manganese (as Mn)	mg/L	IS 3025 (P:59)	BDL(MDL=0.01)	0.1 (Max)
27	Nickel (as Ni)	mg/L	IS 3025 (P:54)	BDL(MDL=0.01)	0.02 (Max)
28	Molybdenum (as Mo)	mg/L	IS 3025 (P:02)	BDL(MDL=0.002	0.07 (Max)
29	Lead (as Pb)	mg/L	IS 3025 (P:47)	BDL(MDL=0.01)	0.01 (Max)
30	Zinc (as Zn)	mg/L	IS 3025 (P:49)	0.1	5 (Max)
31	Arsenic (as As)	mg/L	IS 3025 (P:37)	BDL(MDL0.005)	0.01 (Max)
32	Mercury (as Hg)	mg/L	IS 3025 (P:48)	BDL(MDL0.0001)	0.001(Max)
33	Selenium (as Se)	mg/L	IS 3025 (P:56)	BDL(MDL=0.001)	0.1 (Max)
34	Antimony (as Sb)	mg/L	APHA:3113B	BDL(MDL=0.001)	Max0.1

BDL: Below Detection Limit
MDL: Minimum Detection Limit

S.Mahamed Iqbal
Manager (Quality Control)

QUALITY CONTROL DEPARTMENT
BPCL-KOCHI REFINERY, AMBALAMUGAL

BOREWELL WATER TEST REPORT

Bore well No. 27
Date of Sample: 13.11.2021
Date of Testing: 17.11.2021

KR.TECH.QC.26.DRINK.WATR

Sl No:	Test Parameters	Unit	Method	Result	Acceptable limi
5	pH	-	IS 3025 (P:11)	7.6	6.5 – 8.5
15	Oil	mg/L	IS 3025 (P:39)	nil	nil
	Metals				
16	Silver (as Ag)	mg/L	IS13428 Annexe J	BDL (MDL=0.005)	0.1 (Max)
17	Aluminium (as Al)	mg/L	IS 3025 (P:55)	BDL(MDL=0.002)	0.03 (Max)
18	Boron (as B)	mg/L	IS 3025 (P:57)	BDL(MDL=0.01)	0.5 (Max)
19	Barium (as Ba)	mg/L	IS13428 Annexe F	BDL(MDL=0.01)	0.7 (Max)
20	Calcium (as Ca)	mg/L	IS 3025 (P:40)	36	75 (Max)
21	Cadmium (as Cd)	mg/L	IS 3025 (P:41)	BDL(MDL=0.001)	0.003 (Max)
22	Chromium (as Cr)	mg/L	IS 3025 (P:52)	BDL(MDL=0.01)	0.05 (Max)
23	Copper (as Cu)	mg/L	IS 3025 (P:42)	BDL(MDL=0.01)	0.05 (Max)
24	Iron (as Fe)	mg/L	IS 3025 (P:53)	0.03	0.3 (Max)
25	Magnesium (as Mg)	mg/L	IS 3025 (P:46)	7	30 (Max)
26	Manganese (as Mn)	mg/L	IS 3025 (P:59)	BDL(MDL=0.01)	0.1 (Max)
27	Nickel (as Ni)	mg/L	IS 3025 (P:54)	BDL(MDL=0.01)	0.02 (Max)
28	Molybdenum (as Mo)	mg/L	IS 3025 (P:02)	BDL(MDL=0.002	0.07 (Max)
29	Lead (as Pb)	mg/L	IS 3025 (P:47)	BDL(MDL=0.01)	0.01 (Max)
30	Zinc (as Zn)	mg/L	IS 3025 (P:49)	0.3	5 (Max)
31	Arsenic (as As)	mg/L	IS 3025 (P:37)	BDL(MDL0.005)	0.01 (Max)
32	Mercury (as Hg)	mg/L	IS 3025 (P:48)	BDL(MDL0.0001)	0.001(Max)
33	Selenium (as Se)	mg/L	IS 3025 (P:56)	BDL(MDL=0.001)	0.1 (Max)
34	Antimony (as Sb)	mg/L	APHA:3113B	BDL(MDL=0.001)	Max0.1

