



# मंगलूर रिफाइनरी एण्ड पेट्रोकेमिकल्स लिमिटेड

## MANGALORE REFINERY AND PETROCHEMICALS LIMITED

अनुसूची 'अ' के अंतर्गत भारत सरकार का उद्यम SCHEDULE 'A' GOVT. OF INDIA ENTERPRISE.  
(ऑयल एण्ड नेचुरल गैस कॉरपोरेशन लिमिटेड की सहायक कंपनी A SUBSIDIARY OF OIL AND NATURAL GAS CORPORATION LIMITED)  
सीआईएन/CIN : L23209KA1988GOI008959

पंजीकृत कार्यालय : कुत्तेर पोस्ट, वाया काटीपल्ला मंगलूर - 575 030 (भारत) दूरभाष: 0824-2270400, फैक्स: 0824-2271404, E-mail:mrplmr@mrpl.co.in  
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आई.एस.ओ. 9001, 14001 एवं 50001 प्रमाणित कंपनी AN ISO 9001, 14001 AND 50001 CERTIFIED COMPANY

L/MS/MoEF&CC/6740  
11<sup>th</sup> February, 2022

The Director  
Ministry of Environment, Forest & Climate Change,  
4<sup>th</sup> Floor, E&F Wing, Kendriya Sadan,  
Koramangala, Bengaluru – 560 034

Dear Sir,

**विषय Subject:- Submission of Compliance to the Environmental Clearance(s) along with monitoring data**

Please find enclosed herewith point wise compliance to the following Environmental Clearance(s) issued to MRPL by Ministry of Environment, Forest & Climate Change (MoEF & CC), New Delhi.

1. F. No. J – 11011/215/2010-IA II (I) dated 1<sup>st</sup> November, 2011 (PPU Project)

Also environment monitoring data of Noise level, Base levels of Ground Water, Ground Water quality, SO<sub>2</sub> Emission and Ambient Air Quality for the period April, 2021 to September, 2021 is enclosed as **Annexure – I to V.**

धन्यवाद Thanking You,

भवदीय Yours sincerely,

मंगलूर रिफाइनरी एण्ड पेट्रोकेमिकल्स लिमिटेड  
For Mangalore Refinery & Petrochemicals Limited,

M.S. Sudarsan  
11/2/2022

एम.एस सुदर्शन M.S Sudarsan

मुख्य महा प्रबंधक (स्वास्थ्य, संरक्षा एवं पर्यावरण)  
Chief General Manager (Health, Safety and Environment)

Encl: As above

Cc: Zonal Office, CPCB, Bengaluru  
Head Office, KSPCB, Bengaluru

बेंगलूर कार्यालय : प्लॉट नं. A-1, - के .एस.एस.आई.डी.सी. प्रशासनिक कार्यालय भवन के सामने, इंडस्ट्रीयल एस्टेट, राजाजीनगर, बेंगलूर -560 010  
Bengaluru Office: Plot A-1, Opp. KSSIDC A. O. Building, Industrial Estate, Rajajinagar, Bengaluru - 560 010.  
दूरभाष: Tel: (का.) (O) 080-22642200, फैक्स Fax : 080 - 23505501  
दिल्ली कार्यालय : कोर-8,7<sup>th</sup> मंजिल, स्कोप कॉम्प्लेक्स, लोधी रोड, नई दिल्ली- 110003 दूरभाष: 011-24306400, फैक्स: 011-24361744  
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**Compliance to the Environmental Clearance for Expansion by adding Polypropylene Manufacturing Unit (440000 TPA) at Existing MRPL Refinery Complex issued by Ministry of Environment, Forests & Climate Change, New Delhi**

