adani
Power

Ref: APML/EMD/MOEF/EC/129/11/21
Date: 18/11/2021

**To,**
**Additional Principal Chief Conservator of Forest (APCCF)**
**Ministry of Environment, Forest & Climate Change**
**Regional Office (WCZ),**
**Ground Floor, East Wing,**
**New Secretariat Building, Civil Line,**
**Nagpur-440001 (MH).**

Sub: **Six Monthly Compliance Status report of Environmental Clearance of Tiroda Thermal Power Plant for Phase- I & II along with Environmental Monitoring reports– Reg.**

Ref: Environmental Clearance letter J 13011/4/2008-IA.II (T) dated 29.05.2008 & EC Amendment letter no. J-13011/4/2008 –IA II (T) dated: 21/03/2012.
Letter No. J-13012/81/2008-1A-II (T) dated – 22.04.2010 & EC Amendment Letter no. J-13012/81/2008 - IA II (T) dated: 30/03/2012 & 13/03/2014

Dear Sir,

With reference to above subject, please find enclosed herewith Six-Monthly Environmental Clearance (EC) compliance status report along with environmental monitoring results like Ambient Air Quality, Stack Emission, Water Quality, Noise level, Soil, CAAQM, CEMS data, Met data, Green belt development and CSR reports etc. for the period of **April'2021 to September'2021** in hard & soft (**e-mail**).

This is for your kind information & record please.

Thanking you

**Yours faithfully,**
for **Adani Power Maharashtra Limited**

(**Santosh Kumar Singh**)
**Head- Environment**

Encl: **As above**

**CC:** Member Secretary
**Central Pollution control Board**
Parivesh Bhavan, East Arjun Nagar
Kendriya Paryavaran Bhawan
New Delhi- 110 032.

The Regional Officer,
**Maharashtra Pollution Control Board**
Regional Office, 5th Floor
Udyog Bhawan, Civil Lines, Nagpur – 440001

Member Secretary,
**Maharashtra Pollution Control Board**
Kalpataru Point, 2nd – 4th floor, **Mumbai–22**

# COMPLIANCE REPORT
# OF
# ENVIRONMENTAL CLEARANCES

## 3300 (5X660) MW THERMAL POWER PLANT
## PHASE – I & II

## At

## TIRORA, DISTRICT GONDIA
## MAHARASHTRA

**Submitted to:**

**MINISTRY OF ENVIRONMENT, FOREST & CLIMATIC CHANGES**

**Submitted By:**

**Environment Management Department**
**Adani Power Maharashtra Limited**
Plot NO: A -1, Tirora Growth Centre
MIDC, Tirora, Gondia – 441911 (M.H)

## PERIOD: APRIL 21 – SEPTEMBER 2021

# CONTENT

## 1.0 Introduction

Adani Power Maharashtra Ltd, (APML), a wholly owned company of Adani Power Limited has established 3300 MW (5 x 660) Coal-based Thermal Power Plant at Tiroda, District Gondia in Maharashtra in two phases as below:
Phase I: 2 x 660 MW
Phase II: 3 x 660 MW

The plant site is located at Tiroda Growth Centre of MIDC (Maharashtra Industrial Development Corporation) developed area near Tiroda, District Gondia in Maharashtra. The Villages, Gumadhawara, Khairbodi, Chikhali, Churdi, Bhiwapur, Kachewani and Mendipur, surround the site. The power plant is based on supercritical, energy efficient & environment friendly technology.

APML has been granted Environmental Clearances from Ministry of Environment & Forest, Consent to Establish & Consent to Operate from Maharashtra Pollution Control Board for phase I & II (Unit 1, 2, 3, 4 & 5). As a part of the compliance of statutory requirements, environmental quality monitoring is being done regularly at locations suggested by Sub- Regional Officer, MPCB, Bhandara on the basis of micrometeorological parameters. Also, three nos. of Continuous Ambient Air Quality Monitoring System have been established in three different locations inside the plant boundary as per wind rose and suggested by SRO, MPCB Bhandara. Also third party lab (M/s Enviro Analyst & Engineers Pvt. Ltd, Mumbai) carried out, environmental monitoring & analysis for the power plant.

Point wise compliance status of Environmental Clearance for Phase -1 & 2 is furnished herewith.

# Compliance status on Environmental Clearance

## (Phase -1: 2 X 660 MW Coal based Thermal Power Plant)

LETTER NO.J-13011/4/2008-1A-II (T) DATED 29.05.2008 and

Subsequent amendement in Environmental Clearance vide
LETTER NO.J-13011/4/2008-1A-II (T) DATED 21.03.2012

| Sr. No. | Conditions | Compliance Status |
|---|---|---|
| (i) | The total land requirement for the project shall be restricted to 210 ha. | Complied.<br>The project has undergone expansion. The total area has changed and the same has been approved by MoEF. The total area required for all two phases is 565.84 ha. |
| (ii) | Sulphur and ash content in the coal to be used in the project shall not exceed 0.5 % and 29.57 % respectively.(Amendment dt. 21.03.2012) | Being Complied.<br>Sulphur & ash contents are below 0.5 % and 29.57 % respectively. |
| (iii) | A bi-flue stack of 275 m height shall be provided with continuous online monitoring equipment's for SOx, NOx and Particulate matter. Exit velocity of flue gases shall not be less than 22 m/sec. | Bi-flue Stack containing two flues of phase-I of 275 meters is installed with On-line monitoring equipment for $SO_2$, NOx & PM. Exit velocity of flue gas is more than 22m/sec. |
| (iv) | High efficiency Electrostatic Precipitator (ESPs) shall be installed to ensure that particulate emission does not exceed 50 $mg/Nm^3$. | Highly efficient Electro Static Precipitators (ESPs) with efficiency of 99.93 % have been installed for each boiler to meet particulate emission less than 50 mg/Nm3. Monitoring report enclosed as Annexure – I. PG test carried out for effective operation of ESPs from M/s. Vardan Envirolab, Gurugram (Haryana.) Please refer **Annexure - XII** |
| (v) | Space provision shall be kept for retrofitting of FGD, if required at a later date. | Noted.<br>Space for installation of FGDs have been provided since construction stage. As per MoEF&CC's Notification dated 31st March 2021, Tiroda TPP is falling under Category "C" Non- retiring TPP and the timelines for compliance of SO2 emission is up to December 2024. Accordingly, the work is under progress for FGD installation. |
| (vi) | Adequate dust extraction system such as cyclones /bag filters and water spray system in dusty areas such as in coal handling and ash handling points, transfer areas and other vulnerable dusty areas shall be provided. | Adequate air pollution control measures such as dust extraction system (bag filters followed by Cyclone) in the coal crusher and coal conveying transfer points (JNTs). Rain gun type dust suppression system in coal yard and dry fog type dust suppression system in belt conveyor have been provided. |
| (vii) | Fly ash shall be collected in dry form and storage facility (silos) shall be provided and its utilization to the maximum extant shall be ensured. 100% fly ash utilization shall be ensured from 5th year onward. Unutilized fly ash shall be disposed off in the ash pond in the form of High Concentrated Slurry and the bottom ash in conventional slurry mode. | Fly ash silos (06) established to collect dry ash for further utilization. High Concentration Slurry Disposal system also installed. Rail line facility established for transportation of dry ash by rail to various cement manufacturers. In FY 2020-21 more than 100% ash utilized i.e. 120.12 %. |
| (viii) | Ash pond shall be lined with HDPE lining. Adequate safety measures shall also be | **Being complied.**<br>Well design ash dyke with LDPE lining has |

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| | implemented to protect the ash dyke from getting breached. Guard drains shall be provided all along the periphery of the ash dyke to avoid contamination of soil and surface water in case of run-off. | been established as per the guidelines of MoEF&CC, CEA & CPCB. Adequate safety measures are being taken for any unforeseen incidents. Guard drains & guard pond established. |
| (ix) | Water requirement shall not exceed 36 MCM/year. No ground water shall be extracted for this power project including during construction phase. | **Complied.**<br>This quantity is adequate to meet the plant's requirement. Monthly water consumption report is being submitted regularly to Board.<br>Water allocation from Wainganga River is for 70 MCM for both phases,<br>However, Comprehensive water audit has been conducted by "Academy of Water Technology Environ Management" Kolkata in technical collaboration Indian Institute of Social Welfare and Business Management (IISWBM) – Kolkata. **(Please refer XIV).** |
| (x) | Closed cycle cooling system with cooling towers shall be provided. Cycle of concentration (COC) of at least 5.5 shall be adopted and the effluents treated as per the prescribed norms. | Being complied.<br>COC of 5.5 is being maintained. |
| (xi) | The treated effluents confirming to the prescribed standards shall be re-circulated and reused within the plant. There shall be no discharge outside the plant boundary except during monsoon for storm water. Arrangements shall be made that effluents and storm water do not get mixed. | All the effluent treated adequately & treated water is being reused within the plant. The concept of "Zero Discharge Condition" implemented except during monsoon period. Separate drainage network established for storm water. |
| (xii) | A sewage treatment plant shall be provided and the treated sewage shall be used for raising green belt/plantation. | Sewage Treatment Plants have been installed & treated water reused suitably within the plant premises for green belt development. |
| (xiii) | Rainwater harvesting should be adopted. Central Ground water Authority / Board shall be consulted for finalization of appropriate rainwater harvesting technology within a period of three months from the date of clearance and details shall be furnished. | Rain Water Harvesting study carried out & report submitted to Regional Director, Central Ground Water Board, Nagpur & Member Secretary- Central Ground Water Authority, New Delhi. Rainwater harvesting structures have been constructed within the plant to store the rain water for further uses. |
| (xiv) | Adequate safety measures shall be provided in the plant area to check/minimize spontaneous fires in coal yard, especially during summer season. Details of these measures along with location plant layout shall be submitted to Ministry as well as to the regional Office of the Ministry at Bhopal. | Adequate safety team with safety measures is available in the plant site to take preventive control measures. Fire hydrant and rain gun type water sprinklers established in the coal yard. Copy of control measures and locations in plant layout have been already submitted. |
| (xv) | Storage facilities for liquid fuel such as LDO to be used as auxiliary fuel in the project shall be made in the plant area where risk is minimum to the storage facilities. Adequate assessment of risk management shall be made in the Disaster management Plan for the same. Mock drills shall be conducted regularly as plan. Necessary clearance as may be applicable to such storage under HSM Rules | The fuel LDO properly stored in minimum risk area & as per the norms. Storage location approved by the Chief Controller of Explosive. Disaster management plan and On-site emergency plan prepared & Mock drills are being conducted periodically. |

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| | shall be obtained. | |
| (xvi) | Regular monitoring of ground water in and around the ash pond area shall be carried out, records maintained and periodic reports shall be furnished to the Regional Office of this Ministry. | Regular monitoring of ground water carried out around ash pond area. Monitoring results are being submitted to Regional Officer, MoEF &CC and MPCB regularly. Please Refer **Annexure – I**. |
| (xvii) | A green belt of adequate width and density shall be developed around the plant periphery covering at least 69.64 ha of project area preferably with local species. | Green belt development/ plantations are being carried out on available land. Our efforts are being made to develop more greenery in and around plant premises. We have already established our nursery to develop saplings for afforestation & horticultural activities. Besides this, we have also developed lawn & gardens to create aesthetic view inside the plant premises.<br>Green belt/plantation developed in 258 ha land which is more than the norms of 33% of total land area. Please Refer **Annexure – VI.** |
| (xviii) | A plan for conservation of fauna reported in the study area shall be prepared in consultation with State Forests and Wildlife Department within 3 months and shall be implemented effectively. | Complied.<br>Conservation plan of Fauna in the study area was prepared in consultation with State Forest dept. and submitted to Wildlife warden, Govt. of Maharashtra with compliance report.<br>Biodiversity Policy has been formulated to protect the local Flora & fauna. We are the member of India Business & Biodiversity Initiative (IBBI). Various migratory birds have been observed inside the plant premises **(Refer Annexure – IX).** We have engaged third party experts for Biodiversity Assessment. |
| (xix) | First aid and sanitation arrangements shall be made for the drivers and other contract workers during construction phase. | First Aid and sanitation facility provided for the drivers and contract workers during construction phase. |
| (xx) | Leq of Noise levels emanating from gas and steam turbines shall be limited to 75 dBA. For people working in the high noise area, requisite personal protective equipment like earplugs/ear muffs etc. shall be provided. Workers engaged in noisy areas such as steam & gas turbines etc. shall be periodically examined to maintain audiometric record and for treatment for any hearing loss including shifting to non noisy/less noisy areas**.** | Necessary actions have been taken care to maintain Ambient Noise levels within 75 db(A) during plant operation. The personal protective equipment's have been provided to workers & employees working in noisy areas. Noise level monitoring is being carried out regularly and reports submitted to MoEF & CC, CPCB & MPCB. A complete medical checkup with audiometric test of workers & employees are being carried out as per frequency. Please refer **Annexure –I & IA** |
| (xxi) | Regular monitoring of ground level concentration of $SO_2$, NOx, SPM and RSPM shall be carried out in the impact zone and records maintained. If at any stage these levels are found to exceed the prescribed limits, necessary control measures shall be provided immediately. The location of the monitoring stations and frequency of monitoring shall be decided in consultation with SPCB. Periodic reports (six monthly) shall be submitted to the Regional Office of this | Regular monitoring of PM10, PM2.5, SO2 & NOx are being carried out as per frequency & monitoring results are well within the norm. Monitoring results are being submitted to MPCB monthly. Ambient Air Quality monitoring stations established in consultation with Sub- Regional Officer, MPCB. Please refer **Annexure –I & IA** |

<table>
<tr><td></td><td>Ministry.</td><td></td></tr>
<tr><td>(xxii)</td><td>The project proponent shall advertise in at least two local newspapers widely circulated in the region around the project, one of which shall be in the vernacular language of the locality concerned within seven days from the date of this clearance letter, informing that the project has been accorded environmental clearance and copies of 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://envfor.nic.in.</td><td>Complied.<br>Copy of the same already submitted to your good office.</td></tr>
<tr><td>(xxiii)</td><td>A separate environment management cell with qualified staff shall be set up for implementation of the stipulated environmental safeguards.</td><td>We have already established Environment Management Dept. headed by General Manager & supported by Environmental Engineers, Chemist & Horticulturist. Environmental laboratory has been established to monitor Environmental Quality Parameters for Ambient Air, Water, Stack emission monitoring etc.<br>Environmental Management System as per EMS ISO 14001:2015 implemented under Integrated Management System. Our Environmental lab is Accredited with NABL as per ISO/IEC 17025:2017 which is valid up to 27.06.2022.</td></tr>
<tr><td>(xxiv)</td><td>Half yearly report on the status of implementation of the stipulated conditions and environmental safeguards shall be submitted to this Ministry/Regional Office/CPCB/SPCB.</td><td>Six monthly compliance report submitted regularly to MoEF, CPCB & MPCB.<br>The same has been sent by email also. Last compliance report was submitted in May - 2021 for the period of October '20 to March '2021 to MoEFCC/MPCB/CPCB vide our letter no. APML/EMD/MoEF/EC/125/05/21 on 29.05.2021.</td></tr>
<tr><td>(xxv)</td><td>Regional Office of the Ministry of Environment & Forests located at Bhopal will monitor the implementation of the stipulated conditions. A complete set of documents including Environmental Impact Assessment Report and Environment Management Plan along with the additional information submitted from time to time shall be forwarded to the Regional Office for their use during monitoring.</td><td>Being Complied.<br>APML is regularly submitting compliance of Environment Clearance to MoEFCC/CPCB/MPCB.<br>Compliance status is also uploaded on https://parivesh.nic.in and www.adanipower.com on company website.</td></tr>
<tr><td>(xxvi)</td><td>Separate funds shall be allocated for implementation of environmental protection measures along with item-wise break-up. These cost shall be included as part of the project cost. The funds earmarked for the environment protection measures shall not be diverted for other purposes and year-wise expenditure should be reported to the</td><td>Separate fund has been already allocated for environmental protection.<br>Budget details for pollution control measure for F.Y 21 – 22 is as below (in Lakhs):<table>
<tr><th>SL. No</th><th>Particulars</th><th>Cost (in Lac.)</th></tr>
<tr><td>1</td><td>Pollution control equipment O &M</td><td>5512.54</td></tr>
</table></td></tr>
</table>

<table>
<tr><td></td><td>Ministry.</td><td><table>
<tr><td>2</td><td>Pollution Monitoring ,Study and analysis</td><td>99.00</td></tr>
<tr><td>3</td><td>Green belt Development</td><td>310.2</td></tr>
<tr><td>4</td><td>Rural Development/CSR</td><td>417.83</td></tr>
<tr><td>5</td><td>Legal & consent fees</td><td>379.85</td></tr>
<tr><td>6</td><td>Training & Awareness</td><td>3.3</td></tr>
<tr><td>7</td><td>Waste Management</td><td>9116</td></tr>
<tr><td></td><td><b>Total</b></td><td><b>15838.72</b></td></tr>
</table></td></tr>
<tr><td>(xxvii)</td><td>The project authorities shall inform the Regional Office as well as the Ministry regarding the date of financial closure and final approval of the project by the concerned authorities and the dates of start of land development work and commissioning of plant.</td><td>Complied.</td></tr>
<tr><td>(xxviii)</td><td>Full cooperation shall be extended to the Scientists/Officers from the Ministry / Regional Office of the Ministry at Bhopal /the CPCB/the SPCB who would be monitoring the compliance of environmental status.</td><td>We always extend full cooperation to the Scientists/Officers from the Ministry / Regional Office of the Ministry at Bhopal /the CPCB/the SPCB etc.</td></tr>
<tr><td>(xxix)</td><td>The project proponent shall upload the status of compliance of the conditions stipulated in the environmental clearance issued vide this Ministry's letter of even no. dated 30.03.2007, in its website and uploaded periodically and also simultaneously send the same by e-mail to the Regional Office of the Ministry of Environment and Forests.</td><td>Six monthly Environmental Clearance compliance status report is regularly submitted to MoEF, CPCB and SPCB. The same is sent by email also.<br>Compliance status updated on Company's website. www.adanipower.com</td></tr>
<tr><td>(xxx)</td><td>Criteria pollutant levels including NOx, RSPM, (PM10 & PM2.5), Sox (from Stack & ambient air) shall be regularly monitored and results displayed in your website and also at the main gate of the power plant.</td><td>Criteria pollutant viz. NOx, PM10 PM2.5 & SOx (from Stack & Ambient Air) are being continuous monitored and results are displayed at the main gate of the power plant.</td></tr>
</table>

# Compliance Status of Environmental Clearance
## (Phase- II (3X660) MW THERMAL POWER PLANT)

## LETTER NO.J-13012/81/2008-1A-II (T) DATED 22.04.2010)
## & Subsequent Amendment
LETTER NO. J – 13012/81/2008- IA.II (T) dated 30.03.2012 and
LETTER No. J-13012/81/2008-IA.II (T) dated 13.03.2014

| SL. NO. | CONDITIONS | COMPLIANCE |
|---|---|---|
| (i) | Only one unit of 1 x 660 MW shall be run on 100% domestic coal for which coal linkage from SECL is available and the other two units of 2 x 660 MW shall be run purely on imported coal, as per details in Para 2. | MoEF vide letter no. J-13012/81/2008-1A-II (T) dtd. 13.03.2014 has amended the condition for change of source of coal to indigenous Coal from subsidiary companies of "Coal India Limited" in place of Imported coal. |
| (ii) | Separate stacking arrangement shall be made for indigenous and imported coal. | EC is amended and the source of coal is domestic. Separate stacking/storage arrangement is not required. |
| (iii) | In case source of fuel supply is to be changed at a later stage for the 2 x 660 MW the project proponent shall come back to the ministry as the appraisal presently was done based on imported coal for 2 x 660 MW unit. | APML requested the MoEF&CC for Change of source of coal to indigenous Coal from subsidiary companies of "Coal India Limited" in place of imported coal.<br>The EAC of MoEF considered our proposal on October 10, 2013 & January 9-10, 2014 respectively and subsequently the Environmental Clearance condition amended for change of coal source from imported to domestic/indigenous on 13/03/2014. |
| **A** | **Water & Waste Water Management** | |
| (iv) | No ground water shall be extracted for use in operation of the power plant even in lean season | Being Complied.<br>We have already obtained permission from water resource department Govt. of Maharashtra for withdrawal of 70 MCM water for both phases from Wainganga river. The above quantity is adequate to meet the plant's requirement including lean season.<br>However, Comprehensive water audit conducted by "Academy of Water Technology Environ Management" Kolkata in technical collaboration Indian Institute of Social Welfare and Business Management (IISWBM) – Kolkata. **(Please refer XIV).** |
| (v) | No water bodies including natural drainage system in the area shall be disturbed due to activities associated with the setting up / operation of the power plant | Complied<br>There is no water body within plant premises. |
| (vi) | Minimum required environmental flow suggested by the Competent Authority of the State Govt. shall be maintained in the Channel / Rivers (as applicable) even in lean season. | Complied.<br>Water allocation is from Dhapewada Irrigation Project constructed and maintained by Vidarbha Irrigation Development Corporation. APML has no role in regulating the water flow downstream. |
| (vii) | Hydro-geological study of the area shall be reviewed annually and results submitted to the Ministry and concerned agency in the | Quality of ground water is being monitored in and around the plant premises. Ground water level in nearby villages is also being monitored to |

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|  | State Govt. In case adverse impact on ground water quality and quantity is observed, immediate mitigating steps to contain any adverse impact on ground water shall be undertaken | know the seasonal fluctuations.<br>CSIR – NEERI, Nagpur engaged to carry out Hydro-geological study & review from 2019 – 2022. Hydrogeological review report for pre & post monsoon seasons enclosed as **Annexure – XI**. |
| (viii) | Closed cycle cooling system with induced draft cooling towers shall be provided and COC of at least 5.5 shall be adopted. | 5.5 COC is being maintained. |
| (ix) | The treated effluent confirming to the prescribed standards only shall be re-circulated and reused within the plant. There shall be no discharge outside the plant boundary except during monsoon. Arrangements shall be made that effluent and storm water do not get mixed. | Effluent treatment plant installed within the plant and treated water is being utilize/reuse within the premises to meet "Zero Discharge". Separate drainage system established for storm water. |
| (x) | Effluent from the desalination plant shall be first treated in a guard pond before discharged, if applicable. | Not Applicable<br>The desalination plant is not required |
| (xi) | A sewage treatment plant shall be provided (as applicable) and the treated sewage shall be used for raising greenbelt/plantation. | Complied.<br>Sewage Treatment Plants have been installed and treated water is being suitably reused within the plant premises for green belt development. |
| (xii) | Rainwater harvesting should be adopted. Central Groundwater Authority/ Board shall be consulted for finalization of appropriate rainwater harvesting technology within a period of three months from the date of clearance and details shall be furnished. | Rainwater Harvesting study carried out & report submitted to Regional Director, Central Ground Water Board, Nagpur & Member Secretary, Central Ground Water Board, New Delhi. Rain water harvesting practices adopted within the plant area. |
| (xiii) | Regular monitoring of ground water shall be carried out by establishing a network of existing wells and constructing new piezometers. Monitoring around the ash pond area shall be carried out particularly for heavy metals (Hg, Cr, As, Pb) and records maintained and submitted to the Regional Office of the Ministry. The data so obtained should be compared with the baseline data so as to ensure that the ground water quality is not adversely affected due to the project. | Being Complied.<br>Regular monitoring of ground water quality including heavy metals is being carried out regularly in and around the project area. Piezometric wells are established around the ash pond area. Records are maintained and the same are submitted to Regional office of the Ministry at Nagpur.<br>Please Refer **Annexure – I.** |
| **B** | **Air Pollution Control** |  |
| (xiv) | Provision for installation of FGD shall be provided. | Noted.<br>Space for installation of FGDs have been provided since construction stage. As per MoEF&CC's Notification dated 31st March 2021, Tiroda TPP is falling under Category "C" Non-retiring TPP and the timelines for compliance of SO2 emission is up to December 2024. Accordingly, the work is under progress for FGD installation. |
| (xv) | High Efficiency Electrostatic Precipitator (ESPs) shall be installed to ensure that particulate emission does not exceed 50 mg / Nm3. | ESP with efficiency of 99.93% (ESPs of 10 fields) installed for each boiler to meet permissible norm for particulate emission of less than 50 mg / Nm3. PG test carried out for effective operation of ESP from M/s. Vardan Envirolab Jaipur please refer |

| | | |
|---|---|---|
| | | **Annexure - XII** |
| (xvi) | Adequate dust extraction system such as cyclones /bag filters and water spray system in dusty areas such as in coal handling and ash handling points, transfer areas and other vulnerable dusty areas shall be provided. | Complied.<br>Adequate air pollution control measures such as dust extraction system (Cyclone followed by bag filters) in coal crushers and rain gun type dust suppression system in coal yard and dry fog type dust suppression system in the belt conveyor with insertable dust collector at transfer points have been installed to meet particulate matter emission within the norms. |
| (xvii) | Green Belt consisting of 3 tiers plantations of native species around plant and at least 100 m width shall be raised. Wherever 100 m width is not feasible a 50 m width Shall be raised and adequate justification shall be submitted to the ministry. Tree density shall not be less than 2500 per ha with survival rate not less than 70%. | Green belt development/ plantations are being carried out on available land. Our efforts are being made to develop more greenery in and around plant premises. We have already established our nursery to develop saplings for afforestation & horticultural activities. Besides this, we have also developed lawn & gardens to create aesthetic view inside the plant premises APML have developed green belt/plantation in 258 ha land which is more than 33%. Please refer **Annexure – VI.** |
| (xviii) | Noise level emanating from turbines shall be so controlled such that the noise in the work zone shall be limited to 75dBA. For people working in the high noise area, requisite personal protective equipment like earplugs/ear muffs etc. shall be provided. Workers engaged in noisy areas such as turbine area, air compressor etc. shall be periodically examined to maintain audiometric record and for treatment for any hearing loss including shifting to non noisy/less noisy areas. | Necessary actions have been taken care to maintain ambient noise levels within 75 db(A) during plant operation. The working personals provided with appropriate personal protective equipment and periodic audiometric check up is being carried out and records are being maintained. The monitoring reports regularly submitted to the MPCB & MoEF&CC. Please refer Annexure – I & IA |
| **C** | **Fly Ash Management** | |
| (xix) | Utilization of 100% Fly Ash generated shall be made from 4th year of operation of the plant. Status of implementation shall be reported to the Regional Office of the Ministry from time to time. | Annual ash generation and utilization status is regularly submitted to MoEF&CC, MPCB & CEA. In FY 2020-21 more than 100% ash utilized i.e. 120.12 %. **Refer Annexure – X** |
| (xx) | Fly ash shall be collected in dry form and storage facility (silos) shall be provided. Unutilized fly ash shall be disposed off in the ash pond in the form of slurry. Mercury and other heavy metals (As, Hg, Cr, Pb etc.) will be monitored in the bottom ash as also in the effluents emanating from the existing ash pond. No ash shall be disposed off in low lying area. | Complied.<br>Fly ash silos (06) established to collect dry ash for further utilization. High Concentration Slurry Disposal system also installed. Rail line facility established for transportation of dry ash by rail to various cement manufacturers. In FY 2020-21 more than 100% ash utilized i.e. 120.12 %. |
| (xxi) | Ash pond shall be lined with HDP/LDP lining or any other suitable impermeable media such that no leachate takes place at any point of time. Adequate safety measures shall also be implemented to protect the ash dyke from getting breached. | Complied.<br>Well-designed Ash dyke with HDPE lining have been established as per guidelines of MoEF&CC, and CPCB. Regular monitoring is being carried out. |
| (xxii) | For disposal of Bottom Ash in abandoned | Being Followed. |

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| | mines (if proposed to be undertaken) it shall be ensured that the Bottom and sides of the mined out area are adequately lined with clay before Bottom Ash is filled up. The project proponent shall inform the State Pollution Control Board well in advance before undertaking the activity. | We will inform to Maharashtra Pollution Control Board well in advance. |
| (xxiii) | Regular monitoring of ground water level shall be carried out by establishing a network of existing wells and constructing new piezometers. Monitoring around the ash pond area shall be carried out particularly for heavy metals (Hg, Cr, As, Pb) and records maintained and submitted to the regional Office of this Ministry. The data so obtained should be compared with the baseline data so as to ensure that the ground water quality is not adversely affected due to the project. | Regular monitoring of ground water quality including heavy metals is being carried out in and around the project area. Piezometric wells are established around the ash pond. Records are maintained and the same being submitted along with compliance report.<br>Please refer **Annexure – I**.<br>We have engaged CSIR – NEERI, Nagpur to carry out Fly Ash Leachability Study since **2019 up to 2022**. |
| **D** | **Disaster Management** | |
| (xxiv) | Adequate safety measures shall be provided in the plant area to check/minimize spontaneous fires in coal yard, especially during summer season. Copy of these measures with full details along with location plant layout shall be submitted to Ministry as well as to the regional Office of the Ministry. | Adequate safety team with safety control measures is available in the plant site to take preventive control measures. Fire hydrant and rain gun type water sprinklers established in the coal yard. Details of control measures and location within the plant layout has been already submitted to your good office. |
| (xxv) | Storage facilities for auxiliary liquid fuel such as LDO and / HFO/LSHS shall be made in the plant area in consultation with Department of Explosive, Nagpur. Sulphur content in the liquid fuel will not exceed 0.5%. Disaster management plan shall be prepared to meet any eventuality in case of an accident taking place due to storage of oil. | The Fuel LDO is properly stored in minimum risk area & as per the norms fixed by the Chief Controller of Explosive. Disaster management plan and On-site emergency plan prepared & Mock drills are being conducted periodically. |
| **E** | **CSR/RCR Plan** | |
| (xxvi) | A good action plan for R & R (if applicable) with package for the project affected persons be submitted and implemented as per prevalent R&R policy within three months from the date of the issue of this letter. | R&R plan approved by the State govt. and implemented. APML had engaged Indian Institute of Social Welfare and Business Management (IISWBM), Kolkata for carrying out R&R audit. The report has already been submitted along the compliance report of the period April'2019 to Sept.'2019. |
| (xxvii) | An amount of Rs. 66.0 Crores shall be earmarked as one time capital cost for CSR programme. Subsequently a recurring expenditure of Rs. 13.20 Crore per annum shall be earmarked as recurring expenditure for CSR activities. Details of the activities to be undertaken shall be submitted within one month along with road map for implementation. | A separate budget earmarked for CSR activities. Need Base Assessment study carried out and report already submitted to the ministry. We have established well qualified team with village mobilizers to take care of CSR activities.<br>Six Monthly Progress report on CSR activities from April – 21 to Sept. – 21 is being enclosed as **Annexure – VII**. |
| (xxviii) | While identifying CSR programme the | Need Base Assessment Study for development of |

| | | |
|---|---|---|
| | company shall conduct need based assessment for the nearby villages to study economic measures with action plan which can help in upliftment of poor section of society. Income generating projects consistent with the traditional skills of the people besides development of fodder farm, fruits bearing orchards, vocational training etc. can form a part of such programme. Company shall provide separate budget for community development activities and income generating programmes. This will be in addition to vocational training for individuals imparted to take up self-employment and jobs.<br>In addition a special scheme for upliftment of SC/ST's and marginalized population in the study area out of CSR programme shall be formulated and submitted to the Ministry within six months along with firm commitment of implementation. The scheme shall have an in – built monitoring mechanism. | CSR plan prepared and report already submitted to MoEF.<br>Need Base plan implementation being done in nearby village for the individuals who are economically weak to undertake some economic activity that would help them to achieve sustainable livelihood and financial independence.<br>We have established a Skill Development Center for skill development of SC/ST and marginalized populations from Gondia and Bhandara district. So far, we have trained 931 students in which 857 placed for good job. Training on nursing (General Duty Assistance) for old aged people and severe patient given to 123 girls in which 88 girls have been placed for job.<br>Please refer **Annexure VIII** for year wise training and placement details. |
| **F** | **General** | |
| (xxix) | Additional soil for leveling of the proposed site shall be generated within the site (to the extent possible) so that natural drainage system of the area is protected and improved. | Complied<br>Natural drains has not been disturbed due to plant activities. |
| (xxx) | First aid and sanitation arrangements shall be made for the drivers and other contract workers during construction phase. | First Aid and sanitation facilities were provided for the drivers and contract workers during construction period. |
| (xxxi) | Provision shall be made for the housing of construction labour within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, crèche etc. The housing may be in the form of temporary structures to be removed after the completion of the project. | Labour hutments have been established with all required facilities & infrastructure for construction phase only. |
| (xxxii) | The project proponent shall advertise in at least two local newspapers widely circulated in the region around the project, one of which shall be in the vernacular language of the locality concerned within seven days from the date of this clearance letter, informing that the project has been accorded environmental clearance and copies of 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://envfor.nic.in. | Complied.<br>Copy of the same already submitted to your good office with compliance report. |
| (xxxiii) | A copy of clearance letter shall be sent by the proponent to concern panchayat, Zila parisad/municipal corporation, urban local | Complied.<br>Copy of Environmental Clearance and other required documents provided to Zila Parishad & |

| | | |
|---|---|---|
| | body and the local NG, if any from whom suggestions/representations, if any received while processing the proposal. The clearance letter shall also be put on the website of the company by the proponent. | Gram Panchayat. |
| (xxxiv) | A separate environment management cell with qualified staff shall be setup for implementation of the stipulated safeguards. | We have already established Environment Management Dept. headed by AGM & supported by Env. Engineer, Chemist & Horticulturist. Environmental laboratory has been established to monitor Environmental Quality Parameters for Ambient Air, Water, Stack emission monitoring etc.<br>Environmental Management System as per EMS ISO 14001:2015 implemented under Integrated Management System. Our Environmental lab is Accredited with NABL as per ISO/IEC 17025:2017 which is valid up to 27.06.2021. |
| (xxxv) | The proponent shall upload the status of compliance of stipulated EC conditions, including the results of monitoring data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional office of MoEF, the respective zone of CPCB & the SPCB. The criteria pollutant level namely; SPM, RSPM (PM10, PM2.5), SO2 and NOx (ambient level and stack emission) shall be displayed at the convenient location near the main gate of the company in the public domain. | Six monthly Environmental Clearance compliance status report is regularly submitted to MoEF, CPCB and SPCB. The same is sent by email also.<br>Compliance status updated on Company's website.<br>Display board already installed in main gate. |
| (xxxvi) | 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 by e-mail) to the respective Regional Office of MOEF, the respective Zonal Office of CPCB and the SPCB | Six monthly compliance report is regularly submitted to MoEF, CPCB & MPCB.<br>The same is sent by email also. Last compliance report was submitted in May - 2021 for the period of October '20 to March '2021 to MoEFCC/MPCB/CPCB vide our letter no. APML/EMD/MoEF/EC/125/05/21 on 29.05.2021. |
| (xxxvii) | The environment 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 the Ministry by e-mail | Environment Statement for F.Y 20-21 submitted through online portal of Maharashtra Pollution Control Board. Please Refer **Annexure - IV** |
| (xxxviii) | The project proponent shall submit six monthly reports on the status of the implementation of the stipulated environmental safeguards to the Ministry of Environment and Forests, its Regional Office, Central Pollution Control Board and State Pollution Control Board. The project proponent shall upload the status of | Six monthly Environmental Clearance compliance status report is regularly submitted to MoEF&CC, CPCB and SPCB. The same is sent by email also.<br>Compliance status is also uploaded on https://parivesh.nic.in and www.adanipower.com on company website. |

<table>
<tr><td></td><td>compliance of the environment of the environmental clearance conditions on their website and update the same periodically and simultaneously send the same by e-mail to the Regional Office, Ministry of Environment and Forests.</td><td></td></tr>
<tr><td>(xxxix)</td><td>Regional Office of the Ministry of Environment & Forests will monitor the implementation of the stipulated conditions. A complete set of documents including Environmental Impact Assessment Report and Environment Management Plan along with the additional information submitted from time to time shall be forwarded to the Regional Office for their use during monitoring. Project proponent will up-load the compliance status in their website and up-date the same from time to time at least six monthly basis. Criteria pollutants levels including NOx (from stack & ambient air) shall be displayed at the main gate of the power plant.</td><td>Being Complied.<br>Six monthly Environmental Clearance compliance status report is regularly submitted to MoEF, CPCB and SPCB. The same is sent by email also.<br>Compliance status is also uploaded on https://parivesh.nic.in and www.adanipower.com on company website. .</td></tr>
<tr><td>(xi)</td><td>Separate funds shall be allocated for implementation of environmental protection measures along with item-wise break-up. These cost shall be included as part of the project cost. The funds earmarked for the environment protection measures shall not be diverted for other purposes and year-wise expenditure should be reported to the Ministry</td><td>Separate fund has already been allocated and being utilize for Environmental Protection measures.<br><b>Budget details for pollution control measures furnished herewith for F.Y 20-21 as below (in Lakhs):</b>
<table>
<tr><th>SL. No</th><th>Particulars</th><th>Cost (in Lac.)</th></tr>
<tr><td>1</td><td>Pollution control equipment O &M</td><td>5512.54</td></tr>
<tr><td>2</td><td>Pollution Monitoring ,Study and analysis</td><td>99.00</td></tr>
<tr><td>3</td><td>Green belt Development</td><td>310.2</td></tr>
<tr><td>4</td><td>Rural Development/CSR</td><td>417.83</td></tr>
<tr><td>5</td><td>Legal & consent fees</td><td>379.85</td></tr>
<tr><td>6</td><td>Training & Awareness</td><td>3.3</td></tr>
<tr><td>7</td><td>Waste Management</td><td>9116</td></tr>
<tr><td></td><td><b>Total</b></td><td><b>15838.72</b></td></tr>
</table></td></tr>
<tr><td>(xii)</td><td>The project authorities shall inform the Regional Office as well as the Ministry regarding the date of financial closure and final approval of the project by the concerned authorities and the dates of start of land development work and commissioning of plant</td><td>Complied.</td></tr>
<tr><td>(xiii)</td><td>Full cooperation shall be extended to the Scientists/Officers from the Ministry / Regional Office of the Ministry at Bangalore / CPCB/ SPCB who would be monitoring the compliance of environmental status.</td><td>Noted.<br>Full cooperation always extended.</td></tr>
<tr><td colspan="3"><b>Additional Conditions (EC Amendment)</b></td></tr>
</table>

| | | |
|---|---|---|
| (xiv) | The coal transportation by road shall be through tarpaulin covered trucks for a maximum period of two years and hence forth shall be only through mechanically covered trucks. | Compliance Assured.<br>At present coal is being transported by rail and unloaded within plant premises at wagon tippler & track hopper. |
| (xv) | Avenue plantation of 2/3 rows all along the road shall be carried out by the project proponent at its own expense. | Thick Plantation have been done in all around the Plant boundary. |
| (xvi) | Periodic maintenance of the road shall be done by the project proponent at its own expense and shall also facilitate the traffic control on the road. | Complied.<br>All internal roads are black topped or concreated and being maintained. |
| (xvii) | Sulphur and ash contents in the domestic coal to be used in the project shall not exceed 0.4 % and 33% at any given time. In case of variation of coal quantity at any point of time, fresh reference shall be made to the Ministry for suitable amendments to environmental clearance condition wherever necessary. | Being complied.<br>We are using washed coal from SECL and blended with raw coal. We have also installed Real time Coal Ash Analyzers to monitor ash content. MPCB official also collect coal samples time to time and analysis results are well within the stipulated limit.<br>Quarterly Ash content report is being sent to MoEFCC regional office, Six monthly (April 21 to Sept 21) average ash content is 32.47% |
| (xlvii) | A long term study of radio activity and heavy metals content on coal to be used shall be carried out through a reputed institute. Thereafter, mechanism for an in-built continuous monitoring for radio activity and heavy metals in coal and fly ash (including bottom ash) shall be put in place. | Being Complied. |
| (xviii) | Harnessing solar power within the premises of the plant particularly at available roof tops shall be undertaken and status of implementation shall be submitted periodically to the regional office of the Ministry. | Solar panel installed at the roof top of Administrative building to cater domestic power requirement of administrative building. In addition to above, solar street lights have been installed along the ash dyke area. Under CSR activities, we have installed more than 200 solar street lights in nearby villages. |
| (xix) | Mercury emission from the stack shall also be monitored on periodic basis. | Being complied.<br>Mercury emission from the stack is being monitored & reports are being submitted. Please refer **Annexure – I.** |
| (l) | Fugitive emission shall be controlled to prevent impact on agricultural or non-agricultural land. | To control fugitive emission, rain gun type water sprinkling system has been installed in coal yard. All coal conveying belts conveyors are covered and fog type dust suppression system provided. Adequate water sprinkling arrangements made in wagon tipplers and track hoopers to mitigate dust emission during coal un-loading by rail. Closed coal conveyor belts have been established. Cyclones followed by bag filters are provided at each coal transfer points (JNT's). Additionally, mobile water sprinklers are deployed at CHP area to suppress fugitive dust while movement of vehicles. |
| (li) | Source sustainability study of water requirement shall be carried out by an institute of repute. The study shall also | VIDC has developed and is operating Dhapewada Barrage on River Wainganga for water supply. However, we have undergone source |

| | | |
|---|---|---|
| | specify the source of water for meeting the requirement during lean season. The report shall be submitted to the Regional Office of the Ministry within six months. | sustainability study of River Wainganga by "Academy of Water Technology Environ Management" Kolkata in technical collaboration Indian Institute of Social Welfare and Business Management – Kolkata and CSIR – CGCRI, Kolkata. Final report was already submitted along with compliance report. |
| (lii) | Fly ash shall not be used for agricultural purpose. No mine void filling will be undertaken as on option for ash utilization without adequate lining of mine with suitable media such that no leachate shall take place at any point of time. In case, the option of mine void filling is to be adopted, prior detailed study of soil characteristics of the mine area shall be undertaken from an institute of repute and adequate clay lining shall be ascertained by the State Pollution Control Board and implementation done in close co-ordination with the State Pollution Control Board. | As per Fly ash Notification 25th January, 2016; Ash may be utilize in Agriculture as a soil conditioner. For the same APML has engaged AMPRI Bhopal (A division of CSIR) for R&D and Demonstration and promotional Activity.<br>CSIR – NEERI, Nagpur was engaged for three years (2019 – 2022) to carry out fly ash leachability study in an around land reclamation through fly ash of radius 35 KM from APML.1st Year inception report already submitted with EC Compliance report of October 2019 – March 2020. |
| (liv) | Three tire green belt shall be developed all around Ash Pond over and above the Green Belt around the Plant Boundary. | A thick plantation/ green bet development around Ash pond area done. Our efforts are being made to develop more & more greenery inside the plant premises. |
| (lv) | Social audit for the CSR Scheme shall be carried out periodically by reputed university or an institution as per the CSR guidelines of Government of India and Details to be submitted to MoEF besides putting it on company's website. | Further, Social Audit being carried out by Indian Institute of Social Welfare & Business Management, **University of Kolkata.** Final Report is already submitted to your good office with compliance report of April 2019 to Sept 2019. |
| (lvi) | An Environmental Cell shall be created at the project site itself and shall be headed by an officer of the company of appropriate seniority and qualification. It shall be ensured that the head of the Cell shall directly report to Head of the Organization. The environmental Cell shall be responsible and accountable for implementation of all the conditions given in the EC including in the amendment letter. | We have already established Environment Management Dept. headed by AGM & supported by Env. Engineer, Chemist & Horticulturist. Environmental laboratory **(NABL Accredited)** has been established to monitor Environmental Quality Parameters for Ambient Air, Water, Stack emission monitoring etc.<br>Environmental Management System as per EMS ISO 14001:2015 implemented under Integrated Management System. Environmental Management System as per EMS ISO 14001:2015 implemented under Integrated Management System. Our Environmental lab is Accredited with NABL as per ISO/IEC 17025:2017 which is valid up to 27.06.2022. |
| (lvii) | Monitoring of surface water quantity and quality shall also be regularly conducted and record maintained. The monitoring data shall be submitted to the Ministry regularly. Further, monitoring points shall be located between the plant and drainage in the direction of flow of ground water and records maintained. Monitoring for heavy metals in ground water shall be undertaken. | Monitoring of surface water and ground water quality including heavy metals is being done on regular basis and records maintained. Please refer **Annexure - I** |
| (lviii) | The environmental statement for each | Environmental statement is being submitted |

| | | |
|---|---|---|
| | 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 compliances of environmental clearance conditions and shall also be sent to the respective Regional Offices of the Ministry by e-mail. | regularly to MPCB. Last Environmental Statement submitted to MPCB through online portal. Please Refer Annexure - |
| (lix) | The project proponent shall formulate a well laid Corporate Environment Policy and identify and designate responsible officers at all levels of its hierarchy stipulated in this clearance letter and other applicable environment laws and regulations. | We have implemented ISO 14001:2015 under Integrated Management System consist of Environment, Health & Safety, Quality and Energy Management Systems. We have formulated a Corporate policy as per the requirement of Integrated Management System (IMS), Biodiversity Conservation Policy has already been framed and incorporated in existing IMS policy. We are member of Indian Biodiversity Business Initiative (IBBI) as initiated by MoEF&CC. IMS is Integrated with International Finance Corporation (IFC) Performance and also complied IFC standards on Environmental Management.<br>We are pleased to inform that Single Use Plastic has been completely restricted in the plant & township. CII certified for the non use of single use plastic. Please refer Annexure - XIII |

Annexure - I

# SIX MONTHLY ENVIRONMENTAL MONITORING REPORT

## FOR

## The Period of Apr.2021-Sept. 2021

of

# ADANI POWER MAHARASHTRA LTD.

**Tirora, Growth Center,**
**MIDC, Gondia – 441 911**

**Prepared by**

**Recognised by MoEF (GOI). F. No. Q-15018/19/2019-CPW dated. 9.6.2020**
**NABET Accredited and ISO 9001: 2000Certified Organisation**

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**ENVIRO ANALYSTS & ENGINEERS PVT. LTD.**
NABET Accredited & MoEF (Govt. of India) approved
CIN No. : U28900MH1995PTC093129

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# Foreword

*The protection of environment plays a crucial role in maintaining the local environment quality for any industry, throughout their production. Hence compliance of the statutory requirements becomes very important to conserve the ecological balance within and surrounding the plant area. Therefore, environment protection is becoming a prerequisite for sustainable development. In line with this requirement, the management of* ***Adani Power Maharashtra Ltd****. has adopted a corporate responsibility of development and top priority is given for environment protection.*

*In order to comply with the Environment protection act, to fulfill statutory requirement and to be in tune with Environmental Preservation and sustainable development* ***Adani Power Maharashtra Ltd****., has retained* ***Enviro Analysts and Engineers Pvt. Ltd.*** *as Environment Consultants and for various Environmental issues related to their Power Plant.*

*This report presents the Environmental Status for the period* ***Apr.2021-Sept. 2021*** *as a compliance to the statutory requirements.*

*The co-operation extended by the Staff and Management of Adani Power Maharashtra Ltd. during the work execution period is gratefully acknowledged.*

For **ENVIRO ANALYSTS & ENGINEERS PVT. LTD.**

**Authorized Signatory**

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**Workshop :**
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MIDC Tarapur,
Boisar,
Dist. - Thane - 401 506.

**Table of Contents**

## LIST OF TABLES:

## LIST OF FIGURES:

## LIST OF ANNEXURES:

# Chapter – 1

# Introduction

# &

# Scope of work

## 1.0 INTRODUCTION.

**M/s. Adani Power Maharashtra Limited (APML)** a wholly owned company of Adani Power Limited has established 3300 MW (5x660) Coal-based Thermal Power Plant at Tiroda, District Gondia in Maharashtra in two phases as below:

Phase I: 2 x 660 MW
Phase II: 3 x 660 MW

## 1.1 Scope of Work.

The scope of work includes the data generation for various environmental components viz Meteorology, Air, Noise, Water, Stack, Effluent and soil of Adani Power Maharashtra limited, Tirora.

To monitor the environmental parameters and data analysis in the vicinity of the power plant of 5x660MW at MIDC Area Tiroda, APML awarded the service to M/s Enviro Analysts & Engineers Pvt. Ltd. (EAEPL), Mumbai.

The present report incorporates data of various Environmental parameters for APR.2021- SEPT. 2021

# Chapter – 2

# Details of sampling Locations & Methodology for sampling and analytical procedures

## 2.0 DETAILS OF SAMPLING LOCATIONS.

The details of sampling location w. r. t. Air, Water and Noise quality around the power plant are shown in the Sampling location Map as depicted in Figure.2.1

### 2.1 Meteorology and Ambient Air Quality.

Meteorological data was collected at one station concurrently with the ambient air quality monitoring. The weather station was placed on the roof top at a height of 10m. Wind speed, wind direction, relative humidity and temperature & Rainfall were recorded at hourly intervals contineously.

The sampling locations of Ambient Air Quality in the Power plant premises covering upwind and down wind direction . To assess the effect of industrial activity of power plant on the air, environmental parameters like Particulate Matter-$PM_{10}$, Particulate Matter-$PM_{2.5}$, Sulphur Dioxide-$SO_2$, Nitrogen Dioxide –$NO_2$ were monitored Details of the sampling locations with respect to the plant site are given below in **Table-2.1** .

**Table 2.1 Ambient Air Quality Monitoring Location**

| Code | Name of the monitoring Station | Distance from plant boundry (km) | Direction with respect to plant | Environmental Setting | Remarks |
|---|---|---|---|---|---|
| A1 | **Near AWRS** | Within Plant | - | Within Plant | Industrial area |
| A2 | **Near Brick Plant** | Within Plant | - | Within Plant | Industrial area |
| A3 | **Near China colony** | Within Plant | - | Within Plant | Industrial area |

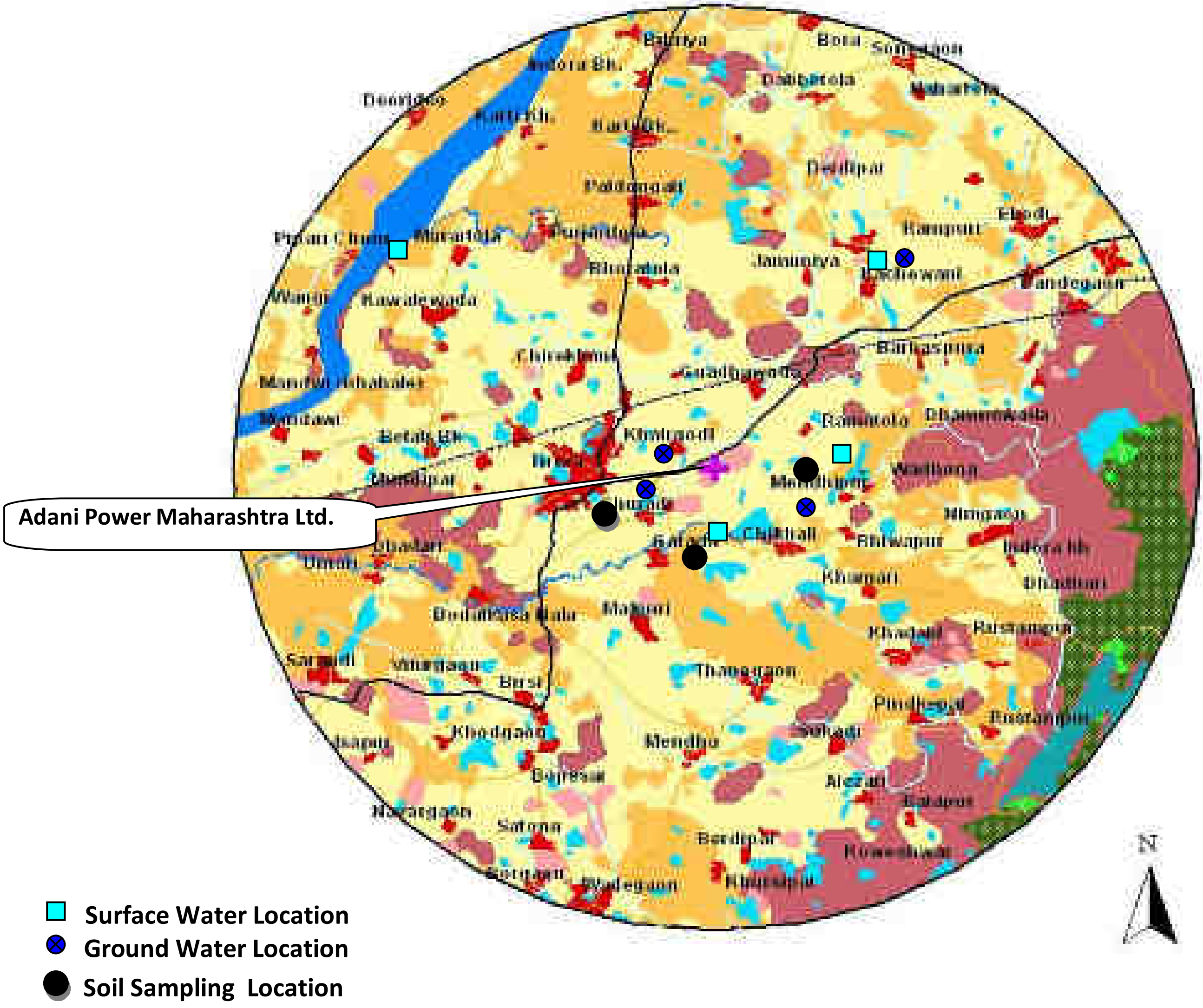


**Figure : 2.1 SAMPLING LOCATIONS MAP**

## 2.2 Water Quality

Water samples were collected at various locations within the area of 10 Km radius from the plant to assess the Physico-Chemical quality of Surface and Ground Quality water. Samples were collected as per the standard procedures. On site Parameters like Temperature, Electrical Conductivity, pH and Dissolved Oxygen were analyzed at-site using portable water analysis kit. Samples were collected by taking suitable precautions for preparation and transportation, particularly using sterilized bottles for bacteriological analysis. The details of the sampling locations are given in **Table-2.2** and **Figure.2.1** as depicted.

Water samples were collected on quarterly basis from 8 locations (Ground water 4, Surface water-4 Analytical methods mentioned in IS: 3025 and Standard Methods published by APHA were followed.

## TABLE-2.2 WATER SAMPLING LOCATIONS

| **Surface Water** | | | | |
|---|---|---|---|---|
| **Code** | **Name of the monitoring Station** | **Distance from plant boundry (km)** | **Direction respect to plant** | **Source** |
| **SW1** | **Wainganga River Water** | **7.0** | **NW** | **River** |
| **SW2** | **Mendipur Pond Water** | **2.0** | **SE** | **Pond** |
| **SW3** | **Garada Village Nalah water** | **3.0** | **SSW** | **Nalah water** |
| **SW4** | **Kachewani Pond water** | **3.0** | **NE** | **Pond water** |
| **Ground Water** | | | | |
| **GW1** | **Kachewani Hand Pump** | **3.2** | **NE** | **Bore well** |
| **GW2** | **Mendipur Hand Pump** | **2.5** | **SE** | **Bore well** |
| **GW3** | **Garada Hand Pump** | **3.2** | **SW** | **Bore well** |
| **GW4** | **Chikhali Hand Pump** | **2.0** | **S** | **Bore well** |
| **Waste Water** | | | | |
| **WW1** | **Cooling Tower Blow Down water Unit-1** | | | **In Plant** |
| **WW2** | **Cooling Tower Blow Down water Unit-2** | | | **In Plant** |
| **WW3** | **Cooling Tower Blow Down water Unit-3** | | | **In Plant** |
| **WW4** | **Cooling Tower Blow Down water Unit-4** | | | **In Plant** |
| **WW5** | **Cooling Tower Blow Down water Unit-5** | | | **In Plant** |
| **WW6** | **Boiler Blow down Water Unit-2** | | | **In Plant** |
| **Piezometric Well water** | | | | |
| **P1** | **Near AWRPH** | | | **In Plant** |
| **P2** | **B/H Ash dyke -1** | | | **In Plant** |
| **P3** | **Near Raw Water pump house -02** | | | **In Plant** |

## 2.3 Noise Level:

Noise level at following in plant location and Buffer zone location were recorded by APML for the period of APR.2021- SEPT. 2021. Location details are given in **Table-2.3**. and as depicted in **Figure.2.1**

**TABLE: 2.3 NOISE LEVEL LOCATIONS FOR THE PERIOD OF Apr.2021- Sept.2021**

| Code | Location | Location type | Remarks |
|---|---|---|---|
| NL- 1 | Inside the plant | Near Shanti Niketan I, II & III | Industrial |
| NL- 2 | | Near Labour Hutment | Industrial |
| NL- 3 | | Near Store Area | Industrial |
| NL- 4 | | Gate No.1 | Industrial |
| NL- 5 | | Gate No.2 | Industrial |
| NL- 6 | | Gate No.3 | Industrial |
| NL-7 | | Near OHC | Industrial |
| NL-8 | | Railway Siding | Industrial |
| NL-9 | | Near Reservoir 2 | Industrial |
| NL-10 | | Near Ash Water Recovery Pump House | Industrial |
| NL-11 | | In China Colony | Industrial |

## 2.4 Soil Quality:

Soil Samples collected at 3 location around the plant zone on the seasonal basis for the period of Apr.2021-Sept. 2021 Location details are given in **Table-2.4**. and as depicted in **Figure.2.1**

**TABLE: 2.4 SOIL SAMPLING LOCATIONS FOR THE PERIOD OF Apr.2021-Sept-2021**

| Code | Location | Location type | Remarks |
|---|---|---|---|
| S1 | Buffer Zone | Garada Village | Agricultural Field |
| S2 | | Mendipur Village | Agricultural Field |
| S3 | | Churadi Village | Agricultural Field |

## 2.5 Methodology of Monitoring

### 2.5.1 Instruments Used

Samples were collected at *'Ambient Air'* monitoring locations' using standard *Fine dust sampler &* RDS sampler for monitoring $PM_{10}$, $PM_{2.5}$, $SO_2$, $NO_2$, concentrations and analyzed as per *USEPA / IS* methods in APML Laboratories at site

Also Continuous Ambient Air Monitoring station installed (CAAQMS) at APML make Tyledyne and Met One instrument approved by USEPA.

On site Micro-meteorological data for wind direction, wind Speed, Temp, Relative humidity and Rainfall collected from APML.

Ground water, Surface water & Effluent water were analyzed for onsite parameters likeTemperature, Electrical Conductivity, pH and Dissolved Oxygen were analyzed on-site using portable water analysis kit**.** Samples are collected, preserved and sent for further analysis to Enviro Analysts & Engineers Pvt. Ltd, where other parameters like total hardness, chlorides, sulphate etc and heavy metals are analyzed as per requirements IS 3025/APHA methods.

Soil samples were analyzed for physical, chemical and heavy metal concentrations, using analytical methods.

Noise was measured at site locations using a noise level meter to determine sound levels in a scale as dB (A) This is suitable for audible range of 20 to 20,000 Hz for human being. Sound level monitoring done by APML.

Stack Monitoring kit having sensor probe was used to monitor stack data like Flue gas velocity, Volumetric flow of flue gas, Temperature of flue gas, Moisture content and other parameters like SPM, $SO_2$, $NO_2$ make by ECOTECH

### 2.5.2 Method of Analysis

Air samples were analyzed as per standard methods specified by Central Pollution Control Board (CPCB), EPA & IS method.

### *2.5.2.1 Meteorology*

Micro-meteorological data was observed for wind direction and speed using wind vane and anemometer using an automatic met logger. The data was recorded at 1 hour interval. Wind speed & wind direction, Temperature, Rain fall, Relative humidity were recorded by Weather Monitoring Station by APML.

### *2.5.2.2 Ambient Air Quality (AAQ)*

Sampling was carried out at each station during the stipulated study period using pre-calibrated Respirable Dust Samplers and Fine Dust Sampler in each of the stations by APML.

Earmarked samples were collected for Particulate Matter-$PM_{10}$, Particulate Matter-$PM_{2.5}$, $SO_2$ and $NO_2$ for 24 hourly.

The baseline data of air environment is generated for the parameters namely: Particulate Matter-$PM_{10,}$ Particulate Matter-$PM_{2.5}$, Sulphur Dioxide $SO_{2,}$ and Nitrogen Dioxide $NO_2$ in APML

### 2.5.2.3 Stack Monitoring

Stack emission were analyzed with the help of stack Kit (ECOTECH Stack Kit & Prob set, quarterly basis at Boiler Stack situated in plant. Height of the Boiler Stack was noted as, 275 m and I.D. 7.4m.Flue gas, Velocity, Temperature, Volume & Qty, Moisture Content, PM, $SO_2$, $NO_2$, Hg were analyzed. The values obtained were then compared vis-a-vis with the standards prescribed by CPCB.

Iso-kinetic stack monitoring was conducted as per standard method IS 11255 (Part-3) specified in Emission Regulation Act Part to determine PM, $SO_2$ and $NO_2$, Data was collected and analysis was done for other parameters like Flue gas Velocity, Temperature, Volumetric flow rate, Moisture contents.

### 2.5.2.4 Water/Waste Water Quality

Water/Waste water samples were collected for physico-chemical and bacteriological parameters taking suitable Precautions. Temperature, pH, Dissolved Oxygen and Electrical conductivity were measured in the field while collecting the samples. Sterilized bottles were used to collect samples for bacteriological analysis, stored in ice and transported to the Laboratory.

Ground and surface water samples were analysed as per IS: 10500 and Waste Water samples were analysed as per IS: 3025. The analytical methods mentioned in IS: 3025 and Standard Methods published by APHA were followed. MPN Index of coli forms was found as per standard methods (IS: 1622).

### 2.5.2.5 Noise Level

Noise is defined as unwanted sound that creates interferences in speech, communication, causes annoyance, disturbance in work concentration and sleep, thus deteriorating the quality of Noise environment. In the present study, Noise monitoring has been conducted regularly by APML Since loudness of sound is the important parameter to assess the effects of particular activities on human being, hence noise level is measured for noise environment assessment. Hourly Sound Pressure level (SPL) was recorded with Sound Level Meter for 24 hours.

## 2.6 Analytical Procedures

### 2.6.1 Meteorology

The data obtained from field is used to as certain the wind percentage frequencies in the sixteen directions for wind speeds using Beaufort's scale in the range of 0-1.8, 1.8-3.6, 3.6 – 7.2, 7.2 – 14.4, 14.4 – 28.8 and >28.8 kmph. Average wind roses at twenty four hourly are prepared from the data collected. Temperature, Relative Humidity is monitoring by Automatic Weather Monitor (WM 271, Envirotech) and Rain fall by using Rain Gauge of WM 271.

### 2.6.2 Ambient Air Quality

Whatman GF/A & PTFE filter paper was used in Respirable dust sampler RSPM and FDS and weighed in Mettler electronic balance and computed as per standard methods.
Ambient Air samples were analyzed for $SO_2$ concentration levels by using Improved West-Gaeke method using spectrophotometer (HACH DR 5000) at a wavelength of 560 nm. NO2 conc. levels were estimated using Jacob and Hocheiser modified (Na-As) method using spectrophotometer (HACH DR 5000) at a wavelength of 540 nm

Sampling and Analytical Techniques

The techniques used for ambient air quality monitoring and minimum detectable levels are given in **Table-2.5**

**TABLE- 2.5 (TECHNIQUES USED FOR AMBIENT AIR QUALITY MONITORING)**

| Sr. No. | Parameter | Technique | Technical protocol | Minimum detectable limit (µg/$m^3$) |
|---|---|---|---|---|
| 1 | PM10 | Respirable Dust Sampler (Gravimetric Method) | IS-5182 (Part-IV) | 5.0 |
| 2 | PM2.5 | Fine Respirable Dust Sampler (Gravimetric Method) | IS-5182 (Part-IV) | 5.0 |
| 3 | Sulphur dioxide | Improved West & Gaeke Method | IS-5182 (Part-II) | 4.0 |
| 4 | Nitrogen dioxide | Modified Jacob & Hochheiser Method | IS-5182 (Part-VI) | 4.0 |

# Chapter – 3

# DATA ANALYSIS

## 3.0 DATA ANALYSIS

Environmental monitoring for the period of APR.2021- SEPT. 2021 consisted of collection and analysis of meteorological parameters, ambient air quality and ground water and surface water quality at different locations within study area selected for carrying out environmental monitoring around the plant site.

## 3.1 Meteorology

Meteorological data was collected by APML on hourly basis for wind speed, Wind direction, temperature and relative humidity continuously. Total Rain fall on monthly basis during the period of APR.2021-SEPT. 2021 was measured and recorded and reported in the Environmental report.

**Wind Pattern for the period APR.2021- SEPT. 2021.**

The data recorded during the study period was analyzed and the daily maximum, minimum and total of all the parameters were observed. The summary of all the meteorological observations is given in **Table-3.1**.

**TABLE- 3.1 METEOROLOGICAL DATA MONITORED AT SITE**

**(for the period of APR.2021- SEPT. 2021)**

| **Month** | **Temperature ( $^0$C)** | | **Relative Humidity (%)** | | **Rainfall (mm)** |
|---|---|---|---|---|---|
| | Max | Min | Max | Min | (Total) |
| April 2021 | 44.9 | 19.3 | 68.3 | 20.1 | 0 |
| May 2021 | 43.6 | 18.6 | 92.7 | 11.6 | 36.1 |
| Jun. 2021 | 40.2 | 19.1 | 81.1 | 22.7 | 181 |
| July 2021 | 38.6 | 19.4 | 81.5 | 32.1 | 365.1 |
| Aug. 2021 | 35.2 | 19.2 | 82.5 | 35.6 | 234.5 |
| Sept. 2021 | 34.9 | 21.3 | 86.1 | 35.8 | 287.0 |

### Temperature

The Temperature for the month of APR.2021- SEPT. 2021 was found to be within range of 19.1°C – 44.9°C.

### Relative Humidity

The average relative humidity for the month of APR.2021- SEPT. 2021 was found to be within range of 11.6-92.7%.

### Rain Fall

Total Rain fall found the period of APR.2021- SEPT. 2021 was 1103.7mm

### Wind Speed/Direction

The wind speed and direction data collected during the period of APR.2021- SEPT. 2021. The wind roses plot using the collected data for APR.2021- SEPT. 2021 is given in **Figure-3.1**

The first predominant wind direction during APR.2021- SEPT. 2021 was W. The calm condition ranges from 0 to 54.6%.

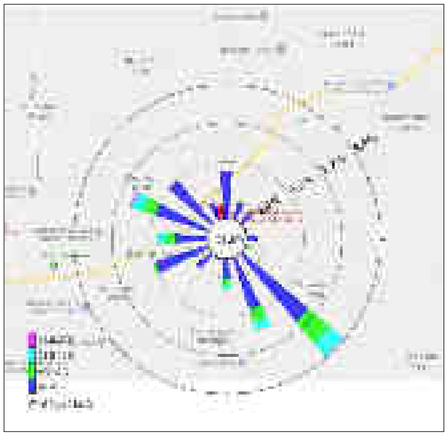
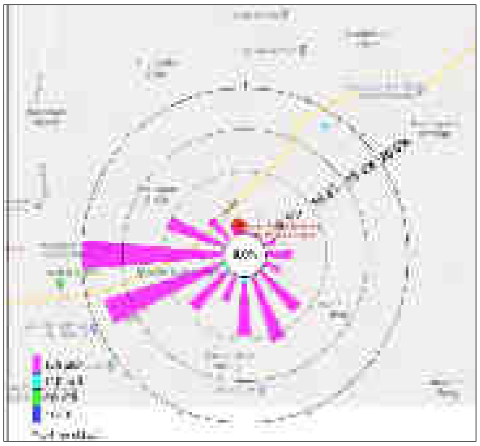
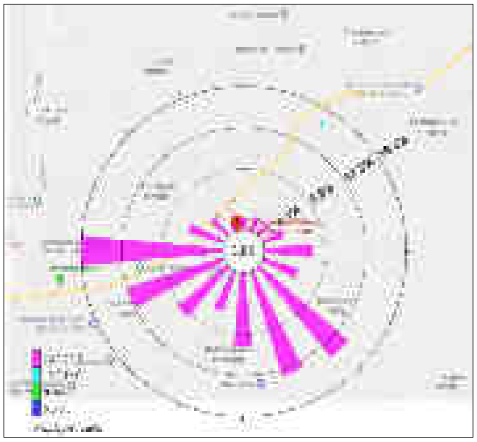
| | |
|---|---|
|  |  |
| **Wind rose for Apr. 2021** | **Wind rose for May 2021** |
|  |  |
| **Wind rose for Jun. 2021** | **Wind rose for July. 2021** |
|  |  |
| **Wind rose for Aug. 2021** | **Wind rose for Sept. 2021** |

**FIGURE-3.1 SITE SPECIFIC WINDROSE FOR APR. 2021- SEPT. 2021**

## 3.2 Ambient Air Quality

Ambient air quality has been carried out within plant for the period of APR.2021- SEPT. 2021. $PM_{10}$, $PM_{2.5}$, $SO_2$ & $NO_2$, sampling at all the locations is done for 24 hours average twice a week by APML. The values obtained were then compared vis-a-vis the standards prescribed by CPCB for Industrial/ Rural / Residential uses.

### 3.2.1 Presentation of Results.

The summary of Ambient Air Quality monitoring results for the period of APR.2021- SEPT. 2021 are presented in detail in **Table 3.2** for Inside plant area. 98th percentile; maximum and minimum values etc have been computed from the collected raw data for all the AAQ monitoring station. The data has been compared with the standards prescribed by Central Pollution Control Board (CPCB)/NAAQ for residential and rural zone.

### Particulate Matter-PM10

The minimum and maximum concentrations during APR.2021- SEPT. 2021 in the plant area location for Particulate Matter-$PM_{10}$ were recorded as 19.1 $\mu g/m^3$ and 96.0 $\mu g/m^3$ respectively. The minimum concentration was recorded at Near China colony (A3) and maximum concentration at Near AWRS (A1).

### Particulate Matter-$PM_{2.5}$

The minimum and maximum concentrations in the plant area location for $PM_{2.5}$ were recorded as 7.9$\mu g/m^3$ and 38.5 $\mu g/m^3$ respectively. The minimum concentration was recorded at Near China colony (A3) and maximum concentration at Near AWRS (A1).

### Sulphur Dioxide ($SO_2$)

The minimum and maximum $SO_2$ concentrations in the plant area location were recorded as 4.4$\mu g/m^3$ and 17.2 $\mu g/m^3$ respectively. The minimum concentration was recorded at Near Brick Plant (A2) and maximum concentration was recorded at Near Brick Plant (A2) respectively.

## Nitrogen Dioxide ($NO_2$)

The minimum and maximum $NO_2$ concentrations in the plant area location were recorded as 7.8 µg/$m^3$ and 30.7 µg/$m^3$ respectively. The minimum concentration was recorded at Near AWRS (A1) and maximum concentration was recorded at Near Brick Plant(A2) respectively.

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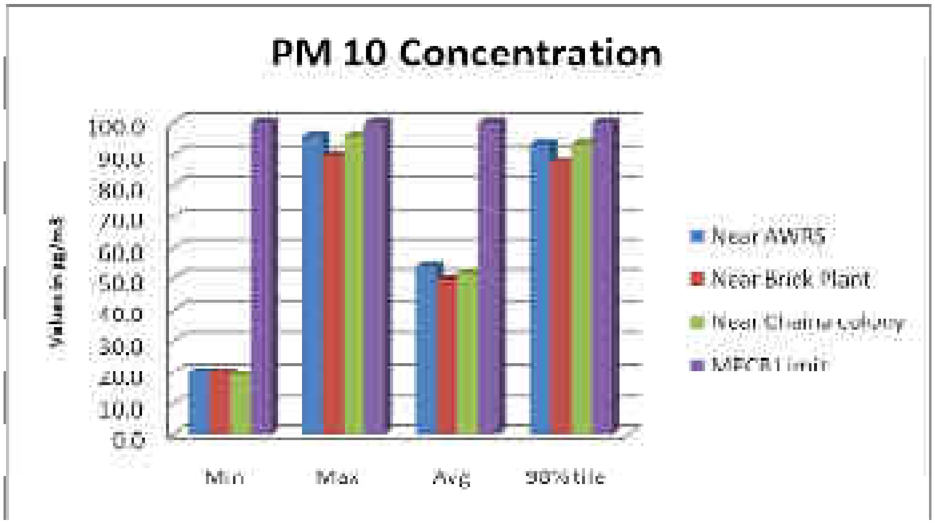
### TABLE- 3.2 SUMMARY OF AMBIENT AIR QUALITY RESULT

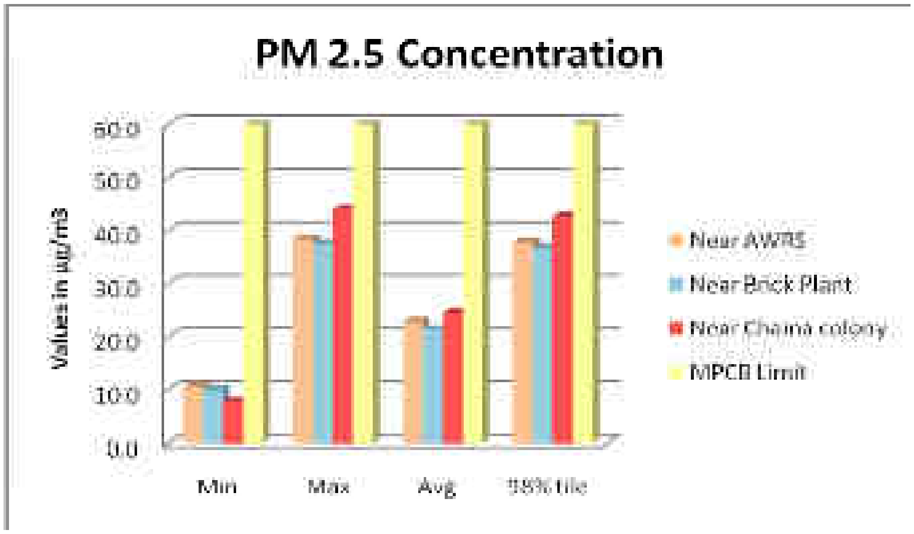
### ( Inside Plant Premises)

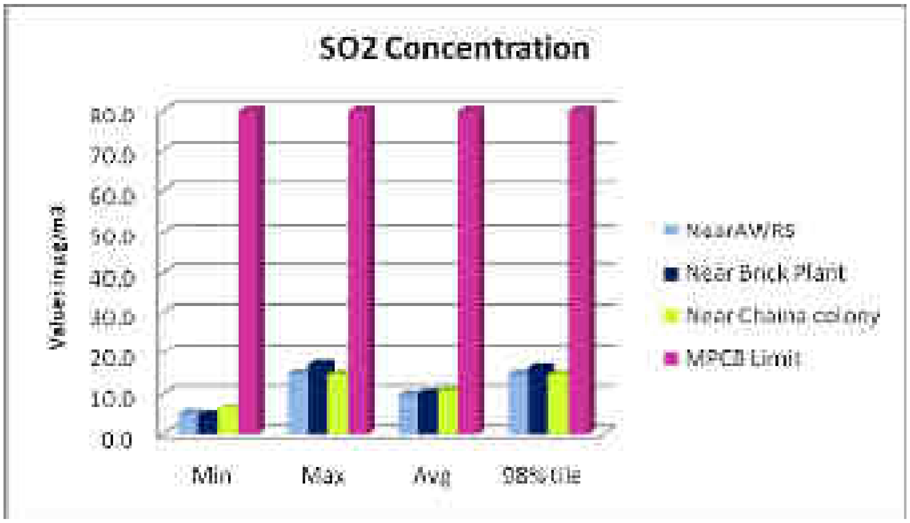
### for the period of Apr 2021- Sept. 2021

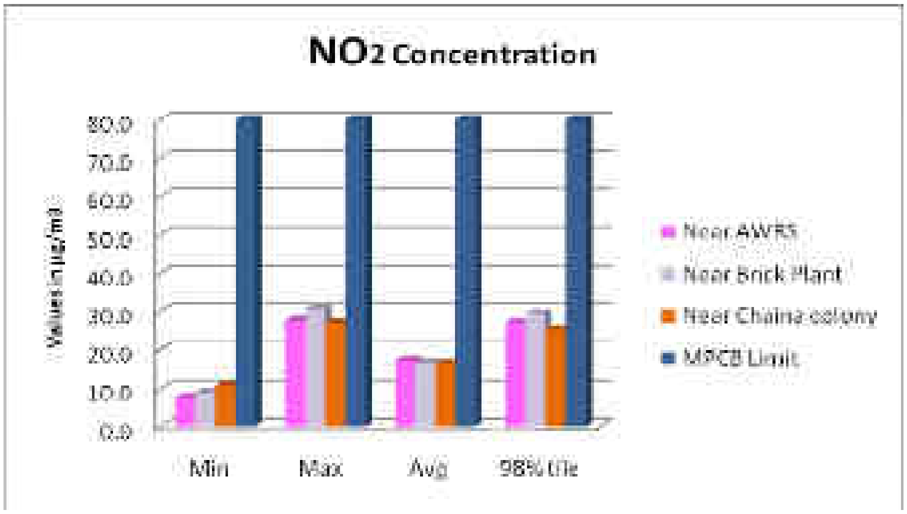
**All values are µg/m3**

| Location | $PM_{10}$ | | | | $PM_{2.5}$ | | | | $SO_2$ | | | | $NO_2$ | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Min | Max | Avg | 98% tile | Min | Max | Avg | 98% tile | Min | Max | Avg. | 98% tile | Min | Max | Avg. | 98% tile |
| **Near AWRS** | 20.3 | 96.0 | 54.3 | 93.3 | 10.6 | 38.5 | 23.1 | 37.9 | 4.8 | 14.9 | 9.9 | 14.8 | 7.8 | 27.7 | 17.3 | 27.1 |
| **Near Brick Plant** | 20.0 | 89.7 | 49.7 | 87.8 | 10.1 | 37.6 | 21.4 | 36.8 | 4.4 | 17.2 | 10.1 | 16.5 | 9.1 | 30.7 | 16.8 | 29.5 |
| **Near Chaina colony** | 19.1 | 95.8 | 51.5 | 93.5 | 7.9 | 44.1 | 24.6 | 42.9 | 6.3 | 14.8 | 10.8 | 14.7 | 10.8 | 27.1 | 16.5 | 25.3 |
| **MPCB Limit** | **100** | | | | **60** | | | | **80** | | | | **80** | | | |




PM 2.5 Concentration
Values in µg/m3
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Min
Max
Avg
98% tile
Near AWRS
Near Brick Plant
Near Chaina colony
MPCB Limit


SO2 Concentration
Values in µg/m3
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Min
Max
Avg
98% tile
NearAWRS
Near Brick Plant
Near Chaina colony
MPCB Limit


NO2 Concentration
Values in µg/m3
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Min
Max
Avg
98% tile
Near AWRS
Near Brick Plant
Near Chaina colony
MPCB Limit

## 3.3 Stack Monitoring.

Stack monitoring is done with the help of stack Kit (ECOTECH Stack Kit) & Prob set, once in a quarter at Boiler Stack 1 to 5 situated in plant. Height of the Boiler Stack was noted as, 275m and I.D. 7.4m.Flue gas, Velocity, Temperature, Volume & Qty, PM, $SO_2$, $NO_x$, Hg are analysed. The values obtained are then compared vis-a-vis with the standards prescribed by CPCB.

### 3.3.1 Presentation of Results.

The Stack analysis results for the period of APR.2021- SEPT. 2021 are presented in detail for various parameters like Flue gas, Velocity, Temperature, Volume & Qty, SPM, $SO_2$, NOx, Hg values etc computed from the collected raw data for the Stack monitoring station. The summary of these results is presented below. The data has been compared with the standards prescribed by Central Pollution Control Board (CPCB)/MPCB

**TABLE- 3.3 Stack Analysis Report for the period of Apr. 2021 - Sept.-2021**

**Power Plant** (Unit-I to Unit 5)

| **PARAMETERS** | **CONCENTRATION** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Unit I** | | **Unit 2** | | **Unit 3** | | **Unit 4** | | **Unit 5** | |
| **Date of Sampling** | **Jun2021** | **Sept. 2021** | **Jun2021** | **Sept. 2021** | **Jun2021** | **Sept. 2021** | **Jun2021** | **Sept. 2021** | **Jun2021** | **Sept. 2021** |
| **Diameter of Stack (M)** | 7.4 | 7.4 | 7.4 | 7.4 | 7.4 | 7.4 | 7.4 | 7.4 | 7.4 | 7.4 |
| **Height of Stack (M)** | 275 | 275 | 275 | 275 | 275 | 275 | 275 | 275 | 275 | 275 |
| **Temp. of exit gas (0 C)** | 135 | 118 | 127 | 123 | 131 | 124 | 134 | 115 | 132 | 117 |
| **Velocity of exit gas (m/sec)** | 23.9 | 23.74 | 23.7 | 23.53 | 23.85 | 23.96 | 23.97 | 23.30 | 23.66 | 23.44 |
| **Flow of exit gas at stack temp. & Press.( m3/hr)** | 3698567.0 | 3673806.78 | 3667616.71 | 3641308.91 | 3690829.48 | 3707852.17 | 3709399.69 | 3605716.0 | 3661426.64 | 3627381.25 |
| **Flow of exit gas at NTP(Nm3/hr)** | 2593348.2 | 2659986.44 | 2623079.47 | 2603168.06 | 2613545.78 | 2644062.84 | 2607334.30 | 2630871.65 | 2586323.29 | 2633106.75 |
| **PM (mg/Nm3)** | 41.5 | 43.2 | 43.2 | 40.7 | 43.8 | 41.8 | 48.2 | 45.5 | 44.1 | 46.3 |
| **Total dust emission (kg/hr)** | 107.62 | 114.91 | 113.3 | 105.95 | 114.47 | 110.52 | 125.67 | 119.70 | 114.06 | 121.91 |
| **SO2 (mg/Nm3)** | 1120.8 | 946.6 | 1074.7 | 944.6 | 994.6 | 941.7 | 977.3 | 945.6 | 1017.6 | 932.6 |
| **SO2 (kg/hr)** | 2906.62 | 2517.94 | 2819.02 | 2458.95 | 2599.43 | 2489.91 | 2548.15 | 2487.75 | 2631.84 | 2455.63 |
| **SO2 (TPD)** | 69.76 | 60.43 | 67.66 | 59.01 | 62.4 | 59.75 | 61.15 | 59.70 | 63.16 | 58.93 |
| **NOx (mg/Nm3)** | 408.6 | 348.3 | 415.5 | 341.3 | 401.7 | 336.7 | 398.7 | 346.3 | 411.7 | 330.8 |
| **Mercury (mg/Nm3)** | 0.0176 | 0.0168 | 0.0168 | 0.0160 | 0.0171 | 0.0179 | 0.0176 | 0.0163 | 0.0162 | 0.0167 |

**Note: Values of PM, SO2 and NOx based on 6% O2**

## 3.4 Water Quality

Ground waters were collected at 4 locations and Surface water at 4 locations within the 10 km radial distance of power plant were analyzed as per IS 10500 to assess the quality of water for portability.

Presentation of Results

The results of the water quality monitored in the period of APR.2021- SEPT. 2021, that of four surface water and four ground water samples and seven drinking water samples. The surface water quality results are given in **Table-3.4**, the results of ground water quality is given in **Table-3.5** and the results of Waste water quality are given in **Table-3.6** the findings are discussed below.

### 3.4.1 Ground Water Quality.

Most of the villages in the Nearby plant area have hand pumps, as most of the residents of these area use of this water for drinking and other domestic uses.

The analysis results indicate that the pH ranges from 7.2 to 7.95 the maximum pH observed at Kachewani Village(GW1) and Minimum pH were observed at Medipur Village (GW2) which is well within the specified standard of 6.5 to 8.5.

Total hardness was observed to be ranging from 94 to 342 mg/l. The maximum hardness 342 mg/l was recorded at Kachewani Village (GW1) and the minimum hardness of 94 mg/l was recorded at Mendipur village(GW2), Which is well within the specified standard of 200(600) mg/l.

Chlorides were found to be in the range of 9.2 mg/l to 112.7mg/l, the maximum concentration of chlorides was observed at Kachewani Village (GW1) and the minimum concentration of chlorides was observed at Mendipur Village(GW2)

Sulphates were found to be in the range of 8.8 mg/l to 96.6 mg/l. The maximum value observed at Kachewani Village (GW1) and the minimum value observed at Mendipur Village(GW2).
The values of Chlorides and sulphate are acceptable limits.
The analysis results indicate all parameter including bacteriological and heavy metal parameters are well within the drinking water standards.

### 3.4.2 Surface Water Quality.

The analysis results indicate that the pH values in the range of 7.3 to 7.7the minimum and maximum value was observed at Wainganga River and Garada nalah water respectively which is well within the specified standard of 6.5 to 8.5.

TDS was observed in the range of 100 mg/l to284 mg/l, the maximum TDS value was observed at Garada Nalah where as minimum value was observed in Wainganga River, where as TDS is within Desirable limits.

Chlorides and Sulphates were found to be in the range of 9.0 to 16.4 mg/l and 5.7 to 10.6 mg/l respectively. It is observed that value of chlorides and Sulphates are well within acceptable limits. It is evident from the above values that all the parameters are found to comply with the requirements of IS: 10500 specification of surface water except bacteriological parameters. The surface water quality does not indicate any industrial contamination.

Heavy metals concentrations for metals like Arsenic (As), Mercury (Hg), Lead (Pb), Cadmium (Cd), Chromium (Cr) and Copper (Cu) were found to be within the acceptable limits.

### 3.4.3 Waste Water Quality

Waste water samples were also collected from Cooling Tower Blodown of unit 1 to 5, Analytical methods mentioned in IS: 3025 and Standard Methods published by APHA were followed. The summary of waste water quality collected on quarterly basis for the period of Apr. 2021- Sept 2021 are given in **Table-3.6**

### 3.4.4 Pizo-Metric water

There were 3 Pizo meteric monitoried for water level and collected water samples were analyzed as per IS: 3025 and Standard Methods published by APHA were followed. The summary of pizo-metric water quality collected on quarterly basis for the period of APR. 2021- SEPT. 2021 are given in **Table-3.7**

## 3.5 Noise Level:

Noise level was measured by APML in basic units of dB(A) at eleven location inside the plant (industrial Area) during day time and Night time for 24Hrs.

Noise level was found within the acceptable limits during daytime as well as night time for all locations with reference to CPCB standard limits for Industrial area and Residential area.

Noise levels at following locations were recorded for the period of APR. 2021- SEPT. 2021 on monthly basis. The summary of Noise Level is given in **Table-3.8**

## 3.6 Soil Quality

Soil samples were collected at 3 locations within the 10 km radial distance of power plant were analyzed as per IS:2720 . The analysis results given in **Table-3.9.**

### TABLE- 3.4 SURFACE WATER QUALITY

**SW1: Wainganga River Water**

| Sr. No. | Test Parameters | Unit | As per IS 10500 : 2012 | Results | |
|---|---|---|---|---|---|
| | | | | Jun 2021 | Sept. 2021 |
| 1 | **Apparent Colour** | Hazen units | 5 (15) | 7.5 | 3.5 |
| 2 | **Odour** | - | Agreeable | Agreeable | Agreeable |
| 3 | **Taste** | - | Agreeable | - | - |
| 4 | **Turbidity NTU** | NTU | 1(5) | 5.5 | 2.0 |
| 5 | **Total Dissolved Solid** | mg / l | 500 (2000) | 100 | 110 |
| 6 | **Electrical Conductivity** | µS/cm | - | 162 | 174 |
| 7 | **Total Alkalinity** | mg / l | 200 (600) | 68 | 46 |
| 8 | **pH Value** at 25°C | - | 6.5 to 8.5 | 7.4 | 7.3 |
| 9 | **Total Hardness ( CaCO3)** | mg / l | 200 (600) | 76 | 78 |
| 10 | **Calcium (as Ca)** | mg / l | 75 (200) | 24.8 | 24.2 |
| 11 | **Magnesium (as Mg)** | mg / l | 30 (100) | 3.4 | 4.25 |
| 12 | **Copper as(Cu)** | mg / l | 0.05(1.5) | < 0.01 | < 0.01 |
| 13 | **Iron (as Fe)** | mg / l | 0.3 | < 0.07 | 0.07 |
| 14 | **Manganese as (Mn)** | mg / l | 0.1(0.3) | < 0.01 | < 0.01 |
| 15 | **Chlorides (as Cl)** | mg / l | 250(1000) | 9.0 | 9.8 |
| 16 | **Sulphate (as SO4)** | mg / l | 200 (400) | 5.7 | 6.7 |
| 17 | **Nitrates (as NO3)** | mg / l | 45 | 2.55 | 2.40 |
| 18 | **Fluoride (as F)** | mg / l | 1.0 (1.5) | 0.25 | 0.20 |
| 19 | **Phenolic Compounds** | mg / l | 0.001 | BDL | BDL |
| 20 | **Mercury as (Hg)** | mg / l | 0.001 | < 0.0005 | < 0.0005 |
| 21 | **Cadmium as (Cd)** | mg / l | 0.003 | < 0.001 | < 0.001 |
| 22 | **Selenium as (Se)** | mg / l | 0.01 | < 0.001 | < 0.001 |
| 23 | **Arsenic as (As)** | mg / l | 0.01 (0.05) | < 0.01 | < 0.01 |
| 24 | **Cyanide as (CN)** | mg / l | 0.05 | < 0.005 | < 0.005 |
| 25 | **Lead as (Pb)** | mg / l | 0.01 | < 0.001 | < 0.001 |
| 26 | **Zinc as (Zn)** | mg / l | 5 (15) | 0.11 | 0.10 |
| 27 | **Total Chromium as (Cr )** | mg / l | 0.05 | < 0.03 | < 0.03 |
| 28 | **Mineral Oil** | mg / l | 0.05 | < 0.01 | < 0.01 |
| 29 | **Free Residual Chlorine** | mg / l | 0.2 (1.0) | Nil | Nil |
| 30 | **Total Coliform** | MPN/100 ml | Absent | >16 | >16 |
| 31 | **E. Coli** | Nos./100 ml | Absent | >16 | >16 |

Note : Standards limit given as Acceptable Limit (Permissible Limit)

## SW2: Mendipur Pond Water

| Sr. No. | Test Parameters | Unit | As per IS 10500 : 2012 | Results | |
|---|---|---|---|---|---|
| | | | | **Jun 2021** | **Sept. 2021** |
| 1 | **Apparent Colour** | Hazen units | 5 (15) | 8.0 | 6.0 |
| 2 | **Odour** | - | Agreeable | Agreeable | Agreeable |
| 3 | **Taste** | - | Agreeable | - | - |
| 4 | **Turbidity NTU** | NTU | 1(5) | 6.5 | 3.5 |
| 5 | **Total Dissolved Solid** | mg / l | 500 (2000) | 140 | 122 |
| 6 | **Electrical Conductivity** | µS/cm | - | 228 | 202 |
| 7 | **Total Alkalinity** | mg / l | 200 (600) | 122 | 124 |
| 8 | **pH Value** at 25°C | - | 6.5 to 8.5 | 7.65 | 7.40 |
| 9 | **Total Hardness ( CaCO3)** | mg / l | 200 (600) | 88 | 92 |
| 10 | **Calcium (as Ca)** | mg / l | 75 (200) | 26.2 | 27.2 |
| 11 | **Magnesium (as Mg)** | mg / l | 30 (100) | 5.5 | 5.8 |
| 12 | **Copper as(Cu)** | mg / l | 0.05(1.5) | < 0.01 | < 0.01 |
| 13 | **Iron (as Fe)** | mg / l | 0.3 | 0.070 | 0.074 |
| 14 | **Manganese as (Mn)** | mg / l | 0.1(0.3) | 0.008 | 0.007 |
| 15 | **Chlorides (as Cl)** | mg / l | 250(1000) | 10.3 | 10.8 |
| 16 | **Sulphate (as SO4)** | mg / l | 200 (400) | 8.5 | 9.1 |
| 17 | **Nitrates (as NO3)** | mg / l | 45 | 2.85 | 2.65 |
| 18 | **Fluoride (as F)** | mg / l | 1.0 (1.5) | 0.30 | 0.30 |
| 19 | **Phenolic Compounds** | mg / l | 0.001 | BDL | BDL |
| 20 | **Mercury as (Hg)** | mg / l | 0.001 | < 0.0005 | < 0.0005 |
| 21 | **Cadmium as (Cd)** | mg / l | 0.003 | < 0.001 | < 0.001 |
| 22 | **Selenium as (Se)** | mg / l | 0.01 | < 0.001 | < 0.001 |
| 23 | **Arsenic as (As)** | mg / l | 0.01 (0.05) | < 0.01 | < 0.01 |
| 24 | **Cyanide as (CN)** | mg / l | 0.05 | < 0.005 | < 0.005 |
| 25 | **Lead as (Pb)** | mg / l | 0.01 | < 0.001 | < 0.001 |
| 26 | **Zinc as (Zn)** | mg / l | 5 (15) | 0.11 | 0.10 |
| 27 | **Total Chromium as (Cr )** | mg / l | 0.05 | < 0.03 | < 0.03 |
| 28 | **Mineral Oil** | mg / l | 0.05 | < 0.01 | < 0.01 |
| 29 | **Free Residual Chlorine** | mg / l | 0.2 (1.0) | Nil | Nil |
| 30 | **Total Coliform** | MPN/100 ml | Absent | > 16 | > 16 |
| 31 | **E. Coli** | Nos./100 ml | Absent | > 16 | > 16 |

**Note : Standards limit given as Acceptable Limit (Permissible Limit)**

**SW3: Garada Village Nalah water**

| Sr. No. | Test Parameters | Unit | As per IS 10500 : 2012 | Results | |
|---|---|---|---|---|---|
| | | | | Jun 2021 | Sept. 2021 |
| 1 | **Apparent Colour** | Hazen units | 5 (15) | 6.0 | 3.0 |
| 2 | **Odour** | - | Agreeable | Agreeable | Agreeable |
| 3 | **Taste** | - | Agreeable | - | - |
| 4 | **Turbidity NTU** | NTU | 1(5) | 5.5 | 1.5 |
| 5 | **Total Dissolved Solid** | mg / l | 500 (2000) | 284 | 118 |
| 6 | **Electrical Conductivity** | µS/cm | - | 460 | 196 |
| 7 | **Total Alkalinity** | mg / l | 200 (600) | 144 | 136 |
| 8 | **pH Value** at 25°C | - | 6.5 to 8.5 | 7.70 | 7.55 |
| 9 | **Total Hardness ( CaCO3)** | mg / l | 200 (600) | 182 | 90 |
| 10 | **Calcium (as Ca)** | mg / l | 75 (200) | 52.2 | 22.8 |
| 11 | **Magnesium (as Mg)** | mg / l | 30 (100) | 12.5 | 8.0 |
| 12 | **Copper as(Cu)** | mg / l | 0.05(1.5) | < 0.01 | < 0.01 |
| 13 | **Iron (as Fe)** | mg / l | 0.3 | 0.075 | 0.060 |
| 14 | **Manganese as (Mn)** | mg / l | 0.1(0.3) | < 0.01 | < 0.01 |
| 15 | **Chlorides (as Cl)** | mg / l | 250(1000) | 16.4 | 11.4 |
| 16 | **Sulphate (as SO4)** | mg / l | 200 (400) | 10.2 | 10.6 |
| 17 | **Nitrates (as NO3)** | mg / l | 45 | 2.85 | 2.85 |
| 18 | **Fluoride (as F)** | mg / l | 1.0 (1.5) | 0.30 | 0.30 |
| 19 | **Phenolic Compounds** | mg / l | 0.001 | BDL | BDL |
| 20 | **Mercury as (Hg)** | mg / l | 0.001 | < 0.0005 | < 0.0005 |
| 21 | **Cadmium as (Cd)** | mg / l | 0.003 | < 0.001 | < 0.001 |
| 22 | **Selenium as (Se)** | mg / l | 0.01 | < 0.001 | < 0.001 |
| 23 | **Arsenic as (As)** | mg / l | 0.01 (0.05) | < 0.01 | < 0.01 |
| 24 | **Cyanide as (CN)** | mg / l | 0.05 | < 0.005 | < 0.005 |
| 25 | **Lead as (Pb)** | mg / l | 0.01 | < 0.001 | < 0.001 |
| 26 | **Zinc as (Zn)** | mg / l | 5 (15) | 0.14 | 0.14 |
| 27 | **Total Chromium as (Cr )** | mg / l | 0.05 | < 0.03 | < 0.03 |
| 28 | **Mineral Oil** | mg / l | 0.05 | < 0.01 | < 0.01 |
| 29 | **Free Residual Chlorine** | mg / l | 0.2 (1.0) | Nil | Nil |
| 30 | **Total Coliform** | MPN/100 ml | Absent | > 16 | > 16 |
| 31 | **E. Coli** | Nos./100 ml | Absent | > 16 | > 16 |

**Note : Standards limit given as Acceptable Limit (Permissible Limit)**

## SW4: Kachewani Pond water

| Sr. No. | Test Parameters | Unit | As per IS 10500 : 2012 | Results | |
|---|---|---|---|---|---|
| | | | | **Jun 2021** | **Sept. 2021** |
| 1 | **Apparent Colour** | Hazen units | 5 (15) | 6.5 | 5.0 |
| 2 | **Odour** | - | Agreeable | Agreeable | Agreeable |
| 3 | **Taste** | - | Agreeable | - | - |
| 4 | **Turbidity NTU** | NTU | 1(5) | 5.4 | 3.0 |
| 5 | **Total Dissolved Solid** | mg / l | 500 (2000) | 220 | 268 |
| 6 | **Electrical Conductivity** | µS/cm | - | 358 | 436 |
| 7 | **Total Alkalinity** | mg / l | 200 (600) | 146 | 130 |
| 8 | **pH Value** at 25$^o$C | - | 6.5 to 8.5 | 7.55 | 7.40 |
| 9 | **Total Hardness ( CaCO3)** | mg / l | 200 (600) | 130 | 138 |
| 10 | **Calcium (as Ca)** | mg / l | 75 (200) | 40.8 | 42.2 |
| 11 | **Magnesium (as Mg)** | mg / l | 30 (100) | 6.8 | 7.9 |
| 12 | **Copper as(Cu)** | mg / l | 0.05(1.5) | < 0.01 | < 0.01 |
| 13 | **Iron (as Fe)** | mg / l | 0.3 | 0.070 | 0.079 |
| 14 | **Manganese as (Mn)** | mg / l | 0.1(0.3) | < 0.01 | < 0.01 |
| 15 | **Chlorides (as Cl)** | mg / l | 250(1000) | 12.6 | 12.8 |
| 16 | **Sulphate (as SO4)** | mg / l | 200 (400) | 9.7 | 10.5 |
| 17 | **Nitrates (as NO3)** | mg / l | 45 | 2.90 | 2.75 |
| 18 | **Fluoride (as F)** | mg / l | 1.0 (1.5) | 0.35 | 0.30 |
| 19 | **Phenolic Compounds** | mg / l | 0.001 | BDL | BDL |
| 20 | **Mercury as (Hg)** | mg / l | 0.001 | < 0.0005 | < 0.0005 |
| 21 | **Cadmium as (Cd)** | mg / l | 0.003 | < 0.001 | < 0.001 |
| 22 | **Selenium as (Se)** | mg / l | 0.01 | < 0.001 | < 0.001 |
| 23 | **Arsenic as (As)** | mg / l | 0.01 (0.05) | < 0.01 | < 0.01 |
| 24 | **Cyanide as (CN)** | mg / l | 0.05 | < 0.005 | < 0.005 |
| 25 | **Lead as (Pb)** | mg / l | 0.01 | < 0.001 | < 0.001 |
| 26 | **Zinc as (Zn)** | mg / l | 5 (15) | 0.11 | 0.12 |
| 27 | **Total Chromium as (Cr )** | mg / l | 0.05 | < 0.03 | < 0.03 |
| 28 | **Mineral Oil** | mg / l | 0.05 | < 0.01 | < 0.01 |
| 29 | **Free Residual Chlorine** | mg / l | 0.2 (1.0) | Nil | Nil |
| 30 | **Total Coliform** | MPN/100 ml | Absent | > 16 | > 16 |
| 31 | **E.Coli** | Nos./100 ml | Absent | > 16 | > 16 |

**Note : Standards limit given as Acceptable Limit (Permissible Limit)**

## TABLE- 3.5 GROUND WATER REPORT

**Monitoring Date**: 28.06.2021

| STATIC WATER LEVEL OF OPEN WELL | | | | | | |
|---|---|---|---|---|---|---|
| **Name of village** | **Plinth Height (m)** | **Diameter (m)** | **Water level from G.L. (m)** | **Shape** | **Total Depth of well from G.L (m)** | **Landmark** |
| **Mendipur** | 0.85 | 1.45 | 7.60 | Round | 11.00 | **Near Vitoba Ahinshak Suryavanshi Residence** |
| **Khairbori** | 1.10 | 1.83 | 5.55 | Round | 10.10 | **Near Hanuman Temple, Durga Temple** |
| **Churadi** | 1.20 | 2.60 | 7.50 | Round | 11.60 | **Near Primary School** |
| **Kachewani** | 1.5 | 4.80 | 9.70 | Round | 12.30 | **Opp. ZP. school** |

**Monitoring Date**: 16.09.2021

| STATIC WATER LEVEL OF OPEN WELL | | | | | | |
|---|---|---|---|---|---|---|
| **Name of village** | **Plinth Height (m)** | **Diameter (m)** | **Water level from G.L. (m)** | **Shape** | **Total Depth of well from G.L (m)** | **Landmark** |
| **Mendipur** | 0.85 | 1.45 | 1.20 | Round | 11.00 | **Near Vitoba Ahinshak Suryavanshi Residence** |
| **Khairbori** | 1.10 | 1.83 | 0.70 | Round | 10.10 | **Near Hanuman Temple, Durga Temple** |
| **Churadi** | 1.20 | 2.60 | 1.10 | Round | 11.60 | **Near Primary School** |
| **Kachewani** | 1.5 | 4.80 | 0.55 | Round | 12.30 | **Opp. ZP. school** |

## GROUND WATER QUALITY

**GW1: Kachewani Hand Pump water**

| Sr. No. | Test Parameters | Unit | As per IS 10500 : 2012 | Results | |
|---|---|---|---|---|---|
| | | | | **Jun 2021** | **Sept. 2021** |
| 1 | **Apparent Colour** | Hazen units | 5 (15) | 0.1 | 0.1 |
| 2 | **Odour** | - | Agreeable | Agreeable | Agreeable |
| 3 | **Taste** | - | Agreeable | Agreeable | Agreeable |
| 4 | **Turbidity NTU** | NTU | 1(5) | 0.1 | 0.1 |
| 5 | **Total Dissolved Solid** | mg / l | 500 (2000) | 562 | 730 |
| 6 | **Electrical Conductivity** | µS/cm | - | 930 | 1168 |
| 7 | **Total Alkalinity** | mg / l | 200 (600) | 182 | 210 |
| 8 | **pH Value** at 25°C | - | 6.5 to 8.5 | 7.70 | 7.95 |
| 9 | **Total Hardness ( CaCO3)** | mg / l | 200 (600) | 280 | 342 |
| 10 | **Calcium (as Ca)** | mg / l | 75 (200) | 74.2 | 80.8 |
| 11 | **Magnesium (as Mg)** | mg / l | 30 (100) | 23.0 | 34.0 |
| 12 | **Copper as(Cu)** | mg / l | 0.05(1.5) | < 0.01 | < 0.01 |
| 13 | **Iron (as Fe)** | mg / l | 0.3 | 0.095 | 0.12 |
| 14 | **Manganese as (Mn)** | mg / l | 0.1(0.3) | 0.010 | 0.010 |
| 15 | **Chlorides (as Cl)** | mg / l | 250(1000) | 86.4 | 112.7 |
| 16 | **Sulphate (as SO4)** | mg / l | 200 (400) | 82.2 | 96.6 |
| 17 | **Nitrates (as NO3)** | mg / l | 45 | 2.15 | 2.40 |
| 18 | **Fluoride (as F)** | mg / l | 1.0 (1.5) | 0.70 | 0.90 |
| 19 | **Phenolic Compounds** | mg / l | 0.001 | BDL | BDL |
| 20 | **Mercury as (Hg)** | mg / l | 0.001 | < 0.0005 | < 0.0005 |
| 21 | **Cadmium as (Cd)** | mg / l | 0.003 | < 0.001 | < 0.001 |
| 22 | **Selenium as (Se)** | mg / l | 0.01 | < 0.001 | < 0.001 |
| 23 | **Arsenic as (As)** | mg / l | 0.01 (0.05) | < 0.01 | < 0.01 |
| 24 | **Cyanide as (CN)** | mg / l | 0.05 | < 0.005 | < 0.005 |
| 25 | **Lead as (Pb)** | mg / l | 0.01 | < 0.001 | < 0.001 |
| 26 | **Zinc as (Zn)** | mg / l | 5 (15) | 0.34 | 0.4 |
| 27 | **Total Chromium as (Cr )** | mg / l | 0.05 | < 0.03 | < 0.03 |
| 28 | **Mineral Oil** | mg / l | 0.05 | < 0.01 | < 0.01 |
| 29 | **Free Residual Chlorine** | mg / l | 0.2 (1.0) | < 0.1 | < 0.1 |
| 30 | **Total Coliform** | MPN/100 ml | Absent | Absent | Absent |
| 31 | **E. Coli** | Nos./100 ml | Absent | Absent | Absent |

**Note : Standards limit given as Acceptable Limit (Permissible Limit)**

**GW2: Mendipur Hand Pump water**

| Sr. No. | Test Parameters | Unit | As per IS 10500 :2012 | Results | |
|---|---|---|---|---|---|
| | | | | Jun 2021 | Sept. 2021 |
| 1 | **Apparent Colour** | Hazen units | 5 (15) | 0.1 | 0.1 |
| 2 | **Odour** | - | Agreeable | Agreeable | Agreeable |
| 3 | **Taste** | - | Agreeable | Agreeable | Agreeable |
| 4 | **Turbidity NTU** | NTU | 1(5) | 0.1 | 0.1 |
| 5 | **Total Dissolved Solid** | mg / l | 500 (2000) | 377 | 162 |
| 6 | **Electrical Conductivity** | µS/cm | - | 612 | 270 |
| 7 | **Total Alkalinity** | mg / l | 200 (600) | 168 | 142 |
| 8 | **pH Value** at 25$^{o}$C | - | 6.5 to 8.5 | 7.55 | 7.20 |
| 9 | **Total Hardness ( CaCO3)** | mg / l | 200 (600) | 182 | 94 |
| 10 | **Calcium (as Ca)** | mg / l | 75 (200) | 51.8 | 21.2 |
| 11 | **Magnesium (as Mg)** | mg / l | 30 (100) | 12.8 | 9.9 |
| 12 | **Copper as(Cu)** | mg / l | 0.05(1.5) | < 0.01 | < 0.01 |
| 13 | **Iron (as Fe)** | mg / l | 0.3 | 0.090 | 0.058 |
| 14 | **Manganese as (Mn)** | mg / l | 0.1(0.3) | < 0.01 | < 0.01 |
| 15 | **Chlorides (as Cl)** | mg / l | 250(1000) | 23.5 | 9.2 |
| 16 | **Sulphate (as SO4)** | mg / l | 200 (400) | 13.7 | 8.8 |
| 17 | **Nitrates (as NO3)** | mg / l | 45 | 2.10 | 2.00 |
| 18 | **Fluoride (as F)** | mg / l | 1.0 (1.5) | 0.65 | 0.30 |
| 19 | **Phenolic Compounds** | mg / l | 0.001 | BDL | BDL |
| 20 | **Mercury as (Hg)** | mg / l | 0.001 | < 0.0005 | < 0.0005 |
| 21 | **Cadmium as (Cd)** | mg / l | 0.003 | < 0.001 | < 0.001 |
| 22 | **Selenium as (Se)** | mg / l | 0.01 | < 0.001 | < 0.001 |
| 23 | **Arsenic as (As)** | mg / l | 0.01 (0.05) | < 0.01 | < 0.01 |
| 24 | **Cyanide as (CN)** | mg / l | 0.05 | < 0.005 | < 0.005 |
| 25 | **Lead as (Pb)** | mg / l | 0.01 | < 0.001 | < 0.001 |
| 26 | **Zinc as (Zn)** | mg / l | 5 (15) | 0.24 | 0.10 |
| 27 | **Total Chromium as (Cr )** | mg / l | 0.05 | < 0.03 | < 0.03 |
| 28 | **Mineral Oil** | mg / l | 0.05 | < 0.01 | < 0.01 |
| 29 | **Free Residual Chlorine** | mg / l | 0.2 (1.0) | < 0.1 | < 0.1 |
| 30 | **Total Coliform** | MPN/100 ml | Absent | Absent | Absent |
| 31 | **E.Coli** | Nos./100 ml | Absent | Absent | Absent |

**Note : Standards limit given as Acceptable Limit (Permissible Limit)**

**GW3: Garada Hand Pump water**

| Sr. No. | Test Parameters | Unit | As per IS 10500 : 2012 | Results | |
|---|---|---|---|---|---|
| | | | | Jun 2021 | Sept. 2021 |
| 1 | **Apparent Colour** | Hazen units | 5 (15) | 0.1 | 0.1 |
| 2 | **Odour** | - | Agreeable | Agreeable | Agreeable |
| 3 | **Taste** | - | Agreeable | Agreeable | Agreeable |
| 4 | **Turbidity NTU** | NTU | 1(5) | 0.1 | 0.1 |
| 5 | **Total Dissolved Solid** | mg / l | 500 (2000) | 508 | 164 |
| 6 | **Electrical Conductivity** | µS/cm | - | 820 | 272 |
| 7 | **Total Alkalinity** | mg / l | 200 (600) | 190 | 152 |
| 8 | **pH Value** at 25°C | - | 6.5 to 8.5 | 7.65 | 7.30 |
| 9 | **Total Hardness ( CaCO3)** | mg / l | 200 (600) | 294 | 102 |
| 10 | **Calcium (as Ca)** | mg / l | 75 (200) | 76.8 | 22.2 |
| 11 | **Magnesium (as Mg)** | mg / l | 30 (100) | 24.8 | 11.3 |
| 12 | **Copper as(Cu)** | mg / l | 0.05(1.5) | < 0.01 | < 0.01 |
| 13 | **Iron (as Fe)** | mg / l | 0.3 | 0.09 | 0.077 |
| 14 | **Manganese as (Mn)** | mg / l | 0.1(0.3) | < 0.01 | < 0.01 |
| 15 | **Chlorides (as Cl)** | mg / l | 250(1000) | 80.5 | 13.0 |
| 16 | **Sulphate (as SO4)** | mg / l | 200 (400) | 29.6 | 10.6 |
| 17 | **Nitrates (as NO3)** | mg / l | 45 | 2.25 | 2.05 |
| 18 | **Fluoride (as F)** | mg / l | 1.0 (1.5) | 0.70 | 0.35 |
| 19 | **Phenolic Compounds** | mg / l | 0.001 | BDL | BDL |
| 20 | **Mercury as (Hg)** | mg / l | 0.001 | < 0.0005 | < 0.0005 |
| 21 | **Cadmium as (Cd)** | mg / l | 0.003 | < 0.001 | < 0.001 |
| 22 | **Selenium as (Se)** | mg / l | 0.01 | < 0.001 | < 0.001 |
| 23 | **Arsenic as (As)** | mg / l | 0.01 (0.05) | < 0.01 | < 0.01 |
| 24 | **Cyanide as (CN)** | mg / l | 0.05 | < 0.005 | < 0.005 |
| 25 | **Lead as (Pb)** | mg / l | 0.01 | < 0.001 | < 0.001 |
| 26 | **Zinc as (Zn)** | mg / l | 5 (15) | 0.30 | 0.30 |
| 27 | **Total Chromium as (Cr )** | mg / l | 0.05 | < 0.03 | < 0.03 |
| 28 | **Mineral Oil** | mg / l | 0.05 | < 0.01 | < 0.01 |
| 29 | **Free Residual Chlorine** | mg / l | 0.2 (1.0) | < 0.1 | < 0.1 |
| 30 | **Total Coliform** | MPN/100 ml | Absent | Absent | Absent |
| 31 | **E. Coli** | Nos./100 ml | Absent | Absent | Absent |

**Note : Standards limit given as Acceptable Limit (Permissible Limit)**

**GW4: Chikhali Hand Pump water**

| Sr. No. | Test Parameters | Unit | As per IS 10500 : 2012 | Results | |
|---|---|---|---|---|---|
| | | | | Jun 2021 | Sept. 2021 |
| 1 | Apparent Colour | Hazen units | 5 (15) | 0.1 | 0.1 |
| 2 | Odour | - | Agreeable | Agreeable | Agreeable |
| 3 | Taste | - | Agreeable | Agreeable | Agreeable |
| 4 | Turbidity NTU | NTU | 1(5) | 0.1 | 0.1 |
| 5 | Total Dissolved Solid | mg / l | 500 (2000) | 510 | 494 |
| 6 | Electrical Conductivity | µS/cm | - | 826 | 802 |
| 7 | Total Alkalinity | mg / l | 200 (600) | 172 | 158 |
| 8 | pH Value at 25oC | - | 6.5 to 8.5 | 7.65 | 7.45 |
| 9 | Total Hardness ( CaCO3) | mg / l | 200 (600) | 220 | 208 |
| 10 | Calcium (as Ca) | mg / l | 75 (200) | 65.8 | 61.2 |
| 11 | Magnesium (as Mg) | mg / l | 30 (100) | 13.5 | 13.3 |
| 12 | Copper as(Cu) | mg / l | 0.05(1.5) | < 0.01 | < 0.01 |
| 13 | Iron (as Fe) | mg / l | 0.3 | 0.080 | 0.070 |
| 14 | Manganese as (Mn) | mg / l | 0.1(0.3) | < 0.01 | < 0.01 |
| 15 | Chlorides (as Cl) | mg / l | 250(1000) | 22.1 | 16.3 |
| 16 | Sulphate (as SO4) | mg / l | 200 (400) | 15.3 | 11.8 |
| 17 | Nitrates (as NO3) | mg / l | 45 | 2.15 | 2.05 |
| 18 | Fluoride (as F) | mg / l | 1.0 (1.5) | 0.75 | 0.60 |
| 19 | Phenolic Compounds | mg / l | 0.001 | BDL | BDL |
| 20 | Mercury as (Hg) | mg / l | 0.001 | < 0.0005 | < 0.0005 |
| 21 | Cadmium as (Cd) | mg / l | 0.003 | < 0.001 | < 0.001 |
| 22 | Selenium as (Se) | mg / l | 0.01 | < 0.001 | < 0.001 |
| 23 | Arsenic as (As) | mg / l | 0.01 (0.05) | < 0.01 | < 0.01 |
| 24 | Cyanide as (CN) | mg / l | 0.05 | < 0.005 | < 0.005 |
| 25 | Lead as (Pb) | mg / l | 0.01 | < 0.001 | < 0.001 |
| 26 | Zinc as (Zn) | mg / l | 5 (15) | 0.22 | 0.17 |
| 27 | Total Chromium as (Cr ) | mg / l | 0.05 | < 0.03 | < 0.03 |
| 28 | Mineral Oil | mg / l | 0.05 | < 0.01 | < 0.01 |
| 29 | Free Residual Chlorine | mg / l | 0.2 (1.0) | < 0.1 | < 0.1 |
| 30 | Total Coliform | MPN/100 ml | Absent | Absent | Absent |
| 31 | E. Coli | Nos./100 ml | Absent | Absent | Absent |

Note : Standards limit given as Acceptable Limit (Permissible Limit)

## TABLE- 3.6 WASTE WATER QUALITY (Apr.2021- Sept. 2021)

**Sample Category : Unit-1- Cooling Tower Blow Down water (WW-1)**

| Sr. No. | Parameters | Unit | MPCB Limit | Results | |
|---|---|---|---|---|---|
| | | | | Jun 2021 | Sept. 2021 |
| 1. | Free Available Chlorine | mg / l | 0.5 | 0.22 | 0.24 |
| 2. | Zinc as (Zn) | mg / l | 1.0 | 0.12 | 0.10 |
| 3. | Total Chromium as (Cr ) | mg / l | 0.2 | 0.015 | 0.011 |
| 4. | Phosphate as (PO4) | mg/ l | 5.0 | 1.28 | 1.30 |

**Sample Category : Unit-2- Cooling Tower Blow Down water (WW-2)**

| Sr. No. | Parameters | Unit | MPCB Limit | Results | |
|---|---|---|---|---|---|
| | | | | Jun 2021 | Sept. 2021 |
| 1. | Free Available Chlorine | mg / l | 0.5 | 0.20 | 0.15 |
| 2. | Zinc as (Zn) | mg / l | 1.0 | 0.11 | 0.13 |
| 3. | Total Chromium as (Cr ) | mg / l | 0.2 | 0.012 | 0.015 |
| 4. | Phosphate as (PO4) | mg/ l | 5.0 | 1.36 | 1.31 |

**Sample Category : Unit-3- Cooling Tower Blow Down water (WW-3)**

| Sr. No. | Parameters | Unit | MPCB Limit | Results | |
|---|---|---|---|---|---|
| | | | | Jun 2021 | Sept. 2021 |
| 1. | Free Available Chlorine | mg / l | 0.5 | 0.22 | 0.20 |
| 2. | Zinc as (Zn) | mg / l | 1.0 | 0.14 | 0.12 |
| 3. | Total Chromium as (Cr ) | mg / l | 0.2 | 0.012 | 0.011 |
| 4. | Phosphate as (PO4) | mg/ l | 5.0 | 1.33 | 1.29 |

**Sample Category : Unit-4-Cooling Tower Blow Down water (WW-4)**

| Sr. No. | Parameters | Unit | MPCB Limit | Results | |
|---|---|---|---|---|---|
| | | | | Jun 2021 | Sept. 2021 |
| 1. | **Free Available Chlorine** | mg / l | 0.5 | 0.25 | 0.23 |
| 2. | **Zinc as (Zn)** | mg / l | 1.0 | 0.11 | 0.14 |
| 3. | **Total Chromium as (Cr )** | mg / l | 0.2 | 0.014 | 0.012 |
| 4. | **Phosphate as (PO4)** | mg/ l | 5.0 | 1.31 | 1.35 |

**Sample Category : Unit-5- Cooling Tower Blow Down water (WW-5)**

| Sr. No. | Parameters | Unit | MPCB Limit | Results | |
|---|---|---|---|---|---|
| | | | | Jun 2021 | Sept. 2021 |
| 1. | **Free Available Chlorine** | mg / l | 0.5 | 0.21 | 0.20 |
| 2. | **Zinc as (Zn)** | mg / l | 1.0 | 0.14 | 0.11 |
| 3. | **Total Chromium as (Cr )** | mg / l | 0.2 | 0.012 | 0.013 |
| 4. | **Phosphate as (PO4)** | mg/ l | 5.0 | 1.38 | 1.33 |

## TABLE- 3.7 Pizo-metric well water Report

**Monitoring Date**: 28.06.2021

| | STATIC WATER LEVEL OF PIZO. WELL | | | |
|---|---|---|---|---|
| **Name of village** | **Water level from B.G.L. (m)** | **Total Depth of Pizo well from G.L (m)** | **Total Depth of Pizo well with Casing (m)** | **Landmark** |
| **Pizo well (P1)** | 1.2 | 18.6 | 19.8 | Near AWRPH |
| **Pizo well (P2)** | 1.7 | 20.0 | 21.0 | B/H Ash dyke -1 |
| **Pizo well (P3)** | 1.0 | 20.0 | 20.7 | Near Raw Water pump house -02 |

### Pizo-metric well water Analysis Report

| Sr. No. | Test Parameters | Unit | As per IS : 10500 : 2012 | Pizo well (P1) Near AWRPH | Pizo well (P2) B/H Ash dyke -1 | Pizo -well (P3) Near Raw Water pump house -02 |
|---|---|---|---|---|---|---|
| 1 | pH | | 6.5 to 8.5 | 7.70 | 8.05 | 7.70 |
| 2 | Total Dissolved Solid | mg / l | 500 (2000) | 484 | 470 | 508 |
| 3 | Electrical Conductivity | µS/cm | - | 786 | 760 | 822 |
| 4 | Copper as(Cu) | mg / l | 0.05 (1.5) | < 0.01 | < 0.01 | < 0.01 |
| 5 | Iron (as Fe) | mg / l | 0.3 (1.0) | 0.12 | 0.11 | 0.10 |
| 6 | Manganese as (Mn) | mg / l | 0.1 (0.3) | 0.055 | 0.076 | 0.050 |
| 7 | Mercury as (Hg) | mg / l | 0.001 | < 0.0005 | < 0.0005 | < 0.0005 |
| 8 | Cadmium as (Cd) | mg / l | 0.01 | 0.0014 | 0.0015 | 0.0010 |
| 9 | Selenium as (Se) | mg / l | 0.01 | 0.0010 | 0.0010 | 0.0010 |
| 10 | Arsenic as (As) | mg / l | 0.05 | 0.0075 | 0.006 | 0.010 |
| 11 | Cyanide as (CN) | mg / l | 0.05 | < 0.005 | < 0.005 | < 0.005 |
| 12 | Lead as (Pb) | mg / l | 0.05 | 0.0016 | 0.0015 | 0.0011 |
| 13 | Zinc as (Zn) | mg / l | 5 (15) | 1.85 | 2.17 | 2.35 |
| 14 | Total Chromium as (Cr ) | mg / l | 0.05 | < 0.010 | < 0.010 | < 0.010 |

**TABLE- 3.8 Noise Level (Within Plant area)**

| SL. NO. | LOCATION | RESULT (dBA) | | | | | |
|---|---|---|---|---|---|---|---|
| | | DAY | | | | | |
| | | April 2021 | May 2021 | Jun. 2021 | Jul. 2021 | Aug. 2021 | Sept. 2021 |
| 1 | Near Shanti Niketan I, II & III | 57.7 | 59.0 | 59.8 | 60.4 | 50.3 | 63.1 |
| 2 | Near Labour Hutment | 62.7 | 65.1 | 62.6 | 62.5 | 65.2 | 61.8 |
| 3 | Near Store Area | 66.7 | 59.2 | 62.9 | 61.3 | 62.7 | 63.0 |
| 4 | Gate No.1 | 54.9 | 60.8 | 55.3 | 56.7 | 58.7 | 52.9 |
| 5 | Gate No.2 | 66.2 | 61.1 | 65.3 | 64.8 | 64.7 | 64.6 |
| 6 | Gate No.3 | 71.2 | 71.9 | 73.1 | 73.5 | 70.8 | 70.4 |
| 7 | Near OHC | 56.3 | 51.8 | 55.2 | 53.7 | 60.0 | 53.8 |
| 8 | Railway Siding | 67.0 | 67.3 | 64.9 | 67.2 | 66.5 | 66.4 |
| 9 | Near Reservoir 2 | 59.4 | 56.8 | 54.6 | 54.8 | 52.8 | 53.8 |
| 10 | Near Ash Water Recovery Pump House | 61.3 | 59.5 | 64.0 | 64.7 | 54.5 | 64.5 |
| 11 | In China Colony | 41.0 | 40.5 | 39.0 | 46.2 | 39.4 | 39.9 |
| **CPCB Standards** | | | | | | | |
| Industrial Area | | 75 | | | | | |

| SL. NO. | LOCATION | RESULT (dBA) | | | | | |
|---|---|---|---|---|---|---|---|
| | | NIGHT | | | | | |
| | | April 2021 | May 2021 | Jun. 2021 | Jul. 2021 | Aug. 2021 | Sept. 2021 |
| 1 | Near Shanti Niketan I II & III | 51.8 | 50.8 | 51.2 | 50.7 | 45.4 | 53.0 |
| 2 | Near Labour Hutment | 59.8 | 58.2 | 55.5 | 53.8 | 52.8 | 55.8 |
| 3 | Near Store Area | 61.5 | 51.5 | 50.2 | 55.5 | 53.5 | 51.2 |
| 4 | Gate No.1 | 50.5 | 49.2 | 45.1 | 49.2 | 48.2 | 50.2 |
| 5 | Gate No.2 | 51.4 | 50.4 | 55.5 | 42.4 | 41.0 | 51.3 |
| 6 | Gate No.3 | 65.5 | 68.5 | 69.4 | 58.5 | 62.5 | 65.5 |
| 7 | Near OHC | 41.5 | 45.5 | 48.8 | 40.5 | 41.5 | 42.5 |
| 8 | Railway Siding | 58.8 | 57.8 | 52.2 | 51.8 | 50.8 | 55.9 |
| 9 | Near Reservoir 2 | 47.9 | 46.9 | 44.2 | 42.9 | 40.9 | 47.8 |
| 10 | Near Ash Water Recovery Pump House | 45.5 | 49.5 | 52.2 | 54.5 | 44.5 | 57.5 |
| 11 | In China Colony | 38.9 | 39.9 | 35.5 | 39.9 | 37.2 | 38.3 |
| **CPCB Standards** | | | | | | | |
| Industrial Area | | 70 | | | | | |

## TABLE- 3.9 SOIL ANALYSIS as Per IS 2720 for (Jun.2021)

| Sr. No. | Test Parameters | Unit | Garada Village | Mendipur Village | Churdi Village |
|---|---|---|---|---|---|
| 1 | **pH** | - | 7.90 | 7.90 | 8.0 |
| 2 | **E. Conductivity** | µs/cm | 551 | 494 | 494 |
| 3 | **Nitrogen as N** | Kg/ha | 248 | 208 | 218 |
| 4 | **Phosphorus as P2O5** | Kg/ha | 132.2 | 77.5 | 68.6 |
| 5 | **Potassium as K** | Kg/ha | 74.5 | 63.3 | 53.7 |
| 6 | **Calcium (as Ca)** | Kg/ha | 3.58 | 3.81 | 3.81 |
| 7 | **Magnesium (as Mg)** | Kg/ha | 1.34 | 1.05 | 1.10 |
| 8 | **Total Organic Carbon** | % | 0.714 | 0.772 | 0.693 |
| 9 | **Iron as Fe** | Kg/ha | 2.45 | 2.51 | 2.31 |
| 10 | **Boron as B** | Kg/ha | ND | ND | ND |
| 11 | **Natural Moisture Content** | % | 6.5 | 6.3 | 6.4 |
| 12 | **Field Capacity** | % | 6.9 | 6.7 | 7.0 |
| 13 | **Wilting Coefficient** | % | 0.70 | 0.68 | 0.70 |
| 14 | **Available Water Storage Capacity** | % | 0.69 | 0.71 | 0.68 |
| 15 | **Bulk Density** | gm/cc | 1.38 | 1.37 | 1.37 |
| 16 | **Grain size Distribution : a) Sand** | % | 32.4 | 36.6 | 33.8 |
|  | **b) Silt** | % | 33.3 | 29.7 | 31.7 |
|  | **c) Clay** | % | 34.3 | 33.7 | 34.5 |
| 17 | **Cation Exchange Capacity** | meq/100gm | 38.1 | 34.3 | 31.9 |
| 18 | **Biological Status:** |  |  |  |  |
|  | **a) Total Heterotrophy** | CFU | 47.1 x103/gm | 28.8 x103/gm | 43.1 x103/gm |
|  | **b) Azetobacter** | CFU | 44.6 x103/gm | 35.6 x103/gm | 33.5 x103/gm |
|  | **c) Actinomycetes** | CFU | 28.8 x101/gm | 25.7 x102/gm | 40.3 x103/gm |
|  | **d) Yeast** | CFU | 137 x102/gm | 163 x102/gm | 171 x102/gm |

## Annexure I - On site Meteorological Data for APR. 2021- SEPT. 2021

### Apr. 2021

| Date | Wind Direction (Blowing From) | Wind Speed (Km/hr) | | Temperature (°C) | | | Humidity (%) | | | Barometric Pressure (mBar) | Rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Max. | Avg. | Max | Min | Avg. | Max | Min | Avg | (Average) | |
| 01.04.2021 | S | 28.7 | 3.4 | 40.0 | 23.3 | 30.9 | 58.8 | 24.7 | 35.7 | 972.5 | 0.0 |
| 02.04.2021 | SSE | 36.6 | 3.6 | 38.9 | 20.6 | 30.0 | 54.8 | 22.8 | 33.4 | 974.2 | 0.0 |
| 03.04.2021 | ESE | 30.6 | 3.9 | 39.6 | 20.6 | 30.8 | 47.0 | 22.8 | 31.0 | 975.1 | 0.0 |
| 04.04.2021 | ESE | 28.9 | 3.3 | 38.7 | 22.5 | 29.8 | 54.2 | 25.2 | 37.4 | 977.3 | 0.0 |
| 05.04.2021 | ESE | 38.5 | 3.7 | 39.6 | 21.8 | 30.7 | 56.2 | 21.8 | 31.1 | 978.2 | 0.0 |
| 06.04.2021 | NNW | 30.4 | 4.9 | 40.2 | 19.3 | 30.1 | 64.9 | 24.6 | 39.3 | 977.8 | 0.0 |
| 07.04.2021 | SSW | 28.2 | 3.1 | 40.1 | 23.5 | 31.3 | 68.3 | 29.8 | 46.4 | 978.0 | 0.0 |
| 08.04.2021 | SSE | 48.7 | 6.8 | 40.3 | 25.0 | 31.9 | 61.6 | 31.3 | 44.8 | 976.0 | 0.0 |
| 09.04.2021 | SSE | 27.6 | 3.4 | 40.1 | 22.1 | 30.8 | 57.6 | 23.5 | 34.2 | 971.3 | 0.0 |
| 10.04.2021 | S | 30.2 | 3.96 | 41.2 | 23.1 | 29.9 | 48.1 | 22.6 | 31.2 | 973.0 | 0.0 |
| 11.04.2021 | ESE | 28.8 | 3.4 | 38.9 | 22.6 | 29.4 | 55.2 | 27.2 | 37.1 | 976.0 | 0.0 |
| 12.04.2021 | SSW | 38.5 | 3.7 | 40.0 | 22.3 | 31.3 | 58.1 | 22.5 | 30.2 | 989.0 | 0.0 |
| 13.04.2021 | SSW | 27.3 | 4.7 | 41.6 | 20.3 | 31.6 | 61.2 | 21.6 | 38.7 | 974.0 | 0.0 |
| 18.04.2021 | SWW | 29.7 | 4.90 | 39.4 | 21.7 | 30.2 | 64.2 | 30.1 | 43.5 | 975.0 | 0.0 |
| 19.04.2021 | NW | 30.2 | 2.9 | 42.6 | 26.8 | 32.6 | 65.9 | 32.4 | 43.2 | 977.0 | 0.0 |
| 20.04.2021 | WWS | 28.3 | 3.9 | 41.6 | 22.5 | 31.3 | 56.1 | 22.6 | 34.2 | 975.0 | 0.0 |
| 21.04.2021 | SSW | 31.2 | 4.3 | 38.5 | 21.0 | 29.5 | 55.7 | 21.3 | 34.3 | 971.0 | 0.0 |
| 22.04.2021 | N | 28.6 | 3.3 | 40.2 | 21.8 | 29.1 | 49.0 | 24.3 | 30.3 | 973.0 | 0.0 |
| 23.04.2021 | SSW | 29.1 | 4.9 | 42.6 | 22.7 | 32.4 | 57.3 | 20.1 | 30.2 | 976.0 | 0.0 |
| 24.04.2021 | ESE | 29.2 | 3.1 | 44.9 | 25.6 | 30.4 | 50.3 | 22.1 | 30.2 | 978.0 | 0.0 |
| 25.04.2021 | SSW | 28.6 | 3.9 | 42.6 | 22.2 | 30.6 | 61.2 | 31.5 | 42.6 | 977.0 | 0.0 |
| 26.04.2021 | SW | 29.3 | 3.4 | 41.8 | 23.6 | 30.2 | 58.2 | 23.4 | 36.3 | 976.0 | 0.0 |
| 27.04.2021 | SSW | 29.7 | 30.1 | 42.2 | 26.3 | 32.8 | 58.4 | 30.9 | 45.7 | 978.0 | 0.0 |
| 28.04.2021 | ESE | 30.5 | 3.9 | 42.6 | 21.3 | 32.0 | 51.3 | 23.8 | 33.1 | 973.0 | 0.0 |
| 29.04.2021 | SSE | 28.4 | 2.9 | 43.5 | 27.4 | 33.2 | 48.2 | 23.1 | 33.5 | 971.0 | 0.0 |
| 30.04.2021 | SEE | 32.6 | 4.0 | 39.6 | 20.8 | 30.1 | 58.1 | 20.3 | 30.5 | 789.0 | 0.0 |

**May 2021**

| Date | Wind Direction (Blowing From) | Wind Speed (Km/hr) | | Temperature (°C) | | | Humidity (%) | | | Barometric Pressure (mBar) | Rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Max. | Avg. | Max | Min | Avg. | Max | Min | Avg | (Average) | |
| 01.05.2021 | SSE | 28.7 | 3.43 | 40 | 23.3 | 30.9 | 58.8 | 24.7 | 35.7 | 972.5 | 0.0 |
| 02.05.2021 | N | 34.0 | 4.3 | 39.7 | 21.3 | 30.1 | 56.2 | 23.5 | 33.6 | 978.0 | 0.0 |
| 03.05.2021 | E | 47.0 | 5.1 | 39.5 | 21.4 | 35.1 | 58.4 | 24.8 | 35.7 | 974.0 | 0.0 |
| 04.05.2021 | N | 30.0 | 3.8 | 43.5 | 23.1 | 34.7 | 54.3 | 21.7 | 32.6 | 975.0 | 0.0 |
| 05.05.2021 | NW | 27.2 | 3.1 | 43.6 | 24.8 | 34.5 | 60.2 | 26.4 | 39.5 | 976.2 | 0.0 |
| 06.05.2021 | NNW | 32.4 | 3.8 | 41.3 | 21.5 | 31.6 | 59.6 | 29.4 | 34.2 | 979.0 | 0.0 |
| 07.05.2021 | ESE | 30.1 | 4.3 | 40.7 | 24.3 | 30.2 | 53.7 | 25.1 | 34.8 | 974.0 | 0.0 |
| 08.05.2021 | SSW | 68.0 | 5.3 | 39.0 | 22.4 | 31.3 | 52.7 | 21.2 | 32.6 | 971.0 | 11.3 |
| 09.05.2021 | SSE | 52 | 4.2 | 29 | 21 | 24.1 | 66 | 22.1 | 32.6 | 978.0 | 0.0 |
| 10.05.2021 | NNW | 63 | 4.62 | 35 | 18.6 | 31.7 | 92.7 | 45.9 | 53.7 | 973.5 | 23.5 |
| 11.05.2021 | SSW | 47.2 | 4.84 | 37.1 | 22.1 | 28.6 | 85.7 | 39.5 | 62.8 | 974.7 | 0.0 |
| 12.05.2021 | WNW | 33.3 | 5.8 | 39.6 | 24.4 | 30.8 | 74.5 | 33.5 | 54.3 | 973.0 | 0.0 |
| 13.05.2021 | SSW | 34.6 | 4.7 | 37.7 | 26.3 | 31.9 | 69.3 | 32.2 | 47.9 | 972.2 | 0.0 |
| 14.05.2021 | NW | 39.4 | 8.90 | 39.5 | 22.5 | 31.0 | 72.2 | 31 | 51.6 | 979.2 | 0.0 |
| 15.05.2021 | SSW | 43.2 | 5.57 | 40 | 25.2 | 34.1 | 72.5 | 24.7 | 38.9 | 973.7 | 0.0 |
| 16.05.2021 | SSW | 43.2 | 5.57 | 40 | 25.2 | 34.1 | 72.5 | 24.7 | 38.9 | 973.7 | 0.0 |
| 17.05.2021 | NW | 55.8 | 7.84 | 40 | 23.4 | 31.3 | 58.8 | 24.7 | 36.1 | 973.4 | 0.0 |
| 18.05.2021 | EES | 97.2 | 26.32 | 37.6 | 24.9 | 30.4 | 69.5 | 28.5 | 46.9 | 975.6 | 0.5 |
| 19.05.2021 | NNE | 105.7 | 24.25 | 35.2 | 23 | 27.4 | 71.3 | 33.9 | 57.7 | 975.6 | 0.7 |
| 20.05.2021 | ESE | 100.2 | 29.81 | 33.5 | 22.7 | 28.8 | 71.5 | 30.6 | 48.7 | 975.6 | 0.2 |
| 21.05.2021 | SW | 75.8 | 22.4 | 36.9 | 22.5 | 30.2 | 62.9 | 22.0 | 37.0 | 975.6 | 0.0 |
| 22.05.2021 | SSW | 86 | 21.92 | 38.8 | 23.5 | 30.5 | 56.4 | 19.8 | 36.0 | 975.6 | 0.0 |
| 23.05.2021 | SW | 93.8 | 21.13 | 39.7 | 24.5 | 30.6 | 53.1 | 17.7 | 36.3 | 975.6 | 0.0 |
| 24.05.2021 | SSW | 78.8 | 23.4 | 38.7 | 27.8 | 34.0 | 38.9 | 16.2 | 25.9 | 975.6 | 0.0 |
| 25.05.2021 | S | 75.8 | 22.6 | 37.6 | 23.6 | 30.4 | 42.4 | 12.1 | 24.5 | 973.2 | 0.0 |
| 26.05.2021 | S | 105.3 | 23.58 | 39.3 | 23 | 31.5 | 48.1 | 11.6 | 22.9 | 971.2 | 0.0 |
| 27.05.2021 | SE | 77.8 | 22.33 | 39.6 | 24.1 | 31.7 | 46.3 | 12.5 | 25.8 | 971.4 | 0.0 |
| 28.05.2021 | E | 84.3 | 25.3 | 40.1 | 25.0 | 32.5 | 48.7 | 16.0 | 29.9 | 973.3 | 0.0 |

**Jun. 2021**

| Date | Wind Direction (Blowing From) | Wind Speed (Km/hr) | | Temperature (°C) | | | Humidity (%) | | | Barometric Pressure (mBar) | Rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Max. | Avg. | Max | Min | Avg. | Max | Min | Avg | (Average) | |
| 01.06.2021 | E | 62.2 | 22.2 | 37.6 | 26.9 | 30.8 | 55.9 | 26.0 | 40.7 | 974.6 | 0.0 |
| 02.06.2021 | E | 81.5 | 25.2 | 34.4 | 26.1 | 29.6 | 54.8 | 29.5 | 43.3 | 976.0 | 0.0 |
| 03.06.2021 | NW | 96.2 | 26.4 | 38.1 | 24.4 | 29.7 | 63.6 | 22.7 | 43.9 | 976.8 | 0.0 |
| 04.06.2021 | NW | 104.0 | 24.0 | 37.8 | 21.5 | 26.1 | 77.3 | 30.5 | 60.0 | 977.1 | 13.3 |
| 05.06.2021 | NNW | 64.5 | 22.5 | 37.2 | 22.4 | 27.4 | 78.0 | 30.9 | 58.4 | 976.9 | 0.8 |
| 06.06.2021 | NNW | 57.7 | 23.8 | 38.7 | 24.5 | 30.7 | 70.7 | 24.4 | 46.1 | 975.9 | 0.2 |
| 07.06.2021 | ENE | 77.5 | 21.9 | 40.2 | 25.5 | 29.2 | 66.3 | 22.7 | 50.3 | 975.3 | 3.4 |
| 08.06.2021 | NE | 106.7 | 23.2 | 37.8 | 23.8 | 26.8 | 69.7 | 31.6 | 59.5 | 974.2 | 0.2 |
| 09.06.2021 | E | 68.3 | 25.5 | 35.3 | 23.2 | 27.6 | 75.2 | 31.4 | 56.2 | 973.4 | 0.2 |
| 10.06.2021 | E | 82.6 | 23.9 | 27.8 | 21.4 | 23.6 | 79.0 | 56.7 | 68.8 | 972.6 | 16.9 |
| 11.06.2021 | E | 88.7 | 32.0 | 28.9 | 20.4 | 23.0 | 79.6 | 58.0 | 73.4 | 971.8 | 4.2 |
| 12.06.2021 | E | 82.2 | 29.1 | 30.6 | 20.8 | 24.5 | 78.7 | 42.2 | 66.1 | 972.2 | 6.1 |
| 13.06.2021 | E | 106.0 | 24.0 | 33.7 | 23.3 | 26.7 | 78.1 | 41.6 | 64.1 | 971.0 | 2.5 |
| 14.06.2021 | NNW | 106.7 | 27.8 | 34.4 | 22.2 | 25.9 | 77.2 | 36.8 | 63.5 | 970.2 | 3.9 |
| 15.06.2021 | ENE | 106.4 | 25.7 | 33.9 | 22.6 | 25.6 | 77.2 | 41.0 | 64.0 | 970.3 | 0.2 |
| 16.06.2021 | ENE | 106.7 | 24.9 | 35.3 | 21.0 | 25.9 | 74.2 | 41.8 | 63.6 | 971.8 | 4.8 |
| 17.06.2021 | ENE | 75.1 | 26.72 | 33.5 | 23 | 26.5 | 75.1 | 38.9 | 61.4 | 972.0 | 0.0 |
| 18.06.2021 | ENE | 91.4 | 27.25 | 31.4 | 22.4 | 25.4 | 79.4 | 44.7 | 66.6 | 972.9 | 18.6 |
| 19.06.2021 | ENE | 94.8 | 25.73 | 28.9 | 22.4 | 24.5 | 77.7 | 54.3 | 69.9 | 974.3 | 4.5 |
| 20.06.2021 | E | 106.7 | 27.38 | 32.6 | 22.5 | 26.1 | 76.9 | 40.9 | 62.8 | 975.1 | 3.4 |
| 21.06.2021 | E | 78.8 | 29.36 | 33.3 | 22.9 | 28.0 | 77.3 | 35 | 55.2 | 975.1 | 0.0 |
| 22.06.2021 | E | 106.7 | 28.24 | 34 | 19.9 | 26.7 | 80 | 37.7 | 59.7 | 974.5 | 30.0 |
| 23.06.2021 | ENE | 97.5 | 25.85 | 29.1 | 19.6 | 23.0 | 80.8 | 51.1 | 72.8 | 974.4 | 21.7 |
| 24.06.2021 | E | 83.9 | 30.90 | 27.9 | 19.1 | 23.1 | 81.1 | 59.2 | 72.6 | 974.4 | 38.0 |
| 25.06.2021 | E | 55.0 | 23.0 | 27.8 | 19.3 | 23.6 | 80.0 | 57.0 | 71.2 | 973.7 | 7.0 |
| 26.06.2021 | NNW | 93.8 | 20.76 | 34.8 | 22.5 | 26.0 | 80.1 | 41.8 | 66.5 | 973.7 | 0.2 |
| 27.06.2021 | NW | 94.5 | 19.95 | 36.3 | 22.6 | 26.9 | 74.8 | 36.1 | 62.3 | 975.1 | 0.0 |
| 28.06.2021 | N | 64.5 | 21.35 | 34.2 | 23.8 | 28.0 | 78.7 | 39.1 | 62.0 | 975.6 | 0.8 |
| 29.06.2021 | ENE | 64.5 | 23.86 | 35 | 23.8 | 28.1 | 74.9 | 40 | 59.8 | 975.2 | 0.0 |
| 30.06.2021 | N | 82.2 | 26.36 | 34.1 | 24.6 | 28.3 | 75.5 | 41.4 | 60.4 | 974.6 | 0.0 |

**July 2021**

| Date | Wind Direction (Blowing From) | Wind Speed (Km/hr) | | Temperature (°C) | | | Humidity (%) | | | Barometric Pressure (mBar) | Rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Max. | Avg. | Max | Min | Avg. | Max | Min | Avg | (Average) | |
| 01.07.2021 | E | 103 | 24.58 | 35.2 | 23.3 | 26.2 | 75.5 | 40.2 | 65.7 | 973.7 | 5.9 |
| 02.07.2021 | NNW | 66.2 | 22.0 | 30.5 | 23.2 | 25.9 | 75.0 | 50.7 | 67.7 | 974.3 | 0.4 |
| 03.07.2021 | ENE | 64.5 | 23.66 | 34.7 | 24.1 | 28.2 | 74.3 | 37.3 | 59.4 | 974.9 | 0.0 |
| 04.07.2021 | N | 60.1 | 22.4 | 36.2 | 25.1 | 29.9 | 71.8 | 32.9 | 53.0 | 975.4 | 0.0 |
| 05.07.2021 | NNW | 53 | 20.27 | 35.1 | 25.3 | 29.1 | 68.5 | 34.9 | 55.3 | 975.7 | 0.0 |
| 06.07.2021 | ENE | 76.4 | 22.82 | 38.6 | 23.3 | 28.4 | 72.6 | 33.9 | 56.9 | 974.7 | 0.0 |
| 07.07.2021 | E | 70.7 | 25.21 | 37.4 | 24.2 | 29.4 | 73.4 | 32.1 | 53.6 | 974.1 | 0.0 |
| 08.07.2021 | NNW | 67.6 | 23.29 | 24.5 | 20.5 | 22.6 | 81 | 69.7 | 77.1 | 974.8 | 86.7 |
| 09.07.2021 | ENE | 53.3 | 20.69 | 33.3 | 22.3 | 26.7 | 80 | 42.9 | 65.1 | 973.3 | 0.2 |
| 10.07.2021 | NW | 53.3 | 22.16 | 32.9 | 24.3 | 27.4 | 74.7 | 45 | 64.4 | 972.2 | 1.1 |
| 11.07.2021 | NNW | 65.6 | 22.28 | 32.9 | 23.1 | 28.0 | 76.2 | 43.1 | 61.6 | 972.4 | 0.2 |
| 12.07.2021 | NW | 81.5 | 26.46 | 33.7 | 24.9 | 28.5 | 72.1 | 41.3 | 57.2 | 973.1 | 0.2 |
| 13.07.2021 | WNW | 75.4 | 24.84 | 33.7 | 23.8 | 28.0 | 75.4 | 39.5 | 59.5 | 972.8 | 0.3 |
| 14.07.2021 | NW | 65.2 | 25.57 | 31.2 | 23.6 | 26.7 | 76.7 | 47.1 | 63.3 | 972.6 | 0.0 |
| 15.07.2021 | NW | 75.8 | 29.13 | 33.9 | 22.8 | 27.4 | 78.6 | 39.8 | 61.4 | 973.3 | 0.2 |
| 16.07.2021 | NNW | 73.4 | 24.21 | 33.4 | 23.3 | 27.7 | 78.3 | 40.8 | 61.5 | 975.8 | 8.3 |
| 17.07.2021 | NNW | 52.3 | 21.80 | 35.7 | 24 | 28.8 | 74.7 | 36.8 | 57.8 | 975.9 | 0.0 |
| 18.07.2021 | NNW | 74.7 | 22.59 | 34.6 | 25.1 | 28.7 | 74.5 | 41.5 | 60.0 | 974.1 | 0.0 |
| 19.07.2021 | N | 79.2 | 22.78 | 33.8 | 23.6 | 27.9 | 73.6 | 40.7 | 59.4 | 973.3 | 0.0 |
| 20.07.2021 | E | 89 | 27.39 | 30.5 | 23 | 25.3 | 78.8 | 51.8 | 71.5 | 973.6 | 28.4 |
| 21.07.2021 | E | 76.8 | 30.84 | 28.9 | 22.6 | 23.7 | 80.3 | 66.1 | 77.1 | 972.1 | 28.1 |
| 22.07.2021 | SE | 77.8 | 23.76 | 30.9 | 22.2 | 24.9 | 80.6 | 51.7 | 73.1 | 969.4 | 65.7 |
| 23.07.2021 | E | 86 | 30.71 | 29.1 | 22.1 | 23.8 | 81.5 | 58.5 | 75.6 | 969.9 | 14.7 |
| 24.07.2021 | E | 72.4 | 32.03 | 27.2 | 22 | 24.2 | 78.4 | 63.1 | 72.4 | 970.9 | 4.3 |
| 25.07.2021 | ENE | 96.2 | 31.80 | 29.8 | 23.6 | 26.1 | 74.9 | 52.5 | 65.3 | 971.9 | 0.0 |
| 26.07.2021 | ENE | 91.1 | 32.13 | 29.7 | 22.8 | 25.2 | 79 | 51 | 67.5 | 972.8 | 11.4 |
| 27.07.2021 | E | 81.2 | 31.28 | 24 | 22.1 | 23.1 | 79.6 | 71.9 | 76.8 | 972.6 | 22.9 |
| 28.07.2021 | ENE | 106.0 | 27.01 | 25.3 | 21.9 | 22.8 | 81.1 | 67.1 | 78.2 | 973.4 | 33.0 |
| 29.07.2021 | E | 82.6 | 33.01 | 26.9 | 22.2 | 23.9 | 80.3 | 62 | 73.1 | 973.7 | 1.4 |
| 30.07.2021 | E | 106.7 | 33.49 | 23.6 | 19.4 | 22.4 | 81.3 | 68.8 | 78.8 | 973.9 | 46.9 |
| 31.07.2021 | E | 97.2 | 33.89 | 26.1 | 22.4 | 24.0 | 80.8 | 60.2 | 72.0 | 973.7 | 4.8 |

**Aug. 2021**

| Date | Wind Direction (Blowing From) | Wind Speed (Km/hr) | | Temperature (°C) | | | Humidity (%) | | | Barometric Pressure (mBar) | Rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Max. | Avg. | Max | Min | Avg. | Max | Min | Avg | (Average) | |
| 01.08.2021 | ENE | 79.8 | 25.83 | 25.8 | 22.4 | 24.0 | 79.7 | 64.3 | 72.6 | 971.8 | 4.3 |
| 02.08.2021 | ENE | 80.6 | 26.19 | 25.6 | 20.1 | 23.8 | 79.9 | 62.5 | 72.8 | 973.8 | 0.9 |
| 03.08.2021 | ENE | 78.1 | 25.95 | 28.3 | 22.5 | 24.5 | 79.1 | 57.6 | 70.6 | 972.3 | 0.0 |
| 04.08.2021 | E | 84.6 | 33.39 | 28.4 | 19.4 | 22.5 | 79.6 | 68.4 | 76.8 | 973.9 | 2.6 |
| 05.08.2021 | ENE | 78.3 | 28.72 | 28.9 | 19.5 | 23.8 | 79.7 | 60.2 | 72.3 | 974.2 | 0.0 |
| 06.08.2021 | E | 73.7 | 28.24 | 29 | 22.5 | 25.3 | 79.2 | 53.4 | 68.1 | 973.5 | 0.0 |
| 07.08.2021 | ENE | 105.3 | 27.75 | 31.7 | 22.1 | 26.0 | 80.3 | 46.9 | 66.5 | 974.8 | 34.8 |
| 08.08.2021 | ENE | 67.3 | 23.60 | 32 | 23.3 | 27.0 | 80 | 45.4 | 65.3 | 976.0 | 0.0 |
| 09.08.2021 | E | 78.3 | 28.10 | 30.5 | 21.3 | 26.1 | 79.6 | 45.2 | 67.0 | 974.8 | 5.6 |
| 10.08.2021 | E | 83.4 | 27.47 | 26.9 | 20.3 | 24.6 | 82.5 | 50.3 | 73.9 | 969.5 | 34.8 |
| 11.08.2021 | E | 78.1 | 28.45 | 31.7 | 22.5 | 26.9 | 78.8 | 45.2 | 62.7 | 974.4 | 0.0 |
| 12.08.2021 | E | 67.9 | 23.04 | 35.2 | 23.1 | 28.0 | 75.7 | 37.8 | 60.6 | 976.7 | 0.0 |
| 13.08.2021 | ESE | 67.5 | 23.80 | 33.6 | 23.7 | 27.5 | 77.9 | 44.9 | 62.3 | 976.1 | 0.0 |
| 14.08.2021 | SE | 62.3 | 14.47 | 31.4 | 21.8 | 26.2 | 77.9 | 38.6 | 57.6 | 978.3 | 0.0 |
| 15.08.2021 | ESE | 89.4 | 22.19 | 34.9 | 23.9 | 27.0 | 75.8 | 37.8 | 63.4 | 974.6 | 0.0 |
| 16.08.2021 | N | 65.6 | 21.91 | 32.9 | 23.6 | 26.4 | 77.8 | 46.1 | 68.7 | 975.5 | 4.7 |
| 17.08.2021 | E | 58.1 | 23.53 | 31.9 | 22.6 | 24.8 | 81 | 50.5 | 74.6 | 975.2 | 21.8 |
| 18.08.2021 | NE | 67.2 | 21.13 | 27.9 | 22.6 | 25.5 | 80.9 | 54.9 | 71.8 | 974.5 | 16.5 |
| 19.08.2021 | NE | 79.6 | 24.37 | 23.8 | 19.2 | 21.8 | 82.3 | 52 | 73.1 | 969.5 | 53.8 |
| 20.08.2021 | ESE | 70.8 | 22.55 | 32.7 | 21.2 | 27.9 | 79.5 | 43.1 | 61.6 | 972.4 | 0.7 |
| 21.08.2021 | NNW | 56.7 | 25.07 | 31.3 | 24.9 | 28.0 | 73.6 | 46.4 | 60.1 | 976.9 | 0.0 |
| 22.08.2021 | NNW | 65.2 | 29.63 | 28.7 | 23.3 | 24.3 | 75.3 | 55.9 | 72.0 | 977.9 | 0.0 |
| 23.08.2021 | NE | 72.6 | 25.01 | 27.5 | 21.5 | 24.4 | 77.5 | 57.6 | 71.1 | 972.3 | 0.0 |
| 24.08.2021 | NE | 58.8 | 26.80 | 30.8 | 22.4 | 25.7 | 69.2 | 56.2 | 65.7 | 974.6 | 0.0 |
| 25.08.2021 | E | 42.8 | 27.15 | 27.8 | 25.8 | 26.7 | 64.6 | 57.5 | 61.6 | 975.2 | 0.0 |
| 26.08.2021 | E | 73.7 | 28.73 | 31.9 | 23.8 | 27.2 | 77.1 | 43.7 | 62.0 | 974.4 | 0.0 |
| 27.08.2021 | E | 57.1 | 23.47 | 34.7 | 23.4 | 28.3 | 79.3 | 35.6 | 57.6 | 974.6 | 0.0 |
| 28.08.2021 | ESE | 66.6 | 22.73 | 33.9 | 23 | 27.0 | 79.1 | 40.6 | 63.7 | 973.5 | 2.6 |
| 29.08.2021 | ENE | 87.3 | 22.04 | 31.6 | 23.3 | 25.3 | 79.6 | 49.4 | 73.2 | 972.8 | 41.6 |
| 30.08.2021 | W | 78.1 | 24.29 | 32.2 | 23.3 | 26.6 | 80.2 | 44.6 | 67.5 | 973.8 | 7.5 |
| 31.08.2021 | NW | 86.6 | 30.28 | 32.5 | 22.8 | 26.3 | 78.2 | 44.2 | 64.9 | 975.6 | 2.3 |

**Sept. 2021**

| Date | Wind Direction (Blowing From) | Wind Speed (Km/hr) | | Temperature (°C) | | | Humidity (%) | | | Barometric Pressure (mBar) | Rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Max. | Avg. | Max | Min | Avg. | Max | Min | Avg | (Average) | |
| 01.09.2021 | NW | 62.5 | 33.9 | 31.2 | 22.9 | 26.7 | 77.5 | 43.7 | 63.0 | 975.3 | 0.0 |
| 02.09.2021 | N | 65.7 | 26.47 | 33.8 | 21.3 | 28.8 | 73.7 | 36.8 | 57.8 | 975.9 | 0.0 |
| 03.09.2021 | NE | 82.2 | 22.53 | 32.6 | 23.1 | 27.4 | 77.2 | 47.5 | 64.2 | 975.4 | 11.3 |
| 04.09.2021 | SE | 78.2 | 31.71 | 32.9 | 22.5 | 27.0 | 78.3 | 42.3 | 63.3 | 975.3 | 2.2 |
| 05.09.2021 | N | 79.2 | 23.63 | 34.9 | 23.4 | 28.4 | 80.3 | 35.8 | 57.6 | 974.6 | 1.3 |
| 06.09.2021 | W | 81.6 | 23.71 | 33.4 | 21.9 | 26.2 | 83.4 | 47.8 | 68.9 | 975.5 | 26.0 |
| 07.09.2021 | NW | 78.8 | 27.83 | 30.9 | 22.8 | 26.0 | 79.2 | 48.7 | 68.3 | 972.6 | 57.1 |
| 08.09.2021 | NNW | 91.1 | 32.69 | 29.1 | 22.1 | 23.9 | 81 | 58.5 | 74.7 | 970.5 | 17.8 |
| 09.09.2021 | NE | 65.2 | 21.5 | 32.4 | 22.4 | 28.4 | 85.4 | 52.6 | 76.8 | 975.1 | 18.4 |
| 10.09.2021 | NW | 71.5 | 19.8 | 30.5 | 21.9 | 26.5 | 86.1 | 55.7 | 77.6 | 973.4 | 15.7 |
| 11.09.2021 | E | 78.6 | 27.22 | 31.5 | 21.6 | 27.7 | 80 | 47.2 | 63.0 | 973.8 | 20.6 |
| 12.09.2021 | WNW | 81.6 | 21.74 | 29.3 | 21.4 | 23.6 | 80.8 | 54.6 | 74.5 | 973.7 | 31.4 |
| 13.09.2021 | ENE | 64.9 | 25.15 | 33.7 | 22 | 27.6 | 80.6 | 45.3 | 64.4 | 971.8 | 28.9 |
| 14.09.2021 | E | 75.4 | 32.32 | 30.7 | 22.3 | 24.8 | 80.7 | 52.3 | 74.2 | 971.5 | 14.4 |
| 15.09.2021 | ENE | 76.8 | 28.56 | 28.5 | 21.3 | 24.2 | 80 | 57.6 | 74.6 | 970.7 | 10.3 |
| 16.09.2021 | E | 79.2 | 27.39 | 30.3 | 21.6 | 25.9 | 79.9 | 45.2 | 67.0 | 974.8 | 7.4 |
| 17.09.2021 | N | 73 | 26.70 | 29.8 | 23.1 | 25.6 | 78.1 | 54.4 | 68.2 | 975.3 | 0.0 |
| 18.09.2021 | E | 55.7 | 25.38 | 30.8 | 22.7 | 26.2 | 79.9 | 46.6 | 66.2 | 976.8 | 0.0 |
| 19.09.2021 | NNW | 57.1 | 25.78 | 31.1 | 22.7 | 26.7 | 79.7 | 46.6 | 65.4 | 978.4 | 0.0 |
| 20.09.2021 | NNW | 51.6 | 22.29 | 27.2 | 21.3 | 23.9 | 80.2 | 60.2 | 73.8 | 977.8 | 10.3 |
| 21.09.2021 | E | 51.3 | 22.95 | 29.6 | 22.8 | 24.4 | 80.2 | 55.8 | 74.5 | 976.2 | 4.5 |
| 22.09.2021 | NE | 78.8 | 22.30 | 33.9 | 22.3 | 25.2 | 81.3 | 43.4 | 70.1 | 974.7 | 0.0 |
| 23.09.2021 | ENE | 56.4 | 21.22 | 33.6 | 22.6 | 26.3 | 79.9 | 43.4 | 67.1 | 975.3 | 0.0 |
| 24.09.2021 | NNW | 106.7 | 23.18 | 33.3 | 21.8 | 25.7 | 78.6 | 44.3 | 69.1 | 976.7 | 4.7 |
| 25.09.2021 | N | 51.3 | 21.80 | 30.9 | 22.9 | 26.4 | 79.6 | 52.8 | 67.9 | 976.5 | 0.0 |
| 26.09.2021 | W | 68.6 | 25.54 | 30.3 | 21.9 | 26.1 | 80.1 | 45.2 | 67.0 | 974.8 | 4.8 |
| 27.09.2021 | WSW | 94.1 | 23.59 | 31.5 | 25.5 | 27.7 | 66.2 | 45.1 | 57.4 | 973.1 | 0.0 |
| 28.09.2021 | NW | 93.4 | 28.81 | 30.8 | 23.2 | 26.1 | 71.6 | 46.3 | 61.7 | 974.8 | 0.0 |
| 29.09.2021 | NW | 39.3 | 22.19 | 33.2 | 22.6 | 26.7 | 77.7 | 42.3 | 63.2 | 977.6 | 0.0 |
| 30.09.2021 | E | 38.2 | 20.44 | 33.7 | 23.1 | 27.5 | 80.6 | 40.6 | 62.7 | 978.5 | 0.0 |

adani

# ENVIRONMENTAL LABORATORY

(Accredited by NABL)

## ADANI POWER MAHARASHTRA LIMITED, TIRODA

Format No: APML/ENV-LB/7.8/F01

| | |
|---|---|
| TC519321000000426F | Date: 30.04.2021 |
| **Issued To:** | APML,Plot No. A -1, Tirora Growth Centre, MIDC – Tirora,<br>Dist. Gondia – 441 911 |
| **Sample Particulars :** | Stack Monitoring |
| **Sample Collected by :** | Environment Dept. APML |

| | | | |
|---|---|---|---|
| 1 | Sampling Location | : | Unit -1 |
| 2 | Date of Sampling | : | 29.04.2021 |
| 3 | Time of Sampling | : | 10:28 AM |
| 4 | Load (MW) | : | 645 |
| 5 | Height of Stack (Meter) | : | 275 |
| 6 | Diameter of Stack (Meter) | : | 7.4 |
| 7 | Type of Fuel | : | Coal |
| 8 | Flue Gas Temperature ($^0$ C) | : | 125 |
| 9 | Flue Gas Velocity (M/sec) | : | 23.51 |
| 10 | Flow of Exit Gas at NTP (NM$^3$/Hr) | : | 2621992 |

| Sr. No | Test Parameters | Test Method | MPCB Standards | Units | Results * |
|---|---|---|---|---|---|
| 1 | PM | IS 11255 (Part- 1):1985 | 50 | Mg/Nm$^3$ | 44.2 |
| 2 | $SO_2$ | IS 11255 (Part 2) 1985 | 200 | Mg/Nm$^3$ | 983.3 |
| 3 | NOx | IS 11255 (Part 7) 2005 | 450 | Mg/Nm$^3$ | 410.9 |

* Results are corrected with 6% oxygen

***End of the Report***

Note: Tested results are well within the permissible limits of MPCB.

1. The report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.
4 # As per MoEF&CC Notification the SO2 Limit will be applicable after installation of FGD (March 2023-March 2024)

TC-5193

30/04/21

**Authorized Signatory**
**(Technical Manager)**

Page 1 of 1

Format No: APML/ENV-LB/7.8/F01

| | |
|---|---|
| TC619321000000427F | Date: 30.04.2021 |
| **Issued To:** | APML,Plot No. A -1, Tirora Growth Centre, MIDC – Tirora,<br>Dist. Gondia – 441 911 |
| **Sample Particulars :** | Stack Monitoring |
| **Sample Collected by :** | Environment Dept. APML |

| | | |
|---|---|---|
| 1 | Sampling Location : | Unit -2 |
| 2 | Date of Sampling : | 29.04.2021 |
| 3 | Time of Sampling : | 11:10 AM |
| 4 | Load (MW) : | 650 |
| 5 | Height of Stack (Meter) : | 275 |
| 6 | Diameter of Stack (Meter) : | 7.4 |
| 7 | Type of Fuel : | Coal |
| 8 | Flue Gas Temperature ($^0$C) : | 123 |
| 9 | Flue Gas Velocity (M/sec) : | 22.91 |
| 10 | Flow of Exit Gas at NTP (NM$^3$/Hr) : | 2568636 |

| Sr. No | Test Parameters | Test Method | MPCB Standards | Units | Results * |
|---|---|---|---|---|---|
| 1 | PM | IS 11255 (Part- 1):1985 | 50 | Mg/Nm$^3$ | 45.8 |
| 2 | $SO_2$ | IS 11255 (Part 2) 1985 | 200 | Mg/Nm$^3$ | 972.0 |
| 3 | NOx | IS 11255 (Part 7) 2005 | 450 | Mg/Nm$^3$ | 399.9 |

* Results are corrected with 6% oxygen

***End of the Report***

Note: Tested results are well within the permissible limits of MPCB.

1. The report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.

4 # As per MoEF&CC Notification the SO2 Limit will be applicable after installation of FGD - (March 2023-March 2024)

30/4/21

Authorized Signatory
(Technical Manager)

**adani**

# ENVIRONMENTAL LABORATORY
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## ADANI POWER MAHARASHTRA LIMITED, TIRODA

Format No: APML/ENV-LB/7.8/F01

| TC519321000000428F | Date: 30.04.2021 |
|---|---|

| | |
|---|---|
| Issued To: | APML,Plot No. A -1, Tirora Growth Centre, MIDC – Tirora,<br>Dist. Gondia – 441 911 |
| Sample Particulars : | Stack Monitoring |
| Sample Collected by : | Environment Dept. APML |

| | | | |
|---|---|---|---|
| 1 | Sampling Location | : | Unit -3 |
| 2 | Date of Sampling | : | 29.04.2021 |
| 3 | Time of Sampling | : | 11:20 AM |
| 4 | Load (MW) | : | 640 |
| 5 | Height of Stack (Meter) | : | 275 |
| 6 | Diameter of Stack (Meter) | : | 7.4 |
| 7 | Type of Fuel | : | Coal |
| 8 | Flue Gas Temperature ($^0$C) | : | 122 |
| 9 | Flue Gas Velocity (M/sec) | : | 22.94 |
| 10 | Flow of Exit Gas at NTP (NM$^3$/Hr) | : | 2578885 |

| Sr. No | Test Parameters | Test Method | MPCB Standards | Units | Results * |
|---|---|---|---|---|---|
| 1 | PM | IS 11255 (Part- 1):1985 | 50 | Mg/Nm$^3$ | 40.5 |
| 2 | $SO_2$ | IS 11255 (Part 2) 1985 | 200 | Mg/Nm$^3$ | 979.1 |
| 3 | NOx | IS 11255 (Part 7) 2005 | 450 | Mg/Nm$^3$ | 416.7 |

** Results are corrected with 6% oxygen*

***End of the Report***

**Note:** Tested results are well within the permissible limits of MPCB.

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3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.
4 # As per MoEF&CC Notification the SO2 Limit will be applicable after installation of FGD. (March 2022-March 2024)

30/4/21
**Authorized Signatory**
**(Technical Manager)**

adani **ENVIRONMENTAL LABORATORY**

**(Accredited by NABL)**

**ADANI POWER MAHARASHTRA LIMITED, TIRODA**

**Format No: APML/ENV-LB/7.8/F01**

| TC519321000000429F | Date: 30.04.2021 |
|---|---|

## TEST REPORT

| | |
|---|---|
| **Issued To:** | **APML,Plot No. A -1, Tirora Growth Centre, MIDC – Tirora,<br>Dist. Gondia – 441 911** |
| **Sample Particulars :** | **Stack Monitoring** |
| **Sample Collected by :** | **Environment Dept. APML** |

| | | | |
|---|---|---|---|
| 1 | **Sampling Location** | : | **Unit -4** |
| 2 | **Date of Sampling** | : | **29.04.2021** |
| 3 | **Time of Sampling** | : | **12:00 PM** |
| 4 | **Load (MW)** | : | **642** |
| 5 | **Height of Stack (Meter)** | : | **275** |
| 6 | **Diameter of Stack (Meter)** | : | **7.4** |
| 7 | **Type of Fuel** | : | **Coal** |
| 8 | **Flue Gas Temperature ($^0$C)** | : | **125** |
| 9 | **Flue Gas Velocity (M/sec)** | : | **22.69** |
| 10 | **Flow of Exit Gas at NTP (NM$^3$/Hr)** | : | **2583781** |

| Sr. No | Test Parameters | Test Method | MPCB Standards | Units | Results |
|---|---|---|---|---|---|
| 1 | PM | IS 11255<br>(Part- 1):1985 | 50 | Mg/Nm$^3$ | 40 |
| 2 | $SO_2$ | IS 11255 (Part 2)<br>1985 | 200 | Mg/Nm$^3$ | 978 |
| 3 | NOx | IS 11255 (Part 7)<br>2005 | 450 | Mg/Nm$^3$ | 427 |

** Results are corrected with 6% oxygen*

***End of the Report***

**Note:** Tested results are well within the permissible limits of MPCB.

1. The report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.

4 # As per MoEF&CC Notification the SO2 Limit will be applicable after installation of FGD (March 2022-March 2024)

30/4/21

**Authorized Signatory**
**(Technical Manager)**

adani **ENVIRONMENTAL LABORATORY**
(Accredited by NABL)

**ADANI POWER MAHARASHTRA LIMITED, TIRODA**

TC-5193

Format No: APML/ENV-LB/7.8/F01

| TC519321000000430F | Date: 30.04.2021 |
|---|---|

## TEST REPORT

| | |
|---|---|
| Issued To: | APML,Plot No. A -1, Tirora Growth Centre, MIDC – Tirora,<br>Dist. Gondia – 441 911 |
| Sample Particulars : | Stack Monitoring |
| Sample Collected by : | Environment Dept. APML |

1 Sampling Location : Unit -5
2 Date of Sampling : 29.04.2021
3 Time of Sampling : 12:38 PM
4 Load (MW) : 653
5 Height of Stack (Meter) : 275
6 Diameter of Stack (Meter) : 7.4
7 Type of Fuel : Coal
8 Flue Gas Temperature ($^0$C) : 117
9 Flue Gas Velocity (M/sec) : 23.78
10 Flow of Exit Gas at NTP (NM$^3$/Hr) : 2704680

| Sr. No | Test Parameters | Test Method | MPCB Standards | Units | Results |
|---|---|---|---|---|---|
| 1 | PM | IS 11255 (Part- 1):1985 | 50 | Mg/Nm$^3$ | 43 |
| 2 | $SO_2$ | IS 11255 (Part 2) 1985 | 200 | Mg/Nm$^3$ | 963 |
| 3 | NOx | IS 11255 (Part 7) 2005 | 450 | Mg/Nm$^3$ | 404 |

** Results are corrected with 6% oxygen*

***End of the Report***

Note: Tested results are well within the permissible limits of MPCB.