BDL: Below Detection Limit
MDL: Minimum Detection Limit

S.Mahamed Iqbal
Manager (Quality Control)

QUALITY CONTROL DEPARTMENT
BPCL-KOCHI REFINERY, AMBALAMUGAL

BOREWELL WATER TEST REPORT

Bore well No. 44
Date of Sample: 24.12.2021
Date of Testing: 26.12.2021

KR.TECH.QC.26.DRINK.WATR

Sl No:	Test Parameters	Unit	Method	Result	Acceptable limit
5	pH	-	IS 3025 (P:11)	7.3	6.5 – 8.5
15	Oil	mg/L	IS 3025 (P:39)	nil	nil
	Metals				
16	Silver (as Ag)	mg/L	IS13428 Annexe J	BDL (MDL=0.005)	0.1 (Max)
17	Aluminium (as Al)	mg/L	IS 3025 (P:55)	BDL(MDL=0.002)	0.03 (Max)
18	Boron (as B)	mg/L	IS 3025 (P:57)	BDL(MDL=0.01)	0.5 (Max)
19	Barium (as Ba)	mg/L	IS13428 Annexe F	BDL(MDL=0.01)	0.7 (Max)
20	Calcium (as Ca)	mg/L	IS 3025 (P:40)	28	75 (Max)
21	Cadmium (as Cd)	mg/L	IS 3025 (P:41)	BDL(MDL=0.001)	0.003 (Max)
22	Chromium (as Cr)	mg/L	IS 3025 (P:52)	BDL(MDL=0.01)	0.05 (Max)
23	Copper (as Cu)	mg/L	IS 3025 (P:42)	BDL(MDL=0.01)	0.05 (Max)
24	Iron (as Fe)	mg/L	IS 3025 (P:53)	0.05	0.3 (Max)
25	Magnesium (as Mg)	mg/L	IS 3025 (P:46)	6.5	30 (Max)
26	Manganese (as Mn)	mg/L	IS 3025 (P:59)	BDL(MDL=0.01)	0.1 (Max)
27	Nickel (as Ni)	mg/L	IS 3025 (P:54)	BDL(MDL=0.01)	0.02 (Max)
28	Molybdenum (as Mo)	mg/L	IS 3025 (P:02)	BDL(MDL=0.002	0.07 (Max)
29	Lead (as Pb)	mg/L	IS 3025 (P:47)	BDL(MDL=0.01)	0.01 (Max)
30	Zinc (as Zn)	mg/L	IS 3025 (P:49)	0.1	5 (Max)
31	Arsenic (as As)	mg/L	IS 3025 (P:37)	BDL(MDL0.005)	0.01 (Max)
32	Mercury (as Hg)	mg/L	IS 3025 (P:48)	BDL(MDL0.0001)	0.001(Max)
33	Selenium (as Se)	mg/L	IS 3025 (P:56)	BDL(MDL=0.001)	0.1 (Max)
34	Antimony (as Sb)	mg/L	APHA:3113B	BDL(MDL=0.001)	Max0.1

BDL: Below Detection Limit
MDL: Minimum Detection Limit

S.Mahamed Iqbal
Manager (Quality Control)

