



इंडियन ऑयल कॉर्पोरेशन लिमिटेड

पारादीप रिफाइनरी

डाकघर: झिमानी, भाया: कुजंग, जिला: जगतसिंहपुर, ओडिशा - 754 141

Indian Oil Corporation Limited

Paradip Refinery

PO: Jhimani, Via : Kujang, Dist. : Jagatsinghpur, Odisha - 754 141

Tel.: 06722 - 252001, 252002, Fax : 06722 - 252101

Website: www.iocl.com, E-mail : paradiprefinery@indianoil.in



रिफाइनरीज प्रभाग
Refineries Division

Ref: PDR/HSE/HC/MOEFCC/002

Date: 28-11-2020

Dy. Director (S), Eastern Region
Ministry of Environment and Forests,
Eastern Region Office, A/3, Chandrasekharpur,
Bhubaneswar - 751 023, Odisha

Sub: Half Yearly Compliance Report of ECs issued to IOCL, Paradip Refinery

Dear Sir,

Please find enclosed the Half Yearly Compliance Report of the following ECs for period Apr'20 to Sep'20.

1. Compliance Status for Environment Clearance for Grass Root Refinery-cum Petrochemical Complex of 15 MMTPA at Paradip (Letter F.No.J-11011/70/2007-1A II (I) dated 06th Jul, 2007) is enclosed as Annexure-A.
2. Compliance Status for half Yearly Compliance Report in respect of Conditions of the CRZ Clearance for laying of Storm Water Outfall Pipelines to sea for Paradip Refinery Project. (Letter F. No.11-86/2011-IA III dated 21st Feb'2012) is enclosed as Annexure-B.
3. Compliance Status for CRZ Clearance for laying of pipeline from Paradip Refinery to South Oil Jetty at Paradip Port, Odisha (Letter F. No. 11-33/2013-IA III, Government of India, Ministry of Environment & Forests (IA Division), Dated 19th Sep'2013) is enclosed as Annexure-C.
4. Compliance Status for CRZ Clearance for 'Pet Coke Evacuation Project' for Paradip Refinery in District Jagatsinghpur (Odisha) by Indian Oil Corporation Ltd – CRZ Clearance - reg. issued by Ministry of Environment and Forest (MoEF) (Letter no. F. No. 11-30/2015-IA.III dated 11th Feb'2016) enclosed as Annexure-D.
5. Compliance Status for EC and CRZ Clearance for "Installation Ethylene Recovery Unit, Mono Ethylene Glycol Unit and BS-VI facility by M/s Indian Oil Corporation Ltd (IOCL) at Paradip Refinery cum Petrochemical Complex, village Abhayachandrapur, Tehsil Kujang, District Jagatsinghpur (Odisha) – Environmental and CRZ Clearance - reg. issued by Ministry of Environment and Forest (MoEF) (Letter no. F. No. J-11011-344/2016-IA-II (I) dated 11th Oct' 2018) enclosed as Annexure-E.

Thanking you.

Yours faithfully,

S.K.
28/11/2020
(Sarvesh Kumar)

Dy. General Manager (HSE)

Copy to:

1. The Member Secretary, Odisha Pollution Control Board, Paribesh Bhawan, A/118, Neelkanthanagar, Unit-8, Bhubaneswar - 751012, Orissa.
2. The Additional Project Director, OCZMA, 1st Floor, Administrative Building, Regional Plant Resource Centre Campus, Nayapalli, Bhubaneswar-751015, Odisha

IOCL, Paradip Refinery cum Petrochemicals Complex

Subject: EC CRZ - Compliance Status Report

Annexure-A

Name of Project	:	Grass Root Refinery-cum-Petrochemical Complex of 15 MMTPA at Paradip, Odisha
Clearance Letter(s) No. & Date	:	F.No.J-11011/70/2007-1A II (I) dated 06th July, 2007
Period of Compliance Report	:	Apr'20 to Sept'20

S. No.	CONDITION	STATUS
A.	SPECIFIC CONDITIONS:	
i.	The company shall ensure strict implementation/compliance to the stipulations made by MOEF vide OM No.J-11011/26/1997-IA-II dated 24 th December, 1997.	All stipulations are complied
ii.	The gaseous emissions (SO ₂ , NO _x , CO, NMHC & Benzene) from the various process units shall conform to the standards prescribed under the Environment (Protection) Rules, 1986 or norms stipulated by the SPCB whichever is more stringent. At no time, the emission level shall go beyond the stipulated standards. In the event of failure of pollution control system(s) adopted by the unit, the respective unit should not be restarted until the control measures are rectified to achieve the desired efficiency.	Complied Stack emission being monitored for adherence to the MoEF notification dated 18 th March'2008.
iii.	Ambient air monitoring stations, [SPM, SO ₂ , NO _x and NMHC, Benzene] shall be set up in the refinery complex in consultation with SPCB, based on occurrence of maximum ground level concentration and down-wind direction of wind. The monitoring network must be decided based on modelling exercise to represent short term GLCs. Continuous on-line stack monitoring equipment shall be installed for measurement of SO ₂ and NO _x . Data on VOC shall be monitored and submitted to the SPCB/ Ministry.	7 nos. of Ambient Air Quality Monitoring (AAQM) stations were set up based on the modelling exercise conducted under the Comprehensive EIA Study Continuous monitoring in all the 7 monitoring station already implemented. On-line data transmission to OSPCB/CPCB server is already done. Continuous monitoring in all stacks already implemented. On-line data transmission to OSPCB/CPCB server is already done. VOC monitoring being done at various locations of the Refinery Reports attached as Annexure-1 . Ambient Air quality attached as Annexure-2
iv.	The total SO ₂ emission from the refinery complex shall not exceed 1000 kg/hr after fully stabilizing of the expansion and modernization of the refinery complex and upgrading the existing facilities.SO ₂ emission report may be made on daily basis for all	Complied SO ₂ emission in kg/hr being calculated monthly basis.



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S. No.	CONDITION	STATUS
	the stacks (fuel burning and process emissions through the computerized mechanism). Further, regular monitoring of stacks every fortnight must also be carried out to cross check the data obtained from computerized monitoring by engaging a reputed organization. In addition, a monthly sulphur balance statement indicating type of fluid, its S – content, product S - content, SO ₂ emission etc. may be made. Daily, fortnightly and monthly reports generated as above shall be sent to the SPCB and MOEF.	Stack Report attached as Annexure-3 . Sulphur Balance attached as Annexure-4 .
v.	All the Sulphur Recovery Units shall have overall efficiency of 99.9%.	Sulphur Recovery Units with overall efficiency of 99.9% has been commissioned.
vi.	Ultra Low – NO _x burners shall be provided in the new furnaces to avoid excessive formation of NO _x .	Complied Ultra Low NO _x burners installed in major fired heaters.
vii.	Company shall install online SO ₂ and NO _x analysers in all the stacks of the refinery.	On-line SO ₂ and NO _x analysers installed in all the stacks of the refinery. Data being reflected in OSPCB/CPCB RTDAS.
viii.	Fugitive emissions of HC from product storage tank farms etc. must be regularly monitored. Sensors for detecting HC leakage shall be provided at strategic locations. Necessary measures shall be adopted so as to ensure that the NMHC levels outside the refinery complex premises do not exceed prescribed limits. Monitored data shall be submitted to OPCB / CPCB every three months and to Ministry of Environment & Forests every six months.	Complied HC detectors installed in strategic locations of the tankage area. Fugitive emission in tankage area is enclosed as Annexure-5 .
ix.	For control of fugitive emissions, the company shall augment route all unsaturated hydrocarbons to the flare system in addition to the existing flare system. All the pumps and other equipment where there is a likelihood of HC leakages shall be provided with LEL indicators and also provide for immediate isolation of such equipment, in case of a leakage. The company shall adopt Leak Detection and Repair (LDAR) programme for quantification and control of fugitive emissions.	Complied To safeguard process units during emergency, flare system is installed for complete combustion of hydrocarbon before releasing to atmosphere. HC detectors are installed in strategic locations. LDAR being carried out in process units as well as tankage areas.
x.	All the stacks shall be of appropriate design and height shall be attached to pollution control systems, wherever necessary. All stacks in the complex must meet the minimum stack height criteria as prescribed in the Environment Protection emissions.	Complied The minimum stack height designed as per the following: H = 14 Qg ^{0.3} H = Height of stack in meters Qg = Quantity of SO ₂ emission in kg/hr

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S. No.	CONDITION	STATUS
		All the major stacks are of height more than 60 m and tallest height is the flare of 131 m.
xi.	All new standards/ norms which are being proposed by CPCB for refinery projects/ petrochemical units shall be applicable for the proposed expansion and modernization of the petrochemical refinery complex. These standards shall be incorporated into the detail designs for the proposed expansion and modernization. The existing refinery complex shall also be upgraded to the new above mentioned emission standards.	Complied The Refinery in its design has incorporated the updated environment standard issued on 18 th March'2008 for emission & discharge and 18 th November'2009 for Ambient Air Quality.
xii.	Ground water shall not be tapped for construction, industrial or domestic uses including the township.	Complied No ground water tapping done during construction work
xiii.	Liquid effluents shall be treated to conform to the standards stipulated by CPCB / Ministry of Environment & Forests under EPA 1986 and also the new norms being specified. Treated effluent will be recycled and reused. The treated effluent shall be discharged into the sea through a pipeline of about 3 km from low tide line. The domestic effluent after treatment and conforming to the prescribed standards shall be used for greenbelt development.	Complied State-of-the-art effluent treatment plant has been commissioned to treat industrial effluent as well as domestic sewage with maximum recycle facility. Balanced treated effluent after recycle being discharged to the sea through a pipeline of about 3 km from low tide line. Treated effluent quality report attached as Annexure-6.
xiv.	The company shall undertake monitoring of the groundwater quality at the locations as suggested by the Central Ground Water Board. Monitoring results of the same shall be submitted to the OPCB/CPCB and MOEF.	Complied Ground water monitoring being carried out in the Refinery. Latest report attached as Annexure-7.
xv.	M/s IOCL shall undertake rainwater harvesting measures to recharge the ground water in the area in consultation with Central Ground Water Board and Orissa Pollution Control Board.	Two storm water reservoirs (Capacities: 2,96,000 KL and 3,13,000 KL) have been developed to store rain water in monsoon in the refinery premises. Also, recently one more storm water collection pond of capacity @ 470000 kl has been constructed in newly developed ecological park.
xvi.	Green belt shall be raised in 580 acre area as per CPCB guidelines.	Complied Greenbelt has been developed in an area of 580 acres with the help of Orissa Forest Development Corporation Ltd. (OFDCL). 5,87,000 trees have been planted around the refinery area and approx. 50,682 trees have been planted in the township. Every year also, Paradip Refinery is doing plantation in and around Refinery. Till date approximately >8 Lac trees have been planted.

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S. No.	CONDITION	STATUS
xvii.	Occupational Health Surveillance of the employees and workers shall be done on a regular basis and records maintained as per the Factories Act.	Complied Report attached as Annexure-8 .
xviii.	The marine water quality shall be regularly monitored for the water quality (temperature, petroleum hydrocarbons, phenols, sulphides, total organic carbon), sediment quality (trace elements, petroleum hydrocarbons, TOC and sediment size) and biological parameters (primary productivity, benthos, fish quality and growth, biomass, phytoplankton and zooplankton).	Complied Marine water quality monitoring job is being carried out by third party. Report attached as Annexure-9 .
xix.	The design, material of construction, assembly, inspection, testing and safety aspects of operation and maintenance of pipeline and transporting the oil shall be governed by ASME/ANSI B31.8/B31.4 and OISD standard 141.	Complied The Refinery is strictly following the standards
xx.	The project authorities should install SCADA system with dedicated optical fibre based telecommunication link for safe operation of pipeline and Leak Detection System. Intelligent pigging facility should be provided for the entire pipeline system for internal corrosion monitoring. Coating and impressed current cathodic protection system should be provided to prevent external corrosion.	Complied Online detection of leak in the pipeline is through Optical fibre cable and is installed in South Oil jetty pipelines. Cathodic protection system is provided for all underground pipelines to prevent external corrosion.
xxi.	The project authorities shall patrol and inspect the pipeline regularly for detection of faults as per OISD guidelines and continuous monitoring of pipeline operation by adopting non-destructive method(s) of testing as envisaged in the EMP. Pearson survey and continuous potential survey should be carried out at regular intervals to ensure the adequacy of cathodic protection system.	Complied. Regular patrolling is being done for the SOJ and Marketing pipelines. CAT & DCVG survey has been planned to be carried out within 05 years of commissioning of the lines (ie, by 2021) as per OISD-138 guidelines. Agency lining up for the same is in progress and same is under final technical evaluation.
xxii.	The solid waste shall be disposed of in secured landfill facility within the refinery. The spent catalyst and incinerated sludge will be stored in segregated manner in the secured landfill area. Tank bottom sludge from refinery operation shall be put to oil recovery system and the residual sludge will be incinerated. The incinerated sludge ash shall be stored in secured landfill inside refinery. Bio sludge shall be stored in drying pit for natural weathering and then used as manure inside refinery premises.	Complied Melting pit has been constructed to recover oil from tank bottom sludge and Incinerator has been installed to burn the residual sludge. SLF has been constructed to dispose the incinerated ash. In ETP, sludge drying bed is constructed for drying of bio sludge



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S. No.	CONDITION	STATUS
xxiii.	The company shall also comply with all the conditions and safeguards prescribed in the EIA & Risk Assessment Reports.	Complied Paradip Refinery fully implemented all the conditions stipulated in EIA and Risk Assessment reports.
xxiv.	The On-site and Off-site Emergency Preparedness Plans, Oil Spill Contingency Plans, Marine Disaster Management Plan shall be prepared for the enhanced refinery throughput and submitted to the Ministry before commissioning at the enhanced capacity.	Complied On-site and off-site preparedness plan of Paradip Refinery is in place. Emergency Response and Disaster management Plan (ERDMP) has been approved by MoP&G On-site emergency plan is approved by Director of Factories and Boiler. Off-site plan is incorporated in District Emergency Plan.
xxv.	The Environment Management Cell and laboratory facilities for the collection of the samples shall be augmented with suitable facilities and qualified personnel and directly report to the chief executive of the refinery complex.	Complied Paradip Refinery is equipped with full-fledged environment cell headed by CGM-HSE.
xxvi.	The company shall prepare comprehensive EIA/EMP report and submit to the Ministry within one year.	Complied Comprehensive EIA Report was prepared and submitted to OPCB on 12.09.2008 and MOEF on 22.09.2008.
B.	GENERAL CONDITIONS:	
i.	The project authorities must strictly adhere to the stipulations made by the Orissa State Pollution Control Board and the State Government.	Noted for compliance
ii.	No further expansion or modernization in the plant shall be carried out without prior approval of the Ministry of Environment and Forests.	Noted for compliance
iii.	At no time, the emissions shall go beyond the prescribed standards. In the event of failure of any pollution control system adopted by the units, the respective unit should be immediately put out of operation and shall not be restarted until the desired efficiency has been achieved.	Noted for compliance
iv.	The overall noise levels in and around the plant area should be kept well within the standards (75 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	Presently noise survey is going on for which one hygienist has been engaged. Report attached as Annexure-10 .



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S. No.	CONDITION	STATUS
	under EPA Rules, 1989 viz. 75 dBA (day time) and 70 dBA (night time).	
v.	The project authorities must strictly comply with the provisions made in Manufacture, Storage and Import of Hazardous Chemicals Rules 1989 as amended in 2000 for handling of hazardous chemicals etc. Necessary approvals from Chief Controller of Explosives must be obtained before commission of the project.	Complied with All required licenses obtained from CCE.
vi.	The project authorities must strictly comply with the rules and regulations with regard to handling and disposal of hazardous wastes in accordance with the Hazardous Wastes (Management and Handling) Rules, 2003. Authorization from the State Pollution Control Board must be obtained for collections/treatment/storage/disposal of hazardous wastes.	Complied with HW authorization obtained from OSPCB vide Ref no. IND-IV-HW-930/5028 dated 24-05-2019 with a validity till 31-03-2024
vii.	The project authorities will provide requisite 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 conditions stipulated herein. The funds so provided should not be diverted for any other purposes.	Complied with Paradip Refinery has installed all the pollution control units at an approximate cost of 10% of the capital expenditure of Refinery. In 2019-20, total expenditure on account of environment related job was approximately of Rs. 30.5 Cr. However, year wise budget provision being made for environment related activities
viii.	The stipulated conditions will be monitored by the Regional of this Ministry at Bhubaneshwar / Central Pollution Control Board / State Pollution Control Board. A six monthly compliance report and the monitored data should be submitted to them regularly.	Six monthly compliance report is being sent to MoEF. Last report was submitted vide letter no. PDR/HSE/HC/MOEFCC/01 dated 29.05.2020
ix.	The Project Proponent should inform the public that the project has been accorded environmental clearance by the Ministry and copies of the clearance letter are available with the State Pollution Control Board/ Committee and may also be seen at Website of the Ministry of Environment and Forests at http:// www.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 The information has been published in the two daily local newspapers i.e. 'The Samaj' in Oriya and 'The Indian Express' in English dated 18.07.2007.
x.	The Project Authorities should inform the Regional	Complied



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S. No.	CONDITION	STATUS
	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 of Directors of IOCL accorded investment approval on 28.02.2009 for the project.