**F. No. J – 11011/215/2010-IA II (I) dated 1<sup>st</sup> November, 2011**

Sl. No.	Environmental Clearance Conditions	Compliance
<b>A</b>	<b>SPECIFIC CONDITIONS:</b>	
<b>i</b>	Environmental clearance is subjected to disposal of court case regarding suspected contamination of the groundwater near Aturkodi area of Kuthethoor village	Details of the Actions taken by MRPL to prevent recurrence of such incidents as desired by Sub Divisional Magistrate was submitted on 26.8.2011.  A letter issued from the Office of the Assistant Commissioner & Sub-Divisional Magistrate, Mangaluru Subdivision on 27/04/2016 regarding disposal of court case on 18/07/2011.
<b>ii</b>	All the specific conditions and general conditions specified in the earlier environmental clearance letters accorded vide Ministry's letter no. 11011/6/89-IA-II dated 1 <sup>st</sup> February, 1991, J-11011/1/96-IA-II dated 5 <sup>th</sup> August, 1996, J-21-383/2007-IA-II dated 3 <sup>rd</sup> April, 2008 and J-11011/8/2009-IA-II dated 23 <sup>rd</sup> December, 2009 shall be implemented.	All the clearances were obtained from the statutory authorities and point wise compliance to the conditions stipulated in Ministry's letter nos. 11011/6/89-IA-II dated 1 <sup>st</sup> February, 1991, J-11011/1/96-IA-II dated 5 <sup>th</sup> August, 1996 and J-11011/8/2009 IA- II dated 23 <sup>rd</sup> December, 2009 are complied.
<b>iii</b>	M/s Mangalore Refinery and Petrochemical Limited shall comply with new standards/norms for Oil Refinery Industry notified under the Environment (Protection) Rules,1986 vide G.S.R. 186 (E) dated 18th March 2008	MRPL is adhering to new standards for Oil Refinery Industry notified under the Environment (Protection) Rules, 1986.
<b>iv</b>	The process emissions (particulate matter, SO <sub>x</sub> , NO <sub>x</sub> ,HC,CO,VOCs and Benzene) from various units shall conform to all standards prescribed by the CPCB/Karnataka State Pollution Control Board (KSPCB) from time to time. At no time, the emissions levels shall go beyond the prescribed standards. In the event of failure of any pollution control system adopted by the unit, the respective unit shall not be restarted until the control measures are rectified to achieve the	One stack provided in this proposed project i.e. Frame - 6 GT and suitable pollution monitoring / control equipment are provided accordingly in the stack. Stack emissions are monitored on regular basis

	desired efficiency. Stack emissions shall be monitored regularly.	
v	As proposed, polypropylene powder particles shall be removed/dedusted through elutriator cyclone/multi stage cyclone. The VOCs shall be removed by vacuum degassing system and then gas will be sent to flare. Stack of adequate height shall be provided to gas based CPP.	The process employs a closed loop nitrogen conveying system which eliminates the emission of PP powder particles. Membrane system is deployed to separate VOC and Nitrogen. Frame-6 GT stack has been installed as per stipulations.
vi	Sulphur Recovery unit shall be installed to recover Sulphur with minimum 99.5 % efficiencies. Steps must be taken by MRPL to reduce the SO2 emissions from the refinery and action plan shall be submitted to the ministry and its regional Office at Bangalore.	The Sulphur Recovery units installed under the Phase-3 project have a design sulphur recovery efficiency of 99.9%.
vii	As proposed, ultra low Sulphur fuel gas shall be used as fuel for the proposed gas based captive power plant. Fuel for the project shall be low sulfur fuel with less than 0.1 % S.	The Frame-6 GT with Fuel gas firing has been installed and commissioned. The Fuel gas sulphur is around 100 PPM wt. The GT is operational utilizing refinery Fuel Gas having low sulphur content.
viii	As proposed, De-NOx technology shall be installed for major NOx emission sources for reducing the overall Nox emissions from the refinery complex. Low NOx burner shall be installed to control NOx emissions.	The Frame - 6 GT is equipped with inbuilt NOx control system
ix	Ambient air quality data shall be collected as per NAAQES standards notified by the Ministry vide G.S.R No. 826(E) dated 16th September, 2009	Ambient Air Quality Monitoring is being carried out at 10 locations in and around the refinery in consultation with the KSPCB. Permude, Perare, Ganeshpura, Effluent Treatment Plant, near Phase I cooling Tower, Benkinatheshwara temple, Coke Laydown area, SS-40, SS-45 and CISF Township. Apart from this, two Continuous Ambient Air Quality Monitoring stations (CAAQMS) are also installed in south east and North west directions to monitor real time data of ambient air quality.
x	Continuous ambient air quality monitoring stations for PM10/PM2.5, SO2,NOx, H2S, Mercaptan, NMHC, Ozone, Nickel shall be set up in the refinery complex in consultation with CPCB/KSPCB .Proper calibration of the monitoring instruments	Continuous Ambient Air Quality Monitoring Stations (CAAQMS) have been installed for monitoring continuous ambient air quality. Periodic calibration of the instruments being carried out. Ambient air quality data is being