QUALITY CONTROL DEPARTMENT
BPCL-KOCHI REFINERY, AMBALAMUGAL

BOREWELL WATER TEST REPORT

Bore well No. 26
Date of Sample: 14.1.2022
Date of Testing: 20.1.2022

KR.TECH.QC.26.DRINK.WATR

Sl No:	Test Parameters	Unit	Method	Result	Acceptable limi
5	pH	-	IS 3025 (P:11)	7.8	6.5 – 8.5
15	Oil	mg/L	IS 3025 (P:39)	nil	nil
	Metals				
16	Silver (as Ag)	mg/L	IS13428 Annexe J	BDL (MDL=0.005)	0.1 (Max)
17	Aluminium (as Al)	mg/L	IS 3025 (P:55)	BDL(MDL=0.002)	0.03 (Max)
18	Boron (as B)	mg/L	IS 3025 (P:57)	BDL(MDL=0.01)	0.5 (Max)
19	Barium (as Ba)	mg/L	IS13428 Annexe F	BDL(MDL=0.01)	0.7 (Max)
20	Calcium (as Ca)	mg/L	IS 3025 (P:40)	31	75 (Max)
21	Cadmium (as Cd)	mg/L	IS 3025 (P:41)	BDL(MDL=0.001)	0.003 (Max)
22	Chromium (as Cr)	mg/L	IS 3025 (P:52)	BDL(MDL=0.01)	0.05 (Max)
23	Copper (as Cu)	mg/L	IS 3025 (P:42)	BDL(MDL=0.01)	0.05 (Max)
24	Iron (as Fe)	mg/L	IS 3025 (P:53)	0.06	0.3 (Max)
25	Magnesium (as Mg)	mg/L	IS 3025 (P:46)	5.0	30 (Max)
26	Manganese (as Mn)	mg/L	IS 3025 (P:59)	BDL(MDL=0.01)	0.1 (Max)
27	Nickel (as Ni)	mg/L	IS 3025 (P:54)	BDL(MDL=0.01)	0.02 (Max)
28	Molybdenum (as Mo)	mg/L	IS 3025 (P:02)	BDL(MDL=0.002	0.07 (Max)
29	Lead (as Pb)	mg/L	IS 3025 (P:47)	BDL(MDL=0.01)	0.01 (Max)
30	Zinc (as Zn)	mg/L	IS 3025 (P:49)	0.1	5 (Max)
31	Arsenic (as As)	mg/L	IS 3025 (P:37)	BDL(MDL0.005)	0.01 (Max)
32	Mercury (as Hg)	mg/L	IS 3025 (P:48)	BDL(MDL0.0001)	0.001(Max)
33	Selenium (as Se)	mg/L	IS 3025 (P:56)	BDL(MDL=0.001)	0.1 (Max)
34	Antimony (as Sb)	mg/L	APHA:3113B	BDL(MDL=0.001)	Max0.1

BDL: Below Detection Limit
MDL: Minimum Detection Limit

S.Mahamed Iqbal
Manager (Quality Control)

Bharat Petroleum OHC

KOCHI REFINERY

HEALTH MONITORING REPORT OF EMPLOYEE'S HANDLING HAZARDOUS CHEMICALS

For the month December 2021

TEST	CHEMICAL HANDLED	PERIODICITY OF TESTING	NO.OF SAMPLES TESTED	NO.OF SAMPLES PASSED	REMARKS
URINE PHENOL	BENZENE	ONCE IN 6 MONTHS (ALL 'N' SHIFT EMPLOYEE'S)	0	0	
BLOOD	BENZENE	ONCE IN 6 MONTHS	117	117	

Dr. Rajendran K G
Chief Manager (Medical Services)

To: GM (Environment)
Cc. CGM (HR)

Bharat Petroleum OHC

KOCHI REFINERY

HEALTH MONITORING REPORT OF EMPLOYEE'S HANDLING HAZARDOUS CHEMICALS

For the month NOVEMBER 2021

TEST	CHEMICAL HANDLED	PERIODICITY OF TESTING	NO.OF SAMPLES TESTED	NO.OF SAMPLES PASSED	REMARKS
URINE PHENOL	BENZENE	ONCE IN 6 MONTHS (ALL 'N' SHIFT EMPLOYEE'S)	0	0	
BLOOD	BENZENE	ONCE IN 6 MONTHS	315	315	

Dr. Rajendran K G
Chief Manager (Medical Services)

To: GM (Environment)
Cc. CGM I/C (HR)

Bharat Petroleum OHC

KOCHI REFINERY

HEALTH MONITORING REPORT OF EMPLOYEE'S HANDLING HAZARDOUS CHEMICALS

For the month March 2022

TEST	CHEMICAL HANDLED	PERIODICITY OF TESTING	NO.OF SAMPLES TESTED	NO.OF SAMPLES PASSED	REMARKS
URINE PHENOL	BENZENE	ONCE IN 6 MONTHS (ALL 'N' SHIFT EMPLOYEE'S)	101	101	
BLOOD	BENZENE	ONCE IN 6 MONTHS	332	332	