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Annexure-B

Name of Project	:	CRZ Clearance for laying of Storm Water Outfall Pipelines to sea for Paradip Refinery Project
Clearance Letter(s) No. & Date	:	F. No.11-86/2011-IA III dated 21st February 2012
Period of Compliance Report	:	Apr'20 to Sept'20

S.N.	SPECIFIC CONDITIONS :	Status
4(i)	"Consent for Establishment" shall be obtained from State Pollution Control Board under Air and Water Act and a copy shall be submitted' to the Ministry before start of any construction work at the site.	"Consent for Establishment" obtained vide letter no. 12048 Ind-II-NOC- 4600 dated 25-06-2012
(ii)	The proposed storm water line shall be laid along the Crude Oil pipeline corridor which was accorded CRZ clearance for transportation of crude oil after the recommendation of the SCZMA. However, the proponent shall submit the CRZ map showing the proposed pipeline route to SCZMA with a copy to the Ministry before commencement of the work.	Complied with CRZ map has already been submitted (Ref No. IOCL/PDRP/LSTK-11/1/014)
(iii)	The unit shall provide separate drains and collection system at the process area so as to prevent any possible mixing of process spillage in to storm water as proposed.	Complied with Separate drains for storm water and process drains have been provided in the process area of the Refinery.
(iv)	The project proponent shall set up separate environmental management cell for effective implementation of the stipulated environmental safeguards under the supervision of a Senior Executive.	Complied with Separate Environment Management Cell headed by CGM-HSE exists in the Refinery to take care of all the environmental issues
(v)	The funds earmarked for environment management plan shall be included in the budget and this shall not be diverted for any other purposes.	Paradip Refinery has installed all the pollution control units at an approximate cost of 10% of the capital expenditure of Refinery. In 2019-20, total expenditure on account of environment related job was approximately of Rs. 30.5 Cr. However, year wise budget provision being made for environment related activities
	GENERAL CONDITIONS:	
5(i)	Appropriate measures must be taken while undertaking digging activities to avoid any	Complied



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Subject: EC CRZ - Compliance Status Report

S.N.	SPECIFIC CONDITIONS :	Status
	likely degradation of water quality.	Taken care during construction activities. Now lines are already commissioned.
(ii)	Full support shall be extended to the officers of this Ministry/ Regional Office at Bhubaneswar by the project proponent during inspection of the project for monitoring purposes by furnishing full details and action plan including action taken reports in respect of mitigation measures and other environmental protection activities.	Noted for compliance
(iii)	A six-Monthly monitoring report shall need to be submitted by the project proponents to the Regional Office of this Ministry at Bhubaneswar regarding the implementation of the stipulated conditions.	Six monthly compliance report is being sent to MoEF. Last report was submitted vide letter no. PDR/HSE/HC/MOEFCC/01 dated 29.05.2020
(iv)	Ministry of Environment & Forests or any other competent authority may stipulate any additional conditions or modify the existing ones, if necessary in the interest of environment and the same shall be complied with.	Noted for compliance
(v)	The Ministry reserves the right to revoke this clearance if any of the conditions stipulated are not complied with the satisfaction of the Ministry.	Noted
(vi)	In the event of a change in project profile or change in the implementation agency, a fresh reference shall be made to the Ministry of Environment and Forests.	Noted for compliance
(vii)	The project proponents 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 start of land development work.	Complied This is the part of the entire Refinery Project. The Board of Directors of IOCL accorded investment approval for the entire project at Paradip on 28.02.2009 for the project.
(viii)	State Pollution Control Board shall display a copy of the clearance letter at the Regional Office, District Industries Center and Collector's Office/Tehsildar's office for 30 days.	For compliance by OSPCB office.
6	These stipulations would be enforced among others under the provisions of Water (Prevention and Control of Pollution) Act 1974, the Air (Prevention and Control of Pollution)	Noted

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S.N.	SPECIFIC CONDITIONS :	Status
	Act 1981, the Environment (Protection) Act, 1986, the Public Liability (Insurance) Act, 1991 and EIA Notification 1994, including the amendments and rules made thereafter	
7	All other statutory clearances such as the approvals for storage of diesel from Chief Controller. of Explosives, Fire Department, Civil Aviation Department, Forest Conservation Act, 1980 and Wildlife (Protection) Act, 1972 etc. shall be obtained, as applicable by project proponents from the respective competent authorities.	Complied with Paradip Refinery has already obtained all necessary statutory approvals
8	The project proponent shall advertise in at least two local Newspapers widely circulated in the region, one of which shall be in the vernacular language informing that the-project has been accorded Environmental Clearance and copies of clearance letters are available with the State Pollution Control Board and may also be seen on the website of the Ministry of Environment and Forests at http://www.envfor.nic.in . The advertisement should be made within 10 days from the date of receipt of the Clearance letter and a copy of the same should be forwarded to the Regional office of this Ministry at Bhubaneswar.	Complied with Advertisement placed in two newspapers (One is "The Samaj" and other is "The Times of India"), dated 1st March'12).
9	Environmental clearance is subject to final order of the Hon'ble-Supreme Court of India in the matter of Goa Foundation Vs. Union of India in Writ Petition (Civil) No.460 of 2004 as may be applicable to this project.	Noted
10	Status of compliance to the various stipulated environmental conditions and environmental safeguards will be uploaded by the project proponent in its website	Complied
11.	A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, Zilla Parisad/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	Complied



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S.N.	SPECIFIC CONDITIONS :	Status
	website of the company by the proponent.	
12	The proponent shall upload the status of compliance of the stipulated EC 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 MoEF, the respective Zonal Office of CPCB and the SPCB.	Complied Six monthly compliance report is being sent to MoEF. Last report was submitted vide letter no. PDR/HSE/HC/MOEFCC/01 dated 29.05.2020
13	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 EC conditions and shall also be sent to the respective Regional Offices of MoEF by e-mail	Complied Paradip Refinery regularly submitting the Environment Statement in September. Environment Statement for FY 2019-20 submitted on 28.09.2020 vide ref no. PDR/HSE/OSPCB/Env-S/2020-21 dated 25.09.2020



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Subject: EC CRZ - Compliance Status Report

Annexure-C

Name of Project	:	CRZ Clearance for laying of pipeline from Paradip Refinery to South Oil Jetty at Paradip Port, Odisha
Clearance Letter(s) No. & Date	:	F. No. 11-33/2013-IA III dated 19th September, 2013
Period of Compliance Report	:	Apr'20 to Sept'20

S.N.	SPECIFIC CONDITIONS :	Status
5(i)	"Consent for Establishment" shall be obtained from State Pollution Control Board under Air and Water Act and a copy shall be submitted to the Ministry before start of any construction work at the site.	"Consent for Establishment" obtained vide letter no 12048 Ind-II-NOC- 4600 dated 25-06-2012. Copy has been submitted to the ministry vide letter no. PDRP/HSE/CRZ/MoEF/2013-1 dated 03.10.2013.
(ii)	All the conditions of Forest Clearance dated 06/02/2013 shall be complied with.	Complied Compliance status already submitted and based on the status, Forest and Environment Dept. Govt. of Odisha has been issued a letter (Letter No. 10F(Cons)510/2012 23891/F&E. Dtd 20/11/13) to accord the final clearance.
(iii)	The laying of pipeline at creek shall be carried out in such a way that it shall not obstruct tidal flow of the creek.	Due care was taken during laying of the pipeline.
(iv)	All the conditions stipulated by the Odisha Coastal Zone Management Authority (OCZMA) shall be complied with.	Complied. Leak detection System is under commissioning.
(v)	Laying pipe line shall not be carried out during the breeding of olive Ridely turtle as committed vide undertaking dated 25.06.2013.	Complied Point was taken care. No construction work was done during the breeding season of olive Ridely turtle
(vi)	Soil and water samples shall be regularly monitored along the pipeline route to check the leakage/contamination, if any and shall examine if any strengthening is required.	Complied Soil sampling carried out by third party engaged for environment monitoring. Copy enclosed as Annexure-11 .
(vii)	Proper oil spillage contingency plan shall be put in place.	Complied PDR has submitted the oil contingency plan for SOJ facility to PPT to incorporate in the existing plan of PPT.
(viii)	It shall be ensured that there is no disturbance to people, houses or fishing activity as a result of the project.	Taken care during construction. Now it is commissioned.
(ix)	The smooth and safe operation of the system shall be ensured by incorporating a computerized SCADA (Supervisory Control And Data Automation) system. Any leakage in the pipeline shall be immediately detected by the Computer system and product pumping shall be immediately cut off.	Complied Leak detection by optical fibre cable installed for south oil jetty pipelines.



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Subject: EC CRZ - Compliance Status Report

S.N.	SPECIFIC CONDITIONS :	Status
(x)	All the recommendation of the EMP shall be complied with letter and spirit. All the mitigation measures submitted in the EIA report shall be prepared in a matrix format and the compliance for each mitigation plan shall be submitted to MoEF along with half yearly compliance report to MoEF-RO.	Complied
(xi)	The project proponent shall set up separate environmental management cell for effective implementation of the stipulated environmental safeguards under the supervision of a Senior Executive.	Complied Separate Environment Management Cell headed by CGM-HSE exists in the Refinery to take care of all the environmental issues
(xii)	The funds earmarked for environment management plan shall be included in the budget and this shall not be diverted for any other purposes.	Paradip Refinery has installed all the pollution control units at an approximate cost of 10% of the capital expenditure of Refinery. In 2019-20, total expenditure on account of environment related job was approximately of Rs. 30.5 Cr. However, year wise budget provision being made for environment related activities
	GENERAL CONDITIONS :	
6(i)	Appropriate measures must be taken while undertaking digging activities to avoid any likely degradation of water quality.	Complied Due care was taken during construction. Now the lines are already commissioned.
(ii)	Full support shall be extended to the officers of this Ministry/Regional Office at Bhubaneswar by the project proponent during inspection of the project for monitoring purposes by furnishing full details and action plan including action taken reports in respect of mitigation measures and other environmental protection activities.	Noted for compliance
(iii)	A six-monthly monitoring report shall need to be submitted by the project proponents to the Regional Office of this Ministry at Bhubaneswar regarding the implementation of the stipulated conditions.	Six monthly compliance report is being sent to MoEF. Last report was submitted vide letter no. PDR/HSE/HC/MOEFCC/01 dated 29.05.2020
(iv)	Ministry of Environment & Forests or any other competent authority may stipulate any additional conditions or modify the existing ones, if necessary in the interest of environment and the same shall be complied with.	Noted
(v)	The Ministry reserves the right to revoke this clearance if any of the conditions stipulated are not complied with the satisfaction of the Ministry.	Noted
(vi)	In the event of a change in project profile or change in the implementation agency, a fresh reference shall be made to the Ministry of Environment and Forests.	Noted



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Subject: EC CRZ - Compliance Status Report

S.N.	SPECIFIC CONDITIONS :	Status
(vii)	The project proponents 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 start of land development work.	Complied The Board of Directors of IOCL accorded investment approval on 28.02.2009 for the project
(viii)	State Pollution Control Board shall display a copy of the clearance letter at the Regional Office, District Industries Centre and Collector's Office/Tehsildar's office for 30 days.	Compliance by OSPCB
9	The project proponent shall advertise in at least two local Newspapers widely circulated in the region, one of which shall be in the vernacular language informing that the project has been accorded CRZ Clearance and copies of clearance letters are available with the State Pollution Control Board and may also be seen on the website of the Ministry of Environment and Forests at http://www.envfor.nic.in . The advertisement should be made within 10 days from the date of receipt of the Clearance letter and a copy of the same should be forwarded to the Regional office of this Ministry at Bhubaneswar.	Complied Advertisement placed in two newspapers (One is "The Samaj" and other is "The New Indian Express", dated 29th Sept'13)
11	Status of compliance to the various stipulated environmental conditions and environmental safeguards will be uploaded by the project proponent in its website.	Complied
12	A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, Zilla Parisad /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 website of the company by the proponent.	Complied
14	The proponent shall upload the status of compliance of the stipulated 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 MoEF, the respective Zonal Office of CPCB and the SPCB.	Six monthly compliance report is being sent to MoEF. Last report was submitted vide letter no. PDR/HSE/HC/MOEF dated 30.11.2019
15	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 Clearance conditions and shall also be sent to the respective Regional Offices of MoEF by e-mail.	Complied



IOCL, Paradip Refinery cum Petrochemicals Complex

Subject: EC CRZ - Compliance Status Report

Annexure-D

Name of Project	:	CRZ Clearance for 'Pet Coke Evacuation Project' for Paradip Refinery in District Jagatsinghpur (Odisha)
Clearance Letter(s) No. & Date	:	F. No. 11-30/2015-IA.III dated 11th February, 2016
Period of Compliance Report	:	Apr'20 to Sept'20

S.N.	CONDITIONS :	Status
A	SPECIFIC CONDITIONS:	
i)	The project proponent shall undertake periodic inspection and maintenance to avoid spillages, wear and tear of the proposed conveying system.	Complied
ii)	Adequate safe guards including alarm and emergency shutdown system shall be provided for the proposed conveying system.	Complied
iii)	Proper fire hydrant and fire extinguisher shall be provided at appropriate locations conforming to prevailing norms or fire safety.	Complied
iv)	There shall be no destruction of the mangrove during construction as well as the operation phase.	Complied
v)	The top soil of excavated area during the construction shall be kept separately and to be used for vegetation.	Complied Excavated soil used in Ecological Park and road side land filling which used for vegetation.
vi)	The labour camps, storage of material and machinery during construction phase shall be located outside the CRZ.	Complied Yes, located outside the CRZ.
vii)	Crossing of creek shall be on trestles with adequate clearance thereby having negligible impact on the flow.	Complied The RRLS facility is laid on the existing bridge for which sufficient clearance already exist.
viii)	During construction, solid waste generated will include packaging and wrapping material, stubs of spent welding electrodes, used rags and housekeeping etc. The project proponent shall ensure disposal of such wastes at approved sites. There shall be no disposal in CRZs.	Complied
ix)	There shall be no ground water withdrawal within CRZ limits.	Complied
x)	All the recommendations and conditions specified by Odisha Coastal Zone Management Authority (OCZMA) vide letter No. 56/OCZMA dated 25.08.2015, shall be complied with.	Complied
xi)	Project proponent shall implement all the recommendations stipulated in the EIA, EMP and Risk Assessment reports pertaining to the project.	Complied



IOCL, Paradip Refinery cum Petrochemicals Complex

Subject: EC CRZ - Compliance Status Report

S.N.	CONDITIONS :	Status
xii)	The project proponent shall set up separate environmental management cell for effective implementation of the stipulated environmental safeguards under the supervision of a Senior Executive.	Complied Paradip Refinery is equipped with full-fledged environment cell headed by CGM-HSE
xiii)	The project proponent shall take up mangrove plantation/ green belt in the project area, wherever possible. Adequate budget shall be provided in the Environment Management Plan for such mangrove development.	Complied
B	General Conditions	
i)	'Consent to Establish' shall be obtained from the State Pollution Control Board under the Air (Prevention and Control of Pollution) Act, 1981 and the Water (Prevention and Control of Pollution) Act, 1974.	Complied
ii)	A copy of the clearance letter shall also be displayed on the website of the concerned State Pollution Control Board. The EC letter shall also be displayed at the Regional Office, District Industries centre and Collector's Office/ Tehsildar's office for 30 days.	Compliance at OSPCB site
iii)	The funds earmarked for environmental protection measures shall be kept in separate account and shall not be diverted for other purpose. Year-wise expenditure shall be reported to this Ministry and its concerned Regional Office.	Complied Year wise budget provision being made for environment related activities. In 2019-20, total expenditure on account of environment related job was approximately of Rs. 30.5 Cr.
5	The above stipulations would be enforced among others under the provisions of Water (Prevention and Control of Pollution) Act, 1974, the Air (Prevention and control of Pollution) act 1981, the Environment (Protection) Act, 1986, the Public Liability (Insurance) Act, 1991, EIA Notification, 2006 and CRZ Notification, 2011.	Noted
6	Officials from the Regional Office of MoEF&CC, Bhubaneswar who would be monitoring the implementation of environmental safeguards should be given full cooperation, facilities and documents/ data by the project proponents during their inspection. A complete set of all the documents submitted to MoEF&CC should be forwarded to the CCF, Regional Office of MoEF&CC Bhubaneswar.	Noted
7	In the case of any change(s) in the scope of the project, the project would require a fresh appraisal by this Ministry.	Noted for Compliance
8	The Ministry reserves the right to add additional	Noted

IOCL, Paradip Refinery cum Petrochemicals Complex

Subject: EC CRZ - Compliance Status Report

S.N.	CONDITIONS :	Status
	safeguard measures subsequently, if found necessary, and to take action including revoking of the CRZ Clearance under the provisions of the Environmental (Protection) Act, 1986, to ensure effective implementation of the suggested safeguard measures in a time bound and satisfactory manner.	
9	All other statutory clearances such as the approvals for storage of diesel from Chief Controller of Explosives, Fire Department, Civil Aviation Department, Forest Conservation Act, 1980 and Wildlife (Protection) Act, 1972 etc. shall be obtained, as applicable by project proponents from the respective competent authorities.	Complied
10	The project proponent should advertise in at least two local Newspapers widely circulated in the region, one of which shall be in the vernacular language informing that the project has been accorded CRZ Clearance and copies of clearance letters are available with the State Pollution Control Board and may also be seen on the website of the Ministry of Environment, Forest & Climate Change at http://www.envfor.nic.in . The advertisement should be made within Seven days from the date of receipt of the Clearance letter and a copy of the same should be forwarded to the Regional Office of this Ministry at Bhubaneswar.	Complied
11	This Clearance is subject to final order of the Hon'ble Supreme Court of India in the matter of Goa Foundation Vs Union of India in Writ Petition (Civil) No.460 of 2004 as may be applicable to this project.	Noted
12	Any appeal against this clearance shall lie with the National Green Tribunal, if preferred, within a period of 30 days as prescribed under Section 16 of the National Green Tribunal Act, 2010.	Noted
13	A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, Zilla Parisad/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 website of the company by the proponent.	Complied

IOCL, Paradip Refinery cum Petrochemicals Complex

Subject: EC CRZ - Compliance Status Report

Annexure-E

Name of Project	:	EC and CRZ Clearance for “Installation Ethylene Recovery Unit, Mono Ethylene Glycol Unit and BS-VI facility at Paradip Refinery cum Petrochemical Complex, village Abhayachandrapur, Tehsil Kujanga, District Jagatsinghpur (Odisha)
Clearance Letter(s) No. & Date	:	F. No. J-11011-344/2016-IA-II (I) dated 11 th October, 2018
Period of Compliance Report	:	Apr'20 to Sept'20