1. The report is referring only to the tested sample and for applicable parameters.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.

4 # As per MoEF&CC Notification the SO2 Limit will be applicable after installation of FGD. (March 2023/March 2024)

Environmental Laboratory TC-5193

30/04/21

Authorized Signatory
(Technical Manager)

Page 1 of 1

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(Accredited by NABL)

**ADANI POWER MAHARASHTRA LIMITED, TIRODA**

TC-6183

Format No: APML/ENV-LB/7.8/F01

ULR No : TC619321000000401F

Date 30.04.2021

| | |
|---|---|
| **Issued To:** | APML,Plot No. A -1, Tirora Growth Centre, MIDC – Tirora, Dist. Gondia – 441 911 |
| **Sample Particulars :** | Ambient Air Quality ( Plant ) |
| **Sample Collected by :** | Environment Dept. APML |

**Test Report**

| Station | Sampling Location | Sampling Date | Analysis Starting Date | Parameters<br>PM 10<br>µg/m3 | <br>PM 2.5<br>µg/m3 | <br>SO2<br>µg/m3 | <br>NOx<br>µg/m3 |
|---|---|---|---|---|---|---|---|
| AAQ 1 | Near AWRS | 02.04.2021 | 03.04.2021 | 83.9 | 34.1 | 9.0 | 24.1 |
| | | 05.04.2021 | 06.04.2021 | 79.1 | 31.9 | 12.9 | 24.7 |
| | | 09.04.2021 | 10.04.2021 | 71.1 | 26.4 | 11.7 | 16.2 |
| | | 12.04.2021 | 13.04.2021 | 98.6 | 28.8 | 10.2 | 19.2 |
| | | 16.04.2021 | 17.04.2021 | 71.9 | 24.0 | 9.8 | 20.4 |
| | | 19.04.2021 | 20.04.2021 | 61.3 | 24.3 | 10.4 | 22.8 |
| | | 23.04.2021 | 24.04.2021 | 82.4 | 34.6 | 7.8 | 16.2 |
| | | 26.04.2021 | 27.04.2021 | 96.0 | 37.9 | 11.9 | 25.9 |
| | | 29.04.2021 | 30.04.2021 | 56.5 | 29.1 | 10.4 | 23.5 |
| AAQ 2 | Near Brick Plant | 02.04.2021 | 03.04.2021 | 74.5 | 27.1 | 11.7 | 21.0 |
| | | 05.04.2021 | 06.04.2021 | 49.4 | 18.4 | 12.3 | 16.0 |
| | | 09.04.2021 | 10.04.2021 | 60.5 | 23.1 | 10.2 | 18.6 |
| | | 12.04.2021 | 13.04.2021 | 77.0 | 28.5 | 13.9 | 20.4 |
| | | 16.04.2021 | 17.04.2021 | 87.2 | 37.6 | 13.1 | 21.0 |
| | | 19.04.2021 | 20.04.2021 | 81.6 | 29.4 | 16.2 | 29.5 |
| | | 23.04.2021 | 24.04.2021 | 62.4 | 20.5 | 9.8 | 19.8 |
| | | 26.04.2021 | 27.04.2021 | 74.5 | 25.4 | 11.2 | 22.2 |
| | | 29.04.2021 | 30.04.2021 | 62.8 | 29.1 | 12.9 | 21.6 |
| AAQ 3 | China Colony | 02.04.2021 | 03.04.2021 | 84.3 | 30.8 | 9.4 | 17.4 |
| | | 05.04.2021 | 06.04.2021 | 64.7 | 24.6 | 12.7 | 20.4 |
| | | 09.04.2021 | 10.04.2021 | 75.5 | 35.7 | 14.1 | 21.6 |
| | | 12.04.2021 | 13.04.2021 | 65.4 | 30.5 | 12.9 | 19.2 |
| | | 16.04.2021 | 17.04.2021 | 70.0 | 35.3 | 13.9 | 23.5 |
| | | 19.04.2021 | 20.04.2021 | 83.0 | 24.0 | 11.4 | 24.7 |
| | | 23.04.2021 | 24.04.2021 | 55.2 | 28.8 | 13.5 | 22.2 |
| | | 26.04.2021 | 27.04.2021 | 93.5 | 25.7 | 14.7 | 27.1 |
| | | 29.04.2021 | 30.04.2021 | 64.8 | 19.2 | 10.8 | 16.2 |
| NAAQMS Standard | | | | 100 | 60 | 80 | 80 |

***End of the Report***

**Note:** Tested results are well within the permissible limits of National Ambient Air Quality Monitoring Standard (NAAQMS

1. The report is referring only to the tested sample and for applicable parameter.
2. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.

30/4/21

Authorized Signatory
( Technical Manager )

adani

# ENVIRONMENTAL LABORATORY

(Accredited by NABL)

## ADANI POWER MAHARASHTRA LIMITED, TIRODA

Format No: APML/ENV-LB/7.8/F01

| | |
|---|---|
| URL No : TC519321000000417F | Date: 30.04.2021 |

| | | | |
|---|---|---|---|
| Issued To: | APML,Plot No. A -1, Tirora Growth Centre, MIDC – Tirora, Dist. Gondia – 441 911 | | |
| Sample Collection Date | 21.04.2021 | Analysis Starting Date | 21.04.2021 |
| Quantity received | 3 Lit /Sample | Sampled by | Environment Dept. |
| Sample Particulars : Treated Waste Water | | | |
| Location of sample : STP -1 & 2 Out Let | | | |

### TEST REPORT

| Sr no | Parameter (NABL SCOPE) | Unit | Test Methods | MPCB Standards | Results | |
|---|---|---|---|---|---|---|
| | | | | | STP-1 | STP-2 |
| 1 | TSS | mg / l | APHA-23rd - 2540 D | 50 | 33 | 46 |
| 2 | COD | mg / l | APHA-23rd Ed 2017-5220B Open Reflux Method | 100 | 50 | 40 |
| 3 | BOD at 27°C for 3 days | mg / l | IS: 3025 (P-44)-1993 R-1999 Ad.1 BOD 3-days at 27 °C | 30 | 15 | 13 |

***End of the Report***

Note Tested results are well within the permissible limits of MPCB.

1. The report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.
4. # Indicates this parameter is not covered in our NABL scope

30/04/21

Authorized Signatory/
(Technical Manager)

# adani ENVIRONMENTAL LABORATORY
(Accredited by NABL)

## ADANI POWER MAHARASHTRA LIMITED, TIRODA

Format No: APML/ENV/LB/7.8/F01

| | |
|---|---|
| URL No : TC519321000000415F | Date: 30.04.2021 |

| | | | |
|---|---|---|---|
| Issued To: | APML,Plot No. A -1, Tirora Growth Centre, MIDC – Tirora, Dist. Gondia – 441 911 | | |
| Sample Collection Date | 21.04.2021 | Analysis Starting Date | 21.04.2021 |
| Quantity received | 3 Lit /Sample | Sampled by | Environment Dept. APML |
| Sample Particulars : Treated Effluent Water | | | |
| Location of sample : DM Plant N-Pit ; ETP Outlet | | | |

### TEST REPORT

| Sr no | Parameter (NABL SCOPE) | Unit | Test Methods | MPCB Standards | Results | |
|---|---|---|---|---|---|---|
| | | | | | N-pit | ETP Outlet |
| 1 | pH Value | --- | APHA-23rd -4500-H+B Electrometric Method | 5.5-9.0 | 7.3 | 7.6 |
| 2 | TSS | mg / l | APHA-23rd - 2540 D | 100.0 | 28 | 32 |
| 3 | TDS | mg / l | APHA-23rd - 2540 C | 2100.0 | 505 | 125 |
| 4 | COD | mg / l | APHA-23rd Ed 2017-5220B Open Reflux Method | 250.0 | 31 | 61 |
| 5 | BOD at 27°C for 3 days | mg / l | IS: 3025 (P-44):1993 R: 1999 Ad.1 BOD 3-days at 27 °C | 30.0 | 13 | 16 |
| 6 | Oil & Grease | mg / l | APHA-23rd Ed 2017-5520 B Liquid Liquid Partition Gravimetric method | 10.0 | BDL | 2.5 |

***End of the Report***

**Note:** Tested results are well within the permissible limits of MPCB.

1. The report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.
4. # indicates this parameter is not covered in our NABL scope

30/04/21
Authorized Signatory
(Technical Manager)

# adani ENVIRONMENTAL LABORATORY

(Accredited by NABL)

## ADANI POWER MAHARASHTRA LIMITED, TIRODA

Format No: APML/ENV-LB/7.8/F01

URL No : TC5193210000000414F

Date: 30.04.2021

| | | | |
|---|---|---|---|
| Issued To: | APML,Plot No. A -1, Tirora Growth Centre, MIDC – Tirora, Dist. Gondia – 441 911 | | |
| Sample Collection Date | 21.04.2021 | Analysis Starting Date : | 21.04.2021 |
| Quantity received | 1 Ltr / Sample | Sampled by : | Environment Dept. APML |

Sample Particulars : Cooling tower blowdown ( Waste Water )

Location of sample : Unit1,Unit-2,Unit-3,Unit-4 & Unit-5.

### TEST REPORT

| Sr no | Parameter (NABL SCOPE) | Unit | Test Methods | MPCB Standards | Results | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | U # 1 | U # 2 | U # 3 | U # 4 | U # 5 |
| 1 | Free Available Chlorine | mg/l | APHA-23rd - 4500-Cl G, DPD Colorimetric Method | 0.5 | 0.3 | 0.3 | 0.3 | 0.1 | 0.1 |
| 2 | Phosphate as (PO4) | mg/l | APHA-23rd -4500-P D Stannous Chloride Method | 5 | 2.5 | 2.1 | 2.2 | 1.8 | 1.7 |
| 3 | Zinc as (Zn) | mg/l | ---- | 1 | BDL | BDL | BDL | BDL | BDL |
| 4 | Total Chromium as (Cr ) | mg/l | --- | 0.2 | BDL | BDL | BDL | BDL | BDL |

**End of the Report**

**Note:** Tested results are well within the permissible limits of MPCB.

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2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.

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Page 1 Of 1

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**ADANI POWER MAHARASHTRA LIMITED, TIRODA**

Format No: APML/ENV-LB/7.8/F01

URL No : TC5193210000000413F

Date: 30.04.2021

| | | | |
|---|---|---|---|
| Issued To: | APML,Plot No. A -1, Tirora Growth Centre, MIDC – Tirora, Dist. Gondia – 441 911 | | |
| Sample Collection Date | 21.04.2021 | Analysis Starting Date : | 21.04.2021 |
| Quantity received | 1 Ltr / Sample | Sampled by : | Environment Dept. APML |
| Sample Particulars : Condenser Cooling Water ( Waste Water ) | | | |
| Location of sample : Unit1,Unit-2,Unit-3,Unit-4 & Unit-5 | | | |

## TEST REPORT

| Sr no | Parameter | Unit | Test Methods | MPCB Standards | Results | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | U # 1 | U # 2 | U # 3 | U # 4 | U # 5 |
| 1 | pH Value | --- | APHA-23rd - 4500-H+B Electrometric Method | 6.5-8.5 | 8.4 | 8.3 | 8.1 | 7.9 | 8.2 |
| 2 | Temperature | Deg C | APHA-23rd - 2550 B | Not to exceed 5°c then that of intake water | 35.0 | 34.0 | 35.0 | 32.0 | 33.0 |
| 3 | Free Available Chlorine | PPM | APHA-23rd - 4500-Cl G, DPD Colorimetric Method | 0.5 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 |

***End of the Report***

Note: Tested results are well within the permissible limits of MPCB.

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2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.

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(Technical Manager)

Page 1 Of 1

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(Accredited by NABL)

**ADANI POWER MAHARASHTRA LIMITED, TIRODA**

TC-6181

Format No: APML/ENV-LB/7.8/F01

URL No. : TC5193210000000423F | Date: 30.04.2021

| | |
|---|---|
| Issued To: | APML,Plot No. A -1, Tirora Growth Centre,<br>MIDC – Tirora, Dist. Gondia – 441 911 |
| Sample Particulars : | Ambient Noise Level (Plant) |
| Sample Collected by : | Environment Dept. APML |
| Date of Sampling: | 10.04.2021 |

**Test Report**

| S. No | Locations | Day Time in dB (A) | Night Time in dB (A) |
|---|---|---|---|
| | | (6.00 a.m. to 10.00 p.m.) | (10.00 p.m. to 06.00 a.m.) |
| 1 | Near Shanti Niketan I II & III | 57.7 | 51.8 |
| 2 | Near Labour Hutment | 62.7 | 59.8 |
| 3 | Near Store Area | 66.7 | 61.5 |
| 4 | Gate No.1 | 54.9 | 50.5 |
| 5 | Gate No.2 | 66.2 | 51.4 |
| 6 | Gate No.3 | 71.2 | 65.5 |
| 7 | Near OHC | 56.3 | 41.5 |
| 8 | Railway Siding | 67.0 | 58.8 |
| 9 | Near Reservoir 2 | 59.4 | 47.9 |
| 10 | Near Ash Water Recovery Pump House | 61.3 | 45.5 |
| 11 | In China Colony | 41.0 | 38.9 |
| CPCB Standards (Industrial Area) | | 75 | 70 |

*** End Of the Report***

**Note:** Tested results are well within the permissible limits of MPCB / CPCB.

1. The report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.

30/4/21

Authorized Signatory
(Technical Manager)

# ENVIRONMENTAL LABORATORY

(Accredited by NABL)

## ADANI POWER MAHARASHTRA LIMITED, TIRODA

Format No: APML/ENV-LB/7.8/F01

|  |  |
|---|---|
| TC619321000000626F | Date: 15.05.2021 |

|  |  |
|---|---|
| Issued To: | APML,Plot No. A -1, Tirora Growth Centre, MIDC – Tirora,<br>Dist. Gondia – 441 911 |
| Sample Particulars : | Stack Monitoring |
| Sample Collected by : | Environment Dept. APML |

1 Sampling Location : Unit -1

2 Date of Sampling : 13.05.2021

3 Time of Sampling : 10:15 AM

4 Load (MW) : 595

5 Height of Stack (Meter) : 275

6 Diameter of Stack (Meter) : 7.4

7 Type of Fuel : Coal

8 Flue Gas Temperature ($^0$C) : 128

9 Flue Gas Velocity (M/sec) : 23.85

10 Flow of Exit Gas at NTP (NM$^3$/Hr) : 2641011

| Sr. No | Test Parameters | Test Method | MPCB Standards | Units | Results * |
|---|---|---|---|---|---|
| 1 | PM | IS 11255<br>(Part- 1):1985 | 50 | Mg/Nm$^3$ | 38.4 |
| 2 | $SO_2$ | IS 11255 (Part 2)<br>1985 | 200 | Mg/Nm$^3$ | 965.0 |
| 3 | NOx | IS 11255 (Part 7)<br>2005 | 450 | Mg/Nm$^3$ | 424.8 |

* Results are corrected with 6% oxygen

***End of the Report***

Note: Tested results are well within the permissible limits of MPCB

1. The report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.
4. # As per MoEF&CC Notification the SO2 Limit will be applicable after installation of FGD [illegible]

15/05/21

Authorized Signatory
(Technical Manager)

adani

# ENVIRONMENTAL LABORATORY

(Accredited by NABL)

ADANI POWER MAHARASHTRA LIMITED, TIRODA

Format No: APML/ENV-LB/7.8F01

| | |
|---|---|
| TC5193210000000525F | Date: 28.05.2021 |
| Issued To: | APML,Plot No. A -1, Tirora Growth Centre, MIDC – Tirora,<br>Dist. Gondia – 441 911 |
| Sample Particulars : | Stack Monitoring |
| Sample Collected by : | Environment Dept. APML |

| | | | |
|---|---|---|---|
| 1 | Sampling Location | : | Unit -2 |
| 2 | Date of Sampling | : | 27.05.2021 |
| 3 | Time of Sampling | : | 3:45 PM |
| 4 | Load (MW) | : | 660 |
| 5 | Height of Stack (Meter) | : | 275 |
| 6 | Diameter of Stack (Meter) | : | 7.4 |
| 7 | Type of Fuel | : | Coal |
| 8 | Flue Gas Temperature (° C) | : | 128 |
| 9 | Flue Gas Velocity (M/sec) | : | 22.72 |
| 10 | Flow of Exit Gas at NTP ($NM^3$/Hr) | : | 2534089 |

| Sr. No | Test Parameters | Test Method | MPCB Standards | Units | Results * |
|---|---|---|---|---|---|
| 1 | PM | IS 11255 (Part- 1):1985 | 50 | $Mg/Nm^3$ | 42.1 |
| 2 | $SO_2$ | IS 11255 (Part 2) 1985 | 200 | $Mg/Nm^3$ | 564.4 |
| 3 | NOx | IS 11255 (Part 7) 2005 | 400 | $Mg/Nm^3$ | 309.3 |

* Results are corrected with 6% oxygen

**End of the Report**

Note: Tested results are well within the permissible limits of MPCB.

1. The report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specifically.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.
4. # As per MoEF&CC Notification the SO2 Limit will be applicable after installation of FGD [illegible]

Authorized Signatory
(Technical Manager)

adani

# ENVIRONMENTAL LABORATORY

(Accredited by NABL)

## ADANI POWER MAHARASHTRA LIMITED, TIRODA

Format No: APML/ENV-LB/7.8/F01

| TC519321000000330F | Date: 28.05.2021 |
|---|---|

| | |
|---|---|
| Issued To: | APML,Plot No. A -1, Tirora Growth Centre, MIDC – Tirora,<br>Dist. Gondia – 441 911 |
| Sample Particulars : | Stack Monitoring |
| Sample Collected by : | Environment Dept. APML |

| | | | |
|---|---|---|---|
| 1 | Sampling Location | : | Unit -3 |
| 2 | Date of Sampling | : | 27.05.2021 |
| 3 | Time of Sampling | : | 4:20 PM |
| 4 | Load (MW) | : | 600 |
| 5 | Height of Stack (Meter) | : | 275 |
| 6 | Diameter of Stack (Meter) | : | 7.4 |
| 7 | Type of Fuel | : | Coal |
| 8 | Flue Gas Temperature (° C) | : | 132 |
| 9 | Flue Gas Velocity (M/sec) | : | 23.80 |
| 10 | Flow of Exit Gas at NTP ($NM^3/hr$) | : | 3609136 |

| Sr. No | Test Parameters | Test Method | MPCB Standards | Units | Results * |
|---|---|---|---|---|---|
| 1 | PM | IS 11255 (Part- 1):1985 | 50 | $Mg/Nm^3$ | 39.1 |
| 2 | $SO_2$ | IS 11255 (Part 2) 1985 | 200 | $Mg/Nm^3$ | 970.1 |
| 3 | NOx | IS 11255 (Part 7) 2005 | 450 | $Mg/Nm^3$ | 417.5 |

* Results are corrected with 6% oxygen

***End of the Report***

**Note:** Tested results are well within the permissible limits of MPCB.

1. The report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. The report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.
4.# As per MoEF&CC Notification the SO2 Limit will be applicable after installation of FGD. [illegible]

Authorized Signatory
(Technical Manager)

# ENVIRONMENTAL LABORATORY

(Accredited by NABL)

**ADANI POWER MAHARASHTRA LIMITED, TIRODA**

Format No: APML/ENV-LB/7.8/F01

| | |
|---|---|
| TC519321000000527F | Date: 15.06.2021 |

## TEST REPORT

| | |
|---|---|
| **Issued To:** | APML,Plot No. A -1, Tirora Growth Centre, MIDC – Tirora,<br>Dist. Gondia :- 441 911 |
| **Sample Particulars :** | Stack Monitoring |
| **Sample Collected by :** | Environment Dept. APML |

1 Sampling Location : Unit -4

2 Date of Sampling : 13.06.2021

3 Time of Sampling : 10:45 AM

4 Load (MW) : 615

5 Height of Stack (Meter) : 275

6 Diameter of Stack (Meter) : 7.4

7 Type of Fuel : Coal

8 Flue Gas Temperature ($^0$C) : 137

9 Flue Gas Velocity (M/sec) : 24.11

10 Flow of Exit Gas at NTP (NM$^3$/Hr) : 3676428

| Sr. No | Test Parameters | Test Method | MPCB Standards | Units | Results |
|---|---|---|---|---|---|
| 1 | PM | IS 11255 (Part- 1):1985 | 50 | Mg/Nm$^3$ | 42 |
| 2 | $SO_2$ | IS 11255 (Part 2) 1985 | 200 | Mg/Nm$^3$ | 1023 |
| 3 | NOx | IS 11255 (Part 7) 2005 | 450 | Mg/Nm$^3$ | 376 |

*Results are corrected with 6% oxygen

***End of the Report***

**Note:** Tested results are well within the permissible limits of MPCB.

1. The report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholy or in part, and can't be used as evidence in court of law.

4 # As per MoEF&CC Notification the SO2 Limit will be applicable after installation of FGD. [illegible]

Authorised Signatory
(Technical Manager)

Format No: APML/ENV-LB/TAF01

| TC519321000000538F | Date: 15.05.2021 |
|---|---|

## TEST REPORT

| | |
|---|---|
| Issued To: | APML,Plot No. A -1, Tirora Growth Centre, MIDC – Tirora,<br>Dist. Gondia – 441 911 |
| Sample Particulars : | Stack Monitoring |
| Sample Collected by : | Environment Dept. APML |

1 Sampling Location : Unit -5
2 Date of Sampling : 13.05.2021
3 Time of Sampling : 11:35 AM
4 Load (MW) : 620
5 Height of Stack (Meter) : 275
6 Diameter of Stack (Meter) : 7.4
7 Type of Fuel : Coal
8 Flue Gas Temperature (⁰ C) : 134
9 Flue Gas Velocity (M/sec) : 23.48
10 Flow of Exit Gas at NTP (NM³/Hr) : 2625748

| Sr. No | Test Parameters | Test Method | MPCB Standards | Units | Results |
|---|---|---|---|---|---|
| 1 | PM | IS 11255 (Part- 1):1985 | 50 | Mg/Nm³ | 44 |
| 2 | $SO_2$ | IS 11255 (Part 2) 1985 | 200 | Mg/Nm³ | 1002 |
| 3 | NOx | IS 11255 (Part 7) 2005 | 450 | Mg/Nm³ | 406 |

*Results are corrected with 6% oxygen

***End of the Report!**

**Note:** Tested results are well within the permissible limits of MPCB.

1. The report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.

4.# As per MoEF&CC Notification the SO2 Limit will be applicable after installation of FGD. (March 2023-March 2024)

Authorized Signatory
(Technical Manager)

Format No: APML/ENV-L/07 AF01

ULR No : TC516521000000051F

Date: 31.05.2021

| | |
|---|---|
| Issued To: | APML, Plot No. A -1, Tiroda Growth Centre, MIDC – Tiroda, Dist. Gondia – 441 911 |
| Sample Particulars : | Ambient Air Quality ( Plant ) |
| Sample Collected by : | Environment Dept. APML |

Test Report

| Station | Sampling Location | Sampling Date | Analysis Starting Date | Parameters | | | |
|---|---|---|---|---|---|---|---|
| | | | | PM 10 | PM 2.5 | SO2 | NOx |
| | | | | µg/m3 | µg/m3 | µg/m3 | µg/m3 |
| AAQ 1 | Near AWRS | 03.05.2021 | 04.05.2021 | 94.7 | 33.9 | 10.4 | 24.1 |
| | | 07.05.2021 | 08.05.2021 | 78.8 | 24.3 | 13.2 | 22.0 |
| | | 10.05.2021 | 11.05.2021 | 87.0 | 31.5 | 14.6 | 22.8 |
| | | 14.05.2021 | 15.05.2021 | 83.5 | 26.6 | 16.5 | 26.0 |
| | | 17.05.2021 | 18.05.2021 | 85.4 | 26.4 | 13.3 | 27.1 |
| | | 21.05.2021 | 22.05.2021 | 64.0 | 24.0 | 11.9 | 19.6 |
| | | 24.05.2021 | 25.05.2021 | 73.9 | 32.8 | 10.8 | 27.7 |
| | | 28.05.2021 | 29.05.2021 | 98.1 | 30.7 | 12.8 | 29.3 |
| AAQ 2 | Near Brick Plant | 03.05.2021 | 04.05.2021 | 81.8 | 35.1 | 11.7 | 24.7 |
| | | 07.05.2021 | 08.05.2021 | 87.3 | 32.8 | 13.3 | 23.9 |
| | | 10.05.2021 | 11.05.2021 | 72.4 | 20.3 | 13.3 | 19.6 |
| | | 14.05.2021 | 15.05.2021 | 69.7 | 21.8 | 14.1 | 22.2 |
| | | 17.05.2021 | 18.05.2021 | 86.4 | 25.1 | 10.1 | 22.8 |
| | | 21.05.2021 | 22.05.2021 | 88.9 | 33.3 | 17.3 | 30.7 |
| | | 24.05.2021 | 25.05.2021 | 58.1 | 30.7 | 14.9 | 21.8 |
| | | 28.05.2021 | 29.05.2021 | 87.6 | 30.6 | 13.9 | 32.2 |
| AAQ 3 | China Colony | 03.05.2021 | 04.05.2021 | 82.8 | 30.2 | 9.0 | 19.8 |
| | | 07.05.2021 | 08.05.2021 | 89.4 | 42.9 | 7.0 | 23.4 |
| | | 10.05.2021 | 11.05.2021 | 78.8 | 37.4 | 10.8 | 20.4 |
| | | 14.05.2021 | 15.05.2021 | 95.9 | 44.1 | 9.0 | 22.9 |
| | | 17.05.2021 | 18.05.2021 | 31.9 | 23.2 | 10.6 | 20.4 |
| | | 21.05.2021 | 22.05.2021 | 47.3 | 36.7 | 11.3 | 21.6 |
| | | 24.05.2021 | 25.05.2021 | 71.3 | 35.0 | 12.1 | 24.7 |
| | | 28.05.2021 | 29.05.2021 | 65.6 | 43.6 | 11.4 | 15.3 |
| NAAQMS Standard | | | | 100 | 60 | 80 | 80 |

***End of the Report***

Note: Tested results are well within the permissible limits of National Ambient Air Quality Monitoring Standard (NAAQMS)

1. The report is referring only to the tested sample and for applicable parameter.
2. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.

31/05/21

Authorised Signatory
( Technical Manager )

Format No: APML/ENV-LB/7.8F01

ULR. No : TC51932100000[illegible]F

Date: 31.08.2021

| | | | |
|---|---|---|---|
| Issued To: | APML,Plot No. A-1, Tirora Growth Centre, MIDC – Tirora, Dist. Gondia – 441 911 | | |
| Sample Collection Date: | 13.08.2021 | Analysis Starting Date : | 13.08.2021 |
| Quantity received | 1 Ltr / Sample | Sampled by : | Environment Dept. APML |

Sample Particulars : Condenser Cooling Water ( Waste Water )

Location of sample : Unit1,Unit-2,Unit-3,Unit-4 & Unit-5

## TEST REPORT

| Sr no | Parameter | Unit | Test Methods | MPCB Standards | Results | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | U # 1 | U # 2 | U # 3 | U # 4 | U # 5 |
| 1 | pH Value | --- | APHA-23rd - 4500-H+B Electrometric Method | 6.5-8.5 | 8.2 | 8.1 | 8.0 | 8.3 | 8.4 |
| 2 | Temperature | Deg C | APHA-23rd - 2550 B | Not to exceed 5°C than that of intake water | 35.8 | 35.0 | 35.8 | 33.0 | 36.0 |
| 3 | Free Available Chlorine | PPM | APHA-23rd – 4500-Cl G, DPD Colorimetric Method | 0.5 | 0.3 | 0.2 | 0.2 | 0.2 | 0.2 |

**End of the Report**

Note: Tested results are well within the permissible limits of MPCB.

1. The report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.

31/08/21

Authorised Signatory
(Technical Manager)

Format No: APML/ENV-LAB/7.8/F-01

ULR No.: TC61632100000000DF

Date: 31.05.2021

| | | | |
|---|---|---|---|
| Issued To: | APML, Plot No. A-1, Tiroda Growth Centre, MIDC – Tiroda, Dist. Gondia – 441 911 | | |
| Sample Collection Date | 12.05.2021 | Analysis Starting Date : | 12.05.2021 |
| Quantity received | 1 Ltr) Sample | Sampled by : | Environment Dept. APML |
| Sample Particulars : Cooling tower blowdown (Waste Water) | | | |
| Location of sample : Unit-1, Unit-2, Unit-3, Unit-4 & Unit-5 | | | |

TEST REPORT

| Sr no | Parameter (NABL SCOPE) | Unit | Test Methods | MPCB Standards | Results | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | U # 1 | U # 2 | U # 3 | U # 4 | U # 5 |
| 1 | Free Available Chlorine | mg/l | APHA (23rd) - 4500 Cl G, DPD Colorimetric Method | 0.5 | 0.2 | 0.2 | 0.3 | 0.4 | 0.2 |
| 2 | Phosphate as (PO4) | mg/l | APHA (23rd) 4500-P D Stannous Chloride Method | 5 | 3.7 | 3.8 | 3.8 | 3.5 | 3.1 |
| 3 | Zinc as (Zn) | mg/l | — | 1 | BDL | BDL | BDL | BDL | BDL |
| 4 | Total Chromium as (Cr) | mg/l | — | 0.2 | BDL | BDL | BDL | BDL | BDL |

**End of the Report**

Note: Tested results are well within the permissible limits of MPCB.

1. The report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproduced wholly or in part, and can't be used as evidence in court of law.

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(Technical Manager)

Page 1 Of 1

## ADANI POWER MAHARASHTRA LIMITED, TIRODA

Format No.: APML/ENV-LAB/T.R/01

| ULR No.: TC513221000000920F | Date: 31.05.2021 |
|---|---|

| | | | |
|---|---|---|---|
| Issued To: | APML, Plot No. A-1, Tiroda Growth Centre MIDC – Tiroda, Dist. Gondia – 441 911 | | |
| Sample Collection Date | 15.05.2021 | Analysis Starting Date | 15.05.2021 |
| Quantity received | 3 Lit./Sample | Sampled by | Environment Dept. APML |
| Sample Particulars: Treated Effluent Water | | | |
| Location of sample: STP Plant Pit Pit / ETP Outlet | | | |

TEST REPORT

| Sr.no. | Parameter (NABL SCOPE) | Unit | Test Methods | MPCB Standards | Results | |
|---|---|---|---|---|---|---|
| | | | | | [illegible] | ETP Outlet |
| 1 | pH Value | — | APHA 23rd Ed. 4500-H+ B Electrometric Method | 6.5-8.5 | 7.8 | 7.2 |
| 2 | TSS | mg/l | APHA 23rd Ed. : 2540 D | 100.0 | 19 | 24 |
| 3 | TDS | mg/l | APHA 23rd Ed. : 2540 C | 2100.0 | 118 | 368 |
| 4 | COD | mg/l | APHA 23rd Ed. 2017-5220 B Open Reflux Method | 250.0 | 51 | 71 |
| 5 | BOD at 27°C for 3 days | mg/l | IS 3025 (Part 44) 1993 R. 1999 Ed. 1 2021 3 days at 27 °C | 30.0 | 11 | 13 |
| 6 | Oil & Grease | mg/l | APHA 23rd Ed. 2017-5520 B Liquid Liquid Partition Gravimetric method | 10.0 | BDL | 1.0 |

***End of the Report***

**Note:** Tested results are well within the permissible limits of MPCB.

1. The report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproduced wholly or in part, and can't be used as evidence in court of law.
4. # indicates the parameter is not covered in our NABL scope.

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(Technical Manager)

Page 1 Of 1

adani

# ENVIRONMENTAL LABORATORY

(Accredited by NABL)

ADANI POWER MAHARASHTRA LIMITED, TIRODA

Format No: APML/ENV-LRT-RF01

| ULR. No : TC61522100000011F | Date: 31.05.2021 |
|---|---|

| | | | |
|---|---|---|---|
| Issued To: | APML, Plot No. A-1, Tiroda Growth Centre, MIDC – Tiroda, Dist. Gondia – 441 911 | | |
| Sample Collection Date | 12.05.2021 | Analysis Starting Date | 12.05.2021 |
| Quantity received | 2 Ltr. Sample | Sampled by | Environment Dept. |

Sample Particulars : Treated Waste Water

Location of sample : STP -1 & 2 Out Let

TEST REPORT

| Sr. no. | Parameter (NABL SCOPE) | Unit | Test Methods | MPCB Standards | Results | |
|---|---|---|---|---|---|---|
| | | | | | STP-1 | STP-2 |
| 1 | TSS | mg / l | APHA-23rd : 2540 D | 50 | 21 | 30 |
| 2 | COD | mg / l | APHA-23rd Ed 2017: 5220B Open Reflux Method | 150 | 39 | 60 |
| 3 | BOD at 27°C for 3 days | mg / l | IS: 3025 (P-44) 1993 R-1999 Ad.1 BOD 3-days at 27°C | 30 | 11 | 10 |

***End of the Report***

Note: Tested results are well within the permissible limits of MPCB.

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4. # indicates this parameter is not covered in our NABL scope

31/5/21

Authorized Signatory
(Technical Manager)

Page 1 Of 1

ULR. No.: TC018321000000523F

Date: 31.05.2021

| | |
|---|---|
| Issued To: | APML, Plot No. A-1, Tirora Growth Centre,<br>MIDC – Tirora, Dist. Gondia – 441 911 |
| Sample Particulars : | Ambient Noise Level (Plant) |
| Sample Collected by : | Environment Dept. APML |
| Date of Sampling: | 18.05.2021 |

Test Report

| S. No | Locations | Day Time in dB (A) | Night Time in dB (A) |
|---|---|---|---|
| | | (6.00 a.m. to 10.00 p.m.) | (10.00 p.m. to 06.00 a.m.) |
| 1 | Near Shanti Niketan I II & III | 59.0 | 50.8 |
| 2 | Near Labour Hutment | 65.1 | 58.2 |
| 3 | Near Store Area | 66.2 | 51.5 |
| 4 | Gate No.1 | 60.8 | 49.2 |
| 5 | Gate No.2 | 61.1 | 60.4 |
| 6 | Gate No.3 | 71.5 | 68.8 |
| 7 | Near OHC | 51.5 | 45.5 |
| 8 | Railway Siding | 67.3 | 57.5 |
| 9 | Near Reservoir 2 | 56.8 | 46.3 |
| 10 | Near Ash Water Recovery Pump House | 59.0 | 48.5 |
| 11 | In China Colony | 40.6 | 39.9 |
| CPCB Standards (Industrial Area) | | 75 | 70 |

*** End Of the Report***

Note: Tested results are well within the permissible limits of MPCB / CPCB.

1. The report is referring only to the tested sample and for applicable parameter.
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3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.

31/05/21

Authorized Signatory
(Technical Manager)

Format No: APML/ENV-LB/7.8/F01

| | |
|---|---|
| TC519321000000526F | Date: 19.06.2021 |
| | |
| Issued To: | APML,Plot No. A -1, Tirora Growth Centre, MIDC – Tirora,<br>Dist. Gondia – 441 911 |
| Sample Particulars : | Stack Monitoring |
| Sample Collected by : | Environment Dept. APML |

1 Sampling Location : Unit -1
2 Date of Sampling : 17.06.2021
3 Time of Sampling : 3:30 PM
4 Load (MW) : 360
5 Height of Stack (Meter) : 275
6 Diameter of Stack (Meter) : 7.4
7 Type of Fuel : Coal
8 Flue Gas Temperature (°C) : 132
9 Flue Gas Velocity (M/sec) : 23.01
10 Flow of Exit Gas at NTP ($NM^3/Hr$) : 2575587

| Sr. No | Test Parameters | Test Method | MPCB Standards | Units | Results * |
|---|---|---|---|---|---|
| 1 | PM | IS 11255 (Part- 1):1985 | 50 | $Mg/Nm^3$ | 36.6 |
| 2 | $SO_2$ | IS 11255 (Part 2) 1985 | 200 | $Mg/Nm^3$ | 952.5 |
| 3 | NOx | IS 11255 (Part 7) 2005 | 450 | $Mg/Nm^3$ | 419.0 |

* Results are corrected with 6% oxygen

***End of the Report***

Note: Tested results are well within the permissible limits of MPCB.

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2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.
4.# As per MoEF&CC Notification the SO2 Limit will be applicable after installation of FGD (March 2023/March 2024)

Authorized Signatory
(Technical Manager)

adani **ENVIRONMENTAL LABORATORY**
(Accredited by NABL)

**ADANI POWER MAHARASHTRA LIMITED, TIRODA**

Format No: APML/ENV-LB/T/BF01

| | |
|---|---|
| TC819321000000627F | Date: 18.06.2021 |
| | |
| **Issued To:** | APML,Plot No. A -1, Tirora Growth Centre, MIDC – Tirora,<br>Dist. Gondia – 441 911 |
| **Sample Particulars :** | Stack Monitoring |
| **Sample Collected by :** | Environment Dept. APML |

| | | | |
|---|---|---|---|
| 1 | Sampling Location | : | Unit -2 |
| 2 | Date of Sampling | : | 17.06.2021 |
| 3 | Time of Sampling | : | 4:54 PM |
| 4 | Load (MW) | : | 457 |
| 5 | Height of Stack (Meter) | : | 275 |
| 6 | Diameter of Stack (Meter) | : | 7.4 |
| 7 | Type of Fuel | : | Coal |
| 8 | Flue Gas Temperature ($^0$C) | : | 133 |
| 9 | Flue Gas Velocity (M/sec) | : | 22.55 |
| 10 | Flow of Exit Gas at NTP (NM$^3$/Hr) | : | 2872927 |

| Sr. No | Test Parameters | Test Method | MPCB Standards | Units | Results * |
|---|---|---|---|---|---|
| 1 | PM | IS 11255 (Part- 1):1985 | 50 | Mg/Nm$^3$ | 39.1 |
| 2 | $SO_2$ | IS 11255 (Part.2) 1985 | 200 | Mg/Nm$^3$ | 888.8 |
| 3 | NOx | IS 11255 (Part 7) 2005 | 450 | Mg/Nm$^3$ | 415.3 |

* Results are corrected with 6% oxygen

***End of the Report***

Note: Tested results are well within the permissible limits of MPCB.

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2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.
4.# As per MoEF&CC Notification the SO2 Limit will be applicable after installation of FGD (March 2023/March 2024)

Authorized Signatory 18/6/21
(Technical Manager)

Page 1 of 1

Format No: APML/ENV-LB/7.8/F01

| | |
|---|---|
| TC81183210000000839F | Date: 18.06.2021 |

| | |
|---|---|
| Issued To: | APML,Plot No. A -1, Tirora Growth Centre, MIDC – Tirora,<br>Dist. Gondia – 441 911 |
| Sample Particulars : | Stack Monitoring |
| Sample Collected by : | Environment Dept. APML |

1 Sampling Location : Unit -3
2 Date of Sampling : 17.06.2021
3 Time of Sampling : 4:20 PM
4 Load (MW) : 443
5 Height of Stack (Meter) : 275
6 Diameter of Stack (Meter) : 7.4
7 Type of Fuel : Coal
8 Flue Gas Temperature ($^0$C) : 125
9 Flue Gas Velocity (M/sec) : 23.32
10 Flow of Exit Gas at NTP (NM$^3$/Hr) : 2800831

| Sr. No | Test Parameters | Test Method | MPCB Standards | Units | Results * |
|---|---|---|---|---|---|
| 1 | PM | IS 11255 (Part- 1):1985 | 50 | Mg/Nm$^3$ | 40.6 |
| 2 | $SO_2$ | IS 11255 (Part 2) 1985 | 200 | Mg/Nm$^3$ | 588.1 |
| 3 | NOx | IS 11255 (Part 7) 2005 | 450 | Mg/Nm$^3$ | 406.7 |

* Results are corrected with 6% oxygen

***End of the Report***

**Note:** Tested results are well within the permissible limits of MPCB

1. The report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.
4 # As per MoEF&CC Notification the SO2 Limit will be applicable after installation of FGD (MoEF [illegible] 2018)

Authorized Signatory
(Technical Manager)

Page 1 of 1

Format No: APML/ENV-LB/7.8/F01

| TC51932100000629F | Date: 25.06.2021 |
|---|---|

## TEST REPORT

| | |
|---|---|
| Issued To: | APML,Plot No. A -1, Tirora Growth Centre, MIDC – Tirora,<br>Dist. Gondia – 441 911 |
| Sample Particulars : | Stack Monitoring |
| Sample Collected by : | Environment Dept. APML |

1 Sampling Location : Unit -4
2 Date of Sampling : 24.06.2021
3 Time of Sampling : 3.30 PM
4 Load (MW) : 480
5 Height of Stack (Meter) : 275
6 Diameter of Stack (Meter) : 7.4
7 Type of Fuel : Coal
8 Flue Gas Temperature ($^0$C) : 121
9 Flue Gas Velocity (M/sec) : 22.04
10 Flow of Exit Gas at NTP (NM$^3$/Hr) : 2551471

| Sr No | Test Parameters | Test Method | MPCB Standards | Units | Results |
|---|---|---|---|---|---|
| 1 | PM | IS 11255 (Part-1):1985 | 50 | Mg/Nm$^3$ | 43 |
| 2 | $SO_2$ | IS 11255 (Part 2) 1985 | 200 | Mg/Nm$^3$ | 860 |
| 3 | NOx | IS 11255 (Part 7) 2005 | 450 | Mg/Nm$^3$ | 401 |

* Results are corrected with 6% oxygen

**End of the Report**

Note: Tested results are well within the permissible limits of MPCB

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3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.

4.# As per MoEF&CC Notification the SO2 Limit will be applicable after installation of FGD (March 2022-March 2024)

14/07/21
Authorised Signatory
(Technical Manager)

# ENVIRONMENTAL LABORATORY

(Accredited by NABL)

ADANI POWER MAHARASHTRA LIMITED, TIRODA

Format No: APML/ENV-LB/7.8/F01

| TC51832100000030F | Date: 26.06.2021 |
|---|---|

**TEST REPORT**

| | |
|---|---|
| Issued To: | APML,Plot No. A -1, Tirora Growth Centre, MIDC – Tirora,<br>Dist. Gondia – 441 911 |
| Sample Particulars : | Stack Monitoring |
| Sample Collected by : | Environment Dept. APML |

| | | | |
|---|---|---|---|
| 1 | Sampling Location | : | Unit -5 |
| 2 | Date of Sampling | : | 24.06.2021 |
| 3 | Time of Sampling | : | 4:09 PM |
| 4 | Load (MW) | : | 655 |
| 5 | Height of Stack (Meter) | : | 275 |
| 6 | Diameter of Stack (Meter) | : | 7.4 |
| 7 | Type of Fuel | : | Coal |
| 8 | Flue Gas Temperature ($^0$C) | : | 123 |
| 9 | Flue Gas Velocity (M/sec) | : | 23.15 |
| 10 | Flow of Exit Gas at NTP (NM$^3$/Hr) | : | 2000036 |

| Sr. No | Test Parameters | Test Method | MPCB Standards | Units | Results |
|---|---|---|---|---|---|
| 1 | PM | IS 11255<br>(Part- 1):1985 | 50 | Mg/Nm$^3$ | 44 |
| 2 | $SO_2$ | IS 11255 (Part 2)<br>1985 | 200 | Mg/Nm$^3$ | 863 |
| 3 | NOx | IS 11255 (Part 7)<br>2005 | 450 | Mg/Nm$^3$ | 395 |

* Results are corrected with 6% oxygen

***End of the Report***

Note: Tested results are well within the permissible limits of MPCB

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3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.

4 # As per MoEF&CC Notification the SO2 Limit will be applicable after installation of FGD. (March 2023/March 2024)

Authorized Signatory
(Technical Manager)

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# ENVIRONMENTAL LABORATORY

(Accredited by NABL)

## ADANI POWER MAHARASHTRA LIMITED, TIRODA

Format No: APML/ENV-LB/7.8/F01

ULR No : TC6155210000000081F

Date: 30.06.2021

| | |
|---|---|
| Issued To: | APML,Plot No. A-1, Tiroda Growth Centre, MIDC – Tiroda, Dist. Gondia – 441 911 |
| Sample Particulars : | Ambient Air Quality ( Plant ) |
| Sample Collected by : | Environment Dept. APML |

Test Report

| Station | Sampling Location | Sampling Date | Analysis Starting Date | Parameters | | | |
|---|---|---|---|---|---|---|---|
| | | | | PM 10 | PM 2.5 | SO2 | NOx |
| | | | | µg/m3 | µg/m3 | µg/m3 | µg/m3 |
| AAQ 1 | Near AWRS | 04.06.2021 | 05.06.2021 | 43.0 | 18.6 | 9.0 | 17.4 |
| | | 07.06.2021 | 08.06.2021 | 53.6 | 15.1 | 10.2 | 19.2 |
| | | 11.06.2021 | 12.06.2021 | 59.2 | 12.6 | 7.8 | 16.8 |
| | | 14.06.2021 | 15.06.2021 | 61.7 | 20.4 | 8.8 | 18.0 |
| | | 18.06.2021 | 19.06.2021 | 54.3 | 17.4 | 10.5 | 15.6 |
| | | 21.06.2021 | 22.06.2021 | 45.7 | 19.3 | 8.4 | 16.2 |
| | | 25.06.2021 | 26.06.2021 | 38.7 | 19.3 | 11.2 | 15.6 |
| | | 28.06.2021 | 29.06.2021 | 42.9 | 20.7 | 9.8 | 14.4 |
| AAQ 2 | Near Brick Plant | 04.06.2021 | 05.06.2021 | 33.8 | 17.2 | 7.8 | 13.8 |
| | | 07.06.2021 | 08.06.2021 | 31.1 | 16.8 | 8.2 | 12.4 |
| | | 11.06.2021 | 12.06.2021 | 33.8 | 14.3 | 10.4 | 16.8 |
| | | 14.06.2021 | 15.06.2021 | 35.4 | 18.8 | 9.2 | 12.2 |
| | | 18.06.2021 | 19.06.2021 | 42.8 | 22.3 | 9.4 | 16.0 |
| | | 21.06.2021 | 22.06.2021 | 44.2 | 25.0 | 10.8 | 15.0 |
| | | 25.06.2021 | 26.06.2021 | 40.2 | 22.5 | 9.8 | 16.2 |
| | | 28.06.2021 | 29.06.2021 | 41.1 | 22.7 | 8.4 | 14.4 |
| AAQ 3 | China Colony | 04.06.2021 | 05.06.2021 | 41.9 | 26.0 | 9.8 | 18.0 |
| | | 07.06.2021 | 08.06.2021 | 49.3 | 21.8 | 12.7 | 17.4 |
| | | 11.06.2021 | 12.06.2021 | 46.7 | 22.5 | 14.1 | 16.2 |
| | | 14.06.2021 | 15.06.2021 | 39.6 | 17.9 | 12.6 | 14.4 |
| | | 18.06.2021 | 19.06.2021 | 45.7 | 25.1 | 13.7 | 17.4 |
| | | 21.06.2021 | 22.06.2021 | 41.7 | 28.8 | 10.4 | 12.8 |
| | | 25.06.2021 | 26.06.2021 | 33.7 | 17.4 | 11.7 | 16.8 |
| | | 28.06.2021 | 29.06.2021 | 40.2 | 19.7 | 12.7 | 18.6 |
| NAAQMS Standard | | | | 100 | 60 | 80 | 80 |

***End of the Report***

Note/ Tested results are well within the permissible limits of National Ambient Air Quality Monitoring Standard (NAAQMS )

1. This report is referring only to the tested sample and for applicable parameter.
2. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.

Authorised Signatory
( Technical Manager )

Page 1 of 1

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# ENVIRONMENTAL LABORATORY

(Accredited by NABL)

ADANI POWER MAHARASHTRA LIMITED, TIRODA

Format No: APML/ENV-LS/7.8/F01

| | |
|---|---|
| ULR No.: TC515221000000621F | Date: 28.06.2021 |

| | | | |
|---|---|---|---|
| Issued To: | APML, Plot No. A -1, Tiroda Growth Centre, MIDC – Tiroda, Dist. Gondia – 441 911 | | |
| Sample Collection Date | 25.06.2021 | Analysis Starting Date | 25.06.2021 |
| Quantity received | 1 Lit Sample | Sampled by | Environment Dept. |
| Sample Particulars : Treated Waste Water | | | |
| Location of sample : STP -1 & 2 Out Let | | | |

**TEST REPORT**

| Sr. No. | Parameter (NABL SCOPE) | Unit | Test Methods | MPCB Standards | Results | |
|---|---|---|---|---|---|---|
| | | | | | STP-1 | STP-2 |
| 1 | TSS | mg / l | APHA 23rd – 2540 D | 50 | 25 | 33 |
| 2 | COD | mg / l | APHA 23rd Ed 2017-5220B Open Reflux Method | 100 | 40 | 56 |
| 3 | BOD at 27°C for 3 days | mg / l | IS: 3025 (P-44) 1993 R-1999 Ad.1 BOD 3-days at 27 °C | 30 | 8 | 13 |

***End of the Report***

Note Tested results are well within the permissible limits of MPCB.

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2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.
4. # Indicates this parameter is not covered in our NABL scope

Authorized Signatory
(Technical Manager)

Format No: [illegible]

| | |
|---|---|
| ULR No.: [illegible] | Date: [illegible] |

| | | | |
|---|---|---|---|
| Issued To: | APML, Plot No. A-1, Tiroda Growth Centre, MIDC – Tiroda, Dist. Gondia – 441 911 | | |
| Sample Collection Date | [illegible].05.2021 | Analysis Starting Date | [illegible].05.2021 |
| Quantity received | 2 Ltr Sample | Sampled by | Environment Dept. APML |
| Sample Particulars : Treated Effluent Water | | | |
| Location of sample : DM Plant N Pit , ETP Outlet | | | |

TEST REPORT

| Sr no | Parameter (NABL SCOPE) | Unit | Test Methods | MPCB Standards | Results | |
|---|---|---|---|---|---|---|
| | | | | | N pit | ETP Outlet |
| 1 | pH Value | --- | APHA 23rd 4500-H+B Electrometric Method | 5.5-9.0 | 8.7 | 6.8 |
| 2 | TSS | mg / l | APHA 23rd – 2540 D | 100.0 | 28 | 20 |
| 3 | TDS | mg / l | APHA 23rd – 2540 C | 2100.0 | 333 | 381 |
| 4 | COD | mg / l | APHA 23rd Ed. 5220 B Open Reflux Method | 250.0 | 71 | 81 |
| 5 | BOD at 27°C for 3 days | mg / l | IS: 3025 (P-44) 1993 R: 1999 Ad 1. BOD 3 days at 27°C | 30.0 | 16 | 24 |
| 6 | Oil & Grease | mg / l | APHA 23rd Ed. 5520 B Liquid Liquid Partition Gravimetric method | 10.0 | BDL | 5.8 |

**End of the Report**

Note: Treated results are well within the permissible limits of MPCB.

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2. The sample will be destroyed after retention time unless otherwise specified specially.
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4. # indicates the parameter is not covered in our NABL scope.

Authorised Signatory
(Technical Manager)

adani

# ENVIRONMENTAL LABORATORY

(Accredited by NABL)

ADANI POWER MAHARASHTRA LIMITED, TIRODA

Format No: APML/ENV LB/T.SF01

ULR. No : TC01822100000018F

Date: 30.06.2021

| | | | |
|---|---|---|---|
| Issued To: | APML_Plot No. A -1, Tirora Growth Centre, MIDC – Tirora, Dist. Gondia – 441 911 | | |
| Sample Collection Date | 23.06.2021 | Analysis Starting Date : | 23.06.2021 |
| Quantity received | 1 Ltr / Sample | Sampled by : | Environment Dept. APML |

Sample Particulars : Cooling tower blowdown ( Waste Water )

Location of sample : Unit1,Unit-2,Unit-3,Unit-4 & Unit-5

TEST REPORT

| Sr no | Parameter (NABL SCOPE) | Unit | Test Methods | MPCB Standards | Results | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | U # 1 | U # 2 | U # 3 | U # 4 | U # 5 |
| 1 | Free Available Chlorine | mg/l | APHA-23rd – 4500-Cl G, DPD Colorimetric Method | 0.5 | 0.4 | 0.3 | 0.3 | 0.4 | 0.4 |
| 2 | Phosphate as (PO4) | mg/l | APHA-23rd 4500-P D Stannous Chloride Method | 5 | 3.1 | 2.8 | 2.2 | 2.4 | 2.6 |
| 3 | Zinc as (Zn) | mg/l | ---- | 1 | BDL | BDL | BDL | BDL | BDL |
| 4 | Total Chromium as (Cr ) | mg/l | ---- | 0.2 | BDL | BDL | BDL | BDL | BDL |

**End of the Report**

Note: Tested results are well within the permissible limits of MPCB.

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2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part and can't be used as evidence in court of law.

30/06/21

Authorized Signatory
(Technical Manager)

Page 1 Of 1

# adani ENVIRONMENTAL LABORATORY
(Accredited by NABL)

ADANI POWER MAHARASHTRA LIMITED, TIRODA

Format No: APML/ENV-LB/7.8/F01

URL No : TC519321000000E17F

Date: 30.09.2021

| | | | |
|---|---|---|---|
| Issued To: | APML,Plot No. A-1, Tiroda Growth Centre, MIDC – Tiroda, Dist. Gondia – 441 911 | | |
| Sample Collection Date | 23.09.2021 | Analysis Starting Date : | 23.09.2021 |
| Quantity received | 1 Ltr / Sample | Sampled by : | Environment Dept. APML |
| Sample Particulars : Condenser Cooling Water ( Waste Water ) | | | |
| Location of sample : Unit1,Unit-2,Unit-3,Unit-4 & Unit-5 | | | |

## TEST REPORT

| Sr no | Parameter | Unit | Test Methods | MPCB Standards | Results | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | U # 1 | U # 2 | U # 3 | U # 4 | U # 5 |
| 1 | pH Value | — | APHA-23rd – 4500-H+B Electrometric Method | 6.5-8.5 | 8.3 | 8.2 | 8.4 | 8.1 | 8.2 |
| 2 | Temperature | Deg C | APHA-23rd – 2550 B | Not to exceed 5°C than that of intake water | 33.0 | 33.0 | 31.4 | 32.5 | 31.5 |
| 3 | Free Available Chlorine | PPM | APHA-23rd – 4500 Cl G, DPD Colorimetric Method | 0.5 | 0.3 | 0.2 | 0.2 | 0.4 | 0.4 |

**End of the Report**

Note: Tested results are well within the permissible limits of MPCB.

1. The report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.

19/09/21

Authorized Signatory
(Technical Manager)

adani

# ENVIRONMENTAL LABORATORY

(Accredited by NABL)

## ADANI POWER MAHARASHTRA LIMITED, TIRODA

Format No: APML/ENV LB/7.8/F01

URL No.: TC519321000000023F

Date: 30.06.2021

| | |
|---|---|
| Issued To: | APML, Plot No. A -1, Tirora Growth Centre,<br>MIDC – Tirora, Dist. Gondia – 441 911 |
| Sample Particulars: | Ambient Noise Level (Plant) |
| Sample Collected by: | Environment Dept. APML |
| Date of Sampling: | 12.06.2021 |

Test Report

| S. No | Locations | Day Time in dB (A) | Night Time in dB (A) |
|---|---|---|---|
| | | (6.00 a.m. to 10.00 p.m.) | (10.00 p.m. to 06.00 a.m.) |
| 1 | Near Shanti Niketan I & II | 55.8 | 51.2 |
| 2 | Near Labour Hutment | 62.6 | 56.6 |
| 3 | Near Store Area | 62.3 | 55.2 |
| 4 | Gate No.1 | 65.3 | 48.1 |
| 5 | Gate No.2 | 66.3 | 50.6 |
| 6 | Gate No.3 | 73.1 | 59.4 |
| 7 | Near CHC | 55.2 | 48.5 |
| 8 | Railway Siding | 64.9 | 52.2 |
| 9 | Near Reservoir 2 | 56.6 | 44.2 |
| 10 | Near Ash Water Recovery Pump House | 64.0 | 52.2 |
| 11 | In China Gallery | 30.0 | 30.0 |
| CPCB Standards (Industrial Area) | | 75 | 70 |

*** End Of the Report***

Note: Tested results are well within the permissible limits of MPCB / CPCB.

1. The report is referring only to the tested sample and for applicable parameter.
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Authorized Signatory
(Technical Manager)

# ENVIRONMENTAL LABORATORY

(Accredited by NABL)

## ADANI POWER MAHARASHTRA LIMITED, TIRODA

Format No: APML/ENV-LB/7.8/F01

| | |
|---|---|
| TC5153210000000726F | Date: 24.07.2021 |
| Issued To: | APML,Plot No. A -1, Tirora Growth Centre, MIDC – Tirora,<br>Dist. Gondia – 441 911 |
| Sample Particulars : | Stack Monitoring |
| Sample Collected by : | Environment Dept. APML |

1 Sampling Location : Unit -1

2 Date of Sampling : 20.07.2021

3 Time of Sampling : 3:27 PM

4 Load (MW) : 362.7

5 Height of Stack (Meter) : 275

6 Diameter of Stack (Meter) : 7.4

7 Type of Fuel : Coal

8 Flue Gas Temperature ($^0$C) : 120

9 Flue Gas Velocity (M/sec) : 23.24

10 Flow of Exit Gas at NTP (NM$^3$/Hr) : 2020101

| Sr. No. | Test Parameters | Test Method | MPCB Standards | Units | Results * |
|---|---|---|---|---|---|
| 1 | PM | IS 11255 (Part- 1):1985 | 50 | Mg/Nm$^3$ | 36.7 |
| 2 | $SO_2$ | IS 11255 (Part 2) 1985 | 200 | Mg/Nm$^3$ | 630.7 |
| 3 | NOx | IS 11255 (Part 7) 2005 | 450 | Mg/Nm$^3$ | 365.8 |

* Results are corrected with 6% oxygen

**End of the Report**

Note: Tested results are well within the permissible limits of MPCB.

1. The report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproduced wholly or in part, and can't be used as evidence in court of law.
4. # As per MoEF&CC Notification the SO2 Limit will be applicable after installation of FGD. (Stack [illegible]

Authorized Signatory
(Technical Manager)

Format No: APML/ENV-LB/7.8/F01

| TC515321000000727F | Date: 24.07.2021 |
|---|---|
| | |

| | |
|---|---|
| Issued To: | APML,Plot No. A -1, Tirora Growth Centre, MIDC – Tirora,<br>Dist. Gondia – 441 911 |
| Sample Particulars : | Stack Monitoring |
| Sample Collected by : | Environment Dept. APML |

1 Sampling Location : Unit -5
2 Date of Sampling : 20.07.2021
3 Time of Sampling : 4:00 PM
4 Load (MW) : 370
5 Height of Stack (Meter) : 275
6 Diameter of Stack (Meter) : 7.4
7 Type of Fuel : Coal
8 Flue Gas Temperature ($^0$C) : 123
9 Flue Gas Velocity (M/sec) : 25.38
10 Flow of Exit Gas at NTP (NM$^3$/hr) : 2621049

| Sr. No | Test Parameters | Test Method | MPCB Standards | Units | Results * |
|---|---|---|---|---|---|
| 1 | PM | IS 11255 (Part- 1):1985 | 50 | Mg/Nm$^3$ | 40.5 |
| 2 | $SO_2$ | IS 11255 (Part 2) 1985 | 200 | Mg/Nm$^3$ | 791.6 |
| 3 | NOx | IS 11255 (Part 7) 2005 | 450 | Mg/Nm$^3$ | 291.1 |

* Results are corrected with 6% oxygen

**End of the Report**

Note: Tested results are well within the permissible limits of MPCB.

1. The report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.
4. # As per MoEF&CC Notification the SO2 Limit will be applicable after installation of FGD (March [illegible] March 2024)

Authorised Signatory
(Technical Manager)

Format No: APML/ENV-LB/T.8/F01

| | |
|---|---|
| TC518321000000729F | Date: 31.07.2021 |
| | |
| Issued To: | APML, Plot No. A -1, Tirora Growth Centre, MIDC – Tirora, Dist. Gondia – 441 911 |
| Sample Particulars : | Stack Monitoring |
| Sample Collected by : | Environment Dept. APML |

| | | | |
|---|---|---|---|
| 1 | Sampling Location | : | Unit -3 |
| 2 | Date of Sampling | : | 30.07.2021 |
| 3 | Time of Sampling | : | 4:30 PM |
| 4 | Load (MW) | : | 443 |
| 5 | Height of Stack (Meter) | : | 275 |
| 6 | Diameter of Stack (Meter) | : | 7.4 |
| 7 | Type of Fuel | : | Coal |
| 8 | Flue Gas Temperature ($^0$C) | : | 122 |
| 9 | Flue Gas Velocity (M/sec) | : | 22.20 |
| 10 | Flow of Exit Gas at NTP (NM$^3$/Hr) | : | 2501930 |

| Sr. No | Test Parameters | Test Method | MPCB Standards | Units | Results * |
|---|---|---|---|---|---|
| 1 | PM | IS 11255 (Part- 1):1985 | 50 | Mg/Nm$^3$ | 46.5 |
| 2 | $SO_2$ | IS 11255 (Part 2) 1985 | 200 | Mg/Nm$^3$ | 939.3 |
| 3 | NOx | IS 11255 (Part 7) 2005 | 450 | Mg/Nm$^3$ | 388.5 |

* Results are corrected with 6% oxygen

**End of the Report**

**Note:** Tested results are well within the permissible limits of MPCB

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3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.
4. # As per MoEF&CC Notification the SO2 Limit will be applicable after installation of FGD (March 2022) [illegible]

Authorized Signatory
(Technical Manager)

Format No: APML/ENV-LB/7.8/F01

| TC519321000000728F | Date: 24.07.2021 |
|---|---|

## TEST REPORT

| | |
|---|---|
| Issued To: | APML_Plot No. A -1, Tirora Growth Centre, MIDC – Tirora, Dist. Gondia – 441 911 |
| Sample Particulars : | Stack Monitoring |
| Sample Collected by : | Environment Dept. APML |

1 Sampling Location : Unit -4
2 Date of Sampling : 22.07.2021
3 Time of Sampling : 3:40 PM
4 Load (MW) : 300
5 Height of Stack (Meter) : 275
6 Diameter of Stack (Meter) : 7.4
7 Type of Fuel : Coal
8 Flue Gas Temperature ($^0$C) : 121
9 Flue Gas Velocity (M/sec) : 22.83
10 Flow of Exit Gas at NTP (NM$^3$/Hr) : 2572848

| Sr. No. | Test Parameters | Test Method | MPCB Standards | Units | Results |
|---|---|---|---|---|---|
| 1 | PM | IS 11255 (Part- 1) 1985 | 50 | Mg/Nm$^3$ | 44 |
| 2 | $SO_2$ | IS 11255 (Part 2) 1985 | 200 | Mg/Nm$^3$ | 776 |
| 3 | NOx | IS 11255 (Part 7) 2005 | 450 | Mg/Nm$^3$ | 378 |

* Results are corrected with 6% oxygen

**End of the Report**

Note: Tested results are well within the permissible limits of MPCB.

1. This report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.

4.# As per MoEF&CC Notification the SO2 Limit will be applicable after installation of FGD. (March 2022-March 2024)

24/07/21
Authorized Signatory
(Technical Manager)

# adani ENVIRONMENTAL LABORATORY

(Accredited by NABL)

ADANI POWER MAHARASHTRA LIMITED, TIRODA

Format No: APML/ENV-LB/7.8/F01

| | |
|---|---|
| TCE1952100000730F | Date: 24.07.2021 |
| **TEST REPORT** | |
| Issued To: | APML_Plot No. A -1, Tiroda Growth Centre, MIDC – Tiroda,<br>Dist: Gondia – 441 911 |
| Sample Particulars : | Stack Monitoring |
| Sample Collected by : | Environment Dept. APML |

| | | | |
|---|---|---|---|
| 1 | Sampling Location | : | Unit -5 |
| 2 | Date of Sampling | : | 22.07.2021 |
| 3 | Time of Sampling | : | 4:15 PM |
| 4 | Load (MW) | : | 308 |
| 5 | Height of Stack (Meter) | : | 275 |
| 6 | Diameter of Stack (Meter) | : | 7.4 |
| 7 | Type of Fuel | : | Coal |
| 8 | Flue Gas Temperature (°C) | : | 120 |
| 9 | Flue Gas Velocity (M/sec) | : | 23.28 |
| 10 | Flow of Exit Gas at NTP ($NM^3/Hr$) | : | 2827384 |

| Sr. No | Test Parameters | Test Method | MPCB Standards | Units | Results |
|---|---|---|---|---|---|
| 1 | PM | IS 11255 (Part- 1):1985 | 50 | $Mg/Nm^3$ | 47 |
| 2 | $SO_2$ | IS 11255 (Part 2) 1985 | 200 | $Mg/Nm^3$ | 866 |
| 3 | NOx | IS 11255 (Part 7) 2005 | 450 | $Mg/Nm^3$ | 201 |

* Results are corrected with 6% oxygen

***End of the Report***

**Note:** Tested results are well within the permissible limits of MPCB

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3. This report is not to be reproduced wholly or in part, and can't be used as evidence in court of law.

4.# As per MoEF&CC Notification the SO2 Limit will be applicable after installation of FGD. [illegible]

24/7/21

Authorized Signatory
(Technical Manager)

Page 1 of 1

Format No: APML/ENV LAB/F/01

ULR No : TC913321000000701F

Date: 31.07.2021

| | |
|---|---|
| Issued To | APML,Plot No. A-1, Tiroda Growth Centre, MIDC – Tiroda, Dist. Gondia – 441 911 |
| Sample Particulars : | Ambient Air Quality ( Plant ) |
| Sample Collected by : | Environment Dept. APML |

Test Report

| Station | Sampling Location | Sampling Date | Analysis Starting Date | Parameters | | | |
|---|---|---|---|---|---|---|---|
| | | | | PM 10 | PM 2.5 | SO2 | NOx |
| | | | | µg/m3 | µg/m3 | µg/m3 | µg/m3 |
| AAQ 1 | Near AWRS | 02.07.2021 | 03.07.2021 | 50.9 | 14.4 | 5.7 | 7.8 |
| | | 05.07.2021 | 06.07.2021 | 59.8 | 17.3 | 7.0 | 13.5 |
| | | 09.07.2021 | 10.07.2021 | 54.8 | 17.5 | 8.8 | 10.8 |
| | | 12.07.2021 | 13.07.2021 | 45.3 | 28.9 | 7.5 | 11.4 |
| | | 16.07.2021 | 17.07.2021 | 29.8 | 14.0 | 5.5 | 9.0 |
| | | 19.07.2021 | 20.07.2021 | 36.4 | 25.0 | 8.8 | 12.8 |
| | | 23.07.2021 | 24.07.2021 | 35.6 | 23.9 | 9.2 | 12.5 |
| | | 26.07.2021 | 27.07.2021 | 34.1 | 19.2 | 7.2 | 10.2 |
| | | 30.07.2021 | 31.07.2021 | 20.3 | 10.5 | 6.1 | 9.8 |
| AAQ 2 | Near Brick Plant | 02.07.2021 | 03.07.2021 | 30.9 | 11.6 | 5.3 | 11.4 |
| | | 05.07.2021 | 06.07.2021 | 21.2 | 11.2 | 7.6 | 12.4 |
| | | 09.07.2021 | 10.07.2021 | 30.6 | 16.4 | 5.5 | 10.8 |
| | | 12.07.2021 | 13.07.2021 | 29.8 | 11.5 | 9.2 | 11.0 |
| | | 16.07.2021 | 17.07.2021 | 30.2 | 22.1 | 8.0 | 10.6 |
| | | 19.07.2021 | 20.07.2021 | 23.3 | 10.1 | 10.2 | 13.2 |
| | | 23.07.2021 | 24.07.2021 | 20.0 | 14.4 | 5.3 | 10.2 |
| | | 26.07.2021 | 27.07.2021 | 22.1 | 11.8 | 6.7 | 9.6 |
| | | 30.07.2021 | 31.07.2021 | 37.8 | 13.9 | 9.8 | 13.2 |
| AAQ 3 | Civil Colony | 02.07.2021 | 03.07.2021 | 33.7 | 10.1 | 9.4 | 10.8 |
| | | 05.07.2021 | 06.07.2021 | 23.1 | 11.5 | 10.6 | 13.8 |
| | | 09.07.2021 | 10.07.2021 | 39.8 | 20.4 | 9.6 | 12.8 |
| | | 12.07.2021 | 13.07.2021 | 37.5 | 14.8 | 11.0 | 14.4 |
| | | 16.07.2021 | 17.07.2021 | 51.3 | 25.5 | 12.1 | 13.8 |
| | | 19.07.2021 | 20.07.2021 | 27.6 | 17.7 | 11.7 | 13.2 |
| | | 23.07.2021 | 24.07.2021 | 39.3 | 20.6 | 10.4 | 12.6 |
| | | 26.07.2021 | 27.07.2021 | 34.2 | 7.9 | 7.0 | 13.2 |
| | | 30.07.2021 | 31.07.2021 | 19.1 | 11.0 | 8.3 | 11.6 |
| NAAQMS Standard | | | | 100 | 60 | 80 | 80 |

***End of the Report***

Note: Tested results are well within the permissible limits of National Ambient Air Quality Monitoring Standard (NAAQMS)

1. The report is referring only to the tested sample and for applicable parameter.
2. This report is not to be reproduced wholly or in part, and can't be used as evidence in court of law.

Authorized Signatory
( Technical Manager )

Format No: APML/ENV LB/7.8/F01

| ULR No.: TC5193210000000704F | Date: 31.07.2021 |
|---|---|

| | | | |
|---|---|---|---|
| Issued To: | APML, Plot No. A-1, Tiroda Growth Centre, MIDC – Tiroda, Dist. Gondia – 441 911 | | |
| Sample Collection Date | 07.07.2021 | Analysis Starting Date | 07.07.2021 |
| Quantity received | 1 Ltr /Sample | Sampled by | Environment Dept. |

Sample Particulars : Treated Waste Water

Location of sample : STP-1 & 2 Out Let

TEST REPORT

| Sr No | Parameter (NABL SCOPE) | Unit | Test Methods | MPCB Standards | Results | |
|---|---|---|---|---|---|---|
| | | | | | STP-1 | STP-2 |
| 1 | TSS | mg / l | APHA-23rd - 2540 D | 50 | 12 | 10 |
| 2 | COD | mg / l | APHA-23rd Ed 2017-5220 B Open Reflux Method | 100 | 70 | 50 |
| 3 | BOD at 27$^0$C For 3 days | mg / l | IS: 3025 (P-44):1993 R-1999 Ad.1 BOD 3-days at 27°C | 30 | 19 | 25 |

***End of the Report***

Note Tested results are well within the permissible limits of MPCB

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2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.
4. # indicates this parameter is not covered in our NABL scope.

31/07/21
Authorized Signatory
(Technical Manager)

Page 1 Of 1

Format No: [illegible]

| | |
|---|---|
| ULR No.: [illegible] | Date: 11.07.2021 |

| | | | |
|---|---|---|---|
| Issued To: | APML, Plot No. A-1, Tiroda Growth Centre, MIDC – Tiroda, Dist. Gondia – 441 911 | | |
| Sample Collection Date | 07.07.2021 | Analysis Starting Date | 07.07.2021 |
| Quantity received | 1 Lit./Sample | Sampled by | Environment Dept. APML |
| Sample Particulars : Treated Effluent Water | | | |
| Location of sample : [illegible] R-PS , ETP Outlet | | | |

TEST REPORT

| Sr no. | Parameters (NABL Scope) | Unit | Test Methods | MPCB Standards | Results | |
|---|---|---|---|---|---|---|
| | | | | | R-PS | ETP Outlet |
| 1 | pH Value | — | APHA 23rd : 4500 H+B Electrometric Method | 5.5-9.0 | 8.3 | 8.3 |
| 2 | TSS | mg / l | APHA 23rd : 2540 D | 100.0 | [illegible] | 49 |
| 3 | TDS | mg / l | APHA 23rd : 2540 C | 2100.0 | 1321 | 384 |
| 4 | COD | mg / l | APHA 23rd Ed 2017 5220 B Open Reflux Method | 250.0 | 36 | 69 |
| 5 | BOD at 27°C for 3 days | mg / l | IS 3025 (P-44) 1993 Reaff. 2003 3 days at 27°C | 30.0 | 10 | 17 |
| 6 | Oil & Grease | mg / l | APHA 23rd Ed 2017 5520 B Liquid Liquid Partition Gravimetric Method | 10.0 | BDL | 2.1 |

**End of the Report**

Note: Tested results are well within the permissible limits of MPCB.

1. The report is referring only to the tested sample and for applicable parameters.
2. The sample will be disposed after retention date unless otherwise specified specially.
3. This report is not to be reproduced wholly or in part, and can't be used as evidence in court of law.
4. # Indicates the parameter is not covered in our NABL scope.

31/07/21

Authorized Signatory
(Technical Manager)

# ENVIRONMENTAL LABORATORY
(Accredited by NABL)

## ADANI POWER MAHARASHTRA LIMITED, TIRODA

Format No: APML/ENV LAB/7.8/F01

ULR No : TC519921000000707F

Date: 31.07.2021

| | | | |
|---|---|---|---|
| Issued To: | APML,Plot No. A-1, Tirora Growth Centre, MIDC - Tirora Dist. Gondia - 441 911 | | |
| Sample Collection Date | 07.07.2021 | Analysis Starting Date : | 07.07.2021 |
| Quantity received | 1 Ltr / Sample | Sampled by : | Environment Dept. APML |

Sample Particulars : Cooling tower blowdown ( Waste Water )

Location of sample : Unit1,Unit-2,Unit-3,Unit-4 & Unit-5

TEST REPORT

| Sr no | Parameter (NABL SCOPE) | Unit | Test Methods | MPCB Standards | Results | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | U # 1 | U # 2 | U # 3 | U # 4 | U # 5 |
| 1 | Free Available Chlorine | mg/l | APHA 23rd - 4500-Cl G DPD Colorimetric Method | 0.5 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 |
| 2 | Phosphate as (PO4) | mg/l | APHA 23rd - 4500-P D Stannous Chloride Method | 5 | 3.8 | 2.7 | 3.4 | 1.9 | 2.2 |
| 3 | Zinc as (Zn) | mg/l | — | 1 | BDL | BDL | BDL | BDL | BDL |
| 4 | Total Chromium as (Cr ) | mg/l | — | 0.2 | BDL | BDL | BDL | BDL | BDL |

**End of the Report**

Note: Tested results are well within the permissible limits of MPCB.

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2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.

31/7/21

Authorized Signatory
(Technical Manager)

adani **ENVIRONMENTAL LABORATORY**
(Accredited by NABL)

**ADANI POWER MAHARASHTRA LIMITED, TIRODA**

Format No: APML/ENV-LB/7.8/F01

ULR No : TC51932100000007OFF

Date: 31.07.2021

| | | | |
|---|---|---|---|
| Issued To: | APML, Plot No. A -1, Tirora Growth Centre, MIDC – Tirora, Dist. Gondia – 441 911 | | |
| Sample Collection Date | 07.07.2021 | Analysis Starting Date : | 07.07.2021 |
| Quantity received | 1 Ltr / Sample | Sampled by : | Environment Dept. APML |

Sample Particulars : Condenser Cooling Water ( Waste Water )

Location of sample : Unit1,Unit-2,Unit-3,Unit-4 & Unit-5.

## TEST REPORT

| Sr no | Parameter | Unit | Test Methods | MPCB Standards | Results | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | U # 1 | U # 2 | U # 3 | U # 4 | U # 5 |
| 1 | pH Value | — | APHA-23rd - 4500-H+B Electrometric Method | 6.5-8.5 | 8.1 | 7.9 | 8.0 | 8.3 | 8.3 |
| 2 | Temperature | Deg C | APHA-23rd - 2550 B | Not to exceed 5°c than that of intake water | 34.0 | 33.0 | 34.0 | 31.0 | 31.0 |
| 3 | Free Available Chlorine | PPM | APHA-23rd - 4500-Cl G, DPD Colorimetric Method | 0.5 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 |

***End of the Report***

Note: Tested results are well within the permissible limits of MPCB.

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2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.

31/07/21
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(Technical Manager)

Page 1 Of 1

ULR. No. : TC5193210000000725F

Date: 31.07.2021

| | |
|---|---|
| Issued To: | APML, Plot No. A-1, Tirora Growth Centre,<br>MIDC – Tirora, Dist. Gondia – 441 911 |
| Sample Particulars : | Ambient Noise Level (Plant) |
| Sample Collected by : | Environment Dept. APML |
| Date of Sampling: | 10.07.2021 |

Test Report

| S. No | Locations | Day Time in dB (A) | Night Time in dB (A) |
|---|---|---|---|
| | | (6.00 a.m. to 10.00 p.m.) | (10.00 p.m. to 06.00 a.m.) |
| 1 | Near Shanti Niketan I & II | 60.4 | 50.7 |
| 2 | Near Labour Hutment | 63.5 | 53.6 |
| 3 | Near Store Area | 61.5 | 55.9 |
| 4 | Gate No.1 | 56.7 | 49.2 |
| 5 | Gate No.2 | 64.8 | 42.4 |
| 6 | Gate No.3 | 73.5 | 50.5 |
| 7 | Near OHC | 53.7 | 40.3 |
| 8 | Railway Siding | 67.2 | 51.6 |
| 9 | Near Reservoir 2 | 54.6 | 42.9 |
| 10 | Near Ash Water Recovery Pump House | 64.7 | 54.5 |
| 11 | In China Colony | 46.2 | 39.9 |
| CPCB Standards (Industrial Area) | | 75 | 70 |

*** End Of the Report***

Note: Tested results are well within the permissible limits of MPCB / CPCB.

1. This report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part and can't be used as evidence in court of law.

31/7/21
Authorised Signatory
(Technical Manager)

# ENVIRONMENTAL LABORATORY
(Accredited by NABL)

**ADANI POWER MAHARASHTRA LIMITED, TIRODA**

Format No: APML/ENV-LB/7.8F01

| TC519321000000635F | Date: 07.08.2021 |
|---|---|

| | |
|---|---|
| **Issued To:** | APML,Plot No. A -1, Tirora Growth Centre, MIDC – Tirora,<br>Dist. Gondia – 441 911 |
| **Sample Particulars :** | Stack Monitoring |
| **Sample Collected by :** | Environment Dept. APML |

1 Sampling Location : Unit -1
2 Date of Sampling : 05.08.2021
3 Time of Sampling : 3:30 PM
4 Load (MW) : 555
5 Height of Stack (Meter) : 275
6 Diameter of Stack (Meter) : 7.4
7 Type of Fuel : Coal
8 Flue Gas Temperature ($^0$C) : 130
9 Flue Gas Velocity (M/sec) : 23.33
10 Flow of Exit Gas at NTP (NM$^3$/Hr) : 2835588

| Sr. No | Test Parameters | Test Method | MPCB Standards | Units | Results * |
|---|---|---|---|---|---|
| 1 | PM | IS 11255 (Part- 1):1985 | 50 | Mg/Nm$^3$ | 36.2 |
| 2 | $SO_2$ | IS 11255 (Part 2) 1985 | 200 | Mg/Nm$^3$ | 971.4 |
| 3 | NOx | IS 11255 (Part 7) 2005 | 450 | Mg/Nm$^3$ | 409.9 |

* Results are corrected with 6% oxygen

***End of the Report***

Note: Tested results are well within the permissible limits of MPCB.

1. The report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.
4.# As per MoEF&CC Notification the SO2 Limit will be applicable after installation of FGD. ([illegible])

Authorised Signatory
(Technical Manager)

Format No: APML/ENV-LB/7.8/F01

| | |
|---|---|
| TC519321000000827F | Date: 07.08.2021 |
| | |
| Issued To: | APML,Plot No. A -1, Tiroda Growth Centre, MIDC – Tiroda,<br>Dist. Gondia – 441 911 |
| Sample Particulars : | Stack Monitoring |
| Sample Collected by : | Environment Dept. APML |

1 Sampling Location : Unit -2
2 Date of Sampling : 06.08.2021
3 Time of Sampling : 4:15 PM
4 Load (MW) : 549
5 Height of Stack (Meter) : 275
6 Diameter of Stack (Meter) : 7.4
7 Type of Fuel : Coal
8 Flue Gas Temperature ($^0$ C) : 133
9 Flue Gas Velocity (M/sec) : 22.35
10 Flow of Exit Gas at NTP (NM$^3$/Hr) : 2505883

| Sr. No | Test Parameters | Test Method | MPCB Standards | Units | Results * |
|---|---|---|---|---|---|
| 1 | PM | IS 11255 (Part- 1):1985 | 50 | Mg/Nm$^3$ | 42.9 |
| 2 | $SO_2$ | IS 11255 (Part 2) 1985 | 200 | Mg/Nm$^3$ | 565.9 |
| 3 | NOx | IS 11255 (Part 7) 2005 | 450 | Mg/Nm$^3$ | 407.6 |

* Results are corrected with 6% oxygen

***End of the Report***

Note: Tested results are well within the permissible limits of MPCB.

1. The report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.
4 # As per MoEF&CC Notification the SO2 Limit will be applicable after installation of FGD (March December 2024)

Authorized Signatory
(Technical Manager)

Page 1 of 1

# adani ENVIRONMENTAL LABORATORY

(Accredited by NABL)

ADANI POWER MAHARASHTRA LIMITED, TIRODA

Format No: APML/ENV-LB/7.8/F01

| | |
|---|---|
| TC6193210000000825F | Date: 07.08.2021 |

| | |
|---|---|
| Issued To: | APML,Plot No. A -1, Tirora Growth Centre, MIDC – Tiroru,<br>Dist. Gondia – 441 911 |
| Sample Particulars : | Stack Monitoring |
| Sample Collected by : | Environment Dept. APML |

| | | | |
|---|---|---|---|
| 1 | Sampling Location | : | Unit -3 |
| 2 | Date of Sampling | : | 05.08.2021 |
| 3 | Time of Sampling | : | 5:00 PM |
| 4 | Load (MW) | : | 641 |
| 5 | Height of Stack (Meter) | : | 275 |
| 6 | Diameter of Stack (Meter) | : | 7.4 |
| 7 | Type of Fuel | : | Coal |
| 8 | Flue Gas Temperature ($^0$C) | : | 121 |
| 9 | Flue Gas Velocity (M/sec) | : | 33.22 |
| 10 | Flow of Exit Gas at NTP (NM$^3$/Hr) | : | 2610744 |

| Sr. No | Test Parameters | Test Method | MPCB Standards | Units | Results * |
|---|---|---|---|---|---|
| 1 | PM | IS 11255 (Part- 1):1985 | 50 | Mg/Nm$^3$ | 38.6 |
| 2 | $SO_2$ | IS 11255 (Part 2) 1985 | 200 | Mg/Nm$^3$ | 896.3 |
| 3 | NOx | IS 11255 (Part 7) 2005 | 450 | Mg/Nm$^3$ | 403.6 |

* Results are corrected with 6% oxygen

***End of the Report***

Note: Tested results are well within the permissible limits of MPCB

1. The report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.
4.# As per MoEF&CC Notification the SO2 Limit will be applicable after installation of FGD (March [illegible] 2024)

Authorized Signatory 07/08/21
(Technical Manager)

Format No: APML/ENV-LS/7.8/F01

| TC519321000000829F | Date: 30.08.2021 |
|---|---|

## TEST REPORT

| | |
|---|---|
| Issued To: | APML,Plot No. A -1, Tirora Growth Centre, MIDC – Tirora, Dist. Gondia – 441 911 |
| Sample Particulars : | Stack Monitoring |
| Sample Collected by : | Environment Dept. APML |

| | | | |
|---|---|---|---|
| 1 | Sampling Location | : | Unit -4 |
| 2 | Date of Sampling | : | 28.08.2021 |
| 3 | Time of Sampling | : | 4:35 PM |
| 4 | Load (MW) | : | 488 |
| 5 | Height of Stack (Meter) | : | 275 |
| 6 | Diameter of Stack (Meter) | : | 7.4 |
| 7 | Type of Fuel | : | Coal |
| 8 | Flue Gas Temperature ($^0$ C) | : | 121 |
| 9 | Flue Gas Velocity (M/sec) | : | 22.48 |
| 10 | Flow of Exit Gas at NTP (NM$^3$/hr) | : | 2532840 |

| Sr No | Test Parameters | Test Method | MPCB Standards | Units | Results |
|---|---|---|---|---|---|
| 1 | PM | IS 11255 (Part. 1) 1985 | 50 | Mg/Nm$^3$ | 42 |
| 2 | $SO_2$ | IS 11255 (Part 2) 1985 | 200 | Mg/Nm$^3$ | 860 |
| 3 | NOx | IS 11255 (Part 7) 2005 | 450 | Mg/Nm$^3$ | 306 |

* Results are corrected with 6% oxygen

***End of the Report***

Note: Tested results are well within the permissible limits of MPCB

1. The report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproduced wholly or in part, and can't be used as evidence in court of law.
4. # As per MoEF&CC Notification the SO2 Limit will be applicable after installation of FGD (March [illegible] 2024)

Authorized Signatory
(Technical Manager)

adani

# ENVIRONMENTAL LABORATORY

(Accredited by NABL)

**ADANI POWER MAHARASHTRA LIMITED, TIRODA**

Format No: APML/ENV-LB/7.8/F01

| | |
|---|---|
| TC6193210000008830F | Date: 30.08.2021 |

## TEST REPORT

| | |
|---|---|
| **Issued To:** | APML,Plot No. A -1, Tiroda Growth Centre, MIDC – Tiroda,<br>Dist. Gondia – 441 911 |
| **Sample Particulars :** | Stack Monitoring |
| **Sample Collected by :** | Environment Dept. APML |

| | | | |
|---|---|---|---|
| 1 | Sampling Location | : | Unit -5 |
| 2 | Date of Sampling | : | 28.08.2021 |
| 3 | Time of Sampling | : | 4:00 PM |
| 4 | Load (MW) | : | 551 |
| 5 | Height of Stack (Meter) | : | 275 |
| 6 | Diameter of Stack (Meter) | : | 7.4 |
| 7 | Type of Fuel | : | Coal |
| 8 | Flue Gas Temperature ($^{0}$C) | : | 123 |
| 9 | Flue Gas Velocity (M/sec) | : | 23.08 |
| 10 | Flow of Exit Gas at NTP (NM$^3$/Hr) | : | 2388807 |

| Sr. No | Test Parameters | Test Method | MPCB Standards | Units | Results |
|---|---|---|---|---|---|
| 1 | PM | IS 11255<br>(Part- 1):1985 | 50 | Mg/Nm$^3$ | 40 |
| 2 | $SO_2$ | IS 11255 (Part 2)<br>1985 | 200 | Mg/Nm$^3$ | 651 |
| 3 | NOx | IS 11255 (Part 7)<br>2005 | 450 | Mg/Nm$^3$ | 413 |

* Results are corrected with 6% oxygen

***End of the Report***

Note: Tested results are well within the permissible limits of MPCB

1. The report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.

4 # As per MoEF&CC Notification the SO2 Limit will be applicable after installation of FGD (MAHGEN) December 2024

30/8/21

Authorized Signatory
(Technical Manager)

Format No: APML/ENV-LB/7.8/F01

ULR No.: TC519321000000001F

Date: 31.08.2021

| | |
|---|---|
| Issued To: | APML, Plot No. A-1, Tirora Growth Centre, MIDC – Tirora, Dist. Gondia – 441 911 |
| Sample Particulars : | Ambient Air Quality ( Plant ) |
| Sample Collected by : | Environment Dept. APML |

Test Report

| Station | Sampling Location | Sampling Date | Analysis Starting Date | Parameters | | | |
|---|---|---|---|---|---|---|---|
| | | | | PM 10 | PM 2.5 | SO2 | NOx |
| | | | | µg/m3 | µg/m3 | µg/m3 | µg/m3 |
| AAQ 1 | Near AWRS | 02.08.2021 | 03.08.2021 | 38.8 | 18.3 | 8.8 | 11.7 |
| | | 05.08.2021 | 06.08.2021 | 41.8 | 21.6 | 13.8 | 17.2 |
| | | 09.08.2021 | 10.08.2021 | 46.0 | 13.0 | 11.4 | 13.2 |
| | | 13.08.2021 | 14.08.2021 | 52.7 | 14.5 | 10.2 | 15.3 |
| | | 16.08.2021 | 17.08.2021 | 49.9 | 27.8 | 9.6 | 14.0 |
| | | 20.08.2021 | 21.08.2021 | 52.8 | 28.8 | 10.2 | 13.8 |
| | | 23.08.2021 | 24.08.2021 | 43.0 | 15.9 | 14.8 | 17.4 |
| | | 27.08.2021 | 28.08.2021 | 43.8 | 13.1 | 11.4 | 15.7 |
| | | 30.08.2021 | 31.08.2021 | 43.4 | 15.4 | 14.8 | 20.8 |
| AAQ 2 | Near Brick Plant | 02.08.2021 | 03.08.2021 | 34.8 | 16.3 | 7.4 | 13.7 |
| | | 05.08.2021 | 06.08.2021 | 40.0 | 13.9 | 9.7 | 12.4 |
| | | 09.08.2021 | 10.08.2021 | 31.6 | 20.3 | 8.8 | 16.7 |
| | | 13.08.2021 | 14.08.2021 | 49.3 | 12.1 | 7.8 | 13.8 |
| | | 16.08.2021 | 17.08.2021 | 45.6 | 16.9 | 11.9 | 17.5 |
| | | 20.08.2021 | 21.08.2021 | 33.6 | 20.3 | 5.8 | 13.2 |
| | | 23.08.2021 | 24.08.2021 | 44.4 | 24.1 | 10.8 | 11.7 |
| | | 27.08.2021 | 28.08.2021 | 47.6 | 21.0 | 10.4 | 9.1 |
| | | 30.08.2021 | 31.08.2021 | 43.3 | 19.8 | 7.4 | 13.6 |
| AAQ 3 | China Colony | 02.08.2021 | 03.08.2021 | 44.7 | 19.9 | 7.4 | 12.5 |
| | | 05.08.2021 | 06.08.2021 | 53.1 | 24.8 | 6.8 | 11.4 |
| | | 09.08.2021 | 10.08.2021 | 59.8 | 15.7 | 9.1 | 12.6 |
| | | 13.08.2021 | 14.08.2021 | 54.8 | 23.8 | 8.8 | 13.2 |
| | | 16.08.2021 | 17.08.2021 | 47.1 | 24.1 | 7.9 | 12.8 |
| | | 20.08.2021 | 21.08.2021 | 57.0 | 15.7 | 10.8 | 11.4 |
| | | 23.08.2021 | 24.08.2021 | 43.2 | 23.8 | 11.8 | 15.0 |
| | | 27.08.2021 | 28.08.2021 | 59.5 | 34.2 | 10.5 | 13.0 |
| | | 30.08.2021 | 31.08.2021 | 51.4 | 30.0 | 14.8 | 20.3 |
| NAAQMS Standard | | | | 100 | 60 | 80 | 80 |

***End of the Report***

Note: Tested results are well within the permissible limits of National Ambient Air Quality Monitoring Standard (NAAQMS)

1. The report is referring only to the tested sample and for applicable parameters.
2. This report is not to be reproduced wholly or in part, and can't be used as evidence in court of law.

Authorized Signatory
( Technical Manager )

Format No: APML/ENV-LBT/[illegible]

URL No. : TC91852100000803F

Date: 31.08.2021

| | |
|---|---|
| Issued To : | APML, Plot No. A -1, Tirora Growth Centre,<br>MIDC – Tirora, Dist. Gondia – 441 911 |
| Sample Particulars : | Ambient Noise Level (Plant) |
| Sample Collected by : | Environment Dept. APML |
| Date of Sampling: | 07.08.2021 |

Test Report

| S. No | Locations | Day Time in dB (A) | Night Time in dB (A) |
|---|---|---|---|
| | | (6.00 a.m. to 10.00 p.m.) | (10.00 p.m. to 06.00 a.m.) |
| 1 | Near Shanti Niketan I II & III | 60.3 | 45.4 |
| 2 | Near Labour Hutment | 66.2 | 52.5 |
| 3 | Near Store Area | 63.7 | 53.5 |
| 4 | Gate No.1 | 58.7 | 49.2 |
| 5 | Gate No.2 | 64.7 | 41.5 |
| 6 | Gate No.3 | 70.5 | 65.5 |
| 7 | Near OHC | 60.5 | 41.5 |
| 8 | Railway Siding | 65.5 | 55.8 |
| 9 | Near Reservoir 3 | 53.8 | 40.9 |
| 10 | Near Ash Water Recovery Pump House | 64.5 | 44.5 |
| 11 | In China Colony | 35.4 | 37.2 |
| CPCB Standards (Industrial Area) | | 75 | 70 |

*** End Of the Report***

Note: Tested results are well within the permissible limits of MPCB / CPCB.

1. The report is reflecting only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.

31/08/21

Authorised Signatory
(Technical Manager)

# adani ENVIRONMENTAL LABORATORY
(Accredited by NABL)

## ADANI POWER MAHARASHTRA LIMITED, TIRODA

Format No: APML/ENV/LAB/F/01

| | |
|---|---|
| ULR No : TC813221100000[illegible]F | Date: 31.08.2021 |

| | | | |
|---|---|---|---|
| Issued To | APML, Plot No. A-1, Tiroda Growth Centre, MIDC – Tiroda, Dist. Gondia – 441 911 | | |
| Sample Collection Date | 11.08.2021 | Analysis Starting Date | 11.08.2021 |
| Quantity received | 2 Lit. Sample | Sampled by | Environment Dept. APML |
| Sample Particulars : Treated Effluent Water | | | |
| Location of sample : DM Plant N-Pit , ETP Outlet | | | |

TEST REPORT

| Sr.no. | Parameter (NABL SCOPE) | Unit | Test Methods | MPCB Standards | Results | |
|---|---|---|---|---|---|---|
| | | | | | N-pit | ETP Outlet |
| 1 | pH Value | --- | APHA 23rd 4500 H+B Electrometric Method | 5.5-9.0 | 8.2 | 7.8 |
| 2 | TSS | mg / l | APHA 23rd – 2540 D | 100.0 | 20 | 27 |
| 3 | TDS | mg / l | APHA 23rd – 2540 C | 2100.0 | 228 | 312 |
| 4 | COD | mg / l | APHA-23rd Ed 2017 5220B Open Reflux Method | 250.0 | 61 | 81 |
| 5 | BOD at 27°C for 3 days | mg / l | IS: 3025 (Part 44) 1993, R: 1999 Ed 1 BOD 3 days at 27 °C | 30.0 | 9 | 18 |
| 6 | Oil & Grease | mg / l | APHA 23rd Ed 2017 5520 B Liquid Liquid Partition Gravimetric method | 10.0 | BDL | 1.1 |

**End of the Report**

**Note:** Tested results are well within the permissible limits of MPCB.

1. The report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproduced wholly or in part, and can't be used as evidence in court of law.
4. # Indicates this parameter is not covered in our NABL scope.

31/08/21

Authorised Signatory
(Technical Manager)

Page 1 of 1

# adani ENVIRONMENTAL LABORATORY

(Accredited by NABL)

## ADANI POWER MAHARASHTRA LIMITED, TIRODA

Format No: APML/ENV.LB/7.8/F01

| ULR No : TC91652100000091F | Date: 21.08.2021 |
|---|---|

| | | | |
|---|---|---|---|
| **Issued To:** | APML, Plot No. A -1, Tiroda Growth Centre, MIDC – Tiroda, Dist. Gondia – 441 911 | | |
| **Sample Collection Date** | 11.08.2021 | **Analysis Starting Date** | 11.08.2021 |
| **Quantity received** | 5 Lit /Sample | **Sampled by** | Environment Dept. |
| **Sample Particulars :** Treated Waste Water | | | |
| **Location of sample :** STP -1 & 2 Out Let | | | |

### TEST REPORT

| Sr. no | Parameter (NABL SCOPE) | Unit | Test Methods | MPCB Standards | Results | |
|---|---|---|---|---|---|---|
| | | | | | STP-1 | STP-2 |
| 1 | TSS | mg / l | APHA 23rd - 2540 D | 50 | 20 | 33 |
| 2 | COD | mg / l | APHA 23rd Ed 2017-5220B Open Reflux Method | 100 | 30 | 65 |
| 3 | BOD at 27°C for 3 days | mg / l | IS: 3025 (P-44)-1993 R-1999 Ed 1 BOD 3 days at 27 °C | 30 | 6 | 11 |

**End of the Report**

Note: Tested results are well within the permissible limits of MPCB.

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2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.
4. # Indicates this parameter is not covered in our NABL scope.

21/8/21

Authorized Signatory

(Technical Manager)

Page 1 Of 1

adani

# ENVIRONMENTAL LABORATORY

(Accredited by NABL)

## ADANI POWER MAHARASHTRA LIMITED, TIRODA

Format No: APML/ENV-LIST-8/F01

ULR No : TC5193210000005077F

Date: 31.08.2021

| | | | |
|---|---|---|---|
| Issued To: | APML, Plot No. A-1, Tiroda Growth Centre, MIDC – Tiroda, Dist. Gondia – 441 911 | | |
| Sample Collection Date | 11.08.2021 | Analysis Starting Date : | 11.08.2021 |
| Quantity received | 1 Ltr / Sample | Sampled by : | Environment Dept. APML |
| Sample Particulars : Cooling tower blowdown (Waste Water) | | | |
| Location of sample : Unit 1, Unit-2, Unit-3, Unit-4 & Unit-5 | | | |

TEST REPORT

| Sr no | Parameter (NABL SCOPE) | Unit | Test Methods | MPCB Standards | Results | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | U # 1 | U # 2 | U # 3 | U # 4 | U # 5 |
| 1 | Free Available Chlorine | mg/l | APHA 23rd – 4500-Cl G, DPD Colorimetric Method | 0.5 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 |
| 2 | Phosphate as (PO4) | mg/l | APHA 23rd-4500-P D Stannous Chloride Method | 5 | 3.0 | 3.4 | 3.3 | 3.1 | 3.2 |
| 3 | Zinc as (Zn) | mg/l | ---- | 1 | BDL | BDL | BDL | BDL | BDL |
| 4 | Total Chromium as (Cr) | mg/l | ---- | 0.2 | BDL | BDL | BDL | BDL | BDL |

**End of the Report**

Note: Tested results are well within the permissible limits of MPCB.

1. The report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproduced wholly or in part, and can't be used as evidence in court of law.

31/08/21

Authorized Signatory
(Technical Manager)

Format No.: APML/ENV/LB/7.8/F01

ULR No : TC5183210000000031F | Date: 31.08.2021

| Issued To: | APML, Plot No. A-1, Tiroda Growth Centre, MIDC – Tiroda, Dist. Gondia – 441 911 | | |
|---|---|---|---|
| Sample Collection Date | 26.08.2021 | Analysis Starting Date : | 30.08.2021 |
| Quantity received | 1 Ltr / Sample | Sampled by : | Environment Dept. APML |

Sample Particulars : Boiler blowdown (Waste Water)

Location of sample : Unit-1 & Unit-2

TEST REPORT

| Sr no | Parameter (NABL SCOPE) | Unit | Test Methods | MPCB Standards | Results | |
|---|---|---|---|---|---|---|
| | | | | | U # 1 | U # 2 |
| 1 | TSS | mg / l | APHA 23rd - 2540 D | 100 | 8.8 | 6.0 |
| 2 | Oil & Grease | mg / l | APHA 23rd Ed 2012: 5520 B Liquid Liquid Partition Gravimetric method | 10 | BDL | BDL |
| 3 | Copper (Total) | mg/l | — | 1 | BDL | BDL |
| 4 | Iron (Total) | mg/l | APHA-23rd-3500-Fe-B | 1 | BDL | BDL |

**End of the Report**

Note: Tested results are well within the permissible limits of MPCB.

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2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.

31/8/21
Authorized Signatory
(Technical Manager)

# ENVIRONMENTAL LABORATORY
(Accredited by NABL)

ADANI POWER MAHARASHTRA LIMITED, TIRODA

Format No: APML/ENV-LB/7.8/F01

URL No : TC518321000000806F

Date: 31.08.2021

| | | | |
|---|---|---|---|
| Issued To: | APML,Plot No. A -1, Tiroda Growth Centre, MIDC – Tiroda, Dist. Gondia – 441 911 | | |
| Sample Collection Date | 11.08.2021 | Analysis Starting Date : | 11.08.2021 |
| Quantity received | 1 Ltr / Sample | Sampled by : | Environment Dept. APML |
| Sample Particulars : Condenser Cooling Water ( Waste Water ) | | | |
| Location of sample : Unit1,Unit-2,Unit-3,Unit-4 & Unit-5 | | | |

## TEST REPORT

| Sr no | Parameter | Unit | Test Methods | MPCB Standards | Results | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | U # 1 | U # 2 | U # 3 | U # 4 | U # 5 |
| 1 | pH Value | — | APHA-23rd - 4500-H+B Electrometric Method | 6.5-8.5 | 8.0 | 8.2 | 8.1 | 8.4 | 8.2 |
| 2 | Temperature | Deg C | APHA-23rd - 2550 B | Not to exceed 5°C than that of intake water | 33.0 | 31.8 | 33.0 | 33.0 | 33.0 |
| 3 | Free Available Chlorine | PPM | APHA-23rd - 4500-Cl G, DPD Colorimetric Method | 0.5 | 0.2 | 0.2 | 0.2 | 0.1 | 0.1 |

***End of the Report***

Note: Tested results are well within the permissible limits of MPCB.

1. The report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.

31/08/21

Authorised Signatory
(Technical Manager)

Format No. APML/ENV-LB/F/MF01

ULR No.: TC[illegible]

Date: 29.09.2021

| | |
|---|---|
| Issued To: | APML, Plot No. A-1, Tiroda Growth Centre, MIDC – Tiroda, Dist. Gondia – 441 911 |
| Sample Particulars : | Ambient Air Quality ( Plant ) |
| Sample Collected by : | Environment Dept. APML |

Test Report

| Station | Sampling Location | Sampling Date | Analysis Starting Date | Parameters | | | |
|---|---|---|---|---|---|---|---|
| | | | | PM 10 | PM 2.5 | SO2 | NOx |
| | | | | µg/m3 | µg/m3 | µg/m3 | µg/m3 |
| AAQ 1 | Near AWRS | 03.09.2021 | 04.09.2021 | 38.1 | 19.8 | 8.7 | 16.2 |
| | | 06.09.2021 | 07.09.2021 | 33.1 | 19.8 | 7.8 | 15.1 |
| | | 08.09.2021 | 09.09.2021 | 31.3 | 15.4 | 11.8 | 16.8 |
| | | 13.09.2021 | 14.09.2021 | 29.9 | 13.2 | 8.2 | 14.3 |
| | | 17.09.2021 | 18.09.2021 | 51.3 | 28.5 | 10.2 | 20.2 |
| | | 20.09.2021 | 21.09.2021 | 57.4 | 28.5 | 4.8 | 15.7 |
| | | 24.09.2021 | 25.09.2021 | 41.3 | 18.8 | 7.3 | 10.8 |
| | | 27.09.2021 | 28.09.2021 | 46.1 | 28.3 | 9.7 | 12.5 |
| AAQ 2 | Near Brick Plant | 03.09.2021 | 04.09.2021 | 21.0 | 13.8 | 9.2 | 14.3 |
| | | 06.09.2021 | 07.09.2021 | 35.1 | 26.7 | 4.6 | 13.8 |
| | | 08.09.2021 | 09.09.2021 | 36.6 | 16.2 | 7.4 | 16.2 |
| | | 13.09.2021 | 14.09.2021 | 34.4 | 14.8 | 7.8 | 10.7 |
| | | 17.09.2021 | 18.09.2021 | 46.9 | 16.7 | 8.3 | 10.8 |
| | | 20.09.2021 | 21.09.2021 | 52.8 | 21.6 | 7.3 | 13.7 |
| | | 24.09.2021 | 25.09.2021 | 53.1 | 27.8 | 11.1 | 18.3 |
| | | 27.09.2021 | 28.09.2021 | 48.8 | 25.4 | 8.7 | 21.5 |
| AAQ 3 | China Colony | 03.09.2021 | 04.09.2021 | 43.6 | 14.4 | 8.5 | 10.5 |
| | | 06.09.2021 | 07.09.2021 | 30.5 | 18.3 | 15.7 | 14.2 |
| | | 08.09.2021 | 09.09.2021 | 36.8 | 22.5 | 13.5 | 13.8 |
| | | 13.09.2021 | 14.09.2021 | 23.3 | 28.7 | 9.8 | 10.8 |
| | | 17.09.2021 | 18.09.2021 | 56.7 | 21.4 | 11.6 | 15.2 |
| | | 20.09.2021 | 21.09.2021 | 51.1 | 18.4 | 9.7 | 11.6 |
| | | 24.09.2021 | 25.09.2021 | 65.4 | 24.7 | 11.1 | 12.8 |
| | | 27.09.2021 | 28.09.2021 | 47.3 | 21.3 | 8.3 | 10.5 |
| NAAQS Standard | | | | 100 | 60 | 80 | 80 |

***End of the Report***

Note: Tested results are well within the permissible limits of National Ambient Air Quality Monitoring Standard (NAAQMS).

1. The report is referring only to the tested sample and for applicable parameter.
2. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.

30.09.21

Authorized Signatory
( Technical Manager )

Format No: APML/ENV-LAB/F/01

| ULR. No : TC013321000009913F | Date: 22.09.2021 |
|---|---|

| | | | |
|---|---|---|---|
| Issued To | APML, Plot No. A-1, Tiroda Growth Centre, MIDC – Tiroda, Dist. Gondia – 441 911 | | |
| Sample Collection Date | 15.09.2021 | Analysis Starting Date | 15.09.2021 |
| Quantity received | 2 Lit./Sample | Sampled by | Environment Dept. |
| Sample Particulars : Treated Waste Water | | | |
| Location of sample : STP -1 & 2 Out Let | | | |

TEST REPORT

| Sr no | Parameter (NABL SCOPE) | Unit | Test Methods | MPCB Standards | Results | |
|---|---|---|---|---|---|---|
| | | | | | STP-1 | STP-2 |
| 1 | TSS | mg / l | APHA 23rd – 2540 D | 50 | 33 | 19 |
| 2 | COD | mg / l | APHA 23rd Ed 2017-5220 B Open Reflux Method | 100 | 75 | 60 |
| 3 | BOD at 27°C for 3 days | mg / l | IS: 3025 (P-44) 1993 R-1999 Ad.1 BOD 3-days at 27 °C | 30 | 7 | 12 |

***End of the Report***

Note: Tested results are well within the permissible limits of MPCB.

1. The report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.
4. # indicates this parameter is not covered in our NABL scope

20/09/21

Authorised Signatory
(Technical Manager)

adani

# ENVIRONMENTAL LABORATORY

(Accredited by NABL)

## ADANI POWER MAHARASHTRA LIMITED, TIRODA

Format No: [illegible]

| | |
|---|---|
| ULR No : [illegible] | Date [illegible] |

| | | | |
|---|---|---|---|
| Issued To: | APML, Plot No. A-1, Tiroda Growth Centre, MIDC – Tiroda, Dist. Gondia – 441 911 | | |
| Sample Collection Date | 15.05.2021 | Analysis Starting Date | 15.05.2021 |
| Quantity received | 2 Lit. Sample | Sampled by | Environment Dept. APML |
| Sample Particulars : Treated Effluent Water | | | |
| Location of sample : DM Plant N-Pit, STP Outlet | | | |

TEST REPORT

| Sr no | Parameter (NABL SCOPE) | Unit | Test Methods | MPCB Standards | Results | |
|---|---|---|---|---|---|---|
| | | | | | N-pit | STP Outlet |
| 1 | pH Value | — | APHA 23rd -4500 H+B Electrometric Method | 5.5-9.0 | 7.7 | 7.8 |
| 2 | TSS | mg / l | APHA 23rd – 2540 D | 100.0 | 11 | 17 |
| 3 | TDS | mg / l | APHA 23rd – 2540 C | 2100.0 | 389 | 359 |
| 4 | COD | mg / l | APHA 23rd Ed.2017-5220B Open Reflux Method | 250.0 | 83 | 32 |
| 5 | BOD at 27°C for 3 days | mg / l | IS 3025 (P-44) 1993 R: 1999 Ed.1 (BOD 3 days at 27°C) | 30.0 | 9 | 15 |
| 6 | Oil & Grease | mg / l | APHA 23rd Ed 2017-5520 B Liquid-Liquid Partition Gravimetric method | 10.0 | BDL | 1.5 |

***End of the Report***

Note: Tested results are well within the permissible limits of MPCB

1. The report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproduced wholly or in part and cannot be used as evidence in court of law.
4. # indicates the parameter is not covered in our NABL scope.

Authorized Signatory
(Technical Manager)

Page 1 Of 1

Format No: APML/ENV-LB/7.8/F01

URL No : TC6150210000000[illegible]F

Date: 20.09.2021

| | | | |
|---|---|---|---|
| Issued To: | APML,Plot No. A-1, Tirora Growth Centre, MIDC – Tirora, Dist. Gondia – 441 911 | | |
| Sample Collection Date | 15.09.2021 | Analysis Starting Date : | 15.09.2021 |
| Quantity received | 1 Ltr / Sample | Sampled by : | Environment Dept. APML |
| Sample Particulars : Condenser Cooling Water ( Waste Water ) | | | |
| Location of sample : Unit1,Unit-2,Unit-3,Unit-4 & Unit-5 | | | |

## TEST REPORT

| Sr no. | Parameter | Unit | Test Methods | MPCB Standards | Results | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | U # 1 | U # 2 | U # 3 | U # 4 | U # 5 |
| 1 | pH Value | --- | APHA-23rd - 4500 H+B Electrometric Method | 6.5-8.5 | 8.1 | 8.2 | 7.9 | 8.0 | 8.2 |
| 2 | Temperature | Deg C | APHA-23rd - 2500 B | Not to exceed 5°c than that of intake water | 35.0 | 32.3 | 31.6 | 34.0 | 33.9 |
| 3 | Free Available Chlorine | PPM | APHA-23rd - 4500-Cl G, DPD Colorimetric Method | 0.5 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |

**End of the Report**

Note: Tested results are well within the permissible limits of MPCB.

1. The report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.

Authorized Signatory
(Technical Manager)

Page 1 Of 1

adani

# ENVIRONMENTAL LABORATORY
(Accredited by NABL)

## ADANI POWER MAHARASHTRA LIMITED, TIRODA

TC-8435

Format No: APML/ENV-LB/27,SF01

ULR No : TC418521000000087F

Date: 20.09.2021

| | | | |
|---|---|---|---|
| Issued To: | APML,Plot No. A-1, Tiroda Growth Centre, MIDC – Tiroda, Dist. Gondia – 441 911 | | |
| Sample Collection Date | 15.09.2021 | Analysis Starting Date : | 15.09.2021 |
| Quantity received | 1 Ltr / Sample | Sampled by : | Environment Dept. APML |

Sample Particulars : Cooling tower blowdown ( Waste Water )

Location of sample : Unit-1,Unit-2,Unit-3,Unit-4 & Unit-5.

TEST REPORT

| Sr no | Parameter (NABL SCOPE) | Unit | Test Methods | MPCB Standards | Results | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | U # 1 | U # 2 | U # 3 | U # 4 | U # 5 |
| 1 | Free Available Chlorine | mg/l | APHA 23rd – 4500 Cl G, DPD Colorimetric Method | 0.5 | 0.1 | 0.1 | 0.1 | 0.4 | 0.4 |
| 2 | Phosphate as (PO4) | mg/l | APHA 23rd -4500 P D Stannous Chloride Method | 5 | 2.8 | 2.7 | 2.6 | 2.8 | 2.8 |
| 3 | Zinc as (Zn) | mg/l | ---- | 1 | BDL | BDL | BDL | BDL | BDL |
| 4 | Total Chromium as (Cr ) | mg/l | ---- | 0.2 | BDL | BDL | BDL | BDL | BDL |

**End of the Report**

Note: Tested results are well within the permissible limits of MPCB.

1. The report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproduced wholly or in part, and can't be used as evidence in court of law.

20.09.21

Authorised Signatory
(Technical Manager)

Format No.: APML/ENV-LB/7.8F01

URL No. : TC5192210000000023F

Date: 30.05.2021

| | |
|---|---|
| Issued To: | APML,Plot No. A -1, Tirora Growth Centre,<br>MIDC – Tirora, Dist. Gondia – 441 911 |
| Sample Particulars : | Ambient Noise Level (Plant) |
| Sample Collected by : | Environment Dept. APML |
| Date of Sampling: | 04.05.2021 |

Test Report

| S. No | Locations | Day Time in dB (A)<br>(6.00 a.m. to 10.00 p.m.) | Night Time in dB (A)<br>(10.00 p.m. to 06.00 a.m.) |
|---|---|---|---|
| 1 | Near Shanti Niketan ( I & II | 63.1 | 53.0 |
| 2 | Near Labour Hutment | 61.8 | 55.9 |
| 3 | Near Store Area | 63.0 | 51.2 |
| 4 | Gate No.1 | 52.9 | 55.2 |
| 5 | Gate No.2 | 64.6 | 51.3 |
| 6 | Gate No.3 | 70.4 | 65.5 |
| 7 | Near OHC | 53.8 | 42.9 |
| 8 | Railway Siding | 68.4 | 55.9 |
| 9 | Near Reservoir 2 | 53.8 | 47.8 |
| 10 | Near Ash Water Recovery Pump House | 64.6 | 57.5 |
| 11 | In China Colony | 38.9 | 38.3 |
| CPCB Standards (Industrial Area) | | 75 | 70 |

*** End Of the Report***

Note: Tested results are well within the permissible limits of MPCB / CPCB.

1. The report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.

Authorised Signatory
(Technical Manager)

# adani ENVIRONMENTAL LABORATORY
(Accredited by NABL)

## ADANI POWER MAHARASHTRA LIMITED, TIRODA

Format No: APML/ENV-LB/7.8/F01

| | |
|---|---|
| TC51932100000929F | Date: 18.09.2021 |

| | |
|---|---|
| Issued To: | APML,Plot No. A -1, Tirora Growth Centre, MIDC – Tirora,<br>Dist. Gondia – 441 911 |
| Sample Particulars : | Stack Monitoring |
| Sample Collected by : | Environment Dept. APML |

1 Sampling Location : Unit -1

2 Date of Sampling : 15.09.2021

3 Time of Sampling : 12:05 PM

4 Load (MW) : 384

5 Height of Stack (Meter) : 275

6 Diameter of Stack (Meter) : 7.4

7 Type of Fuel : Coal

8 Flue Gas Temperature (°C) : 123

9 Flue Gas Velocity (M/sec) : 23.34

10 Flow of Exit Gas at NTP (Nm³/hr) : 2605584

| Sr. No | Test Parameters | Test Method | MPCB Standards | Units | Results * |
|---|---|---|---|---|---|
| 1 | PM | IS 11255 (Part- 1):1985 | 50 | Mg/Nm³ | 38.3 |
| 2 | $SO_2$ | IS 11255 (Part 2) 1985 | 200 | Mg/Nm³ | 782.3 |
| 3 | NOx | IS 11255 (Part 7) 2005 | 450 | Mg/Nm³ | 339.2 |
| 4## | Mercury | USEPA - 0060 | 0.03 | Mg/Nm³ | 0.0189 |

* Results are corrected with 6% oxygen

***End of the Report***

**Note:** Tested results are well within the permissible limits of MPCB

1. The report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.
4.# As per MoEF&CC Notification the SO2 Limit will be applicable after installation of FGD (March 2023-March 2024)
5.## indicates the parameter is not covered in our NABL scope
6. Mercury monitoring & analysis is being done on quarterly basis through third party

Authorised Signatory
(Technical Manager)

# ENVIRONMENTAL LABORATORY
(Accredited by NABL)

## ADANI POWER MAHARASHTRA LIMITED, TIRODA

Format No: APML/ENV-LB/7.8F01

| TC512321000000627F | Date: 18.09.2021 |
|---|---|

| | |
|---|---|
| Issued To: | APML,Plot No. A -1, Tirora Growth Centre, MIDC – Tirora, Dist. Gondia – 441 911 |
| Sample Particulars : | Stack Monitoring |
| Sample Collected by : | Environment Dept. APML |

| | | | |
|---|---|---|---|
| 1 | Sampling Location | : | Unit -2 |
| 2 | Date of Sampling | : | 16.09.2021 |
| 3 | Time of Sampling | : | 11:30 AM |
| 4 | Load (MW) | : | 650 |
| 5 | Height of Stack (Meter) | : | 275 |
| 6 | Diameter of Stack (Meter) | : | 7.4 |
| 7 | Type of Fuel | : | Coal |
| 8 | Flue Gas Temperature (°C) | : | 121 |
| 9 | Flue Gas Velocity (M/sec) | : | 20.77 |
| 10 | Flow of Exit Gas at NTP (NM³/Hr) | : | 2885488 |

| Sr. No | Test Parameters | Test Method | MPCB Standards | Units | Results * |
|---|---|---|---|---|---|
| 1 | PM | IS 11255 (Part- 1):1985 | 50 | Mg/Nm³ | 44.2 |
| 2 | $SO_2$ | IS 11255 (Part 2) 1985 | 200 | Mg/Nm³ | 798.1 |
| 3 | NOx | IS 11255 (Part 7) 2005 | 450 | Mg/Nm³ | 298.8 |
| 4## | Mercury | USEPA - 0560 | 0.03 | Mg/Nm³ | 0.0105 |

* Results are corrected with 6% oxygen

***End of the Report***

Note: Tested results are well within the permissible limits of MPCB.

1. The report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.
4 # As per MoEF&CC Notification the SO2 Limit will be applicable after installation of FGD. (March 2023-March 2024)
5 ## indicates this parameter is not covered in our NABL scope.
6. Mercury monitoring & analysis is being done on quarterly basis through third party.

Authorized Signatory
(Technical Manager)

Page 1 of 1

Format No: APML/ENV-LM/7.8/F01

| TC510321000000508F | Date: 18.09.2021 |
|---|---|

| | |
|---|---|
| Issued To: | APML, Plot No. A -1, Tirora Growth Centre, MIDC – Tirora,<br>Dist. Gondia – 441 911 |
| Sample Particulars : | Stack Monitoring |
| Sample Collected by : | Environment Dept. APML |

| | | | |
|---|---|---|---|
| 1 | Sampling Location | : | Unit -2 |
| 2 | Date of Sampling | : | 16.09.2021 |
| 3 | Time of Sampling | : | 12:40 PM |
| 4 | Load (MW) | : | 456 |
| 5 | Height of Stack (Meter) | : | 275 |
| 6 | Diameter of Stack (Meter) | : | 7.4 |
| 7 | Type of Fuel | : | Coal |
| 8 | Flue Gas Temperature (°C) | : | 128 |
| 9 | Flue Gas Velocity (M/sec) | : | 23.79 |
| 10 | Flow of Exit Gas at NTP (NM$^3$/Hr) | : | 2887400 |

| Sr. No | Test Parameters | Test Method | MPCB Standards | Units | Results * |
|---|---|---|---|---|---|
| 1 | PM | IS 11255 (Part- 1):1985 | 50 | Mg/Nm$^3$ | 35.4 |
| 2 | $SO_2$ | IS 11255 (Part 2) 1985 | 200 | Mg/Nm$^3$ | 880.6 |
| 3 | NOx | IS 11255 (Part 7) 2005 | 450 | Mg/Nm$^3$ | 317.1 |
| 4## | Mercury | USEPA - 0060 | 0.03 | Mg/Nm$^3$ | 0.0179 |

* Results are corrected with 6% oxygen

***End of the Report***

Note: Tested results are well within the permissible limits of MPCB.

1. The report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.
4. # As per MoEF&CC Notification the SO2 Limit will be applicable after installation of FGD - (dated [illegible] 2024)
5. ## indicates this parameter is not covered in our NABL scope.
6. Mercury monitoring & analysis is being done on quaterly basis through third party.

20/9/21

Authorized Signatory
(Technical Manager)

Page 1 of 1

# ENVIRONMENTAL LABORATORY

(Accredited by NABL)

**ADANI POWER MAHARASHTRA LIMITED, TIRODA**

Format No: APML/ENV-LB/7.8/F01

| TC5193210000009829F | Date: 19.09.2021 |
|---|---|
| **TEST REPORT** | |
| Issued To: | APML, Plot No. A -1, Tirora Growth Centre, MIDC – Tirora,<br>Dist. Gondia – 441 911 |
| Sample Particulars : | Stack Monitoring |
| Sample Collected by : | Environment Dept. APML |

| | | | |
|---|---|---|---|
| 1 | Sampling Location | : | Unit -4 |
| 2 | Date of Sampling | : | 18.09.2021 |
| 3 | Time of Sampling | : | 3:26 PM |
| 4 | Load (MW) | : | 596 |
| 5 | Height of Stack (Meter) | : | 275 |
| 6 | Diameter of Stack (Meter) | : | 7.4 |
| 7 | Type of Fuel | : | Coal |
| 8 | Flue Gas Temperature (°C) | : | 130 |
| 9 | Flue Gas Velocity (M/sec) | : | 22.76 |
| 10 | Flow of Exit Gas at NTP (NM$^3$/Hr) | : | 2672988 |

| Sr. No | Test Parameters | Test Method | MPCB Standards | Units | Results |
|---|---|---|---|---|---|
| 1 | PM | IS 11255<br>(Part- 1):1985 | 50 | Mg/Nm$^3$ | 45 |
| 2 | SO$_2$ | IS 11255 (Part 2)<br>1985 | 200 | Mg/Nm$^3$ | 880 |
| 3 | NOx | IS 11255 (Part 7)<br>2005 | 450 | Mg/Nm$^3$ | 340 |
| 4## | Mercury | USEPA - 0060 | 0.03 | Mg/Nm$^3$ | 0.0163 |

*Results are corrected with 6% oxygen

**End of the Report**

Note: Tested results are well within the permissible limits of MPCB.

1. This report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.
4. # As per MoEF&CC Notification the SO2 Limit will be applicable after installation of FGD - (March 2023-March 2024)
5. ## Indicates this parameter is not covered in our NABL scope
6. Mercury monitoring & analysis is being done on quarterly basis through third party.

20.09.21

Authorised Signatory
(Technical Manager)

adani **ENVIRONMENTAL LABORATORY**
(Accredited by NABL)

**ADANI POWER MAHARASHTRA LIMITED, TIRODA**

Format No: APML/ENV-LB/7.8/F01

| TC51932100000263IIF | Date: 18.05.2021 |
|---|---|
| **TEST REPORT** | |
| Issued To: | APML_Plot No. A -1, Tiroda Growth Centre, MIDC – Tirora,<br>Dist. Gondia – 441 911 |
| Sample Particulars : | Stack Monitoring |
| Sample Collected by : | Environment Dept. APML |

1 Sampling Location : Unit -4
2 Date of Sampling : 16.05.2021
3 Time of Sampling : 4:00 PM
4 Load (MW) : 350
5 Height of Stack (Meter) : 275
6 Diameter of Stack (Meter) : 7.4
7 Type of Fuel : Coal
8 Flue Gas Temperature ($^0$C) : 127
9 Flue Gas Velocity (M/sec) : 23.30
10 Flow of Exit Gas at NTP (NM$^3$/Hr) : 2625871

| Sr. No. | Test Parameters | Test Method | MPCB Standards | Units | Results |
|---|---|---|---|---|---|
| 1 | PM | IS 11255 (Part- 1):1985 | 50 | Mg/Nm$^3$ | 37 |
| 2 | $SO_2$ | IS 11255 (Part 2) 1985 | 200 | Mg/Nm$^3$ | 841 |
| 3 | NOx | IS 11255 (Part 7) 2005 | 450 | Mg/Nm$^3$ | 348 |
| 4## | Mercury | USEPA - 2000 | 0.03 | Mg/Nm$^3$ | 0.0167 |

*Results are corrected with 6% oxygen

***End of the Report***

Note: Tested results are well within the permissible limits of MPCB.

1. The report is referring only to the tested sample and for applicable parameter.
2. The sample will be destroyed after retention time unless otherwise specified specially.
3. This report is not to be reproducing wholly or in part, and can't be used as evidence in court of law.
4. # As per MoEF&CC Notification the SO2 Limit will be applicable after installation of FGD. (March 2023/March 2024)
5. ## Indicates this parameter is not covered in our NABL scope.
6. Mercury monitoring & analysis is being done on quarterly basis through third party.

Authorised Signatory
(Technical Manager)

**ADANI POWER MAHARASHTRA LIMITED**

**5 x 660 MW Thermal Power Plant , Tirora, Gondia**

Station: AAQMS 1 AAQMS 2 AAQMS 3

| Month | AAQMS-1 ( Labour Hutment ) | | | | | | | | | | | | AAQMS-2 (China Colony) | | | | | | | | | | | | AAQMS-3 (Gate no -2) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PM 10 | | | PM 2.5 | | | SO2 | | | NOx | | | PM 10 | | | PM 2.5 | | | SO2 | | | NOx | | | PM 10 | | | PM 2.5 | | | SO2 | | | NOx | | |
| | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | |
| | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg |
| **1-Apr-21** | 69.8 | 38.9 | 50.0 | 41.4 | 20.8 | 36.3 | 15.5 | 11.1 | 14.1 | 50.0 | 33.7 | 48.4 | 73.2 | 42.3 | 53.4 | 36.8 | 34.2 | 16.7 | 68.4 | 58.0 | 65.0 | 46.4 | 28.1 | 41.8 | 72.5 | 41.6 | 62.7 | 43.1 | 21.5 | 36.0 | 32.2 | 21.8 | 29.8 | 30.7 | 12.4 | 30.0 |
| **2-Apr-21** | 72.5 | 41.6 | 52.7 | 33.9 | 12.3 | 28.8 | 22.2 | 11.8 | 19.8 | 34.7 | 16.4 | 30.1 | 75.9 | 45.0 | 56.1 | 36.2 | 25.6 | 16.1 | 41.1 | 36.9 | 35.5 | 39.1 | 20.8 | 35.0 | 75.2 | 44.3 | 55.4 | 52.8 | 31.2 | 49.7 | 36.9 | 27.5 | 35.4 | 33.4 | 15.1 | 32.8 |
| **3-Apr-21** | 74.6 | 43.7 | 54.8 | 35.0 | 13.4 | 32.9 | 23.3 | 11.9 | 20.9 | 32.8 | 14.5 | 29.2 | 78.0 | 47.1 | 58.2 | 35.9 | 23.3 | 25.8 | 46.2 | 42.0 | 43.6 | 50.2 | 31.9 | 37.6 | 77.3 | 46.4 | 57.5 | 30.9 | 15.3 | 30.8 | 42.0 | 30.6 | 39.5 | 35.5 | 17.2 | 34.9 |
| **4-Apr-21** | 67.9 | 37.0 | 48.1 | 38.5 | 16.9 | 18.4 | 13.6 | 11.2 | 11.2 | 36.9 | 18.6 | 35.3 | 71.3 | 40.4 | 51.5 | 41.9 | 38.6 | 21.8 | 44.5 | 38.3 | 39.9 | 44.5 | 26.2 | 43.0 | 70.6 | 39.7 | 50.8 | 31.7 | 21.1 | 26.6 | 35.7 | 29.3 | 34.3 | 28.8 | 10.5 | 28.2 |
| **5-Apr-21** | 71.2 | 40.3 | 51.4 | 35.8 | 14.2 | 15.7 | 16.9 | 13.4 | 14.5 | 54.4 | 36.1 | 52.8 | 74.6 | 43.7 | 52.0 | 45.2 | 40.6 | 25.1 | 47.8 | 41.0 | 44.2 | 47.8 | 12.1 | 35.2 | 73.9 | 41.0 | 54.1 | 51.5 | 40.9 | 45.4 | 46.6 | 37.2 | 40.2 | 32.0 | 13.7 | 31.4 |
| **6-Apr-21** | 71.6 | 40.7 | 51.8 | 35.4 | 13.8 | 28.3 | 17.3 | 10.9 | 14.9 | 44.8 | 26.5 | 43.2 | 75.0 | 44.1 | 57.2 | 45.6 | 43.0 | 25.5 | 30.2 | 14.8 | 20.8 | 48.2 | 29.9 | 35.6 | 84.3 | 53.4 | 64.5 | 54.9 | 12.7 | 46.8 | 56.0 | 47.3 | 53.3 | 38.5 | 20.2 | 37.9 |
| **7-Apr-21** | 71.8 | 38.9 | 52.0 | 33.2 | 11.6 | 27.1 | 21.0 | 11.6 | 18.6 | 27.0 | 8.7 | 25.4 | 73.2 | 42.3 | 53.4 | 43.8 | 41.2 | 35.7 | 48.4 | 33.0 | 39.0 | 46.4 | 28.1 | 33.8 | 72.5 | 41.6 | 52.7 | 37.1 | 15.5 | 33.0 | 51.2 | 41.8 | 50.8 | 25.7 | 13.4 | 25.1 |
| **8-Apr-21** | 72.3 | 41.4 | 52.5 | 37.1 | 15.5 | 30.0 | 18.0 | 13.4 | 15.6 | 30.5 | 12.2 | 28.9 | 75.7 | 44.8 | 55.9 | 46.3 | 43.7 | 26.2 | 30.9 | 15.5 | 21.5 | 48.9 | 30.6 | 36.3 | 72.8 | 41.9 | 53.0 | 41.4 | 28.8 | 35.3 | 52.5 | 45.1 | 43.1 | 31.0 | 12.7 | 30.4 |
| **9-Apr-21** | 73.1 | 42.2 | 53.3 | 35.6 | 14.0 | 25.5 | 18.8 | 13.1 | 16.4 | 32.4 | 14.1 | 30.8 | 76.5 | 45.6 | 58.7 | 47.1 | 44.5 | 27.0 | 55.7 | 46.3 | 46.3 | 55.7 | 37.4 | 43.1 | 75.8 | 44.9 | 72.0 | 36.4 | 23.3 | 34.3 | 20.4 | 19.0 | 15.0 | 29.4 | 11.1 | 28.8 |
| **10-Apr-21** | 73.5 | 42.6 | 53.7 | 30.9 | 11.3 | 20.8 | 45.2 | 37.8 | 42.8 | 37.7 | 19.4 | 36.1 | 82.6 | 51.7 | 62.8 | 53.2 | 50.6 | 33.1 | 21.4 | 20.0 | 19.0 | 42.8 | 24.5 | 30.2 | 84.6 | 53.7 | 64.8 | 53.2 | 40.6 | 33.1 | 58.3 | 45.9 | 48.9 | 31.6 | 13.3 | 31.0 |
| **11-Apr-21** | 73.6 | 39.7 | 53.8 | 31.4 | 9.8 | 21.3 | 34.3 | 29.9 | 31.9 | 37.8 | 26.5 | 36.2 | 77.0 | 46.1 | 57.2 | 47.6 | 45.0 | 27.5 | 66.7 | 57.3 | 60.3 | 31.2 | 12.9 | 26.0 | 75.3 | 44.4 | 65.5 | 43.9 | 25.3 | 41.3 | 46.0 | 35.6 | 36.6 | 33.5 | 15.2 | 32.9 |
| **12-Apr-21** | 73.8 | 42.9 | 54.0 | 45.4 | 23.8 | 35.3 | 37.5 | 33.1 | 35.1 | 38.0 | 31.7 | 36.4 | 75.2 | 44.3 | 55.4 | 45.8 | 10.9 | 43.7 | 40.9 | 31.5 | 34.5 | 25.4 | 17.1 | 22.8 | 75.5 | 44.6 | 55.7 | 44.1 | 27.5 | 24.0 | 45.2 | 34.8 | 39.8 | 27.8 | 14.5 | 27.2 |
| **13-Apr-21** | 72.1 | 36.2 | 52.3 | 43.7 | 22.1 | 33.6 | 43.8 | 39.4 | 41.4 | 36.3 | 12.2 | 34.7 | 72.5 | 41.6 | 52.7 | 43.1 | 11.1 | 23.0 | 38.2 | 28.8 | 31.8 | 31.5 | 13.2 | 18.9 | 72.6 | 41.7 | 52.8 | 41.2 | 24.6 | 21.1 | 43.3 | 32.9 | 39.9 | 21.7 | 10.4 | 21.1 |
| **14-Apr-21** | 72.2 | 41.3 | 52.4 | 43.8 | 22.2 | 29.7 | 20.1 | 15.7 | 19.7 | 36.4 | 6.8 | 29.8 | 71.5 | 40.6 | 51.7 | 42.1 | 20.5 | 22.0 | 48.2 | 47.8 | 41.8 | 22.1 | 12.6 | 12.1 | 70.4 | 39.5 | 64.6 | 39.0 | 23.4 | 36.9 | 42.1 | 34.7 | 41.7 | 30.9 | 20.6 | 30.3 |
| **15-Apr-21** | 74.3 | 43.4 | 54.5 | 45.9 | 14.1 | 35.8 | 18.7 | 14.3 | 16.3 | 38.5 | 28.2 | 37.2 | 77.7 | 46.8 | 57.9 | 48.3 | 11.8 | 28.2 | 56.4 | 47.0 | 50.0 | 50.4 | 32.1 | 37.8 | 75.0 | 44.1 | 55.2 | 43.6 | 27.0 | 35.5 | 45.7 | 35.3 | 43.3 | 25.2 | 14.9 | 12.6 |
| **16-Apr-21** | 74.5 | 43.6 | 54.7 | 46.1 | 24.5 | 26.0 | 46.2 | 41.8 | 43.8 | 38.7 | 30.4 | 36.1 | 77.9 | 47.0 | 61.1 | 32.8 | 11.2 | 29.3 | 43.6 | 34.2 | 41.2 | 46.1 | 27.8 | 33.5 | 85.2 | 54.3 | 65.4 | 30.5 | 11.9 | 24.4 | 44.9 | 38.5 | 42.5 | 43.4 | 25.1 | 35.8 |
| **17-Apr-21** | 80.1 | 49.2 | 60.3 | 51.7 | 10.6 | 42.6 | 25.8 | 21.4 | 25.0 | 44.3 | 34.0 | 39.7 | 83.5 | 52.6 | 63.7 | 54.1 | 28.5 | 34.0 | 49.2 | 39.8 | 46.8 | 41.7 | 23.4 | 29.1 | 82.8 | 51.9 | 63.0 | 53.4 | 31.8 | 33.3 | 42.5 | 32.1 | 39.1 | 41.0 | 22.7 | 39.4 |
| **18-Apr-21** | 80.6 | 49.7 | 60.8 | 52.2 | 30.6 | 49.1 | 26.3 | 21.9 | 23.9 | 27.6 | 9.3 | 27.0 | 84.0 | 53.1 | 64.2 | 54.6 | 16.3 | 34.5 | 49.7 | 40.3 | 47.3 | 42.2 | 23.9 | 29.6 | 83.3 | 52.4 | 63.5 | 53.9 | 32.3 | 33.8 | 49.0 | 38.6 | 39.6 | 41.5 | 23.2 | 28.9 |
| **19-Apr-21** | 82.4 | 48.6 | 62.6 | 54.0 | 12.3 | 47.9 | 36.1 | 31.7 | 33.7 | 46.6 | 28.3 | 34.0 | 87.0 | 51.1 | 67.2 | 57.6 | 36.0 | 50.5 | 52.7 | 43.3 | 46.3 | 25.4 | 12.6 | 23.8 | 88.1 | 57.2 | 68.3 | 49.7 | 28.1 | 46.6 | 53.8 | 43.4 | 51.4 | 46.3 | 28.0 | 33.7 |
| **20-Apr-21** | 76.9 | 46.0 | 57.1 | 38.5 | 16.9 | 34.4 | 33.6 | 22.2 | 31.2 | 41.1 | 22.8 | 28.5 | 85.1 | 54.2 | 65.3 | 52.7 | 14.2 | 32.6 | 50.8 | 35.4 | 41.4 | 53.3 | 35.0 | 45.7 | 79.6 | 48.7 | 59.8 | 43.2 | 21.6 | 38.1 | 45.3 | 34.9 | 35.9 | 37.8 | 19.5 | 36.3 |
| **21-Apr-21** | 80.2 | 49.3 | 60.4 | 51.8 | 30.2 | 41.7 | 21.8 | 10.4 | 19.4 | 44.4 | 26.1 | 31.8 | 81.2 | 50.3 | 61.4 | 51.8 | 30.2 | 31.7 | 46.9 | 36.5 | 37.5 | 45.4 | 27.1 | 42.7 | 82.4 | 51.5 | 62.6 | 53.0 | 31.4 | 32.9 | 48.1 | 39.7 | 41.7 | 40.6 | 22.3 | 37.7 |
| **22-Apr-21** | 83.4 | 52.5 | 63.6 | 55.0 | 13.4 | 50.9 | 29.1 | 20.9 | 26.7 | 47.6 | 29.3 | 35.0 | 86.8 | 58.5 | 67.0 | 57.4 | 11.6 | 37.3 | 52.5 | 43.1 | 46.1 | 45.0 | 11.3 | 41.4 | 86.1 | 58.2 | 66.3 | 56.7 | 35.1 | 36.6 | 51.8 | 46.4 | 51.4 | 44.3 | 26.0 | 43.0 |
| **23-Apr-21** | 83.5 | 52.6 | 63.7 | 48.1 | 26.5 | 43.0 | 29.2 | 21.0 | 26.8 | 47.7 | 29.4 | 35.1 | 86.9 | 56.0 | 67.1 | 37.5 | 15.3 | 17.4 | 52.6 | 43.2 | 46.2 | 45.1 | 17.6 | 43.3 | 86.2 | 55.3 | 66.4 | 56.8 | 35.2 | 50.7 | 51.9 | 41.5 | 42.5 | 40.4 | 22.1 | 37.7 |
| **24-Apr-21** | 83.7 | 52.8 | 63.9 | 30.2 | 11.6 | 28.1 | 29.4 | 21.2 | 27.0 | 47.9 | 29.6 | 35.3 | 87.1 | 56.2 | 67.3 | 57.7 | 11.3 | 37.6 | 52.8 | 43.4 | 46.4 | 45.3 | 27.0 | 32.7 | 86.4 | 55.5 | 66.6 | 37.0 | 17.4 | 34.9 | 52.1 | 43.1 | 42.7 | 44.6 | 26.3 | 42.9 |
| **25-Apr-21** | 84.2 | 53.3 | 64.4 | 29.6 | 10.7 | 21.5 | 29.9 | 21.7 | 27.5 | 48.4 | 30.1 | 46.8 | 87.6 | 56.7 | 67.8 | 48.2 | 12.6 | 46.1 | 53.3 | 43.9 | 46.9 | 45.8 | 27.5 | 33.2 | 86.9 | 56.0 | 67.1 | 51.5 | 29.9 | 45.4 | 52.6 | 41.2 | 43.2 | 45.1 | 26.8 | 44.5 |
| **26-Apr-21** | 84.3 | 53.4 | 64.5 | 32.7 | 11.1 | 12.6 | 30.0 | 21.8 | 27.6 | 48.5 | 30.2 | 35.9 | 87.7 | 56.8 | 67.9 | 51.3 | 13.2 | 41.2 | 53.4 | 44.0 | 52.0 | 45.9 | 27.6 | 33.3 | 87.0 | 56.1 | 67.2 | 45.6 | 28.0 | 43.5 | 52.7 | 13.4 | 43.3 | 45.2 | 26.9 | 43.5 |
| **27-Apr-21** | 81.6 | 50.7 | 61.8 | 30.1 | 17.3 | 22.0 | 20.8 | 12.6 | 18.4 | 45.8 | 27.5 | 33.2 | 85.0 | 54.1 | 65.2 | 55.6 | 53.0 | 35.5 | 38.5 | 29.1 | 32.1 | 43.2 | 24.9 | 38.6 | 84.3 | 53.4 | 64.5 | 54.9 | 37.3 | 51.8 | 48.0 | 36.6 | 47.6 | 42.5 | 24.2 | 38.9 |
| **28-Apr-21** | 84.1 | 53.2 | 64.3 | 34.1 | 12.5 | 14.0 | 23.1 | 14.9 | 20.7 | 48.3 | 30.0 | 45.7 | 80.7 | 49.8 | 60.9 | 51.3 | 14.2 | 31.2 | 39.7 | 30.3 | 33.3 | 38.9 | 20.6 | 37.4 | 85.1 | 54.2 | 65.3 | 45.7 | 31.1 | 25.6 | 50.8 | 38.4 | 48.4 | 43.3 | 30.0 | 43.1 |
| **29-Apr-21** | 83.1 | 52.2 | 63.3 | 33.6 | 12.0 | 31.5 | 20.4 | 12.2 | 20.0 | 47.3 | 29.0 | 34.7 | 87.7 | 56.8 | 67.9 | 30.1 | 11.7 | 20.0 | 40.5 | 31.1 | 34.1 | 45.9 | 27.6 | 43.3 | 85.8 | 54.9 | 66.0 | 56.4 | 40.8 | 36.3 | 51.5 | 45.1 | 51.1 | 44.0 | 25.7 | 42.2 |
| **30-Apr-21** | 80.3 | 49.4 | 60.5 | 34.5 | 12.9 | 14.4 | 26.0 | 17.8 | 23.6 | 44.5 | 26.2 | 43.6 | 83.7 | 52.8 | 63.9 | 35.4 | 13.8 | 30.3 | 38.9 | 29.5 | 34.5 | 41.9 | 23.6 | 29.3 | 83.0 | 52.1 | 63.2 | 36.6 | 23.5 | 33.5 | 50.7 | 35.3 | 41.3 | 41.2 | 22.9 | 36.6 |

## ADANI POWER MAHARASHTRA LIMITED

### 5 x 660 MW Thermal Power Plant , Tirora, Gondia

Station: AAQMS 1 AAQMS 2 AAQMS 3

| Month | AAQMS-1 ( Labour Hutment ) | | | | | | | | | | | | AAQMS-2 (China Colony) | | | | | | | | | | | | AAQMS-3 (Gate no -2) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PM 10 | | | PM 2.5 | | | SO2 | | | NOx | | | PM 10 | | | PM 2.5 | | | SO2 | | | NOx | | | PM 10 | | | PM 2.5 | | | SO2 | | | NOx | | |
| | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | |
| | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg |
| 1-May-21 | 73.5 | 42.6 | 68.7 | 44.1 | 23.5 | 35.0 | 45.2 | 40.8 | 42.8 | 41.7 | 25.4 | 29.1 | 76.9 | 46.0 | 57.1 | 38.1 | 16.5 | 33.5 | 22.6 | 12.2 | 19.2 | 35.1 | 16.8 | 22.5 | 76.2 | 45.3 | 56.4 | 46.8 | 25.2 | 44.7 | 21.9 | 12.5 | 19.5 | 44.4 | 26.1 | 31.8 |
| 2-May-21 | 71.5 | 40.6 | 60.7 | 42.4 | 20.8 | 40.3 | 51.2 | 40.8 | 41.8 | 35.7 | 17.4 | 23.1 | 74.9 | 44.0 | 55.1 | 36.2 | 14.6 | 33.0 | 31.6 | 27.4 | 26.0 | 33.1 | 14.8 | 20.5 | 74.2 | 43.3 | 54.4 | 44.8 | 23.2 | 40.7 | 19.9 | 10.5 | 10.5 | 47.4 | 29.1 | 34.8 |
| 3-May-21 | 70.9 | 40.0 | 51.1 | 40.3 | 18.7 | 20.2 | 41.6 | 30.2 | 39.2 | 41.1 | 22.8 | 28.5 | 74.3 | 43.4 | 54.5 | 35.9 | 14.3 | 25.8 | 20.0 | 15.8 | 17.4 | 32.5 | 31.2 | 19.9 | 73.6 | 42.7 | 53.8 | 30.9 | 10.1 | 10.8 | 41.3 | 34.9 | 31.9 | 31.8 | 13.5 | 30.2 |
| 4-May-21 | 68.2 | 37.3 | 48.4 | 42.9 | 21.3 | 37.8 | 13.9 | 11.5 | 11.5 | 38.7 | 29.4 | 26.1 | 71.6 | 40.7 | 51.8 | 36.4 | 14.8 | 16.3 | 17.3 | 11.1 | 12.7 | 28.4 | 10.1 | 15.8 | 70.9 | 40.0 | 62.1 | 31.7 | 10.5 | 11.6 | 38.6 | 32.2 | 32.2 | 44.1 | 25.8 | 31.5 |
| 5-May-21 | 66.2 | 35.3 | 46.4 | 42.9 | 21.3 | 22.8 | 31.9 | 13.4 | 29.5 | 45.4 | 32.1 | 32.8 | 69.6 | 38.7 | 59.0 | 35.6 | 14.0 | 15.5 | 39.3 | 32.5 | 35.7 | 23.5 | 12.1 | 10.9 | 68.9 | 36.0 | 49.1 | 39.5 | 10.7 | 19.4 | 36.6 | 27.2 | 33.0 | 32.0 | 13.7 | 19.4 |
| 6-May-21 | 75.1 | 44.2 | 55.3 | 49.8 | 28.2 | 48.2 | 48.8 | 42.4 | 46.4 | 33.3 | 15.0 | 20.7 | 78.5 | 47.6 | 70.7 | 36.1 | 14.5 | 34.0 | 49.2 | 33.8 | 39.8 | 36.7 | 18.4 | 24.1 | 77.8 | 46.9 | 58.0 | 48.4 | 11.3 | 28.3 | 45.5 | 36.8 | 41.9 | 51.0 | 32.7 | 38.4 |
| 7-May-21 | 73.2 | 40.3 | 69.4 | 47.9 | 26.3 | 44.8 | 46.9 | 37.5 | 44.5 | 38.4 | 20.1 | 25.8 | 74.6 | 43.7 | 54.8 | 33.2 | 11.6 | 13.1 | 22.0 | 6.6 | 12.6 | 32.8 | 14.5 | 20.2 | 73.9 | 43.0 | 54.1 | 44.5 | 22.9 | 33.4 | 41.6 | 32.2 | 38.0 | 44.1 | 31.8 | 31.5 |
| 8-May-21 | 73.3 | 42.4 | 53.5 | 48.0 | 26.4 | 45.9 | 47.0 | 42.4 | 44.6 | 31.5 | 13.2 | 18.9 | 76.7 | 45.8 | 65.5 | 29.4 | 12.3 | 26.3 | 20.7 | 5.3 | 11.3 | 34.9 | 16.6 | 22.3 | 73.8 | 42.9 | 54.0 | 44.4 | 31.8 | 24.3 | 41.5 | 34.1 | 37.9 | 32.0 | 13.7 | 30.4 |
| 9-May-21 | 69.2 | 38.3 | 49.4 | 35.6 | 14.0 | 29.5 | 42.9 | 37.2 | 40.5 | 47.4 | 29.1 | 34.8 | 72.6 | 41.7 | 54.8 | 28.6 | 12.9 | 8.5 | 17.9 | 8.5 | 8.5 | 30.8 | 12.5 | 18.2 | 71.9 | 41.0 | 52.1 | 42.5 | 29.4 | 40.4 | 39.6 | 28.2 | 36.0 | 30.1 | 11.8 | 17.5 |
| 10-May-21 | 69.7 | 38.8 | 49.9 | 30.9 | 11.3 | 27.0 | 43.4 | 36.0 | 41.0 | 48.9 | 30.6 | 36.3 | 82.6 | 51.7 | 71.8 | 30.4 | 15.2 | 10.3 | 21.4 | 6.0 | 12.0 | 40.8 | 22.5 | 28.2 | 84.6 | 53.7 | 64.8 | 55.2 | 42.6 | 53.1 | 52.3 | 39.9 | 48.7 | 42.8 | 24.5 | 41.2 |
| 11-May-21 | 72.5 | 38.6 | 52.7 | 31.4 | 20.8 | 20.9 | 46.2 | 41.8 | 43.8 | 51.9 | 41.6 | 39.3 | 75.9 | 45.0 | 66.1 | 32.4 | 10.8 | 29.3 | 46.6 | 37.2 | 40.2 | 49.1 | 30.8 | 36.5 | 74.2 | 43.3 | 54.4 | 44.8 | 26.2 | 42.7 | 44.9 | 34.5 | 41.3 | 47.4 | 29.1 | 34.8 |
| 12-May-21 | 73.6 | 42.7 | 53.8 | 32.9 | 11.3 | 23.1 | 47.3 | 42.9 | 44.9 | 31.8 | 25.5 | 19.2 | 75.0 | 44.1 | 67.2 | 30.4 | 10.9 | 24.3 | 45.7 | 36.3 | 39.3 | 43.2 | 24.9 | 30.6 | 76.3 | 45.4 | 56.5 | 46.9 | 30.3 | 44.8 | 47.0 | 36.6 | 43.4 | 34.5 | 21.2 | 21.9 |
| 13-May-21 | 67.7 | 31.8 | 47.9 | 38.3 | 16.7 | 35.2 | 41.4 | 37.0 | 39.0 | 40.9 | 12.2 | 28.3 | 68.1 | 37.2 | 58.3 | 32.4 | 11.1 | 12.3 | 38.8 | 29.4 | 32.4 | 26.3 | 25.0 | 13.7 | 68.2 | 37.3 | 48.4 | 38.8 | 25.7 | 36.7 | 38.9 | 28.5 | 35.3 | 26.4 | 15.1 | 24.8 |
| 14-May-21 | 72.2 | 41.3 | 52.4 | 42.8 | 21.2 | 28.7 | 45.9 | 41.5 | 45.5 | 30.4 | 21.1 | 28.8 | 71.5 | 40.6 | 51.7 | 34.9 | 13.3 | 30.8 | 42.2 | 32.8 | 35.8 | 29.7 | 12.6 | 17.1 | 70.4 | 39.5 | 60.6 | 41.0 | 25.4 | 38.9 | 41.1 | 33.7 | 31.7 | 49.6 | 39.3 | 37.0 |
| 15-May-21 | 76.1 | 45.2 | 56.3 | 46.7 | 14.1 | 36.6 | 41.8 | 37.4 | 39.4 | 34.3 | 24.0 | 21.7 | 79.5 | 48.6 | 68.2 | 32.7 | 11.8 | 12.6 | 50.2 | 40.8 | 43.8 | 37.7 | 19.4 | 25.1 | 78.8 | 47.9 | 59.0 | 49.4 | 32.8 | 47.3 | 49.5 | 39.1 | 40.1 | 29.0 | 18.7 | 16.4 |
| 16-May-21 | 71.3 | 40.4 | 51.5 | 41.9 | 20.3 | 32.8 | 40.0 | 35.6 | 37.6 | 50.4 | 42.1 | 47.8 | 74.7 | 43.8 | 57.9 | 32.8 | 11.2 | 20.7 | 45.4 | 36.0 | 43.0 | 38.9 | 20.6 | 26.3 | 74.0 | 43.1 | 54.2 | 44.6 | 26.0 | 42.5 | 44.7 | 38.3 | 42.3 | 32.2 | 13.9 | 24.6 |
| 17-May-21 | 76.5 | 45.6 | 56.7 | 47.1 | 10.6 | 27.0 | 46.2 | 41.8 | 45.4 | 49.6 | 41.3 | 45.0 | 79.9 | 49.0 | 70.1 | 37.8 | 12.2 | 17.7 | 50.6 | 41.2 | 48.2 | 38.1 | 19.8 | 25.5 | 79.2 | 48.3 | 59.4 | 49.8 | 28.2 | 47.7 | 46.9 | 36.5 | 43.5 | 52.4 | 34.1 | 42.8 |
| 18-May-21 | 77.9 | 47.0 | 58.1 | 48.5 | 26.9 | 40.3 | 48.6 | 44.2 | 46.2 | 52.6 | 34.3 | 40.0 | 81.3 | 50.4 | 71.5 | 28.6 | 16.3 | 8.5 | 52.0 | 42.6 | 45.6 | 45.5 | 27.2 | 32.9 | 80.6 | 49.7 | 60.8 | 51.2 | 29.6 | 49.1 | 48.3 | 37.9 | 38.9 | 38.8 | 20.5 | 26.2 |
| 19-May-21 | 75.6 | 41.8 | 65.8 | 46.2 | 12.3 | 26.1 | 42.3 | 37.9 | 39.9 | 30.8 | 12.5 | 18.2 | 80.2 | 44.3 | 60.4 | 36.1 | 14.5 | 19.0 | 50.9 | 41.5 | 44.5 | 25.4 | 7.1 | 12.8 | 81.3 | 50.4 | 61.5 | 51.9 | 30.3 | 49.8 | 49.0 | 38.6 | 46.6 | 32.1 | 13.8 | 19.5 |
| 20-May-21 | 75.4 | 44.5 | 55.6 | 46.0 | 24.4 | 25.9 | 21.1 | 9.7 | 18.7 | 25.9 | 16.6 | 13.3 | 78.8 | 47.9 | 59.0 | 37.9 | 14.2 | 37.8 | 49.5 | 34.1 | 40.1 | 28.9 | 10.6 | 16.3 | 78.1 | 47.2 | 68.3 | 52.7 | 31.1 | 50.6 | 45.8 | 35.4 | 36.4 | 57.3 | 39.0 | 44.7 |
| 21-May-21 | 79.2 | 48.3 | 59.4 | 49.8 | 28.2 | 38.5 | 50.9 | 39.5 | 48.5 | 30.5 | 12.2 | 17.9 | 81.2 | 50.3 | 71.4 | 31.8 | 17.2 | 11.7 | 51.9 | 41.5 | 42.5 | 25.1 | 6.8 | 12.5 | 82.4 | 51.5 | 62.6 | 53.0 | 31.4 | 50.9 | 50.1 | 41.7 | 43.7 | 52.6 | 34.3 | 40.0 |
| 22-May-21 | 79.8 | 48.9 | 60.0 | 43.4 | 13.4 | 39.3 | 50.5 | 42.3 | 48.1 | 47.9 | 29.6 | 35.3 | 83.2 | 54.9 | 73.4 | 30.2 | 11.6 | 24.1 | 53.9 | 44.5 | 47.5 | 23.4 | 11.3 | 10.8 | 82.5 | 54.6 | 62.7 | 53.1 | 31.5 | 51.0 | 50.2 | 44.8 | 44.8 | 53.7 | 35.4 | 41.1 |
| 23-May-21 | 79.6 | 48.7 | 59.8 | 43.2 | 21.6 | 33.2 | 50.3 | 42.1 | 47.9 | 49.7 | 31.4 | 37.1 | 83.0 | 52.1 | 63.2 | 30.4 | 15.3 | 29.3 | 53.7 | 44.3 | 47.3 | 22.6 | 21.3 | 20.0 | 82.3 | 51.4 | 62.5 | 52.9 | 31.3 | 50.8 | 50.0 | 39.6 | 40.6 | 45.5 | 27.2 | 32.9 |
| 24-May-21 | 81.4 | 50.5 | 61.6 | 45.0 | 26.4 | 39.6 | 51.1 | 42.9 | 48.7 | 51.5 | 33.2 | 38.9 | 84.8 | 53.9 | 82.0 | 30.8 | 11.3 | 28.7 | 30.5 | 21.1 | 24.1 | 43.0 | 24.7 | 30.4 | 84.1 | 53.2 | 74.3 | 54.7 | 35.1 | 48.6 | 51.8 | 42.8 | 42.4 | 52.3 | 34.0 | 50.7 |
| 25-May-21 | 76.9 | 46.0 | 57.1 | 46.5 | 10.7 | 26.4 | 43.6 | 35.4 | 41.2 | 47.0 | 28.7 | 34.4 | 80.3 | 49.4 | 60.5 | 27.6 | 12.6 | 17.5 | 21.6 | 12.2 | 15.2 | 32.1 | 13.8 | 19.5 | 79.6 | 48.7 | 59.8 | 35.1 | 13.5 | 33.0 | 50.3 | 38.9 | 40.9 | 48.8 | 30.5 | 36.2 |
| 26-May-21 | 82.2 | 51.3 | 62.4 | 45.8 | 24.2 | 39.1 | 43.9 | 35.7 | 41.5 | 52.3 | 34.0 | 39.7 | 85.6 | 54.7 | 65.8 | 28.6 | 13.2 | 25.5 | 31.3 | 21.9 | 24.9 | 43.8 | 42.5 | 31.2 | 84.9 | 54.0 | 83.1 | 55.5 | 37.9 | 52.4 | 52.6 | 13.4 | 43.2 | 54.1 | 35.8 | 41.5 |
| 27-May-21 | 82.4 | 51.5 | 62.6 | 46.0 | 17.3 | 39.3 | 43.1 | 34.9 | 40.7 | 51.9 | 33.6 | 39.3 | 85.8 | 54.9 | 66.0 | 27.9 | 13.1 | 18.8 | 38.5 | 29.1 | 32.1 | 30.7 | 12.4 | 28.1 | 85.1 | 54.2 | 65.3 | 55.7 | 38.1 | 35.6 | 49.8 | 38.4 | 40.4 | 58.3 | 40.0 | 45.7 |
| 28-May-21 | 83.2 | 52.3 | 63.4 | 46.8 | 25.2 | 26.7 | 45.9 | 37.7 | 43.5 | 53.3 | 35.0 | 40.7 | 80.7 | 49.8 | 60.9 | 32.4 | 14.2 | 22.3 | 39.7 | 30.3 | 33.3 | 27.1 | 8.8 | 14.5 | 85.1 | 54.2 | 65.3 | 55.7 | 41.1 | 55.6 | 52.8 | 40.4 | 43.4 | 58.3 | 45.0 | 45.7 |
| 29-May-21 | 83 | 52.1 | 63.2 | 43.4 | 21.8 | 38.6 | 52.8 | 44.6 | 50.4 | 53.1 | 37.8 | 40.5 | 87.6 | 56.7 | 80.8 | 30.1 | 11.7 | 28.0 | 40.5 | 31.1 | 34.1 | 26.4 | 8.1 | 13.8 | 85.7 | 54.8 | 65.9 | 56.3 | 40.7 | 46.2 | 53.4 | 47.0 | 44.0 | 58.9 | 40.6 | 57.3 |
| 30-May-21 | 81.6 | 50.7 | 61.8 | 45.2 | 23.6 | 40.1 | 46.1 | 37.9 | 43.7 | 51.7 | 33.4 | 39.1 | 85.0 | 54.1 | 65.2 | 35.4 | 13.8 | 26.8 | 40.2 | 30.8 | 33.8 | 43.2 | 24.9 | 30.6 | 84.3 | 53.4 | 64.5 | 26.9 | 13.8 | 24.8 | 30.0 | 14.6 | 20.6 | 30.8 | 12.5 | 18.2 |
| 31-May-21 | 80.2 | 49.3 | 69.4 | 40.1 | 18.5 | 34.0 | 47.4 | 39.2 | 45.0 | 50.4 | 32.1 | 37.8 | 83.6 | 52.7 | 71.3 | 30.2 | 11.6 | 23.1 | 38.3 | 28.9 | 31.9 | 30.4 | 12.1 | 17.8 | 82.9 | 52.0 | 63.1 | 27.6 | 14.0 | 25.5 | 20.3 | 11.9 | 10.9 | 56.1 | 37.8 | 43.5 |