M K Ramachandran
GM I/C (HSE)

To: GM (Environment)
Cc. CGM I/C (HR)

Annexure -- VII

CORPORATE RESPONSIBILITY FOR ENVIRONMENTAL PROTECTION (CREP)

PROGRESS REPORT ON ACTION POIN

Sl. No.	Task	Remarks/Status
1	All the refineries provide on line emission and effluent monitoring systems and give linkages to SPCB and CPCB server and detailed note shall be submitted by individual refineries indicating number of sensors, make and type etc.	Online connectivity of all five AAQMS given and intimated to CPCB/KSPCB. Total 926 No's of Hydrocarbon (HC) detectors, 267 No's of Hydrogen sulphide (H2S) detectors and 42 No's of Hydrogen (H2) detectors are installed at different locations of refinery including product loading, storage tank farms and process plants etc. Most of sensors are made up of M/s Honeywell. HC sensors belong to Infra-red type and H2S/H2 sensors belong to electrochemical type.
2	The refineries shall submit action plan to achieve zero discharge (except once through cooling water in coastal region) within three months.	As part of integrated Refinery cum expansion project (IREP), an integrated ETP has been setup and the treated effluent is routed to RO plant for further processing and recycling water as DM water
3	The HSE department of refineries shall co-ordinate with marketing divisions for submission of note on evaporation during loading, leakage possibilities, steps taken for fire safety, management of oily sludge	HSE department of BPCL has initiated coordination and various measures to control evaporation during loading, leakage, fire safety, management of oily sludge etc. It includes vapor recovery system, bottom loading, fugitive emission survey, LDAR etc. Separate scheme is adopted for the management of oily sludge which includes centrifuging, oil recovery and bio-remediation.
4	The refineries who have not completed the task of providing low NOx burners shall complete within six month and submit completion note without further delay.	All the heaters under CEMP phase-II/IREP have been provided with low NOx burners.

Status as on 31st March. 2022

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 552 kg/hr. from the complex. It contributes to net reduction in SO2 emission by producing Euro- VI MS and Diesel. Following steps are taken to reduce SO2 emissions from the refinery. • Modifications to plant fuel system to facilitate usage of low sulfur liquid fuel. • Amine treatment of fuel gas • Sulfur Recovery Units with 99.9% efficiency as part of IREP with inclusion of TGTU (Tail Gas Treating Unit) • Low Pressure Amine treatment of vacuum column vent. • Employing Biturox technology for Bitumen production, where off gas is incinerated and further treated.
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:	BPCL Kochi refinery has been explored the possibility of Oxygen enrichment technology for enhancing the efficiency of SRU and the same commissioned.
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 boilers (total six numbers) installed as part of capacity expansion cum modernization project, CEMP - Phase II and all IREP units 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) program and vapor recovery systems (for loading and unloading operations within Refineries only):	Following provisions exists for VOC control a) Provision of mechanical seals on pumps for leak free operation. b) Use of submerged filling in product loading gantries. c) Closed blow down system for 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 facility for oily effluent storage.

		h) VOC control system is in place in new ETPs for treatment of VOCs generated during in the effluent treatment area. i) 926 No's of HC detectors, 267 No's of H2S detectors and 42 No's of H2 detectors are installed at different locations of refinery including product loading, storage tank farms and process plants etc. j) Benzene monitoring is carried out using "dragger" chip technique in the aromatic recovery unit on a daily basis. k) Five ambient air quality monitoring stations (AAQMS) are working online to monitor the ambient air quality on continuous basis. They provide eleven ambient air quality parameters, including hydrocarbons and the data is transferred online to CPCB/KSPCB. l) Vapor recovery system is being implemented in ISOM Naphtha tank farm. m) New vapor recovery system is being implemented for Benzene & Toluene truck loading area.
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 in December 2017.
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 and is connected to the CPCB server system.
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	18 No's of HC detectors are installed in the truck loading/wagon loading area.2 No's of HC detectors and 2 No's of H2S detectors are installed in ETP-V area. Benzene monitoring is carried out using "dragger" chip technique in the aromatic recovery unit on a daily basis. 5 No's of ambient air quality monitoring stations (AAQMS) are installed at the peripheries of the refinery to enable close monitoring of ambient air quality near the refinery. The ambient air quality information is also communicated to general public through an electronic display board.