S.N.	CONDITIONS :	Status
11.0	EC CONDITIONS:	
i)	Consent to Establish/Operate for the project shall be obtained from the State Pollution Control Board as required under the Air (Prevention and Control of Pollution) Act, 1981 and the Water (Prevention and Control of Pollution) Act, 1974.	Consent to Establish for the said project obtained from OSPCB vide letter ref: 9365/IND-II-NOC-6193 dated 06-08-2018.
ii)	Necessary authorization required under Hazardous and Other Wastes (Management and Transboundary Movement) Rules,2016 and Solid Waste Management Rule, 2016 shall be obtained and provisions contained in the Rules shall be strictly adhered to.	Complied. MEG&ERU and BS-VI project is part of the existing Refinery which is having valid HW Authorization vide ref no. IND-IV-HW-930/5028 dated 24-05-2019 with a validity till 31-03-2024
iii)	National Emission standards for Organic Chemicals Manufacturing Industry issued by the Ministry vide G.S.R 608 € dated 21st July, 2010 and amended from time to time shall be followed.	G.S.R 186 (E) dated 18 th March,2008 is applicable to Oil Refinery and IOCL Paradip Refinery is complying the same.
iv)	To control source and the fugitive emissions, suitable pollution control devices shall be installed with different stacks to meet the prescribed norms and/or the NAAQMS. The gaseous emissions shall be dispersed through stacks of adequate height as per the CPCB/SPCB guideline.	Being Complied Stack height is as per statutory requirement i.e. $H = 14 Q_g^{0.3}$ H = Height of stack in meters Q _g = Quantity of SO ₂ emission in kg/hr
v)	The project proponent shall take necessary steps to prevent any liquid hydrocarbon falling on the water body of the creek from the pipelines passing over the bridge of Santra creek by creating a tray like barrier below the pipelines which can hold any leakage materials.	Being Complied The External Safety Audit of the refinery during Nov-2018 by Oil Industry Safety Directorate (OISD) MoP&NG Government of India during audit reviewed in detail the CRZ concerns & recommendation, OISD recommended to review two options 1. Providing enclosure around these pipelines 2. Develop approach to



IOCL, Paradip Refinery cum Petrochemicals Complex

Subject: EC CRZ - Compliance Status Report

S.N.	CONDITIONS :	Status
		<p>the creek waterway and deploy oil spill containment boom & skimmers so as to address if any incidental oil leakage spill containment and mitigation.</p> <p>Accordingly IOCL reviewed the hydrocarbon pipelines crossing Santra creek for design, Inspection, Operation & Maintenance, environment & safety procedures, its location within refinery complex and pipelines leak occurrence probability, mitigation measures options feasibility for Spill oil containment in detail and observed as below.</p> <p>Design, O&M, inspection:</p> <ul style="list-style-type: none"> • The refinery location compatible Design standards, O&M & Inspection practices ensures integrity of pipelines and structure stability. • Illumination at pipeline bridge area has been enhanced. • The bridge area is under round the clock patrolling by CISF personnel placed at site. • All the pipelines crossing the creek are subject to health checks like monthly walk thru inspection, quarterly thickness sampling for corrosion detection and periodical LRUT survey as per standards (once in two years) and records maintained. <p>View the above actions, hydrocarbon pipelines leakage probability is almost NIL.</p> <p>The option 1 providing tray barrier or enclosure around the pipelines crossing over the creek require humongous structures erection at the extant pipelines bridge, so as to maintain integrity & stability of structures against high wind pressure load considering super cyclones prone location of Paradip Refinery. While reviewing pipe racks adequacy for new projects, it is found that the structures cannot accommodate additional load. Hence the option is not found feasible.</p> <p>The alternate option found feasible and implemented as detailed below so as to ensure compliance with the recommendation.</p> <p>Oil spill containment Booms, Boats, oil</p>



IOCL, Paradip Refinery cum Petrochemicals Complex

Subject: EC CRZ - Compliance Status Report

S.N.	CONDITIONS :	Status
		adsorbent, oil dispersant and cleaning kit are deployed. Employee's knowledge & skill development action taken through Oil Spill Response (OSR) drill conducted on 07.10.2020 involving an expert agency. Regular drills will be conducted to ensure skill readiness for attending any emergency in minimum possible time. Complied with.
vi)	Total water requirement shall not exceed 4685 cum/hr to be met from Mahanadi River. Necessary permission in this regard shall be obtained from the concerned regulatory authority.	Being complied
vii)	Hazardous chemicals shall be stored in tanks, tank farms, drums, carboys etc. Flame arrestors shall be provided on tank farm, and solvent transfer to be done through pumps.	Being complied
viii)	Process effluent/any waste water shall not be allowed to mix with storm water. Storm water drain shall be passed through guard pond.	Being complied
ix)	Process organic residue and spent carbon, if any, shall be sent to cement industries. ETP sludge, process inorganic and evaporation salt shall be disposed off to the TSDF. The ash from boiler shall be sold to brick manufacturer/cement industry.	MEG-ERU and BS-VI facility is integral part of the existing Refinery. So, existing facility is complying the same.
x)	The company shall strictly comply with the rules and guidelines under Manufacture, Storage and Import of Hazardous Chemical (MSIHC) Rules, 1989 as amended time to time. All transportation of Hazardous Chemicals shall be as per the Motor Vehicle Act (MVA), 1989.	Being complied
xi)	Regular VOC monitoring to be done at vulnerable points	Being complied
xii)	The oily sludge shall be subjected to melting pit for oil recovery and the residue shall be bio-remediated. The sludge shall be stored in HDPE lined pit with proper leachate collection system	Being complied MEG-ERU and BS-VI facility is integral part of the existing Refinery. So, existing facility is complying the same
xiii)	Comprehensive water audit to be conducted on annual basis and report to the concerned Regional Office of MEF&CC. Outcome from	Complied Water Audit by M/s EIL has been carried out for entire Refinery in 2019-20.



IOCL, Paradip Refinery cum Petrochemicals Complex

Subject: EC CRZ - Compliance Status Report

S.N.	CONDITIONS :	Status
	the report to be implemented for conservation scheme	
xiv)	Oil catchers/oil traps shall be provided at all possible locations in rain/ storm water drainage system inside the factory premises	Complied MEG-ERU and BS-VI facility is integral part of the existing Refinery. Oil catchers are already provided in the existing facility.
xv)	The company shall undertake waste minimization measures as below:- (a) Metering and control of quantities of active ingredients to minimize waste. (b) Reuse of by-products from the process as raw materials or as raw material substitutes in other processes. (c) Use of automated filling to minimize spillage. (d) Use of Close Feed system into batch reactors. (e) Venting equipment through vapour recovery system. (f) Use of high pressure hoses for equipment clearing to reduce wastewater generation.	Complied IOCL PDR has installed facilities like Vapor recovery system, Closed feed system etc. to minimize spillage or vent.
xvi)	The green belt of 5-10 m width shall be developed in more than 33% of the total project area, mainly along the plant periphery, in downward wind direction, and along road sides etc. Selection of plant species shall be as per the CPCB guidelines in consultation with the State Forest Department.	Being complied
xvii)	At least 0.25% of the total project cost shall be allocated for Corporate Environment Responsibility (GER) and item-wise details along with time bound action plan shall be prepared and submitted to the Ministry's Regional Office.	Being complied
xviii)	For the DG sets, emission limits and the stack height shall be in conformity with the extant regulations and the CPCB guidelines. Acoustic enclosure shall be provided to DG set for controlling the noise pollution	Shall be complied with
xix)	The unit shall make the arrangement for protection of possible fire hazards during manufacturing process in material handling. Firefighting system shall be as per the norms	Complied MEG-ERU and BS-VI facility is integral part of the existing Refinery. So, existing facility is compiled for the same



IOCL, Paradip Refinery cum Petrochemicals Complex

Subject: EC CRZ - Compliance Status Report

S.N.	CONDITIONS :	Status
xx)	Continuous online (24x7) monitoring system for stack emissions shall be installed for measurement of flue gas discharge and the pollutants concentration, and the data to be transmitted to the CPCB and SPCB server. For online continuous monitoring of effluent, the unit shall install web camera with night vision capability and flow meters in the channel/drain carrying effluent within the premises. In case of the treated effluent to be utilized for irrigation/gardening, real time monitoring system shall be installed at the ETP outlet	Complied MEG-ERU and BS-VI facility is integral part of the existing Refinery. So, existing facility is complied for the same.
xxi)	Occupational health surveillance of the workers shall be done on a regular basis and records maintained as per the Factories Act	Complied
xxii)	All terms and conditions stipulated by the State Coastal Zone Management Authority in their recommendation/NOC letter dated 11th January, 2018 shall be strictly adhered to	Complied
xxiii)	The National Emission Standards for Petroleum Oil Refinery issued by the Ministry vide G.S.R. 186(E) dated 18th March, 2008 and G.S.R. 595(E) dated 21st August, 2009 as amended from time to time shall be followed	Complied with Paradip Refinery is strictly following the Standards vide G.S.R. 186(E) dated 18th March, 2008 and G.S.R. 595(E) dated 21st August, 2009
xxiv)	The National Emission Standards for Petrochemical (Basic & Intermediates) issued by the Ministry vide G.S.R. 820 (E) dated 9th November, 2012 as amended time to time shall be followed.	Shall be complied
11.1	Compliance of other general conditions:	
i)	The project authorities must strictly adhere to the stipulations made by the State Pollution Control Board, Central Pollution Control Board, State Government and any other statutory authority	Being complied
ii)	No further expansion or modifications in the plant shall be carried out without prior approval of the Ministry of Environment, Forest and Climate Change. In case of deviations or alterations in the project proposal from those submitted to this	Noted for Compliance



IOCL, Paradip Refinery cum Petrochemicals Complex

Subject: EC CRZ - Compliance Status Report

S.N.	CONDITIONS :	Status
	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	
iii)	The locations of ambient air quality monitoring stations shall be decided in consultation with the State Pollution Control Board (SPCB) and it shall be ensured that at least one station each is installed in the upwind and downwind direction as well as where maximum ground level concentrations are anticipated.	Complied The AAQMS installed in existing Refinery shall be extended for the MEG & BS-VI project.
iv)	The National Ambient Air Quality Emission Standards issued by the Ministry vide G.S.R. No. 826(E) dated 16th November, 2009 shall be followed.	Complied
v)	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 Environment (Protection) Act, 1986 Rules, 1989 viz. 75 dBA (day time) and 70 dBA (night time).	Complied
vi)	The Company shall harvest rainwater from the roof tops of the buildings and storm water drains to recharge the ground water and use the same water for the process activities of the project to conserve fresh water	Complied Ground water recharging is not suitable in Paradip region as water table is very high. However, Refinery has constructed two storm water reservoirs (Capacities: 2,96,000 KL and 3,13,000 KL) to store rain water in monsoon in the refinery premises. Further, Refinery has recently developed an Ecological park integrated with rain water harvesting pond which can store approximately 470000 m ³ water during rain.
vii)	Training shall be imparted to all employees on safety and health aspects of chemicals handling. Pre-employment and routine periodical medical examinations for all employees shall be undertaken on regular	Being complied



IOCL, Paradip Refinery cum Petrochemicals Complex

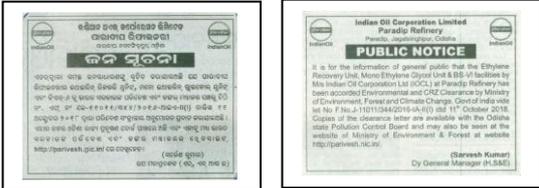
Subject: EC CRZ - Compliance Status Report

S.N.	CONDITIONS :	Status														
	basis. Training to all employees on handling of chemicals shall be imparted.															
viii)	The company shall also comply with all the environmental protection measures and safeguards proposed in the documents submitted to the Ministry. All the recommendations made in the EIA/EMP in respect of environmental management, and risk mitigation measures relating to the project shall be implemented.	Complied EIA/EMP recommendations are compiled and attached														
ix)	The company shall undertake all relevant measures for improving the socio-economic conditions of the surrounding area. ESC activities shall be undertaken by involving local villages and administration	Being complied IOCL PDR is implementing projects under CSR and CER extensively for improving the socio-economic conditions of the surrounding area														
x)	The company shall undertake eco-developmental measures including community welfare measures in the project area for the overall improvement of the environment	Complied with Paradip Refinery has recently developed an ecological park to create an ambience for ecology and sustainability.														
xi)	The company shall earmark sufficient funds towards capital cost and recurring cost per annum to implement the conditions stipulated by the Ministry of Environment, Forest and Climate Change as well as the State Government along with the implementation schedule for all the conditions stipulated herein. The funds so earmarked for environment management/ pollution control measures shall not be diverted for any other purpose	Complied Yearly budget is earmarked for environmental expenditures. <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Year</th> <th>Expenditure (Rs. Lakh)</th> <th>Remarks</th> </tr> </thead> <tbody> <tr> <td>2018-19</td> <td>2544</td> <td>Incurred</td> </tr> <tr> <td>2019-20</td> <td>3052</td> <td>Incurred</td> </tr> <tr> <td>2020-21</td> <td>888</td> <td rowspan="2">Planned (Excluding operating cost)</td> </tr> <tr> <td>2021-22</td> <td>909</td> </tr> </tbody> </table>	Year	Expenditure (Rs. Lakh)	Remarks	2018-19	2544	Incurred	2019-20	3052	Incurred	2020-21	888	Planned (Excluding operating cost)	2021-22	909
Year	Expenditure (Rs. Lakh)	Remarks														
2018-19	2544	Incurred														
2019-20	3052	Incurred														
2020-21	888	Planned (Excluding operating cost)														
2021-22	909															
xii)	A copy of the clearance letter shall be sent by the project proponent to concerned Panchayat, Zilla Parishad/Municipal Corporation, Urban local Body and the local NGO, if any, from whom suggestions/representations, if any, were received while processing the proposal	Complied														
xiii)	The project proponent shall also submit six monthly reports on the status of compliance	Being complied														



IOCL, Paradip Refinery cum Petrochemicals Complex

Subject: EC CRZ - Compliance Status Report

S.N.	CONDITIONS :	Status
	of the stipulated Environmental Clearance conditions including results of monitored data (both in hard copies as well as by e-mail) to the respective Regional Office of MoEF&CC, the respective Zonal Office of CPCB and SPCB. A copy of Environmental Clearance and six monthly compliance status report shall be posted on the website of the company	Six monthly compliance report is being sent to MoEF. Last report was submitted vide letter no. PDR/HSE/HC/MOEFCC/01 dated 29.05.2020
xiv)	The environmental statement for each financial year ending 31st March in Form-V as is mandated shall be submitted 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 clearance conditions and shall also be sent to the respective Regional Offices of MoEF&CC by e-mail	Being complied Paradip Refinery regularly submitting the Environment Statement in September. Environment Statement for FY 2019-20 submitted on 28.09.2020 vide ref no. PDR/HSE/OSPCB/Env-S/2020-21 dated 25.09.2020
xv)	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/Committee and may also be seen at Website of the Ministry at http://moef.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 a copy of the same shall be forwarded to the concerned Regional Office of the Ministry	Complied Advertisement given in two news papers 
xvi)	The project authorities shall inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities and the date of start of the project	Shall be complied



ANNEXURES

Annexures	Description
Annexure-1	VOC monitoring
Annexure-2	Ambient Air quality
Annexure-3	Stack Report
Annexure-4	Sulphur Balance
Annexure-5	LDAR of tankage area
Annexure-6	Treated effluent quality
Annexure-7	Ground water quality
Annexure-8	Occupational Health report
Annexure-9	Marine water quality
Annexure-10	Noise survey report
Annexure-11	Soil analysis report

Annexure-1

VOC monitoring



INDIAN OIL CORPORATION LIMITED

PARADIP REFINERY

QUALITY CONTROL LABORATORY

VOC/FUGITIVE EMISSION SUMMARY: MAY-2020

Source of sample: Inside the Plant

Reason for testing: VOC/Fugitive Emission study

Sample drawn by: QC Lab representative

Test report No: PDR/QC/FE/2020/02

Date: 03.06.2020

SI No	UNIT	Date of measurement	VOC (kg/hr)
1	AVU	23-26.5.2020	0.1331
2	CCR	27-28.5.2020	0.01429
3	NHT	27-28.5.2020	0.19438
4	DHDT	30.5.2020	0.051
5	VGOHDT	28-29.5..2020	0.09114
TOTAL		23.5.2020 - 30.5.2020	0.48391

Dr. Nruparaj Sahu
Assistant Manager (QC)
Indian Oil Corporation Ltd
Paradip Refinery



INDIAN OIL CORPORATION LIMITED

PARADIP REFINERY

QUALITY CONTROL LABORATORY

VOC/FUGITIVE EMISSION SUMMARY: SEPTEMBER-2020

Source of sample: Inside the Plant

Reason for testing: VOC/Fugitive Emission study

Sample drawn by: QC Lab representative

Test report No: PDR/QC/FE/2020/03

Date: 23.09.2020

SI No	UNIT	Date of measurement	VOC (kg/hr)
1	AVU	12 -14.09.2020	0.21216
2	CCR	11.09.2020	0.05078
3	NHT	10 -11.09.2020	0.53695
4	DHDT	08.09.2020	0.0664
5	VGOHDT	15 -19.09.020	0.16882
TOTAL		08.09.2020 – 19.09.2020	1.03511

Dr. Nruparaj Sahu
Quality Control Manager
Indian Oil Corporation Ltd
Paradip Refinery

Annexure-2

Ambient Air quality



INDIAN OIL CORPORATION LIMITED
PARADIP REFINERY
QUALITY CONTROL LABORATORY
AAQM TEST REPORT APRIL-2020

Source of sample: AAQMS-1, 2, 3, 4, 5, 6 & 7 (All Ambient Air Monitoring Stations)