## ADANI POWER MAHARASHTRA LIMITED

## 5 x 660 MW Thermal Power Plant , Tirora, Gondia

Station: AAQMS 1 AAQMS 2 AAQMS 3

| Month | AAQMS-1 ( Labour Hutment ) | | | | | | | | | | | | AAQMS-2 (China Colony) | | | | | | | | | | | | AAQMS-3 (Gate no -2) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PM 10 | | | PM 2.5 | | | SO2 | | | NOx | | | PM 10 | | | PM 2.5 | | | SO2 | | | NOx | | | PM 10 | | | PM 2.5 | | | SO2 | | | NOx | | |
| | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | |
| | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg |
| 1-Jun-21 | 66.9 | 46.0 | 47.1 | 40.5 | 41.3 | 20.4 | 25.6 | 21.2 | 23.2 | 30.1 | 13.8 | 21.5 | 65.9 | 45.0 | 46.1 | 32.5 | 10.9 | 22.4 | 35.6 | 25.2 | 32.2 | 24.1 | 5.8 | 11.5 | 69.6 | 38.7 | 49.8 | 34.2 | 12.6 | 32.1 | 33.3 | 22.9 | 30.9 | 32.8 | 14.5 | 20.2 |
| 2-Jun-21 | 62.9 | 42.0 | 43.1 | 33.8 | 40.3 | 13.7 | 23.6 | 13.2 | 14.2 | 28.1 | 9.8 | 15.5 | 62.1 | 41.2 | 42.3 | 28.7 | 7.1 | 26.6 | 31.8 | 27.6 | 26.2 | 29.3 | 19.0 | 16.7 | 65.6 | 34.7 | 45.8 | 36.2 | 14.6 | 34.1 | 35.3 | 25.9 | 25.9 | 23.8 | 5.5 | 11.2 |
| 3-Jun-21 | 66.4 | 45.5 | 46.6 | 35.8 | 14.2 | 33.7 | 25.1 | 13.7 | 22.7 | 31.6 | 13.3 | 19.0 | 56.9 | 46.0 | 37.1 | 23.5 | 21.9 | 23.4 | 18.6 | 14.4 | 16.0 | 24.1 | 5.8 | 11.5 | 69.1 | 38.2 | 49.3 | 39.7 | 28.1 | 19.6 | 32.8 | 21.4 | 23.4 | 32.3 | 14.0 | 19.7 |
| 4-Jun-21 | 63.1 | 42.2 | 43.3 | 34.8 | 13.2 | 14.7 | 23.8 | 21.4 | 21.4 | 26.3 | 8.0 | 13.7 | 54.3 | 40.4 | 34.5 | 20.9 | 10.3 | 18.8 | 22.5 | 16.3 | 17.9 | 22.5 | 12.2 | 9.9 | 65.8 | 34.9 | 46.0 | 36.4 | 14.8 | 16.3 | 32.5 | 26.1 | 26.1 | 24.0 | 5.7 | 22.4 |
| 5-Jun-21 | 66.6 | 45.7 | 46.8 | 46.3 | 24.7 | 26.2 | 27.3 | 13.4 | 24.9 | 24.8 | 6.5 | 12.2 | 55.9 | 40.0 | 33.3 | 48.1 | 26.5 | 28.0 | 30.6 | 23.8 | 27.0 | 22.1 | 11.8 | 9.5 | 69.3 | 36.4 | 49.5 | 39.9 | 18.3 | 37.8 | 33.0 | 23.6 | 26.6 | 32.5 | 14.2 | 29.9 |
| 6-Jun-21 | 69.8 | 48.9 | 50.0 | 48.5 | 26.9 | 42.4 | 30.5 | 24.1 | 28.1 | 33.0 | 14.7 | 20.4 | 57.3 | 51.4 | 39.5 | 36.1 | 14.5 | 16.0 | 18.0 | 12.6 | 8.6 | 15.5 | 5.2 | 2.9 | 56.0 | 25.1 | 36.2 | 26.6 | 11.3 | 24.5 | 20.7 | 12.0 | 11.3 | 24.2 | 5.9 | 11.6 |
| 7-Jun-21 | 68.3 | 47.4 | 66.5 | 43.0 | 21.4 | 22.9 | 27.7 | 18.3 | 25.3 | 26.5 | 6.9 | 13.9 | 50.9 | 45.0 | 31.1 | 17.5 | 10.9 | -2.6 | 20.6 | 19.2 | 11.2 | 16.1 | 13.8 | 14.5 | 69.0 | 38.1 | 49.2 | 39.6 | 18.0 | 19.5 | 40.7 | 31.3 | 31.3 | 38.2 | 25.9 | 25.6 |
| 8-Jun-21 | 64.2 | 43.3 | 44.4 | 38.9 | 17.3 | 18.8 | 24.9 | 20.3 | 22.5 | 22.4 | 12.4 | 12.8 | 60.8 | 54.9 | 41.0 | 31.4 | 12.3 | 28.3 | 30.5 | 9.2 | 21.1 | 28.0 | 21.7 | 15.4 | 64.7 | 33.8 | 44.9 | 39.3 | 26.7 | 37.2 | 28.4 | 21.0 | 19.0 | 31.9 | 13.6 | 19.3 |
| 9-Jun-21 | 69.1 | 48.2 | 49.3 | 35.6 | 14.0 | 15.5 | 30.8 | 25.1 | 28.4 | 32.3 | 14.0 | 28.7 | 61.3 | 55.4 | 43.5 | 48.1 | 12.9 | 40.0 | 36.0 | 26.6 | 26.6 | 28.5 | 10.2 | 15.9 | 71.8 | 40.9 | 52.0 | 40.5 | 27.4 | 20.4 | 35.5 | 24.1 | 30.1 | 35.0 | 16.7 | 22.4 |
| 10-Jun-21 | 63.8 | 42.9 | 62.0 | 42.5 | 22.9 | 22.4 | 24.5 | 17.1 | 22.1 | 22.0 | 10.2 | 9.4 | 61.9 | 56.0 | 42.1 | 27.5 | 15.2 | 25.4 | 25.6 | 10.3 | 16.2 | 29.1 | 22.8 | 16.5 | 66.5 | 35.6 | 46.7 | 24.6 | 12.0 | 22.5 | 30.2 | 17.8 | 20.8 | 31.6 | 13.3 | 19.0 |
| 11-Jun-21 | 65.2 | 44.3 | 45.4 | 43.9 | 22.3 | 23.8 | 26.9 | 22.5 | 24.5 | 28.4 | 11.6 | 23.8 | 68.6 | 62.7 | 48.8 | 32.2 | 10.6 | 30.1 | 43.3 | 33.9 | 36.9 | 32.8 | 26.5 | 20.2 | 66.9 | 36.0 | 47.1 | 41.5 | 22.9 | 41.4 | 33.6 | 23.2 | 24.2 | 30.1 | 11.8 | 17.5 |
| 12-Jun-21 | 69.7 | 48.8 | 49.9 | 48.4 | 26.8 | 28.3 | 30.4 | 26.0 | 28.0 | 27.9 | 12.3 | 15.3 | 69.7 | 63.8 | 49.9 | 40.3 | 40.3 | 38.2 | 39.4 | 30.0 | 33.0 | 19.9 | 13.6 | 7.3 | 70.4 | 39.5 | 50.6 | 42.0 | 25.4 | 39.9 | 37.1 | 26.7 | 31.7 | 33.6 | 20.3 | 21.0 |
| 13-Jun-21 | 69.3 | 48.4 | 49.5 | 48.9 | 27.3 | 28.8 | 30.0 | 25.6 | 27.6 | 40.5 | 12.2 | 27.9 | 70.1 | 64.2 | 50.3 | 40.7 | 11.1 | 38.6 | 44.8 | 35.4 | 38.4 | 37.3 | 19.0 | 24.7 | 69.8 | 38.9 | 50.0 | 34.4 | 18.8 | 14.3 | 39.5 | 29.1 | 36.1 | 33.0 | 21.7 | 20.4 |
| 14-Jun-21 | 66.3 | 45.4 | 56.5 | 45.0 | 23.4 | 30.9 | 27.0 | 22.6 | 26.6 | 39.5 | 6.8 | 26.9 | 65.6 | 59.7 | 45.8 | 36.2 | 14.6 | 34.1 | 40.3 | 30.9 | 33.9 | 32.8 | 12.6 | 30.2 | 64.5 | 33.6 | 44.7 | 39.1 | 23.5 | 19.0 | 36.2 | 28.8 | 26.8 | 30.9 | 20.6 | 18.3 |
| 15-Jun-21 | 66.1 | 45.2 | 46.3 | 36.7 | 14.1 | 16.6 | 18.7 | 14.3 | 16.3 | 29.3 | 8.9 | 27.7 | 69.5 | 63.6 | 49.7 | 36.1 | 11.8 | 34.0 | 39.2 | 29.8 | 32.8 | 33.7 | 23.4 | 21.1 | 68.8 | 37.9 | 49.0 | 32.4 | 15.8 | 12.3 | 35.5 | 25.1 | 26.1 | 37.0 | 26.7 | 34.4 |
| 16-Jun-21 | 69.4 | 48.5 | 67.6 | 40.0 | 18.4 | 19.9 | 31.1 | 26.7 | 28.7 | 44.6 | 36.3 | 42.0 | 60.7 | 39.8 | 60.3 | 31.3 | 9.7 | 29.2 | 30.4 | 21.0 | 28.0 | 27.9 | 21.6 | 15.3 | 70.1 | 39.2 | 50.3 | 40.7 | 22.1 | 38.6 | 36.8 | 30.4 | 34.4 | 33.3 | 15.0 | 25.7 |
| 17-Jun-21 | 68.7 | 47.8 | 58.9 | 44.3 | 10.6 | 24.2 | 29.4 | 25.0 | 28.6 | 36.9 | 11.3 | 32.3 | 58.3 | 52.4 | 60.9 | 28.9 | 23.3 | 26.8 | 33.0 | 23.6 | 30.6 | 25.5 | 7.2 | 12.9 | 71.4 | 40.5 | 51.6 | 34.0 | 12.4 | 31.9 | 43.1 | 32.7 | 39.7 | 29.6 | 11.3 | 20.0 |
| 18-Jun-21 | 68.2 | 47.3 | 66.4 | 38.8 | 10.9 | 18.7 | 13.9 | 9.5 | 11.5 | 38.4 | 20.1 | 25.8 | 59.7 | 53.8 | 39.9 | 23.3 | 20.6 | 3.2 | 33.4 | 22.0 | 23.0 | 17.9 | 9.6 | 5.3 | 70.9 | 40.0 | 51.1 | 33.8 | 12.2 | 31.7 | 42.6 | 32.2 | 33.2 | 39.1 | 20.8 | 26.5 |
| 19-Jun-21 | 67.3 | 46.4 | 47.5 | 46.0 | 12.3 | 25.9 | 29.0 | 24.6 | 26.6 | 33.5 | 15.2 | 20.9 | 60.4 | 54.5 | 40.6 | 31.0 | 9.4 | 29.9 | 30.1 | 20.7 | 23.7 | 28.6 | 22.3 | 16.0 | 73.0 | 42.1 | 53.2 | 35.6 | 14.0 | 33.5 | 36.7 | 26.3 | 34.3 | 32.1 | 13.8 | 19.5 |
| 20-Jun-21 | 59.1 | 48.2 | 39.3 | 26.8 | 12.2 | 6.7 | 19.8 | 8.4 | 17.4 | 17.3 | 13.6 | 15.7 | 62.5 | 56.6 | 42.7 | 33.1 | 14.2 | 31.0 | 20.6 | 8.3 | 11.2 | 26.7 | 8.4 | 24.1 | 61.8 | 30.9 | 42.0 | 32.4 | 10.8 | 30.3 | 25.5 | 15.1 | 16.1 | 23.0 | 4.7 | 10.4 |
| 21-Jun-21 | 57.4 | 46.5 | 37.6 | 36.1 | 14.5 | 16.0 | 21.8 | 10.4 | 19.4 | 15.6 | 9.0 | 13.0 | 66.9 | 61.0 | 63.7 | 37.5 | 15.9 | 35.4 | 30.4 | 20.0 | 21.0 | 31.1 | 21.8 | 18.5 | 60.1 | 29.2 | 40.3 | 30.7 | 21.1 | 10.6 | 26.8 | 18.4 | 20.4 | 21.3 | 3.0 | 8.7 |
| 22-Jun-21 | 60.3 | 49.4 | 40.5 | 24.0 | 13.4 | 3.9 | 6.0 | 4.8 | 3.6 | 18.5 | 15.8 | 15.9 | 63.7 | 52.8 | 43.9 | 34.3 | 11.6 | 32.2 | 28.4 | 19.0 | 22.0 | 27.9 | 21.6 | 15.3 | 63.0 | 35.1 | 43.2 | 35.6 | 14.0 | 33.5 | 26.7 | 21.3 | 21.3 | 26.2 | 7.9 | 13.6 |
| 23-Jun-21 | 68.1 | 57.2 | 48.3 | 36.8 | 15.2 | 14.3 | 13.8 | 5.6 | 11.4 | 34.3 | 16.0 | 21.7 | 68.7 | 57.8 | 48.9 | 38.1 | 19.8 | 11.9 | 25.4 | 16.0 | 19.0 | 35.9 | 29.6 | 33.3 | 70.8 | 39.9 | 51.0 | 30.9 | 17.3 | 28.8 | 34.5 | 24.1 | 25.1 | 34.0 | 15.7 | 21.4 |
| 24-Jun-21 | 57.3 | 46.4 | 47.5 | 28.0 | 9.4 | 7.9 | 16.7 | 8.5 | 14.3 | 15.5 | 6.3 | 13.9 | 60.7 | 54.8 | 66.8 | 25.3 | 11.3 | 5.2 | 27.4 | 18.0 | 21.0 | 28.9 | 10.6 | 16.3 | 60.0 | 29.1 | 40.2 | 24.6 | 15.0 | 4.5 | 26.7 | 17.7 | 17.3 | 28.2 | 9.9 | 15.6 |
| 25-Jun-21 | 59.9 | 49.0 | 40.1 | 30.6 | 10.7 | 28.5 | 21.6 | 13.4 | 19.2 | 20.1 | 9.8 | 7.5 | 63.3 | 52.4 | 43.5 | 28.2 | 12.6 | 8.1 | 28.0 | 18.6 | 21.6 | 21.5 | 15.2 | 10.9 | 62.6 | 31.7 | 42.8 | 31.2 | 19.6 | 29.1 | 26.3 | 14.9 | 16.9 | 25.8 | 7.5 | 13.2 |
| 26-Jun-21 | 66.8 | 55.9 | 65.0 | 27.5 | 5.9 | 25.4 | 12.5 | 9.3 | 10.1 | 25.0 | 6.7 | 18.4 | 70.2 | 64.3 | 50.4 | 34.8 | 13.2 | 14.7 | 34.9 | 25.5 | 28.5 | 33.4 | 15.1 | 20.8 | 69.5 | 38.6 | 49.7 | 28.2 | 10.6 | 22.1 | 33.2 | 13.4 | 23.8 | 27.7 | 9.4 | 15.1 |
| 27-Jun-21 | 63.9 | 53.0 | 44.1 | 30.1 | 17.3 | 28.0 | 23.3 | 15.1 | 20.9 | 32.2 | 13.9 | 25.6 | 67.3 | 61.4 | 65.5 | 37.9 | 25.6 | 35.8 | 32.0 | 22.6 | 25.6 | 28.5 | 10.2 | 15.9 | 66.6 | 35.7 | 46.8 | 32.2 | 14.6 | 30.1 | 30.3 | 18.9 | 20.9 | 27.8 | 9.5 | 15.2 |
| 28-Jun-21 | 61.3 | 50.4 | 51.5 | 34.1 | 12.5 | 34.0 | 23.1 | 14.9 | 20.7 | 22.5 | 14.2 | 9.9 | 67.9 | 62.0 | 59.7 | 38.5 | 14.2 | 36.4 | 32.6 | 23.2 | 26.2 | 32.1 | 25.8 | 19.5 | 64.0 | 33.1 | 44.2 | 29.6 | 15.0 | 27.5 | 30.7 | 18.3 | 21.3 | 27.2 | 13.9 | 14.6 |
| 29-Jun-21 | 69.9 | 59.0 | 50.1 | 34.8 | 13.2 | 32.7 | 29.3 | 21.1 | 26.9 | 26.1 | 7.8 | 13.5 | 63.0 | 57.1 | 60.3 | 33.6 | 11.7 | 13.5 | 27.7 | 18.3 | 21.3 | 30.2 | 23.9 | 17.6 | 71.6 | 40.7 | 51.8 | 37.2 | 21.6 | 35.1 | 35.3 | 28.9 | 25.9 | 34.8 | 16.5 | 22.2 |
| 30-Jun-21 | 66.2 | 55.3 | 46.4 | 34.5 | 12.9 | 14.4 | 27.9 | 19.7 | 25.5 | 25.4 | 7.1 | 12.8 | 67.6 | 61.7 | 57.8 | 28.2 | 16.6 | 26.1 | 22.8 | 13.4 | 16.4 | 25.8 | 19.5 | 23.2 | 67.9 | 37.0 | 48.1 | 26.9 | 13.8 | 24.8 | 32.6 | 17.2 | 23.2 | 30.8 | 12.5 | 29.2 |

**ADANI POWER MAHARASHTRA LIMITED**

**5 x 660 MW Thermal Power Plant , Tirora, Gondia**

Station: AAQMS 1 AAQMS 2 AAQMS 3

| Month | AAQMS-1 ( Labour Hutment ) | | | | | | | | | | | | AAQMS-2 (China Colony) | | | | | | | | | | | | AAQMS-3 (Gate no -2) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PM 10 | | | PM 2.5 | | | SO2 | | | NOx | | | PM 10 | | | PM 2.5 | | | SO2 | | | NOx | | | PM 10 | | | PM 2.5 | | | SO2 | | | NOx | | |
| | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | |
| | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg |
| **1-Jul-21** | 53.7 | 46.8 | 33.9 | 30.6 | 10.0 | 10.5 | 18.4 | 14.0 | 16.0 | 11.9 | 5.6 | -0.7 | 57.1 | 54.2 | 37.3 | 40.3 | 18.7 | 20.2 | 22.3 | 11.9 | 18.9 | 25.3 | 7.0 | 12.7 | 56.4 | 42.5 | 36.6 | 32.4 | 10.8 | 12.3 | 30.1 | 19.7 | 27.7 | 14.6 | 4.3 | 2.0 |
| **2-Jul-21** | 55.9 | 49.0 | 36.1 | 33.3 | 11.7 | 13.2 | 25.6 | 25.2 | 16.2 | 14.1 | 5.8 | 1.5 | 59.3 | 56.4 | 39.5 | 36.2 | 14.6 | 16.1 | 25.0 | 20.8 | 19.4 | 27.5 | 9.2 | 14.9 | 58.6 | 49.7 | 38.8 | 33.5 | 11.9 | 13.4 | 23.3 | 13.9 | 13.9 | 26.8 | 8.5 | 14.2 |
| **3-Jul-21** | 60.8 | 53.9 | 41.0 | 27.5 | 5.9 | 7.4 | 29.5 | 25.1 | 27.1 | 19.0 | 17.7 | 6.4 | 64.2 | 61.3 | 44.4 | 35.9 | 14.3 | 15.8 | 28.6 | 24.4 | 26.0 | 22.4 | 4.1 | 9.8 | 63.5 | 54.6 | 43.7 | 30.9 | 10.1 | 10.8 | 37.2 | 25.8 | 27.8 | 21.7 | 3.4 | 9.1 |
| **4-Jul-21** | 61.9 | 46.8 | 42.1 | 37.4 | 15.8 | 17.3 | 30.6 | 28.2 | 28.2 | 20.1 | 18.8 | 7.5 | 65.3 | 62.4 | 45.5 | 42.1 | 20.5 | 22.0 | 31.0 | 24.8 | 26.4 | 28.4 | 10.1 | 15.8 | 64.6 | 55.7 | 44.8 | 31.7 | 10.5 | 11.6 | 38.3 | 31.9 | 31.9 | 22.8 | 4.5 | 10.2 |
| **5-Jul-21** | 66.8 | 59.9 | 47.0 | 26.5 | 4.9 | 6.4 | 12.5 | 13.4 | 10.1 | 25.0 | 18.7 | 12.4 | 68.2 | 65.3 | 45.6 | 35.6 | 14.0 | 15.5 | 13.9 | 7.1 | 10.3 | 23.5 | 12.1 | 10.9 | 69.5 | 60.6 | 49.7 | 25.9 | 10.7 | 5.8 | 43.2 | 33.8 | 36.8 | 32.0 | 13.7 | 19.4 |
| **6-Jul-21** | 64.2 | 57.3 | 44.4 | 31.4 | 9.8 | 11.3 | 32.9 | 28.5 | 30.5 | 22.4 | 16.1 | 9.8 | 67.6 | 64.7 | 49.8 | 36.1 | 14.5 | 16.0 | 33.3 | 17.9 | 23.9 | 25.8 | 7.5 | 13.2 | 66.9 | 58.0 | 47.1 | 27.1 | 11.3 | 7.0 | 40.6 | 31.9 | 31.2 | 25.1 | 6.8 | 12.5 |
| **7-Jul-21** | 61.8 | 54.9 | 42.0 | 28.8 | 7.2 | 8.7 | 21.0 | 11.6 | 18.6 | 17.0 | 6.9 | 4.4 | 65.2 | 60.3 | 45.4 | 33.2 | 11.6 | 13.1 | 22.0 | 6.1 | 12.6 | 30.1 | 11.8 | 17.5 | 62.5 | 53.6 | 42.7 | 43.8 | 22.2 | 23.7 | 36.2 | 26.8 | 26.8 | 30.7 | 18.4 | 18.1 |
| **8-Jul-21** | 60.6 | 53.7 | 40.8 | 26.4 | 4.8 | 6.3 | 29.3 | 24.9 | 26.9 | 18.8 | 12.4 | 6.2 | 64.0 | 53.1 | 44.2 | 44.7 | 12.3 | 24.6 | 20.7 | 9.2 | 11.3 | 32.2 | 13.9 | 19.6 | 61.1 | 52.2 | 41.3 | 23.9 | 11.3 | 3.8 | 34.8 | 27.4 | 25.4 | 29.3 | 11.0 | 16.7 |
| **9-Jul-21** | 62.7 | 55.8 | 42.9 | 25.2 | 3.6 | 5.1 | 31.4 | 27.0 | 29.0 | 32.4 | 14.1 | 19.8 | 66.1 | 39.2 | 48.3 | 28.6 | 12.9 | 8.5 | 17.9 | 8.5 | 8.5 | 29.7 | 11.4 | 17.1 | 65.4 | 56.5 | 45.6 | 30.1 | 17.0 | 10.0 | 39.1 | 27.7 | 33.7 | 29.4 | 11.1 | 16.8 |
| **10-Jul-21** | 65.3 | 58.4 | 45.5 | 30.9 | 11.3 | 10.8 | 19.3 | 11.9 | 16.9 | 27.6 | 10.2 | 15.0 | 68.7 | 63.8 | 48.9 | 30.4 | 15.2 | 10.3 | 21.4 | 10.3 | 12.0 | 28.3 | 10.0 | 15.7 | 68.0 | 59.1 | 48.2 | 24.6 | 12.0 | 4.5 | 41.7 | 29.3 | 32.3 | 31.6 | 13.3 | 19.0 |
| **11-Jul-21** | 68.7 | 61.8 | 48.9 | 29.9 | 10.3 | 9.8 | 14.4 | 10.0 | 12.0 | 24.1 | 11.6 | 11.5 | 69.1 | 64.2 | 49.3 | 32.4 | 10.8 | 12.3 | 14.8 | 5.4 | 8.4 | 37.3 | 19.0 | 24.7 | 70.4 | 61.5 | 50.6 | 28.9 | 10.3 | 8.8 | 44.1 | 33.7 | 34.7 | 28.6 | 10.3 | 16.0 |
| **12-Jul-21** | 57.3 | 50.4 | 37.5 | 32.9 | 11.3 | 12.8 | 22.0 | 21.9 | 19.6 | 22.3 | 12.3 | 9.7 | 58.7 | 53.8 | 38.9 | 30.4 | 10.9 | 10.3 | 24.4 | 15.0 | 18.0 | 26.9 | 8.6 | 14.3 | 60.0 | 51.1 | 40.2 | 27.1 | 10.5 | 10.0 | 33.7 | 23.3 | 28.3 | 27.8 | 14.5 | 15.2 |
| **13-Jul-21** | 58.5 | 51.6 | 38.7 | 21.9 | 11.3 | 1.8 | 22.0 | 17.6 | 19.6 | 20.9 | 12.2 | 8.3 | 58.9 | 54.0 | 39.1 | 32.4 | 11.1 | 12.3 | 23.1 | 13.7 | 16.7 | 31.5 | 13.2 | 18.9 | 59.0 | 50.1 | 39.2 | 25.9 | 9.6 | 5.8 | 32.7 | 22.3 | 29.3 | 27.2 | 15.9 | 14.6 |
| **14-Jul-21** | 55.1 | 48.2 | 35.3 | 30.1 | 8.5 | 16.0 | 20.1 | 15.7 | 19.7 | 19.3 | 6.8 | 6.7 | 54.4 | 49.5 | 34.6 | 34.9 | 13.3 | 14.8 | 20.1 | 10.7 | 13.7 | 22.1 | 12.6 | 9.5 | 53.3 | 49.7 | 33.5 | 29.1 | 13.5 | 9.0 | 27.0 | 19.6 | 17.6 | 30.9 | 20.6 | 18.3 |
| **15-Jul-21** | 53.9 | 47.0 | 34.1 | 27.9 | 14.1 | 7.8 | 18.7 | 14.3 | 16.3 | 23.4 | 8.9 | 10.8 | 57.3 | 52.4 | 37.5 | 32.7 | 11.8 | 12.6 | 23.0 | 13.6 | 16.6 | 25.5 | 7.2 | 12.9 | 56.6 | 47.7 | 36.8 | 30.2 | 13.6 | 10.1 | 30.3 | 19.9 | 20.9 | 24.8 | 14.5 | 12.2 |
| **16-Jul-21** | 58.3 | 51.4 | 38.5 | 25.5 | 3.9 | 5.4 | 23.1 | 18.7 | 20.7 | 20.1 | 11.8 | 17.5 | 61.7 | 56.8 | 60.3 | 32.8 | 11.2 | 12.7 | 22.8 | 13.4 | 20.4 | 29.9 | 11.6 | 17.3 | 61.0 | 52.1 | 41.2 | 30.5 | 11.9 | 10.4 | 34.7 | 28.3 | 32.3 | 29.2 | 10.9 | 21.6 |
| **17-Jul-21** | 57.1 | 50.2 | 37.3 | 15.9 | 10.6 | -4.2 | 17.8 | 13.4 | 17.0 | 22.6 | 11.3 | 18.0 | 60.5 | 55.6 | 60.9 | 37.8 | 12.2 | 17.7 | 26.2 | 16.8 | 23.8 | 28.7 | 10.4 | 16.1 | 59.8 | 50.9 | 40.0 | 32.6 | 11.0 | 12.5 | 33.5 | 23.1 | 30.1 | 18.0 | 19.1 | 8.4 |
| **18-Jul-21** | 56.5 | 49.6 | 36.7 | 21.7 | 10.9 | 1.6 | 22.2 | 17.8 | 19.8 | 27.6 | 9.3 | 15.0 | 59.9 | 55.0 | 40.1 | 28.6 | 10.2 | 8.5 | 25.6 | 16.2 | 19.2 | 28.1 | 9.8 | 15.5 | 59.2 | 50.3 | 39.4 | 33.8 | 12.2 | 13.7 | 32.9 | 22.5 | 23.5 | 27.4 | 9.1 | 14.8 |
| **19-Jul-21** | 59.4 | 52.5 | 39.6 | 14.1 | 12.3 | -6.0 | 13.1 | 8.7 | 10.7 | 14.6 | 13.3 | 2.0 | 64.0 | 59.1 | 44.2 | 36.1 | 14.5 | 19.0 | 29.7 | 20.3 | 23.3 | 25.4 | 7.1 | 12.8 | 65.1 | 56.2 | 45.3 | 34.1 | 12.5 | 14.0 | 38.8 | 28.4 | 36.4 | 32.1 | 13.8 | 19.5 |
| **20-Jul-21** | 52.1 | 45.2 | 32.3 | 31.0 | 9.4 | 10.9 | 15.8 | 4.4 | 13.4 | 25.9 | 7.6 | 13.3 | 55.5 | 50.6 | 35.7 | 37.9 | 14.2 | 17.8 | 20.6 | 8.3 | 11.2 | 28.9 | 10.6 | 16.3 | 54.8 | 45.9 | 35.0 | 38.4 | 16.8 | 18.3 | 28.5 | 18.1 | 19.1 | 23.0 | 4.7 | 10.4 |
| **21-Jul-21** | 53.4 | 46.5 | 33.6 | 23.7 | 2.1 | 3.6 | 21.8 | 10.4 | 19.4 | 30.5 | 12.2 | 17.9 | 56.8 | 51.9 | 63.7 | 31.8 | 10.2 | 11.7 | 30.4 | 20.0 | 21.0 | 25.1 | 6.8 | 12.5 | 56.1 | 47.2 | 36.3 | 37.0 | 15.4 | 16.9 | 29.8 | 21.4 | 23.4 | 33.0 | 14.7 | 20.4 |
| **22-Jul-21** | 58.9 | 45.0 | 39.1 | 26.4 | 13.4 | 24.3 | 21.6 | 18.4 | 19.2 | 31.0 | 12.7 | 18.4 | 62.3 | 57.4 | 42.5 | 30.2 | 11.6 | 10.1 | 19.3 | 9.9 | 12.9 | 23.4 | 11.3 | 10.8 | 61.6 | 52.7 | 41.8 | 31.9 | 10.3 | 11.8 | 15.1 | 9.7 | 9.7 | 29.8 | 11.5 | 17.2 |
| **23-Jul-21** | 71.3 | 40.4 | 51.5 | 32.8 | 11.2 | 14.3 | 17.0 | 8.8 | 14.6 | 29.5 | 11.2 | 16.9 | 56.4 | 51.5 | 36.6 | 30.4 | 15.3 | 11.9 | 22.1 | 12.7 | 15.7 | 22.6 | 9.4 | 10.0 | 71.6 | 62.7 | 51.8 | 30.9 | 8.9 | 10.8 | 36.4 | 26.0 | 27.0 | 39.8 | 21.5 | 27.2 |
| **24-Jul-21** | 64.8 | 49.9 | 45.0 | 38.9 | 20.3 | 18.8 | 33.5 | 25.3 | 31.1 | 23.0 | 4.7 | 10.4 | 68.2 | 63.3 | 66.8 | 30.8 | 11.3 | 10.7 | 33.9 | 24.5 | 27.5 | 26.4 | 8.1 | 13.8 | 67.5 | 58.6 | 47.7 | 30.4 | 10.8 | 10.3 | 41.2 | 32.2 | 31.8 | 25.7 | 7.4 | 13.1 |
| **25-Jul-21** | 61.5 | 50.6 | 41.7 | 29.6 | 10.7 | 29.5 | 19.2 | 17.0 | 16.8 | 26.4 | 8.1 | 13.8 | 64.9 | 60.0 | 45.1 | 27.6 | 12.6 | 7.5 | 21.6 | 12.2 | 15.2 | 32.1 | 13.8 | 19.5 | 64.2 | 52.3 | 44.4 | 35.1 | 13.5 | 15.0 | 37.9 | 26.5 | 28.5 | 30.2 | 11.9 | 17.6 |
| **26-Jul-21** | 60.2 | 49.3 | 40.4 | 32.7 | 11.1 | 12.6 | 5.9 | 5.7 | 3.5 | 18.4 | 12.1 | 5.8 | 63.6 | 58.7 | 43.8 | 28.6 | 13.2 | 12.6 | 29.3 | 19.9 | 22.9 | 21.8 | 3.5 | 9.2 | 62.9 | 51.0 | 43.1 | 28.2 | 10.6 | 8.1 | 36.6 | 13.4 | 27.2 | 31.1 | 12.8 | 18.5 |
| **27-Jul-21** | 62.8 | 48.9 | 43.0 | 17.8 | 17.3 | -2.3 | 20.8 | 12.6 | 18.4 | 32.2 | 13.9 | 19.6 | 66.2 | 61.3 | 46.4 | 27.9 | 13.1 | 7.8 | 38.5 | 29.1 | 32.1 | 30.7 | 12.4 | 18.1 | 65.5 | 53.6 | 45.7 | 29.1 | 11.5 | 10.2 | 39.2 | 27.8 | 29.8 | 28.9 | 10.6 | 16.3 |
| **28-Jul-21** | 66.9 | 46.0 | 47.1 | 20.4 | 8.8 | 0.3 | 23.1 | 14.9 | 20.7 | 32.7 | 14.4 | 20.1 | 69.3 | 64.4 | 59.7 | 32.4 | 14.2 | 12.3 | 39.7 | 30.3 | 33.3 | 27.1 | 8.8 | 14.5 | 69.6 | 57.7 | 49.8 | 26.7 | 12.1 | 10.8 | 43.3 | 30.9 | 33.9 | 24.6 | 11.3 | 12.0 |
| **29-Jul-21** | 66 | 45.1 | 46.2 | 33.6 | 12.0 | 13.5 | 20.4 | 12.2 | 18.0 | 29.7 | 11.4 | 17.6 | 69.4 | 64.5 | 60.3 | 30.1 | 11.7 | 10.0 | 40.5 | 31.1 | 34.1 | 26.4 | 8.1 | 13.8 | 68.7 | 56.8 | 48.9 | 29.4 | 13.8 | 9.3 | 42.4 | 36.0 | 33.0 | 29.1 | 10.8 | 16.5 |
| **30-Jul-21** | 63.8 | 43.9 | 44.0 | 23.6 | 2.0 | 3.5 | 27.5 | 19.3 | 25.1 | 44.9 | 26.6 | 32.3 | 65.2 | 60.3 | 45.4 | 35.4 | 13.8 | 15.3 | 42.3 | 32.9 | 35.9 | 33.4 | 15.1 | 20.8 | 66.5 | 57.6 | 46.7 | 26.9 | 13.8 | 6.8 | 40.2 | 24.8 | 30.8 | 30.8 | 12.5 | 18.2 |
| **31-Jul-21** | 66.7 | 59.8 | 46.9 | 21.4 | 9.8 | 1.3 | 18.7 | 10.5 | 16.3 | 30.4 | 12.1 | 17.8 | 68.1 | 63.2 | 48.3 | 30.2 | 11.6 | 10.1 | 22.8 | 13.4 | 16.4 | 30.4 | 12.1 | 17.8 | 69.4 | 58.5 | 49.6 | 27.6 | 14.0 | 7.5 | 43.1 | 34.7 | 33.7 | 32.2 | 13.9 | 19.6 |

**ADANI POWER MAHARASHTRA LIMITED**

**5 x 660 MW Thermal Power Plant , Tirora, Gondia**

Station: AAQMS 1 AAQMS 2 AAQMS 3

| Month | AAQMS-1 ( Labour Hutment ) | | | | | | | | | | | | AAQMS-2 (China Colony) | | | | | | | | | | | | AAQMS-3 (Gate no -2) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PM 10 | | | PM 2.5 | | | SO2 | | | NOx | | | PM 10 | | | PM 2.5 | | | SO2 | | | NOx | | | PM 10 | | | PM 2.5 | | | SO2 | | | NOx | | |
| | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | |
| | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg |
| **1-Aug-21** | 58.6 | 51.7 | 38.8 | 30.6 | 10.0 | 10.5 | 23.3 | 18.9 | 20.9 | 16.8 | 10.5 | 4.2 | 62.0 | 59.1 | 42.2 | 40.3 | 18.7 | 20.2 | 22.3 | 11.9 | 18.9 | 30.2 | 11.9 | 17.6 | 61.3 | 47.4 | 41.5 | 32.4 | 10.8 | 12.3 | 35.0 | 24.6 | 32.6 | 19.5 | 9.2 | 6.9 |
| **2-Aug-21** | 54.3 | 47.4 | 34.5 | 38.2 | 16.6 | 18.1 | 24.0 | 23.6 | 14.6 | 22.5 | 14.2 | 9.9 | 57.7 | 54.8 | 37.9 | 36.2 | 14.6 | 16.1 | 23.4 | 19.2 | 17.8 | 25.9 | 7.6 | 13.3 | 57.0 | 48.1 | 37.2 | 33.5 | 11.9 | 13.4 | 21.7 | 12.3 | 12.3 | 25.2 | 6.9 | 12.6 |
| **3-Aug-21** | 62.9 | 56.0 | 43.1 | 33.9 | 12.3 | 13.8 | 31.6 | 27.2 | 29.2 | 21.1 | 19.8 | 8.5 | 66.3 | 63.4 | 46.5 | 35.9 | 14.3 | 15.8 | 28.6 | 24.4 | 26.0 | 24.5 | 6.2 | 11.9 | 65.6 | 56.7 | 45.8 | 30.9 | 10.1 | 10.8 | 39.3 | 27.9 | 29.9 | 23.8 | 5.5 | 11.2 |
| **4-Aug-21** | 62.3 | 46.8 | 42.5 | 42.5 | 20.9 | 22.4 | 31.0 | 28.6 | 28.6 | 20.5 | 19.2 | 7.9 | 65.7 | 62.8 | 45.9 | 42.1 | 20.5 | 22.0 | 31.4 | 25.2 | 26.8 | 28.4 | 10.1 | 15.8 | 65.0 | 56.1 | 45.2 | 31.7 | 10.5 | 11.6 | 38.7 | 32.3 | 32.3 | 23.2 | 4.9 | 10.6 |
| **5-Aug-21** | 62.7 | 55.8 | 42.9 | 26.9 | 5.3 | 6.8 | 31.4 | 13.4 | 29.0 | 20.9 | 14.6 | 8.3 | 64.1 | 61.2 | 41.5 | 35.6 | 14.0 | 15.5 | 28.8 | 27.0 | 25.2 | 32.3 | 12.1 | 19.7 | 65.4 | 56.5 | 45.6 | 25.9 | 10.7 | 5.8 | 39.1 | 29.7 | 32.7 | 32.0 | 13.7 | 19.4 |
| **6-Aug-21** | 61.7 | 54.8 | 41.9 | 27.3 | 5.7 | 7.2 | 30.4 | 26.0 | 28.0 | 19.9 | 13.6 | 7.3 | 65.1 | 62.2 | 47.3 | 36.1 | 14.5 | 16.0 | 30.8 | 15.4 | 21.4 | 23.3 | 5.0 | 10.7 | 64.4 | 55.5 | 44.6 | 27.1 | 11.3 | 7.0 | 38.1 | 29.4 | 28.7 | 22.6 | 4.3 | 10.0 |
| **7-Aug-21** | 55.7 | 48.8 | 35.9 | 41.3 | 19.7 | 21.2 | 21.0 | 11.6 | 18.6 | 20.9 | 6.9 | 8.3 | 59.1 | 54.2 | 39.3 | 33.2 | 11.6 | 13.1 | 22.0 | 6.1 | 12.6 | 30.1 | 11.8 | 17.5 | 56.4 | 47.5 | 36.6 | 41.9 | 20.3 | 21.8 | 30.1 | 20.7 | 20.7 | 24.6 | 12.3 | 12.0 |
| **8-Aug-21** | 59.1 | 52.2 | 39.3 | 35.3 | 13.7 | 15.2 | 27.8 | 23.4 | 25.4 | 17.3 | 12.4 | 4.7 | 62.5 | 51.6 | 42.7 | 44.7 | 12.3 | 24.6 | 27.2 | 9.2 | 17.8 | 30.7 | 12.4 | 18.1 | 59.6 | 50.7 | 39.8 | 23.9 | 11.3 | 3.8 | 33.3 | 25.9 | 23.9 | 27.8 | 9.5 | 15.2 |
| **9-Aug-21** | 60.3 | 53.4 | 40.5 | 38.7 | 17.1 | 18.6 | 29.0 | 24.6 | 26.6 | 32.4 | 14.1 | 19.8 | 61.7 | 40.8 | 43.9 | 28.6 | 12.9 | 8.5 | 26.4 | 17.0 | 17.0 | 29.7 | 11.4 | 17.1 | 63.0 | 54.1 | 43.2 | 30.1 | 17.0 | 10.0 | 36.7 | 25.3 | 31.3 | 29.4 | 11.1 | 16.8 |
| **10-Aug-21** | 60.8 | 53.9 | 41.0 | 30.9 | 11.3 | 10.8 | 19.3 | 11.9 | 16.9 | 27.6 | 10.2 | 15.0 | 64.2 | 59.3 | 44.4 | 30.4 | 15.2 | 10.3 | 21.4 | 10.3 | 12.0 | 28.3 | 10.0 | 15.7 | 63.5 | 54.6 | 43.7 | 24.6 | 12.0 | 4.5 | 37.2 | 24.8 | 27.8 | 31.6 | 13.3 | 19.0 |
| **11-Aug-21** | 58.7 | 51.8 | 38.9 | 25.4 | 10.3 | 5.3 | 27.4 | 23.0 | 25.0 | 24.1 | 11.6 | 11.5 | 59.1 | 54.2 | 39.3 | 32.4 | 10.8 | 12.3 | 24.8 | 15.4 | 18.4 | 27.3 | 9.0 | 14.7 | 60.4 | 51.5 | 40.6 | 28.9 | 10.3 | 8.8 | 34.1 | 23.7 | 24.7 | 24.6 | 6.3 | 12.0 |
| **12-Aug-21** | 56.9 | 50.0 | 37.1 | 32.9 | 11.3 | 12.8 | 21.6 | 21.5 | 19.2 | 22.3 | 12.3 | 9.7 | 58.3 | 53.4 | 38.5 | 30.4 | 10.9 | 10.3 | 24.0 | 14.6 | 17.6 | 26.5 | 8.2 | 13.9 | 59.6 | 50.7 | 39.8 | 27.1 | 10.5 | 10.0 | 33.3 | 22.9 | 27.9 | 27.8 | 14.5 | 15.2 |
| **13-Aug-21** | 57.9 | 51.0 | 38.1 | 21.5 | 10.9 | 1.4 | 22.0 | 17.6 | 19.6 | 20.9 | 12.2 | 8.3 | 58.3 | 53.4 | 38.5 | 32.4 | 11.1 | 12.3 | 23.1 | 13.7 | 16.7 | 31.5 | 13.2 | 18.9 | 58.4 | 49.5 | 38.6 | 25.9 | 9.6 | 5.8 | 32.1 | 21.7 | 28.7 | 26.6 | 15.3 | 14.0 |
| **14-Aug-21** | 52.6 | 45.7 | 32.8 | 37.5 | 15.9 | 23.4 | 20.1 | 15.7 | 19.7 | 19.3 | 6.8 | 6.7 | 51.9 | 47.0 | 32.1 | 34.9 | 13.3 | 14.8 | 16.6 | 7.2 | 10.2 | 22.1 | 12.6 | 9.5 | 50.8 | 49.7 | 31.0 | 29.1 | 13.5 | 9.0 | 24.5 | 17.1 | 15.1 | 30.9 | 20.6 | 18.3 |
| **15-Aug-21** | 55.5 | 48.6 | 35.7 | 27.9 | 14.1 | 7.8 | 18.7 | 14.3 | 16.3 | 23.4 | 8.9 | 10.8 | 58.9 | 54.0 | 39.1 | 32.7 | 11.8 | 12.6 | 24.6 | 15.2 | 18.2 | 27.1 | 8.8 | 14.5 | 58.2 | 49.3 | 38.4 | 30.2 | 13.6 | 10.1 | 31.9 | 21.5 | 22.5 | 26.4 | 16.1 | 13.8 |
| **16-Aug-21** | 58.8 | 51.9 | 39.0 | 27.1 | 5.5 | 7.0 | 23.1 | 18.7 | 20.7 | 20.1 | 11.8 | 17.5 | 62.2 | 57.3 | 60.3 | 32.8 | 11.2 | 12.7 | 22.8 | 13.4 | 20.4 | 30.4 | 12.1 | 17.8 | 61.5 | 52.6 | 41.7 | 30.5 | 11.9 | 10.4 | 35.2 | 28.8 | 32.8 | 29.7 | 11.4 | 22.1 |
| **17-Aug-21** | 59.6 | 52.7 | 39.8 | 38.4 | 10.6 | 18.3 | 20.3 | 15.9 | 19.5 | 22.6 | 11.3 | 18.0 | 63.0 | 58.1 | 60.9 | 37.8 | 12.2 | 17.7 | 28.7 | 19.3 | 26.3 | 31.2 | 12.9 | 18.6 | 62.3 | 53.4 | 42.5 | 32.6 | 11.0 | 12.5 | 36.0 | 25.6 | 32.6 | 20.5 | 21.6 | 10.9 |
| **18-Aug-21** | 60.1 | 53.2 | 40.3 | 24.2 | 10.9 | 4.1 | 25.8 | 21.4 | 23.4 | 27.6 | 9.3 | 15.0 | 63.5 | 58.6 | 43.7 | 28.6 | 10.2 | 8.5 | 29.2 | 19.8 | 22.8 | 31.7 | 13.4 | 19.1 | 62.8 | 53.9 | 43.0 | 33.8 | 12.2 | 13.7 | 36.5 | 26.1 | 27.1 | 31.0 | 12.7 | 18.4 |
| **19-Aug-21** | 63.9 | 57.0 | 44.1 | 17.7 | 12.3 | -2.4 | 17.6 | 13.2 | 15.2 | 19.1 | 17.8 | 6.5 | 68.5 | 63.6 | 48.7 | 36.1 | 14.5 | 19.0 | 34.2 | 24.8 | 27.8 | 25.4 | 7.1 | 12.8 | 69.6 | 60.7 | 49.8 | 34.1 | 12.5 | 14.0 | 43.3 | 32.9 | 40.9 | 32.1 | 13.8 | 19.5 |
| **20-Aug-21** | 63.5 | 56.6 | 43.7 | 35.5 | 13.9 | 15.4 | 27.2 | 15.8 | 24.8 | 25.9 | 7.6 | 13.3 | 66.9 | 62.0 | 47.1 | 37.9 | 14.2 | 17.8 | 20.6 | 8.3 | 11.2 | 28.9 | 10.6 | 16.3 | 66.2 | 57.3 | 46.4 | 38.4 | 16.8 | 18.3 | 39.9 | 29.5 | 30.5 | 34.4 | 16.1 | 21.8 |
| **21-Aug-21** | 61.4 | 54.5 | 41.6 | 35.1 | 13.5 | 15.0 | 21.8 | 10.4 | 19.4 | 30.5 | 12.2 | 17.9 | 64.8 | 59.9 | 63.7 | 31.8 | 10.2 | 11.7 | 30.4 | 20.0 | 21.0 | 25.1 | 6.8 | 12.5 | 64.1 | 55.2 | 44.3 | 37.0 | 15.4 | 16.9 | 37.8 | 29.4 | 31.4 | 33.0 | 14.7 | 20.4 |
| **22-Aug-21** | 63.4 | 49.5 | 43.6 | 26.4 | 13.4 | 24.3 | 26.1 | 22.9 | 23.7 | 31.0 | 12.7 | 18.4 | 66.8 | 61.9 | 47.0 | 30.2 | 11.6 | 10.1 | 19.3 | 9.9 | 12.9 | 23.4 | 11.3 | 10.8 | 66.1 | 57.2 | 46.3 | 31.9 | 10.3 | 11.8 | 15.1 | 9.7 | 9.7 | 34.3 | 16.0 | 21.7 |
| **23-Aug-21** | 65.8 | 44.9 | 46.0 | 32.8 | 11.2 | 14.3 | 34.5 | 26.3 | 32.1 | 24.0 | 5.7 | 11.4 | 56.4 | 51.5 | 36.6 | 30.4 | 15.3 | 11.9 | 22.1 | 12.7 | 15.7 | 24.6 | 9.4 | 12.0 | 66.1 | 57.2 | 46.3 | 30.9 | 12.9 | 20.8 | 36.4 | 26.0 | 27.0 | 34.3 | 16.0 | 21.7 |
| **24-Aug-21** | 65.9 | 51.0 | 46.1 | 33.4 | 14.8 | 13.3 | 32.6 | 24.4 | 30.2 | 24.1 | 5.8 | 11.5 | 69.3 | 64.4 | 66.8 | 30.8 | 11.3 | 10.7 | 35.0 | 25.6 | 28.6 | 27.5 | 9.2 | 14.9 | 68.6 | 54.7 | 48.8 | 30.4 | 10.8 | 10.3 | 42.3 | 33.3 | 32.9 | 26.8 | 8.5 | 14.2 |
| **25-Aug-21** | 64.8 | 53.9 | 45.0 | 29.6 | 10.7 | 29.5 | 22.5 | 20.3 | 20.1 | 26.4 | 8.1 | 13.8 | 68.2 | 63.3 | 48.4 | 27.6 | 12.6 | 7.5 | 21.6 | 12.2 | 15.2 | 32.1 | 13.8 | 19.5 | 67.5 | 65.6 | 47.7 | 35.1 | 13.5 | 15.0 | 41.2 | 29.8 | 31.8 | 30.2 | 11.9 | 17.6 |
| **26-Aug-21** | 59.9 | 49.0 | 40.1 | 32.7 | 11.1 | 12.6 | 5.6 | 5.4 | 3.2 | 18.1 | 11.8 | 5.5 | 63.3 | 58.4 | 43.5 | 28.6 | 13.2 | 12.6 | 29.0 | 19.6 | 22.6 | 21.5 | 11.2 | 8.9 | 62.6 | 40.7 | 42.8 | 28.2 | 10.6 | 8.1 | 36.3 | 13.4 | 26.9 | 30.8 | 12.5 | 18.2 |
| **27-Aug-21** | 56.7 | 42.8 | 36.9 | 39.5 | 17.3 | 19.4 | 20.8 | 12.6 | 18.4 | 32.2 | 13.9 | 19.6 | 60.1 | 55.2 | 40.3 | 27.9 | 13.1 | 7.8 | 38.5 | 29.1 | 32.1 | 30.7 | 12.4 | 18.1 | 59.4 | 47.5 | 39.6 | 29.1 | 11.5 | 10.2 | 33.1 | 21.7 | 23.7 | 28.9 | 10.6 | 16.3 |
| **28-Aug-21** | 66.9 | 46.0 | 47.1 | 36.3 | 24.7 | 16.2 | 23.1 | 14.9 | 20.7 | 32.7 | 14.4 | 20.1 | 69.3 | 64.4 | 59.7 | 32.4 | 14.2 | 12.3 | 39.7 | 30.3 | 33.3 | 27.1 | 8.8 | 14.5 | 69.6 | 57.7 | 49.8 | 26.7 | 12.1 | 10.8 | 40.3 | 27.9 | 30.9 | 24.6 | 11.3 | 12.0 |
| **29-Aug-21** | 71 | 50.1 | 51.2 | 33.6 | 12.0 | 13.5 | 20.4 | 12.2 | 18.0 | 29.7 | 11.4 | 17.6 | 66.9 | 62.0 | 60.3 | 30.1 | 11.7 | 10.0 | 40.5 | 31.1 | 34.1 | 26.4 | 8.1 | 13.8 | 71.3 | 59.4 | 51.5 | 29.4 | 13.8 | 9.3 | 41.0 | 34.6 | 31.6 | 29.1 | 10.8 | 16.5 |
| **30-Aug-21** | 67.8 | 47.9 | 48.0 | 28.6 | 7.0 | 8.5 | 31.5 | 23.3 | 29.1 | 26.0 | 7.7 | 13.4 | 69.2 | 64.3 | 49.4 | 35.4 | 13.8 | 15.3 | 40.6 | 31.2 | 34.2 | 39.4 | 21.1 | 26.8 | 70.5 | 61.6 | 50.7 | 26.9 | 13.8 | 6.8 | 34.2 | 18.8 | 24.8 | 30.8 | 12.5 | 18.2 |
| **31-Aug-21** | 68.4 | 61.5 | 48.6 | 25.4 | 13.8 | 5.3 | 18.7 | 10.5 | 16.3 | 30.4 | 12.1 | 17.8 | 69.8 | 64.9 | 50.0 | 30.2 | 11.6 | 10.1 | 24.5 | 15.1 | 18.1 | 30.4 | 12.1 | 17.8 | 71.1 | 60.2 | 51.3 | 27.6 | 14.0 | 7.5 | 42.8 | 34.4 | 33.4 | 32.2 | 13.9 | 19.6 |

| ADANI POWER MAHARASHTRA LIMITED | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 x 660 MW Thermal Power Plant , Tirora, Gondia | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Station: AAQMS 1 AAQMS 2 AAQMS 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Month | AAQMS-1 ( Labour Hutment ) | | | | | | | | | | | | AAQMS-2 (China Colony) | | | | | | | | | | | | AAQMS-3 (Gate no -2) | | | | | | | | | | | |
| | PM 10 | | | PM 2.5 | | | SO2 | | | NOx | | | PM 10 | | | PM 2.5 | | | SO2 | | | NOx | | | PM 10 | | | PM 2.5 | | | SO2 | | | NOx | | |
| | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | | ug/m3 | | |
| | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg | Max | Min | Avg |
| **1-Sep-21** | 60.8 | 53.9 | 41.0 | 42.6 | 22.0 | 22.5 | 25.5 | 21.1 | 23.1 | 19.0 | 12.7 | 6.4 | 64.2 | 61.3 | 44.4 | 40.3 | 18.7 | 20.2 | 22.3 | 11.9 | 18.9 | 32.4 | 14.1 | 19.8 | 63.5 | 49.6 | 43.7 | 32.4 | 30.8 | 12.3 | 37.2 | 26.8 | 34.8 | 21.7 | 11.4 | 9.1 |
| **2-Sep-21** | 62.3 | 55.4 | 42.5 | 40.4 | 18.8 | 20.3 | 32.0 | 31.6 | 22.6 | 30.5 | 22.2 | 17.9 | 65.7 | 62.8 | 45.9 | 36.2 | 14.6 | 16.1 | 31.4 | 27.2 | 25.8 | 33.9 | 15.6 | 21.3 | 65.0 | 56.1 | 45.2 | 33.5 | 11.9 | 13.4 | 29.7 | 20.3 | 20.3 | 33.2 | 14.9 | 20.6 |
| **3-Sep-21** | 62.8 | 55.9 | 43.0 | 41.9 | 20.3 | 21.8 | 31.5 | 27.1 | 29.1 | 21.0 | 19.7 | 8.4 | 66.2 | 63.3 | 46.4 | 35.9 | 14.3 | 15.8 | 28.6 | 24.4 | 26.0 | 24.4 | 6.1 | 11.8 | 65.5 | 56.6 | 45.7 | 30.9 | 13.6 | 10.8 | 39.2 | 27.8 | 29.8 | 23.7 | 5.4 | 11.1 |
| **4-Sep-21** | 61.9 | 46.8 | 42.1 | 42.4 | 20.8 | 22.3 | 30.6 | 28.2 | 28.2 | 20.1 | 18.8 | 7.5 | 65.3 | 62.4 | 45.5 | 42.1 | 20.5 | 22.0 | 31.0 | 24.8 | 26.4 | 28.4 | 10.1 | 15.8 | 64.6 | 55.7 | 44.8 | 31.7 | 30.1 | 11.6 | 38.3 | 31.9 | 31.9 | 22.8 | 12.5 | 10.2 |
| **5-Sep-21** | 58.7 | 51.8 | 38.9 | 33.5 | 11.9 | 13.4 | 27.4 | 13.4 | 25.0 | 16.9 | 10.6 | 4.3 | 60.1 | 57.2 | 37.5 | 35.6 | 14.0 | 15.5 | 24.8 | 23.0 | 21.2 | 28.3 | 12.1 | 15.7 | 61.4 | 52.5 | 41.6 | 25.9 | 14.6 | 5.8 | 35.1 | 25.7 | 28.7 | 32.0 | 13.7 | 19.4 |
| **6-Sep-21** | 72.6 | 65.7 | 52.8 | 36.3 | 14.7 | 16.2 | 41.3 | 36.9 | 38.9 | 30.8 | 24.5 | 18.2 | 76.0 | 73.1 | 58.2 | 36.1 | 14.5 | 16.0 | 41.7 | 26.3 | 32.3 | 34.2 | 15.9 | 21.6 | 75.3 | 66.4 | 55.5 | 27.1 | 11.3 | 7.0 | 49.0 | 40.3 | 39.6 | 33.5 | 15.2 | 20.9 |
| **7-Sep-21** | 55.6 | 48.7 | 35.8 | 44.2 | 22.6 | 24.1 | 21.0 | 11.6 | 18.6 | 20.8 | 6.9 | 8.2 | 59.0 | 54.1 | 39.2 | 33.2 | 19.6 | 13.1 | 22.0 | 14.6 | 12.6 | 30.1 | 11.8 | 17.5 | 56.3 | 54.4 | 36.5 | 41.9 | 40.3 | 21.8 | 30.0 | 20.6 | 20.6 | 24.5 | 12.2 | 11.9 |
| **8-Sep-21** | 53.9 | 47.0 | 34.1 | 33.2 | 11.6 | 13.1 | 22.6 | 18.2 | 20.2 | 12.1 | 12.4 | -0.5 | 57.3 | 46.4 | 37.5 | 40.3 | 12.3 | 20.2 | 22.0 | 12.6 | 12.6 | 25.5 | 7.2 | 12.9 | 54.4 | 52.5 | 34.6 | 23.9 | 11.3 | 3.8 | 28.1 | 20.7 | 18.7 | 22.6 | 12.3 | 10.0 |
| **9-Sep-21** | 71.0 | 64.1 | 51.2 | 33.5 | 11.9 | 13.4 | 39.7 | 35.3 | 37.3 | 32.4 | 14.1 | 19.8 | 72.4 | 51.5 | 54.6 | 28.6 | 12.9 | 8.5 | 37.1 | 27.7 | 27.7 | 29.7 | 11.4 | 17.1 | 73.7 | 64.8 | 53.9 | 30.1 | 28.5 | 10.0 | 47.4 | 36.0 | 42.0 | 29.4 | 11.1 | 16.8 |
| **10-Sep-21** | 65.9 | 59.0 | 46.1 | 48.6 | 29.0 | 28.5 | 19.3 | 11.9 | 16.9 | 27.6 | 10.2 | 15.0 | 67.3 | 62.4 | 47.5 | 30.4 | 15.2 | 10.3 | 21.4 | 10.3 | 12.0 | 28.3 | 10.0 | 15.7 | 68.6 | 59.7 | 48.8 | 24.6 | 23.0 | 4.5 | 42.3 | 29.9 | 32.9 | 31.6 | 13.3 | 19.0 |
| **11-Sep-21** | 62.1 | 55.2 | 42.3 | 43.5 | 10.3 | 23.4 | 30.8 | 26.4 | 28.4 | 24.1 | 11.6 | 11.5 | 62.5 | 57.6 | 42.7 | 32.4 | 18.3 | 12.3 | 28.2 | 18.8 | 21.8 | 30.7 | 12.4 | 18.1 | 63.8 | 54.9 | 44.0 | 28.9 | 17.3 | 8.8 | 37.5 | 27.1 | 28.1 | 28.0 | 9.7 | 15.4 |
| **12-Sep-21** | 56.3 | 49.4 | 36.5 | 32.9 | 11.3 | 12.8 | 21.0 | 20.9 | 18.6 | 22.3 | 12.3 | 9.7 | 57.7 | 52.8 | 37.9 | 40.6 | 14.6 | 20.5 | 23.4 | 14.0 | 17.0 | 25.9 | 7.6 | 13.3 | 59.0 | 50.1 | 39.2 | 27.1 | 25.5 | 10.0 | 32.7 | 22.3 | 27.3 | 27.8 | 14.5 | 15.2 |
| **13-Sep-21** | 73.9 | 67.0 | 54.1 | 27.9 | 17.3 | 7.8 | 22.0 | 17.6 | 19.6 | 20.9 | 12.2 | 8.3 | 74.3 | 69.4 | 54.5 | 36.9 | 23.3 | 16.8 | 23.1 | 13.7 | 16.7 | 31.5 | 13.2 | 18.9 | 74.4 | 65.5 | 54.6 | 25.9 | 16.8 | 5.8 | 48.1 | 37.7 | 44.7 | 42.6 | 31.3 | 30.0 |
| **14-Sep-21** | 53.6 | 46.7 | 33.8 | 45.5 | 23.9 | 31.4 | 20.1 | 15.7 | 19.7 | 26.8 | 6.8 | 14.2 | 52.9 | 48.0 | 33.1 | 33.6 | 20.0 | 13.5 | 17.6 | 15.3 | 11.2 | 22.1 | 12.6 | 9.5 | 51.8 | 49.9 | 32.0 | 29.1 | 27.5 | 9.0 | 25.5 | 18.1 | 16.1 | 30.9 | 20.6 | 18.3 |
| **15-Sep-21** | 71.6 | 64.7 | 51.8 | 31.2 | 14.1 | 11.1 | 18.7 | 14.3 | 16.3 | 23.4 | 8.9 | 10.8 | 75.0 | 70.1 | 55.2 | 32.7 | 19.1 | 12.6 | 40.7 | 31.3 | 34.3 | 43.2 | 24.9 | 30.6 | 74.3 | 65.4 | 54.5 | 30.2 | 28.6 | 10.1 | 48.0 | 37.6 | 38.6 | 42.5 | 32.2 | 29.9 |
| **16-Sep-21** | 58.9 | 52.0 | 39.1 | 43.2 | 21.6 | 23.1 | 23.1 | 18.7 | 20.7 | 20.1 | 11.8 | 17.5 | 62.3 | 57.4 | 60.3 | 32.8 | 19.2 | 12.7 | 22.8 | 13.4 | 20.4 | 30.5 | 12.2 | 17.9 | 61.6 | 52.7 | 41.8 | 30.5 | 28.9 | 10.4 | 35.3 | 28.9 | 32.9 | 29.8 | 11.5 | 22.2 |
| **17-Sep-21** | 62.6 | 55.7 | 42.8 | 38.5 | 10.6 | 18.4 | 23.3 | 18.9 | 22.5 | 22.6 | 11.3 | 18.0 | 63.0 | 58.1 | 60.9 | 37.8 | 12.2 | 17.7 | 28.7 | 19.3 | 26.3 | 31.2 | 12.9 | 18.6 | 65.3 | 56.4 | 45.5 | 32.6 | 21.0 | 12.5 | 39.0 | 28.6 | 35.6 | 23.5 | 24.6 | 13.9 |
| **18-Sep-21** | 73.6 | 66.7 | 53.8 | 27.2 | 10.9 | 7.1 | 39.3 | 34.9 | 36.9 | 27.6 | 9.3 | 15.0 | 74.0 | 69.1 | 54.2 | 35.6 | 16.8 | 15.5 | 39.7 | 30.3 | 33.3 | 42.2 | 23.9 | 29.6 | 76.3 | 67.4 | 56.5 | 33.8 | 32.2 | 13.7 | 50.0 | 39.6 | 40.6 | 44.5 | 26.2 | 31.9 |
| **19-Sep-21** | 59.7 | 52.8 | 39.9 | 31.2 | 12.3 | 11.1 | 25.4 | 21.0 | 23.0 | 14.9 | 13.6 | 2.3 | 64.3 | 59.4 | 44.5 | 36.1 | 14.5 | 19.0 | 30.0 | 20.6 | 23.6 | 25.4 | 7.1 | 12.8 | 65.4 | 56.5 | 45.6 | 34.1 | 32.5 | 14.0 | 39.1 | 28.7 | 36.7 | 32.1 | 13.8 | 19.5 |
| **20-Sep-21** | 61.4 | 54.5 | 41.6 | 37.3 | 15.7 | 17.2 | 25.1 | 13.7 | 22.7 | 25.9 | 7.6 | 13.3 | 61.8 | 56.9 | 42.0 | 37.9 | 14.2 | 17.8 | 20.6 | 13.6 | 11.2 | 28.9 | 10.6 | 16.3 | 77.2 | 68.3 | 57.4 | 40.3 | 38.7 | 20.2 | 50.9 | 40.5 | 41.5 | 45.4 | 27.1 | 32.8 |
| **21-Sep-21** | 70.3 | 63.4 | 50.5 | 33.0 | 11.4 | 12.9 | 36.0 | 24.6 | 33.6 | 30.5 | 12.2 | 17.9 | 70.7 | 65.8 | 63.7 | 40.6 | 16.9 | 20.5 | 30.4 | 20.0 | 21.0 | 25.1 | 6.8 | 12.5 | 73.0 | 64.1 | 53.2 | 37.0 | 15.4 | 16.9 | 46.7 | 38.3 | 40.3 | 33.0 | 14.7 | 20.4 |
| **22-Sep-21** | 60.3 | 46.4 | 40.5 | 26.4 | 13.4 | 24.3 | 23.0 | 19.8 | 20.6 | 31.0 | 12.7 | 18.4 | 63.7 | 58.8 | 43.9 | 41.9 | 28.3 | 21.8 | 19.3 | 15.9 | 12.9 | 23.4 | 11.3 | 10.8 | 63.0 | 54.1 | 43.2 | 31.9 | 20.3 | 11.8 | 15.1 | 9.7 | 9.7 | 31.2 | 12.9 | 18.6 |
| **23-Sep-21** | 65.9 | 59.0 | 46.1 | 32.8 | 11.2 | 14.3 | 34.6 | 26.4 | 32.2 | 34.1 | 15.8 | 21.5 | 56.4 | 51.5 | 36.6 | 41.7 | 15.3 | 11.9 | 22.1 | 12.7 | 15.7 | 24.6 | 9.4 | 12.0 | 66.2 | 57.3 | 46.4 | 30.9 | 19.3 | 20.8 | 36.4 | 26.0 | 27.0 | 34.4 | 16.1 | 21.8 |
| **24-Sep-21** | 65.4 | 50.5 | 45.6 | 33.5 | 14.9 | 13.4 | 32.1 | 23.9 | 29.7 | 33.6 | 15.3 | 21.0 | 68.8 | 63.9 | 66.8 | 30.8 | 17.2 | 10.7 | 34.5 | 25.1 | 28.1 | 27.0 | 8.7 | 14.4 | 68.1 | 54.2 | 48.3 | 42.6 | 23.0 | 22.5 | 41.8 | 32.8 | 32.4 | 26.3 | 8.0 | 13.7 |
| **25-Sep-21** | 61.7 | 50.8 | 41.9 | 29.6 | 10.7 | 29.5 | 19.4 | 17.2 | 17.0 | 26.4 | 8.1 | 13.8 | 65.1 | 60.2 | 45.3 | 40.3 | 26.7 | 20.2 | 21.6 | 12.2 | 15.2 | 32.1 | 13.8 | 19.5 | 64.4 | 62.5 | 44.6 | 35.1 | 33.5 | 15.0 | 38.1 | 26.7 | 28.7 | 30.2 | 11.9 | 17.6 |
| **26-Sep-21** | 56.4 | 49.5 | 36.6 | 32.7 | 11.1 | 12.6 | 32.1 | 31.9 | 29.7 | 14.6 | 8.3 | 2.0 | 59.8 | 54.9 | 40.0 | 38.7 | 13.2 | 12.6 | 25.5 | 16.1 | 19.1 | 18.0 | 7.7 | 5.4 | 59.1 | 57.2 | 39.3 | 28.2 | 26.6 | 8.1 | 32.8 | 13.4 | 23.4 | 27.3 | 9.0 | 14.7 |
| **27-Sep-21** | 56.7 | 49.8 | 36.9 | 36.0 | 17.3 | 15.9 | 20.8 | 12.6 | 18.4 | 32.2 | 13.9 | 19.6 | 60.1 | 55.2 | 40.3 | 40.3 | 13.1 | 20.2 | 38.5 | 29.1 | 32.1 | 30.7 | 12.4 | 18.1 | 59.4 | 47.5 | 39.6 | 29.1 | 11.5 | 10.2 | 33.1 | 21.7 | 23.7 | 28.9 | 10.6 | 16.3 |
| **28-Sep-21** | 70.6 | 49.7 | 50.8 | 36.3 | 24.7 | 16.2 | 23.1 | 14.9 | 20.7 | 32.7 | 14.4 | 20.1 | 72.0 | 67.1 | 59.7 | 32.4 | 14.2 | 12.3 | 39.7 | 30.3 | 33.3 | 27.1 | 8.8 | 14.5 | 73.3 | 61.4 | 53.5 | 26.7 | 25.1 | 10.8 | 44.0 | 31.6 | 34.6 | 24.6 | 11.3 | 12.0 |
| **29-Sep-21** | 73.1 | 66.2 | 53.3 | 33.6 | 12.0 | 13.5 | 20.4 | 12.2 | 18.0 | 29.7 | 11.4 | 17.6 | 76.5 | 71.6 | 60.3 | 30.1 | 16.5 | 10.0 | 40.5 | 31.1 | 34.1 | 26.4 | 8.1 | 13.8 | 71.3 | 59.4 | 51.5 | 29.4 | 13.8 | 9.3 | 41.0 | 34.6 | 31.6 | 29.1 | 10.8 | 16.5 |
| **30-Sep-21** | 54.8 | 47.9 | 35.0 | 44.7 | 23.1 | 24.6 | 20.5 | 12.3 | 18.1 | 33.0 | 14.7 | 20.4 | 56.2 | 51.3 | 36.4 | 35.4 | 21.8 | 33.3 | 40.6 | 31.2 | 34.2 | 26.4 | 8.1 | 13.8 | 57.5 | 48.6 | 37.7 | 26.9 | 13.8 | 6.8 | 21.2 | 5.8 | 11.8 | 30.8 | 12.5 | 18.2 |

# Annexure - III

**CEMS DAYWISE VALUES FOR THE MONTH OF APR '2021**

| S.NO. | DATE | UNIT# 1 LOAD(MW) | UNIT# 1 SOX(mg/nm3) | | | UNIT# 1 NOX(mg/nm3) | | | UNIT# 1 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Apr-21 | 444.7 | 847.2 | 820.0 | 871.7 | 262.9 | 252.3 | 272.2 | 42.1 | 40.1 | 44.1 |
| 2 | 02-Apr-21 | 452.7 | 845.2 | 820.8 | 871.4 | 261.6 | 252.5 | 271.8 | 42.0 | 40.2 | 44.2 |
| 3 | 03-Apr-21 | 458.7 | 845.2 | 822.0 | 872.7 | 261.4 | 252.3 | 271.9 | 42.0 | 40.1 | 44.0 |
| 4 | 04-Apr-21 | 469.7 | 848.4 | 822.1 | 875.7 | 262.1 | 252.3 | 273.0 | 42.1 | 40.1 | 44.2 |
| 5 | 05-Apr-21 | 578.8 | 899.8 | 833.2 | 944.4 | 277.5 | 255.9 | 293.0 | 45.1 | 40.8 | 48.0 |
| 6 | 06-Apr-21 | 586.5 | 892.8 | 851.9 | 950.0 | 274.9 | 262.7 | 294.9 | 44.6 | 42.2 | 48.5 |
| 7 | 07-Apr-21 | 596.6 | 900.7 | 872.3 | 936.0 | 277.3 | 267.7 | 290.7 | 45.0 | 43.1 | 47.7 |
| 8 | 08-Apr-21 | 569.7 | 873.7 | 795.8 | 935.2 | 268.0 | 242.1 | 289.6 | 42.6 | 37.1 | 47.4 |
| 9 | 09-Apr-21 | 562.3 | 865.8 | 835.3 | 894.3 | 265.0 | 253.6 | 275.2 | 41.5 | 39.3 | 43.6 |
| 10 | 10-Apr-21 | 572.4 | 873.5 | 838.9 | 900.5 | 267.5 | 255.4 | 277.3 | 41.9 | 39.7 | 43.9 |
| 11 | 11-Apr-21 | 556.9 | 861.6 | 814.9 | 901.0 | 263.7 | 249.3 | 277.3 | 41.3 | 38.5 | 44.0 |
| 12 | 12-Apr-21 | 621.1 | 886.8 | 860.4 | 920.5 | 270.7 | 260.4 | 283.2 | 42.6 | 40.6 | 45.1 |
| 13 | 13-Apr-21 | 572.4 | 866.9 | 844.7 | 894.4 | 265.1 | 256.2 | 275.7 | 41.6 | 39.8 | 43.6 |
| 14 | 14-Apr-21 | 603.2 | 885.3 | 848.2 | 918.0 | 270.8 | 259.0 | 282.3 | 42.7 | 40.3 | 45.0 |
| 15 | 15-Apr-21 | 626.3 | 889.9 | 856.9 | 920.4 | 271.8 | 259.5 | 283.1 | 42.9 | 40.4 | 45.1 |
| 16 | 16-Apr-21 | 580.5 | 873.3 | 807.7 | 902.7 | 267.3 | 245.5 | 278.2 | 42.0 | 37.7 | 44.2 |
| 17 | 17-Apr-21 | 609.0 | 883.6 | 852.1 | 915.1 | 270.0 | 259.0 | 281.8 | 42.5 | 40.2 | 44.9 |
| 18 | 18-Apr-21 | 622.3 | 890.0 | 852.9 | 919.3 | 271.9 | 261.1 | 282.6 | 42.9 | 40.6 | 45.0 |
| 19 | 19-Apr-21 | 535.7 | 851.3 | 800.3 | 913.9 | 260.7 | 243.6 | 281.0 | 40.8 | 37.4 | 44.7 |
| 20 | 20-Apr-21 | 572.9 | 870.0 | 804.0 | 906.1 | 266.4 | 244.8 | 278.0 | 41.9 | 37.6 | 44.1 |
| 21 | 21-Apr-21 | 577.9 | 872.3 | 812.8 | 912.2 | 267.0 | 247.1 | 280.5 | 42.0 | 38.3 | 44.6 |
| 22 | 22-Apr-21 | 607.6 | 882.7 | 843.8 | 923.0 | 269.8 | 255.8 | 284.0 | 42.5 | 39.7 | 45.1 |
| 23 | 23-Apr-21 | 627.7 | 892.3 | 866.9 | 915.7 | 272.7 | 262.7 | 281.6 | 43.0 | 41.0 | 44.8 |
| 24 | 24-Apr-21 | 593.9 | 879.2 | 848.4 | 905.1 | 268.9 | 257.4 | 278.6 | 42.4 | 40.0 | 44.5 |
| 25 | 25-Apr-21 | 71.6 | 821.5 | 821.5 | 821.5 | 251.1 | 251.1 | 251.1 | 38.5 | 38.5 | 38.5 |
| 26 | 26-Apr-21 | Unit in shutdown condition | | | | | | | | | |
| 27 | 27-Apr-21 | Unit in shutdown condition | | | | | | | | | |
| 28 | 28-Apr-21 | Unit in shutdown condition | | | | | | | | | |
| 29 | 29-Apr-21 | 548.8 | 866.9 | 837.2 | 906.7 | 265.1 | 255.1 | 279.2 | 41.7 | 39.6 | 44.4 |
| 30 | 30-Apr-21 | 473.3 | 827.0 | 797.7 | 863.9 | 253.9 | 242.5 | 263.3 | 39.4 | 37.2 | 41.2 |

**CEMS DAYWISE VALUES FOR THE MONTH OF MAY '2021**

| S.NO. | DATE | UNIT# 1 LOAD(MW) | UNIT# 1 SOX(mg/nm3) | | | UNIT# 1 NOX(mg/nm3) | | | UNIT# 1 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-May-21 | 486.23 | 868.88 | 798 | 937.16 | 395.64 | 372.81 | 417.58 | 37.82 | 33.28 | 42.05 |
| 2 | 02-May-21 | 511.7 | 886.53 | 817.06 | 941.57 | 401.35 | 379.62 | 419.03 | 38.84 | 34.63 | 42.34 |
| 3 | 03-May-21 | 513.32 | 886.8 | 804.68 | 944.07 | 401.09 | 375.83 | 420.07 | 38.79 | 33.89 | 42.55 |
| 4 | 04-May-21 | 611.01 | 918.57 | 885.76 | 948.04 | 409.9 | 398.6 | 420.41 | 40.5 | 38.28 | 42.59 |
| 5 | 05-May-21 | 618.58 | 924.88 | 896.79 | 960.77 | 412.06 | 401.14 | 424.63 | 40.92 | 38.76 | 43.42 |
| 6 | 06-May-21 | 627.12 | 924.6 | 897.68 | 953.18 | 411.63 | 401.41 | 422.27 | 40.85 | 38.81 | 42.96 |
| 7 | 07-May-21 | 608.25 | 920.82 | 885.71 | 958.64 | 411.01 | 398.3 | 423.73 | 40.8 | 38.22 | 43.24 |
| 8 | 08-May-21 | 592.93 | 916.26 | 890.14 | 947.14 | 409.78 | 399.65 | 420.8 | 40.52 | 38.47 | 42.68 |
| 9 | 09-May-21 | 583.82 | 909.13 | 882.86 | 931.41 | 407.32 | 397.2 | 416.39 | 40.04 | 38 | 41.86 |
| 10 | 10-May-21 | 608.5 | 926.13 | 898.48 | 949.88 | 412.94 | 401.92 | 421.75 | 41.09 | 38.92 | 42.87 |
| 11 | 11-May-21 | 621.34 | 919.27 | 903.26 | 940.54 | 409.7 | 402.98 | 418.77 | 40.46 | 39.24 | 42.29 |
| 12 | 12-May-21 | 624.43 | 926.24 | 895.18 | 952.25 | 412.3 | 401.01 | 422.19 | 41.01 | 38.74 | 42.97 |
| 13 | 13-May-21 | 602.81 | 918.36 | 893.25 | 937.36 | 410.26 | 399.94 | 416.85 | 40.59 | 38.53 | 41.92 |
| 14 | 14-May-21 | 620.8 | 925.37 | 889.03 | 950.24 | 412.21 | 398.77 | 421.26 | 41 | 38.3 | 42.76 |
| 15 | 15-May-21 | 578.65 | 904.66 | 830.62 | 932.46 | 405.92 | 383.22 | 416.53 | 39.7 | 35.32 | 41.84 |
| 16 | 16-May-21 | 300.03 | 832.66 | 799.24 | 858.32 | 385.76 | 375.77 | 394.93 | 35.91 | 34.06 | 37.69 |
| 17 | 17-May-21 | Unit in shutdown condition | | | | | | | | | |
| 18 | 18-May-21 | Unit in shutdown condition | | | | | | | | | |
| 19 | 19-May-21 | Unit in shutdown condition | | | | | | | | | |
| 20 | 20-May-21 | Unit in shutdown condition | | | | | | | | | |
| 21 | 21-May-21 | Unit in shutdown condition | | | | | | | | | |
| 22 | 22-May-21 | Unit in shutdown condition | | | | | | | | | |
| 23 | 23-May-21 | Unit in shutdown condition | | | | | | | | | |
| 24 | 24-May-21 | Unit in shutdown condition | | | | | | | | | |
| 25 | 25-May-21 | Unit in shutdown condition | | | | | | | | | |
| 26 | 26-May-21 | Unit in shutdown condition | | | | | | | | | |
| 27 | 27-May-21 | Unit in shutdown condition | | | | | | | | | |
| 28 | 28-May-21 | Unit in shutdown condition | | | | | | | | | |
| 29 | 29-May-21 | Unit in shutdown condition | | | | | | | | | |
| 30 | 30-May-21 | Unit in shutdown condition | | | | | | | | | |
| 31 | 31-May-21 | Unit in shutdown condition | | | | | | | | | |

## CEMS DAYWISE VALUES FOR THE MONTH OF JUN '2021

| S.NO. | DATE | UNIT# 1 LOAD(MW) | UNIT# 1 SOX(mg/nm3) | | | UNIT# 1 NOX(mg/nm3) | | | UNIT# 1 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 2 | 02-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 3 | 03-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 4 | 04-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 5 | 05-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 6 | 06-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 7 | 07-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 8 | 08-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 9 | 09-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 10 | 10-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 11 | 11-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 12 | 12-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 13 | 13-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 14 | 14-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 15 | 15-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 16 | 16-Jun-21 | 265.77 | 840.19 | 794.57 | 919.39 | 387.32 | 373.85 | 412.32 | 36.13 | 33.53 | 41.03 |
| 17 | 17-Jun-21 | 475.21 | 864.63 | 811.63 | 929.28 | 394.24 | 378.49 | 414.69 | 37.46 | 34.42 | 41.48 |
| 18 | 18-Jun-21 | 551.94 | 893.48 | 813.5 | 944.86 | 402.7 | 379.16 | 420.13 | 39.19 | 34.56 | 42.55 |
| 19 | 19-Jun-21 | 495.86 | 871.71 | 797.72 | 938.88 | 396.83 | 373.14 | 417.73 | 37.94 | 33.07 | 42.07 |
| 20 | 20-Jun-21 | 516.18 | 875.73 | 795.56 | 946.56 | 397.33 | 372.02 | 420.16 | 38.11 | 33.13 | 42.55 |
| 21 | 21-Jun-21 | 571.88 | 900.49 | 841.96 | 937.6 | 404.68 | 386.47 | 417.26 | 39.51 | 35.93 | 42.07 |
| 22 | 22-Jun-21 | 599.13 | 919.2 | 816.12 | 952.14 | 410.72 | 380.32 | 421.86 | 40.73 | 35.28 | 42.88 |
| 23 | 23-Jun-21 | 527.63 | 895.16 | 800.26 | 946.93 | 403.68 | 373.9 | 420.1 | 39.3 | 33.51 | 42.53 |
| 24 | 24-Jun-21 | 561.38 | 896.81 | 841.55 | 952.98 | 403.69 | 386.36 | 422.36 | 39.33 | 35.93 | 42.98 |
| 25 | 25-Jun-21 | 583.12 | 910.81 | 855.22 | 949.05 | 407.88 | 391.15 | 420.83 | 40.17 | 36.87 | 42.68 |
| 26 | 26-Jun-21 | 578.25 | 903.8 | 845.45 | 942.1 | 405.6 | 387.16 | 419.48 | 39.69 | 36.23 | 42.43 |
| 27 | 27-Jun-21 | 489.96 | 865.31 | 799.12 | 912.28 | 394.52 | 373.14 | 409.47 | 37.53 | 33.35 | 40.46 |
| 28 | 28-Jun-21 | 532.63 | 886.41 | 795.88 | 942.89 | 400.53 | 372.16 | 419.34 | 38.73 | 33.16 | 42.4 |
| 29 | 29-Jun-21 | 598.65 | 916.39 | 881.11 | 946.51 | 409.75 | 396.9 | 420.15 | 40.47 | 37.66 | 42.55 |
| 30 | 30-Jun-21 | 567.91 | 900.9 | 866.52 | 947.36 | 404.78 | 392.59 | 420.51 | 39.53 | 37.11 | 42.62 |

## CEMS DAYWISE VALUES FOR THE MONTH OF JUL '2021

| S.NO. | DATE | UNIT# 1 LOAD(MW) | UNIT# 1 SOX(mg/nm3) | | | UNIT# 1 NOX(mg/nm3) | | | UNIT# 1 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Jul-21 | 632.28 | 928.08 | 885.22 | 961.91 | 412.76 | 399.38 | 425.19 | 41.04 | 38.46 | 43.54 |
| 2 | 02-Jul-21 | 633.51 | 927.4 | 905.47 | 952.98 | 412.47 | 403.79 | 422.53 | 41 | 39.28 | 43.02 |
| 3 | 03-Jul-21 | 594.54 | 911.38 | 873.49 | 948.85 | 407.95 | 394.56 | 420.83 | 40.15 | 37.45 | 42.74 |
| 4 | 04-Jul-21 | 642.68 | 931.64 | 900.68 | 956.87 | 413.74 | 402.06 | 423.01 | 41.26 | 38.93 | 43.1 |
| 5 | 05-Jul-21 | 612.7 | 915.07 | 888.55 | 935.01 | 408.54 | 398.94 | 416.84 | 40.19 | 38.34 | 41.91 |
| 6 | 06-Jul-21 | 621.43 | 927.65 | 894.23 | 957.56 | 413 | 400.38 | 423.52 | 41.11 | 38.61 | 43.2 |
| 7 | 07-Jul-21 | 606.88 | 922.03 | 888.52 | 944.68 | 411.48 | 398.77 | 420.24 | 40.86 | 38.3 | 42.61 |
| 8 | 08-Jul-21 | 611.42 | 921.28 | 888.87 | 951.99 | 411.03 | 401.81 | 421.5 | 40.75 | 38.89 | 42.8 |
| 9 | 09-Jul-21 | 641.06 | 934.7 | 894.43 | 961.68 | 414.87 | 400.36 | 425.15 | 41.45 | 38.61 | 43.53 |
| 10 | 10-Jul-21 | 607.51 | 917.17 | 887.1 | 942.64 | 409.66 | 399.87 | 418.29 | 40.48 | 38.65 | 42.18 |
| 11 | 11-Jul-21 | 539.44 | 894.36 | 806.85 | 951.25 | 403.73 | 375.72 | 422.11 | 39.3 | 33.86 | 42.94 |
| 12 | 12-Jul-21 | 510.57 | 877.51 | 800.82 | 934.74 | 398.21 | 373.58 | 416.06 | 38.27 | 33.43 | 42.11 |
| 13 | 13-Jul-21 | 517.82 | 882.52 | 805.78 | 956.11 | 400.03 | 375.41 | 423.15 | 38.62 | 33.79 | 43.13 |
| 14 | 14-Jul-21 | 445.22 | 853.94 | 799.39 | 922.12 | 391.96 | 373.17 | 411.79 | 37.05 | 33.35 | 40.9 |
| 15 | 15-Jul-21 | 493.91 | 873.29 | 802.62 | 923.75 | 397.12 | 374.63 | 414 | 38.09 | 33.65 | 41.37 |
| 16 | 16-Jul-21 | 538.82 | 886.87 | 795.76 | 931.5 | 400.67 | 372.36 | 415.46 | 38.78 | 33.2 | 41.63 |
| 17 | 17-Jul-21 | 550.57 | 891.64 | 824.2 | 936.69 | 402.02 | 383.36 | 417.74 | 39.04 | 35.54 | 42.09 |
| 18 | 18-Jul-21 | 452.84 | 856.35 | 805.85 | 932.49 | 392.73 | 375.97 | 416.04 | 37.21 | 33.92 | 41.75 |
| 19 | 19-Jul-21 | 406.43 | 842.09 | 801.7 | 925.62 | 388.42 | 374.18 | 413.55 | 36.38 | 33.75 | 41.26 |
| 20 | 20-Jul-21 | 395.02 | 833.31 | 799.2 | 865.11 | 385.48 | 373.38 | 395.64 | 35.83 | 33.4 | 37.98 |
| 21 | 21-Jul-21 | 367.12 | 822.05 | 795.42 | 856.86 | 382.28 | 371.86 | 393.62 | 35.18 | 33.09 | 37.4 |
| 22 | 22-Jul-21 | 393.54 | 830.96 | 794.34 | 940.04 | 384.55 | 371.95 | 417.78 | 35.64 | 33.12 | 42.08 |
| 23 | 23-Jul-21 | 476.03 | 866.07 | 803.21 | 933.64 | 394.92 | 374.91 | 416.47 | 37.65 | 33.7 | 41.83 |
| 24 | 24-Jul-21 | 468.69 | 855.38 | 804.55 | 917.83 | 391.5 | 375.72 | 410.5 | 37 | 33.87 | 40.36 |
| 25 | 25-Jul-21 | 448.63 | 845.38 | 794.4 | 915.69 | 388.54 | 371.58 | 408.71 | 36.38 | 33.04 | 40.27 |
| 26 | 26-Jul-21 | 441.76 | 854.9 | 797.05 | 940.42 | 392.2 | 372.67 | 418.9 | 37.07 | 33.17 | 42.32 |
| 27 | 27-Jul-21 | 482.97 | 863.33 | 800.81 | 929.74 | 394.05 | 374.14 | 415.91 | 37.46 | 33.55 | 41.74 |
| 28 | 28-Jul-21 | 462.05 | 858 | 803.37 | 925.71 | 392.64 | 375.1 | 413.44 | 37.21 | 33.74 | 41.23 |
| 29 | 29-Jul-21 | 474.29 | 862.87 | 806.76 | 913.81 | 393.74 | 375.87 | 410.48 | 37.41 | 33.89 | 40.91 |
| 30 | 30-Jul-21 | 465.57 | 858.36 | 794.16 | 924.75 | 392.67 | 371.58 | 414.49 | 37.22 | 33.04 | 41.47 |
| 31 | 31-Jul-21 | 472.34 | 865.99 | 810.78 | 937.33 | 395 | 377.81 | 417.29 | 37.61 | 34.28 | 41.99 |

## CEMS DAYWISE VALUES FOR THE MONTH OF AUG '2021

| S.NO. | DATE | UNIT# 1 LOAD(MW) | UNIT# 1 SOX(mg/nm3) | | | UNIT# 1 NOX(mg/nm3) | | | UNIT# 1 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Aug-21 | 513.32 | 886.8 | 804.68 | 944.07 | 401.09 | 375.83 | 420.07 | 38.79 | 33.89 | 42.55 |
| 2 | 02-Aug-21 | 611.01 | 918.57 | 885.76 | 948.04 | 409.9 | 398.6 | 420.41 | 40.5 | 38.28 | 42.59 |
| 3 | 03-Aug-21 | 618.58 | 924.88 | 896.79 | 960.77 | 412.06 | 401.14 | 424.63 | 40.92 | 38.76 | 43.42 |
| 4 | 04-Aug-21 | 627.12 | 924.6 | 897.68 | 953.18 | 411.63 | 401.41 | 422.27 | 40.85 | 38.81 | 42.96 |
| 5 | 05-Aug-21 | 552.02 | 930.7 | 901.22 | 958.88 | 381.25 | 370.71 | 392.54 | 44.68 | 42.21 | 47.48 |
| 6 | 06-Aug-21 | 548.71 | 934.63 | 901.9 | 955.88 | 383.08 | 370.57 | 391.09 | 45.15 | 42.12 | 47.08 |
| 7 | 07-Aug-21 | 579.94 | 947.71 | 909.93 | 973.41 | 387.07 | 373.16 | 396.89 | 45.99 | 42.67 | 48.35 |
| 8 | 08-Aug-21 | 606.66 | 949.38 | 929.38 | 973.13 | 415.6 | 406.7 | 426.71 | 40.73 | 39 | 42.93 |
| 9 | 09-Aug-21 | 584.06 | 944 | 923.33 | 964.9 | 414.42 | 404.36 | 423.96 | 40.6 | 38.55 | 42.43 |
| 10 | 10-Aug-21 | 544.43 | 923.42 | 905.77 | 941.61 | 406.77 | 398.37 | 415.34 | 39.15 | 37.46 | 40.82 |
| 11 | 11-Aug-21 | 566.97 | 939.77 | 915.27 | 969.33 | 395.26 | 386.17 | 406.44 | 42.87 | 40.79 | 45.47 |
| 12 | 12-Aug-21 | 627.34 | 955.99 | 932.81 | 986.94 | 417.56 | 407.46 | 431.29 | 41.11 | 39.34 | 43.77 |
| 13 | 13-Aug-21 | 618.85 | 953.14 | 928.97 | 978.56 | 416.64 | 406.08 | 428.2 | 40.88 | 38.65 | 43.19 |
| 14 | 14-Aug-21 | 633.28 | 957.93 | 901.39 | 982.48 | 418.19 | 397.71 | 429.79 | 41.2 | 37.38 | 43.5 |
| 15 | 15-Aug-21 | 178.73 | 863.67 | 839.59 | 875.65 | 388.79 | 378.18 | 393.89 | 35.9 | 33.87 | 36.93 |
| 16 | 16-Aug-21 | 543.12 | 927.21 | 904.04 | 953.85 | 391.04 | 382.2 | 401.74 | 42 | 39.91 | 44.72 |
| 17 | 17-Aug-21 | 602.81 | 918.36 | 893.25 | 937.36 | 410.26 | 399.94 | 416.85 | 40.59 | 38.53 | 41.92 |
| 18 | 18-Aug-21 | 620.8 | 925.37 | 889.03 | 950.24 | 412.21 | 398.77 | 421.26 | 41 | 38.3 | 42.76 |
| 19 | 19-Aug-21 | 578.65 | 904.66 | 830.62 | 932.46 | 405.92 | 383.22 | 416.53 | 39.7 | 35.32 | 41.84 |
| 20 | 20-Aug-21 | 592.93 | 916.26 | 890.14 | 947.14 | 409.78 | 399.65 | 420.8 | 40.52 | 38.47 | 42.68 |
| 21 | 21-Aug-21 | 583.82 | 909.13 | 882.86 | 931.41 | 407.32 | 397.2 | 416.39 | 40.04 | 38 | 41.86 |
| 22 | 22-Aug-21 | 608.5 | 926.13 | 898.48 | 949.88 | 412.94 | 401.92 | 421.75 | 41.09 | 38.92 | 42.87 |
| 23 | 23-Aug-21 | 537.63 | 928.29 | 886.96 | 973.27 | 391.64 | 376.97 | 407.67 | 42.22 | 39.1 | 45.48 |
| 24 | 24-Aug-21 | 570.2 | 947.38 | 916.49 | 969.23 | 398.1 | 385.75 | 406.27 | 43.49 | 40.42 | 45.39 |
| 25 | 25-Aug-21 | Unit in shutdown condition | | | | | | | | | |
| 26 | 26-Aug-21 | Unit in shutdown condition | | | | | | | | | |
| 27 | 27-Aug-21 | Unit in shutdown condition | | | | | | | | | |
| 28 | 28-Aug-21 | Unit in shutdown condition | | | | | | | | | |
| 29 | 29-Aug-21 | Unit in shutdown condition | | | | | | | | | |
| 30 | 30-Aug-21 | Unit in shutdown condition | | | | | | | | | |
| 31 | 31-Aug-21 | Unit in shutdown condition | | | | | | | | | |

## CEMS DAYWISE VALUES FOR THE MONTH OF SEP '2021

| S.NO. | DATE | UNIT# 1 LOAD(MW) | UNIT# 1 SOX(mg/nm3) | | | UNIT# 1 NOX(mg/nm3) | | | UNIT# 1 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 2 | 02-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 3 | 03-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 4 | 04-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 5 | 05-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 6 | 06-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 7 | 07-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 8 | 08-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 9 | 09-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 10 | 10-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 11 | 11-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 12 | 12-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 13 | 13-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 14 | 14-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 15 | 15-Sep-21 | 183.47 | 845.64 | 790.3 | 878.29 | 300.41 | 278.51 | 329.99 | 36.36 | 33.02 | 38.86 |
| 16 | 16-Sep-21 | 448.61 | 856.79 | 802.04 | 904.98 | 305.52 | 271.37 | 344.58 | 37.13 | 33.26 | 40.31 |
| 17 | 17-Sep-21 | 408.45 | 838.54 | 806.76 | 871.08 | 311.65 | 275.11 | 341.57 | 36.14 | 33.9 | 38.43 |
| 18 | 18-Sep-21 | 418.69 | 845.24 | 810.42 | 869.21 | 318.52 | 287.78 | 344.4 | 36.52 | 34.1 | 38.39 |
| 19 | 19-Sep-21 | 449.08 | 857.31 | 828.07 | 882.14 | 309.17 | 281.42 | 343.78 | 37.16 | 35 | 39.04 |
| 20 | 20-Sep-21 | 436.76 | 850.23 | 830.76 | 869.22 | 311.56 | 270.98 | 344.74 | 36.78 | 35.2 | 38.26 |
| 21 | 21-Sep-21 | 461.33 | 862.83 | 816.3 | 892.1 | 304.46 | 270.66 | 341.45 | 37.47 | 34.25 | 39.66 |
| 22 | 22-Sep-21 | 472.18 | 864.17 | 801.1 | 894.42 | 307.02 | 270.98 | 343.41 | 37.51 | 33.54 | 39.87 |
| 23 | 23-Sep-21 | 520.81 | 879.05 | 821.6 | 917.4 | 298.4 | 270.08 | 343.2 | 38.19 | 34.68 | 40.86 |
| 24 | 24-Sep-21 | 478.2 | 860.12 | 797.86 | 896.1 | 312.82 | 272.79 | 343.89 | 37.17 | 33.31 | 39.85 |
| 25 | 25-Sep-21 | 471.79 | 864.21 | 811.66 | 896.47 | 305.2 | 270.97 | 343.68 | 37.52 | 34.23 | 39.9 |
| 26 | 26-Sep-21 | 478.31 | 865.08 | 827.82 | 901.36 | 304.19 | 270.76 | 344.58 | 37.59 | 35.26 | 40.08 |
| 27 | 27-Sep-21 | 480.3 | 870.11 | 825.77 | 910.98 | 307.65 | 278.68 | 342.21 | 37.96 | 35.15 | 40.45 |
| 28 | 28-Sep-21 | 465.76 | 856.51 | 820.9 | 895.01 | 298.84 | 270.86 | 343.57 | 36.99 | 34.74 | 39.74 |
| 29 | 29-Sep-21 | 465.2 | 857.22 | 802.78 | 887.94 | 312.45 | 270.72 | 344.39 | 37 | 33.59 | 39.32 |
| 30 | 30-Sep-21 | 546.67 | 897.38 | 854.23 | 923.16 | 299.32 | 270.43 | 335.34 | 39.4 | 36.44 | 41.26 |

## CEMS DAYWISE VALUES FOR THE MONTH OF APR '2021

| S.NO. | DATE | UNIT# 2 LOAD(MW) | UNIT# 2 SOX(mg/nm3) | | | UNIT# 2 NOX(mg/nm3) | | | UNIT# 2 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-May-21 | 576 | 944 | 909 | 970 | 278 | 263 | 291 | 46 | 43 | 48 |
| 2 | 02-May-21 | 619 | 960 | 917 | 995 | 283 | 266 | 298 | 45 | 43 | 48 |
| 3 | 03-May-21 | 594 | 953 | 913 | 988 | 282 | 265 | 296 | 46 | 43 | 49 |
| 4 | 04-May-21 | 638 | 964 | 939 | 996 | 283 | 273 | 299 | 45 | 43 | 46 |
| 5 | 05-May-21 | 650 | 972 | 948 | 992 | 287 | 275 | 296 | 47 | 45 | 49 |
| 6 | 06-May-21 | 626 | 958 | 931 | 987 | 282 | 270 | 294 | 46 | 44 | 49 |
| 7 | 07-May-21 | 610 | 958 | 928 | 979 | 283 | 269 | 293 | 47 | 44 | 49 |
| 8 | 08-May-21 | 591 | 934 | 878 | 981 | 270 | 245 | 293 | 43 | 38 | 49 |
| 9 | 09-May-21 | 554 | 913 | 883 | 951 | 259 | 246 | 276 | 41 | 38 | 44 |
| 10 | 10-May-21 | 569 | 922 | 890 | 945 | 263 | 248 | 273 | 42 | 39 | 44 |
| 11 | 11-May-21 | 571 | 925 | 897 | 948 | 264 | 250 | 275 | 42 | 39 | 44 |
| 12 | 12-May-21 | 618 | 940 | 912 | 971 | 268 | 255 | 281 | 43 | 40 | 45 |
| 13 | 13-May-21 | 585 | 928 | 897 | 949 | 265 | 251 | 275 | 42 | 39 | 44 |
| 14 | 14-May-21 | 607 | 935 | 902 | 971 | 266 | 252 | 281 | 42 | 40 | 45 |
| 15 | 15-May-21 | 637 | 939 | 919 | 973 | 266 | 258 | 283 | 42 | 41 | 46 |
| 16 | 16-May-21 | 595 | 933 | 908 | 952 | 266 | 254 | 276 | 42 | 40 | 44 |
| 17 | 17-May-21 | 610 | 940 | 912 | 971 | 269 | 255 | 281 | 43 | 40 | 45 |
| 18 | 18-May-21 | 639 | 945 | 914 | 971 | 269 | 255 | 281 | 43 | 40 | 45 |
| 19 | 19-May-21 | 617 | 938 | 919 | 962 | 267 | 258 | 279 | 42 | 41 | 45 |
| 20 | 20-May-21 | 619 | 935 | 918 | 960 | 265 | 257 | 278 | 42 | 40 | 45 |
| 21 | 21-May-21 | 646 | 949 | 927 | 976 | 271 | 259 | 284 | 43 | 41 | 46 |
| 22 | 22-May-21 | 638 | 952 | 927 | 973 | 273 | 260 | 283 | 43 | 41 | 46 |
| 23 | 23-May-21 | 614 | 933 | 909 | 957 | 265 | 254 | 276 | 42 | 40 | 44 |
| 24 | 24-May-21 | 615 | 939 | 904 | 974 | 268 | 253 | 282 | 43 | 40 | 45 |
| 25 | 25-May-21 | 604 | 930 | 905 | 960 | 264 | 253 | 279 | 42 | 40 | 45 |
| 26 | 26-May-21 | 640 | 949 | 924 | 976 | 271 | 259 | 283 | 43 | 41 | 46 |
| 27 | 27-May-21 | 648 | 949 | 928 | 976 | 271 | 260 | 284 | 43 | 41 | 46 |
| 28 | 28-May-21 | 598 | 925 | 896 | 960 | 263 | 250 | 278 | 42 | 39 | 45 |
| 29 | 29-May-21 | 582 | 929 | 898 | 949 | 266 | 252 | 275 | 42 | 39 | 44 |
| 30 | 30-May-21 | 586 | 927 | 897 | 950 | 264 | 250 | 275 | 42 | 39 | 44 |

## CEMS DAYWISE VALUES FOR THE MONTH OF MAY '2021

| S.NO. | DATE | UNIT# 2 LOAD(MW) | UNIT# 2 SOX(mg/nm3) | | | UNIT# 2 NOX(mg/nm3) | | | UNIT# 2 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-May-21 | 640.41 | 966.64 | 940.84 | 997.12 | 403.2 | 394.06 | 414.84 | 44.09 | 41.96 | 46.93 |
| 2 | 02-May-21 | 619.65 | 962.59 | 934.81 | 995.24 | 402.34 | 391.65 | 414.4 | 44.05 | 41.41 | 46.76 |
| 3 | 03-May-21 | 625.69 | 962.94 | 919.57 | 991.84 | 402.16 | 386.65 | 413.35 | 43.9 | 40.55 | 46.59 |
| 4 | 04-May-21 | 620.42 | 962.46 | 932.67 | 975.06 | 402.31 | 390.75 | 407.04 | 44.03 | 41.74 | 45.45 |
| 5 | 05-May-21 | 631.57 | 959.26 | 938.84 | 984.94 | 400.57 | 392.77 | 410.52 | 43.42 | 41.62 | 46.04 |
| 6 | 06-May-21 | 634.47 | 966.05 | 935.75 | 986.44 | 403.26 | 391.59 | 411.07 | 44.15 | 41.34 | 46.01 |
| 7 | 07-May-21 | 621.74 | 960.95 | 936.18 | 990 | 401.64 | 392.09 | 412.69 | 43.82 | 41.49 | 46.44 |
| 8 | 08-May-21 | 616.74 | 957.42 | 936.43 | 985.56 | 400.43 | 392.04 | 411.28 | 43.62 | 41.51 | 46.2 |
| 9 | 09-May-21 | 618.9 | 959.96 | 935.65 | 985.08 | 401.41 | 391.76 | 410.95 | 43.85 | 41.45 | 46.08 |
| 10 | 10-May-21 | 629.67 | 963.88 | 938.69 | 989.43 | 402.51 | 392.59 | 412.35 | 43.99 | 41.54 | 46.4 |
| 11 | 11-May-21 | 590.65 | 949.23 | 889 | 987.84 | 398.22 | 378.54 | 411.84 | 43.34 | 39.71 | 46.24 |
| 12 | 12-May-21 | 449.75 | 902.64 | 881.52 | 923.25 | 383.94 | 375.7 | 392.04 | 41.07 | 39.05 | 43.03 |
| 13 | 13-May-21 | Unit in shutdown condition | | | | | | | | | |
| 14 | 14-May-21 | Unit in shutdown condition | | | | | | | | | |
| 15 | 15-May-21 | Unit in shutdown condition | | | | | | | | | |
| 16 | 16-May-21 | 257.32 | 871.71 | 838.65 | 928.06 | 375.07 | 362.48 | 393.84 | 39.91 | 37.26 | 43.44 |
| 17 | 17-May-21 | 440.24 | 893.54 | 840.07 | 976.46 | 381.24 | 362.84 | 407.1 | 40.65 | 36.9 | 45 |
| 18 | 18-May-21 | 611.14 | 958.57 | 887.91 | 992.54 | 401.04 | 379.86 | 412.9 | 43.84 | 40.55 | 46.27 |
| 19 | 19-May-21 | 626.92 | 965.32 | 939.52 | 990.84 | 403.2 | 392.76 | 412.81 | 44.2 | 41.78 | 46.46 |
| 20 | 20-May-21 | 640.57 | 970.84 | 942.54 | 992.51 | 404.89 | 393.89 | 413.35 | 44.49 | 41.8 | 46.51 |
| 21 | 21-May-21 | 631.36 | 955.31 | 931.04 | 983.7 | 399.08 | 390.31 | 410.03 | 43.14 | 41.2 | 45.79 |
| 22 | 22-May-21 | 632.16 | 958.12 | 938.49 | 990.47 | 400.14 | 392.5 | 412.69 | 43.38 | 41.52 | 46.39 |
| 23 | 23-May-21 | 615.5 | 957.97 | 930.21 | 994.55 | 400.78 | 390.4 | 413.84 | 43.73 | 41.34 | 46.54 |
| 24 | 24-May-21 | 636.98 | 971.09 | 947.8 | 994.6 | 405.14 | 395.95 | 414.13 | 44.57 | 42.3 | 46.69 |
| 25 | 25-May-21 | 642.02 | 969.67 | 943.48 | 992.61 | 404.39 | 394.15 | 413.39 | 44.32 | 41.83 | 46.61 |
| 26 | 26-May-21 | 600.98 | 949.94 | 923.86 | 976.41 | 398.14 | 388.17 | 407.25 | 43.21 | 40.87 | 45.71 |
| 27 | 27-May-21 | 584.37 | 950.12 | 924.48 | 972.2 | 398.68 | 388.35 | 407.38 | 43.52 | 40.95 | 45.64 |
| 28 | 28-May-21 | 622.04 | 956.76 | 922.9 | 989.77 | 399.84 | 387.7 | 412.47 | 43.37 | 40.73 | 46.35 |
| 29 | 29-May-21 | 648.55 | 969.04 | 943.07 | 1000 | 403.93 | 394.48 | 415.95 | 44.12 | 42.06 | 47.01 |
| 30 | 30-May-21 | 625.31 | 960.04 | 934.41 | 988.27 | 401.22 | 391.63 | 412.06 | 43.73 | 41.49 | 46.31 |
| 31 | 31-May-21 | 633.5 | 966.01 | 937.88 | 993.44 | 403.23 | 392.86 | 413.32 | 44.13 | 41.78 | 46.43 |

## CEMS DAYWISE VALUES FOR THE MONTH OF JUN '2021

| S.NO. | DATE | UNIT# 2 LOAD(MW) | UNIT# 2 SOX(mg/nm3) | | | UNIT# 2 NOX(mg/nm3) | | | UNIT# 2 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Jun-21 | 641.64 | 968.05 | 946.63 | 995.45 | 403.74 | 395.1 | 414.43 | 44.14 | 41.73 | 46.76 |
| 2 | 02-Jun-21 | 627.37 | 968.44 | 940.74 | 990.3 | 404.43 | 393.72 | 412.9 | 44.52 | 41.52 | 46.52 |
| 3 | 03-Jun-21 | 630.22 | 969.33 | 933.66 | 994.03 | 404.68 | 391.12 | 414.01 | 44.51 | 41.33 | 46.69 |
| 4 | 04-Jun-21 | 642.82 | 966.5 | 943.36 | 999.43 | 403.09 | 394.18 | 415.63 | 44 | 42 | 46.94 |
| 5 | 05-Jun-21 | 633.26 | 963.63 | 948.32 | 981.93 | 402.35 | 396.6 | 409.9 | 43.94 | 42.38 | 45.87 |
| 6 | 06-Jun-21 | 631.53 | 964.65 | 938.62 | 989.24 | 402.72 | 392.84 | 412.23 | 44.01 | 41.63 | 46.41 |
| 7 | 07-Jun-21 | 635.99 | 966.91 | 943.88 | 990.15 | 403.52 | 394.1 | 412.55 | 44.18 | 41.76 | 46.35 |
| 8 | 08-Jun-21 | 634.06 | 965.87 | 939.6 | 987.16 | 403.17 | 392.71 | 411.34 | 44.12 | 41.5 | 46.05 |
| 9 | 09-Jun-21 | 641.71 | 967.62 | 948.81 | 991.22 | 403.56 | 395.96 | 413.04 | 44.08 | 42.11 | 46.55 |
| 10 | 10-Jun-21 | 602.19 | 951.63 | 875.09 | 985.52 | 398.75 | 375.33 | 411.04 | 43.35 | 39.59 | 46.07 |
| 11 | 11-Jun-21 | 644.46 | 973.98 | 943.29 | 996.27 | 405.98 | 394.36 | 414.57 | 44.7 | 41.87 | 46.74 |
| 12 | 12-Jun-21 | 646.75 | 974.55 | 947.95 | 996.71 | 406.17 | 395.24 | 414.75 | 44.7 | 41.9 | 46.34 |
| 13 | 13-Jun-21 | 634.16 | 963.57 | 939.34 | 989.79 | 402.22 | 393 | 412.61 | 43.85 | 41.68 | 46.43 |
| 14 | 14-Jun-21 | 646.28 | 969.84 | 945.2 | 988.48 | 404.28 | 394.79 | 411.98 | 44.23 | 41.7 | 46.26 |
| 15 | 15-Jun-21 | 643.56 | 970.21 | 946.91 | 994.37 | 404.56 | 395.69 | 414.14 | 44.33 | 42.2 | 46.72 |
| 16 | 16-Jun-21 | 618.83 | 959.28 | 923.05 | 985.02 | 401.14 | 391.66 | 410.89 | 43.72 | 41.4 | 46.05 |
| 17 | 17-Jun-21 | 618.72 | 955 | 879.14 | 993.25 | 399.48 | 374.66 | 413.48 | 43.37 | 38.76 | 46.5 |
| 18 | 18-Jun-21 | 637.24 | 972.82 | 953.72 | 994.86 | 405.79 | 398.7 | 414.06 | 44.7 | 42.68 | 46.62 |
| 19 | 19-Jun-21 | 632.91 | 965.54 | 922.56 | 998.25 | 403 | 387.71 | 415.31 | 44.05 | 40.78 | 46.9 |
| 20 | 20-Jun-21 | 602.41 | 954.52 | 843.89 | 992.65 | 399.94 | 363.98 | 413.42 | 43.67 | 37.08 | 46.57 |
| 21 | 21-Jun-21 | 618.79 | 961.44 | 921.75 | 987.6 | 401.98 | 387.37 | 411.87 | 43.96 | 40.69 | 46.28 |
| 22 | 22-Jun-21 | 648.61 | 967.55 | 942.94 | 993.56 | 403.29 | 394.36 | 413.84 | 44 | 42.01 | 46.66 |
| 23 | 23-Jun-21 | 641.05 | 970.67 | 928.32 | 996.71 | 404.87 | 391.21 | 414.79 | 44.47 | 41.67 | 46.8 |
| 24 | 24-Jun-21 | 647.72 | 970.99 | 944.78 | 997.9 | 404.75 | 394.71 | 414.93 | 44.39 | 41.86 | 46.74 |
| 25 | 25-Jun-21 | 628.37 | 958.21 | 927.62 | 991.61 | 400.4 | 389.2 | 412.48 | 43.54 | 40.99 | 46.41 |
| 26 | 26-Jun-21 | 633.78 | 967.28 | 934.91 | 995.63 | 403.63 | 391.36 | 414.41 | 44.2 | 41.32 | 46.72 |
| 27 | 27-Jun-21 | 633.69 | 961.78 | 934.11 | 990.9 | 401.57 | 391.32 | 412.69 | 43.69 | 41.39 | 46.34 |
| 28 | 28-Jun-21 | 602.15 | 955.16 | 933.46 | 979.46 | 400.08 | 392.09 | 408.93 | 43.69 | 41.73 | 45.73 |
| 29 | 29-Jun-21 | 595.78 | 952.03 | 919.61 | 976.22 | 398.97 | 386.91 | 408.15 | 43.43 | 40.69 | 45.73 |
| 30 | 30-Jun-21 | 632.01 | 965.39 | 931.35 | 991.64 | 402.92 | 390.29 | 412.93 | 44.04 | 41.15 | 46.39 |

## CEMS DAYWISE VALUES FOR THE MONTH OF JUL '2021

| S.NO. | DATE | UNIT# 2 LOAD(MW) | UNIT# 2 SOX(mg/nm3) | | | UNIT# 2 NOX(mg/nm3) | | | UNIT# 2 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Jul-21 | 645.18 | 967.04 | 939.72 | 991.23 | 403.22 | 392.78 | 412.71 | 44.01 | 41.53 | 46.39 |
| 2 | 02-Jul-21 | 614.12 | 959.42 | 933.34 | 983.66 | 401.4 | 390.93 | 410.78 | 43.89 | 41.26 | 45.98 |
| 3 | 03-Jul-21 | 633.6 | 964.3 | 942.09 | 995.8 | 402.49 | 393.95 | 414.42 | 43.94 | 41.98 | 46.71 |
| 4 | 04-Jul-21 | 644.55 | 969.04 | 941.45 | 995.86 | 404.03 | 393.3 | 414.38 | 44.19 | 41.61 | 46.68 |
| 5 | 05-Jul-21 | 645.82 | 970.58 | 945.31 | 994.74 | 404.63 | 395.01 | 414.2 | 44.37 | 42.08 | 46.71 |
| 6 | 06-Jul-21 | 622.94 | 954.46 | 925.79 | 988.03 | 399.07 | 388.64 | 412.12 | 43.24 | 40.91 | 46.37 |
| 7 | 07-Jul-21 | 139.5 | 939.8 | 882.81 | 985.96 | 394.45 | 375.55 | 411.41 | 42.41 | 38.82 | 46.22 |
| 8 | 08-Jul-21 | Unit in shutdown condition | | | | | | | | | |
| 9 | 09-Jul-21 | Unit in shutdown condition | | | | | | | | | |
| 10 | 10-Jul-21 | Unit in shutdown condition | | | | | | | | | |
| 11 | 11-Jul-21 | 413.41 | 941.04 | 868.87 | 970.57 | 395.39 | 374.36 | 405.98 | 42.82 | 39.12 | 45.36 |
| 12 | 12-Jul-21 | 591.36 | 947.94 | 878.76 | 988.39 | 397.5 | 377.71 | 411.8 | 43.18 | 40.45 | 46.15 |
| 13 | 13-Jul-21 | 612.61 | 958.66 | 897.45 | 987.87 | 401.18 | 383.9 | 412.1 | 43.84 | 40.4 | 46.38 |
| 14 | 14-Jul-21 | 574.12 | 940.44 | 864.77 | 981.42 | 395.31 | 372.64 | 409.49 | 42.81 | 39.78 | 45.89 |
| 15 | 15-Jul-21 | 607.93 | 954.3 | 920.67 | 981.03 | 399.56 | 387.5 | 409.68 | 43.51 | 40.88 | 45.95 |
| 16 | 16-Jul-21 | 589.28 | 946.25 | 889.15 | 993.78 | 396.86 | 378.59 | 413.56 | 42.98 | 39.72 | 46.48 |
| 17 | 17-Jul-21 | 627.17 | 960.15 | 937.58 | 984.45 | 401.21 | 393.28 | 410.69 | 43.71 | 42 | 46.01 |
| 18 | 18-Jul-21 | 595.29 | 944.76 | 847.63 | 990.53 | 396.27 | 366.13 | 412.95 | 42.87 | 37.8 | 46.53 |
| 19 | 19-Jul-21 | 488.13 | 904.73 | 838.51 | 984.52 | 384.52 | 362.45 | 410.19 | 41.15 | 36.8 | 45.86 |
| 20 | 20-Jul-21 | 460.36 | 893.88 | 840.52 | 960.32 | 380.54 | 362.92 | 403.34 | 40.2 | 36.9 | 44.87 |
| 21 | 21-Jul-21 | 453.56 | 893.08 | 835.52 | 989.98 | 380.91 | 361.5 | 412.1 | 40.48 | 36.71 | 46.13 |
| 22 | 22-Jul-21 | 459.56 | 900.95 | 845.28 | 987.89 | 383.42 | 364.86 | 411.51 | 40.99 | 37.39 | 46.05 |
| 23 | 23-Jul-21 | 563.58 | 932.97 | 835.57 | 982.35 | 392.79 | 361.15 | 409.18 | 42.35 | 36.51 | 45.6 |
| 24 | 24-Jul-21 | 533.22 | 921.43 | 847 | 984.39 | 389.27 | 365.27 | 409.84 | 41.76 | 37.41 | 46 |
| 25 | 25-Jul-21 | 546.14 | 936.67 | 859.66 | 1000 | 395.05 | 370.75 | 415.96 | 43.06 | 38.9 | 47 |
| 26 | 26-Jul-21 | 546.18 | 934.26 | 845.23 | 996.16 | 394.09 | 364.28 | 414.45 | 42.87 | 37.08 | 46.68 |
| 27 | 27-Jul-21 | 591.6 | 947.64 | 883.47 | 996.47 | 397.58 | 377.41 | 414.63 | 43.19 | 39.74 | 46.75 |
| 28 | 28-Jul-21 | 569.55 | 941.17 | 896.66 | 972.65 | 395.63 | 383.28 | 407.46 | 42.89 | 40.79 | 45.63 |
| 29 | 29-Jul-21 | 589.64 | 945.08 | 915.25 | 981.84 | 396.48 | 385.4 | 409.39 | 42.93 | 40.38 | 45.92 |
| 30 | 30-Jul-21 | 554.33 | 937.03 | 900.88 | 964.55 | 394.57 | 381.32 | 405.01 | 42.82 | 39.84 | 45.25 |
| 31 | 31-Jul-21 | 528.53 | 927.41 | 867.32 | 960.57 | 391.76 | 372.55 | 403.72 | 42.37 | 38.99 | 45.02 |

**CEMS DAYWISE VALUES FOR THE MONTH OF AUG '2021**

| S.NO. | DATE | UNIT# 2 LOAD(MW) | UNIT# 2 SOX(mg/nm3) | | | UNIT# 2 NOX(mg/nm3) | | | UNIT# 2 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Aug-21 | 520.65 | 922.5 | 867.3 | 943.2 | 390 | 374.3 | 398.4 | 42.02 | 39.9 | 44.16 |
| 2 | 02-Aug-21 | 520.56 | 920.9 | 886.2 | 959.1 | 389.4 | 377.1 | 403.1 | 41.88 | 39.3 | 44.86 |
| 3 | 03-Aug-21 | 494.4 | 911.2 | 873.4 | 948.8 | 386.3 | 372.8 | 400.2 | 41.37 | 38.4 | 44.5 |
| 4 | 04-Aug-21 | 547.23 | 934.2 | 889.3 | 961.2 | 393.4 | 378.5 | 403.2 | 42.48 | 39.7 | 44.78 |
| 5 | 05-Aug-21 | 546.21 | 932.68 | 900.5 | 967.7 | 393.17 | 381.21 | 405.86 | 42.56 | 39.82 | 45.34 |
| 6 | 06-Aug-21 | 515.96 | 920.06 | 899.63 | 943.95 | 389.19 | 381.18 | 398.85 | 41.86 | 39.55 | 44.31 |
| 7 | 07-Aug-21 | 529.89 | 930.89 | 899.91 | 956.71 | 392.94 | 380.91 | 402.52 | 42.64 | 39.73 | 44.81 |
| 8 | 08-Aug-21 | 545.1 | 931.34 | 906.85 | 955.58 | 392.62 | 382.78 | 402.19 | 42.38 | 40.4 | 44.81 |
| 9 | 09-Aug-21 | 568.16 | 940.75 | 905.96 | 970.16 | 395.56 | 383.09 | 406.3 | 42.92 | 40.2 | 45.29 |
| 10 | 10-Aug-21 | 565.68 | 938.42 | 906.16 | 973.22 | 394.6 | 382.72 | 406.78 | 42.65 | 39.85 | 45.45 |
| 11 | 11-Aug-21 | 566.97 | 939.77 | 915.27 | 969.33 | 395.26 | 386.17 | 406.44 | 42.87 | 40.79 | 45.47 |
| 12 | 12-Aug-21 | 553.81 | 930.35 | 898.58 | 962.7 | 392.04 | 380.4 | 403.94 | 42.24 | 39.61 | 45.01 |
| 13 | 13-Aug-21 | 545.03 | 934.07 | 901.63 | 962.86 | 393.66 | 381.36 | 403.99 | 42.62 | 39.77 | 45.03 |
| 14 | 14-Aug-21 | 564.57 | 943.1 | 916.41 | 968.77 | 396.59 | 386.67 | 406.29 | 43.22 | 40.93 | 45.45 |
| 15 | 15-Aug-21 | 557.57 | 937.8 | 903.05 | 967.95 | 394.78 | 381.89 | 406.06 | 42.85 | 39.9 | 45.42 |
| 16 | 16-Aug-21 | 543.12 | 927.21 | 904.04 | 953.85 | 391.04 | 382.2 | 401.74 | 42 | 39.91 | 44.72 |
| 17 | 17-Aug-21 | 561.96 | 937.53 | 905.69 | 964.3 | 394.42 | 382.66 | 403.96 | 42.66 | 40 | 44.71 |
| 18 | 18-Aug-21 | 514.59 | 921.58 | 896.33 | 948.25 | 389.97 | 380.83 | 400.11 | 42.1 | 39.97 | 44.49 |
| 19 | 19-Aug-21 | 517.32 | 919.1 | 894.4 | 955 | 388.7 | 379.4 | 402.2 | 41.73 | 39.5 | 44.83 |
| 20 | 20-Aug-21 | 550.06 | 933.5 | 901.7 | 962 | 393.1 | 383 | 403.3 | 42.44 | 40.7 | 44.62 |
| 21 | 21-Aug-21 | 513.94 | 923.1 | 886.5 | 954 | 390.6 | 377.7 | 401.1 | 42.28 | 39.5 | 44.43 |
| 22 | 22-Aug-21 | 520.8 | 921.3 | 901.2 | 947.7 | 389.4 | 381.9 | 399.7 | 41.85 | 40 | 44.37 |
| 23 | 23-Aug-21 | 537.63 | 928.3 | 887 | 973.3 | 391.6 | 377 | 407.7 | 42.22 | 39.1 | 45.48 |
| 24 | 24-Aug-21 | 570.2 | 947.4 | 916.5 | 969.2 | 398.1 | 385.8 | 406.3 | 43.49 | 40.4 | 45.39 |
| 25 | 25-Aug-21 | 606.68 | 956.3 | 932.6 | 984.4 | 400.3 | 390.6 | 411 | 43.73 | 41.2 | 46.15 |
| 26 | 26-Aug-21 | 529.84 | 922 | 886.3 | 957.4 | 389.7 | 376.9 | 402.8 | 41.88 | 39.1 | 44.87 |
| 27 | 27-Aug-21 | 581.91 | 950.2 | 913.6 | 979.3 | 398.6 | 385 | 408.7 | 43.48 | 40.4 | 45.67 |
| 28 | 28-Aug-21 | 180.42 | 936.4 | 822 | 992.1 | 393.7 | 357.4 | 413 | 42.39 | 36 | 46.38 |
| 29 | 29-Aug-21 | Unit in shutdown condition | | | | | | | | | |
| 30 | 30-Aug-21 | Unit in shutdown condition | | | | | | | | | |
| 31 | 31-Aug-21 | Unit in shutdown condition | | | | | | | | | |

**CEMS DAYWISE VALUES FOR THE MONTH OF SEP '2021**

| S.NO. | DATE | UNIT# 2 LOAD(MW) | UNIT# 2 SOX(mg/nm3) | | | UNIT# 2 NOX(mg/nm3) | | | UNIT# 2 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Sep-21 | 179.58 | 920.52 | 873.72 | 946.57 | 294.99 | 279.82 | 306.79 | 41.85 | 39.85 | 44.19 |
| 2 | 02-Sep-21 | 563.07 | 932.38 | 912.47 | 949.3 | 297.67 | 272.8 | 330.5 | 42.6 | 40.33 | 44.97 |
| 3 | 03-Sep-21 | 591.87 | 930.96 | 900.91 | 949.42 | 299.26 | 272.32 | 329.2 | 42.92 | 40.73 | 44.81 |
| 4 | 04-Sep-21 | 564.87 | 927.04 | 900.6 | 949.37 | 298.6 | 272.26 | 329.69 | 42.8 | 39.89 | 44.7 |
| 5 | 05-Sep-21 | 601.41 | 932.05 | 906 | 949.28 | 307.54 | 274.75 | 331.68 | 43.41 | 41.21 | 44.98 |
| 6 | 06-Sep-21 | 593.89 | 926.67 | 904.02 | 945.72 | 307.39 | 273.97 | 329.62 | 42.97 | 40.13 | 44.88 |
| 7 | 07-Sep-21 | 595.76 | 931.48 | 905.53 | 946.65 | 309.23 | 274.38 | 329.03 | 43.31 | 40.83 | 44.99 |
| 8 | 08-Sep-21 | 513.12 | 903.68 | 843.38 | 939.87 | 307.36 | 276.33 | 331.53 | 41.43 | 37.18 | 44.76 |
| 9 | 09-Sep-21 | 531.73 | 907.78 | 839.51 | 944.18 | 296.7 | 272.89 | 329.04 | 42.13 | 36.67 | 44.95 |
| 10 | 10-Sep-21 | 515.17 | 907.57 | 838.54 | 945.88 | 301.23 | 273 | 329.55 | 41.69 | 36.77 | 44.93 |
| 11 | 11-Sep-21 | 563.84 | 928.57 | 882.76 | 949.5 | 304.31 | 272.69 | 328.04 | 42.42 | 39.53 | 44.65 |
| 12 | 12-Sep-21 | 555.34 | 922.52 | 900.88 | 946.6 | 300.53 | 275.3 | 331.67 | 42.5 | 39.84 | 44.64 |
| 13 | 13-Sep-21 | 559.58 | 932.06 | 901.24 | 948.68 | 303.49 | 276.48 | 328.59 | 42.6 | 39.72 | 44.9 |
| 14 | 14-Sep-21 | 586.4 | 929.1 | 900.84 | 946.52 | 299.31 | 274.84 | 330.14 | 42.94 | 40.26 | 44.99 |
| 15 | 15-Sep-21 | 530.5 | 923.7 | 893.2 | 947.2 | 296.5 | 272.9 | 322.3 | 42 | 39.3 | 44.44 |
| 16 | 16-Sep-21 | 465.28 | 901.4 | 852.4 | 931.7 | 293.4 | 273 | 323.5 | 41.02 | 37.3 | 43.21 |
| 17 | 17-Sep-21 | 425.47 | 884.3 | 863.9 | 917.5 | 302.1 | 273.8 | 328.9 | 39.97 | 37.7 | 42.79 |
| 18 | 18-Sep-21 | 422.64 | 883.5 | 854.4 | 908.5 | 296.4 | 272.7 | 330.7 | 40.02 | 37.6 | 42.51 |
| 19 | 19-Sep-21 | 462.27 | 904.5 | 878.4 | 931.8 | 303.3 | 277.3 | 331.1 | 41.28 | 39.3 | 43.15 |
| 20 | 20-Sep-21 | 456.22 | 898 | 867.5 | 920.7 | 305.6 | 275.6 | 329.4 | 40.85 | 38.3 | 43.13 |
| 21 | 21-Sep-21 | 481.1 | 905.8 | 868.5 | 936.1 | 301.2 | 274.6 | 326 | 41.11 | 38.3 | 43.9 |
| 22 | 22-Sep-21 | 496.24 | 908.3 | 877.8 | 946.4 | 302.3 | 273.1 | 328.2 | 41.04 | 38.7 | 44.41 |
| 23 | 23-Sep-21 | 525.36 | 920.2 | 896.2 | 941.2 | 303.8 | 274.1 | 331.4 | 41.65 | 39.5 | 43.99 |
| 24 | 24-Sep-21 | 499.71 | 911.5 | 880.2 | 946.8 | 304.9 | 272.9 | 331.7 | 41.41 | 39 | 44.39 |
| 25 | 25-Sep-21 | 502.13 | 917.7 | 878 | 943.5 | 296.1 | 274.9 | 330.7 | 41.9 | 38.6 | 44.23 |
| 26 | 26-Sep-21 | 496.68 | 912.5 | 885.2 | 942.5 | 304.8 | 282.1 | 328.2 | 41.93 | 39.4 | 44.74 |
| 27 | 27-Sep-21 | 507.5 | 916.9 | 877.9 | 944.7 | 297 | 272.4 | 327.2 | 41.99 | 38.7 | 44.34 |
| 28 | 28-Sep-21 | 499.83 | 917 | 872 | 939.8 | 295.7 | 272.5 | 325.7 | 41.87 | 39.8 | 44.11 |
| 29 | 29-Sep-21 | 458.42 | 896.4 | 868.1 | 926.4 | 294.2 | 273.3 | 325.4 | 40.71 | 38.1 | 43.1 |
| 30 | 30-Sep-21 | 537.39 | 927.8 | 901.9 | 947.2 | 300.4 | 273.4 | 330.5 | 42.91 | 40.2 | 44.94 |

## CEMS DAYWISE VALUES FOR THE MONTH OF APR '2021

| S.NO. | DATE | UNIT# 3 LOAD(MW) | UNIT# 3 SOX(mg/nm3) | | | UNIT# 3 NOX(mg/nm3) | | | UNIT# 3 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Apr-21 | 496 | 896 | 841 | 950 | 277 | 260 | 295 | 45 | 41 | 48 |
| 2 | 02-Apr-21 | 562 | 883 | 826 | 944 | 273 | 254 | 293 | 44 | 40 | 48 |
| 3 | 03-Apr-21 | 639 | 894 | 823 | 937 | 275 | 253 | 290 | 45 | 40 | 48 |
| 4 | 04-Apr-21 | 632 | 906 | 837 | 942 | 279 | 257 | 292 | 45 | 41 | 48 |
| 5 | 05-Apr-21 | 581 | 890 | 830 | 941 | 274 | 255 | 292 | 44 | 41 | 48 |
| 6 | 06-Apr-21 | 592 | 889 | 829 | 939 | 274 | 255 | 291 | 44 | 41 | 47 |
| 7 | 07-Apr-21 | 563 | 884 | 826 | 945 | 273 | 254 | 293 | 44 | 40 | 48 |
| 8 | 08-Apr-21 | 561 | 883 | 835 | 931 | 273 | 257 | 288 | 44 | 41 | 47 |
| 9 | 09-Apr-21 | 579 | 879 | 830 | 934 | 271 | 256 | 290 | 44 | 41 | 48 |
| 10 | 10-Apr-21 | 564 | 896 | 838 | 944 | 277 | 258 | 293 | 45 | 41 | 48 |
| 11 | 11-Apr-21 | 597 | 906 | 844 | 946 | 280 | 260 | 293 | 45 | 42 | 48 |
| 12 | 12-Apr-21 | 471 | 915 | 839 | 945 | 283 | 258 | 293 | 46 | 41 | 48 |
| 13 | 13-Apr-21 | 454 | 896 | 840 | 947 | 276 | 258 | 294 | 45 | 41 | 48 |
| 14 | 14-Apr-21 | 435 | 908 | 851 | 948 | 280 | 261 | 294 | 45 | 42 | 48 |
| 15 | 15-Apr-21 | 506 | 923 | 897 | 944 | 285 | 274 | 293 | 44 | 42 | 46 |
| 16 | 16-Apr-21 | 544 | 912 | 851 | 941 | 281 | 262 | 291 | 46 | 43 | 48 |
| 17 | 17-Apr-21 | 517 | 901 | 837 | 946 | 278 | 257 | 293 | 45 | 41 | 48 |
| 18 | 18-Apr-21 | 545 | 910 | 846 | 945 | 281 | 261 | 293 | 46 | 42 | 48 |
| 19 | 19-Apr-21 | 583 | 906 | 828 | 945 | 279 | 254 | 293 | 45 | 41 | 48 |
| 20 | 20-Apr-21 | 595 | 914 | 859 | 950 | 282 | 265 | 295 | 46 | 43 | 48 |
| 21 | 21-Apr-21 | 585 | 905 | 843 | 939 | 279 | 259 | 291 | 45 | 41 | 48 |
| 22 | 22-Apr-21 | 552 | 908 | 842 | 933 | 279 | 258 | 288 | 45 | 41 | 47 |
| 23 | 23-Apr-21 | 559 | 919 | 874 | 947 | 283 | 270 | 294 | 46 | 44 | 48 |
| 24 | 24-Apr-21 | 548 | 916 | 866 | 946 | 283 | 268 | 293 | 46 | 43 | 48 |
| 25 | 25-Apr-21 | 568 | 915 | 897 | 944 | 281 | 274 | 293 | 46 | 44 | 48 |
| 26 | 26-Apr-21 | 569 | 906 | 840 | 946 | 279 | 258 | 293 | 45 | 41 | 48 |
| 27 | 27-Apr-21 | 555 | 894 | 832 | 949 | 275 | 255 | 294 | 45 | 41 | 48 |
| 28 | 28-Apr-21 | 556 | 905 | 839 | 944 | 279 | 259 | 293 | 45 | 41 | 48 |
| 29 | 29-Apr-21 | 570 | 916 | 878 | 949 | 282 | 269 | 294 | 46 | 43 | 48 |
| 30 | 30-Apr-21 | 599 | 907 | 840 | 946 | 279 | 259 | 293 | 45 | 41 | 48 |

## CEMS DAYWISE VALUES FOR THE MONTH OF MAY '2021

| S.NO. | DATE | UNIT# 3 LOAD(MW) | UNIT# 3 SOX(mg/nm3) | | | UNIT# 3 NOX(mg/nm3) | | | UNIT# 3 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-May-21 | 647.44 | 970.1 | 946 | 995.6 | 396.1 | 386.8 | 406.2 | 43.14 | 41.3 | 45.2 |
| 2 | 02-May-21 | 646.98 | 968.4 | 934.3 | 999.6 | 395.5 | 382.9 | 407.5 | 43.09 | 40.5 | 45.5 |
| 3 | 03-May-21 | 654.26 | 974 | 939.6 | 1000 | 397.5 | 384.9 | 408.1 | 43.44 | 40.9 | 45.5 |
| 4 | 04-May-21 | 645.04 | 968.9 | 942 | 994.7 | 395.8 | 385.6 | 405.6 | 43.13 | 41 | 45.1 |
| 5 | 05-May-21 | 652.48 | 971.7 | 945.7 | 998.4 | 396.6 | 386.4 | 407 | 43.27 | 41.2 | 45 |
| 6 | 06-May-21 | 658.34 | 974 | 950.8 | 998.9 | 397.3 | 388 | 407.2 | 43.4 | 41.6 | 45.4 |
| 7 | 07-May-21 | 650.16 | 972.8 | 943.4 | 997.3 | 397.1 | 385.7 | 406.6 | 43.4 | 41.1 | 45.3 |
| 8 | 08-May-21 | 631.22 | 965.1 | 939.8 | 985.9 | 394.7 | 385 | 403.2 | 42.9 | 40.9 | 44.6 |
| 9 | 09-May-21 | 635.64 | 968.8 | 942 | 992.9 | 396 | 385.5 | 405.4 | 43.14 | 41 | 45 |
| 10 | 10-May-21 | 651.85 | 971.8 | 951.3 | 995.8 | 396.6 | 388.5 | 406.1 | 43.29 | 41.7 | 45.2 |
| 11 | 11-May-21 | 651.03 | 970.4 | 945.7 | 996.4 | 396.1 | 386.5 | 406.2 | 43.17 | 41.3 | 45.2 |
| 12 | 12-May-21 | 634.03 | 964.2 | 935.9 | 991.6 | 394.2 | 383.5 | 405 | 42.8 | 40.6 | 44.9 |
| 13 | 13-May-21 | 605.93 | 955.7 | 923.9 | 992.9 | 391.8 | 380.3 | 405.2 | 42.24 | 39.5 | 45 |
| 14 | 14-May-21 | 471 | 960 | 927 | 989.8 | 393.1 | 380.7 | 404.2 | 42.54 | 40 | 44.8 |
| 15 | 15-May-21 | Unit in shutdown condition | | | | | | | | | |
| 16 | 16-May-21 | Unit in shutdown condition | | | | | | | | | |
| 17 | 17-May-21 | Unit in shutdown condition | | | | | | | | | |
| 18 | 18-May-21 | 475.36 | 939.4 | 866.7 | 969.7 | 386.4 | 362.9 | 398 | 41.14 | 36.2 | 43.5 |
| 19 | 19-May-21 | 638.21 | 965.8 | 940.4 | 1000 | 394.7 | 384.9 | 407.7 | 42.91 | 40.9 | 45.5 |
| 20 | 20-May-21 | 639.23 | 970 | 947.2 | 993.9 | 396.4 | 387.9 | 405.7 | 43.19 | 41.3 | 45.1 |
| 21 | 21-May-21 | 630.24 | 960.9 | 926.8 | 986.1 | 393.1 | 380.5 | 403 | 42.61 | 40 | 44.7 |
| 22 | 22-May-21 | 643.03 | 968.2 | 945 | 990.2 | 395.5 | 386.4 | 404.5 | 43.03 | 41.2 | 44.8 |
| 23 | 23-May-21 | 636.83 | 967.9 | 938.5 | 996.3 | 395.7 | 384.1 | 406.2 | 43.05 | 40.7 | 45.5 |
| 24 | 24-May-21 | 632.81 | 963.5 | 943.2 | 990.3 | 394 | 385.7 | 404.5 | 42.72 | 41.1 | 44.8 |
| 25 | 25-May-21 | 643.17 | 964.8 | 947.2 | 989.4 | 394.1 | 387 | 403.9 | 42.76 | 41.4 | 44.7 |
| 26 | 26-May-21 | 644.76 | 973.9 | 944.1 | 993.9 | 397.7 | 385.9 | 405.5 | 43.52 | 41.6 | 45.1 |
| 27 | 27-May-21 | 645.2 | 973.4 | 942.2 | 997.8 | 397.5 | 385.3 | 407 | 43.44 | 41 | 45.4 |
| 28 | 28-May-21 | 647.21 | 976.5 | 944.7 | 996 | 398.7 | 386.9 | 406.2 | 43.65 | 41.3 | 45.2 |
| 29 | 29-May-21 | 638.95 | 964.9 | 944.7 | 986.5 | 394.4 | 386.3 | 402.9 | 42.79 | 41.1 | 44.5 |
| 30 | 30-May-21 | 630.8 | 962.1 | 941 | 989.7 | 393.5 | 384.9 | 404.1 | 42.62 | 40.9 | 44.8 |
| 31 | 31-May-21 | 636.17 | 969.6 | 934.6 | 992.4 | 396.3 | 382.9 | 405.2 | 43.22 | 40.5 | 45 |

## CEMS DAYWISE VALUES FOR THE MONTH OF JUN '2021

| S.NO. | DATE | UNIT# 3 LOAD(MW) | UNIT# 3 SOX(mg/nm3) | | | UNIT# 3 NOX(mg/nm3) | | | UNIT# 3 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Jun-21 | 639.91 | 968.6 | 941 | 989.4 | 395.8 | 384.9 | 404.1 | 43.08 | 40.9 | 44.8 |
| 2 | 02-Jun-21 | 631.67 | 968.8 | 940 | 988.7 | 396.2 | 384.7 | 403.9 | 43.17 | 40.9 | 44.7 |
| 3 | 03-Jun-21 | 630.53 | 966.9 | 944.4 | 988.8 | 395.4 | 385.9 | 404 | 42.98 | 41.1 | 44.7 |
| 4 | 04-Jun-21 | 635.21 | 961 | 934 | 992.3 | 392.9 | 382.7 | 405.1 | 42.52 | 40.5 | 45 |
| 5 | 05-Jun-21 | 648.67 | 969.8 | 946.7 | 997.4 | 396 | 386.9 | 406.5 | 43.17 | 41.3 | 45.3 |
| 6 | 06-Jun-21 | 645.98 | 965.9 | 941.4 | 999.8 | 394.5 | 385.1 | 407.5 | 42.87 | 41 | 45.5 |
| 7 | 07-Jun-21 | 651.08 | 968 | 947.6 | 994.3 | 395.2 | 386.9 | 405.7 | 42.92 | 41.4 | 45.1 |
| 8 | 08-Jun-21 | 645.25 | 966.1 | 948.1 | 991.8 | 394.6 | 387.5 | 405 | 42.88 | 41.5 | 45 |
| 9 | 09-Jun-21 | 644.13 | 969.3 | 945.1 | 993.6 | 395.9 | 386.2 | 405.5 | 43.09 | 41.3 | 45 |
| 10 | 10-Jun-21 | 606.89 | 958.6 | 863.1 | 994 | 393 | 362.5 | 405.7 | 42.47 | 36.1 | 45.1 |
| 11 | 11-Jun-21 | 644.1 | 970.5 | 945.6 | 994.8 | 396.4 | 386.9 | 406 | 43.22 | 41.3 | 45.2 |
| 12 | 12-Jun-21 | 640.08 | 966.9 | 938.9 | 994.3 | 395.1 | 384.2 | 405.7 | 42.97 | 40.8 | 45.1 |
| 13 | 13-Jun-21 | 638.1 | 969.6 | 941.4 | 992.1 | 396.3 | 385.2 | 405 | 43.21 | 41 | 45 |
| 14 | 14-Jun-21 | 650.03 | 971.2 | 947.3 | 992.7 | 396.5 | 387 | 405.1 | 43.25 | 41.4 | 45 |
| 15 | 15-Jun-21 | 646.28 | 973 | 944.4 | 997.7 | 397.3 | 386.2 | 406.9 | 43.42 | 41.2 | 45.3 |
| 16 | 16-Jun-21 | 629.99 | 963.1 | 897.8 | 994.2 | 394 | 373.8 | 405.4 | 42.73 | 38.4 | 45 |
| 17 | 17-Jun-21 | 644.14 | 965 | 948.6 | 991.9 | 394.2 | 387.5 | 404.9 | 42.81 | 41.5 | 44.9 |
| 18 | 18-Jun-21 | 646.52 | 970.7 | 948.3 | 995.5 | 396.4 | 388.1 | 406.2 | 43.21 | 41.5 | 45.2 |
| 19 | 19-Jun-21 | 625.18 | 958.5 | 922.1 | 987.3 | 392.3 | 379.3 | 403 | 42.43 | 39.7 | 44.9 |
| 20 | 20-Jun-21 | 608.8 | 951.3 | 871.3 | 989.7 | 390 | 365.8 | 403.9 | 41.89 | 36.7 | 44.7 |
| 21 | 21-Jun-21 | 637.66 | 968.9 | 942.1 | 989.1 | 396 | 385.5 | 404.1 | 43.17 | 41 | 44.8 |
| 22 | 22-Jun-21 | 653.24 | 976.4 | 953.2 | 995.3 | 398.5 | 389 | 406 | 43.66 | 41.9 | 45.2 |
| 23 | 23-Jun-21 | 638.36 | 963.6 | 917.9 | 992.5 | 393.9 | 378.7 | 404.7 | 42.69 | 39.2 | 44.9 |
| 24 | 24-Jun-21 | 641.7 | 967.7 | 932 | 995.4 | 395.3 | 382.6 | 406.1 | 42.99 | 40.4 | 45.2 |
| 25 | 25-Jun-21 | 630.78 | 960.8 | 910.4 | 996.5 | 392.9 | 375.4 | 406.5 | 42.54 | 38.9 | 45.3 |
| 26 | 26-Jun-21 | 638 | 963.6 | 934.9 | 994.8 | 393.9 | 383.5 | 405.6 | 42.71 | 40.6 | 45.1 |
| 27 | 27-Jun-21 | 630.36 | 963.8 | 936.1 | 996.9 | 394.2 | 383.4 | 406.6 | 42.8 | 40.6 | 45.3 |
| 28 | 28-Jun-21 | 627.82 | 966 | 942.5 | 990.9 | 395.1 | 385.7 | 404.5 | 42.94 | 40.9 | 44.8 |
| 29 | 29-Jun-21 | 617.59 | 958.3 | 929.3 | 984.4 | 392.4 | 381.5 | 402.2 | 42.43 | 40.5 | 44.4 |
| 30 | 30-Jun-21 | 644.11 | 973.8 | 943.4 | 998.1 | 398 | 386 | 407 | 43.55 | 41.1 | 45.4 |

## CEMS DAYWISE VALUES FOR THE MONTH OF JUL '2021

| S.NO. | DATE | UNIT# 3 LOAD(MW) | UNIT# 3 SOX(mg/nm3) | | | UNIT# 3 NOX(mg/nm3) | | | UNIT# 3 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Jul-21 | 644.4 | 967.8 | 943.4 | 994.9 | 395.3 | 385.6 | 406.1 | 43.03 | 41.1 | 45.2 |
| 2 | 02-Jul-21 | 646.96 | 970.8 | 947.3 | 997.5 | 396.4 | 387.2 | 406.8 | 43.2 | 41.4 | 45.3 |
| 3 | 03-Jul-21 | 649.23 | 977.3 | 939.4 | 997.9 | 398.9 | 384.5 | 406.8 | 43.76 | 41 | 45.3 |
| 4 | 04-Jul-21 | 651.38 | 975.4 | 951 | 994.9 | 398.1 | 388.2 | 406 | 43.59 | 41.6 | 45.2 |
| 5 | 05-Jul-21 | 640.78 | 967.4 | 939.9 | 990.1 | 395.2 | 384.9 | 404.5 | 42.94 | 40.9 | 44.8 |
| 6 | 06-Jul-21 | 644.45 | 967.6 | 943.7 | 985.2 | 395.2 | 386 | 402.3 | 42.98 | 41.1 | 44.4 |
| 7 | 07-Jul-21 | 650.45 | 973.6 | 951.4 | 998.2 | 397.4 | 388.6 | 407 | 43.45 | 41.6 | 45.4 |
| 8 | 08-Jul-21 | 647.84 | 970.1 | 945.5 | 991.2 | 396.1 | 386.4 | 404.5 | 43.14 | 41.2 | 44.9 |
| 9 | 09-Jul-21 | 646.42 | 965.2 | 943.9 | 985.5 | 394.2 | 386 | 402.3 | 42.78 | 41.1 | 44.3 |
| 10 | 10-Jul-21 | 646.73 | 969.6 | 945.1 | 990.7 | 396 | 386.2 | 404.4 | 43.16 | 41.2 | 44.8 |
| 11 | 11-Jul-21 | 616.63 | 959.4 | 916.3 | 986.9 | 393 | 377.3 | 403 | 42.53 | 39.3 | 44.6 |
| 12 | 12-Jul-21 | 615.82 | 954.3 | 884.8 | 990 | 390.9 | 370 | 403.9 | 42.14 | 37.9 | 44.7 |
| 13 | 13-Jul-21 | 618.1 | 956.1 | 895.7 | 996.3 | 391.6 | 374.1 | 406.5 | 42.23 | 38.4 | 45.3 |
| 14 | 14-Jul-21 | 573 | 939.4 | 840.6 | 979.2 | 386.5 | 354.3 | 400.8 | 41.11 | 34.4 | 44.1 |
| 15 | 15-Jul-21 | 626.14 | 960.5 | 937.1 | 986.3 | 393 | 383.8 | 403.2 | 42.51 | 40.7 | 44.6 |
| 16 | 16-Jul-21 | 607.37 | 949.9 | 873.7 | 993.9 | 389.5 | 365.3 | 405.7 | 41.75 | 36.7 | 45.1 |
| 17 | 17-Jul-21 | 634.37 | 970 | 942.3 | 997 | 396.5 | 387 | 406.7 | 43.26 | 41.4 | 45.3 |
| 18 | 18-Jul-21 | 610.46 | 958.9 | 879.6 | 999.1 | 393 | 366.9 | 407.2 | 42.54 | 37 | 45.4 |
| 19 | 19-Jul-21 | 499.38 | 913.7 | 837.9 | 993.7 | 379 | 352.9 | 405.4 | 39.53 | 34.1 | 45 |
| 20 | 20-Jul-21 | 475.38 | 909.7 | 836.5 | 994.4 | 377.7 | 352.5 | 405.6 | 39.24 | 34 | 45.1 |
| 21 | 21-Jul-21 | 453.7 | 895.3 | 840.1 | 984.4 | 373 | 353.9 | 402.4 | 38.24 | 34.3 | 44.4 |
| 22 | 22-Jul-21 | 463.62 | 904.4 | 841.5 | 994.6 | 375.9 | 354.4 | 405.8 | 38.87 | 34.4 | 45.1 |
| 23 | 23-Jul-21 | 564.74 | 934.4 | 849.5 | 990.8 | 384.9 | 357.6 | 404.2 | 40.75 | 35.1 | 44.7 |
| 24 | 24-Jul-21 | 542.8 | 927.9 | 839.5 | 990.9 | 382.9 | 353.6 | 404.4 | 40.34 | 34.3 | 44.8 |
| 25 | 25-Jul-21 | 560.26 | 931 | 837.3 | 990.2 | 383.7 | 352.7 | 404 | 40.54 | 34.1 | 44.8 |
| 26 | 26-Jul-21 | 553.96 | 932.4 | 844.1 | 997 | 384.3 | 355.3 | 406.5 | 40.73 | 34.6 | 45.3 |
| 27 | 27-Jul-21 | 602.13 | 952 | 885.3 | 984.4 | 390.6 | 368.7 | 401.7 | 41.97 | 37 | 44.5 |
| 28 | 28-Jul-21 | 577.05 | 944.1 | 888.6 | 980.5 | 388.2 | 368.7 | 401.7 | 41.49 | 37.5 | 44.2 |
| 29 | 29-Jul-21 | 596.8 | 946.7 | 921.8 | 985.5 | 388.4 | 379.2 | 402.9 | 41.55 | 39.7 | 44.6 |
| 30 | 30-Jul-21 | 564.55 | 940.4 | 915.5 | 965 | 387.1 | 376.9 | 396.7 | 41.24 | 39.2 | 43.2 |
| 31 | 31-Jul-21 | 547.08 | 930.6 | 858.3 | 959.9 | 383.8 | 361.1 | 394.5 | 40.54 | 35.8 | 42.7 |

## CEMS DAYWISE VALUES FOR THE MONTH OF AUG '2021

| S.NO. | DATE | UNIT# 2 LOAD(MW) | UNIT# 2 SOX(mg/nm3) | | | UNIT# 2 NOX(mg/nm3) | | | UNIT# 2 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Aug-21 | 539.42 | 921.2 | 851.6 | 956.4 | 380.3 | 358 | 393.7 | 39.81 | 35.1 | 42.4 |
| 2 | 02-Aug-21 | 524.77 | 920.2 | 884.5 | 958.8 | 380.4 | 367.7 | 394.5 | 39.79 | 37.2 | 42.7 |
| 3 | 03-Aug-21 | 529.56 | 924.6 | 892.9 | 954.4 | 381.7 | 369.9 | 392 | 40.18 | 37.7 | 42.5 |
| 4 | 04-Aug-21 | 557.38 | 935.9 | 902.7 | 962.8 | 385.5 | 373.2 | 396 | 40.86 | 38.4 | 43 |
| 5 | 05-Aug-21 | 529.47 | 922.4 | 894.7 | 956.1 | 381.1 | 370.5 | 394 | 39.98 | 37.9 | 42.6 |
| 6 | 06-Aug-21 | 515.06 | 919.8 | 898.7 | 946 | 380.5 | 372.4 | 390.8 | 39.77 | 37.9 | 41.8 |
| 7 | 07-Aug-21 | 525.62 | 922.5 | 899.7 | 943.5 | 381.2 | 373.1 | 389.7 | 40.01 | 38.1 | 41.7 |
| 8 | 08-Aug-21 | 561.22 | 937.7 | 904.1 | 968.9 | 386 | 373.6 | 397.4 | 41.01 | 38.5 | 43.4 |
| 9 | 09-Aug-21 | 552.27 | 938.3 | 901.2 | 965.3 | 386.7 | 372.7 | 396.8 | 41.13 | 38.3 | 43.2 |
| 10 | 10-Aug-21 | 581.35 | 951.8 | 912.4 | 982.2 | 391 | 376.6 | 401.8 | 42.06 | 39.1 | 44.6 |
| 11 | 11-Aug-21 | 575.97 | 940.5 | 912.2 | 975.8 | 386.8 | 376.4 | 399.4 | 41.27 | 39.1 | 44.3 |
| 12 | 12-Aug-21 | 588.57 | 947.9 | 910 | 973.4 | 389.2 | 375.3 | 398.7 | 41.71 | 38.9 | 43.6 |
| 13 | 13-Aug-21 | 563.64 | 932.8 | 907.4 | 964.8 | 384.2 | 374.4 | 396.7 | 40.66 | 38.7 | 43.2 |
| 14 | 14-Aug-21 | 579.83 | 947.5 | 918.1 | 973.2 | 389.3 | 377.8 | 399.1 | 41.72 | 39.4 | 43.7 |
| 15 | 15-Aug-21 | 571.62 | 941.2 | 919.3 | 965.8 | 387.1 | 378.2 | 397 | 41.28 | 39.5 | 43.2 |
| 16 | 16-Aug-21 | 549.97 | 932 | 915.6 | 959.3 | 384.2 | 377.4 | 395 | 40.63 | 39.3 | 42.8 |
| 17 | 17-Aug-21 | 568.86 | 941.7 | 921.9 | 963.3 | 387.3 | 379.6 | 395.2 | 41.34 | 39.8 | 42.9 |
| 18 | 18-Aug-21 | 555.45 | 934.4 | 875.1 | 965.2 | 385 | 364.7 | 396.7 | 40.84 | 37 | 43.2 |
| 19 | 19-Aug-21 | 570.53 | 936.7 | 911.9 | 962.7 | 385.3 | 376.3 | 395.4 | 40.92 | 39.1 | 42.9 |
| 20 | 20-Aug-21 | 591.75 | 953.1 | 911.9 | 975.5 | 391.2 | 376.9 | 399.8 | 42.17 | 39.5 | 43.9 |
| 21 | 21-Aug-21 | 567.97 | 934.9 | 904.8 | 964.4 | 384.9 | 373.7 | 396.3 | 40.78 | 38.5 | 43.1 |
| 22 | 22-Aug-21 | 529.21 | 928.3 | 902.5 | 954.4 | 383.5 | 373.4 | 393.1 | 40.43 | 38.6 | 42.2 |
| 23 | 23-Aug-21 | 534.39 | 933.3 | 905.3 | 953.5 | 385.2 | 374.3 | 392.4 | 40.83 | 38.9 | 42.3 |
| 24 | 24-Aug-21 | 582.06 | 948.8 | 919.2 | 973.6 | 389.6 | 378.3 | 399.3 | 41.79 | 39.5 | 43.7 |
| 25 | 25-Aug-21 | 608.95 | 950.5 | 927.5 | 984.4 | 389.6 | 381.1 | 402.8 | 41.82 | 40.1 | 44.5 |
| 26 | 26-Aug-21 | 569.31 | 940.9 | 909.7 | 978.9 | 387.2 | 375.4 | 400.8 | 41.23 | 38.9 | 44.1 |
| 27 | 27-Aug-21 | 585.21 | 947.3 | 921.3 | 966.5 | 389.1 | 378.9 | 397.2 | 41.67 | 39.6 | 43.1 |
| 28 | 28-Aug-21 | 643.69 | 971.5 | 951.4 | 993 | 396.8 | 388.7 | 405.3 | 43.32 | 41.3 | 45 |
| 29 | 29-Aug-21 | 646.95 | 968.1 | 945.8 | 991.9 | 395.3 | 386.5 | 404.8 | 42.99 | 41.1 | 45.1 |
| 30 | 30-Aug-21 | 644.73 | 964.8 | 935.8 | 996.1 | 394.1 | 383.3 | 405.8 | 42.78 | 40.9 | 45.2 |
| 31 | 31-Aug-21 | 625.51 | 961.9 | 938.2 | 992.1 | 393.6 | 384.1 | 404.7 | 42.64 | 40.7 | 44.9 |

## CEMS DAYWISE VALUES FOR THE MONTH OF SEP '2021

| S.NO. | DATE | UNIT# 3 LOAD(MW) | UNIT# 3 SOX(mg/nm3) | | | UNIT# 3 NOX(mg/nm3) | | | UNIT# 3 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Sep-21 | 623.75 | 932.7 | 905.6 | 950 | 306.8 | 281.7 | 339.4 | 42.57 | 40.4 | 44.7 |
| 2 | 02-Sep-21 | 598.92 | 929.8 | 902.5 | 949.8 | 304.2 | 280.6 | 333.1 | 41.99 | 39.6 | 44.1 |
| 3 | 03-Sep-21 | 605.5 | 925.2 | 900.4 | 942.8 | 310.4 | 282.2 | 338 | 42.29 | 39.5 | 44.7 |
| 4 | 04-Sep-21 | 588.51 | 929.4 | 903.9 | 947.7 | 314.7 | 284.3 | 336.9 | 41.65 | 39.6 | 43.4 |
| 5 | 05-Sep-21 | 618.87 | 927.1 | 902.3 | 949.6 | 312.3 | 281.4 | 338.6 | 42.63 | 40.6 | 44.6 |
| 6 | 06-Sep-21 | 602.74 | 925.6 | 900.1 | 949.6 | 312.6 | 281.3 | 339 | 41.9 | 40.1 | 44.1 |
| 7 | 07-Sep-21 | 576.35 | 926.9 | 904.7 | 948.5 | 310.2 | 283.5 | 337.7 | 41.01 | 38.7 | 44.2 |
| 8 | 08-Sep-21 | 529.48 | 911.2 | 842 | 945.3 | 302.9 | 280.5 | 329.5 | 39.8 | 34.4 | 43.5 |
| 9 | 09-Sep-21 | 542.13 | 911.2 | 845.2 | 948.4 | 314.9 | 281.5 | 339.2 | 40.47 | 34.9 | 44.4 |
| 10 | 10-Sep-21 | 522.9 | 906.1 | 852.8 | 948.4 | 309.5 | 281.6 | 339.2 | 40.2 | 35.3 | 43.8 |
| 11 | 11-Sep-21 | 570.15 | 924.5 | 898.2 | 946.5 | 313.4 | 282.6 | 339.9 | 41.25 | 38.3 | 44.1 |
| 12 | 12-Sep-21 | 552.33 | 929.5 | 904.6 | 948.8 | 309.4 | 280.3 | 338 | 40.78 | 38.6 | 43.8 |
| 13 | 13-Sep-21 | 566.97 | 925.2 | 900.7 | 941.2 | 316.8 | 285 | 339.5 | 40.93 | 38.8 | 43.6 |
| 14 | 14-Sep-21 | 593.69 | 928.9 | 900.1 | 949 | 312.6 | 281.7 | 339.1 | 41.78 | 39.7 | 44.1 |
| 15 | 15-Sep-21 | 516.32 | 911.4 | 886.4 | 947.5 | 311.1 | 282.3 | 336.4 | 39.35 | 37.3 | 42.2 |
| 16 | 16-Sep-21 | 477.57 | 905.4 | 874.7 | 937.8 | 308.5 | 280.5 | 335.2 | 38.9 | 36.7 | 41.3 |
| 17 | 17-Sep-21 | 413.15 | 881.9 | 855.2 | 909.6 | 305.2 | 282.7 | 331.7 | 37.4 | 35.4 | 39.1 |
| 18 | 18-Sep-21 | 418.55 | 883.2 | 845.6 | 911.8 | 301.6 | 280.3 | 328.8 | 37.4 | 34.8 | 39.4 |
| 19 | 19-Sep-21 | 468.75 | 903.6 | 865.6 | 934.4 | 311.3 | 283.8 | 337.8 | 38.78 | 35.9 | 41.1 |
| 20 | 20-Sep-21 | 472.5 | 903.3 | 877.3 | 934.1 | 310.8 | 285.9 | 338.6 | 38.79 | 36.7 | 41.2 |
| 21 | 21-Sep-21 | 463.94 | 896.4 | 866.4 | 920 | 308.1 | 285.2 | 337.9 | 38.26 | 36 | 40.5 |
| 22 | 22-Sep-21 | 501.8 | 919.2 | 882.7 | 947.3 | 304.2 | 281.8 | 338 | 39.93 | 37.2 | 42.1 |
| 23 | 23-Sep-21 | 543.96 | 930.1 | 911.9 | 948.2 | 304.4 | 281.7 | 332 | 40.68 | 39.1 | 42.3 |
| 24 | 24-Sep-21 | 519.78 | 920.3 | 897.5 | 937.7 | 314.5 | 283.6 | 339.8 | 40.32 | 38.1 | 42.4 |
| 25 | 25-Sep-21 | 513.68 | 917.9 | 891.4 | 949.2 | 307.8 | 280.4 | 338.9 | 39.79 | 37.7 | 42.6 |
| 26 | 26-Sep-21 | 478.76 | 905 | 876.8 | 932.9 | 308.6 | 281.3 | 339.2 | 38.84 | 36.5 | 41.2 |
| 27 | 27-Sep-21 | 492.21 | 910.6 | 883.2 | 942 | 318.3 | 281.8 | 339.7 | 39.27 | 37.2 | 41.6 |
| 28 | 28-Sep-21 | 494.85 | 911.2 | 855.6 | 938.6 | 310.2 | 280.2 | 338.7 | 39.31 | 35 | 42.1 |
| 29 | 29-Sep-21 | 516.31 | 914.9 | 874.2 | 946.9 | 308.9 | 281.2 | 338.9 | 39.77 | 36.6 | 43.9 |
| 30 | 30-Sep-21 | 542.31 | 920.2 | 891.2 | 939.9 | 308.5 | 281.3 | 337.7 | 40.63 | 37.7 | 44.6 |

| CEMS DAYWISE VALUES FOR THE MONTH OF APR '2021 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S.NO. | DATE | UNIT# 4 LOAD(MW) | UNIT# 4 SOX(mg/nm3) | | | UNIT# 4 NOX(mg/nm3) | | | UNIT# 4 DUST(mg/nm3) | | |
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Apr-21 | 500.8 | 916.4 | 881.8 | 942.5 | 270.3 | 256.0 | 282.5 | 44.0 | 41.2 | 46.5 |
| 2 | 02-Apr-21 | 483.2 | 911.3 | 893.1 | 942.5 | 269.1 | 260.3 | 282.5 | 43.8 | 42.1 | 46.5 |
| 3 | 03-Apr-21 | 483.4 | 910.9 | 879.8 | 932.8 | 268.8 | 254.0 | 278.9 | 43.8 | 40.8 | 45.8 |
| 4 | 04-Apr-21 | 462.5 | 902.5 | 880.3 | 939.5 | 266.4 | 255.5 | 281.8 | 43.3 | 41.0 | 46.4 |
| 5 | 05-Apr-21 | 555.5 | 938.2 | 881.0 | 981.5 | 276.4 | 256.3 | 293.1 | 45.3 | 41.3 | 48.6 |
| 6 | 06-Apr-21 | 577.8 | 941.2 | 901.7 | 983.1 | 277.2 | 264.3 | 292.6 | 45.4 | 42.9 | 48.5 |
| 7 | 07-Apr-21 | 582.4 | 943.9 | 915.6 | 971.5 | 277.7 | 264.9 | 290.7 | 45.5 | 43.0 | 48.1 |
| 8 | 08-Apr-21 | 542.3 | 925.2 | 876.1 | 963.4 | 271.8 | 253.5 | 289.3 | 44.4 | 40.7 | 47.9 |
| 9 | 09-Apr-21 | 532.4 | 926.5 | 893.1 | 955.4 | 273.1 | 258.0 | 286.5 | 44.6 | 41.6 | 47.3 |
| 10 | 10-Apr-21 | 561.3 | 941.0 | 906.8 | 977.2 | 277.8 | 263.4 | 292.3 | 45.5 | 43.0 | 48.5 |
| 11 | 11-Apr-21 | 552.4 | 929.1 | 876.8 | 967.3 | 272.7 | 254.0 | 288.7 | 44.6 | 40.8 | 47.7 |
| 12 | 12-Apr-21 | 552.8 | 935.9 | 913.1 | 966.4 | 276.1 | 264.0 | 289.6 | 45.2 | 42.8 | 47.9 |
| 13 | 13-Apr-21 | 540.7 | 926.8 | 900.6 | 957.0 | 272.5 | 260.3 | 286.2 | 44.5 | 42.1 | 47.2 |
| 14 | 14-Apr-21 | 552.4 | 942.6 | 891.4 | 965.8 | 279.5 | 259.6 | 289.4 | 45.9 | 41.9 | 47.9 |
| 15 | 15-Apr-21 | 572.8 | 942.4 | 916.7 | 968.3 | 277.9 | 267.2 | 289.8 | 45.6 | 43.4 | 48.0 |
| 16 | 16-Apr-21 | 542.5 | 930.5 | 895.1 | 961.6 | 274.3 | 263.2 | 287.9 | 44.8 | 42.6 | 47.6 |
| 17 | 17-Apr-21 | 582.4 | 949.5 | 917.1 | 978.8 | 280.4 | 266.8 | 292.9 | 46.1 | 43.4 | 48.6 |
| 18 | 18-Apr-21 | 564.2 | 940.8 | 887.5 | 969.0 | 277.3 | 259.8 | 290.3 | 45.5 | 42.0 | 48.1 |
| 19 | 19-Apr-21 | 519.7 | 921.0 | 872.6 | 978.2 | 271.4 | 252.1 | 291.9 | 44.3 | 40.4 | 48.8 |
| 20 | 20-Apr-21 | 552.1 | 929.3 | 875.8 | 983.2 | 273.3 | 253.1 | 294.5 | 44.6 | 40.6 | 49.0 |
| 21 | 21-Apr-21 | 565.3 | 934.3 | 876.6 | 992.3 | 274.5 | 253.8 | 296.7 | 44.9 | 40.5 | 49.3 |
| 22 | 22-Apr-21 | 570.9 | 945.4 | 897.0 | 982.6 | 279.5 | 261.1 | 293.9 | 45.8 | 42.2 | 48.8 |
| 23 | 23-Apr-21 | 585.1 | 949.1 | 919.4 | 971.0 | 280.2 | 265.9 | 290.9 | 46.0 | 43.2 | 47.9 |
| 24 | 24-Apr-21 | 570.7 | 942.1 | 899.2 | 972.3 | 277.9 | 261.0 | 291.4 | 45.6 | 42.2 | 48.3 |
| 25 | 25-Apr-21 | 559.2 | 938.9 | 882.2 | 978.9 | 277.3 | 255.7 | 292.5 | 45.5 | 41.1 | 48.5 |
| 26 | 26-Apr-21 | 596.1 | 945.2 | 927.0 | 971.6 | 277.4 | 269.0 | 291.5 | 45.5 | 43.8 | 48.3 |
| 27 | 27-Apr-21 | 613.5 | 959.8 | 935.6 | 984.7 | 283.3 | 273.3 | 294.2 | 46.7 | 44.7 | 48.8 |
| 28 | 28-Apr-21 | 571.7 | 936.9 | 892.7 | 974.6 | 275.4 | 259.6 | 289.3 | 45.1 | 41.9 | 47.9 |
| 29 | 29-Apr-21 | 540.2 | 929.8 | 901.5 | 959.3 | 274.0 | 261.8 | 287.3 | 44.8 | 42.2 | 47.5 |
| 30 | 30-Apr-21 | 571.6 | 938.8 | 909.5 | 973.2 | 276.2 | 264.9 | 291.1 | 45.2 | 43.3 | 47.8 |

| CEMS DAYWISE VALUES FOR THE MONTH OF MAY '2021 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S.NO. | DATE | UNIT# 4 LOAD(MW) | UNIT# 4 SOX(mg/nm3) | | | UNIT# 4 NOX(mg/nm3) | | | UNIT# 4 DUST(mg/nm3) | | |
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-May-21 | 493.03 | 908.2 | 854 | 961.8 | 402.4 | 383.7 | 422.3 | 38.4 | 34.9 | 42.4 |
| 2 | 02-May-21 | 511.37 | 920.5 | 855.7 | 976.4 | 407.1 | 384.7 | 427.7 | 39.2 | 35.1 | 42.65 |
| 3 | 03-May-21 | 509.78 | 919.1 | 851.2 | 961.1 | 406 | 381.3 | 422.5 | 39 | 34.4 | 42.32 |
| 4 | 04-May-21 | 593.88 | 944.3 | 917 | 965.7 | 414 | 401.9 | 423.8 | 40.4 | 38.1 | 42.37 |
| 5 | 05-May-21 | 601.57 | 944.6 | 926.6 | 963.6 | 413.6 | 404.8 | 423.2 | 40.4 | 38.6 | 42.14 |
| 6 | 06-May-21 | 606.66 | 949.4 | 929.4 | 973.1 | 415.6 | 406.7 | 426.7 | 40.7 | 39 | 42.93 |
| 7 | 07-May-21 | 584.06 | 944 | 923.3 | 964.9 | 414.4 | 404.4 | 424 | 40.6 | 38.6 | 42.43 |
| 8 | 08-May-21 | 544.43 | 923.4 | 905.8 | 941.6 | 406.8 | 398.4 | 415.3 | 39.2 | 37.5 | 40.82 |
| 9 | 09-May-21 | 543.82 | 925.1 | 903.9 | 946.8 | 407.5 | 397.4 | 418.1 | 39.3 | 37.3 | 41.39 |
| 10 | 10-May-21 | 578.46 | 939.3 | 917 | 960.7 | 412.3 | 402.2 | 422.6 | 40.2 | 38.2 | 42.19 |
| 11 | 11-May-21 | 588.94 | 942.2 | 914.6 | 969.2 | 413.1 | 401.5 | 424.7 | 40.2 | 37.7 | 42.54 |
| 12 | 12-May-21 | 575.56 | 937.5 | 919.1 | 956.8 | 411.6 | 402.8 | 420 | 40 | 38.2 | 41.64 |
| 13 | 13-May-21 | 627.34 | 956 | 932.8 | 986.9 | 417.6 | 407.5 | 431.3 | 41.1 | 39.3 | 43.77 |
| 14 | 14-May-21 | 618.85 | 953.1 | 929 | 978.6 | 416.6 | 406.1 | 428.2 | 40.9 | 38.7 | 43.19 |
| 15 | 15-May-21 | 633.28 | 957.9 | 901.4 | 982.5 | 418.2 | 397.7 | 429.8 | 41.2 | 37.4 | 43.5 |
| 16 | 16-May-21 | 178.73 | 863.7 | 839.6 | 875.7 | 388.8 | 378.2 | 393.9 | 35.9 | 33.9 | 36.93 |
| 17 | 17-May-21 | Unit in shutdown condition | | | | | | | | | |
| 18 | 18-May-21 | Unit in shutdown condition | | | | | | | | | |
| 19 | 19-May-21 | Unit in shutdown condition | | | | | | | | | |
| 20 | 20-May-21 | Unit in shutdown condition | | | | | | | | | |
| 21 | 21-May-21 | Unit in shutdown condition | | | | | | | | | |
| 22 | 22-May-21 | Unit in shutdown condition | | | | | | | | | |
| 23 | 23-May-21 | Unit in shutdown condition | | | | | | | | | |
| 24 | 24-May-21 | Unit in shutdown condition | | | | | | | | | |
| 25 | 25-May-21 | Unit in shutdown condition | | | | | | | | | |
| 26 | 26-May-21 | Unit in shutdown condition | | | | | | | | | |
| 27 | 27-May-21 | Unit in shutdown condition | | | | | | | | | |
| 28 | 28-May-21 | Unit in shutdown condition | | | | | | | | | |
| 29 | 29-May-21 | Unit in shutdown condition | | | | | | | | | |
| 30 | 30-May-21 | Unit in shutdown condition | | | | | | | | | |
| 31 | 31-May-21 | Unit in shutdown condition | | | | | | | | | |