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/tons (for 90% of time) except for the monsoon season:	The discharge of treated water from Kochi refinery is 0.23 m3 /MT of crude processed. Steam condensate in the process plants is being recycled back to the boilers as feed water for the steam generation, there by resulting in reduction in the fresh water consumption. Approximately 130-150 m^3/hr. steam condensate is being recycled to steam boilers in the refinery. The stripped water from the stripped water units is recycled as make up water to the desalting process in the crude unit. 150 m3/hr. of liquid effluent generation is avoided by recycle. Treated effluent water from the wastewater treatment plants are recycled in RO DM plant.
3	Oil spill response facilities at Coastal Refineries will be in position within two years:	Oil spill response (OSR) facility at Cochin port is already in place. Additionally, BPCL Kochi refinery has procured oil containment booms as part of SBM facilities commissioning to augment the capabilities of oil spill response related facilities. We have also conducted a mock drill to build confidence for the safe operation of SBM facilities with the help of port trust/coast guard personnel. It was decided to further strengthen the oil spill response facilities at Cochin port through purchase and installation of additional equipment and the major share of the investment was shouldered by BPCL Kochi refinery. Advance payment has been released to Cochin port trust for procurement of equipment.

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

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

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

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

a) BPCL Kochi refinery has implemented leak detection and repair (LDAR) program using portable hydrocarbon detector instrument. These programs are carried out on continuous basis on a large number of valves, flanges etc.in all process units and offsite areas. The leaks identified are attended by maintenance crew immediately and are monitored on regular basis. During the Period **1st October 2021 to 31st March 2022,** we have checked more than 55000 nos of points.

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

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

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

e. Six ambient air quality monitoring stations (AAQMS) are working online to monitor the ambient air quality on continuous basis. The ambient air quality information is also communicated to public through an electronic display board.

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

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

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

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

Various process schemes implemented to reduce flaring

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

Flare gas recovery system is installed as part of IREP project and it can recover around **6.75 TPD** flare gas to fuel gas system.

6. Assessment of Potential leakages from petroleum storage tanks

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

Total 63 No's of bore wells have been constructed at various locations inside the refinery in order to monitor the ground water for any hydrocarbon leakages from the refinery storage tanks and processing plants. The ground water samples from the bore wells are tested periodically for presence of hydrocarbons. In addition, 14 piezometer wells have been installed for monitoring of ground water quality.

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

Clean technologies adopted to combat Air Pollution includes:

1. BPCL Kochi refinery has consistently met all deadlines for up gradation of auto fuel quality, set by the Government of India. KR is producing MS and HSD of BS VI norms.

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

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

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

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

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

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

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

9. State of the art Biturox Technology has been adopted for production of Bitumen without any harmful emission. Unlike the traditional bitumen blowing technology, this technology helps for no odor or pollutants emissions. The off gases generated is subjected to incineration and caustic scrubbing in this technique. The waste water stream generated is also oxidized, thereby resulting in zero BOD for effluent. The fresh water consumption is also significantly reduced by the adoption of this technique.

10. An electrostatic precipitator has been installed downstream of CO boiler for minimizing particulate matter emission from FCCU regenerator flue gases. As part of PFCCU (part of IREP project) we have installed a tertiary cyclone separator and another ESP (Electrostatic precipitator) for particulate capture.

11. Closed loop sampling system in process plants.

12. Flare gas recovery system is installed as part of IREP project to recover around 3.63 TPD flare gas to fuel gas system

b) Clean technologies adopted to improve effluent water quality:

1. We have 4 effluent treatment plants catering to the different process units.
2. Installation of 5 numbers of sour water strippers and recycling of stripped water in process units.
3. Provision of two stage API oil separation system for effluent streams.
4. Spent caustic treatment utilizing H_2O_2 and air oxidation methods for treatment in an in an environment friendly way.
5. Closed drainage system for tank farm drains.