Date of Sample: 02, 06, 09, 13, 16, 20, 23, 27 & 30.04.2020

Test report No: PDR/QC/AAQM/2020/04

Date: 02.05.2020

S. No.	Parameter	Location		Main Gate-no-2			QCL/S-Fire Station			LT Flare			LPG Loading Area			Near ETP area			Near N-Fire Station			Near Incinerator		
		AAQM station	AAQM station	AAQMS-1			AAQMS-6			AAQMS-3			AAQMS-4			AAQMS-5			AAQMS-2			AAQMS-7		
		UoM	Limit	Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max
1	PM2.5	µg/m ³	60 Max	31.46	27.78	33.76	29.07	24.59	32.65	28.63	24.59	32.26	29.1	23.9	32.7	31.2	28.8	34.3	30.7	25.5	34.6	29.8	27.0	33.4
2	PM10	µg/m ³	100 Max	54.52	48.59	66.87	53.32	47.47	65.10	52.96	47.47	64.91	54.0	47.7	63.6	54.6	49.2	69.5	54.6	49.2	65.8	54.1	49.8	61.4
3	Ozone	µg/m ³	100 Max	1.36	1.28	1.44	1.34	1.30	1.41	1.34	1.21	1.44	1.3	1.3	1.4	1.4	1.3	1.5	1.4	1.3	1.4	1.3	1.2	1.4
4	Ammonia	µg/m ³	400 Max	1.41	1.31	1.53	1.40	1.32	1.50	1.38	1.27	1.47	1.4	1.3	1.5	1.4	1.3	1.5	1.4	1.3	1.5	1.4	1.2	1.4
5	NO _x	µg/m ³	80 Max	13.37	11.45	15.37	12.88	10.25	16.47	12.40	10.20	13.95	12.5	11.1	15.1	14.3	11.8	17.5	13.9	11.6	16.7	13.7	12.2	14.7
6	Benzene	µg/m ³	5 Max	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	BenzoPyrene	ng/m ³	1 Max	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	SO _x	µg/m ³	80 Max	15.35	13.10	17.32	14.24	10.71	17.75	13.47	10.67	15.23	13.8	12.6	15.7	16.0	12.7	19.8	15.2	13.0	17.0	15.4	14.4	16.7
9	Pb	µg/m ³	1 Max	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	As	ng/m ³	6 Max	0.02	0.01	0.04	0.03	0.01	0.03	0.02	0.01	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	Ni	ng/m ³	20 Max	1.32	1.31	1.33	1.32	1.30	1.34	1.32	1.31	1.33	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
12	CO	mg/m ³	2 Max	0.27			0.30			0.32			0.76			0.29			0.70			1.13		

Dr. Nruparaj Sahu
Assistant Manager (QC)
Indian Oil Corporation Ltd
Paradip Refinery



INDIAN OIL CORPORATION LIMITED
PARADIP REFINERY
QUALITY CONTROL LABORATORY
AAQM TEST REPORT MAY-2020

Source of sample: AAQMS-1, 2, 3, 4, 5, 6 & 7 (All Ambient Air Monitoring Stations)

Date of Sample: 04, 07, 11, 14, 18, 21, 25 & 28.05.2020

Test report No: PDR/QC/AAQM/2020/05

Date: 30.05.2020

S. No.	Parameter	Location		Main Gate-no-2			QCL/S-Fire Station			LT Flare			LPG Loading Area			Near ETP area			Near N-Fire Station			Near Incinerator		
		AAQM station	Limit	Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max
1	PM2.5	µg/m ³	60 Max	34.18	32.50	36.29	32.05	30.90	33.28	31.47	29.20	33.76	29.8	28.3	31.4	33.8	29.2	38.8	32.3	27.9	35.2	31.5	28.2	38.9
2	PM10	µg/m ³	100 Max	61.52	50.74	66.57	57.95	51.78	64.31	56.94	47.54	63.79	55.9	48.6	61.3	59.3	51.1	65.8	60.0	51.2	66.1	55.8	49.6	61.1
3	Ozone	µg/m ³	100 Max	1.37	1.29	1.47	1.35	1.24	1.47	1.33	1.27	1.42	1.3	1.3	1.4	1.4	1.3	1.5	1.4	1.3	1.4	1.4	1.3	1.5
4	Ammonia	µg/m ³	400 Max	1.37	1.33	1.48	1.36	1.32	1.40	1.37	1.35	1.38	1.4	1.4	1.4	1.4	1.4	1.5	1.4	1.3	1.5	1.4	1.4	1.5
5	NO _x	µg/m ³	80 Max	12.97	11.26	13.54	12.03	10.48	13.87	13.12	11.53	15.42	12.1	11.2	13.8	13.3	11.3	15.6	13.2	12.3	14.2	12.3	11.3	13.8
6	Benzene	µg/m ³	5 Max	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	BenzoPyrene	ng/m ³	1 Max	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	SO _x	µg/m ³	80 Max	14.55	12.14	16.58	13.88	12.47	15.86	14.06	12.56	15.88	13.9	12.6	15.5	14.9	12.9	17.4	14.6	13.3	15.5	14.0	12.4	15.5
9	Pb	µg/m ³	1 Max	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	As	ng/m ³	6 Max	0.02	0.01	0.03	0.02	0.01	0.03	0.02	0.01	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	Ni	ng/m ³	20 Max	1.32	1.30	1.34	1.32	1.30	1.33	1.32	1.30	1.34	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
12	CO	mg/m ³	2 Max	0.38			0.30			0.32			1.39			0.32			0.58			1.13		

Dr. Nruparaj Sahu
Assistant Manager (QC)
Indian Oil Corporation Ltd
Paradip Refinery



INDIAN OIL CORPORATION LIMITED
PARADIP REFINERY
QUALITY CONTROL LABORATORY
AAQM TEST REPORT JUNE-2020

Source of sample: AAQMS-1, 2, 3, 4, 5, 6 & 7 (All Ambient Air Monitoring Stations)

Date of Sample: 01, 04, 08, 11, 15, 18, 22, 25 & 29.06.2020

Test report No: PDR/QC/AAQM/2020/06

Date: 30.06.2020

S. No.	Parameter	UoM	Limit	AAQMS-1: Main Gate			AAQMS-2: IOTL Tech Bld			AAQMS-3: LT Flare			AAQMS-4: IOT Loading Area			AAQMS-5: ETP area			AAQMS-6: S-Fire Station/QCLab.			AAQMS-7: Incinerator		
				Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max
1	PM2.5	µg/m ³	60 Max	32.8	24.5	37.7	31.7	18.8	40.8	29.3	17.5	33.2	31.3	18.0	35.8	29.7	15.7	35.5	30.9	18.3	37.1	29.9	16.4	34.2
2	PM10	µg/m ³	100 Max	63.4	52.6	69.4	59.2	34.2	65.9	57.5	32.1	64.9	58.9	32.1	65.7	57.8	30.6	67.4	58.3	33.9	63.9	57.8	31.2	64.3
3	Ozone	µg/m ³	100 Max	1.4	1.4	1.4	1.4	1.4	1.5	1.4	1.2	1.4	1.4	1.3	1.5	1.4	1.3	1.4	1.4	1.3	1.5	1.4	1.3	1.5
4	Ammonia	µg/m ³	400 Max	1.4	1.3	1.6	1.4	1.3	1.6	1.4	1.3	1.4	1.4	1.3	1.5	1.4	1.3	1.5	1.4	1.3	1.5	1.4	1.3	1.5
5	NO _x	µg/m ³	80 Max	14.3	11.4	15.9	14.8	12.5	16.9	14.0	12.9	16.1	14.7	11.9	18.2	14.4	11.8	17.5	15.3	13.0	17.5	14.0	10.6	16.8
6	Benzene	µg/m ³	5 Max	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	BenzoPyrene	ng/m ³	1 Max	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	SO _x	µg/m ³	80 Max	15	13	16	16	13	18	15	13	18	16	13	20	16	13	18	16	14	18	15	12	18
9	Pb	µg/m ³	1 Max	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	As	ng/m ³	6 Max	0.02	0.01	0.03	0.02	0.01	0.04	0.02	0.01	0.03	0.02	0.01	0.03	0.02	0.01	0.03	0.02	0.01	0.03	0.02	0.01	0.04
11	Ni	ng/m ³	20 Max	1.32	1.30	1.34	1.33	1.30	1.34	1.32	1.30	1.34	1.32	1.30	1.34	1.33	1.32	1.34	1.32	1.30	1.34	1.32	1.30	1.34
12	CO	mg/m ³	2 Max															0.40	0.29	0.49				

Dr. Nruparaj Sahu
Quality Control Manager
Indian Oil Corporation Ltd
Paradip Refinery



INDIAN OIL CORPORATION LIMITED
PARADIP REFINERY
QUALITY CONTROL LABORATORY
AAQM TEST REPORT JULY-2020

Source of sample: AAQMS-1, 2, 3, 4, 5, 6 & 7 (All Ambient Air Monitoring Stations)

Date of Sample: 02, 06, 09, 13, 16, 20, 23, 27 & 30.07.2020

Test report No: PDR/QC/AAQM/2020/07

Date: 01.08.2020

S. No.	Parameter	UoM	Limit	AAQMS-1: Main Gate			AAQMS-2: IOTL Tech Bld			AAQMS-3: LT Flare			AAQMS-4: IOT Loading Area			AAQMS-5: ETP area			AAQMS-6: S-Fire Station/QCLab.			AAQMS-7: Incinerator		
				Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max
1	PM2.5	µg/m ³	60 Max	27.4	20.5	34.1	30.5	24.9	35.9	25.5	19.3	33.5	33.9	33.8	33.9	26.6	20.3	31.5	26.0	23.5	33.9	24.5	19.6	32.1
2	PM10	µg/m ³	100 Max	59.9	53.4	67.2	68.0	60.3	76.4	53.1	40.9	62.1	66.3	64.0	68.5	54.1	43.7	62.4	54.1	42.5	63.5	55.2	46.4	61.9
3	Ozone	µg/m ³	100 Max	1.38	1.32	1.42	1.44	1.36	1.50	1.38	1.33	1.42	1.45	1.40	1.50	1.37	1.32	1.42	1.40	1.32	1.50	1.36	1.34	1.40
4	Ammonia	µg/m ³	400 Max	1.38	1.33	1.42	1.40	1.35	1.42	1.37	1.32	1.40	1.43	1.37	1.48	1.36	1.33	1.41	1.38	1.34	1.42	1.35	1.32	1.39
5	NO _x	µg/m ³	80 Max	14.8	13.5	15.7	16.5	15.6	18.0	14.3	13.0	15.1	16.6	16.5	16.6	14.3	12.5	16.3	14.1	12.9	15.4	14.0	13.4	14.7
6	Benzene	µg/m ³	5 Max	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	BenzoPyrene	ng/m ³	1 Max	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	SO _x	µg/m ³	80 Max	16.6	15.3	17.5	17.9	16.1	19.6	15.5	14.5	16.8	17.6	17.3	18.0	15.5	14.4	17.5	16.1	15.2	16.9	15.4	14.9	15.9
9	Pb	µg/m ³	1 Max	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	As	ng/m ³	6 Max	0.02	0.01	0.03	0.02	0.01	0.03	0.03	0.01	0.03	0.02	0.01	0.03	0.02	0.01	0.03	0.02	0.01	0.03	0.02	0.01	0.03
11	Ni	ng/m ³	20 Max	1.31	1.30	1.33	1.32	1.30	1.33	1.32	1.30	1.34	1.34	1.33	1.34	1.32	1.30	1.34	1.33	1.30	1.34	1.32	1.30	1.32
12	CO	mg/m ³	2 Max															0.35	0.29	0.44				

Dr. Nruparaj Sahu
Quality Control Manager
Indian Oil Corporation Ltd
Paradip Refinery



INDIAN OIL CORPORATION LIMITED
PARADIP REFINERY
QUALITY CONTROL LABORATORY
AAQM TEST REPORT AUGUST-2020

Source of sample: AAQMS-1, 2, 3, 5, 6 & 7 (Ambient Air Monitoring Stations)

Date of Sample: 03, 06, 10, 13, 17, 20, 24, 27 & 31.08.2020

Test report No: PDR/QC/AAQM/2020/07

Date: 01.09.2020

S. No.	Parameter	UoM	Limit	AAQMS-1: Main Gate			AAQMS-2: IOTL Tech Bld			AAQMS-3: LT Flare			AAQMS-5: ETP area			AAQMS-6: S-Fire Station/QCLab.			AAQMS-7: Incinerator		
				Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max
1	PM2.5	µg/m ³	60 Max	23.2	20.2	24.6	25.9	20.8	31.9	18.4	16.5	19.9	22.0	19.4	24.2	20.9	16.3	23.9	20.7	15.4	24.7
2	PM10	µg/m ³	100 Max	55.8	34.5	62.2	63.4	36.4	74.0	48.4	45.9	51.9	57.3	54.3	62.9	49.9	28.3	58.5	53.1	31.8	61.9
3	Ozone	µg/m ³	100 Max	1.37	1.34	1.40	1.39	1.32	1.43	1.35	1.33	1.38	1.38	1.35	1.41	1.38	1.33	1.44	1.35	1.32	1.39
4	Ammonia	µg/m ³	400 Max	1.36	1.33	1.39	1.39	1.31	1.44	1.36	1.33	1.38	1.37	1.34	1.40	1.38	1.34	1.41	1.36	1.32	1.38
5	NO _x	µg/m ³	80 Max	13.8	11.5	15.2	15.7	13.5	18.1	13.6	12.3	15.5	14.3	12.0	16.1	14.2	11.9	15.7	13.5	10.8	14.4
6	Benzene	µg/m ³	5 Max	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	BenzoPyrene	ng/m ³	1 Max	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	SO _x	µg/m ³	80 Max	15.4	12.6	17.4	18.2	17.0	19.8	15.0	13.4	16.5	16.0	13.1	17.8	15.8	13.0	18.0	15.1	12.5	15.9
9	Pb	µg/m ³	1 Max	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	As	ng/m ³	6 Max	0.02	0.01	0.03	0.02	0.01	0.03	0.02	0.01	0.03	0.02	0.01	0.03	0.02	0.01	0.03	0.02	0.01	0.03
11	Ni	ng/m ³	20 Max	1.32	1.30	1.33	1.32	1.30	1.33	1.31	1.30	1.32	1.32	1.30	1.33	1.32	1.30	1.33	1.32	1.30	1.33
12	CO	mg/m ³	2 Max												0.33	0.26	0.39				

Dr. Nruparaj Sahu
Quality Control Manager
Indian Oil Corporation Ltd
Paradip Refinery



INDIAN OIL CORPORATION LIMITED
PARADIP REFINERY
QUALITY CONTROL LABORATORY
AAQM TEST REPORT SEPTEMBER-2020

Source of sample: AAQMS-1, 2, 3, 4, 5, 6 & 7 (All Ambient Air Monitoring Stations)

Date of Sample: 03, 07, 10, 14, 17, 21, 24 & 28.09.2020

Test report No: PDR/QC/AAQM/2020/09

Date: 30.09.2020

S. No.	Parameter	UoM	Limit	AAQMS-1: Main Gate			AAQMS-2: IOTL Tech Bid			AAQMS-3: LT Flare			AAQMS-4: IOT Loading Area			AAQMS-5: ETP area			AAQMS-6: S-Fire Station/QCLab.			AAQMS-7: Incinerator		
				Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max	Avg.	Min	Max
1	PM2.5	µg/m ³	60 Max	23.0	20.9	26.8	26.2	23.5	28.6	18.5	16.6	20.7	21.6	20.7	22.8	22.3	19.8	24.6	20.9	19.8	23.2	20.2	19.3	21.7
2	PM10	µg/m ³	100 Max	58.3	52.3	65.7	68.8	64.5	75.4	48.8	45.8	54.5	59.4	53.9	63.3	53.9	48.1	61.7	56.0	51.4	60.0	52.3	47.6	60.0
3	Ozone	µg/m ³	100 Max	1.39	1.33	1.42	1.40	1.36	1.44	1.33	1.28	1.38	1.36	1.35	1.38	1.34	1.31	1.38	1.38	1.34	1.39	1.36	1.31	1.40
4	Ammonia	µg/m ³	400 Max	1.38	1.30	1.51	1.44	1.37	1.54	1.36	1.31	1.40	1.42	1.32	1.48	1.39	1.33	1.50	1.39	1.33	1.45	1.37	1.30	1.47
5	NO _x	µg/m ³	80 Max	14.5	13.6	15.7	16.1	15.1	17.4	13.6	11.4	15.7	15.1	14.3	16.1	14.1	13.3	15.2	14.8	11.9	17.7	13.1	11.8	13.7
6	Benzene	µg/m ³	5 Max	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	BenzoPyrene	ng/m ³	1 Max	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	SO _x	µg/m ³	80 Max	16.9	15.0	18.5	17.7	15.2	19.8	14.7	12.8	16.4	18.1	17.0	18.7	17.0	15.0	17.4	16.7	15.0	18.0	15.4	14.5	17.6
9	Pb	µg/m ³	1 Max	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	As	ng/m ³	6 Max	0.02	0.01	0.05	0.03	0.01	0.06	0.02	0.01	0.03	0.02	0.01	0.05	0.03	0.01	0.05	0.03	0.01	0.05	0.02	0.01	0.03
11	Ni	ng/m ³	20 Max	1.38	1.30	1.80	1.38	1.30	1.72	1.32	1.30	1.33	1.45	1.31	1.70	1.36	1.30	1.62	1.35	1.30	1.62	1.34	1.30	1.56
12	CO	mg/m ³	2 Max																0.33	0.27	0.44			


Dr. Nruparaj Sahu
Quality Control Manager
Indian Oil Corporation Ltd
Paradip Refinery