## CEMS DAYWISE VALUES FOR THE MONTH OF JUN '2021

| S.NO. | DATE | UNIT# 4 LOAD(MW) | UNIT# 4 SOX(mg/nm3) | | | UNIT# 4 NOX(mg/nm3) | | | UNIT# 4 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 2 | 02-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 3 | 03-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 4 | 04-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 5 | 05-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 6 | 06-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 7 | 07-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 8 | 08-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 9 | 09-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 10 | 10-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 11 | 11-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 12 | 12-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 13 | 13-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 14 | 14-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 15 | 15-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 16 | 16-Jun-21 | 221.7 | 899.4 | 842 | 955.7 | 399 | 377.6 | 419.7 | 41.4 | 38.2 | 44.99 |
| 17 | 17-Jun-21 | 473.15 | 899.5 | 838.7 | 953.8 | 398.9 | 376.7 | 418.9 | 43 | 38.6 | 45.86 |
| 18 | 18-Jun-21 | 545.38 | 912.6 | 837.9 | 950.7 | 402.5 | 375.9 | 418.6 | 45.4 | 40.7 | 48.04 |
| 19 | 19-Jun-21 | 489.46 | 906.7 | 841.7 | 974.9 | 402.1 | 376.8 | 427.5 | 44 | 39.5 | 48.68 |
| 20 | 20-Jun-21 | 526.14 | 919.4 | 846.7 | 974.7 | 406 | 379.4 | 427.4 | 44.5 | 38.4 | 49.05 |
| 21 | 21-Jun-21 | 575.58 | 934.7 | 844.4 | 968.2 | 411.3 | 378.8 | 424.7 | 46 | 41.4 | 49.26 |
| 22 | 22-Jun-21 | 584.31 | 936.7 | 864.4 | 964 | 412.1 | 389 | 423.1 | 45.5 | 38.9 | 48.24 |
| 23 | 23-Jun-21 | 517.12 | 924.2 | 875.8 | 971.3 | 408.4 | 393.8 | 426.1 | 44.7 | 38.8 | 48.77 |
| 24 | 24-Jun-21 | 559.49 | 919.6 | 861.7 | 968.5 | 405.5 | 383.4 | 425.1 | 45.2 | 41.5 | 49.08 |
| 25 | 25-Jun-21 | 566.88 | 937.3 | 899.5 | 972.8 | 411.4 | 398.5 | 426.8 | 45.6 | 41.6 | 48.36 |
| 26 | 26-Jun-21 | 583.81 | 944.5 | 883.2 | 977.1 | 414.5 | 391 | 427.6 | 45.4 | 42.1 | 47.98 |
| 27 | 27-Jun-21 | 477.48 | 901.5 | 858.3 | 947.1 | 400.1 | 386 | 416.8 | 43.3 | 38.7 | 47.77 |
| 28 | 28-Jun-21 | 528.41 | 914.4 | 855.1 | 957.3 | 404.9 | 384.5 | 421.3 | 44.2 | 38.6 | 48.68 |
| 29 | 29-Jun-21 | 550.82 | 936.5 | 914.5 | 956.9 | 411.4 | 401.5 | 421.2 | 44.8 | 42.3 | 47.61 |
| 30 | 30-Jun-21 | 546.16 | 930.6 | 902.1 | 960.9 | 409.4 | 397.1 | 420.7 | 45.1 | 42.7 | 48.61 |

## CEMS DAYWISE VALUES FOR THE MONTH OF JUL '2021

| S.NO. | DATE | UNIT# 4 LOAD(MW) | UNIT# 4 SOX(mg/nm3) | | | UNIT# 4 NOX(mg/nm3) | | | UNIT# 4 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Jul-21 | 596.22 | 944.9 | 926.4 | 971.1 | 414.1 | 405.3 | 426 | 40.5 | 38.7 | 42.8 |
| 2 | 02-Jul-21 | 594.28 | 943.5 | 920.2 | 961 | 413.6 | 402.8 | 422 | 40.4 | 38.2 | 42.22 |
| 3 | 03-Jul-21 | 608.71 | 953.3 | 933.3 | 978.5 | 417.5 | 408.5 | 428.5 | 41.1 | 39.2 | 43.25 |
| 4 | 04-Jul-21 | 584.64 | 941.9 | 915.4 | 969.7 | 413.3 | 401.5 | 425.6 | 40.4 | 38 | 42.73 |
| 5 | 05-Jul-21 | 616.39 | 949.6 | 920.2 | 976.8 | 414.9 | 402.9 | 427.1 | 40.6 | 38.3 | 43.01 |
| 6 | 06-Jul-21 | 618.61 | 953 | 926 | 976.1 | 416.8 | 405.1 | 427.4 | 40.9 | 38.7 | 43.05 |
| 7 | 07-Jul-21 | 612.46 | 951.6 | 931.8 | 976.6 | 416.5 | 407 | 428.1 | 40.9 | 39.3 | 43.19 |
| 8 | 08-Jul-21 | 601.51 | 948.5 | 925.8 | 971.2 | 415.6 | 408.1 | 425.5 | 40.7 | 39.3 | 42.69 |
| 9 | 09-Jul-21 | 592.64 | 941.9 | 910.3 | 970.5 | 413 | 399.5 | 424.8 | 40.3 | 37.6 | 42.54 |
| 10 | 10-Jul-21 | 600.84 | 949.2 | 914 | 982.9 | 415.8 | 400.6 | 430.1 | 40.8 | 37.8 | 43.13 |
| 11 | 11-Jul-21 | 502.61 | 906.7 | 857.5 | 971.1 | 401.7 | 385.3 | 425.2 | 38.3 | 35.2 | 42.63 |
| 12 | 12-Jul-21 | 491.76 | 903.6 | 837.8 | 961 | 400.5 | 375.7 | 421.2 | 38 | 33.3 | 42.24 |
| 13 | 13-Jul-21 | 511.49 | 908.9 | 844.6 | 966.5 | 402 | 378.1 | 424.1 | 38.2 | 33.8 | 42.07 |
| 14 | 14-Jul-21 | 446.88 | 887.8 | 847.8 | 943.9 | 395.7 | 379.5 | 414.9 | 37.1 | 34.1 | 40.69 |
| 15 | 15-Jul-21 | 502.59 | 907.6 | 844.4 | 967.5 | 401.4 | 377.7 | 425 | 38.1 | 33.7 | 42.62 |
| 16 | 16-Jul-21 | 531.44 | 920.1 | 838.1 | 968.7 | 406 | 376.4 | 424.6 | 39 | 33.6 | 42.51 |
| 17 | 17-Jul-21 | 552.27 | 928.7 | 853.6 | 965.4 | 409.2 | 381.1 | 423.3 | 39.6 | 34.3 | 42.34 |
| 18 | 18-Jul-21 | 455.51 | 886.7 | 843.8 | 949.1 | 394.8 | 378.1 | 415.4 | 37 | 33.8 | 40.69 |
| 19 | 19-Jul-21 | 392.68 | 869.3 | 839.4 | 923.5 | 389.4 | 376.5 | 407.6 | 36 | 33.5 | 39.31 |
| 20 | 20-Jul-21 | 380.76 | 866.6 | 837.9 | 908.2 | 388.6 | 375.8 | 403.9 | 35.9 | 33.5 | 38.71 |
| 21 | 21-Jul-21 | 364.91 | 857.9 | 837.6 | 892.7 | 385.5 | 375.7 | 398.6 | 35.3 | 33.3 | 37.75 |
| 22 | 22-Jul-21 | 390.54 | 873.6 | 839.2 | 949.8 | 391.5 | 376.3 | 419 | 36.4 | 33.4 | 41.54 |
| 23 | 23-Jul-21 | 471.51 | 900.2 | 838.9 | 964.2 | 399.6 | 376 | 423.4 | 37.9 | 33.4 | 42.32 |
| 24 | 24-Jul-21 | 459.02 | 890.4 | 840.7 | 948.1 | 396.3 | 377.1 | 417.5 | 37.2 | 33.6 | 41.2 |
| 25 | 25-Jul-21 | 449.53 | 884.6 | 846.8 | 946.8 | 394 | 380.4 | 414.3 | 36.9 | 34.3 | 40.86 |
| 26 | 26-Jul-21 | 442.57 | 885.5 | 838.2 | 956.2 | 394.5 | 376 | 417.8 | 36.9 | 33.4 | 41.13 |
| 27 | 27-Jul-21 | 480.63 | 900.2 | 839.3 | 959.5 | 399.7 | 376.8 | 421.8 | 37.9 | 33.6 | 42.02 |
| 28 | 28-Jul-21 | 462.88 | 891.6 | 837.1 | 956.1 | 396.3 | 375.3 | 420 | 37.2 | 33.2 | 41.9 |
| 29 | 29-Jul-21 | 479.82 | 901.8 | 839.1 | 946.9 | 400 | 376 | 416.7 | 37.9 | 33.4 | 41.04 |
| 30 | 30-Jul-21 | 485.31 | 902.5 | 841.5 | 957.9 | 400.4 | 377.6 | 421.6 | 38 | 33.7 | 42 |
| 31 | 31-Jul-21 | 467.67 | 896.5 | 835.2 | 947.8 | 398.1 | 374.7 | 416.9 | 37.5 | 33.1 | 41.08 |

| CEMS DAYWISE VALUES FOR THE MONTH OF AUG '2021 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S.NO. | DATE | UNIT# 4 LOAD(MW) | UNIT# 4 SOX(mg/nm3) | | | UNIT# 4 NOX(mg/nm3) | | | UNIT# 4 DUST(mg/nm3) | | |
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Aug-21 | 436.37 | 882.7 | 835.8 | 940.6 | 393.3 | 374.9 | 416.1 | 36.6 | 33.2 | 40.74 |
| 2 | 02-Aug-21 | 446.03 | 889.8 | 857.9 | 915.5 | 395.8 | 385.4 | 405.8 | 37.1 | 35.1 | 38.8 |
| 3 | 03-Aug-21 | 491.88 | 907.3 | 859.3 | 940 | 401.8 | 386.2 | 415.7 | 38.2 | 35.2 | 40.6 |
| 4 | 04-Aug-21 | 544.92 | 924.1 | 900.8 | 948.8 | 406.8 | 397 | 417.5 | 39.1 | 37.2 | 41.07 |
| 5 | 05-Aug-21 | 524.92 | 918.5 | 894.3 | 944.8 | 405.5 | 395.3 | 417.2 | 38.9 | 36.5 | 41.19 |
| 6 | 06-Aug-21 | 528.89 | 918.9 | 898.8 | 941.9 | 405.3 | 396.6 | 416.5 | 38.8 | 37.1 | 41.08 |
| 7 | 07-Aug-21 | 542.04 | 929.8 | 906.6 | 958.9 | 410 | 398.3 | 422.2 | 39.8 | 37.4 | 42.13 |
| 8 | 08-Aug-21 | 529.49 | 917.5 | 897.1 | 931.8 | 404.7 | 396.2 | 413.2 | 38.7 | 37.1 | 40.49 |
| 9 | 09-Aug-21 | 545.27 | 921.5 | 900.4 | 953 | 405.7 | 396.2 | 419.9 | 38.9 | 37 | 41.69 |
| 10 | 10-Aug-21 | 563.39 | 933.4 | 899.9 | 965 | 410.2 | 396.1 | 423.9 | 39.8 | 37 | 42.41 |
| 11 | 11-Aug-21 | 543.79 | 928.5 | 887.5 | 961.5 | 409.5 | 392.4 | 422.2 | 39.7 | 36.4 | 42.09 |
| 12 | 12-Aug-21 | 553.2 | 932.2 | 904.2 | 954.6 | 410.4 | 397.9 | 420.4 | 39.8 | 37.4 | 41.83 |
| 13 | 13-Aug-21 | 536.25 | 920.5 | 891.1 | 946.1 | 405.9 | 394.2 | 416.6 | 39 | 36.7 | 41.11 |
| 14 | 14-Aug-21 | 523.86 | 921.2 | 898.2 | 943.2 | 406.8 | 396.1 | 416.8 | 39.2 | 37.1 | 41.13 |
| 15 | 15-Aug-21 | 517.52 | 914.6 | 874.1 | 948.1 | 404.1 | 388.6 | 417.7 | 38.6 | 35.7 | 41.26 |
| 16 | 16-Aug-21 | 523.56 | 919.6 | 889.2 | 951.1 | 406.3 | 394.7 | 418.7 | 39.1 | 36.9 | 41.76 |
| 17 | 17-Aug-21 | 544.44 | 922.8 | 891 | 967.3 | 406.2 | 395.9 | 424 | 39 | 37 | 42.11 |
| 18 | 18-Aug-21 | 478.39 | 899.1 | 865.9 | 948.6 | 399 | 385.8 | 417.7 | 37.7 | 35.2 | 41.24 |
| 19 | 19-Aug-21 | 466.6 | 899.3 | 839.3 | 932.4 | 399.9 | 376.5 | 412.8 | 37.9 | 33.5 | 40.38 |
| 20 | 20-Aug-21 | 494.01 | 909.6 | 885.7 | 927.5 | 403 | 391.4 | 410.9 | 38.5 | 36.2 | 40.01 |
| 21 | 21-Aug-21 | 479.3 | 900.5 | 851.8 | 936.6 | 399.4 | 381.7 | 414.7 | 37.8 | 34.5 | 40.74 |
| 22 | 22-Aug-21 | 454.81 | 891.4 | 838.6 | 933.6 | 396.7 | 376.2 | 413.4 | 37.3 | 33.4 | 40.81 |
| 23 | 23-Aug-21 | 434.61 | 882.2 | 848.7 | 930.3 | 393.5 | 379.1 | 412.7 | 36.8 | 33.9 | 40.4 |
| 24 | 24-Aug-21 | 393.08 | 869.8 | 841.1 | 913.4 | 389.7 | 377.2 | 407.2 | 36.1 | 33.6 | 39.4 |
| 25 | 25-Aug-21 | 463.65 | 897.9 | 844.3 | 927 | 399.1 | 378.1 | 411.1 | 37.8 | 33.8 | 40.08 |
| 26 | 26-Aug-21 | 516.36 | 919.4 | 900.1 | 941.5 | 406.2 | 396.6 | 416.3 | 39 | 37.1 | 41.05 |
| 27 | 27-Aug-21 | 544.86 | 923.7 | 905.5 | 946.1 | 406.8 | 398.1 | 417.3 | 39.1 | 37.5 | 41.31 |
| 28 | 28-Aug-21 | 515.54 | 913.7 | 886.7 | 945.5 | 403.9 | 391.5 | 417.5 | 38.6 | 36.2 | 41.3 |
| 29 | 29-Aug-21 | 547.95 | 927 | 895.1 | 969.4 | 408.3 | 394.5 | 425.3 | 39.4 | 36.7 | 42.67 |
| 30 | 30-Aug-21 | 535.5 | 925.6 | 903.2 | 946.9 | 408.3 | 397.2 | 417.7 | 39.4 | 37.2 | 41.27 |
| 31 | 31-Aug-21 | 522.71 | 917.4 | 868.4 | 950 | 405.2 | 388.6 | 418.7 | 38.9 | 35.7 | 41.72 |

| CEMS DAYWISE VALUES FOR THE MONTH OF SEP '2021 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| S.NO. | DATE | UNIT# 4 LOAD(MW) | UNIT# 4 SOX(mg/nm3) | | | UNIT# 4 NOX(mg/nm3) | | | UNIT# 4 DUST(mg/nm3) | | |
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Sep-21 | 524.23 | 920.9 | 894.7 | 938.1 | 310.4 | 279.9 | 332.9 | 39.2 | 36.8 | 40.42 |
| 2 | 02-Sep-21 | 546.93 | 929.1 | 910.9 | 946.8 | 308 | 281.3 | 337.6 | 39.6 | 38.1 | 41.02 |
| 3 | 03-Sep-21 | 532.56 | 923.1 | 898.5 | 949.8 | 310.2 | 279.8 | 338.4 | 39.3 | 37.2 | 41.43 |
| 4 | 04-Sep-21 | 540.3 | 922.9 | 904.2 | 944.3 | 308.6 | 282.9 | 338.9 | 39.1 | 37.5 | 41.09 |
| 5 | 05-Sep-21 | 484.1 | 904.6 | 844.5 | 938.7 | 309.8 | 282.3 | 337.9 | 38.2 | 33.9 | 40.38 |
| 6 | 06-Sep-21 | 565.6 | 935.6 | 901.9 | 949.7 | 299.2 | 280 | 321.4 | 40.1 | 38.2 | 42.58 |
| 7 | 07-Sep-21 | 517.98 | 912.6 | 871.8 | 948.7 | 317.4 | 280.7 | 337.8 | 38.5 | 35.9 | 41.3 |
| 8 | 08-Sep-21 | 419.72 | 878.8 | 833.2 | 929.8 | 308.1 | 279.1 | 337.4 | 36.5 | 33.1 | 39.89 |
| 9 | 09-Sep-21 | 447.39 | 888.9 | 846.9 | 949.1 | 304.5 | 281.4 | 337.9 | 37.2 | 34.2 | 42.24 |
| 10 | 10-Sep-21 | 432.64 | 880.3 | 843.1 | 943.8 | 310.9 | 280.6 | 336.2 | 36.7 | 33.8 | 41.56 |
| 11 | 11-Sep-21 | 427.87 | 884 | 843.9 | 921.7 | 313.3 | 281.5 | 338.1 | 36.9 | 33.7 | 39.53 |
| 12 | 12-Sep-21 | 459.59 | 893.6 | 842.7 | 936.2 | 315.5 | 289.9 | 336.7 | 37.5 | 34.1 | 39.99 |
| 13 | 13-Sep-21 | 487 | 903.2 | 849 | 947.3 | 311.6 | 279.6 | 334 | 38.1 | 34 | 41.84 |
| 14 | 14-Sep-21 | 454.17 | 892.6 | 848.1 | 931.3 | 313.1 | 280.9 | 338.4 | 37.4 | 34.4 | 40.41 |
| 15 | 15-Sep-21 | 342.82 | 888.2 | 864.2 | 930.7 | 309.4 | 281.6 | 334.4 | 37.2 | 35.2 | 40.53 |
| 16 | 16-Sep-21 | 399.57 | 869.3 | 837 | 901 | 306 | 281 | 332.9 | 35.9 | 33.4 | 38.6 |
| 17 | 17-Sep-21 | 414.01 | 877.4 | 855.6 | 906.4 | 311.6 | 280.6 | 337.6 | 36.4 | 34.6 | 38.71 |
| 18 | 18-Sep-21 | 432.12 | 883.4 | 864.3 | 911.1 | 304.2 | 280 | 335.1 | 36.8 | 34.9 | 39.06 |
| 19 | 19-Sep-21 | 471.75 | 902.7 | 878.4 | 945.5 | 300 | 280.4 | 333.5 | 38.1 | 36.4 | 41.11 |
| 20 | 20-Sep-21 | 445.7 | 884.2 | 861.2 | 906.7 | 311.4 | 280.8 | 339 | 36.7 | 34.7 | 38.84 |
| 21 | 21-Sep-21 | 455.69 | 894.2 | 856.9 | 920.6 | 309.1 | 279.1 | 339 | 37.5 | 35.2 | 39.69 |
| 22 | 22-Sep-21 | 461.47 | 895.5 | 852.1 | 932.3 | 313.2 | 279.9 | 338 | 37.6 | 34.2 | 40.26 |
| 23 | 23-Sep-21 | 487.5 | 908.6 | 857 | 932.9 | 307.4 | 279.8 | 336.6 | 38.5 | 34.8 | 40.62 |
| 24 | 24-Sep-21 | 486.77 | 904.8 | 885.1 | 928.7 | 310.8 | 280.6 | 334.4 | 38.3 | 36.4 | 41.26 |
| 25 | 25-Sep-21 | 494.29 | 902.2 | 860 | 927.8 | 307.7 | 280.2 | 334.7 | 37.8 | 35.7 | 40.36 |
| 26 | 26-Sep-21 | 506.43 | 918.5 | 881.7 | 936.3 | 312.6 | 288.2 | 335.2 | 39.2 | 36.7 | 40.8 |
| 27 | 27-Sep-21 | 469.86 | 896 | 848.3 | 929.6 | 306.5 | 281.7 | 337.4 | 37.5 | 34 | 40.3 |
| 28 | 28-Sep-21 | 444.58 | 886.5 | 838.8 | 920.2 | 309.7 | 282.5 | 337.1 | 36.9 | 33.4 | 39.47 |
| 29 | 29-Sep-21 | 461.38 | 894.5 | 845.4 | 929.1 | 314.4 | 279.7 | 336.4 | 37.5 | 34.2 | 39.97 |
| 30 | 30-Sep-21 | 507.55 | 912.1 | 881.8 | 937.2 | 303.9 | 279.5 | 346.3 | 38.5 | 36.1 | 40.62 |

## CEMS DAYWISE VALUES FOR THE MONTH OF APR '2021

| S.NO. | DATE | UNIT# 5 LOAD(MW) | UNIT# 5 SOX(mg/nm3) | | | UNIT# 5 NOX(mg/nm3) | | | UNIT# 5 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Apr-21 | 441.4 | 844.0 | 816.0 | 870.4 | 263.5 | 250.8 | 273.9 | 39.7 | 37.2 | 41.8 |
| 2 | 02-Apr-21 | 451.9 | 846.5 | 820.7 | 876.6 | 263.9 | 251.8 | 277.9 | 39.8 | 37.4 | 42.6 |
| 3 | 03-Apr-21 | 448.2 | 846.0 | 819.1 | 872.5 | 264.1 | 251.3 | 276.2 | 39.8 | 37.3 | 42.2 |
| 4 | 04-Apr-21 | 455.4 | 840.5 | 820.0 | 861.0 | 260.7 | 251.2 | 270.7 | 39.1 | 37.2 | 41.3 |
| 5 | 05-Apr-21 | 555.3 | 885.2 | 828.0 | 924.3 | 274.9 | 253.9 | 290.9 | 42.0 | 37.8 | 45.2 |
| 6 | 06-Apr-21 | 575.6 | 891.5 | 825.2 | 934.2 | 277.3 | 253.1 | 294.2 | 42.4 | 37.3 | 45.8 |
| 7 | 07-Apr-21 | 627.2 | 910.6 | 886.5 | 944.1 | 282.5 | 273.3 | 296.9 | 43.5 | 41.7 | 46.4 |
| 8 | 08-Apr-21 | 581.3 | 887.8 | 829.4 | 942.9 | 275.4 | 254.2 | 297.5 | 42.1 | 37.9 | 46.5 |
| 9 | 09-Apr-21 | 538.5 | 879.1 | 844.8 | 911.7 | 273.8 | 258.7 | 287.6 | 41.7 | 38.7 | 44.5 |
| 10 | 10-Apr-21 | 574.7 | 898.0 | 856.6 | 919.4 | 280.5 | 262.0 | 289.9 | 43.1 | 39.4 | 45.0 |
| 11 | 11-Apr-21 | 565.7 | 892.9 | 823.3 | 926.8 | 278.7 | 252.2 | 292.8 | 42.7 | 37.4 | 45.3 |
| 12 | 12-Apr-21 | 594.7 | 897.9 | 871.5 | 937.5 | 279.0 | 266.7 | 296.0 | 42.8 | 40.7 | 46.2 |
| 13 | 13-Apr-21 | 576.7 | 894.5 | 864.5 | 924.1 | 278.5 | 266.9 | 291.0 | 42.7 | 40.4 | 45.2 |
| 14 | 14-Apr-21 | 581.4 | 891.2 | 829.2 | 924.1 | 276.7 | 254.1 | 291.5 | 42.3 | 37.8 | 45.3 |
| 15 | 15-Apr-21 | 601.3 | 904.0 | 874.6 | 926.4 | 281.5 | 267.5 | 292.4 | 43.3 | 40.5 | 45.5 |
| 16 | 16-Apr-21 | 569.3 | 891.3 | 828.1 | 922.9 | 277.7 | 254.9 | 291.2 | 42.6 | 38.0 | 45.2 |
| 17 | 17-Apr-21 | 602.5 | 903.6 | 877.9 | 938.0 | 280.9 | 269.6 | 295.8 | 43.2 | 40.9 | 46.2 |
| 18 | 18-Apr-21 | 587.3 | 898.3 | 848.7 | 927.3 | 279.8 | 265.3 | 292.4 | 42.9 | 39.8 | 45.3 |
| 19 | 19-Apr-21 | 538.0 | 878.3 | 825.9 | 939.2 | 273.9 | 253.7 | 295.4 | 41.8 | 37.8 | 46.1 |
| 20 | 20-Apr-21 | 570.6 | 889.2 | 828.2 | 943.7 | 276.9 | 255.2 | 298.0 | 42.4 | 38.1 | 46.6 |
| 21 | 21-Apr-21 | 577.6 | 892.1 | 825.6 | 945.9 | 277.7 | 253.3 | 298.5 | 42.5 | 37.7 | 46.3 |
| 22 | 22-Apr-21 | 587.1 | 893.0 | 846.8 | 944.2 | 277.2 | 261.9 | 297.9 | 42.5 | 39.4 | 46.6 |
| 23 | 23-Apr-21 | 622.5 | 909.1 | 888.2 | 929.5 | 282.4 | 272.2 | 292.5 | 43.5 | 41.2 | 45.5 |
| 24 | 24-Apr-21 | 584.2 | 899.1 | 868.8 | 928.6 | 280.5 | 268.5 | 292.8 | 43.1 | 40.7 | 45.3 |
| 25 | 25-Apr-21 | 570.2 | 896.5 | 838.2 | 936.6 | 280.1 | 258.4 | 295.8 | 43.0 | 38.7 | 46.0 |
| 26 | 26-Apr-21 | 603.1 | 907.7 | 847.4 | 935.9 | 283.1 | 261.4 | 295.4 | 43.6 | 38.9 | 46.1 |
| 27 | 27-Apr-21 | 629.5 | 917.4 | 889.8 | 946.3 | 285.9 | 273.7 | 298.9 | 44.2 | 41.7 | 46.8 |
| 28 | 28-Apr-21 | 589.5 | 900.8 | 822.1 | 932.0 | 281.1 | 251.7 | 293.4 | 43.2 | 37.3 | 45.9 |
| 29 | 29-Apr-21 | 581.1 | 900.0 | 858.8 | 925.0 | 280.8 | 263.6 | 292.0 | 43.2 | 39.7 | 45.4 |
| 30 | 30-Apr-21 | 602.9 | 907.2 | 850.9 | 937.5 | 283.0 | 262.9 | 295.9 | 43.6 | 39.6 | 46.0 |

## CEMS DAYWISE VALUES FOR THE MONTH OF MAY '2021

| S.NO. | DATE | UNIT# 5 LOAD(MW) | UNIT# 5 SOX(mg/nm3) | | | UNIT# 5 NOX(mg/nm3) | | | UNIT# 5 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-May-21 | 499.2 | 916.2 | 840.9 | 981.4 | 377.6 | 352.8 | 398.7 | 44.1 | 38.9 | 48.95 |
| 2 | 02-May-21 | 505.88 | 913.6 | 835.3 | 988.6 | 376.2 | 350.6 | 401.2 | 43.7 | 38.1 | 49.17 |
| 3 | 03-May-21 | 514.42 | 926.8 | 847.8 | 977.9 | 380.7 | 355.4 | 397.2 | 44.7 | 39.3 | 48.19 |
| 4 | 04-May-21 | 587.56 | 947.9 | 920.6 | 978.9 | 387 | 376.8 | 398 | 45.9 | 43.5 | 48.59 |
| 5 | 05-May-21 | 583.7 | 940.8 | 914 | 970.9 | 384.3 | 374.3 | 394.8 | 45.3 | 42.9 | 47.75 |
| 6 | 06-May-21 | 626.31 | 966.1 | 937.3 | 986.3 | 392.7 | 381.2 | 400.4 | 47.1 | 44.3 | 48.97 |
| 7 | 07-May-21 | 590.48 | 947.1 | 904.8 | 976.4 | 386.6 | 372.3 | 396.6 | 45.8 | 42.6 | 48.15 |
| 8 | 08-May-21 | 552.02 | 930.7 | 901.2 | 958.9 | 381.3 | 370.7 | 392.5 | 44.7 | 42.2 | 47.48 |
| 9 | 09-May-21 | 548.71 | 934.6 | 901.9 | 955.9 | 383.1 | 370.6 | 391.1 | 45.2 | 42.1 | 47.08 |
| 10 | 10-May-21 | 579.94 | 947.7 | 909.9 | 973.4 | 387.1 | 373.2 | 396.9 | 46 | 42.7 | 48.35 |
| 11 | 11-May-21 | 582.5 | 944.7 | 913.3 | 980.5 | 385.9 | 374.3 | 398.7 | 45.7 | 42.9 | 48.61 |
| 12 | 12-May-21 | 582.13 | 952.7 | 920.7 | 972 | 389 | 376.7 | 395.7 | 46.5 | 43.4 | 48.11 |
| 13 | 13-May-21 | 625.75 | 965.1 | 934.2 | 993.4 | 392.3 | 381.2 | 402.9 | 47 | 44.3 | 49.57 |
| 14 | 14-May-21 | 626.87 | 965.1 | 937.4 | 987.6 | 392.2 | 381.3 | 401.2 | 47 | 44.3 | 49.21 |
| 15 | 15-May-21 | 624.65 | 960.2 | 887.6 | 988.3 | 390.4 | 367.2 | 401 | 46.6 | 41.6 | 49.1 |
| 16 | 16-May-21 | 436.46 | 887.2 | 832.3 | 956.6 | 368.5 | 350.6 | 391.7 | 42.2 | 37.9 | 47.26 |
| 17 | 17-May-21 | 293.78 | 937.2 | 890.5 | 959.2 | 384.7 | 371.6 | 392.6 | 45.6 | 43.2 | 47.51 |
| 18 | 18-May-21 | Unit in shutdown condition | | | | | | | | | |
| 19 | 19-May-21 | Unit in shutdown condition | | | | | | | | | |
| 20 | 20-May-21 | Unit in shutdown condition | | | | | | | | | |
| 21 | 21-May-21 | Unit in shutdown condition | | | | | | | | | |
| 22 | 22-May-21 | Unit in shutdown condition | | | | | | | | | |
| 23 | 23-May-21 | Unit in shutdown condition | | | | | | | | | |
| 24 | 24-May-21 | Unit in shutdown condition | | | | | | | | | |
| 25 | 25-May-21 | Unit in shutdown condition | | | | | | | | | |
| 26 | 26-May-21 | Unit in shutdown condition | | | | | | | | | |
| 27 | 27-May-21 | Unit in shutdown condition | | | | | | | | | |
| 28 | 28-May-21 | Unit in shutdown condition | | | | | | | | | |
| 29 | 29-May-21 | Unit in shutdown condition | | | | | | | | | |
| 30 | 30-May-21 | Unit in shutdown condition | | | | | | | | | |
| 31 | 31-May-21 | Unit in shutdown condition | | | | | | | | | |

### CEMS DAYWISE VALUES FOR THE MONTH OF JUN '2021

| S.NO. | DATE | UNIT# 5 LOAD(MW) | UNIT# 5 SOX(mg/nm3) | | | UNIT# 5 NOX(mg/nm3) | | | UNIT# 5 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 2 | 02-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 3 | 03-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 4 | 04-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 5 | 05-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 6 | 06-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 7 | 07-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 8 | 08-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 9 | 09-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 10 | 10-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 11 | 11-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 12 | 12-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 13 | 13-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 14 | 14-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 15 | 15-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 16 | 16-Jun-21 | 221.7 | 873.8 | 836.3 | 919.8 | 364.6 | 351 | 380.5 | 38.5 | 36.4 | 44.58 |
| 17 | 17-Jun-21 | 473.15 | 902.4 | 842.9 | 951.1 | 372.8 | 353 | 387.3 | 36.8 | 34.6 | 48.56 |
| 18 | 18-Jun-21 | 545.38 | 935.8 | 865.8 | 969.8 | 383.7 | 361.7 | 395.6 | 36.5 | 41.1 | 46.51 |
| 19 | 19-Jun-21 | 489.46 | 913.5 | 849.7 | 983.8 | 377.1 | 356.2 | 400.1 | 39.5 | 37.9 | 48.68 |
| 20 | 20-Jun-21 | 526.14 | 923.4 | 838.8 | 985.3 | 379.7 | 351.9 | 400.4 | 39.5 | 36.4 | 49.05 |
| 21 | 21-Jun-21 | 575.58 | 946.1 | 870.2 | 988.4 | 386.8 | 364 | 401.4 | 40.4 | 39.3 | 49.26 |
| 22 | 22-Jun-21 | 584.31 | 943.2 | 843.3 | 976.6 | 385.2 | 353.7 | 397.1 | 39.8 | 38.2 | 47.79 |
| 23 | 23-Jun-21 | 517.12 | 927.3 | 838.1 | 981.8 | 380.9 | 351.6 | 399.2 | 40.5 | 38.8 | 48.69 |
| 24 | 24-Jun-21 | 559.49 | 935.9 | 888.5 | 985.6 | 383.3 | 367 | 400.5 | 41.4 | 40.5 | 48.09 |
| 25 | 25-Jun-21 | 566.88 | 942.2 | 885.7 | 973.9 | 385.3 | 366.8 | 396.5 | 41.7 | 39.3 | 49.36 |
| 26 | 26-Jun-21 | 583.81 | 941.8 | 893.4 | 971.8 | 384.7 | 369.8 | 395.1 | 44.7 | 42.1 | 47.55 |
| 27 | 27-Jun-21 | 477.48 | 903.7 | 844.4 | 963 | 373.8 | 353.5 | 393.9 | 43.3 | 38.7 | 47.77 |
| 28 | 28-Jun-21 | 528.41 | 921.8 | 844.4 | 976.9 | 378.8 | 353.5 | 397.6 | 44.2 | 38.6 | 48.62 |
| 29 | 29-Jun-21 | 550.82 | 931.4 | 903.5 | 961.6 | 381.8 | 371.3 | 393.3 | 44.8 | 41.3 | 47.85 |
| 30 | 30-Jun-21 | 546.16 | 933.8 | 909.4 | 979.3 | 382.8 | 373.1 | 398.4 | 45.1 | 39.3 | 47.81 |

### CEMS DAYWISE VALUES FOR THE MONTH OF JUL '2021

| S.NO. | DATE | UNIT# 5 LOAD(MW) | UNIT# 5 SOX(mg/nm3) | | | UNIT# 5 NOX(mg/nm3) | | | UNIT# 5 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Jul-21 | 592.91 | 949.8 | 918.9 | 977.2 | 387.5 | 376.9 | 398.1 | 46 | 43.4 | 48.6 |
| 2 | 02-Jul-21 | 612.79 | 957.3 | 928.5 | 986.8 | 389.6 | 378.6 | 400.5 | 46.4 | 43.7 | 49.1 |
| 3 | 03-Jul-21 | 608.34 | 955.1 | 924.7 | 990.3 | 389 | 378 | 401.8 | 46.3 | 43.7 | 49.31 |
| 4 | 04-Jul-21 | 589.92 | 948.8 | 923.1 | 973.9 | 387.2 | 377.5 | 396.7 | 45.9 | 43.6 | 48.27 |
| 5 | 05-Jul-21 | 610.57 | 962.2 | 936.5 | 987.1 | 391.6 | 381.1 | 401 | 46.9 | 44.3 | 49.17 |
| 6 | 06-Jul-21 | 603.06 | 949.7 | 926 | 985.9 | 387.1 | 378.4 | 400.6 | 45.9 | 43.8 | 49.09 |
| 7 | 07-Jul-21 | 598.7 | 950.9 | 926.3 | 976.7 | 387.7 | 378.7 | 397.6 | 46 | 43.9 | 48.48 |
| 8 | 08-Jul-21 | 604.07 | 953 | 885.7 | 983.6 | 388.4 | 366.1 | 399.6 | 46.2 | 41.3 | 49.26 |
| 9 | 09-Jul-21 | 597.07 | 950.5 | 918.1 | 970.3 | 387.7 | 375.6 | 395.8 | 46.1 | 43.1 | 48.12 |
| 10 | 10-Jul-21 | 600.41 | 954.1 | 909.4 | 981.9 | 388.9 | 373.3 | 399.6 | 46.3 | 42.8 | 48.91 |
| 11 | 11-Jul-21 | 504.79 | 911 | 846.8 | 981.5 | 375.6 | 354.9 | 398.9 | 43.6 | 39.1 | 48.65 |
| 12 | 12-Jul-21 | 486.45 | 907.3 | 851.8 | 957.8 | 374.7 | 357 | 391 | 43.5 | 39.6 | 46.94 |
| 13 | 13-Jul-21 | 492.45 | 903.5 | 837.3 | 943.5 | 373 | 351.4 | 386.1 | 43 | 38.3 | 45.84 |
| 14 | 14-Jul-21 | 454.12 | 897.4 | 843.3 | 963 | 372.1 | 353.5 | 393.6 | 43 | 39.2 | 47.65 |
| 15 | 15-Jul-21 | 493.32 | 912.6 | 863.5 | 969.7 | 376.4 | 361.9 | 395.1 | 43.8 | 40.8 | 47.85 |
| 16 | 16-Jul-21 | 531.28 | 920.9 | 837.4 | 973 | 378.5 | 351.3 | 396.5 | 44.2 | 38.3 | 48.23 |
| 17 | 17-Jul-21 | 549.5 | 931.3 | 853.7 | 977.2 | 381.9 | 356.5 | 398.1 | 44.9 | 39.4 | 48.6 |
| 18 | 18-Jul-21 | 445.93 | 883.8 | 841.6 | 960.4 | 367.2 | 353.1 | 391.1 | 41.8 | 38.7 | 46.65 |
| 19 | 19-Jul-21 | 395.89 | 877.9 | 843.2 | 920.3 | 366.2 | 353.7 | 380.9 | 41.8 | 38.7 | 44.63 |
| 20 | 20-Jul-21 | 389.9 | 874 | 837.2 | 924.3 | 364.7 | 351.3 | 382.1 | 41.5 | 38.3 | 45.4 |
| 21 | 21-Jul-21 | 375.88 | 866.8 | 842.4 | 912 | 362.4 | 353 | 378.2 | 41 | 38.7 | 44.34 |
| 22 | 22-Jul-21 | 384.93 | 869.1 | 838.8 | 951.1 | 363 | 351.9 | 389.2 | 41 | 38.4 | 46.71 |
| 23 | 23-Jul-21 | 468.43 | 906.4 | 850.5 | 968 | 374.8 | 356.4 | 395.4 | 43.5 | 39.8 | 48.07 |
| 24 | 24-Jul-21 | 448.4 | 892.1 | 835.5 | 962.5 | 370.2 | 350.7 | 393.7 | 42.5 | 38.2 | 47.73 |
| 25 | 25-Jul-21 | 441.2 | 891.1 | 836.1 | 963.1 | 370.1 | 351.1 | 393.8 | 42.6 | 38.3 | 47.85 |
| 26 | 26-Jul-21 | 435.92 | 878.8 | 833.1 | 957.7 | 365.2 | 350 | 392.3 | 41.3 | 38 | 47.46 |
| 27 | 27-Jul-21 | 482.51 | 908.5 | 839.8 | 982.2 | 375.3 | 352.2 | 399.6 | 43.6 | 38.5 | 48.9 |
| 28 | 28-Jul-21 | 458.45 | 896.9 | 842.6 | 952.9 | 371.6 | 353.1 | 389.6 | 42.8 | 38.7 | 46.67 |
| 29 | 29-Jul-21 | 473.96 | 906.9 | 838.5 | 960.1 | 374.7 | 352 | 392.9 | 43.5 | 38.5 | 47.54 |
| 30 | 30-Jul-21 | 471.29 | 896.9 | 842.6 | 961.7 | 371.2 | 353.6 | 393.5 | 42.7 | 38.9 | 47.69 |
| 31 | 31-Jul-21 | 467.2 | 896.5 | 835.2 | 947.8 | 398.1 | 374.7 | 416.9 | 37.5 | 33.1 | 41.08 |

**CEMS DAYWISE VALUES FOR THE MONTH OF AUG '2021**

| S.NO. | DATE | UNIT# 5 LOAD(MW) | UNIT# 5 SOX(mg/nm3) | | | UNIT# 5 NOX(mg/nm3) | | | UNIT# 5 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Aug-21 | 433.94 | 888.5 | 841.3 | 936.4 | 369 | 352.6 | 383.9 | 42.3 | 38.6 | 45.36 |
| 2 | 02-Aug-21 | 454.71 | 899.1 | 841.8 | 941.3 | 372.2 | 352.8 | 387.3 | 42.9 | 38.6 | 46.42 |
| 3 | 03-Aug-21 | 463.13 | 898.6 | 839.8 | 933.3 | 371.9 | 352 | 384.9 | 42.9 | 38.4 | 45.96 |
| 4 | 04-Aug-21 | 485.79 | 911.9 | 841.1 | 956.9 | 376.3 | 354.6 | 391.4 | 43.9 | 39.4 | 47.44 |
| 5 | 05-Aug-21 | Unit in shutdown condition | | | | | | | | | |
| 6 | 06-Aug-21 | Unit in shutdown condition | | | | | | | | | |
| 7 | 07-Aug-21 | 230.37 | 926.3 | 901.6 | 949.6 | 381.1 | 374.2 | 389.6 | 44.9 | 43.1 | 46.64 |
| 8 | 08-Aug-21 | 542.01 | 929.3 | 892.9 | 961.9 | 381.1 | 368.5 | 392.8 | 44.7 | 41.8 | 47.41 |
| 9 | 09-Aug-21 | 521.47 | 917.6 | 890.1 | 947.1 | 377.4 | 367.6 | 388.3 | 43.9 | 41.6 | 46.6 |
| 10 | 10-Aug-21 | 515.52 | 922.5 | 893 | 943.9 | 379.4 | 368.2 | 388.1 | 44.4 | 41.7 | 46.6 |
| 11 | 11-Aug-21 | 109.72 | 892.3 | 838.7 | 919.6 | 369.6 | 351.9 | 378.9 | 42.4 | 38.4 | 44.39 |
| 12 | 12-Aug-21 | Unit in shutdown condition | | | | | | | | | |
| 13 | 13-Aug-21 | Unit in shutdown condition | | | | | | | | | |
| 14 | 14-Aug-21 | 514.69 | 923.4 | 893.8 | 949.7 | 379.4 | 368.4 | 389 | 44.3 | 41.7 | 46.72 |
| 15 | 15-Aug-21 | 519.2 | 918.6 | 872 | 957.1 | 377.9 | 362 | 392.1 | 44 | 40.5 | 47.26 |
| 16 | 16-Aug-21 | 515.83 | 922.3 | 876.7 | 960.1 | 379.2 | 364.7 | 391.6 | 44.4 | 41.3 | 47.02 |
| 17 | 17-Aug-21 | 530.85 | 925.9 | 888.1 | 971.1 | 380.2 | 368.6 | 396.5 | 44.5 | 42.1 | 48.29 |
| 18 | 18-Aug-21 | 467.04 | 899.3 | 865.4 | 929.4 | 372.2 | 362.6 | 382.4 | 43 | 40.9 | 45.34 |
| 19 | 19-Aug-21 | 473.32 | 900.4 | 849.7 | 954.5 | 372.3 | 356.5 | 390.9 | 42.9 | 39.6 | 47.07 |
| 20 | 20-Aug-21 | 491.04 | 909.5 | 874.6 | 932.2 | 375.3 | 363.4 | 383.4 | 43.6 | 40.7 | 45.49 |
| 21 | 21-Aug-21 | 482.95 | 910.7 | 874.9 | 940.5 | 376.1 | 365.4 | 386.6 | 43.8 | 41.7 | 46.22 |
| 22 | 22-Aug-21 | 458.38 | 899.7 | 836.7 | 948.9 | 372.6 | 351.1 | 389.6 | 43 | 38.2 | 46.92 |
| 23 | 23-Aug-21 | 420.44 | 881.1 | 848.8 | 920.9 | 366.7 | 354.7 | 379.4 | 41.8 | 38.9 | 44.49 |
| 24 | 24-Aug-21 | 390.6 | 870.6 | 837.9 | 904.2 | 363.5 | 351.4 | 376 | 41.2 | 38.3 | 44.13 |
| 25 | 25-Aug-21 | 462.8 | 901.8 | 842.1 | 936.1 | 373.2 | 352.7 | 385.6 | 43.1 | 38.6 | 46.07 |
| 26 | 26-Aug-21 | 532.33 | 928.8 | 897.3 | 956.6 | 381.3 | 369.4 | 391.9 | 44.8 | 41.9 | 47.37 |
| 27 | 27-Aug-21 | 551.47 | 941.7 | 912.6 | 963.2 | 385.7 | 374.3 | 394 | 45.8 | 43 | 47.41 |
| 28 | 28-Aug-21 | 561.91 | 936.7 | 904.1 | 978.8 | 383.5 | 371.3 | 398.3 | 45.2 | 42.3 | 48.58 |
| 29 | 29-Aug-21 | 547.38 | 928.5 | 902.6 | 950 | 380.8 | 370.8 | 388.1 | 44.6 | 42.2 | 46.44 |
| 30 | 30-Aug-21 | 553.08 | 938.3 | 915.6 | 960.4 | 384.4 | 374.9 | 392.3 | 45.5 | 43 | 47.28 |
| 31 | 31-Aug-21 | 524.09 | 917.4 | 868.4 | 950 | 405.2 | 388.6 | 418.7 | 38.9 | 35.7 | 41.72 |

**CEMS DAYWISE VALUES FOR THE MONTH OF SEP '2021**

| S.NO. | DATE | UNIT# 5 LOAD(MW) | UNIT# 5 SOX(mg/nm3) | | | UNIT# 5 NOX(mg/nm3) | | | UNIT# 5 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Sep-21 | 532.6 | 922.6 | 897.4 | 948.9 | 308.5 | 282.1 | 333.5 | 44.2 | 42 | 47.29 |
| 2 | 02-Sep-21 | 556.84 | 928.4 | 903 | 949.9 | 309.3 | 281.7 | 340 | 44.8 | 42.8 | 47.34 |
| 3 | 03-Sep-21 | 536.33 | 925.7 | 900.8 | 949.4 | 310.5 | 281.2 | 340.4 | 44.6 | 42.2 | 47.06 |
| 4 | 04-Sep-21 | 537.61 | 920.6 | 891.1 | 942.8 | 310.5 | 285.3 | 338.7 | 44.1 | 41.5 | 47.12 |
| 5 | 05-Sep-21 | 494.94 | 909.3 | 849.8 | 949 | 313.1 | 282.2 | 340.9 | 43.8 | 39.1 | 47.8 |
| 6 | 06-Sep-21 | 570.41 | 929.3 | 864.9 | 948.5 | 311.6 | 290.1 | 338.5 | 44.8 | 40 | 47.61 |
| 7 | 07-Sep-21 | 527.49 | 914.3 | 861 | 946 | 307.6 | 281.2 | 339.9 | 44.3 | 40 | 48.11 |
| 8 | 08-Sep-21 | 422.02 | 881.5 | 841.7 | 938.4 | 318 | 282.7 | 339.7 | 41.7 | 38.7 | 46.05 |
| 9 | 09-Sep-21 | 431.91 | 891.5 | 851.2 | 946.3 | 315.2 | 282.5 | 340.4 | 43 | 39.7 | 47.59 |
| 10 | 10-Sep-21 | 433.48 | 887 | 852 | 936.9 | 311.6 | 281.5 | 339.8 | 42.3 | 39.6 | 44.96 |
| 11 | 11-Sep-21 | 423.46 | 888.6 | 836.3 | 931.5 | 307.9 | 283.3 | 341 | 42.2 | 38.2 | 44.84 |
| 12 | 12-Sep-21 | 449.15 | 890.5 | 854.6 | 932.9 | 312.7 | 285 | 340 | 42.6 | 39.6 | 47.19 |
| 13 | 13-Sep-21 | 475.53 | 902.8 | 853.2 | 938.2 | 308 | 283.6 | 340.7 | 43.2 | 39.6 | 47.11 |
| 14 | 14-Sep-21 | 458.77 | 897.6 | 842.2 | 942.1 | 310.8 | 282.4 | 335.6 | 42.8 | 38.8 | 46.43 |
| 15 | 15-Sep-21 | 474.28 | 915.8 | 874 | 944.8 | 308.9 | 282.2 | 337.9 | 43.6 | 40.7 | 46.44 |
| 16 | 16-Sep-21 | 422.77 | 881.6 | 846.9 | 926.7 | 311.6 | 282.6 | 339.5 | 41.8 | 39.4 | 44.5 |
| 17 | 17-Sep-21 | 407.1 | 877.9 | 837.4 | 909.8 | 308 | 282.4 | 338.9 | 41.7 | 38.4 | 44.4 |
| 18 | 18-Sep-21 | 442.53 | 890.4 | 868 | 927.2 | 307.7 | 281.2 | 333 | 42.3 | 40.2 | 45 |
| 19 | 19-Sep-21 | 101.66 | 904.6 | 864.2 | 932 | 308.1 | 282.4 | 327.1 | 43.6 | 41.7 | 44.78 |
| 20 | 20-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 21 | 21-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 22 | 22-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 23 | 23-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 24 | 24-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 25 | 25-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 26 | 26-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 27 | 27-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 28 | 28-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 29 | 29-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 30 | 30-Sep-21 | Unit in shutdown condition | | | | | | | | | |

# Annexure - III

**CEMS DAYWISE VALUES FOR THE MONTH OF APR '2021**

| S.NO. | DATE | UNIT# 1 LOAD(MW) | UNIT# 1 SOX(mg/nm3) | | | UNIT# 1 NOX(mg/nm3) | | | UNIT# 1 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Apr-21 | 444.7 | 847.2 | 820.0 | 871.7 | 262.9 | 252.3 | 272.2 | 42.1 | 40.1 | 44.1 |
| 2 | 02-Apr-21 | 452.7 | 845.2 | 820.8 | 871.4 | 261.6 | 252.5 | 271.8 | 42.0 | 40.2 | 44.2 |
| 3 | 03-Apr-21 | 458.7 | 845.2 | 822.0 | 872.7 | 261.4 | 252.3 | 271.9 | 42.0 | 40.1 | 44.0 |
| 4 | 04-Apr-21 | 469.7 | 848.4 | 822.1 | 875.7 | 262.1 | 252.3 | 273.0 | 42.1 | 40.1 | 44.2 |
| 5 | 05-Apr-21 | 578.8 | 899.8 | 833.2 | 944.4 | 277.5 | 255.9 | 293.0 | 45.1 | 40.8 | 48.0 |
| 6 | 06-Apr-21 | 586.5 | 892.8 | 851.9 | 950.0 | 274.9 | 262.7 | 294.9 | 44.6 | 42.2 | 48.5 |
| 7 | 07-Apr-21 | 596.6 | 900.7 | 872.3 | 936.0 | 277.3 | 267.7 | 290.7 | 45.0 | 43.1 | 47.7 |
| 8 | 08-Apr-21 | 569.7 | 873.7 | 795.8 | 935.2 | 268.0 | 242.1 | 289.6 | 42.6 | 37.1 | 47.4 |
| 9 | 09-Apr-21 | 562.3 | 865.8 | 835.3 | 894.3 | 265.0 | 253.6 | 275.2 | 41.5 | 39.3 | 43.6 |
| 10 | 10-Apr-21 | 572.4 | 873.5 | 838.9 | 900.5 | 267.5 | 255.4 | 277.3 | 41.9 | 39.7 | 43.9 |
| 11 | 11-Apr-21 | 556.9 | 861.6 | 814.9 | 901.0 | 263.7 | 249.3 | 277.3 | 41.3 | 38.5 | 44.0 |
| 12 | 12-Apr-21 | 621.1 | 886.8 | 860.4 | 920.5 | 270.7 | 260.4 | 283.2 | 42.6 | 40.6 | 45.1 |
| 13 | 13-Apr-21 | 572.4 | 866.9 | 844.7 | 894.4 | 265.1 | 256.2 | 275.7 | 41.6 | 39.8 | 43.6 |
| 14 | 14-Apr-21 | 603.2 | 885.3 | 848.2 | 918.0 | 270.8 | 259.0 | 282.3 | 42.7 | 40.3 | 45.0 |
| 15 | 15-Apr-21 | 626.3 | 889.9 | 856.9 | 920.4 | 271.8 | 259.5 | 283.1 | 42.9 | 40.4 | 45.1 |
| 16 | 16-Apr-21 | 580.5 | 873.3 | 807.7 | 902.7 | 267.3 | 245.5 | 278.2 | 42.0 | 37.7 | 44.2 |
| 17 | 17-Apr-21 | 609.0 | 883.6 | 852.1 | 915.1 | 270.0 | 259.0 | 281.8 | 42.5 | 40.2 | 44.9 |
| 18 | 18-Apr-21 | 622.3 | 890.0 | 852.9 | 919.3 | 271.9 | 261.1 | 282.6 | 42.9 | 40.6 | 45.0 |
| 19 | 19-Apr-21 | 535.7 | 851.3 | 800.3 | 913.9 | 260.7 | 243.6 | 281.0 | 40.8 | 37.4 | 44.7 |
| 20 | 20-Apr-21 | 572.9 | 870.0 | 804.0 | 906.1 | 266.4 | 244.8 | 278.0 | 41.9 | 37.6 | 44.1 |
| 21 | 21-Apr-21 | 577.9 | 872.3 | 812.8 | 912.2 | 267.0 | 247.1 | 280.5 | 42.0 | 38.3 | 44.6 |
| 22 | 22-Apr-21 | 607.6 | 882.7 | 843.8 | 923.0 | 269.8 | 255.8 | 284.0 | 42.5 | 39.7 | 45.1 |
| 23 | 23-Apr-21 | 627.7 | 892.3 | 866.9 | 915.7 | 272.7 | 262.7 | 281.6 | 43.0 | 41.0 | 44.8 |
| 24 | 24-Apr-21 | 593.9 | 879.2 | 848.4 | 905.1 | 268.9 | 257.4 | 278.6 | 42.4 | 40.0 | 44.5 |
| 25 | 25-Apr-21 | 71.6 | 821.5 | 821.5 | 821.5 | 251.1 | 251.1 | 251.1 | 38.5 | 38.5 | 38.5 |
| 26 | 26-Apr-21 | Unit in shutdown condition | | | | | | | | | |
| 27 | 27-Apr-21 | Unit in shutdown condition | | | | | | | | | |
| 28 | 28-Apr-21 | Unit in shutdown condition | | | | | | | | | |
| 29 | 29-Apr-21 | 548.8 | 866.9 | 837.2 | 906.7 | 265.1 | 255.1 | 279.2 | 41.7 | 39.6 | 44.4 |
| 30 | 30-Apr-21 | 473.3 | 827.0 | 797.7 | 863.9 | 253.9 | 242.5 | 263.3 | 39.4 | 37.2 | 41.2 |

**CEMS DAYWISE VALUES FOR THE MONTH OF MAY '2021**

| S.NO. | DATE | UNIT# 1 LOAD(MW) | UNIT# 1 SOX(mg/nm3) | | | UNIT# 1 NOX(mg/nm3) | | | UNIT# 1 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-May-21 | 486.23 | 868.88 | 798 | 937.16 | 395.64 | 372.81 | 417.58 | 37.82 | 33.28 | 42.05 |
| 2 | 02-May-21 | 511.7 | 886.53 | 817.06 | 941.57 | 401.35 | 379.62 | 419.03 | 38.84 | 34.63 | 42.34 |
| 3 | 03-May-21 | 513.32 | 886.8 | 804.68 | 944.07 | 401.09 | 375.83 | 420.07 | 38.79 | 33.89 | 42.55 |
| 4 | 04-May-21 | 611.01 | 918.57 | 885.76 | 948.04 | 409.9 | 398.6 | 420.41 | 40.5 | 38.28 | 42.59 |
| 5 | 05-May-21 | 618.58 | 924.88 | 896.79 | 960.77 | 412.06 | 401.14 | 424.63 | 40.92 | 38.76 | 43.42 |
| 6 | 06-May-21 | 627.12 | 924.6 | 897.68 | 953.18 | 411.63 | 401.41 | 422.27 | 40.85 | 38.81 | 42.96 |
| 7 | 07-May-21 | 608.25 | 920.82 | 885.71 | 958.64 | 411.01 | 398.3 | 423.73 | 40.8 | 38.22 | 43.24 |
| 8 | 08-May-21 | 592.93 | 916.26 | 890.14 | 947.14 | 409.78 | 399.65 | 420.8 | 40.52 | 38.47 | 42.68 |
| 9 | 09-May-21 | 583.82 | 909.13 | 882.86 | 931.41 | 407.32 | 397.2 | 416.39 | 40.04 | 38 | 41.86 |
| 10 | 10-May-21 | 608.5 | 926.13 | 898.48 | 949.88 | 412.94 | 401.92 | 421.75 | 41.09 | 38.92 | 42.87 |
| 11 | 11-May-21 | 621.34 | 919.27 | 903.26 | 940.54 | 409.7 | 402.98 | 418.77 | 40.46 | 39.24 | 42.29 |
| 12 | 12-May-21 | 624.43 | 926.24 | 895.18 | 952.25 | 412.3 | 401.01 | 422.19 | 41.01 | 38.74 | 42.97 |
| 13 | 13-May-21 | 602.81 | 918.36 | 893.25 | 937.36 | 410.26 | 399.94 | 416.85 | 40.59 | 38.53 | 41.92 |
| 14 | 14-May-21 | 620.8 | 925.37 | 889.03 | 950.24 | 412.21 | 398.77 | 421.26 | 41 | 38.3 | 42.76 |
| 15 | 15-May-21 | 578.65 | 904.66 | 830.62 | 932.46 | 405.92 | 383.22 | 416.53 | 39.7 | 35.32 | 41.84 |
| 16 | 16-May-21 | 300.03 | 832.66 | 799.24 | 858.32 | 385.76 | 375.77 | 394.93 | 35.91 | 34.06 | 37.69 |
| 17 | 17-May-21 | Unit in shutdown condition | | | | | | | | | |
| 18 | 18-May-21 | Unit in shutdown condition | | | | | | | | | |
| 19 | 19-May-21 | Unit in shutdown condition | | | | | | | | | |
| 20 | 20-May-21 | Unit in shutdown condition | | | | | | | | | |
| 21 | 21-May-21 | Unit in shutdown condition | | | | | | | | | |
| 22 | 22-May-21 | Unit in shutdown condition | | | | | | | | | |
| 23 | 23-May-21 | Unit in shutdown condition | | | | | | | | | |
| 24 | 24-May-21 | Unit in shutdown condition | | | | | | | | | |
| 25 | 25-May-21 | Unit in shutdown condition | | | | | | | | | |
| 26 | 26-May-21 | Unit in shutdown condition | | | | | | | | | |
| 27 | 27-May-21 | Unit in shutdown condition | | | | | | | | | |
| 28 | 28-May-21 | Unit in shutdown condition | | | | | | | | | |
| 29 | 29-May-21 | Unit in shutdown condition | | | | | | | | | |
| 30 | 30-May-21 | Unit in shutdown condition | | | | | | | | | |
| 31 | 31-May-21 | Unit in shutdown condition | | | | | | | | | |

## CEMS DAYWISE VALUES FOR THE MONTH OF JUN '2021

| S.NO. | DATE | UNIT# 1 LOAD(MW) | UNIT# 1 SOX(mg/nm3) | | | UNIT# 1 NOX(mg/nm3) | | | UNIT# 1 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 2 | 02-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 3 | 03-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 4 | 04-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 5 | 05-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 6 | 06-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 7 | 07-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 8 | 08-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 9 | 09-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 10 | 10-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 11 | 11-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 12 | 12-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 13 | 13-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 14 | 14-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 15 | 15-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 16 | 16-Jun-21 | 265.77 | 840.19 | 794.57 | 919.39 | 387.32 | 373.85 | 412.32 | 36.13 | 33.53 | 41.03 |
| 17 | 17-Jun-21 | 475.21 | 864.63 | 811.63 | 929.28 | 394.24 | 378.49 | 414.69 | 37.46 | 34.42 | 41.48 |
| 18 | 18-Jun-21 | 551.94 | 893.48 | 813.5 | 944.86 | 402.7 | 379.16 | 420.13 | 39.19 | 34.56 | 42.55 |
| 19 | 19-Jun-21 | 495.86 | 871.71 | 797.72 | 938.88 | 396.83 | 373.14 | 417.73 | 37.94 | 33.07 | 42.07 |
| 20 | 20-Jun-21 | 516.18 | 875.73 | 795.56 | 946.56 | 397.33 | 372.02 | 420.16 | 38.11 | 33.13 | 42.55 |
| 21 | 21-Jun-21 | 571.88 | 900.49 | 841.96 | 937.6 | 404.68 | 386.47 | 417.26 | 39.51 | 35.93 | 42.07 |
| 22 | 22-Jun-21 | 599.13 | 919.2 | 816.12 | 952.14 | 410.72 | 380.32 | 421.86 | 40.73 | 35.28 | 42.88 |
| 23 | 23-Jun-21 | 527.63 | 895.16 | 800.26 | 946.93 | 403.68 | 373.9 | 420.1 | 39.3 | 33.51 | 42.53 |
| 24 | 24-Jun-21 | 561.38 | 896.81 | 841.55 | 952.98 | 403.69 | 386.36 | 422.36 | 39.33 | 35.93 | 42.98 |
| 25 | 25-Jun-21 | 583.12 | 910.81 | 855.22 | 949.05 | 407.88 | 391.15 | 420.83 | 40.17 | 36.87 | 42.68 |
| 26 | 26-Jun-21 | 578.25 | 903.8 | 845.45 | 942.1 | 405.6 | 387.16 | 419.48 | 39.69 | 36.23 | 42.43 |
| 27 | 27-Jun-21 | 489.96 | 865.31 | 799.12 | 912.28 | 394.52 | 373.14 | 409.47 | 37.53 | 33.35 | 40.46 |
| 28 | 28-Jun-21 | 532.63 | 886.41 | 795.88 | 942.89 | 400.53 | 372.16 | 419.34 | 38.73 | 33.16 | 42.4 |
| 29 | 29-Jun-21 | 598.65 | 916.39 | 881.11 | 946.51 | 409.75 | 396.9 | 420.15 | 40.47 | 37.66 | 42.55 |
| 30 | 30-Jun-21 | 567.91 | 900.9 | 866.52 | 947.36 | 404.78 | 392.59 | 420.51 | 39.53 | 37.11 | 42.62 |

## CEMS DAYWISE VALUES FOR THE MONTH OF JUL '2021

| S.NO. | DATE | UNIT# 1 LOAD(MW) | UNIT# 1 SOX(mg/nm3) | | | UNIT# 1 NOX(mg/nm3) | | | UNIT# 1 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Jul-21 | 632.28 | 928.08 | 885.22 | 961.91 | 412.76 | 399.38 | 425.19 | 41.04 | 38.46 | 43.54 |
| 2 | 02-Jul-21 | 633.51 | 927.4 | 905.47 | 952.98 | 412.47 | 403.79 | 422.53 | 41 | 39.28 | 43.02 |
| 3 | 03-Jul-21 | 594.54 | 911.38 | 873.49 | 948.85 | 407.95 | 394.56 | 420.83 | 40.15 | 37.45 | 42.74 |
| 4 | 04-Jul-21 | 642.68 | 931.64 | 900.68 | 956.87 | 413.74 | 402.06 | 423.01 | 41.26 | 38.93 | 43.1 |
| 5 | 05-Jul-21 | 612.7 | 915.07 | 888.55 | 935.01 | 408.54 | 398.94 | 416.84 | 40.19 | 38.34 | 41.91 |
| 6 | 06-Jul-21 | 621.43 | 927.65 | 894.23 | 957.56 | 413 | 400.38 | 423.52 | 41.11 | 38.61 | 43.2 |
| 7 | 07-Jul-21 | 606.88 | 922.03 | 888.52 | 944.68 | 411.48 | 398.77 | 420.24 | 40.86 | 38.3 | 42.61 |
| 8 | 08-Jul-21 | 611.42 | 921.28 | 888.87 | 951.99 | 411.03 | 401.81 | 421.5 | 40.75 | 38.89 | 42.8 |
| 9 | 09-Jul-21 | 641.06 | 934.7 | 894.43 | 961.68 | 414.87 | 400.36 | 425.15 | 41.45 | 38.61 | 43.53 |
| 10 | 10-Jul-21 | 607.51 | 917.17 | 887.1 | 942.64 | 409.66 | 399.87 | 418.29 | 40.48 | 38.65 | 42.18 |
| 11 | 11-Jul-21 | 539.44 | 894.36 | 806.85 | 951.25 | 403.73 | 375.72 | 422.11 | 39.3 | 33.86 | 42.94 |
| 12 | 12-Jul-21 | 510.57 | 877.51 | 800.82 | 934.74 | 398.21 | 373.58 | 416.06 | 38.27 | 33.43 | 42.11 |
| 13 | 13-Jul-21 | 517.82 | 882.52 | 805.78 | 956.11 | 400.03 | 375.41 | 423.15 | 38.62 | 33.79 | 43.13 |
| 14 | 14-Jul-21 | 445.22 | 853.94 | 799.39 | 922.12 | 391.96 | 373.17 | 411.79 | 37.05 | 33.35 | 40.9 |
| 15 | 15-Jul-21 | 493.91 | 873.29 | 802.62 | 923.75 | 397.12 | 374.63 | 414 | 38.09 | 33.65 | 41.37 |
| 16 | 16-Jul-21 | 538.82 | 886.87 | 795.76 | 931.5 | 400.67 | 372.36 | 415.46 | 38.78 | 33.2 | 41.63 |
| 17 | 17-Jul-21 | 550.57 | 891.64 | 824.2 | 936.69 | 402.02 | 383.36 | 417.74 | 39.04 | 35.54 | 42.09 |
| 18 | 18-Jul-21 | 452.84 | 856.35 | 805.85 | 932.49 | 392.73 | 375.97 | 416.04 | 37.21 | 33.92 | 41.75 |
| 19 | 19-Jul-21 | 406.43 | 842.09 | 801.7 | 925.62 | 388.42 | 374.18 | 413.55 | 36.38 | 33.75 | 41.26 |
| 20 | 20-Jul-21 | 395.02 | 833.31 | 799.2 | 865.11 | 385.48 | 373.38 | 395.64 | 35.83 | 33.4 | 37.98 |
| 21 | 21-Jul-21 | 367.12 | 822.05 | 795.42 | 856.86 | 382.28 | 371.86 | 393.62 | 35.18 | 33.09 | 37.4 |
| 22 | 22-Jul-21 | 393.54 | 830.96 | 794.34 | 940.04 | 384.55 | 371.95 | 417.78 | 35.64 | 33.12 | 42.08 |
| 23 | 23-Jul-21 | 476.03 | 866.07 | 803.21 | 933.64 | 394.92 | 374.91 | 416.47 | 37.65 | 33.7 | 41.83 |
| 24 | 24-Jul-21 | 468.69 | 855.38 | 804.55 | 917.83 | 391.5 | 375.72 | 410.5 | 37 | 33.87 | 40.36 |
| 25 | 25-Jul-21 | 448.63 | 845.38 | 794.4 | 915.69 | 388.54 | 371.58 | 408.71 | 36.38 | 33.04 | 40.27 |
| 26 | 26-Jul-21 | 441.76 | 854.9 | 797.05 | 940.42 | 392.2 | 372.67 | 418.9 | 37.07 | 33.17 | 42.32 |
| 27 | 27-Jul-21 | 482.97 | 863.33 | 800.81 | 929.74 | 394.05 | 374.14 | 415.91 | 37.46 | 33.55 | 41.74 |
| 28 | 28-Jul-21 | 462.05 | 858 | 803.37 | 925.71 | 392.64 | 375.1 | 413.44 | 37.21 | 33.74 | 41.23 |
| 29 | 29-Jul-21 | 474.29 | 862.87 | 806.76 | 913.81 | 393.74 | 375.87 | 410.48 | 37.41 | 33.89 | 40.91 |
| 30 | 30-Jul-21 | 465.57 | 858.36 | 794.16 | 924.75 | 392.67 | 371.58 | 414.49 | 37.22 | 33.04 | 41.47 |
| 31 | 31-Jul-21 | 472.34 | 865.99 | 810.78 | 937.33 | 395 | 377.81 | 417.29 | 37.61 | 34.28 | 41.99 |

## CEMS DAYWISE VALUES FOR THE MONTH OF AUG '2021

| S.NO. | DATE | UNIT# 1 LOAD(MW) | UNIT# 1 SOX(mg/nm3) | | | UNIT# 1 NOX(mg/nm3) | | | UNIT# 1 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Aug-21 | 513.32 | 886.8 | 804.68 | 944.07 | 401.09 | 375.83 | 420.07 | 38.79 | 33.89 | 42.55 |
| 2 | 02-Aug-21 | 611.01 | 918.57 | 885.76 | 948.04 | 409.9 | 398.6 | 420.41 | 40.5 | 38.28 | 42.59 |
| 3 | 03-Aug-21 | 618.58 | 924.88 | 896.79 | 960.77 | 412.06 | 401.14 | 424.63 | 40.92 | 38.76 | 43.42 |
| 4 | 04-Aug-21 | 627.12 | 924.6 | 897.68 | 953.18 | 411.63 | 401.41 | 422.27 | 40.85 | 38.81 | 42.96 |
| 5 | 05-Aug-21 | 552.02 | 930.7 | 901.22 | 958.88 | 381.25 | 370.71 | 392.54 | 44.68 | 42.21 | 47.48 |
| 6 | 06-Aug-21 | 548.71 | 934.63 | 901.9 | 955.88 | 383.08 | 370.57 | 391.09 | 45.15 | 42.12 | 47.08 |
| 7 | 07-Aug-21 | 579.94 | 947.71 | 909.93 | 973.41 | 387.07 | 373.16 | 396.89 | 45.99 | 42.67 | 48.35 |
| 8 | 08-Aug-21 | 606.66 | 949.38 | 929.38 | 973.13 | 415.6 | 406.7 | 426.71 | 40.73 | 39 | 42.93 |
| 9 | 09-Aug-21 | 584.06 | 944 | 923.33 | 964.9 | 414.42 | 404.36 | 423.96 | 40.6 | 38.55 | 42.43 |
| 10 | 10-Aug-21 | 544.43 | 923.42 | 905.77 | 941.61 | 406.77 | 398.37 | 415.34 | 39.15 | 37.46 | 40.82 |
| 11 | 11-Aug-21 | 566.97 | 939.77 | 915.27 | 969.33 | 395.26 | 386.17 | 406.44 | 42.87 | 40.79 | 45.47 |
| 12 | 12-Aug-21 | 627.34 | 955.99 | 932.81 | 986.94 | 417.56 | 407.46 | 431.29 | 41.11 | 39.34 | 43.77 |
| 13 | 13-Aug-21 | 618.85 | 953.14 | 928.97 | 978.56 | 416.64 | 406.08 | 428.2 | 40.88 | 38.65 | 43.19 |
| 14 | 14-Aug-21 | 633.28 | 957.93 | 901.39 | 982.48 | 418.19 | 397.71 | 429.79 | 41.2 | 37.38 | 43.5 |
| 15 | 15-Aug-21 | 178.73 | 863.67 | 839.59 | 875.65 | 388.79 | 378.18 | 393.89 | 35.9 | 33.87 | 36.93 |
| 16 | 16-Aug-21 | 543.12 | 927.21 | 904.04 | 953.85 | 391.04 | 382.2 | 401.74 | 42 | 39.91 | 44.72 |
| 17 | 17-Aug-21 | 602.81 | 918.36 | 893.25 | 937.36 | 410.26 | 399.94 | 416.85 | 40.59 | 38.53 | 41.92 |
| 18 | 18-Aug-21 | 620.8 | 925.37 | 889.03 | 950.24 | 412.21 | 398.77 | 421.26 | 41 | 38.3 | 42.76 |
| 19 | 19-Aug-21 | 578.65 | 904.66 | 830.62 | 932.46 | 405.92 | 383.22 | 416.53 | 39.7 | 35.32 | 41.84 |
| 20 | 20-Aug-21 | 592.93 | 916.26 | 890.14 | 947.14 | 409.78 | 399.65 | 420.8 | 40.52 | 38.47 | 42.68 |
| 21 | 21-Aug-21 | 583.82 | 909.13 | 882.86 | 931.41 | 407.32 | 397.2 | 416.39 | 40.04 | 38 | 41.86 |
| 22 | 22-Aug-21 | 608.5 | 926.13 | 898.48 | 949.88 | 412.94 | 401.92 | 421.75 | 41.09 | 38.92 | 42.87 |
| 23 | 23-Aug-21 | 537.63 | 928.29 | 886.96 | 973.27 | 391.64 | 376.97 | 407.67 | 42.22 | 39.1 | 45.48 |
| 24 | 24-Aug-21 | 570.2 | 947.38 | 916.49 | 969.23 | 398.1 | 385.75 | 406.27 | 43.49 | 40.42 | 45.39 |
| 25 | 25-Aug-21 | Unit in shutdown condition | | | | | | | | | |
| 26 | 26-Aug-21 | Unit in shutdown condition | | | | | | | | | |
| 27 | 27-Aug-21 | Unit in shutdown condition | | | | | | | | | |
| 28 | 28-Aug-21 | Unit in shutdown condition | | | | | | | | | |
| 29 | 29-Aug-21 | Unit in shutdown condition | | | | | | | | | |
| 30 | 30-Aug-21 | Unit in shutdown condition | | | | | | | | | |
| 31 | 31-Aug-21 | Unit in shutdown condition | | | | | | | | | |

## CEMS DAYWISE VALUES FOR THE MONTH OF SEP '2021

| S.NO. | DATE | UNIT# 1 LOAD(MW) | UNIT# 1 SOX(mg/nm3) | | | UNIT# 1 NOX(mg/nm3) | | | UNIT# 1 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 2 | 02-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 3 | 03-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 4 | 04-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 5 | 05-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 6 | 06-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 7 | 07-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 8 | 08-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 9 | 09-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 10 | 10-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 11 | 11-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 12 | 12-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 13 | 13-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 14 | 14-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 15 | 15-Sep-21 | 183.47 | 845.64 | 790.3 | 878.29 | 300.41 | 278.51 | 329.99 | 36.36 | 33.02 | 38.86 |
| 16 | 16-Sep-21 | 448.61 | 856.79 | 802.04 | 904.98 | 305.52 | 271.37 | 344.58 | 37.13 | 33.26 | 40.31 |
| 17 | 17-Sep-21 | 408.45 | 838.54 | 806.76 | 871.08 | 311.65 | 275.11 | 341.57 | 36.14 | 33.9 | 38.43 |
| 18 | 18-Sep-21 | 418.69 | 845.24 | 810.42 | 869.21 | 318.52 | 287.78 | 344.4 | 36.52 | 34.1 | 38.39 |
| 19 | 19-Sep-21 | 449.08 | 857.31 | 828.07 | 882.14 | 309.17 | 281.42 | 343.78 | 37.16 | 35 | 39.04 |
| 20 | 20-Sep-21 | 436.76 | 850.23 | 830.76 | 869.22 | 311.56 | 270.98 | 344.74 | 36.78 | 35.2 | 38.26 |
| 21 | 21-Sep-21 | 461.33 | 862.83 | 816.3 | 892.1 | 304.46 | 270.66 | 341.45 | 37.47 | 34.25 | 39.66 |
| 22 | 22-Sep-21 | 472.18 | 864.17 | 801.1 | 894.42 | 307.02 | 270.98 | 343.41 | 37.51 | 33.54 | 39.87 |
| 23 | 23-Sep-21 | 520.81 | 879.05 | 821.6 | 917.4 | 298.4 | 270.08 | 343.2 | 38.19 | 34.68 | 40.86 |
| 24 | 24-Sep-21 | 478.2 | 860.12 | 797.86 | 896.1 | 312.82 | 272.79 | 343.89 | 37.17 | 33.31 | 39.85 |
| 25 | 25-Sep-21 | 471.79 | 864.21 | 811.66 | 896.47 | 305.2 | 270.97 | 343.68 | 37.52 | 34.23 | 39.9 |
| 26 | 26-Sep-21 | 478.31 | 865.08 | 827.82 | 901.36 | 304.19 | 270.76 | 344.58 | 37.59 | 35.26 | 40.08 |
| 27 | 27-Sep-21 | 480.3 | 870.11 | 825.77 | 910.98 | 307.65 | 278.68 | 342.21 | 37.96 | 35.15 | 40.45 |
| 28 | 28-Sep-21 | 465.76 | 856.51 | 820.9 | 895.01 | 298.84 | 270.86 | 343.57 | 36.99 | 34.74 | 39.74 |
| 29 | 29-Sep-21 | 465.2 | 857.22 | 802.78 | 887.94 | 312.45 | 270.72 | 344.39 | 37 | 33.59 | 39.32 |
| 30 | 30-Sep-21 | 546.67 | 897.38 | 854.23 | 923.16 | 299.32 | 270.43 | 335.34 | 39.4 | 36.44 | 41.26 |

## CEMS DAYWISE VALUES FOR THE MONTH OF APR '2021

| S.NO. | DATE | UNIT# 2 LOAD(MW) | UNIT# 2 SOX(mg/nm3) | | | UNIT# 2 NOX(mg/nm3) | | | UNIT# 2 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-May-21 | 576 | 944 | 909 | 970 | 278 | 263 | 291 | 46 | 43 | 48 |
| 2 | 02-May-21 | 619 | 960 | 917 | 995 | 283 | 266 | 298 | 45 | 43 | 48 |
| 3 | 03-May-21 | 594 | 953 | 913 | 988 | 282 | 265 | 296 | 46 | 43 | 49 |
| 4 | 04-May-21 | 638 | 964 | 939 | 996 | 283 | 273 | 299 | 45 | 43 | 46 |
| 5 | 05-May-21 | 650 | 972 | 948 | 992 | 287 | 275 | 296 | 47 | 45 | 49 |
| 6 | 06-May-21 | 626 | 958 | 931 | 987 | 282 | 270 | 294 | 46 | 44 | 49 |
| 7 | 07-May-21 | 610 | 958 | 928 | 979 | 283 | 269 | 293 | 47 | 44 | 49 |
| 8 | 08-May-21 | 591 | 934 | 878 | 981 | 270 | 245 | 293 | 43 | 38 | 49 |
| 9 | 09-May-21 | 554 | 913 | 883 | 951 | 259 | 246 | 276 | 41 | 38 | 44 |
| 10 | 10-May-21 | 569 | 922 | 890 | 945 | 263 | 248 | 273 | 42 | 39 | 44 |
| 11 | 11-May-21 | 571 | 925 | 897 | 948 | 264 | 250 | 275 | 42 | 39 | 44 |
| 12 | 12-May-21 | 618 | 940 | 912 | 971 | 268 | 255 | 281 | 43 | 40 | 45 |
| 13 | 13-May-21 | 585 | 928 | 897 | 949 | 265 | 251 | 275 | 42 | 39 | 44 |
| 14 | 14-May-21 | 607 | 935 | 902 | 971 | 266 | 252 | 281 | 42 | 40 | 45 |
| 15 | 15-May-21 | 637 | 939 | 919 | 973 | 266 | 258 | 283 | 42 | 41 | 46 |
| 16 | 16-May-21 | 595 | 933 | 908 | 952 | 266 | 254 | 276 | 42 | 40 | 44 |
| 17 | 17-May-21 | 610 | 940 | 912 | 971 | 269 | 255 | 281 | 43 | 40 | 45 |
| 18 | 18-May-21 | 639 | 945 | 914 | 971 | 269 | 255 | 281 | 43 | 40 | 45 |
| 19 | 19-May-21 | 617 | 938 | 919 | 962 | 267 | 258 | 279 | 42 | 41 | 45 |
| 20 | 20-May-21 | 619 | 935 | 918 | 960 | 265 | 257 | 278 | 42 | 40 | 45 |
| 21 | 21-May-21 | 646 | 949 | 927 | 976 | 271 | 259 | 284 | 43 | 41 | 46 |
| 22 | 22-May-21 | 638 | 952 | 927 | 973 | 273 | 260 | 283 | 43 | 41 | 46 |
| 23 | 23-May-21 | 614 | 933 | 909 | 957 | 265 | 254 | 276 | 42 | 40 | 44 |
| 24 | 24-May-21 | 615 | 939 | 904 | 974 | 268 | 253 | 282 | 43 | 40 | 45 |
| 25 | 25-May-21 | 604 | 930 | 905 | 960 | 264 | 253 | 279 | 42 | 40 | 45 |
| 26 | 26-May-21 | 640 | 949 | 924 | 976 | 271 | 259 | 283 | 43 | 41 | 46 |
| 27 | 27-May-21 | 648 | 949 | 928 | 976 | 271 | 260 | 284 | 43 | 41 | 46 |
| 28 | 28-May-21 | 598 | 925 | 896 | 960 | 263 | 250 | 278 | 42 | 39 | 45 |
| 29 | 29-May-21 | 582 | 929 | 898 | 949 | 266 | 252 | 275 | 42 | 39 | 44 |
| 30 | 30-May-21 | 586 | 927 | 897 | 950 | 264 | 250 | 275 | 42 | 39 | 44 |

## CEMS DAYWISE VALUES FOR THE MONTH OF MAY '2021

| S.NO. | DATE | UNIT# 2 LOAD(MW) | UNIT# 2 SOX(mg/nm3) | | | UNIT# 2 NOX(mg/nm3) | | | UNIT# 2 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-May-21 | 640.41 | 966.64 | 940.84 | 997.12 | 403.2 | 394.06 | 414.84 | 44.09 | 41.96 | 46.93 |
| 2 | 02-May-21 | 619.65 | 962.59 | 934.81 | 995.24 | 402.34 | 391.65 | 414.4 | 44.05 | 41.41 | 46.76 |
| 3 | 03-May-21 | 625.69 | 962.94 | 919.57 | 991.84 | 402.16 | 386.65 | 413.35 | 43.9 | 40.55 | 46.59 |
| 4 | 04-May-21 | 620.42 | 962.46 | 932.67 | 975.06 | 402.31 | 390.75 | 407.04 | 44.03 | 41.74 | 45.45 |
| 5 | 05-May-21 | 631.57 | 959.26 | 938.84 | 984.94 | 400.57 | 392.77 | 410.52 | 43.42 | 41.62 | 46.04 |
| 6 | 06-May-21 | 634.47 | 966.05 | 935.75 | 986.44 | 403.26 | 391.59 | 411.07 | 44.15 | 41.34 | 46.01 |
| 7 | 07-May-21 | 621.74 | 960.95 | 936.18 | 990 | 401.64 | 392.09 | 412.69 | 43.82 | 41.49 | 46.44 |
| 8 | 08-May-21 | 616.74 | 957.42 | 936.43 | 985.56 | 400.43 | 392.04 | 411.28 | 43.62 | 41.51 | 46.2 |
| 9 | 09-May-21 | 618.9 | 959.96 | 935.65 | 985.08 | 401.41 | 391.76 | 410.95 | 43.85 | 41.45 | 46.08 |
| 10 | 10-May-21 | 629.67 | 963.88 | 938.69 | 989.43 | 402.51 | 392.59 | 412.35 | 43.99 | 41.54 | 46.4 |
| 11 | 11-May-21 | 590.65 | 949.23 | 889 | 987.84 | 398.22 | 378.54 | 411.84 | 43.34 | 39.71 | 46.24 |
| 12 | 12-May-21 | 449.75 | 902.64 | 881.52 | 923.25 | 383.94 | 375.7 | 392.04 | 41.07 | 39.05 | 43.03 |
| 13 | 13-May-21 | Unit in shutdown condition | | | | | | | | | |
| 14 | 14-May-21 | Unit in shutdown condition | | | | | | | | | |
| 15 | 15-May-21 | Unit in shutdown condition | | | | | | | | | |
| 16 | 16-May-21 | 257.32 | 871.71 | 838.65 | 928.06 | 375.07 | 362.48 | 393.84 | 39.91 | 37.26 | 43.44 |
| 17 | 17-May-21 | 440.24 | 893.54 | 840.07 | 976.46 | 381.24 | 362.84 | 407.1 | 40.65 | 36.9 | 45 |
| 18 | 18-May-21 | 611.14 | 958.57 | 887.91 | 992.54 | 401.04 | 379.86 | 412.9 | 43.84 | 40.55 | 46.27 |
| 19 | 19-May-21 | 626.92 | 965.32 | 939.52 | 990.84 | 403.2 | 392.76 | 412.81 | 44.2 | 41.78 | 46.46 |
| 20 | 20-May-21 | 640.57 | 970.84 | 942.54 | 992.51 | 404.89 | 393.89 | 413.35 | 44.49 | 41.8 | 46.51 |
| 21 | 21-May-21 | 631.36 | 955.31 | 931.04 | 983.7 | 399.08 | 390.31 | 410.03 | 43.14 | 41.2 | 45.79 |
| 22 | 22-May-21 | 632.16 | 958.12 | 938.49 | 990.47 | 400.14 | 392.5 | 412.69 | 43.38 | 41.52 | 46.39 |
| 23 | 23-May-21 | 615.5 | 957.97 | 930.21 | 994.55 | 400.78 | 390.4 | 413.84 | 43.73 | 41.34 | 46.54 |
| 24 | 24-May-21 | 636.98 | 971.09 | 947.8 | 994.6 | 405.14 | 395.95 | 414.13 | 44.57 | 42.3 | 46.69 |
| 25 | 25-May-21 | 642.02 | 969.67 | 943.48 | 992.61 | 404.39 | 394.15 | 413.39 | 44.32 | 41.83 | 46.61 |
| 26 | 26-May-21 | 600.98 | 949.94 | 923.86 | 976.41 | 398.14 | 388.17 | 407.25 | 43.21 | 40.87 | 45.71 |
| 27 | 27-May-21 | 584.37 | 950.12 | 924.48 | 972.2 | 398.68 | 388.35 | 407.38 | 43.52 | 40.95 | 45.64 |
| 28 | 28-May-21 | 622.04 | 956.76 | 922.9 | 989.77 | 399.84 | 387.7 | 412.47 | 43.37 | 40.73 | 46.35 |
| 29 | 29-May-21 | 648.55 | 969.04 | 943.07 | 1000 | 403.93 | 394.48 | 415.95 | 44.12 | 42.06 | 47.01 |
| 30 | 30-May-21 | 625.31 | 960.04 | 934.41 | 988.27 | 401.22 | 391.63 | 412.06 | 43.73 | 41.49 | 46.31 |
| 31 | 31-May-21 | 633.5 | 966.01 | 937.88 | 993.44 | 403.23 | 392.86 | 413.32 | 44.13 | 41.78 | 46.43 |

### CEMS DAYWISE VALUES FOR THE MONTH OF JUN '2021

| S.NO. | DATE | UNIT# 2 LOAD(MW) | UNIT# 2 SOX(mg/nm3) | | | UNIT# 2 NOX(mg/nm3) | | | UNIT# 2 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Jun-21 | 641.64 | 968.05 | 946.63 | 995.45 | 403.74 | 395.1 | 414.43 | 44.14 | 41.73 | 46.76 |
| 2 | 02-Jun-21 | 627.37 | 968.44 | 940.74 | 990.3 | 404.43 | 393.72 | 412.9 | 44.52 | 41.52 | 46.52 |
| 3 | 03-Jun-21 | 630.22 | 969.33 | 933.66 | 994.03 | 404.68 | 391.12 | 414.01 | 44.51 | 41.33 | 46.69 |
| 4 | 04-Jun-21 | 642.82 | 966.5 | 943.36 | 999.43 | 403.09 | 394.18 | 415.63 | 44 | 42 | 46.94 |
| 5 | 05-Jun-21 | 633.26 | 963.63 | 948.32 | 981.93 | 402.35 | 396.6 | 409.9 | 43.94 | 42.38 | 45.87 |
| 6 | 06-Jun-21 | 631.53 | 964.65 | 938.62 | 989.24 | 402.72 | 392.84 | 412.23 | 44.01 | 41.63 | 46.41 |
| 7 | 07-Jun-21 | 635.99 | 966.91 | 943.88 | 990.15 | 403.52 | 394.1 | 412.55 | 44.18 | 41.76 | 46.35 |
| 8 | 08-Jun-21 | 634.06 | 965.87 | 939.6 | 987.16 | 403.17 | 392.71 | 411.34 | 44.12 | 41.5 | 46.05 |
| 9 | 09-Jun-21 | 641.71 | 967.62 | 948.81 | 991.22 | 403.56 | 395.96 | 413.04 | 44.08 | 42.11 | 46.55 |
| 10 | 10-Jun-21 | 602.19 | 951.63 | 875.09 | 985.52 | 398.75 | 375.33 | 411.04 | 43.35 | 39.59 | 46.07 |
| 11 | 11-Jun-21 | 644.46 | 973.98 | 943.29 | 996.27 | 405.98 | 394.36 | 414.57 | 44.7 | 41.87 | 46.74 |
| 12 | 12-Jun-21 | 646.75 | 974.55 | 947.95 | 996.71 | 406.17 | 395.24 | 414.75 | 44.7 | 41.9 | 46.34 |
| 13 | 13-Jun-21 | 634.16 | 963.57 | 939.34 | 989.79 | 402.22 | 393 | 412.61 | 43.85 | 41.68 | 46.43 |
| 14 | 14-Jun-21 | 646.28 | 969.84 | 945.2 | 988.48 | 404.28 | 394.79 | 411.98 | 44.23 | 41.7 | 46.26 |
| 15 | 15-Jun-21 | 643.56 | 970.21 | 946.91 | 994.37 | 404.56 | 395.69 | 414.14 | 44.33 | 42.2 | 46.72 |
| 16 | 16-Jun-21 | 618.83 | 959.28 | 923.05 | 985.02 | 401.14 | 391.66 | 410.89 | 43.72 | 41.4 | 46.05 |
| 17 | 17-Jun-21 | 618.72 | 955 | 879.14 | 993.25 | 399.48 | 374.66 | 413.48 | 43.37 | 38.76 | 46.5 |
| 18 | 18-Jun-21 | 637.24 | 972.82 | 953.72 | 994.86 | 405.79 | 398.7 | 414.06 | 44.7 | 42.68 | 46.62 |
| 19 | 19-Jun-21 | 632.91 | 965.54 | 922.56 | 998.25 | 403 | 387.71 | 415.31 | 44.05 | 40.78 | 46.9 |
| 20 | 20-Jun-21 | 602.41 | 954.52 | 843.89 | 992.65 | 399.94 | 363.98 | 413.42 | 43.67 | 37.08 | 46.57 |
| 21 | 21-Jun-21 | 618.79 | 961.44 | 921.75 | 987.6 | 401.98 | 387.37 | 411.87 | 43.96 | 40.69 | 46.28 |
| 22 | 22-Jun-21 | 648.61 | 967.55 | 942.94 | 993.56 | 403.29 | 394.36 | 413.84 | 44 | 42.01 | 46.66 |
| 23 | 23-Jun-21 | 641.05 | 970.67 | 928.32 | 996.71 | 404.87 | 391.21 | 414.79 | 44.47 | 41.67 | 46.8 |
| 24 | 24-Jun-21 | 647.72 | 970.99 | 944.78 | 997.9 | 404.75 | 394.71 | 414.93 | 44.39 | 41.86 | 46.74 |
| 25 | 25-Jun-21 | 628.37 | 958.21 | 927.62 | 991.61 | 400.4 | 389.2 | 412.48 | 43.54 | 40.99 | 46.41 |
| 26 | 26-Jun-21 | 633.78 | 967.28 | 934.91 | 995.63 | 403.63 | 391.36 | 414.41 | 44.2 | 41.32 | 46.72 |
| 27 | 27-Jun-21 | 633.69 | 961.78 | 934.11 | 990.9 | 401.57 | 391.32 | 412.69 | 43.69 | 41.39 | 46.34 |
| 28 | 28-Jun-21 | 602.15 | 955.16 | 933.46 | 979.46 | 400.08 | 392.09 | 408.93 | 43.69 | 41.73 | 45.73 |
| 29 | 29-Jun-21 | 595.78 | 952.03 | 919.61 | 976.22 | 398.97 | 386.91 | 408.15 | 43.43 | 40.69 | 45.73 |
| 30 | 30-Jun-21 | 632.01 | 965.39 | 931.35 | 991.64 | 402.92 | 390.29 | 412.93 | 44.04 | 41.15 | 46.39 |

### CEMS DAYWISE VALUES FOR THE MONTH OF JUL '2021

| S.NO. | DATE | UNIT# 2 LOAD(MW) | UNIT# 2 SOX(mg/nm3) | | | UNIT# 2 NOX(mg/nm3) | | | UNIT# 2 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Jul-21 | 645.18 | 967.04 | 939.72 | 991.23 | 403.22 | 392.78 | 412.71 | 44.01 | 41.53 | 46.39 |
| 2 | 02-Jul-21 | 614.12 | 959.42 | 933.34 | 983.66 | 401.4 | 390.93 | 410.78 | 43.89 | 41.26 | 45.98 |
| 3 | 03-Jul-21 | 633.6 | 964.3 | 942.09 | 995.8 | 402.49 | 393.95 | 414.42 | 43.94 | 41.98 | 46.71 |
| 4 | 04-Jul-21 | 644.55 | 969.04 | 941.45 | 995.86 | 404.03 | 393.3 | 414.38 | 44.19 | 41.61 | 46.68 |
| 5 | 05-Jul-21 | 645.82 | 970.58 | 945.31 | 994.74 | 404.63 | 395.01 | 414.2 | 44.37 | 42.08 | 46.71 |
| 6 | 06-Jul-21 | 622.94 | 954.46 | 925.79 | 988.03 | 399.07 | 388.64 | 412.12 | 43.24 | 40.91 | 46.37 |
| 7 | 07-Jul-21 | 139.5 | 939.8 | 882.81 | 985.96 | 394.45 | 375.55 | 411.41 | 42.41 | 38.82 | 46.22 |
| 8 | 08-Jul-21 | Unit in shutdown condition | | | | | | | | | |
| 9 | 09-Jul-21 | Unit in shutdown condition | | | | | | | | | |
| 10 | 10-Jul-21 | Unit in shutdown condition | | | | | | | | | |
| 11 | 11-Jul-21 | 413.41 | 941.04 | 868.87 | 970.57 | 395.39 | 374.36 | 405.98 | 42.82 | 39.12 | 45.36 |
| 12 | 12-Jul-21 | 591.36 | 947.94 | 878.76 | 988.39 | 397.5 | 377.71 | 411.8 | 43.18 | 40.45 | 46.15 |
| 13 | 13-Jul-21 | 612.61 | 958.66 | 897.45 | 987.87 | 401.18 | 383.9 | 412.1 | 43.84 | 40.4 | 46.38 |
| 14 | 14-Jul-21 | 574.12 | 940.44 | 864.77 | 981.42 | 395.31 | 372.64 | 409.49 | 42.81 | 39.78 | 45.89 |
| 15 | 15-Jul-21 | 607.93 | 954.3 | 920.67 | 981.03 | 399.56 | 387.5 | 409.68 | 43.51 | 40.88 | 45.95 |
| 16 | 16-Jul-21 | 589.28 | 946.25 | 889.15 | 993.78 | 396.86 | 378.59 | 413.56 | 42.98 | 39.72 | 46.48 |
| 17 | 17-Jul-21 | 627.17 | 960.15 | 937.58 | 984.45 | 401.21 | 393.28 | 410.69 | 43.71 | 42 | 46.01 |
| 18 | 18-Jul-21 | 595.29 | 944.76 | 847.63 | 990.53 | 396.27 | 366.13 | 412.95 | 42.87 | 37.8 | 46.53 |
| 19 | 19-Jul-21 | 488.13 | 904.73 | 838.51 | 984.52 | 384.52 | 362.45 | 410.19 | 41.15 | 36.8 | 45.86 |
| 20 | 20-Jul-21 | 460.36 | 893.88 | 840.52 | 960.32 | 380.54 | 362.92 | 403.34 | 40.2 | 36.9 | 44.87 |
| 21 | 21-Jul-21 | 453.56 | 893.08 | 835.52 | 989.98 | 380.91 | 361.5 | 412.1 | 40.48 | 36.71 | 46.13 |
| 22 | 22-Jul-21 | 459.56 | 900.95 | 845.28 | 987.89 | 383.42 | 364.86 | 411.51 | 40.99 | 37.39 | 46.05 |
| 23 | 23-Jul-21 | 563.58 | 932.97 | 835.57 | 982.35 | 392.79 | 361.15 | 409.18 | 42.35 | 36.51 | 45.6 |
| 24 | 24-Jul-21 | 533.22 | 921.43 | 847 | 984.39 | 389.27 | 365.27 | 409.84 | 41.76 | 37.41 | 46 |
| 25 | 25-Jul-21 | 546.14 | 936.67 | 859.66 | 1000 | 395.05 | 370.75 | 415.96 | 43.06 | 38.9 | 47 |
| 26 | 26-Jul-21 | 546.18 | 934.26 | 845.23 | 996.16 | 394.09 | 364.28 | 414.45 | 42.87 | 37.08 | 46.68 |
| 27 | 27-Jul-21 | 591.6 | 947.64 | 883.47 | 996.47 | 397.58 | 377.41 | 414.63 | 43.19 | 39.74 | 46.75 |
| 28 | 28-Jul-21 | 569.55 | 941.17 | 896.66 | 972.65 | 395.63 | 383.28 | 407.46 | 42.89 | 40.79 | 45.63 |
| 29 | 29-Jul-21 | 589.64 | 945.08 | 915.25 | 981.84 | 396.48 | 385.4 | 409.39 | 42.93 | 40.38 | 45.92 |
| 30 | 30-Jul-21 | 554.33 | 937.03 | 900.88 | 964.55 | 394.57 | 381.32 | 405.01 | 42.82 | 39.84 | 45.25 |
| 31 | 31-Jul-21 | 528.53 | 927.41 | 867.32 | 960.57 | 391.76 | 372.55 | 403.72 | 42.37 | 38.99 | 45.02 |

## CEMS DAYWISE VALUES FOR THE MONTH OF AUG '2021

| S.NO. | DATE | UNIT# 2 LOAD(MW) | UNIT# 2 SOX(mg/nm3) | | | UNIT# 2 NOX(mg/nm3) | | | UNIT# 2 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Aug-21 | 520.65 | 922.5 | 867.3 | 943.2 | 390 | 374.3 | 398.4 | 42.02 | 39.9 | 44.16 |
| 2 | 02-Aug-21 | 520.56 | 920.9 | 886.2 | 959.1 | 389.4 | 377.1 | 403.1 | 41.88 | 39.3 | 44.86 |
| 3 | 03-Aug-21 | 494.4 | 911.2 | 873.4 | 948.8 | 386.3 | 372.8 | 400.2 | 41.37 | 38.4 | 44.5 |
| 4 | 04-Aug-21 | 547.23 | 934.2 | 889.3 | 961.2 | 393.4 | 378.5 | 403.2 | 42.48 | 39.7 | 44.78 |
| 5 | 05-Aug-21 | 546.21 | 932.68 | 900.5 | 967.7 | 393.17 | 381.21 | 405.86 | 42.56 | 39.82 | 45.34 |
| 6 | 06-Aug-21 | 515.96 | 920.06 | 899.63 | 943.95 | 389.19 | 381.18 | 398.85 | 41.86 | 39.55 | 44.31 |
| 7 | 07-Aug-21 | 529.89 | 930.89 | 899.91 | 956.71 | 392.94 | 380.91 | 402.52 | 42.64 | 39.73 | 44.81 |
| 8 | 08-Aug-21 | 545.1 | 931.34 | 906.85 | 955.58 | 392.62 | 382.78 | 402.19 | 42.38 | 40.4 | 44.81 |
| 9 | 09-Aug-21 | 568.16 | 940.75 | 905.96 | 970.16 | 395.56 | 383.09 | 406.3 | 42.92 | 40.2 | 45.29 |
| 10 | 10-Aug-21 | 565.68 | 938.42 | 906.16 | 973.22 | 394.6 | 382.72 | 406.78 | 42.65 | 39.85 | 45.45 |
| 11 | 11-Aug-21 | 566.97 | 939.77 | 915.27 | 969.33 | 395.26 | 386.17 | 406.44 | 42.87 | 40.79 | 45.47 |
| 12 | 12-Aug-21 | 553.81 | 930.35 | 898.58 | 962.7 | 392.04 | 380.4 | 403.94 | 42.24 | 39.61 | 45.01 |
| 13 | 13-Aug-21 | 545.03 | 934.07 | 901.63 | 962.86 | 393.66 | 381.36 | 403.99 | 42.62 | 39.77 | 45.03 |
| 14 | 14-Aug-21 | 564.57 | 943.1 | 916.41 | 968.77 | 396.59 | 386.67 | 406.29 | 43.22 | 40.93 | 45.45 |
| 15 | 15-Aug-21 | 557.57 | 937.8 | 903.05 | 967.95 | 394.78 | 381.89 | 406.06 | 42.85 | 39.9 | 45.42 |
| 16 | 16-Aug-21 | 543.12 | 927.21 | 904.04 | 953.85 | 391.04 | 382.2 | 401.74 | 42 | 39.91 | 44.72 |
| 17 | 17-Aug-21 | 561.96 | 937.53 | 905.69 | 964.3 | 394.42 | 382.66 | 403.96 | 42.66 | 40 | 44.71 |
| 18 | 18-Aug-21 | 514.59 | 921.58 | 896.33 | 948.25 | 389.97 | 380.83 | 400.11 | 42.1 | 39.97 | 44.49 |
| 19 | 19-Aug-21 | 517.32 | 919.1 | 894.4 | 955 | 388.7 | 379.4 | 402.2 | 41.73 | 39.5 | 44.83 |
| 20 | 20-Aug-21 | 550.06 | 933.5 | 901.7 | 962 | 393.1 | 383 | 403.3 | 42.44 | 40.7 | 44.62 |
| 21 | 21-Aug-21 | 513.94 | 923.1 | 886.5 | 954 | 390.6 | 377.7 | 401.1 | 42.28 | 39.5 | 44.43 |
| 22 | 22-Aug-21 | 520.8 | 921.3 | 901.2 | 947.7 | 389.4 | 381.9 | 399.7 | 41.85 | 40 | 44.37 |
| 23 | 23-Aug-21 | 537.63 | 928.3 | 887 | 973.3 | 391.6 | 377 | 407.7 | 42.22 | 39.1 | 45.48 |
| 24 | 24-Aug-21 | 570.2 | 947.4 | 916.5 | 969.2 | 398.1 | 385.8 | 406.3 | 43.49 | 40.4 | 45.39 |
| 25 | 25-Aug-21 | 606.68 | 956.3 | 932.6 | 984.4 | 400.3 | 390.6 | 411 | 43.73 | 41.2 | 46.15 |
| 26 | 26-Aug-21 | 529.84 | 922 | 886.3 | 957.4 | 389.7 | 376.9 | 402.8 | 41.88 | 39.1 | 44.87 |
| 27 | 27-Aug-21 | 581.91 | 950.2 | 913.6 | 979.3 | 398.6 | 385 | 408.7 | 43.48 | 40.4 | 45.67 |
| 28 | 28-Aug-21 | 180.42 | 936.4 | 822 | 992.1 | 393.7 | 357.4 | 413 | 42.39 | 36 | 46.38 |
| 29 | 29-Aug-21 | Unit in shutdown condition | | | | | | | | | |
| 30 | 30-Aug-21 | Unit in shutdown condition | | | | | | | | | |
| 31 | 31-Aug-21 | Unit in shutdown condition | | | | | | | | | |

## CEMS DAYWISE VALUES FOR THE MONTH OF SEP '2021

| S.NO. | DATE | UNIT# 2 LOAD(MW) | UNIT# 2 SOX(mg/nm3) | | | UNIT# 2 NOX(mg/nm3) | | | UNIT# 2 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Sep-21 | 179.58 | 920.52 | 873.72 | 946.57 | 294.99 | 279.82 | 306.79 | 41.85 | 39.85 | 44.19 |
| 2 | 02-Sep-21 | 563.07 | 932.38 | 912.47 | 949.3 | 297.67 | 272.8 | 330.5 | 42.6 | 40.33 | 44.97 |
| 3 | 03-Sep-21 | 591.87 | 930.96 | 900.91 | 949.42 | 299.26 | 272.32 | 329.2 | 42.92 | 40.73 | 44.81 |
| 4 | 04-Sep-21 | 564.87 | 927.04 | 900.6 | 949.37 | 298.6 | 272.26 | 329.69 | 42.8 | 39.89 | 44.7 |
| 5 | 05-Sep-21 | 601.41 | 932.05 | 906 | 949.28 | 307.54 | 274.75 | 331.68 | 43.41 | 41.21 | 44.98 |
| 6 | 06-Sep-21 | 593.89 | 926.67 | 904.02 | 945.72 | 307.39 | 273.97 | 329.62 | 42.97 | 40.13 | 44.88 |
| 7 | 07-Sep-21 | 595.76 | 931.48 | 905.53 | 946.65 | 309.23 | 274.38 | 329.03 | 43.31 | 40.83 | 44.99 |
| 8 | 08-Sep-21 | 513.12 | 903.68 | 843.38 | 939.87 | 307.36 | 276.33 | 331.53 | 41.43 | 37.18 | 44.76 |
| 9 | 09-Sep-21 | 531.73 | 907.78 | 839.51 | 944.18 | 296.7 | 272.89 | 329.04 | 42.13 | 36.67 | 44.95 |
| 10 | 10-Sep-21 | 515.17 | 907.57 | 838.54 | 945.88 | 301.23 | 273 | 329.55 | 41.69 | 36.77 | 44.93 |
| 11 | 11-Sep-21 | 563.84 | 928.57 | 882.76 | 949.5 | 304.31 | 272.69 | 328.04 | 42.42 | 39.53 | 44.65 |
| 12 | 12-Sep-21 | 555.34 | 922.52 | 900.88 | 946.6 | 300.53 | 275.3 | 331.67 | 42.5 | 39.84 | 44.64 |
| 13 | 13-Sep-21 | 559.58 | 932.06 | 901.24 | 948.68 | 303.49 | 276.48 | 328.59 | 42.6 | 39.72 | 44.9 |
| 14 | 14-Sep-21 | 586.4 | 929.1 | 900.84 | 946.52 | 299.31 | 274.84 | 330.14 | 42.94 | 40.26 | 44.99 |
| 15 | 15-Sep-21 | 530.5 | 923.7 | 893.2 | 947.2 | 296.5 | 272.9 | 322.3 | 42 | 39.3 | 44.44 |
| 16 | 16-Sep-21 | 465.28 | 901.4 | 852.4 | 931.7 | 293.4 | 273 | 323.5 | 41.02 | 37.3 | 43.21 |
| 17 | 17-Sep-21 | 425.47 | 884.3 | 863.9 | 917.5 | 302.1 | 273.8 | 328.9 | 39.97 | 37.7 | 42.79 |
| 18 | 18-Sep-21 | 422.64 | 883.5 | 854.4 | 908.5 | 296.4 | 272.7 | 330.7 | 40.02 | 37.6 | 42.51 |
| 19 | 19-Sep-21 | 462.27 | 904.5 | 878.4 | 931.8 | 303.3 | 277.3 | 331.1 | 41.28 | 39.3 | 43.15 |
| 20 | 20-Sep-21 | 456.22 | 898 | 867.5 | 920.7 | 305.6 | 275.6 | 329.4 | 40.85 | 38.3 | 43.13 |
| 21 | 21-Sep-21 | 481.1 | 905.8 | 868.5 | 936.1 | 301.2 | 274.6 | 326 | 41.11 | 38.3 | 43.9 |
| 22 | 22-Sep-21 | 496.24 | 908.3 | 877.8 | 946.4 | 302.3 | 273.1 | 328.2 | 41.04 | 38.7 | 44.41 |
| 23 | 23-Sep-21 | 525.36 | 920.2 | 896.2 | 941.2 | 303.8 | 274.1 | 331.4 | 41.65 | 39.5 | 43.99 |
| 24 | 24-Sep-21 | 499.71 | 911.5 | 880.2 | 946.8 | 304.9 | 272.9 | 331.7 | 41.41 | 39 | 44.39 |
| 25 | 25-Sep-21 | 502.13 | 917.7 | 878 | 943.5 | 296.1 | 274.9 | 330.7 | 41.9 | 38.6 | 44.23 |
| 26 | 26-Sep-21 | 496.68 | 912.5 | 885.2 | 942.5 | 304.8 | 282.1 | 328.2 | 41.93 | 39.4 | 44.74 |
| 27 | 27-Sep-21 | 507.5 | 916.9 | 877.9 | 944.7 | 297 | 272.4 | 327.2 | 41.99 | 38.7 | 44.34 |
| 28 | 28-Sep-21 | 499.83 | 917 | 872 | 939.8 | 295.7 | 272.5 | 325.7 | 41.87 | 39.8 | 44.11 |
| 29 | 29-Sep-21 | 458.42 | 896.4 | 868.1 | 926.4 | 294.2 | 273.3 | 325.4 | 40.71 | 38.1 | 43.1 |
| 30 | 30-Sep-21 | 537.39 | 927.8 | 901.9 | 947.2 | 300.4 | 273.4 | 330.5 | 42.91 | 40.2 | 44.94 |

### CEMS DAYWISE VALUES FOR THE MONTH OF APR '2021

| S.NO. | DATE | UNIT# 3 LOAD(MW) | UNIT# 3 SOX(mg/nm3) | | | UNIT# 3 NOX(mg/nm3) | | | UNIT# 3 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Apr-21 | 496 | 896 | 841 | 950 | 277 | 260 | 295 | 45 | 41 | 48 |
| 2 | 02-Apr-21 | 562 | 883 | 826 | 944 | 273 | 254 | 293 | 44 | 40 | 48 |
| 3 | 03-Apr-21 | 639 | 894 | 823 | 937 | 275 | 253 | 290 | 45 | 40 | 48 |
| 4 | 04-Apr-21 | 632 | 906 | 837 | 942 | 279 | 257 | 292 | 45 | 41 | 48 |
| 5 | 05-Apr-21 | 581 | 890 | 830 | 941 | 274 | 255 | 292 | 44 | 41 | 48 |
| 6 | 06-Apr-21 | 592 | 889 | 829 | 939 | 274 | 255 | 291 | 44 | 41 | 47 |
| 7 | 07-Apr-21 | 563 | 884 | 826 | 945 | 273 | 254 | 293 | 44 | 40 | 48 |
| 8 | 08-Apr-21 | 561 | 883 | 835 | 931 | 273 | 257 | 288 | 44 | 41 | 47 |
| 9 | 09-Apr-21 | 579 | 879 | 830 | 934 | 271 | 256 | 290 | 44 | 41 | 48 |
| 10 | 10-Apr-21 | 564 | 896 | 838 | 944 | 277 | 258 | 293 | 45 | 41 | 48 |
| 11 | 11-Apr-21 | 597 | 906 | 844 | 946 | 280 | 260 | 293 | 45 | 42 | 48 |
| 12 | 12-Apr-21 | 471 | 915 | 839 | 945 | 283 | 258 | 293 | 46 | 41 | 48 |
| 13 | 13-Apr-21 | 454 | 896 | 840 | 947 | 276 | 258 | 294 | 45 | 41 | 48 |
| 14 | 14-Apr-21 | 435 | 908 | 851 | 948 | 280 | 261 | 294 | 45 | 42 | 48 |
| 15 | 15-Apr-21 | 506 | 923 | 897 | 944 | 285 | 274 | 293 | 44 | 42 | 46 |
| 16 | 16-Apr-21 | 544 | 912 | 851 | 941 | 281 | 262 | 291 | 46 | 43 | 48 |
| 17 | 17-Apr-21 | 517 | 901 | 837 | 946 | 278 | 257 | 293 | 45 | 41 | 48 |
| 18 | 18-Apr-21 | 545 | 910 | 846 | 945 | 281 | 261 | 293 | 46 | 42 | 48 |
| 19 | 19-Apr-21 | 583 | 906 | 828 | 945 | 279 | 254 | 293 | 45 | 41 | 48 |
| 20 | 20-Apr-21 | 595 | 914 | 859 | 950 | 282 | 265 | 295 | 46 | 43 | 48 |
| 21 | 21-Apr-21 | 585 | 905 | 843 | 939 | 279 | 259 | 291 | 45 | 41 | 48 |
| 22 | 22-Apr-21 | 552 | 908 | 842 | 933 | 279 | 258 | 288 | 45 | 41 | 47 |
| 23 | 23-Apr-21 | 559 | 919 | 874 | 947 | 283 | 270 | 294 | 46 | 44 | 48 |
| 24 | 24-Apr-21 | 548 | 916 | 866 | 946 | 283 | 268 | 293 | 46 | 43 | 48 |
| 25 | 25-Apr-21 | 568 | 915 | 897 | 944 | 281 | 274 | 293 | 46 | 44 | 48 |
| 26 | 26-Apr-21 | 569 | 906 | 840 | 946 | 279 | 258 | 293 | 45 | 41 | 48 |
| 27 | 27-Apr-21 | 555 | 894 | 832 | 949 | 275 | 255 | 294 | 45 | 41 | 48 |
| 28 | 28-Apr-21 | 556 | 905 | 839 | 944 | 279 | 259 | 293 | 45 | 41 | 48 |
| 29 | 29-Apr-21 | 570 | 916 | 878 | 949 | 282 | 269 | 294 | 46 | 43 | 48 |
| 30 | 30-Apr-21 | 599 | 907 | 840 | 946 | 279 | 259 | 293 | 45 | 41 | 48 |

### CEMS DAYWISE VALUES FOR THE MONTH OF MAY '2021

| S.NO. | DATE | UNIT# 3 LOAD(MW) | UNIT# 3 SOX(mg/nm3) | | | UNIT# 3 NOX(mg/nm3) | | | UNIT# 3 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-May-21 | 647.44 | 970.1 | 946 | 995.6 | 396.1 | 386.8 | 406.2 | 43.14 | 41.3 | 45.2 |
| 2 | 02-May-21 | 646.98 | 968.4 | 934.3 | 999.6 | 395.5 | 382.9 | 407.5 | 43.09 | 40.5 | 45.5 |
| 3 | 03-May-21 | 654.26 | 974 | 939.6 | 1000 | 397.5 | 384.9 | 408.1 | 43.44 | 40.9 | 45.5 |
| 4 | 04-May-21 | 645.04 | 968.9 | 942 | 994.7 | 395.8 | 385.6 | 405.6 | 43.13 | 41 | 45.1 |
| 5 | 05-May-21 | 652.48 | 971.7 | 945.7 | 998.4 | 396.6 | 386.4 | 407 | 43.27 | 41.2 | 45 |
| 6 | 06-May-21 | 658.34 | 974 | 950.8 | 998.9 | 397.3 | 388 | 407.2 | 43.4 | 41.6 | 45.4 |
| 7 | 07-May-21 | 650.16 | 972.8 | 943.4 | 997.3 | 397.1 | 385.7 | 406.6 | 43.4 | 41.1 | 45.3 |
| 8 | 08-May-21 | 631.22 | 965.1 | 939.8 | 985.9 | 394.7 | 385 | 403.2 | 42.9 | 40.9 | 44.6 |
| 9 | 09-May-21 | 635.64 | 968.8 | 942 | 992.9 | 396 | 385.5 | 405.4 | 43.14 | 41 | 45 |
| 10 | 10-May-21 | 651.85 | 971.8 | 951.3 | 995.8 | 396.6 | 388.5 | 406.1 | 43.29 | 41.7 | 45.2 |
| 11 | 11-May-21 | 651.03 | 970.4 | 945.7 | 996.4 | 396.1 | 386.5 | 406.2 | 43.17 | 41.3 | 45.2 |
| 12 | 12-May-21 | 634.03 | 964.2 | 935.9 | 991.6 | 394.2 | 383.5 | 405 | 42.8 | 40.6 | 44.9 |
| 13 | 13-May-21 | 605.93 | 955.7 | 923.9 | 992.9 | 391.8 | 380.3 | 405.2 | 42.24 | 39.5 | 45 |
| 14 | 14-May-21 | 471 | 960 | 927 | 989.8 | 393.1 | 380.7 | 404.2 | 42.54 | 40 | 44.8 |
| 15 | 15-May-21 | Unit in shutdown condition | | | | | | | | | |
| 16 | 16-May-21 | Unit in shutdown condition | | | | | | | | | |
| 17 | 17-May-21 | Unit in shutdown condition | | | | | | | | | |
| 18 | 18-May-21 | 475.36 | 939.4 | 866.7 | 969.7 | 386.4 | 362.9 | 398 | 41.14 | 36.2 | 43.5 |
| 19 | 19-May-21 | 638.21 | 965.8 | 940.4 | 1000 | 394.7 | 384.9 | 407.7 | 42.91 | 40.9 | 45.5 |
| 20 | 20-May-21 | 639.23 | 970 | 947.2 | 993.9 | 396.4 | 387.9 | 405.7 | 43.19 | 41.3 | 45.1 |
| 21 | 21-May-21 | 630.24 | 960.9 | 926.8 | 986.1 | 393.1 | 380.5 | 403 | 42.61 | 40 | 44.7 |
| 22 | 22-May-21 | 643.03 | 968.2 | 945 | 990.2 | 395.5 | 386.4 | 404.5 | 43.03 | 41.2 | 44.8 |
| 23 | 23-May-21 | 636.83 | 967.9 | 938.5 | 996.3 | 395.7 | 384.1 | 406.2 | 43.05 | 40.7 | 45.5 |
| 24 | 24-May-21 | 632.81 | 963.5 | 943.2 | 990.3 | 394 | 385.7 | 404.5 | 42.72 | 41.1 | 44.8 |
| 25 | 25-May-21 | 643.17 | 964.8 | 947.2 | 989.4 | 394.1 | 387 | 403.9 | 42.76 | 41.4 | 44.7 |
| 26 | 26-May-21 | 644.76 | 973.9 | 944.1 | 993.9 | 397.7 | 385.9 | 405.5 | 43.52 | 41.6 | 45.1 |
| 27 | 27-May-21 | 645.2 | 973.4 | 942.2 | 997.8 | 397.5 | 385.3 | 407 | 43.44 | 41 | 45.4 |
| 28 | 28-May-21 | 647.21 | 976.5 | 944.7 | 996 | 398.7 | 386.9 | 406.2 | 43.65 | 41.3 | 45.2 |
| 29 | 29-May-21 | 638.95 | 964.9 | 944.7 | 986.5 | 394.4 | 386.3 | 402.9 | 42.79 | 41.1 | 44.5 |
| 30 | 30-May-21 | 630.8 | 962.1 | 941 | 989.7 | 393.5 | 384.9 | 404.1 | 42.62 | 40.9 | 44.8 |
| 31 | 31-May-21 | 636.17 | 969.6 | 934.6 | 992.4 | 396.3 | 382.9 | 405.2 | 43.22 | 40.5 | 45 |

## CEMS DAYWISE VALUES FOR THE MONTH OF JUN '2021

| S.NO. | DATE | UNIT# 3 LOAD(MW) | UNIT# 3 SOX(mg/nm3) | | | UNIT# 3 NOX(mg/nm3) | | | UNIT# 3 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Jun-21 | 639.91 | 968.6 | 941 | 989.4 | 395.8 | 384.9 | 404.1 | 43.08 | 40.9 | 44.8 |
| 2 | 02-Jun-21 | 631.67 | 968.8 | 940 | 988.7 | 396.2 | 384.7 | 403.9 | 43.17 | 40.9 | 44.7 |
| 3 | 03-Jun-21 | 630.53 | 966.9 | 944.4 | 988.8 | 395.4 | 385.9 | 404 | 42.98 | 41.1 | 44.7 |
| 4 | 04-Jun-21 | 635.21 | 961 | 934 | 992.3 | 392.9 | 382.7 | 405.1 | 42.52 | 40.5 | 45 |
| 5 | 05-Jun-21 | 648.67 | 969.8 | 946.7 | 997.4 | 396 | 386.9 | 406.5 | 43.17 | 41.3 | 45.3 |
| 6 | 06-Jun-21 | 645.98 | 965.9 | 941.4 | 999.8 | 394.5 | 385.1 | 407.5 | 42.87 | 41 | 45.5 |
| 7 | 07-Jun-21 | 651.08 | 968 | 947.6 | 994.3 | 395.2 | 386.9 | 405.7 | 42.92 | 41.4 | 45.1 |
| 8 | 08-Jun-21 | 645.25 | 966.1 | 948.1 | 991.8 | 394.6 | 387.5 | 405 | 42.88 | 41.5 | 45 |
| 9 | 09-Jun-21 | 644.13 | 969.3 | 945.1 | 993.6 | 395.9 | 386.2 | 405.5 | 43.09 | 41.3 | 45 |
| 10 | 10-Jun-21 | 606.89 | 958.6 | 863.1 | 994 | 393 | 362.5 | 405.7 | 42.47 | 36.1 | 45.1 |
| 11 | 11-Jun-21 | 644.1 | 970.5 | 945.6 | 994.8 | 396.4 | 386.9 | 406 | 43.22 | 41.3 | 45.2 |
| 12 | 12-Jun-21 | 640.08 | 966.9 | 938.9 | 994.3 | 395.1 | 384.2 | 405.7 | 42.97 | 40.8 | 45.1 |
| 13 | 13-Jun-21 | 638.1 | 969.6 | 941.4 | 992.1 | 396.3 | 385.2 | 405 | 43.21 | 41 | 45 |
| 14 | 14-Jun-21 | 650.03 | 971.2 | 947.3 | 992.7 | 396.5 | 387 | 405.1 | 43.25 | 41.4 | 45 |
| 15 | 15-Jun-21 | 646.28 | 973 | 944.4 | 997.7 | 397.3 | 386.2 | 406.9 | 43.42 | 41.2 | 45.3 |
| 16 | 16-Jun-21 | 629.99 | 963.1 | 897.8 | 994.2 | 394 | 373.8 | 405.4 | 42.73 | 38.4 | 45 |
| 17 | 17-Jun-21 | 644.14 | 965 | 948.6 | 991.9 | 394.2 | 387.5 | 404.9 | 42.81 | 41.5 | 44.9 |
| 18 | 18-Jun-21 | 646.52 | 970.7 | 948.3 | 995.5 | 396.4 | 388.1 | 406.2 | 43.21 | 41.5 | 45.2 |
| 19 | 19-Jun-21 | 625.18 | 958.5 | 922.1 | 987.3 | 392.3 | 379.3 | 403 | 42.43 | 39.7 | 44.9 |
| 20 | 20-Jun-21 | 608.8 | 951.3 | 871.3 | 989.7 | 390 | 365.8 | 403.9 | 41.89 | 36.7 | 44.7 |
| 21 | 21-Jun-21 | 637.66 | 968.9 | 942.1 | 989.1 | 396 | 385.5 | 404.1 | 43.17 | 41 | 44.8 |
| 22 | 22-Jun-21 | 653.24 | 976.4 | 953.2 | 995.3 | 398.5 | 389 | 406 | 43.66 | 41.9 | 45.2 |
| 23 | 23-Jun-21 | 638.36 | 963.6 | 917.9 | 992.5 | 393.9 | 378.7 | 404.7 | 42.69 | 39.2 | 44.9 |
| 24 | 24-Jun-21 | 641.7 | 967.7 | 932 | 995.4 | 395.3 | 382.6 | 406.1 | 42.99 | 40.4 | 45.2 |
| 25 | 25-Jun-21 | 630.78 | 960.8 | 910.4 | 996.5 | 392.9 | 375.4 | 406.5 | 42.54 | 38.9 | 45.3 |
| 26 | 26-Jun-21 | 638 | 963.6 | 934.9 | 994.8 | 393.9 | 383.5 | 405.6 | 42.71 | 40.6 | 45.1 |
| 27 | 27-Jun-21 | 630.36 | 963.8 | 936.1 | 996.9 | 394.2 | 383.4 | 406.6 | 42.8 | 40.6 | 45.3 |
| 28 | 28-Jun-21 | 627.82 | 966 | 942.5 | 990.9 | 395.1 | 385.7 | 404.5 | 42.94 | 40.9 | 44.8 |
| 29 | 29-Jun-21 | 617.59 | 958.3 | 929.3 | 984.4 | 392.4 | 381.5 | 402.2 | 42.43 | 40.5 | 44.4 |
| 30 | 30-Jun-21 | 644.11 | 973.8 | 943.4 | 998.1 | 398 | 386 | 407 | 43.55 | 41.1 | 45.4 |

## CEMS DAYWISE VALUES FOR THE MONTH OF JUL '2021

| S.NO. | DATE | UNIT# 3 LOAD(MW) | UNIT# 3 SOX(mg/nm3) | | | UNIT# 3 NOX(mg/nm3) | | | UNIT# 3 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Jul-21 | 644.4 | 967.8 | 943.4 | 994.9 | 395.3 | 385.6 | 406.1 | 43.03 | 41.1 | 45.2 |
| 2 | 02-Jul-21 | 646.96 | 970.8 | 947.3 | 997.5 | 396.4 | 387.2 | 406.8 | 43.2 | 41.4 | 45.3 |
| 3 | 03-Jul-21 | 649.23 | 977.3 | 939.4 | 997.9 | 398.9 | 384.5 | 406.8 | 43.76 | 41 | 45.3 |
| 4 | 04-Jul-21 | 651.38 | 975.4 | 951 | 994.9 | 398.1 | 388.2 | 406 | 43.59 | 41.6 | 45.2 |
| 5 | 05-Jul-21 | 640.78 | 967.4 | 939.9 | 990.1 | 395.2 | 384.9 | 404.5 | 42.94 | 40.9 | 44.8 |
| 6 | 06-Jul-21 | 644.45 | 967.6 | 943.7 | 985.2 | 395.2 | 386 | 402.3 | 42.98 | 41.1 | 44.4 |
| 7 | 07-Jul-21 | 650.45 | 973.6 | 951.4 | 998.2 | 397.4 | 388.6 | 407 | 43.45 | 41.6 | 45.4 |
| 8 | 08-Jul-21 | 647.84 | 970.1 | 945.5 | 991.2 | 396.1 | 386.4 | 404.5 | 43.14 | 41.2 | 44.9 |
| 9 | 09-Jul-21 | 646.42 | 965.2 | 943.9 | 985.5 | 394.2 | 386 | 402.3 | 42.78 | 41.1 | 44.3 |
| 10 | 10-Jul-21 | 646.73 | 969.6 | 945.1 | 990.7 | 396 | 386.2 | 404.4 | 43.16 | 41.2 | 44.8 |
| 11 | 11-Jul-21 | 616.63 | 959.4 | 916.3 | 986.9 | 393 | 377.3 | 403 | 42.53 | 39.3 | 44.6 |
| 12 | 12-Jul-21 | 615.82 | 954.3 | 884.8 | 990 | 390.9 | 370 | 403.9 | 42.14 | 37.9 | 44.7 |
| 13 | 13-Jul-21 | 618.1 | 956.1 | 895.7 | 996.3 | 391.6 | 374.1 | 406.5 | 42.23 | 38.4 | 45.3 |
| 14 | 14-Jul-21 | 573 | 939.4 | 840.6 | 979.2 | 386.5 | 354.3 | 400.8 | 41.11 | 34.4 | 44.1 |
| 15 | 15-Jul-21 | 626.14 | 960.5 | 937.1 | 986.3 | 393 | 383.8 | 403.2 | 42.51 | 40.7 | 44.6 |
| 16 | 16-Jul-21 | 607.37 | 949.9 | 873.7 | 993.9 | 389.5 | 365.3 | 405.7 | 41.75 | 36.7 | 45.1 |
| 17 | 17-Jul-21 | 634.37 | 970 | 942.3 | 997 | 396.5 | 387 | 406.7 | 43.26 | 41.4 | 45.3 |
| 18 | 18-Jul-21 | 610.46 | 958.9 | 879.6 | 999.1 | 393 | 366.9 | 407.2 | 42.54 | 37 | 45.4 |
| 19 | 19-Jul-21 | 499.38 | 913.7 | 837.9 | 993.7 | 379 | 352.9 | 405.4 | 39.53 | 34.1 | 45 |
| 20 | 20-Jul-21 | 475.38 | 909.7 | 836.5 | 994.4 | 377.7 | 352.5 | 405.6 | 39.24 | 34 | 45.1 |
| 21 | 21-Jul-21 | 453.7 | 895.3 | 840.1 | 984.4 | 373 | 353.9 | 402.4 | 38.24 | 34.3 | 44.4 |
| 22 | 22-Jul-21 | 463.62 | 904.4 | 841.5 | 994.6 | 375.9 | 354.4 | 405.8 | 38.87 | 34.4 | 45.1 |
| 23 | 23-Jul-21 | 564.74 | 934.4 | 849.5 | 990.8 | 384.9 | 357.6 | 404.2 | 40.75 | 35.1 | 44.7 |
| 24 | 24-Jul-21 | 542.8 | 927.9 | 839.5 | 990.9 | 382.9 | 353.6 | 404.4 | 40.34 | 34.3 | 44.8 |
| 25 | 25-Jul-21 | 560.26 | 931 | 837.3 | 990.2 | 383.7 | 352.7 | 404 | 40.54 | 34.1 | 44.8 |
| 26 | 26-Jul-21 | 553.96 | 932.4 | 844.1 | 997 | 384.3 | 355.3 | 406.5 | 40.73 | 34.6 | 45.3 |
| 27 | 27-Jul-21 | 602.13 | 952 | 885.3 | 984.4 | 390.6 | 368.7 | 401.7 | 41.97 | 37 | 44.5 |
| 28 | 28-Jul-21 | 577.05 | 944.1 | 888.6 | 980.5 | 388.2 | 368.7 | 401.7 | 41.49 | 37.5 | 44.2 |
| 29 | 29-Jul-21 | 596.8 | 946.7 | 921.8 | 985.5 | 388.4 | 379.2 | 402.9 | 41.55 | 39.7 | 44.6 |
| 30 | 30-Jul-21 | 564.55 | 940.4 | 915.5 | 965 | 387.1 | 376.9 | 396.7 | 41.24 | 39.2 | 43.2 |
| 31 | 31-Jul-21 | 547.08 | 930.6 | 858.3 | 959.9 | 383.8 | 361.1 | 394.5 | 40.54 | 35.8 | 42.7 |

CEMS DAYWISE VALUES FOR THE MONTH OF AUG '2021

| S.NO. | DATE | UNIT# 2 LOAD(MW) | UNIT# 2 SOX(mg/nm3) | | | UNIT# 2 NOX(mg/nm3) | | | UNIT# 2 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Aug-21 | 539.42 | 921.2 | 851.6 | 956.4 | 380.3 | 358 | 393.7 | 39.81 | 35.1 | 42.4 |
| 2 | 02-Aug-21 | 524.77 | 920.2 | 884.5 | 958.8 | 380.4 | 367.7 | 394.5 | 39.79 | 37.2 | 42.7 |
| 3 | 03-Aug-21 | 529.56 | 924.6 | 892.9 | 954.4 | 381.7 | 369.9 | 392 | 40.18 | 37.7 | 42.5 |
| 4 | 04-Aug-21 | 557.38 | 935.9 | 902.7 | 962.8 | 385.5 | 373.2 | 396 | 40.86 | 38.4 | 43 |
| 5 | 05-Aug-21 | 529.47 | 922.4 | 894.7 | 956.1 | 381.1 | 370.5 | 394 | 39.98 | 37.9 | 42.6 |
| 6 | 06-Aug-21 | 515.06 | 919.8 | 898.7 | 946 | 380.5 | 372.4 | 390.8 | 39.77 | 37.9 | 41.8 |
| 7 | 07-Aug-21 | 525.62 | 922.5 | 899.7 | 943.5 | 381.2 | 373.1 | 389.7 | 40.01 | 38.1 | 41.7 |
| 8 | 08-Aug-21 | 561.22 | 937.7 | 904.1 | 968.9 | 386 | 373.6 | 397.4 | 41.01 | 38.5 | 43.4 |
| 9 | 09-Aug-21 | 552.27 | 938.3 | 901.2 | 965.3 | 386.7 | 372.7 | 396.8 | 41.13 | 38.3 | 43.2 |
| 10 | 10-Aug-21 | 581.35 | 951.8 | 912.4 | 982.2 | 391 | 376.6 | 401.8 | 42.06 | 39.1 | 44.6 |
| 11 | 11-Aug-21 | 575.97 | 940.5 | 912.2 | 975.8 | 386.8 | 376.4 | 399.4 | 41.27 | 39.1 | 44.3 |
| 12 | 12-Aug-21 | 588.57 | 947.9 | 910 | 973.4 | 389.2 | 375.3 | 398.7 | 41.71 | 38.9 | 43.6 |
| 13 | 13-Aug-21 | 563.64 | 932.8 | 907.4 | 964.8 | 384.2 | 374.4 | 396.7 | 40.66 | 38.7 | 43.2 |
| 14 | 14-Aug-21 | 579.83 | 947.5 | 918.1 | 973.2 | 389.3 | 377.8 | 399.1 | 41.72 | 39.4 | 43.7 |
| 15 | 15-Aug-21 | 571.62 | 941.2 | 919.3 | 965.8 | 387.1 | 378.2 | 397 | 41.28 | 39.5 | 43.2 |
| 16 | 16-Aug-21 | 549.97 | 932 | 915.6 | 959.3 | 384.2 | 377.4 | 395 | 40.63 | 39.3 | 42.8 |
| 17 | 17-Aug-21 | 568.86 | 941.7 | 921.9 | 963.3 | 387.3 | 379.6 | 395.2 | 41.34 | 39.8 | 42.9 |
| 18 | 18-Aug-21 | 555.45 | 934.4 | 875.1 | 965.2 | 385 | 364.7 | 396.7 | 40.84 | 37 | 43.2 |
| 19 | 19-Aug-21 | 570.53 | 936.7 | 911.9 | 962.7 | 385.3 | 376.3 | 395.4 | 40.92 | 39.1 | 42.9 |
| 20 | 20-Aug-21 | 591.75 | 953.1 | 911.9 | 975.5 | 391.2 | 376.9 | 399.8 | 42.17 | 39.5 | 43.9 |
| 21 | 21-Aug-21 | 567.97 | 934.9 | 904.8 | 964.4 | 384.9 | 373.7 | 396.3 | 40.78 | 38.5 | 43.1 |
| 22 | 22-Aug-21 | 529.21 | 928.3 | 902.5 | 954.4 | 383.5 | 373.4 | 393.1 | 40.43 | 38.6 | 42.2 |
| 23 | 23-Aug-21 | 534.39 | 933.3 | 905.3 | 953.5 | 385.2 | 374.3 | 392.4 | 40.83 | 38.9 | 42.3 |
| 24 | 24-Aug-21 | 582.06 | 948.8 | 919.2 | 973.6 | 389.6 | 378.3 | 399.3 | 41.79 | 39.5 | 43.7 |
| 25 | 25-Aug-21 | 608.95 | 950.5 | 927.5 | 984.4 | 389.6 | 381.1 | 402.8 | 41.82 | 40.1 | 44.5 |
| 26 | 26-Aug-21 | 569.31 | 940.9 | 909.7 | 978.9 | 387.2 | 375.4 | 400.8 | 41.23 | 38.9 | 44.1 |
| 27 | 27-Aug-21 | 585.21 | 947.3 | 921.3 | 966.5 | 389.1 | 378.9 | 397.2 | 41.67 | 39.6 | 43.1 |
| 28 | 28-Aug-21 | 643.69 | 971.5 | 951.4 | 993 | 396.8 | 388.7 | 405.3 | 43.32 | 41.3 | 45 |
| 29 | 29-Aug-21 | 646.95 | 968.1 | 945.8 | 991.9 | 395.3 | 386.5 | 404.8 | 42.99 | 41.1 | 45.1 |
| 30 | 30-Aug-21 | 644.73 | 964.8 | 935.8 | 996.1 | 394.1 | 383.3 | 405.8 | 42.78 | 40.9 | 45.2 |
| 31 | 31-Aug-21 | 625.51 | 961.9 | 938.2 | 992.1 | 393.6 | 384.1 | 404.7 | 42.64 | 40.7 | 44.9 |

CEMS DAYWISE VALUES FOR THE MONTH OF SEP '2021

| S.NO. | DATE | UNIT# 3 LOAD(MW) | UNIT# 3 SOX(mg/nm3) | | | UNIT# 3 NOX(mg/nm3) | | | UNIT# 3 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Sep-21 | 623.75 | 932.7 | 905.6 | 950 | 306.8 | 281.7 | 339.4 | 42.57 | 40.4 | 44.7 |
| 2 | 02-Sep-21 | 598.92 | 929.8 | 902.5 | 949.8 | 304.2 | 280.6 | 333.1 | 41.99 | 39.6 | 44.1 |
| 3 | 03-Sep-21 | 605.5 | 925.2 | 900.4 | 942.8 | 310.4 | 282.2 | 338 | 42.29 | 39.5 | 44.7 |
| 4 | 04-Sep-21 | 588.51 | 929.4 | 903.9 | 947.7 | 314.7 | 284.3 | 336.9 | 41.65 | 39.6 | 43.4 |
| 5 | 05-Sep-21 | 618.87 | 927.1 | 902.3 | 949.6 | 312.3 | 281.4 | 338.6 | 42.63 | 40.6 | 44.6 |
| 6 | 06-Sep-21 | 602.74 | 925.6 | 900.1 | 949.6 | 312.6 | 281.3 | 339 | 41.9 | 40.1 | 44.1 |
| 7 | 07-Sep-21 | 576.35 | 926.9 | 904.7 | 948.5 | 310.2 | 283.5 | 337.7 | 41.01 | 38.7 | 44.2 |
| 8 | 08-Sep-21 | 529.48 | 911.2 | 842 | 945.3 | 302.9 | 280.5 | 329.5 | 39.8 | 34.4 | 43.5 |
| 9 | 09-Sep-21 | 542.13 | 911.2 | 845.2 | 948.4 | 314.9 | 281.5 | 339.2 | 40.47 | 34.9 | 44.4 |
| 10 | 10-Sep-21 | 522.9 | 906.1 | 852.8 | 948.4 | 309.5 | 281.6 | 339.2 | 40.2 | 35.3 | 43.8 |
| 11 | 11-Sep-21 | 570.15 | 924.5 | 898.2 | 946.5 | 313.4 | 282.6 | 339.9 | 41.25 | 38.3 | 44.1 |
| 12 | 12-Sep-21 | 552.33 | 929.5 | 904.6 | 948.8 | 309.4 | 280.3 | 338 | 40.78 | 38.6 | 43.8 |
| 13 | 13-Sep-21 | 566.97 | 925.2 | 900.7 | 941.2 | 316.8 | 285 | 339.5 | 40.93 | 38.8 | 43.6 |
| 14 | 14-Sep-21 | 593.69 | 928.9 | 900.1 | 949 | 312.6 | 281.7 | 339.1 | 41.78 | 39.7 | 44.1 |
| 15 | 15-Sep-21 | 516.32 | 911.4 | 886.4 | 947.5 | 311.1 | 282.3 | 336.4 | 39.35 | 37.3 | 42.2 |
| 16 | 16-Sep-21 | 477.57 | 905.4 | 874.7 | 937.8 | 308.5 | 280.5 | 335.2 | 38.9 | 36.7 | 41.3 |
| 17 | 17-Sep-21 | 413.15 | 881.9 | 855.2 | 909.6 | 305.2 | 282.7 | 331.7 | 37.4 | 35.4 | 39.1 |
| 18 | 18-Sep-21 | 418.55 | 883.2 | 845.6 | 911.8 | 301.6 | 280.3 | 328.8 | 37.4 | 34.8 | 39.4 |
| 19 | 19-Sep-21 | 468.75 | 903.6 | 865.6 | 934.4 | 311.3 | 283.8 | 337.8 | 38.78 | 35.9 | 41.1 |
| 20 | 20-Sep-21 | 472.5 | 903.3 | 877.3 | 934.1 | 310.8 | 285.9 | 338.6 | 38.79 | 36.7 | 41.2 |
| 21 | 21-Sep-21 | 463.94 | 896.4 | 866.4 | 920 | 308.1 | 285.2 | 337.9 | 38.26 | 36 | 40.5 |
| 22 | 22-Sep-21 | 501.8 | 919.2 | 882.7 | 947.3 | 304.2 | 281.8 | 338 | 39.93 | 37.2 | 42.1 |
| 23 | 23-Sep-21 | 543.96 | 930.1 | 911.9 | 948.2 | 304.4 | 281.7 | 332 | 40.68 | 39.1 | 42.3 |
| 24 | 24-Sep-21 | 519.78 | 920.3 | 897.5 | 937.7 | 314.5 | 283.6 | 339.8 | 40.32 | 38.1 | 42.4 |
| 25 | 25-Sep-21 | 513.68 | 917.9 | 891.4 | 949.2 | 307.8 | 280.4 | 338.9 | 39.79 | 37.7 | 42.6 |
| 26 | 26-Sep-21 | 478.76 | 905 | 876.8 | 932.9 | 308.6 | 281.3 | 339.2 | 38.84 | 36.5 | 41.2 |
| 27 | 27-Sep-21 | 492.21 | 910.6 | 883.2 | 942 | 318.3 | 281.8 | 339.7 | 39.27 | 37.2 | 41.6 |
| 28 | 28-Sep-21 | 494.85 | 911.2 | 855.6 | 938.6 | 310.2 | 280.2 | 338.7 | 39.31 | 35 | 42.1 |
| 29 | 29-Sep-21 | 516.31 | 914.9 | 874.2 | 946.9 | 308.9 | 281.2 | 338.9 | 39.77 | 36.6 | 43.9 |
| 30 | 30-Sep-21 | 542.31 | 920.2 | 891.2 | 939.9 | 308.5 | 281.3 | 337.7 | 40.63 | 37.7 | 44.6 |

## CEMS DAYWISE VALUES FOR THE MONTH OF APR '2021

| S.NO. | DATE | UNIT# 4 LOAD(MW) | UNIT# 4 SOX(mg/nm3) | | | UNIT# 4 NOX(mg/nm3) | | | UNIT# 4 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Apr-21 | 500.8 | 916.4 | 881.8 | 942.5 | 270.3 | 256.0 | 282.5 | 44.0 | 41.2 | 46.5 |
| 2 | 02-Apr-21 | 483.2 | 911.3 | 893.1 | 942.5 | 269.1 | 260.3 | 282.5 | 43.8 | 42.1 | 46.5 |
| 3 | 03-Apr-21 | 483.4 | 910.9 | 879.8 | 932.8 | 268.8 | 254.0 | 278.9 | 43.8 | 40.8 | 45.8 |
| 4 | 04-Apr-21 | 462.5 | 902.5 | 880.3 | 939.5 | 266.4 | 255.5 | 281.8 | 43.3 | 41.0 | 46.4 |
| 5 | 05-Apr-21 | 555.5 | 938.2 | 881.0 | 981.5 | 276.4 | 256.3 | 293.1 | 45.3 | 41.3 | 48.6 |
| 6 | 06-Apr-21 | 577.8 | 941.2 | 901.7 | 983.1 | 277.2 | 264.3 | 292.6 | 45.4 | 42.9 | 48.5 |
| 7 | 07-Apr-21 | 582.4 | 943.9 | 915.6 | 971.5 | 277.7 | 264.9 | 290.7 | 45.5 | 43.0 | 48.1 |
| 8 | 08-Apr-21 | 542.3 | 925.2 | 876.1 | 963.4 | 271.8 | 253.5 | 289.3 | 44.4 | 40.7 | 47.9 |
| 9 | 09-Apr-21 | 532.4 | 926.5 | 893.1 | 955.4 | 273.1 | 258.0 | 286.5 | 44.6 | 41.6 | 47.3 |
| 10 | 10-Apr-21 | 561.3 | 941.0 | 906.8 | 977.2 | 277.8 | 263.4 | 292.3 | 45.5 | 43.0 | 48.5 |
| 11 | 11-Apr-21 | 552.4 | 929.1 | 876.8 | 967.3 | 272.7 | 254.0 | 288.7 | 44.6 | 40.8 | 47.7 |
| 12 | 12-Apr-21 | 552.8 | 935.9 | 913.1 | 966.4 | 276.1 | 264.0 | 289.6 | 45.2 | 42.8 | 47.9 |
| 13 | 13-Apr-21 | 540.7 | 926.8 | 900.6 | 957.0 | 272.5 | 260.3 | 286.2 | 44.5 | 42.1 | 47.2 |
| 14 | 14-Apr-21 | 552.4 | 942.6 | 891.4 | 965.8 | 279.5 | 259.6 | 289.4 | 45.9 | 41.9 | 47.9 |
| 15 | 15-Apr-21 | 572.8 | 942.4 | 916.7 | 968.3 | 277.9 | 267.2 | 289.8 | 45.6 | 43.4 | 48.0 |
| 16 | 16-Apr-21 | 542.5 | 930.5 | 895.1 | 961.6 | 274.3 | 263.2 | 287.9 | 44.8 | 42.6 | 47.6 |
| 17 | 17-Apr-21 | 582.4 | 949.5 | 917.1 | 978.8 | 280.4 | 266.8 | 292.9 | 46.1 | 43.4 | 48.6 |
| 18 | 18-Apr-21 | 564.2 | 940.8 | 887.5 | 969.0 | 277.3 | 259.8 | 290.3 | 45.5 | 42.0 | 48.1 |
| 19 | 19-Apr-21 | 519.7 | 921.0 | 872.6 | 978.2 | 271.4 | 252.1 | 291.9 | 44.3 | 40.4 | 48.8 |
| 20 | 20-Apr-21 | 552.1 | 929.3 | 875.8 | 983.2 | 273.3 | 253.1 | 294.5 | 44.6 | 40.6 | 49.0 |
| 21 | 21-Apr-21 | 565.3 | 934.3 | 876.6 | 992.3 | 274.5 | 253.8 | 296.7 | 44.9 | 40.5 | 49.3 |
| 22 | 22-Apr-21 | 570.9 | 945.4 | 897.0 | 982.6 | 279.5 | 261.1 | 293.9 | 45.8 | 42.2 | 48.8 |
| 23 | 23-Apr-21 | 585.1 | 949.1 | 919.4 | 971.0 | 280.2 | 265.9 | 290.9 | 46.0 | 43.2 | 47.9 |
| 24 | 24-Apr-21 | 570.7 | 942.1 | 899.2 | 972.3 | 277.9 | 261.0 | 291.4 | 45.6 | 42.2 | 48.3 |
| 25 | 25-Apr-21 | 559.2 | 938.9 | 882.2 | 978.9 | 277.3 | 255.7 | 292.5 | 45.5 | 41.1 | 48.5 |
| 26 | 26-Apr-21 | 596.1 | 945.2 | 927.0 | 971.6 | 277.4 | 269.0 | 291.5 | 45.5 | 43.8 | 48.3 |
| 27 | 27-Apr-21 | 613.5 | 959.8 | 935.6 | 984.7 | 283.3 | 273.3 | 294.2 | 46.7 | 44.7 | 48.8 |
| 28 | 28-Apr-21 | 571.7 | 936.9 | 892.7 | 974.6 | 275.4 | 259.6 | 289.3 | 45.1 | 41.9 | 47.9 |
| 29 | 29-Apr-21 | 540.2 | 929.8 | 901.5 | 959.3 | 274.0 | 261.8 | 287.3 | 44.8 | 42.2 | 47.5 |
| 30 | 30-Apr-21 | 571.6 | 938.8 | 909.5 | 973.2 | 276.2 | 264.9 | 291.1 | 45.2 | 43.3 | 47.8 |

## CEMS DAYWISE VALUES FOR THE MONTH OF MAY '2021

| S.NO. | DATE | UNIT# 4 LOAD(MW) | UNIT# 4 SOX(mg/nm3) | | | UNIT# 4 NOX(mg/nm3) | | | UNIT# 4 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-May-21 | 493.03 | 908.2 | 854 | 961.8 | 402.4 | 383.7 | 422.3 | 38.4 | 34.9 | 42.4 |
| 2 | 02-May-21 | 511.37 | 920.5 | 855.7 | 976.4 | 407.1 | 384.7 | 427.7 | 39.2 | 35.1 | 42.65 |
| 3 | 03-May-21 | 509.78 | 919.1 | 851.2 | 961.1 | 406 | 381.3 | 422.5 | 39 | 34.4 | 42.32 |
| 4 | 04-May-21 | 593.88 | 944.3 | 917 | 965.7 | 414 | 401.9 | 423.8 | 40.4 | 38.1 | 42.37 |
| 5 | 05-May-21 | 601.57 | 944.6 | 926.6 | 963.6 | 413.6 | 404.8 | 423.2 | 40.4 | 38.6 | 42.14 |
| 6 | 06-May-21 | 606.66 | 949.4 | 929.4 | 973.1 | 415.6 | 406.7 | 426.7 | 40.7 | 39 | 42.93 |
| 7 | 07-May-21 | 584.06 | 944 | 923.3 | 964.9 | 414.4 | 404.4 | 424 | 40.6 | 38.6 | 42.43 |
| 8 | 08-May-21 | 544.43 | 923.4 | 905.8 | 941.6 | 406.8 | 398.4 | 415.3 | 39.2 | 37.5 | 40.82 |
| 9 | 09-May-21 | 543.82 | 925.1 | 903.9 | 946.8 | 407.5 | 397.4 | 418.1 | 39.3 | 37.3 | 41.39 |
| 10 | 10-May-21 | 578.46 | 939.3 | 917 | 960.7 | 412.3 | 402.2 | 422.6 | 40.2 | 38.2 | 42.19 |
| 11 | 11-May-21 | 588.94 | 942.2 | 914.6 | 969.2 | 413.1 | 401.5 | 424.7 | 40.2 | 37.7 | 42.54 |
| 12 | 12-May-21 | 575.56 | 937.5 | 919.1 | 956.8 | 411.6 | 402.8 | 420 | 40 | 38.2 | 41.64 |
| 13 | 13-May-21 | 627.34 | 956 | 932.8 | 986.9 | 417.6 | 407.5 | 431.3 | 41.1 | 39.3 | 43.77 |
| 14 | 14-May-21 | 618.85 | 953.1 | 929 | 978.6 | 416.6 | 406.1 | 428.2 | 40.9 | 38.7 | 43.19 |
| 15 | 15-May-21 | 633.28 | 957.9 | 901.4 | 982.5 | 418.2 | 397.7 | 429.8 | 41.2 | 37.4 | 43.5 |
| 16 | 16-May-21 | 178.73 | 863.7 | 839.6 | 875.7 | 388.8 | 378.2 | 393.9 | 35.9 | 33.9 | 36.93 |
| 17 | 17-May-21 | Unit in shutdown condition | | | | | | | | | |
| 18 | 18-May-21 | Unit in shutdown condition | | | | | | | | | |
| 19 | 19-May-21 | Unit in shutdown condition | | | | | | | | | |
| 20 | 20-May-21 | Unit in shutdown condition | | | | | | | | | |
| 21 | 21-May-21 | Unit in shutdown condition | | | | | | | | | |
| 22 | 22-May-21 | Unit in shutdown condition | | | | | | | | | |
| 23 | 23-May-21 | Unit in shutdown condition | | | | | | | | | |
| 24 | 24-May-21 | Unit in shutdown condition | | | | | | | | | |
| 25 | 25-May-21 | Unit in shutdown condition | | | | | | | | | |
| 26 | 26-May-21 | Unit in shutdown condition | | | | | | | | | |
| 27 | 27-May-21 | Unit in shutdown condition | | | | | | | | | |
| 28 | 28-May-21 | Unit in shutdown condition | | | | | | | | | |
| 29 | 29-May-21 | Unit in shutdown condition | | | | | | | | | |
| 30 | 30-May-21 | Unit in shutdown condition | | | | | | | | | |
| 31 | 31-May-21 | Unit in shutdown condition | | | | | | | | | |

## CEMS DAYWISE VALUES FOR THE MONTH OF JUN '2021

| S.NO. | DATE | UNIT# 4 LOAD(MW) | UNIT# 4 SOX(mg/nm3) | | | UNIT# 4 NOX(mg/nm3) | | | UNIT# 4 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 2 | 02-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 3 | 03-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 4 | 04-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 5 | 05-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 6 | 06-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 7 | 07-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 8 | 08-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 9 | 09-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 10 | 10-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 11 | 11-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 12 | 12-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 13 | 13-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 14 | 14-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 15 | 15-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 16 | 16-Jun-21 | 221.7 | 899.4 | 842 | 955.7 | 399 | 377.6 | 419.7 | 41.4 | 38.2 | 44.99 |
| 17 | 17-Jun-21 | 473.15 | 899.5 | 838.7 | 953.8 | 398.9 | 376.7 | 418.9 | 43 | 38.6 | 45.86 |
| 18 | 18-Jun-21 | 545.38 | 912.6 | 837.9 | 950.7 | 402.5 | 375.9 | 418.6 | 45.4 | 40.7 | 48.04 |
| 19 | 19-Jun-21 | 489.46 | 906.7 | 841.7 | 974.9 | 402.1 | 376.8 | 427.5 | 44 | 39.5 | 48.68 |
| 20 | 20-Jun-21 | 526.14 | 919.4 | 846.7 | 974.7 | 406 | 379.4 | 427.4 | 44.5 | 38.4 | 49.05 |
| 21 | 21-Jun-21 | 575.58 | 934.7 | 844.4 | 968.2 | 411.3 | 378.8 | 424.7 | 46 | 41.4 | 49.26 |
| 22 | 22-Jun-21 | 584.31 | 936.7 | 864.4 | 964 | 412.1 | 389 | 423.1 | 45.5 | 38.9 | 48.24 |
| 23 | 23-Jun-21 | 517.12 | 924.2 | 875.8 | 971.3 | 408.4 | 393.8 | 426.1 | 44.7 | 38.8 | 48.77 |
| 24 | 24-Jun-21 | 559.49 | 919.6 | 861.7 | 968.5 | 405.5 | 383.4 | 425.1 | 45.2 | 41.5 | 49.08 |
| 25 | 25-Jun-21 | 566.88 | 937.3 | 899.5 | 972.8 | 411.4 | 398.5 | 426.8 | 45.6 | 41.6 | 48.36 |
| 26 | 26-Jun-21 | 583.81 | 944.5 | 883.2 | 977.1 | 414.5 | 391 | 427.6 | 45.4 | 42.1 | 47.98 |
| 27 | 27-Jun-21 | 477.48 | 901.5 | 858.3 | 947.1 | 400.1 | 386 | 416.8 | 43.3 | 38.7 | 47.77 |
| 28 | 28-Jun-21 | 528.41 | 914.4 | 855.1 | 957.3 | 404.9 | 384.5 | 421.3 | 44.2 | 38.6 | 48.68 |
| 29 | 29-Jun-21 | 550.82 | 936.5 | 914.5 | 956.9 | 411.4 | 401.5 | 421.2 | 44.8 | 42.3 | 47.61 |
| 30 | 30-Jun-21 | 546.16 | 930.6 | 902.1 | 960.9 | 409.4 | 397.1 | 420.7 | 45.1 | 42.7 | 48.61 |

## CEMS DAYWISE VALUES FOR THE MONTH OF JUL '2021

| S.NO. | DATE | UNIT# 4 LOAD(MW) | UNIT# 4 SOX(mg/nm3) | | | UNIT# 4 NOX(mg/nm3) | | | UNIT# 4 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Jul-21 | 596.22 | 944.9 | 926.4 | 971.1 | 414.1 | 405.3 | 426 | 40.5 | 38.7 | 42.8 |
| 2 | 02-Jul-21 | 594.28 | 943.5 | 920.2 | 961 | 413.6 | 402.8 | 422 | 40.4 | 38.2 | 42.22 |
| 3 | 03-Jul-21 | 608.71 | 953.3 | 933.3 | 978.5 | 417.5 | 408.5 | 428.5 | 41.1 | 39.2 | 43.25 |
| 4 | 04-Jul-21 | 584.64 | 941.9 | 915.4 | 969.7 | 413.3 | 401.5 | 425.6 | 40.4 | 38 | 42.73 |
| 5 | 05-Jul-21 | 616.39 | 949.6 | 920.2 | 976.8 | 414.9 | 402.9 | 427.1 | 40.6 | 38.3 | 43.01 |
| 6 | 06-Jul-21 | 618.61 | 953 | 926 | 976.1 | 416.8 | 405.1 | 427.4 | 40.9 | 38.7 | 43.05 |
| 7 | 07-Jul-21 | 612.46 | 951.6 | 931.8 | 976.6 | 416.5 | 407 | 428.1 | 40.9 | 39.3 | 43.19 |
| 8 | 08-Jul-21 | 601.51 | 948.5 | 925.8 | 971.2 | 415.6 | 408.1 | 425.5 | 40.7 | 39.3 | 42.69 |
| 9 | 09-Jul-21 | 592.64 | 941.9 | 910.3 | 970.5 | 413 | 399.5 | 424.8 | 40.3 | 37.6 | 42.54 |
| 10 | 10-Jul-21 | 600.84 | 949.2 | 914 | 982.9 | 415.8 | 400.6 | 430.1 | 40.8 | 37.8 | 43.13 |
| 11 | 11-Jul-21 | 502.61 | 906.7 | 857.5 | 971.1 | 401.7 | 385.3 | 425.2 | 38.3 | 35.2 | 42.63 |
| 12 | 12-Jul-21 | 491.76 | 903.6 | 837.8 | 961 | 400.5 | 375.7 | 421.2 | 38 | 33.3 | 42.24 |
| 13 | 13-Jul-21 | 511.49 | 908.9 | 844.6 | 966.5 | 402 | 378.1 | 424.1 | 38.2 | 33.8 | 42.07 |
| 14 | 14-Jul-21 | 446.88 | 887.8 | 847.8 | 943.9 | 395.7 | 379.5 | 414.9 | 37.1 | 34.1 | 40.69 |
| 15 | 15-Jul-21 | 502.59 | 907.6 | 844.4 | 967.5 | 401.4 | 377.7 | 425 | 38.1 | 33.7 | 42.62 |
| 16 | 16-Jul-21 | 531.44 | 920.1 | 838.1 | 968.7 | 406 | 376.4 | 424.6 | 39 | 33.6 | 42.51 |
| 17 | 17-Jul-21 | 552.27 | 928.7 | 853.6 | 965.4 | 409.2 | 381.1 | 423.3 | 39.6 | 34.3 | 42.34 |
| 18 | 18-Jul-21 | 455.51 | 886.7 | 843.8 | 949.1 | 394.8 | 378.1 | 415.4 | 37 | 33.8 | 40.69 |
| 19 | 19-Jul-21 | 392.68 | 869.3 | 839.4 | 923.5 | 389.4 | 376.5 | 407.6 | 36 | 33.5 | 39.31 |
| 20 | 20-Jul-21 | 380.76 | 866.6 | 837.9 | 908.2 | 388.6 | 375.8 | 403.9 | 35.9 | 33.5 | 38.71 |
| 21 | 21-Jul-21 | 364.91 | 857.9 | 837.6 | 892.7 | 385.5 | 375.7 | 398.6 | 35.3 | 33.3 | 37.75 |
| 22 | 22-Jul-21 | 390.54 | 873.6 | 839.2 | 949.8 | 391.5 | 376.3 | 419 | 36.4 | 33.4 | 41.54 |
| 23 | 23-Jul-21 | 471.51 | 900.2 | 838.9 | 964.2 | 399.6 | 376 | 423.4 | 37.9 | 33.4 | 42.32 |
| 24 | 24-Jul-21 | 459.02 | 890.4 | 840.7 | 948.1 | 396.3 | 377.1 | 417.5 | 37.2 | 33.6 | 41.2 |
| 25 | 25-Jul-21 | 449.53 | 884.6 | 846.8 | 946.8 | 394 | 380.4 | 414.3 | 36.9 | 34.3 | 40.86 |
| 26 | 26-Jul-21 | 442.57 | 885.5 | 838.2 | 956.2 | 394.5 | 376 | 417.8 | 36.9 | 33.4 | 41.13 |
| 27 | 27-Jul-21 | 480.63 | 900.2 | 839.3 | 959.5 | 399.7 | 376.8 | 421.8 | 37.9 | 33.6 | 42.02 |
| 28 | 28-Jul-21 | 462.88 | 891.6 | 837.1 | 956.1 | 396.3 | 375.3 | 420 | 37.2 | 33.2 | 41.9 |
| 29 | 29-Jul-21 | 479.82 | 901.8 | 839.1 | 946.9 | 400 | 376 | 416.7 | 37.9 | 33.4 | 41.04 |
| 30 | 30-Jul-21 | 485.31 | 902.5 | 841.5 | 957.9 | 400.4 | 377.6 | 421.6 | 38 | 33.7 | 42 |
| 31 | 31-Jul-21 | 467.67 | 896.5 | 835.2 | 947.8 | 398.1 | 374.7 | 416.9 | 37.5 | 33.1 | 41.08 |

## CEMS DAYWISE VALUES FOR THE MONTH OF AUG '2021

| S.NO. | DATE | UNIT# 4 LOAD(MW) | UNIT# 4 SOX(mg/nm3) | | | UNIT# 4 NOX(mg/nm3) | | | UNIT# 4 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Aug-21 | 436.37 | 882.7 | 835.8 | 940.6 | 393.3 | 374.9 | 416.1 | 36.6 | 33.2 | 40.74 |
| 2 | 02-Aug-21 | 446.03 | 889.8 | 857.9 | 915.5 | 395.8 | 385.4 | 405.8 | 37.1 | 35.1 | 38.8 |
| 3 | 03-Aug-21 | 491.88 | 907.3 | 859.3 | 940 | 401.8 | 386.2 | 415.7 | 38.2 | 35.2 | 40.6 |
| 4 | 04-Aug-21 | 544.92 | 924.1 | 900.8 | 948.8 | 406.8 | 397 | 417.5 | 39.1 | 37.2 | 41.07 |
| 5 | 05-Aug-21 | 524.92 | 918.5 | 894.3 | 944.8 | 405.5 | 395.3 | 417.2 | 38.9 | 36.5 | 41.19 |
| 6 | 06-Aug-21 | 528.89 | 918.9 | 898.8 | 941.9 | 405.3 | 396.6 | 416.5 | 38.8 | 37.1 | 41.08 |
| 7 | 07-Aug-21 | 542.04 | 929.8 | 906.6 | 958.9 | 410 | 398.3 | 422.2 | 39.8 | 37.4 | 42.13 |
| 8 | 08-Aug-21 | 529.49 | 917.5 | 897.1 | 931.8 | 404.7 | 396.2 | 413.2 | 38.7 | 37.1 | 40.49 |
| 9 | 09-Aug-21 | 545.27 | 921.5 | 900.4 | 953 | 405.7 | 396.2 | 419.9 | 38.9 | 37 | 41.69 |
| 10 | 10-Aug-21 | 563.39 | 933.4 | 899.9 | 965 | 410.2 | 396.1 | 423.9 | 39.8 | 37 | 42.41 |
| 11 | 11-Aug-21 | 543.79 | 928.5 | 887.5 | 961.5 | 409.5 | 392.4 | 422.2 | 39.7 | 36.4 | 42.09 |
| 12 | 12-Aug-21 | 553.2 | 932.2 | 904.2 | 954.6 | 410.4 | 397.9 | 420.4 | 39.8 | 37.4 | 41.83 |
| 13 | 13-Aug-21 | 536.25 | 920.5 | 891.1 | 946.1 | 405.9 | 394.2 | 416.6 | 39 | 36.7 | 41.11 |
| 14 | 14-Aug-21 | 523.86 | 921.2 | 898.2 | 943.2 | 406.8 | 396.1 | 416.8 | 39.2 | 37.1 | 41.13 |
| 15 | 15-Aug-21 | 517.52 | 914.6 | 874.1 | 948.1 | 404.1 | 388.6 | 417.7 | 38.6 | 35.7 | 41.26 |
| 16 | 16-Aug-21 | 523.56 | 919.6 | 889.2 | 951.1 | 406.3 | 394.7 | 418.7 | 39.1 | 36.9 | 41.76 |
| 17 | 17-Aug-21 | 544.44 | 922.8 | 891 | 967.3 | 406.2 | 395.9 | 424 | 39 | 37 | 42.11 |
| 18 | 18-Aug-21 | 478.39 | 899.1 | 865.9 | 948.6 | 399 | 385.8 | 417.7 | 37.7 | 35.2 | 41.24 |
| 19 | 19-Aug-21 | 466.6 | 899.3 | 839.3 | 932.4 | 399.9 | 376.5 | 412.8 | 37.9 | 33.5 | 40.38 |
| 20 | 20-Aug-21 | 494.01 | 909.6 | 885.7 | 927.5 | 403 | 391.4 | 410.9 | 38.5 | 36.2 | 40.01 |
| 21 | 21-Aug-21 | 479.3 | 900.5 | 851.8 | 936.6 | 399.4 | 381.7 | 414.7 | 37.8 | 34.5 | 40.74 |
| 22 | 22-Aug-21 | 454.81 | 891.4 | 838.6 | 933.6 | 396.7 | 376.2 | 413.4 | 37.3 | 33.4 | 40.81 |
| 23 | 23-Aug-21 | 434.61 | 882.2 | 848.7 | 930.3 | 393.5 | 379.1 | 412.7 | 36.8 | 33.9 | 40.4 |
| 24 | 24-Aug-21 | 393.08 | 869.8 | 841.1 | 913.4 | 389.7 | 377.2 | 407.2 | 36.1 | 33.6 | 39.4 |
| 25 | 25-Aug-21 | 463.65 | 897.9 | 844.3 | 927 | 399.1 | 378.1 | 411.1 | 37.8 | 33.8 | 40.08 |
| 26 | 26-Aug-21 | 516.36 | 919.4 | 900.1 | 941.5 | 406.2 | 396.6 | 416.3 | 39 | 37.1 | 41.05 |
| 27 | 27-Aug-21 | 544.86 | 923.7 | 905.5 | 946.1 | 406.8 | 398.1 | 417.3 | 39.1 | 37.5 | 41.31 |
| 28 | 28-Aug-21 | 515.54 | 913.7 | 886.7 | 945.5 | 403.9 | 391.5 | 417.5 | 38.6 | 36.2 | 41.3 |
| 29 | 29-Aug-21 | 547.95 | 927 | 895.1 | 969.4 | 408.3 | 394.5 | 425.3 | 39.4 | 36.7 | 42.67 |
| 30 | 30-Aug-21 | 535.5 | 925.6 | 903.2 | 946.9 | 408.3 | 397.2 | 417.7 | 39.4 | 37.2 | 41.27 |
| 31 | 31-Aug-21 | 522.71 | 917.4 | 868.4 | 950 | 405.2 | 388.6 | 418.7 | 38.9 | 35.7 | 41.72 |