	shall be done time to-time. Data of stack monitoring and ambient air shall be displayed on the web as well as outside the premises at prominent place for public viewing. The company shall upload the results of monitored data on its 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 KSPCB.	displayed at our website as well as in the electronic display outside the gate for public viewing. Monitoring data is being uploaded at website periodically and also report is being sent to regional office of MoEF, CPCB zonal office and KSPCB.
<b>xi</b>	Steps shall be taken to minimize fugitive emissions. Monitoring of fugitive emissions shall be carried out as per guidelines of CPCB by fugitive emissions detector and report shall be submitted to the Ministry Regional Office at Bangalore. Fugitive emissions of BTX and VOCs from product storage tank yards shall be regularly monitored. Sensor for monitoring HC (BTX) and VOCs shall be installed at strategic locations.	Leak Detection and Repair program implemented in the existing Refinery complex and same is extended to this project also.
<b>xii</b>	For further control of fugitive emissions, following steps shall be followed:	
<b>a.</b>	Closed handling system shall be provided for chemicals.	Closed handling system provided for chemicals.
<b>b.</b>	Reflux condenser shall be provided over reactor.	The reactor has a proprietary technology where the un-reacted propylene is recycled through a condenser.
<b>c.</b>	System of leak detection and repair of pump/pipeline based on preventive maintenance.	Leak Detection and Repair program being implemented in the existing Refinery complex
<b>d.</b>	The acids shall be taken from storage tanks to reactors through closed pipeline. Storage tanks shall be vented through trap receiver and condenser operated on chilled water.	No acid is being handled in the Polypropylene unit. However in the Cooling Tower the acid addition is used occasionally for pH control.
<b>e.</b>	Cathodic protection shall be provided to the underground solvent storage tanks.	Not applicable as there is no underground storage tanks envisaged in the proposed project.
<b>xiii</b>	Continuous detection equipment for polypropylene powder particles and VOCs in the work zone and ambient air shall be controlled as per National/International norms	All systems are closed under inert atmosphere at the area where powder particles likely to generate.
<b>xiv</b>	Fugitive emissions due to polypropylene powder particles and VOCs in the work zone and ambient	Being followed.

	air shall be controlled as per National / International norms	
xv	Leak Detection and Repair Programme shall be prepared and implemented.	In vogue.
xvi	The gaseous emission from DG set shall be dispersed through adequate stack heights as per CPCB standards. Acoustic enclosure shall be provided to the DG sets to mitigate the noise pollution.	Not applicable as there is no DGs envisaged in the project.
xvii	Total water requirement from Netravati River shall not exceed 1.48 MGD and prior permission shall be obtained from the concerned authority.	The water requirement for the project is within the limits.
xviii	As proposed, effluent generation from the proposed propylene unit shall not exceed 37 m <sup>3</sup> /hr and treated in wastewater treatment plant (WWTP-3) comprising primary treatment, secondary treatment, contaminated rain water treatment facility and tertiary treatment. Treated wastewater shall be reused as cooling water make-up. Domestic sewage shall be treated in sewage treatment plant (STP). No effluent shall be discharged outside the factory premises and Zero discharge concept shall be adopted. Treated effluent quality shall be monitored regularly and conform to the norms prescribed by the CPCB/KSPCB from time to time.	Effluent generation from the polypropylene unit is less than 37 m <sup>3</sup> /hr and treated in wastewater treatment plant (WWTP-3).  Treated wastewater is being used in the cooling water as a make-up. Domestic sewage is treated in sewage treatment plant (STP) which is a part of WWTP-3. The effluent generated from this project, mainly comprising Cooling Tower Blow Down stream is being sent to WWTP for treatment.  Treated effluent quality is being monitored regularly and being ensured that the quality conforms to the norms prescribed by the CPCB/KSPCB from time to time.
xix	Oil catchers/Oil traps shall be provided at all possible locations in rain/storm water drainage system inside the factory premises.	Oil catchers/Oil traps are provided.
xx	The company shall obtain Authorization for collection, storage and disposal of hazardous waste under the Hazardous Waste (Management, handling and Trans-Boundary Movement) Rules, 2008 and amended as on date for management of Hazardous wastes and prior permission from KSPCB shall be obtained for disposal of sold/hazardous waste in the TSDF. Measure shall be taken for fire fighting facilities in case of emergency.	Hazardous Waste Authorization obtained from KSPCB and valid till 30-06-2021.  HWA further extended by 6 more months vide KSPCB OM No. KSPCB/Corp cell/2021/644 dated 02 June 2021.

<b>xxi</b>	Spent catalyst shall be disposed through CPCB registered recyclers.	The Spent catalysts are being disposed to CPCB/KSPCB Authorized Recyclers/Reprocessors only as per the authorization of the Board.
<b>xxii</b>	If the oily sludge is disposed by Bio-remediation process then proper care shall be taken to control water pollution by prevention from rain, ground water pollution by putting proper lining as per CPCB guidelines.	As a proactive measure, MRPL has designed a system for reprocessing of oily sludge and the crude oil tank sludge in the Delayed Coking Unit (DCU).  Apart from the above, we have installed an advanced Closed Bioremediation unit which helps in bioremediation of oily sludge in phased manner.  Further, Oily sludge is being disposed to Cement Industries for co-processing in their unit.
<b>xxiii</b>	Proper oil spillage management plan shall be prepared to avoid spillage/leakage of oil/petroleum products and ensure regular monitoring.	No oil handling in Polypropylene Unit (PPU).
<b>xxiv</b>	The company shall strictly follow all the recommendation mentioned in the charter on Corporate Responsibility for Environmental Protection (CREP) for the oil refineries.	Compliance to the CREP recommendation is being followed in the Refinery.
<b>xxv</b>	All the OISD standards shall be followed.	OISD norms / Guidelines are followed.
<b>xxvi</b>	The Company shall strictly comply with the rules and guidelines under Manufacture, Storage and Import of hazardous Chemicals (MSIHC) Rules,1989 as amended time to time. All Transportation of Hazardous Chemicals shall be as per the Motor Vehicle act (MVA), 1989.	Being followed in the refinery.
<b>xxvii</b>	The company shall undertake following waste minimization measures:-	
<b>a.</b>	Metering and Control of quantities of active ingredients to minimize waste.	System in place.
<b>b.</b>	Reuse of by-products from the process as raw materials substitutes in other processes.	No by-products is manufactured from the PPU process.
<b>c.</b>	Use of automated filling to minimize spillage.	Automated filling system in place to minimize spillage.