Annexure-3

Stack Report



INDIAN OIL CORPORATION LIMITED
PARADIP REFINERY
QUALITY CONTROL LABORATORY
STACK MONITORING REPORT - MAY-2020

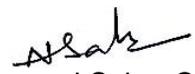
Parameter	SO ₂	NO _x	Particulate Matter	CO	
Method	IS 11255 [P-2]	IS 11255 [P-7]	IS 11255 [P-1]	Flue gas meter	
UOM	mg/Nm ³	mg/Nm ³	mg/Nm ³	mg/Nm ³	
Date	Stack attached to				
Dt: 15 May 2020 09:50	HRSR - 3	14.5	85.8	15.86	1.7
Dt: 15 May 2020 14:40	CPP - UB2	22.9	74.6	31.26	3.4
Dt: 16 May 2020 09:50	CPP - UB3	19.8	89.1	34.83	3.4
Dt: 18 May 2020 10:00	DHDT	18.0	49.8	4.35	<1
Dt: 21 May 2020 14:20	DCU Heater-2	14.0	29.5	21.12	115.7
Dt: 22 May 2020 14:30	DCU Heater-1	13.9	88.2	12.90	<1
Dt: 26 May 2020 10:10	FCC RR	28.3	13.7	34.13	280.0
Dt: 26 May 2020 14:10	FCC Heater	15.9	89.6	10.79	3.0
Dt: 27 May 2020 10:00	SRU/TGTU	10.3	21.3	15.82	140.0
Dt: 28 May 2020 10:50	NHDT	14.1	34.0	3.68	<1
Dt: 28 May 2020 14:30	CCRU-P	16.2	30.4	4.45	2.9
Dt: 29 May 2020 14:40	VGOHT Atmospheric	16.6	55.6	3.87	<1
Dt: 29 May 2020 10:30	VGOHT HDT Feed Heater	14.8	49.2	4.77	2.9
Dt: 30 May 2020 12:50	VGOHT MHC-2	17.5	54.0	3.73	<1
Dt: 30 May 2020 15:30	VGOHT MHC-1	14.6	58.1	2.74	<1


(Dr. Nruparaj Sahu, AM, QC)
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INDIAN OIL CORPORATION LIMITED
PARADIP REFINERY
QUALITY CONTROL LABORATORY
STACK MONITORING REPORT - JUNE-2020

Parameter		SO ₂	NO _x	Particulate Matter	CO
Method		IS 11255 [P-2]	IS 11255 [P-7]	IS 11255 [P-1]	Flue gas meter
UOM		mg/Nm ³	mg/Nm ³	mg/Nm ³	mg/Nm ³
Date	Stack attached to				
Dt: 02.06.2020 10:00	HRS-3	12.9	48.3	15.31	2.0
Dt: 02.06.2020 14:10	CPP UB-2	20.9	31.5	40.60	8.1
Dt: 02.06.2020 14:40	CPP UB-3	16.3	43.9	31.05	5.0
Dt: 03 Jun 2020 10:20	DCU Heater-1	16.4	79.9	9.56	<1
Dt: 04 Jun 2020 14:00	AVU VDU	18.2	45.2	22.77	<1
Dt: 05 Jun 2020 10:00	AVU CDU	18.6	48.9	17.77	<1
Dt: 08 Jun 2020 09:40	DHDT	15.7	45.2	3.84	<1
Dt: 09 Jun 2020 09:40	CCRU-P	13.3	29.2	4.79	2.9
Dt: 09 Jun 2020 14:30	NHDT	16.7	43.2	4.39	<1
Dt: 10 Jun 2020 13:00	FCC RR	24.0	11.2	41.76	253.7
Dt: 10 Jun 2020 17:00	FCC Heater	11.7	46.2	9.29	1.2
Dt: 11 Jun 2020 09:40	SRU/TGTU	12.4	25.1	20.46	145.1
Dt: 12 Jun 2020 10:00	VGOHT MHC-1	17.3	34.9	4.52	<1
Dt: 12 Jun 2020 10:50	VGOHT MHC-2	13.9	28.7	2.16	<1
Dt: 12 Jun 2020 14:40	VHOHT Atmospheric	13.0	41.3	4.33	<1
Dt: 13 Jun 2020 09:30	VGOHT HDT Feed	13.5	40.4	3.78	<1
Dt: 16 Jun 2020 14:30	VGOHT Atmospheric	14.2	39.6	2.87	<1
Dt: 17 Jun 2020 14:00	VGOHT MHC-1	15.4	35.2	3.93	<1
Dt: 17 Jun 2020 09:40	VGOHT MHC-2	15.3	39.8	1.32	<1
Dt: 19 Jun 2020 10:30	FCC RR	19.5	23.6	25.1	233.1
Dt: 19 Jun 2020 14:30	FCC Heater	13.5	43.9	7.5	<1
Dt: 20 Jun 2020 09:40	DCU Heater-1	14.5	81.3	8.10	<1
Dt: 20 Jun 2020 10:20	DCU Heater-2	18.0	89.0	9.72	<1
Dt: 22 Jun 2020 11:10	HRS-3	16.1	79.2	12.96	<1
Dt: 22 Jun 2020 10:30	CPP -UB1	25.6	104.6	15.31	<1
Dt: 22 Jun 2020 12:50	CPP -UB2	16.5	48.8	30.14	<1
Dt: 25 Jun 2020 12:30	DHDT	12.9	52.3	3.54	1.2
Dt: 25 Jun 2020 17:10	NHDT	10.5	40.8	4.30	1.2
Dt: 26 Jun 2020 12:20	AVU CDU	15.4	45.2	20.61	<1
Dt: 26 Jun 2020 17:00	AVU VDU	17.4	40.7	25.15	<1
Dt: 27 Jun 2020 09:50	CCRU	11.5	20.3	3.38	5.7
Dt: 29 Jun 2020 14:50	SRU/TGTU	15.7	7.6	14.77	143.2


(Dr. Nruparaj Sahu, QCM)
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INDIAN OIL CORPORATION LIMITED
PARADIP REFINERY
QUALITY CONTROL LABORATORY
STACK MONITORING REPORT - JULY-2020

Parameter		SO ₂	NO _x	Particulate Matter	CO
Method		IS 11255 [P-2]	IS 11255 [P-7]	IS 11255 [P-1]	Flue gas meter
UOM		mg/Nm ³	mg/Nm ³	mg/Nm ³	mg/Nm ³
Date	Stack attached to				
Dt: 03 Jul 2020 12:20	DCU Heater-1	13.1	79.6	9.43	<1
Dt: 03 Jul 2020 09:40	DCU Heater-2	16.4	92.6	9.35	<1
Dt: 06 Jul 2020 09:30	CPP - UB2	19.9	119.7	29.39	2.9
Dt: 06 Jul 2020 10:10	CPP - UB3	16.9	70.9	20.37	6.9
Dt: 06 Jul 2020 14:10	HRS-3	13.3	80.0	12.58	<1
Dt: 07 Jul 2020 10:30	DHDT	15.7	70.5	4.37	<1
Dt: 07 Jul 2020 14:10	NHDT	13.2	47.2	3.81	<1
Dt: 08 Jul 2020 09:30	CCRU	13.7	20.8	4.19	3.2
Dt: 08 Jul 2020 14:20	VGOHT HDT Feed	14.1	38.1	3.90	<1
Dt: 09 Jul 2020 10:00	VGOHT MHC-1	13.2	31.8	3.57	<1
Dt: 09 Jul 2020 11:00	VGOHT MHC-2	12.4	41.7	3.20	<1
Dt: 09 Jul 2020 14:30	VGOHT Atmospheric	15.9	44.3	4.44	<1
Dt: 11 Jul 2020 11:30	FCC RR	17.7	25.3	30.16	154.5
Dt: 13 Jul 2020 09:50	FCC Heater	14.9	38.5	8.19	<1
Dt: 14 Jul 2020 11:50	SRU/TGTU	14.4	1026.0	11.51	60.3
Dt: 16 Jul 2020 10:00	HRS-3	14.5	72.2	10.82	<1
Dt: 16 Jul 2020 14:20	CPP UB-2	16.7	114.2	18.43	<1
Dt: 17 Jul 2020 10:30	CPP UB-3	18.6	66.2	15.72	4.0
Dt: 22 Jul 2020 11:00	DCU Heater-1	14.7	74.5	8.10	<1
Dt: 22 Jul 2020 14:00	DCU Heater-2	17.9	85.1	8.67	<1
Dt: 25 Jul 2020 10:20	AVU VDU	15.9	38.1	12.64	<1
Dt: 25 Jul 2020 14:30	AVU CDU	18.4	43.7	15.76	<1


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INDIAN OIL CORPORATION LIMITED
PARADIP REFINERY
QUALITY CONTROL LABORATORY
STACK MONITORING REPORT - AUGUST-2020

Parameter		SO ₂	NO _x	Particulate Matter	CO
Method		IS 11255 [P-2]	IS 11255 [P-7]	IS 11255 [P-1]	Flue gas meter
UOM		mg/Nm ³	mg/Nm ³	mg/Nm ³	mg/Nm ³
Date	Stack attached to				
Dt: 05 Aug 2020 09:50	CPP UB-2	13.3	40.6	34.77	12.8
Dt: 06 Aug 2020 09:40	CPP UB-2	15.8	43.8	30.61	9.5
Dt: 27 Aug 2020 09:50	CPP UB-2	16.6	105.3	18.76	1.2
Dt: 29 Aug 2020 14:30	CPP UB-3	17.4	38.9	20.70	1.2
Dt: 29 Aug 2020 11:00	HRS-2	11.5	75.4	9.21	<1


(Dr. Nruparaj Sahu, QCM)
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INDIAN OIL CORPORATION LIMITED
PARADIP REFINERY
QUALITY CONTROL LABORATORY
STACK MONITORING REPORT - SEPTEMBER-2020

Parameter		SO ₂	NO _x	Particulate Matter	CO
Method		IS 11255 [P-2]	IS 11255 [P-7]	IS 11255 [P-1]	Flue gas meter
UOM		mg/Nm ³	mg/Nm ³	mg/Nm ³	mg/Nm ³
Date	Stack attached to				
Dt: 01 Sep 2020 10:10	DCU Heater-1	17.5	69.9	8.32	4.6
Dt: 01 Sep 2020 13:50	DCU Heater-2	15.5	105.8	9.10	<1
Dt: 02 Sep 2020 11:00	AVU VDU	18.5	45.4	15.84	11.5
Dt: 03 Sep 2020 10:30	VGOHT Atmospheric	12.8	40.4	3.19	<1
Dt: 04 Sep 2020 14:00	VGOHT HDT Feed	16.8	40.3	4.63	<1
Dt: 04 Sep 2020 09:30	VGOHT MHC-1	15.6	45.0	3.58	<1
Dt: 04 Sep 2020 10:00	VGOHT MHC-2	12.1	39.1	3.73	3.4
Dt: 05 Sep 2020 11:10	FCC RR	19.3	15.5	35.78	234.3
Dt: 07 Sep 2020 14:20	FCC Heater	16.6	63.9	10.47	<1
Dt: 07 Sep 2020 09:50	DHDT	14.3	20.4	3.63	20.3
Dt: 08 Sep 2020 09:30	CCRU-P	15.1	30.1	4.74	3.4
Dt: 08 Sep 2020 14:10	NHDT	16.8	40.3	3.32	4.6
Dt: 10 Sep 2020 14:00	HRSO-2	13.6	81.2	10.87	<1
Dt: 10 Sep 2020 10:00	CPP - UB-2	21.1	157.7	24.42	59.5
Dt: 12 Sep 2020 09:40	HRSO-3	14.8	196.7	15.27	130.0
Dt: 12 Sep 2020 13:50	CPP - UB-3	20.4	89.0	39.69	83.1
Dt: 15 Sep 2020 10:50	AVU CDU	16.5	40.2	20.39	12.8
Dt: 15 Sep 2020 15:00	AVU VDU	17.2	45.9	14.66	7.2
Dt: 16 Sep 2020 14:30	DCU Heater-2	15.9	94.2	9.51	<1
Dt: 17 Sep 2020 09:30	DCU Heater-1	15.2	38.0	10.6	35.0
Dt: 18 Sep 2020 10:30	VGOHT Atmospheric	15.6	38.2	3.9	<1
Dt: 18 Sep 2020 14:00	VGOHT HDT Feed	13.8	44.1	3.38	3.0
Dt: 19 Sep 2020 09:50	VGOHT MHC-1	14.1	39.7	2.55	9.2
Dt: 19 Sep 2020 12:50	VGOHT MHC-2	14.0	30.6	3.5	7.4
Dt: 21 Sep 2020 14:00	DHDT	16.8	53.3	3.7	13.5
Dt: 22 Sep 2020 14:00	FCC Heater	15.1	41.7	10.26	55.1
Dt: 23 Sep 2020 09:50	FCC RR	15.2	29.7	30.09	269.0
Dt: 23 Sep 2020 14:40	NHDT	18.3	45.6	4.68	13.1
Dt: 24 Sep 2020 09:30	CCRU-P	13.1	26.8	3.29	24.3
Dt: 24 Sep 2020 14:00	HRSO-3	16.1	142.9	15.6	101.2
Dt: 25 Sep 2020 09:50	HRSO-2	18.0	122.6	14.9	101.0
Dt: 25 Sep 2020 14:30	CPP UB-2	24.5	105.2	43.95	57.9
Dt: 26 Sep 2020 10:30	CPP UB-3	17.4	94.7	30.56	50.8


(Dr. Nruparaj Sahu, QCM)
Authorised Signatory

Month-Apr'20

		Indian Oil Corporation Limited			
Paradip Refinery					
Continuous Emission Monitoring Data-Stack Emission					
Unit Name	STATION ID.	CO (IN MG/NM ³)	NOX (IN MG/NM ³)	PM (IN MG/NM ³)	SO2 (IN MG/NM ³)
DHDT	CEMS-1	5.73	97.90	3.68	14.15
HRS-1	CEMS-12	9.16	100.65	1.96	43.92
VGO-HDT-2	CEMS-13	5.48	24.42	3.64	25.19
VDU	CEMS-14	25.10	135.23	2.25	171.29
FCC-RR	CEMS-15	205.95	3.66	25.71	91.50
HGU	CEMS-16	21.68	73.95	0.07	37.85
FCC-Heater	CEMS-17	39.24	35.03	5.70	39.92
CCR	CEMS-18	34.62	32.15	0.76	10.65
VGO-HDT-3	CEMS-19	28.58	25.92	3.80	21.83
VGO-HDT-1	CEMS-2	14.31	26.26	2.07	2.08
HRS-2	CEMS-21	18.49	134.82	2.75	31.25
HRS-3	CEMS-22	13.14	144.68	4.73	11.82
DCU-2	CEMS-3	4.43	40.05	2.08	15.38
CDU	CEMS-4	6.26	70.34	1.71	119.03
DCU-1	CEMS-5	18.37	6.88	7.65	29.22
SRU	CEMS-6	3.72	43.05	0.76	304.12
NHT	CEMS-7	12.15	34.07	1.74	5.66
UB-1	CEMS-8	22.08	103.53	0.93	369.13
UB-2	CEMS-9	24.68	110.34	1.89	222.43
Limit	Gas/oil fired	100/150	250/350	5/50	50/850

CEMS-1/ CEMS-13/ CEMS-18/ CEMS-2/ CEMS-7 are gas fired heaters



Month-May'20

		Indian Oil Corporation Limited			
Paradip Refinery					
Continuous Emission Monitoring Data-Stack Emission					
Unit Name	STATION ID.	CO (IN MG/NM ³)	NOX (IN MG/NM ³)	PM (IN MG/NM ³)	SO2 (IN MG/NM ³)
DHDT	CEMS-1	5.74	112.96	3.12	20.95
UB-3	CEMS-10	9.41	63.82	4.06	14.41
HRSG-1	CEMS-12	8.93	9.05	3.40	44.20
VGO-HDT-2	CEMS-13	5.39	23.59	3.50	3.66
VDU	CEMS-14	25.64	78.71	2.24	176.94
FCC-RR	CEMS-15	166.54	6.84	30.32	157.78
HGU	CEMS-16	21.22	73.82	0.49	42.33
FCC-Heater	CEMS-17	7.14	74.20	5.07	162.36
CCR	CEMS-18	44.75	30.67	0.53	6.03
VGO-HDT-3	CEMS-19	23.52	29.36	3.18	22.69
VGO-HDT-1	CEMS-2	14.68	20.38	2.85	2.10
HRSG-2	CEMS-21	18.48	100.66	3.02	31.77
HRSG-3	CEMS-22	14.54	126.17	3.11	11.83
DCU-2	CEMS-3	4.42	39.61	2.09	15.32
CDU	CEMS-4	6.19	72.56	1.70	117.24
DCU-1	CEMS-5	18.18	34.11	8.36	27.93
SRU	CEMS-6	2.76	22.22	0.69	304.38
NHT	CEMS-7	11.93	33.44	1.68	5.67
UB-2	CEMS-9	25.99	89.38	4.64	189.49
Limit	Gas/oil fired	100/150	250/350	5/50	50/850



Month-Jun'20

 Indian Oil Corporation Limited					
IndianOil					
Paradip Refinery					
Continuous Emission Monitoring Data-Stack Emission					
Unit Name	STATION ID.	CO (IN MG/NM ³)	NOX (IN MG/NM ³)	PM (IN MG/NM ³)	SO2 (IN MG/NM ³)
DHDT	CEMS-1	5.80	7.96	2.35	19.648
HRSG-1	CEMS-12	9.30	11.45	2.94	18.801
VGO-HDT-2	CEMS-13	5.93	37.61	3.45	3.51
VDU	CEMS-14	25.27	61.53	2.25	166.389
FCC-RR	CEMS-15	59.36	30.65	43.97	201.882
HGU	CEMS-16	26.24	75.01	0.55	40.464
FCC-Heater	CEMS-17	8.90	38.80	4.70	581.51
CCR	CEMS-18	42.93	28.50	0.55	10.506
VGO-HDT-3	CEMS-19	21.38	32.80	2.25	28.91
VGO-HDT-1	CEMS-2	15.75	25.32	1.79	27.144
HRSG-2	CEMS-21	18.47	103.57	3.02	32.331
HRSG-3	CEMS-22	16.36	142.51	2.96	26.279
DCU-2	CEMS-3	4.44	42.37	3.41	16.733
CDU	CEMS-4	6.12	68.07	1.70	134.94
DCU-1	CEMS-5	17.81	46.14	12.78	20.782
SRU	CEMS-6	2.04	9.21	0.76	84.677
NHT	CEMS-7	15.74	44.43	2.07	7.09
UB-1	CEMS-8	22.388	91.595	11.361	139.403
UB-2	CEMS-9	26.02	70.51	4.09	136.625
Limit	Gas/oil fired	100/150	250/350	5/50	50/850