## CEMS DAYWISE VALUES FOR THE MONTH OF SEP '2021

| S.NO. | DATE | UNIT# 4 LOAD(MW) | UNIT# 4 SOX(mg/nm3) | | | UNIT# 4 NOX(mg/nm3) | | | UNIT# 4 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Sep-21 | 524.23 | 920.9 | 894.7 | 938.1 | 310.4 | 279.9 | 332.9 | 39.2 | 36.8 | 40.42 |
| 2 | 02-Sep-21 | 546.93 | 929.1 | 910.9 | 946.8 | 308 | 281.3 | 337.6 | 39.6 | 38.1 | 41.02 |
| 3 | 03-Sep-21 | 532.56 | 923.1 | 898.5 | 949.8 | 310.2 | 279.8 | 338.4 | 39.3 | 37.2 | 41.43 |
| 4 | 04-Sep-21 | 540.3 | 922.9 | 904.2 | 944.3 | 308.6 | 282.9 | 338.9 | 39.1 | 37.5 | 41.09 |
| 5 | 05-Sep-21 | 484.1 | 904.6 | 844.5 | 938.7 | 309.8 | 282.3 | 337.9 | 38.2 | 33.9 | 40.38 |
| 6 | 06-Sep-21 | 565.6 | 935.6 | 901.9 | 949.7 | 299.2 | 280 | 321.4 | 40.1 | 38.2 | 42.58 |
| 7 | 07-Sep-21 | 517.98 | 912.6 | 871.8 | 948.7 | 317.4 | 280.7 | 337.8 | 38.5 | 35.9 | 41.3 |
| 8 | 08-Sep-21 | 419.72 | 878.8 | 833.2 | 929.8 | 308.1 | 279.1 | 337.4 | 36.5 | 33.1 | 39.89 |
| 9 | 09-Sep-21 | 447.39 | 888.9 | 846.9 | 949.1 | 304.5 | 281.4 | 337.9 | 37.2 | 34.2 | 42.24 |
| 10 | 10-Sep-21 | 432.64 | 880.3 | 843.1 | 943.8 | 310.9 | 280.6 | 336.2 | 36.7 | 33.8 | 41.56 |
| 11 | 11-Sep-21 | 427.87 | 884 | 843.9 | 921.7 | 313.3 | 281.5 | 338.1 | 36.9 | 33.7 | 39.53 |
| 12 | 12-Sep-21 | 459.59 | 893.6 | 842.7 | 936.2 | 315.5 | 289.9 | 336.7 | 37.5 | 34.1 | 39.99 |
| 13 | 13-Sep-21 | 487 | 903.2 | 849 | 947.3 | 311.6 | 279.6 | 334 | 38.1 | 34 | 41.84 |
| 14 | 14-Sep-21 | 454.17 | 892.6 | 848.1 | 931.3 | 313.1 | 280.9 | 338.4 | 37.4 | 34.4 | 40.41 |
| 15 | 15-Sep-21 | 342.82 | 888.2 | 864.2 | 930.7 | 309.4 | 281.6 | 334.4 | 37.2 | 35.2 | 40.53 |
| 16 | 16-Sep-21 | 399.57 | 869.3 | 837 | 901 | 306 | 281 | 332.9 | 35.9 | 33.4 | 38.6 |
| 17 | 17-Sep-21 | 414.01 | 877.4 | 855.6 | 906.4 | 311.6 | 280.6 | 337.6 | 36.4 | 34.6 | 38.71 |
| 18 | 18-Sep-21 | 432.12 | 883.4 | 864.3 | 911.1 | 304.2 | 280 | 335.1 | 36.8 | 34.9 | 39.06 |
| 19 | 19-Sep-21 | 471.75 | 902.7 | 878.4 | 945.5 | 300 | 280.4 | 333.5 | 38.1 | 36.4 | 41.11 |
| 20 | 20-Sep-21 | 445.7 | 884.2 | 861.2 | 906.7 | 311.4 | 280.8 | 339 | 36.7 | 34.7 | 38.84 |
| 21 | 21-Sep-21 | 455.69 | 894.2 | 856.9 | 920.6 | 309.1 | 279.1 | 339 | 37.5 | 35.2 | 39.69 |
| 22 | 22-Sep-21 | 461.47 | 895.5 | 852.1 | 932.3 | 313.2 | 279.9 | 338 | 37.6 | 34.2 | 40.26 |
| 23 | 23-Sep-21 | 487.5 | 908.6 | 857 | 932.9 | 307.4 | 279.8 | 336.6 | 38.5 | 34.8 | 40.62 |
| 24 | 24-Sep-21 | 486.77 | 904.8 | 885.1 | 928.7 | 310.8 | 280.6 | 334.4 | 38.3 | 36.4 | 41.26 |
| 25 | 25-Sep-21 | 494.29 | 902.2 | 860 | 927.8 | 307.7 | 280.2 | 334.7 | 37.8 | 35.7 | 40.36 |
| 26 | 26-Sep-21 | 506.43 | 918.5 | 881.7 | 936.3 | 312.6 | 288.2 | 335.2 | 39.2 | 36.7 | 40.8 |
| 27 | 27-Sep-21 | 469.86 | 896 | 848.3 | 929.6 | 306.5 | 281.7 | 337.4 | 37.5 | 34 | 40.3 |
| 28 | 28-Sep-21 | 444.58 | 886.5 | 838.8 | 920.2 | 309.7 | 282.5 | 337.1 | 36.9 | 33.4 | 39.47 |
| 29 | 29-Sep-21 | 461.38 | 894.5 | 845.4 | 929.1 | 314.4 | 279.7 | 336.4 | 37.5 | 34.2 | 39.97 |
| 30 | 30-Sep-21 | 507.55 | 912.1 | 881.8 | 937.2 | 303.9 | 279.5 | 346.3 | 38.5 | 36.1 | 40.62 |

## CEMS DAYWISE VALUES FOR THE MONTH OF APR '2021

| S.NO. | DATE | UNIT# 5 LOAD(MW) | UNIT# 5 SOX(mg/nm3) | | | UNIT# 5 NOX(mg/nm3) | | | UNIT# 5 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Apr-21 | 441.4 | 844.0 | 816.0 | 870.4 | 263.5 | 250.8 | 273.9 | 39.7 | 37.2 | 41.8 |
| 2 | 02-Apr-21 | 451.9 | 846.5 | 820.7 | 876.6 | 263.9 | 251.8 | 277.9 | 39.8 | 37.4 | 42.6 |
| 3 | 03-Apr-21 | 448.2 | 846.0 | 819.1 | 872.5 | 264.1 | 251.3 | 276.2 | 39.8 | 37.3 | 42.2 |
| 4 | 04-Apr-21 | 455.4 | 840.5 | 820.0 | 861.0 | 260.7 | 251.2 | 270.7 | 39.1 | 37.2 | 41.3 |
| 5 | 05-Apr-21 | 555.3 | 885.2 | 828.0 | 924.3 | 274.9 | 253.9 | 290.9 | 42.0 | 37.8 | 45.2 |
| 6 | 06-Apr-21 | 575.6 | 891.5 | 825.2 | 934.2 | 277.3 | 253.1 | 294.2 | 42.4 | 37.3 | 45.8 |
| 7 | 07-Apr-21 | 627.2 | 910.6 | 886.5 | 944.1 | 282.5 | 273.3 | 296.9 | 43.5 | 41.7 | 46.4 |
| 8 | 08-Apr-21 | 581.3 | 887.8 | 829.4 | 942.9 | 275.4 | 254.2 | 297.5 | 42.1 | 37.9 | 46.5 |
| 9 | 09-Apr-21 | 538.5 | 879.1 | 844.8 | 911.7 | 273.8 | 258.7 | 287.6 | 41.7 | 38.7 | 44.5 |
| 10 | 10-Apr-21 | 574.7 | 898.0 | 856.6 | 919.4 | 280.5 | 262.0 | 289.9 | 43.1 | 39.4 | 45.0 |
| 11 | 11-Apr-21 | 565.7 | 892.9 | 823.3 | 926.8 | 278.7 | 252.2 | 292.8 | 42.7 | 37.4 | 45.3 |
| 12 | 12-Apr-21 | 594.7 | 897.9 | 871.5 | 937.5 | 279.0 | 266.7 | 296.0 | 42.8 | 40.7 | 46.2 |
| 13 | 13-Apr-21 | 576.7 | 894.5 | 864.5 | 924.1 | 278.5 | 266.9 | 291.0 | 42.7 | 40.4 | 45.2 |
| 14 | 14-Apr-21 | 581.4 | 891.2 | 829.2 | 924.1 | 276.7 | 254.1 | 291.5 | 42.3 | 37.8 | 45.3 |
| 15 | 15-Apr-21 | 601.3 | 904.0 | 874.6 | 926.4 | 281.5 | 267.5 | 292.4 | 43.3 | 40.5 | 45.5 |
| 16 | 16-Apr-21 | 569.3 | 891.3 | 828.1 | 922.9 | 277.7 | 254.9 | 291.2 | 42.6 | 38.0 | 45.2 |
| 17 | 17-Apr-21 | 602.5 | 903.6 | 877.9 | 938.0 | 280.9 | 269.6 | 295.8 | 43.2 | 40.9 | 46.2 |
| 18 | 18-Apr-21 | 587.3 | 898.3 | 848.7 | 927.3 | 279.8 | 265.3 | 292.4 | 42.9 | 39.8 | 45.3 |
| 19 | 19-Apr-21 | 538.0 | 878.3 | 825.9 | 939.2 | 273.9 | 253.7 | 295.4 | 41.8 | 37.8 | 46.1 |
| 20 | 20-Apr-21 | 570.6 | 889.2 | 828.2 | 943.7 | 276.9 | 255.2 | 298.0 | 42.4 | 38.1 | 46.6 |
| 21 | 21-Apr-21 | 577.6 | 892.1 | 825.6 | 945.9 | 277.7 | 253.3 | 298.5 | 42.5 | 37.7 | 46.3 |
| 22 | 22-Apr-21 | 587.1 | 893.0 | 846.8 | 944.2 | 277.2 | 261.9 | 297.9 | 42.5 | 39.4 | 46.6 |
| 23 | 23-Apr-21 | 622.5 | 909.1 | 888.2 | 929.5 | 282.4 | 272.2 | 292.5 | 43.5 | 41.2 | 45.5 |
| 24 | 24-Apr-21 | 584.2 | 899.1 | 868.8 | 928.6 | 280.5 | 268.5 | 292.8 | 43.1 | 40.7 | 45.3 |
| 25 | 25-Apr-21 | 570.2 | 896.5 | 838.2 | 936.6 | 280.1 | 258.4 | 295.8 | 43.0 | 38.7 | 46.0 |
| 26 | 26-Apr-21 | 603.1 | 907.7 | 847.4 | 935.9 | 283.1 | 261.4 | 295.4 | 43.6 | 38.9 | 46.1 |
| 27 | 27-Apr-21 | 629.5 | 917.4 | 889.8 | 946.3 | 285.9 | 273.7 | 298.9 | 44.2 | 41.7 | 46.8 |
| 28 | 28-Apr-21 | 589.5 | 900.8 | 822.1 | 932.0 | 281.1 | 251.7 | 293.4 | 43.2 | 37.3 | 45.9 |
| 29 | 29-Apr-21 | 581.1 | 900.0 | 858.8 | 925.0 | 280.8 | 263.6 | 292.0 | 43.2 | 39.7 | 45.4 |
| 30 | 30-Apr-21 | 602.9 | 907.2 | 850.9 | 937.5 | 283.0 | 262.9 | 295.9 | 43.6 | 39.6 | 46.0 |

## CEMS DAYWISE VALUES FOR THE MONTH OF MAY '2021

| S.NO. | DATE | UNIT# 5 LOAD(MW) | UNIT# 5 SOX(mg/nm3) | | | UNIT# 5 NOX(mg/nm3) | | | UNIT# 5 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-May-21 | 499.2 | 916.2 | 840.9 | 981.4 | 377.6 | 352.8 | 398.7 | 44.1 | 38.9 | 48.95 |
| 2 | 02-May-21 | 505.88 | 913.6 | 835.3 | 988.6 | 376.2 | 350.6 | 401.2 | 43.7 | 38.1 | 49.17 |
| 3 | 03-May-21 | 514.42 | 926.8 | 847.8 | 977.9 | 380.7 | 355.4 | 397.2 | 44.7 | 39.3 | 48.19 |
| 4 | 04-May-21 | 587.56 | 947.9 | 920.6 | 978.9 | 387 | 376.8 | 398 | 45.9 | 43.5 | 48.59 |
| 5 | 05-May-21 | 583.7 | 940.8 | 914 | 970.9 | 384.3 | 374.3 | 394.8 | 45.3 | 42.9 | 47.75 |
| 6 | 06-May-21 | 626.31 | 966.1 | 937.3 | 986.3 | 392.7 | 381.2 | 400.4 | 47.1 | 44.3 | 48.97 |
| 7 | 07-May-21 | 590.48 | 947.1 | 904.8 | 976.4 | 386.6 | 372.3 | 396.6 | 45.8 | 42.6 | 48.15 |
| 8 | 08-May-21 | 552.02 | 930.7 | 901.2 | 958.9 | 381.3 | 370.7 | 392.5 | 44.7 | 42.2 | 47.48 |
| 9 | 09-May-21 | 548.71 | 934.6 | 901.9 | 955.9 | 383.1 | 370.6 | 391.1 | 45.2 | 42.1 | 47.08 |
| 10 | 10-May-21 | 579.94 | 947.7 | 909.9 | 973.4 | 387.1 | 373.2 | 396.9 | 46 | 42.7 | 48.35 |
| 11 | 11-May-21 | 582.5 | 944.7 | 913.3 | 980.5 | 385.9 | 374.3 | 398.7 | 45.7 | 42.9 | 48.61 |
| 12 | 12-May-21 | 582.13 | 952.7 | 920.7 | 972 | 389 | 376.7 | 395.7 | 46.5 | 43.4 | 48.11 |
| 13 | 13-May-21 | 625.75 | 965.1 | 934.2 | 993.4 | 392.3 | 381.2 | 402.9 | 47 | 44.3 | 49.57 |
| 14 | 14-May-21 | 626.87 | 965.1 | 937.4 | 987.6 | 392.2 | 381.3 | 401.2 | 47 | 44.3 | 49.21 |
| 15 | 15-May-21 | 624.65 | 960.2 | 887.6 | 988.3 | 390.4 | 367.2 | 401 | 46.6 | 41.6 | 49.1 |
| 16 | 16-May-21 | 436.46 | 887.2 | 832.3 | 956.6 | 368.5 | 350.6 | 391.7 | 42.2 | 37.9 | 47.26 |
| 17 | 17-May-21 | 293.78 | 937.2 | 890.5 | 959.2 | 384.7 | 371.6 | 392.6 | 45.6 | 43.2 | 47.51 |
| 18 | 18-May-21 | Unit in shutdown condition | | | | | | | | | |
| 19 | 19-May-21 | Unit in shutdown condition | | | | | | | | | |
| 20 | 20-May-21 | Unit in shutdown condition | | | | | | | | | |
| 21 | 21-May-21 | Unit in shutdown condition | | | | | | | | | |
| 22 | 22-May-21 | Unit in shutdown condition | | | | | | | | | |
| 23 | 23-May-21 | Unit in shutdown condition | | | | | | | | | |
| 24 | 24-May-21 | Unit in shutdown condition | | | | | | | | | |
| 25 | 25-May-21 | Unit in shutdown condition | | | | | | | | | |
| 26 | 26-May-21 | Unit in shutdown condition | | | | | | | | | |
| 27 | 27-May-21 | Unit in shutdown condition | | | | | | | | | |
| 28 | 28-May-21 | Unit in shutdown condition | | | | | | | | | |
| 29 | 29-May-21 | Unit in shutdown condition | | | | | | | | | |
| 30 | 30-May-21 | Unit in shutdown condition | | | | | | | | | |
| 31 | 31-May-21 | Unit in shutdown condition | | | | | | | | | |

**CEMS DAYWISE VALUES FOR THE MONTH OF JUN '2021**

| S.NO. | DATE | UNIT# 5 LOAD(MW) | UNIT# 5 SOX(mg/nm3) | | | UNIT# 5 NOX(mg/nm3) | | | UNIT# 5 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 2 | 02-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 3 | 03-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 4 | 04-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 5 | 05-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 6 | 06-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 7 | 07-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 8 | 08-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 9 | 09-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 10 | 10-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 11 | 11-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 12 | 12-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 13 | 13-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 14 | 14-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 15 | 15-Jun-21 | Unit in shutdown condition | | | | | | | | | |
| 16 | 16-Jun-21 | 221.7 | 873.8 | 836.3 | 919.8 | 364.6 | 351 | 380.5 | 38.5 | 36.4 | 44.58 |
| 17 | 17-Jun-21 | 473.15 | 902.4 | 842.9 | 951.1 | 372.8 | 353 | 387.3 | 36.8 | 34.6 | 48.56 |
| 18 | 18-Jun-21 | 545.38 | 935.8 | 865.8 | 969.8 | 383.7 | 361.7 | 395.6 | 36.5 | 41.1 | 46.51 |
| 19 | 19-Jun-21 | 489.46 | 913.5 | 849.7 | 983.8 | 377.1 | 356.2 | 400.1 | 39.5 | 37.9 | 48.68 |
| 20 | 20-Jun-21 | 526.14 | 923.4 | 838.8 | 985.3 | 379.7 | 351.9 | 400.4 | 39.5 | 36.4 | 49.05 |
| 21 | 21-Jun-21 | 575.58 | 946.1 | 870.2 | 988.4 | 386.8 | 364 | 401.4 | 40.4 | 39.3 | 49.26 |
| 22 | 22-Jun-21 | 584.31 | 943.2 | 843.3 | 976.6 | 385.2 | 353.7 | 397.1 | 39.8 | 38.2 | 47.79 |
| 23 | 23-Jun-21 | 517.12 | 927.3 | 838.1 | 981.8 | 380.9 | 351.6 | 399.2 | 40.5 | 38.8 | 48.69 |
| 24 | 24-Jun-21 | 559.49 | 935.9 | 888.5 | 985.6 | 383.3 | 367 | 400.5 | 41.4 | 40.5 | 48.09 |
| 25 | 25-Jun-21 | 566.88 | 942.2 | 885.7 | 973.9 | 385.3 | 366.8 | 396.5 | 41.7 | 39.3 | 49.36 |
| 26 | 26-Jun-21 | 583.81 | 941.8 | 893.4 | 971.8 | 384.7 | 369.8 | 395.1 | 44.7 | 42.1 | 47.55 |
| 27 | 27-Jun-21 | 477.48 | 903.7 | 844.4 | 963 | 373.8 | 353.5 | 393.9 | 43.3 | 38.7 | 47.77 |
| 28 | 28-Jun-21 | 528.41 | 921.8 | 844.4 | 976.9 | 378.8 | 353.5 | 397.6 | 44.2 | 38.6 | 48.62 |
| 29 | 29-Jun-21 | 550.82 | 931.4 | 903.5 | 961.6 | 381.8 | 371.3 | 393.3 | 44.8 | 41.3 | 47.85 |
| 30 | 30-Jun-21 | 546.16 | 933.8 | 909.4 | 979.3 | 382.8 | 373.1 | 398.4 | 45.1 | 39.3 | 47.81 |

**CEMS DAYWISE VALUES FOR THE MONTH OF JUL '2021**

| S.NO. | DATE | UNIT# 5 LOAD(MW) | UNIT# 5 SOX(mg/nm3) | | | UNIT# 5 NOX(mg/nm3) | | | UNIT# 5 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Jul-21 | 592.91 | 949.8 | 918.9 | 977.2 | 387.5 | 376.9 | 398.1 | 46 | 43.4 | 48.6 |
| 2 | 02-Jul-21 | 612.79 | 957.3 | 928.5 | 986.8 | 389.6 | 378.6 | 400.5 | 46.4 | 43.7 | 49.1 |
| 3 | 03-Jul-21 | 608.34 | 955.1 | 924.7 | 990.3 | 389 | 378 | 401.8 | 46.3 | 43.7 | 49.31 |
| 4 | 04-Jul-21 | 589.92 | 948.8 | 923.1 | 973.9 | 387.2 | 377.5 | 396.7 | 45.9 | 43.6 | 48.27 |
| 5 | 05-Jul-21 | 610.57 | 962.2 | 936.5 | 987.1 | 391.6 | 381.1 | 401 | 46.9 | 44.3 | 49.17 |
| 6 | 06-Jul-21 | 603.06 | 949.7 | 926 | 985.9 | 387.1 | 378.4 | 400.6 | 45.9 | 43.8 | 49.09 |
| 7 | 07-Jul-21 | 598.7 | 950.9 | 926.3 | 976.7 | 387.7 | 378.7 | 397.6 | 46 | 43.9 | 48.48 |
| 8 | 08-Jul-21 | 604.07 | 953 | 885.7 | 983.6 | 388.4 | 366.1 | 399.6 | 46.2 | 41.3 | 49.26 |
| 9 | 09-Jul-21 | 597.07 | 950.5 | 918.1 | 970.3 | 387.7 | 375.6 | 395.8 | 46.1 | 43.1 | 48.12 |
| 10 | 10-Jul-21 | 600.41 | 954.1 | 909.4 | 981.9 | 388.9 | 373.3 | 399.6 | 46.3 | 42.8 | 48.91 |
| 11 | 11-Jul-21 | 504.79 | 911 | 846.8 | 981.5 | 375.6 | 354.9 | 398.9 | 43.6 | 39.1 | 48.65 |
| 12 | 12-Jul-21 | 486.45 | 907.3 | 851.8 | 957.8 | 374.7 | 357 | 391 | 43.5 | 39.6 | 46.94 |
| 13 | 13-Jul-21 | 492.45 | 903.5 | 837.3 | 943.5 | 373 | 351.4 | 386.1 | 43 | 38.3 | 45.84 |
| 14 | 14-Jul-21 | 454.12 | 897.4 | 843.3 | 963 | 372.1 | 353.5 | 393.6 | 43 | 39.2 | 47.65 |
| 15 | 15-Jul-21 | 493.32 | 912.6 | 863.5 | 969.7 | 376.4 | 361.9 | 395.1 | 43.8 | 40.8 | 47.85 |
| 16 | 16-Jul-21 | 531.28 | 920.9 | 837.4 | 973 | 378.5 | 351.3 | 396.5 | 44.2 | 38.3 | 48.23 |
| 17 | 17-Jul-21 | 549.5 | 931.3 | 853.7 | 977.2 | 381.9 | 356.5 | 398.1 | 44.9 | 39.4 | 48.6 |
| 18 | 18-Jul-21 | 445.93 | 883.8 | 841.6 | 960.4 | 367.2 | 353.1 | 391.1 | 41.8 | 38.7 | 46.65 |
| 19 | 19-Jul-21 | 395.89 | 877.9 | 843.2 | 920.3 | 366.2 | 353.7 | 380.9 | 41.8 | 38.7 | 44.63 |
| 20 | 20-Jul-21 | 389.9 | 874 | 837.2 | 924.3 | 364.7 | 351.3 | 382.1 | 41.5 | 38.3 | 45.4 |
| 21 | 21-Jul-21 | 375.88 | 866.8 | 842.4 | 912 | 362.4 | 353 | 378.2 | 41 | 38.7 | 44.34 |
| 22 | 22-Jul-21 | 384.93 | 869.1 | 838.8 | 951.1 | 363 | 351.9 | 389.2 | 41 | 38.4 | 46.71 |
| 23 | 23-Jul-21 | 468.43 | 906.4 | 850.5 | 968 | 374.8 | 356.4 | 395.4 | 43.5 | 39.8 | 48.07 |
| 24 | 24-Jul-21 | 448.4 | 892.1 | 835.5 | 962.5 | 370.2 | 350.7 | 393.7 | 42.5 | 38.2 | 47.73 |
| 25 | 25-Jul-21 | 441.2 | 891.1 | 836.1 | 963.1 | 370.1 | 351.1 | 393.8 | 42.6 | 38.3 | 47.85 |
| 26 | 26-Jul-21 | 435.92 | 878.8 | 833.1 | 957.7 | 365.2 | 350 | 392.3 | 41.3 | 38 | 47.46 |
| 27 | 27-Jul-21 | 482.51 | 908.5 | 839.8 | 982.2 | 375.3 | 352.2 | 399.6 | 43.6 | 38.5 | 48.9 |
| 28 | 28-Jul-21 | 458.45 | 896.9 | 842.6 | 952.9 | 371.6 | 353.1 | 389.6 | 42.8 | 38.7 | 46.67 |
| 29 | 29-Jul-21 | 473.96 | 906.9 | 838.5 | 960.1 | 374.7 | 352 | 392.9 | 43.5 | 38.5 | 47.54 |
| 30 | 30-Jul-21 | 471.29 | 896.9 | 842.6 | 961.7 | 371.2 | 353.6 | 393.5 | 42.7 | 38.9 | 47.69 |
| 31 | 31-Jul-21 | 467.2 | 896.5 | 835.2 | 947.8 | 398.1 | 374.7 | 416.9 | 37.5 | 33.1 | 41.08 |

## CEMS DAYWISE VALUES FOR THE MONTH OF AUG '2021

| S.NO. | DATE | UNIT# 5 LOAD(MW) | UNIT# 5 SOX(mg/nm3) | | | UNIT# 5 NOX(mg/nm3) | | | UNIT# 5 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Aug-21 | 433.94 | 888.5 | 841.3 | 936.4 | 369 | 352.6 | 383.9 | 42.3 | 38.6 | 45.36 |
| 2 | 02-Aug-21 | 454.71 | 899.1 | 841.8 | 941.3 | 372.2 | 352.8 | 387.3 | 42.9 | 38.6 | 46.42 |
| 3 | 03-Aug-21 | 463.13 | 898.6 | 839.8 | 933.3 | 371.9 | 352 | 384.9 | 42.9 | 38.4 | 45.96 |
| 4 | 04-Aug-21 | 485.79 | 911.9 | 841.1 | 956.9 | 376.3 | 354.6 | 391.4 | 43.9 | 39.4 | 47.44 |
| 5 | 05-Aug-21 | Unit in shutdown condition | | | | | | | | | |
| 6 | 06-Aug-21 | Unit in shutdown condition | | | | | | | | | |
| 7 | 07-Aug-21 | 230.37 | 926.3 | 901.6 | 949.6 | 381.1 | 374.2 | 389.6 | 44.9 | 43.1 | 46.64 |
| 8 | 08-Aug-21 | 542.01 | 929.3 | 892.9 | 961.9 | 381.1 | 368.5 | 392.8 | 44.7 | 41.8 | 47.41 |
| 9 | 09-Aug-21 | 521.47 | 917.6 | 890.1 | 947.1 | 377.4 | 367.6 | 388.3 | 43.9 | 41.6 | 46.6 |
| 10 | 10-Aug-21 | 515.52 | 922.5 | 893 | 943.9 | 379.4 | 368.2 | 388.1 | 44.4 | 41.7 | 46.6 |
| 11 | 11-Aug-21 | 109.72 | 892.3 | 838.7 | 919.6 | 369.6 | 351.9 | 378.9 | 42.4 | 38.4 | 44.39 |
| 12 | 12-Aug-21 | Unit in shutdown condition | | | | | | | | | |
| 13 | 13-Aug-21 | Unit in shutdown condition | | | | | | | | | |
| 14 | 14-Aug-21 | 514.69 | 923.4 | 893.8 | 949.7 | 379.4 | 368.4 | 389 | 44.3 | 41.7 | 46.72 |
| 15 | 15-Aug-21 | 519.2 | 918.6 | 872 | 957.1 | 377.9 | 362 | 392.1 | 44 | 40.5 | 47.26 |
| 16 | 16-Aug-21 | 515.83 | 922.3 | 876.7 | 960.1 | 379.2 | 364.7 | 391.6 | 44.4 | 41.3 | 47.02 |
| 17 | 17-Aug-21 | 530.85 | 925.9 | 888.1 | 971.1 | 380.2 | 368.6 | 396.5 | 44.5 | 42.1 | 48.29 |
| 18 | 18-Aug-21 | 467.04 | 899.3 | 865.4 | 929.4 | 372.2 | 362.6 | 382.4 | 43 | 40.9 | 45.34 |
| 19 | 19-Aug-21 | 473.32 | 900.4 | 849.7 | 954.5 | 372.3 | 356.5 | 390.9 | 42.9 | 39.6 | 47.07 |
| 20 | 20-Aug-21 | 491.04 | 909.5 | 874.6 | 932.2 | 375.3 | 363.4 | 383.4 | 43.6 | 40.7 | 45.49 |
| 21 | 21-Aug-21 | 482.95 | 910.7 | 874.9 | 940.5 | 376.1 | 365.4 | 386.6 | 43.8 | 41.7 | 46.22 |
| 22 | 22-Aug-21 | 458.38 | 899.7 | 836.7 | 948.9 | 372.6 | 351.1 | 389.6 | 43 | 38.2 | 46.92 |
| 23 | 23-Aug-21 | 420.44 | 881.1 | 848.8 | 920.9 | 366.7 | 354.7 | 379.4 | 41.8 | 38.9 | 44.49 |
| 24 | 24-Aug-21 | 390.6 | 870.6 | 837.9 | 904.2 | 363.5 | 351.4 | 376 | 41.2 | 38.3 | 44.13 |
| 25 | 25-Aug-21 | 462.8 | 901.8 | 842.1 | 936.1 | 373.2 | 352.7 | 385.6 | 43.1 | 38.6 | 46.07 |
| 26 | 26-Aug-21 | 532.33 | 928.8 | 897.3 | 956.6 | 381.3 | 369.4 | 391.9 | 44.8 | 41.9 | 47.37 |
| 27 | 27-Aug-21 | 551.47 | 941.7 | 912.6 | 963.2 | 385.7 | 374.3 | 394 | 45.8 | 43 | 47.41 |
| 28 | 28-Aug-21 | 561.91 | 936.7 | 904.1 | 978.8 | 383.5 | 371.3 | 398.3 | 45.2 | 42.3 | 48.58 |
| 29 | 29-Aug-21 | 547.38 | 928.5 | 902.6 | 950 | 380.8 | 370.8 | 388.1 | 44.6 | 42.2 | 46.44 |
| 30 | 30-Aug-21 | 553.08 | 938.3 | 915.6 | 960.4 | 384.4 | 374.9 | 392.3 | 45.5 | 43 | 47.28 |
| 31 | 31-Aug-21 | 524.09 | 917.4 | 868.4 | 950 | 405.2 | 388.6 | 418.7 | 38.9 | 35.7 | 41.72 |

## CEMS DAYWISE VALUES FOR THE MONTH OF SEP '2021

| S.NO. | DATE | UNIT# 5 LOAD(MW) | UNIT# 5 SOX(mg/nm3) | | | UNIT# 5 NOX(mg/nm3) | | | UNIT# 5 DUST(mg/nm3) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AVG | AVG | MIN | MAX | AVG | MIN | MAX | AVG | MIN | MAX |
| 1 | 01-Sep-21 | 532.6 | 922.6 | 897.4 | 948.9 | 308.5 | 282.1 | 333.5 | 44.2 | 42 | 47.29 |
| 2 | 02-Sep-21 | 556.84 | 928.4 | 903 | 949.9 | 309.3 | 281.7 | 340 | 44.8 | 42.8 | 47.34 |
| 3 | 03-Sep-21 | 536.33 | 925.7 | 900.8 | 949.4 | 310.5 | 281.2 | 340.4 | 44.6 | 42.2 | 47.06 |
| 4 | 04-Sep-21 | 537.61 | 920.6 | 891.1 | 942.8 | 310.5 | 285.3 | 338.7 | 44.1 | 41.5 | 47.12 |
| 5 | 05-Sep-21 | 494.94 | 909.3 | 849.8 | 949 | 313.1 | 282.2 | 340.9 | 43.8 | 39.1 | 47.8 |
| 6 | 06-Sep-21 | 570.41 | 929.3 | 864.9 | 948.5 | 311.6 | 290.1 | 338.5 | 44.8 | 40 | 47.61 |
| 7 | 07-Sep-21 | 527.49 | 914.3 | 861 | 946 | 307.6 | 281.2 | 339.9 | 44.3 | 40 | 48.11 |
| 8 | 08-Sep-21 | 422.02 | 881.5 | 841.7 | 938.4 | 318 | 282.7 | 339.7 | 41.7 | 38.7 | 46.05 |
| 9 | 09-Sep-21 | 431.91 | 891.5 | 851.2 | 946.3 | 315.2 | 282.5 | 340.4 | 43 | 39.7 | 47.59 |
| 10 | 10-Sep-21 | 433.48 | 887 | 852 | 936.9 | 311.6 | 281.5 | 339.8 | 42.3 | 39.6 | 44.96 |
| 11 | 11-Sep-21 | 423.46 | 888.6 | 836.3 | 931.5 | 307.9 | 283.3 | 341 | 42.2 | 38.2 | 44.84 |
| 12 | 12-Sep-21 | 449.15 | 890.5 | 854.6 | 932.9 | 312.7 | 285 | 340 | 42.6 | 39.6 | 47.19 |
| 13 | 13-Sep-21 | 475.53 | 902.8 | 853.2 | 938.2 | 308 | 283.6 | 340.7 | 43.2 | 39.6 | 47.11 |
| 14 | 14-Sep-21 | 458.77 | 897.6 | 842.2 | 942.1 | 310.8 | 282.4 | 335.6 | 42.8 | 38.8 | 46.43 |
| 15 | 15-Sep-21 | 474.28 | 915.8 | 874 | 944.8 | 308.9 | 282.2 | 337.9 | 43.6 | 40.7 | 46.44 |
| 16 | 16-Sep-21 | 422.77 | 881.6 | 846.9 | 926.7 | 311.6 | 282.6 | 339.5 | 41.8 | 39.4 | 44.5 |
| 17 | 17-Sep-21 | 407.1 | 877.9 | 837.4 | 909.8 | 308 | 282.4 | 338.9 | 41.7 | 38.4 | 44.4 |
| 18 | 18-Sep-21 | 442.53 | 890.4 | 868 | 927.2 | 307.7 | 281.2 | 333 | 42.3 | 40.2 | 45 |
| 19 | 19-Sep-21 | 101.66 | 904.6 | 864.2 | 932 | 308.1 | 282.4 | 327.1 | 43.6 | 41.7 | 44.78 |
| 20 | 20-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 21 | 21-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 22 | 22-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 23 | 23-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 24 | 24-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 25 | 25-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 26 | 26-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 27 | 27-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 28 | 28-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 29 | 29-Sep-21 | Unit in shutdown condition | | | | | | | | | |
| 30 | 30-Sep-21 | Unit in shutdown condition | | | | | | | | | |

Annexure - IV

**Maharashtra Pollution Control Board**

**महाराष्ट्र प्रदूषण नियंत्रण मंडळ**

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# FORM V

## (See Rule 14)

## Environmental Audit Report for the financial Year ending the 31st March 2021

| | |
|---|---|
| ***Unique Application Number*** | ***Submitted Date*** |
| MPCB-ENVIRONMENT_STATEMENT-0000036614 | 24-09-2021 |

# PART A

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### *Company Information*

| | | |
|---|---|---|
| ***Company Name*** | ***Application UAN number*** | |
| Adani Power Maharastra Limited | MPCB-CONSENT-0000094229 | |
| ***Address*** | | |
| plot A 1, Tirora Growth centre, MIDC Area, Tirora, Gondia | | |
| ***Plot no*** | ***Taluka*** | ***Village*** |
| PLOT NO: A-1, TIRODA GROWTH CENTRE, MIDC, TIRODA | Tiroda | MIDC Tirora |
| ***Capital Investment (In lakhs)*** | ***Scale*** | ***City*** |
| 1847648.00 | L.S.I | Gondiya |
| ***Pincode*** | ***Person Name*** | ***Designation*** |
| 441911 | Kanti Biswas | Station Head |
| ***Telephone Number*** | ***Fax Number*** | ***Email*** |
| 8875088555 | | Kanti.Biswas@adani.com |
| ***Region*** | ***Industry Category*** | ***Industry Type*** |
| SRO-Bhandara | Red | R48 Thermal Power Plants |
| ***Last Environmental statement submitted online*** | ***Consent Number*** | ***Consent Issue Date*** |
| yes | MPCB-CONSENT-0000094229 | 2020-09-09 |
| ***Consent Valid Upto*** | ***Establishment Year*** | ***Date of last environment statement submitted*** |
| 2021-08-31 | 2012 | Sep 29 2020 12:00:00:000AM |
| ***Industry Category Primary (STC Code) & Secondary (STC Code)*** | | |

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### *Product Information*

| ***Product Name*** | ***Consent Quantity*** | ***Actual Quantity*** | ***UOM*** |
|---|---|---|---|
| Electricity Generation | 3300 | 2060.44 | Mwh |
| Fly Ash Bricks | 10000 | 356000 | Nos./Y |

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### *By-product Information*

| ***By Product Name*** | ***Consent Quantity*** | ***Actual Quantity*** | ***UOM*** |
|---|---|---|---|
| - | 0 | 0 | MT/A |

# Part-B (Water & Raw Material Consumption)

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### *1) Water Consumption in m3/day*

| Water Consumption for | Consent Quantity in m3/day | Actual Quantity in m3/day |
|---|---|---|
| **Process** | 26592 | 1828.00 |
| **Cooling** | 163728 | 112600.00 |
| **Domestic** | 1440 | 1203.00 |
| **All others** | 100 | 95.00 |
| **Total** | 191860 | 115726.00 |

### 2) Effluent Generation in CMD / MLD

| Particulars | Consent Quantity | Actual Quantity | UOM |
|---|---|---|---|
| Trade Effluent | 34205 | 15941 | CMD |
| Domestic Effluent | 192 | 181 | CMD |

### 2) Product Wise Process Water Consumption (cubic meter of process water per unit of product)

| Name of Products (Production) | During the Previous financial Year | During the current Financial year | UOM |
|---|---|---|---|
| Thermal Power Plants | 143442 | 115726 | CMD |
| Bricks | 7.5 | 7.35 | CMD |

### 3) Raw Material Consumption (Consumption of raw material per unit of product)

| Name of Raw Materials | During the Previous financial Year | During the current Financial year | UOM |
|---|---|---|---|
| Coal | 0.63 | 0.64 | MT/MWH |

### 4) Fuel Consumption

| Fuel Name | Consent quantity | Actual Quantity | UOM |
|---|---|---|---|
| LDO | 95.52 | 1.42 | CMD |

## Part-C

### Pollution discharged to environment/unit of output (Parameter as specified in the consent issued)

### [A] Water

| Pollutants Detail | Quantity of Pollutants discharged (kL/day) | Concentration of Pollutants discharged(Mg/Lit) Except PH,Temp,Colour | Percentage of variation from prescribed standards with reasons | | |
|---|---|---|---|---|---|
| | Quantity | Concentration | %variation | Standard | Reason |
| ZLD Maintained | 0 | 0 | - | - | - |

### [B] Air (Stack)

| Pollutants Detail | Quantity of Pollutants discharged (kL/day) | Concentration of Pollutants discharged(Mg/NM3) | Percentage of variation from prescribed standards with reasons | | |
|---|---|---|---|---|---|
| | Quantity | Concentration | %variation | Standard | Reason |
| Particulate Matter | 2650 | 42 | - | - | - |
| SO2 | 56930 | 961 | - | - | - |
| NOx | 20260 | 301 | - | - | - |

## Part-D

### HAZARDOUS WASTES

### 1) From Process

| **Hazardous Waste Type** | **Total During Previous Financial year** | **Total During Current Financial year** | **UOM** |
|---|---|---|---|
| 5.1 Used or spent oil | 31.06 | 37.55 | KL/A |
| 33.1 Empty barrels /containers /liners contaminated with hazardous chemicals /wastes | 300 | 389 | Nos./Y |
| 35.2 Spent ion exchange resin containing toxic metals | 0.64 | 0.4365 | KL/A |

***2) From Pollution Control Facilities***

| **Hazardous Waste Type** | **Total During Previous Financial year** | **Total During Current Financial year** | **UOM** |
|---|---|---|---|
| 35.3 Chemical sludge from waste water treatment | 0.14 | 0.370 | MT/A |

## Part-E

***SOLID WASTES***

***1) From Process***

| **Non Hazardous Waste Type** | **Total During Previous Financial year** | **Total During Current Financial year** | **UOM** |
|---|---|---|---|
| Bottom Ash | 963038 | 756000 | MT/A |

***2) From Pollution Control Facilities***

| **Non Hazardous Waste Type** | **Total During Previous Financial year** | **Total During Current Financial year** | **UOM** |
|---|---|---|---|
| Fly Ash | 3852155 | 3024001 | MT/A |

***3) Quantity Recycled or Re-utilized within the unit***

| **Waste Type** | **Total During Previous Financial year** | **Total During Current Financial year** | **UOM** |
|---|---|---|---|
| 0 | 0 | 0 | MT/A |

## Part-F

***Please specify the characteristics(in terms of concentration and quantum) of hazardous as well as solid wastes and indicate disposal practice adopted for both these categories of wastes.***

***1) Hazardous Waste***

| **Type of Hazardous Waste Generated** | **Qty of Hazardous Waste** | **UOM** | **Concentration of Hazardous Waste** |
|---|---|---|---|
| 5.1 Used or spent oil | 33.55 | KL/A | Report Enclosed |
| 33.1 Empty barrels /containers /liners contaminated with hazardous chemicals /wastes | 389 | Nos./Y | Empty chemical containers |
| 35.2 Spent ion exchange resin containing toxic metals | 0.435 | KL/A | Waste Resin replaced from maintenance |
| 35.3 Chemical sludge from waste water treatment | 0.370 | MT/A | Chemical Sludge from ETP |

***2) Solid Waste***

| **Type of Solid Waste Generated** | **Qty of Solid Waste** | **UOM** | **Concentration of Solid Waste** |
|---|---|---|---|
| Organic Waste | 77.96 | Kg/Day | Waste from kitchen, horticulture activities. |
| Inorganic Waste | 337 | Kg/Day | Plastic, Metal, Wood, Rubber and Glass |
| Paper Waste | 10 | Kg/Day | Paper from office & packing material |

## Part-G

***Impact of the pollution Control measures taken on conservation of natural resources and consequently on the cost of production.***

| ***Description*** | ***Reduction in Water Consumption (M3/day)*** | ***Reduction in Fuel & Solvent Consumption (KL/day)*** | ***Reduction in Raw Material (Kg)*** | ***Reduction in Power Consumption (KWH)*** | ***Capital Investment(in Lacs)*** | ***Reduction in Maintenance(in Lacs)*** |
|---|---|---|---|---|---|---|
| Replacement of existing CT fills with new low clogging CT fills | 0 | 0 | 7630 | 0 | 645 | 0 |
| Improvement in Main Stream Temperature (MST) by operational measures | 0 | 0 | 17923 | 0 | 0 | 0 |
| Effective Monitoring & Running PT plant drive (flash mixture) as per raw water turbidity | 0 | 0 | 0 | 30073 | 0 | 0 |
| Rainwater Harvesting through various rainwater harvesting structures | 1.20 | 0 | 0 | 0 | 0 | 0 |
| Recycling of Guard Pond Water for Green Belt Development | 4475.67 | 0 | 0 | 0 | 0 | 0 |
| Natural Conservation through Waste Paper Recycling Unit | 0 | 0 | 1630 | 0 | 0 | 0 |
| Used of Bottom Ash as replacement of sand | 0 | 0 | 427000 | 0 | 0 | 0 |

## Part-H

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### *Additional measures/investment proposal for environmental protection abatement of pollution, prevention of pollution.*

### *[A] Investment made during the period of Environmental Statement*

| ***Detail of measures for Environmental Protection*** | ***Environmental Protection Measures*** | ***Capital Investment (Lacks)*** |
|---|---|---|
| Pollution Control Equipment O&M | ESP, Bag Filters ETC | 5011.40 |
| Pollution Monitoring, Study and Analysis | Environment Monitoring Equipment's, Third Party Monitoring, Fly Ash Lechability Study and Hydrogeological Study | 90.00 |
| Green Belt Development | Nursary Development, Sapling Plantation and Maintenance of Existing Green Belt. Also plantation in gap filling areas carried out. | 282.0 |
| Corporate Social Responsibility | Under CSR Activities Deeping and renovation of Ponds, Health & Sanitization, Waste Management and Skill Development | 397.0 |
| Legal & Consent Fees | Consent to Operate and JVS sampling done by MPCB and Hazardous Waste Management by MEPL | 379.85 |
| Training & Awareness | Environmental Workshop, Seminar and Training and Celebration of World Environment Day | 3.0 |
| Waste Management | Fly Ash Utilization and its Management | 6975 |

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### *[B] Investment Proposed for next Year*

| ***Detail of measures for Environmental Protection*** | ***Environmental Protection Measures*** | ***Capital Investment (Lacks)*** |
|---|---|---|
| Pollution Control Equipment O&M | ESP, Bag Filters ETC | 5512.54 |
| Pollution Monitoring, Study and Analysis | Environment Monitoring Equipment's, Third Party Monitoring, Fly Ash Lechability Study and Hydrogeological Study | 99 |

| | | |
|---|---|---|
| Green Belt Development | Nursary Development, Sapling Plantation and Maintenance of Existing Green Belt. Also plantation in gap filling areas carried out. | 310.2 |
| Corporate Social Responsibility | Under CSR Activities Deeping and renovation of Ponds, Health & Sanitization, Waste Management, Skill Development etc. | 436.7 |
| Legal & Consent Fees | Consent to Operate and JVS sampling done by MPCB and Hazardous Waste Management by MEPL | 417.835 |
| Training & Awareness | Environmental Workshop, Seminar and Training and Celebration of World Environment Day | 3.3 |
| Waste Management | Fly Ash Utilization and its Management | 7672.5 |
| Establishment of Ash Utilization Research Park | For 100% Fly Ash Utilization | 150.0 |
| Stabilization of Ash Dyke With Green Coverage | For Legacy Ash Utilization | 350.0 |

## Part-I

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### *Any other particulars for improving the quality of the environment.*

***Particulars***

1) Environmental Laboratory (NABL Accredited) is being maintained 2) We are scientifically depositing waste originated from canteen and guest house from our plant through

***Name & Designation***

Kanti Biswas - Station Head

***UAN No:***

MPCB-ENVIRONMENT_STATEMENT-0000036614

***Submitted On:***

24-09-2021

Annexure - V

**ENVIRO ANALYSTS & ENGINEERS PVT. LTD.**
NABET Accredited & MoEF (Govt. of India) approved
CIN No. : [illegible]
H. O. : B-1003, Enviro House, 10th Floor, Western Edge II, Western Express Highway, Borivali (E), Mumbai - 400 066
• Tel. : +91 22 2854 1647 / 48 / 49 / 67 / 68 • E-mail : info@eaepl.com • Website : www.eaepl.com

**ENV/SWT/2021-22/029** **Date: 8.07.2021**

**ISSUED TO:**
**M/s ADANI POWER MAHARASHTRA LIMITED**
Plot no. - A1, Tirora Growth Center, MIDC, Tirora,
Dist.: Gondia, Maharashtra – 441 911. India

**Sample Particulars : Fly Ash Sample**

| | | | |
|---|---|---|---|
| Sample Registration Date | : **28.06.2021** | Analysis Starting Date : | 30.06.2021 |
| Quantity received | : **2 kg** | Analysis Completion Date : | 8.07.2021 |
| Sample Type: | : **Solid Waste** | Sampled by : | EAEPL Representative |

**TEST RESULTS**

| Sr. No. | Test Parameters | Measurement Unit | Results |
|---|---|---|---|
| 1 | Alumina (as $Al_2O_3$) | % by mass | 24.81 |
| 2 | Iron Oxide (as $Fe_2O_3$) | % by mass | 5.07 |
| 3 | Silica (as $SiO_2$) | % by mass | 56.8 |
| 4 | Reactive Silica | % by mass | 0.026 |
| 5 | Magnesium Oxide (as MgO) | % by mass | 1.53 |
| 6 | Sulphur Trioxide (as $SO_3$) | % by mass | 0.051 |
| 7 | Alkalies (as $Na_2O$) | % by mass | 3.16 |
| 8 | Chloride (as Cl) | % by mass | 0.028 |
| 9 | Loss on ignition (as LOI) | % by mass | 0.03 |
| 10 | Cadmium | mg/kg | 0.21 |
| 11 | Chromium | mg/kg | 14.8 |
| 12 | Arsenic | mg/kg | 0.782 |
| 13 | Mercury | mg/kg | 0.062 |
| 14 | Selenium | mg/kg | Nil |
| 15 | Cyanide | mg/kg | Nil |
| 16 | Cobalt | mg/kg | 15.7 |
| 17 | Copper | mg/kg | 29.1 |
| 18 | Lead | mg/kg | 16.3 |
| 19 | Molybdenum | mg/kg | Nil |
| 20 | Nickel | mg/kg | 19.8 |
| 21 | Tin | mg/kg | Nil |

**For Enviro Analysts & Engineers Pvt. Ltd.**

**Authorized Signatory**

**ENV/SWT/2021-22/029** **Date: 8.07.2021**

**ISSUED TO:**

**M/s ADANI POWER MAHARASHTRA LIMITED**
Plot no. - A1, Tirora Growth Center, MIDC, Tirora,
Dist.: Gondia, Maharashtra – 441 911. India

**Sample Particulars : Fly Ash Sample**

| | | | |
|---|---|---|---|
| Sample Registration Date | : **28.06.2021** | Analysis Starting Date : | 30.06.2021 |
| Quantity received | : **2 kg** | Analysis Completion Date : | 8.07.2021 |
| Sample Type: | : **Solid Waste** | Sampled by : | EAEPL Representative |

**TEST RESULTS**

| Sr. No. | Test Parameters | Measurement Unit | Results |
|---|---|---|---|
| 22 | Barium | mg/kg | 277 |
| 23 | Calcium | mg/kg | 123781 |
| 24 | Iron | mg/kg | 35439.3 |
| 25 | Zinc | mg/kg | 68.3 |
| 26 | Aluminium | mg/kg | 131244.90 |
| 27 | Manganese | mg/kg | 117.5 |
| 28 | Antimony | mg/kg | Nil |
| 29 | Beryllium | mg/kg | Nil |

**Note:** 1. Results relate to tested sample only.
2. Test report should not be reproduced partially.

**REMARKS:** Based upon request of party, sample was tested for above mentioned parameters only.

**For Enviro Analysts & Engineers Pvt. Ltd.**

**Authorized Signatory**

**ENV/SWT/2021-22/029 /1** **Date: 8.07.2021**

**ISSUED TO:**
**M/s ADANI POWER MAHARASHTRA LIMITED**
Plot no. - A1, Tirora Growth Center, MIDC, Tirora,
Dist.: Gondia, Maharashtra – 441 911. India

**Sample Particulars : Pond Ash Sample**

| | | | |
|---|---|---|---|
| Sample Registration Date | : **28.06.2021** | Analysis Starting Date : | 30.06.2021 |
| Quantity received | : **2 kg** | Analysis Completion Date : | 8.07.2021 |
| Sample Type: | : **Solid Waste** | Sampled by : | EAEPL Representative |

## TEST RESULTS

| Sr. No. | Test Parameters | Measurement Unit | Results |
|---|---|---|---|
| 1 | Alumina (as $Al_2O_3$) | % by mass | 21.70 |
| 2 | Iron Oxide (as $Fe_2O_3$) | % by mass | 4.78 |
| 3 | Silica (as $SiO_2$) | % by mass | 57.92 |
| 4 | Reactive Silica | % by mass | 0.021 |
| 5 | Magnesium Oxide (as MgO) | % by mass | 1.24 |
| 6 | Sulphur Trioxide (as $SO_3$) | % by mass | 0.073 |
| 7 | Alkalies (as $Na_2O$) | % by mass | 3.20 |
| 8 | Chloride (as Cl) | % by mass | 0.048 |
| 9 | Loss on ignition (as LOI) | % by mass | 0.055 |
| 10 | Cadmium | mg/kg | 0.17 |
| 11 | Chromium | mg/kg | 15.2 |
| 12 | Arsenic | mg/kg | 0.97 |
| 13 | Mercury | mg/kg | 0.052 |
| 14 | Selenium | mg/kg | Nil |
| 15 | Cyanide | mg/kg | Nil |
| 16 | Cobalt | mg/kg | 10.7 |
| 17 | Copper | mg/kg | 21.1 |
| 18 | Lead | mg/kg | 15.7 |
| 19 | Molybdenum | mg/kg | Nil |
| 20 | Nickel | mg/kg | 18.8 |
| 21 | Tin | mg/kg | Nil |

**For Enviro Analysts & Engineers Pvt. Ltd.**

**Authorized Signatory**

**ENV/SWT/2021-22/029 /1** **Date: 8.07.2021**

**ISSUED TO:**
**M/s ADANI POWER MAHARASHTRA LIMITED**
Plot no. - A1, Tirora Growth Center, MIDC, Tirora,
Dist.: Gondia, Maharashtra – 441 911. India

**Sample Particulars : Pond Ash Sample**

| | | | | | |
|---|---|---|---|---|---|
| Sample Registration Date | : | **28.06.2021** | Analysis Starting Date | : | 30.06.2021 |
| Quantity received | : | **2 kg** | Analysis Completion Date | : | 8.07.2021 |
| Sample Type: | : | **Solid Waste** | Sampled by | : | EAEPL Representative |

**TEST RESULTS**

| Sr. No. | Test Parameters | Measurement Unit | Results |
|---|---|---|---|
| 22 | Barium | mg/kg | 210 |
| 23 | Calcium | mg/kg | 121340 |
| 24 | Iron | mg/kg | 33412.2 |
| 25 | Zinc | mg/kg | 56.3 |
| 26 | Aluminium | mg/kg | 114793.0 |
| 27 | Manganese | mg/kg | 98.6 |
| 28 | Antimony | mg/kg | Nil |
| 29 | Beryllium | mg/kg | Nil |

Note:
1. Results relate to tested sample only.
2. Test report should not be reproduced partially.

REMARKS: Based upon request of party sample was tested for above mentioned parameters only.

**For Enviro Analysts & Engineers Pvt. Ltd.**

**Authorized Signatory**

Page 1 of 2

**ENV/SWT/2021-22/029/2** **Date: 8.07.2021**

**ISSUED TO:**

**M/s ADANI POWER MAHARASHTRA LIMITED**
Plot no. - A1, Tirora Growth Center, MIDC, Tirora,
Dist.: Gondia, Maharashtra – 441 911. India

**Sample Particulars : Bottom Ash Sample**

| | | | |
|---|---|---|---|
| Sample Registration Date | : **28.06.2021** | Analysis Starting Date : | 30.06.2021 |
| Quantity received | : **2 kg** | Analysis Completion Date : | 8.07.2021 |
| Sample Type: | : **Solid Waste** | Sampled by : | EAEPL Representative |

**TEST RESULTS**

| Sr. No. | Test Parameters | Measurement Unit | Results |
|---|---|---|---|
| 1 | Alumina (as $Al_2O_3$) | % by mass | 20.14 |
| 2 | Iron Oxide (as $Fe_2O_3$) | % by mass | 5.17 |
| 3 | Silica (as $SiO_2$) | % by mass | 49.05 |
| 4 | Reactive Silica | % by mass | 0.013 |
| 5 | Magnesium Oxide (as MgO) | % by mass | 1.61 |
| 6 | Sulphur Trioxide (as $SO_3$) | % by mass | 0.069 |
| 7 | Alkalies (as $Na_2O$) | % by mass | 2.74 |
| 8 | Chloride (as Cl) | % by mass | 0.051 |
| 9 | Loss on ignition (as LOI) | % by mass | 0.006 |
| 10 | Cadmium | mg/kg | 0.11 |
| 11 | Chromium | mg/kg | 15.3 |
| 12 | Arsenic | mg/kg | 0.31 |
| 13 | Mercury | mg/kg | 0.03 |
| 14 | Selenium | mg/kg | Nil |
| 15 | Cyanide | mg/kg | Nil |
| 16 | Cobalt | mg/kg | 11.02 |
| 17 | Copper | mg/kg | 18.7 |
| 18 | Lead | mg/kg | 16.6 |
| 19 | Molybdenum | mg/kg | Nil |
| 20 | Nickel | mg/kg | 19.3 |
| 21 | Tin | mg/kg | Nil |

**For Enviro Analysts & Engineers Pvt. Ltd.**

**Authorized Signatory**

**ENV/SWT/2021-22/029/2** **Date: 8.07.2021**

**ISSUED TO:**
**M/s ADANI POWER MAHARASHTRA LIMITED**
Plot no. - A1, Tirora Growth Center, MIDC, Tirora,
Dist.: Gondia, Maharashtra – 441 911. India

**Sample Particulars : Bottom Ash Sample**

| | | | |
|---|---|---|---|
| Sample Registration Date | : **28.06.2021** | Analysis Starting Date : | 30.06.2021 |
| Quantity received | : **2 kg** | Analysis Completion Date : | 8.07.2021 |
| Sample Type: | : **Solid Waste** | Sampled by : | EAEPL Representative |

**TEST RESULTS**

| Sr. No. | Test Parameters | Measurement Unit | Results |
|---|---|---|---|
| 22 | Barium | mg/kg | 286 |
| 23 | Calcium | mg/kg | 127612 |
| 24 | Iron | mg/kg | 36138.3 |
| 25 | Zinc | mg/kg | 59.7 |
| 26 | Aluminium | mg/kg | 106540.6 |
| 27 | Manganese | mg/kg | 104.8 |
| 28 | Antimony | mg/kg | Nil |
| 29 | Beryllium | mg/kg | Nil |

Note: 1. Results relate to tested sample only.
2. Test report should not be reproduced partially.

REMARKS: Based upon request of party sample was tested for above mentioned parameters only.

**For Enviro Analysts & Engineers Pvt. Ltd.**

**Authorized Signatory**

**Annexure - VI**

# ADANI POWER MAHARSHTRA LIMITED, TIRORA

## GREEN BELT & PLANTATION DETAILS

**Total Area Covered**: 258 HA
**Tree Planted**: 513367 Nos.
**Shrubs Planted**: 59884 Sq. Meter
**Green Carpet**: 3, 22,194 Sq. Meter

**Plant & Shrubs Species used for Green Belt Development**

| **Shrubs** | **Tree Species** |
|---|---|
| Bogunvellia | Psidium guavajava (Amarud) |
| Rose | Punica granatum (Anar) |
| Furcaria | Manilkara zapota (Chikoo) |
| Cassia biflora | Phyllanthus emblica (Aonla) |
| Lagerstromia indica | Tamarindus indica (Imali) |
| Shrubs | Mangifera indica (Mango) |
| Flower Beds. | Lemon |
| Lawn | Carissa carandas |
| Exora Tall | Bottle Brush |
| Golden Ficus | Casuarina |
| Ficus panda | Samania saman |
| Group plants | Ficus religeosa |
| Nerium Bell (Yellow Ghanti Kanher) | Casia siamia |
| Hibiscus | Bauhinia purpuria |
| Musanda | Ficus bengalensis |
| Nolino | Delonix regia |
| Furcaria | Azadiracta Indica |
| Junifer | Spathodia |
| Ficus Golden | Peltaphorum |
| Ficus blackiana | Delonix regia |
| Headge | Acacia auriculiformis |
|  | Jackranda |
|  | Peltaphorum |
|  | Neolamarckia cadamba |
|  | Palms (Coconut, Fistal palm, Royal Palm, etc) |
|  | Ficus Golden |
|  | Rain Tree |
|  | Mimusops elengii |
|  | Cassia fistula |
|  | Tectona grandis (Teak) |
|  | Wad (Bargad) |
|  | Peepal |
|  | Neem |
|  | Bamboo |
|  | Satparni |
|  | Gulmohar |

# ADANI POWER MAHARSHTRA LIMITED, TIRORA

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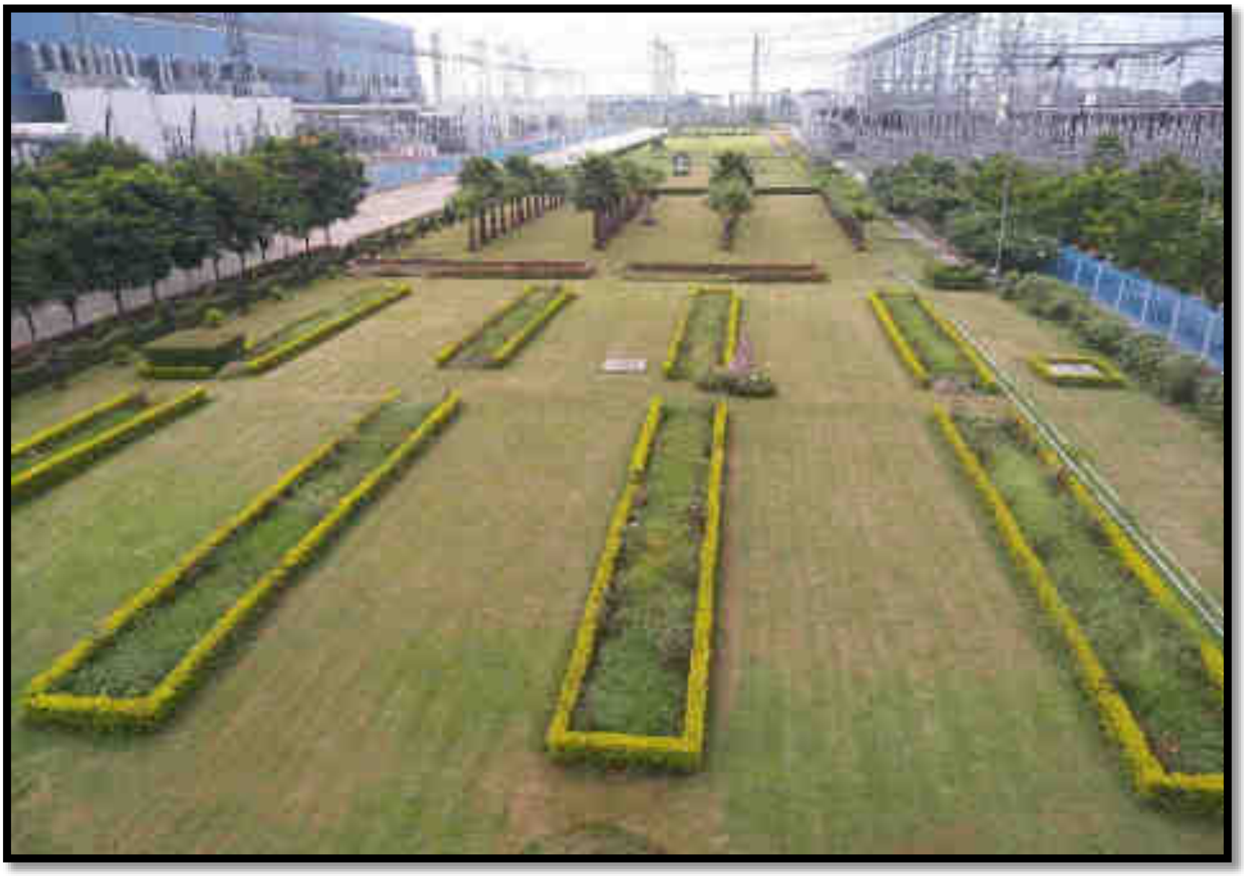

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ADANI POWER MAHARSHTRA LIMITED, TIRORA

Annexure - VII

# Adani Foundation

## CSR TIRODA

### Six monthly report

### (APR-SEP)

### FY- 2021-22

## 1. Fight against COVID-19

### Installation of Liquid Oxygen Storage Tank (13KL Capacity) at GMCH, Gondia-

Adani Foundation has supported district administration by providing 13KL liquid oxygen storage tank at Government Medical Collage Hospital (KTS), Gondia. It is serving the need of oxygen for COVID-19 patients. Capacity of the tank is 1000-1200 oxygen cylinder refilling per day. This timely support serving the need of oxygen of COVID-19 patients in Gondia District.

APML Employee Volunteers supported for installation of Oxygen Tank, in which Mechanical and Maintenance Department, Techno-commercial Dept., Electrical Dept, O&M Dept, CSR, Quality Control, and corporate Affairs Dept. are supported constantly.

**Provided 35 Seater Bus Service-** Through business CSR 35 seater bus service for COVID-19 patients in nearby villages.

**Provided technical support to run Oxygen Plant in MIDC Gondia-** In COVID-19 pandemic while demand of oxygen is on the rise and shortage of technically skilled manpower APML has provided technically skilled manpower for the private oxygen plant in MIDC Gondia. Therefore the plant is able to run 24*7 in full capacity.

**Adani Foundation Facilitates Oxygen Supply in Gondia and Bhandara District**.

After installation of 13 KL liquid oxygen storage tank at KTS Government Hospital Gondia, the Bhandara district administration also requested for 13KL Liquid Storage Tank for which AF readily agreed.

AF also handed over 50 Jumbo Oxygen cylinders each to District administration Gondia and Bhandara.

## Special Activity

### 1. Birthday Celebration- Respected Dr. Priti Adani Ma'am

Celebrated Our Beloved Chairperson Respected Dr. Priti G. Adani Ma'am birthday on 29th Aug,2021. On this occasion the 18 tribal students of Government Secondary & Higher Secondary Ashram School, Majitpur has created the role Play Biography video on respected Dr. Priti Adani Ma'am. Students successfully played the Ma'am biography with an efforts of school teachers, principle and students under the Adani Team guidance. The participated students and teachers efforts appreciated by respected Dr. Priti Ma'am. AF team facilitated the participated students & teachers with the guidance of respected Ms. Ratna Biswas Station Head Ma'am, Ms. Madhavi Shiralkar Ma'am.

### 2. Birthday Celebration- Respected Shri. Gautam Adani

Adani Foundation has celebrated Respected Shri. Gautam Adani birthday on 24th Jun, 2021, and gave our wishes by organizing tree plantation and food kit distribution activity.

Distributed 159 Ration Kit to Navegaon-Nagzira Tiger Reserves' (NNTR) tourist guides and Gypsy Drivers, as the Covid-19 situation affected the Tourism Business and livelihood of them. (Ration Kit contained 10kg Rice, 10kg-Wheat, 5kg-Tur Daal, 3 liter-Edible oil.) Tree plantation drive conducted at various Z.P. Schools with support of APML employee volunteers.

**3. Celebration- Adani Foundation Day :-** AF team celebrated 25th Foundation Day of Adani Foundation on 11th Aug,2021 along with APML- station, HODs, Adani Vidyalaya teachers. On this occasion the 10 years of service Award and certificate also facilitated to our 3- AF employees.

**4. World Environment Day Celebration-**

To spread awareness about ecosystem and resetting relations with nature Adani Foundation has celebrated World Environment Day-2021 on 5th June,2021 with the theme **"Ecosystem Restoration"**. To restored ecosystem AF planted about 100 trees at Z.P. School, Mohlli with the community participation.

**5. International Yoga Day Celebration**

Adani Foundation celebrated International Yoga Day on 21st June,2021 on the theme ***'Yoga for wellness'*** on Pre-Police Training Ground at Khairbodi with AF's Pre-Police training students as well as AF employees. Yoga trainer cum employee volunteer Mr. Abani Panigrahi has conducted the Yoga session, total 70 students were present and taken an oath of practicing Yoga regularly.

# I- Education

### 1. Navodaya Coaching Classes-

Navodaya Coaching Classes started to nurture talent from rural area and support talented students from deprived families to get into Navodaya School. AF has opened special coaching classes for these students in Government school. In COVID 19 Lockdown period, all schools and classes are closed, but to utilize students' time through effective way of learning, AF initiated take online Navodaya Coaching classes for enrolled students. Accordingly, the online classes have been started at Gumadhavda and Birsi centers for 2021-22 batch. This FY 2021 - 22 total 36 students enrolled at 2 centers Birsi- 26, Gumadhawada-10. Daily 2 hours of online classes are conducted on Google meet application, Students are actively learning through online classes. Additionally teacher has also started doing one to one interaction with students & solving students' queries by maintaining social distancing.

### 2. Pre- Training of Youths for Army and Police services-

Pre- Training of Youths for Army and Police services started with an objective to transform young candidates into academically proficient, physically fit, mentally strong individuals bursting with energy and confidence and ready to face any challenge in life. AF conducted total 3 months training association with police department. Three months Pre-police training has benefitting the youths to appear in the Police and army services examination. Looking at previous positive results of trained youths, aspiring village youths are requested AF to start the online classes in this COVID-19 lockdown period. Thus, as per the request of youth, AF started online pre-police training classes with the support of Police Department. Total 200 students are attending the online training classes through online platform, conducted daily 2 hours of Theory classes. The respective resource person teaching the exam syllabus online and conducts weekly online tests for the students.

**Scholarship Distribution Program-** Started form Application forms collection from 10th Pass out meritorious students.

## II- Community Health

### 1. Mobile Health Care Unit (MHCU)

Providing quality healthcare service at the doorstep of villages. Two MHCUs are operational – with partnership of Helpage India Organization. In COVID-19 pandemic situation 2 MHCUs are working for medical emergency which is transporting Corona Patients from villages to the treatment facilities- Hospital.

In COVID-19 pandemic situation, on the behalf of Sub-District Hospital-Tiroda, One MHCU van working as an Ambulance 24*7 to transport COVID patients and suspected patients from villages to the COVID treatment Centre and District Hospital.

**Covid-19 Vaccination drive for APML Employees-** Our MHCU team is working with Primary Health Centres (PHC) for COVID-19 vaccination work. The vaccination camp organised at PHCs of Kachewani, Ekodi, Sukadi, Indora, and Khairbodi.

The General category and Cardio vascular & life style disease patients were found more as compared to other diseases.

Started treatment of B.P., Hypertension patients at village level.

**General Medical Health Camps-** Organized 12 General Medical Health camps in 12 villages- Murdala, Boratola, Bibitola, Sukali, Mahalgaon,Gangazari,Malhi, Sawarra, Koilari, Bhagoli Gondmohadi & Kindgipar total 1473 beneficiaries (Male- 675, Female- 798) have attended the camp.

**Awareness on Health and Hygine-** Awareness campagain on health and hygine was conducted in 6 villages Bibitola, Sukali, Mahalgaon,Gangazari, Belati and Belati Kh, total 244 (M-109 & F-135) patients were present in the awareness programme.

**Regular OPD-** MHCU completed 717 visits in villages & consulted total 13343 patients (6393-Male and 6950 -Female).

**ECG Check-ups-** Completed total 44 patients ECG check-ups.

## III- Sustainable Livelihood Development

**1. Organic System Rice Intensification (SRI) –** This year, to demonstrate implementation of 100% SRI principles we have developed SRI demonstration plots aiming to get maximum yield (more than 30qtl. /acre). However, deployed FPC as a SRI implementing agency under the guidance & support of AF and Agriculture department. Selected 100 progressive farmers from villages. With the start of monsoon, SRI paddy farming process had started in full swing. Now SRI paddy are at the seed bearing stage and Harvesting will start in month of Nov-20.

- AF distributed 4 kg hybrid seeds of Bayer 6444 variety per farmers.
- Completed 120 farmers farmland soil testing and reporting given by Center for Agricultural Sciences, Gondia.
- Before the onset of monsoon all 100 selected SRI farmers have completed summer land preparation work and Farm Yard Manure (FYM) spreading.
- AF distributed Dhencha Green Manure Seeds, Arize 6444 paddy seeds and Trichoderma and Azospirilium bio-fertilizers for seed treatment to 100 farmers.
- By continuous monitoring farmers are maintaining water level after paddy transplantation.
- To control pesticides Spraying of Dashparni arc, Jivamrut & Aangiastra as per the need.
- Prepared 600 liters of Panchagavya and selling to other 90 farmers at Rs. 55/liter. 3liter/acre panchgavya required in each round of spraying, all farmers completed 2nd round of Panchagavya spraying.
- NEB- Solution Soracid green FZ liquid has been spread in 12 demo plots by 12 farmers.

### 2. Milk Collection and Chilling Centre (MC&CC)-

Adani Foundation is supporting Tiroda Farmers Producer Company (TFPCL) for dairy development. Anuradha dairy operating **three Milk Collection and Chilling Centres** at Jamuniya/Berdipar, Chikhali & Kawalewada and initially **16 milk collection centres** in other villages.

For sustainability of the dairy business and providing fair price for produced milk we have collaborated with **Amul in May 2021.** Farmers are getting average additional benefit of **Rs. 4 to 10/ ltr.**

Total milk collection is **264144 Ltr** and **Rs. 1,02,21,603/- turnover** of Anuradha dairy till Sep 2021.

### 3. Animal Husbandry related Initiatives –

The objective is to develop livelihood of the farmers through breed improvement program. Two livestock development centers (LDC) are established in Khairbodi and Kawalewada which covered 26 villages. The LDCs are providing the services like Artificial Insemination (AI), Sorted Semen Sex (SSS) AI, and Pregnancy Diagnose (PD) as well as cattle health checkup camps.

| Sr No | Activity | Apr-Sep 2021-22 | Cumulative 2017-21 |
|---|---|---|---|
| 1 | AI | 522 | 4826 |
| 2 | AI (Sorted Sex semen) | 562 | 1555 |
| 3 | PD | 379 | 3623 |
| 4 | PD (Sorted Sex semen) | 422 | 866 |
| 5 | Fodder seeds | 0 | 928 |
| 6 | Meeting | 0 | 26 |
| 7 | Training | 0 | 29 |
| 8 | Cattle Health Check-up Camps | 0 | 35 |
| 9 | Calving | 235 | 1608 |
| 10 | SSS Calving | 112 | 220 |

### Fodder Crop Plantation-

Completed the plantation of Hybrid Nepier crop by 33 farmers.

# 4. Income generation activities

**4.1 Lac Bangles Making –** Adani Foundation Supporting 45 SHG women for Lac Bangle Making. Women are making new designs of lac Kada and Bangles. Lac Bangle making Programme are ongoing through Buy back. We have completed the registration process of "Aadhirakshi" brand of women farmer Producer Company on amazon.in, and selling is ongoing. Women are making it on demand by women from nearby villages. New designed 'Veni Bangles, Stone and Multicolor Bangles are making on demand by women from nearby villages.

**4.2 Agarbatti Production-** The objectives of program was Capacity building and economic development of women self-help groups. 20 Agarbatti Machines have been distributed in 6 villages (Garada, Ramatola, Tikaramtola, Mendipur, Gumadhawada, & Tiroda). AF also gave training on operation of machines. As a result total 60 women are making Agarbatti very skillfully. In COVID-19 lockdown period the Agarbatti Production has been increasing, beneficiaries are spending more time on producing Agarbatti and earning income from home only. In six months 31143 Kg total Agarbatti Produced and sold in a rate of Rs. Rs. 16,46,126/-

**4.3 Mushroom Cultivation: -**

- **Won Plan India Impact Award-** Adani Foundation supported and Nominated oyster mushroom cultivator SHG- Kalyani Women Self Help Group, Berdipar Village Has won 2nd Position in **"Plan India Impact Award-2021 under SHG category"**

Oyster Mushroom spawn making process has been started at Mushroom Spawn Unit & started to supply spawn in nearby villages SHG's and other beneficiaries. Oyster Mushroom spawn making process has been started at Mushroom Spawn Unit & started to supply spawn in nearby villages SHG's and other beneficiaries. The beneficiaries have started the Mushroom bed making process with the start of winter. This year Mushroom cultivation is on expansion, with the collaboration of Mahila Aarthik Vikas Mahamandal (MAVIM), AF is giving Mushroom Cultivation training to women at Tiroda block. AF facilitated detail training on theoretical concept and practical demonstration of Oyster Mushroom Cultivation.

- With the collaboration of Mahila Aarthik Vikas Mahamandal (MAVIM), AF Completed Mushroom practical demonstration in 9 villages
- With the start of winter Mushroom beds cultivation started in villages, cultivated 234 beds by new & old women SHG members in 20 villages of Tiroda block.

- **4.4 Vegetable Cart –**
- Enhancement in livelihood of women SHG members.
- Promotion of organic food for better health.
- To ensure availability of fresh organic vegetable for local community.
- 3 women are handling the Cart and keeping fresh seasonal vegetables & fruits from of the village Kitchen gardens.
- The Vegetable cart is getting tremendous response from the Township Residences.
- Though selling daily women are earning profit of Rs.400-500 /day
-

# Media Coverage

TheHitavada

Nagpur City Line | 2021-05-20 | Page 7

## Adani Foundation facilitates oxygen supply in Bhandara and Gondia districts

MP Praful Patel and Collector Deepak Kumar Meena with the jumbo oxygen cylinders refilled by Adani Foundation.

■ Our Correspondent

नवभारत

## मशरूम उत्पादन का दिया प्रशिक्षण

## पुलिस विभाग एवं अदानी फाउंडेशन दे रहा पुलिस एवं सेना भर्ती के लिये युवतियों युवक युवतियों को नि:शुल्क प्रशिक्षण..

नवभारत

## अदानी फाउंडेशन ने दी जिप शाला को सदिच्छा भेंट

## नवेगाव नागझिरा टाईगर प्रोजेक्ट के 159 गाईड और जिप्सी चालकों को राशन किट का वितरण..

लोकमत

# युवक-युवतींनी अधिकारी होण्याचे ध्येय निश्चित करावे

# दुग्ध संकलन केंद्राचे उद्घाटन

The Hitavada

# Adani Foundation's pre-recruitment training helping youths in Gondia

**Anneuxre - VIII**

## ASDC Tiroda Training and Placement Details

| S. N. | FY Year | Trade | Candidates Training | | | | | | | | Drop Out Candidates | Total Trained | Total Placement |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ST | SC | Minority | OBC | Gen | Male | Female | Total | | | |
| 1 | 2017-18 | Welding Technician | 125 | 0 | 0 | 0 | 0 | 125 | 0 | 125 | 2 | 123 | 117 |
| 2 | 2017-18 | Assistant Electrician | 116 | 0 | 0 | 0 | 0 | 116 | 0 | 116 | 5 | 111 | 95 |
| 3 | 2018-19 | Welding Technician | 30 | 18 | 2 | 0 | 0 | 50 | 0 | 50 | 5 | 45 | 45 |
| 4 | 2018-19 | Assistant Electrician | 11 | 14 | 5 | 0 | 0 | 30 | 0 | 30 | 2 | 28 | 26 |
| 5 | 2019-20 | Welding Technician | 45 | 25 | 0 | 59 | 4 | 133 | 0 | 133 | 11 | 122 | 112 |
| 6 | 2019-20 | Assistant Electrician | 30 | 28 | 0 | 65 | 9 | 132 | 0 | 132 | 10 | 122 | 114 |
| 7 | 2019-20 | General Duty Assistant | 36 | 27 | 0 | 27 | 15 | 0 | 105 | 105 | 2 | 103 | 88 |
| 8 | 2020-21 | Welding Technician | 11 | 13 | 0 | 42 | 0 | 66 | 0 | 66 | 0 | 66 | 63 |
| 9 | 2020-21 | Assistant Electrician | 13 | 21 | 0 | 75 | 5 | 114 | 0 | 114 | 0 | 114 | 105 |
| 10 | 2020-21 | Domestic Data Entry Op. | 1 | 1 | 0 | 20 | 0 | 16 | 6 | 22 | 0 | 22 | 22 |
| 11 | 2021-22 | Assistant Electrician | 2 | 1 | 0 | 30 | 1 | 34 | 0 | 34 | 0 | 34 | 32 |
| 12 | 2021-22 | Welding Technician | 1 | 2 | 0 | 3 | 0 | 6 | 0 | 6 | 0 | 6 | 6 |
| 13 | 2021-22 | Domestic Data Entry Op. | 2 | 2 | 0 | 11 | 0 | 3 | 12 | 15 | 0 | 15 | 12 |
| 14 | 2021-22 | Fitter: Mechanical Asse. | 2 | 2 | 0 | 12 | 4 | 20 | 0 | 20 | 0 | 20 | 20 |
| **Total** | | | **425** | **154** | **7** | **344** | **38** | **845** | **123** | **968** | **37** | **931** | **857** |

**Digital Literacy Out-reach Training Program Total 256 Trained FY 2018-19**

**Digital Literacy Out-reach Training Program Total 1334 Trained FY 2019-20**

**Digital Literacy and other course Online Training Program Total 573 Trained FY 2020-21**

**Digital Literacy and other course Online Training Program Total 108 Trained FY 2021-22**

**Digital Literacy and other course Training Program Total 2271 Trained Till Date**

Annexure - IX

# BIODIVERSITY CONSERVATION AT APML TIRODA

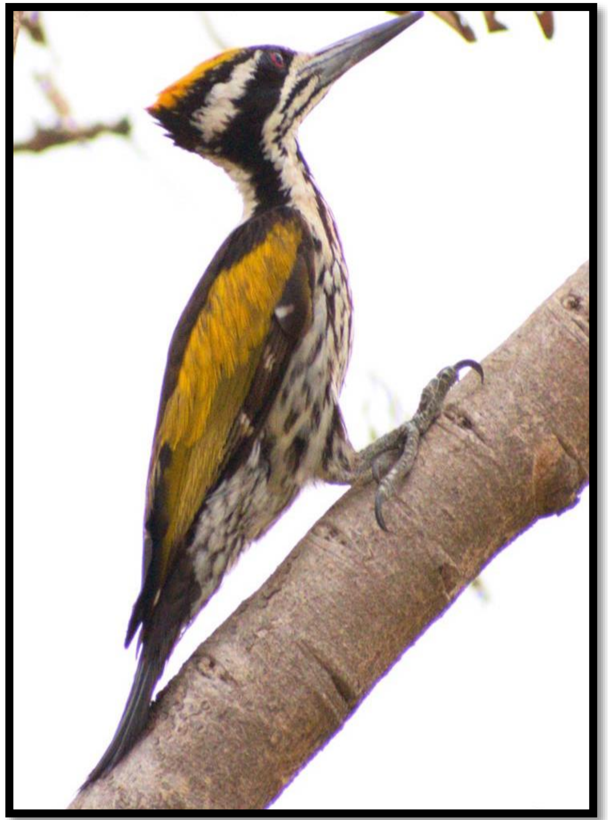
# BIODIVERSITY GLIMPS

Indian Paradise
(Flycatcher)

Red Dwarf Honeybee

Squirting Caterpillar

# BIODIVERSITY GLIMPS



White – naped woodpecker

Ferruginous Hawk

Black – naped oriole

# BIODIVERSITY GLIMPS

Painted francolin

Eurasian Golden Oriole

Giant African Snail

# BIODIVERSITY GLIMPS

White throated kingfisher

Black Giant Squirrel

# ASH UTILIZATION EFFORTS TO ACHEICE 100 % ASH UTILIZATION

- We have made long agreements with various cement manufacturers such as Ultratech Cement, ACC Cement, Ambuja Cement, Dalamia Cement, Birla Corporation and Shree Cement and providing ash as per their requirement.
- Agreement has been done with Birla Corporation limited for lifting of fly ash to BTAP Wagon.
- Jumbo Bag loading successfully done, through BOST Wagon. (2 Jumbo Bag Racks has been dispatched for cement manufacturing).
- We are providing fly ash to fly ash brick manufacturers (more than 150 nos.) and also in construction activities.
- We are also supplying Bottom Ash more than 145 nos. red brick manufactures for "Use of Bottom Ash in production of Red Brick"
- Bottom ash has been provided to in fly ash bricks manufactures for replacement of sand.
- We are providing ash to road & embankment projects. Presently, we have made agreement and supplying ash to various Road Project like Barbik Road Project, Atcon Raod Project, JMC Road Project Limited and HG Infra. Providing Ash to ROB – Tumsar, Maharashtra
- We have also successfully demonstrated use of Ash in Agriculture with engagement of AMPRI – Bhopal (CSIR – GOI). We are provide ash to nearby progressive farmers
- We have also conducted feasibility study from CFRI – Dhanbad for Ash Stowing of Underground Mines of MOIL. We are providing Bottom Ash to MOIL, Balaghat for mine stowing.
- CSIR – NEERI, Nagpur engaged for carry out hydrogeological & fly ash leachability study around the ash dyke area and Land Reclamation sites.

## Way Forward for maximize Ash Utilization

- We have engaged Tropical Forest Research Institute (TFRI) – Jabalpur for "Implementable Forestry Research for Ash Utilization promotion and development of Research Park" at APML.
- Planning for disposal of ash in WCL coal mines.
- We are in discussion with VNIT – Nagpur to explore feasibility to extract M-Sand from Ash.
- Discussion with CSIR – AMPRI Bhopal for Fly ash based Geo polymer Concrete road for bulk utilization of ash.
- Production of fly ash based concrete blocks under the guidance of M/s. MASA, Germany in under discussion.
- Discussion with M/s. Builtech, India for Fly ash based Aerated autoclaved concrete block.
- M/s CeEntek, Singapore also interested to set up plant for Fly ash based Ultra high performance concrete at APML, Tiroda.

***Interim Report-II***

# *Providing services for carrying out review of hydrogeological conditions for 5x660 MW thermal power plant, Tiroda, Dist-Gondia, Maharashtra*

## (Hydrogeology Component)

**Submitted to**
**M/s. Adani Power Maharashtra Limited (APML), Tiroda,**
**Gondia District (Maharashtra)**

**CSIR-National Environmental Engineering Research Institute**
**Under Council of Scientific & Industrial Research**
**Nehru Marg, Nagpur – 440 020**

ISO 9001:2008

**November 2021**

# *Chapter 1*

# *Introduction*

## 1.1 Preamble

Adani Power Maharashtra Limited (APML) is operating 3300 MW (5 X 660 MW) coal based thermal power plant at Tiroda, Dist – Gondia, Maharashtra. The 1st unit of the plant was operational in September 2012. The other units were added subsequently in 2013 and 2014. The plant is having ash lagoons (3 nos) having Low-density polyethylene (LDPE) liners for disposal. The ash dyke area is spread over approximately 156 hectares. The total ash generation during 2017-19 is about 1,27,10,910 metric ton, in that, the fly ash is about 1,01,68,727 metric ton and bottom ash is about 25,42,181 metric ton (Table-1.1).

**Table 1.1: Ash Generation (MT-Metric Ton )**

| Year | Fly Ash | Bottom Ash | Total Ash |
|---|---|---|---|
| 2017-18 | 28,25,523 | 7,06,380 | 35,31,904 |
| 2018-19 | 34,91,049 | 8,72,762 | 43,63,812 |
| 2019-20 | 38,52,155 | 9,63,039 | 48,15,194 |
| Total | 1,01,68,727 | 25,42,181 | 1,27,10,910 |

(**Source:** APML)

As far as the reuse of fly ash is concerned (Table-1.2), part of the generated ash is sent for brick making in the plant itself and is also sent to other place for making of bricks. In addition, fly ash is being used for land reclamation in the villages surrounding the APML plant. The activities including the land reclamation of low-lying areas by ash backfilling, road & bridge construction, rising of ash dyke bunds and cement manufacturing being carried out in the buffer zone of the plant area. In general 80 to 90% of generated ash being utilized for various mentioned activities (Table-1.3).The back filling at the low-lying areas is being pursued to comply with the fly ash notification, 2009 (As Amended in 2016) of the MoEF& CC of the Government of India.

**Table 1.2: Ash Utilization (MT-Metric Ton)**

| Year | Bricks & ash-based products | Land filling purpose | Other purpose |
|---|---|---|---|
| 2017-18 | 55,435 | 2,71,090 | 25,33,183 |
| 2018-19 | 57,725 | 5,33,112 | 30,94,301 |
| 2019-20 | 76,614 | 20,36,334 | 22,62,547 |

(**Source:** APML)

**Table 1.3: Total ash Utilization per year (MT-Metric Ton)**

| Year | Total ash utilization | Ash utilization percentage |
|---|---|---|
| 2017-18 | 28,59,707 | 81.00 |
| 2018-19 | 36,85,139 | 84.40 |
| 2019-20 | 43,75,495 | 90.87 |

(**Source:** APML)

**CSIR-NEERI** was assigned the task of assessing the impact of ash fill sites of Adani Power Maharashtra Limited (APML) on the water resources in the surrounding area of Tiroda village. The study was completed in 2019. Subsequently, M/S Adani desired CSIR-NEERI to provide services for review of the hydrogeological study vide Service order No.5700267218. Previously, the Hydrogeological study was carried out in 2011 by APML while seeking EC from the MoEF.

***The present hydrogeological study seeks to study the groundwater scenario with respect to the pre-project scenario.*** The review will be done with reference to the overall groundwater level in the buffer area, the yield of the wells and the Groundwater Stage Development. A network of observation wells was set up in the study area for this purpose. The present review activity was initiated in April 2019 for three complete hydrological cycles. Initially four seasons data was corrected so far i.e. Pre'2019 and Post'2019,Post'2020 and Pre'2021. The data could not be collected in pre-monsoon'2020 period due to the existing Corona Pandemic situation.

## 1.2 Scope of work

- The study will cover the 35 km buffer zone as well as the core zone surrounding the ash ponds of APML plant. The study will cover the pre-monsoon as well as post-monsoon season in three complete hydrological cycles and compare year-wise hydrogeological trend with base line data.
- Monitoring of ground water levels and deciphering its flow direction and quantity.
- Physiochemical analysis of groundwater quality as per BIS 10500:2012 in pre and post monsoon seasons.

- Heavy Metal analysis (As, B, Cd, Cr, Cu, Fe, Pb, Mn, Ni, Se, Zn, Hg, Co, Mo) for ground water samples collected around the study area.
- Identify & select key observation wells and monitor the concentration of trace elements like Pb, Hg and As during the study period.
- Groundwater stage development estimation as per the norms of GEC-2O15 in the proposed project area.
- Formulate the conceptual model to understand the hydrological setting.
- Submit the recommendation along with groundwater management plan based on the findings of the report.
- Submit the progress report after completion of individual hydrological cycle (post monsoon each year).

## 1.3 Approach of the study

A kick off meeting was arranged at the APML on 12th June, 2019 wherein presentation of the project was made before the senior management of the APML. Subsequently, discussions were held in the Environmental section wherein planning for the field activities were discussed. A reconnaissance visit took place wherein the ash disposal at the low-lying areas in the 35 km buffer was covered.

The observation well network and low-lying areas for back filling by ash were identified during the reconnaissance visit and followed by the pre-monsoon sampling.

## 1.4 Report layout

Chapter 2 presents the study area details

Chapter 3 presents the methodology of data collection

Chapter 4 presents the water quality data and groundwater level data generated and analysed on the basis of sampling carried out during 2019, 2020 and 2021.

Chapter 5 presents the findings of the study carried out during pre and post monsoon period of 2019, post monsoon period of 2020 and pre monsoon period of 2021 and future activities planned for the period 2021-22.

# *Chapter 2*

# *Study Area*

## 2.1 Location

The Adani Power Maharashtra Limited (APML) lies in the study area between latitudes 21° 05' 34" N to 21° 43' 57" N and longitudes 79° 37' 36" E and 80° 18' 51" E. The plant is covered by the survey of India toposheet No 55 O/15 (scale: 1:50,000). The 35 km buffer zone around the plant is covered by Survey of India Toposheet (55 O/10, 55 O/11, 55 O/12, 55 O/14, 55 O/15, 55 O/16, 64 C/2, 64 C/3, 64 C/4, 64 C/6, 64 C/7, on 1:50,000 scale. (Source: http://soinakshe.uk.gov.in/). The study area is located in Tiroda village in Gondia District of Maharashtra.

## 2.2 Climate

The study area experiences tropical monsoon climate with mild winter and hot summer. Rainfall in this region usually starts with the onset of monsoon by the middle of June. The southwest monsoon arrives over the district around the second week of week of June. The rainfall increases from west to east of Tiroda Tehsil. The annual average rainfall in Tiroda is about 1322 mm is observed (Table 2.1).

**Table 2.1: The rainfall (mm) distribution in the study area (2012-19)**

| Year | Jan | Feb | Mar | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec | Total rainfall (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| .32012 | 3.5 | 7 | 0 | 8.5 | 1.5 | 101 | 389.3 | 342.4 | 192.5 | 1 | 25.5 | 0 | 1072.2 |
| 2013 | 7 | 27 | 6.5 | 51 | 0 | 284 | 737.8 | 508.7 | 71 | 94 | 0 | 0 | 1787 |
| 2014 | 0 | 61.5 | 26.5 | 52.5 | 27 | 88 | 699.4 | 193.2 | 129 | 45.8 | 0 | 0.2 | 1323.1 |
| 2015 | 2 | 17.5 | 170.5 | 26.5 | 10 | 300.5 | 255.5 | 407.6 | 208.8 | 0 | 0 | 0 | 1398.9 |
| 2016 | 0 | 10 | 25.5 | 10.5 | 37.5 | 96.0 | 454.5 | 410.0 | 162.0 | 29.0 | 0 | 0 | 1235 |
| 2017 | 0 | 0.0 | 9.5 | 0.0 | 28.5 | 143.5 | 259.0 | 333 | 85.5 | 28 | 0 | 0 | 887 |
| 2018 | 0.0 | 18.8 | 0.0 | 18.5 | 7.5 | 146.2 | 615 | 370.4 | 111.5 | 0 | 0 | 1.5 | 1289 |
| 2019 | 11.5 | 0 | 24.5 | 0 | 0 | 203.5 | 290.9 | 551.6 | 417.9 | 52.2 | 0 | 26.4 | 1579 |

(**Source:** Adani Power Maharashtra Limited)

The average monthly maximum temperature recorded is 42.1°C in the month of May while the lowest average monthly temperature recorded is 13.1°C in the month of December. The study area has the hottest month during May when daily maximum temperature rises above 42.5°C and the heat is intense. December is the coldest month. During cold waves which affect the district in association with the passage of western disturbances across north India, the minimum temperature at times goes down to 7°C.

Except during the monsoon season when humidity is high, the air is generally dry during the year. The summer season is the driest part of the year when relative humidity goes down to 20% or less in the afternoon.

## 2.3 Topography

The study area is located in the extreme north-eastern district (Gondia) of Maharashtra. The land in this part is partly undulating at higher elevation (more than 300 m on land away from river) while it becomes more or less flat near the river. The proposed site lies on the Wainganga plains. The general elevation of the study area ranges from 301.11 m to 338.4 m. The area has rocky outcrops of granites and gneisses.

## 2.4 Geology

Geologically the area essentially belongs to the Archeans sediments preserved in the synclinal depressions of the landscape and is highly metamorphosed. The proposed plant site area is basically marked by the rock formations from the oldest granite and gneiss of pre-cambrian to recent alluvium. The gneisses comprise of biotite, hornblende gneiss and magnetite. The Biotite gneiss is composite in character and forms the basement for younger metamorphoses sedimentary rocks. Two types of series of rocks viz. Sausar series and Sakoli formations are found in the region.

In Tirora region, especially the study area belongs to the Sausar series. LithologicallySausar series consist of talc granulites, mica and hornblende schist, gneiss rocks of the Sausar group contain and biotite but not chlorite. Manganese deposits are associated with rocks of this group. The rocks comprise of low grade metamorphoses such as phyllites, chlorites, muscovite and hornblende schist, quartzite, kyanite and sillimanite rocks. These are intruded by basic rocks and quartz veins. Along the bank of the river Wainganga alluvial cover varying from a few meters to 15 m thick has been observed.

Geologically, the study area is mainly covered by Granite Gneiss/ Migmatite,Meta Basalt, Granite Gneiss Migmatite (Figure–2.1). In addition, the rock types namely Biotite schist, Muscovite Schist, Tonalite-Trondhjemite-Granite/ Granodiorite, Granite, Laterite, Meta Gabbro, Meta Arkose, KyaniteSillimanite Cordierite Schist, BIF, Meta Rhyolite/ Tuff, Quartz Mica Schist, Schist, Calc Gneiss, Calc Silicate rock, Phyllite, Basalt, Foliated Granite, Amphibolite, Ultramafic rock, Chert, Quartz vein, Quartzite, Tourmaline, Meta Ultramafic, Quartz Vein, Andalusite Mica Schist, Marble, Mica Schist are existed in minor quantity.

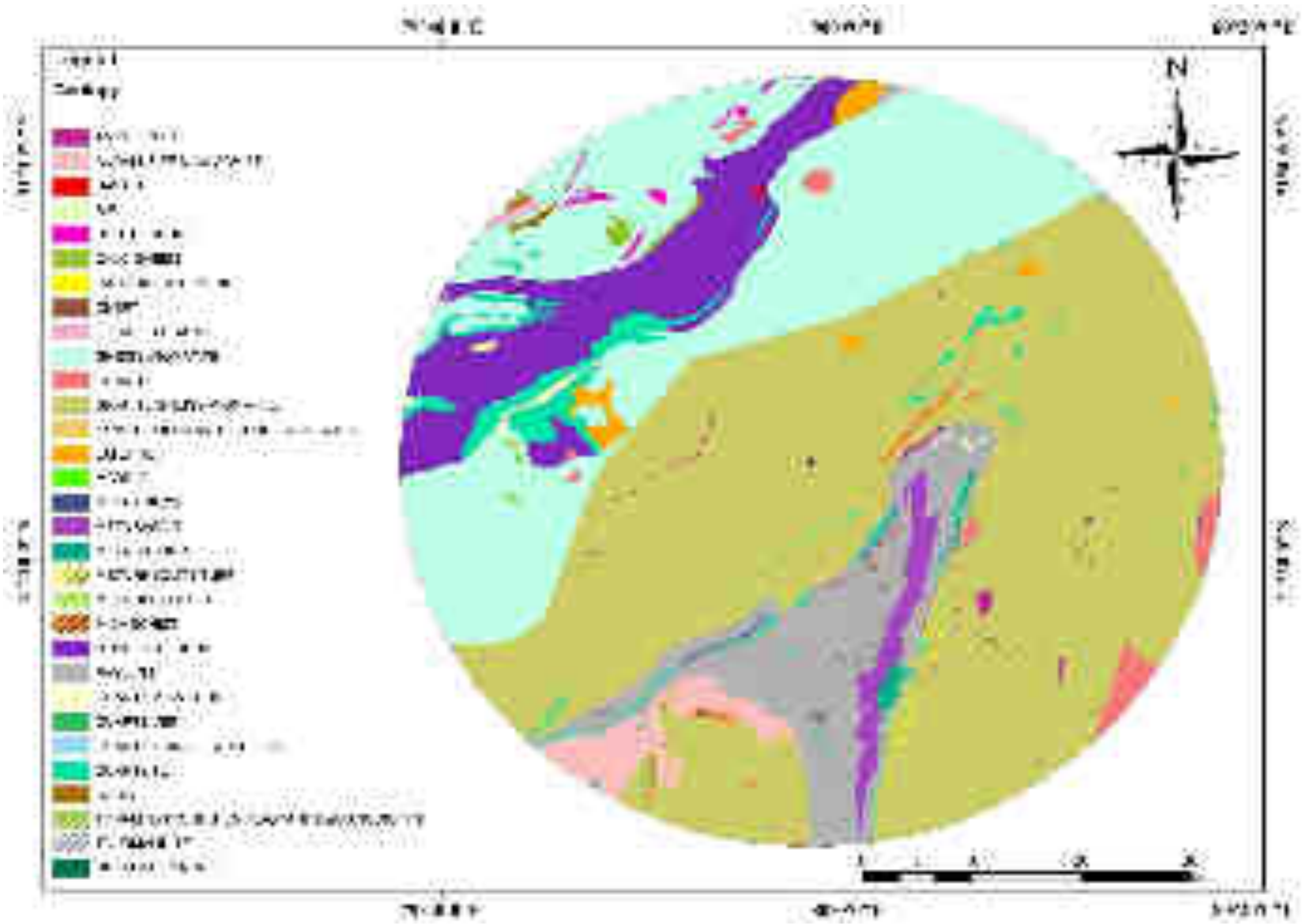


**Figure 2.1:Geology map of the study area**

(**Source:**https://bhukosh.gsi.gov.in/Bhukosh/Public)

## 2.5 Hydrogeology

The study area, covering Tirora and Gondiatalukas of Gondia district, is occupied by the crystalline rocks of Pre-Cambrian formations i.e., Granite Gneisses and Dharwars (Sausar and Sakoli group). The Pre-Cambrian crystalline rocks are the major water bearing formations in the study area. The weathered portions of crystalline rocks together with joints and fracture zones act as good aquifers (CGWB, 2013). Ground water occurs under water table conditions in the weathered mantle and then the fractured, well-jointed and sheared zones. Dug wells, dug cum bore wells and bore wells are the common ground water abstraction structures in the study area. Ground water occurs under water table conditions and semi-confined conditions in these formations. Water table conditions prevail in the weathered mantle and the fractures, jointed and sheared zones (CGWB, 2013).

# *Chapter 3*

# *Methodology of data collection*

## 3.1 General

The study envisages the following tasks

- Setting up observation well network
- Hydrochemistry of the observation well network
- Groundwater level monitoring

Accordingly, primary data has been generated by undertaking extensive field survey in the month of December 2020 (post-monsoon season) and June 2021 (pre monsoon season). Due to existing corona pandemic situations, it was not possible to collect the pre-monsoon 2020 field data. Secondary data has been collected through interaction with Adani Power Maharashtra Limited (APML) officials and the local villagers in and around the study area.

## 3.2. Groundwater Sampling

The study area has been delineated on the basis of 35 km buffer zone (Figure 3.1) with the consideration of APML is core zone of the area which covers is about 3,846.5 sq. km. A network of observation wells (Table-3.1) was established in the study area during Post monsoon 2020 with including of new monitoring wells as per APML request and the co-ordinates (latitude/longitude) were noted with the help of hand-held GPS of Garmin make.

For physico-chemical parameters and heavy metal analysis, the samples were collected in pre-cleaned 500 ml and 100 ml polyethylene bottles respectively. Concentrated $HNO_3$ was added to the heavy metal samples for preservation. Parameters namely, pH and temperature were measured in the field itself. The physico-chemical parameters were analyzed by following the standard protocols (APHA, 2012). The heavy metal analysis was done by using ICP-OES (Model iCAP 6300 DUO, Make: Thermo Scientific). The detection limit for Fe, Mn, Zn, Pb, Cd, Cr and Cu are 0.0003 mg/L, 0.018 mg/L, 0.0002 mg/L, 0.05 mg/L, 0.009 mg/L, 0.0006 mg/L and 0.0004 mg/L respectively. The parameters namely Na and K were analyzed by Flame Photometer (Model- CL361).

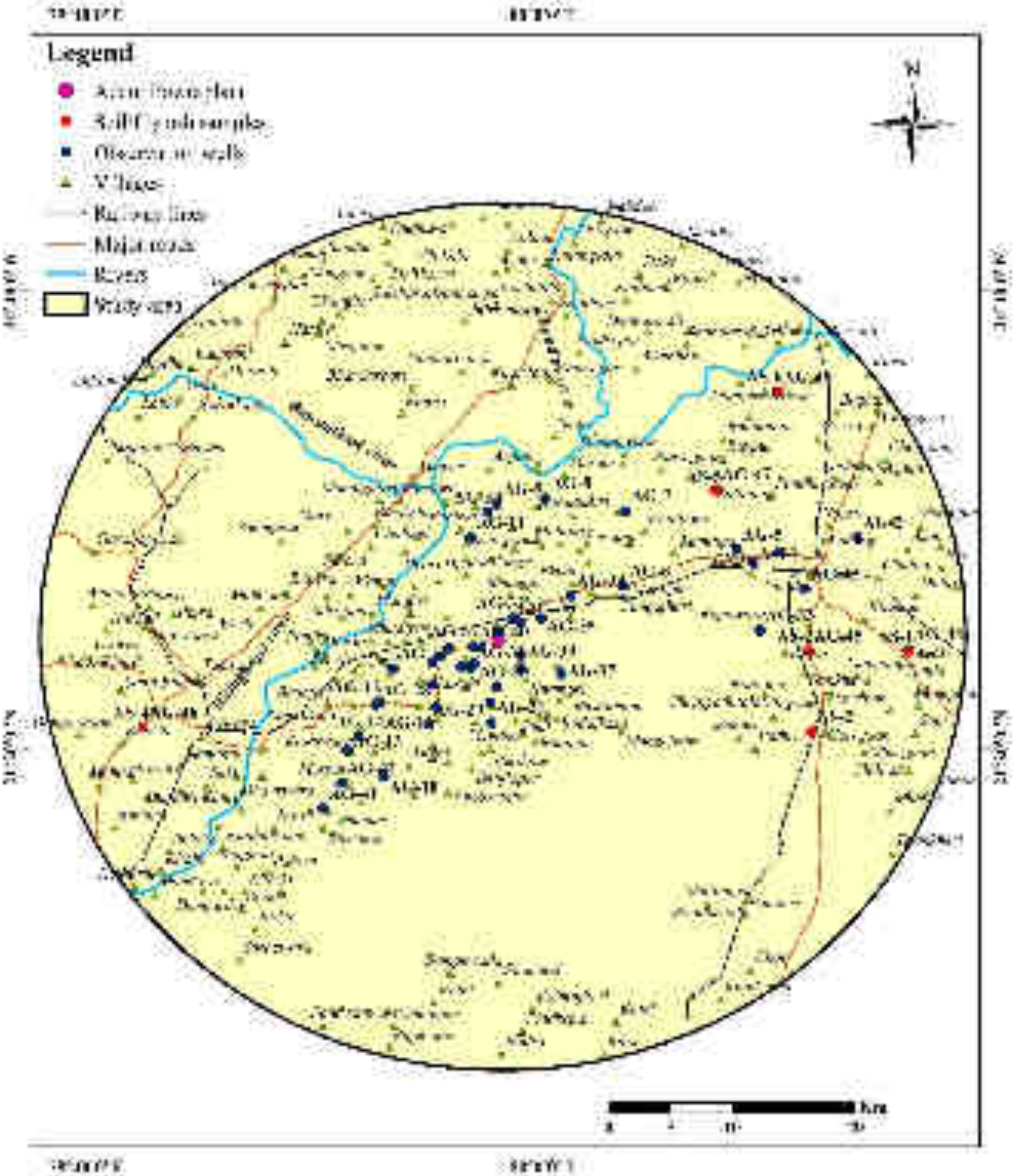


Figure 3.1: Base map of the study area

## Table 3.1: Observation well network for groundwater monitoring in the study area

| Sr. No | Code | Source | Latitude | Longitude | Location Description |
|---|---|---|---|---|---|
| 1 | AS-1 | BW | N21°29'12.5" | E80°13'42.4" | **Amboora**– On road, new dumping site, RHS of Gondiya to Barbaspur road |
| 2 | AG-2 | DW | N21°29' 13.6" | E80°13'42.3" | **Amboora** – On road, new dumping site, LHS of Gondiya to Barbaspur road |
| 3 | AG-3 | BW | N 21°28'35.6" | E80°10'18.2" | **GondiyaKudava** – On Gondiya to Bagartula road, LHS, besides flyash dumping site, Mr.Bansodbhai Patel farm house |
| 4 | AG-4 | BW | N 21°28'06.7" | E80°09'09.2" | **Dagni** – On road, RHS, opposite fly ash dumping site, Mr. Ramesh BharatlalBisen Ag. farm |
| 5 | AG-5 | BW | N 21°28'42.5" | E80°08'25.8" | **Modipar** – Opposite to fly ash dumping site, at Paramatma bricks manufacturing company (Mr.JayendraPatle) |
| 6 | AG-6 | HP | N21°27'06.7" | E80°03'30.3" | **Majitpur** – At Govt. Middle & Higher Ashram School, fly ash landfill activity completed during 2017 in the Ashram premises. |
| 7 | AG-7 | HP | N 21°30'22.7" | E80°03'34.5" | **Dawanwada** – Opposite to Primary Health Centre (PHC), close to ash filling site, in front of police station |
| 8 | AG-8 | DW | N 21°30'56.1" | E80°00'3.8" | **Gondmahadi** – At Late LaxmanraoMankarAdiwasi Ashram School (Govt. aided Trust School) |
| 9 | AG-9 | HP | N 21°30'41.5" | E79°57'56.2" | **Paraswada** – Opposite to land filling site, at ZillaParishat High School premises, RHS, on road, was filling activity during 2017. |
| 10 | AG-10 | DW | N 21°30'20.4" | E79°57'30.8" | **Bhagoli** – on road, LHS, Tiroda – Indora road, Opposite to ZillaParishat Primary School, near to ash filling site, (during 2017 – 2019). |
| 11 | AG-11 | DW | N 21°29'13.7" | E79°56'48.6" | **Indora:Tiroda (Buzru)** – On road, behind the primary school (In between Panchayat – school). |
| 12 | AG-12 | DW | N 21°22'1.3" | E79°52'49.1" | **Sarandi** – LHS on Birsi to Mundikota road, at ash fill site, agricultural land, April 2019, Mr.NitinAgasey land |
| 13 | AG-13 | DW | N 21°19'54.7" | E79°51'25.05" | **Keslawada** – Mr.RamachandKukude residence, opposite to ash fill site |
| 14 | AG-14 | HP | N 21°20'31.3" | E79°51'54.3" | **Baiywada** – On road, LHS towards Keslawada road, besides panchayatbhawan, at the residence of Mr.PandurangYaswantaraoBawankar. |
| 15 | AG-15 | DW | N 21°18'46.1" | E79°52'59.9" | **Silli** – at Mr.KiranPatle site, Ag. land |

| | | | | | |
|---|---|---|---|---|---|
| 16 | AG-16 | HP | N 21°21'48.4" | E79°55'17.2" | **Birsi**– LHS on Birsi to Adani road, end of the village |
| 17 | AG-17 | DW | N 21°23'16" | E80°00'46.1" | **Indora** – situated near to ash fill site of Mr.KantilalPremlalBaghele poultry farm, agricultural fields |
| 18 | AG-18 | HP | N 21°23'29.8" | E79°58'59.4" | **Biwapur**– on Tiroda to Indora road, LHS, corner point, besides village bus stop |
| 19 | AG-19 | BW | N 21°22'42" | E79°57'54.8" | **Chikli** – Tiroda-Chilki, on Chikle to Tanegaon / Minda road, RHS, at Mr.AnandraoMudkkuPatle poultry farm |
| 20 | AG-20 | HP | N 21°21'59.2" | E79°57'39" | **Tanegaon** – centre of the village, besides bus stop and opposite to temple as well as junior science college |
| 21 | AG-21 | DW | N 21°21'6.9" | E79°57'41.5" | **Menda** – at Govt. Ashram School premesis, on road, RHS towards Birsi, 2017 ash filling site |
| 22 | AG-22 | DW | N 21°22'46.5" | E79°55'9.9" | **Birsi** – at Birsi to Adani road, at Mr.SantoshRaghavathe agricultural fields |
| 23 | AG-23 | HP | N 21°24'0.6" | E79°55'27.8" | **Tiroda** – at Sukudinaka, LHS on road, corner point besides welding and automobile shop |
| 24 | AG-24 | DW | N 21°23'34.4" | E79°56'22.3" | **Churdi** – at Mr.MohangyanChandani agricultural fields, ash filled during 2016-17. |
| 25 | AG-25 | HP | N 21°24'22.8" | E79°55'50.2" | **Tiroda** – opposite to Sahid Mishra School, at Sahid Mishra Square, Gandhi statue |
| 26 | AG-26 | BW | N 21°23'44.9" | E79°55'7.7" | **Lodhitola –** at Meritorious public school, near Tiroda |
| 27 | AG-27 | HP | N 21°23'30" | E79°53'25.5" | **Dhadri** – near panchayat office, MaaDurga temple, RHS, Dhadri to Umri road |
| 28 | AG-28 | HP | N21°21'53.4" | E79°52'38.8" | **Sarandi**- on main road, RHS, in bus stop premises, corner point at behind the bus shelter |
| 29 | AG-29 | HP | N 21°21'2.5" | E79°54'57.5" | **Bhupeswar** – in front of anganwadicentre, near village overhead water tank |
| 30 | AG-30 | DW | N 21°23'44.2" | E79°56'56.3" | **Khasighat (Tiroda)** – at temple premises, on Tiroda-Churdi-Chikle road |
| 31 | AG-31 | DW | N 21°23'32.1" | E79°56'49.6" | **Garada** – entrance of the village, privte well at the residence of Mr.DevrajPardii |
| 32 | AG-32 | HP | N 21°25'41.4" | E79°58'36.8" | **Kachhvani -** Adani to Gonida road, near railway crossing, LHS, on road |
| 33 | AG-33 | HP | N 21°25'10.2" | E80°09'27.2" | **Rapewada** – centre of the village, opposite to village library (AdarshSarvajanikVachanalay) |

| | | | | | |
|---|---|---|---|---|---|
| 34 | AG-34 | HP | N21°26'40.4" | E80°01'10.8" | **Ekodi** – at bus stop, near MaaDurga temple and primary health centre (PHC) |
| 35 | AG-35 | HP | N 21°25'40.4" | E79°59'53.2" | **Barbaspura** – near gram panchayat office |
| 36 | AG-36 | BW | N21º25'31.7" | E79º58'57.6" | **APML** – at plant premises near fly ash bricks plant |
| 37 | AG-37 | BW | N21°24'26.4" | E79°57'16.7" | **APML**– at China colony premises, behind the Shanti Niketan guest house |
| 38 | AG-38 | HP | N 21°25'8.4" | E 79°58'1.8" | **Gumadhavada** – Opposite to Adani plant in between gate no.2 nd gate no.3, before entrance of the village, LHS on road, opposite to village bus stop |
| 39 | AG-39 | HP | N 21°24'4.9" | E 79°59'0.8" | **Mehendipur**– entrance of the village, on road, besides anganwadi office |
| 40 | AG-40 | DW | N 21°24'26.1" | E 79°56'55.9" | **Khairabodi**– on Tiroda to Adani main road, LHS, before plant area |
| 41 | AG-41 | DW | N 21°17'23.1" | E 79°50'21" | **Sonkheri**–towards Murpur, LHS, besides nala / puliya on road. |
| 42 | AG-42 | HP | N 21°18'29" | E 79°51'09" | **Murpar** – back side panchayat building, infrontofMr.MarkanKukude residence |
| 43 | AG-43 | BW | N 21°26'58.1" | E 80°11'26.7" | **Gondiya** – at Ag. Market yard, SabjiMandi, RHS, entrance of the main gate |
| 44 | AG-44 | HP | N 21°24'19" | E 80°15'55.9" | **Adasi**:- Besides dumping site on road, LHS in front of vijaysitugautam residence |
| 45 | AG-45 | BW | N 21°24'15.7" | E 80°11'34.3" | **Dawwa:-** Opposite to Ash back filling site on main highway on road at Jay Bambeswari, Dharam kata |
| 46 | AG-46 | BW | N 21°20'54.7" | E 79°42'28.8" | **Khapa**:- New Ash filling site, Mr.Sakure (Bhandar) beside new site(Khapa village Panchaya) |
| 47 | AG-47 | DW | N 21°31'19" | E 80°07'33.1" | **Raipur Mines**:-Mr.Prabhakar S. Rangdale, Ag. fields besides Ash fill site well. Govt. well |
| 48 | AG-48 | BW | N 21°35'35.6" | E 80°10'12.7" | **Tedva**:- Agriculture bore well, besides rice mill at Rreclamation site. |
| 49 | AG-49 | BW | N 21º 35' 35.6" | E 80º 14' 47.9" | Near ash filling site |
| 50 | AG-50 | BW | N 21º 26' 57.8" | E 79º 59'48.4" | In **APML township**, Near temple |

**Note:**AG: Sample Code,DW: Dug Well, BW: Bore Well,HP: Hand Pump,
LHS: left hand side,RHS: right hand side

### 3.3 Groundwater Level Measurement

The observation well network (50 nos.) consisted of India Mark II hand-pumps as well as open wells (Table 3.1). The observation wells are present in the vicinity core zone and buffer zone of the ash filled low lying areas to the extent possible.

Few sampling locations are close to the disposal site i.e., ash filled low lying areas. The water levels from observation well network (Table-3.1) were obtained using Electric Contact Gauze (The Solinst 101 Water Level Meter). The groundwater level has been obtained with respect to below ground level (bgl).

### 3.4 Soil and Ash Sampling and Analysis

The ash and soil samples were collected at six (06) locations in the study area. The samples were packed in air tight sampling bags for their safe transportation to the laboratory. The coordinates of soil and ash sampling locations (Table-3.2) have been noted with the help of hand-held GPS.

**Table 3.2: List of Soil sample / ash sample locations in the study area**

**(Post monsoon Period- December 2020)**

| Sr.No | Code | Latitude | Longitude | Location Description |
|---|---|---|---|---|
| 1 | AS-1 | N 21°24'13.6" | E80°15'56.9" | Adasi:- Village panchayat land |
| 2 | AS-2 | N 21°20'43.7" | E 80°11'42.2" | Goregaon |
| 3 | AS-3 | N 21°24'14.4" | E 80°11'36.7" | Dawwa |
| 4 | AS-4 | N 21°20'55.5" | E 79°42'27.6" | Khapa - Tumsar-Bhandara road, on road, LHS |
| 5 | AS-5 | N 21°31'16" | E 80°07'31.2" | Raipur mines, rock mine, produces building stone |
| 6 | AS-6 | N 21°35'36.4" | E 80°10'16.4" | Tedva:- end of the village LHS, at Dhanyotham farmers produces company |

**Note:**AS: Sample Code, LHS: left hand side

# *Chapter 4*

# *Results and Discussions*

### 4.1 Groundwater Level

Groundwater level has been measured in the identified sources (Table 3.1). The groundwater level reflects the overall groundwater scenario as regards to its withdrawal, the recharge due precipitation, recharge from agricultural return flow, seepage from water bodies etc. The groundwater level was measured in pre-monsoon and post-monsoon seasons and are mentioned in the **(Table 4.1)**. The groundwater level (m-below ground level) is varied in between 3.70 m (AG-17) to 14.20 m (AG-9) during pre-monsoon(June 2019), 1.00 m (AG-21) to 12.96 m (AG-16) during post-monsoon(November 2019), 1.97 m (AG-13) to 6.8 m (AG-1) in post-monsoon(December 2020), 3.85 m (AG-21) to 13.76 m (AG-5) in pre-monsoon(June 2021). The basic statistics of ground water level for pre and post monsoon seasons are shown in the **(Table 4.2)**.

**Table 4.1: Groundwater level (m – below ground level) in the study area during 2019-2021**

| Sr. No. | Sample Code | Pre-monsoon-2019 water level (meter) | Post-monsoon-2019 water level (meter) | Post-monsoon 2020 water level (meter) | Pre-monsoon 2021 water level (meter) |
|---|---|---|---|---|---|
| 1. | AG-1 | 9.91 | 8.05 | 6.80 | 9.73 |
| 2. | AG-2 | 9.50 | 5.46 | 5.84 | 9.61 |
| 3. | AG-3 | 11.88 | 5.82 | - | - |
| 4. | AG-4 | 7.87 | 2.50 | - | - |
| 5. | AG-5 | 14.20 | 6.49 | - | 13.76 |
| 6. | AG-6 | 8.60 | 3.73 | - | 9.10 |
| 7. | AG-7 | 6.19 | 1.91 | 3.20 | 7.41 |
| 8. | AG-8 | 5.35 | 3.63 | 5.26 | 7.1 |
| 9. | AG-9 | 6.16 | 2.10 | - | - |
| 10. | AG-10 | 11.18 | 4.60 | 4.52 | 7.17 |
| 11. | AG-11 | - | 1.81 | 2.69 | 5.4 |
| 12. | AG-12 | 10.40 | 12.96 | 4.12 | 5.05 |
| 13. | AG-13 | 3.70 | 2.08 | 1.97 | 4.3 |
| 14. | AG-14 | 7.45 | 5.37 | - | 10.08 |
| 15. | AG-15 | 10.20 | 2.53 | 2.60 | 5.9 |
| 16. | AG-16 | 5.80 | 1.00 | 3.05 | 6.37 |
| 17. | AG-17 | 5.96 | 3.93 | 2.56 | 4 |
| 18. | AG-18 | 7.42 | 2.44 | 5.73 | 6.4 |
| 19. | AG-19 | 5.36 | 4.20 | - | - |

|  |  |  |  |  |  |
|---|---|---|---|---|---|
| 20. | AG-20 | 8.41 | 2.13 | 4.91 | 10.32 |
| 21. | AG-21 | 7.29 | 5.77 | 2.70 | 3.85 |
| 22. | AG-22 | 9.26 | 3.63 | 5.19 | 10.43 |
| 23. | AG-23 | 5.71 | 4.99 | 4.04 | 4.89 |
| 24. | AG-4 | 7.00 | 5.47 | 4.84 | 6.87 |
| 25. | AG-25 | 9.00 | 3.37 | 3.15 | 8.12 |
| 26. | AG-26 | 4.90 | - | - | - |
| 27. | AG-27 | 9.79 | 3.12 | 6.46 | 6.02 |
| 28. | AG-28 | 10.32 | 6.22 | 4.62 | 6.2 |
| 29. | AG-29 | 7.71 | 2.53 | 3.76 | 8.6 |
| 30. | AG-30 | 6.44 | 1.29 | 5.36 | 5.05 |
| 31. | AG-31 | - | 2.50 | 6.13 | 6.78 |
| 32. | AG-32 | - | 2.96 | - |  |
| 33. | AG-33 | - | - | 5.86 | 8.95 |
| 34. | AG-34 | - | - | - | - |
| 35. | AG-35 | - | - | - | - |
| 36. | AG-36 | - | - | - | - |
| 37. | AG-37 | - | - | - | - |
| 38. | AG-38 | - | - | 3.03 | 7.20 |
| 39. | AG-39 | - | - | 4.49 | 6.42 |
| 40. | AG-40 | - | - | 2.53 | 5.1 |
| 41. | AG-41 | - | - | 3.16 | 6.25 |
| 42. | AG-42 | - | - | 4.00 | 5.12 |
| 43. | AG-43 | - | - | - | - |
| 44. | AG-44 | - | - | 2.10 | 4.34 |
| 45. | AG-45 | - | - | - | - |
| 46. | AG-46 | - | - | - | - |
| 47. | AG-47 | - | - | 5.83 | 5.36 |
| 48. | AG-48 | - | - | - | - |
| 49. | AG-49 | - | - | - | - |
| 50. | AG-50 | - | - | - | - |

**Table 4.2: Basic statistics of groundwater level (m-below ground level) in Pre- monsoon 2019, Post-monsoon 2019, Post-monsoon 2020and pre-monsoon 2021**

| Parameters (in meter) | Pre-monsoon' 2019 | Post-monsoon' 2019 | Post-monsoon' 2020 | Pre-monsoon' 2021 |
|---|---|---|---|---|
| Minimum water level | 3.70 | 1.00 | 1.97 | 3.85 |
| Maximum water level | 14.20 | 12.96 | 6.80 | 13.76 |
| Average level | 8.03 | 4.01 | 4.209 | 6.97 |
| Standard deviation | 2.38 | 2.39 | 1.4 | 2.24 |

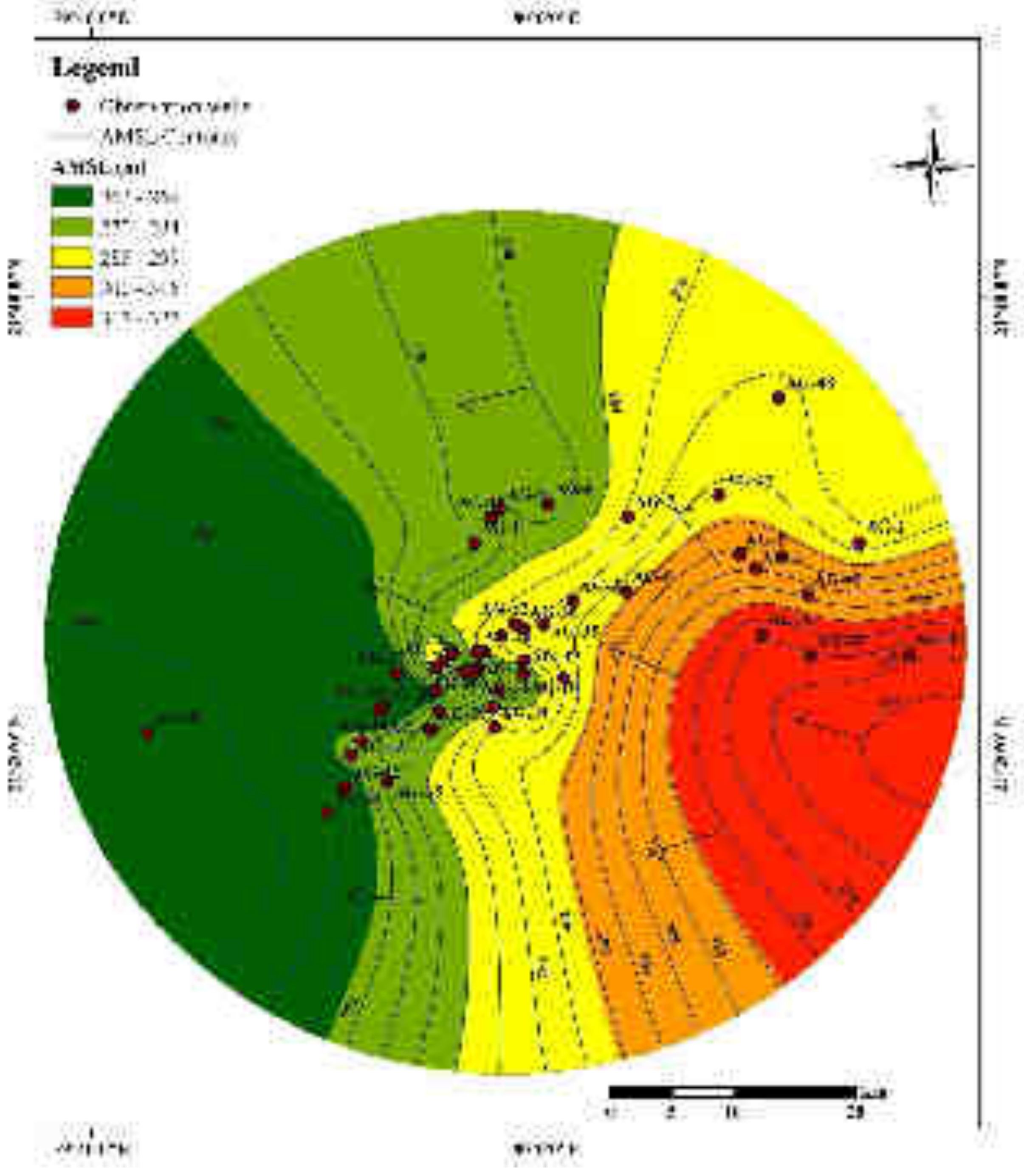


Figure 4.1: Groundwater level (m-amsl) contour plot of the study area – post monsoon’2020

### 4.2 Groundwater Chemistry

The samples were analysed for Physico-chemical parameters and heavy metal parameters for pre-monsoon (June 2019),post-monsoon (November 2019),post-monsoon (December 2020) and pre-monsoon (June 2021).

#### 4.2.1 Pre-monsoon season (June 2019)

**Physico-chemical parameters**

The physico chemical parameters of water samples in pre-monsoon season (June 2019) are mentioned in the **Table 4.3**.

**Turbidity:**Turbidity concentration for all the samples was found to be within the permissible and acceptable limit of BIS (10500:2012) (10500:2012) except samples, AG 9 (10.2 NTU).

**Total Hardness:**The concentration of Total Hardness for all the samples were found to be within the permissible and acceptable limit of BIS (10500:2012) except samples AG-35, AG-38 and AG-40.

**Magnesium ($Mg^{2+}$):**Magnesium concentration for all the samples were found to be within the permissible and acceptable limit except $Mg^+$ for sample code AG-35 (189 Mg/L) was found to above the permissible and acceptable limit of BIS (10500:2012).

**Nitrate ($NO^{3-}$):** The concentration of Nitrate were found to be within the permissible limit of BIS (10500:2012) , except for samples AG-7,AG-12,AG-13, AG-14,AG-20,AG-21, AG-25,AG-26,AG-27,AG-29,AG-34,AG-35,AG-39,AG-40which were found to be in the range of 47-574 mg/l.

**Sulphate($SO_4^2$-):**The concentrations of Sulphate for all the samples were found to be within the permissible and acceptable limit except samples AG-31 & AG-38.

**Fluoride ($F^-$):**The concentration of Fluoride for all the samples were found to be within the permissible and acceptable limitexcept samples AG-6, AG-10, AG-11, AG-21 and AG-38 were found to be 1.5,2.8,1.5,1.6 and 1.9mg/l respectively which were above the permissible and acceptable limit of BIS (10500:2012).

The concentration for rest of all the water sample parameters viz. pH, EC, TDS, calcium, sodium, potassium, Total alkalinity, Phosphate and Chlorides were found to be within the permissible and acceptable limits of BIS (10500:2012).

**Table 4.3: Physico-chemical parameters in Pre-monsoon (June 2019)**

| Sr. No | Sample Code | pH | EC | TDS (mg/l) | Turbidity | Total Hardness as $CaCO_3$ | Calcium as $Ca^{2+}$ | Magnesium $Mg^{2+}$ | Sodium | Potassium | Total alkalinity as $CaCO_3$ | Phosphate as $PO_4^{-2}$ | Fluoride as $F^-$ | Nitrate $NO^{3-}$ | Sulphate | Chloride |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Units** | | **-** | **µS/cm** | **mg/L** | **NTU** | **mg/L** | | | | | | | | | | |
| **BIS (10500:2012) 10500:2012 (Acceptable/ Permissible limit)** | | **6.5/8.5** | **-** | **500/ 2000** | **1/5** | **200/ 600** | **75/200** | **30/100** | **-** | **-** | **200/600** | **-** | **1.0/1.5** | **45** | **200/400** | **250/ 1000** |
| 1 | AG-1 | 7.6 | 248 | 149 | 0.4 | 180 | 32 | 24 | 10 | 1 | 152 | 0.6 | 0.4 | 8 | 16 | 22 |
| 2 | AG-2 | 7.6 | 455 | 273 | 0.6 | 100 | 34 | 4 | 9 | 2 | 120 | 1.8 | 0.2 | 3 | 14 | 10 |
| 3 | AG-3 | 7.3 | 239 | 143 | 0.6 | 252 | 37 | 38 | 36 | 1 | 188 | 1.5 | 0.9 | 9 | 17 | 52 |
| 4 | AG-4 | 7.6 | 606 | 364 | 0.4 | 200 | 35 | 27 | 21 | 2 | 224 | 1.2 | 1.3 | 14 | 13 | 14 |
| 5 | AG-5 | 7.5 | 945 | 567 | 0.8 | 236 | 78 | 10 | 37 | 5 | 220 | 0.9 | 0.5 | 3 | 46 | 74 |
| 6 | AG-6 | 7.4 | 745 | 447 | 1.8 | 184 | 58 | 10 | 27 | 2 | 160 | 0.6 | 1.5 | 5 | 13 | 88 |
| 7 | AG-7 | 7.6 | 639 | 383 | 0.7 | 220 | 64 | 14 | 22 | 3 | 160 | 2.1 | 0.3 | **84** | 8 | 70 |
| 8 | AG-8 | 7.7 | 443 | 266 | 0.2 | 120 | 34 | 9 | 16 | 1 | 140 | 1.1 | 0.4 | 21 | 6 | 16 |
| 9 | AG-9 | 6.9 | 735 | 441 | **10.2** | 268 | 48 | 36 | 18 | 3 | 176 | 0.7 | 0.3 | 2 | 34 | 114 |
| 10 | AG-10 | 8.2 | 1254 | 752 | 0.5 | 156 | 22 | 24 | 190 | 2 | 480 | 1.4 | **2.8** | 6 | 11 | 100 |
| 11 | AG-11 | 7.9 | 615 | 369 | 0.6 | 160 | 40 | 14 | 44 | 2 | 204 | 2.8 | 1.5 | 30 | 17 | 22 |
| 12 | AG-12 | 7.9 | 596 | 358 | 0.4 | 208 | 30 | 32 | 29 | 1 | 188 | 2.1 | 0.5 | **47** | 44 | 36 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 | AG-13 | 7.8 | 1067 | 640 | 0.6 | 424 | 45 | 75 | 57 | 1 | 284 | 1.3 | 1.3 | **95** | 46 | 92 |
| 14 | AG-14 | 7.5 | 1239 | 743 | 0.9 | 512 | 107 | 59 | 43 | 6 | 216 | 1.0 | 0.5 | **154** | 41 | 140 |
| 15 | AG-15 | 7.7 | 564 | 338 | 0.3 | 208 | 48 | 21 | 18 | 2 | 180 | 1.1 | 0.4 | 15 | 5 | 20 |
| 16 | AG-16 | 7.7 | 627 | 376 | 0.7 | 228 | 38 | 32 | 42 | 6 | 220 | 2.2 | 0.6 | 2 | 5 | 40 |
| 17 | AG-17 | 7.6 | 614 | 368 | 0.8 | 288 | 29 | 52 | 22 | 2 | 268 | 1.4 | 0.7 | 4 | 22 | 20 |
| 18 | AG-18 | 7.6 | 447 | 268 | 3.5 | 152 | 16 | 27 | 24 | 2 | 200 | 1.1 | 0.6 | 0 | 3 | 24 |
| 19 | AG-19 | 7.6 | 456 | 274 | 0.4 | 180 | 35 | 22 | 23 | 2 | 200 | 0.4 | 0.3 | 2 | 5 | 12 |
| 20 | AG-20 | 7.3 | 771 | 463 | 0.3 | 284 | 45 | 41 | 25 | 8 | 232 | 0.5 | 0.4 | **94** | 23 | 50 |
| 21 | AG-21 | 7.7 | 1027 | 616 | 0.5 | 236 | 16 | 47 | 80 | 4 | 228 | 1.9 | **1.6** | **68** | 47 | 130 |
| 22 | AG-22 | 7.7 | 684 | 410 | 0.6 | 164 | 32 | 20 | 55 | 1 | 224 | 1.1 | 0.6 | 7 | 57 | 46 |
| 23 | AG-23 | 7.8 | 1194 | 716 | 0.4 | 340 | 72 | 38 | 28 | 2 | 168 | 0.7 | 0.5 | 16 | 66 | 152 |
| 24 | AG-24 | 7.4 | 234 | 140 | 0.7 | 108 | 27 | 10 | 9 | 3 | 112 | 1.2 | 0.3 | 3 | 17 | 20 |
| 25 | AG-25 | 7.8 | 1280 | 768 | 0.3 | 492 | 104 | 56 | 24 | 4 | 204 | 1.0 | 0.5 | **174** | 86 | 172 |
| 26 | AG-26 | 7.4 | 638 | 383 | 0.4 | 346 | 51 | 52 | 24 | 2 | 172 | 2.3 | 0.4 | **56** | 21 | 70 |
| 27 | AG-27 | 7.6 | 1668 | 1001 | 0.6 | 380 | 88 | 38 | 38 | 2 | 168 | 0.8 | 0.4 | **83** | 71 | 156 |
| 28 | AG-28 | 7.5 | 739 | 443 | 0.9 | 232 | 59 | 20 | 51 | 4 | 340 | 0.9 | 0.3 | 1 | 15 | 44 |
| 29 | AG-29 | 7.7 | 798 | 479 | 0.6 | 320 | 45 | 50 | 25 | 3 | 188 | 1.0 | 0.7 | **116** | 47 | 96 |
| 30 | AG-30 | 7.6 | 675 | 405 | 0.4 | 176 | 43 | 16 | 31 | 1 | 148 | 0.6 | 0.6 | 4 | 104 | 56 |
| 31 | AG-31 | 7.7 | 1141 | 685 | 1.0 | 396 | 118 | 24 | 32 | 2 | 120 | 0.5 | 0.2 | 5 | **408** | 76 |
| 32 | AG-32 | 7.1 | 795 | 477 | 1.5 | 160 | 22 | 25 | 34 | 6 | 256 | 0.7 | 0.3 | 1 | 8 | 24 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 33 | AG-33 | 7.4 | 534 | 320 | 2.0 | 154 | 38 | 14 | 22 | 3 | 204 | 1.1 | 0.7 | 18 | 6 | 22 |
| 34 | AG-34 | 7.5 | 980 | 588 | 0.6 | 280 | 43 | 41 | 34 | 4 | 212 | 0.5 | 0.4 | **90** | 37 | 92 |
| 35 | AG-35 | 7.2 | 2530 | 1518 | 0.9 | **920** | 53 | **189** | 132 | 2 | 280 | 0.7 | 0.6 | **574** | 192 | 392 |
| 36 | AG-36 | 7.2 | 533 | 320 | 1.6 | 244 | 45 | 32 | 17 | 5 | 200 | 0.6 | 0.4 | 3 | 17 | 30 |
| 37 | AG-37 | 7.6 | 328 | 197 | 1.6 | 108 | 29 | 9 | 24 | 2 | 140 | 0.8 | 0.3 | 2 | 15 | 28 |
| 38 | AG-38 | 7.9 | 1505 | 903 | 1.5 | **620** | 128 | 72 | 68 | 13 | 108 | 1.4 | **1.9** | 20 | **600** | 100 |
| 39 | AG-39 | 7.5 | 824 | 494 | 1.1 | 224 | 38 | 31 | 64 | 2 | 220 | 0.6 | 0.4 | **50** | 37 | 76 |
| 40 | AG-40 | 7.4 | 2070 | 1242 | 0.6 | **672** | 109 | 96 | 135 | 3 | 260 | 0.7 | 0.7 | **369** | 116 | 330 |
| 41 | AG-41 | 7.9 | 409 | 245 | 0.4 | 104 | 16 | 15 | 90 | 4 | 192 | 0.7 | 0.8 | 3 | 14 | 30 |

Results mentioned in Table as **Bold and underlined** are above BIS 10500-2012 Permissible limits

ND- Not Detected

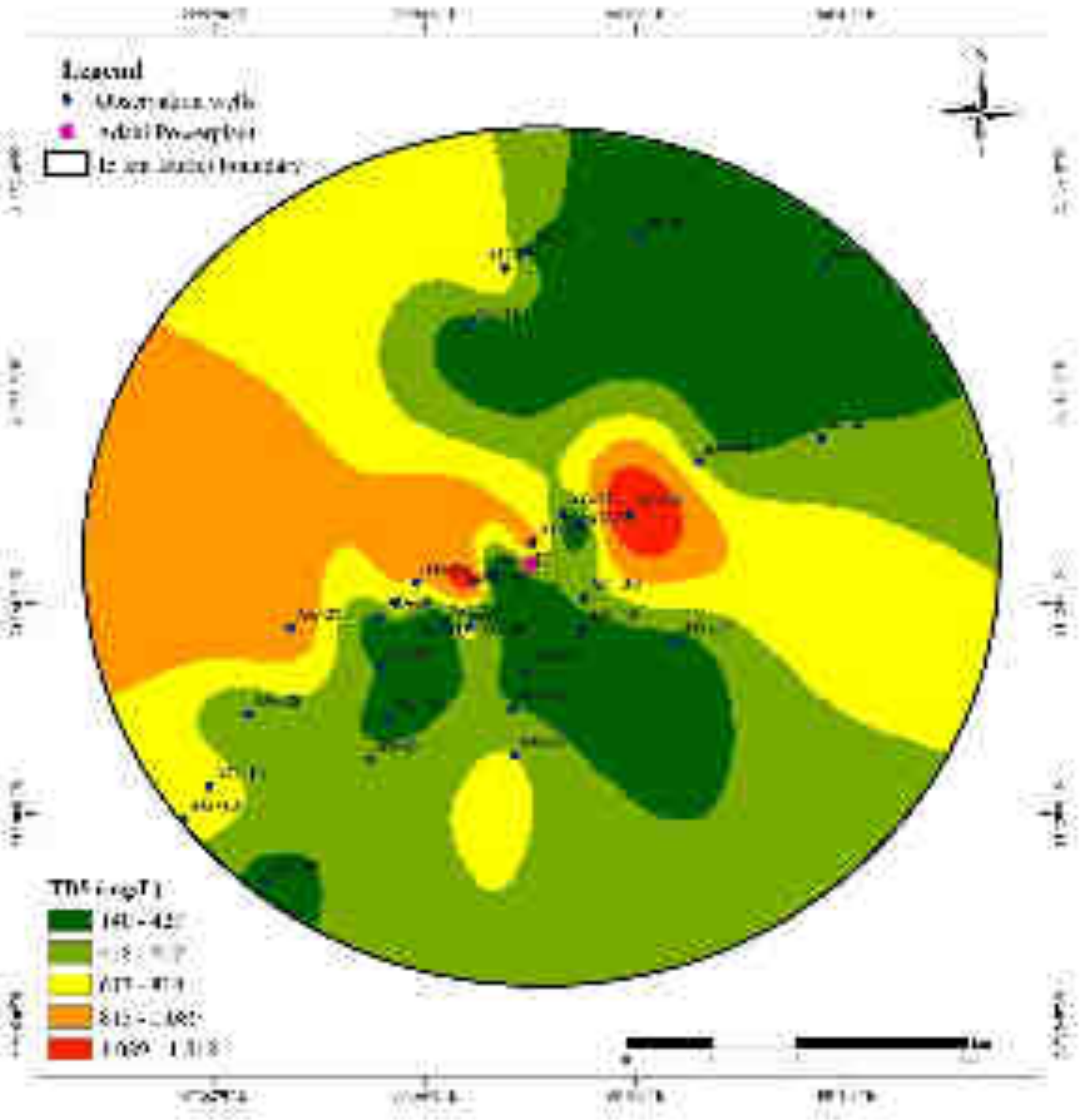


Figure 4.2: TDS concentration in June 2019

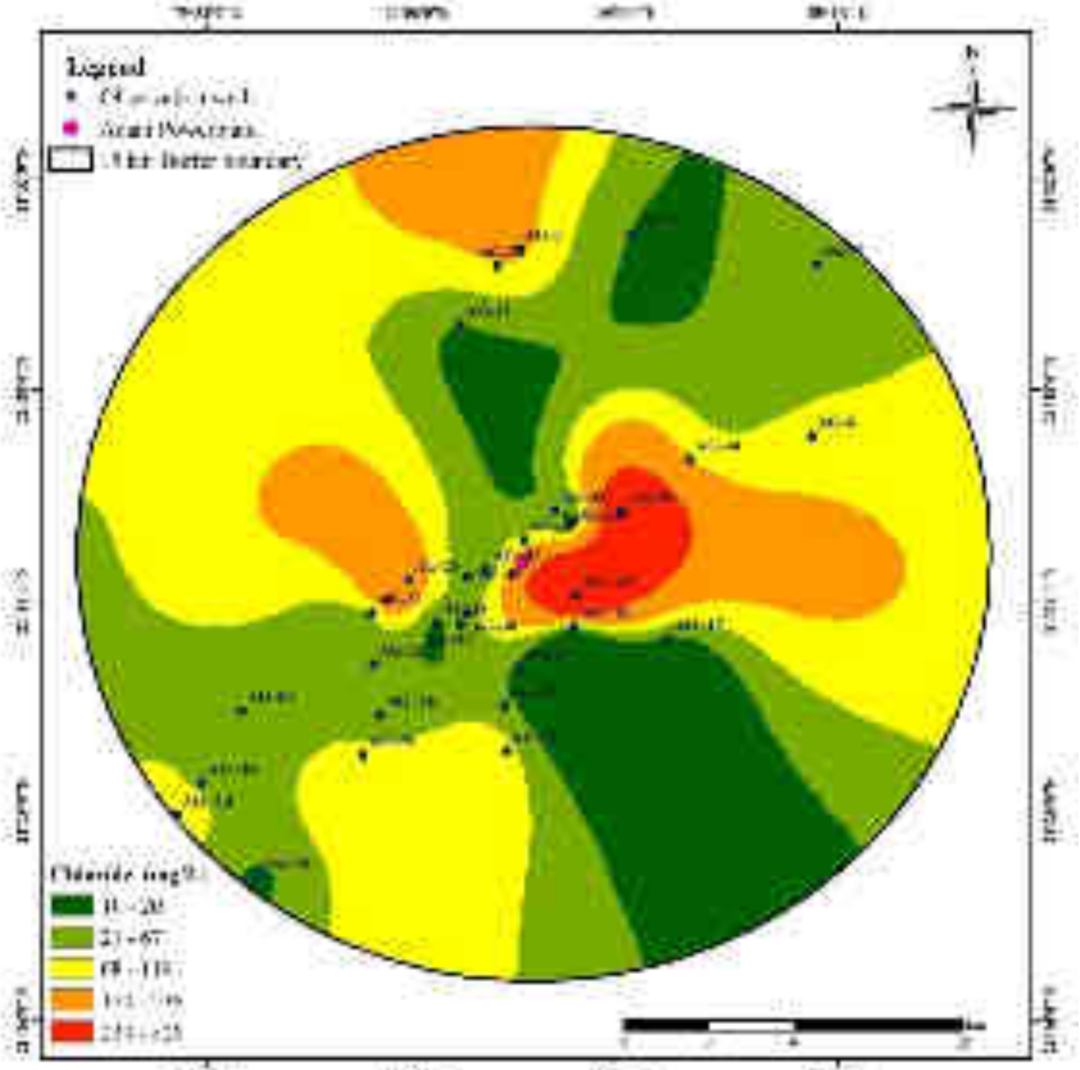


Figure 4.3: Chloride concentration in June 2019

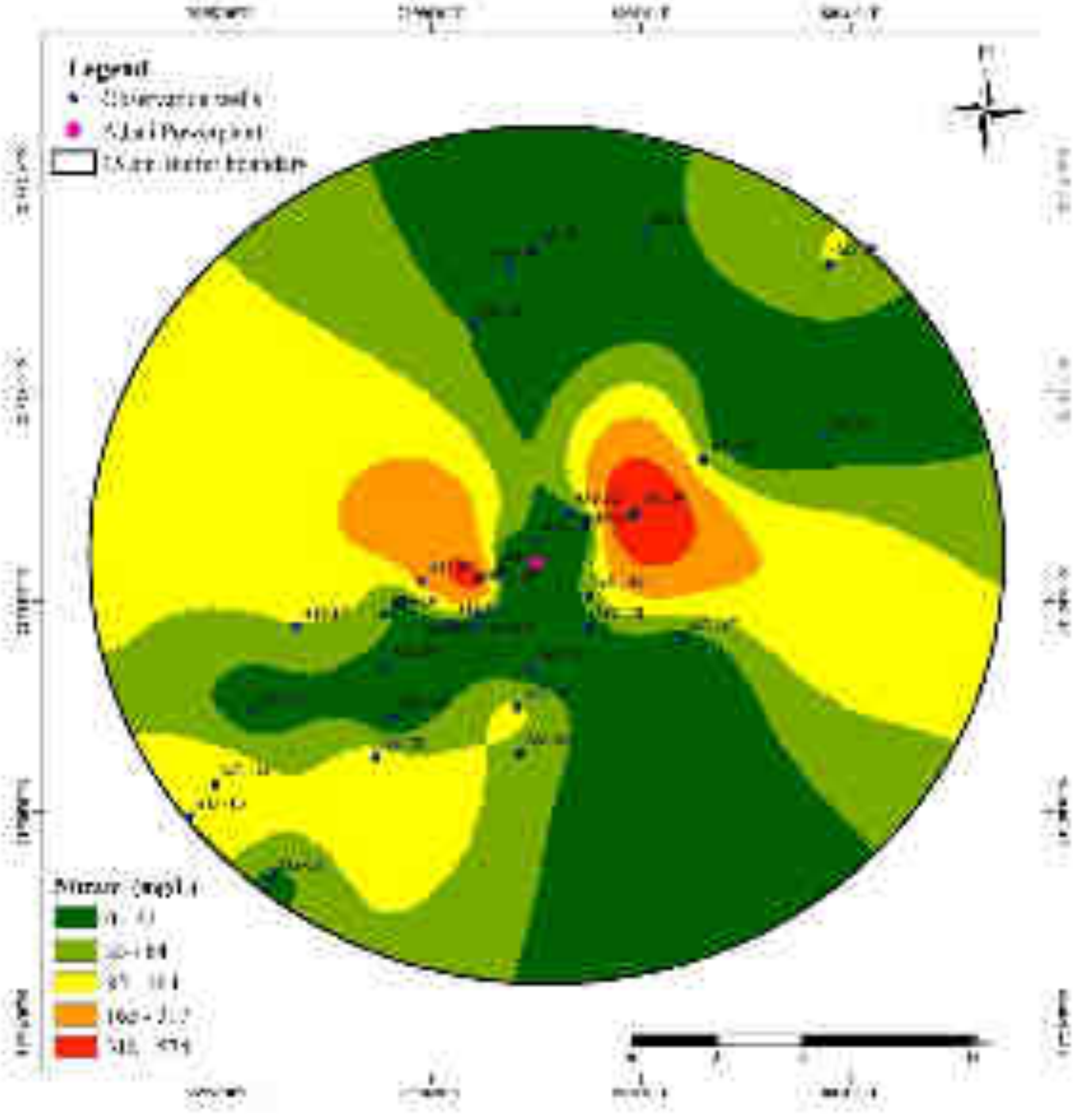


Figure 4.4: Nitrate concentration in June 2019

**Heavy metals (June 2019):**

Concentration of heavy metal namely Silver(Ag), Aluminium(Al), Arsenic(As), Cadmium(Cd), Cobalt(Co), Chromium(Cr), Copper(Cu), Manganese(Mn), Nickel(Ni), Lead(Pb), Zinc(Zn) and Mercury(Hg) were found to be Below Detection Limit(BDL) (Table 4.4). The concentrations of Iron (Fe) in all the samples were found to be within the permissible limit of BIS (10500:2012) except sample AG-13 **(Table 4.4)** respectively.

**Table 4.4: Heavy Metal concentration in Pre-monsoon season (June 2019)**

| Sr.No | Sample code | Ag | Al | As | Cd | Co | Cr | Cu | Fe | Mn | Ni | Pb | Zn | Hg |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BIS (10500:2012) Limit (mg/L)** | | **0.1** | **0.03-0.2** | **0.01** | **0.003** | **-** | **0.05** | **0.05-1.5** | **0.3-1.0** | **0.10-0.30** | **0.02** | **0.01** | **5.0-15** | **0.001** |
| **ICP detection Limit (mg/L)** | | | **0.00001** | **0.007** | **0.0001** | **0.0004** | **0.01** | **0.0004** | **0.0003** | **0.0001** | **0.005** | **0.009** | **0.001** | **0.000075** |
| 1 | AG-1 | ND | 0.02 | BDL | ND | BDL | BDL | 0.007 | 0.2 | 0.2 | BDL | BDL | 0.06 | BDL |
| 2 | AG-2 | ND | 0.02 | BDL | ND | ND | ND | 0.0005 | 0.2 | 0.08 | BDL | ND | 0.5 | BDL |
| 3 | AG-3 | ND | 0.01 | ND | ND | ND | ND | 0.004 | 0.07 | 0.03 | BDL | ND | 0.3 | BDL |
| 4 | AG-4 | ND | 0.02 | BDL | ND | BDL | ND | 0.009 | 0.3 | 0.05 | BDL | BDL | 0.8 | BDL |
| 5 | AG-5 | ND | 0.01 | ND | ND | ND | ND | 0.006 | 0.7 | 0.09 | BDL | ND | 3.9 | BDL |
| 6 | AG-6 | ND | 0.01 | ND | ND | ND | ND | 0.007 | 0.2 | 0.03 | BDL | ND | 0.7 | BDL |
| 7 | AG-7 | ND | 0.02 | BDL | ND | ND | ND | 0.007 | 0.2 | 0.05 | BDL | ND | 0.08 | BDL |
| 8 | AG-8 | ND | 0.02 | BDL | ND | ND | ND | 0.004 | 0.1 | 0.06 | BDL | BDL | 0.07 | BDL |
| 9 | AG-9 | ND | 0.01 | ND | ND | ND | ND | 0.003 | 0.2 | 0.02 | ND | BDL | 0.03 | BDL |
| 10 | AG-10 | ND | 0.02 | BDL | ND | BDL | ND | 0.001 | 1.0 | 0.04 | ND | BDL | 0.4 | BDL |
| 11 | AG-11 | ND | 0.03 | BDL | ND | ND | ND | 0.002 | 0.2 | 0.04 | ND | BDL | 0.07 | BDL |
| 12 | AG-12 | ND | 0.02 | ND | ND | BDL | ND | 0.005 | 0.1 | 0.04 | BDL | BDL | 0.8 | BDL |
| 13 | AG-13 | ND | 0.02 | ND | ND | BDL | ND | 0.004 | **1.2** | 0.08 | ND | BDL | 0.9 | BDL |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14 | AG-14 | ND | 0.03 | BDL | ND | BDL | ND | 0.001 | 0.2 | 0.002 | BDL | BDL | 0.8 | BDL |
| 15 | AG-15 | ND | 0.02 | ND | ND | BDL | ND | 0.005 | 0.3 | 0.2 | BDL | BDL | 0.8 | BDL |
| 16 | AG-16 | ND | 0.01 | ND | ND | BDL | BDL | 0.007 | 0.1 | 0.003 | BDL | BDL | 0.04 | BDL |
| 17 | AG-17 | ND | 0.02 | BDL | ND | BDL | ND | 0.003 | 0.1 | 0.2 | BDL | BDL | 0.07 | BDL |
| 18 | AG-18 | ND | 0.007 | BDL | ND | BDL | ND | 0.003 | 0.1 | 0.1 | BDL | BDL | 0.4 | BDL |
| 19 | AG-19 | ND | 0.006 | BDL | ND | BDL | ND | 0.0008 | 0.2 | 0.04 | BDL | BDL | 0.3 | BDL |
| 20 | AG-20 | ND | 0.04 | ND | ND | BDL | BDL | 0.007 | 0.1 | 0.2 | BDL | BDL | 0.3 | BDL |
| 21 | AG-21 | ND | 0.03 | ND | ND | ND | BDL | BDL | 0.006 | 0.05 | BDL | BDL | 0.5 | BDL |
| 22 | AG-22 | ND | 0.005 | ND | ND | BDL | BDL | 0.004 | 0.7 | 0.06 | BDL | BDL | 0.4 | BDL |
| 23 | AG-23 | ND | 0.008 | BDL | ND | ND | BDL | 0.0001 | 0.005 | 0.005 | BDL | BDL | 0.09 | BDL |
| 24 | AG-24 | ND | 0.006 | ND | ND | BDL | BDL | 0.006 | 0.2 | 0.05 | BDL | BDL | 2.0 | BDL |
| 25 | AG-25 | ND | 0.03 | BDL | ND | BDL | BDL | 0.007 | 0.9 | 0.05 | BDL | BDL | 0.09 | BDL |
| 26 | AG-26 | ND | 0.09 | ND | ND | ND | BDL | 0.001 | 0.2 | 0.2 | BDL | ND | 0.4 | BDL |
| 27 | AG-27 | ND | 0.03 | BDL | ND | ND | BDL | 0.007 | 0.1 | 0.05 | BDL | BDL | 0.3 | BDL |
| 28 | AG-28 | ND | 0.03 | BDL | ND | ND | BDL | 0.001 | 0.2 | 0.009 | BDL | BDL | 0.05 | BDL |
| 29 | AG-29 | ND | 0.03 | ND | ND | BDL | BDL | 0.004 | 0.1 | 0.2 | BDL | BDL | 2.0 | BDL |
| 30 | AG-30 | ND | 0.01 | ND | ND | ND | BDL | 0.005 | 0.1 | 0.04 | BDL | BDL | 0.09 | BDL |
| 31 | AG-31 | ND | 0.01 | ND | ND | ND | BDL | 0.004 | 0.1 | 0.03 | BDL | BDL | 0.06 | BDL |
| 32 | AG-32 | ND | 0.02 | BDL | ND | ND | BDL | 0.006 | 0.1 | 0.05 | BDL | BDL | 0.4 | BDL |
| 33 | AG-33 | ND | 0.02 | BDL | ND | BDL | BDL | 0.003 | 0.1 | 0.03 | BDL | BDL | 0.4 | BDL |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 34 | AG-34 | ND | 0.04 | ND | ND | ND | BDL | 0.003 | 0.09 | 0.03 | BDL | BDL | 0.3 | BDL |
| 35 | AG-35 | ND | 0.02 | ND | ND | ND | BDL | 0.004 | 0.09 | 0.02 | ND | BDL | 0.05 | BDL |
| 36 | AG-36 | ND | 0.03 | BDL | ND | ND | BDL | 0.005 | 0.09 | 0.1 | BDL | ND | 0.06 | BDL |
| 37 | AG-37 | ND | 0.04 | ND | ND | ND | BDL | 0.007 | 0.9 | 0.09 | BDL | ND | 0.7 | BDL |
| 38 | AG-38 | ND | 0.02 | ND | ND | ND | BDL | 0.003 | 0.3 | 0.07 | ND | ND | 0.3 | BDL |
| 39 | AG-39 | ND | 0.03 | ND | ND | ND | BDL | 0.001 | 0.3 | 0.09 | BDL | BDL | 0.4 | BDL |
| 40 | AG-40 | ND | 0.03 | BDL | ND | ND | BDL | BDL | 0.006 | 0.06 | BDL | BDL | 0.5 | BDL |
| 41 | AG-41 | ND | 0.03 | BDL | ND | ND | BDL | BDL | 0.007 | 0.07 | BDL | BDL | 0.6 | BDL |

### 4.2.2. Post-monsoon season (November 2019)

### Physico-chemical parameters

The physico chemical parameters of water samples in post-monsoon season are mentioned in the **Table 4.5**.

**Total Dissolved Solids:** The TDS for all the samples were found to be within the permissible and acceptable limit. TDS for sample AG-39 (2754 mg/l) was found to be above the permissible and acceptable limit of BIS (10500:2012).

**Nitrate:** The concentration of nitrate ($No_3^-$) were found to be within the permissible limit of BIS (10500:2012) , except for sample AG-7,AG-13,AG-20, AG -25,AG -26,AG-29, AG-34,AG-35 and AG-39 which were found to be in the range of 60–180 mg/L.

**Fluoride:**The concentration of fluoride($F^-$) in all the sample were found to be well within the permissible and acceptable limit of BIS (10500:2012) except for samples AG-10,AG-11, AG-13 and AG-21.

The physico-chemical parameters viz pH, calcium, Total Hardness, Total alkalinity, sulphate, Phosphate and Chlorides were found to be within the permissible limits of BIS (10500:2012).

**Table 4.5: Physico-chemical parameters in post-monsoon season (November 2019)**

| Sr. No | Sample Code | pH | EC | TDS (mg/l) | Turbidity | Total Hardness as $CaCO_3$ | Calcium as $Ca^{2+}$ | Magnesium $Mg^{2+}$ | Sodium | Potassium | Total alkalinity as $CaCO_3$ | Phosphate as $PO_4^{-2}$ | Fluoride as $F^-$ | Nitrate $NO^{3-}$ | sulphate | chloride |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Units | | - | µS/cm | mg/L | NTU | mg/L | | | | | | | | | | |
| BIS (10500:2012) (Acceptable/ Permissible limit) | | 6.5/8.5 | - | 500/ 2000 | 1/5 | 200/ 600 | 75/200 | 30/100 | - | - | 200/600 | - | 1.0/1.5 | 45 | 200/400 | 250/ 1000 |
| 1 | AS-1 | 7.6 | 429 | 257 | 0.4 | 220 | 40 | 29 | 13 | 4 | 160 | 0.2 | 0.5 | 9 | 18 | 30 |
| 2 | AG-2 | 7.8 | 68 | 41 | 55 | 148 | 35 | 14 | 9 | 2 | 130 | 0.7 | 0.2 | 4 | 16 | 10 |
| 3 | AG-3 | 7.5 | 649 | 389 | 0.2 | 170 | 33 | 21 | 20 | 4 | 160 | 0.5 | 0.9 | 10 | 18 | 50 |
| 4 | AG-4 | 7.8 | 400 | 240 | 0.6 | 180 | 32 | 24 | 20 | 1 | 160 | 0.8 | 1.2 | 12 | 10 | 20 |
| 5 | AG-5 | 7.7 | 1072 | 643 | 0.2 | 248 | 80 | 12 | 40 | 6 | 228 | 0.9 | 0.5 | 3 | 50 | 80 |
| 6 | AG-6 | 7.8 | 789 | 473 | 1 | 178 | 55 | 10 | 30 | 1 | 160 | 0.6 | 1 | 5 | 11 | 84 |
| 7 | AG-7 | 7.9 | 614 | 368 | 0.2 | 240 | 72 | 14 | 26 | 2 | 180 | 0.6 | 0.2 | **80** | 8 | 64 |
| 8 | AG-8 | 8 | 378 | 227 | 0.3 | 110 | 32 | 7 | 14 | 2 | 120 | 0.4 | 0.3 | 20 | 4 | 20 |
| 9 | AG-9 | 7.4 | 866 | 520 | 3.4 | 300 | 56 | 38 | 20 | 2 | 180 | 0.4 | 0.2 | 2 | 30 | 130 |
| 10 | AG-10 | 8.3 | 1507 | 904 | 0.2 | 196 | 35 | 26 | 180 | 3 | 498 | 0.4 | **2** | 5 | 12 | 110 |
| 11 | AG-11 | 8.3 | 582 | 349 | 0.3 | 164 | 39 | 16 | 48 | 3 | 200 | 0.6 | **2** | 29 | 18 | 20 |
| 12 | AG-12 | 7.9 | 1441 | 865 | 0.3 | 260 | 48 | 34 | 60 | 1 | 220 | 0.4 | 0.4 | 33 | 42 | 120 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 | AG-13 | 7.9 | 1199 | 719 | 0.2 | 410 | 44 | 72 | 60 | 2 | 288 | 0.7 | **2** | **98** | 48 | 122 |
| 14 | AG-14 | 7.9 | 582 | 349 | 0.3 | 218 | 32 | 33 | 23 | 3 | 180 | 0.4 | 0.4 | 40 | 28 | 60 |
| 15 | AG-15 | 7.8 | 167 | 100 | 0.2 | 132 | 24 | 17 | 9 | 1 | 100 | 0.3 | 0.2 | 9 | 6 | 10 |
| 16 | AG-16 | 7.9 | 602 | 361 | 0.3 | 216 | 35 | 31 | 35 | 3 | 208 | 0.4 | 0.3 | 1 | 5 | 36 |
| 17 | AG-17 | 7.8 | 306 | 184 | 0.3 | 248 | 27 | 43 | 18 | 1 | 198 | 0.8 | 0.6 | 2 | 13 | 16 |
| 18 | AG-18 | 7.9 | 472 | 283 | 0.7 | 160 | 24 | 24 | 20 | 1 | 210 | 0.5 | 0.5 | 1 | 2 | 20 |
| 19 | AG-19 | 7.6 | 489 | 293 | 0.5 | 198 | 35 | 26 | 16 | 1 | 200 | 0.4 | 0.3 | 3 | 4 | 16 |
| 20 | AG-20 | 7.9 | 777 | 466 | 0.2 | 280 | 44 | 41 | 24 | 7 | 240 | 0.5 | 0.3 | **88** | 22 | 40 |
| 21 | AG-21 | 7.9 | 646 | 388 | 0.2 | 260 | 24 | 48 | 34 | 3 | 210 | 4.2 | **2** | 28 | 22 | 82 |
| 22 | AG-22 | 7.8 | 665 | 399 | 0.5 | 158 | 39 | 14 | 40 | 2 | 180 | 3.6 | 0.5 | 5 | 48 | 40 |
| 23 | AG-23 | 7.7 | 1234 | 740 | 0.2 | 390 | 84 | 43 | 30 | 3 | 188 | 2.9 | 0.4 | 14 | 60 | 176 |
| 24 | AG-24 | 8 | 181 | 109 | 1.2 | 68 | 19 | 5 | 11 | 1 | 78 | 1 | 0.3 | 2 | 12 | 16 |
| 25 | AG-25 | 7.7 | 1518 | 911 | 0.5 | 540 | 112 | 62 | 28 | 5 | 240 | 1.2 | 0.5 | **180** | 90 | 180 |
| 26 | AG-26 | 7.9 | 623 | 374 | 0.3 | 358 | 55 | 53 | 25 | 2 | 188 | 0.9 | 0.4 | **60** | 22 | 62 |
| 27 | AG-28 | 7 | 582 | 349 | 0.8 | 144 | 32 | 15 | 48 | 3 | 220 | 0.8 | 0.2 | 2 | 10 | 40 |
| 28 | AG-29 | 8 | 810 | 486 | 0.3 | 338 | 51 | 50 | 21 | 2 | 180 | 0.6 | 0.6 | **110** | 50 | 92 |
| 29 | AG-30 | 8 | 631 | 379 | 0.2 | 164 | 40 | 15 | 32 | 2 | 100 | 0.9 | 0.6 | 3 | 100 | 44 |
| 30 | AG-31 | 8 | 582 | 349 | 0.3 | 196 | 38 | 24 | 22 | 2 | 120 | 0.3 | 0.2 | 2 | 50 | 50 |
| 31 | AG-32 | 7.9 | 748 | 449 | 1.2 | 160 | 24 | 24 | 30 | 4 | 228 | 0.5 | 0.3 | 1 | 9 | 30 |
| 32 | AG-34 | 7.9 | 1244 | 746 | 0.3 | 320 | 72 | 34 | 24 | 4 | 120 | 0.6 | 0.4 | **100** | 40 | 124 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 33 | AG-35 | 7.8 | 2350 | 1410 | 0.4 | 890 | 56 | 180 | 113 | 20 | 260 | 0.5 | 0.5 | **<u>100</u>** | 200 | 370 |
| 34 | AG-36 | 8.3 | 273 | 164 | 0.5 | 140 | 24 | 19 | 9 | 3 | 120 | 0.7 | 0.3 | 4 | 10 | 26 |
| 35 | AG-37 | 8.2 | 267 | 160 | 0.5 | 90 | 24 | 7 | 12 | 1 | 80 | 0.8 | 0.3 | 1 | 11 | 26 |
| 36 | AG-38 | 8 | 957 | 574 | 0.8 | 256 | 44 | 35 | 60 | 1 | 240 | 1.6 | 0.4 | 43 | 32 | 90 |
| 37 | AG-39 | 7.9 | 4590 | **<u>2754</u>** | 0.6 | 740 | 152 | 86 | 140 | 5 | 298 | 1.1 | 0.7 | **<u>98</u>** | 100 | 520 |
| 38 | AG-40 | 8.4 | 457 | 274 | 0.3 | 128 | 19 | 19 | 88 | 3 | 196 | 2.2 | 0.8 | 2 | 12 | 40 |
| 39 | AG-41 | 8.2 | 726 | 436 | 0.3 | 160 | 32 | 19 | 22 | 3 | 160 | 0.8 | 0.7 | 19 | 12 | 36 |
| 40 | AG-42 | 8.2 | 854 | 512 | 0.3 | 168 | 35 | 19 | 21 | 11 | 160 | 0.8 | 0.6 | 33 | 33 | 36 |
| 41 | AG-43 | 8.2 | 556 | 334 | 0.9 | 140 | 32 | 14 | 20 | 10 | 180 | 0.8 | 0.5 | 21 | 26 | 10 |

Results mentioned in Table as **<u>Bold and underlined</u>** are above BIS 10500-2012 Permissible limits

ND- Not Detected

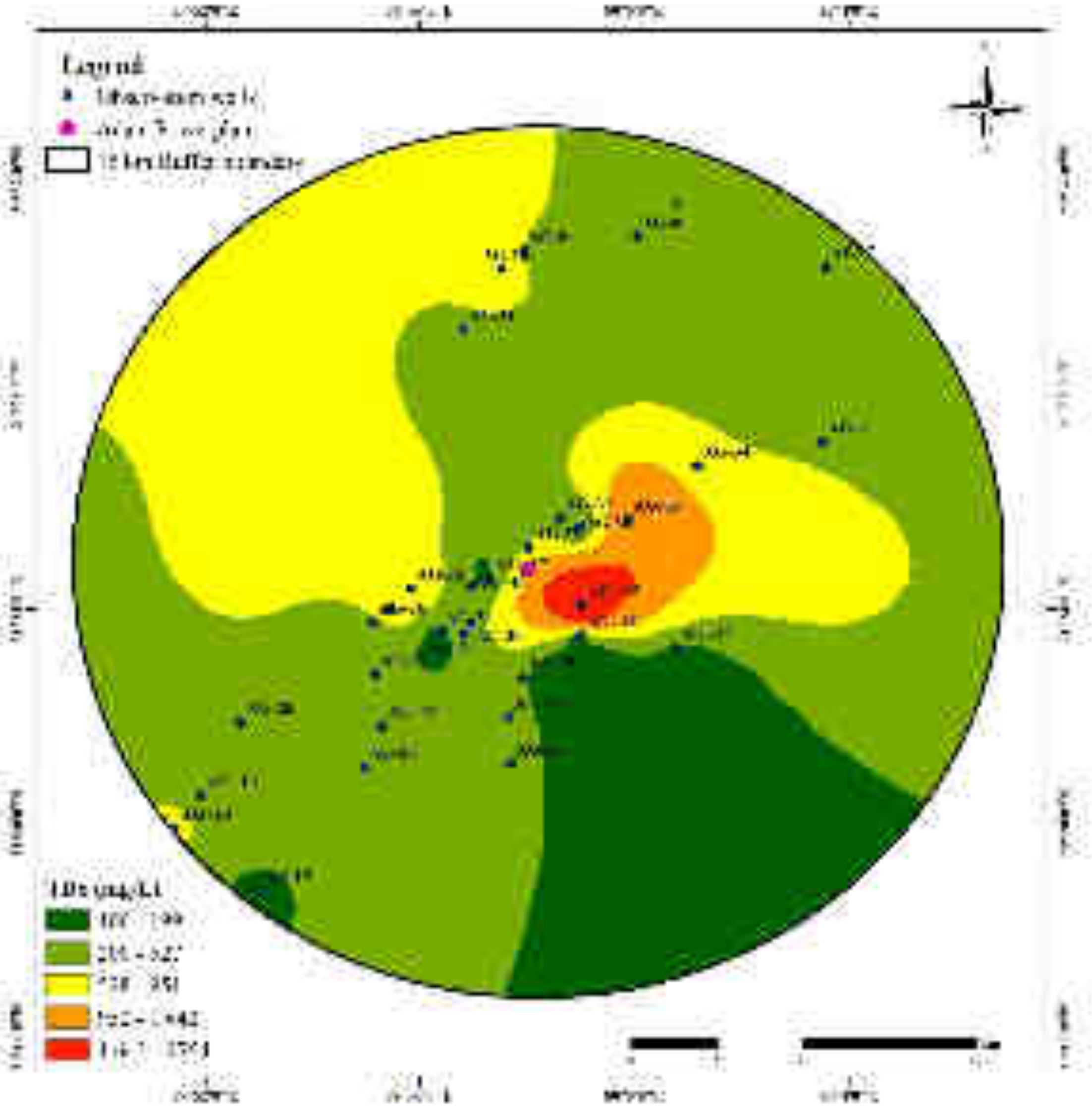


Figure 4.5: TDS concentration in November 2019

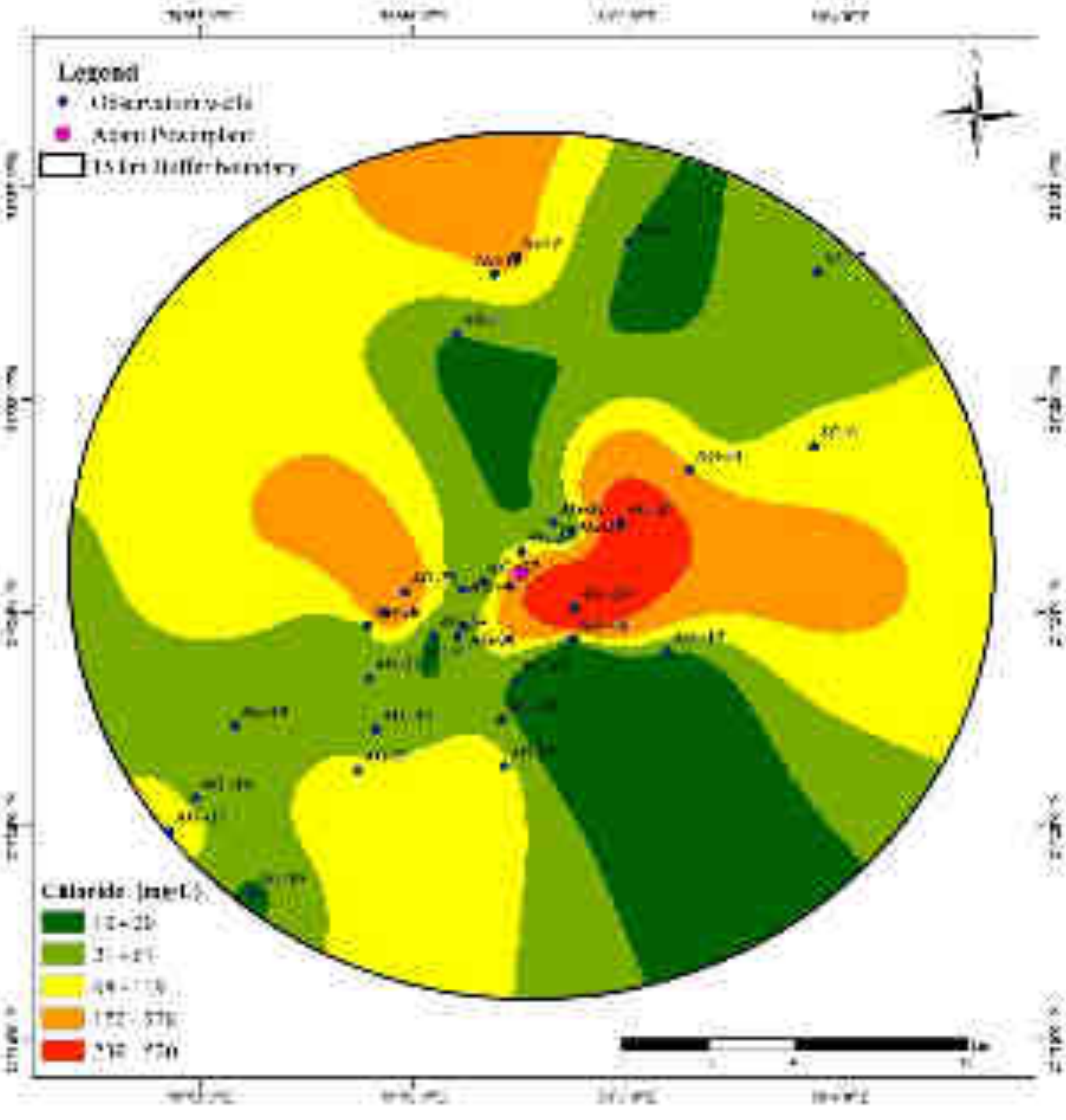


**Figure 4.6: Chloride concentration in November 2019**

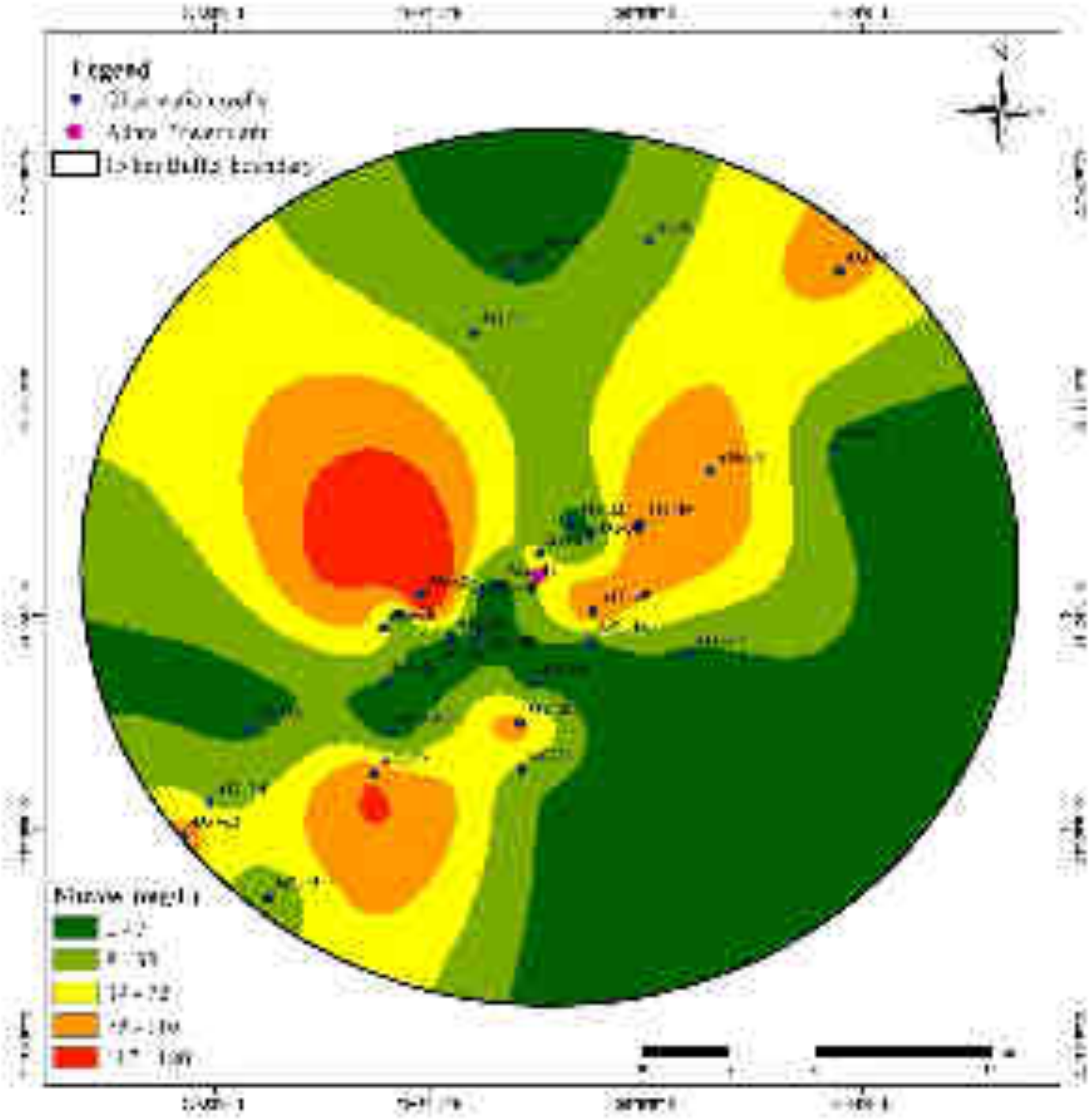


Figure 4.7:Nitrate concentration in November 2019

**Heavy metals:**

The Heavy metal analysis of water samples in post-monsoon (November 2019)season are mentioned in the **Table 4.6**. The concentration of heavy metalsAs,Cd, Cr, Cu, Ni and Pb were all found to be well within the permissible limit of BIS (10500:2012). The concentration of Al in all the samples were found to be within the permissible and acceptable limit of BIS (10500:2012), except for samples AG-24 (0.5 mg/L) permissible limits of BIS (10500:2012).The concentration of Iron (Fe) were found to be within the permissible limit of BIS (10500:2012) except for samples AG-1,AG-2, AG-4, AG-5, AG-6,AG-7, AG-9,AG-12,AG-14,AG-16,AG-18,AG-19,AG-20,AG-23,AG-24,AG-25,AG-28,AG-29,AG-32,AG-34,AG-35,AG-36,AG-38,AG-40, AG-42 & AG-43 which were found to be in the range of 1-18 mg/L.The concentration of Mn in all the samples were found to be within the permissible limits of BIS (10500:2012) except samples AG-4, AG-9 and AG-31 which were found to be 0.4,0.4 and 0.5 mg/L respectively. The concentrations of zinc (Zn) in all the samples were found to be within the permissible and acceptable limits of BIS (10500:2012). Whereas concentration of Zn in sample AG-9 (19.0 mg/L) was found to be above the permissible and acceptable limits of BIS (10500:2012).