<b>d.</b>	Use of close feed system into batch reactors:	Closed feed system provided.
<b>e.</b>	Venting equipment through vapor recovery system.	Venting of equipment is reused again in the process unit.
<b>f.</b>	Use of high pressure hoses for equipment clearing to reduce wastewater generation.	High pressure hoses are used for equipment cleaning.
<b>xxviii</b>	Green belt shall be developed in 33% of the total land as per the CPCB guidelines to mitigate the effect of fugitive emissions.	In MRPL, total land area is 1592 Acres. Greenbelt in 462 acres already exists. Additional compensatory greenbelt development in 50 acres at Pilikula Biological Park, Mangalore is completed.
<b>xxix</b>	Occupational health surveillance program shall be undertaken as regular exercise for all the employees. The first aid facilities in the occupational health centre shall be strengthened and the regular medical test records of each employee shall be maintained separately.	Occupational health programme is being taken up in the refinery. An Occupational Health Center is already functioning round the clock inside the Refinery.  MRPL has implemented a system of periodic medical check-ups for all the employees and health records are being maintained.
<b>xxx</b>	Company shall prepare project specific environmental manual and a copy shall be made available at the project site for the compliance.	As a part of ISO 14001 Environment Management System, environmental manual is prepared for PPU.
<b>xxxi</b>	All the recommendations mentioned in the rapid risk assessment report, disaster management plan and safety guidelines shall be implemented.	Recommendations mentioned in the rapid risk assessment report have implemented.
<b>xxxii</b>	Company shall adopt Corporate Environment Policy as per the Ministry's O.M Mo. J-11013/41/2006-IA.II (I) dated 26th April, 2011 and implemented.	Environment Policy is adopted as a part of ISO 14001 Environment Management System.
<b>xxxiii</b>	MRPL shall carry out project 'Evaluation of SO <sub>2</sub> prediction due to MRPL refinery and comparison with the ambient air quality data'.	Noted
<b>xxxiv</b>	Provision shall be made for the housing for the construction labourers within site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile sewage treatment plant, safe drinking water, medical	Not applicable at present

	health care, crèche etc. The housing may be in the form of temporary structure to be removed after the completion of the project. All the construction wastes shall be managed so that there is no impact on the surrounding environment.	
<b>B</b>	<b>GENERAL CONDITIONS</b>	
<b>i.</b>	The project authorities shall strictly adhere to the stipulation made by the Karnataka State Pollution Control Board (KSPCB).	Being followed in the refinery.
<b>ii.</b>	No further expansion or modification in the plant shall be carried out without prior approval of Ministry of Environment and Forest. In case of deviation or alterations in the project proposal from those submitted to this Ministry of 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.	Noted. No further expansion or modification in the plant will be carried out without prior approval of Ministry of Environment, Forest & Climate Change, New Delhi
<b>iii.</b>	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 stations is installed in the upwind and downwind direction as well as where maximum ground level concentrations are anticipated.	Ambient Air Quality Monitoring is being carried out at 10 locations in and around the refinery in consultation with the KSPCB.  Apart from this, two Continuous Ambient Air Quality Monitoring stations (CAAQMS) are also installed in south east and North west directions to monitor real time data of air quality.
<b>iv.</b>	The overall noise levels in and around the plant area shall be kept 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 75dBA (day time) and 70 dBA(night time)	The average noise level at the boundary wall found to be within stipulated limit.
<b>v.</b>	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 water.	Mangalore is experiencing more than six months of heavy rain fall. Ground water table is very high in this region and therefore rain water harvesting to recharge the ground water is not feasible for this area.