Month-Jul'20

 Indian Oil Corporation Limited					
Paradip Refinery					
Continuous Emission Monitoring Data-Stack Emission					
Unit Name	STATION ID.	CO (IN MG/NM ³)	NOX (IN MG/NM ³)	PM (IN MG/NM ³)	SO ₂ (IN MG/NM ³)
DHDT	CEMS-1	5.77	50.83	2.43	28.92
HRS-1	CEMS-12	9.55	12.35	1.89	10.79
VGO-HDT-2	CEMS-13	4.81	39.04	3.36	2.91
VDU	CEMS-14	23.88	61.59	2.25	161.17
FCC-RR	CEMS-15	34.27	27.22	28.73	147.76
HGU	CEMS-16	21.03	66.78	0.44	43.95
FCC-Heater	CEMS-17	48.39	79.84	12.67	304.58
CCR	CEMS-18	38.71	37.57	0.77	32.12
VGO-HDT-3	CEMS-19	24.46	50.67	1.14	32.53
VGO-HDT-1	CEMS-2	15.79	23.38	1.61	7.01
HRS-2	CEMS-21	18.48	108.31	2.92	34.36
HRS-3	CEMS-22	19.15	97.62	2.87	38.45
DCU-2	CEMS-3	4.43	74.70	3.59	15.30
CDU	CEMS-4	12.80	68.20	1.70	120.58
DCU-1	CEMS-5	16.77	164.91	2.78	61.00
SRU	CEMS-6	1.85	21.93	2.34	321.22
NHT	CEMS-7	8.90	48.32	1.61	16.40
UB-1	CEMS-8	24.13	39.11	7.04	56.54
UB-2	CEMS-9	27.07	57.44	2.83	117.15
Limit	Gas/oil fired	100/150	250/350	5/50	50/850



Month-Aug'20

 Indian Oil Corporation Limited					
Paradip Refinery					
Continuous Emission Monitoring Data-Stack Emission					
MONTH-YEAR	STATION ID.	CO (IN MG/NM ³)	NOX (IN MG/NM ³)	PM (IN MG/NM ³)	SO2 (IN MG/NM ³)
Aug'20	CEMS-1	5.721	47.997	2.559	33.235
	CEMS-10	12.559	14.323	3.844	23.351
	CEMS-12	8.369	13.467	2.005	13.802
	CEMS-13	12.622	69.719	3.621	2.649
	CEMS-14	22.726	61.149	2.229	164.531
	CEMS-15	68.548	52.224	35.885	151.639
	CEMS-16	19.793	65.658	0.352	49.121
	CEMS-17	14.441	19.272	2.626	41.291
	CEMS-18	13.239	57.728	0.434	16.478
	CEMS-19	0.01	32.464	0.421	12.713
	CEMS-2	14.215	17.925	1.351	7.57
	CEMS-21	18.476	29.526	2.699	34.281
	CEMS-22	23.545	8.683	2.664	38.561
	CEMS-4	25.184	67.522	1.699	10.573
	CEMS-5	17.815	61.55	2.937	96.141
	CEMS-6	29.14	36.492	3.893	502.128
	CEMS-7	8.827	10.794	1.711	14.655
	CEMS-8	26.444	24.513	5.939	56.605
	CEMS-9	27.663	29.361	4.971	144.731
Limit	Gas/oil fired	100/150	250/350	5/50	50/850



Month-Sept'20

 Indian Oil Corporation Limited					
Paradip Refinery					
Continuous Emission Monitoring Data-Stack Emission					
MONTH-YEAR	STATION ID.	CO (IN MG/NM ³)	NOX (IN MG/NM ³)	PM (IN MG/NM ³)	SO ₂ (IN MG/NM ³)
DHDT	CEMS-1	13.241	48.231	2.264	29.938
UB-3	CEMS-10	10.618	395.243	3.897	46.508
HRS-1	CEMS-12	8.243	13.162	1.965	17.704
VGO-HDT-2	CEMS-13	11.48	47.662	3.381	15.456
VDU	CEMS-14	27.505	61.062	2.236	148.005
FCC-RR	CEMS-15	92.177	13.703	38.259	35.775
HGU	CEMS-16	16.654	62.865	0.261	41.045
FCC-Heater	CEMS-17	14.008	26.525	3.043	420.573
CCR	CEMS-18	15.163	59.381	0.423	12.58
VGO-HDT-3	CEMS-19	55.183	92.435	0.421	12.826
VGO-HDT-1	CEMS-2	13.321	28.944	3.356	14.486
HRS-2	CEMS-21	18.517	5.247	2.731	34.472
HRS-3	CEMS-22	26.265	9.667	2.799	13.843
DCU-2	CEMS-3	4.457	41.379	3.443	10.562
CDU	CEMS-4	25.919	68.302	1.696	146.277
DCU-1	CEMS-5	12.856	67.587	2.91	95.081
SRU	CEMS-6	26.264	11.029	3.182	556.038
NHT	CEMS-7	13.812	29.549	1.641	20.362
UB-2	CEMS-9	29.323	20.254	3.306	389.217
Limit	Gas/oil fired	100/150	250/350	5/50	50/850



Annexure-4

Sulphur Balance

SULPHUR BALANCE

Actual (Apr'20)

SULPHUR IN

TOTAL CRUDE CHARGED	TMT/Month		725.3
SULPHUR CONTENT OF CRUDE MIX	% WT		2.300
SULPHUR CONTENT IN FEED	TMT/Month		16.68

PRODUCTS MAKE	TMT/Month	AVG. SULPHUR IN PRODUCT, PPM	SULPHUR WT.%	SULPHUR CONTENT, TMT/Month
LPG	62	150	0.015	0.01
NAPHTHA	0	250	0.025	0.00
PROPYLENE	0	0.01	0.000	0.00
GASOLENE-88	0	20	0.002	0.00
REFORMATE	75	1	0.000	0.00
MS-VI	88	10	0.001	0.00
KERO	4	2500	0.250	0.01
ATF	30	2500	0.250	0.07
HSD	271	10	0.001	0.00
COKE	58	70000	7.000	4.04
SULPHUR PRODUCT	12			12.24
Sulphur content in product				16.4
Sulphur in Crude	16.68			
Sulphur in Product	16.4			
S' emission, TMT/Month	0.30			
SO2 emission, kg/hr	828.47			



SULPHUR BALANCE

May'20

SULPHUR IN

TOTAL CRUDE CHARGED	TMT/Month		959.4
SULPHUR CONTENT OF CRUDE MIX	% WT		2.001
SULPHUR CONTENT IN FEED	TMT/Month		19.20

PRODUCTS MAKE	TMT/Month	AVG. SULPHUR IN PRODUCT, PPM	SULPHUR WT.%	SULPHUR CONTENT, TMT/Month
LPG	86.404	150	0.015	0.01
NAPHTHA	7.389	250	0.025	0.00
PROPYLENE	3.571	0.01	0.000	0.00
GASOLENE-88	0.000	20	0.002	0.00
REFORMATE	46.636	1	0.000	0.00
MS-VI	173.693	10	0.001	0.00
KERO	1.875	1000	0.100	0.00
ATF	44.494	2500	0.250	0.11
HSD	365.084	10	0.001	0.00
HF HSD	17.476	50	0.005	0.00
COKE	81.689	83000	8.300	6.78
SULPHUR PRODUCT	11.840			11.84
Sulphur content in product				18.8
ISD buld up				0.1
Sulphur in Crude	19.20			
Sulphur in Product	18.8			
S' emission, TMT/Month	0.34			
SO2 emission, kg/hr	920.27			



SULPHUR BALANCE

June'20

SULPHUR IN

TOTAL CRUDE CHARGED	TMT/Month		1227.799
SULPHUR CONTENT OF CRUDE MIX	% WT		2.308
SULPHUR CONTENT IN FEED	TMT/Month		28.34

PRODUCTS MAKE	TMT/Month	AVG. SULPHUR IN PRODUCT, PPM	SULPHUR WT.%	SULPHUR CONTENT, TMT/Month
LPG	107.31	150	0.015	0.02
NAPHTHA	18.24	250	0.025	0.00
PROPYLENE	5.81	0.01	0.000	0.00
GASOLENE-88	0.00	20	0.002	0.00
REFORMATE	57.74	1	0.000	0.00
MS-VI	239.04	10	0.001	0.00
KERO	0.00	1000	0.100	0.00
ATF	28.39	2500	0.250	0.07
HSD	440.09	10	0.001	0.00
HF HSD	57.12	10	0.001	0.00
LCO	6.11	700	0.070	0.00
COKE	105.04	70000	7.000	7.35
SULPHUR PRODUCT	19.30			19.30
Sulphur content in product				26.8
ISD build up				1.3
Sulphur in Crude	28.34			
Sulphur in Product	26.8			
S' emission, TMT/Month	0.31			
SO2 emission, kg/hr	862.06			

SULPHUR BALANCE

July'20

SULPHUR IN

TOTAL CRUDE CHARGED	TMT/Month		1024.683
SULPHUR CONTENT OF CRUDE MIX	% WT		2.200
SULPHUR CONTENT IN FEED	TMT/Month		22.54

PRODUCTS MAKE	TMT/Month	AVG. SULPHUR IN PRODUCT, PPM	SULPHUR WT.%	SULPHUR CONTENT, TMT/Month
LPG	92.11	150	0.015	0.01
NAPHTHA	0.00	250	0.025	0.00
PROPYLENE	6.22	0.01	0.000	0.00
GASOLENE-88	0.00	20	0.002	0.00
REFORMATE	68.34	1	0.000	0.00
MS-VI	176.26	10	0.001	0.00
KERO	5.82	1000	0.100	0.01
ATF	25.05	1000	0.100	0.03
HSD	388.69	10	0.001	0.00
HF HSD	42.14	10	0.001	0.00
LCO	6.36	700	0.070	0.00
COKE	100.01	55000	5.500	5.50
SULPHUR PRODUCT	16.77			16.77
Sulphur content in product				22.3
ISD build up/line fill				
Sulphur in Crude	22.54			
Sulphur in Product	22.3			
S' emission, TMT/Month	0.22			
SO2 emission, kg/hr	589.69			

SULPHUR BALANCE

Aug'20

SULPHUR IN

TOTAL CRUDE CHARGED	TMT/Month		266.397
SULPHUR CONTENT OF CRUDE MIX	% WT		2.100
SULPHUR CONTENT IN FEED	TMT/Month		5.59

PRODUCTS MAKE	TMT/Month	AVG. SULPHUR IN PRODUCT, PPM	SULPHUR WT.%	SULPHUR CONTENT, TMT/Month
LPG	23.36	150	0.015	0.00
NAPHTHA	1.55	250	0.025	0.00
PROPYLENE	1.51	0.01	0.000	0.00
GASOLENE-88	0.00	20	0.002	0.00
REFORMATE	20.84	1	0.000	0.00
MS-VI	42.56	10	0.001	0.00
KERO	1.40	1000	0.100	0.00
ATF	10.37	1000	0.100	0.01
HSD	81.35	10	0.001	0.00
HF HSD	26.37	10	0.001	0.00
LCO	3.63	700	0.070	0.00
COKE	9.81	55000	5.500	0.54
SULPHUR PRODUCT	4.98			4.98
Sulphur content in product				5.5
ISD build up/line fill				
Sulphur in Crude	5.59			
Sulphur in Product	5.5			
S' emission, TMT/Month	0.06			
SO2 emission, kg/hr	158.61			

SULPHUR BALANCE

Sept'20

SULPHUR IN

TOTAL CRUDE CHARGED	TMT/Month		992.056
SULPHUR CONTENT OF CRUDE MIX	% WT		1.900
SULPHUR CONTENT IN FEED	TMT/Month		18.85

PRODUCTS MAKE	TMT/Month	AVG. SULPHUR IN PRODUCT, PPM	SULPHUR WT.%	SULPHUR CONTENT, TMT/Month
LPG	94.07	150	0.015	0.01
NAPHTHA	16.30	250	0.025	0.00
PROPYLENE	0.00	0.01	0.000	0.00
GASOLENE-88	0.00	20	0.002	0.00
REFORMATE	46.52	1	0.000	0.00
MS-VI	191.31	10	0.001	0.00
KERO	5.65	1000	0.100	0.01
ATF	35.49	1000	0.100	0.04
HSD	329.95	10	0.001	0.00
HF HSD	40.08	10	0.001	0.00
LCO	26.26	700	0.070	0.02
COKE	74.64	55000	5.500	4.11
SULPHUR PRODUCT	14.42			14.42
Sulphur content in product				18.6
ISD build up/line fill				
Sulphur in Crude	18.85			
Sulphur in Product	18.6			
S' emission, TMT/Month	0.24			
SO2 emission, kg/hr	667.74			

SULPHUR BALANCE

Oct'20

SULPHUR IN

TOTAL CRUDE CHARGED	TMT/Month		1278.957
SULPHUR CONTENT OF CRUDE MIX	% WT		2.270
SULPHUR CONTENT IN FEED	TMT/Month		29.03

PRODUCTS MAKE	TMT/Month	AVG. SULPHUR IN PRODUCT, PPM	SULPHUR WT.%	SULPHUR CONTENT, TMT/Month
LPG	96.69	150	0.015	0.01
NAPHTHA	7.35	250	0.025	0.00
PROPYLENE	0.00	0.01	0.000	0.00
GASOLENE-88	0.00	20	0.002	0.00
REFORMATE	53.80	1	0.000	0.00
MS-VI	296.60	10	0.001	0.00
KERO	5.39	1000	0.100	0.01
ATF	28.78	1000	0.100	0.03
HSD	516.85	10	0.001	0.01
HF HSD	6.02	10	0.001	0.00
LCO	17.88	700	0.070	0.01
COKE	99.82	79000	7.900	7.89
SULPHUR PRODUCT	20.84			20.84
Sulphur content in product				28.8
ISD build up/line fill				
Sulphur in Crude	29.03			
Sulphur in Product	28.8			
S' emission, TMT/Month	0.24			
SO2 emission, kg/hr	662.07			



Annexure-5

LDAR of tankage area

REPORT
on
LEAK DETECTION AND REPAIR PROGRAMME (LDAR)
BOOT-3



FOR
IOT INFRASTRUCTURE AND ENERGY SERVICES LTD
IOCL REFINARY PLANT
PARADIP, ODISHA.

FORUTH QUARTER FOR NOVEMBER -2020

Conducted By



CVR Labs Private Limited,
No.2/9, Abdul Razack Street,
Dignity Centre, Saidapet,
Chennai – 600 015, Tamilnadu.
Phone: 09500121376.

1.0 INTRODUCTION

1.1 ABOUT INDUSTRY

IOT INFRASTRUCTURE AND ENERGY SERVICES LTD

IOT is a 50-50 joint venture between Indian Oil Corporation (IOC) and Oil tanking GmbH of Germany. IOT Infrastructure & Energy Services Limited (IOT) is a technical and logistics solutions provider with domain expertise in Engineering Procurement & Construction (EPC), Terminal, Upstream Services and Renewable Energy. IOT commenced operations in 1998 as an independent tank terminal company for oil and petroleum products.

Consortium comprising IOT Infrastructure & Energy Services Ltd., (IOT) and Oil tanking GmbH, Germany (OT) has been awarded the concession for development of crude/product tankers facilities at Paradip Refinery Project, Paradip, Orissa on Build, Own, Operate and Transfer (BOOT) basis by Indian Oil Corporation Limited (IOC). IVRCL Infrastructures & Projects Limited (IVRCL) will be the joint venture partner in the special purpose vehicle, IOT Utkal Energy Services Ltd., which has been set up for the implementation of this project.

The project involves Installation, Operation & Maintenance of approx. 1.4 million kilolitres of tankers for crude oil, petroleum products. LPG and sulphur and associated facilities at Paradip Refinery Project in Orissa which is expected to go on stream during 2012. The concession period will be 15 years after commissioning. The total project cost is estimated at around Rs. 3000 Crores.

The refinery is configured to process high-sulphur heavy crude oils with major secondary processing units like Fluidised Catalytic Cracker, Delayed Coking Unit (DCU) for coke production, besides Diesel Hydro-treatment and Catalytic Reformer, Alkylation unit, Merox, etc., for quality up gradation of products.

1.2 About LDAR:

Leak Detection and Repair (LDAR) is a program implemented to comply with environmental regulations for reducing the fugitive emissions of targeted chemicals into the environment. Several standards such as *Maximum Achievable Control Technology* (MACT) standards, *New Source Performance Standards* (NSPS), *National Emissions Standards for Hazardous Air Pollutants* (NESHAP), European Council of Vinyl Manufacture (ECVM) Charter, Ministry of Environment and Forest (MoEF) and Central Pollution Control Board (CPCB) require the monitoring and reporting of these fugitive emissions from process equipment.

A typical chemical unit can emit some tons per year of VOCs from leaking equipment, such as valves, connectors, pumps, sampling connections, compressors, pressure relief devices and open ended lines.