## Table 4.6: Heavy Metal parameters in Post-monsoon (November 2019)

| Sr.No | Sample code | Al | As | Cd | Cr | Cu | Fe | Mn | Ni | Pb | Zn | Hg |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BIS (10500:2012) Limit (mg/L)** | | **0.03-0.2** | **0.01** | **0.003** | **0.05** | **0.05-1.5** | **0.3-1.0** | **0.10-0.30** | **0.02** | **0.01** | **5.0-15** | **0.001** |
| **ICP detection Limit (mg/L)** | | **0.00001** | **0.007** | **0.0001** | **0.01** | **0.0004** | **0.0003** | **0.0001** | **0.005** | **0.009** | **0.001** | **0.000075** |
| 1 | AS-1 | 0.09 | 0.009 | 0.0009 | 0.03 | 0.01 | **1.6** | 0.03 | BDL | 0.009 | 0.1 | BDL |
| 2 | AG-2 | 0.09 | 0.009 | 0.002 | 0.02 | 0.01 | **4.2** | 0.1 | 0.006 | 0.009 | 0.2 | BDL |
| 3 | AG-3 | 0.02 | 0.007 | 0.001 | BDL | 0.01 | 0.8 | 0.1 | 0.009 | 0.009 | 0.1 | BDL |
| 4 | AG-4 | 0.02 | 0.007 | 0.001 | BDL | 0.02 | 1.0 | **0.4** | 0.01 | 0.009 | 0.1 | BDL |
| 5 | AG-5 | 0.09 | 0.009 | 0.0005 | BDL | 0.01 | 1.0 | 0.03 | BDL | BDL | 0.2 | BDL |
| 6 | AG-6 | 0.09 | 0.009 | ND | BDL | 0.009 | **9.2** | 0.1 | BDL | BDL | 0.6 | BDL |
| 7 | AG-7 | 0.09 | 0.009 | 0.0001 | BDL | 0.01 | 1.0 | 0.03 | BDL | BDL | 0.2 | BDL |
| 8 | AG-8 | 0.09 | BDL | 0.0001 | BDL | 0.01 | 0.6 | 0.02 | BDL | BDL | 0.7 | BDL |
| 9 | AG-9 | 0.09 | ND | ND | BDL | 0.01 | **6.7** | **0.4** | 0.006 | BDL | 19.0 | BDL |
| 10 | AG-10 | 0.09 | ND | ND | BDL | 0.009 | 0.6 | 0.03 | BDL | BDL | 0.2 | BDL |
| 11 | AG-11 | 0.09 | ND | ND | BDL | 0.01 | 0.6 | 0.04 | BDL | BDL | 0.5 | BDL |
| 12 | AG-12 | 0.09 | ND | ND | BDL | 0.01 | 0.8 | 0.03 | BDL | BDL | 0.6 | BDL |
| 13 | AG-13 | 0.09 | ND | ND | BDL | 0.03 | 0.5 | 0.04 | BDL | BDL | 0.2 | BDL |
| 14 | AG-14 | 0.09 | ND | ND | BDL | 0.01 | **1.4** | 0.09 | BDL | BDL | 0.3 | BDL |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | AG-15 | 0.09 | ND | ND | BDL | 0.01 | 0.7 | 0.02 | BDL | BDL | 0.6 | BDL |
| 16 | AG-16 | 0.09 | ND | ND | BDL | 0.007 | 1.0 | 0.02 | BDL | BDL | 0.09 | BDL |
| 17 | AG-17 | 0.03 | ND | ND | BDL | 0.008 | 0.5 | 0.2 | BDL | BDL | 0.08 | BDL |
| 18 | AG-18 | 0.09 | ND | ND | BDL | 0.01 | **12.0** | 0.05 | BDL | BDL | 0.2 | BDL |
| 19 | AG-19 | 0.09 | ND | ND | BDL | 0.02 | **2.4** | 0.05 | BDL | BDL | 0.1 | BDL |
| 20 | AG-20 | 0.09 | ND | ND | BDL | 0.02 | **2.6** | 0.03 | BDL | BDL | 0.3 | BDL |
| 21 | AG-21 | 0.09 | ND | ND | BDL | 0.01 | 0.8 | 0.03 | BDL | BDL | 0.1 | BDL |
| 22 | AG-22 | 0.09 | ND | ND | BDL | 0.01 | 0.6 | 0.05 | BDL | BDL | 0.06 | BDL |
| 23 | AG-23 | 0.008 | ND | ND | BDL | 0.009 | **1.1** | 0.02 | BDL | BDL | 0.2 | BDL |
| 24 | AG-24 | **0.5** | ND | ND | BDL | 0.01 | **1.4** | 0.1 | BDL | BDL | 0.1 | BDL |
| 25 | AG-25 | 0.006 | ND | ND | BDL | 0.01 | **2.3** | 0.05 | BDL | BDL | 1.4 | BDL |
| 26 | AG-26 | 0.007 | ND | ND | BDL | 0.009 | 0.6 | 0.03 | BDL | BDL | 0.09 | BDL |
| 27 | AG-28 | 0.009 | ND | ND | BDL | 0.01 | **2.7** | 0.2 | BDL | BDL | 0.5 | BDL |
| 28 | AG-29 | 0.001 | ND | ND | BDL | 0.02 | **8.8** | 0.09 | BDL | BDL | 0.5 | BDL |
| 29 | AG-30 | 0.004 | ND | ND | BDL | 0.01 | 0.7 | 0.02 | BDL | BDL | 0.08 | BDL |
| 30 | AG-31 | 0.002 | ND | ND | BDL | 0.009 | 0.8 | **0.5** | BDL | BDL | 0.1 | BDL |
| 31 | AG-32 | 0.001 | ND | ND | BDL | 0.006 | **18.0** | 0.1 | BDL | BDL | 0.6 | BDL |
| 32 | AG-34 | 0.006 | ND | ND | BDL | 0.009 | **1.8** | 0.04 | BDL | BDL | 0.2 | BDL |
| 33 | AG-35 | 0.005 | ND | ND | BDL | 0.02 | **3.3** | 0.03 | BDL | BDL | 0.1 | BDL |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 34 | AG-36 | 0.09 | ND | ND | BDL | 0.01 | **4.0** | 0.03 | BDL | BDL | 0.2 | BDL |
| 35 | AG-37 | 0.03 | ND | ND | BDL | 0.01 | 0.8 | 0.01 | BDL | BDL | 0.2 | BDL |
| 36 | AG-38 | 0.03 | ND | ND | BDL | 0.009 | **1.2** | 0.04 | BDL | BDL | 0.1 | BDL |
| 37 | AG-39 | 0.09 | ND | ND | BDL | 0.007 | 0.8 | 0.01 | BDL | BDL | 0.05 | BDL |
| 38 | AG-40 | 0.09 | ND | ND | BDL | 0.009 | **2.2** | 0.02 | BDL | BDL | 0.1 | BDL |
| 39 | AG-41 | 0.09 | ND | ND | BDL | 0.04 | 0.5 | 0.04 | BDL | BDL | 0.07 | BDL |
| 40 | AG-42 | 0.09 | ND | ND | BDL | 0.008 | **3.2** | 0.05 | BDL | BDL | 0.2 | BDL |
| 41 | AG-43 | 0.09 | ND | ND | BDL | 0.006 | 1.0 | 0.05 | BDL | BDL | 0.05 | BDL |

BDL- below Detection Limit; ND- Not detected

### 4.2.3 Pre-monsoon season (December-2020)

#### Physico-chemical parameters

The physico chemical parameters of water samples in pre-monsoon season are mentioned in the **Table-4.7**.

**TDS:** The TDS concentration was found within permissible limit for all the samples (Figure-4.2).The minimum concentration is 81 mg/L at sample code AG-2 and maximum concentration is 1303 mg/Lat AG-35.

**Chloride ($Cl^-$):**The Chloride ($Cl^-$) concentration was within permissible limit for all the samples (Figure-4.3). The minimum concentration is 5 mg/L at sample code AG-2 and maximum concentration is 425 mg/L at AG-35.

**Turbidity:** Turbidity concentration for all the samples was found to be within the permissible and acceptable limit of BIS except samples AS-1, AG-2, AG-6,AG-14, AG-16, AG-17, AG-18, AG-28, AG-29, AG-32and AG-44 which were found to be in the range of 1-5 NTU. The minimum concentration is 0.1NTU at sample code AG-9 and maximum concentration is 84NTU at AG-18.

**Total Hardness:** The concentration of Total Hardness for all the samples were found to be within the permissible and acceptable limit of BIS except sample AG-35.The minimum concentration is 70 mg/L at sample code AG-2 and maximum concentration is 880 mg/L at AG-35.

**Nitrate($No_3^-$):** The concentration of nitrate ($No_3^-$) were found to be within the permissible limit of BIS, except for sample AG-9, AG-12, AG-14, AG-23, AG-27, AG-33, AG-34, AG-35 and AG-39 which were found to be in the range of 60 – 180 mg/L(Figure-4.4).The minimum concentration is 2 mg/L at sample code AG-18 and maximum concentration is 89.8 mg/L at AG-35.

**Sulphate ($SO_4^2$-):** The Sulphate ($SO_4^2$-) concentration was within permissible limit for all the samples (Figure-4.5).The minimum concentration is 16.5 mg/L at sample code AG-31 and maximum concentration is 0.6 mg/L at AG-43.

**Fluoride($F^-$):**The concentration of fluoride ($F^-$) in all the sample were found to be well within the permissible and acceptable limit of BIS. exceptfor samples AS-1, AG-10, AG-37 and AG-

38 which were found to be 2 mg/l (Figure 4.6).The minimum concentration is 0.1 mg/L at sample code AG-2 and maximum concentration is 2.3 mg/L at AG-10.

The parameters namely pH, TDS,Total Alkalinity, Calcium ($Ca^{2+}$), Magnesium ($Mg^{2+}$),Sulphate ($SO_4^{2}$-) and Chloride ($Cl^-$) concentrations of all the samples were found to be within the permissible and acceptable limits of BIS.

**Table4.7: Physico-chemical parameters in post-monsoon(December2020)**

| Sr. No | Sample Code | pH | EC | TDS | Turbidity | Total alkalinity as $CaCO_3$ | Total Hardness as $CaCO_3$ | Calcium as $Ca^{2+}$ | Magnesium $Mg^2$ | Chloride as $Cl^-$ | Sulphate as $SO_4^{2-}$ | Nitrate $NO^{3-}$ | Phosphate as $PO_4^{-2}$ | Sodium as $Na^+$ | Potassium as $K^+$ | Fluoride as $F^-$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Units | | - | µS/cm | mg/L | NTU | mg/L | | | | | | | | | | |
| BIS 10500:2012 (Acceptable/ Permissible limit) | | 6.5-8.5 | - | 500-2000 | 1-5 | 200-600 | 200-600 | 75-200 | 30-100 | 250-1000 | 200-400 | 45 | - | - | - | 1.0-1.5 |
| 1 | **AG-2** | 7.2 | 135 | 81 | **7.4** | 80 | 70 | 20 | 4.8 | 5 | 1.7 | 5.2 | 0.3 | 15.2 | 4.2 | 0.1 |
| 2 | **AG-3** | 7.6 | 667 | 400 | 0.4 | 240 | 250 | 20 | 48 | 50 | 2.3 | 12 | 1.1 | 68.2 | 2.8 | 0.7 |
| 3 | **AG-4** | 7.2 | 584 | 351 | 0.3 | 260 | 250 | 36 | 38.4 | 60 | 2.5 | 13.4 | 0.9 | 73.4 | 4.1 | 1.1 |
| 4 | **AG-5** | 7.2 | 1240 | 744 | 0.4 | 370 | 360 | 16 | 76.8 | 90 | 13.2 | 11 | 0.9 | 115 | 9.3 | 0.4 |
| 5 | **AG-6** | 7.1 | 492 | 295 | **23** | 80 | 140 | 48 | 4.8 | 105 | 2.9 | 23 | ND | 72.5 | 5.2 | 0.4 |
| 6 | **AG-7** | 7.1 | 718 | 431 | 0.4 | 170 | 300 | 48 | 43.2 | 95 | 1.9 | 34.6 | 0.8 | 49 | 6.6 | 0.2 |
| 7 | **AG-8** | 7.5 | 586 | 352 | 0.2 | 200 | 220 | 40 | 28.8 | 65 | 3.1 | 20.6 | 0.6 | 72.4 | 6.5 | 0.2 |
| 8 | **AG-9** | 6.4 | 982 | 589 | 0.1 | 210 | 310 | 20 | 62.4 | 105 | 2.6 | **45.3** | 0.4 | 79.3 | 6.7 | 0.3 |
| 9 | **AG-10** | 8.3 | 1463 | 878 | 0.3 | 530 | 140 | 28 | 16.8 | 130 | 3.2 | 16.9 | 0.9 | 350 | 4.8 | **2.3** |
| 10 | **AG-11** | 7.5 | 643 | 374 | 0.5 | 290 | 230 | 40 | 31.2 | 25 | 2.3 | 19.6 | 1 | 88 | 3.4 | 1.2 |
| 11 | **AG-12** | 7.2 | 1088 | 639 | 0.3 | 270 | 370 | 32 | 69.6 | 105 | 9.8 | **63** | 0.7 | 103 | 3.2 | 0.3 |

| **Sr. No** | **Sample Code** | **pH** | **EC** | **TDS** | **Turbidity** | **Total alkalinity as $CaCO_3$** | **Total Hardness as $CaCO_3$** | **Calcium as $Ca^{2+}$** | **Magnesium $Mg^2$** | **Chloride as $Cl^-$** | **Sulphate as $SO_4^{2-}$** | **Nitrate $NO^{3-}$** | **Phosphate as $PO_4^{-2}$** | **Sodium as $Na^+$** | **Potassium as $K^+$** | **Fluoride as $F^-$** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Units** | | **-** | **µS/cm** | **mg/L** | **NTU** | **mg/L** | | | | | | | | | | |
| **BIS 10500:2012 (Acceptable/ Permissible limit)** | | **6.5-8.5** | **-** | **500-2000** | **1-5** | **200-600** | **200-600** | **75-200** | **30-100** | **250-1000** | **200-400** | **45** | **-** | **-** | **-** | **1.0-1.5** |
| 12 | **AG-13** | 7.6 | 1114 | 669 | 0.4 | 390 | 460 | 44 | 84 | 120 | 7.7 | 29 | 0.8 | 150 | 3.9 | 1 |
| 13 | **AG-14** | 7 | 1524 | 915 | 10 | 280 | 480 | 60 | 79.2 | 275 | 5.8 | 78.9 | 1.1 | 118 | 15.4 | 0.3 |
| 14 | **AG-15** | 7.6 | 162 | 97 | 0.7 | 100 | 90 | 24 | 7.2 | 10 | 1.4 | 7 | 0.9 | 24.3 | 3.0 | 0.2 |
| 15 | **AG-15** | 7.2 | 702 | 421 | 20 | 310 | 230 | 20 | 43.2 | 70 | 1.7 | 4.3 | 0.7 | 124 | 8.7 | 0.5 |
| 16 | **AG-17** | 7.8 | 318 | 191 | 19 | 160 | 130 | 12 | 24.0 | 15 | 2.1 | 5.5 | 0.8 | 42.3 | 4.0 | 0.3 |
| 17 | **AG-18** | 7.3 | 453 | 272 | 84 | 210 | 170 | 20 | 28.8 | 25 | 0.8 | 2 | 0.8 | 60.9 | 3.9 | 0.4 |
| 18 | **AG-19** | 7.6 | 488 | 293 | 0.9 | 210 | 150 | 16 | 26.4 | 25 | 2.1 | 7.9 | 1.1 | 71.6 | 4.8 | 0.2 |
| 19 | **AG-20** | 7.4 | 730 | 438 | 0.9 | 200 | 150 | 24 | 21.6 | 30 | 2.5 | 28 | 0.5 | 80.4 | 5.6 | 0.5 |
| 20 | **AG-21** | 7.6 | 827 | 496 | 0.4 | 170 | 230 | 48 | 26.4 | 135 | 2.7 | 19.9 | 0.3 | 109 | 5.2 | 0.4 |
| 21 | **AG-22** | 7 | 656 | 394 | 0.6 | 220 | 200 | 16 | 38.4 | 92 | 4.6 | 4.1 | 0.3 | 111 | 2.3 | 0.5 |
| 22 | **AG-23** | 7.2 | 1158 | 695 | 4.5 | 250 | 410 | 76 | 52.8 | 180 | 6.8 | 53.6 | 0.8 | 91.8 | 5.6 | 0.4 |
| 23 | **AG-24** | 7.7 | 172 | 103 | 2.6 | 80 | 90 | 20 | 9.6 | 10 | 2.2 | 4.3 | 0.7 | 13.2 | 3.5 | 0.2 |

| Sr. No | Sample Code | pH | EC | TDS | Turbidity | Total alkalinity as $CaCO_3$ | Total Hardness as $CaCO_3$ | Calcium as $Ca^{2+}$ | Magnesium $Mg^2$ | Chloride as $Cl^-$ | Sulphate as $SO_4^{2-}$ | Nitrate $NO^{3-}$ | Phosphate as $PO_4^{-2}$ | Sodium as $Na^+$ | Potassium as $K^+$ | Fluoride as $F^-$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Units** | | **-** | **µS/cm** | **mg/L** | **NTU** | **mg/L** | | | | | | | | | | |
| **BIS 10500:2012 (Acceptable/ Permissible limit)** | | **6.5-8.5** | **-** | **500-2000** | **1-5** | **200-600** | **200-600** | **75-200** | **30-100** | **250-1000** | **200-400** | **45** | **-** | **-** | **-** | **1.0-1.5** |
| 24 | **AG-25** | 7.1 | 1351 | 811 | 1.7 | 290 | 220 | 44 | 26.4 | 190 | 8.9 | 30.9 | 0.3 | 185 | 5.3 | 0.5 |
| 25 | **AG-26** | 7.5 | 595 | 357 | 0.7 | 210 | 260 | 28 | 45.6 | 75 | 2.6 | 18.2 | 0.4 | 65.3 | 4.8 | 0.4 |
| 2 | **AG-27** | 7.1 | 1665 | 999 | 1.7 | 370 | 400 | 40 | 72 | 225 | 9.6 | 65.9 | 0.7 | 187 | 100 | 0.7 |
| 28 | **AG-28** | 7.5 | 502 | 301 | 20 | 200 | 140 | 16 | 24 | 35 | 4.3 | 4.8 | 0.7 | 77.0 | 9.5 | 0.3 |
| 29 | **AG-29** | 7.3 | 905 | 543 | 7.4 | 220 | 250 | 32 | 40.8 | 160 | 5.9 | 35.2 | ND | 64.7 | 9.6 | 0.3 |
| 30 | **AG-30** | 7.4 | 650 | 309 | 0.2 | 200 | 198 | 16 | 37.9 | 75 | 4.2 | 2.8 | 0.1 | 86.4 | 2.7 | 0.5 |
| 31 | **AG-31** | 6.9 | 815 | 489 | 0.5 | 260 | 340 | 40 | 57.6 | 60 | 16.5 | 16.4 | 0.6 | 55.4 | 4.3 | 0.2 |
| 32 | **AG-32** | 7.3 | 696 | 418 | 42 | 320 | 220 | 20 | 40.8 | 35 | 1.2 | 5.1 | 0.4 | 82.8 | 14.5 | 0.3 |
| 33 | **AG-33** | 6.7 | 1410 | 846 | 4.4 | 220 | 410 | 80 | 50.4 | 255 | 6.4 | 52.5 | 0.2 | 147 | 3.5 | 0.5 |
| 34 | **AG-34** | 7.3 | 1033 | 620 | 0.5 | 270 | 320 | 16 | 67.2 | 135 | 2.1 | 53.4 | 0.7 | 136 | 6.6 | 0.5 |
| 35 | **AG-35** | 7.1 | 2190 | 1303 | 4.7 | 360 | 880 | 80 | 163 | 425 | 12.5 | 89.8 | 1.1 | 192 | 3.9 | 0.5 |
| 36 | **AG-36** | 7.8 | 289 | 173 | 0.4 | 110 | 90 | 16 | 12 | 30 | 1.7 | 2.8 | 0.3 | 45.6 | 3.8 | 0.2 |

| Sr. No | Sample Code | pH | EC | TDS | Turbidity | Total alkalinity as $CaCO_3$ | Total Hardness as $CaCO_3$ | Calcium as $Ca^{2+}$ | Magnesium $Mg^2$ | Chloride as $Cl^-$ | Sulphate as $SO_4^{2-}$ | Nitrate $NO^{3-}$ | Phosphate as $PO_4^{-2}$ | Sodium as $Na^+$ | Potassium as $K^+$ | Fluoride as $F^-$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Units** | | **-** | **µS/cm** | **mg/L** | **NTU** | **mg/L** | | | | | | | | | | |
| **BIS 10500:2012 (Acceptable/ Permissible limit)** | | **6.5-8.5** | **-** | **500-2000** | **1-5** | **200-600** | **200-600** | **75-200** | **30-100** | **250-1000** | **200-400** | **45** | **-** | **-** | **-** | **1.0-1.5** |
| 37 | **AG-37** | 7.5 | 624 | 375 | 0.2 | 380 | 180 | 20 | 31.2 | 25 | 1.7 | 3.4 | 0.9 | 141 | 11.6 | 1.8 |
| 38 | **AG-38** | 7.4 | 869 | 521 | 1.2 | 290 | 160 | 24 | 24 | 95 | 4.3 | 2 | 1.2 | 170 | 3.5 | 1.6 |
| 39 | **AG-39** | 7 | 1879 | 1127 | 3.7 | 320 | 330 | 56 | 45.6 | 330 | 9.1 | 65.8 | 0.6 | 252 | 3.8 | 0.8 |
| 40 | **AG-40** | 7.8 | 444 | 267 | 0.4 | 190 | 140 | 20 | 21.6 | 25 | 1.9 | 3.8 | 1.2 | 64.3 | 2.9 | 0.5 |
| 41 | **AG-41** | 7.5 | 738 | 443 | 0.5 | 360 | 270 | 28 | 48.0 | 30 | 1.0 | 3.7 | 0.4 | 102 | 5.1 | 0.4 |
| 42 | **AG-42** | 7.4 | 774 | 464 | 1.3 | 380 | 260 | 20 | 50.4 | 60 | 2.1 | 9.1 | 1.3 | 146 | 8.6 | 0.6 |
| 43 | **AG-43** | 7.4 | 458 | 275 | 3.5 | 250 | 210 | 32 | 31.2 | 20 | 0.6 | 2.4 | 0.8 | 59.1 | 2.9 | 0.5 |
| 44 | **AG-44** | 6.9 | 878 | 527 | 32 | 230 | 300 | 40 | 48.0 | 130 | 4.6 | 38.3 | 1.1 | 115 | 3.3 | 0.5 |
| 45 | **AG-45** | 7.1 | 709 | 425 | 2.1 | 310 | 250 | 32 | 40.8 | 60 | 1.5 | 3.1 | 1.4 | 91.7 | 5.9 | 0.3 |
| 46 | **AG-46** | 7.7 | 621 | 373 | 0.2 | 310 | 220 | 24 | 38.4 | 35 | 1.8 | 8.4 | 1.4 | 105 | 2.5 | 0.8 |
| 47 | **AG-47** | 7.6 | 276 | 166 | 0.4 | 120 | 120 | 24 | 14.4 | 10 | 1.6 | 8.9 | 0.8 | 16.5 | 4.3 | 0.2 |
| 48 | **AG-48** | 7.2 | 250 | 150 | 0.2 | 120 | 108 | 16 | 16.3 | 20 | 0.8 | 11.8 | 1.4 | 38.2 | 2.9 | 0.4 |

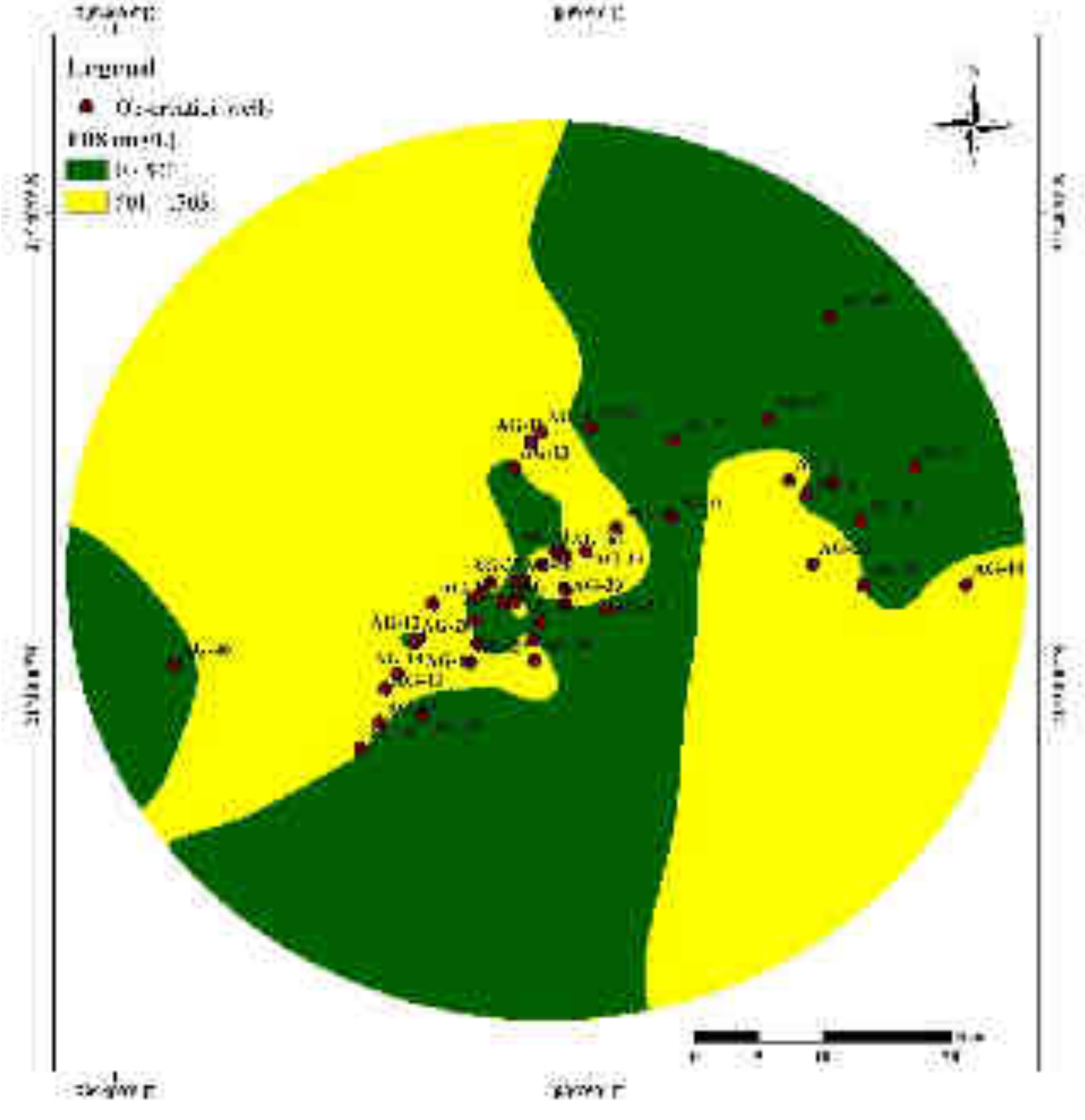


Figure 4.8:TDS concentration inDecember 2020

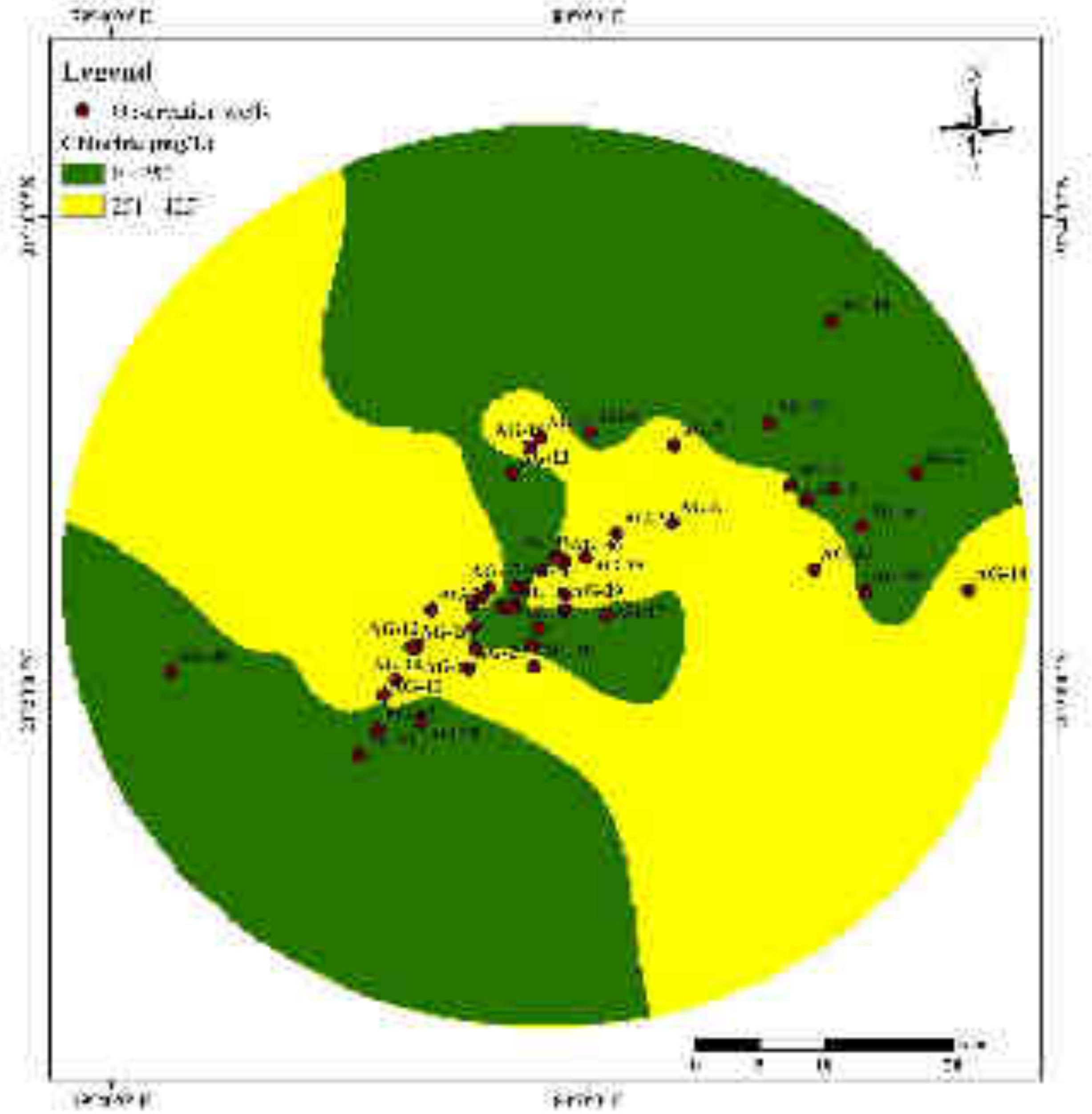


Figure 4.9: Chloride concentration in December 2020

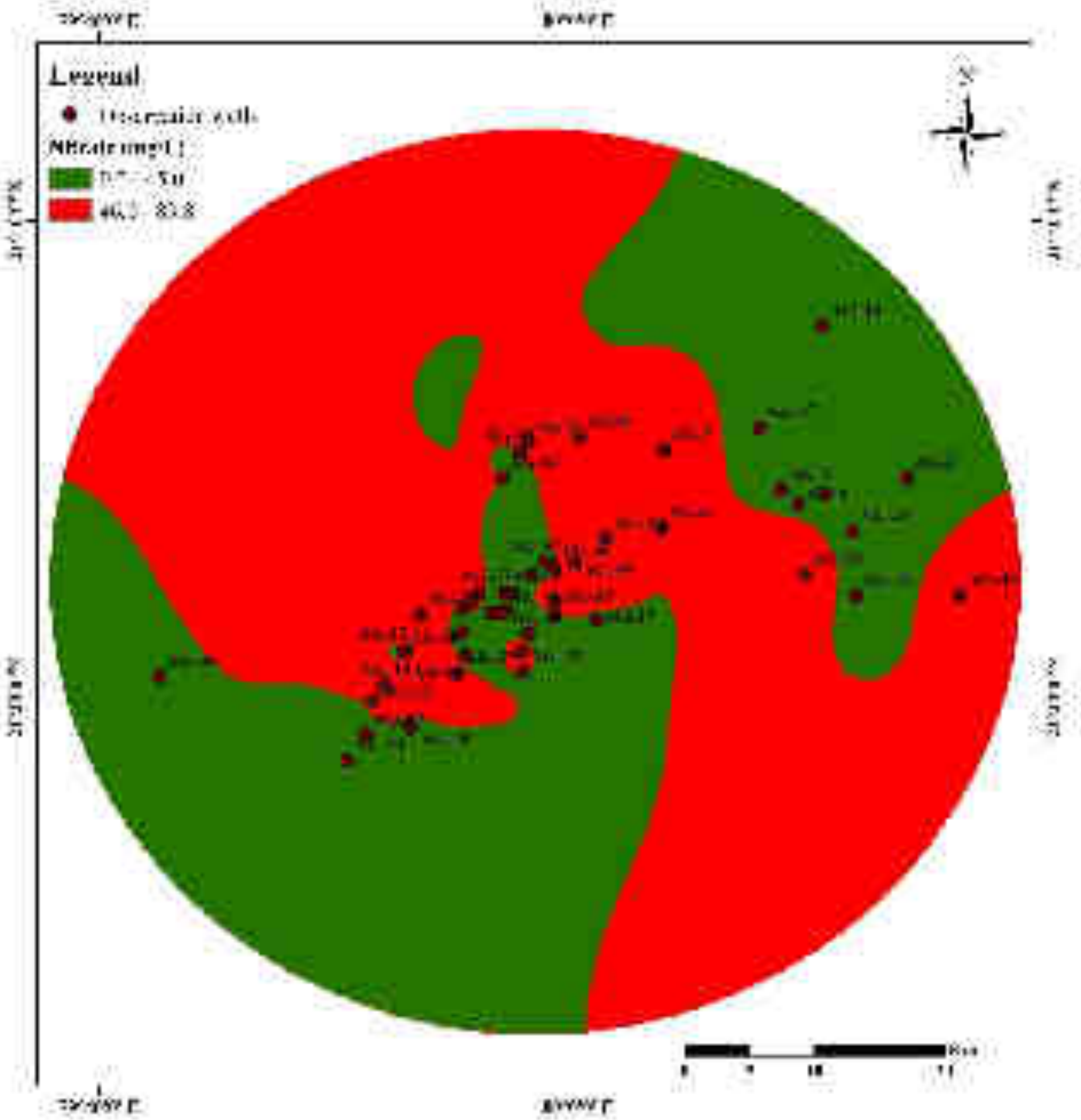


**Figure 4.10: Nitrate concentration in December 2020**

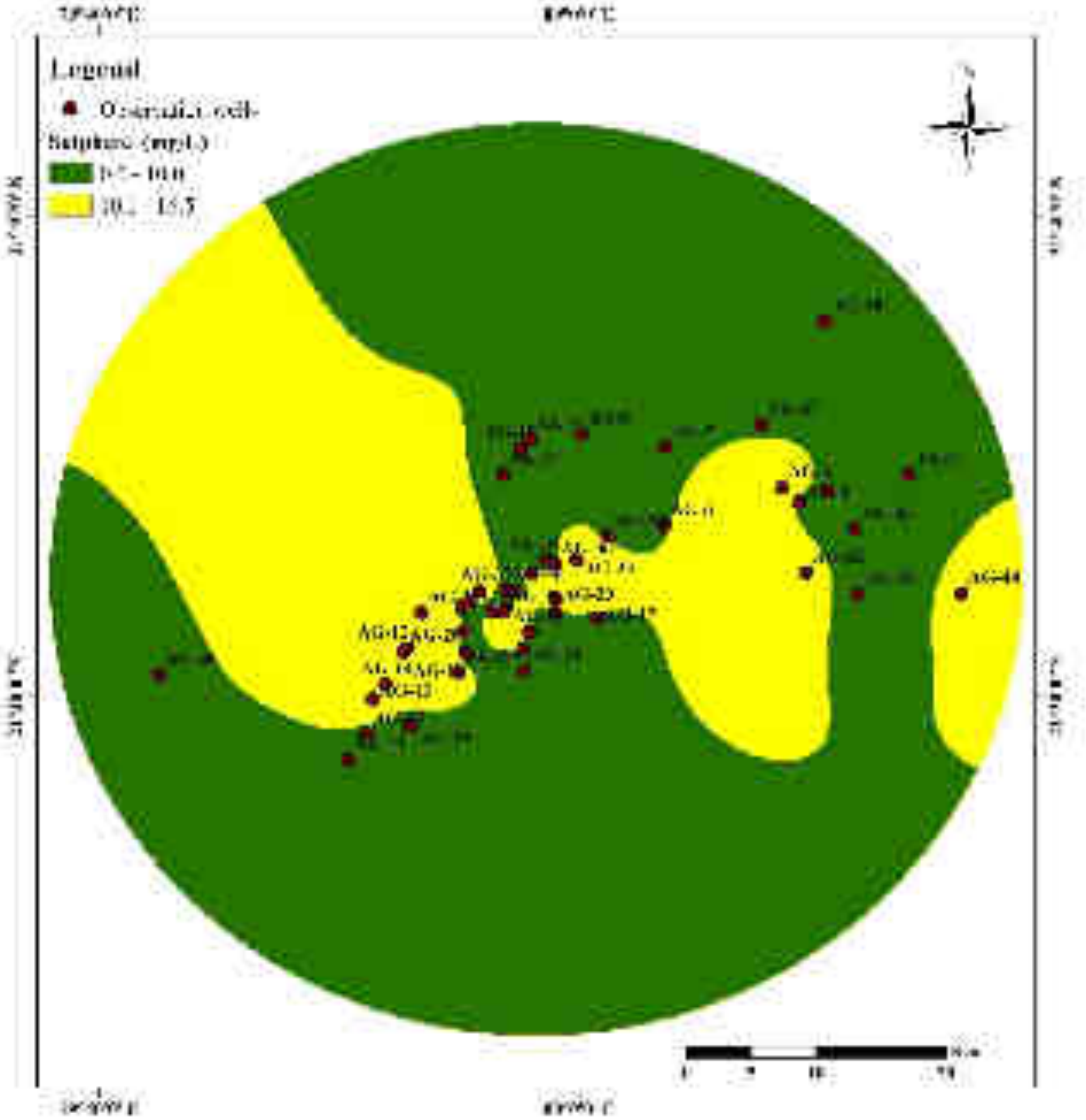


Figure 4.11: Sulphate  concentration inDecember 2020

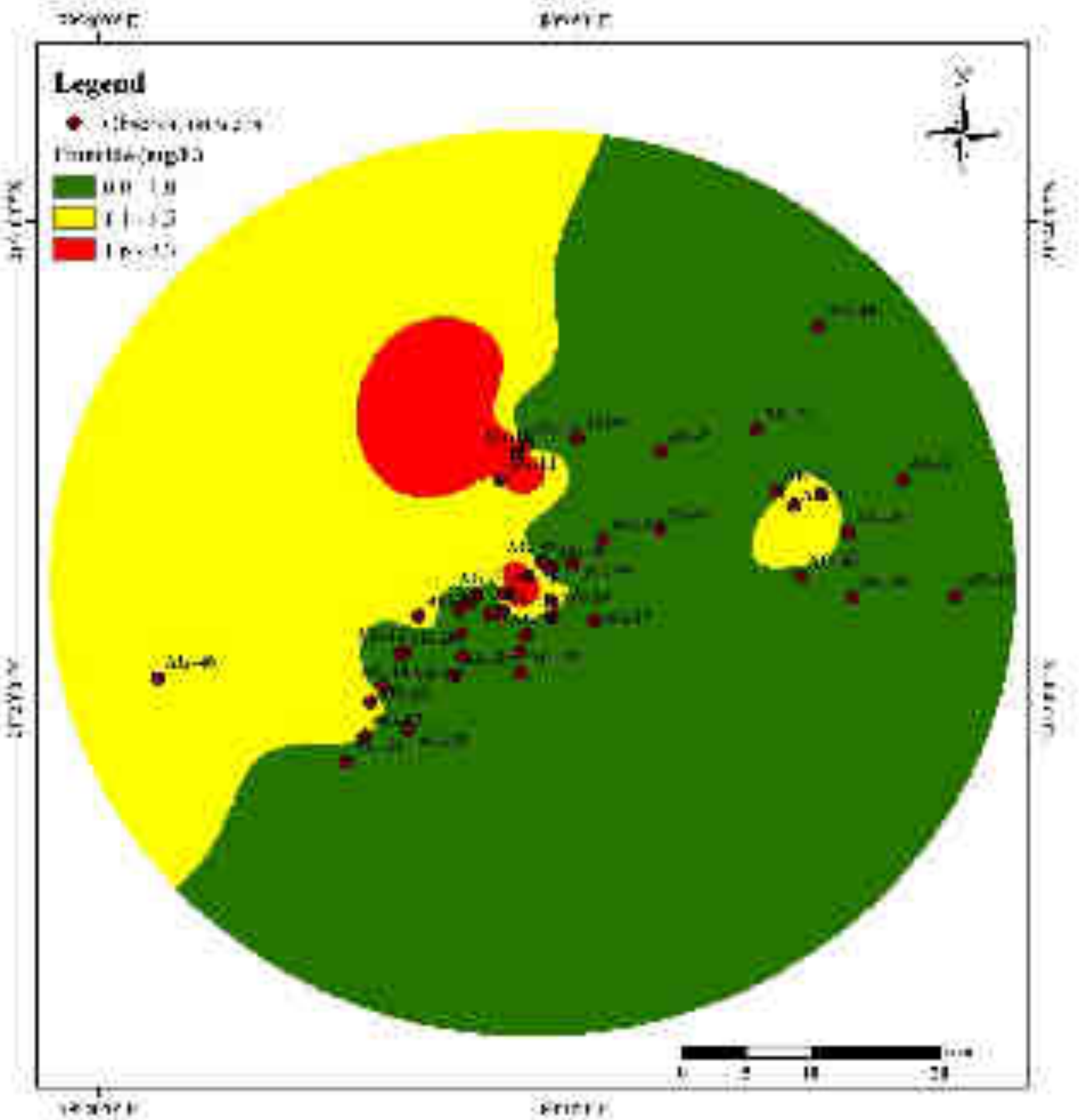


Figure 4.12: Fluoride  concentration in December 2020

**Heavy metal parameters**

The Heavy metal analysis of water samples in post-monsoon(December 2020) season are mentioned in the **Table-4.8**.

The concentration of heavy metals Ba, Co, Cd, Cr, Cu, Ni, Pb, Zn and Hg were all found to be well within the permissible and acceptable limit of BIS.

The concentration of As in all the samples were found to be within the permissible and acceptable limits of BIS except samples AG-18 and AG-25.The minimum concentration is 0.01 ppm at sample code AG-2, AG-4, AG-6, AG-7, AG- 10, AG-16, AG-19, AG-21, AG-26, AG-41 and maximum concentration is 0.1 ppm at AG-17.

The concentration of Al in all the samples were found to be within the permissible and acceptable limit of BIS, except for samples AG-2 and AG-6.The minimum concentration is 0.01 ppm at sample code AG-3, AG-5, AG-7, AG-8, AG- 21, AG-40, AG-48and maximum concentration is 0.2 ppm at AG-43.

The concentration of Mn in all the samples were found to be within the permissible and acceptable limits of BIS except samples AG-2 and AG-6 which were found to be 0.4 and 0.5ppm respectively.

The concentration of Iron (Fe-) were found to be within the permissible limit of BIS, except for sample AG-6. The minimum concentration is 0.003ppm at sample code AG-48 and maximum concentration is 5.2 ppm at AG-6.

## Table-4.8: Heavy Metal parameters in Post-monsoon (December2020)

| Sr. No | Sample code | As | Al | Ba | Co | Cd | Cr | Cu | Fe | Mn | Ni | Pb | Zn | Hg |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BIS Limit (ppm)** | | **0.01** | **0.03-0.2** | **0.7** | **-** | **0.003** | **0.05** | **0.05-1.5** | **1.0** | **0.10-0.3** | **0.02** | **0.01** | **5.0-15** | **0.001** |
| **ICP detection Limit (ppm)** | | 0.007 | 0.00001 | 0.0001 | - | 0.0001 | 0.01 | 0.0004 | 0.0003 | 0.0001 | 0.005 | 0.009 | 0.001 | 0.000001 |
| 1 | **AS-1** | **0.1** | **5.4** | 0.2 | 0.003 | 0.0002 | BDL | 0.02 | 0.5 | 0.1 | ND | BDL | 0.1 | 0.4 |
| 2 | **AG-2** | 0.01 | **0.5** | 0.02 | 0.0003 | 0.0001 | BDL | 0.1 | 0.1 | **0.4** | ND | BDL | 0.1 | ND |
| 3 | **AG-3** | BDL | 0.01 | 0.1 | 0.0005 | BDL | BDL | 0.005 | 0.01 | 0.1 | ND | BDL | 0.005 | ND |
| 4 | **AG-4** | 0.01 | 0.1 | 0.04 | 0.0009 | BDL | BDL | 0.05 | 0.02 | 0.1 | ND | BDL | 0.02 | ND |
| 5 | **AG-5** | BDL | 0.01 | 0.03 | ND | BDL | BDL | 0.01 | 0.005 | 0.03 | ND | BDL | 0.01 | ND |
| 6 | **AG-6** | 0.01 | **0.6** | ND | 0.005 | 0.001 | BDL | 0.1 | **5.2** | **0.5** | ND | BDL | 1.9 | ND |
| 7 | **AG-7** | 0.01 | 0.01 | 0.1 | 0.0007 | 0.0001 | BDL | 0.004 | 0.1 | 0.1 | ND | BDL | 0.07 | ND |
| 8 | **AG-8** | BDL | 0.01 | 0.05 | 0.0005 | BDL | BDL | 0.01 | 0.01 | 0.1 | ND | BDL | 0.02 | ND |
| 9 | **AG-9** | BDL | 0.04 | 0.3 | 0.002 | BDL | BDL | 0.01 | 0.03 | 0.2 | ND | BDL | 0.05 | ND |
| 10 | **AG-10** | 0.01 | 0.05 | 0.02 | 0.001 | BDL | BDL | 0.005 | 0.04 | 0.04 | ND | BDL | 0.01 | ND |
| 11 | **AG-11** | BDL | 0.04 | 0.01 | ND | BDL | BDL | 0.02 | 0.02 | 0.1 | ND | BDL | 0.02 | ND |
| 12 | **AG-12** | BDL | 0.01 | 0.01 | 0.008 | 0.001 | BDL | 0.01 | 0.01 | 0.1 | ND | BDL | 0.01 | ND |
| 13 | **AG-13** | BDL | 0.04 | 0.01 | 0.001 | BDL | BDL | 0.01 | 0.02 | 0.1 | ND | BDL | 0.01 | ND |
| 14 | **AG-14** | BDL | 0.02 | 0.04 | 0.001 | BDL | BDL | ND | 0.01 | 0.1 | ND | BDL | 0.01 | ND |

| **Sr. No** | **Sample code** | **As** | **Al** | **Ba** | **Co** | **Cd** | **Cr** | **Cu** | **Fe** | **Mn** | **Ni** | **Pb** | **Zn** | **Hg** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BIS Limit (ppm)** | | **0.01** | **0.03-0.2** | **0.7** | **-** | **0.003** | **0.05** | **0.05-1.5** | **1.0** | **0.10-0.3** | **0.02** | **0.01** | **5.0-15** | **0.001** |
| **ICP detection Limit (ppm)** | | 0.007 | 0.00001 | 0.0001 | - | 0.0001 | 0.01 | 0.0004 | 0.0003 | 0.0001 | 0.005 | 0.009 | 0.001 | 0.000001 |
| 15 | **AG-15** | BDL | 0.1 | 0.02 | ND | 0.0001 | BDL | 0.001 | 0.01 | 0.1 | ND | BDL | 0.1 | ND |
| 16 | **AG-16** | 0.01 | 0.04 | 0.04 | 0.001 | 0.0003 | BDL | 0.002 | 0.02 | 0.1 | ND | BDL | 0.2 | ND |
| 17 | **AG-17** | BDL | 0.1 | 0.03 | 0.001 | 0.0001 | BDL | 0.005 | 0.03 | 0.2 | ND | BDL | 0.2 | ND |
| 18 | **AG-18** | **0.02** | 0.02 | ND | 0.001 | 0.0001 | BDL | ND | 0.02 | 0.1 | ND | BDL | 0.04 | ND |
| 19 | **AG-19** | 0.01 | 0.02 | ND | 0.002 | 0.0001 | BDL | 0.001 | 0.01 | 0.02 | ND | BDL | 0.01 | ND |
| 20 | **AG-20** | BDL | 0.02 | ND | 0.001 | BDL | BDL | ND | 0.01 | 0.03 | ND | BDL | 0.005 | ND |
| 21 | **AG-21** | 0.01 | 0.01 | ND | 0.0003 | 0.0001 | BDL | 0.004 | 0.01 | 0.03 | ND | BDL | 0.01 | ND |
| 22 | **AG-22** | BDL | 0.02 | ND | 0.001 | 0.0001 | BDL | ND | 0.01 | 0.02 | ND | BDL | 0.002 | ND |
| 23 | **AG-23** | 0.01 | 0.02 | ND | ND | 0.0002 | BDL | 0.002 | 0.01 | 0.06 | ND | BDL | 0.01 | ND |
| 24 | **AG-24** | 0.01 | 0.03 | ND | 0.002 | 0.0001 | BDL | ND | 0.005 | 0.04 | ND | BDL | 0.02 | ND |
| 25 | **AG-25** | **0.02** | 0.03 | 0.02 | 0.001 | 0.0002 | BDL | BDL | 0.01 | 0.2 | ND | BDL | 0.05 | ND |
| 26 | **AG-26** | 0.01 | 0.03 | ND | 0.001 | 0.0002 | BDL | ND | 0.005 | 0.04 | ND | BDL | 0.01 | 0.8 |
| 27 | **AG-27** | BDL | 0.02 | ND | 0.001 | 0.0001 | BDL | ND | 0.004 | 0.01 | ND | BDL | 0.006 | ND |
| 28 | **AG-28** | BDL | 0.03 | ND | 0.001 | 0.0001 | BDL | BDL | 0.01 | 0.06 | ND | BDL | 0.001 | ND |
| 29 | **AG-29** | BDL | 0.04 | ND | 0.001 | 0.0001 | BDL | ND | 0.01 | 0.1 | ND | BDL | 0.001 | ND |

| Sr. No | Sample code | As | Al | Ba | Co | Cd | Cr | Cu | Fe | Mn | Ni | Pb | Zn | Hg |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BIS Limit (ppm)** | | **0.01** | **0.03-0.2** | **0.7** | **-** | **0.003** | **0.05** | **0.05-1.5** | **1.0** | **0.10-0.3** | **0.02** | **0.01** | **5.0-15** | **0.001** |
| **ICP detection Limit (ppm)** | | 0.007 | 0.00001 | 0.0001 | - | 0.0001 | 0.01 | 0.0004 | 0.0003 | 0.0001 | 0.005 | 0.009 | 0.001 | 0.000001 |
| 30 | **AG-30** | BDL | 0.04 | ND | 0.001 | 0.0002 | BDL | 0.006 | 0.01 | 0.1 | ND | BDL | 0.03 | ND |
| 31 | **AG-31** | BDL | 0.03 | ND | 0.002 | 0.0002 | BDL | ND | 0.01 | 0.05 | ND | BDL | 0.01 | ND |
| 32 | **AG-32** | ND | 0.03 | ND | 0.001 | 0.0002 | BDL | 0.002 | 0.01 | 0.1 | ND | BDL | 0.02 | ND |
| 33 | **AG-33** | BDL | 0.03 | ND | 0.001 | 0.0001 | BDL | ND | 0.01 | 0.1 | ND | BDL | 0.01 | ND |
| 34 | **AG-34** | BDL | 0.03 | ND | 0.002 | 0.0002 | BDL | ND | 0.01 | 0.1 | ND | BDL | 0.01 | ND |
| 35 | **AG-35** | BDL | 0.03 | ND | 0.0002 | 0.0002 | BDL | ND | 0.01 | 0.1 | ND | BDL | 0.003 | ND |
| 36 | **AG-36** | BDL | 0.03 | ND | 0.001 | 0.0002 | BDL | 0.002 | 0.01 | 0.1 | ND | BDL | 0.005 | 0.004 |
| 37 | **AG-37** | BDL | 0.05 | ND | 0.001 | 0.0002 | BDL | ND | 0.004 | 0.01 | ND | BDL | ND | ND |
| 38 | **AG-38** | BDL | 0.05 | ND | 0.001 | 0.0001 | BDL | ND | 0.01 | 0.01 | ND | BDL | 0.002 | ND |
| 39 | **AG-39** | BDL | 0.06 | ND | 0.002 | 0.0002 | BDL | ND | 0.01 | 0.02 | ND | BDL | 0.003 | ND |
| 40 | **AG-40** | BDL | 0.01 | ND | 0.001 | 0.0001 | BDL | 0.003 | 0.01 | 0.1 | ND | BDL | 0.003 | ND |
| 41 | **AG-41** | 0.01 | 0.04 | ND | 0.001 | 0.0002 | BDL | ND | 0.01 | 0.03 | ND | BDL | 0.001 | ND |
| 42 | **AG-42** | BDL | 0.02 | ND | 0.001 | 0.0002 | BDL | 0.004 | 0.01 | 0.05 | ND | BDL | 0.003 | ND |
| 43 | **AG-43** | BDL | 0.2 | ND | 0.001 | 0.0003 | BDL | 0.004 | 0.02 | ND | ND | BDL | 0.5 | ND |
| 44 | **AG-44** | BDL | 0.02 | 0.1 | 0.0004 | 0.0003 | BDL | ND | 0.01 | 0.3 | ND | BDL | 0.4 | ND |
| 45 | **AG-45** | BDL | 0.02 | ND | 0.001 | 0.0003 | BDL | ND | 0.004 | ND | ND | BDL | 0.1 | ND |
| 46 | **AG-46** | ND | 0.02 | ND | 0.001 | 0.0002 | BDL | ND | 0.01 | ND | ND | BDL | 0.03 | ND |

| Sr. No | Sample code | As | Al | Ba | Co | Cd | Cr | Cu | Fe | Mn | Ni | Pb | Zn | Hg |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BIS Limit (ppm)** | | **0.01** | **0.03-0.2** | **0.7** | **-** | **0.003** | **0.05** | **0.05-1.5** | **1.0** | **0.10-0.3** | **0.02** | **0.01** | **5.0-15** | **0.001** |
| **ICP detection Limit (ppm)** | | 0.007 | 0.00001 | 0.0001 | - | 0.0001 | 0.01 | 0.0004 | 0.0003 | 0.0001 | 0.005 | 0.009 | 0.001 | 0.000001 |
| 47 | **AG-47** | BDL | 0.03 | ND | 0.001 | 0.0002 | BDL | ND | 0.01 | 0.1 | ND | BDL | 0.02 | ND |
| 48 | **AG-48** | BDL | 0.01 | ND | 0.0003 | 0.0002 | BDL | ND | 0.003 | 0.1 | ND | BDL | 0.04 | ND |

### 4.2.4 Pre-monsoon Season (June 2021)

**Physico-chemical Parameters**

The results of physico chemical parameters forgroundwater samples collected in pre-monsoon season (June 2021) are mentioned in **(Table 4.9).**

**pH:** The pH of the samples were found in between 6.6 (AG-9, AG-47) to 8.4 (AG-10) all the samples were within the permissible range (6.5-8.5) as per BIS standards (10500:2012).

**Turbidity:** The Turbidity for all the samples was found to be within the permissible limit as perBIS (10500:2012)except samples, AG-2 (7 NTU), AG-6 (123 NTU), AG-14 (6 NTU), AG-16 (9 NTU), AG-17 (16 NTU), AG-18 (18 NTU), AG-26 (20 NTU), AG-27 (15 NTU), AG-28 (25 NTU), AG-29 (14 NTU), AG-31 (6 NTU), AG-32 (31 NTU), AG-33 (23 NTU), AG-42 (50 NTU), AG-43 (27 NTU), AG-44 (10 NTU), AG-46 (13 NTU), AG-47 (13 NTU) & AG-49 (8 NTU).

**Magnesium:**Magnesium concentration for all the samples were found to be within the permissible limit except sample AG-35 (132 Mg/L) was found to above the permissible and acceptable limit of BIS (10500:2012).

**Nitrate:** The concentration of Nitrate were found to be within the permissible limit of BIS (10500:2012) , except for samples AG-7 (58 Mg/L), AG-9 (45.3 Mg/L),AG-14 (148 Mg/L), AG-20 (52 Mg/L), AG-23 (87 Mg/L), AG-27 (63 Mg/L), AG-29 (92 Mg/L), AG-33 (81 Mg/L),AG-34 (106 Mg/L),AG-35 (187 Mg/L) and AG-39 (167 Mg/L).

**Fluoride:**The concentration of Fluoride for all the samples were found to be within the permissible limitexcept samples AG-10 (2.7 Mg/L), AG-13 (1.6 Mg/L) and AG-38 (1.8 Mg/L)were found exceeding permissible limit as perBIS (10500:2012).

The physic-chemical parameters viz TDS, calcium, Total Hardness, Total alkalinity, sulphate, Phosphate and Chlorides were found to be within the permissible limits of BIS (10500:2012).

**Table 4.9: Physico-chemical parameters in pre-monsoon (June 2021)**

| Sr. No | Sample Code | pH | EC | TDS | Turbidity | Total alkalinity as $CaCO_3$ | Total Hardness as $CaCO_3$ | Calcium as $Ca^{2+}$ | Magnesium $Mg^{2+}$ | Chloride as $Cl^-$ | Sulphate as $SO_4^{2-}$ | Nitrate $NO^{3-}$ | Phosphate as $PO_4^{-2}$ | Sodium as $Na^+$ | Potassium as $K^+$ | Fluoride as $F^-$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Units** | | **-** | **µS/cm** | **mg/L** | **NTU** | **mg/L** | | | | | | | | | | |
| **BIS 10500:2012 (Acceptable/ Permissible limit)** | | **6.5-8.5** | **-** | **500-2000** | **1-5** | **200-600** | **200-600** | **75-200** | **30-100** | **250-1000** | **200-400** | **45** | **-** | **-** | **-** | **1.0-1.5** |
| 1 | **AG-2** | 7 | 164 | 98 | **7** | 80 | 100 | 16 | 14 | 10 | 14 | 2.8 | 0.5 | 12 | 5.4 | 0.2 |
| 2 | **AG-3** | 7.4 | 687 | 412 | 2 | 280 | 150 | 20 | 24 | 50 | 19 | 5.4 | 1.5 | 88 | 4.1 | 0.8 |
| 3 | **AG-4** | 7.1 | 713 | 428 | 1 | 320 | 200 | 20 | 36 | 30 | 32 | 3.5 | 1 | 77 | 3.9 | 0.9 |
| 4 | **AG-5** | 7 | 1135 | 681 | 0.5 | 350 | 310 | 24 | 60 | 70 | 253 | 5.6 | 1 | 118 | 12 | 0.4 |
| 5 | **AG-6** | 7.2 | 1082 | 649 | **123** | 220 | 260 | 16 | 53 | 125 | 18 | 1.1 | 0.2 | 82 | 5.7 | 1.2 |
| 6 | **AG-7** | 7.5 | 640 | 384 | 2 | 180 | 200 | 12 | 41 | 70 | 32 | **58** | 0.9 | 43 | 7.5 | 0.3 |
| 7 | **AG-8** | 7.5 | 648 | 389 | 4 | 260 | 200 | 16 | 38 | 35 | 24 | 19 | 0.8 | 71 | 7.9 | 0.3 |
| 8 | **AG-9** | 6.6 | 961 | 577 | 0.6 | 180 | 300 | 20 | 60 | 140 | 55 | **118** | 0.5 | 77 | 7.9 | 0.3 |
| 9 | **AG-10** | 8.4 | 1481 | 889 | 3 | 580 | 110 | 8 | 22 | 125 | 47 | 1.2 | 1 | 334 | 6.3 | **2.7** |
| 10 | **AG-11** | 7.7 | 670 | 402 | 0.8 | 290 | 170 | 20 | 29 | 30 | 31 | 17 | 1.1 | 99 | 4.9 | 1.3 |
| 11 | **AG-12** | 7.4 | 686 | 412 | 4 | 300 | 200 | 20 | 36 | 25 | 60 | 5.3 | 0.9 | 60 | 3.5 | 0.4 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | **AG-13** | 8.3 | 1001 | 601 | 1 | 470 | 170 | 12 | 34 | 50 | 46 | 4.5 | 0.8 | 216 | 10 | **1.6** |
| 13 | **AG-14** | 7.4 | 1417 | 850 | **6** | 290 | 440 | 20 | 94 | 215 | 88 | **148** | 1.3 | 103 | 16 | 0.4 |
| 14 | **AG-15** | 8 | 211 | 127 | 0.9 | 100 | 90 | 12 | 14 | 20 | 12 | 2.4 | 1.1 | 35 | 5.3 | 0.3 |
| 15 | **AG-16** | 7.8 | 705 | 423 | **9** | 290 | 240 | 12 | 50 | 75 | ND | 4.4 | 0.9 | 108 | 9.7 | 0.6 |
| 16 | **AG-17** | 7.8 | 445 | 267 | **16** | 200 | 180 | 20 | 31 | 20 | 15 | 2.4 | 0.9 | 50 | 4.2 | 0.6 |
| 17 | **AG-18** | 7.8 | 486 | 292 | **18** | 230 | 170 | 16 | 31 | 20 | ND | 2.3 | 0.9 | 62 | 5.2 | 0.6 |
| 18 | **AG-19** | 8.2 | 462 | 277 | 0.6 | 210 | 150 | 12 | 29 | 10 | ND | 5.6 | 1.2 | 58 | 4.4 | 0.3 |
| 19 | **AG-20** | 7.7 | 861 | 517 | 0.8 | 260 | 330 | 12 | 72 | 95 | ND | **52** | 0.7 | 82 | 21 | 0.4 |
| 20 | **AG-21** | 8.1 | 878 | 527 | 3 | 230 | 220 | 16 | 43 | 135 | ND | 8.1 | 0.5 | 136 | 7.1 | 0.5 |
| 21 | **AG-22** | 7.6 | 676 | 405 | 2 | 230 | 110 | 12 | 19 | 50 | 20 | 5.2 | 0.4 | 79 | 3.1 | 0.6 |
| 22 | **AG-23** | 7.3 | 1396 | 837 | 5 | 240 | 460 | 28 | 94 | 220 | ND | **87** | 0.9 | 101 | 6.2 | 0.4 |
| 23 | **AG-24** | 7.6 | 427 | 256 | 2 | 130 | 160 | 8 | 34 | 25 | 32 | 4.2 | 0.8 | 34 | 7.5 | 0.2 |
| 24 | **AG-25** | 7.3 | 1578 | 947 | 4 | 260 | 300 | 24 | 58 | 250 | 15 | 42 | 0.4 | 181 | 10 | 0.5 |
| 25 | **AG-26** | 7.7 | 611 | 367 | **20** | 190 | 200 | 12 | 41 | 65 | 3 | 26 | 0.6 | 57 | 5.4 | 0.4 |
| 26 | **AG-27** | 8.2 | 1056 | 634 | **15** | 260 | 280 | 8 | 62 | 132 | 41 | **63** | 0.8 | 120 | 77 | 0.6 |
| 27 | **AG-28** | 7.7 | 421 | 253 | **25** | 170 | 140 | 12 | 26 | 20 | 13 | 2.4 | 0.9 | 46 | 11 | 0.3 |
| 28 | **AG-29** | 7.7 | 940 | 564 | **14** | 220 | 270 | 8 | 60 | 95 | 26 | **92** | 0.2 | 47 | 5.1 | 0.4 |
| 29 | **AG-30** | 7.6 | 810 | 486 | 3 | 230 | 220 | 12 | 46 | 75 | 18 | 5.5 | 0.3 | 90 | 2.9 | 0.6 |
| 30 | **AG-31** | 7 | 1039 | 624 | **6** | 200 | 360 | 16 | 77 | 70 | 310 | 10 | 0.7 | 92 | 5.9 | 0.2 |
| 31 | **AG-32** | 7.3 | 762 | 451 | **31** | 340 | 160 | 20 | 26 | 25 | 18 | 2.1 | 0.6 | 75 | 14 | 0.3 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 32 | **AG-33** | 7.1 | 1282 | 769 | **23** | 280 | 350 | 12 | 77 | 185 | 112 | **81** | 0.3 | 121 | 5.6 | 1.1 |
| 33 | **AG-34** | 7.5 | 988 | 593 | 0.4 | 280 | 270 | 16 | 55 | 105 | 40 | **106** | 0.8 | 100 | 8.4 | 0.5 |
| 34 | **AG-35** | 7.4 | 2120 | 1272 | 1 | 410 | 600 | 20 | **132** | 360 | 124 | **187** | 1.4 | 164 | 4.4 | 0.6 |
| 35 | **AG-37** | 7.8 | 286 | 172 | 0.7 | 130 | 150 | 12 | 29 | 25 | 15 | 4.7 | 1 | 33 | 4.6 | 0.3 |
| 36 | **AG-38** | 7.6 | 907 | 544 | 0.7 | 280 | 160 | 12 | 31 | 85 | 51 | 37 | 1.1 | 143 | 3.7 | **1.8** |
| 37 | **AG-39** | 7.2 | 1829 | 1097 | 0.5 | 300 | 310 | 12 | 67 | 290 | 116 | **167** | 0.8 | 230 | 3.6 | 1 |
| 38 | **AG-40** | 7.9 | 409 | 245 | 2 | 180 | 100 | 16 | 14 | 20 | 16 | 2.2 | 1.3 | 60 | 3.1 | 0.6 |
| 39 | **AG-41** | 7.4 | 709 | 425 | 0.8 | 310 | 160 | 16 | 29 | 35 | 18 | 1.7 | 0.5 | 100 | 6.2 | 0.5 |
| 40 | **AG-42** | 7.5 | 798 | 479 | **50** | 340 | 200 | 8 | 43 | 40 | 20 | 2 | 1.6 | 122 | 8.8 | 0.5 |
| 41 | **AG-43** | 7.4 | 511 | 307 | **27** | 260 | 140 | 20 | 22 | 10 | 5 | 0.5 | 1 | 53 | 2.8 | 0.6 |
| 42 | **AG-44** | 7.3 | 634 | 380 | **10** | 190 | 130 | 16 | 22 | 60 | 61 | 42 | 1.3 | 88 | 2.8 | 0.6 |
| 43 | **AG-45** | 7.2 | 722 | 433 | 0.5 | 300 | 150 | 12 | 29 | 40 | 22 | 1.1 | 1.7 | 72 | 4.9 | 0.4 |
| 44 | **AG-46** | 7.5 | 619 | 372 | **13** | 310 | 150 | 12 | 29 | 15 | 34 | 2.3 | 1.5 | 104 | 3.4 | 1.1 |
| 45 | **AG-47** | 6.6 | 364 | 218 | **13** | 160 | 130 | 12 | 24 | 15 | 9 | 0.1 | 0.9 | 26 | 3.9 | 0.4 |
| 46 | **AG-48** | 7.2 | 277 | 166 | 2 | 110 | 90 | 12 | 14 | 20 | 6 | 10 | 1.5 | 38 | 2.9 | 0.5 |
| 47 | **AG-49** | 7.2 | 239 | 143 | **8** | 110 | 90 | 16 | 12 | 10 | 1 | 4 | 1.2 | 25 | 5 | 0.6 |
| 48 | **AG-50** | 7.5 | 701 | 420 | 1 | 300 | 240 | 16 | 48 | 30 | 16 | 5.5 | 1.3 | 72 | 9.4 | 0.5 |

Results mentioned in Table as **Bold and underlined** are above BIS 10500-2012 Permissible limits
ND- Not Detected

### Heavy Metal Concentration :

The Heavy metal analysis of water samples in pre-monsoon(June 2021) season are mentioned in the **Table-4.10.**

The Arsenic concentration in all the samples was within the permissible limit of BIS standard except for sample AG-25 (0.02 Mg/L). The Aluminium concentration in all the samples was within the permissible limit of BIS standard except for sample AG-2 (0.3 Mg/L), AG-6 (0.3 Mg/L) & AG-20 (0.3 Mg/L). The Iron concentration in all the samples was within permissible limit except for sample AG-6 (3.8 Mg/L). Manganese concentration was within permissible limit except samples AG-3 (0.06 Mg/L) & AG-6 (0.4 Mg/L). The Nickel concentration was Not Detected (ND) in all samples except AG-3 (0.06). The other heavy metals Cobalt (Co), Barium (Ba), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Zinc (Zn) and Mercury (Hg) were either within permissible limit as per BIS (10500:2012), Below detection Level (BDL) or Not Detected (ND).

## Table 4.10: Heavy Metal Concentration in Pre-monsoon (June 2021)

| Sr. No | Sample code | As | Al | Ba | Co | Cd | Cr | Cu | Fe | Mn | Ni | Pb | Zn | Hg |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BIS Limit (mg/L)** | | **0.01** | **0.03-0.2** | **0.7** | **-** | **0.003** | **0.05** | **0.05-1.5** | **1.0** | **0.10-0.3** | **0.02** | **0.01** | **5.0-15** | **0.001** |
| **ICP detection Limit (mg/L)** | | 0.007 | 0.00001 | 0.0001 | - | 0.0001 | 0.01 | 0.0004 | 0.0003 | 0.0001 | 0.005 | 0.009 | 0.001 | 0.000001 |
| 1 | **AG-2** | 0.01 | **0.3** | 0.1 | 0.001 | 0.001 | BDL | 0.02 | 0.3 | **0.5** | ND | BDL | 0.2 | ND |
| 2 | **AG-3** | BDL | 0.2 | 0.1 | 0.001 | ND | BDL | 0.02 | 0.3 | 0.1 | **0.06** | BDL | 0.2 | ND |
| 3 | **AG-4** | BDL | 0.06 | 0.1 | ND | ND | BDL | 0.02 | 0.7 | 0.09 | BDL | BDL | 0.09 | ND |
| 4 | **AG-5** | BDL | 0.2 | 0.3 | ND | ND | BDL | 0.01 | 0.4 | 0.04 | ND | BDL | 0.05 | ND |
| 5 | **AG-6** | BDL | **0.3** | 0.3 | 0.003 | ND | **0.04** | 0.2 | **3.8** | **0.4** | BDL | 0.01 | 2.8 | ND |
| 6 | **AG-7** | BDL | 0.08 | 0.4 | ND | ND | BDL | 0.02 | 0.9 | 0.04 | ND | BDL | 0.3 | ND |
| 7 | **AG-8** | BDL | 0.2 | 0.5 | 0.001 | ND | BDL | 0.03 | 0.6 | 0.04 | ND | BDL | 0.3 | ND |
| 8 | **AG-9** | BDL | 0.03 | 0.7 | 0.001 | ND | BDL | 0.02 | 0.3 | 0.05 | ND | BDL | 0.1 | ND |
| 9 | **AG-10** | BDL | 0.1 | 0.4 | ND | ND | BDL | 0.008 | 0.07 | 0.08 | ND | BDL | 0.06 | ND |
| 10 | **AG-11** | BDL | 0.05 | 0.3 | ND | ND | ND | 0.007 | 0.07 | 0.06 | ND | BDL | 0.4 | ND |
| 11 | **AG-12** | BDL | 0.06 | 0.1 | ND | ND | ND | 0.01 | 0.3 | 0.06 | ND | BDL | 0.1 | ND |
| 12 | **AG-13** | 0.007 | 0.2 | 0.4 | ND | ND | ND | 0.02 | 0.2 | 0.07 | ND | BDL | 0.1 | ND |
| 13 | **AG-14** | BDL | 0.03 | 0.5 | ND | ND | BDL | 0.1 | 0.8 | 0.1 | ND | BDL | 0.3 | ND |
| 14 | **AG-15** | 0.007 | 0.03 | 0.2 | ND | ND | BDL | 0.04 | 0.4 | 0.07 | ND | BDL | 0.1 | ND |
| 15 | **AG-16** | BDL | 0.2 | 0.1 | ND | ND | BDL | 0.01 | 0.6 | 0.06 | ND | BDL | 0.1 | ND |
| 16 | **AG-17** | 0.009 | 0.04 | 0.08 | ND | ND | BDL | 0.01 | 0.3 | 0.07 | ND | BDL | 0.08 | ND |
| 17 | **AG-18** | 0.01 | 0.2 | 0.06 | ND | ND | BDL | 0.008 | 0.4 | 0.3 | ND | BDL | 0.3 | ND |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18 | **AG-19** | BDL | 0.06 | 0.2 | ND | 0.001 | BDL | 0.05 | 0.4 | 0.08 | ND | BDL | 1.8 | ND |
| 19 | **AG-20** | ND | **0.3** | 0.5 | ND | ND | BDL | 0.02 | 1 | 0.06 | ND | BDL | 0.5 | ND |
| 20 | **AG-21** | BDL | 0.03 | 0.2 | ND | ND | BDL | 0.01 | 0.7 | 0.04 | ND | BDL | 0.2 | ND |
| 21 | **AG-22** | BDL | 0.05 | 0.1 | ND | ND | BDL | 0.009 | 0.3 | 0.09 | ND | BDL | 0.06 | ND |
| 22 | **AG-23** | BDL | 0.2 | 0.4 | ND | ND | BDL | 0.01 | 0.2 | 0.08 | ND | BDL | 0.2 | ND |
| 23 | **AG-24** | BDL | 0.03 | 0.2 | ND | ND | BDL | 0.009 | 0.6 | 0.3 | ND | BDL | 0.2 | ND |
| 24 | **AG-25** | **0.02** | 0.2 | 0.4 | ND | ND | BDL | 0.02 | 0.8 | 0.05 | ND | BDL | 0.3 | ND |
| 25 | **AG-26** | BDL | 0.07 | 0.2 | ND | ND | BDL | 0.02 | 0.9 | 0.04 | ND | BDL | 0.09 | ND |
| 26 | **AG-27** | BDL | 0.09 | 0.2 | 0.001 | ND | ND | 0.009 | 0.6 | 0.05 | ND | BDL | 0.06 | ND |
| 27 | **AG-28** | BDL | 0.04 | 0.4 | ND | ND | BDL | 0.05 | 0.2 | 0.3 | ND | BDL | 0.4 | ND |
| 28 | **AG-29** | BDL | 0.03 | 0.2 | ND | ND | BDL | 0.03 | 0.7 | 0.2 | ND | BDL | 1.3 | ND |
| 29 | **AG-30** | BDL | 0.04 | 0.2 | 0.001 | ND | BDL | 0.02 | 0.6 | 0.3 | ND | BDL | 0.3 | ND |
| 30 | **AG-31** | BDL | 0.2 | 0.2 | 0.003 | 0.002 | BDL | 0.03 | 0.9 | 0.1 | ND | 0.009 | 0.2 | ND |
| 31 | **AG-32** | ND | 0.03 | 0.5 | 0.002 | ND | BDL | 0.04 | 0.4 | 0.2 | ND | BDL | 0.5 | ND |
| 32 | **AG-33** | ND | 0.08 | 0.3 | 0.002 | ND | BDL | 0.02 | 0.2 | 0.1 | ND | BDL | 0.8 | ND |
| 33 | **AG-34** | 0.008 | 0.1 | 0.3 | ND | ND | BDL | 0.02 | 0.4 | 0.3 | ND | BDL | 0.4 | ND |
| 34 | **AG-35** | BDL | 0.2 | 0.1 | ND | ND | BDL | 0.02 | 0.6 | 0.1 | ND | BDL | 2.8 | ND |
| 35 | **AG-37** | ND | 0.04 | 0.1 | ND | ND | BDL | 0.04 | 0.4 | 0.04 | ND | BDL | 0.6 | ND |
| 36 | **AG-38** | ND | 0.06 | 0.1 | ND | ND | BDL | 0.02 | 0.7 | 0.2 | ND | BDL | 0.3 | ND |
| 37 | **AG-39** | ND | 0.2 | 0.3 | ND | ND | ND | 0.01 | 0.4 | 0.1 | ND | BDL | 0.5 | ND |
| 38 | **AG-40** | BDL | 0.07 | 0.2 | ND | ND | ND | 0.005 | 0.6 | 0.03 | ND | BDL | 0.2 | ND |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 39 | **AG-41** | BDL | 0.2 | 0.2 | 0.001 | ND | BDL | 0.007 | 0.2 | 0.06 | ND | BDL | 0.1 | ND |
| 40 | **AG-42** | ND | 0.2 | 0.4 | ND | ND | BDL | 0.01 | 0.3 | 0.2 | ND | BDL | 0.3 | ND |
| 41 | **AG-43** | ND | 0.2 | ND | 0.001 | ND | ND | 0.003 | 0.02 | 0.03 | ND | BDL | 1.8 | ND |
| 42 | **AG-44** | ND | 0.1 | ND | ND | ND | ND | 0.008 | 0.03 | 0.04 | ND | BDL | 0.5 | ND |
| 43 | **AG-45** | ND | 0.05 | ND | ND | ND | ND | ND | 0.1 | 0.005 | ND | **0.03** | 0.2 | ND |
| 44 | **AG-46** | ND | 0.06 | ND | ND | ND | ND | ND | 0.04 | 0.001 | ND | BDL | 0.1 | ND |
| 45 | **AG-47** | ND | 0.04 | ND | ND | ND | ND | 0.001 | 0.1 | 0.009 | ND | BDL | 0.1 | ND |
| 46 | **AG-48** | ND | 0.04 | ND | ND | ND | ND | ND | 0.005 | ND | ND | BDL | 0.06 | ND |
| 47 | **AG-49** | ND | 0.1 | ND | 0.002 | ND | ND | 0.002 | 0.004 | ND | ND | BDL | 0.2 | ND |
| 48 | **AG-50** | ND | 0.09 | 0.4 | ND | ND | BDL | 0.02 | 0.4 | 0.2 | ND | BDL | 0.2 | ND |

Results mentioned in Table as **Bold and underlined** are above BIS 10500-2012 Permissible limits

BDL-Below Detection Limit; ND- Not Detected

## 4.3 Supernatant water Quality:

### 4.3.1 Physico-chemical Parameters:

The physico-chemical results of supernatant water sample (AS) collected from ash dyke taken in the month of November 2019, December 2020 and June 2021 are given in **Table 4.11** respectively.

#### November 2019

The physico-chemical results of supernatant water samples was found pH (8.1), TDS (527 mg/L), Turbidity (12 NTU), Total Hardness (200 mg/L), Total Alkalinity (188 mg/L)Fluoride (1 mg/L), Nitrate (23 mg/L)&chloride (50 mg/L).

#### December 2020

The physico-chemical results of supernatant water samples was found pH (7), TDS (433 mg/L), Turbidity (29 NTU), Total Hardness (280 mg/L), Total Alkalinity (280 mg/L)Fluoride (5 mg/L), Nitrate (8 mg/L)and chloride (50 mg/L).

#### June 2021

The physico-chemical results of supernatant water samples was found pH (7.7), TDS (310 mg/L), Turbidity (17 NTU), Total Hardness (230 mg/L), Total Alkalinity (100 mg/L)Fluoride (2.9 mg/L), Nitrate (4.8 mg/L)&chloride (30 mg/L).

## Table 4.11:- Physico-chemical results of collected supernatant water samples

| Sr. No | Sample Code | pH | EC | TDS (mg/l) | Turbidity | Total Hardness as $CaCO_3$ | Calcium as $Ca^{2+}$ | Magnesium $Mg^{2+}$ | Sodium | Potassium | Total alkalinity as $CaCO_3$ | Phosphate as $PO_4^{-2}$ | Fluoride as $F^-$ | Nitrate $NO^{3-}$ | sulphate | chloride |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Units | | - | µS/cm | mg/L | NTU | mg/L | | | | | | | | | | |
| November 2019 | | | | | | | | | | | | | | | | |
| 1 | AS | 8.1 | 879 | 527 | 12 | 200 | 48 | 19 | 22 | 11 | 188 | 2.8 | 1 | 23 | 23 | 50 |
| December 2020 | | | | | | | | | | | | | | | | |
| 1 | AS | 7 | 722 | 433 | 29 | 280 | 100 | 7.2 | 73 | 10.6 | 280 | 0.8 | 5 | 8 | 7.9 | 50 |
| June 2021 | | | | | | | | | | | | | | | | |
| 1 | AS | 7.7 | 517 | 310 | 17 | 230 | 20 | 43 | 57 | 8.8 | 100 | 0.9 | 2.9 | 4.8 | 148 | 30 |

### 4.3.2 Heavy Metals Concentration (Supernatant sample):

The supernatant water samples collected were analysed for heavy metals concentration in the month of November 2019, December 2020 and June 2021.

**November 2019**

The concentration of heavy metals was found to be Aluminium (5.8 mg/L), Copper (0.01 mg/L), Iron (4 mg/L), Manganese (0.05 mg/L), Nickel (0.01 mg/L), Arsenic (0.07 mg/L), Cadmium (0.0002 mg/L) and Zinc (0.08 mg/L) in sample AS-1. Besides this Lead (Pb), Mercury (Hg) & Chromium (Cr)was below detection level (BDL) **(Table 4.12)** respectively.

**December 2020**

The concentration of heavy metals was found to be Arsenic (0.1 mg/L), Aluminium (5.4 mg/L), Barium (0.2 mg/L), Cadmium (0.0002 mg/L), Copper (0.02 mg/L), Iron (0.5 mg/L), Manganese (0.1 mg/L), Zinc (0.1 mg/L)& Mercury (0.4 mg/L). Besides this Chromiumand Lead was below detection level (BDL) and Nickel was not detected (ND) in the sample AS-1 **(Table 4.13)** respectively.

**June 2021**

The concentration of heavy metals was found to be Arsenic (0.1 mg/L), Aluminium (3 mg/L), Barium (0.4 mg/L), Cadmium (0.003 mg/L), Copper (0.03 mg/L), Iron (0.5 mg/L), Manganese (0.2 mg/L), Zinc (0.1 mg/L)& Mercury (0.001 mg/L). Besides this Chromium and Lead was below detection level (BDL) and Nickel was not detected (ND) in the sample AS-1**(Table 4.13)** respectively.

**Table 4.12:- Heavy metals concentration in collected supernatant water samples (November 2019)**

| Sr.No | Sample code | Al | As | Cd | Cr | Cu | Fe | Mn | Ni | Pb | Zn | Hg |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ICP detection Limit (mg/L)** | | **0.00001** | **0.007** | **0.0001** | **0.01** | **0.0004** | **0.0003** | **0.0001** | **0.005** | **0.009** | **0.001** | **0.000075** |
| 1 | **AS-1** | 5.8 | 0.07 | 0.0002 | BDL | 0.01 | 4.0 | 0.05 | 0.01 | BDL | 0.08 | BDL |

**Table 4.13:- Heavy metals concentration in collected supernatant water samples**

| Sr. No | Sample code | As | Al | Ba | Co | Cd | Cr | Cu | Fe | Mn | Ni | Pb | Zn | Hg |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ICP detection Limit (mg/L)** | | **0.007** | **0.00001** | **0.0001** | **-** | **0.0001** | **0.01** | **0.0004** | **0.0003** | **0.0001** | **0.005** | **0.009** | **0.001** | **0.000001** |
| **December 2020** | | | | | | | | | | | | | | |
| 1 | **AS-1** | 0.1 | 5.4 | 0.2 | 0.003 | 0.0002 | BDL | 0.02 | 0.5 | 0.1 | ND | BDL | 0.1 | 0.4 |
| **June 2021** | | | | | | | | | | | | | | |
| 1 | **AS-1** | 0.1 | 3 | 0.4 | 0.004 | 0.003 | BDL | 0.03 | 0.5 | 0.2 | ND | BDL | 0.2 | 0.001 |

# *Chapter 5*

# *Findings and Recommendation*

## 5.1 Findings

**June 2019 (pre-monsoon) & November 2019 (post-monsoon):**

Heavy metal parameters namely As, Hg in the groundwater sources are within the drinking water standards of BIS (10500:2012).Iron concentration is high in many sources and it can be attributed to the rusting of the pipes in the hand pumps or iron content in the soil.

Physico-chemical parameters are within the permissible limit of drinking water standards of BIS (10500:2012).

The groundwater level is shallow and most of the sources have water level <10m (below ground level).The groundwater level monitoring in pre-monsoon and post-monsoon of 2019 indicates that the groundwater level has not declined with respect to the groundwater level observed in 2011 by HCPL engaged by APML.

**December 2020 (post-monsoon)& June 2021 (pre-monsoon)**

The concentration of heavy metals Ba, Co, Cd, Cr, Cu, Ni, Pb, Zn and Hg were all found to be well within the permissible and acceptable limit of BIS in December 2020 and June 2021.

The concentration of As, Mn and Al is high in some sources in December 2020 and in June 2021 the concentration of As, Al, Fe, Mn, Ni is high in some sources

Physico-chemical parameters namely pH, TDS, Total Alkalinity, Calcium ($Ca^{2+}$), Magnesium ($Mg^{2+}$), Sulphate ($SO_4^2$-) and Chloride (Cl) concentrations of all the samples were found to be within the permissible and acceptable limits of BIS (10500:2012) in December 2020 and in pre-monsoon (June 2021) parameters namely TDS, Calcium, Total Hardness, Total alkalinity, sulphate, Phosphate and Chlorides were found to be within the permissible limits of BIS (10500:2012).

The concentration of Turbidity and nitrate ($No_3^-$) is high in many sources in both December 2020 and June 2021.

The groundwater level is shallow in both post- monsoon (December 2020) as well as in pre-monsoon (June 2021);, having water level <13.76 m (below ground level**)** in all the sources.

**June 2019 (pre-monsoon) & June 2021 (pre-monsoon)**

The pre-monsoon (June 2019) the groundwater level (m-below ground level) varied between 3.70 m (AG-17) to 14.20 m (AG-9) during pre-monsoon and in pre-monsoon (June 2021) the groundwater level (m-below ground level) varied between 3.85 m (AG-21) to 13.76 m (AG-20).

It is observed that the average groundwater levels varied from 8.03 (pre 2019) to 7.07 (Pre 2021). In addition, it is observed that the average groundwater levels varied from 4.01 (Post 2019) to 4.21 (Post 2020).

It is observed that the water level (bgl) in the buffer zone is comparable to that reported in the report on Hydrology and Hydrogeology commissioned by the APML in 2010. In 2010, it wa reported that "The depth to water in buffer zone ranges from 5.00 to 10.00 b.g.l. during post-monsoon period while it is deeper ranging from 8.00 to 13.00 m b.g.l during pre-monsoon" (Section 3.3 of the report) .

## 5.2 Future activities

Post-monsoon of 2021 groundwater monitoring, sample collection and its analysis and pre-monsoon 2022.

Comparison of the groundwater level (pre-monsoon and post-monsoon) in 2021 with the pre-project scenario in 2011.

Collection of primary and secondary data on the groundwater abstraction, yield tests for Groundwater stage development to draw comparison with respect to the stage development in the study area before construction of APML.

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Annexure - XII

2021

# Performance Guarantee Test for Air Pollution Control Equipments (ESP and Bag Filter)

## Adani Power Maharashtra Ltd.

at

Village Tiroda, Gondia District, Maharashtra

Executed By:

**Vardan EnviroLab**

**Plot No. 82A Sector-5 IMT Manesar, Gurugram, Haryana**

# FOREWORD

The Adani Group (1988) has grown from being a trading house to a diversified business group with interests from infrastructural development to FMCGs. The Adani Group has made foray into high growth sector like Power, Infrastructure, Global Trading, Logistics and Energy. Adani Power Limited (APL), a member of the Adani Group, has taken up implementation of large Thermal Power Projects at various locations in India in view of the growing needs of power requirements in the country. APL is also actively planning to implement Thermal Power Stations at various locations in India, totaling to about 20,000 MW in the coming years. Adani Power Maharashtra Ltd (APML), a wholly owned company of APL, has set up Tiroda Thermal Power Plant of 3300 MW (5x660) at Tiroda, District Gondia in Maharashtra.

The protection of environment plays a crucial role in maintaining the local environment quality for any industry, throughout their production. Hence, the efficiency of Pollution control equipments becomes very important to maintain the emissions within the prevailing norms of regulatory authorities. Therefore, it is important to maintain suitable efficiency of Pollution control equipments, so that pollution levels are within the norms and a sustainable environment is maintained. In line with this requirement, the management of Adani Power Maharashtra Ltd. has planned to evaluate the efficiency of pollution control equipment for assessing the capability for control of emissions as part of environmental protection.

In order to maintain the efficiency of pollution control equipments, to limit the emissions from the power plant, to fulfill statutory requirement and to be in tune with Environmental Preservation and sustainable development Adani Power Maharashtra Ltd., has awarded the work of Performance Guarantee test of all pollution control equipments to Vardan EnviroLab. This report presents the Performance Guarantee Evaluation of ESP and Bag filters installed at strategic locations to control emissions inside the power plant.

The co-operation extended by the Staff and Management of Adani Power Maharashtra Ltd. during the work execution period is gratefully acknowledged.

Gurugram
July 26, 2021

Anshul Yadav
General Manager, Vardan EnviroLab

# PROJECT PERSONNEL

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Mr. Anshul Yadav, General Manager, Vardan EnviroLab

# Table of Contents

# List of Tables

# List of Figures

# Abbreviations

| Abbrev. | Full Form | Abbrev. | Full Form |
|---|---|---|---|
| APC | Air Pollution Control | WCL | Western Coalfields Limited |
| ESP | Electrostatic Precipitator | SECL | South Eastern Coalfields Limited |
| TTPP | Tiroda Thermal Power Plant | MCL | Mahanadi Coalfields Limited |
| APML | Adani Power Maharashtra Limited | FD | Forced Draught Fan |
| CDM | Clean Development Mechanism | ID | Induced Draught Fan |
| UNFCCC | United Nations Framework Convention on Climate Change | PA | Primary Air Fan |
| MW | Mega Watt | FGD | Flue Gas Desulfurization |
| MVA | Mega Volt Ampere | MCR | Maximum Continuous Rating |
| KV | Kilo Volt | CHP | Coal Handling Plant |
| PG | Performance Guarantee | TPH | Tons Per Hour |
| TG | Turbo Generator | RCC | Reinforced Cement Concrete |
| RUR | Rail Under Rail | APH | Air Pre-Heater |
| WTP | Water Treatment Plant | LPM | Liters Per Minute |
| CO2 | Carbon Di Oxide | AGM | Assistant General Manager |
| NOx | Nitrogen Oxides | EMS | Environmental Management System |
| SO2 | Sulphur Di Oxides | ISO | International Organization for Standardization |
| MIDC | Maharashtra Industrial Development Corporation | IES | International Electro technical Commission |
| MPCB | Maharashtra Pollution Control Board | VWO | Valve Wide Open |
| CTO | Consent To Operate | | |
| SH | Super Heater | | |
| CPCB | Central Pollution Control Board | | |
| LDO | Light Diesel Oil | | |
| HFO | Heavy Fuel Oil | | |
| DM | De-Mineralized | | |
| MCM | Million Cubic Meter | | |
| HP | High Pressure | | |
| LP | Low Pressure | | |
| IP | Intermediate Pressure | | |
| CW | Cooling Water | | |
| DFDS | Dry Fog Dust Suppression | | |
| MTPA | Million Tons Per Annum | | |

# Executive Summary

## Introduction

Performance Guarantee test is a general term used to describe methods of assessing the effectiveness of Air Pollution Control ("APC") systems, and the efficiency (or performance) of gas turbines, boilers and compressors. Whether during commissioning to meet the requirements of performance guarantees, or to show compliance with Environmental Standards, performance Guarantee testing is required to be prepared for submission to regulatory authorities for evaluation of proper functioning of Pollution Control Devices.

In this report we will discuss about the performance guarantee of Electrostatic Precipitator (ESP) and Bag Filter installed in coal based Thermal Power Plant by Adani Power Maharashtra Limited (APML) at village Tiroda, District Gondia of Maharashtra.

## Details of Thermal Power Plant

Adani Power Maharashtra Limited is the largest coal based Thermal Power Plant in the state of Maharashtra, India. The plant has a capacity to generate 3300 MW power through its 5 units of 660 MW capacity. The plant achieved full capacity with the commissioning of Unit V on October 2014.

All units at this location are of Supercritical Technology, driving efficiency in coal based power generation. Tiroda Thermal Power Plant uses latest technology for environmental management and has been registered under CDM by UNFCCC.

## Performance Guarantee Work

Vardan EnviroLab has been awarded with Work of "Performance Test for Air Pollution Control Devices (ESP & Bag Filters)" for 5x660 MW Coal based Thermal Power Plant at Tiroda, Gondia, Maharashtra vide service order no. 5700290978 dated 28.12.2020.

*Sample no. and quantity*: Total ESP 05 nos. and Total Bag Filter 07 nos. PG Test for each ESP (12 Samples) and Bag Filter (08 Samples)

## Details of Plant

Adani Power Maharashtra Limited's Tiroda Plant has the state of the art Supercritical Technology which is fuel efficient and environment friendly. The plant is a coal based super critical thermal power plant. The TG is a three cylinder tandem compound, four exhausts, condensing reheat turbine, Static excitation & hydrogen cooled generator with 22KV stator voltage, DEH system designed & installed for high operating efficiencies, maximum reliability and smooth operation.

The plant is located on 565 hectares of land which houses the major equipment such as boilers, turbines, generators, transformers, switchyards, cooling towers, coal handling plant, ash handling plant, CW pump house, track hopper, wagon tippler, reservoirs, ESP, WTP, Ash dykes etc. For uninterrupted coal supply, we have Rail under Rail (RUR) on the busiest Mumbai- Howrah rail route. The plant has long term PPA with Maharashtra State for 3085 MW which is evacuated through one dedicated 400KV double circuit 219 km Tiroda-Warora transmission line and two 765 KV Tiroda-Aurangabad 630 km long transmission line.

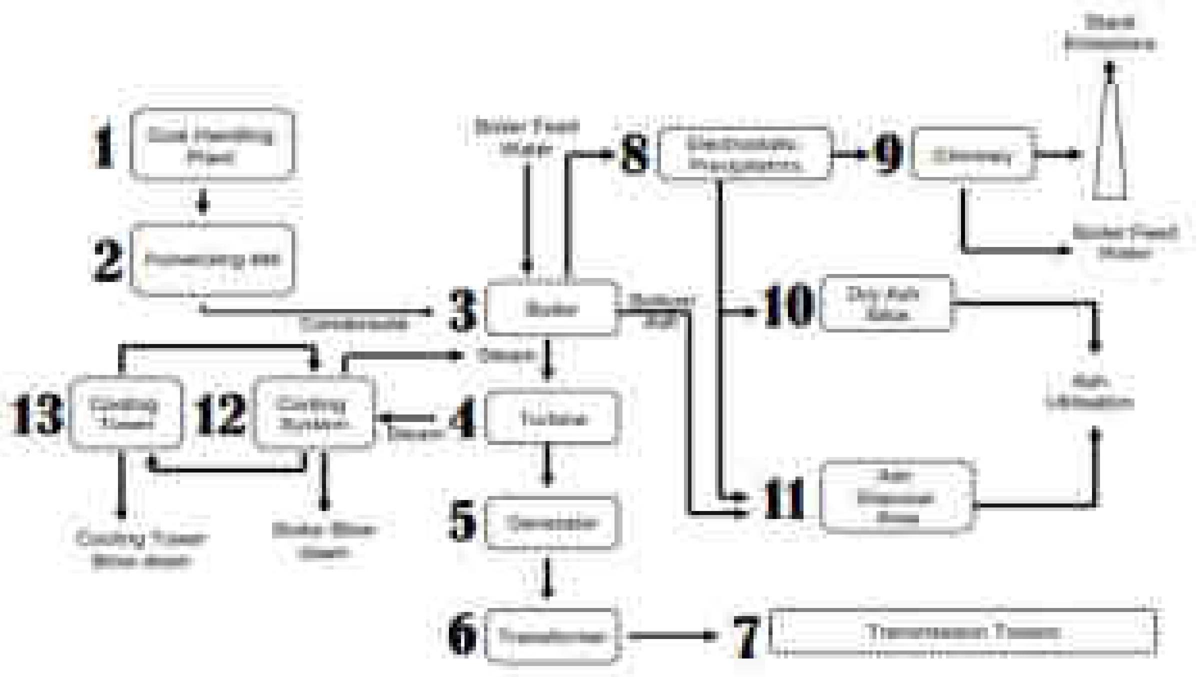


Fig. Thermal Power Plant Process Flow

## Supercritical Technology

The supercritical technology is fairly new to India. Adani Power Maharashtra Limited at Tiroda have installed power plant unit with supercritical technology.

The basic difference in supercritical boilers and sub critical boilers is that there would be no steam drum in supercritical technology unlike sub critical boilers. The feed water is directly made as steam without having a boiler drum. The pressure rating in a supercritical boiler is relatively higher (about 270 bar) as compared to sub critical boilers (about 130 bar). The materials of construction for pressure parts in supercritical boilers would also be superior compared to sub critical boilers. Height of the boiler with supercritical technology is also higher at least by 10 m (since there is no boiler drum and the entire steam has to be produced within the pressure parts) compared to a sub critical boiler.

The main advantage of adopting supercritical technology is gain in the heat rate, thereby requiring lesser coal for firing. Typically, the heat rates for power stations with supercritical boilers is (about 2%-3% gain in heat rate). However, supercritical units entail higher main plant equipment cost of about 10%. Therefore, it is a trade-off between the operating cost and capital cost. The supercritical technology power stations are relatively more sensitive to control systems adopted particularly in regard to quality of boiler feed water etc.

### Commissioning details

The Tiroda Power Plant works on a total capacity of 3300 MW (5x660 MW). The plant has long term PPA with Maharashtra State for supply of 3085 MW power which is evacuated through one dedicated 400KV double circuit 219 km Tiroda-Warora transmission line and two 765 KV Tiroda-Aurangabad 630 km long transmission line. Following are the completion schedule of the plant units.

**Table: Commissioning Details of Power Plant**

| Stage | Unit Number | Installed Capacity (MW) | Date of Commissioning | Status |
|---|---|---|---|---|
| 1 | 1 | 660 | September 2012 | Running |
| 1 | 2 | 660 | March 2013 | Running |
| 1 | 3 | 660 | June 2013 | Running |
| 1 | 4 | 660 | April 2014 | Running |
| 1 | 5 | 660 | October 2014 | Running |

# 1.0 Introduction

## 1.1 Preamble

Adani Power Maharashtra Ltd. (APML) is a wholly owned company of Adani Power Limited, Ahmedabad. The coal-based Thermal Power Plant situated at Tiroda, Gondia District in Maharashtra has a capacity to generate 3,300 MW (5 x 660 MW) electric power. The APML, the supercritical, energy efficient and environment friendly the largest thermal power plant in Maharashtra is established at Tiroda Growth Centre of Maharashtra Industrial Development Corporation (MIDC) developed area near Tiroda, District Gondia in Maharashtra exists on 565 ha land area.

Accordingly, in compliance to the conditions of MPCB's CTO for Tiroda TPP, Performance Evaluation of Air Pollution Control Equipment equipments (Bag Filters & ESPs) for Tiroda TPP need to be performed to check the efficiency of the existing ESP & Bag Filters to ensure reduction of pollution load.

The present study would enable Adani Power Maharashtra Limited to meet the requirement of MPCB's CTO compliance besides meeting its mission of being enviro-socially responsible corporate entity with thrust on sustainability

The project authorities have awarded the work of Performance Guarantee of Pollution control equipments installed in the power plant to Vardan EnviroLab.

## 1.2 Power Plant Location

The plant is located at MIDC Growth Centre, Tiroda in Dist. Gondia of Maharashtra State. The plant site is located near to Bhandara Gondia state highway (SH-249) and is at a distance of 125 km from Nagpur which has major commercial Airport. The nearest major Railhead is at Gondia on Mumbai Howrah rail route at 30 km distance from Plant. The nearest sea port is at Mumbai at a distance of 985 km. The plant is located at about 328 m above mean sea level. The plant location is provided in figure below.

The adjoining districts to Gondia are on northen side Balaghat district of Madhya Pradesh and on eastern side Rajnandgaon district of Chattisgarh state. To the south and west are Chandrapur district and Bhandara district of Maharashtra. The district headquarter is situated at Gondia situated on Mumbai - Calcutta railway route which is 1060 km from Mumbai, capital of state.

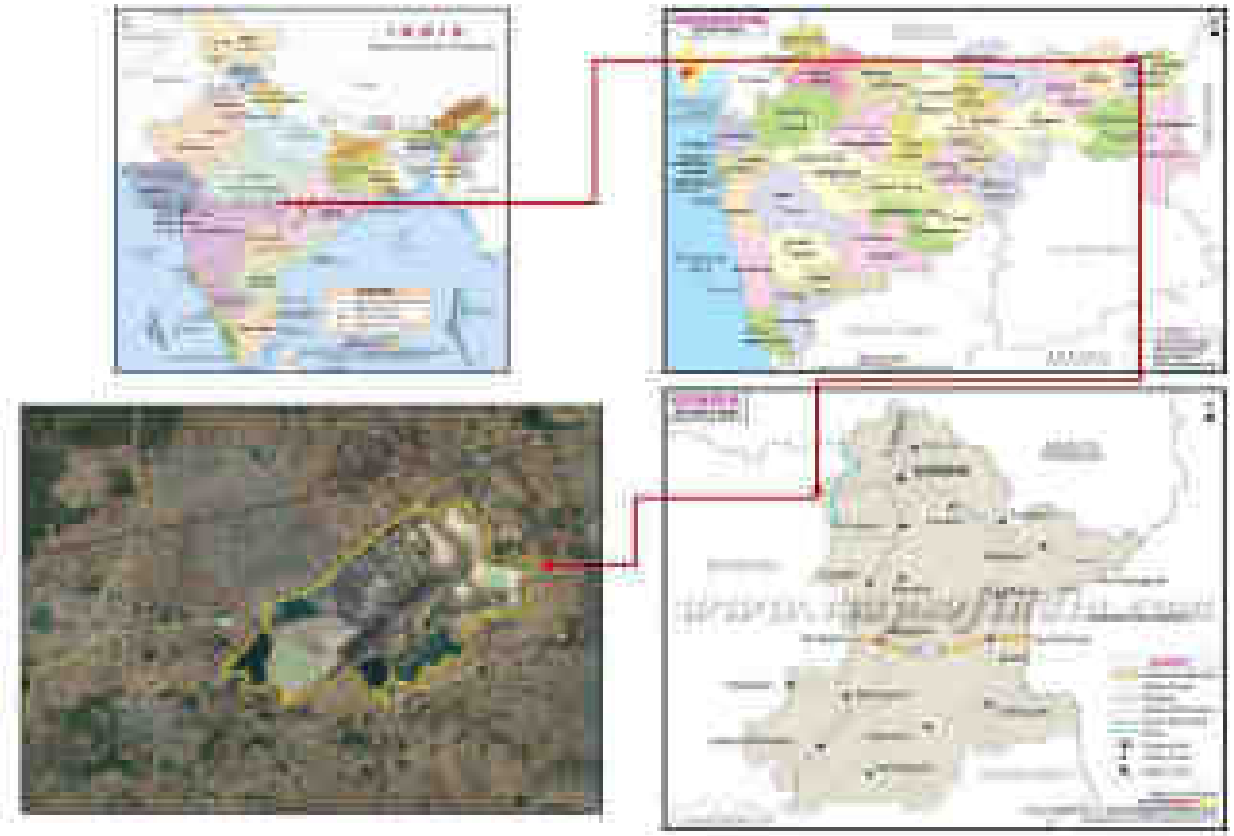


Fig.1 Tiroda Power Plant Location map

### 1.3 Objective of the Study

The main objective of the proposed study is to check the performance of the Air Pollution Control Devices (ESP& Bag Filters). The detailed work carried out as follows:

- Measurement of PM at all Inlet ducts & outlet ducts of each boiler ESP (05 Nos.) by using the state-of-the-art method as recommended by CPCB and MPCB for the purpose.
- Measurement of PM at all Inlet & outlet ducts of each Bag Filters (07 Nos.) of Silo (06 Nos.) and Crusher House (01 Nos.) as recommended by CPCB and MPCB method.
- Suggested the detailed mechanism for sustenance operation of ESP & Bag filter with maximum efficiency

### 1.4 Environment Department of Adani Power Maharashtra Limited

Adani Power Maharashtra Limited has already established an Environment Management Dept. headed by Asso. General Manager & supported by Environmental Engineer, Chemist. Environmental laboratory has been established with well-equipped instruments &

Analysers to monitor Environmental Quality Parameters for Ambient Air, Water, Stack emission monitoring etc.

Environmental Management System as per EMS ISO 14001:2015 implemented under Integrated Management System. APML Environmental lab is accredited with NABL as per ISO/IEC 17025:2017 which is valid up to 27.06.2022.

1) Arun Pratap Singh – Asso. General Manager

2) Girish Kulkarni – Assistant Manager

3) Vijendra Khandekar – Assistant Manager

All the technical and project related information was provided by the Adani Power Team and were eager to help in all aspects of the report

### 1.5 Vardan EnviroLab

Vardan EnviroLab is a pioneer consulting organization of India specializing in Environmental Protection, Industrial Pollution Control, Environmental & Mechanical testing and engineering field. Vardan assists clients in comprehensive environmental and engineering services ranging from conceptual planning and preliminary investigation to detailed engineering designs.

Headquartered in Gurugram and Branch office at Jaipur, Vardan has prominent presence in Delhi-NCR, Rajasthan, Maharashtra, Madhya Pradesh, West Bengal and Jharkhand. With a man-power of over 250 professionals, the organization comprises of senior retired government officers from various departments like Pollution Control Board, Mines & Geology, Civil Services, SAIL, GAIL, NEERI who have decades of experience in the field of environmental management. The team also Comprises of young, dynamic and progress driven Environment, Civil, Mechanical & Chemical engineers, Geologists, GIS experts, Ecologists and Auditors.

Vardan Envirolab provides reliable and precise testing services for a wide range of Environmental, Chemical, Food testing, Microbiology and Building Materials with in-house Equipment/Instruments of advance technology along with experienced technical staff. VEL has state of art equipment for testing viz ICP-MS, GS-MSMS, LC-MSMS, HPLC, Ion Chromatograph, FTIR which are being operated and maintained by different experts for pesticides, Residues and toxins in Environmental, Food and Pharma products.

***Recognitions***

- Approved by NABET in 14 sectors for preparation of EIA/EMP reports.

- Vardan EnviroLab is recognized by Ministry of Environment, Forest & Climate Change, Govt. of India under Environmental Protection Act 1986.
- Vardan EnviroLab is accredited by NABL in the field of Testing.
- Vardan EnviroLab is certified by OHSAS 18001:2007.
- Vardan EnviroLab is certified by ISO 14001:2015.
- Vardan EnviroLab is certified by ISO 9001:2015.
- Vardan EnviroLab is approved by HSPCB & RSPCB.

# 2.0 Project Details

Adani Power Maharashtra Ltd (APML), a wholly owned company of Adani Power Limited, has set up Tiroda Thermal Power Plant (TTPP) of 3300 MW (5x660) capacity near Tiroda Village, District Gondia of Maharashtra. In addition to coal, Light Diesel Oil (LDO) and Heavy Fuel Oil (HFO) are used as an auxiliary liquid fuel. LDO is used for cold start-up and HFO is used for flame stabilization at lower load. The main plant is arranged within the three interconnected structures, the boiler, turbine building & integrated control and switch yard control system.

## 2.1 Supercritical Power Generation Process

In this section, the energy conversion process of Adani Power Maharashtra Ltd.’s SCPP is briefly described with the process flow diagram shown in Fig. 4.

The coal entering the mill is ground to a powder, which flows to the furnace where it is fired. The heat energy released from coal combustion is transferred by various ways of heat travelling, mostly by conduction and convection to the water inside the heat exchangers. The water is supplied by using the feed water pump to enter the various heating stages in the SC boiler, the feed water heater, the economizer (ECON), the water walls and the Superheater (SH). The supercritical conditions occur in the water wall and thereafter. The superheated supercritical steam flows to the steam turbine, in which the thermal energy is converted into mechanical energy. The efficiency is highly influenced by the enthalpy drop and the expansion in the turbine. The turbine can be designed to be combined. Turbines to provide an appropriate steam production are designated as the high pressure (HP) turbine, the intermediate pressure (IP), and even to low pressure (LP) turbine in practice.

The steam exhausted from the HP turbine is fed back to the reheater (RH) to increase the heat content in steam before it is sent back to the IP and LP turbines. The induced draft fans push the flue gas to emanate from the stack.

**Table 1 Salient Features of TTPP**

| S.No. | Item | Particulars |
|---|---|---|
| 1 | Location of the Plant | **Adani Power Maharashtra Limited**<br>Plot A-1, Tiroda Growth Center, MIDC Area, Tiroda, District Gondia 441 911, Maharashtra |
| 2 | Co-ordinates | Latitude: 21$^{o}$24’42.9” North<br>Longitude: 79$^{o}$58’14.9” East |
| 3 | Net capacity | 3300 MW |

| S.No. | Item | Particulars |
|---|---|---|
| 4 | No. of Units and configuration | Phase I 2 x 660 MW<br>Phase II 3 x 660 MW |
| 5 | Steam Generator | Super critical<br>Pressure 255 kg /cm$^2$<br>Temperature 571°C |
| 6 | Turbo Generator | Turbine -246 kg/cm$^2$ (a), 563°C, 3000 rpm<br>Generator - 660 MW (Each unit)<br>Generator Transformer - 776 MVA |
| 7 | Major Auxiliary System | Boiler and Turbine Auxiliaries<br>Pretreatment plant<br>Compressed Air System<br>Coal and Ash Handling system<br>CW System and Raw water system<br>Fire Fighting System<br>Air Conditioning system<br>Ventilation system |
| 8 | No. of Stack | 2 |
| 9 | Stack Height (meter) | 275 each |
| 10 | No. of flue | Five |
| 11 | Air Pollution Control Equipment | ESP, Bag Filters & DFDS system |
| 12 | Coal | Indigenous Coal - 15.0 MTPA<br>(6.3 MTPA for Phase I & 8.7 MTPA for Phase II)<br>Transportation: Railways |
| 13 | Coal Requirement (MT/day) | 39000 MT |
| 14 | Source of Coal | WCL, SECL and MCL |
| 15 | Ash % | <34 % |
| 16 | MIDC Land<br>Forest land | 402.00 ha<br>[210 ha for Phase I & 192 ha for Phase II]<br>163.84 ha |
| 17 | Cooling Technology | Induced draft cooling system is proposed |
| 18 | Total Water Requirement | 70 MCM (191760 m3 /day) |
| 19 | Total Discharge | Zero Liquid Discharge is being practiced |
| 20 | Manpower Requirement | Approx. 700 Employee and 2500 Contractual |

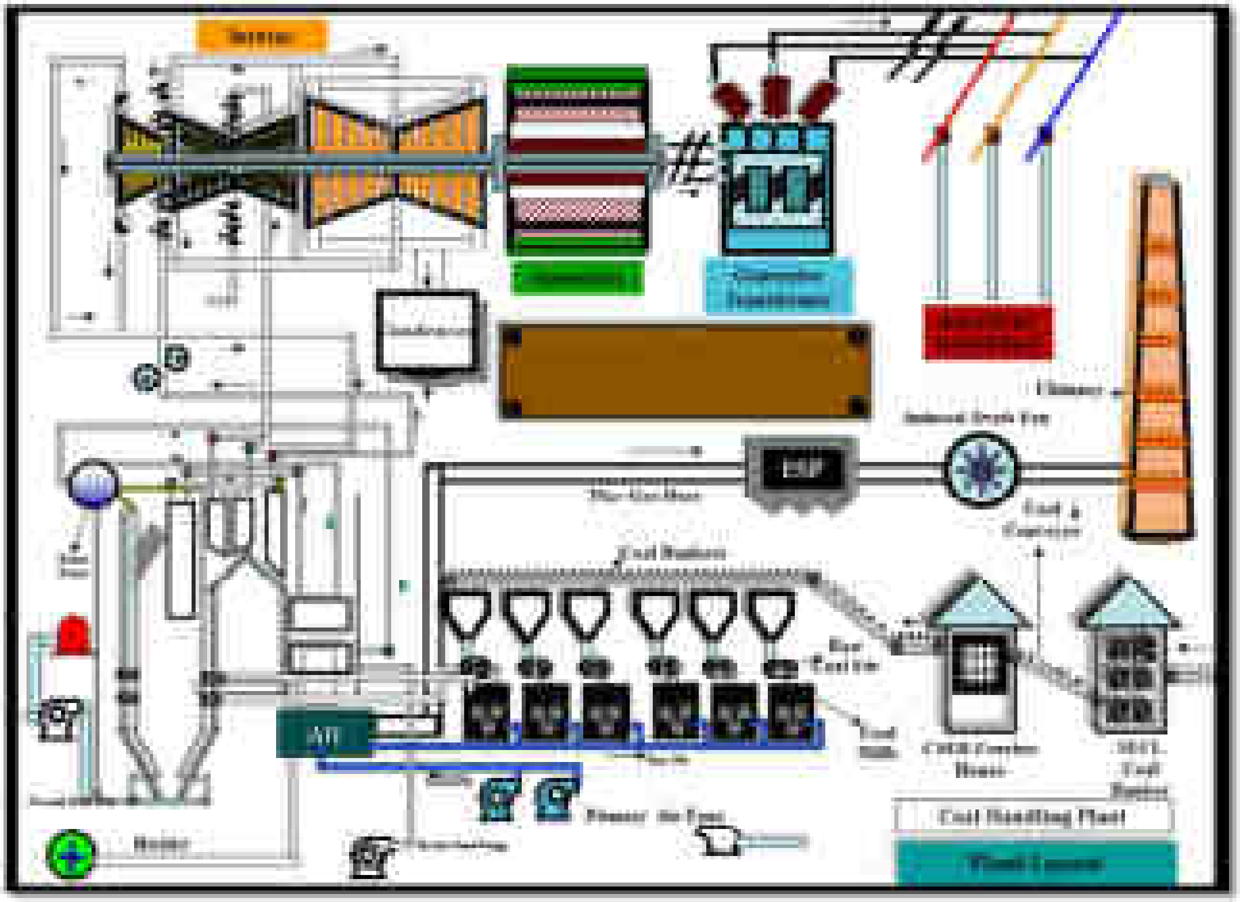


Fig.2 Tiroda Supercritical Power Plant Schematic View

## 2.2 Supercritical Boiler:

A Boiler operating at a pressure above critical point is called Supercritical Boiler. Supercritical Boiler has no drum and heat-absorbing surface being, in effect, one continuous tube hence called “Once through Supercritical pressure boilers”. Boiler feed pump pressurizes the water in boiler, sensible heat is added in feed heaters, economizer and furnace tubes, until water attains saturation temperature and flashes instantaneously to dry saturated steam and super heating commences.

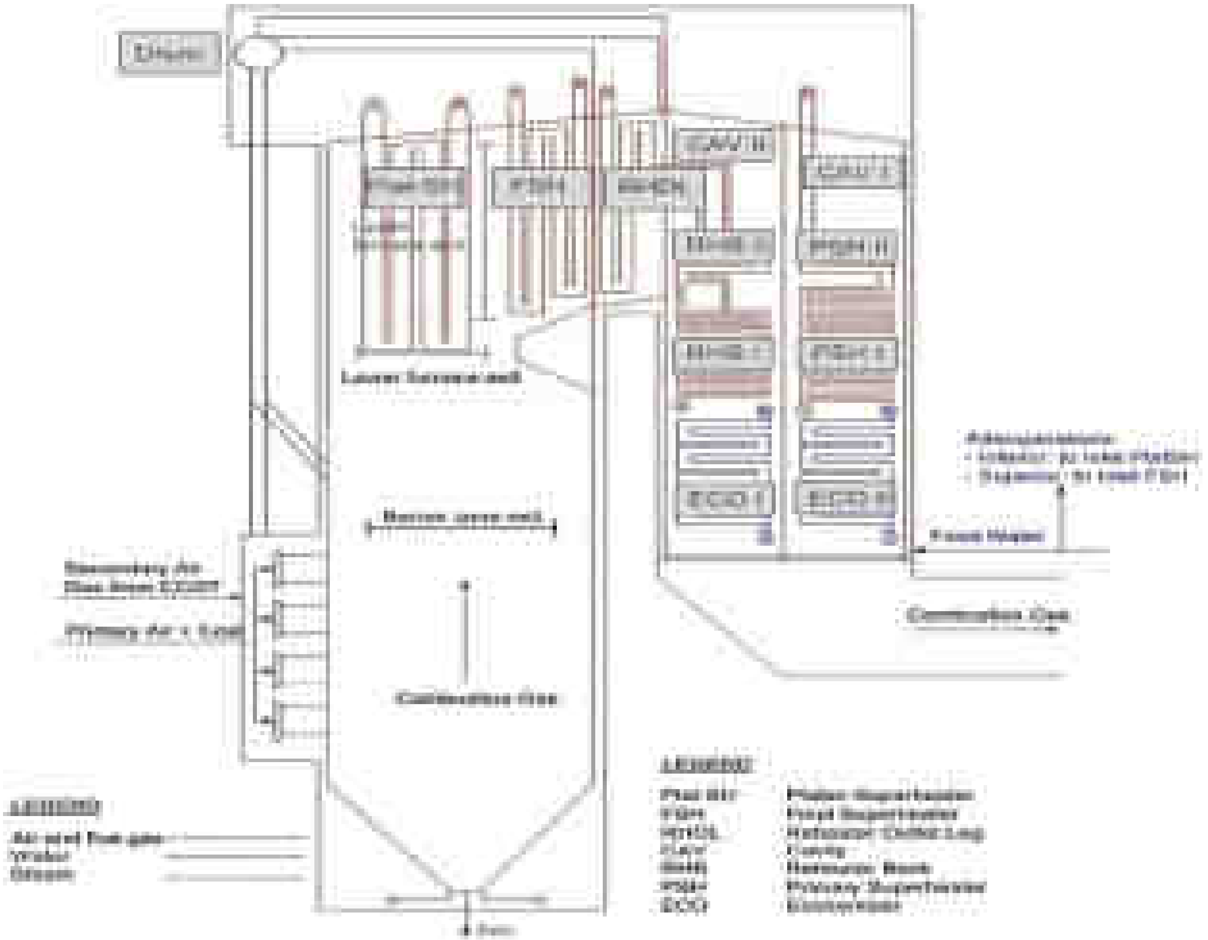


Fig.3 Super Critical Boiler flow diagram

## *Advantages of Supercritical Technology*

Following are the advantages of using Supercritical Technology for Power Plants.

- Reduced fuel costs due to improved plant efficiency.
- Significant reduction in $CO_2$ emissions
- Excellent availability, compared to conventional sub-critical plant
- Plant costs comparable with sub-critical technology and less than other clean coal technologies
- Much reduced NOx, SOx and particulate emissions
- Overall reduction in Auxiliary Power Consumption
- Reduction in requirement of ash dyke land and consumptive water
- Sliding pressure operation due to once through system
- Uniform distribution of heat due to spiral wall arrangement leading to less Boiler tube failure, thereby improving system continuity and availability of the station
- Low thermal stress in turbine
- Less start up time of the boiler

- Compatible with biomass co-firing
- Can be fully integrated with appropriate $CO_2$ capture technology

In summary, highly efficient plants with best available pollution control technology will reduce existing pollution levels by burning less coal per megawatt-hour produced, capturing the vast majority of the pollutants, while allowing additional capacity to be added in a timely manner.

## 2.3 Steam Generator Set:

The steam generator for super-critical unit consists of a number of parallel circuits connected by inlet & outlet headers. Pressurized water enters the circuit at one end and leaves as supercritical steam at other end. Thus boiler is “once through type”. Once through boiler may be designed in both two-pass & tower type design. Since flow is once-through furnace wall tube. Temperature tends to increase at low load. Assisted circulation mode is super imposed to overcome this problem. The volume of the evaporator system is much smaller compared to a Natural circulation boiler. Due to smaller inventory of stored water & steam, theoretical rate of response is much faster than drum unit at base load. Super heater section has been divided in convection and radiant zones and designed so as to maintain rated steam temperature of $571^0$C at the outlet. The units have been completed with coal preparations and firing system, fuel oil firing system, draft plants comprising FD, ID and PA fans, electrostatic precipitators with required number of fields in series and a multi-flue chimney.

Light Diesel Oil (Calorific value around 10,300 K Cal/Kg) is being used as start-up and stabilization fuel. As per GOI norms, space provision for FGD unit has been incorporated in the plant layout.

Due to elevated pressure and temperature, cycle efficiency improves which results in reduction of fuel consumption per unit of electricity generated, which in turn reduces $CO_2$, NOx & $SO_2$ emission. To limit the dust load at the inlet to the chimney to a value of 50 $mg/Nm^3$, as per the norms prescribed by the Ministry of Environment and Forest, Govt. of India, adequately sized electrostatic-precipitators have been provided.

## 2.4 Turbine Generator Set:

The steam turbine set is with standard multi-stage, 3000 rpm, tandem compound, single/double reheat, regenerative, condensing, multi-cylinder unit with eight (8)/nine (9) uncontrolled extractions for regenerative feed water heating. The turbine has one single flow HP cylinder, one double flow IP turbine and two double flow LP casings. The LP turbine exhausts against a condenser pressure of 76 mm Hg (abs) and maximum cooling water temperature of $33^oC$. The unit has horizontally split double flow LP cylinder with the

LP turbine exhausting steam directly into spring mounted surface type, two-pass condenser having divided water box. The turbo-generator sets are designed for a maximum throttle steam flow at turbine valve wide open (VWO) condition of 105% of turbine MCR Flow. A quick acting "HP and LP Turbine Bypass Station" has been provided as a part of turbine package. The unit is equipped with all auxiliaries as per good engineering practice. The steam turbine is directly coupled to the horizontally mounted, three phases, two-pole, cylindrical rotor type electric generator terminal after meeting power requirement for excitation system. The steam turbine is equipped with hydraulic/motorized turning gear for uniform heating/ cooling of the rotor during start up/shut down. Highly sensitive electronic-hydraulic governing system is provided with suitable hardware to ensure fast speed to operation & safety. The units are complete with twin flow, double-pass, horizontal, surface type, water cooled condensers, 2 x 100% vacuum pumps (1W + 1S), vertical/ horizontal shell and tube type high pressure feed water heaters with group bypass arrangement, 4-stage horizontal U-tube low pressure heaters, drain cooler, gland steam condenser, horizontal spray or spray-cum-tray type deaerator with integral vent condenser etc.

## 2.5 Draught System

Large amount of air is required for combustion of fuel. The gaseous combustion products in huge quantity have also to be removed continuously from the furnace. To produce the required flow of air or combustion gas, a pressure differential is needed. The term "draught" or "draft" is used to define the static pressure in the furnace, in the various ducts, and the stack. The function of the draught system is basically two folds:

- To supply to the furnace the required quantity of air for complete of fuel.
- To remove the gaseous products of combustion from the furnace and throw these through chimney or stack to the atmosphere.

### *2.5.1 Forced Draught Fan:*

Air drawn from atmosphere is forced into the furnace, at a pressure higher than the outside atmosphere, by big centrifugal fan or fans to create turbulence and to provide adequate Oxygen for combustion. Hence the system is known by the name Forced draught system and the fan, used to push through combustion air under pressure, is called Forced Draught Fan. FD fan is normally located at the front or sideways of the furnace.

### *2.5.2 Induced Draught Fan*

Instead of drawing atmospheric air and pushing through furnace, a centrifugal fan can be deployed to draw out the air from the furnace and throw out through the chimney, thereby creating negative pressure in the combustion zone and maintain the negative draught throughout the furnace. The system is called Induced Draught system and the fan deployed for this purpose is known as Induced Draught Fan. In the Induced Draught system, the fan is fitted at back end of the furnace or near the base of the chimney. Due to the negative pressure created inside the furnace, by the action of the fan, flue gas will not come out of combustion space i.e. Furnace. The entry of air to Boiler is regulated through air registers and dampers.

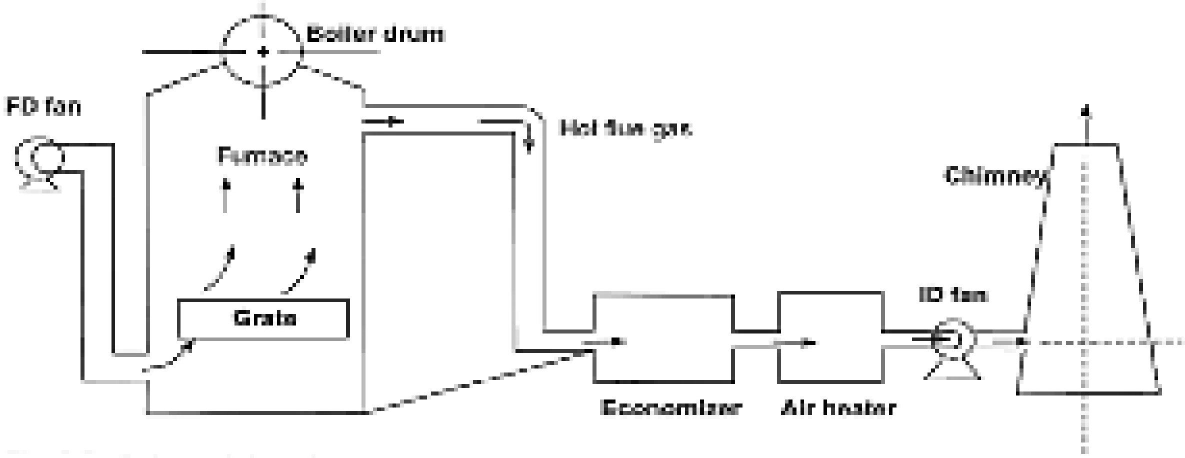


**Fig.4 Draught Fan implementation in Thermal Power Plant**

## 2.6 Air & Flue Gas System

In the air and flue gas system, the draft section of boiler plays the most vital role in the performance and firing of boilers It encompasses not only both air and fuel (mill) supply, but also covers the burning of fuel in the furnace and the flue gas it produces.

The main purpose of Air & Flue Gas System as follow:

- ➢ To ensure sufficient, Efficient and safe flow of Fuel, Air & Flue gas through the Steam Generator.
- ➢ To maintain the Combustion control parameters such as Oxygen in Flue Gas , Carbon in Ash , SOx & NOx in Flue Gas, Flue Gas Velocity, Flue Gas Exhaust Temperature etc.

The following equipment's are involved in Air & Flue Gas system:

- ✓ Induced Draft Fans.
- ✓ Forced Draft Fans.
- ✓ Primary Air Fans.
- ✓ Air Preheater
- ✓ Seal air Fans.
- ✓ Scanner Air Fans.
- ✓ Igniter Cooling Fans

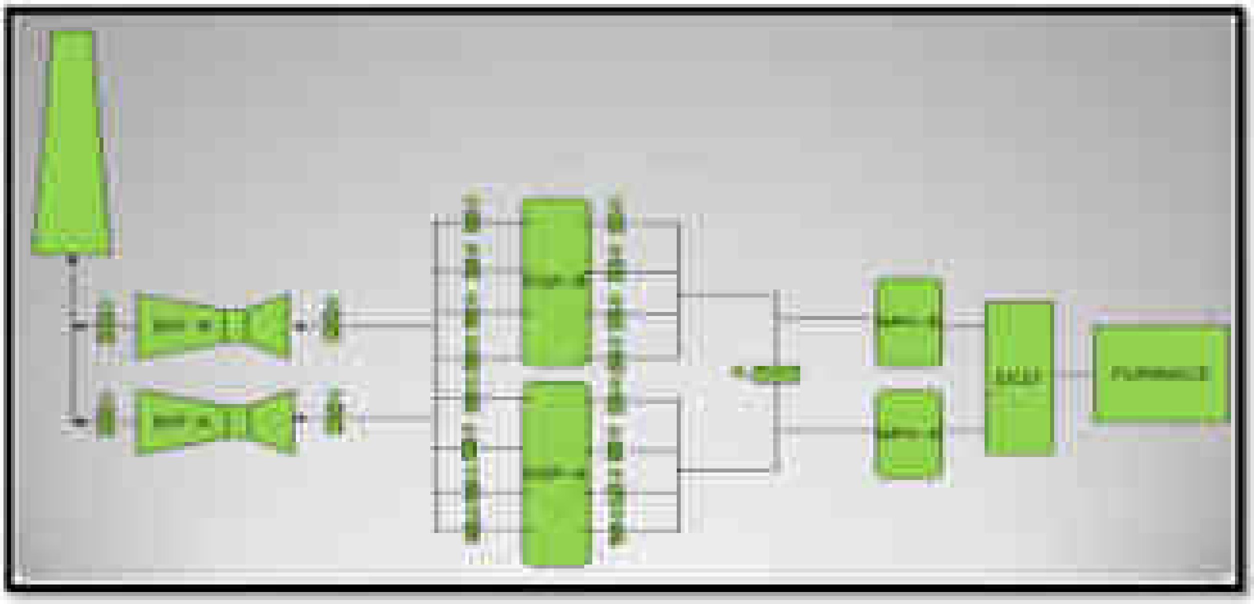
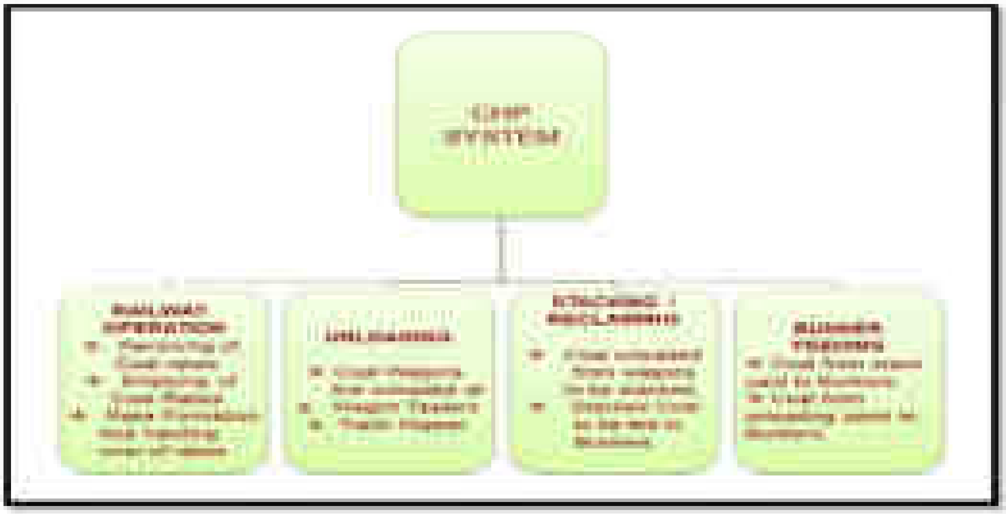


Fig. 5 Flue Gas System of Thermal Power Plant

## 2.7 Coal Handling Plant

CHP is a unit where properly handle the coal from its receipt to transferring it to bunkers. The main objective of the CHP in Thermal Power Plant to unloading of coal, its crushing, storage and filling of boiler bunkers. At APML the coal handling Plant is erected and commissioned by L&T ECC ltd.



Coal unloading and feeding Process at APML Tiroda is as follows:

- Receipt of loaded coal rake in Marshalling Yard.
- Placement of rake on Wagon Tipplers and/or Track Hopper.
- Unloading of coal from Railway Wagons through WT/ Track Hopper.

- Collection of empty wagons and formation of rake.
- Transportation of coal from unloading point i.e WT/ Track Hopper to Stack Yard and Unit Bunkers.
- Screening & Crushing of coal before bunker feeding.
- Proper stacking of coal in stack yard and compacting of coal with Bulldozers
- Re-claiming of coal from stack yard to unit bunkers.

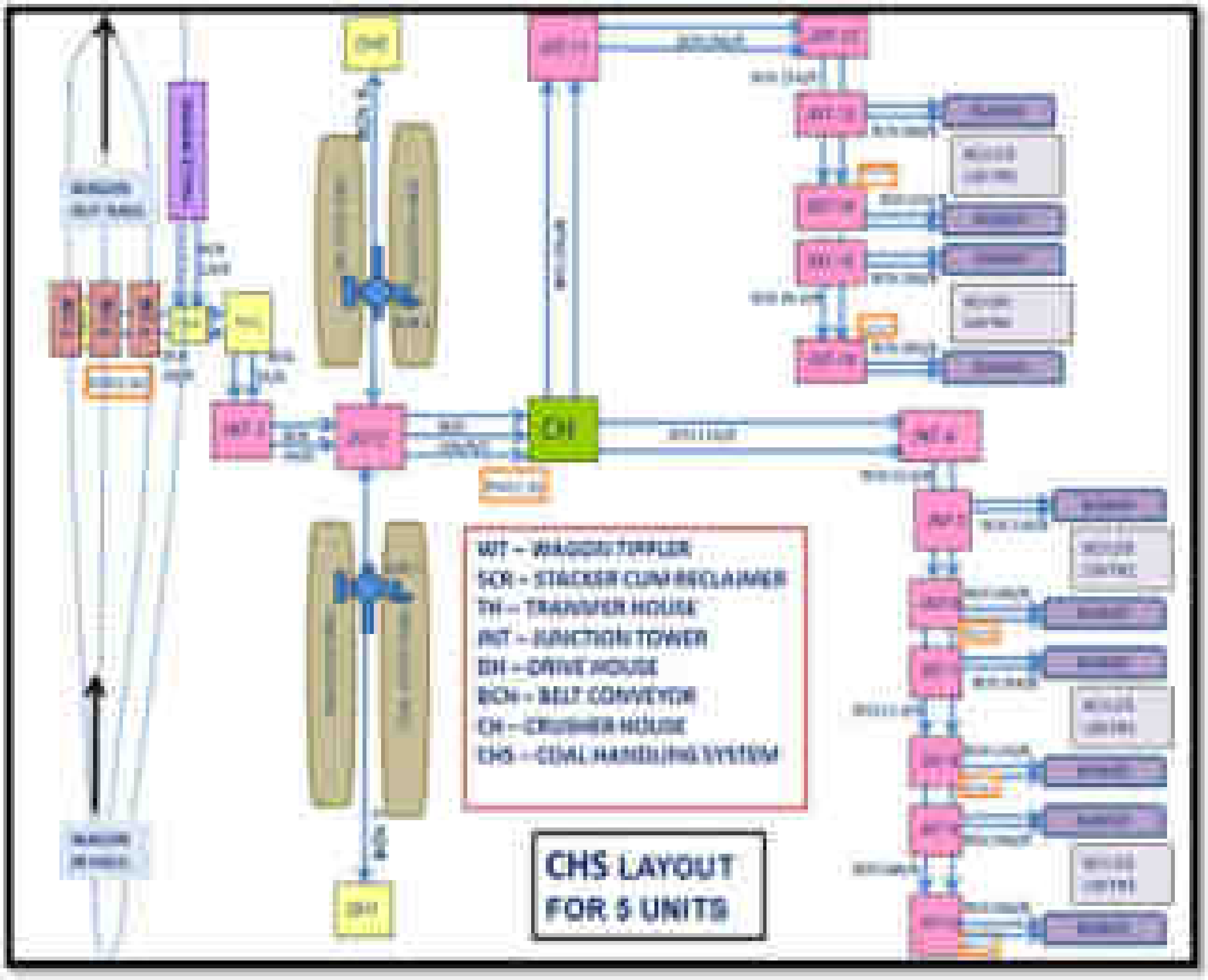


Fig 6: Coal Handling System Layout

Coal Handling Plant consist following major Systems:

1. **Unloading System:** Coal received at site by railway wagons which unloaded using Wagon Tipplers- 3 nos. (Rotary Car Dumpers ) and Track Hopper – 120 m, BOX, BOX-N type wagons unloaded at wagon tippler and BOBR wagons unloaded at Track Hopper. Designed coal size for plant is (-) 300mm.

Fig 7: Pre-wetting System before entering Track Hopper for reduce fugitive dust emission

2. **Coal Yards:** APML Tiroda has 4 coal yards with combined capacity of 7 lac tons of coal, Which gives a backup of about 15 days while all the five units are operational at full load One nos. of Stacker cum Reclaimer is provided with each pair of coal yard to stack and reclaim the coal whenever required
3. **Stacking:** While coal is not fed to the bunkers it has be stacked in the coal yards using stackers. Combined capacity of the coal yards is 7 lac tons, which is adequate

for all five units running at full load for 15 days. Coal have been stacked by using BCN 7 or BCN 9, Stacking capacity : 3600 TPH

4. **Reclaiming:** While there are no coal rakes available, coal from yards could be used for bunkering. Stacker cum Reclaimer are used to reclaim coal from coal yard using reversible BCN 7 and BCN 9 Reclaiming capacity : 2400TPH

**Fig 8: Stacker Reclaimer**

5. **Screening :** The CHP is designed for (-)300mm coal size, coal size of (-) 25 mm size is separated using Vibrating grizzly fodders and fed to the shuttle conveyors. Total 6 nos. of VGS are installed in the crusher house for screening the coal. The Filtered coal get mixed with crushed coal and fed to the Bunkers using conveyors screening capacity: 1250 TPH each screen

6. **Crusher house:** Coal size ranging from (-) 300 mm to (+) 25mm is fed to Crushers which crushes the coal to (-) 25 mm.Total 6 nos. Crushers are installed in the crusher house Crushing capacity: 1250 TPH each Crusher Type: Ring Granulator Crusher

7. **Conveying System:** Coal is conveyed through belt conveyors (BCNs) from one place to another it consists of two conveying streams from unloading to coal bunkers with one stream operating and the other as standby. However, it is possible to operate both the streams simultaneously.

Fig 9: Closed Coal Conveying System

Fig. 10: Rain Guns at Coal Yard for Reduce Fugitive Dust Suppression

## 2.8 Electro Static Precipitator

Many industrial, power generation and chemical processes produce unwanted fine particulate material as a consequence of their operation. Electrostatic precipitation (ESP) is a highly efficient method of removing entrained particulate contaminants from exhaust gases and is extensively used in these industries to limit particulate emissions.

An ESP works because of electrostatic attraction (like charges repel; unlike charges attract). An ESP uses a high voltage electrostatic field to separate dust, fume or mist from a gas stream. The precipitator consists of vertical parallel plates (collecting plates/electrodes) forming gas passages 12 to 16 in. (30.5 to 40.6 cm) apart. Discharge electrodes are electrically isolated from the plates and suspended in rows between the gas passages. Every particle either has or can be given a charge - positive or negative. A high voltage system provides power to the discharge electrode to generate an electrical field. The particulate, entrained in the gas, is charged while passing through the electrical field. The particulate is then attracted to the grounded collector plate, and forms a dust layer on the plate.

Periodic rapping separates the accumulated dust layer from both the collector plates and discharge electrodes (in case of wet ESP by spraying it with a liquid). The dust layer released by the rapping collects in hoppers and is removed by material / ash handling system. At many places in this article, ash is used instead of particulate matter since major application of an ESP is for ash collection.

Tiroda Thermal Power Plant has installed 5 numbers of ESP for control of Air pollution envisaged from the power plant working process.

**Fig. 11 Electro Static Precipitator installed at TTPP**

### Table 2: Technical Specification of ESP

| Sr.No. | Particular | Specification |
|---|---|---|
| 1 | Working Pressure | ±9800 Pa |
| 2 | Equipment Resistance | ≤235 Pa |
| 3 | Number of Column | 2 units |
| 4 | Number of Chamber | 4 units |
| 5 | Number of Field | 10 units |
| 6 | Number of channel | 30 units |
| 7 | Effective Length of Field | 46.55m |
| 8 | Effective Cross-sectional Area | 720m$^2$ |
| 9 | Flue Gas Temperature | 146$^0$C |
| 10 | Flue Gas Velocity | 0.79m/s |
| 11 | Flue Gas Treating Time | 58.92s |
| 12 | Inlet Concentration: | 71.3g/Nm$^3$ |
| 13 | Dust Collecting Efficiency: | 99.93% |
| 14 | Total Collecting Area: | 335160m$^2$ |
| 15 | Number of Hopper | 160 units |

### 2.9 RCC Silos and Bag Filter

At APML, 6 RCC silos are provided for storage of dry fly ash of a Capacity 1700 MT each. Six outlets below each silo are provided. Each silo is provided with one outlet with manual isolation valve & one manual isolation valve along with cylinder operated valve along with 170 TPH rotary ash conditioner for semi wet disposal of dry ash into open truck, Three outlet with manual isolation valve with one Cylinder operated Dome type valve along with 170 TPH motorized telescopic spout with rotary feeder for dry unloading of fly ash in to closed truck/Railway Wagon and remaining one opening is provided with a Blind flange Manual isolation valve for emergency unloading & future use. The accumulated ash in any of ESP/APH hopper can be collected in any of the Silo with necessary PLC logic. Silo Fluidizing Blowers (including a standby) along with air heaters are provided for fluidization of ash to avoid choking and easy flow of ash from silo to unloading equipment's. Necessary instrument air connection & cylinder-operated valve is provided and the tapping is taken from Instrument air compressor from the plant area for the vent filter.

Dry fly ash collection system consists of Bag filters cum buffer hopper, pressure transmitters / blow tanks conveying lines and silo. For collecting fly ash in dry form, the system is designed such that the fly ash and conveying air mixture is passed through buffer hoppers, where ash gets separated and air flows to the vacuum pumps through Bag filters. The bag filters are pneumatic pulse jet type. Suitable tap-off connections with remote operated valves is provided in the main fly ash pipe headers, so that the fly ash conveying air mixture is passed either through wetting unit for wet disposal or through bag filter/buffer hoppers for dry fly ash collection in silos. The fly ash from the buffer hoppers is transported to RCC silo by using conveying compressors. An adequately sized vent filter is mounted on top of the silo to filter the air and let it out to the atmosphere.

Tiroda Thermal Power Plant has installed 6 numbers of Bag Filters for control of Air pollution envisaged from the power plant working process.

**Fig.12 Fly Ash Silo installed at TTPP**

**Fig. 13 Fly ash Silos (1700 MTx6 Nos.) at TTPP**

The technical data for silo bag filters is as follows:

**Table 3: Technical Specification of Bag Filters**

| Sr.No. | Particular | Specification |
|---|---|---|
| 1 | Type of Bag Filters | Pulse Jet |
| 2 | Filter Area | 201.3 $m^2$ |
| 3 | No. of valves | 10 Nos. |
| 4 | Dust Load | 25 gms / Am3 |
| 5 | Dust Nature | Fly Ash |
| 6 | Particle size | 80% - 70 to 25 µ<br>20% - 25 to 10 µ |
| 7 | Bags (Type & Size) | Polyester Needle felt with Antistatic Treatment<br>Ø160 mm x 3660 mm long |
| 8 | Outlet Emission | < 50 mg/$Nm^3$ on dry basis |
| 9 | Compressed Air Required | 35 $Nm^3$/hr Clean and dry air, compressed to 6-8 Kg/$cm^2$ g to be tapped for instrument airline. |

# 3.0 Approach and Methodology

## 3.1 Approach of Study

A kick off meeting was arranged with Environment Management division of APML wherein discussions regarding the Performance Guarantee study was made and its execution; planning and time schedule was discussed. A reconnaissance visit of Vardan team took place wherein the strategic points inside the plant were marked and Pollution Control Equipment was observed for execution of Performance Guarantee study.

The Proficiency Guarantee Test for checking effectiveness of installed pollution control equipments i.e. ESP and Bag filter at Adani Power Maharashtra Ltd. Proficiency of pollution control equipments has been checked to assess the inlet and outlet dust exposure to measure difference percentage of dust/pollutant which shows the effectiveness of control devices. During the activity and operation of plant measurement were taken repeatedly to ensure effectiveness and reliability of measurement. The Proficiency guarantee test is aimed to identify and analyze the proficiency and working effectiveness of pollution control devices.

**Table 4 Brief Description of PG study**

| S. No. | Particulars | Details | | |
|---|---|---|---|---|
| A. | Nature and Size of the Project | Coal Based Power plant with total capacity of 3300 MW at Tiroda, Gondia district, Maharashtra.<br>Comprises of 5x660 MW units, All units at this location are of Supercritical Technology, driving efficiency in coal based power generation. | | |
| B | Location Details | Electrostatic precipitator (ESP) Locations | | |
| | | 660 MW Boiler Duct (Unit-I) | ESP Inlet | ESP Outlet |
| | | 660 MW Boiler Duct (Unit-II) | ESP Inlet | ESP Outlet |
| | | 660 MW Boiler Duct (Unit-III) | ESP Inlet | ESP Outlet |
| | | 660 MW Boiler Duct (Unit-IV) | ESP Inlet | ESP Outlet |
| | | 660 MW Boiler Duct (Unit-V) | ESP Inlet | ESP Outlet |
| | | Bag Filter Locations | | |
| | | CHP Crusher Duct Extraction | Duct extraction Inlet | Duct extraction Outlet |
| | | Fly Ash Silo No.1 | Inlet Duct | Outlet Duct |
| | | Fly Ash Silo No.2 | Inlet Duct | Outlet Duct |
| | | Fly Ash Silo No.3 | Inlet Duct | Outlet Duct |
| | | Fly Ash Silo No.4 | Inlet Duct | Outlet Duct |
| | | Fly Ash Silo No.5 | Inlet Duct | Outlet Duct |
| | | Fly Ash Silo No.6 | Inlet Duct | Outlet Duct |

| C. | Sampling Details | |
|---|---|---|
| | Electrostatic precipitator (ESP): | ESP 3 trial for each location for both inlet & outlet |
| | Bag Filter | Bag filter 4 trial for each location for both inlet & outlet |

## 3.2 Methodology of Sampling

### *3.2.1 General*

Performance Guarantee test were conducted on ESP and Bag filters installed at Tiroda Power Plant with various trail test on each control equipments. Performance evaluation of Air pollution control equipments are measured by sampling and analyzing the pollutant levels at inlet to ESP and outlet of stack with all the units of power plant working on full capacities. The values so obtained are then used for calculating the Performance Guarantee of ESP and Bag Filters. The Emission monitoring is performed as per IS:11255 and CPCB Guidelines.

### *3.2.2 Stack Sampling and Analysis*

*Method and Principle*: Particulate matter test or analysis made in accordance with IS 11255 and CPCB Guidelines, A known volume of flue gas is collected through a suitable thimble and mass is determined using volume of air.

*Sampling accessories*: Sampling probe, Thermostat, vacuum pump, Stack monitoring kit are required for sampling of Particulate matter.

*Instrument Used for Stack Sampling*: Particulate sample will be collected by stack monitoring kit details are given in Table.

**Table 5 Instrument used for sampling & monitoring of Stack Emission**

| Sr. No. | Instrument | Manufacturer | Model No. |
|---|---|---|---|
| 1 | Stack Monitoring Kit & Vacuum pump | Vayubodhan | VSS 3 |
| 2 | Stack Monitoring Kit & Vacuum pump | Enviro Instrument | EI-106 |

### *3.2.3 Sampling Train*

The sampling train comprises the following five essential parts:

- A probe along with sampling nozzle of proper dimension and design;
- An efficient collector for removing the particulates from the gas sample;
- Means for ensuring that the rate of sampling is approximately equal to the gas velocity at the point of sampling ( isokinetic sampling );

- Means for measuring the total volume of the gas filtered; and
- A vacuum pump for drawing the gas through the sampling nozzle and filter

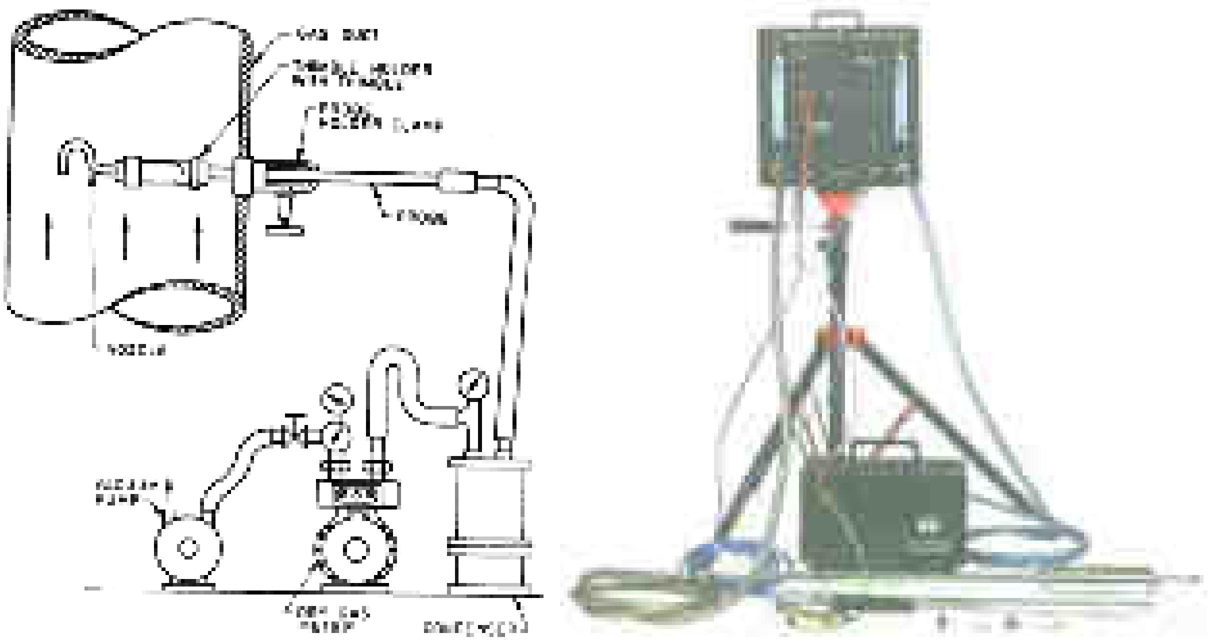


**Fig.14 Isokinetic Sampling Train**

*Pre Sampling Activity:*

Weigh the properly conditioned thimble/filter and place it into the clean, air tight container. Designate appropriate label or ID No. to each thimble/filter container. Field activity starts with the collection of detail information's from the industry about the products, raw materials, fuels, and stack dimensions.

*Traverse Point Calculation*

Calculate the traverse point and accordingly mark the distance from tip of the nozzle on pitot tube and probe. Sample for particulate concentration shall be done at the same location where velocity measurements were carried out. It is the reference sampling point.

*Check the Leak in Sampling Train*

The sampling train after having set up will be tested for leakage by plugging the inlet. The rotameter shall not give a reading beyond 5 lpm when the flow has been set 100 lpm. Also the dry gas meter should give a reading of less than 5 percent of the air flow.

*Composition of Flue Gas:*

Flue gas composition are determined and calculated as per below calculation:

Md = 0.44 (%CO2) + 0.32 (% O2) +0.28(% N 2 + % CO) +……

*Determine Stack Gas Velocity Pressure (Δ P) And Stack Temperature (Ts)*

- Check and adjust the upper miniscus of manometer fluid at zero.
- Connect +ve and –ve end of the pitot tube in respective points.
- Slowly insert the pitot and thermocouple upto the first traverse mark inside the stack. Keep the positive end towards the direction from which flue is coming. Hold it for stabilisation. Take the reading of fluid displacement in manometer and temperature.
- Repeat the same in next traverse mark and so on.
- Take average reading for Δ P and Ts
- For measurement of static gas pressure pitot tube should be rotate by 90 °C from the position of actual Δ P measurement. This would provide better accuracy.

*Stack Gas Velocity Determination (Us)*

Connect pitot tube to the stack for velocity determination, calculate the stack gas velocity at all the traverse point by using the following formula. Consider the density factor for correction of velocity pressure and Δ Ps to convert water column manometer.

$Us = Kp\ Cp\ (\Delta P)^{1/2}\ [(Ts) / (Ps \times Ms)]$

Where

Us = stack gas velocity, m/s
Kp = constant
Cp = s-type pitot tube coefficient.
Ts = absolute stack gas temperature, °K
ΔP = stack gas velocity pressure, mm water column
Ps = absolute stack gas pressure, mm Hg
Ms = molecular weight of stack gas on wet basis, Kg / Kg - mole

*Determination of Volumetric Flow Rate/ Discharge*

The following equation is used to calculate stack gas volumetric flow rate ($m^3$ /hr)

$Qs = 3600\ (Us) \times As\ (1-B_{wo}) \times [T_{ref} / T_s]\ [P_s / P_{ref}]$

As = area of the stack (duct), $m^2$
Bwo = proportion by volume of water vapour in stack gas.
Tref = 298 °K
Pref = 760 mm

Ts = absolute stack gas temperature, °K
Ps = absolute stack gas pressure

*Calculation for Particulate matter*

Calculate the dust concentration using the following equation:
Dust Concentration in mg /Nm3' (25 °C, 760 mm Hg, dry basis)

$$Em = \frac{(W2 - W1)\ gm \times 1000}{Vstd}$$

Where,
Vstd = Volume of dry gas through the meter (25 °C, 760 mm Hg), $Nm^3$
W1 = Initial weight of filter paper
W2 = Final weight of filter paper

*Determination of Emission Rate*

Calculate the dust emission rate as following

$$\text{Dust Emission Rate (Kg/Hr)} = \frac{Em \times Qs}{10^6}$$

Where,
$E_M$ = Measured emission concentration
Qs = Flue gas flow rate (25 °C, 760 Hg mm Hg), $Nm^3$ /hr.

*Efficiency Analysis:*

Performance of pollution control device measured by sampling and monitoring of Inlet and outlet Duct (Emission from Its Connected Stack) simultaneously on full capacity and full load of fuel. It can be calculate by difference of particulate matter at inlet and outlet duct. Particulate matter emission measurement has been done.

*Calculation of Proficiency Test:*

Operating Efficiency of Pollution control device

$$\text{Efficiency \%} = \frac{\text{(Inlet Dust Load- Emission from its Connected Stack) x100}}{\text{Inlet Dust Load}}$$

# Report Sample

**Name of Project:** M/s Adani Power Maharashtra Ltd, Tiroda, Gondia, Maharastra

**Performance Report of Air Pollution Control Equipment**

**Name of Air Pollution Control Equipment : ESP or Bag Filter**

Location of Installation : ____ MW Boiler Duct (Unit-...)

Date Of Testing : 00/00/0000

No of Tripping : Nil

Sample Location : Passes (A/B)

Make of Stack : MS

Coal Ash (%) : 00.00

Load (MW) : 000 to 000

Coal Flow (TPH) : 000 to 000

| **Parameter** | **Inlet** | | | **Outlet** | | |
|---|---|---|---|---|---|---|
| | **Trial 1** | **Trial 2** | **Trial 3** | **Trial 1** | **Trial 2** | **Trial 3** |
| Dimension/Dia of Stack (m) | | | | | | |
| Height of stack (m) | | | | | | |
| Ambient Temp. (°C) | | | | | | |
| Stack Temp. (°C) | | | | | | |
| Velocity of Stack gases (m/sec.) | | | | | | |
| Flow (LPM) | | | | | | |
| Total gas quantity emitted | | | | | | |

| **Trial 1** | | | |
|---|---|---|---|
| Inlet Dust Load | : | | mg/Nm$^3$ |
| Emission from Its Connected Stack | : | | mg/Nm$^3$ |
| Operating Efficiency of ESP | : | | % |

| **Trial 2** | | | |
|---|---|---|---|
| Inlet Dust Load | : | | mg/Nm$^3$ |
| Emission from Its Connected Stack | : | | mg/Nm$^3$ |
| Operating Efficiency of ESP | : | | % |

| **Trial 3** | | | |
|---|---|---|---|
| Inlet Dust Load | : | | mg/Nm$^3$ |
| Emission from Its Connected Stack | : | | mg/Nm$^3$ |
| Operating Efficiency of ESP | : | | % |

Average Operating Efficiency of ESP/Bag Filter : 00.00 %

**Approved By**

# 4.0 Field Survey and Data Collection

The field data was collected at Adani Power Maharashtra Ltd., from five ESP connected to five boilers of 660 MW capacity, Seven Bag filters connected to six Fly Ash Silo's and one CHP crusher.