vi.	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 basis. Training to all employees on handling of chemicals shall be implemented.	Training is being imparted to all the employees on safety and health aspects. Pre-employment and routine medical examinations for all employees being carried out and records are being maintained.
vii.	The company shall also comply with all 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, risk mitigation measures and public hearing relating to the project shall be implemented.	Being followed.
viii.	The company shall undertake all relevant measures for improving the socio-economic conditions of the surrounding area. CSR activities shall be undertaken by involving local village and administration.	CSR Initiatives are being taken – up regularly.
ix.	The company shall undertake eco-development measures including community welfare measures in the project area for the overall improvement of the environment.	MRPL has developed an exclusive road for moving large consignments from the NMPT port to the project site. This is drastically reduced dust emission generated during vehicle movement.
x.	A separate Environment Management Cell equipped with full fledged laboratory facilities shall be set up to carry out the Environmental Management & Monitoring Functions.	MRPL is having a separate Environment Cell headed by Chief General Manager (CGM) and having required laboratory infrastructure earmarked for Environmental cell activities.
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 and Forest as well as the State Government 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.
xii.	A copy of clearance letter shall be sent by the project proponent to the concerned Panchayat, Zila Parisad/Municipal Corporation, Urban Local Body and the local NGO, If any, from whom suggestions/representations, if any, were received	In ToR, public hearing was exempted for the proposed project.

	while processing the proposal.	
<b>xiii.</b>	The project proponent shall also submit six monthly reports on the status of compliance 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, the respective Zonal Office of CPCB and KSPCB. A copy of Environmental Clearance and six monthly compliance status report shall be posted on the website of the company.	Being followed.
<b>xiv.</b>	The environmental statement for each financial year ending 31 <sup>st</sup> 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 by e-mail.	Environment Statement for each financial year ending 31 <sup>st</sup> March in Form-V is being submitted to KSPCB every year.
<b>xv.</b>	The project proponent shall inform the public that the project has been accorded environment 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 <a href="http://envfor.nic.in">http://envfor.nic.in</a> . 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 languages of the locality concerned and a copy of same shall be forwarded top the concerned Regional office of the Ministry.	The relevant advertisement was published on 6/11/11 in English and in Kannada in two widely circulated newspapers respectively. The copy of the advertisement had been sent to MoEF Bangalore Office on 10/11/2011.
<b>xvi.</b>	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.	Financial closure date and Project approval date was 27.05.2009

## ANNEXURE - I

### AVERAGE MONTHLY EXTRACT OF NOISE LEVEL (IN dB) AROUND REFINERY

MONTH	BOUNDARY WALL NORTH OF THE REFINERY	BOUNDARY WALL SOUTH OF THE REFINERY	BOUNDARY WALL EAST OF THE REFINERY	BOUNDARY WALL WEST OF THE REFINERY
Apr-21	53.0	62.0	56.0	53.0
May-21	55.4	60.8	52.8	57.5
Jun-21	51.1	64.1	52.2	51.3
Jul-21	53.6	53.6	53.9	50.9
Aug-21	58.5	69.3	54.9	71.5
Sep-21	45.7	54.8	50.9	55.4

### Base Levels value (Period 1995) of Ground Water

Location	Kuthethur (Monsoon)	Kuthethur (winter)	Kuthethur (summer)	Kalavar (Monsoon)	Kalavar (winter)	Kalavar (summer)	Jokatte (Monsoon)	Jokatte (winter)	Jokatte (summer)	Malyapada (Monsoon)	Malyapada (winter)	Malyapada (summer)
Parameter												
pH	8.2	8	8.3	7.1	7	7.6	8.1	8.5	7.8	7	7.7	8.1
Conductivity (µS)	220	630	70	60	300	70	100	620	240	70	300	106
TDS, ppm	121	284	30	28	154	45	88	341	127	30	210	23
Turbidity (NTU)	21	1	30	1	1	2	1	8	3	0.2	0	1.1
p-alkalinity, ppm	NA	NA	NA	NA	NA.	NA.	NA	NA	NA	NA	NA	NA
M-alkalinity, ppm	80	130	108	10	30	8	82	116	74	23	30	50
Total Hardness ppm	70.4	100	84	10.8	100	44	87	105	115	23.4	100	62
Ca Hardness ppm	40.2	50	44	10.1	20	13	50.3	85	78	18.8	30	31
Chloride ppm	11	45	10	10	38	10	21	80	11	8	40	18
Phenol ppm	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Iron ppm	0.154	ND	0.24	0.016	ND	0.023	0.013	ND	0.071	0.007	ND	ND
Copper micro gm/l	ND	ND	ND	1	ND	2	1	ND	3	1	ND	ND
Zinc ppm	0.051	ND	ND	0.024	ND	ND	0.02	ND	ND	0.183	ND	ND
Arsenic, Micro gm/l	NA	NA	NA	NA	NA	NA.	NA	NA	NA	NA	NA	NA
Lead micro gm/l	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chromium micro gm/l	11	ND	ND	15	ND	ND	14	20	ND	18	ND	ND
Oil ppm	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND - Non detectable level