The environmental regulations are prescribed LDAR programs as a means of reducing emissions have very specific standards and applied to a monitoring and repair program. The LDAR study included the following protocols:

- Chemical streams that must be monitored
- Types of components (pumps, valves, connectors, etc.) to be monitored
- Measured concentration in PPM that indicates a leak
- Frequency of monitoring
- Method of monitoring
- Actions to be taken if a leak is discovered
- Length of time in which an initial attempt to repair the leak must be performed
- Length of time in which an effective repair of the leak must be made
- Actions that must be taken if a leak cannot be repaired within guidelines
- Record-keeping and reporting requirements

VOCs are contributed to the formation of ground level ozone. Many of the areas where Refineries are located do not meet the NAAQ standards for ozone. Ozone can be transported in the atmosphere and contribute to nonattainment in downwind areas.

Affected Sources:

Each pump, compressor, pressure relief device, sampling connection system, open-ended valve or line, flange and connector that contains or contacts a fluid or gas. That is exceeding more than 5000ppm of pump and compressor seals and 3000 ppm other components is an affected source.

Equipment Leak:

A leak is defined as greater than or equal to 3,000 & 5000 ppmv as methane, for organic compounds, as determined by EPA Reference Method 21. Most of the emissions are from valves and connectors because these are most prevalent components and can number in the thousands. The major cause of emissions from valves and connectors is seal or gasket failure due to normal wear or improper maintenance. More than 90% of emissions from the leaking equipment with valves are being the most significant source. The open ended lines and sampling connections account for as much as 5 – 10% of total VOC emissions from equipment leaks.

Minimum Requirements for an Acceptable Organic LDAR Program:

- Each affected source is screened initially using Method e EPA 21. Sources that are unsafe to monitor is not screened, but documentation is provided to substantiate the unsafe nature.
- Monthly visual inspections has to be performed by industry on each affected source for signs of leakage (e.g. dripping liquid, spraying, misting, clouding, ice formation, distinctive odours, etc.)
- Monitoring of each affected source is to be conducting quarterly using Method 21.
- All potential leak points associated with a component must be identified and screened for leaks. The detected leaks by Method EPA 21 test was tagged and repaired. The leak sources are measured after repair and the same is recorded.

2.0 CALCULATION:

Component Type	Default Zero Factor [Kg/hr]	Correlation Equation
Valves	7.8 - 06	2.27 - 06 (SV) ^{0.747}
Pump Seals	1.9 - 05	5.07 - 05 (SV) ^{0.622}
Others	4.0 - 06	8.69 - 06 (SV) ^{0.642}
Connectors	7.5 - 06	1.53 - 06 (SV) ^{0.736}
Flanges	3.1 - 07	4.53 - 06 (SV) ^{0.706}
Open-ended Lines	2.0 - 06	1.90 - 06 (SV) ^{0.724}

The default zero factors apply only when the screening value (SV) corrected for background equals 0 ppmv.

The correlation equations apply for actual screening values, corrected for background.

The “other” component type includes instruments, loading arms, pressure relief valves, vents, compressors, dump lever arms, diaphragms, drains, hatches, meters and polished rods stuffing boxes. This “other” component type should be applied for any component type other than connectors, flanges, open-ended lines, pumps or valves.

For sample:

The screening value (SV) concentration in Valves is 7.2ppm

$$= \text{RF (\% of VOC Flow/100)} * 0.000023 * \text{SV}^{0.746}$$

RF = Response Factor = 1

Response Factors of Different Volatiles:	
Gasoline Vapours	1.05
Naphta Heavy	1.0
Oil Petrol &	1.1
Diesel	0.8
Gasoline Vapours 2	0.7
Light Oil	1.0

% of VOC Flow = Material passing on that particular pipe line.

0.00000227 = Correlation factor

SV = Screening Value in ppm

If we will apply all the values in the below formula

$$= \text{RF} (\% \text{ of VOC Flow}/100) * 0.0000023 * \text{SV}^{0.746}$$

$$= \frac{1}{(100/100) * 0.0000023 * 13.1^{0.746}}$$

$$= 0.00002248 \text{ kg/hr}$$

$$= 0.00002248 (\text{ kg/hr }) \times 720 \text{ hours}$$

The volatile emission per sample = 0.01618 Kgs/month

3.0 METHODOLOGY OF THE STUDY:

EPA has found significant widespread noncompliance with Leak Detection and Repair regulations and more specifically non compliance with Method EPA 21 requirements.

Step 1: Preparation of LDAR project

- Information exchange meeting
- Project introduction
- Project scoping
- Coding & naming conventions
- Prepare technical information (medium, stream, drawings,)
- Stream composition
- YTD production time per stream
- Leak definition, repair definition and tag definition per stream

- Detection equipment to use

Step 2: Database preparation:

- Build site structure (unit - sections - drawings - streams)
- Prepare Basic data
- Prepare Customer data

Step 3: Source inventory:

- Project kick-off meeting
- Safety training
- Site visit
- Define monitoring routes
- Start inventory program
- Prepare monitoring phase

Step 4: Unit monitoring phase

- Prepare detection devices and gather relevant information
- Start monitoring program
- Regular status meetings
- Database update

Step 5: First repair attempt

- Prepare tightening lists (sources with leak-rate > repair definition)
- Guide mechanical/operator to leaking sources
- Perform on-line reparation
- Re-monitoring after repair attempt

Step 6: Reporting

- Consolidate all gathered data
- Prepare lessons learned
- Create LDAR report
- Detail list of all leaking sources
- Repair orders
- Equipment overview per EPA source
- Top leakers (in costs and losses)
- Sort on most leaking equipment (EPA sources)

Sampling Methodology:

Initial Screening:

Screening tests must be conducted initially and include:

1. The type of affected source (e.g. pump, compressor, etc.).
2. Site specific ID of each affected source.
3. Date of the Method EPA 21 test.
4. Type of Method EPA 21 detector.
5. Calibration results of Method EPA 21 detector.
6. Screening results in ppmv.

4.0 Summary: Refer Annexure 1

5.0 CONCLUSION:

The results are submitted component wise in the enclosed Annexure-I. As per CPCB guidelines no components are detected more than the standard values of 3000 ppmv and 5000 ppmv.

Based on the calculation and concentrations of VOC in the equipment, we took default value 1 for Response Factor (RF). IOTL India Limited has a yearly emission of VOC before Repair was 30394.8 kg/year. Total VOC loss in kg/year after repair is 88.2 kg/year

Verified by

Authorized Signatory

REPORT
on
LEAK DETECTION AND REPAIR PROGRAMME (LDAR) JETTY AREA



FOR
IOT INFRASTRUCTURE AND ENERGY SERVICES LTD
IOCLREFINERY PLANT
PARADIP, ODISHA.

JETTY AREA FOR NOVEMBER 2020
Conducted By



CVR Labs Private Limited, No.2/9,
Abdul Razack Street, Dignity Centre,
Saidapet, Chennai – 600 015,
Tamilnadu.
Phone: 09500121376.

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A typical chemical unit can emit some tons per year of VOCs from leaking equipment, such as valves, connectors, pumps, sampling connections, compressors, pressure relief devices and open ended lines.

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Affected Sources:

Each pump, compressor, pressure relief device, sampling connection system, open-ended valve or line, flange and connector that contains or contacts a fluid or gas. That is exceeding more than 5000ppm of pump and compressor seals and 3000 ppm other components is an affected source.

Equipment Leak:

A leak is defined as greater than or equal to 3,000 & 5000 ppmv as methane, for organic compounds, as determined by EPA Reference Method 21. Most of the emissions are from valves and connectors because these are most prevalent components and can number in the thousands. The major cause of emissions from valves and connectors is seal or gasket failure due to normal wear or improper maintenance. More than 90% of emissions from the leaking equipment with valves are being the most significant source. The open ended lines and sampling connections account for as much as 5 – 10% of total VOC emissions from equipment leaks.

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- Monitoring of each affected source is to be conducting quarterly using Method 21.
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2.0 CALCULATION:

Component	Default Zero [Kg/hr]	Correlation Equation
Valves	7.8 - 06	2.27 - 06 (SV) ^{0.747}
Pump Seals	1.9 - 05	5.07 - 05 (SV) ^{0.622}
Others	4.0 - 06	8.69 - 06 (SV) ^{0.642}
Connectors	7.5 - 06	1.53 - 06 (SV) ^{0.736}
Flanges	3.1 - 07	4.53 - 06 (SV) ^{0.706}
Open-ended Lines	2.0 - 06	1.90 - 06 (SV) ^{0.724}

The default zero factors apply only when the screening value (SV) corrected for background equals 0 ppmv.

The correlation equations apply for actual screening values, corrected for background.

The “other” component type includes instruments, loading arms, pressure relief valves, vents, compressors, dump lever arms, diaphragms, drains, hatches, meters and polished rods stuffing boxes. This “other” component type should be applied for any component type other than connectors, flanges, open-ended lines, pumps or valves.

For sample:

The screening value (SV) concentration in Valves is 7.2ppm

$$= \text{RF (\% of VOC Flow/100)} * 0.000023 * \text{SV}^{0.746}$$

RF = Response Factor = 1

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Gasoline Vapours	1.05
Naphta Heavy	1.0
Oil Petrol &	1.1
Diesel	0.8
Gasoline Vapours 2	0.7
Light Oil	1.0

% of VOC Flow = Material passing on that particular pipe line.

0.00000227 = Correlation factor

SV = Screening Value in ppm

If we will apply all the values in the below formula

$$= RF (\% \text{ of VOC Flow}/100) * 0.0000023 * SV^{0.746}$$

$$= 1 (100/100) * 0.0000023 * 20.2^{0.746}$$

$$= 0.000034659 \text{ kg/hr}$$

$$= 0.000034659 (\text{ kg/hr }) \times 720 \text{ hours}$$

The volatile emission per sample = 0.0249546Kgs/month

3.0 METHODOLOGY OF THE STUDY:

EPA has found significant widespread noncompliance with Leak Detection and Repair regulations and more specifically non compliance with Method EPA 21 requirements.

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- Project introduction
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Step 4: Unit monitoring phase

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- Regular status meetings
- Database update

Step 5: First repair attempt

- Prepare tightening lists (sources with leak-rate > repair definition)
- Guide mechanical/operator to leaking sources
- Perform on-line reparation
- Re-monitoring after repair attempt

Step 6: Reporting

- Consolidate all gathered data
- Prepare lessons learned
- Create LDAR report
- Detail list of all leaking sources
- Repair orders
- Equipment overview per EPA source
- Top leakers (in costs and losses)
- Sort on most leaking equipment (EPA sources)

Sampling Methodology:

Initial Screening:

Screening tests must be conducted initially and include:

1. The type of affected source (e.g. pump, compressor, etc.).
2. Site specific ID of each affected source.

3. Date of the Method EPA 21 test.
4. Type of Method EPA 21 detector.
5. Calibration results of Method EPA 21 detector.
6. Screening results in ppmv.

4.0 Summary: Refer Annexure 1

5.0 CONCLUSION:

The results are submitted component wise in the enclosed Annexure-I. As per CPCB guidelines no components are detected more than the standard values of 3000 ppmv and 5000 ppmv.

Based on the calculation and concentrations of VOC in the equipment, we took default value 1 for Response Factor (RF). IOTL India Limited has a yearly emission of VOC before Repair was 2.4kg/year. Total VOC loss in kg/year after repair is 0.0 kg/year

Verified by

Authorized Signatory

Annexure-6

Treated effluent quality



INDIAN OIL CORPORATION LIMITED
PARADIP REFINERY
QUALITY CONTROL LABORATORY

Source of sample: ETP to Sea Discharge (HCOD outlet)					Method of collection: IS 3025 P:1					
Sample drawn by: Production					Reason for testing: Monthly MINAS Parameter					
Date of Sample:					24.04.2020	28.05.2020	20.06.2020	18.07.2020	29.08.2020	24.09.2020
SI No	Parameters	Test Method	UoM	Limits	HCOD Outlet	HCOD Outlet	HCOD Outlet	HCOD Outlet	HCOD Outlet	HCOD Outlet
1	pH	IS 3025(P:11)	...	6.0 -8.5	6.9	7.2	7.3	8.0	7.0	7.6
2	Oil & Grease	IS 3025(P:39)	mg/l	Max 5	<4.0	<4	<4.0	<4.0	<4	<4.0
3	BOD, 3days @ 27°C	IS 3025(P:44)	mg/l	Max 15	10	13	12	11	10	12
4	COD	ASTM D1252(B)	mg/l	Max 125	90	110	102	90	82	98
5	Suspended Solid	IS 3025(P:17)	mg/l	Max 20	<4	<4	<4	<4	<4	<4
6	Phenols	IS 3025(P:43)	mg/l	Max 0.35	0.050	0.060	0.090	0.070	0.090	0.090
7	Sulphides	IS 3025(P:29)	mg/l	Max 0.5	<0.1	<0.10	<0.1	<0.1	<0.10	<0.10
8	CN	APHA 4500 CN-	mg/l	Max 0.2	<0.03	<0.030	<0.03	<0.03	<0.03	<0.03
9	Ammonia as N	IS 3025[P:34]	mg/l	Max 15	1.4	1.5	4.0	2.0	2.6	2.0
10	TKN	ASTM D3590	mg/l	Max 40	2.4	2.4	4.8	2.7	3.6	3.5
11	Phosphorus as P	IS 3025 (P:65)	mg/l	Max 3	0.01	0.01	0.02	0.01	0.01	0.16
12	Cr (Hexavalent)	APHA 3500-Cr B	mg/l	Max 0.1	<0.1	<0.1	<0.10	<0.1	<0.1	<0.10
13	Cr (Total)	IS 3025 (P:65)	mg/l	Max 2	<0.1	<0.1	<0.10	<0.1	<0.1	<0.10
14	Pb	IS 3025 (P:65)	mg/l	Max 0.1	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
15	Hg	IS 3025 (P:65)	mg/l	Max 0.01	<0.001	<0.001	<0.001	<0.001	<0.001	0.001
16	Zn	IS 3025 (P:65)	mg/l	Max 5	0.018	0.013	0.018	0.030	0.018	0.006
17	Ni	IS 3025 (P:65)	mg/l	Max 1	0.007	<0.001	0.008	0.001	0.003	0.007
18	Cu	IS 3025 (P:65)	mg/l	Max 1	0.010	0.001	0.002	0.001	0.010	0.002
19	V	IS 3025 (P:65)	mg/l	Max 0.2	0.001	0.001	0.001	0.002	0.001	0.001
20	Benzene	APHA 6200	mg/l	Max 0.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
21	Benzo(a)-pyrene	APHA 6440	mg/l	Max 0.2	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Note: 1.This report shall not be produced except in full, without the written approval of Quality Control Laboratory, Paradip Refinery.
2.These results relate only to the item tested.
3.The report refers only to the sample submitted.
-----*End of the Report*-----

Authorised Signatory



Indian Oil Corporation Limited

Paradip Refinery

IndianOil

Continuous Monitoring Data-ETP diachrg

MONTH-YEAR	STATION ID.	BOD (IN MG/L)	COD (IN MG/L)	FLOW (IN M ³ /H)	PH (IN PH)	TSS (IN MG/L)
Apr'20	EQMS-1	11.16	96.051	119.736	6.962	4.063
May'20	EQMS-1	11.339	102.275	122.781	6.955	3.677
Jun'20	EQMS-1	11.247	101.268	143.182	7.144	3.618
Jul'20	EQMS-1	10.905	98.541	137.248	7.515	3.839
Aug'20	EQMS-1	10.584	95.728	138.226	7.461	3.453
Sept'20	EQMS-1	10.326	94.249	144.949	7.403	3.386
Limit		15	125	350	6-8.5	20

Annexure-7

Ground water quality



INDIAN OIL CORPORATION LIMITED
PARADIP REFINERY
QUALITY CONTROL LABORATORY

Sample Source: Ground water (Secure landfill)				Method of collection: IS 3025 P:1								
Sample drawn by: Production/HSE				Reason for testing: Ground water monitoring								
Date of Sample:				30.5.20	30.5.20	10.7.20	10.7.20	08.8.20	08.8.20	08.8.20	01.9.20	01.9.20
SI No	Parameters	Test Method	UoM	SLF-1	SLF-2	SLF-1	SLF-2	ETP Caustic Section	ETP Battery Limit	ETP Check Basin Area	SLF-1	SLF-2
1	pH (at 25°C)	APHA 4500 H+ (B)	...	7.8	7.9	8.1	8.0	7.5	7.6	8.0	7.5	7.2
2	Oil and Grease	IS 3025[Part 39]	mg/L	<4.0	<4.0	<4	<4.0	<4	<4	<4	<4.0	<4.0
3	BOD 3 Days	IS 3025[Part:44]	mg/L	4	5	4	5	6	3	5	4	3
4	COD	APHA 5220 (B)	mg/L	34	38	30	36	58	29	48	36	30
5	Phenol	APHA 5530 (B&D)	mg/L	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.01
6	Sulphide	APHA 4500 S (F)	mg/L	<0.1	<0.1	<0.10	<0.10	<0.1	<0.1	<0.1	<0.1	<0.1
7	Cyanide(CN-)	APHA 4500 CN-	mg/L	<0.030	<0.030	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
8	Ammonical Nitrogen	IS 3025[part:34]	mg/L	1.31	1.48	0.80	1.10	1.00	0.70	1.20	<0.1	<0.1
9	Amonia(NH3)	IS 3025[part:34]	mg/L	1.6	1.8	1.1	1.3	1.4	1.0	2.6	<0.1	<0.1
10	TKN	APHA 4500 Norg	mg/L	3.1	3.5	2.7	3.0	2.0	1.5	1.4	<0.2	<0.2
11	Phosphate	APHA 4500 P (D)	mg/L	0.01	0.01	0.01	0.02	1.50	1.70	1.80	<0.01	<0.01
12	Cr (VI)	APHA 3500-Cr (B)	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10
13	Chromium (Cr)	APHA 3125	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.10	<0.10
14	Lead(Pb)	APHA 3125	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
15	Mercury(Hg)	APHA 3125	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
16	Znic(Zn)	APHA 3125	mg/L	0.012	0.010	0.010	0.022	0.010	0.080	0.100	0.030	0.040
17	Nickel(Ni)	APHA 3125	mg/L	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.001	0.001
18	Copper(Cu)	APHA 3125	mg/L	0.001	0.002	0.002	0.003	0.001	<0.001	<0.001	0.002	0.003
19	Vanadium(V)	APHA 3125	mg/L	<0.001	<0.001	<0.001	0.001	<0.001	0.001	0.001	<0.001	<0.001
20	Benzene in Water	APHA 6200	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
21	Benzo Pyrene	APHA 6440	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
22	Conductivity (25°C)	APHA 2510	µS/cm	3290	3800	2910	2310	1019	365	883	940	963
23	Total Hardness	APHA 2340	mg/L	391	681	390	434	490	181	288	123	131
24	Turbidity	APHA 2130	NTU	7.2	60.2	4.7	4.2	38.3	16	29	<0.1	<0.1
25	Alkalinity	APHA 2310	mg/L	279	282	244	153	244	130	226	66	63

Note: 1.This report shall not be produced except in full, without the written approval of Quality Control Laboratory, Paradip Refinery.
2.These results relate only to the item tested. 3.The report refers only to the sample submitted.