The Results of the field data and Analysis is provided below

**Table 6 Consolidated Results of ESP**

| S. No. | Location | Trial | Inlet (mg/Nm$^3$) | Outlet (mg/Nm$^3$) | Operating Efficiency (%) | Average Operating Efficiency (%) |
|---|---|---|---|---|---|---|
| 1. | Unit#2 Boiler Duct Pass-A | Trial 1 | 23244.49 | 24.22 | 99.90 | 99.84 |
| | | Trial 2 | 21480.52 | 45.68 | 99.79 | |
| | | Trial 3 | 25305.23 | 39.64 | 99.84 | |
| 2. | Unit#2 Boiler Duct Pass-B | Trial 1 | 38758.44 | 38.50 | 99.90 | 99.88 |
| | | Trial 2 | 32673.46 | 43.28 | 99.87 | |
| | | Trial 3 | 37013.61 | 39.16 | 99.89 | |
| 3. | Unit#1 Boiler Duct Pass- A | Trial 1 | 38409.89 | 33.00 | 99.91 | 99.88 |
| | | Trial 2 | 36289.15 | 45.61 | 99.87 | |
| | | Trial 3 | 33010.72 | 40.05 | 99.88 | |
| 4. | Unit#1 Boiler Duct Pass-B | Trial 1 | 30092.17 | 45.02 | 99.85 | 99.87 |
| | | Trial 2 | 34427.17 | 38.92 | 99.89 | |
| | | Trial 3 | 40785.28 | 46.17 | 99.89 | |
| 5. | Unit#3 Boiler Duct Pass-A | Trial 1 | 30340.91 | 45.42 | 99.85 | 99.86 |
| | | Trial 2 | 33015.09 | 35.85 | 99.89 | |
| | | Trial 3 | 36082.56 | 48.97 | 99.86 | |
| 6. | Unit#3 Boiler Duct Pass-B | Trial 1 | 34667.72 | 33.72 | 99.90 | 99.88 |
| | | Trial 2 | 37300.31 | 47.61 | 99.87 | |
| | | Trial 3 | 35148.13 | 43.02 | 99.88 | |
| 7. | Unit#4 Boiler Duct Pass-A | Trial 1 | 37991.44 | 45.26 | 99.88 | 99.89 |
| | | Trial 2 | 34711.25 | 33.20 | 99.90 | |
| | | Trial 3 | 42466.46 | 48.01 | 99.89 | |
| 8. | Unit#4 Boiler Duct Pass-B | Trial 1 | 32142.45 | 44.92 | 99.86 | 99.90 |
| | | Trial 2 | 40442.28 | 37.27 | 99.91 | |
| | | Trial 3 | 41447.87 | 29.09 | 99.93 | |
| 9. | Unit#5 Boiler Duct Pass-A | Trial 1 | 34197.77 | 26.97 | 99.92 | 99.90 |
| | | Trial 2 | 32596.53 | 39.10 | 99.88 | |
| | | Trial 3 | 31150.35 | 33.68 | 99.89 | |
| 10. | Unit#5 Boiler Duct Pass-B | Trial 1 | 34197.77 | 26.97 | 99.92 | 99.90 |
| | | Trial 2 | 32596.53 | 39.10 | 99.88 | |
| | | Trial 3 | 31150.35 | 33.68 | 99.89 | |

Average operating efficiency of ESP are 99.84% to 99.90%.

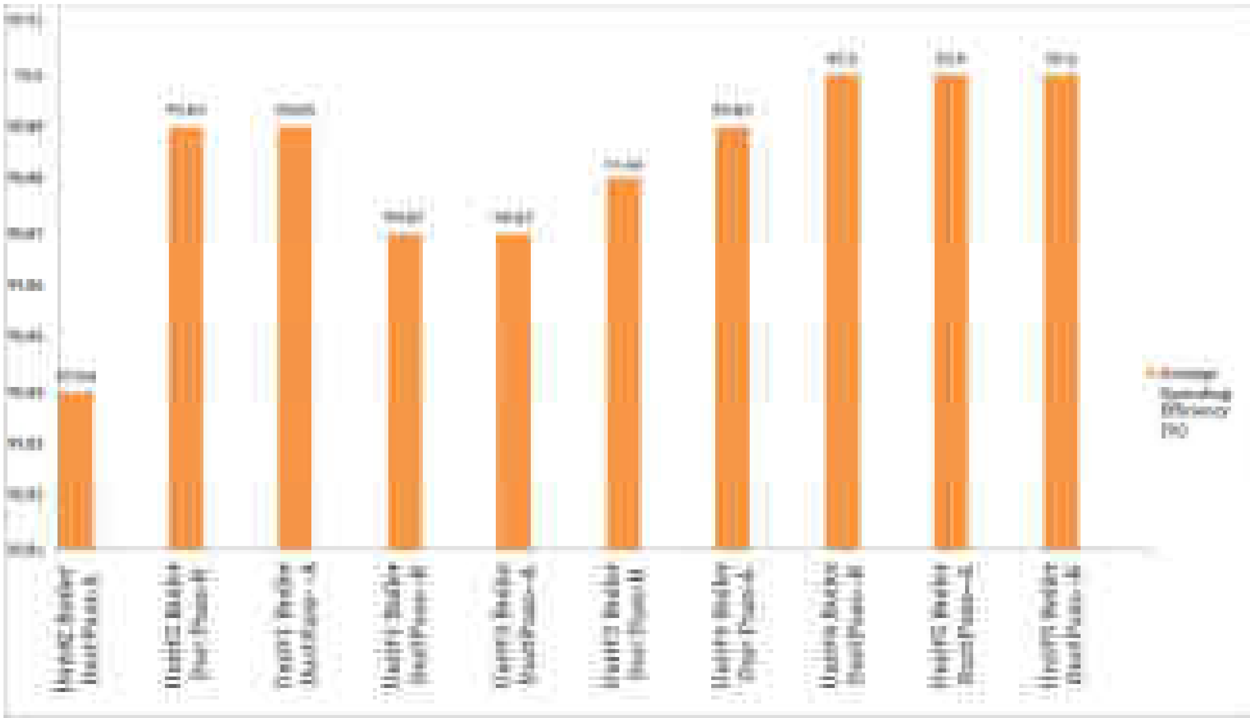


**Fig. 15 Graphical Representation of Operating Efficiency of all installed ESP**

**Table 7 Consolidated Results of Bag Filter**

| S. No. | Location | Trial | Inlet (mg/Nm³) | Outlet (mg/Nm³) | Operating Efficiency (%) | Average Operating Efficiency (%) |
|---|---|---|---|---|---|---|
| 1. | CHP Crusher Duct Extraction Pass -A | Trial 1 | 1117.75 | 8.19 | 99.27 | 99.21 |
| | | Trial 2 | 1235.91 | 11.37 | 99.08 | |
| | CHP Crusher Duct Extraction Pass -B | Trial 1 | 1306.18 | 10.44 | 99.20 | |
| | | Trial 2 | 1021.27 | 7.08 | 99.31 | |
| 2. | Fly Ash Silo No.1 | Trial 1 | 6558.14 | 25.79 | 99.61 | 99.59 |
| | | Trial 2 | 5108.94 | 21.82 | 99.57 | |
| | | Trial 3 | 7093.89 | 26.94 | 99.62 | |
| | | Trial 4 | 5475.05 | 22.71 | 99.59 | |
| 3. | Fly Ash Silo No.2 | Trial 1 | 6634.48 | 13.70 | 99.79 | 99.67 |
| | | Trial 2 | 8507.30 | 31.24 | 99.63 | |
| | | Trial 3 | 6952.67 | 22.43 | 99.68 | |
| | | Trial 4 | 6216.28 | 20.45 | 99.67 | |
| 4. | Fly Ash Silo No.3 | Trial 1 | 7862.01 | 23.27 | 99.70 | 99.69 |
| | | Trial 2 | 7777.36 | 28.90 | 99.63 | |
| | | Trial 3 | 7401.94 | 18.05 | 99.76 | |
| | | Trial 4 | 10369.09 | 33.30 | 99.68 | |
| 5. | Fly Ash Silo No.4 | Trial 1 | 5489.52 | 19.46 | 99.65 | 99.69 |
| | | Trial 2 | 7422.65 | 23.14 | 99.69 | |

| S. No. | Location | Trial | Inlet (mg/Nm³) | Outlet (mg/Nm³) | Operating Efficiency (%) | Average Operating Efficiency (%) |
|---|---|---|---|---|---|---|
| | | Trial 3 | 6573.06 | 18.88 | 99.71 | |
| | | Trial 4 | 6089.50 | 17.85 | 99.71 | |
| 6. | Fly Ash Silo No.5 | Trial 1 | 4716.35 | 19.96 | 99.58 | 99.58 |
| | | Trial 2 | 4606.91 | 22.94 | 99.50 | |
| | | Trial 3 | 5825.02 | 25.67 | 99.56 | |
| | | Trial 4 | 6877.62 | 20.63 | 99.70 | |
| 7. | Fly Ash Silo No.5 | Trial 1 | 6908.81 | 26.01 | 99.62 | 99.68 |
| | | Trial 2 | 6535.17 | 23.48 | 99.64 | |
| | | Trial 3 | 7013.34 | 18.03 | 99.74 | |
| | | Trial 4 | 7578.82 | 20.22 | 99.73 | |

Average operating efficiency of Bag Filter are 99.21% to 99.69%.

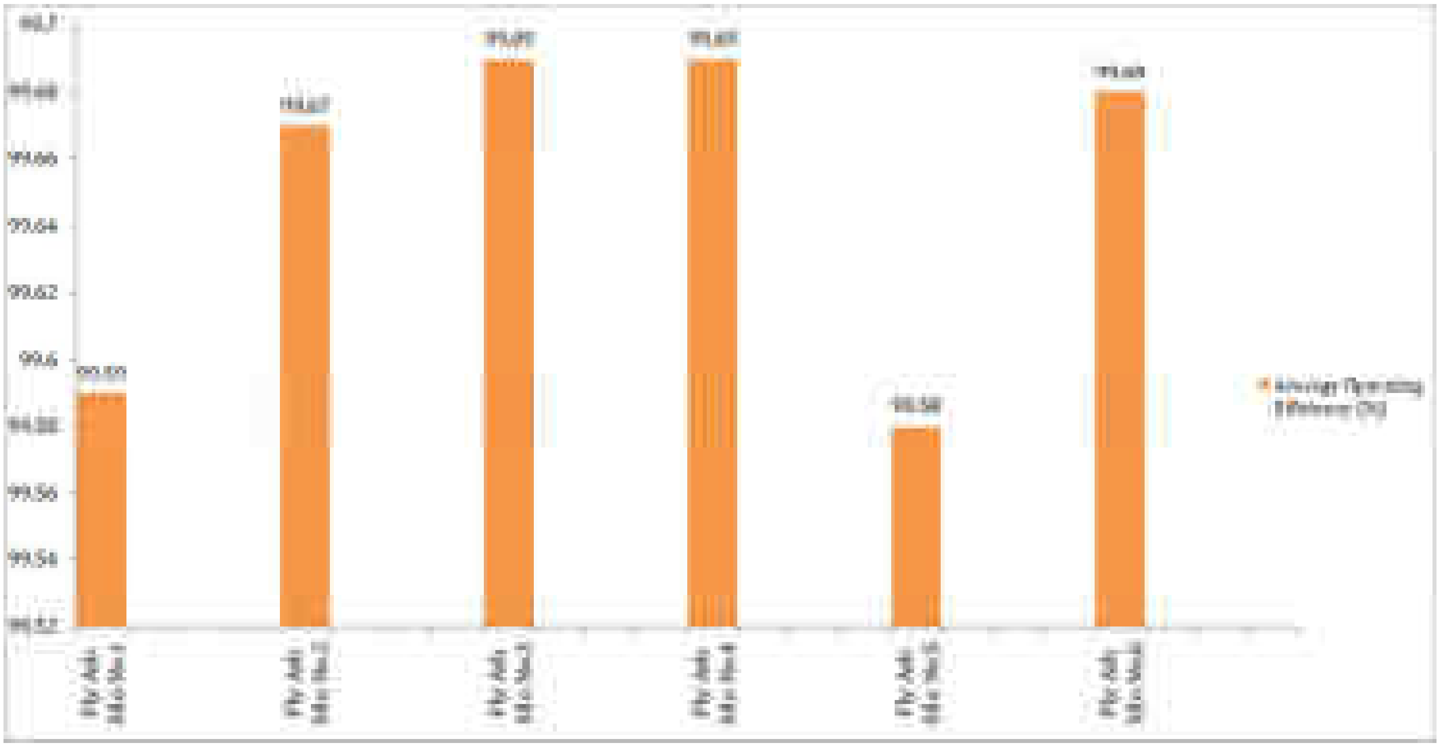


Fig. 16 Graphical Representation of Operating Efficiency of all installed Bag Filters

## Site Photographs of Stack Sampling at Tiroda Thermal Power Plant

| | |
|---|---|
|  |  |
| Unit#1 Boiler Duct Pass- A | Unit#1 Boiler Duct Pass- B |
|  |  |
| Unit#2 Boiler Duct Pass- A | Unit#2 Boiler Duct Pass- B |

| | |
|---|---|
|  |  |
| Unit#3 Boiler Duct Pass- A | Unit#3 Boiler Duct Pass- B |

| | |
|---|---|
|  |  |
| Unit#4 Boiler Duct Pass- A | Unit#4 Boiler Duct Pass- B |

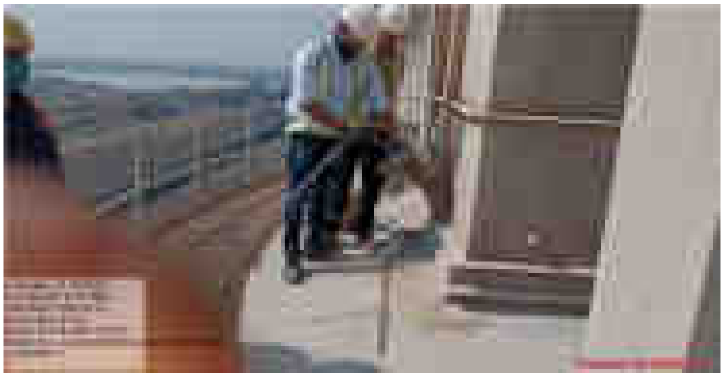
| | |
|---|---|
|  |  |
| Unit#5 Boiler Duct Pass- A | Unit#5 Boiler Duct Pass- B |

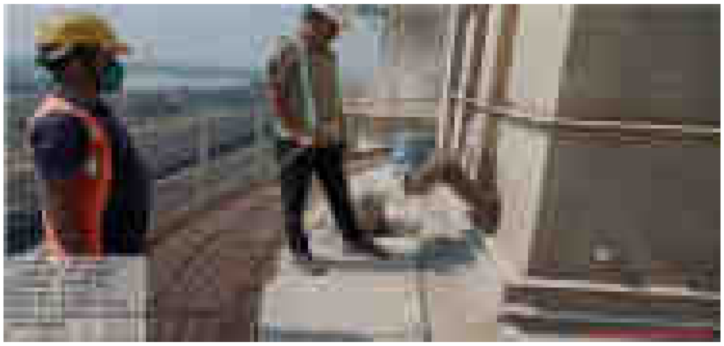
| | |
|---|---|
|  |  |
| CHP Crusher Duct Extraction Pass -A | CHP Crusher Duct Extraction Pass -B |

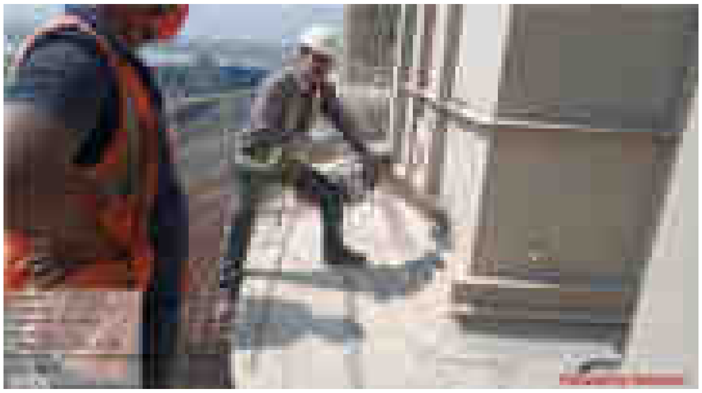
| | |
|---|---|
|  |  |
| Fly Ash Silo No.1 (Inlet) | Fly Ash Silo No. 1 (Outlet) |

Fly Ash Silo No.2 (Inlet)

Fly Ash Silo No. 2 (Outlet)



| Fly Ash Silo No.3 (Inlet) | Fly Ash Silo No. 3 (Outlet) |
|---|---|
|  |  |
| Fly Ash Silo No.4 (Inlet) | Fly Ash Silo No. 4 (Outlet) |

| | |
|---|---|
|  |  |
| Fly Ash Silo No.5 (Inlet) | Fly Ash Silo No. 5 (Outlet) |
|  |  |
| Fly Ash Silo No.6 (Inlet) | Fly Ash Silo No. 6 (Outlet) |

## 5.0 Recommendations and Conclusion

## 5.1 Recommendations

The Tiroda Thermal Power Plant is located at village Tiroda in Gondia District of Maharashtra state. The study has been carried out in order to identify the efficiency of Air pollution control equipments installed at strategic locations in the Tiroda Thermal Power Plant. All the elemental aspects of the study were carried out as per guidelines and methodology by CPCB/MPCB.

The site visit was carried out by the experts from Vardan EnviroLab for reconnaissance survey at Tiroda Thermal Power Plant. The sampling locations and time schedule was finalized for the testing of Air Pollution Control Equipments, at Adani Power Maharashtra Ltd. The Stack emission monitoring was carried out at the identified locations by Field executives of Vardan EnviroLab and the analysis for the same was conducted at Vardan EnviroLab. The Average Operating efficiency for Bag Filter was in the range of 99.21 to 99.69 % and the average operating efficiency for ESP was in the range of 99.84 to 99.90%.

From the study of Performance Guarantee of ESP and Bag filters, it is recommended that in order to maintain highly efficient pollution control equipments certain measures have to be undertaken. The following are recommended to be followed for better functioning of ESP and Bag Filters.

### *5.1.1 Electrostatic Precipitator*

1. Plugging of leakage in the boiler/ESP System up to the stack. This will minimize infiltration as well as make ID Fans operation suitable to create adequate suction in the furnace.
2. Operating the boiler at stable load with minimum fluctuation.
3. Increasing current level of collecting electrodes of ESPs with lower current in initial fields and higher current in final fields.
4. Still-air tests to check the strength of the developed electric field around the discharge electrodes.
5. Straightening of bent discharge and collecting electrodes.
6. Replacement of worn collector plates.
7. Replacement of damaged discharge electrodes.
8. Refurbishment of rapper bearing assemblies.
9. For better & smooth operation of ESP needs to clean/wash on certain frequencies
10. It’s better to have second alternative system to check the status of ESP hopper filled or Empty (Check through with the help of gamma ray sensors)

### *5.1.2 Bag Filters*

1. In case of malfunction of bag-cleaning system, Check all cleaning-system components of the bag filter
2. For Re-entrainment of dust in collector due to low-density material or in leakage at discharge, Check the discharge valves and Lower the A/C ratio.
3. Reduce the inlet volume after discussions with designers
4. If in case of wetting of bags, Control the dew point excursions, use Dry bags with clean air and Clean bags with vacuum.
5. If Bag permeability increases then check the cleaning energy/cycle and reduce it, if possible
6. In case of Vibrations observed in the filter then check source and make appropriate changes
7. For Dew point excursions, carefully monitor and control the process.
8. Check & maintained air pressure in bag filters

## 5.2 Conclusions

Many of the Electrostatic precipitators and Bag filters in operation today are sized and designed to meet performance requirements as per the prevailing norms of MoEFCC and CPCB/SPCB. The Tiroda Thermal Power plant has installed the state of art pollution control equipment, so as to meet the prescribed norms. The Performance Guarantee test was conducted on **five ESP** and **seven Bag Filters** installed at the specific locations inside the Power Plant.

**The Bag Filters and ESP installed at Tiroda Thermal Power Plant are efficient, stable and due to their high durability, these equipments provide economic benefit in long-term. More importantly they provide low concentration of emissions which subsequently helps in preserving environment and social conditions of the region. From the Performance Guarantee study, it can be concluded that the Efficiency of ESP and Bag filters is in accordance with the required standards. The stack emissions after passing through the ESP and Bag filters are observed to be below 50 mg/Nm$^3$ thereby adhering to the norms of regulatory authorities.**

**Looking to the overall PG report, it has been noticed that the ESP and Bag filters installed at Tiroda Thermal Power Plant shall be considered sufficiently efficient and environmentally safe.**

# References

- Gazette Notifications

  https://cpcb.nic.in/displaypdf.php?id=SW5kdXN0cnktU3BlY2lmaWMtU3RhbmRhcmRzL0VmZmx1ZW50LzQyOC5wZGY=

  https://cpcb.nic.in/uploads/Industry-Specific-Standards/Effluent/tpp_modification_13-1-2021.pdf

  https://cpcb.nic.in/displaypdf.php?id=SW5kdXN0cnktU3BlY2lmaWMtU3RhbmRhcmRzL0VmZmx1ZW50LzQyNS5wZGY=

- Indian Standard Methodology

  https://law.resource.org/pub/in/bis/S02/is.11255.1.1985.pdf

- Technical Reference
  https://www.adanipower.com/-/media/Project/Power/Downloads/Tiroda/Environment-Compliance-Report/SixMonthlyECComplianceReportforTirodaTPPOct19toMarch20.pdf

  https://savree.com/en/encyclopedia/electrostatic-precipitator-esp

  http://cpcbenvis.nic.in/scanned%20reports/Probes-45%20Report%20on%20Design%20&%20Operating%20Parameters%20of%20Electostatic%20Precipitators.pdf

  https://www.irjet.net/archives/V7/i10/IRJET-V7I1095.pdf

Annexure - XIII

CII-ITC Centre of Excellence
for Sustainable Development

CII
Confederation of Indian Industry

# Certificate

## Single-use Plastic Free

### Adani Power Maharashtra Limited

Plot A-1, Tirora Growth Centre, MIDC Area, Tirora,
District Gondia-441911, Maharashtra, India

This is to certify that Adani Power Maharashtra Limited, (a subsidiary of Adani Power Limited) at the location mentioned above, is Single-use Plastic Free as verified by the Confederation of Indian Industry, under the provisions of the **Plastics-use Protocol: Verification and Certification (1.0)**.

This Certificate is valid from 16 August 2021 to 15 August 2022.

PLASTICS-USE
PROTOCOL

**Ms Seema Arora**
*Deputy Director General*
*Confederation of Indian Industry (CII)*
*Centre of Excellence for Sustainable Development (CESD)*

**Certificate Date:** 16 September 2021

**Certificate No.: CII/PuP/2021/021**

This certificate has been awarded after the company fulfilled the requirements for phasing-out single-use plastics and provided evidence for it. Responsibility for the data provided to CII rests solely with the company. The conditions of certification, and items are detailed in the Annex.

## Annex

The certification applies to the following single-use plastic items:

- Cutlery (knives, forks, spoons, plates, glasses, cups, stirrers, straws)
- Crockery (plates, glasses, cups)
- Paper cutlery with plastic lining (plates, cups)
- Cutlery made up of Styrofoam or Thermocol or Polystyrene (plates, glasses, cups)
- Thermocol or Polystrene food containers
- Carry bags
- Dustbin liners
- Items of decoration (including those made of polystyrene)
- Cling film
- Water Pouches
- Non-woven polypropylene bags

**Organizational Boundary:** Adani Power Maharashtra Limited Plant Premises

**Operational Boundary:** Office areas, Canteen, and Operations

**Material Boundary:** Single-use Plastics

**Reference**
**Verification Date:** 16 August 2021
**Verification Report No.:** PuP/Verification/2021/APML/001
**Mode:** On account of the COVID-19 pandemic, the verification process was virtual and followed provisions outlined in the Verification Procedure 1.0 of the Protocol

Annexure - IV

# WATER BUDGETING STUDY FOR TIRODA THERMAL POWER PLANT (5x660 MW)

ADANI POWER MAHARASHTRA LIMITED
TIRODA GROWTH CENTRE, MIDC TIRODA
GONDIA - 441911 (MAHARASHTRA

March 2021

# WATER BUDGETING STUDY FOR TIRODA THERMAL POWER PLANT (5x660 MW)

ADANI POWER MAHARASHTRA LIMITED
TIRODA THERMAL POWER PLANT
PLOT NO. A-1, TIRODA GROWTH CENTRE, MIDC TIRODA
DISTRICT GONDIA 441911 (MAHARASHTRA)

*Executed by*

**Academy of Water Technology and Environ Management, Kolkata – 700 008**

**In Technical Collaboration with**

**Department of Environment Management IISWBM, Kolkata – 700 073**

March, 2021

# *FOREWORD*

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*Adani Power Maharashtra Limited (APML), a wholly owned company of Adani Power Limited, has set up 3300 MW (5x660) coal-based super critical thermal power plant at Tiroda under Gondia District of Maharashtra State. With reference to the Ministry of Environment, Forest& Climate Change (MoEF&CC), Government of India (GoI), Environmental Clearance (EC) for Tiroda TPP as well as Consent to Operate for Tiroda TPP of Maharashtra Pollution Control Board (MPCB) Water Budgeting and Action Plan for Recycling of Treated Effluent of Tiroda TPP is required to be formulated for achieving effective Zero Liquid Discharge (ZLD) and maintaining specific water consumption within the applicable prescribed limit as per MoEF&CC notification dated 7th December, 2015 and as amended 28th June, 2018. Accordingly, APML engaged Academy of Water Technology & Environ Management (AWTEM) in technical association with Department of Environment Management, Indian Institute of Social Welfare and Business Management (IISWBM), Kolkata (a constituent Institute of University of Calcutta) as research consultant to undertake Water Budgeting Study (WBS) for Tiroda TPP of APML.*

*The prime objectives of the present study was to assess the process wise water consumption pattern and estimate specific water consumption along with assessment of the recycling & reuse potential of treated effluent and formulation of implementable action plan to optimize the water consumption and effective maintenance of ZLD. The present WBS is primarily based on secondary data collected from Environment Department of APML as well as the field observation and interaction with various stakeholders undertaken during January-March, 2021. This WBS report presents status of specific water consumption, water balance diagram, effectiveness of WTP, ETP & STP, AWRS, RWHS as well as status of recycling and reuse of treated waste water along with implementable solution for enhancing water efficiency of Tiroda TPP.*

*This study would not have been possible without the constant support and guidance of Shri Santosh Singh, SrVP and Shri R. N. Shukla, AGM, Corporate Environment Group, Adani Power Limited, Ahmedabad. We gratefully acknowledge their untiring efforts for timely completion of the study.*

*The cooperation and guidance received from Shri Kanti Biswas, Plant Head; Shri A. P. Singh, Head, Environment Department; Shri Vijendra Khandekar, Shri Girish Kulkarni, Environment Department, APML and other executives and staff of APL and APML in conducting this study is highly acknowledged.*

*Kolkata*
*March 30, 2021*

*Dr Ashim Kr Bhattacharya*
*Executive Director, AWTEM*

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# PROJECT PERSONNEL

## *TEAM MEMBERS*

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NABET Accredited Ecology &Biodiversity Expert
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Dr. SarbaniMitra, Professor, IISWBM
Dr. DebasishMondal, Director, GEEC
Ms. Moumita Sarkar, Project Officer, IISWBM
Mr. Rahul Chakraborty, Project Fellow, IISWBM
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Prof. Swpan Banerjee
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## *PROJECT DIRECTORS*

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&
Dr. Krishna M. Agrawal
Professor & Dean(Ex), IISWBM

# CONTENTS

# LIST OF FIGURES

# LIST OF TABLES

# LIST OF ABBREVIATIONS

| ABBREVIATION | DESCRIPTION |
|---|---|
| AHP | : Ash Handling Plant |
| APL | : Adani Power Limited |
| APML | : Adani Power Maharashtra Limited |
| AWTEM | : Academy of Water Technology & Environ Management |
| AWRS | : Ash Water Recovery System |
| CHP | : Coal Handling Plant |
| COC | : Cycle of Concentration |
| CT | : Cooling Tower |
| CTBD | : Cooling Tower Blow Down |
| DM | : Demineralized |
| EC | : Environmental Clearance |
| EHS | : Environment, Health & Safety |
| ETP | : Effluent Treatment Plant |
| GoI | : Government of India |
| Ha | : Hectare |
| IISWBM | : Indian Institute of Social Welfare & Business Management |
| LSI | : Langlier Saturation Index |
| MCM | : Million Cubic Meter |
| MPCB | : Maharashtra Pollution Control Board |
| MoEF&CC | : Ministry of Environment, Forests & Climate Change |
| MTPA | : Metric Tone per Annum |
| MW | : Megawatt |
| O&M | : Operation & Maintenance |
| ORP | : Oxidation Reduction Potential |
| QoL | : Quality of Life |
| STP | : Sewage Treatment Plant |
| SPCB | : State Pollution Control Board |
| TPP | : Thermal Power Plant |
| TTPP | : Tiroda Thermal Power Plant |
| WBD | : Water Balance Diagram |
| WBS | : Water Budgeting Study |
| WTP | : Water Treatment Plant |
| ZLD | : Zero Liquid Discharge |

# EXECUTIVE SUMMARY

## 1.0 INTRODUCTION

The Adani Group (1988) has grown from being a trading house to a diversified business group with interests from infrastructural development to FMCGs. The Adani Group has made foray into high growth sector like Power, Infrastructure, Global Trading, Logistics and Energy. Adani Power Limited (APL), a member of the Adani Group, has taken up implementation of large Thermal Power Projects at various locations in India in view of the growing needs of power requirements in the country. APL is also actively planning to implement Thermal Power Stations at various locations in India, totaling to about 20,000 MW in the coming years. Adani Power Maharashtra Ltd (APML), a wholly owned company of Adani Power Limited, has set up Tiroda Thermal Power Plant (TTPP) of 3300 MW (5x660) capacity near Tiroda town under District Gondia in Maharashtra.

With reference to the Ministry of Environment, Forest & Climate Change (MoEF&CC), Government of India (GoI), Environmental Clearance (EC) for Tiroda TPP as well as Consent to Operate for Tiroda TPP of Maharashtra Pollution Control Board (MPCB) Water Budgeting and Action Plan for enhancing the efficiency of water utilization and water conservation measures by potential recycling/reuse waste water of Tiroda TPP is required to be formulated for maintaining effective Zero Liquid Discharge (ZLD) and as well as specific water consumption within the applicable prescribed limit as per MoEF&CC notification dated 7th December, 2015 and as amended 28th June, 2018.

Accordingly, the present water budgeting study was entrusted to Academy of Water Technology & Environ Management in technical collaboration of Department of Environment Management, IISWBM, University of Calcutta. The prime objectives of the present study includes:

- To assess the process wise water consumption pattern and estimate specific water consumption of Tiroda TPP;
- To evolve optimum water budget for Tiroda Thermal Power Plant;
- To assess the recycling potential of treated effluet and formulation of action plan to recycle the treated effluent at Tiroda TPP;
- To delineate mechanism for Implementation of Integrated Water Management Plan for Tiroda TPP.

The major scope of the study includes the undertaking of a reconnaissance survey. On the basis of the reconnaissance survey a framework have been evolved for undertaking time bound detailed field survey for assessing the process wise water consumption pattern and availability of water at river Wainganga besides collecting other primary as well as secondary data required for water budgeting and formulation of action plan for recycling of treated effluent.

## 2.0 PROJECT DETAIL

The salient features of a 3300 MW (5 × 660 MW) coal based super critical Tiroda Thermal Power Plant are as follows:

| Item | Particulars |
|---|---|
| Location of the Plant | Town: Tiroda, District: Gondia<br>State: Maharashtra |
| Co-ordinates | Latitude: 21°24’42.9” North and<br>Longitude: 79°58’14.9” East |
| Net capacity | 3300 MW |
| No. of Units and configuration | Phase I – 2 x 660 MW<br>Phase II – 3 x 660 MW |
| Date of Commercial Operation (COD) | Phase I – Unit 1: September 23, 2012<br>Unit 2: March 30, 2013<br>Phase II – Unit 3: June 14, 2013<br>Unit 4: March 31, 2014<br>Unit 5: October 11, 2014 |
| **Technology** | |
| Steam Generator | Super critical<br>Pressure 255 kg /cm$^2$<br>Temperature 571°C |
| Turbo Generator | Turbine -246 kg/cm$^2$ (a), 563°C, 3000 rpm<br>Generator - 660 MW (Each unit)<br>Generator Transformer - 776 MVA |
| Major Auxiliary System | • Boiler & Turbine Auxiliaries<br>• Pretreatment Plant<br>• Compressed Air System<br>• Coal and Ash Handling System<br>• CW System and Raw Water System<br>• Fire-fighting System<br>• Air conditioning System |

| Item | Particulars |
|---|---|
| | • Ventilation System |
| **Stack Details** | |
| No. of Stack | 2 |
| Stack Height (meter) | 275 each |
| No. of flue | Five |
| Additional equipment | Electrostatic Precipitator |
| Coal | Indigenous Coal – 15.0 MTPA<br>(6.3 MTPA for Phase I & 8.7 MTPA for Phase II)<br>Transportation: Railways |
| **Land** | |
| MIDC Land | 402.00 ha<br>[210 ha for Phase I & 192 ha for Phase II] |
| Forest land | 163.84 ha |
| **Water** | |
| Cooling Technology | Induced draft cooling system |
| Total Water Requirement | 70 MCM |
| Daily Water Consumption | 191760 $m^3$/day |
| Total Discharge | ‘Zero Discharge Norm’ is being followed |
| **General Information** | |
| Manpower Requirement (Total) | Approx. 500 |
| Total Project Cost | Rs 18,476 crores |

## 3.0 APPROACH & METHODOLOGY

The present study have been exploratory in nature based on primary as well as secondary data. Methodology adopted for water budgeting study for Tiroda TPP includes a critical assessment of the quality and quantity of water required for various applications i.e. raw water inlet & outlet, boiler feed water makeup, cooling tower makeup, process water and water for drinking and sanitation and undertake water budgeting for the entire plant as well as individual unit viz. CT, AHP, CHP, DM Plant, etc. Critically review of the existing Water Balance Diagram also have been undertaken using last 5 years water uses data i.e. 2016 to 2020 of Tiroda TPP and modified water balance diagram with existing consumption pattern have been evolved.

Detail study have been undertaken based on primary as well as available secondary data for the performance evaluation of WTP, DM, RO, ETP and STP plants and various measures have been suggested for improving its performance. Study was also undertaken to assess the recycling and reuse pattern of various waste water generated and based on the study various measures have been identified to enhance the efficiency of water use and potential recycling and reuse of waste water to conserve the fresh water.

A kick-off meeting was organised on 10th February, 2021 to discuss the modalities for initiating the water budgeting study for Tiroda TPP and logistic support required for the same under the guidance of Shri Kanti Biswas, Station Head, Tiroda TPP, APML and R. N. Shukla, Corporate Environment Group, APL and Shri Arun Pratap Singh, Head (Environment), TPPP, APML with AWTEM & IISWBM team members.

During the introductory meeting with Shri Arun Pratap Singh, Head (Environment), TPPP, APML along with Mr Vijendra Khandekar, Mr Girish Kulkarni, Mr Tapan Singh, Mr Priyabrata Satapathy, Mr Dinesh Gupta, Mr Animesh Mukhopadhyay, Mr Manoj Yadav and Mr Om Prakash, TTPP, APML and AWTEM & IISWBM team members, initially Shri Singh, Head (Environment) mentioned the objectives of proposed study as well as time period which need to be considered for the same. Mr Khandekar explained the existing water consumption pattern and initiatives taken for recycling and reuse of water at TTPP and emphasised the recent interventions of TTPP and their salient features viz. Ash water recovery system, Water Conservation & Rain Water Harvesting, etc. Subsequently Shri Singh also highlighted the prime thrust area and coverage of proposed study to be undertaken by AWTEM & IISWBM and mentioned that the study should consider all the major issues in line with the regulatory agency's requirement as well as needs of plant while assessing the unit wise water consumption pattern, efficiency/performance of treatment system and potential for recycling & reuse of treated waste water to reduce the raw water consumption. Accordingly, the secondary data required for the purpose were submitted by AWTEM & IISWBM.

Dr. Agrawal requested to Shri Singh to kindly provide required data/information for the present study. Accordingly, Dr. Agrawal submitted checklist of detailed information required in connection with water budgeting study of APML. The time schedule for initiating the field survey and data collection was discussed in view of prevailing pandemic (COVID-19) and technical as well as logistic support required for the same. Shri Singh suggested to undertake field survey and data collection in consideration of prevailing norms and guidelines of Central and State Governments with proper protection of project team members as well as other stakeholders involved in the present study and the same was agreed by AWTEM & IISWBM project team.

As discussed in earlier section, the field survey and data collection was undertaken between February-March, 2021. The series of meeting with various concerned executive/officers of TTPP, APML were conducted to understand plant/unit wise water consumption pattern, detail of water and waste water treatment, recycling & reuse of treated waste water along with the performance evaluation as well as their suggestions for improving the efficiency and potential for further utilizing the treated waste water to effectively maintain the ZLD at Tiroda TPP.

## 4.0 WATER BALANCE

Water is used in energy production and supply, and in turn energy is used for pumping, moving and treating water. Freshwater is required for energy extraction and production, refining and processing, transportation and storage and generation of electric power itself. There lies a close nexus between water and energy in the production cycle. A typical list of plant systems/ applications requiring consumptive water in coal based TPP includes:

- Cooling water system for condenser & plant auxiliaries
- Ash handling system
- Power cycle make up
- Equipment cooling system
- CPU regeneration, if applicable
- Air conditioning and ventilation system
- Coal dust suppression system
- Service water system
- Potable water system
- Green belt development/horticulture
- Evaporation from raw water reservoir

With increasing water scarcity, the power sector faced with dwindling supplies of freshwater and increasing costs of water on the one hand and increasing pollution of water sources on the other. Therefore quantitative and qualitative analysis of water consumption/use to identify losses and options for water conservation by means of recycling and reuse of water become one of the critical element of ensuring water security for TPP.

The main source of raw water for the Tiroda TPP is the Wainganga River which is about 5 km away from plant. There are two parallel pipelines which convey water from the source to the raw water reservoir. Water is stored in four raw water reservoirs which also facilitates primary sedimentation. The total capacity of all water reservoirs is approximate 7.361 MCM. The Water Resource Department, Government of Maharashtra has permitted the withdrawal of 70 MCM per annum of water from Dhapewada Sub-Irrigation scheme, Kawalewada. However, the actual withdrawal is less than 50 MCM per annum.

The analysis of last three years data i.e. 2017-18 to 2019-20 reveals that the average yearly consumption of water in TTPP was 48512592 $m^3$/year (i.e. 132911.23 $m^3$/day) with overall PLF of 72.01% which translate into 2.33 $m^3$/MWh specific water consumption rate which is well within the prescribe norm of MoEF&CC i.e. 3.5 $m^3$/MWh. The analysis further reveals that the specific water consumption rate of TTPP has significantly come down from 2.38 to 2.26 $m^3$/MWhr over the last three years due to various water conservation and recycling measures adopted in the TTPP in the recent past.

The study of existing water balance of of TTPP (Unit 1 to 5) indicates that the total raw water consumption has come down from 219490 $m^3$/day to 180312 $m^3$/day including the evaporation losses at water storage reservoirs (i.e. 2160 $m^3$/day). The various water efficiency and conservation measures including recycling and reuse of waste water adopted in Tiroda TPP in recent past resulting about 20% reduction in raw water consumption (i.e. saving of raw water of about 39178 $m^3$/day). The maximum water is being consumed as cooling tower makeup water i.e. 152256 $m^3$/day which account for nearly 85% of total raw water consumption in Tiroda TPP. However DM make-up water account for about 3% of total raw water consumption in Tiroda TPP. For suppression of dust in CHP and AHP no fresh water is being used as treated waste water is being recycled/reuse for the purpose.

## 5.0 PERFORMANCE EVALUATION OF WTP

To evaluate the performance of water treatment plants and improve the efficiency the characteristics of raw water need to be assessed. Accordingly, the long term trend of variations of raw water quality based on the physio-chemical characteristics of raw water as recorded during last three year 2018 to 2020 have been analysed. The analysis of long-term trend of characteristics of raw water reveals that pH of raw water at intake varies from 7.8 to 8.6. Whereas during monsoon month (i.e. July – September) pH of raw water varies from 7.8-8.2 and remaining months it was recorded in the range of 8.3 to 8.6. The turbidity of raw water varies from 5 to 115 NTU. Whereas during monsoon month (i.e. July – September) turbidity of raw water is maximum and varies from 45 – 115 NTU and remaining months it was recorded in the range of 5 to 15 NTU. Total Dissolved Solids (TDS) of raw water at intake varies from 100 to 220 mg/l. Whereas during monsoon month (i.e. July – September) TDS of raw water is lowest and varies from 100 to 175 mg/l and remaining months it was recorded in the range of 170 to 220 mg/l. Total hardness of raw water varies from 65 to 135 mg/l. Whereas during monsoon month (i.e. July – September) total hardness of raw water is lowest and varies from 65 to 110 mg/l and remaining months it was recorded in the range of 70 to 135 mg/l.

APML have installed two Water Treatment Plant (WTP). Raw water is pumped from the reservoir to the clarifiers of water treatment plants. Clarified water is sent to cooling towers as makeup water as well as DM plant for de-mineralisation. Part of clarified water is also being directly used in auxiliary systems.

The performance evaluation of cooling tower water circulation system and efficiency of water use has been carried out based on the quantity of use of CT makeup water along with its quality as well as quality of CT circulation water and COC. As per analysis results, the positive value LSI indicates that water is scale forming in nature rather than corrosive. Further, it has been found the circulating water pH is ranging from 8.3 to 8.5 and Calcium Hardness varies from 300 to 540 mg/l which are most significant parameter with respect to scale forming rather than TDS. It is important to note that the LSI value of the recirculating cooling water presently observed to be follow in the higher side of the scale forming- as LSI value lies between 1.4-1.8 range against maximum allowable LSI is 2. Actually, LSI range for scale forming nature – 0.5-2.0. Based on above, it is recommended that if the LSI vale can be kept between 0.9 -1.2 range- colling water system will be much less prone to scale formation compare to present condition. This can be achieved by simply maintaining the pH in the range of 7.8-8.2 (the best pH range for running a cooling water system). Calcium hardness can go up to its highest value 540 and COC of 6 can also be achieved. Further, it is recommended for chemical treatment of cooling water using scale dispersant based on advance dispersion polymer technology along with the conventional scale inhibitors to provide enhance protection to the heat exchange systems. By implementing the same, the COC may go up even higher than 6 as well.

As mentioned earlier the part of clarified water is being sent to DM Plant (RO and MB units) for demineralisation to be used as boiler feed water and other auxiliary services. To get high-purity demineralized water for boiler feed makeup water the mixed bed (MB) unit is being used in Tiroda TPP. The MB unit consist of two types of resins, cation & anion in the same column. The resins are separated by water during regeneration and mixed with air for service cycle. The analysis of characteristics of RO & MB water against the designed parameters reveals that conductivity of RO is varying from 17.0 to 19.3 micro-Siemens against the designed value of 30 micro-Siemens. Whereas conductivity and Silica content of MB water is varying from 0.5 to 0.7 micro-Siemens and 9 to 15 ppm against the designed value of 1 micro-Siemens and 20 ppm respectively.

## 6.0 PERFORMANCE EVALUATION OF WASTE WATER TREATMENT PLANTS

The prime sources of wastewater generation in TTPP include cooling tower blow down, DM plant effluent, ash pond water, auxiliary service, washing, cleaning and other domestic waste water. The various treatment systems have been provided based on nature of waste water. The waste water generation rate at TTPP was found to be 0.636 m3/MWh of power generated.

All the cooling water systems provided are of the open recirculation type with natural draft cooling towers. Majority of the CTBD water is presently being used for ash handling and dust suppression in CHP and some amount is stored in guard pond for subsequent recycling/reuse in AHP/CHP. However to enhance the water use efficiency it is proposed to recycle/reuse around 600 $m^3$ /hr CTBD with appropriate treatment as CT makeup water to reduce the fresh water consumption.

Ash slurry/ash water is taken into ash pond (i.e. with ash water ratio of 1:5) and 60% of ash water is recovered through ash water recovery system (AWRS) and reused in ash handling. It is proposed to enhance the ash water recovery efficiency to 70% by adopting the measures for reducing the collection and transportation losses/leakages through AWRS as well as improving the efficiency of clarifier being used to clarify the recovered ash water from ash pond. This will reduce the requirement of CTBD water for ash handling and potential utilization of the same.

Acid and alkaline streams from DM plants are taken separately and neutralized in neutralization pit and sent to the ETP. DM effluent and floor washing effluents are treated in a separate effluent treatment plant. Domestic wastewater from the plant after treatment in STP is being reused for green belt development.

Coal pile area run off is being generated due to rainfall on the coal stockpile area. This waste stream is thus only being generated during monsoon months. The coal pile yard has been provided with a garland drain to channelize the run off to a properly designed settling pond. The overflow from the settling pond has been led to a sump and from this sump the same is being pumped to the CMB. This effluent, after treatment, is being pumped to CHP reuse tank. Effluents generated from the coal pile area due to dust suppression system is also being conveyed by the same garland drain and treated in the same settling pond.

To treat the DM plant waste water along with effluent generated from floor washing & cleaning is being treated through ETP (2 x 25 $m^3$/hr capacity) have been installed. The effluent is being led to an oily wastewater collection sump [Fuel Oil Area Oily Wastewater Sump (FOAOWS)] by gravity. From this sump, the oily wastewater is being pumped to Power House Oily Wastewater Sump (PHOWS) for treatment in TPI type oil water separator. The central monitoring basin has two compartments. The maximum wastewater quantity (except rainfall runoff) entering the central monitoring basin from various sources is 270 $m^3$/hr. Central monitoring basin is acting as an equalization basin for the selected effluent stream. The discharge header of Central monitoring basin disposal pumps has been installed with pH/turbidity & flow monitoring instruments. The analysis of characteristics of treated waste water and the extent of deviation from the waste water discharge standards prescribed by MPCB reveals that the pollutant load in treated waste water is well within the prescribed limits.

For the treatment of domestic waste water of plant as well as the township, conventional and modular sewage treatment plants has been installed to decentralize the sewage treatment system for optimizing the installation and operation cost. Two conventional STP of 120 KLD of each (MBBR technology based) has been installed within the plant. STP-I is primarily for unit 1, 2 & 3 and STP-II for units 4 & 5. Both the STP has been operationalized for treating the domestic as well as other service waste water being generated within the plant area. In addition to this, a modular STP of total capacity 240 KLD has been installed and operationalized in township for treating the domestic wastewater of various sections of township. The analysis of characteristics of treated waste water and the extent of deviation from the domestic waste water discharge standards prescribed by MPCB reveals that the pollutant load in treated waste water is well within the prescribed limits.

## 7.0 RECYCLING & REUSE OF WASTE WATER

The use of high volumes of water in the thermal power plants necessitates undertaking water conservation measures. A precursor to undertaking these is a systematic water audit and quantifying water flows at each pumping station and drawing up a water balance. Water audits facilitate in quantifying the inflows and outflows, the losses or wastage which can be optimised by taking appropriate water conservation measures.

Tiroda TPP have adopted various measures for recycling and reuse of waste water for enhancing the efficiency of water use as well as minimization of fresh water consumption besides maintaining the zero liquid discharge (ZLD). The prime measures which have been adopted for the purpose are discussed in subsequent sections.

- **Increasing Cycles of Concentration (COC):** Maximum water loss in the thermal power plants occurs in the cooling towers, in the form of evaporation. Make up water is provided to compensate for this evaporation loss, the blow down losses and drift losses. Since the water is circulated many times in the closed loop, the concentration of dissolved solids increases over a period of time. The cycles of concentration (COC) is the ratio of dissolved solids in the circulating water to the make-up water. Increasing COC results in significant saving of water in TPPs. Cooling towers of Tiroda TPP are designed for a COC of around 5.5. By increasing COC, the blow down quantity can be reduced by external water treatment and adding water treatment chemicals, COC of 6 and even more can be reached.

- **Optimising ash-water ratio**: Around 45-50 per cent of the total water use is consumed in ash handling. Typical design ash water ratios are around 1:5 for fly ash and 1:8 for bottom ash. However, in the Tiroda TPP the actual ash water ratio of 1:5 is being maintained for bottom ash disposal and high concentration disposal system (HCDS) for fly ash to reduce the dilution of ash slurry resulting in energy conservation as well as water conservation. For every percent reduction of ash water ratio, there is a saving potential of 180 to 200 $m^3$/hr of water required for ash disposal in Tiroda TPP.

- **Recycling ash water from the ash dyke:** Once the ash gets settled in the dykes, the decanted water can be recycled and re-used for ash handling purpose after minor treatment. Accordingly ash water recovery system have been installed and operational.

Presently AWRS is operational with 60% ash water recovery efficiency which can be enhanced upto 70% recovery efficiency by effective maintenance of collection and treatment system along with minimization of leakages and other losses during collection and transportation of the same.

- **Reducing leaks and over flows:** Leakages from valves, taps, fire fighting hoses, underground fire fighting lines, cooling tower basin, gardening hoses area also a source of water loss. Overflows from cooling towers of AC plants, and overhead tanks due to non-functioning of float systems are also a common feature in thermal power plants. There lies a possibility of reducing the water consumption by plugging the leakages.

- **Wastewater recycling:** The installation and efficient operation of wastewater treatment plants at Tiroda TPP enable recycling 100 per cent of the wastewater generated which are being used for purposes like gardening, green belt development, dust suppression and fire fighting, etc.

The prime measures being adopted for recycling/reuse of waste water to reduce the consumptive use of water as well as to maintain zero liquid discharge in Tiroda TPP includes:

**Water Conservation and Recycling/Reuse Practices adopted at TTPP**

| S No. | Department | Water Recycling Practices |
|---|---|---|
| 1 | CHP | Waste water from coal settling pit of stacker - I reused in Sprinkling |
| 2 | | DH-1 settling pit for sprinkling |
| 3 | | Wagon Tippler & Track Hopper wastewater reused in Stack Reclaimer - II settling pit for sprinkling |
| 4 | Operation | Change of source of water for Mill Reject System from service water to fore bay water |
| 5 | Environment | Treated water from STPs reused in green belt maintenance (monthly value take from flow meter). |
| 6 | | Excess water from CTBD reused in water sprinkling on road and civil activities. |
| 7 | AHP | Wastewater from ESP vacuum pump reused in AHP at Unit # 4 &5. |
| 8 | Chemistry | Ro reject is completely reused in CHP for dust suppression. |
| 9 | | Waste water from sludge pit of unit 4 & 5 transfer to PTP for reuses. |
| 10 | | Wastewater from DM plant N - pit reused in AHP |
| 11 | | Wastewater (Unit 1 , 2 & 3) PTP being recycled |
| 12 | AHP | Seepage water diverted to Stilling chamber |
| | | Ash Dyke Seepage Water Recycled through AWRS system |
| 13 | Horticulture | Reuses of CTBD for green belt development |

## 8.0 ACTION PLAN FOR WATER MANAGEMENT

The Government of India, in its National Water Mission (NWM) under the National Action Plan on Climate Change (NAPCC), has emphasized the need to develop a framework for optimizing water use efficiency by 20 per cent, through regulatory mechanisms with differential entitlements and pricing. It further emphasizes the need to focus on integrated water resource management through water conservation, wastewater minimization, etc. This require power sector especially coal based thermal power plant being one of the major water intensive industrial sector to optimize their water use efficiency and enhance water conservation, recycling, and reuse measures. Accordingly, to enhance the water use efficiency and conservation measures in Tiroda TPP the cost effective action plan has been formulated.

On the basis of present water budgeting study for Tiroda TPP following potential area have been identified for enhancing water use efficiency and conservation measures:

- Enhancing the water use efficiency of cooling towers by enhancing the CoC initially to around 6, and later to maybe even more by various interventions, including the use of stabilizing chemicals and disinfectants, thus saving a large quantity of fresh water needed as make-up.

- Improving the recycling/reuse potential of Cooling Tower Blow Down (CTBD) water besides being used for ash handling by effective treatment to reduce fresh water needed as make-up.

- Enhancing the recovery of ash water from 60% to 70% by checking the leakages and effective maintenance of AWRS including chemical dosing etc. Efficient recapturing and recycling ash water has a significant potential for water savings.

- Minimization of leakages and losses of water in systems would lead to help in enhancing the water use efficiency and reduce fresh water consumption.

- Potential utilization of guard pond water after appropriate treatment.

As discussed in earlier chapters, the major quantity of water utilized in Tiroda TPP is for CT makeup. The other water consuming area covers boiler feed water, service water and domestic water. Based on the detail assessment of water quality and consumption pattern of Tiroda TPP the various significant area have been identified with respect to potential water recycling, water footprint reduction and at the same time reducing freshwater consumption on long term sustainable basis with an overall objective of maintaining zero liquid discharge.

The total CT Blowdown has been found to be around 1205 $m^3$/hr as per existing water balance. On the basis of discussions held with concerned officials of APML as well as exploration made from present water budgeting study it has been observed that this CTBD water has an enormous opportunity for potential recycling and ruse. Accordingly based on detailed exploration of the present CTBD generation and its recycling/reuse pattern it has been proposed that cost-effective treatment system may be designed for 50 % of CTBD (i.e. around 600 $m^3$/hr) for potential reuse of the same to reduce the fresh water requirement for CT makeup. Remaining 50% of the CTBD water can be utilized in AHP as per present practices.

Accordingly, proposed treatment scheme using CTBD water (@600m/hr) has been worked out based on Conventional followed by Advance Technology for recycle and reuse with 85 -87% recovery. In this scheme detail of treatment cost/project cost, O&M cost has been also worked out to understand the Capex and Opex and Payback period by analyzing typical raw water transportation cost, treatment cost, manpower, chemical and energy cost, etc. Considering the typical cost of raw water for TPP payback period of proposed treatment system would be less than 30 months and implementation of such recycling system would be leading to achieve a significant water conservation measures through CTBD recycling thereby reducing fresh water consumption of about 11520 $m^3$/day (4147200 $m^3$/year) for CT makeup on sustainable basis.

# 1.0 INTRODUCTION

## 1.1 PROLOGUE

The Adani Group (1988) has grown from being a trading house to a diversified business group with interests from infrastructural development to FMCGs. The Adani Group has made foray into high growth sector like Power, Infrastructure, Global Trading, Logistics and Energy.

Adani Power Limited (APL), a member of the Adani Group, has taken up implementation of large Thermal Power Projects at various locations in India in view of the growing needs of power requirements in the country. APL is also actively planning to implement Thermal Power Stations at various locations in India, totaling to about 20,000 MW in the coming years.

Adani Power Maharashtra Ltd (APML), a wholly owned company of Adani Power Limited, has set up Tiroda Thermal Power Plant (TTPP) of 3300 MW (5x660) capacity near Tiroda town under District Gondia in Maharashtra (Figure 1.1).

With reference to the Ministry of Environment, Forest& Climate Change (MoEF&CC), Government of India (GoI), Environmental Clearance (EC) for Tiroda TPP as well as Consent to Operate for Tiroda TPP of Maharashtra Pollution Control Board (MPCB) Water Budgeting and Action Plan for Recycling of Treated Effluent of Tiroda TPP is required to be formulated for achieving effective Zero Liquid Discharge (ZLD) and maintaining specific water consumption within the applicable prescribed limit as per MoEF&CC notification dated 7th December, 2015 and as amended 28th June, 2018 (Annexure I).

Accordingly, in compliance to the conditions of MoEF&CC's EC as well as MPCB's CTO for Tiroda TPP, Water Budgeting and Implementable Solutions for Tiroda TPP need to be evolved to reduce specific water consumption and conserve freshwater resources to ensure water security and sustainability.

The present study would enable Adani Power Maharashtra Limited to meet the requirement of MoEF&CC's EC and MPCB's CTO compliance besides meeting its mission of being enviro-socially responsible corporate entity with thrust on sustainability.

## FIGURE 1.1: LOCATION OF TIRODA THERMAL POWER PLANT

## 1.2 OBJECTIVES OF THE STUDY

The prime objectives of the proposed study are as follows:

- To assess the process wise water consumption pattern and estimate specific water consumption of Tiroda TPP;
- To evolve optimum water budget for Tiroda Thermal Power Plant;
- To assess the recycling potential of treated effluet and formulation of action plan to recycle the treated effluent at Tiroda TPP;
- To delineate mechanism for Implementation of Integrated Water Management Plan for Tiroda TPP.

## 1.3 SCOPE OF THE STUDY

Water is one of the key input requirements for thermal power generation. For Tiroda TPP the raw water is drawn from river Wainganga. Water security for thermal power plants due to depleting freshwater resources are one of the prime concerns for sustainable power generation and conservation of natural resources. This problem is expected to be aggravated more in near future. Thus, there is an urgent need to adopt the measures to minimise consumptive water requirement for thermal power plants.

The scope of the study includes the undertaking of a reconnaissance survey. On the basis of the reconnaissance survey a framework has been evolved for undertaking time bound detailed field survey for assessing the process wise water consumption pattern and availability of water at river Wainganga besides collecting other primary as well as secondary data required for water budgeting and formulation of action plan for recycling of treated effluent.

The prime scope of work of present study includes “Water Budgeting with detailed report and Implementable Solutions” for 5X660 MW Tiroda Thermal Power Plant at Village: Tiroda, Dist. Gondia, Maharashtra. The detail scope of study covers following:

1. A critical assessment of the quality and quantity of water required for various applications which include, raw water inlet & outlet, boiler feed water makeup, cooling tower makeup, process water and water for drinking and sanitation and draw a water mapping/balance (Water budgeting) for the entire plant as well as individual unit (AHP, CHP, DM Plant, Main Plant & etc.).

2. Critically review of the existing Water Balance Diagram and modification with existing consumption pattern.

3. Study the performance of WTP, DM, RO, ETP and STP plants and suggest measures for improving its performance.

4. Evaluate and identify opportunity for recycle and reuse of water quality & quantity in individual section and overall to achieve zero discharge.

5. Identification of major consumption locations and measurement of the flow of open and close channels.

6. Suggest cost effective technology for maintaining Zero Discharge.

7. Explore opportunity for maximum utilization of Cooling Tower Blow-Down (CTBD) Water.

8. Preparation & Submission of Draft report incorporating covering all activities carried out as a part of complete water audit with budgetary details (proposed expenditure) as per recommendations.

9. Preparation & Submission of final report incorporating all observations and suggestions in both hard as well as in soft copy.

# 2.0 PROJECT DETAIL

## 2.1 PROJECT DETAIL

A 3300 MW (5 × 660 MW) coal based super critical thermal power plant has been set up by APML. The layout of Tiroda TPP is presented in Figure 2.1. The brief description of the plant is presented in Table 2.1. In addition to coal, Light Diesel Oil (LDO) and Heavy Fuel Oil (HFO) are used as an auxiliary liquid fuel. LDO is used for cold start up and HFO is used for flame stabilization at lower load. The main plant is arranged within the three interconnected structures, the boiler, turbine building & integrated control and electrical building. The process flow diagram of Tiroda TPP is presented in Figure 2.2 & 2.3.

**TABLE 2.1: SALIENT FEATURES OF TTPP**

| Item | Particulars |
|---|---|
| Location of the Plant | Town: Tiroda, District: Gondia<br>State: Maharashtra |
| Co-ordinates | Latitude: 21º24’42.9” North and<br>Longitude: 79º58’14.9” East |
| Net capacity | 3300 MW |
| No. of Units and configuration | Phase I – 2 x 660 MW<br>Phase II – 3 x 660 MW |
| Date of Commercial Operation (COD) | Phase I – Unit 1: September 23, 2012<br>Unit 2: March 30, 2013<br>Phase II – Unit 3: June 14, 2013<br>Unit 4: March 31, 2014<br>Unit 5: October 11, 2014 |
| **Technology** | |
| Steam Generator | Super critical<br>Pressure 255 kg /cm$^2$<br>Temperature 571°C |
| Turbo Generator | Turbine -246 kg/cm$^2$ (a), 563°C, 3000 rpm<br>Generator - 660 MW (Each unit)<br>Generator Transformer - 776 MVA |
| Major Auxiliary System | • Boiler & Turbine Auxiliaries<br>• Pretreatment Plant<br>• Compressed Air System<br>• Coal and Ash Handling System |

| Item | Particulars |
|---|---|
| | • CW System and Raw Water System<br>• Fire-fighting System<br>• Air conditioning System<br>• Ventilation System |
| **Stack Details** | |
| No. of Stack | 2 |
| Stack Height (meter) | 275 each |
| No. of flue | Five |
| Additional equipment | Electrostatic Precipitator |
| Coal | Indigenous Coal – 15.0 MTPA<br>(6.3 MTPA for Phase I &<br>8.7 MTPA for Phase II)<br>Transportation: Railways |
| **Land** | |
| MIDC Land | 402.00 ha<br>[210 ha for Phase I & 192 ha for Phase II] |
| Forest land | 163.84 ha |
| **Water** | |
| Cooling Technology | Induced draft cooling system |
| Total Water Requirement | 70 MCM |
| Daily Water Consumption | 191760 $m^3$/day |
| Total Discharge | 'Zero Discharge Norm' is being followed |
| **General Information** | |
| Manpower Requirement (Total) | Approx. 500 |
| Project Cost | Rs 18,476 crores (for both Phase I & II) |

FIGURE 2.1: LAYOUT MAP OF TIRODA THERMAL POWER PLANT

## FIGURE 2.2: PROCESS FLOW DIAGRAM OF TIRODA THERMAL POWER PLANT

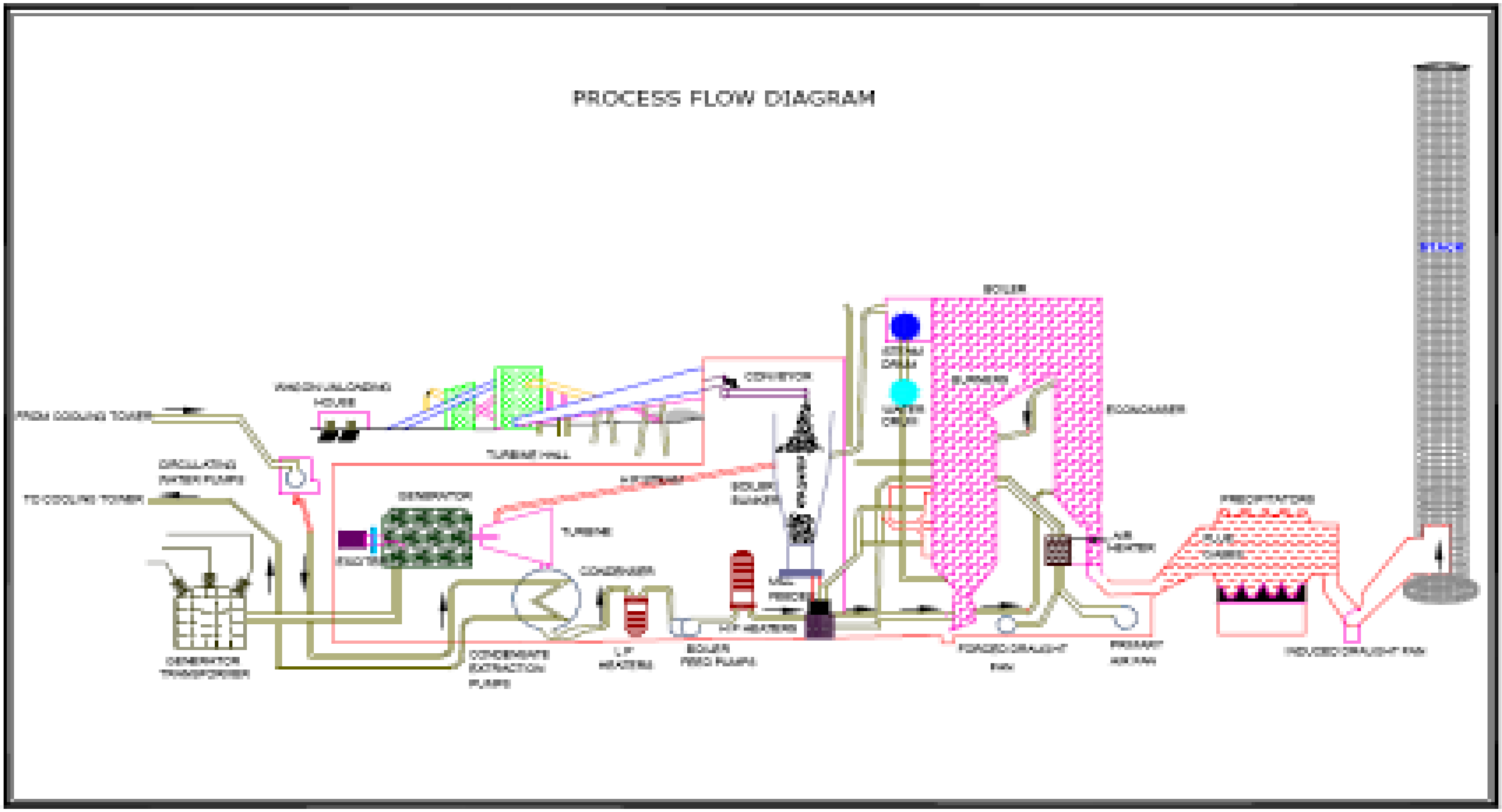


FIGURE 2.3: VIEW OF PROCESS UNITS OF TIRODA THERMAL POWER PLANT (5 X 660 MW)

**Advantages of Supercritical Thermal Cycle:**

- The 660 MW units have super critical steam parameters to achieve higher efficiency and hence, lower cost of generation. The prime advantages of the Super-critical technology are:
    - Improvement in power plant efficiency is more than 2%.
    - Reduction in coal consumption.
    - Reduction in emission of Greenhouse gases.
    - Overall reduction in auxiliary Power Consumption,
    - Reduction in requirement of ash dike land and consumptive water.
    - Sliding pressure operation due to once through system.
    - Uniform distribution of heat due to spiral wall arrangement leading to less Boiler tube failure, thereby improving system continuity and availability of the station.
    - Low thermal stress in turbine.
    - Less start up time of the boiler.
    - Reduction in water requirement.
- The thermodynamic cycle for 660 MW units considers super-critical steam parameters. The unit comprises of boiler, steam turbine generator, condenser, condensate extraction and boiler feed system along with all other necessary equipment for single/double reheat-regenerative cycle. For purpose of the study, the MP/IP cylinders may be of single/double casing design as per manufacturers' standard. The exhaust from HP-IP turbine will further expand in the double flow LP Turbine.

| | |
|---|---|
| **Steam Generator:** | Super critical<br>Pressure 255 kg /cm$^2$<br>Temperature 571°C |
| **Turbo Generator:** | Turbine - 246 kg/cm$^2$ (a), 563°C, 3000 rpm<br>Generator - 660 MW (Each unit)<br>Generator Transformer - 776 MVA |

- A tri-flue chimney with common windshield for the unit 1, 2 & 3 has been installed. The total height of reinforced concrete chimney is 275 m having 7.4 m exit diameter.

- A bi-flue chimney with common windshield for the unit 4 & 5 has been installed. The total height of reinforced concrete chimney is 275 m having 7.4 m exit diameter.

- For air pollution control system, each steam-generating unit has been provided with electrostatic precipitators. Each precipitator has two parallel gas paths, any of which can be isolated for maintenance when required, keeping the other path in operation.

These units utilize main and hot reheat steam at a temperature of $566^0$C at the turbine inlet. The main steam inlet pressure is about 254 Ata and the reheat steam pressures are in the order of 40 bar.

The energy flow in the process of thermal power generation is in four stages - firstly, the chemical energy of the coal is transformed into heat energy, which is then converted into mechanical energy and finally into electric energy through generator. The main raw materials required for thermal power generation are coal, water, and air.

In the first stage, the coal moves from the coal handling plant to the coal bunker, from where it is fed into the pulverizing mills. This mill stacks, reclaims and crushes the coal into fine powder, which is then mixed with air and blow down into the boiler by a fan. In the boiler, the mixture of coal dust and air burns like a gas and produces high temperature. The boiler walls are lined with tubes containing high quality de-mineralized water, better known as boiler water. The heat released by the burning coal is absorbed by the boiler which in turn transfers the water into steam. The steam is then channelized through nozzles onto the turbine’s blades, where it makes the turbine rotate. A generator is attached to the turbine, which produce electricity once the turbine starts to move. The electricity is then passed through a step-up transfer which increase the voltage so that it can be transmitted efficiently over the power line of the grid.

The ash is generated due to combustion of coal as residue. Ash is collected at the bottom of the furnace as bottom ash, Economizer hoppers as Eco ash, Air-preheater hoppers as APH ash, electrostatic precipitator (ESP) hoppers as Fly ash and stack hoppers as Stack ash. The quantum of ash generation would depend on the plant load factor and the quality of coal being fed.

This ash, known as bottom ash, is water quenched, and then conveyed for disposal. The rest is fly-ash, which is in form of fine powders and is taken out of the furnace to the Electrostatic Precipitators. The fly-ash trapped by the ESP is collected pneumatically operated dry ash storage silos for cement manufacturing.

As already mentioned earlier, the plant is using super-critical technology. The thermal efficiency of the power plant can be improved by using the steam at super critical condition. The improvement in overall efficiency of the plant compared to sub critical parameters is usually at least 2% if the super critical parameters are implemented. The importance of thermal efficiency of the thermodynamic cycle and the methods to improve the thermal efficiency of the cycle are also analyzed. The indirect costs such as reduction in maintenance cost, auxiliary power consumption, ash dike land and environmental benefits such as reduction in greenhouse gases; water requirements, etc. are additional to the above increase in efficiency.

**Importance of Efficiency:**

Since the time thermal power stations have been engineered, there is a quest for efficiency improvement. One such effort in that direction is supercritical parameters (i.e.) the pressure above 225 kg/cm$^2$ and temperature above 374.15ºC. The supercritical parameters for Tiroda 660 MW boiler are: 259 kg/cm$^2$ of pressure and 571ºC of temperature.

**Methods of Increasing Ranking Cycle Efficiency:**

The steam power cycle efficiency can be improved by the following methods:

Raising supply temperature by super heating: Increasing the turbine inlet temperature of steam will raise the heat supply to the boiler more than the heat rejection.

Raising inlet pressure of steam: Increasing the pressure will mean increase in saturation temperature at which steam evaporates thus increasing the average inlet temperature ($T_1$). Efficiency can be improved by dropping the final pressure (or temperature) at which heat is rejected.

Regenerative heating: Heating the feed water pumped to the boiler by bleeding steam from turbine.

Reheat cycle: Reheating of steam in boiler after it has already expanded in high pressure (HP) turbine will avoid moisture formation in low pressure (LP) Turbine. Also, more heat content of steam before LP turbine will improve efficiency.

At most elevated condition, the steam is supercritical. Thus, if water is at a supercritical pressure and is heated the temperature will increase continuously. At a particular value, the water will flash instantaneously into steam and super heating will commence. There is no change of specific volume from the liquid to the dry steam state.

**Supercritical Boiler:**

A Boiler operating at a pressure above critical point is called Supercritical Boiler. Supercritical Boiler has no drum and heat-absorbing surface being, in effect, one continuous tube hence called ‘Once Through Supercritical Pressure Boilers’. Boiler Feed Pump pressurizes the water in boiler, sensible heat is added in feed heaters, economizer, and furnace tubes, until water attains saturation temperature and flashes instantaneously to dry saturated steam and super heating commences.

**Steam Generator Set:**

The steam generator for super-critical unit consists of a number of parallel circuits connected by inlet & outlet headers. Pressurized water enters the circuit at one end and leaves as supercritical steam at other end. Thus, boiler is of “Once-through type”. Once-through boiler may be designed in both two-pass & tower type design. Since flow is once-through furnace wall tube. Temperature tends to increase at low load. Assisted circulation mode is super imposed to overcome this problem. The volume of the evaporator system is much smaller compared to a Natural circulation boiler. Due to smaller inventory of stored water & steam, theoretical rate of response is much faster than drum unit at base load. Super heater section has been divided in convection and radiant zones and designed so as to maintain rated steam temperature of $571^0$C at the outlet. The units have been completed with coal preparations and firing system, fuel oil firing system, draft plants comprising FD, ID and PA fans, electrostatic precipitators with required number of fields in series and a multi-flue 275 m high chimney.

Light Diesel Oil (Calorific value around 10,300 K Cal/Kg) is being used as start-up and stabilization fuel. As per GOI norms, space provision for FGD unit has been incorporated in the plant layout.

Due to elevated pressure and temperature, cycle efficiency improves which results in reduction of fuel consumption per unit of electricity generated, which in turn reduces $CO_2$, $NO_X$ & $SO_2$ emission. To limit the dust load at the inlet to the chimney to a value of 50 mg/Nm$^3$, as per the norms prescribed by the Ministry of Environment and Forest, Govt. of India, adequately sized electrostatic-precipitators have been provided.

**Turbine Generator Set:**

The steam turbine set is with standard multi-stage, 3000 rpm, tandem compound, single/double reheat, regenerative, condensing, multi-cylinder unit with eight (8)/nine (9) uncontrolled extractions for regenerative feed water heating. The turbine has one single flow HP cylinder, one double flow IP turbine and two double flow LP casings. The LP turbine exhausts against a condenser pressure of 76 mm Hg (abs) and maximum cooling water temperature of 33ºC. The unit has horizontally split double flow LP cylinder with the LP turbine exhausting steam directly into spring mounted surface type, two-pass condenser having divided water box. The turbo-generator sets are designed for a maximum throttle steam flow at turbine valve wide open (VWO) condition of 105% of turbine MCR flow. A quick acting "HP and LP Turbine Bypass Station" has been provided as a part of turbine package. The unit is equipped with all auxiliaries as per good engineering practice. The steam turbine is directly coupled to the horizontally mounted, three phases, two-pole, cylindrical rotor type electric generator terminal after meeting power requirement for excitation system. The generator is of 0.85 – plant load factor and thus the MVA rating works out to be about 776 MVA. The generators deliver power at the standard voltage of the manufacturer between 20-24 KV, 3 Phase, 50 Hz. The steam turbine is equipped with hydraulic/motorized turning gear for uniform heating/ cooling of the rotor during start-up/shut down. Highly sensitive electronic-hydraulic governing system is provided with suitable hardware to ensure fast speed to operation & safety. The units are complete with twin flow, double-pass, horizontal, surface type, water cooled condensers, 2 x 100% vacuum pumps (1W + 1S), vertical/ horizontal shell and tube type high pressure feed water heaters with group bypass arrangement, 4-stage horizontal U-tube low pressure heaters, drain cooler, gland steam condenser, horizontal spray or spray-cum-tray type deaerator with integral vent condenser etc. The units are equipped with two (2) nos. 50% capacity turbine driven and one (1) 30% capacity motor driven centrifugal, horizontal, boiler feed pumps of barrel casing construction.

# 3.0 APPROACH & METHODOLOGY

## 3.1 FRAMEWORK FOR WATER BUDGETING

Plant consumptive water requirement is governed by a number of factors such as quality of raw water, type of condenser cooling system, quality of coal, ash utilization, type of ash disposal system, waste water management aspects etc. Earlier, power plants were being designed with water systems having liberal considerations for various requirements and with high design margins. Whereas, in recent past, power plants have been designed with consumptive water requirement in the range 3.5 – 4.0 $m^3$/per MWh which is further stringent by 2.5 $m^3$/per MWh for supercritical boiler-based power plants as per MoEF&CC notification dated 7th December, 2015 and as amended 28th June, 2018 (Annexure I).

Optimisation/minimisation of plant consumptive water includes measures such as judicious utilization of water in different unit operations like cooling water system, boiler water treatment, condenser cooling, ash pond handling etc; adoption of reduced margins in various consumptive uses; adequate treatment for improving quality of raw water; use of plant waste waters in various low-grade applications and recycling of plant waste waters to maximum extent. The requirement and scheme for utilization of plant waster is governed by stipulation of MOEF&CC and CPCB/SPCBs in this regard, which is now a mandatory requirement.

The present study is exploratory in nature based on primary as well as secondary data. Methodology adopted for Study of surface water availability and its water quality assessment at source and plant level with water conservation and recycling aspects may be summarized as follows:

- Assessment of river flow rate from secondary data on monthly water level from recorded gage height. Primary data of velocity and depth of channel also to be collected during pre-monsoon and monsoon period near intake well for discharge computation and to ground check the authenticity and variation with the available secondary data. Subsequently, the sediment load secondary data also have been taken into consideration during river flow study. Based on the available monthly water flow in the river month wise water demand are to be matched. The study also analyze the impact of intake water from intake well on local subsurface water and downstream in the different season.

- The impact on hydrology and downstream flow due to water withdrawal from the river and its impact on downstream water availability and impact on the behavior of the river have been assessed based on the available secondary data.

- Optimization/minimization of plant consumptive water usage those includes measures such as judicious utilization of water in different plant applications, adoption of reduced margins in various consumptive uses, adequate treatment in case of deteriorating quality of raw water, use of plant waste waters in various low grade applications and recycling of plant waste waters to its maximum extent.

- The requirement and scheme for utilization of plant waste waters is also governed by stipulation of MOEF&CC and CPCB/SPCB in this regard. MOEF&CC in various recent projects has stipulated the requirement of zero effluent discharge from plant boundary which has a large bearing on plant water management scheme and treatment of waste water to be adopted.

Accordingly, assessment have been made to major water consumptive process of Tiroda TPP which have potential for further reduction in water consumption and aspect of waste water minimization as presented in subsequent sections:

**Cooling Water System**:

Cooling water is required for condensing of steam in a surface condenser and for secondary cooling in heat exchangers of equipment cooling system for plant auxiliaries. The permissible COC which can be maintained in the CW system is dependent on quality of cooling tower make up and scheme of cooling water treatment adopted. The blow down water is considered to be used for disposal of bottom ash, and unutilized blow down, if any, is led to guard pond of the plant for further treatment/utilization/disposal. The quantum of blow down water can be further reduced by increasing the COC of CW system which can be achieved by suitably improving the chemical regime of circulating water, if feasible.

In case of dry condenser cooling system, wet cooling tower is required only for ACW flow and requirement of plant make- up water is considerably reduced. The aspect of dry cooling system for thermal power plants may also be explored.

**Ash Handling System**:

Combustion of coal in a thermal power plant results in generation of ash which needs to be disposed off. The amount of ash generated depends upon the quality of coal particularly its calorific value and its ash content. For a typical 660 MW unit burning typical Indian coal (of 35-40% ash), the amount of ash generated is about 140 ton/h with distribution of fly ash and bottom ash as 80:20. Fly ash and bottom ash generated in the plant has traditionally been disposed to ash pond in the form of wet slurry. Over a period of time, environmental concerns associated with ash generation in thermal plants have resulted in various measures to be adopted viz. reducing water requirement for wet ash disposal, dry disposal of fly ash and utilization of ash in various applications. The measures for reducing consumptive water requirement include reducing water to ash ratio for slurry disposal, recirculation of ash pond water and use of high concentration slurry disposal (HCSD) system for fly ash. Use of Cooling Tower Blow Down water for wet/semi-wet ash disposal also evaluated to reduce the fresh water consumption.

**Power Cycle Make up:**

Power cycle make up refers to DM water added in condenser hot well to compensate for loss of water due to boiler blow down and other losses from the system. The quantum of blow down water depends on boiler steam parameters and quality of make up DM water. In actual, plants are being managed with further reduced make up also as large size units are provided with condensate polishing units (CPU) and materials of better metallurgy are used in feed heating and boiler components. This has been assessed based on real life plant level data to understand the scope of further improvement on consumptive use of water.

**Coal Dust Suppression:**

Water is sprayed over heaps of crushed coal, belt conveyors, transfer points and during coal unloading in order to reduce nuisance due to fugitive dust emission. Amount of water required for coal dust suppression depends upon size of coal stockyard, coal consumption rate, volatility of coal and ambient conditions. Normally, low- grade water such as CT blow down or plant waste water is used for coal dust suppression. In order to reduce plant water consumption, assessment have been carried out to explore the other low grade sources available for coal dust suppression water system.

### Evaporation from Raw Water Reservoir:

The storage requirement of raw water reservoir for plant depends upon availability of raw water from the source. The rate of evaporation from the surface of the reservoir depends upon surface area of the reservoir and prevailing ambient conditions. In the present study, the power plant is considered to have been envisaged with a raw water reservoir of capacity for 20 days plant requirement with effective water depth taken as 8 m. The evaporation from surface of the reservoir has been estimated considering loss of 20 cm water depth in a month which is equivalent to average evaporation of about 1.2 $m^3$/h per acre of reservoir surface. As per above, for a typical 660 MW plant, the evaporation from surface of raw water reservoir amounts to about 30 $m^3$/h. In case surface area of the reservoir envisaged is more than that worked out as per above criterion, the quantum of reservoir evaporation shall increase accordingly.

### Zero Liquid Discharge:

Waste water generated in a coal based thermal power plant typically includes clarifier sludge, filter back wash, CT blow down water, regeneration waste of DM plant & CPU, and boiler blow down etc. In normal practice, sludge from the clarifier is disposed off-along with ash slurry and boiler blow down is led to AHP. Water required for wet ash disposal is tapped from CT blow down, and unutilized blow down water, if any, is led to the guard pond. Clarifier sludge may be considered to be treated for removal of solid waste, and recovered water is recycled to inlet of the clarifier. Filter back wash water from filters of DM plant and potable water system is also considered to be recycled to inlet of the clarifier. The boiler blow down is considered to be used in CW system to supplement the make up water as it is expected to have negligible impact on CW inlet temperature.

The plant drains and side stream filter back wash are treated in effluent treatment plant (ETP), and recovered water is collected in the CMB. Requirement of water for low grade applications such as coal dust suppression and gardening is met from CMB. The balance waste water of CMB is handled in line with stipulations of MOEF&CC/MPCB, as applicable.

The waste water in CMB has high TDS on account of regeneration waste and CT blow down water. If water is to be recovered from this waste water for recycling in the plant, its treatment would require application of reverse osmosis technology. The requirement of plant input water shall reduce by the quantum of water recovered from RO plant. The concentrated brine reject of RO plant can be used for coal dust suppression or it can be used for wet disposal of bottom as.

On the basis of above-mentioned assessment improved water budgeting for Tiroda TPP have been formulated and time bound action plan for recycling of treated effluent have been evolved.

## 3.2 FIELD SURVEY & DATA COLLECTION

### 3.2.1 Reconnaissance Survey

A kick-off meeting was organised on 10th February, 2021 to discuss the modalities for initiating the water budgeting study for Tiroda TPP and logistic support required for the same under the guidance of Shri Kanti Biswas, Station Head, Tiroda TPP, APML and R. N. Shukla, Corporate Environment Group, APL and Shri Arun Pratap Singh, Head (Environment), TPPP, APML with AWTEM & IISWBM team members.

During the introductory meeting with Shri Arun Pratap Singh, Head (Environment), TPPP, APML along with Mr Vijendra Khandekar, Mr Girish Kulkarni, Mr Tapan Singh, Mr Priyabrata Satapathy, Mr Dinesh Gupta, Mr Animesh Mukhopadhyay, Mr Manoj Yadav and Mr Om Prakash, TTPP, APML and AWTEM & IISWBM team members, following issues were discussed & resolved to initiate the social audit & social impact evaluation study for REL’s TPP:

1. Initially Shri Arun Pratap Singh, Head (Environment) mentioned the objectives of proposed study as well as time period which need to be considered for the same. Mr Vijendra Khandekar explained the existing water consumption pattern and initiatives taken for recycling and reuse of water at TTPP and emphasised the recent interventions of TTPP and their salient features viz. Ash water recovery system, Water Conservation & Rain Water Harvesting, etc. Subsequently Shri Singh highlighted the prime thrust area and coverage of proposed study to be undertaken by AWTEM & IISWBM and mentioned that the study should consider all the major issues in line with the regulatory agency’s requirement as well as needs of plant while assessing the unit wise water consumption pattern, efficiency/performance of treatment system and potential for recycling & reuse of treated waste water to reduce the raw water consumption. Accordingly, the secondary data required for the purpose were submitted by AWTEM & IISWBM.

2. Subsequently the detail meeting was held with Mr Vijendra Khandekar, Manager (Environment), APML with AWTEM & IISWBM team members to understand the water consumption pattern, treatment facilities and initiative being undertaken for water conservation and management by APML. Adani Foundation.

3. Dr. Agrawal requested to Shri Singh to kindly provide required data/information for the present study. Accordingly, Dr. Agrawal submitted checklist of detailed information required in connection with water budgeting study of APML.

4. The time schedule for initiating the field survey and data collection was discussed in view of prevailing pandemic (COVID-19) and technical as well as logistic support required for the same. Shri Singh suggested to undertake field survey and data collection in consideration of prevailing norms and guidelines of Central and State Governments with proper protection of project team members as well as other stakeholders involved in the present study and the same was agreed by AWTEM & IISWBM project team.

### 3.2.2 Field Survey & Data Collection

As discussed in earlier section, the field survey and data collection was undertaken between February-March, 2021. The series of meeting with various concerned executive/officers of TTPP, APML were conducted to understand plant/unit wise water consumption pattern, detail of water and waste water treatment, recycling & reuse of treated waste water along with the performance evaluation as well as their suggestions for improving the efficiency and potential for further utilizing the treated waste water for effectively maintain the ZLD (Figure 3.1).

The following informations/documents were provide by APML for Water Budgeting Study with Implementable Solution for Tiroda Thermal power Plant (5 x 660 MW):

1. Monthly raw water consumption of plant along with power generation for last three years (i.e. 2017-18 to 2019-20).
2. Raw water quality Report for last three years (Monthly and annual).
3. Existing Water Balance Diagram – Unit wise and Overall Plant.
4. Water Distribution Network for the entire Plant from Intake to Discharge
5. Detail of various water meters installed at Tiroda TPP.
6. Detail of Specific water consumption for last three years (Monthly/Annual).
7. **Water- Treatment Plant:**
    a) Process/ Treatment Schematic- WTP, RO, DM Plant with Unit Operations, Design Flow/Actual Flow
    b) Sludge Handling system from WTP, RO Reject, DM Plant Backwash/Neutralization/Rinse water handling system with quantity/Quality
    c) Water quality at the Inlet and Outlet of each Treatment Process- Design/actual
    d) O&M Practices, Chemical Dosing systems etc.

**FIGURE 3.1: FIELD SURVEY & DATA COLLECTION FOR WATER BUDGETING STUDY OF TIRODA THERMAL POWER PLANT**

8. **Boiler & Cooling Water:**

    a. Boiler water System Performance evaluation, Make Up, Blowdown water, Quality/Quantity Monitoring monthly basis

    b. Detail of Cooling Towers, Cooling Water system Performance Make Up, Blowdown, COC (Designed Vs Actual), Existing Chemical Treatment in cooling towers, Critical Heat Exchanger, Condenser performance- Scaling & Corrosion Potential Microbial fouling, Operation and Monitoring System monthly basis

9. **Coal Handling & Ash Handling Plant (CHP/AHP):**

    a) Water Quality and Quantity with utilization practices presently following with Treatment Detail in Coal Handling Plant (CHP) monthly basis.

    b) Water Quality and Quantity with utilization practices presently following with Treatment Detail in Ash Handling Plant (AHP) monthly basis.

10. **Wastewater Treatment Plant (ETP/STP):**

    a) ETP- Treatment schematic, Unit Operations, Flow, Design Basis, Input and Out put data monthly basis, O&M Practices etc.

    b) STP- Treatment Process, Flow, Design Basis, Input/output data monthly basis, Performance Monitoring, O&M Practices

11. Cost of Raw Water Transport (INR/CUM) from Water Intake to Water Reservoirs of Tiroda TPP.

12. Cost of Raw Water Treatment starting from Pumping from Reservoirs, Chemical, Energy and Mnapower cost ((INR/CUM).

13. Monthly report of quantity & quality of treated water, DM Water, RO Water

14. Monthly report of waste water generated along with quality from DM Plant, CTBD/BBD/AHP/CHP/FAS, etc.

15. Monthly report of ETP/STP inlet and outlet quality of waste water

16. Detail of Ash Water Recovery System

17. Detail of Rain Water Harvesting System

18. **Water Conservation and Recycling Practices**- Detail of Existing Practices to achieve zero discharge.

Based on the study carried out on the data provided with respect to water quality and consumption pattern as per water balance diagram, the following points found to be quite significant with respect to water recycling, water footprint reduction and at the same time reducing freshwater consumption on long term sustainable basis with an effectively maintaining zero liquid discharge facility:

1. 1st Stage CW consumption 80. 5 % of Total water Treated in Reservoir 1 is used for CW Make UP.

2. 2nd stage CW consumption 93.3% of Total water process from Reservoir 2

3. The total CW Blowdown as per estimated water balance diagram has been found to be around 1205 $m^3$/hr. During the meeting with APML officials as per the discussion and exploration made it has been observed that this CTBD water is an enormous opportunity for recycling and ruse purpose and can give rise to meet the objective of the proposed water Budgeting study.

4. Initially it was decided that entire CTBD water will be recycled with 85% recovery and rest will be utilized in ash handling system etc. Parley Raw water Treatment /Transportation cost will be figure out based on the trend data available from the Plant source. Based on this a Payback philosophy with project cost can be worked out. Accordingly, the project evaluation and assessment of water quality etc has been undertaken.

5. However, during the subsequent meetings held with APML executives/officers in presence of all concerned team members of the TTPP further through and details exploration of the aforesaid scheme has been worked out. To understand the actual/ real life situation of the plant with respect to CTBD generation and Its actual utilization Practices in the Plant premises.

6. After having a through discussion with the officials of Environment & Chemistry Department, data on quality and quantity assessment in real life situation, it has been ultimately decided that we can formulate recycling scheme for 50 % of CTBD through a cost-effective suitable treatment (i.e. around 600 $m^3$/hr) with a recovery of 85% for a possible reuse and thereby saving the fresh water consumption. Remaining part of the CTBD water can be utilized as per present practices.

7. Considering above treatment scheme using CTBD water (@600$m^3$/hr) has been worked out based on conventional followed by advance technology for recycle and reuse with 85 -87% recovery. In the proposed scheme detail of treatment cost, O&M cost have been worked out to understand the Capex and Opex and Payback period by analyzing existing raw water transportation, treatment cost, manpower, chemical and energy cost.

Accordingly, assessment of the unit wise existing water consumption pattern and potential for recycling & reusing the treated waste water for reducing the raw water consumption to the extent possible were undertaken. Subsequently the detail action plan has been suggested to improvement of performance efficiency of water and waste water treatment plants have been suggested.

# 4.0 WATER BALANCE

Water is used in energy production and supply, and in turn energy is used for pumping, moving and treating water. Freshwater is required for energy extraction and production, refining and processing, transportation and storage and generation of electric power itself. There lies a close nexus between water and energy in the production cycle.

With increasing water scarcity, the power sector faced with dwindling supplies of freshwater and increasing costs of water on the one hand and increasing pollution of water sources on the other. Therefore quantitative and qualitative analysis of water consumption/use to identify losses and options for water conservation by means of recycling and reuse of water become one of the critical element of ensuring water security for TPP.

## 4.1 WATER INTAKE AND USAGE PATTERN

The main source of raw water for the TTPP is the Wainganga River which is about 10 km away. There are two parallel pipelines which convey water from the source to the raw water reservoir. Water is stored in four raw water reservoirs which also facilitates primary sedimentation (Figure 4.1). The total capacity of all water reservoirs is approximate 7.361 MCM. The Water Resource Department, Government of Maharashtra initially permitted the withdrawal of 90 MCM per annum of water from Dhapewada Sub-Irrigation scheme, Kawalewada (Annexure II). However, subsequently it was reduced to 70 MCM being super critical technology and other water recycling and reuse measures adopted in Tiroda TPP. Accordingly, the actual withdrawal of raw water is less than 50 MCM per annum.

## FIGURE 4.1 (a): LOCATION OF RAW WATER RESERVOIRS AT TIRODA THERMAL POWER PLANT

**FIGURE 4.1 (b): RAW WATER INTAKE SYSTEM OF TIRODA TPP (5x660 MW)**

Status of yearly as well as monthly variations of water consumption with respect to power generation pattern of TTPP is presented in Table 4.1 & 4.2. The analysis of last three years data i.e. 2017-18 to 2019-20 reveals that the average yearly consumption of water in TTPP was 48512592 m$^3$/year (i.e. 132911.23 m$^3$/day) with overall PLF of 72.01% which translate into 2.33 m$^3$/MWh specific water consumption rate which is well within the prescribe norm of MoEF&CC i.e. 3.5 m$^3$/MWh (Figure 4.2).

### TABLE 4.1: ANNUAL WATER CONSUMPTION PATTERN WITH RESPECT TO POWER LOADFACTOR OF TIRODA TPP

| YEAR | Water Consumption (m$^3$) | Power Generation (MWh) | PLF (%) | Specific Water Consumption Rate (m$^3$/ MWh) |
|---|---|---|---|---|
| 2017-18 | 42012638 | 17596246 | 60.854 | 2.388 |
| 2018-19 | 50861198 | 21665480 | 74.901 | 2.348 |
| 2019-20 | 52663956 | 23254390 | 80.268 | 2.265 |
| **Grand Total** | **145537792** | **62516116** | **-** | **-** |
| **Average** | **48512597** | **20838705** | **72.01** | **2.33** |

### FIGURE 4.2: ANNUAL VARIATIONS IN POWER GENERATION AND WATER CONSUMPTION PATTERN IN TIRODA TPP - 2017-18 TO 2019-20

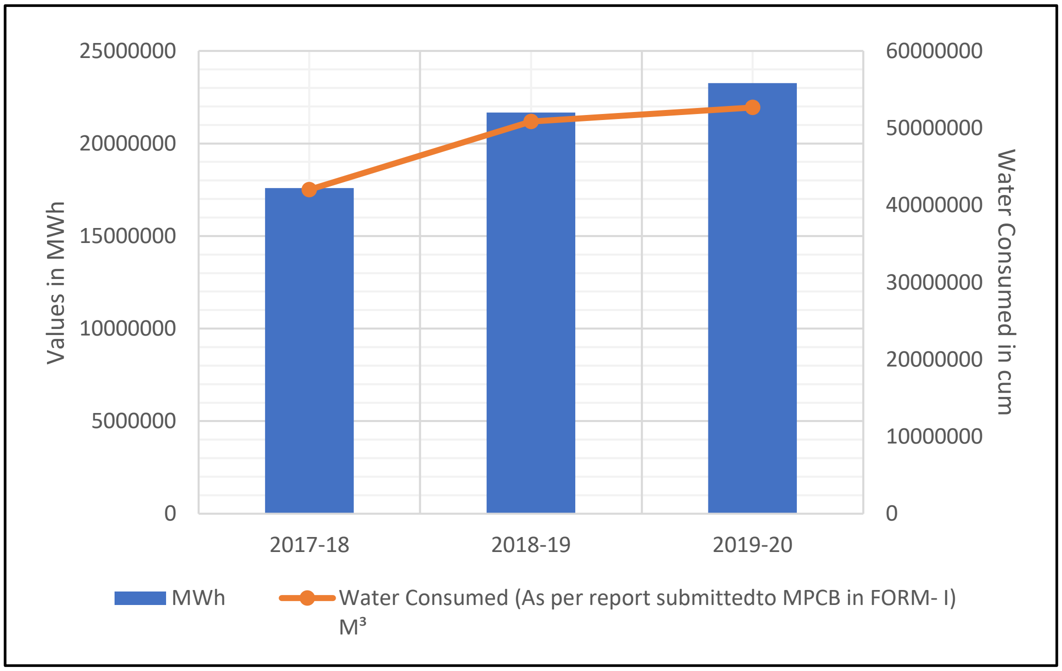
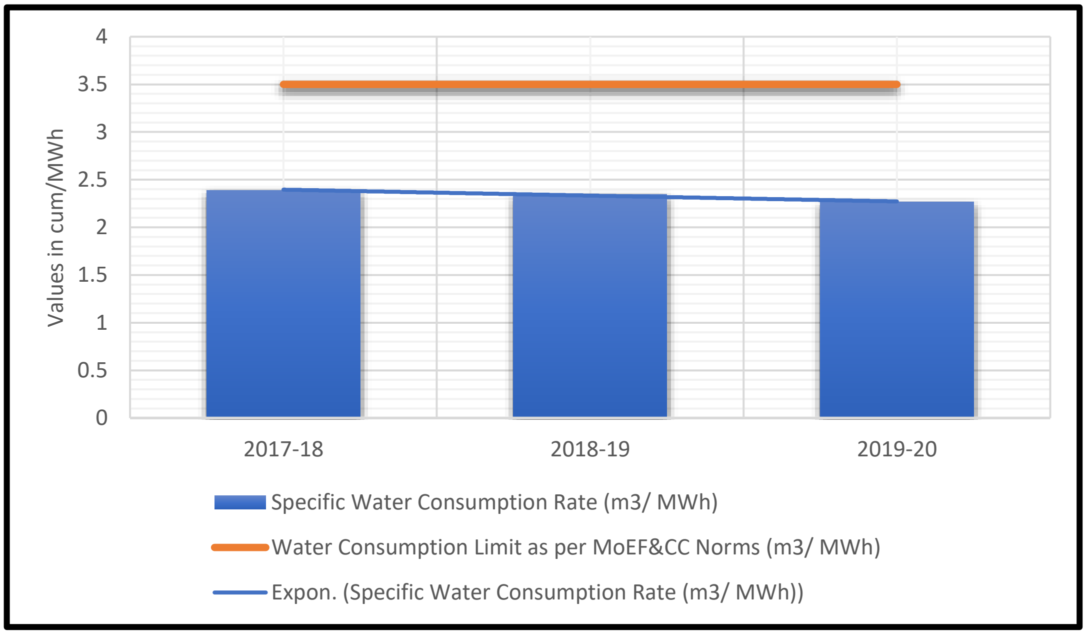


FIGURE 4.2 (b): ANNUAL VARIATIONS IN SPECIFIC WATER CONSUMPTION RATE OF TTPP-2017-18 TO 2019-20



Monthly variations in specific water consumption rate (i.e. quantity of water consumption per unit of power generation) of TTPP for the last three years i.e., from 2017-18 to 2019-20 is presented in Table 4.2 (a – c). Figure 4.3 presents the status of monthly water consumption pattern with respect to power generation at TTPP for the last three years. The analysis reveals that the specific water consumption rate varied from 2.207 to 2.762 $m^3$/MWhr with annual average of 2.388 $m^3$/MWhr during the year 2017-18 (Figure 4.4). The maximum specific water consumption rate was found during May month whereas minimum specific water consumption rate was recorded during December month. The analysis reveals that the specific water consumption rate of TTPP has significantly come down from 2.38 to 2.26 $m^3$/MWhr over the last three years due to various water conservation and recycling measures adopted in the TTPP in the recent past.

## TABLE 4.2 (a): SPECIFIC WATER CONSUMPTION RATE OF TTPP - 2017-18

| Month | Power Generation (MWh) | PLF (%) | Water Consumption ($m^3$) | Specific Water Consumption Rate ($m^3$/MWh) |
|---|---|---|---|---|
| APRIL'17 | 1417150 | 59.64 | 3747831 | 2.645 |
| MAY'17 | 1576126 | 64.20 | 4352720 | 2.762 |
| JUNE'17 | 1561250 | 65.71 | 3685432 | 2.361 |
| JULY'17 | 1743650 | 71.02 | 4006049 | 2.298 |
| AUGUST'17 | 1384240 | 56.38 | 3301003 | 2.385 |
| SEPTEMBER'17 | 1459770 | 61.44 | 3400036 | 2.329 |
| OCTOBER'17 | 1479220 | 60.25 | 3432998 | 2.321 |
| NOVEMBER'17 | 1422530 | 59.87 | 3229320 | 2.270 |
| DECEMBER'17 | 1526340 | 62.17 | 3369025 | 2.207 |
| JANUARY'18 | 1415230 | 57.64 | 3190495 | 2.254 |
| FEBRUARY'18 | 1283520 | 57.88 | 2999437 | 2.337 |
| MARCH'18 | 1327220 | 54.05 | 3298292 | 2.485 |
| **Total/Average** | **17596246** | **60.85** | **42012638** | **2.388** |

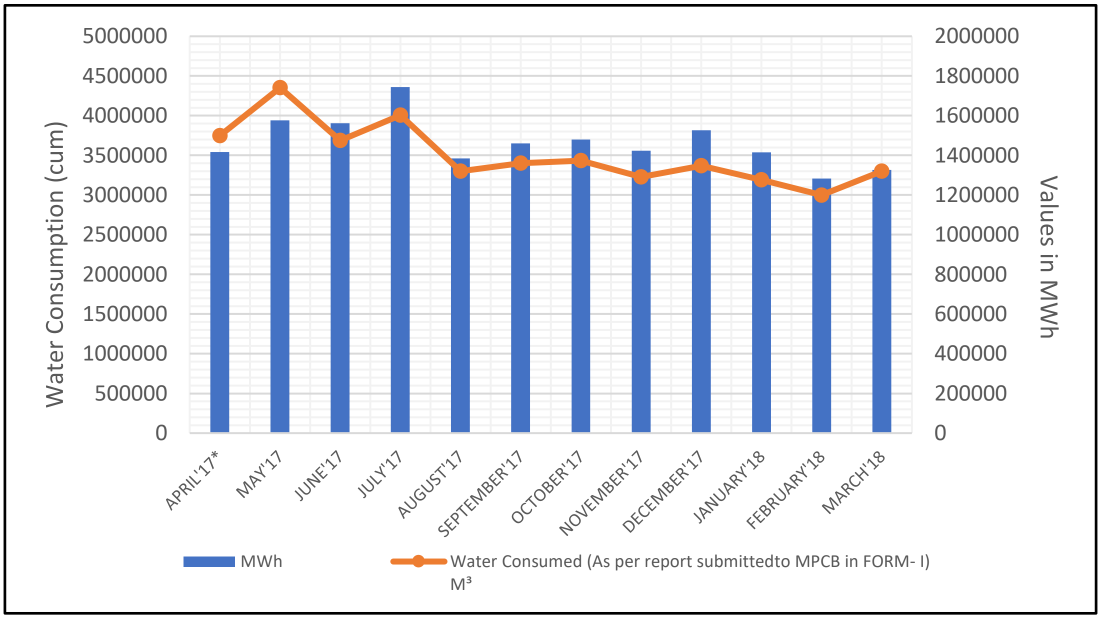
## TABLE 4.2 (b): SPECIFIC WATER CONSUMPTION RATE OF TTPP - 2018-19

| Month | Power Generation (MWh) | PLF (%) | Water Consumption (m3) | Specific Water Consumption Rate (m3/MWh) |
|---|---|---|---|---|
| APRIL'18 | 1353990 | 56.99 | 3457102 | 2.553 |
| MAY'18 | 1503270 | 61.23 | 3956825 | 2.632 |
| JUNE'18 | 1284180 | 54.05 | 3233705 | 2.518 |
| JULY'18 | 1820870 | 74.16 | 4351752 | 2.390 |
| AUGUST'18 | 1742700 | 70.98 | 4024830 | 2.310 |
| SEPTEMBER'18 | 1653170 | 69.58 | 3834375 | 2.319 |
| OCTOBER'18 | 2119100 | 86.3 | 4963095 | 2.342 |
| NOVEMBER'18 | 2038860 | 85.81 | 4674168 | 2.293 |
| DECEMBER'18 | 2102530 | 85.64 | 4695460 | 2.233 |
| JANUARY'19 | 2055320 | 83.71 | 4572503 | 2.225 |
| FEBRUARY'19 | 1785210 | 80.5 | 4009035 | 2.246 |
| MARCH'19 | 2206280 | 89.86 | 5088348 | 2.306 |
| **Total/Average** | **21665480** | **74.90** | **50861198** | **2.348** |

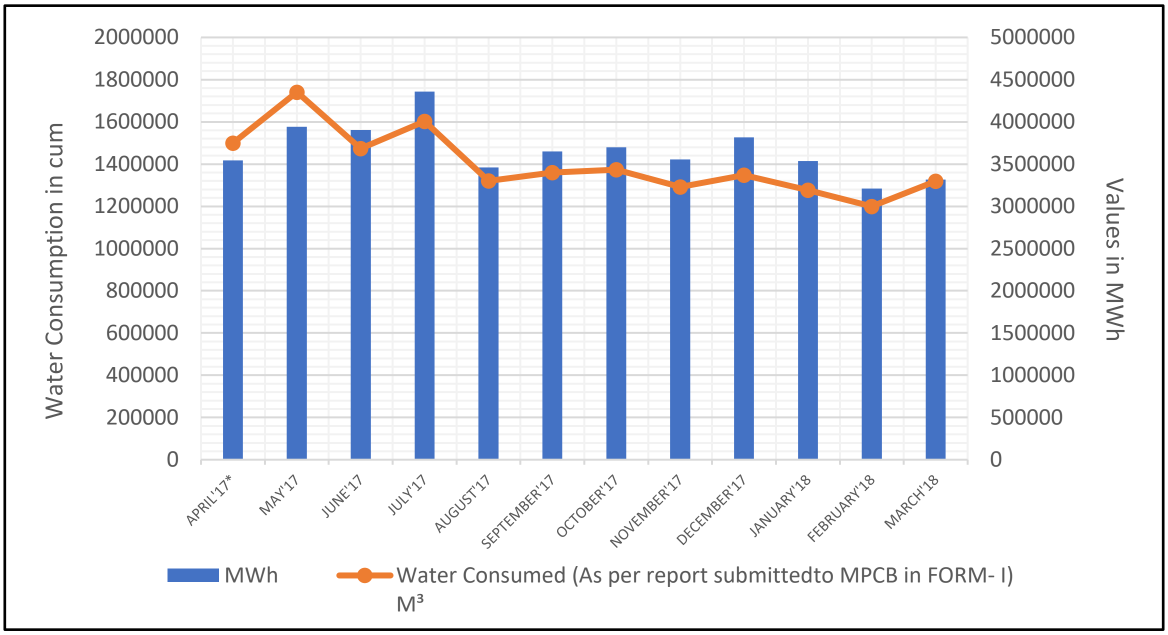
**TABLE 4.2 (c): SPECIFIC WATER CONSUMPTION RATE OF TTPP - 2019-20**

| Month | Power Generation (MWh) | PLF (%) | Water Consumption (m3) | Specific Water Consumption Rate (m3/MWh) |
|---|---:|---:|---:|---:|
| APRIL'19 | 2113730 | 88.96 | 5246136 | 2.482 |
| MAY'19 | 2152990 | 87.69 | 5422934 | 2.519 |
| JUNE'19 | 1903720 | 80.12 | 4623112 | 2.428 |
| JULY'19 | 1903860 | 77.54 | 4413196 | 2.318 |
| AUGUST'19 | 1826510 | 74.39 | 3999114 | 2.189 |
| SEPTEMBER'19 | 1421000 | 59.81 | 3319240 | 2.336 |
| OCTOBER'19 | 1383640 | 56.36 | 3150734 | 2.277 |
| NOVEMBER'19 | 2113590 | 88.96 | 4565519 | 2.160 |
| DECEMBER'19 | 2139740 | 87.15 | 4465077 | 2.087 |
| JANUARY'20 | 2210480 | 90.03 | 4459997 | 2.018 |
| FEBRUARY'20 | 2074250 | 90.31 | 4289611 | 2.068 |
| MARCH'20 | 2010880 | 81.9 | 4709286 | 2.342 |
| **Total/Average** | **23254390** | **80.27** | **52663956** | **2.265** |

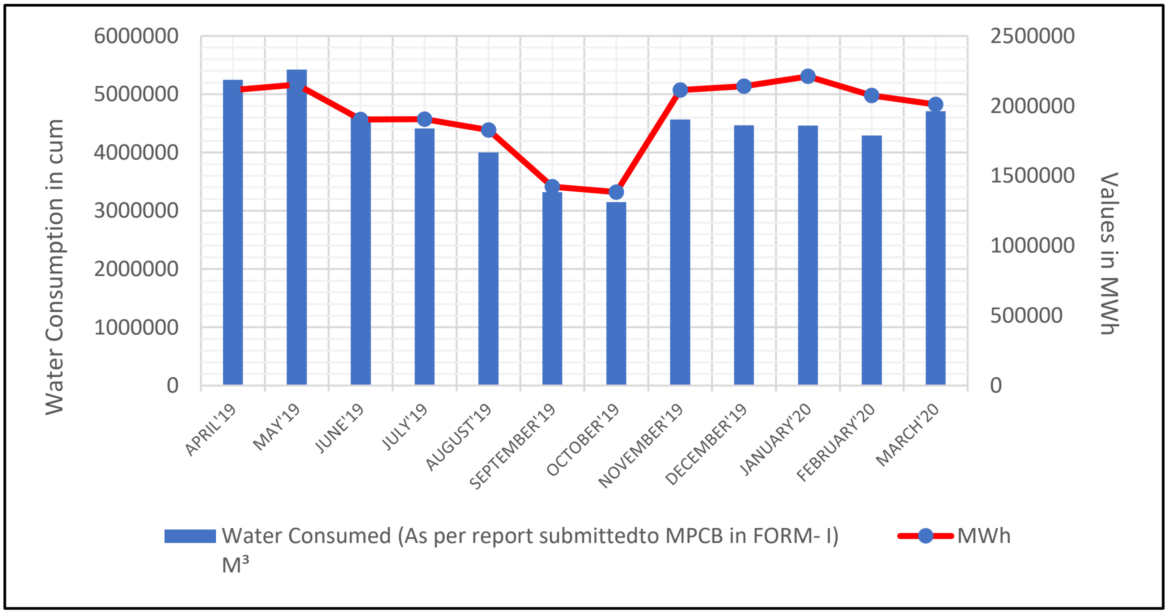
**FIGURE 4.3 (a): MONTHLY VARIATIONS IN POWER GENERATION AND WATER CONSUMPTION PATTERN IN TIRODA TPP - 2017-18**



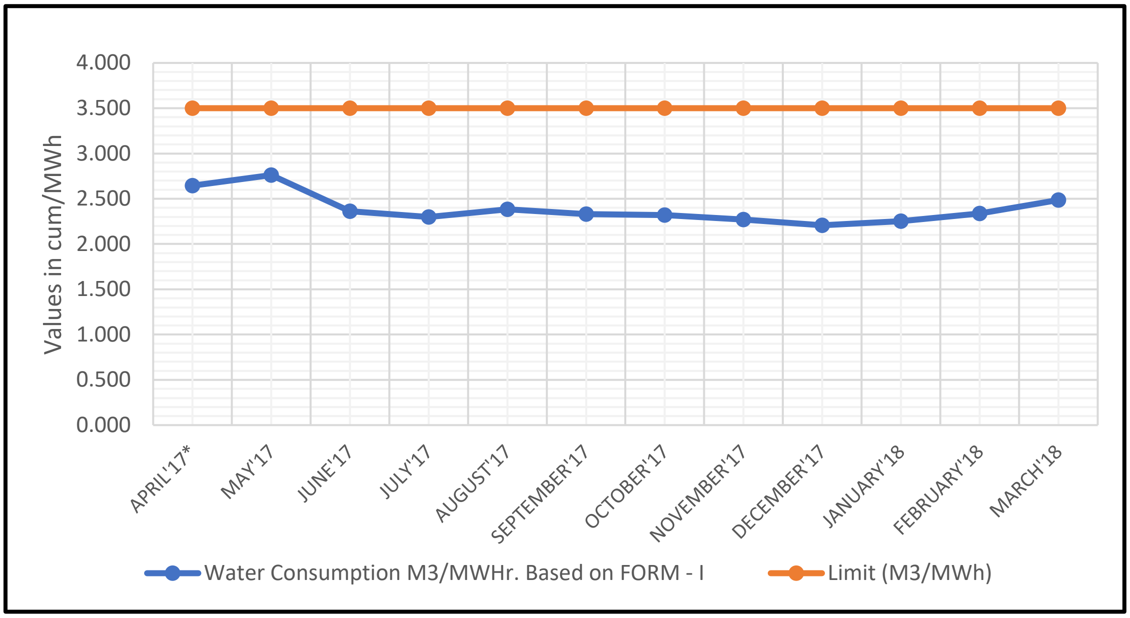
## FIGURE 4.3 (b): MONTHLY VARIATIONS IN POWER GENERATION AND WATER CONSUMPTION PATTERN IN TIRODA TPP - 2018-19



## FIGURE 4.3 (c): MONTHLY VARIATIONS IN POWER GENERATION AND WATER CONSUMPTION PATTERN IN TIRODA TPP - 2019-20



## FIGURE 4.4 (a): MONTHLY VARIATIONS IN SPECIFIC WATER CONSUMPTION RATE OF TTPP-2017-18



## FIGURE 4.4 (b): MONTHLY VARIATIONS IN SPECIFIC WATER CONSUMPTION RATE OF TTPP-2018-19

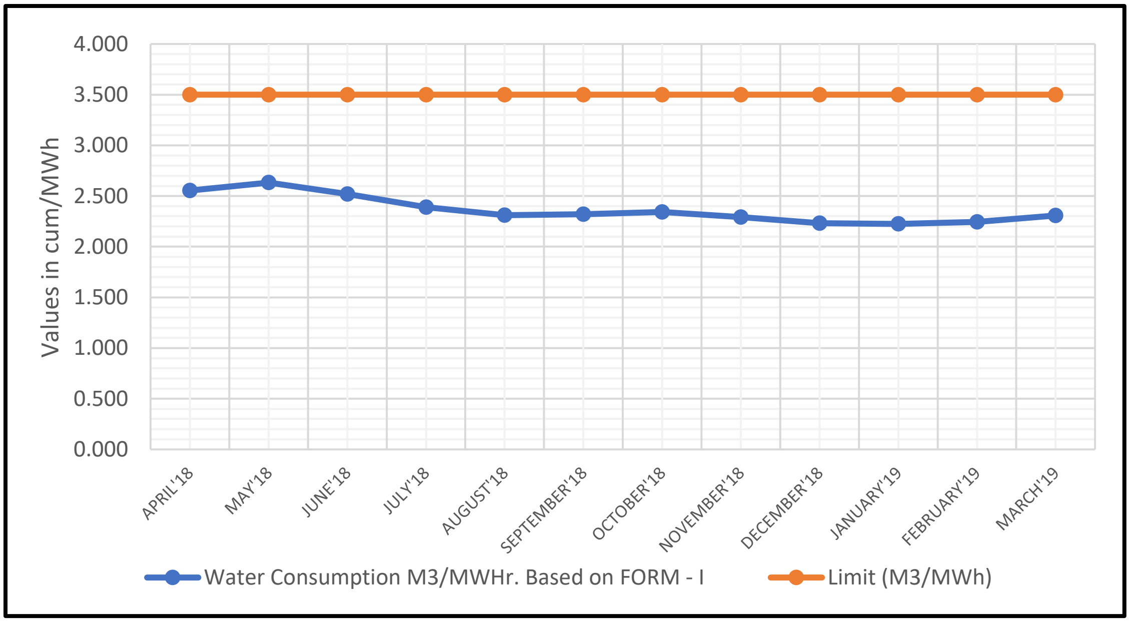
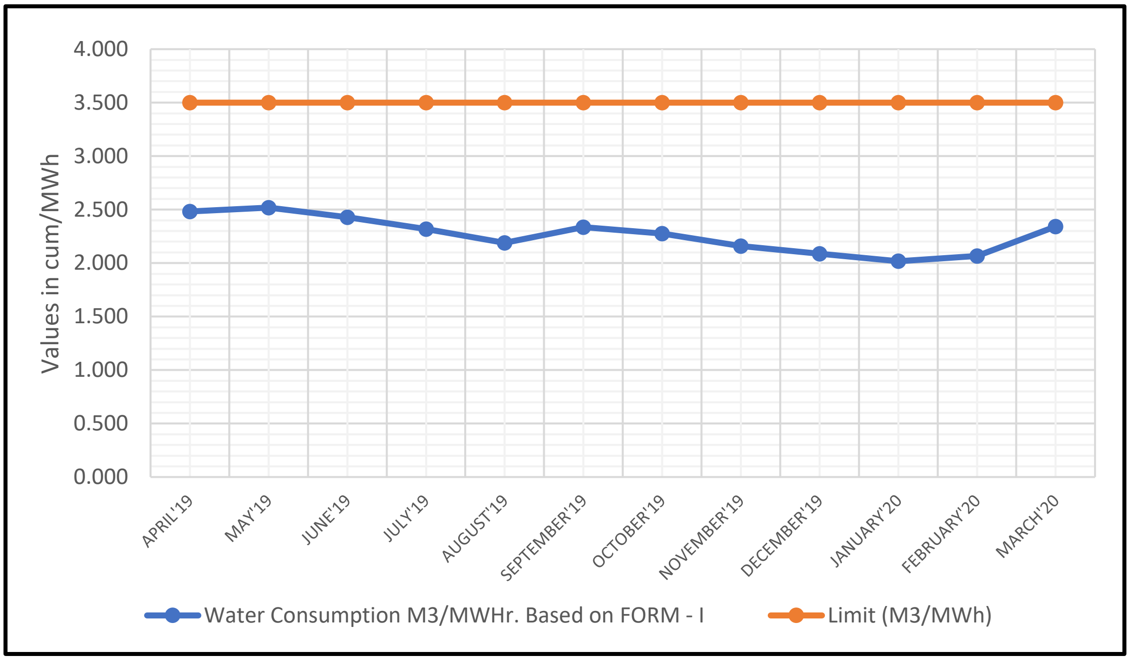


FIGURE 4.4 (c): MONTHLY VARIATIONS IN SPECIFIC WATER CONSUMPTION RATE OF TTPP-2019-20

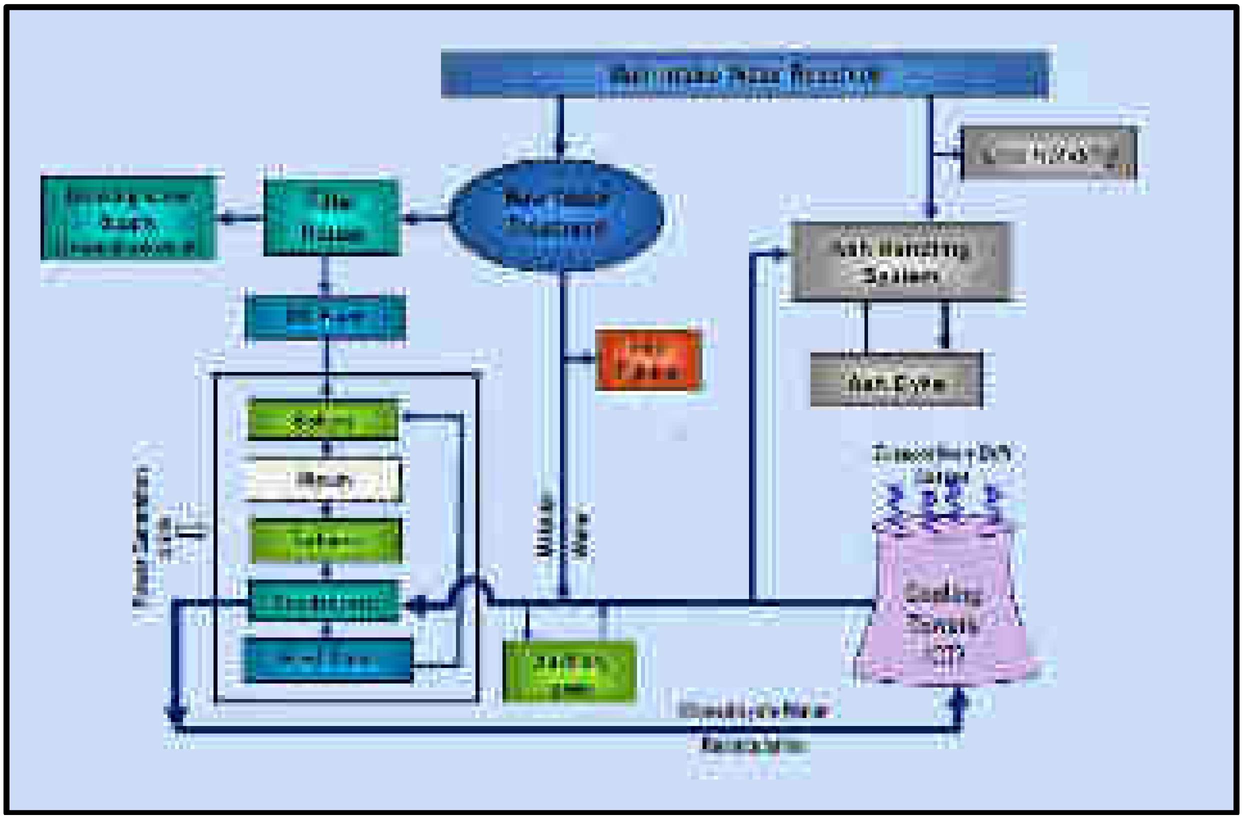


## 4.2 WATER BALANCE OF TIRODA TPP

The typical water use in coal based Thermal Power Plants is presented in Figure 4.5. A typical list of plant systems/ applications requiring consumptive water in coal based TPP is indicated as below:

- Cooling water system for condenser & plant auxiliaries
- Ash handling system
- Power cycle make up
- Equipment cooling system
- CPU regeneration, if applicable
- Air conditioning and ventilation system
- Coal dust suppression system
- Service water system
- Potable water system
- Green belt development/horticulture
- Evaporation from raw water reservoir

FIGURE 4.5: TYPICAL WATER USE IN COAL BASED THERMAL POWER PLANT



The water use in Tiroda TPPs can be majorly classified into the following types depending upon the quality of water and end use considerations:

**Cooling Tower Make-up Water:** Water used to compensate the loss due to evaporation of water in the cooling tower.

**Demineralised Water:** Water used in the boilers for generating steam is demineralised. Demineralised (DM) Water comes at a higher cost as compared to cooling tower water and its use is limited for specific function.

**Auxiliary Water:** Water used for auxiliary processes like refrigeration, AHP, AWS & Others and various coolers, etc

**Potable Water:** water used for drinking water for the plant and the township is known as potable water.

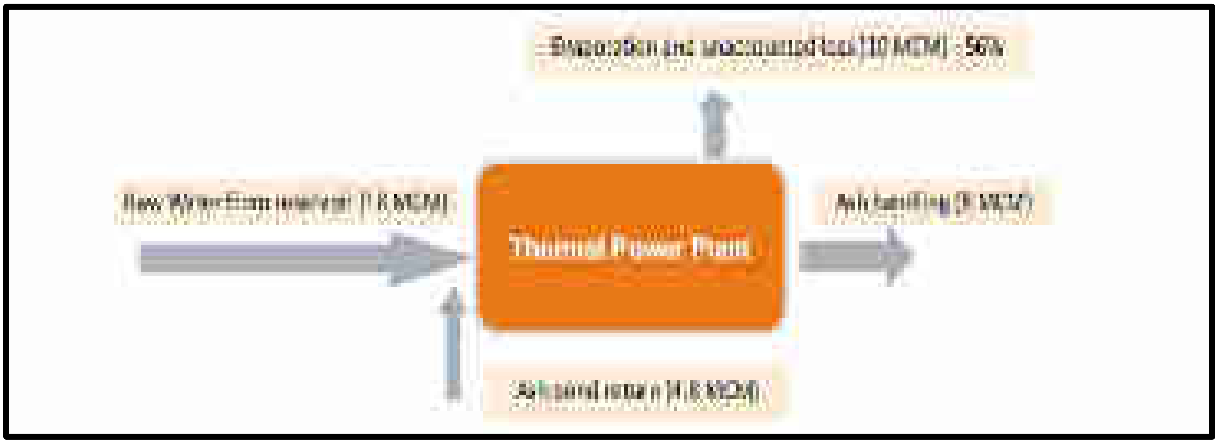
**Ash Handling Water:** Water used for handling ash generated during the combustion process into slurry for disposal. It is ideal to use treated water for ash handling and coal dust suppression.

**Service Water:** water used for processes like, fire fighting measures, use in toilets and other utilities, plantation and greening activities. It is ideal to use treated water instead of freshwater for these purposes.

Optimisation/ minimisation of plant consumptive water includes measures such as judicious utilization of water in different applications, adoption of reduced margins in various consumptive uses, adequate treatment for deteriorating quality of raw water, use of plant waste waters in various low grade applications and recycling of plant waste waters to maximum extent.

A typical water balance for a 660 MW coal based plant is presented in Figure 4.6 (CEA, 2016). It is clearly evident from water balance diagram that, around 56% of the water goes in evaporation and unaccounted loss while ash handling takes the remaining share of water. There is some amount of water used for the drinking water purposes. However, this constitutes a small portion of the total water use.

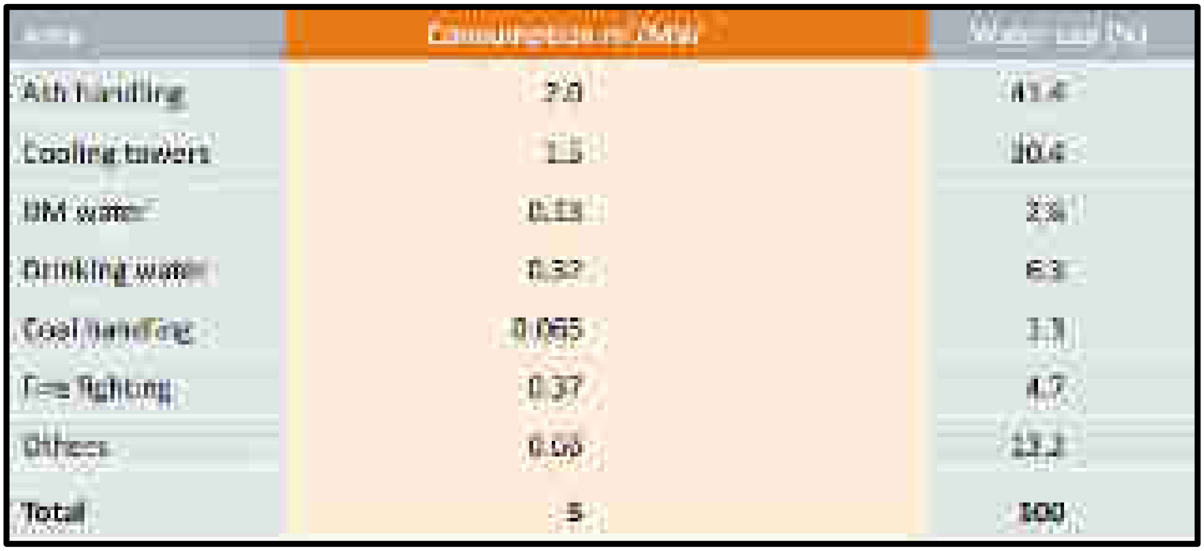
**FIGURE 4.6: TYPICAL WATER BALANCE FOR A 660 MW UNIT OF COAL BASED THERMAL POWER PLANT**



Source: Water Use and Efficiency in Thermal Power Plant, FICCI-HSBC Knowledge Initiative

Typical specific water consumption in various processes of 660 MW unit of a coal based thermal power plant is given in Table 4.3 which is the key indicator for comparing and assessing the performance of different units of thermal power plant. Typically ash handling requires the maximum volume of water (40 per cent) followed by the cooling towers which take up 30 per cent of the water use.

### TABLE 4.3 : SPECIFIC WATER CONSUMPTION PATTERN FOR A TYPICAL 660 MW UNIT OF COAL BASED THERMAL POWER PLANT



| Area | Consumption (cum/MW) | Water use (%) |
|---|---|---|
| Ash handling | 2.0 | 41.4 |
| Cooling towers | 1.5 | 30.4 |
| DM water | 0.13 | 2.6 |
| Drinking water | 0.32 | 6.3 |
| Coal handling | 0.065 | 1.3 |
| Fire fighting | 0.37 | 4.7 |
| Others | 0.66 | 13.3 |
| Total | 5 | 100 |

The specific water consumption in various processes of 660 X 5 MW units of a Tiroda TPP is presented in Table 4.4. The analysis of process wise water requirement of Tiroda TPP reveals that the maximum volume of water required for cooling towers which accounts for about 61% of the water use followed by ash handling (approx. 27%). However, for ash handling primarily Cooling Tower Blow Down (CTBD) water is being used instead of raw water.

### TABLE 4.4: SPECIFIC WATER CONSUMPTION PATTERN FOR A 660 X 5 MW UNITS OF TIRODA THERMAL POWER PLANT

| Area | Consumption $m^3$/MWh | Water Use (%) |
|---|---|---|
| Cooling Tower Make-up Water | 1.922 | 60.93 |
| DM Water | 0.067 | 2.12 |
| Service Water | 0.237 | 7.51 |
| Portable Water | 0.018 | 0.57 |
| Ash Handling* | 0.840 | 26.62 |
| Coal Handling* | 0.033 | 1.05 |
| Horticulture/Fire Fighting & Others* | 0.038 | 1.20 |
| **Total** | **3.155** | **100** |

*Recycling of Waste Water (CTBD, RO Rejects, back wash, etc)

The typical water balance of Tiroda TPP is presented in Table 4.5. The analysis of water balance study indicates that the initially total water consumption was 219490 $m^3$/day including the evaporation losses at water storage reservoirs (i.e. 2160 $m^3$/day). The maximum water is being consumed as cooling tower makeup water i.e. 189280 $m^3$/day which account for nearly 87% of total raw water consumption in Tiroda TPP. However DM make-up water account for about 5% of total raw water consumption in Tiroda TPP.

The existing water balance of of TTPP (Unit 1 to 5) is presented in Table 4.6 and Figure 4.7. The analysis of water balance study indicates that the total water consumption has come down to 180312 $m^3$/day including the evaporation losses at water storage reservoirs (i.e. 2160 $m^3$/day). The various water efficiency and conservation measures including recycling and reuse of waste water adopted in Tiroda TPP in recent past as discussed in subsequent chapters has resulted in about 20% reduction in raw water consumption (i.e. saving of raw water of about 39178 $m^3$/day). The maximum water is being consumed as cooling tower makeup water i.e. 152256 $m^3$/day which account for nearly 85% of total raw water consumption in Tiroda TPP. However DM make-up water account for about 3% of total raw water consumption in Tiroda TPP. For suppression of dust in CHP and AHP no fresh water is being used as treated waste water is being recycled/reuse for the purpose.

### TABLE 4.5: TYPICAL WATER BALANCE OF TIRODA THERMAL POWER PLANT ( 5 X 660 MW)

| Description | Water Requirement | | Waste Water Generation | Treatment Facility | Reuse/Recycle |
|---|---|---|---|---|---|
| | Fresh Water | Waste Water | | | |
| Clarifier Sludge | 2600 | | 2600 | ETP | Dust Suppression at CHP |
| Cooling Tower Make-up Water | 189280 | | 33607 | Not Required | Ash Handling Plant & Dust Suppression at CHP |
| Filtration/Backwash | 600 | | 600 | ETP | Dust Suppression at CHP |
| DM Regeneration | 1200 | | 1200 | ETP | Ash Handling Plant |
| DM Make-up Water | 9840 | | - | - | - |
| HVAC | 5600 | | | | |
| DG Set Make-up Water | 600 | | | | |
| CHP Make-up Water | 5600 | | | | |
| Service Water | 1280 | | | | |
| Domestic/Potable Water | 730 | | 560 | STP | Green belt Development/ Horticulture |
| Ash Handling Plant | | 49200 | 34440 | AWRS | Ash Handling Plant |
| Green belt Development/ Horticulture | | 560 | - | - | - |
| STP Sludge | | | 110 | Sludge Drying Bed | Manure used for Horticulture |
| **Total** | **217330** | **49200** | **73440** | | |

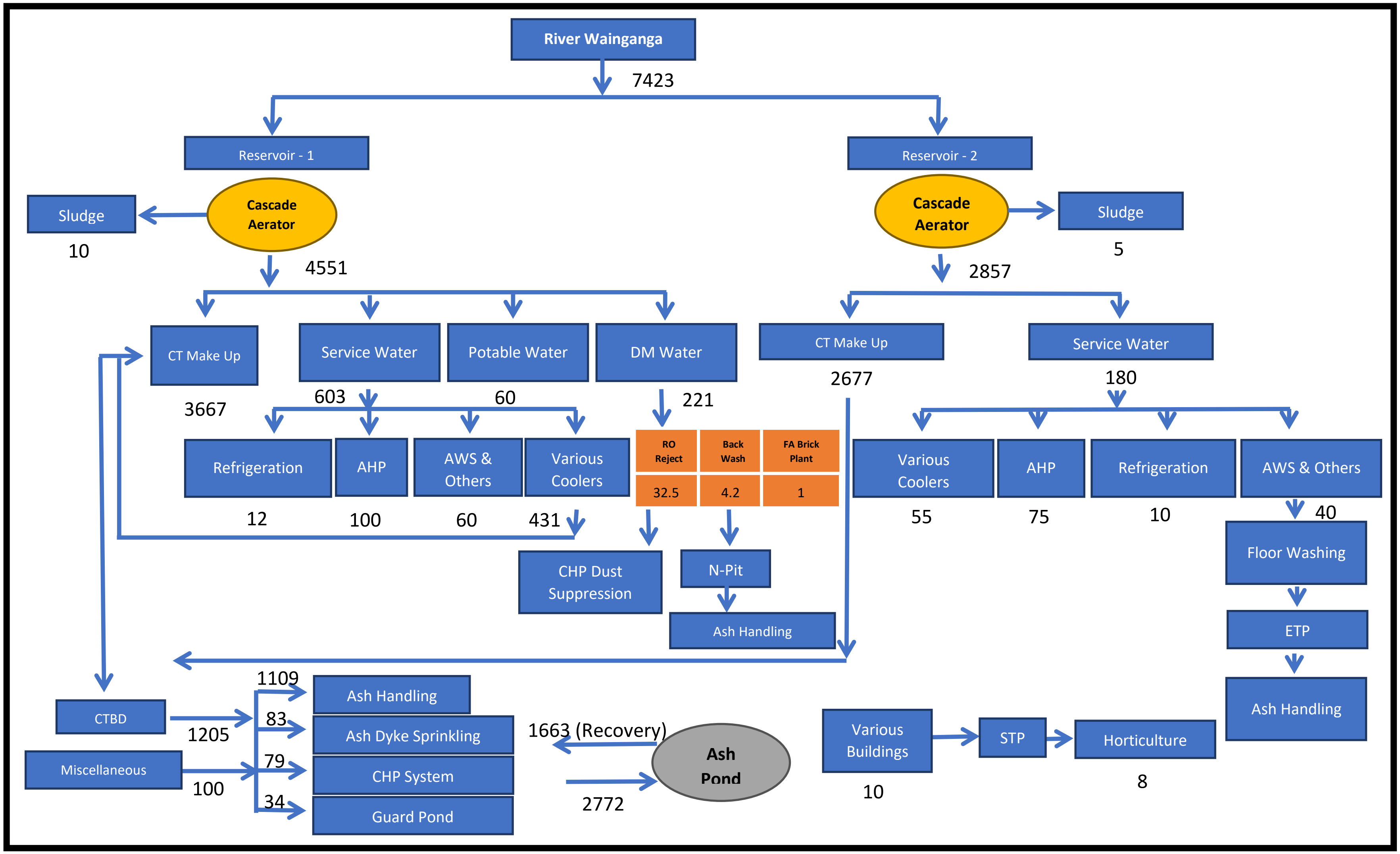
*Evaporation loss from water reservoirs considering @ 1.2 $m^3$/hr per acre work out to be about 90 $m^3$/hr (2160 $m^3$/day)

### TABLE 4.6: EXISTING WATER BALANCE OF TIRODA THERMAL POWER PLANT ( 5 X 660 MW) – 2020-21

| Description | Water Requirement | | Waste Water Generation | Treatment Facility | Reuse/Recycle |
|---|---|---|---|---|---|
| | Fresh Water | Waste Water | | | |
| Clarifier Sludge | 360 | | 360 | ETP | Dust Suppression at CHP |
| Cooling Tower Make-up Water | 152256 | | 28920 | Not Required | Ash Handling Plant & Dust Suppression at CHP |
| Filtration/Backwash | - | | 101 | ETP | Dust Suppression at CHP |
| DM Regeneration | - | | 780 | ETP | Ash Handling Plant |
| DM Make-up Water | 5304 | | | - | - |
| HVAC | - | | | | |
| DG Set Make-up Water | - | - | - | - | - |
| CHP Make-up Water | - | 2675 | | | |
| Service Water | 18792 | | | | |
| Domestic/Potable Water | 1440 | | 1152 | STP | Green belt Development/ Horticulture |
| Ash Handling Plant | - | 66528 | 39917 | AWRS | Ash Handling Plant |
| Green belt Development/ Horticulture | - | 1152 | - | - | - |
| STP Sludge | - | | 230 | Sludge Drying Bed | Manure used for Horticulture |
| **Total** | **178152** | **70335** | **71460** | | |

*Evaporation loss from water reservoirs considering @ 1.2 $m^3$/hr per acre work out to be about 90 $m^3$/hr (2160 $m^3$/day)

**FIGURE 4.7: WATER BALANCE DIAGRAM OF 5 X 660 MW TIRODA THERMAL POWER PLANT (ALL FIGURES ARE IN $M^3$/HOURS)**



About 22 Water flow meters have been installed at various strategic locations (viz water intake point, CTBD return lines, WTP, ETP, STP, AWRS, etc) to measure the actual inflow and outflow of water/waste water for assessing the unit/process wise water consumption/waste water generation as well as water losses. The detail of water flow meters provided in Tiroda TPP is presented in Annexure III.

### Estimation of CT Makeup Water Requirement & Generation of CTBD Water:

The CT makeup water requirement considering 5.5 COC and drift loss of 40 $m^3$/hr work out to be 1366 $m^3$/hr for each unit i.e. total 6830 $m^3$/hr for all the five units (1 to 5). Whereas Cooling Tower Blow Down (CTBD) work out to be 242 $m^3$/hr for each unit i.e. total 1205 $m^3$/hr for all the five units.

| **For Unit 1,2 & 3** | | | |
|---|---|---|---|
| CT Make up | = | 1085 | |
| COC | = | 5.5 | |
| CTBD | = | 1085/(5.5-1) | |
| | = | 241 | 723 (3 Units) |
| Drift Losses | = | 40 | |
| Total CT Requirement/unit | = | 1366 | |
| For 3 Units | = | 4098 | |
| Water Coming from Service water System | = | 431 | |
| **Final CT Requirement** | = | **3667 m3/hr** | |

| **For Unit 4 & 5** | | | |
|---|---|---|---|
| CT Make up | = | 1085 | |
| COC | = | 5.5 | |
| CTBD | = | 1085/(5.5-1) | |
| | = | 241 | 482 (2 Units) |
| drift Losses | = | 40 | |
| Total CT Requirement/unit | = | 1366 | |
| For 2 Units | = | 2732 | |
| Water Coming from Service water System | = | 55 | |
| **Final CT Requirement** | = | **2677 m3/hr** | |

**Estimation of CHP Water Requirement:**

The total CHP water requirement which primarily includes wagon tippler pre wetting, wagon tippler dust suppression, track hopper peddle feeder, coal stockpile dust suppression, etc. work out to be 111.46 $m^3$/hr. Out of total water requirement of CHP, 32.5 $m^3$/hr is met from recycling of RO reject and remaining 79 $m^3$/hr from recycling of other auxiliary service waste water generated within plant.

| **Detail of Estimation of CHP Water Requirement:** | | |
|---|---|---|
| Wagon Tippler Dust Suppression: | = | 12 Racks x2 Hrs x 15.66 /24 |
| | = | 15.66 m3/hr |
| | | (Back up: 15.66 = (4.35LPS/Nozzle*60*60) |
| Track Hooper Peddle Feeder | = | 10 (Nozzle) * 2 (No. of Nozzle) * 2 (Capacity of Nozzle in LPM) * 60 min* 10 (running Hrs.)/24 (for days) |
| | = | 1 m3/hr |
| Dust Suppression System (Coal Stockpile) | = | 22.2 m3/hr (Nozzle) *4 (Nozzle at a time) /hr |
| | = | 88.8 m3/hr |
| Wagon Tippler Pre Wetting | = | 12 rake * 2 hr (time per rake) * 3 Nozzles * 2 m3/h (Nozzle Capacity/WT) / 24 (for day) |
| | = | 6 m3/hr |
| Total CHP Water Requirement | **=** | **111.46 m3/hr** |

**Estimation of Ash Water Requirement:**

The total ash water requirement for disposal of ash works out to be 2772 $m^3$/hr. The ash water requirement is met from recycling of CTBD as makeup (40%) and 60% from recycling of recovery of ash water.

| **Detail of Estimation of Ash Water Requirement** | | |
|---|---|---|
| Ash: Water Ratio | = | 1:5 |
| Water Required for slurry preparation for disposal at ash dyke | = | 5 (unit) x 363 (Coal Req./unit/hr)x 0.3055 (Considered average ash content)x 5 (water requirement) |
| | = | **2772 m3/hr** |
| Ash Water Recovery @ 60 % | = | **1663 m3/hr** |

Key features of water usage in TTPP:

- The major inflow of raw water accounts from Wainganga river. The other source of inflow is recovered water from ash water.

- Major outflows are evaporative losses from cooling towers, ash pond percolation/ leaks & evaporative losses.

- Water flow meters have been provided at all the strategic locations to measure the actual inflow and outflow of water/waste water for assessing the unit/process wise water consumption/waste water generation as well as water losses.

- All cooling water system provided are open recirculation type with induced draft cooling towers.

- Ash water recovery and reuse.

- Zero discharge is being operationalized.

# 5.0 PERFORMANCE EVALUATION OF WTPs

## 5.1 RAW WATER QUALITY

To evaluate the performance of water treatment plants and improve the efficiency the characteristics of raw water need to be assessed. Accordingly, the raw water quality is being monitored regularly at intake well. The physio-chemical characteristics of raw water as recorded during last three-year 2018 to 2020 is presented in Table 5.1 to 5.3. The long-term trend of monthly variations of characteristics of raw water at intake is presented in Figure 5.1 to 5.14.

**Table 5.1: MONTH WISE VARIATIANS IN CHARACTERISTICS OF RAW WATER - YEAR 2018**

| Month | Value | pH | Conductivity, in micro-simenes | Turbidity, in NTU | P-Alkalinity, in mg/l | M-Alkalinity, in mg/l | Ca-Hardness, in mg/l | Mg-Hardness, in mg/l | Total Hardness, in mg/l | Total Chloride, in mg/l | Silica, in mg/l | Iron, in mg/l | Total Dissolve Solid, in mg/l | Oxidation Reduction Potential, in mV | Sulphate, in mg/l |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jan-18 | Min | 8.44 | 280.00 | 3.00 | 4.00 | 132.00 | 82.00 | 40.00 | 122.00 | 7.74 | 15.60 | 0.08 | 182.00 | 130.00 | 8.00 |
| | Max | 8.61 | 316.00 | 6.80 | 8.00 | 146.00 | 86.00 | 44.00 | 128.00 | 11.36 | 16.30 | 0.10 | 205.40 | 136.00 | 9.00 |
| | Avg | 8.52 | 298.58 | 4.21 | 7.61 | 141.03 | 83.61 | 41.29 | 124.90 | 8.93 | 15.88 | 0.09 | 194.08 | 133.29 | 8.97 |
| Feb-18 | Min | 8.24 | 316.00 | 3.14 | 0.00 | 134.00 | 84.00 | 40.00 | 128.00 | 8.52 | 14.60 | 0.07 | 205.40 | 130.00 | 8.00 |
| | Max | 8.46 | 331.00 | 7.20 | 8.00 | 146.00 | 90.00 | 50.00 | 138.00 | 11.36 | 16.60 | 0.22 | 215.15 | 137.00 | 9.00 |
| | Avg | 8.35 | 325.21 | 5.29 | 2.29 | 138.86 | 87.29 | 44.43 | 131.71 | 9.74 | 15.52 | 0.16 | 211.39 | 133.18 | 8.68 |
| Mar-18 | Min | 8.18 | 304.00 | 3.03 | 0.00 | 128.00 | 78.00 | 42.00 | 124.00 | 7.10 | 14.70 | 0.07 | 197.60 | 131.00 | 8.00 |
| | Max | 8.68 | 331.00 | 8.40 | 10.00 | 138.00 | 90.00 | 48.00 | 136.00 | 9.94 | 17.00 | 0.10 | 215.15 | 136.00 | 9.00 |
| | Avg | 8.51 | 312.57 | 5.96 | 7.21 | 132.50 | 82.57 | 45.29 | 127.86 | 9.33 | 15.40 | 0.08 | 203.17 | 132.86 | 8.25 |
| Apr-18 | Min | 8.18 | 298.00 | 6.49 | 0.00 | 120.00 | 74.00 | 44.00 | 120.00 | 5.68 | 16.30 | 0.06 | 0.00 | 130.00 | 8.00 |
| | Max | 8.67 | 316.00 | 12.60 | 10.00 | 140.00 | 80.00 | 50.00 | 130.00 | 8.52 | 18.20 | 0.09 | 205.40 | 146.00 | 9.00 |
| | Avg | 8.41 | 307.96 | 8.51 | 5.00 | 132.14 | 75.86 | 46.86 | 122.71 | 7.13 | 17.04 | 0.08 | 193.03 | 133.43 | 8.36 |
| May-18 | Min | 8.06 | 269.00 | 4.10 | 0.00 | 128.00 | 66.00 | 44.00 | 110.00 | 7.10 | 17.50 | 0.04 | 0.00 | 132.00 | 8.00 |

| Month | Value | pH | Conductivity, in micro-simenes | Turbidity, in NTU | P-Alkalinity, in mg/l | M-Alkalinity, in mg/l | Ca-Hardness, in mg/l | Mg-Hardness, in mg/l | Total Hardness, in mg/l | Total Chloride, in mg/l | Silica, in mg/l | Iron, in mg/l | Total Dissolve Solid, in mg/l | Oxidation Reduction Potential, in mV | Sulphate, in mg/l |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | Max | 8.70 | 349.00 | 6.42 | 10.00 | 140.00 | 68.00 | 50.00 | 118.00 | 8.52 | 18.20 | 0.09 | 226.85 | 137.00 | 9.00 |
|  | Avg | 8.42 | 318.32 | 5.44 | 4.71 | 131.36 | 67.79 | 46.93 | 114.71 | 8.06 | 17.91 | 0.05 | 185.27 | 134.50 | 8.75 |
| Jun-18 | Min | 7.87 | 179.00 | 4.60 | 0.00 | 56.00 | 44.00 | 28.00 | 74.00 | 5.68 | 14.50 | 0.06 | 116.35 | 131.00 | 7.00 |
|  | Max | 8.40 | 307.00 | 144.00 | 4.00 | 130.00 | 68.00 | 78.00 | 128.00 | 8.52 | 16.80 | 1.73 | 199.55 | 136.00 | 8.00 |
|  | Avg | 8.18 | 243.32 | 54.44 | 0.64 | 95.36 | 56.64 | 41.50 | 98.14 | 6.86 | 15.61 | 0.55 | 155.88 | 132.64 | 7.68 |
| Jul-18 | Min | 7.87 | 179.00 | 4.60 | 0.00 | 56.00 | 44.00 | 28.00 | 74.00 | 5.68 | 14.50 | 0.06 | 116.35 | 131.00 | 7.00 |
|  | Max | 8.40 | 307.00 | 144.00 | 4.00 | 130.00 | 68.00 | 78.00 | 128.00 | 8.52 | 16.80 | 1.73 | 199.55 | 136.00 | 8.00 |
|  | Avg | 8.18 | 243.32 | 54.44 | 0.64 | 95.36 | 56.64 | 41.50 | 98.14 | 6.86 | 15.61 | 0.55 | 155.88 | 132.64 | 7.68 |
| Aug-18 | Min | 7.40 | 1.75 | 52.00 | 0.00 | 54.00 | 44.00 | 20.00 | 66.00 | 5.68 | 8.56 | 0.17 | 1.14 | 128.00 | 6.00 |
|  | Max | 8.07 | 193.00 | 136.00 | 0.00 | 64.00 | 50.00 | 30.00 | 80.00 | 7.10 | 13.70 | 1.56 | 125.45 | 136.00 | 7.00 |
|  | Avg | 7.82 | 172.67 | 76.01 | 0.00 | 58.36 | 48.07 | 24.57 | 72.64 | 6.47 | 10.42 | 0.76 | 112.09 | 131.57 | 6.50 |
| Sep-18 | Min | 7.48 | 136.00 | 9.50 | 0.00 | 46.00 | 42.00 | 18.00 | 60.00 | 5.68 | 10.60 | 0.42 | 88.40 | 130.00 | 8.00 |
|  | Max | 8.55 | 199.00 | 92.00 | 6.00 | 66.00 | 50.00 | 24.00 | 74.00 | 8.52 | 13.10 | 1.39 | 129.35 | 135.00 | 10.00 |
|  | Avg | 8.07 | 162.18 | 51.60 | 0.57 | 56.64 | 46.14 | 20.64 | 66.79 | 6.11 | 11.69 | 0.91 | 105.33 | 131.75 | 9.04 |
| Oct-18 | Min | 7.48 | 136.00 | 9.50 | 0.00 | 46.00 | 42.00 | 18.00 | 60.00 | 5.68 | 10.60 | 0.42 | 88.40 | 130.00 | 8.00 |
|  | Max | 8.55 | 199.00 | 92.00 | 6.00 | 66.00 | 50.00 | 24.00 | 74.00 | 8.52 | 13.10 | 1.39 | 129.35 | 135.00 | 10.00 |
|  | Avg | 8.07 | 162.18 | 51.60 | 0.57 | 56.64 | 46.14 | 20.64 | 66.79 | 6.11 | 11.69 | 0.91 | 105.33 | 131.75 | 9.04 |
| Nov-18 | Min | 8.15 | 224.00 | 5.89 | 0.00 | 98.00 | 64.00 | 24.00 | 92.00 | 5.68 | 14.80 | 0.10 | 0.00 | 0.13 | 9.00 |
|  | Max | 8.51 | 248.00 | 13.60 | 6.00 | 108.00 | 70.00 | 32.00 | 100.00 | 7.10 | 16.00 | 0.11 | 161.20 | 136.00 | 9.00 |
|  | Avg | 8.26 | 237.79 | 8.61 | 0.79 | 103.71 | 68.07 | 27.50 | 95.57 | 5.98 | 15.59 | 0.10 | 149.01 | 128.00 | 9.00 |
| Dec-18 | Min | 8.22 | 230.00 | 8.10 | 0.00 | 106.00 | 72.00 | 30.00 | 102.00 | 7.10 | 15.10 | 0.10 | 149.50 | 131.00 | 9.00 |
|  | Max | 8.43 | 281.00 | 14.50 | 4.00 | 118.00 | 78.00 | 36.00 | 114.00 | 8.52 | 15.70 | 0.10 | 182.65 | 136.00 | 9.00 |
|  | Avg | 8.33 | 251.96 | 11.37 | 1.93 | 115.43 | 75.43 | 33.71 | 109.14 | 7.91 | 15.37 | 0.10 | 163.78 | 133.36 | 9.00 |

## TABLE 5.2: MONTH WISE VARIATIANS IN CHARACTERISTICS OF RAW WATER - YEAR 2019

| Month | Value | pH | Conductivity, in micro-simenes | Turbidity, in NTU | P-Alkalinity, in mg/l | M-Alkalinity, in mg/l | Ca-Hardness, in mg/l | Mg-Hardness, in mg/l | Total Hardness, in mg/l | Total Chloride, in mg/l | Silica, in mg/l | Iron, in mg/l | Total Dissolve Solid, in mg/l | Oxidation Reduction Potential, in mV | Sulphate, in mg/l |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Jan-19** | Min | 8.27 | 264.00 | 6.37 | 0.00 | 132.00 | 82.00 | 34.00 | 116.00 | 9.94 | 15.10 | 0.15 | 171.60 | 129.00 | 9.00 |
| | Max | 8.45 | 291.00 | 12.20 | 6.00 | 136.00 | 90.00 | 40.00 | 130.00 | 9.94 | 16.30 | 0.21 | 189.15 | 136.00 | 9.00 |
| | Avg | 8.36 | 283.79 | 9.64 | 3.43 | 134.79 | 87.00 | 37.29 | 124.29 | 9.94 | 15.98 | 0.18 | 184.46 | 132.82 | 9.00 |
| **Feb-19** | Min | 8.32 | 240.00 | 5.89 | 2.00 | 132.00 | 78.00 | 40.00 | 120.00 | 8.52 | 15.60 | 0.11 | 156.00 | 131.00 | 7.00 |
| | Max | 8.54 | 298.00 | 13.10 | 8.00 | 136.00 | 84.00 | 42.00 | 126.00 | 8.84 | 16.50 | 0.19 | 193.70 | 136.00 | 8.00 |
| | Avg | 8.42 | 290.32 | 9.37 | 5.21 | 133.57 | 82.00 | 41.57 | 123.57 | 8.58 | 15.91 | 0.13 | 188.71 | 133.89 | 7.25 |
| **Mar-19** | Min | 8.30 | 278.00 | 5.40 | 2.00 | 112.00 | 70.00 | 40.00 | 110.00 | 8.52 | 15.00 | 0.10 | 180.70 | 131.00 | 7.00 |
| | Max | 8.63 | 322.00 | 12.10 | 10.00 | 122.00 | 76.00 | 48.00 | 122.00 | 9.96 | 15.80 | 0.12 | 209.30 | 136.00 | 10.00 |
| | Avg | 8.47 | 292.32 | 8.26 | 6.50 | 116.71 | 73.00 | 43.64 | 116.64 | 9.29 | 15.44 | 0.11 | 190.01 | 133.64 | 7.39 |
| **Apr-19** | Min | 8.13 | 293.00 | 5.32 | 0.00 | 116.00 | 72.00 | 42.00 | 116.00 | 9.94 | 15.30 | 0.09 | 190.45 | 131.00 | 8.00 |
| | Max | 8.62 | 316.00 | 15.50 | 10.00 | 124.00 | 78.00 | 48.00 | 124.00 | 12.78 | 16.40 | 0.11 | 205.40 | 138.00 | 9.00 |
| | Avg | 8.35 | 301.75 | 8.57 | 3.50 | 120.07 | 74.79 | 45.07 | 119.93 | 11.72 | 15.86 | 0.10 | 196.14 | 134.29 | 8.39 |
| **May-19** | Min | 8.10 | 265.00 | 3.15 | 0.00 | 118.00 | 74.00 | 44.00 | 120.00 | 11.36 | 15.40 | 0.10 | 172.25 | 131.00 | 8.00 |
| | Max | 8.65 | 337.00 | 27.00 | 12.00 | 124.00 | 80.00 | 50.00 | 130.00 | 12.78 | 16.50 | 0.12 | 219.05 | 140.00 | 9.00 |
| | Avg | 8.32 | 292.36 | 6.34 | 2.64 | 121.29 | 77.64 | 46.86 | 124.50 | 12.21 | 16.08 | 0.11 | 190.03 | 134.57 | 8.57 |
| **Jun-19** | Min | 8.42 | 260.00 | 3.22 | 8.00 | 112.00 | 72.00 | 42.00 | 114.00 | 8.94 | 14.24 | 0.10 | 169.00 | 132.00 | 8.00 |
| | Max | 8.68 | 298.00 | 8.51 | 12.00 | 118.00 | 78.00 | 46.00 | 122.00 | 11.50 | 15.80 | 0.12 | 193.70 | 137.00 | 98.00 |
| | Avg | 8.58 | 278.96 | 5.18 | 10.21 | 114.57 | 75.14 | 43.57 | 118.71 | 9.81 | 15.26 | 0.11 | 181.33 | 134.50 | 11.75 |
| **Jul-19** | Min | 7.83 | 175.00 | 5.02 | 0.00 | 84.00 | 66.00 | 24.00 | 90.00 | 8.94 | 12.12 | 0.29 | 113.75 | 125.00 | 7.00 |
| | Max | 8.52 | 280.00 | 98.60 | 8.00 | 96.00 | 74.00 | 30.00 | 104.00 | 10.22 | 14.50 | 0.39 | 182.00 | 136.00 | 8.00 |
| | Avg | 8.24 | 206.71 | 46.15 | 2.29 | 88.29 | 70.36 | 26.57 | 96.93 | 9.49 | 13.18 | 0.35 | 134.36 | 131.43 | 7.50 |
| **Aug-19** | Min | 7.40 | 132.00 | 21.60 | 0.00 | 74.00 | 60.00 | 18.00 | 78.00 | 8.52 | 10.56 | 0.30 | 85.80 | 132.00 | 7.00 |

| Month | Value | pH | Conductivity, in micro-simenes | Turbidity, in NTU | P-Alkalinity, in mg/l | M-Alkalinity, in mg/l | Ca-Hardness, in mg/l | Mg-Hardness, in mg/l | Total Hardness, in mg/l | Total Chloride, in mg/l | Silica, in mg/l | Iron, in mg/l | Total Dissolve Solid, in mg/l | Oxidation Reduction Potential, in mV | Sulphate, in mg/l |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | Max | 8.24 | 204.00 | 203.00 | 0.00 | 84.00 | 66.00 | 24.00 | 90.00 | 10.22 | 11.30 | 0.39 | 132.60 | 136.00 | 8.00 |
|  | Avg | 7.93 | 159.89 | 110.55 | 0.00 | 78.79 | 62.14 | 20.86 | 83.00 | 9.61 | 10.92 | 0.34 | 103.93 | 134.50 | 7.61 |
| Sep-19 | Min | 7.40 | 133.00 | 26.40 | 0.00 | 48.00 | 46.00 | 16.00 | 62.00 | 7.10 | 11.23 | 0.12 | 86.45 | 132.00 | 7.00 |
|  | Max | 8.24 | 210.00 | 203.00 | 0.00 | 54.00 | 52.00 | 18.00 | 68.00 | 9.94 | 12.42 | 0.30 | 136.50 | 136.00 | 9.00 |
|  | Avg | 7.95 | 162.68 | 107.52 | 0.00 | 50.29 | 48.43 | 17.07 | 65.50 | 8.88 | 12.05 | 0.18 | 105.74 | 134.25 | 8.21 |
| Oct-19 | Min | 7.58 | 151.00 | 8.53 | 0.00 | 84.00 | 58.00 | 20.00 | 80.00 | 7.74 | 12.78 | 0.07 | 98.15 | 34.00 | 7.00 |
|  | Max | 8.60 | 204.00 | 45.70 | 8.00 | 92.00 | 64.00 | 24.00 | 86.00 | 9.94 | 13.98 | 0.10 | 132.60 | 138.00 | 9.00 |
|  | Avg | 8.12 | 179.41 | 21.67 | 1.79 | 88.29 | 61.57 | 21.64 | 83.21 | 8.44 | 13.50 | 0.09 | 116.62 | 123.75 | 8.18 |
| Nov-19 | Min | 8.13 | 213.00 | 6.87 | 0.00 | 90.00 | 62.00 | 22.00 | 84.00 | 8.52 | 13.50 | 0.08 | 138.45 | 131.00 | 7.00 |
|  | Max | 8.54 | 281.00 | 20.15 | 8.00 | 1110.00 | 78.00 | 24.00 | 100.00 | 9.94 | 14.01 | 0.15 | 182.65 | 136.00 | 9.00 |
|  | Avg | 8.36 | 259.00 | 13.07 | 3.36 | 141.43 | 69.14 | 23.21 | 92.36 | 9.43 | 13.83 | 0.11 | 168.35 | 134.11 | 8.11 |
| Dec-19 | Min | 8.12 | 31.00 | 9.29 | 0.00 | 118.00 | 78.00 | 28.00 | 106.00 | 8.52 | 14.60 | 0.11 | 20.15 | 130.00 | 7.00 |
|  | Max | 8.38 | 317.00 | 16.30 | 4.00 | 128.00 | 84.00 | 36.00 | 118.00 | 9.94 | 15.68 | 0.23 | 206.05 | 138.00 | 9.00 |
|  | Avg | 8.24 | 287.75 | 13.02 | 0.64 | 123.14 | 80.29 | 31.71 | 112.00 | 9.33 | 15.25 | 0.14 | 187.04 | 134.11 | 7.68 |

# TABLE 5.3: MONTH WISE VARIATIANS IN CHARACTERISTICS OF RAW WATER - YEAR 2020

| Month | Value | pH | Conductivity, in micro-simenes | Turbidity, in NTU | P-Alkalinity, in mg/l | M-Alkalinity, in mg/l | Ca-Hardness, in mg/l | Mg-Hardness, in mg/l | Total Hardness, in mg/l | Total Chloride, in mg/l | Silica, in mg/l | Iron, in mg/l | Total Dissolve Solid, in mg/l | Oxidation Reduction Potential, in mV | Sulphate, in mg/l |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Jan-20** | Min | 8.20 | 244.00 | 6.74 | 0.00 | 106.00 | 68.00 | 28.00 | 98.00 | 7.10 | 12.63 | 0.11 | 158.60 | 132.00 | 7.00 |
| | Max | 8.47 | 329.00 | 24.70 | 6.00 | 116.00 | 74.00 | 36.00 | 110.00 | 8.52 | 14.50 | 0.20 | 213.85 | 139.00 | 8.00 |
| | Avg | 8.32 | 279.93 | 14.44 | 2.00 | 111.00 | 71.50 | 31.79 | 103.29 | 7.86 | 13.30 | 0.14 | 181.95 | 135.14 | 7.39 |
| **Feb-20** | Min | 8.39 | 324.00 | 5.41 | 2.00 | 130.00 | 90.00 | 42.00 | 132.00 | 8.52 | 16.22 | 0.10 | 210.60 | 133.00 | 8.00 |
| | Max | 8.76 | 335.00 | 8.78 | 10.00 | 134.00 | 92.00 | 44.00 | 136.00 | 9.94 | 16.47 | 0.12 | 217.75 | 136.00 | 9.00 |
| | Avg | 8.62 | 330.43 | 6.90 | 8.57 | 132.86 | 91.71 | 42.29 | 134.00 | 9.53 | 16.31 | 0.11 | 214.78 | 134.57 | 8.43 |
| **Mar-20** | Min | 8.12 | 285.00 | 4.35 | 0.00 | 128.00 | 82.00 | 44.00 | 126.00 | 8.52 | 15.88 | 0.10 | 185.25 | 134.00 | 7.00 |
| | Max | 8.72 | 333.00 | 10.20 | 12.00 | 134.00 | 88.00 | 48.00 | 134.00 | 11.36 | 16.30 | 0.12 | 216.45 | 140.00 | 9.00 |
| | Avg | 8.37 | 296.18 | 6.70 | 3.86 | 131.64 | 83.43 | 45.36 | 128.79 | 9.43 | 16.10 | 0.11 | 192.52 | 136.07 | 7.89 |
| **Apr-20** | Min | 8.25 | 254.00 | 5.99 | 0.00 | 116.00 | 76.00 | 36.00 | 112.00 | 8.52 | 15.65 | 0.11 | 165.10 | 124.00 | 7.00 |
| | Max | 8.76 | 280.00 | 9.85 | 12.00 | 122.00 | 80.00 | 40.00 | 120.00 | 8.52 | 16.42 | 0.14 | 182.00 | 141.00 | 9.00 |
| | Avg | 8.54 | 263.54 | 8.10 | 8.21 | 119.43 | 77.86 | 37.79 | 115.64 | 8.52 | 16.14 | 0.12 | 171.30 | 134.32 | 8.25 |
| **May-20** | Min | 8.07 | 265.00 | 6.94 | 0.00 | 128.00 | 66.00 | 44.00 | 110.00 | 7.10 | 17.30 | 0.04 | 172.25 | 131.00 | 8.00 |
| | Max | 8.83 | 315.00 | 10.64 | 10.00 | 140.00 | 70.00 | 50.00 | 118.00 | 8.52 | 18.20 | 0.09 | 204.75 | 136.00 | 9.00 |
| | Avg | 8.46 | 289.71 | 8.16 | 4.71 | 131.07 | 67.86 | 46.93 | 114.79 | 8.01 | 17.88 | 0.05 | 188.31 | 133.57 | 8.07 |
| **Jun-20** | Min | 8.17 | 310.00 | 6.02 | 0.00 | 110.00 | 70.00 | 38.00 | 110.00 | 8.52 | 15.21 | 0.12 | 201.50 | 133.00 | 8.00 |
| | Max | 8.60 | 355.00 | 18.60 | 10.00 | 116.00 | 76.00 | 42.00 | 118.00 | 9.94 | 15.84 | 0.21 | 230.75 | 152.00 | 9.00 |
| | Avg | 8.36 | 331.11 | 9.26 | 3.93 | 112.43 | 73.07 | 40.36 | 113.43 | 8.62 | 15.41 | 0.15 | 215.22 | 141.39 | 8.39 |
| **Jul-20** | Min | 8.13 | 272.00 | 6.07 | 0.00 | 72.00 | 30.00 | 36.00 | 104.00 | 7.10 | 14.12 | 0.18 | 176.80 | 132.00 | 6.00 |
| | Max | 8.75 | 305.00 | 13.62 | 10.00 | 112.00 | 72.00 | 102.00 | 135.00 | 9.94 | 15.32 | 0.32 | 198.25 | 146.00 | 9.00 |
| | Avg | 8.49 | 284.82 | 9.21 | 6.00 | 104.64 | 67.50 | 42.21 | 109.82 | 7.76 | 14.50 | 0.26 | 185.22 | 139.21 | 8.14 |
| **Aug-20** | Min | 7.80 | 201.00 | 5.98 | 0.00 | 88.00 | 60.00 | 30.00 | 90.00 | 7.10 | 12.36 | 0.12 | 130.65 | 132.00 | 7.00 |

| Month | Value | pH | Conductivity, in micro-simenes | Turbidity, in NTU | P-Alkalinity, in mg/l | M-Alkalinity, in mg/l | Ca-Hardness, in mg/l | Mg-Hardness, in mg/l | Total Hardness, in mg/l | Total Chloride, in mg/l | Silica, in mg/l | Iron, in mg/l | Total Dissolve Solid, in mg/l | Oxidation Reduction Potential, in mV | Sulphate, in mg/l |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | Max | 8.62 | 261.00 | 12.20 | 10.00 | 102.00 | 66.00 | 36.00 | 100.00 | 8.52 | 13.65 | 0.15 | 169.65 | 146.00 | 8.00 |
|  | Avg | 8.25 | 238.25 | 9.02 | 1.43 | 94.21 | 62.43 | 33.14 | 95.57 | 7.56 | 13.21 | 0.14 | 154.86 | 139.32 | 7.07 |
| **Sep-20** | Min | 7.70 | 174.00 | 8.12 | 0.00 | 86.00 | 58.00 | 30.00 | 88.00 | 7.10 | 12.74 | 0.13 | 113.10 | 132.00 | 7.00 |
|  | Max | 8.50 | 217.00 | 48.60 | 8.00 | 96.00 | 66.00 | 32.00 | 98.00 | 9.94 | 13.51 | 0.20 | 141.05 | 146.00 | 8.00 |
|  | Avg | 8.19 | 196.21 | 24.22 | 1.64 | 90.57 | 61.57 | 31.00 | 92.57 | 8.06 | 13.05 | 0.15 | 127.54 | 139.96 | 7.39 |
| **Oct-20** | Min | 7.91 | 166.00 | 8.04 | 0.00 | 88.00 | 60.00 | 32.00 | 92.00 | 7.10 | 13.01 | 0.10 | 107.90 | 133.00 | 7.00 |
|  | Max | 8.76 | 214.00 | 35.50 | 10.00 | 98.00 | 70.00 | 36.00 | 106.00 | 9.94 | 14.98 | 0.14 | 139.10 | 153.00 | 9.00 |
|  | Avg | 8.31 | 189.64 | 16.36 | 2.50 | 92.14 | 62.43 | 33.79 | 96.21 | 8.88 | 13.87 | 0.12 | 123.27 | 138.86 | 7.61 |
| **Nov-20** | Min | 8.12 | 224.00 | 7.12 | 0.00 | 102.00 | 66.00 | 32.00 | 98.00 | 8.52 | 14.23 | 0.22 | 145.60 | 134.00 | 7.00 |
|  | Max | 8.66 | 273.00 | 13.84 | 8.00 | 126.00 | 82.00 | 40.00 | 122.00 | 9.94 | 15.98 | 0.96 | 177.45 | 145.00 | 9.00 |
|  | Avg | 8.38 | 258.57 | 10.75 | 3.64 | 116.36 | 74.57 | 35.79 | 110.36 | 9.33 | 15.34 | 0.94 | 168.07 | 138.61 | 7.68 |
| **Dec-20** | Min | 8.02 | 230.00 | 8.09 | 0.00 | 102.00 | 68.00 | 28.00 | 96.00 | 5.68 | 15.20 | 0.10 | 149.50 | 14.00 | 7.00 |
|  | Max | 8.61 | 303.00 | 14.80 | 8.00 | 132.00 | 86.00 | 44.00 | 128.00 | 9.94 | 16.42 | 0.32 | 196.95 | 145.00 | 9.00 |
|  | Avg | 8.41 | 287.25 | 10.37 | 4.64 | 126.71 | 82.57 | 40.14 | 122.71 | 8.98 | 15.98 | 0.23 | 186.71 | 129.96 | 7.50 |

The analysis of long-term trend of characteristics of raw water reveals that pH of raw water at intake varies from 7.8 to 8.6 (Figure 5.1). Whereas during monsoon month (i.e. July – September) pH of raw water varies from 7.8-8.2 and remaining months it was recorded in the range of 8.3 to 8.6. Lowering of pH during monsoon may be explained due to the charging with low pH fresh water from surface runoff.