6. Two stage biological treatment system for effluent streams including tricking filter and activated sludge process, automated Chemostat Treatment and sequential batch reactor.(SBR)

7. Hydrogen Peroxide is utilized in our ETP's instead of FeCl3 to avoid chemical sludge formation.
8. Chemical de-contamination technique is being adopted at BPCL KR during turnarounds. The vessels, columns etc. are decontaminated using specially formulated chemical which is environment friendly, non-hazardous and fully biodegradable. The Hydrocarbons are recovered in the form of slop after de-emulsification process.

c) Clean technologies implemented for optimal solid waste management

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

1. In-situ recovery of oil from crude tank bottom sludge.
2. BPCL Kochi refinery constructed two secured landfills for the safe disposal of hazardous solid wastes as per the standard norms laid down by CPCB. The first landfill pit has a capacity of 590m3 and is dedicated to the disposal of FCC catalyst fines and spent molecular sieves. The second land fill pit with a capacity of 390 m3 is dedicated for the disposal of sludge from effluent treatment plants.
3. Installation of bio gas plant of capacity 1 T/day to convert canteen food waste into gas for use in canteen. The plant is developed based on the NISARGRUNA technology developed by Bhabha Atomic Research Centre. (BARC)
4. We have entered into an agreement with KEIL (Kerala Enviro Infrastructure Limited) for disposing solid hazardous wastes at their TSDF facility.
5. Wherever possible, spent catalyst containing recoverable metals are disposed /sold to authorized recyclers.
6. Paper waste recycling program to dispose old paper to get new printable A4 paper.
7. A centralized solid waste segregation and management facility is under development. This Facility will act as a single point for collection, storage, treatment and evacuation of all types of wastes generated inside BPCL KR in an ecofriendly manner.

Sustainable Development Projects and Activities added during 1st October 2021 to 31st March 2022

1. It was identified that required ATF production can be managed by producing ATF from DHDT and AFT merox whenever diesel hydrotreating capacity is not limiting. KHDS which is an old inefficient unit was kept shutdown whenever opportunity exists. This saved 0.6 TPH Fuel, 1.5 TPH , 0.6 MW Power. Assuming this unit remain shut down for 50% of time, the energy saving is equivalent to 3000 MTOE/yr
2. IREP demountable flare has 2 liquid ring compressors for flare gas recovery. It was not possible to operate both compressors in parallel as it was getting tripped in low suction pressure. On detailed analysis it was found that this is happening because of the pressure drop across suction NRV. The NRVs were removed after concurrence from the supplier M/s Garo. This has resulted in additional recovery of 0.7 TPH FG recovery which is equivalent to 6000 MTOE/yr
3. BPCL KR has a trap population of around 25000. Hence monitoring and ensuring healthiness was a tedious job in the vast offsite areas. A contract was lined up for trap survey, rectification and up keeping of minimum 95% healthiness. Another third party contract was lined up for

performance verification of the maintenance contractor. This has resulted in reduction of offsite steam by around 10 TPH equivalent to 5700MTOE/yr

4. As a strategy 6 nos of heavy oil tanks were isolated by maximizing the hot/ direct feed from primary units to downstream units. This resulted in saving of steam in intermediate tanks with steam coils. Estimated saving of 6.5 TPH steam equivalent to 3900MTOE/yr
5. As CDU3 was running in full gas firing mode, it was observed that the risk of acid dew point corrosion in APH was low even with ambient air directly entering the gas APH. Hence SCAPH steam was stopped in operation on full gas firing mode. This saved 6 TPH LP Steam equivalent to 3424MTOE/Year
6. CEMP 2 flare purge fuel gas was replaced with nitrogen in a phased manner. This has reduced the purge gas requirement by 0.3 TPH FG equivalent to 2600MTOE/yr
7. CDU1 plant fuel system caters fuel oil to CDU2, UB7 and UB10. As CDU2 was operating in full gas mode and UB7 and 10 are operated rarely only, the entire plant fuel system was flushed and isolated. It saved around 3 TPH steam. Assuming that the system can remain isolated 50% of time the saving is 900 MTOE/yr
8. CDU2 crude heater APH was bypassed partially due to limitation in air flow. APH cleaning, general burner overhauling and refractory rectification was done in turn around. This saved around 45 Kg/Hr of fuel saving by efficiency improvement equivalent to 400MTOE/yr
9. Packinox reactor in CCR had a high pressure drop which forced the stripper to operate at a higher pressure. A scheme in Packinox was implemented for the exchanger spray bars backpurge to reduce DP. This has saved 0.5 TPH HP Steam in the stripper re-boiler equivalent to 330MTOE/yr.
10. DCU CBD slop was being routed to crude slop. A scheme was implemented to reprocess CBD slop internally in DCU. This avoided the reprocessing in CDU again. Assuming 70 TPH slop processing in a week, this gives a saving of 175MTOE/yr
11. The loader valves of NHT RGC was always operating at 100%. During turn around, Loader valves adjustment option to operate at variable opening of 25%, 50%, 75% was made available. This has resulted in130 Kw/hr. Power equivalent to 160MTOE/yr.