-----*End of the Report*-----


Authorised Signatory (QCM)

Annexure-8

OHC report

5. Occupational Health: (Submission separately by Medical Dept.)

a) Number of workers exposed beyond permissible limits of exposure of chemical and toxic substances specified in section 41-E (Second Schedule) of Factories Act 1948.

Unit/Installations with Location	Substance	Permissible limits of exposure as per Second Schedule (section 41-E) of Factories Act 1948		Number of workers exposed beyond permissible limit
		TWA (ppm, mg/m3)	STEL (ppm, mg/m3)	
-	H2S	10	15	NIL
	CO	35	400	NIL

Status of Periodic Medical Examination for workers exposed beyond permissible limits of chemical and toxic substances as mentioned above.

Number of workers for whom periodic medical examination planned during the year	Number of workers for whom periodic medical examination done during the quarter	% Overall Compliance
Units (Target annual)	2nd Qtr.	
Production	Nil	Nil
P & U	Nil	Nil
Mech. Maintenance	Nil	Nil
Instrumentation	Nil	Nil

b) Number of workers exposed to sound levels beyond maximum exposure levels stipulated in the Factory Rules.

Unit/Installation with Location	Maximum exposure level stipulated in the Factory Rule	Number of workers exposed to sound levels beyond maximum exposure levels stipulated in Factory Rules.
Production P & U Mech. Maintenance Instrumentation	TWA-90dbA STEL-115dbA	NIL

c) Status of Auditory Examination of the workers as identified above.

Number of workers for whom Auditory Examination planned during the year 2020-21 (2 nd Quarter)	No. of workers for whom Auditory Examination done during the quarter	% Overall Compliance
P & U Mech. Maintenance	Nil Nil	Nil Nil

d) Notified disease as per Section 89 of Factories Act, 1948

Unit/Installation with location	Name of disease as per "Third Schedule" of Factories Act.	Number of workers identified	Date of intimation to the Factory Inspectorate
-	NIL	-	-

Bomen Das.
Industrial Hygienist.
OHC, Medical.

Annexure-9

Marine water quality



Sampling Location			MW-1-Near Final Effluent Discharge MW-2-Near South Oil Jethy Paradip Port	Results	
Date of Sampling			30.11.2019		
S. No.	Test Parameters	Units	Test Method / Specification	MW1	MW2
1	pH at 26°C	-	APHA(23rd Edition) 4500-H-B	7.6	8.17
2	Color	Hazen	APHA (23rd Edition) 2120B 2017	<1.0	<1.0
3	Odour	-	APHA(23rd Edition)2150B	Agreeable	Agreeable
4	Boron (as B)	mg/l	APHA (23rd Edition)4500-B C,2017	<0.5	<0.5
5	Copper (as Cu)	mg/l	APHA (23rd Edition)3120B 2017 (ICP OES)	<0.02	<0.02
6	Fluoride (as F)	mg/l	APHA (23rd Edition)4500 - F C/D, 2017	0.85	0.85
7	Manganese (as Mn)	mg/l	APHA (23rd Edition)3120B 2017 (ICP OES)	<0.02	<0.02
8	Phenolic Compunds	mg/l	APHA (23rd Edition)5530C 2017	<0.001	<0.001
9	Selenium (as Se)	mg/l	APHA (23rd Edition) 3111B 2017	<0.005	<0.005
10	Cadmium (as Cd)	mg/l	APHA (23rd Edition)3120B 2017	<0.001	<0.001
11	Lead (as Pb)	mg/l	APHA (23rd Edition)3120B 2017	<0.005	<0.005
12	Mercury (as Hg)	mg/l	IS 3025(Part 48)-1994; Rffm:2014	<0.001	<0.001
13	Molybdenum (as Mo)	mg/l	APHA 22nd Edtn-2012, 3111D, 3113B	<0.05	<0.05
14	Nickel (as Ni)	mg/l	APHA (23rd Edition)3120B 2017	<0.02	<0.02
15	Arsenic (as As)	mg/l	APHA (23rd Edition)3120B 2017 (ICP OES)	<0.005	<0.005
16	Total Chromium (as Cr)	mg/l	APHA (23rd Edition)3111 D 2017 (AAS Flame)	<0.01	<0.01
17	Zinc (as Zn)	mg/l	APHA (23rd Edition)3120B 2017	<0.02	<0.02
18	Temperature	Deg oC	APHA 23rd EDITION,2550 B	25	25
19	Dissolved Oxygen	mg/l	APHA 23rd EDITION,4500-O C	7.12	7.07
20	BOD	mg/l	APHA (23rd Edition) 5210B 2017	28	12
21	Oil and Grease	mg/l	APHA (23rd Edition) 5520B 2017	<1.4	<1.4
22	TOC	mg/l	APHA (23rd Edition) 5310B 2017	15	7.9
23	Sulphide	mg/l	APHA (23rd Edition)4500 S2- D,2017	<0.1	<0.1
24	Petroleum Hydrocarbon	mg/l	APHA 22nd Edtn-2012, 2120B	<1.0	<1.0
25	Benthos	no/m2	APHA 23rd ED 10500-2017	132	122
26	Biomass	-	Lab Method	NA	NA
27	Fish Quality and Growth	-	Lab Method	NA	NA
28	Primary Productivity	mg/m2/d12 hr	APHA 23rd Ed.10300D	12.6 O2	7.6 O2
29	Feacal Coliform	MPN/100 ml	APHA 23rd Edition 9221 E	<1.8	<1.8
30	Zooplankton	units/ltr	APHA 23rd Edition, 10200	Present	Present
A	cyclops	units/ltr	APHA 23rd Edition, 10201	1000	2000
B	Radiolria	units/ltr	APHA 23rd Edition, 10202	NA	1000
31	Phytoplankton	units/ltr	APHA 23rd Edition, 10200	Present	Present
A	Scytosiphon	units/ltr	Lab Method	2000	NA
B	Ulothrix-	units/ltr	Lab Method	3000	2000
C	Spyrogyra	units/ltr	Lab Method	3000	2000
D	Micractinium	units/ltr	Lab Method	NA	1000
E	Oscillatoria	units/ltr	Lab Method	NA	2000

[Handwritten signatures]



Annexure-10

Noise survey report

30th June 2020

NOISE MONITORING DATA

Sl. No.	Area	Location	Avg. Time of Reading (min)	Standard for 15 min duration as per OISD	Readings in dBA	Readings in dBA
1	South Side	Raw Water End Point	15	75	52.3	52.6
		Raw Water Watch Tower	15	75	54.3	61.1
		Near Fire Pump House	15	75	61.2	69.3
		203-TK-0101	15	75	61	62.1
		Air Station 481/7	15	75	69.8	68.9
		Road 225/2006 Watch Tower	15	75	59.3	53.6
		Road 225/262 Watch Tower	15	75	55.1	51.5
2	IOTL	Watch tower road 1008-1009	15	75	64.1	55.2
		NC 39	15	75	69.1	61.5
		NC 38 NEAR TANK 4 /16	15	75	63.2	65.2
		NEAR SRR 819	15	75	69.4	70.2
		Watch tower NC 34	15	75	64.2	69.2
		Road No.1006 NC 32	15	75	67.3	63.7
		Watch Tower NC 30	15	75	64.3	63.4
		NC 28	15	75	63.6	66.9
		Watch Tower NC 24	15	75	65.8	69.2
		Road No.1004 NC 21	15	75	59.2	51.2

Somen Das.
30/6/20

28th July 2020

NOISE MONITORING DATA

Sl. No.	Area	Location	Avg. Time of Reading (min)	Standard for 15 min duration as	Readings in dBA	Readings in dBA
1	South Side	Raw Water End Point	15	75	52.3	55.6
		Raw Water Watch Tower	15	75	54.3	58.2
		Near Fire Pump House	15	75	61.2	66.6
		203-TK-0101	15	75	61	60.9
		Air Station 481/7	15	75	69.8	61.5
		Road 225/2006 Watch Tower	15	75	59.3	58.5
		Road 225/262 Watch Tower	15	75	55.1	69.5
2	IOTL	Watch tower road 1008-1009	15	75	64.1	57.5
		NC 39	15	75	69.1	58.2
		NC 38 NEAR TANK 4 /16	15	75	63.2	57.2
		NEAR SRR 819	15	75	69.4	58.9
		Watch tower NC 34	15	75	64.2	63.3
		Road No.1006 NC 32	15	75	67.3	61.2
		Watch Tower NC 30	15	75	64.3	49.3
		NC 28	15	75	63.6	68.3
		Watch Tower NC 24	15	75	65.8	60.1
		Road No.1004 NC 21	15	75	59.2	57.2

Somen Das
29/07/20

25th August 2020

NOISE MONITORING DATA

Sl. No.	Area	Location	Avg. Time of Reading (min)	Standard for 15 min duration as per OISD	Readings in dBA	Readings in dBA
1	South Side	Raw Water End Point	15	75	52.3	59.3
		Raw Water Watch Tower	15	75	54.3	51.2
		Near Fire Pump House	15	75	61.2	60.6
		203-TK-0101	15	75	61	69.9
		Air Station 481/7	15	75	69.8	55.5
		Road 225/2006 Watch Tower	15	75	59.3	51.5
		Road 225/262 Watch Tower	15	75	55.1	62.5
2	IOTL	Watch tower road 1008-1009	15	75	64.1	61.5
		NC 39	15	75	69.1	68.2
		NC 38 NEAR TANK 4 /16	15	75	63.2	67.2
		NEAR SRR 819	15	75	69.4	63.9
		Watch tower NC 34	15	75	64.2	61.3
		Road No.1006 NC 32	15	75	67.3	60.2
		Watch Tower NC 30	15	75	64.3	52.3
		NC 28	15	75	63.6	69.3
		Watch Tower NC 24	15	75	65.8	65.1
		Road No.1004 NC 21	15	75	59.2	62.2

Somen Das
26/8/20

28th September 2020

NOISE MONITORING DATA

Sl. No.	Area	Location	Avg. Time of Reading (min)	Standard for 15 min duration as	Readings in dBA	Readings in dBA
1	South Side	Raw Water End Point	15	75	52.3	53.6
		Raw Water Watch Tower	15	75	54.3	52.9
		Near Fire Pump House	15	75	61.2	66.2
		203-TK-0101	15	75	61	62.6
		Air Station 481/7	15	75	69.8	52.3
		Road 225/2006 Watch Tower	15	75	59.3	55.5
		Road 225/262 Watch Tower	15	75	55.1	61.1
2	IOTL	Watch tower road 1008-1009	15	75	64.1	63.2
		NC 39	15	75	69.1	69.1
		NC 38 NEAR TANK 4 /16	15	75	63.2	65.5
		NEAR SRR 819	15	75	69.4	61.1
		Watch tower NC 34	15	75	64.2	63.9
		Road No.1006 NC 32	15	75	67.3	62.9
		Watch Tower NC 30	15	75	64.3	51.9
		NC 28	15	75	63.6	61.9
		Watch Tower NC 24	15	75	65.8	61.9
		Road No.1004 NC 21	15	75	59.2	59.9

Somen Das.
29/09/20

Annexure-11

Soil analysis report

TEST REPORT

Name & Address of the Customer :
Indian Oil Corporation Limited
Paradip, Jagatsinghpur
Odisha

Report No. : BBS/220
Date : 13.11.2019
Sample No. : MSKGL/ED/2019-20/10/00905
Sample Description : Soil
Date of sampling : 29.10.2019
Sampling Location : Along the Products pipelines
from Refinery to South Oil Jetty

ANALYSIS RESULT

Sl. No.	Parameters	Unit	Test Method	Result
1.	pH (1:2.5) at 25 ^o C	None	IS 2720 (Part 26)-1987; Rffm:2011	5.01
2.	Phenolic Compounds (as C ₆ H ₅ OH)	None	IS 3025 (Part 43)-1972; Rffm:2009	<5.0 mg/kg
3.	Available Nitrogen (as N)	mg/kg	TPM/MSK/P&E/1/35	79.0
4.	Electrical Conductivity	us/cm	IS 14767:2000	129
5.	Available Sodium (as Na)	mg/kg	TPM/MSK/P&E/1/4	37.0
6.	Available Potassium (as K)	mg/kg	TPM/MSK/P&E/1/5	25.0
7.	Available Calcium (as Ca)	mg/kg	TPM/MSK/P&E/1/6	250
8.	Available Magnesium (as Mg)	mg/kg	TPM/MSK/P&E/1/6	180
9.	Organic Matter	%	IS 2720 (Part 22)-1972; Rffm:2015	0.42
10.	Available Phosphorus (as P)	mg/kg	TPM/MSK/P&E/1/2	<3.0
11.	Cation Exchange Capacity	meq/100gm	IS 2720 (Part 22)-1976; Rffm:2015	12.0
12.	Oil & Grease	None	TPM/MSK/P&E/2/44	<5.0 mg/kg
13.	Sulphide (as S)	None	TPM/MSK/P&E/1/43	<5.0 mg/kg

Report Prepared by:



For Mitra S. K. Private Limited

Authorized Signatory

TEST REPORT

Name & Address of the Customer :
Indian Oil Corporation Limited
Paradip, Jagatsinghpur
Odisha

Report No. : BBS/221
Date : 13.11.2019
Sample No. : MSKGL/ED/2019-20/10/00906
Sample Description : Soil
Date of sampling : 29.10.2019
Sampling Location : Along the Crude pipelines from
South Oil Jetty to Refinery

ANALYSIS RESULT

Sl. No.	Parameters	Unit	Test Method	Result
1.	pH (1:2.5) at 25°C	None	IS 2720 (Part 26)-1987; Rffm:2011	7.99
2.	Phenolic Compounds (as C ₆ H ₅ OH)	None	IS 3025 (Part 43)-1972; Rffm:2009	<5.0 mg/kg
3.	Available Nitrogen (as N)	mg/kg	TPM/MSK/P&E/1/35	73.0
4.	Electrical Conductivity	us/cm	IS 14767:2000	141
5.	Available Sodium (as Na)	mg/kg	TPM/MSK/P&E/1/4	10.0
6.	Available Potassium (as K)	mg/kg	TPM/MSK/P&E/1/5	97.0
7.	Available Calcium (as Ca)	mg/kg	TPM/MSK/P&E/1/6	1750
8.	Available Magnesium (as Mg)	mg/kg	TPM/MSK/P&E/1/6	270
9.	Organic Matter	%	IS 2720 (Part 22)-1972; Rffm:2015	0.30
10.	Available Phosphorus (as P)	mg/kg	TPM/MSK/P&E/1/2	<3.0
11.	Cation Exchange Capacity	meq/100gm	IS 2720 (Part 22)-1976; Rffm:2015	8.4
12.	Oil & Grease	None	TPM/MSK/P&E/2/44	<5.0 mg/kg
13.	Sulphide (as S)	None	TPM/MSK/P&E/1/43	<5.0 mg/kg

A.L.

Report Prepared by:



For Mitra S. K. Private Limited

Deh
Authorized Signatory

TEST REPORT

Name & Address of the Customer :
Indian Oil Corporation Limited
Paradip, Jagatsinghpur
Odisha

Report No. : BBS/223
Date : 13.11.2019
Sample No. : MSKGL/ED/2019-20/10/00907
Sample Description : Soil
Date of sampling : 29.10.2019
Sampling Location : Secured Land Fill Area

ANALYSIS RESULT

Sl. No.	Parameters	Unit	Test Method	Result
1.	pH (1:2.5) at 25°C	None	IS 2720 (Part 26)-1987; Rffm:2011	7.91
2.	Phenolic Compounds (as C ₆ H ₅ OH)	None	IS 3025 (Part 43)-1972; Rffm:2009	<5.0 mg/kg
3.	Available Nitrogen (as N)	mg/kg	TPM/MSK/P&E/1/35	86.0
4.	Electrical Conductivity	us/cm	IS 14767:2000	558
5.	Available Sodium (as Na)	mg/kg	TPM/MSK/P&E/1/4	161.0
6.	Available Potassium (as K)	mg/kg	TPM/MSK/P&E/1/5	42.0
7.	Available Calcium (as Ca)	mg/kg	TPM/MSK/P&E/1/6	350
8.	Available Magnesium (as Mg)	mg/kg	TPM/MSK/P&E/1/6	210
9.	Organic Matter	%	IS 2720 (Part 22)-1972; Rffm:2015	0.24
10.	Available Phosphorus (as P)	mg/kg	TPM/MSK/P&E/1/2	<3.0
11.	Cation Exchange Capacity	meq/100gm	IS 2720 (Part 22)-1976; Rffm:2015	14.0
12.	Oil & Grease	None	TPM/MSK/P&E/2/44	<5.0 mg/kg
13.	Sulphide (as S)	None	TPM/MSK/P&E/1/43	<5.0 mg/kg

A. L.

Report Prepared by:



For Mitra S. K. Private Limited

[Signature]
Authorized Signatory