NA - Not applicable

## GROUND WATER MONITORING REPORT FOR THE MONTH OF April-2021

Sampling not done due to COVID-19 as KSPCB official not come for sampling

## GROUND WATER MONITORING REPORT FOR THE MONTH OF MAY-21

Parameters	D'souza Well	Fernandes Well	Hand Bore	HGIL Bore 5	HGIL Bore 6	Kalavar Church	MD Bunglow
pH	6.8	6.8	6.8	6.7	7.1	6.2	7.7
T-Hardness, ppm	60.00	56.00	96.00	84.00	88.00	32.00	44.00
Ca-Hardness, ppm	38.00	44.00	50.00	52.00	54.00	8.00	24.00
Mg-Hardness, ppm	22.0	12.0	56.0	32.0	34.0	24.0	20.0
Chloride, ppm	54.00	45.00	45.00	46.00	43.00	22.00	10.00
Sulphate, ppm	19.00	12.00	<1.0	40.00	<1.0	<1.0	5.40
Fluoride, ppm	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Iron, ppm	<0.1	0.58	4.60	7.70	10.80	<0.1	<0.1
Nitrate, ppm	1.5	1.1	<1.0	<1.0	<1.0	15.2	1.1
TDS, ppm	201.00	185.00	269.00	269.00	268.00	111.00	68.00
Phenol, ppm	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Lead, ppm	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium, ppm	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hexavalent Chromium, ppm	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Copper, ppm	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc, ppm	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel, ppm	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese, ppm	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Chromium, ppm	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
COD, ppm	45.0	50.0	20.0	15.0	10.0	20.0	15.0
Oil, ppm	<1.0	<1.0	2.00	3.00	2.50	<1.0	<1.0
Appearance	Clear	Clear	Muddy	Muddy	Muddy	Clear	Clear
Odour	Odourless	Odourless	Odourless	HC	HC	Odourless	Odourless

## GROUND WATER MONITORING REPORT FOR THE MONTH OF JUNE-21

Parameters	D'souza Well	Fernandes Well	Kalavar Church	MD Bunglow
pH	6.1	6.1	5.9	7.6
T-Hardness, ppm	56.00	44.00	30.00	38.00
Ca-Hardness, ppm	24.00	24.00	14.00	30.00
Mg-Hardness, ppm	32.0	20.0	16.0	8.0
Chloride, ppm	52.00	48.00	58.00	27.00
Sulphate, ppm	28.00	9.70	13.10	28.00
Fluoride, ppm	<0.1	<0.1	<0.1	<0.1
Iron, ppm	0.56	1.00	0.24	<0.1
Nitrate, ppm	<1.0	<1.0	26.0	1.7
TDS, ppm	165.00	165.00	112.00	66.00
Phenol, ppm	<0.1	<0.1	<0.1	<0.1
Lead, ppm	<0.1	<0.1	<0.1	<0.1
Cadmium, ppm	<0.1	<0.1	<0.1	<0.1
Hexavalent Chromium, ppm	<0.1	<0.1	<0.1	<0.1
Copper, ppm	<0.1	<0.1	<0.1	<0.1
Zinc, ppm	<0.1	<0.1	<0.1	<0.1
Nickel, ppm	<0.1	<0.1	<0.1	<0.1
Manganese, ppm	<0.1	<0.1	<0.1	<0.1
Total Chromium, ppm	<0.03	<0.03	<0.03	<0.03
COD, ppm	60.0	20.0	60.0	40.0
Oil, ppm	<1.0	<1.0	<1.0	<1.0
Appearance	Clear	Clear	Clear	Clear
Odour	Odourless	Odourless	Odourless	Odourless

## GROUND WATER MONITORING REPORT FOR THE MONTH OF JULY-21

Parameters	D'souza Well	ETP-2 Bore	Fernandes Well	Hand Bore	HGIL Bore 5	HGIL Bore 6	Kalavar Church	MD Bunglow
pH	6.3	7.7	6.1	6.6	6.5	6.5	5	7.4
T-Hardness, ppm	40	20	44	83	80	90	38	38
Ca-Hardness, ppm	28	18	24	72	62	58	14	24
Mg-Hardness, ppm	12	2	20	11	18	32	24	14
Chloride, ppm	34	15	30	39	44	43	24	15
Sulphate, ppm	51	23	45	15	77	35	86	26
Fluoride, ppm	1.1	0.9	1.1	0.8	1	0.9	0.9	1.3
Iron, ppm	0.44	2.4	0.8	4.3	6.2	7.4	<0.1	<0.1
Nitrate, ppm	<1.0	<1.0	5.9	<1.0	2.5	<1.0	20	1.1
TDS, ppm	141	53	139	340	280	286	104	76
Phenol, ppm	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Lead, ppm	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium, ppm	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hexavalent Chromium, ppm	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Copper, ppm	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc, ppm	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel, ppm	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese, ppm	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Chromium, ppm	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
COD, ppm	20	30	69	40	59	84	35	30
Oil, ppm	<1.0	<1.0	<1.0	2	6.5	6	<1.0	<1.0
Appearance	Clear	Clear	Clear	Muddy	Muddy	Muddy	Clear	Clear
Odour	Odourless	Odourless	Odourless	Odourless	HC	HC	Odourless	Odourless