GREEN COVER AT KOCHI REFINERY

BPCL, Kochi Refinery has always given highest preference towards care for environment and their protection. The company has already incorporated pollution control measures in their design itself and has also grown an extensive Green cover on its periphery and within for which the refinery goes by the name **BPCL Green Kochi Refinery**. Recognizing the company's commitment towards environment care and protection, it has been certified for ISO 14001, which was first in the state of Kerala.

Total green cover area at BPCL, Kochi Refinery is around 315 acres.

Kochi Refinery maintains an Eco-park and many theme based parks such as Rainbow Park, Amrutha Sarass, Varshodyan, Kalpkodyan, Herbal Park, Bamboo Park, Miyawaki Forests etc. These were developed as a part of Greenbelt initiatives and they blend with the nature and is inhabited with diverse trees, flowering plants, herbal trees and fruit bearing trees. Three number of Butterfly parks were set up towards enhancement of Bio-diversity. As part of PDP Project green belt development, we have planted more than 20,000 saplings this year to make greenery in Petrochemical complex. A Mini Miyawaki forest was developed near coke dome and PDP Project area. Further, Kochi Refinery has other dense vegetation in the form of plantation and natural growth which constitutes to the green cover. The diversified Green belt within the Refinery has drawn attention from even seasonal migratory birds.

With the reference of Environmental clearance for the project of Integrated Refinery Expansion Project (IREP)), as committed in the EIA/EMP report, the BPCL – KR has done environmental protection measures and community development activities.

Environment Protection Measures:

BPCL – KR has been spent huge amount on Environment management associated with CEMP-II and IREP as per commitment in Environment Management Plan (EMP) were:

- Waste water treatment system
- Tall Stacks for wide dispersion of pollutants
- A closed, automated coke transferring system aims for gains in environmental, economic and safety performance
- Stack gas monitoring (online facilities)
- Land acquisition for safety of the surrounding environment
- Green belt development

Community Development Activates:

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

- **Education**
- **Water Supply for the nearby community**
- **Health Care**
- **Helping hand for Community Development activities**
- **Support for Development Programs in the nearby locality and Kochi City.**

Some of the major activities carried out are as below:

a. Infrastructure support like Buildings, Electricity, Water and Uninterrupted supply of Medical Oxygen needed for setting up a temporary hospital to combat Covid -19 to State Government.
b. Free Liquid Medical Oxygen Supply for Covid Care centers of State Government.
c. Rejuvenation of neighboring Thanneerchal Lake in Tripunithura.
d. Support for Gas Fired Crematoriums in Grama Panchayats.
e. House for poor (Urban & Rural): Vadavucode Puthencruz & Thiruvaniyoor Grama Panchayats and Kochi Corporation.
f. Construction/Renovation of Primary Health Centers and Anganwadis.
g. Construction/renovation of class rooms in Govt. Schools and Support for Special Schools.
h. Support for *Kudumbasree* Units – Building, vehicle for waste collection.
i. Promotion of science education in Govt. Schools.
j. Installation of Traffic Signal Systems and lighting at various junctions.
k. Development/renovation/repair of rural roads and lighting projects
l. Setting up and Up-keeping of public utilities, Public toilets & heritage monuments.

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