GROUND WATER MONITORING REPORT FOR THE MONTH OF AUGUST-21							
Parameters	D'souza Well	Fernandes Well	Hand Bore	HGIL Bore 5	HGIL Bore 6	Kalavar Church	MD Bunglow
pH	5.9	6.5	6.5	6.5	6.6	5.2	7.5
T-Hardness, ppm	26	44	104	132	88	29	30
Ca-Hardness, ppm	16	20	51	80	55	12	18
Mg-Hardness, ppm	10	24	53	52	33	17	12
Chloride, ppm	28	36	56	30	22	35	15
Sulphate, ppm	18	31	9	26	11	12	25
Fluoride, ppm	0.9	<0.1	0.8	0.9	0.8	0.8	<0.1
Iron, ppm	0.8	0.2	2.5	12	15	0.28	0.62
Nitrate, ppm	<0.1	3.6	<0.1	<1.0	0.8	51	<0.1
TDS, ppm	70	110	244	235	230	116	58
Phenol, ppm	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Lead, ppm	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium, ppm	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hexavalent Chromium, ppm	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Copper, ppm	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc, ppm	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel, ppm	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese, ppm	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Chromium, ppm	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
COD, ppm	55	50	65	30	20	120	20
Oil, ppm	<1.0	<1.0	3	7.5	4.5	1.5	<1.0
Appearance	Clear	Clear	Muddy	Muddy	Muddy	Clear	Clear
Odour	Odourless	Odourless	HC	HC	HC	Odourless	Odourless

GROUND WATER MONITORING REPORT FOR THE MONTH OF SEPTEMBER-21								
Parameters	D'souza Well	ETP-2 Bore	Fernandes Well	Hand Bore	HGIL Bore 5	HGIL Bore 6	Kalavar Church	MD Bunglow
pH	6.2	6.3	6.2	6.9	6.9	6.6	4.9	7.4
T-Hardness, ppm	39	39	47	102	100	71	29	27
Ca-Hardness, ppm	17	23	19	63	47	49	9	19
Mg-Hardness, ppm	22	16	28	39	53	22	20	8
Chloride, ppm	33	46	25	64	74	78	50	17
Sulphate, ppm	30	6.7	20	2.6	11	2.6	3.8	13
Fluoride, ppm	0.9	<0.1	1.7	1.1	0.8	<0.1	1	1
Iron, ppm	0.22	7.4	0.28	12.2	10.8	15.2	<0.1	<0.1
Nitrate, ppm	<1.0	<1.0	2.9	<0.1	<0.1	<0.1	50	0.6
TDS, ppm	128	161	134	340	341	300	125	60
Phenol, ppm	<0.10	0.13	<0.10	<0.1	0.19	<0.1	0.12	<0.1
Lead, ppm	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium, ppm	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hexavalent Chromium, ppm	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Copper, ppm	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc, ppm	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel, ppm	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Manganese, ppm	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Chromium, ppm	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
COD, ppm	25	20	15	75	106	30	35	15
Oil, ppm	<1.0	2	<1.0	4	9	18	<1.0	<1.0
Appearance	Clear	Muddy	Clear	Muddy	Muddy	Muddy	Clear	Clear
Odour	Odourless	Odourless	Odourless	Odourless	HC	HC	Odourless	Odourless

Annexure-IV

**Total SO<sub>2</sub> Emission from the Plant (Through Stacks)**

<b>MONTH</b>	<b>Total SO<sub>2</sub> Emission (TPD)</b>
Apr-21	30.0
May-21	26.6
Jun-21	25.0
Jul-21	27.4
Aug-21	36.6
Sep-21	32.5

Note: TPD --Tonnes per Day

**Additional SO<sub>2</sub> Emission through flaring as follow;**

<b>MONTH</b>	<b>SO<sub>2</sub> emission (Through Flaring), TPD</b>
Apr-21	13.4
May-21	11.7
Jun-21	16.1
Jul-21	28
Aug-21	28.7
Sep-21	17.3

Note: TPD - Tonnes per Day

## Ambient Air Quality Monitoring Data for April- 2021

LOCATION	SO <sub>2</sub>	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO	O <sub>3</sub>
	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	mg/m <sup>3</sup>	µg/m <sup>3</sup>
Permude	13.9	17.1	37	28	BDL	BDL
Perara	14.0	17.5	36	26	BDL	BDL
Ganeshpura	14.3	17.9	41	29	BDL	BDL
Cooling Tower	14.6	18.3	36	27	BDL	BDL
ETP	15.7	20.0	36	27	BDL	BDL
Benkinatheswara Temple	14.1	16.1	42	29	BDL	BDL
Substation - 45 area	14.6	17.9	41	29	BDL	BDL
Near CL area Weighbridge	13.9	16.5	46	33	BDL	BDL
Substation - 40 area	14.7	18.6	39	28	BDL	BDL
CISF Quarters	12.5	14.0	34	25	BDL	BDL

BDL : Below Detectable Limit

## Ambient Air Quality Monitoring Data for May- 2021

LOCATION	SO <sub>2</sub>	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO	O <sub>3</sub>
	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	mg/m <sup>3</sup>	µg/m <sup>3</sup>
Permude	13.8	16.8	36	27	BDL	BDL
Perara	13.8	17.3	35	25	BDL	BDL
Ganeshpura	14.2	17.6	40	27	BDL	BDL
Cooling Tower	14.3	18.0	35	26	BDL	BDL
ETP	15.4	19.6	35	25	BDL	BDL
Benkinatheswara Temple	13.8	15.9	40	28	BDL	BDL
Substation - 45 area	14.4	17.6	40	27	BDL	BDL
Near CL area Weighbridge	13.7	16.3	45	31	BDL	BDL
Substation - 40 area	14.5	18.3	38	27	BDL	BDL
CISF Quarters	12.3	13.7	33	24	BDL	BDL

BDL : Below Detectable Limit

## Ambient Air Quality Monitoring Data for June- 2021

LOCATION	SO <sub>2</sub>	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO	O <sub>3</sub>
	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	mg/m <sup>3</sup>	µg/m <sup>3</sup>
Permude	13.0	16.0	33	24	BDL	BDL
Perara	13.1	16.5	32	22	BDL	BDL
Ganeshpura	13.4	16.9	36	25	BDL	BDL
Cooling Tower	13.8	17.5	32	24	BDL	BDL
ETP	14.8	19.1	32	23	BDL	BDL
Benkinatheswara Temple	13.2	15.3	37	24	BDL	BDL
Substation - 45 area	13.7	16.9	36	24	BDL	BDL
Near CL area Weighbridge	13.1	15.8	41	28	BDL	BDL
Substation - 40 area	14.1	17.8	35	25	BDL	BDL
CISF Quarters	11.8	13.0	30	22	BDL	BDL

BDL : Below Detectable Limit



LOCATION	SO <sub>2</sub>	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO	O <sub>3</sub>
	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	mg/m <sup>3</sup>	µg/m <sup>3</sup>
Permude	12.8	15.7	31	23	BDL	BDL
Perara	12.9	16.3	30	21	BDL	BDL
Ganeshpura	13.1	16.6	34	23	BDL	BDL
Cooling Tower	13.3	17.0	31	22	BDL	BDL
ETP	14.4	18.6	30	22	BDL	BDL
Benkinatheswara Temple	12.8	14.8	35	23	BDL	BDL
Substation - 45 area	13.5	16.5	35	23	BDL	BDL
Near CL area Weighbridge	12.7	15.3	39	27	BDL	BDL
Substation - 40 area	13.5	17.2	33	23	BDL	BDL
CISF Quarters	11.4	12.6	29	20	BDL	BDL

BDL : Below Detectable Limit

#### Ambient Air Quality Monitoring Data for Aug- 2021

LOCATION	SO <sub>2</sub>	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO	O <sub>3</sub>
	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	mg/m <sup>3</sup>	µg/m <sup>3</sup>
Near Weighbridge	12.3	14.8	37	26	BDL	BDL
Near SS 40 (Jokattae Panch	13.1	16.8	32	22	BDL	BDL
CT	12.9	16.5	30	21	BDL	BDL
ETP	14.0	18.1	29	21	BDL	BDL
Ganeshpura	12.7	16.1	33	22	BDL	BDL
Permude	12.4	15.2	30	22	BDL	BDL
Perara	12.5	15.8	29	20	BDL	BDL
SS-45	13.0	16.0	34	22	BDL	BDL
B.Temple	12.5	14.3	34	22	BDL	BDL
CISF Quarters	11.0	12.1	28	19	BDL	BDL

BDL : Below Detectable Limit

#### Ambient Air Quality Monitoring Data for Sept- 2021

LOCATION	SO <sub>2</sub>	NO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>	CO	O <sub>3</sub>
	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	mg/m <sup>3</sup>	µg/m <sup>3</sup>
Near Weighbridge	12.5	15.1	39	27	BDL	BDL
Near SS 40 (Jokattae Panch	13.3	17.0	33	23	BDL	BDL
CT	13.2	16.7	31	22	BDL	BDL
ETP	14.2	18.4	31	22	BDL	BDL
Ganeshpura	12.9	16.4	34	23	BDL	BDL
Permude	12.7	15.5	31	23	BDL	BDL
Perara	12.8	16.1	31	21	BDL	BDL
SS-45	13.3	16.4	35	23	BDL	BDL
B.Temple	12.7	14.6	35	23	BDL	BDL
CISF Quarters	11.3	12.4	29	20	BDL	BDL

BDL : Below Detectable Limit