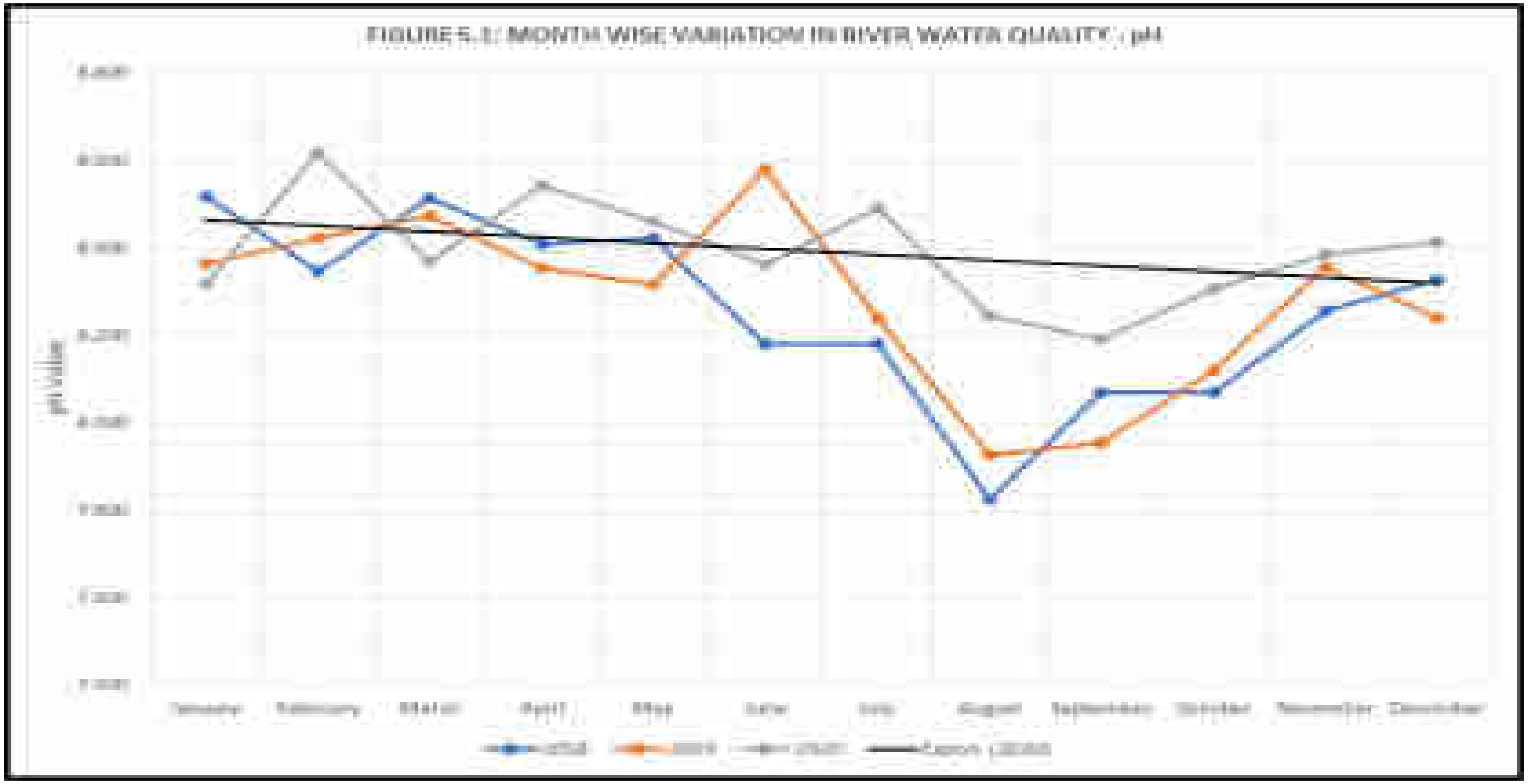


FIGURE 5.1: MONTH WISE VARIATION IN RIVER WATER QUALITY : pH

The analysis of long-term trend of monthly variations in turbidity of raw water reveals that turbidity of raw water at intake varies from 5 to 115 NTU (Figure 5.2). Whereas during monsoon month (i.e. July – September) turbidity of raw water is maximum and varies from 45 – 115 NTU and remaining months it was recorded in the range of 5 to 15 NTU. High turbidity during monsoon month due to surface water run off carrying significant amount of mud and silt material adding to river.

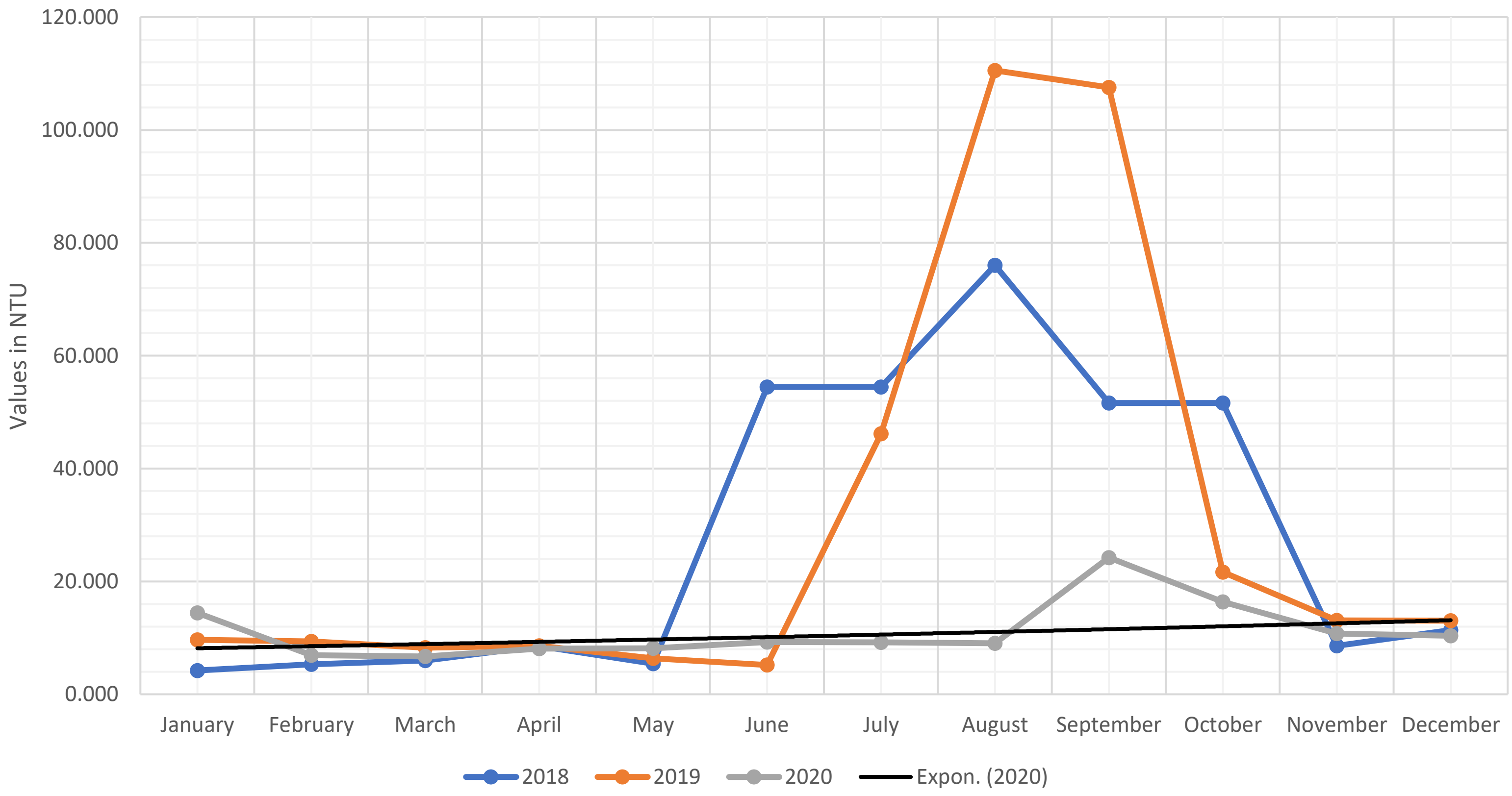
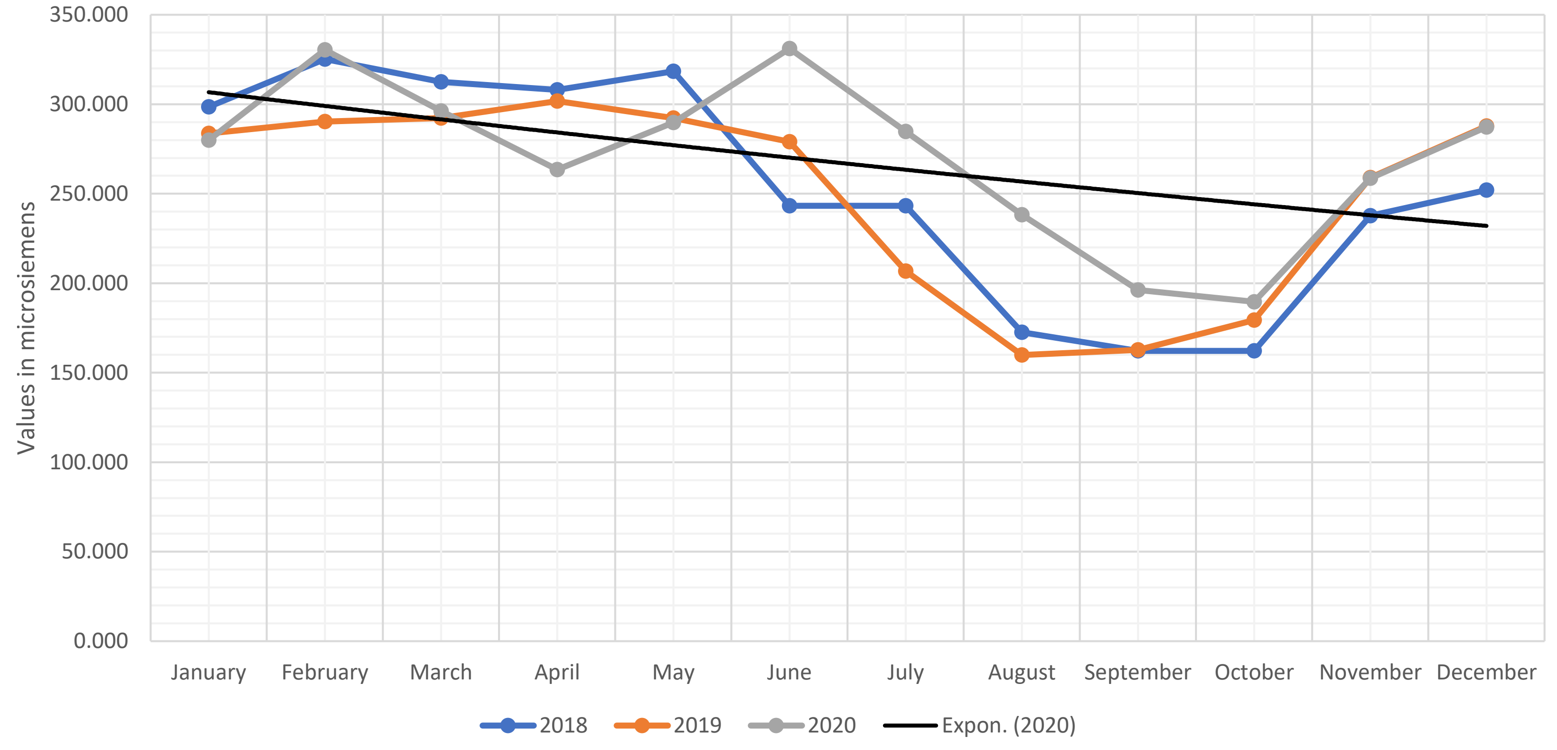


FIGURE 5.2: MONTH WISE VARIATION IN RIVER WATER QUALITY - TURBIDITY (IN NTU)

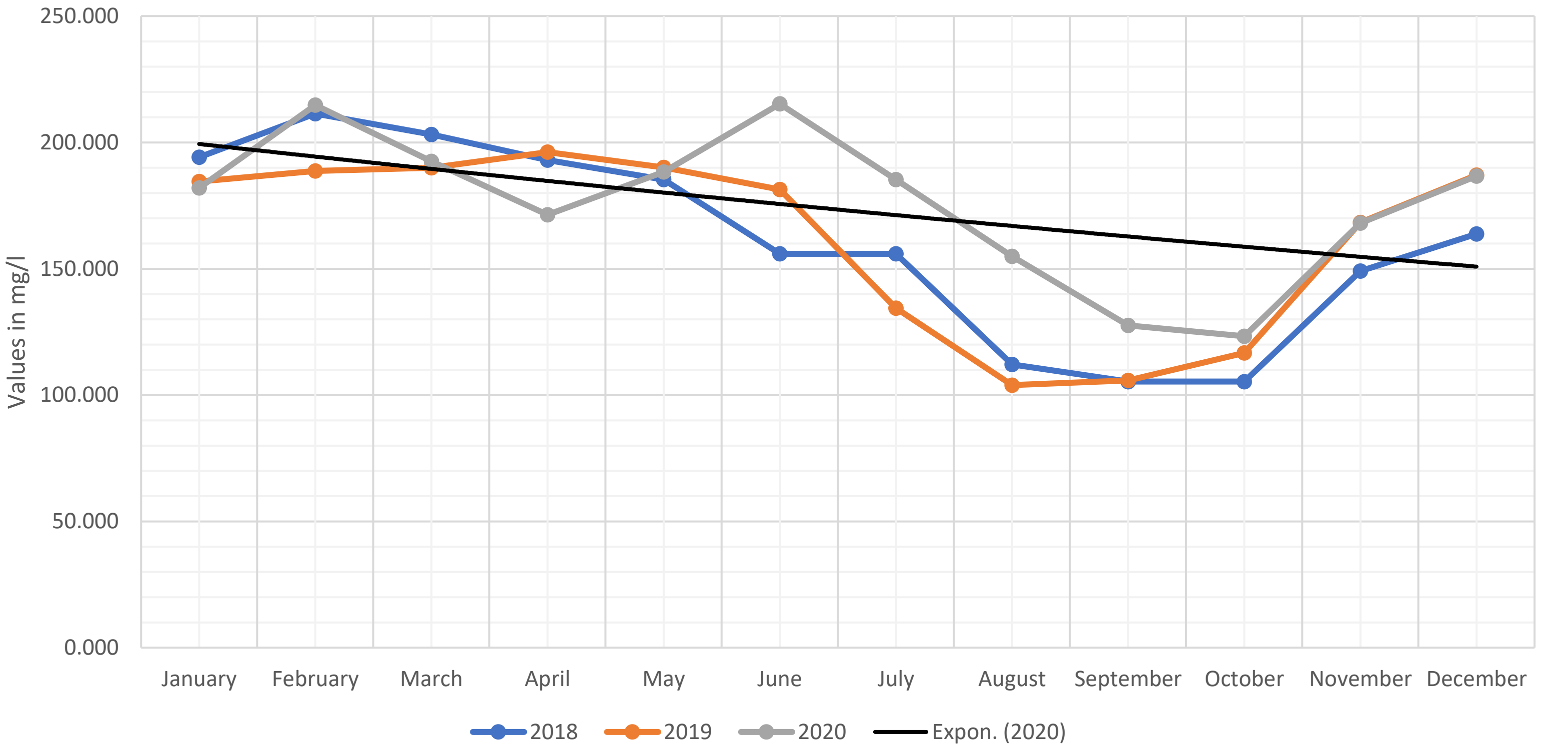
The analysis of long-term trend of monthly variations in conductivity of raw water reveals that conductivity of raw water at intake varies from 140 to 340 micro Siemens (Figure 5.3). Whereas during monsoon month (i.e. July – September) conductivity of raw water is lowest and varies from 140 to 280 micro Siemens and remaining months it was recorded in the range of 250 to 340 micro Siemens. Dilution effect arises due to charging of river water with fresh surface water (mostly from rain) may be assumed for lowest conductivity value during monsoon month.

FIGURE 5.3: MONTH WISE VARIATION IN RIVER WATER QUALITY - CONDUCTIVITY (IN MICROSIEMENS)



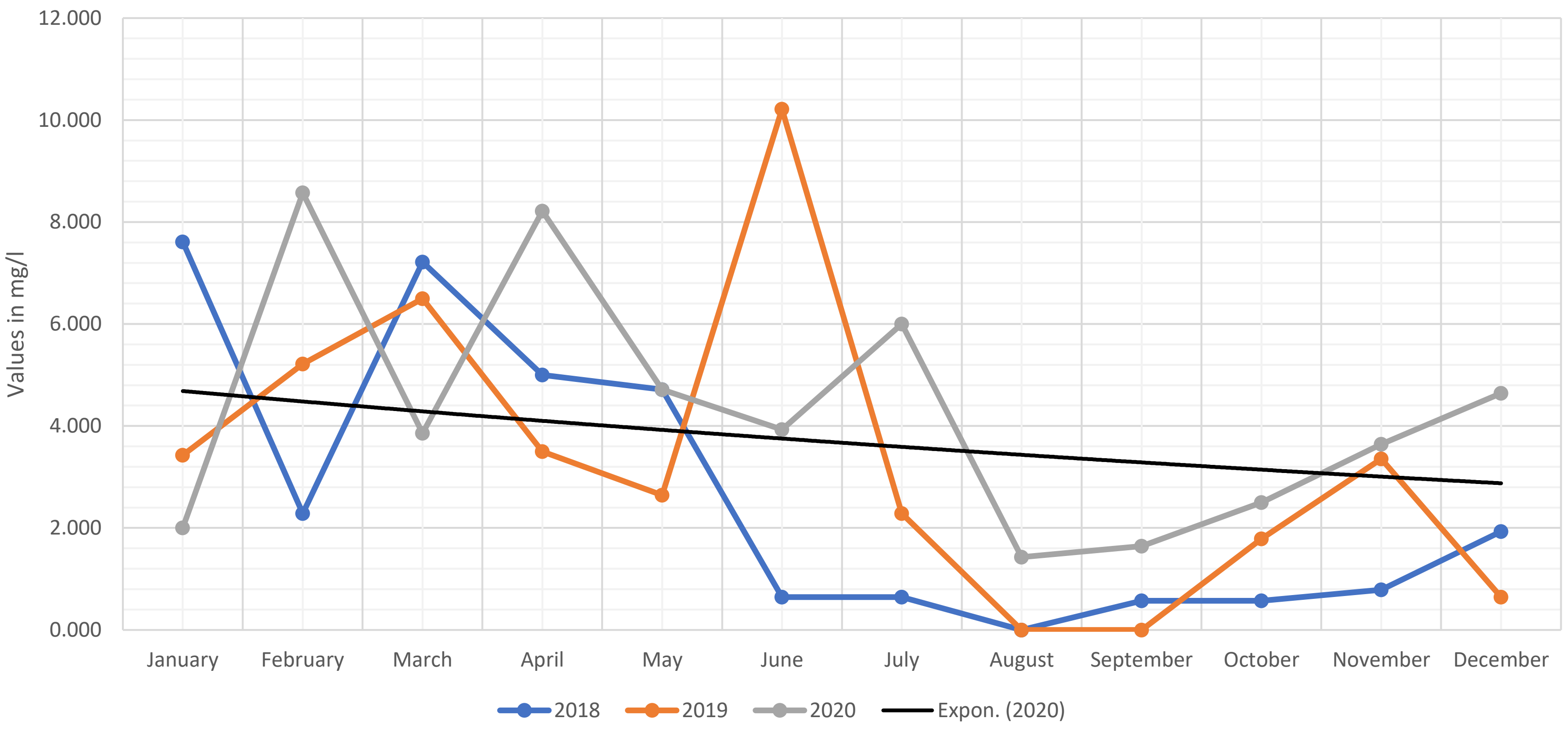
The analysis of long-term trend of monthly variations in Total Dissolved Solids (TDS) of raw water reveals that TDS of raw water at intake varies from 100 to 220 mg/l (Figure 5.4). Whereas during monsoon month (i.e. July – September) conductivity of raw water is lowest and varies from 100 to 175 mg/l and remaining months it was recorded in the range of 170 to 220 mg/l. The reason for TDS variation may be considered same as explained in conductivity section(as conductivity is directly proportional to TDS of water).

FIGURE 5.4: MONTH WISE VARIATION IN RIVER WATER QUALITY - TOTAL DISSOLVE SOLID (mg/l)



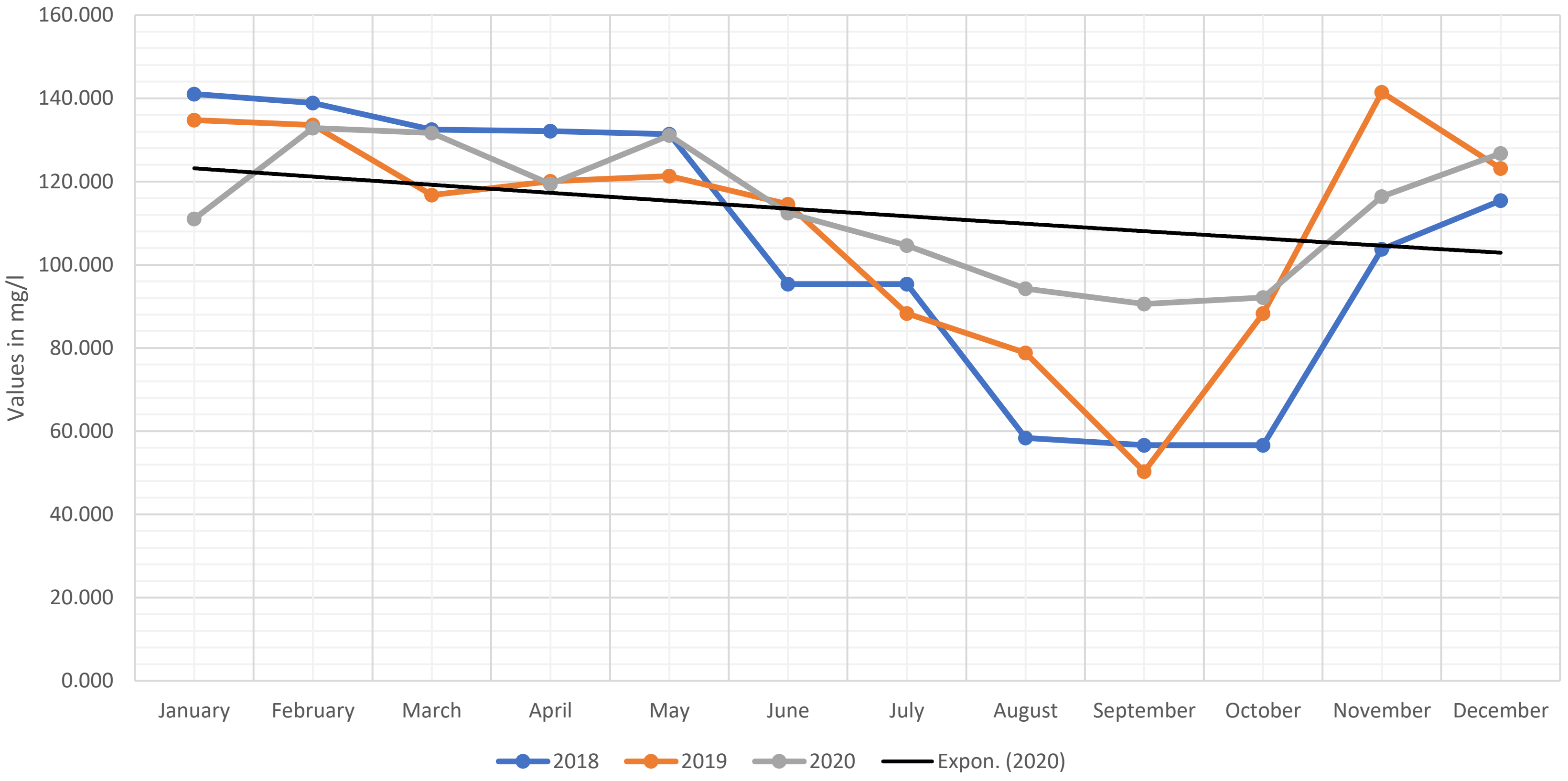
The analysis of long-term trend of monthly variations in p-Alkalinity of raw water reveals that p-Alkalinity of raw water at intake varies from 1.5 to 10 mg/l (Figure 5.5). Whereas during monsoon month (i.e. July – September) p-Alkalinity of raw water is lowest and varies from 1.5 to 6 mg/l and remaining months it was recorded in the range of 2 to 10 mg/l. Since there is a lowering of pH during monsoon period the alkalinity value also seems to be lowest during monsoon based on pH and alkalinity inverse relationship.

FIGURE 5.5: MONTH WISE VARIATION IN RIVER WATER QUALITY - p-ALKALINITY (mg/l)



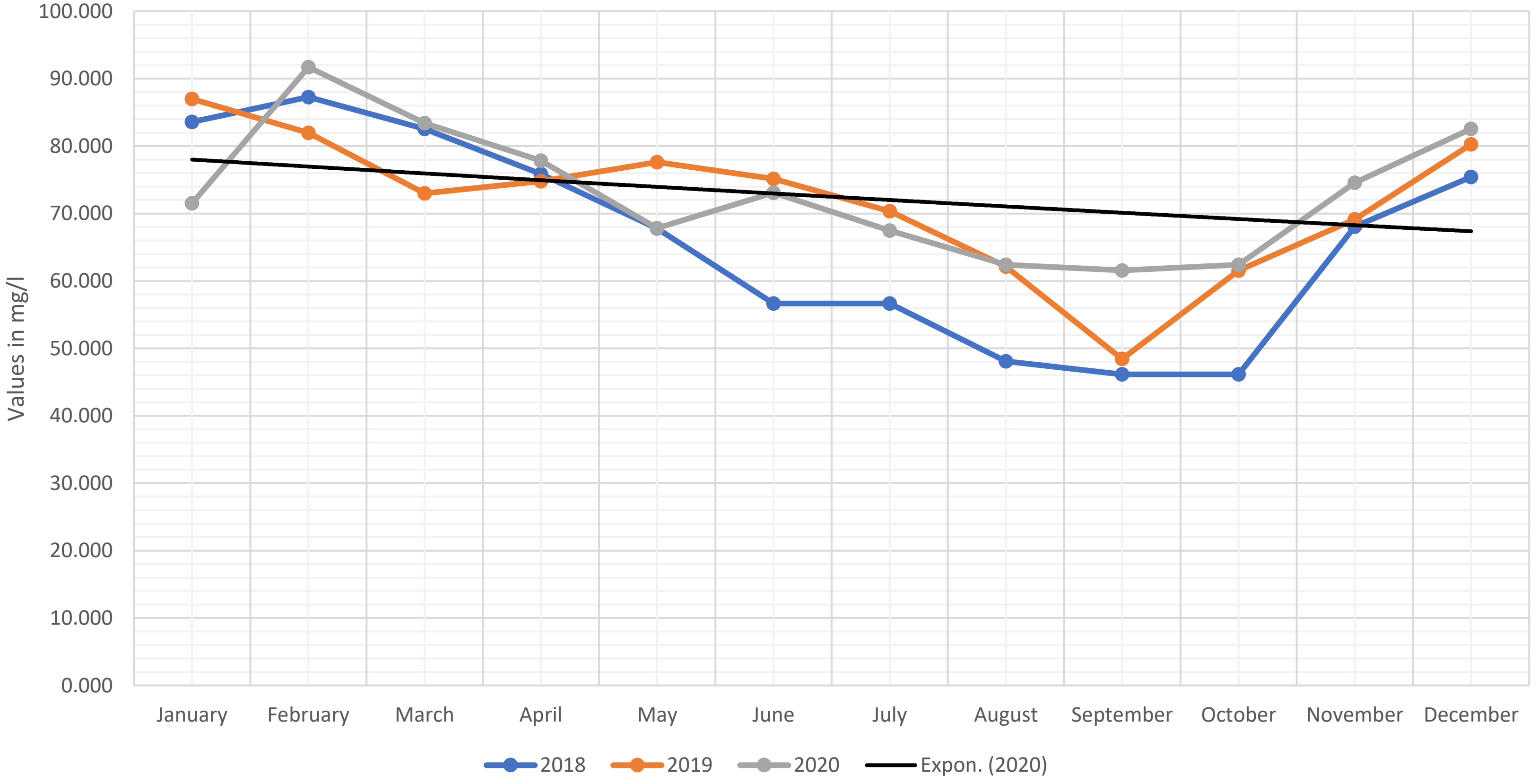
The analysis of long-term trend of monthly variations in m-Alkalinity of raw water reveals that m-Alkalinity of raw water at intake varies from 50 to 140 mg/l (Figure 5.6). Whereas during monsoon month (i.e. July – September) m-Alkalinity of raw water is lowest and varies from 50 to 105 mg/l and remaining months it was recorded in the range of 95 to 140 mg/l. The explanation may be considered same as discussed in previous p- Alk section.

**FIGURE 5.6: MONTH WISE VARIATION IN RIVER WATER QUALITY - m-ALKALINITY (mg/l)**



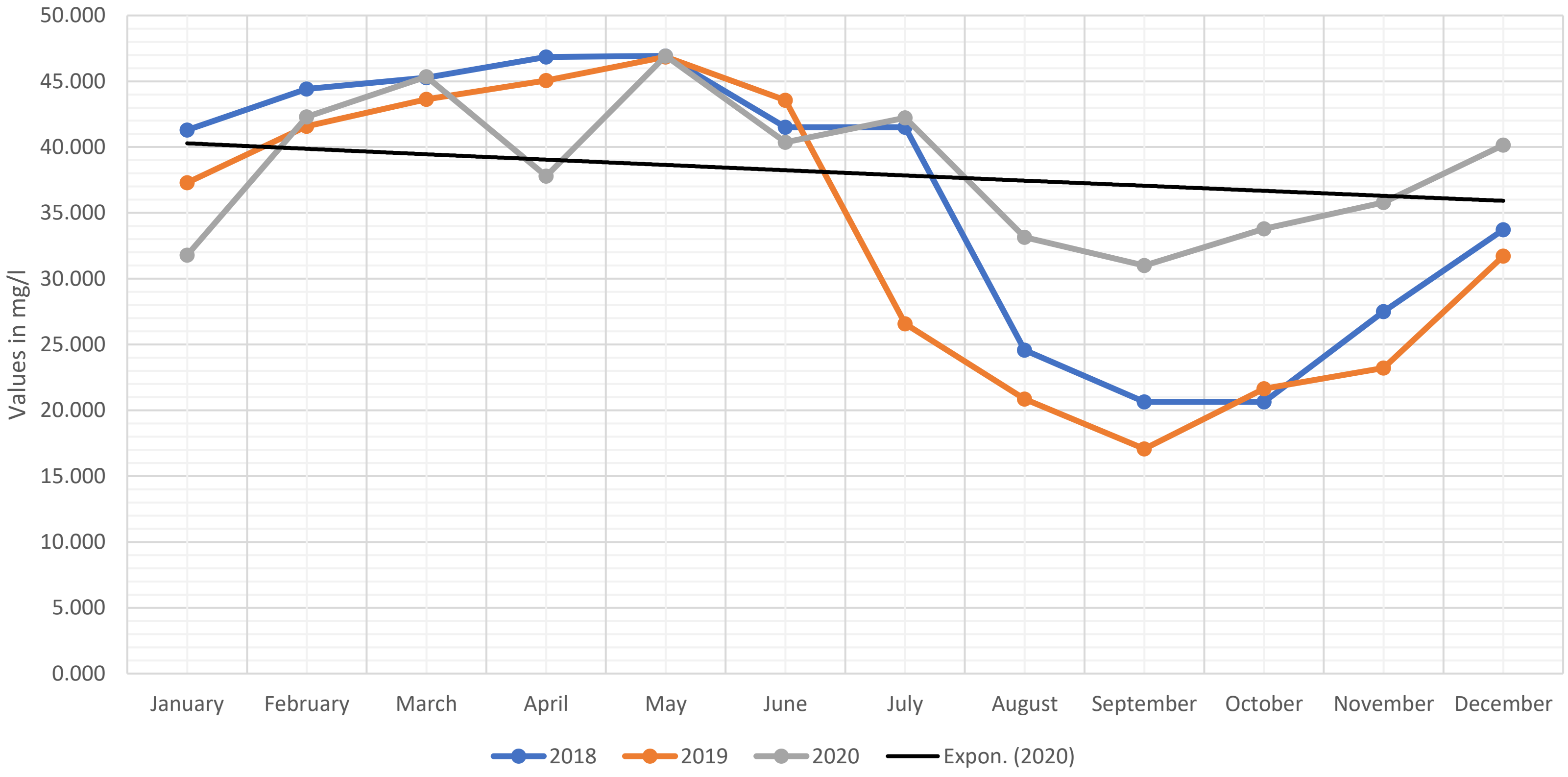
The analysis of long-term trend of monthly variations in Calcium hardness of raw water reveals that Calcium hardness of raw water at intake varies from 45 to 90 mg/l (Figure 5.7). Whereas during monsoon month (i.e. July – September) Calcium hardness of raw water is lowest and varies from 45 to 70 mg/l and remaining months it was recorded in the range of 48 to 90 mg/l. The reason for lowering of Ca hardness value may be considered due to dilution effect during monsoon season.

FIGURE 5.7: MONTH WISE VARIATION IN RIVER WATER QUALITY - CALCIUM HARDNESS (mg/l)



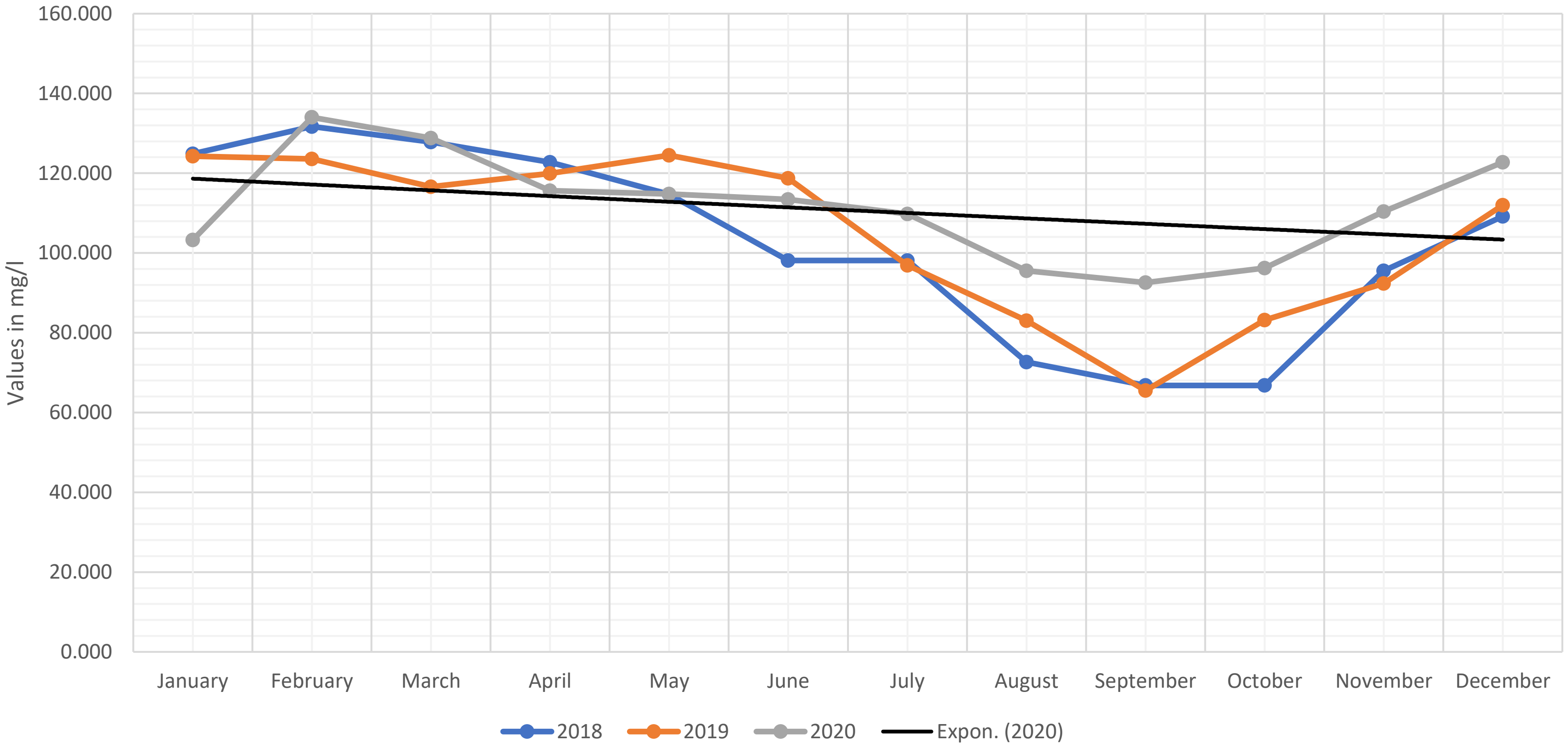
The analysis of long-term trend of monthly variations in Magnesium hardness of raw water reveals that Magnesium hardness of raw water at intake varies from 17 to 47 mg/l (Figure 5.8). Whereas during monsoon month (i.e. July – September) Magnesium hardness of raw water is lowest and varies from 17 to 42 mg/l and remaining months it was recorded in the range of 20 to 47 mg/l. The reason for lowering of MgH value may be considered same as in the case of CaH value in the previous section.

FIGURE 5.8: MONTH WISE VARIATION IN RIVER WATER QUALITY - MAGNESIUM HARDNESS (mg/l)



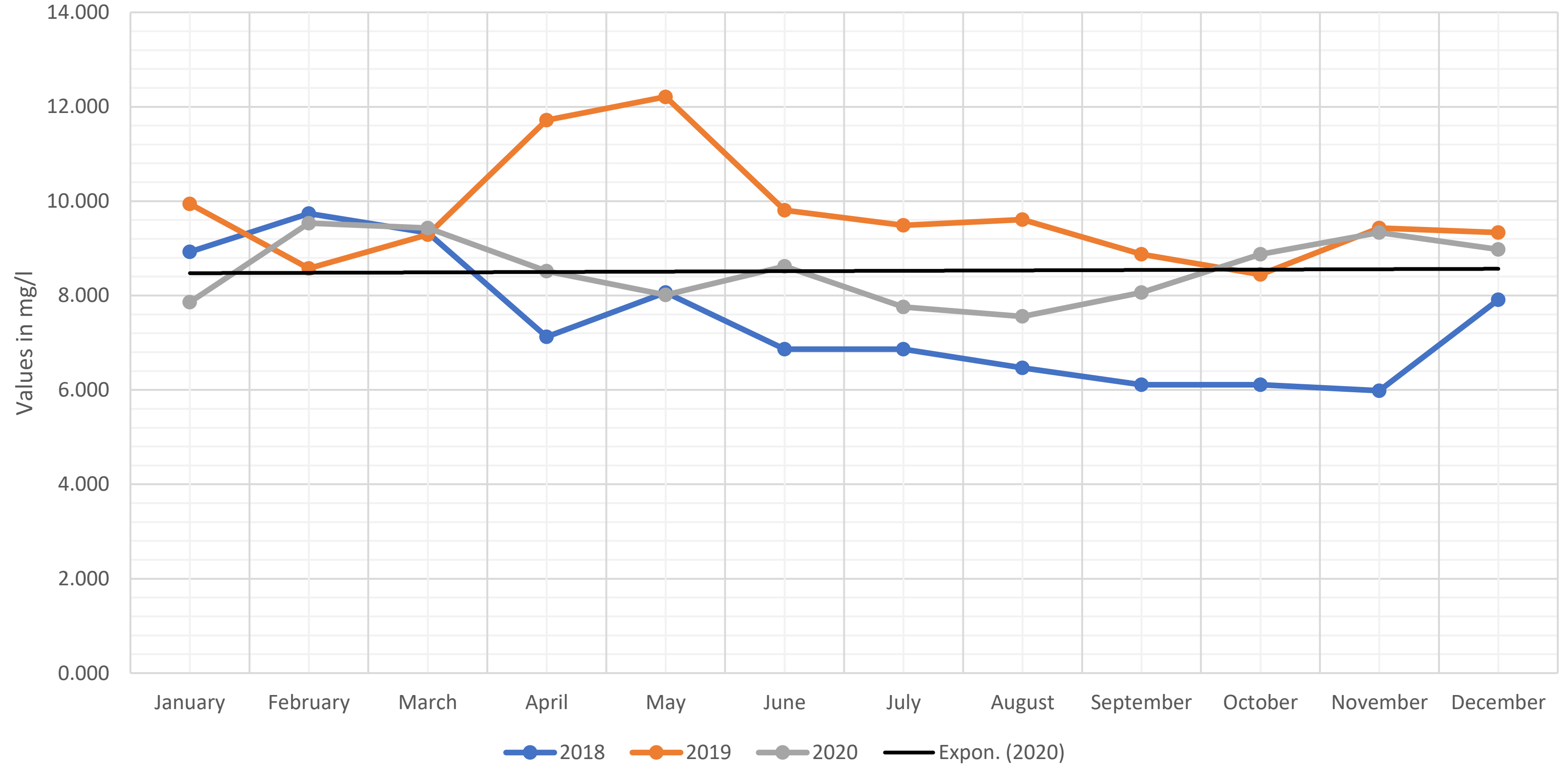
The analysis of long-term trend of monthly variations in Total hardness of raw water reveals that Total hardness of raw water at intake varies from 65 to 135 mg/l (Figure 5.9). Whereas during monsoon month (i.e. July – September) Magnesium hardness of raw water is lowest and varies from 65 to 110 mg/l and remaining months it was recorded in the range of 70 to 135 mg/l. The reason for lowering of total hardness value may be considered same (Dilution effect) as in the case of Ca hardness and Mg hardness value in the previous two section.

FIGURE 5.9: MONTH WISE VARIATION IN RIVER WATER QUALITY - TOTAL HARDNESS (mg/l)



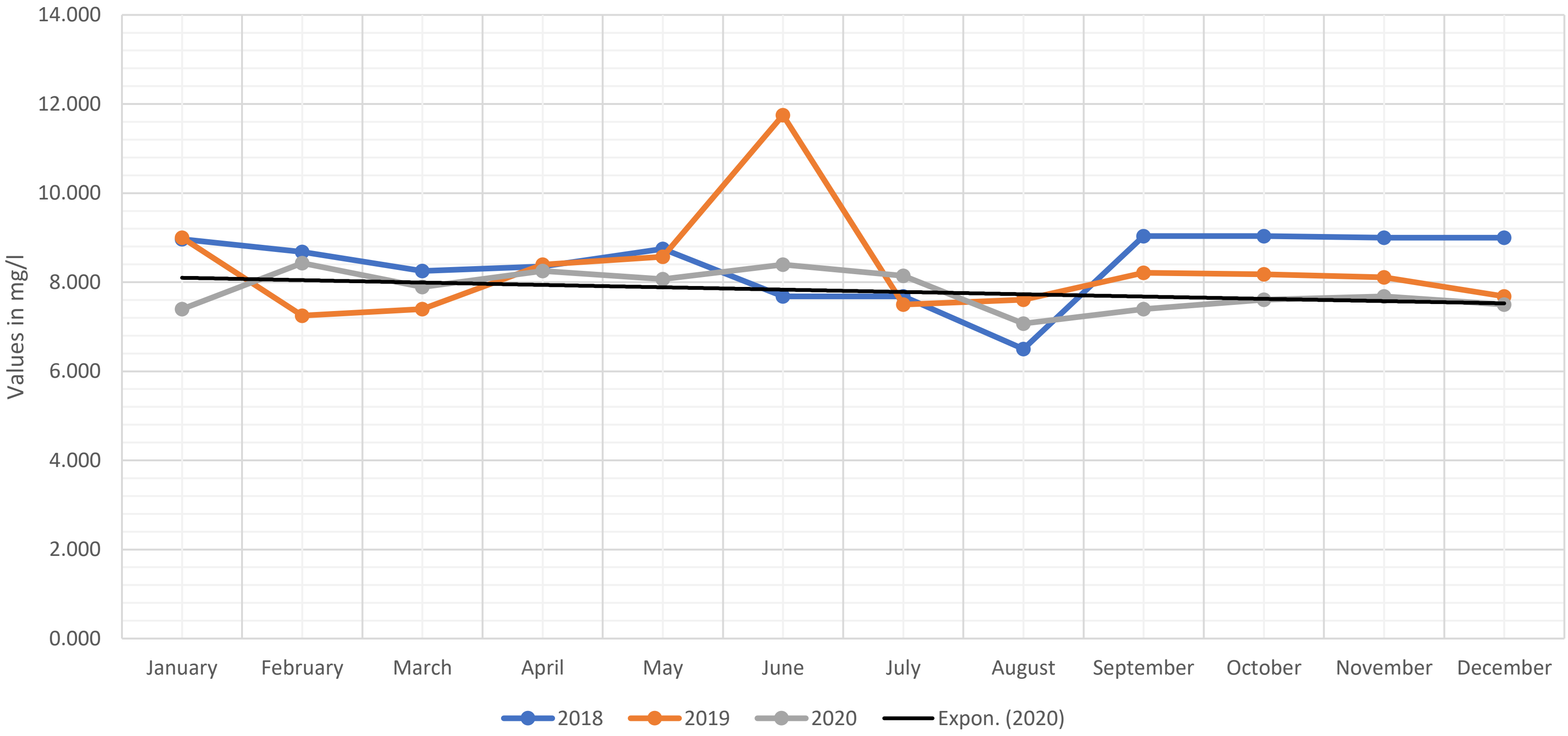
The analysis of long-term trend of monthly variations in Total Chloride of raw water reveals that Total Chloride of raw water at intake varies from 6 to 12 mg/l (Figure 5.10). Whereas during monsoon month (i.e. July – September) Total Chloride of raw water varies from 7 to 9.5 mg/l. The higher value of chloride during monsoon period may be explained as: lowering of pH and alkalinity value of river water during monsoon period seems to be responsible for dissolution of various chloride salts present in water leading to increase in chloride value in river water during monsoon.

FIGURE 5.10: MONTH WISE VARIATION IN RIVER WATER QUALITY - TOTAL CHLORIDE (mg/l)



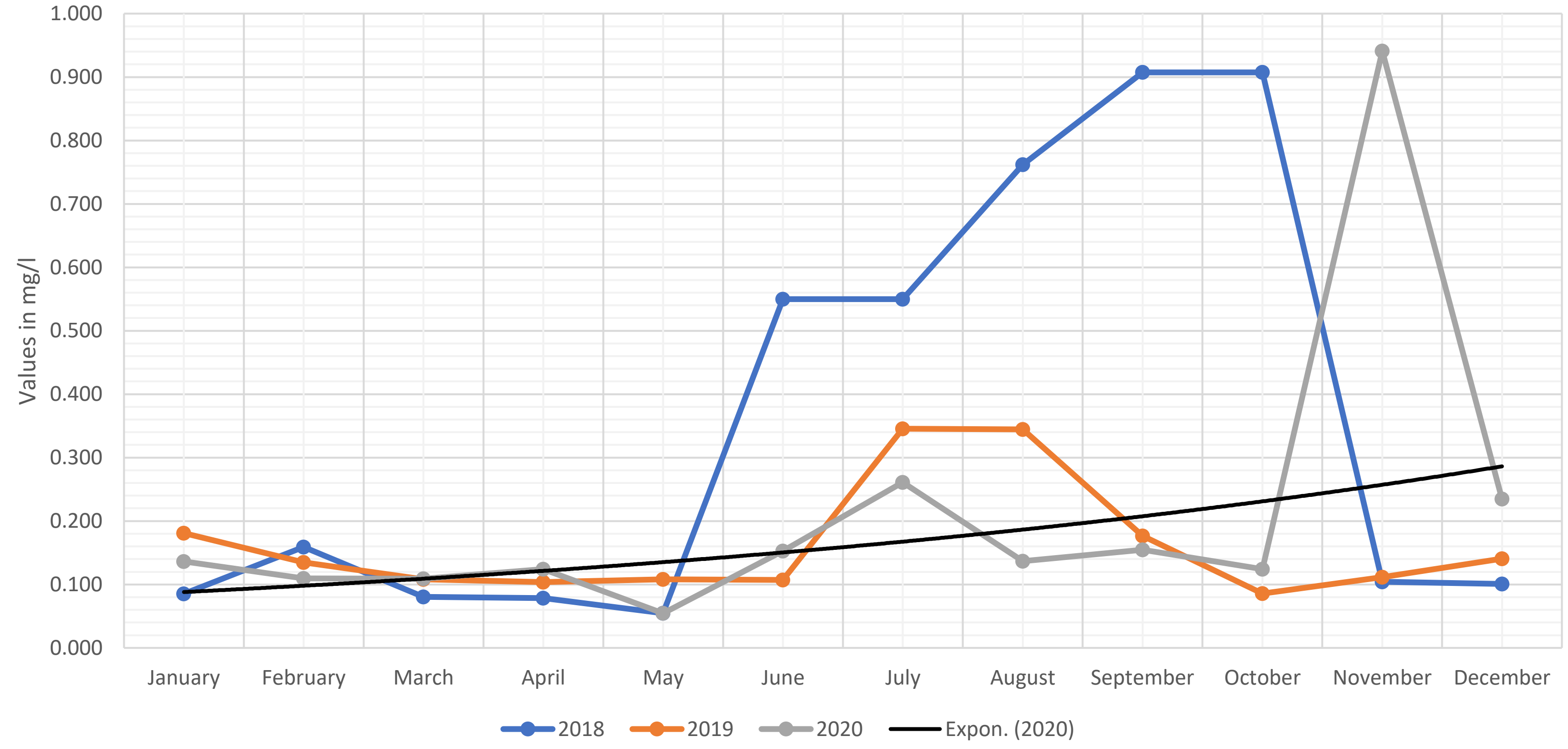
The analysis of long-term trend of monthly variations in Sulphate of raw water reveals that Sulphate of raw water at intake varies from 6.5 to 12 mg/l (Figure 5.11). Whereas during monsoon month (i.e. July – September) Sulphate of raw water is lowest and varies from 6.5 to 9 mg/l and remaining months it was recorded in the range of 7.5 to 12 mg/l. The reason of higher value of sulphate during monsoon is considered to be same(dissolution effects due to lowering of pH) as explained for Chloride in the previous section.

FIGURE 5.11: MONTH WISE VARIATION IN RIVER WATER QUALITY - SULPHATE (mg/l)



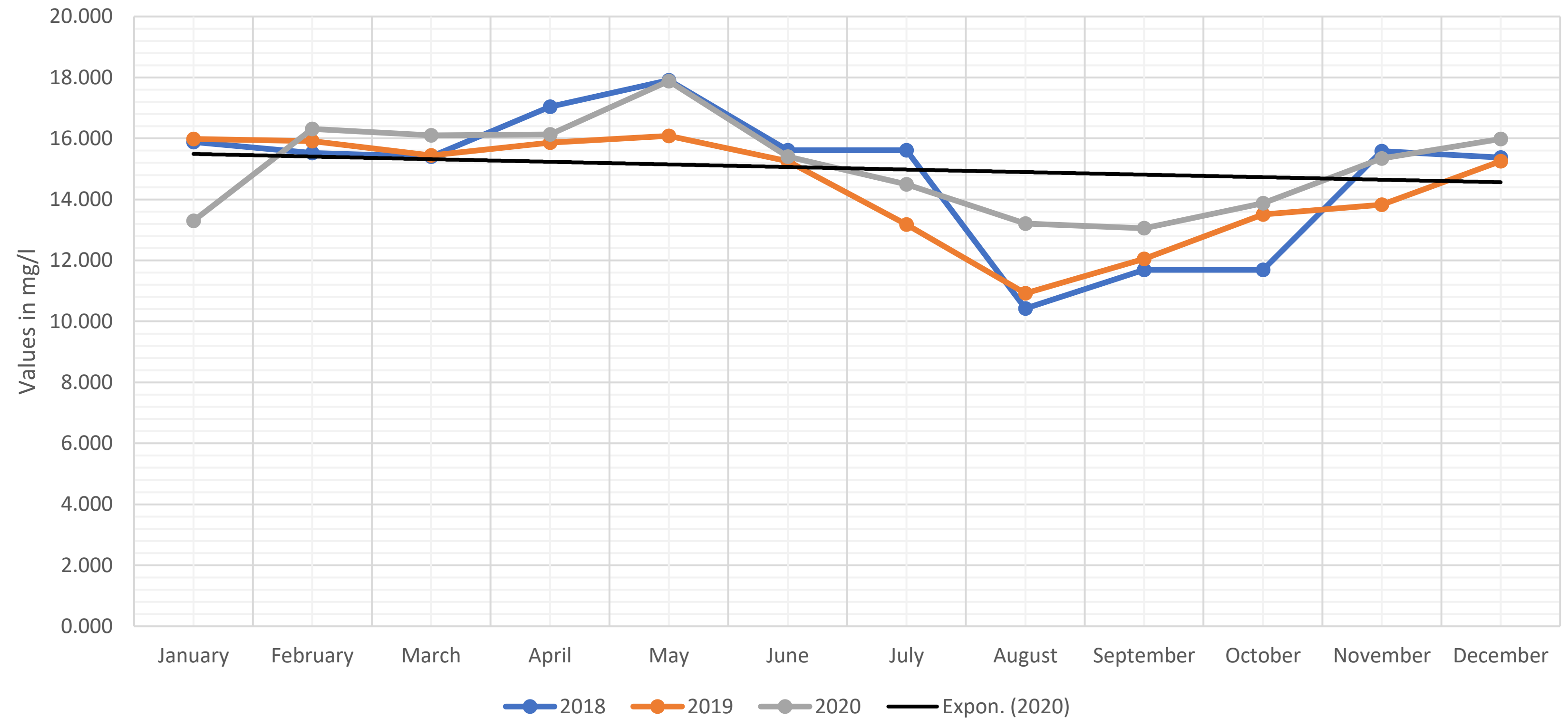
The analysis of long-term trend of monthly variations in Iron of raw water reveals that Iron of raw water at intake varies from 0.08 to 0.95 mg/l (Figure 5.12). Whereas during monsoon month (i.e. July – September) Iron of raw water is slightly higher and varies from 0.55 to 0.9 mg/l as compared to the other months. The reason for higher value of iron is due to lowering of pH that leads to dissolution of iron based salts present in water during the monsoon period.

FIGURE 5.12: MONTH WISE VARIATION IN RIVER WATER QUALITY - IRON (mg/l)



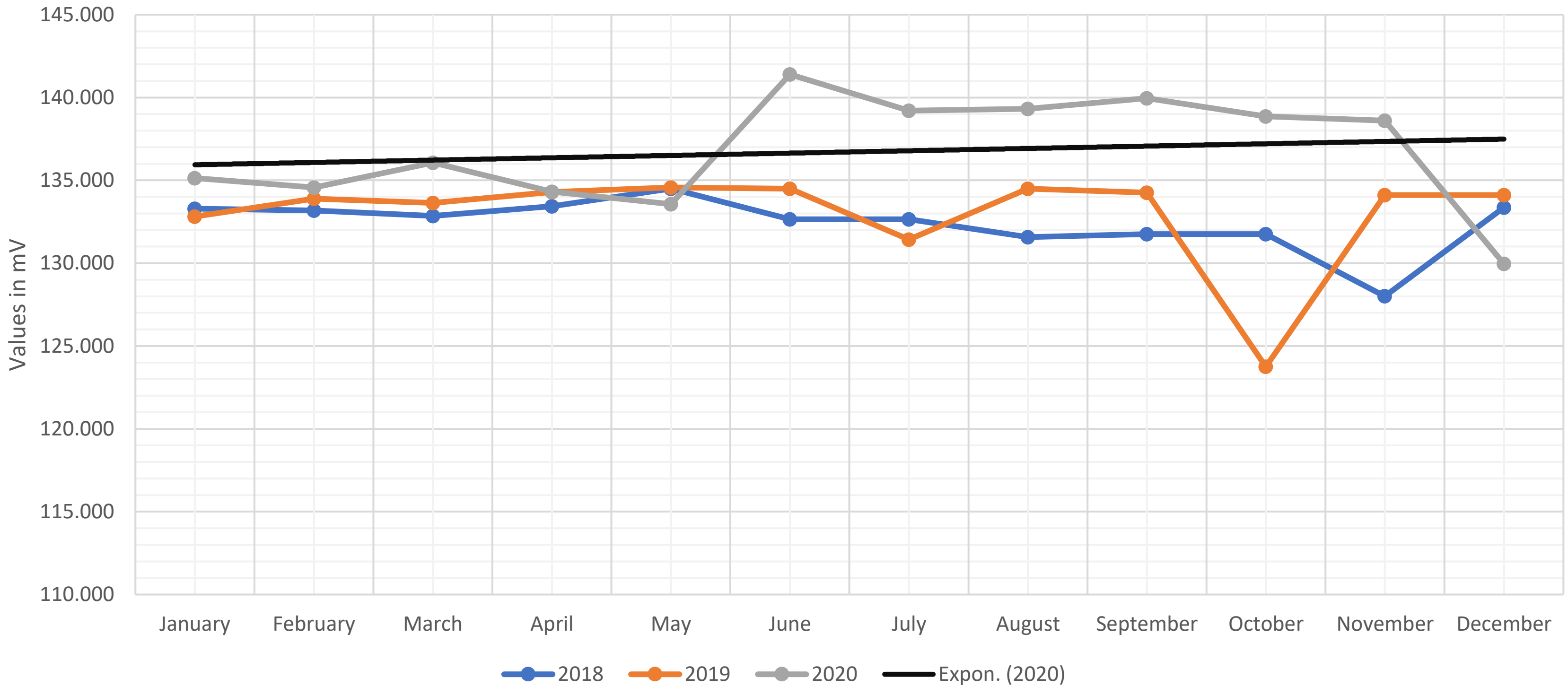
The analysis of long-term trend of monthly variations in Silica of raw water reveals that Silica of raw water at intake varies from 10 to 18 mg/l (Figure 5.13). Whereas during monsoon month (i.e. July – September) Silica of raw water is lowest and varies from 10 to 15.5 mg/l and remaining months it was recorded in the range of 12 to 18 mg/l. Dilution effect seems to be responsible for lowering of silica with other parameters like pH, Conductivity, TDS of river water during monsoon period.

FIGURE 5.13: MONTH WISE VARIATION IN RIVER WATER QUALITY - SILICA (mg/l)



The analysis of long-term trend of monthly variations in Oxidation Reduction Potential (ORP) of raw water reveals that ORP of raw water varies from124 to 142 mV (Figure 5.14). The high ORP indicates the ability of water to cleanse itself or break down waste material due to high oxygen present in water system.

FIGURE 5.14: MONTH WISE VARIATION IN RIVER WATER QUALITY - OXIDATION REDUCTION POTENTIAL (IN mV)



## 5.2 WATER TREATMENT PLANT

Raw water is pumped from the reservoir to the cascade aerators of water treatment plants. Conceptual flow diagram of Water Treatment Plants (WTPs) of Tiroda TPP is presented in Figure 5.15 (a). Clarified water is sent to cooling towers as makeup water as well as DM plant for de-mineralisation. Part of clarified water is also being directly used in auxiliary systems. The view of water treatment plants is presented in Figure 5.15 (b)

**FIGURE 5.15(a): CONCEPTUAL FLOW DIAGRAM OF WATER TREATMENT PLANT AT TIRODA THERMAL POWER PLANT**

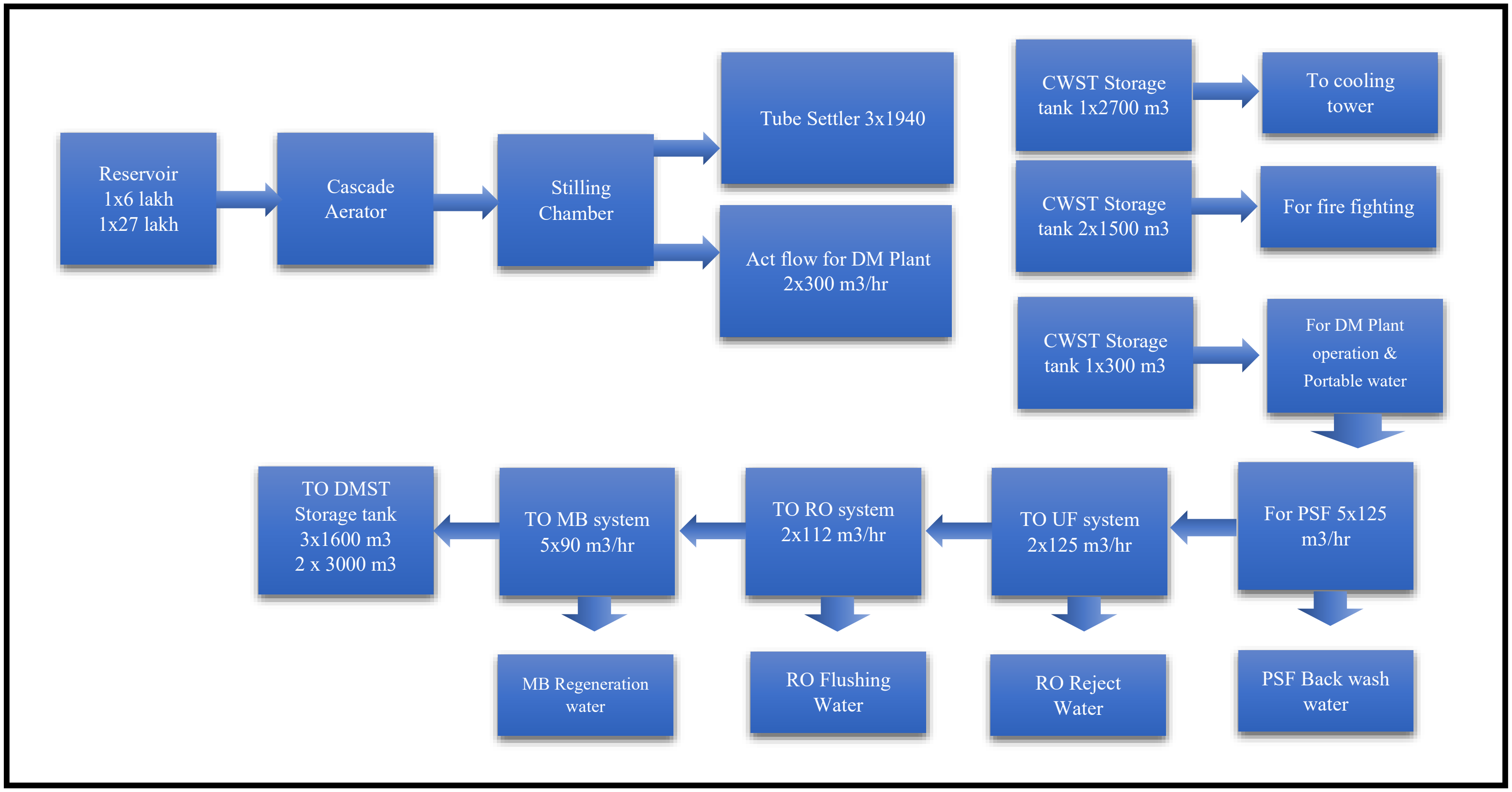


FIGURE 5.15 (b) : VIEW OF WATER TREATMENT PLANT AT TIRODA TPP (5x660 MW)

### 5.2.1 Cooling Tower Makeup Water Quality

The clarified water is being used in cooling towers as makeup water. The characteristics of cooling tower makeup water is presented in Table 5.4.

**TABLE 5.4: COOLING TOWER MAKEUP WATER QUALITY**

| Month/ Designed Value | pH | Conductivity, in micro-siemens | Total Hardness, in mg/l | Ca-Hardness, in mg/l | Mg-Hardness, in mg/l | Alkalinity, in mg/l | Chloride, in mg/l | Silica, in mg/l |
|---|---|---|---|---|---|---|---|---|
| | 7.5-8.5 | 250-350 | 120-160 | 60-90 | 50-70 | 160-200 | 14-25 | 15-30 |
| **Dec-19** | 8.12 | 308 | 120 | 84 | 36 | 129 | 10.68 | 17 |
| **Jan-20** | 8.16 | 282 | 115 | 78 | 37 | 120 | 10.4 | 16 |
| **Feb-20** | 8.44 | 323 | 129 | 88 | 41 | 139 | 11.2 | 17 |
| **Mar-20** | 8.25 | 300 | 125 | 85 | 40 | 135 | 10.26 | 15 |
| **Apr-20** | 8.45 | 266 | 112 | 74 | 38 | 115 | 8.74 | 15 |
| **May-20** | 8.44 | 288 | 119 | 77 | 42 | 116 | 11 | 17 |
| **Jun-20** | 8.21 | 334 | 117 | 75 | 42 | 123 | 12.32 | 18 |
| **Jul-20** | 8.33 | 287 | 103 | 64 | 38 | 101 | 8.99 | 15 |
| **Aug-20** | 8.07 | 240 | 93 | 59 | 34 | 91 | 8.87 | 14 |
| **Sep-20** | 7.68 | 212 | 85 | 55 | 30 | 73 | 7.3 | 13 |
| **Oct-20** | 7.93 | 199 | 89 | 59 | 30 | 86 | 9.53 | 14 |
| **Nov-20** | 8.28 | 259 | 108 | 73 | 35 | 122 | 11.36 | 15 |

The monthly variations in characteristics of clarified water which is being used in cooling towers as makeup water against the designed parameters are presented in Figure 5.16 to 5.19. The analysis reveals that all the parameters of clarified water which is being used in cooling towers as makeup water are being maintained as per the designed parameter values.

FIGURE 5.16: MONTH WISE VARIATION IN COOLING WATER QUALITY - pH & CONDUCTIVITY (IN MICRO-SIEMENS)

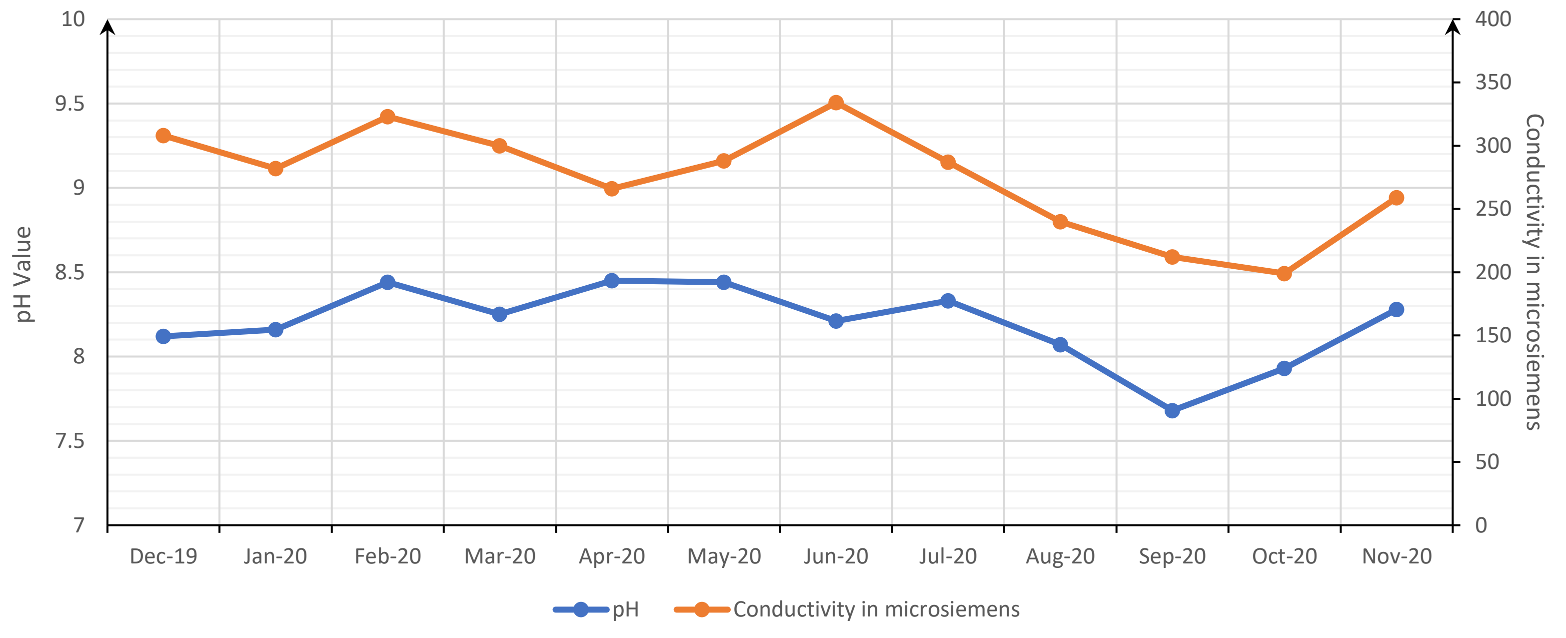


FIGURE 5.17: MONTH WISE VARIATION IN COOLING WATER QUALITY - TOTAL HARDNESS/CALCIUM HARDNESS & MAGNISIUM HARDNESS (mg/l)

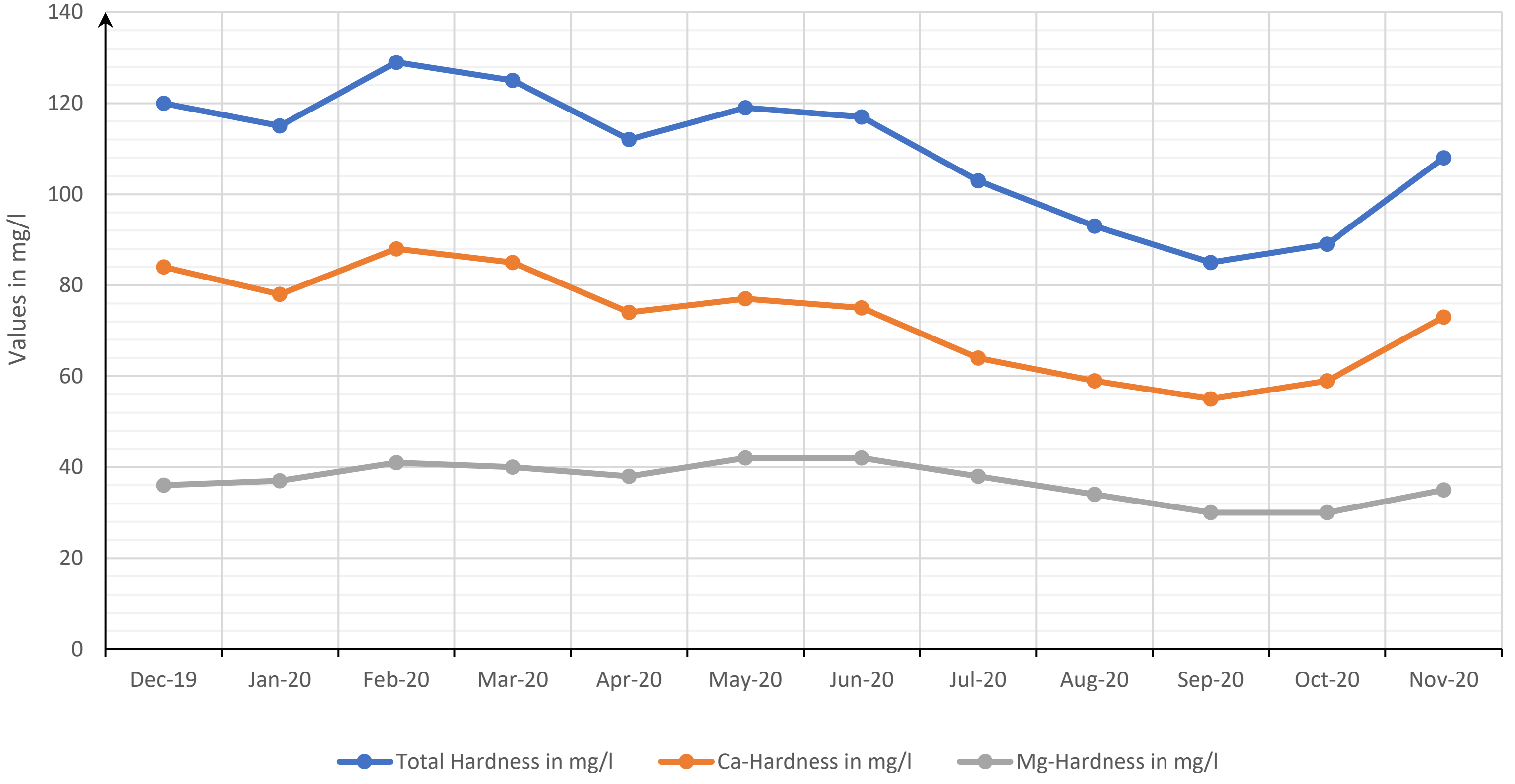


FIGURE 5.18: MONTH WISE VARIATION IN COOLING WATER QUALITY - ALKALINITY (mg/l)

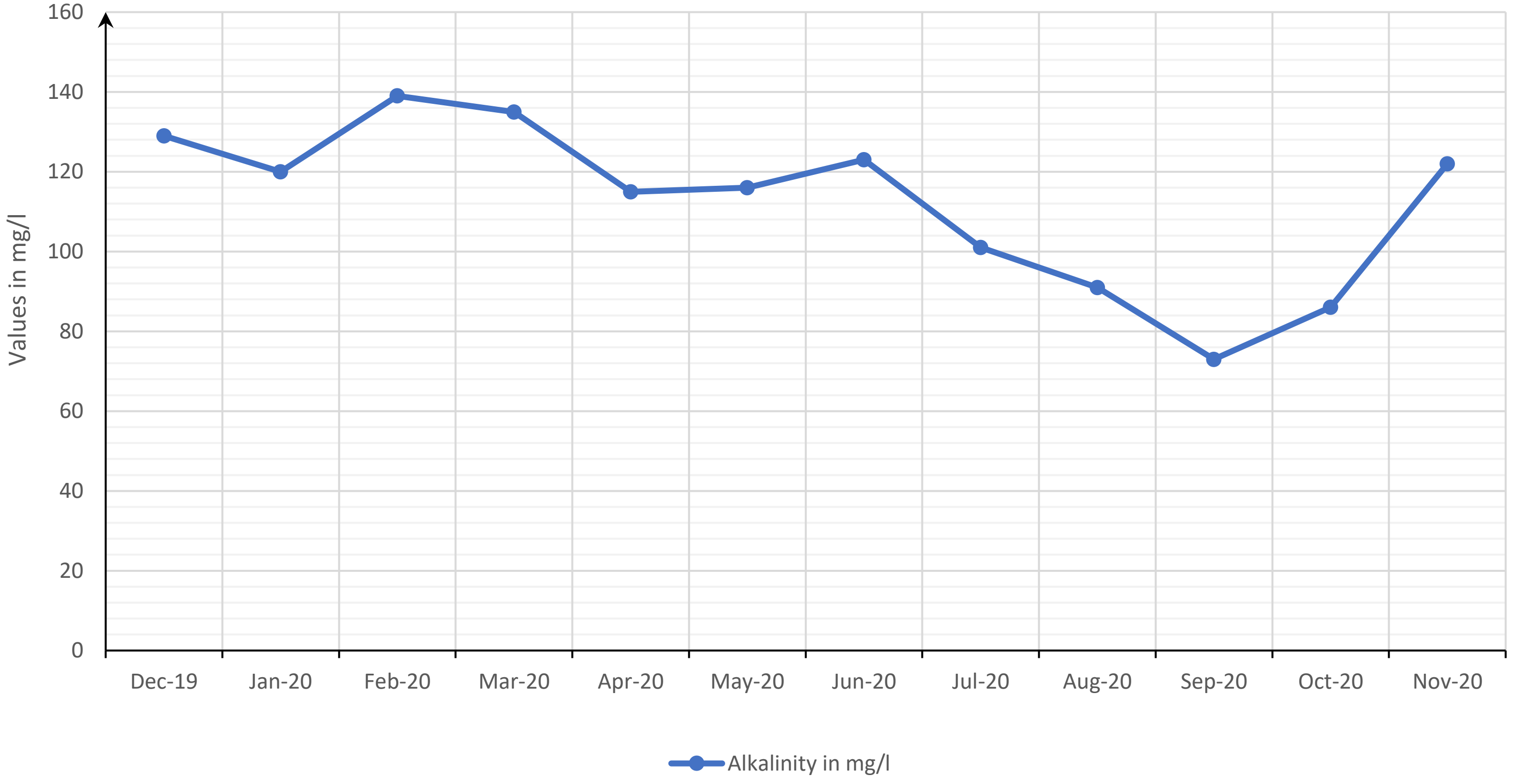
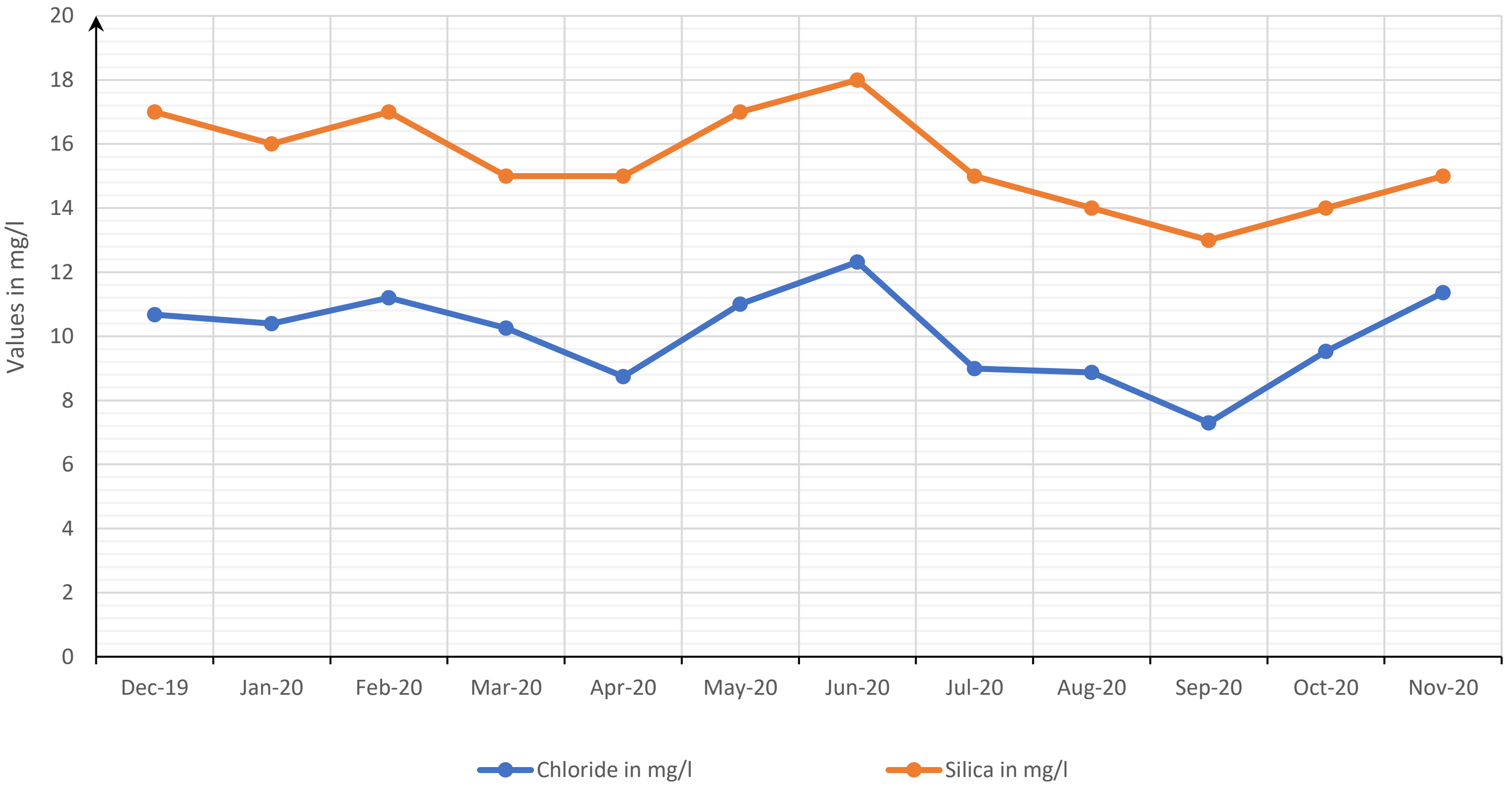


FIGURE 5.19: MONTH WISE VARIATION IN COOLING WATER QUALITY - CHLORIDE & SILICA (mg/l)



### 5.2.2 Circulation Water Quality of Cooling Towers

The characteristics of circulation water of cooling tower is presented in Table 5.5.

**Table 5.5: MONTHLY VARATIONS IN CIRCULATION WATER QUALITY OF COOLING TOWERS**

| Month/Designed Value | pH | Conductivity, in micro-siemens | Turbidity, in NTU | Total Hardness, in mg/l | Ca-Hardness, in mg/l | Mg-Hardness, in mg/l | Alkalinity, in mg/l | Silica, in mg/l | Chloride, in mg/l | LSI | COC |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | <8.5 | <3000 | <20 | <1050 | <550 | <550 | <350 | <170 | <250 | <2.5 | 5.5-6 |
| **Dec-19** | 8.48 | 1624 | 10.13 | 675 | 471 | 204 | 122 | 89 | 64.24 | 1.78 | 5.67 |
| **Jan-20** | 8.41 | 1619 | 10.76 | 670 | 456 | 214 | 113 | 86 | 71.4 | 1.59 | 5.89 |
| **Feb-20** | 8.42 | 1814 | 13.63 | 784 | 536 | 248 | 113 | 90 | 85.18 | 1.68 | 6.12 |
| **Mar-20** | 8.48 | 1578 | 6.93 | 717 | 489 | 228 | 133 | 85 | 74.48 | 1.7 | 5.74 |
| **Apr-20** | 8.45 | 1405 | 11 | 636 | 424 | 212 | 137 | 85 | 75 | 1.69 | 5.69 |
| **May-20** | 8.41 | 1576 | 11.4 | 696 | 456 | 240 | 118 | 86 | 94.22 | 1.62 | 5.89 |
| **Jun-20** | 8.44 | 1535 | 9.69 | 609 | 393 | 216 | 118 | 85 | 86.84 | 1.59 | 5.2 |
| **Jul-20** | 8.4 | 1632 | 8.42 | 603 | 380 | 223 | 107 | 85 | 89.96 | 1.49 | 5.89 |
| **Aug-20** | 8.38 | 1337 | 9.07 | 520 | 332 | 188 | 105 | 82 | 80.46 | 1.42 | 5.64 |
| **Sep-20** | 8.42 | 1139 | 7.02 | 468 | 304 | 164 | 109 | 75 | 75.22 | 1.44 | 5.51 |
| **Oct-20** | 8.38 | 1190 | 6.36 | 510 | 339 | 170 | 105 | 76 | 80.32 | 1.41 | 5.73 |
| **Nov-20** | 8.43 | 1247 | 6.87 | 568 | 387 | 182 | 112 | 77 | 80.83 | 1.54 | 5.34 |

The monthly variations in characteristics of circulation water of cooling towers are presented in Figure 5.20 to 5.26. The analysis reveals that all the parameters of circulation water of cooling towers are being maintained as per the designed parameter values with cycle of concentration (COC) of 5.5.

**FIGURE 5.20: MONTHLY VARIATIONS IN CIRCULATION WATER QUALITY OF COOLING TOWERS - pH & TURBIDITY (IN NTU)**

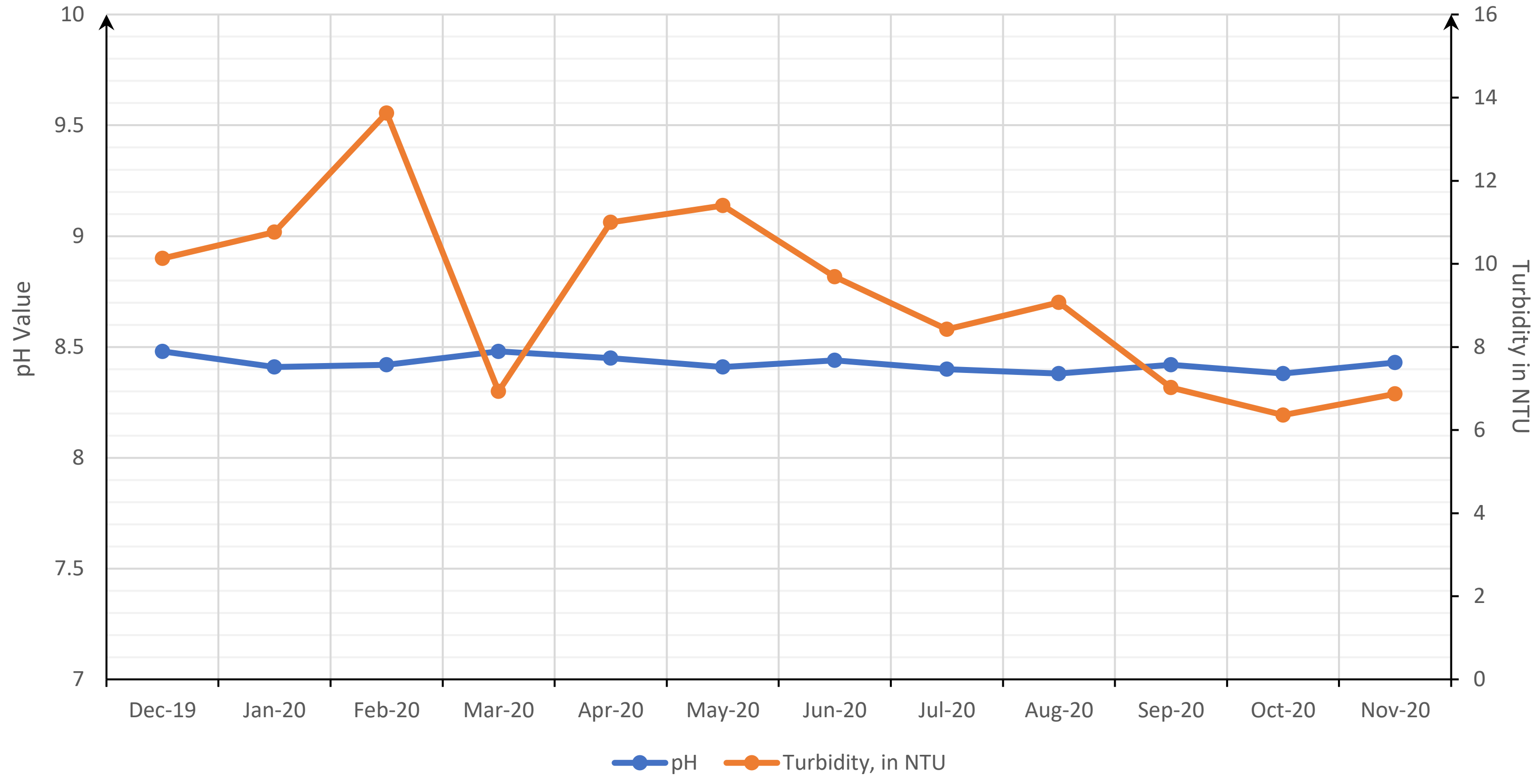
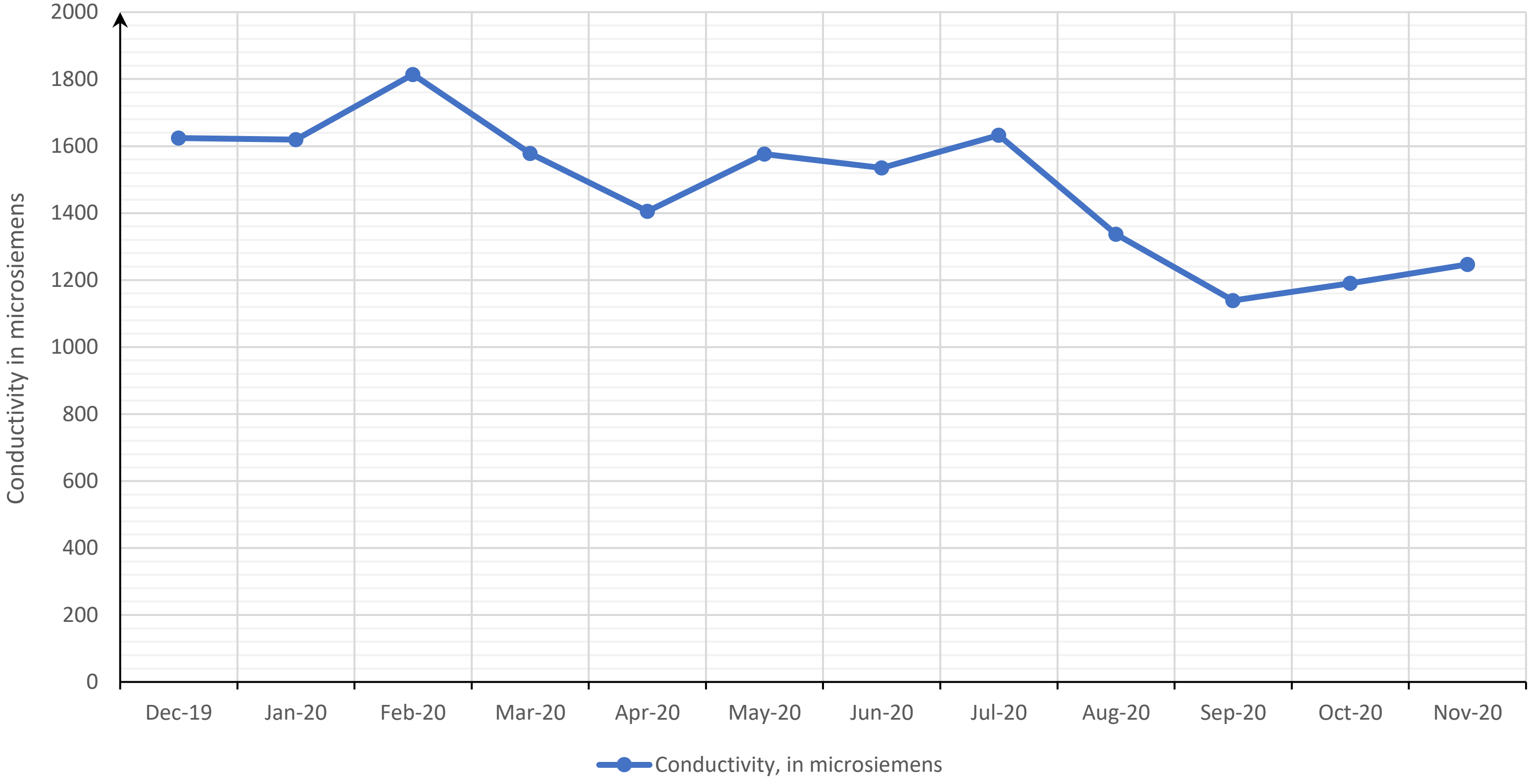


FIGURE 5.21: MONTHLY VARIATIONS IN CIRCULATION WATER QUALITY OF COOLING TOWERS - CONDUCTIVITY (IN MICRO-SIEMENS)



## FIGURE 5.22: MONTHLY VARIATIONS IN CIRCULATION WATER QUALITY OF COOLING TOWERS - TOTAL HARDNESS/CALCIUM HARDNESS & MAGNISIUM HARDNESS (mg/l)

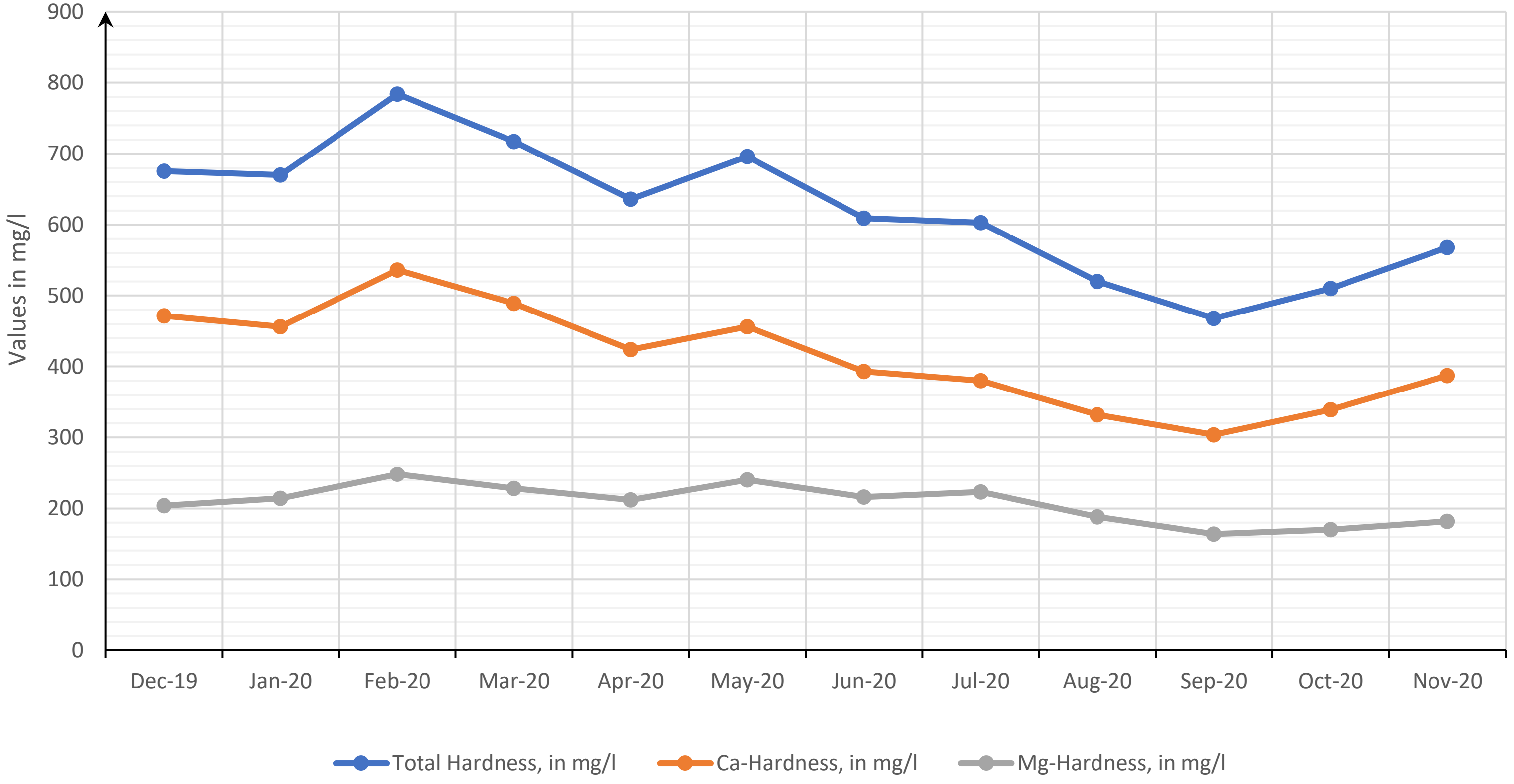


**FIGURE 5.23: MONTHLY VARIATIONS IN CIRCULATION WATER QUALITY OF COOLING TOWERS - ALKALINITY (IN mg/l)**

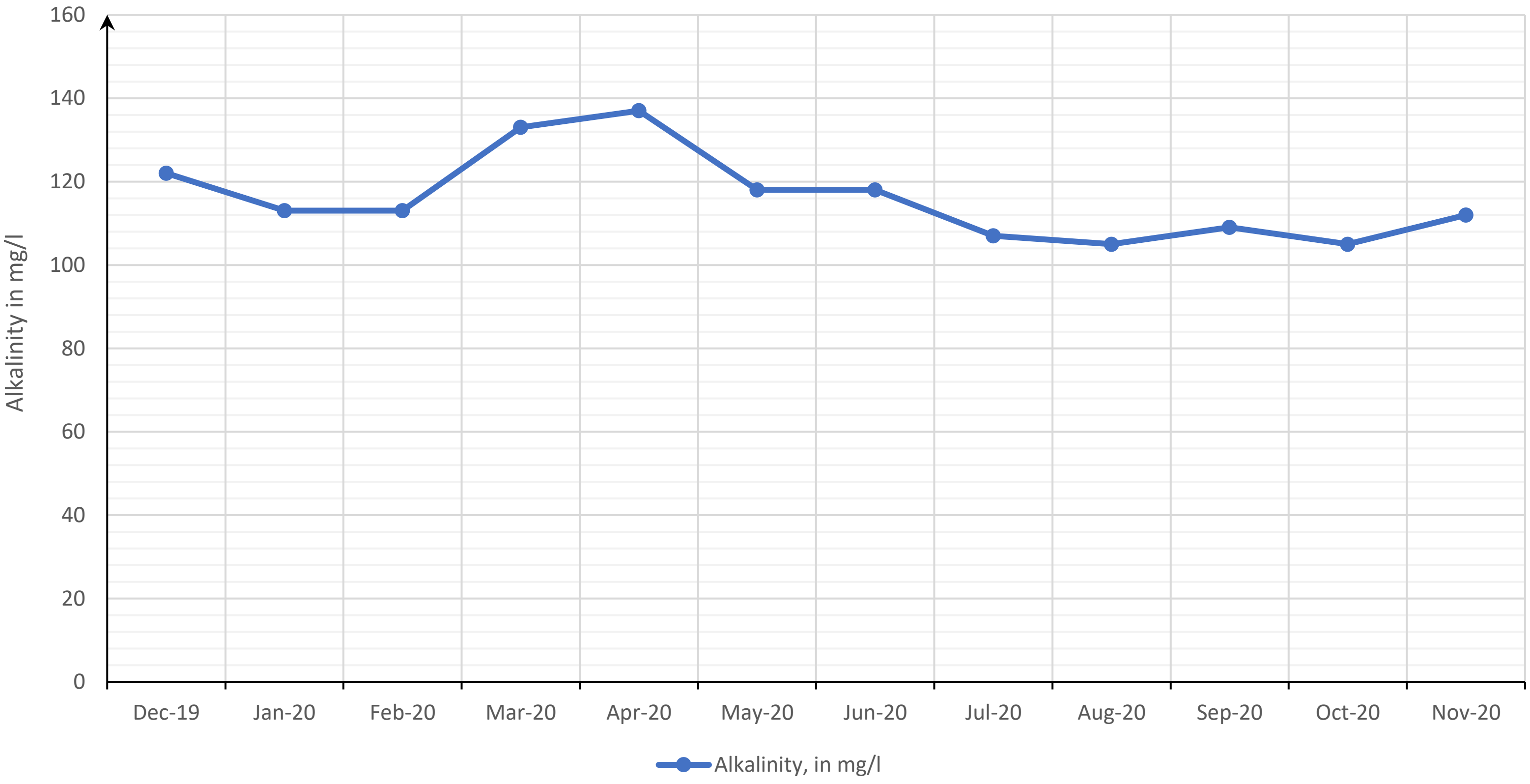


FIGURE 5.24: MONTHLY VARIATIONS IN CIRCULATION WATER QUALITY OF COOLING TOWERS - CHLORIDE & SILICA (mg/l)

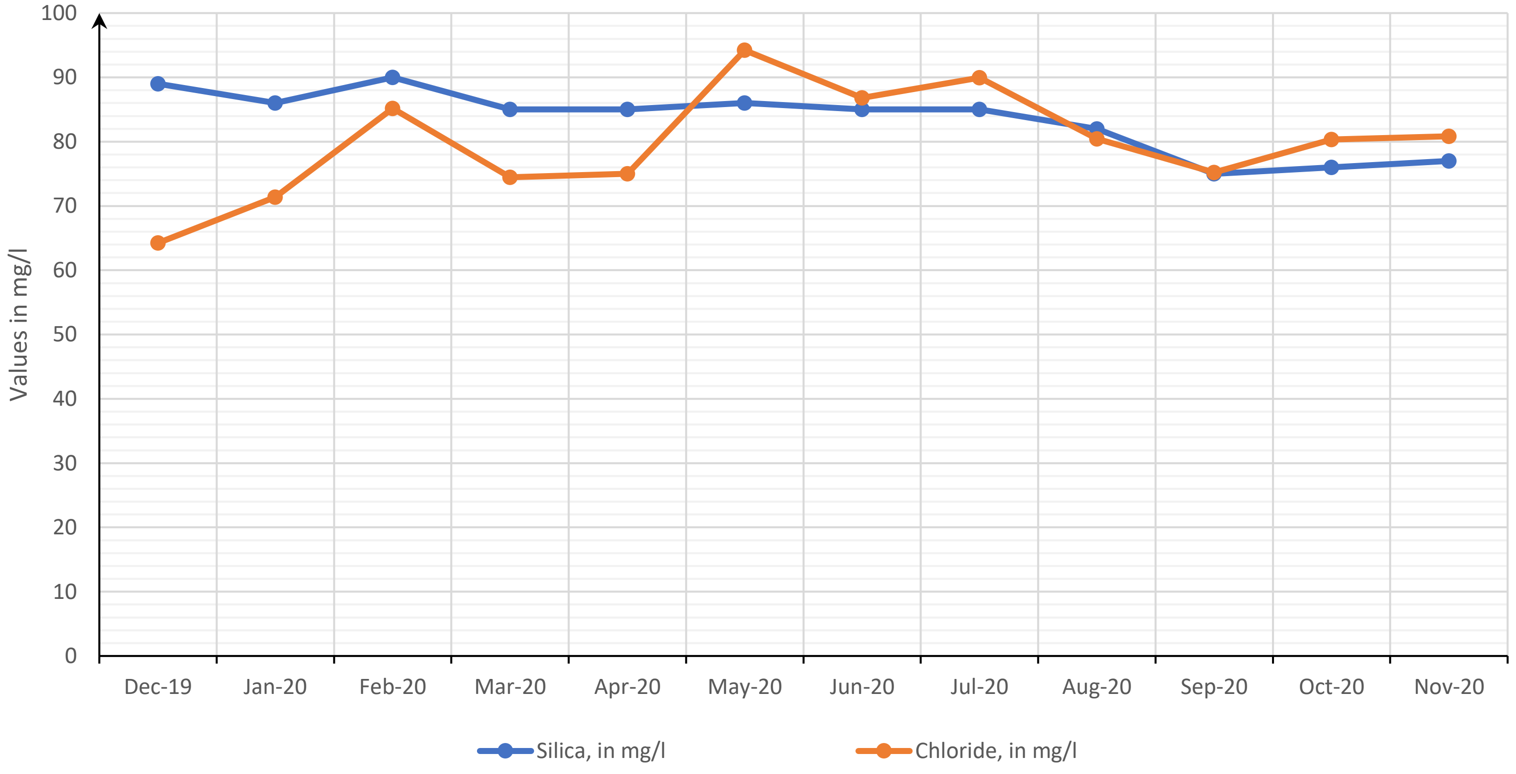


FIGURE 5.25: MONTHLY VARIATIONS IN CIRCULATION WATER QUALITY OF COOLING TOWERS - LANGLIER SATURATION INDEX (LSI)

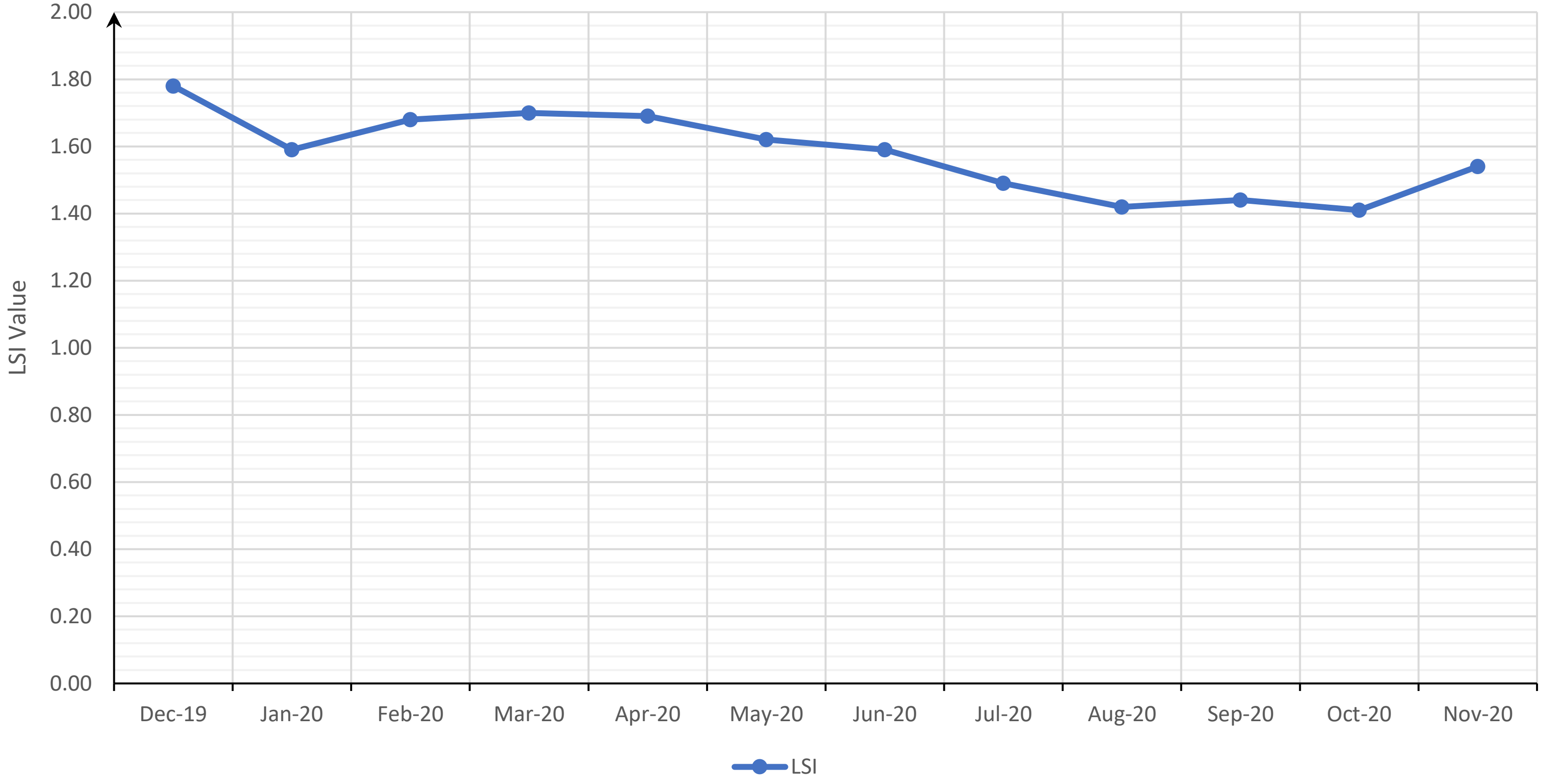
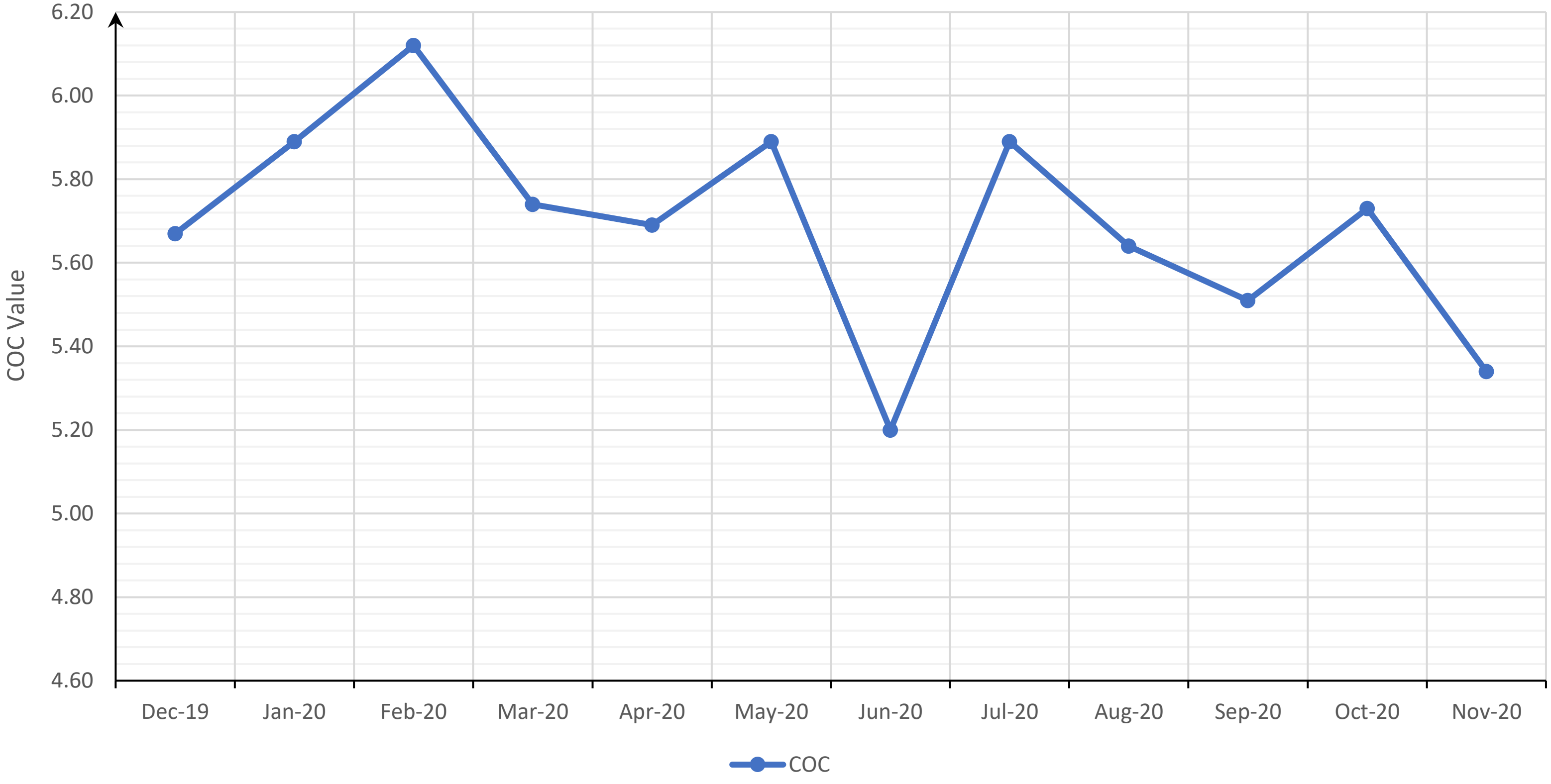


FIGURE 5.26: MONTHLY VARIATIONS IN CIRCULATION WATER QUALITY OF COOLING TOWERS - CYCLE OF CIRCULATIONS (COC)



The performance evaluation of cooling tower water circulation system and efficiency of water use has been carried out based on the quantity of use of CT makeup water along with its quality as well as quality of CT circulation water and COC. The analysis reveals that CT makeup water quality is being maintained as per designed parameter value as follows:

| Parameter | Unit | CT Make-up Water | CT Circulation Water |
|---|---|---|---|
| pH | - | 7.5-8.5 | 8.3-8.5 |
| Turbidity | NTU | - | 6.3-10.2 |
| Conductivity | Micro Siemens | 250-350 | 1140-1815 |
| Total Dissolved Solids | mg/l | 170-250 | |
| Total Hardness | mg/l | 120-160 | 460-785 |
| Calcium Hardness | mg/l | 60-90 | 300-540 |
| Magnesium Hardness | mg/l | 50-70 | 160-250 |
| Alkalinity | mg/l | 160-200 | 105-140 |
| Chloride | mg/l | 14-25 | 64-95 |
| Silica | mg/l | 15-30 | 75-90 |
| Langlier Saturation Index (LSI) | - | - | 1.4-1.8 |
| Cycle of Concentration (COC) | - | - | 5.2-6.1 |

As per analysis results, the positive value LSI indicates that water is scale forming in nature rather than corrosive. Further, it has been found the circulating water pH is ranging from 8.3 to 8.5 and Calcium Hardness varies from 300 to 540 mg/l which seems to be the most significant parameter with respect to scale forming rather than TDS. It is important to note that the LSI value of the recirculating cooling water presently observed to be follow in the higher side of the scale forming- as LSI value lies between 1.4-1.8 range against maximum allowable LSI is 2.

Actually, LSI range for scale forming nature – 0.5-2.0. Based on above, it is recommended that if the LSI vale can be kept between 0.9 -1.2 range- colling water system will be much less prone to scale formation compare to present condition. This can be achieved by simply maintaining the pH in the range of 7.8-8.2 (the best pH range for running a cooling water system). Calcium hardness can go up to its highest value 540 and COC of 6 can also be achieved.

The indications for the LSI and the improved LSI by Carrier are based on the following values:

| Langlier Saturation Index (LSI) | Indication |
|---|---|
| LSI<0 | Water is under saturated with respect to calcium carbonate. Under saturated water has a tendency to remove existing calcium carbonate protective coatings in pipelines and equipment |
| LSI=0 | Water is considered to be neutral. Neither scale-forming nor scale removing |
| LSI>0 | Water is supersaturated with respect to calcium carbonate ($CaCO_3$) and scale forming may occur |

| LSI (Carrier) | Indication |
|---|---|
| -2,0<-0,5 | Serious corrosion |
| -0,5<0 | Slightly corrosion but non-scale forming |
| LSI = 0,0 | Balanced but pitting corrosion possible |
| 0,0<0,5 | Slightly scale forming and corrosive |
| 0,5<2 | Scale forming but non-corrosive |

Further, it is recommended for chemical treatment of cooling water using scale dispersant based on advance dispersion polymer technology along with the conventional scale inhibitors to provide enhance protection to the heat exchange systems. By implementing the same, the COC may go up to 6.5 as well.

### 5.2.3 RO AND MB Water Quality

The part of clarified water is being sent to DM Plant (RO and MB units) for demineralisation to be used as boiler feed water and other auxiliary services. To get high-purity demineralized water for boiler feed makeup water the mixed bed (MB) unit is being used in Tiroda TPP. The MB unit consist of two types of resins, cation & anion in the same column. The resins are separated by water during regeneration and mixed with air for service cycle. The P&I Diagram of RO and MB Units are presented in Annexure IV. The characteristics of RO and MB water is presented in Table 5.6 and 5.7.

**Table 5.6: RO WATER QUALITY**

| Parameter | Design Value | Dec-20 | Nov-20 | Oct-20 | Sep-20 | Aug-20 | Jul-20 | Jun-20 | May-20 | Apr-20 | Mar-20 | Feb-20 | Jan-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| pH | NA | 6.9 | 6.89 | 6.85 | 6.91 | 6.9 | 6.8 | 6.81 | 6.85 | 6.82 | 6.88 | 6.81 | 6.92 |
| Conductivity (Micro-siemens | 30 micro-siemens | 19.3 | 19.2 | 19.1 | 18 | 17.8 | 18.4 | 18.8 | 17.5 | 17.2 | 17.0 | 17.1 | 17.12 |
| Flow(feed) | 112 m3/hrs | 90 | 100 | 100 | 100 | 100 | 99 | 100 | 98 | 100 | 101 | 100 | 105 |
| Flow(perm) | 95 m3/hrs | 75 | 81 | 82 | 81 | 80 | 81 | 83 | 82 | 81 | 81 | 82 | 83 |

**Table 5.7: MB WATER QUALITY**

| Parameter | Design Value | Dec-20 | Nov-20 | Oct-20 | Sep-20 | Aug-20 | Jul-20 | Jun-20 | May-20 | Apr-20 | Mar-20 | Feb-20 | Jan-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *pH* | *5.8 to 6.8* | 5.75 | 5.62 | 5.81 | 5.96 | 6.1 | 6 | 5.92 | 6.12 | 5.76 | 5.98 | 5.80 | 5.88 |
| *Conductivity* | <1 micro-siemens | 0.51 | 0.6 | 0.62 | 0.71 | 0.58 | 0.59 | 0.62 | 0.6 | 0.72 | 0.8 | 0.6 | 0.51 |
| *SiO2* | <20 ppm | 14 | 12 | 13 | 15 | 10 | 12 | 14 | 13 | 9 | 11 | 15 | 11 |
| *Flow(perm)* | *95 m3/hrs* | 78 | 80 | 76 | 72 | 74 | 76 | 77 | 80 | 73 | 79 | 72 | 74 |

The monthly variations in characteristics of RO & MB water against the designed parameters are presented in Figure 5.27 and 5.28-5.29 respectively. The analysis reveals that conductivity of RO is varying from 17.0 to 19.3 micro-Siemens against the designed value of 30 micro-Siemens. Whereas Conductivity and Silica content of MB water is varying from 0.5 to 0.7 micro-Siemens and 9 to 15 ppm against the designed value of 1 micro-Siemens and 20 ppm respectively. As the existing RO treatment system is running with 84.8 percent recovery which may possible improved to 90% by reviewing the membrane specification with proper recommendation based on improved technology and thereby minimizing the reject/wastewater generation.

FIGURE 5.27: MONTH WISE VARIATION IN RO WATER QUALITY - pH & CONDUCTIVITY (IN MICRO-SIEMENS)

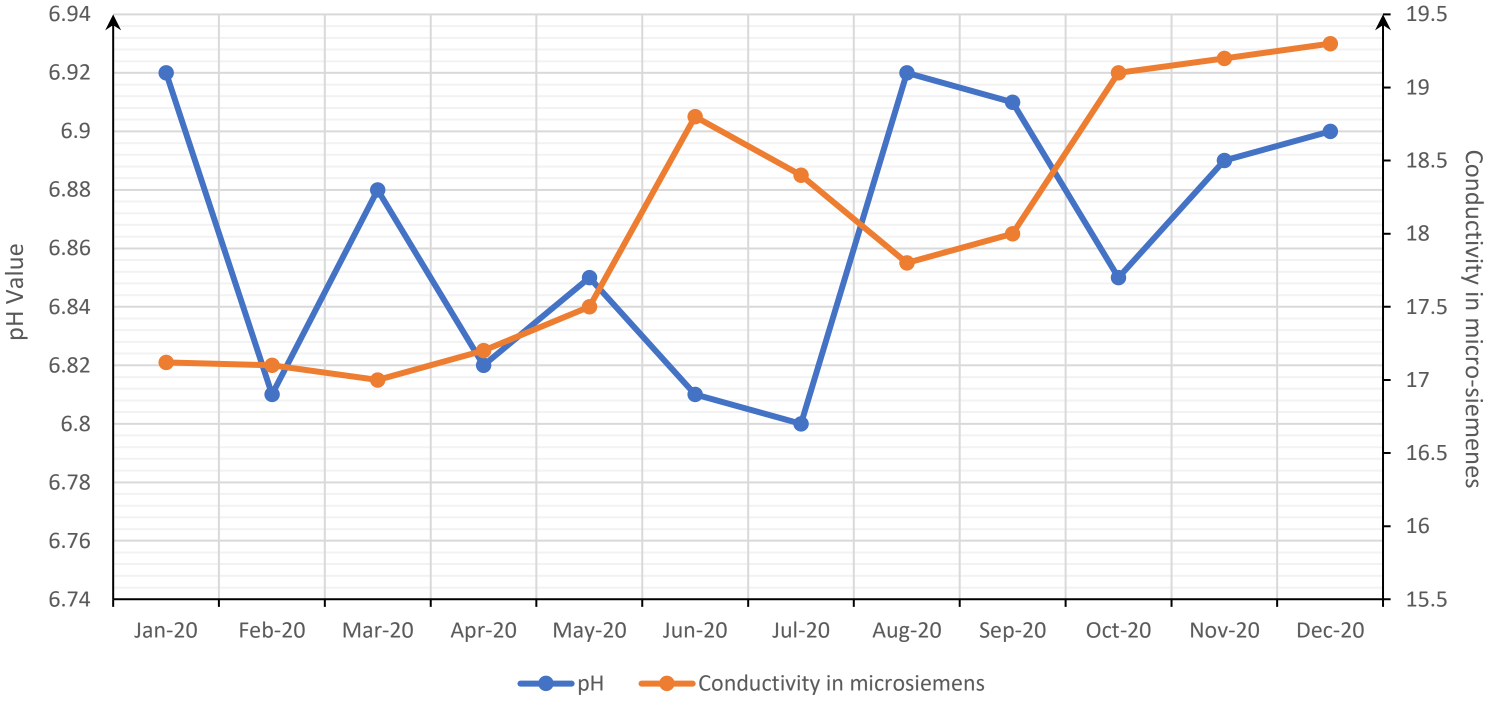


FIGURE 5.28: MONTH WISE VARIATION IN MB WATER QUALITY - pH & CONDUCTIVITY (IN MICRO-SIEMENS)

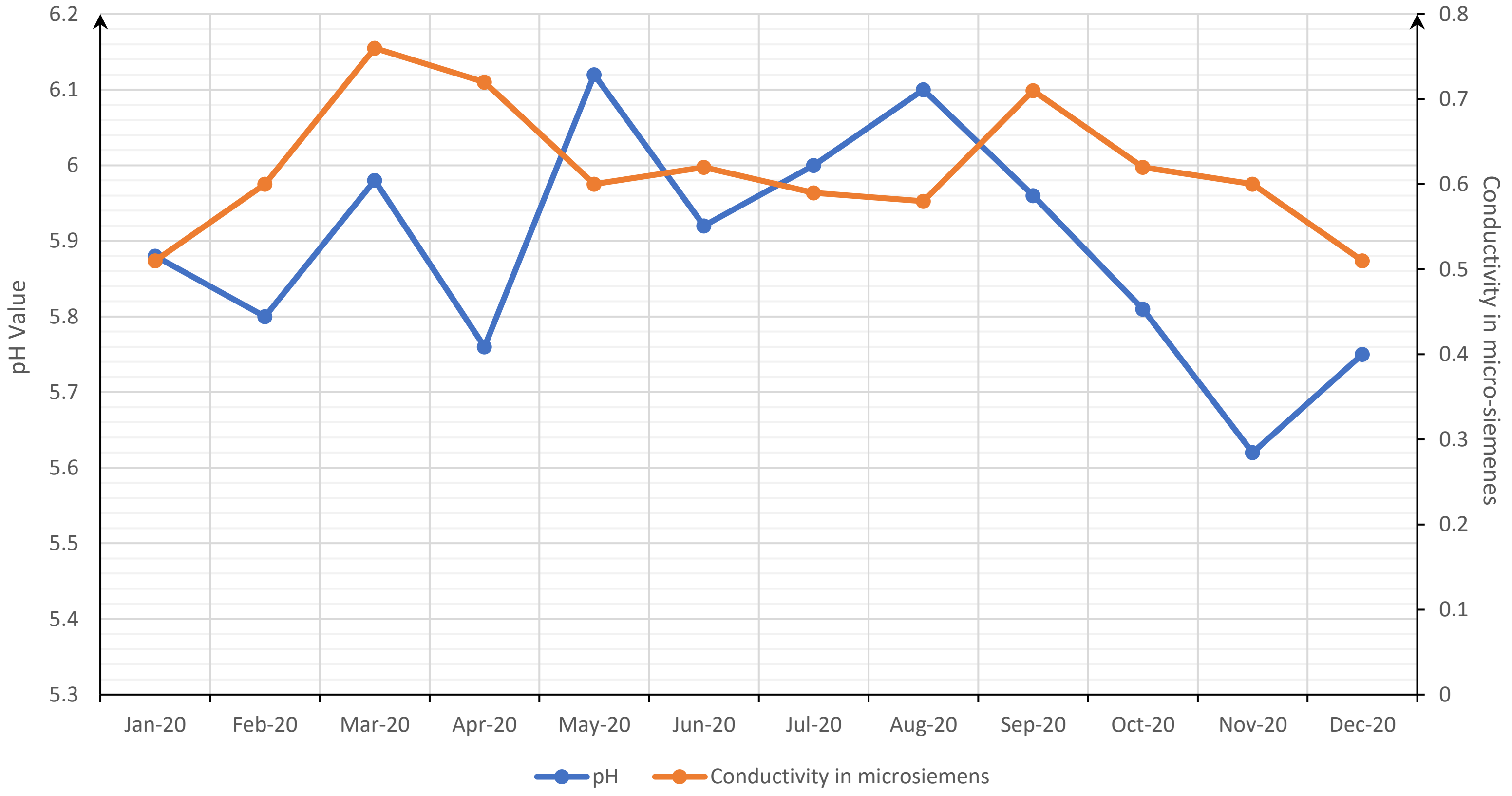
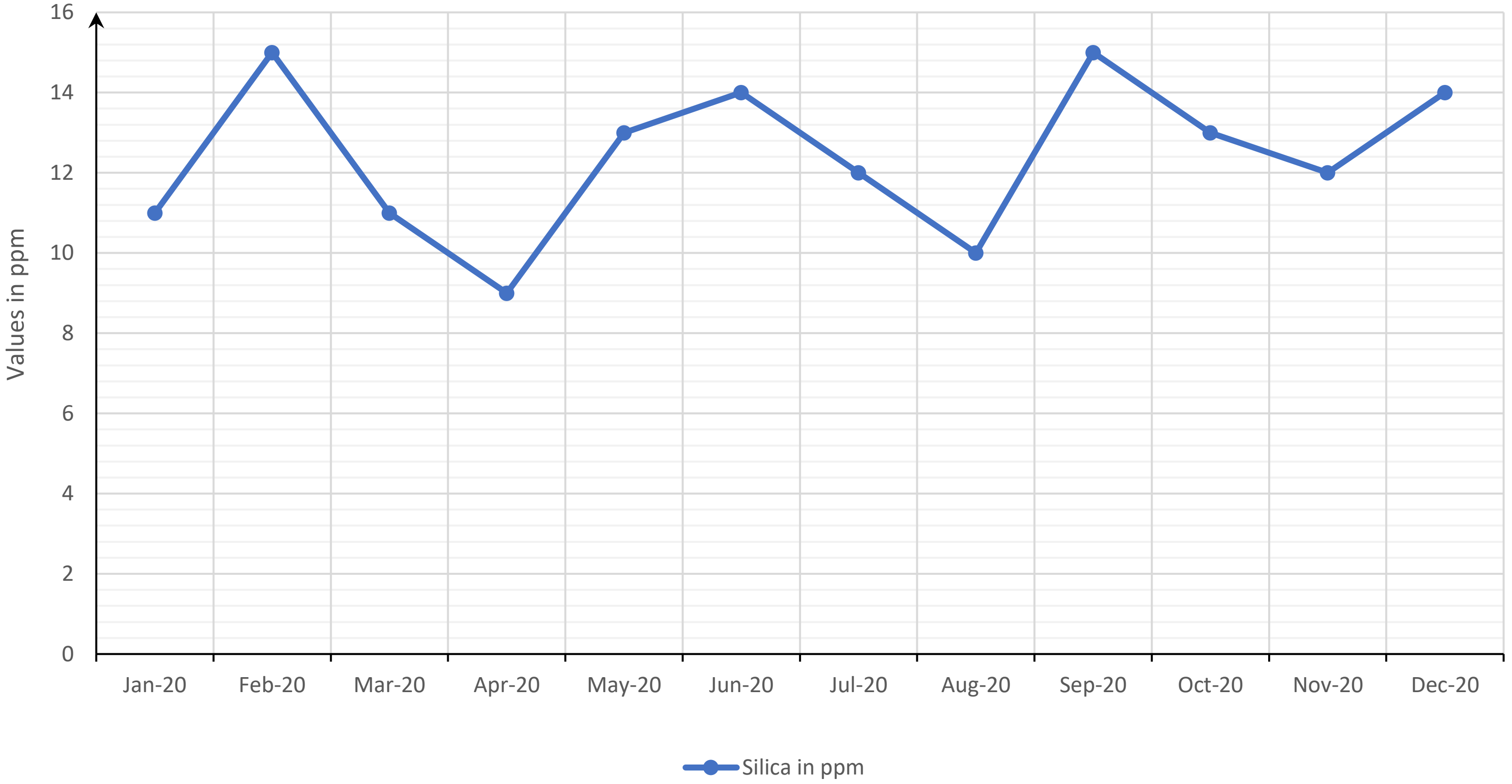


FIGURE 5.29: MONTH WISE VARIATION IN MB WATER QUALITY - SILICA (IN PPM)



# 6.0 PERFORMANCE EVALUATION OF WASTE WATER TREATMENT PLANTS

## 6.1 WASTE WATER GENERATION

The prime sources of wastewater generation in TTPP include cooling tower blow down, DM plant effluent, ash pond water, washing, cleaning and other domestic wastewater. The quantity/quality and treatment systems various wastewater provided in TTPP is presented in subsequent section. The estimated quantity of wastewater generation from TTPP is presented in Table 6.1. The waste water generation rate at TTPP was found to be 0.636 $m^3$/MWh of power generated.

**TABLE 6.1: STATUS OF WASTE WATER GENERATION IN TIRODA TPP**

| Sl. No. | Particulars | Quantity of Wastewater ($m^3$/day)* |
|---|---|---|
| 1 | Cooling tower blow down water | 33607 |
| 2 | DM regeneration wastewater | 1200 |
| 3 | Industrial process wastewater | 3633 |
| 4 | Domestic Waste water | 560 |
| 5 | Boiler Blow down | - |
| | Total | 39000 |

* From all the Units i.e., 1 to 5

All the cooling water systems provided are of the open recirculation type with natural draft cooling towers. Majority of the CTBD water is presently being used for ash handling and dust suppression in CHP and some amount is stored in guard pond for subsequent recycling/reuse in AHP/CHP. However to enhance the water use efficiency it is proposed to recycle/reuse around 600 $m^3$/hr CTBD with appropriate treatment as CT makeup water to reduce the fresh water consumption.

Ash slurry/ash water is taken into ash pond (i.e. with ash water ratio of 1:5) and 60% of ash water is recovered through ash water recovery system (AWRS) and reused in ash handling. It is proposed to enhance the ash water recovery efficiency to 70% by adopting the measures for reducing the collection and transportation losses/leakages through AWRS as well as improving the efficiency of clarifier being used to clarify the recovered ash water from ash pond. This will reduce the requirement of CTBD water for ash handling and potential utilization of the same.

Acid and alkaline streams from DM plants are taken separately and neutralized in neutralization pit and sent to the ETP. DM effluent and floor washing effluents are treated in a separate effluent treatment plant. Domestic wastewater from the plant after treatment in STP is being reused for green belt development.

## 6.2 CHARACTERISTICS OF WASTEWATER

### Cooling Tower Blow Down (CTBD)

Major part of cooling tower blow down is being used in wet ash handling. About 1205 $m^3$/hr of CTBD is being generated from all the units. The monthly variations in characteristics of CTBD is presented in Table 6.2 and 6.3.

Majority of the CTBD is being used in wet ash handling system (about 1109 $m^3$/hr). A portion of this CTBD (about 91 $m^3$/hr) is being used for BSL quenching. However, it is to be noted that since the requirement of BSL quenching water is occasional, normally of the balance CTBD along with other miscellaneous waste water (about 100$m^3$/hr) about 83 $m^3$/hr is being used for ash dyke sprinkling and 79 $m^3$/hr for suppression of dust at CHP and 34 $m^3$/hr is stored at guard pond for subsequent recycling and reuse. During the BSL quenching the additional ash water requirement is being met from the guard pond.

**FIGURE 6.0(a) : CTBD BEING USED IN ASH HANDLING PLANT AT TIRODA TPP (5x660 MW)**

FIGURE 6.0(b) : CTBD & OTHER WASTEWATER BEING USED IN COAL HANDLING PLANT AT TIRODA TPP (5x660 MW)

## TABLE 6.2: WASTEWATER CHARACTERISTICS OF TTPP – COOLING TOWER BLOW DOWN WATER

| Sl. No. | Parameters | Unit | MPCB Limit | Month of Sampling | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jan | Feb | Mar | Apr | May | Jun | July | Aug | Sep | Oct | Nov |
| **Unit-1** | | | | | | | | | | | | | | |
| 1 | Free Available Chlorine | mg/l | 0.5 | 0.2 | 0.1 | 0.22 | 0.2 | Unit Shut down | Unit Shut down | 0.1 | 0.1 | 0.20 | 0.2 | 0.3 |
| 2 | Zinc (as Zn) | mg/l | 1.0 | BDL | BDL | 0.15 | BDL | | | BDL | BDL | 0.22 | BDL | BDL |
| 3 | Total Chromium (as Cr) | mg/l | 0.2 | BDL | BDL | 0.027 | BDL | | | BDL | BDL | 0.024 | BDL | BDL |
| 4 | Phosphate (as $PO_4$) | mg/l | 5.0 | <2 | <2 | 1.38 | <2 | | | <2 | <2 | 1.31 | 0.30 | <2 |
| **Unit-2** | | | | | | | | | | | | | | |
| 5 | Free Available Chlorine | mg/l | 0.5 | 0.2 | 0.1 | 0.25 | 0.2 | Unit Shut down | Unit Shut down | 0.2 | 0.1 | 0.15 | 0.2 | 0.3 |
| 6 | Zinc (as Zn) | mg/l | 1.0 | BDL | BDL | 0.30 | BDL | | | BDL | BDL | 0.18 | BDL | BDL |
| 7 | Total Chromium (as Cr) | mg/l | 0.2 | BDL | BDL | 0.026 | BDL | | | BDL | BDL | 0.020 | BDL | BDL |
| 8 | Phosphate (as $PO_4$) | mg/l | 5.0 | <2 | <2 | 1.40 | <2 | | | <2 | <2 | 1.37 | 0.30 | <2 |
| **Unit-3** | | | | | | | | | | | | | | |
| 9 | Free Available Chlorine | mg/l | 0.5 | 0.2 | 0.1 | 0.22 | 0.1 | Unit Shut Down | Unit Shut Down | 0.3 | 0.1 | 0.15 | 0.3 | 0.2 |
| 10 | Zinc (as Zn) | mg/l | 1.0 | BDL | BDL | 0.28 | BDL | | | BDL | BDL | 0.22 | BDL | BDL |
| 11 | Total Chromium (as Cr) | mg/l | 0.2 | BDL | BDL | 0.020 | BDL | | | BDL | BDL | 0.026 | BDL | BDL |
| 12 | Phosphate (as $PO_4$) | mg/l | 5.0 | <2 | <2 | 1.34 | <2 | | | <2 | <2 | 1.41 | 0.20 | <2 |
| **Unit-4** | | | | | | | | | | | | | | |
| 13 | Free Available Chlorine | mg/l | 0.5 | Unit Shut | 0.1 | 0.25 | 0.1 | 0.1 | 0.2 | 0.1 | Unit Shut | 0.4 | 0.2 | 0.1 |

| Sl. No. | Parameters | Unit | MPCB Limit | Month of Sampling | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jan | Feb | Mar | Apr | May | Jun | July | Aug | Sep | Oct | Nov |
| 14 | Zinc (as Zn) | mg/l | 1.0 | down | BDL | 0.30 | BDL | BDL | BDL | BDL | Down | BDL | BDL | BDL |
| 15 | Total Chromium (as Cr) | mg/l | 0.2 | | BDL | 0.026 | BDL | BDL | BDL | BDL | | BDL | BDL | BDL |
| 16 | Phosphate (as $PO_4$) | mg/l | 5.0 | | <2 | 1.29 | <2 | <3 | <2 | <2 | | <2 | 0.40 | <2 |
| **Unit-5** | | | | | | | | | | | | | | |
| 17 | Free Available Chlorine | mg/l | 0.5 | 0.2 | 0.1 | 0.20 | 0.1 | Unit Shut Down | Unit Shut Down | 0.1 | 0.1 | 0.15 | 0.3 | 0.1 |
| 18 | Zinc (as Zn) | mg/l | 1.0 | BDL | BDL | 0.23 | BDL | | | BDL | BDL | 0.26 | BDL | BDL |
| 19 | Total Chromium (as Cr) | mg/l | 0.2 | BDL | BDL | 0.021 | BDL | | | BDL | BDL | 0.020 | BDL | BDL |
| 20 | Phosphate (as $PO_4$) | mg/l | 5.0 | <2 | <2 | 1.33 | <2 | | | <2 | <2 | 1.35 | 0.80 | <2 |

* Environmental Laboratory of APML ; * Sampling Period: 2016-17

## TABLE 6.3: WASTEWATER CHARACTERISTICS OF TTPP – COOLING TOWER BLOW DOWN WATER

| Sl. No. | Parameters | Unit | MPCB Limit | Month of Sampling | | |
|---|---|---|---|---|---|---|
| | | | | Mar | Jun | Sep |
| **Unit-1** | | | | | | |
| 1 | Free Available Chlorine | mg/l | 0.5 | 0.22 | | 0.20 |
| 2 | Zinc (as Zn) | mg/l | 1.0 | 0.15 | | 0.22 |
| 3 | Total Chromium (as Cr) | mg/l | 0.2 | 0.027 | | 0.024 |
| 4 | Phosphate (as $PO_4$) | mg/l | 5.0 | 1.38 | | 1.31 |
| **Unit-2** | | | | | | |
| 5 | Free Available Chlorine | mg/l | 0.5 | 0.25 | | 0.15 |
| 6 | Zinc (as Zn) | mg/l | 1.0 | 0.30 | | 0.18 |
| 7 | Total Chromium (as Cr) | mg/l | 0.2 | 0.026 | | 0.020 |

| Sl. No. | Parameters | Unit | MPCB Limit | Month of Sampling | | |
|---|---|---|---|---|---|---|
| | | | | Mar | Jun | Sep |
| 8 | Phosphate (as $PO_4$) | mg/l | 5.0 | 1.40 | | 1.37 |
| **Unit-3** | | | | | | |
| 9 | Free Available Chlorine | mg/l | 0.5 | 0.22 | 0.25 | 0.15 |
| 10 | Zinc (as Zn) | mg/l | 1.0 | 0.28 | 0.27 | 0.22 |
| 11 | Total Chromium (as Cr) | mg/l | 0.2 | 0.020 | 0.030 | 0.026 |
| 12 | Phosphate (as $PO_4$) | mg/l | 5.0 | 1.34 | 1.37 | 1.41 |
| **Unit-4** | | | | | | |
| 13 | Free Available Chlorine | mg/l | 0.5 | 0.25 | 0.22 | |
| 14 | Zinc (as Zn) | mg/l | 1.0 | 0.30 | 0.20 | |
| 15 | Total Chromium (as Cr) | mg/l | 0.2 | 0.026 | 0.021 | |
| 16 | Phosphate (as $PO_4$) | mg/l | 5.0 | 1.29 | 1.32 | |
| **Unit-5** | | | | | | |
| 17 | Free Available Chlorine | mg/l | 0.5 | 0.20 | 0.22 | 0.15 |
| 18 | Zinc (as Zn) | mg/l | 1.0 | 0.23 | 0.23 | 0.26 |
| 19 | Total Chromium (as Cr) | mg/l | 0.2 | 0.021 | 0.026 | 0.020 |
| 20 | Phosphate (as $PO_4$) | mg/l | 5.0 | 1.33 | 1.41 | 1.35 |

* Sampling Period: 2016-17

The monthly variations in characteristics of Condenser Cooling Water is presented in Table 6.4 and 6.5.

## TABLE 6.4: WASTEWATER CHARACTERISTICS OF TTPP – CONDENSER COOLING WATER

| Sl. No. | Parameters | Unit | MPCB Limit | Month of Sampling | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jan | Feb | Mar | Apr | May | Jun | July | Aug | Sep | Oct | Nov |
| **Unit-1** | | | | | | | | | | | | | | |
| 1 | pH | | 6.5-8.5 | 8.4 | 8.4 | 8.05 | 8.5 | Unit Shut down | Unit Shut down | 7.8 | 8.2 | 8.1 | 8.2 | 8.2 |
| 2 | Temperature | $^{o}$C | Not to exceed 5$^{0}$C higher than the intake water temperature | 31 | 34 | 30 | 33 | | | 35 | 35 | 34 | 34 | 33 |
| 3 | Free Available Chlorine | mg/l | 0.5 | 0.2 | 0.1 | 0.20 | 0.1 | | | 0.4 | 0.1 | 0.2 | 0.2 | 0.2 |
| **Unit-2** | | | | | | | | | | | | | | |
| 4 | pH | | 6.5-8.5 | 8.3 | 8.4 | 7.90 | 8.4 | Unit Shut down | Unit Shut down | 8.0 | 8.5 | 8.2 | 8.2 | 8.1 |
| 5 | Temperature | $^{o}$C | Not to exceed 5$^{0}$C higher than the intake water temperature | 32 | 34 | 29 | 34 | | | 35 | 36 | 34 | 35 | 32 |
| 6 | Free Available Chlorine | mg/l | 0.5 | 0.2 | 0.1 | 0.25 | 0.1 | | | 0.1 | 0.1 | 0.5 | 0.2 | 0.2 |
| **Unit-3** | | | | | | | | | | | | | | |
| 7 | pH | | 6.5-8.5 | 8.3 | 8.4 | 8.00 | 8.3 | Unit Shut down | Unit Shut down | 7.9 | 8.4 | 8.2 | 8.1 | 8.1 |
| 8 | Temperature | $^{o}$C | Not to exceed 5$^{0}$C higher than the intake water temperature | 32 | 34 | 30 | 34 | | | 36 | 35 | 35 | 35 | 32 |
| 9 | Free Available Chlorine | mg/l | 0.5 | 0.2 | 0.1 | 0.25 | 0.3 | | | 0.4 | 0.1 | 0.4 | 0.2 | 0.2 |
| **Unit-4** | | | | | | | | | | | | | | |
| 10 | pH | | 6.5-8.5 | Unit Shut down | 8.4 | 7.85 | 8.4 | 7.8 | 7.5 | 8.0 | Unit Shut down | 8.3 | 8.3 | 8.2 |
| 11 | Temperature | $^{o}$C | Not to exceed 5$^{0}$C higher than the intake water temperature | | 34 | 29 | 33 | 32 | 31 | 34 | | 34 | 34 | 34 |
| 12 | Free Available Chlorine | mg/l | 0.5 | | 0.1 | 0.20 | 0.2 | 0.1 | 0.2 | 0.2 | | 0.2 | 0.2 | 0.2 |

| Sl. No. | Parameters | Unit | MPCB Limit | Month of Sampling | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jan | Feb | Mar | Apr | May | Jun | July | Aug | Sep | Oct | Nov |
| | | | | | | | | | | | | | | |
| **Unit-5** | | | | | | | | | | | | | | |
| 13 | pH | | 6.5-8.5 | 8.4 | 8.4 | 8.10 | 8.5 | Unit Shut down | Unit Shut down | 8.0 | 8.3 | 8.3 | 8.4 | 8.2 |
| 14 | Temperature | ºC | Not to exceed 5$^{0}$C higher than the intake water temperature | 32 | 34 | 30 | 34 | | | 35 | 36 | 35 | 35 | 33 |
| 15 | Free Available Chlorine | mg/l | 0.5 | 0.2 | 0.1 | 0.2 | 0.1 | | | 0.1 | 0.1 | 0.2 | 0.3 | 0.2 |

* Environmental Laboratory of APML ; * Sampling Period: 2016-17

## TABLE 6.5: WASTEWATER CHARACTERISTICS OF TTPP – CONDENSER COOLING WATER

| Sl. No. | Parameters | Unit | MPCB Limit | Month of Sampling | | |
|---|---|---|---|---|---|---|
| | | | | Mar | Jun | Sep |
| **Unit-1** | | | | | | |
| 1 | pH | | 6.5-8.5 | 8.05 | | 7.95 |
| 2 | Temperature | °C | Not to exceed 5$^{0}$C higher than the intake water temperature | 30 | | 29 |
| 3 | Free Available Chlorine | mg/l | 0.5 | 0.20 | | 0.25 |
| **Unit-2** | | | | | | |
| 4 | pH | | 6.5-8.5 | 7.90 | | 8.05 |
| 5 | Temperature | °C | Not to exceed 5$^{0}$C higher than the intake water temperature | 29 | | 29 |
| 6 | Free Available Chlorine | mg/l | 0.5 | 0.25 | | 0.22 |
| **Unit-3** | | | | | | |
| 7 | pH | | 6.5-8.5 | 8.00 | 8.05 | 8.15 |
| 8 | Temperature | °C | Not to exceed 5$^{0}$C higher than the intake water temperature | 30 | 30 | 29 |
| 9 | Free Available Chlorine | mg/l | 0.5 | 0.25 | 0.30 | 0.17 |
| **Unit-4** | | | | | | |
| 10 | pH | | 6.5-8.5 | 7.85 | 7.90 | |

| Sl. No. | Parameters | Unit | MPCB Limit | Month of Sampling | | |
|---|---|---|---|---|---|---|
| | | | | Mar | Jun | Sep |
| 11 | Temperature | °C | Not to exceed 5⁰C higher than the intake water temperature | 29 | 31 | |
| 12 | Free Available Chlorine | mg/l | 0.5 | 0.20 | 0.25 | |
| **Unit-5** | | | | | | |
| 13 | pH | | 6.5-8.5 | 8.10 | 8.15 | 8.05 |
| 14 | Temperature | °C | Not to exceed 5⁰C higher than the intake water temperature | 30 | 30 | 29 |
| 15 | Free Available Chlorine | mg/l | 0.5 | 0.22 | 0.25 | 0.15 |

* Sampling Period: 2016-17

### DM & CP Plant Regeneration Waste (Neutralized)

The waste is being generated in DM plant due to periodic regeneration of ion-exchange resin beds. Provision has been made for acid/alkali dosing in their neutralization pit for pH correction of the regeneration waste before this effluent is sent to the central monitoring basin. The average quantity of this stream is estimated at 30 $m^3$/hr. The monthly variations in characteristics of DM Plant effluent presented in Table 6.6 and 6.7.

DM regeneration waste Neutralization pit also receive PT plant and ETP chemical storage area effluent and chemical laboratory effluent. This is an irregular/occasional effluent stream.

The average flow from CPU regeneration waste is estimated to be about 24 $m^3$/hr. This effluent is being collected in a sump and neutralized from where it is being disposed to central monitoring basin.

TABLE 6.6: WASTEWATER CHARACTERISTICS OF TTPP
– DM PLANT EFFLUENT

| Sl. No. | Parameters | Unit | MPCB Limit | Month of Sampling | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jan | Feb | Mar | Apr | May | Jun | July | Aug | Sep | Oct | Nov |
| 1 | pH value at 25⁰C | - | 5.5-9.0 | 8.9 | 8.8 | 7.72 | 8.3 | 8.9 | 7.60 | 8.1 | 8.1 | 7.9 | 8.2 | 8.2 |
| 2 | TSS | mg/l | 100 | 80 | 50 | 28 | 70 | 80 | 22 | 70 | 20 | 40 | 60 | 50 |
| 3 | TDS | mg/l | 2100 | 470 | 740 | 452 | 540 | 790 | 1740 | 450 | 620 | 710 | 260 | 330 |
| 4 | COD | mg/l | 250 | 80 | 36 | 128 | 76 | 36 | 116 | 64 | 80 | 98 | 118.0 | 40 |
| 5 | BOD at | mg/l | 100 | 12 | 16 | 16.3 | 24 | 12 | 14.8 | 18 | 12 | 14 | 15.0 | 16 |

| Sl. No. | Parameters | Unit | MPCB Limit | Month of Sampling | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Jan | Feb | Mar | Apr | May | Jun | July | Aug | Sep | Oct | Nov |
| | $27^{0}$C for 3 days | | | | | | | | | | | | | |
| 6 | Oil & Grease | mg/l | 10 | <1 | <2 | <4 | <2 | <2 | <4 | <3 | <3 | 3.4 | 4 | 4 |

* Environmental Laboratory of APML ; * Sampling Period: 2016-17

### TABLE 6.7: WASTEWATER CHARACTERISTICS OF TTPP – DM PLANT EFFLUENT

| Sl. No. | Parameters | Unit | MPCB Limit | Month of Sampling | | |
|---|---|---|---|---|---|---|
| | | | | Mar | Jun | Sep |
| 1 | pH value at $25^{0}$C | - | 5.5-9.0 | 7.72 | 7.60 | 7.50 |
| 2 | TSS | mg/l | 100 | 28 | 22 | 18 |
| 3 | TDS | mg/l | 2100 | 452 | 1740 | 1132 |
| 4 | COD | mg/l | 250 | 128 | 116 | 88.6 |
| 5 | BOD at $27^{0}$C for 3 days | mg/l | 100 | 16.3 | 14.8 | 12.7 |
| 6 | Oil & Grease | mg/l | 10 | <4 | <4 | <4 |

* Sampling Period: 2016-17

The monthly status of quantity of RO reject waste water generation is presented in Table 6.8. The analysis indicates that the quantity of RO reject waste water generation at TTPP varies from 9902-16100 m3/month. The characteristics of RO reject wastewater is presented in Table 6.9 and Figure 6.1 to 6.4.

### TABLE 6.8: STATUS OF MONTHLY VARIATIONS IN QUANTITY OF RO REJECT WASTE WATER GENERATION - 2020

| Month | QUANTITY OF RO REJECT GENERATION (in $m^3$) |
|---|---|
| January | 13265 |
| February | 14628 |
| March | 16100 |
| April | 13475 |
| May | 11270 |

| Month | QUANTITY OF RO REJECT GENERATION (in $m^3$) |
|---|---|
| June | 13055 |
| July | 12008 |
| August | 11081 |
| September | 11830 |
| October | 12320 |
| November | 11025 |
| December | 9902 |

* Environmental Laboratory of APML ; * Sampling Period: 2019-20

## TABLE 6.9: CHACTERISTICS OF RO REJECT WASTEWATER - 2020

| Month | pH | Conductivity in Micro-siemens | Total Hardness in mg/l | Ca-Hardness in mg/l | Mg-Hardness in mg/l | Chloride in mg/l | SiO2 in mg/l | SO4 in mg/l | m-Alkalinity in mg/l |
|---|---|---|---|---|---|---|---|---|---|
| January | 6.48 | 718 | 356 | 228 | 126 | 98.56 | 48 | 16 | 242 |
| February | 6.44 | 842 | 380 | 248 | 136 | 98.56 | 56 | 22 | 240 |
| March | 6.58 | 856 | 366 | 256 | 150 | 104.58 | 68 | 32 | 256 |
| April | 6.6 | 866 | 370 | 260 | 146 | 100.56 | 62 | 30 | 258 |
| May | 6.61 | 865 | 365 | 256 | 140 | 106.56 | 64 | 28 | 260 |
| June | 6.55 | 860 | 370 | 250 | 138 | 110.58 | 66 | 26 | 252 |
| July | 6.5 | 788 | 356 | 224 | 128 | 98.58 | 46 | 16 | 242 |
| August | 6.43 | 846 | 346 | 220 | 128 | 103.56 | 38 | 20 | 236 |
| September | 7.1 | 820 | 316 | 205 | 111 | 98.56 | 44 | 18 | 260 |
| October | 6.9 | 800 | 310 | 202 | 109 | 99.4 | 37.8 | 16 | 260 |
| November | 6.5 | 722 | 354 | 230 | 124 | 98.55 | 46 | 18 | 240 |
| December | 6.42 | 840 | 384 | 250 | 134.4 | 102.55 | 54 | 22 | 232 |

* Environmental Laboratory of APML ; * Sampling Period: 2019-20

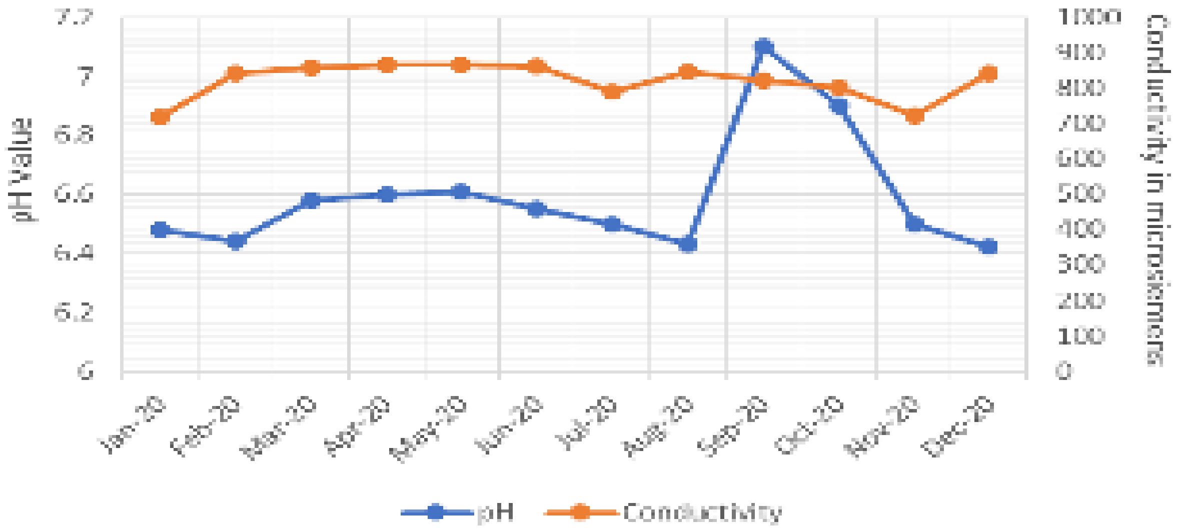


FIGURE 6.1: MONTHLY VARIATIONS IN CHACTERISTICS OF RO REJECTS WASTE WATER - pH & CONDUCTIVITY (IN MICRO-SIEMENS)

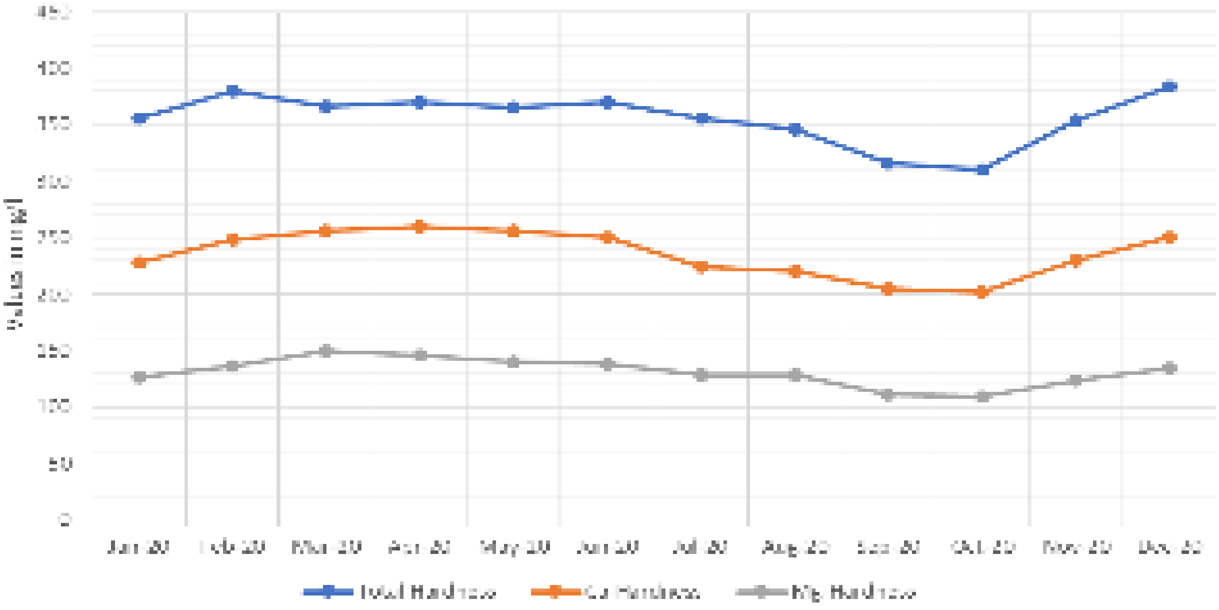


FIGURE 6.2: MONTHLY VARIATIONS IN CHACTERISTICS OF RO REJECTS WASTE WATER - TOTAL HARDNESS/CALCIUM HARDNESS & MAGNESIUM HARDNESS (IN mg/l)

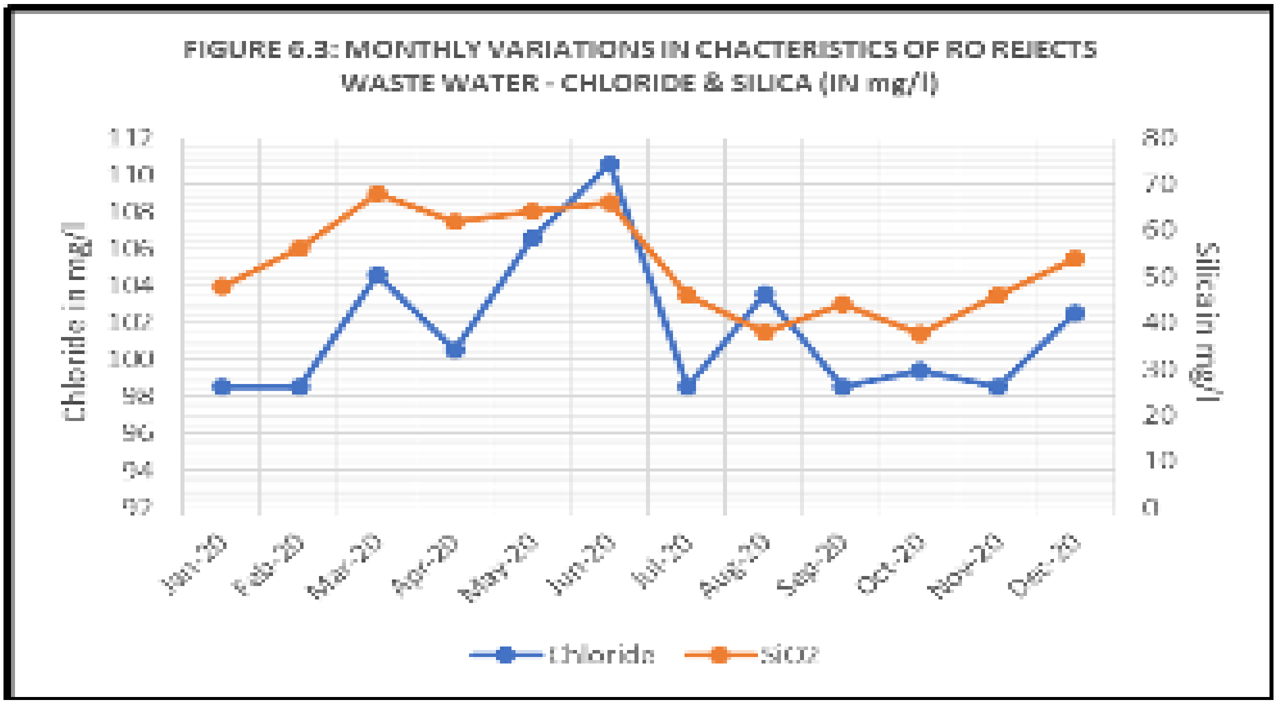


FIGURE 6.3: MONTHLY VARIATIONS IN CHACTERISTICS OF RO REJECTS WASTE WATER - CHLORIDE & SILICA (IN mg/l)

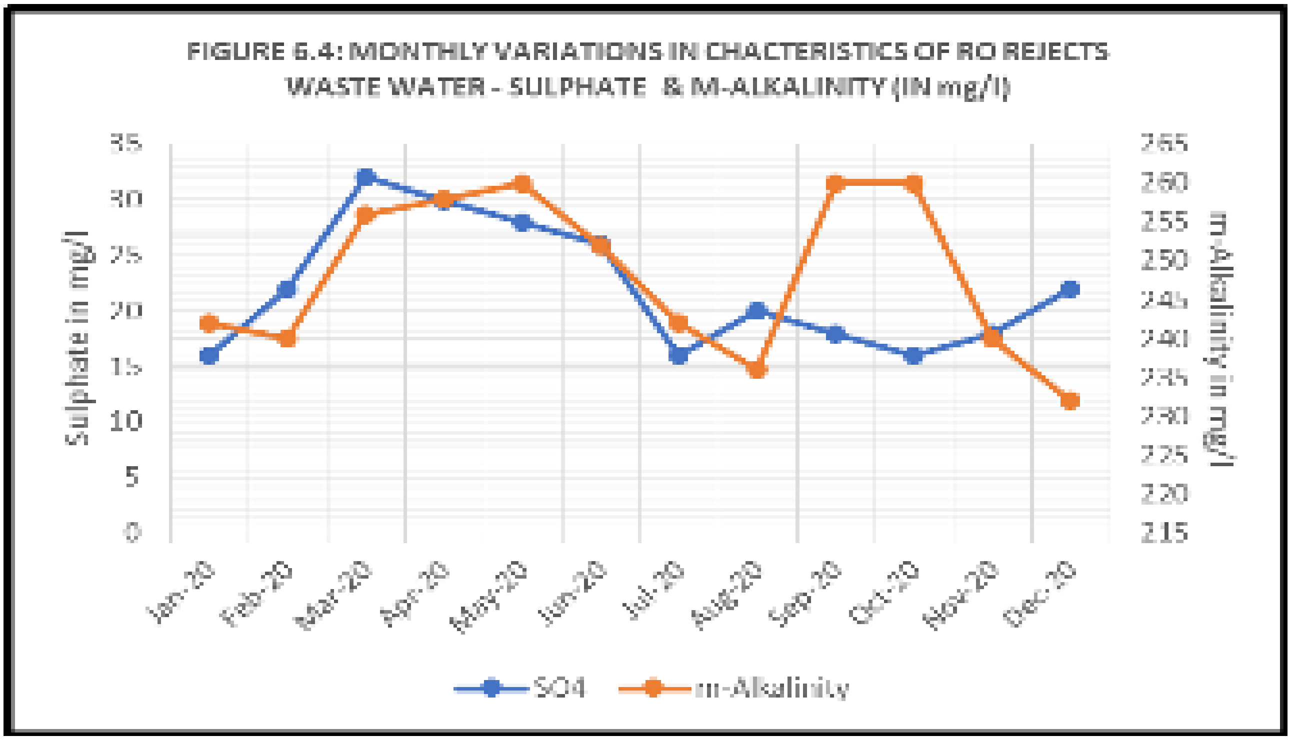


FIGURE 6.4: MONTHLY VARIATIONS IN CHACTERISTICS OF RO REJECTS WASTE WATER - SULPHATE & M-ALKALINITY (IN mg/l)

The monthly status of quantity of neutralization pit waste water generation is presented in Table 6.10. The analysis indicates that the quantity of neutralization pit waste water generation at TTPP varies from 10038-16730 m3/month. The characteristics of neutralization pit waste water is presented in Table 6.11 and Figure 6.5 to 6.8.

### TABLE 6.10: STATUS OF MONTHLY VARIATIONS IN QUANTITY OF DM PLANT N-PIT WASTE WATER GENERATION - 2020

| Month | QUANTITY OF N-PIT WASTEWATER GENERATION (in $m^3$) |
|---|---|
| January | 16730 |
| February | 14989 |
| March | 15829 |
| April | 16520 |
| May | 16590 |
| June | 12005 |
| July | 11965 |
| August | 11725 |
| September | 12110 |
| October | 14280 |
| November | 15540 |
| December | 10038 |

* Environmental Laboratory of APML ; * Sampling Period: 2019-20

## TABLE 6.11: CHACTERISTICS OF DM PLANT N-PIT WASTEWATER - 2020

| Month | pH | Conductivity in Micro-siemens | Total Hardness in mg/l | Ca-Hardness in mg/l | Mg-Hardness in mg/l | Chloride in mg/l | SiO2 in mg/l | SO4 in mg/l | m-Alkalinity in mg/l |
|---|---|---|---|---|---|---|---|---|---|
| January | 6.8 | 2212 | 460 | 224 | 236 | 14.9 | 22 | 11 | 222 |
| February | 6.5 | 2190 | 540 | 322 | 218 | 10 | 15 | 10 | 240 |
| March | 7.1 | 1860 | 516 | 316 | 200 | 12.2 | 23 | 17 | 246 |
| April | 6.6 | 2240 | 382 | 210 | 172 | 11.6 | 18 | 15 | 226 |
| May | 7 | 2000 | 468 | 218 | 250 | 19.4 | 16 | 13 | 238 |
| June | 6.55 | 2400 | 548 | 262 | 286 | 16.8 | 13 | 10 | 242 |
| July | 7.2 | 1800 | 358 | 208 | 150 | 20.2 | 11 | 9 | 218 |
| August | 6.7 | 2300 | 432 | 246 | 186 | 9.9 | 16 | 14 | 238 |
| September | 6.9 | 2000 | 392 | 230 | 162 | 12.8 | 15 | 13 | 222 |
| October | 6.6 | 2180 | 386 | 216 | 171 | 19.6 | 14 | 11 | 215 |
| November | 6.8 | 2300 | 532 | 310 | 222 | 10.3 | 10 | 9 | 248 |
| December | 6.53 | 2200 | 485 | 252 | 233 | 15.4 | 13 | 10 | 232 |

* Environmental Laboratory of APML ; * Sampling Period: 2019-20

FIGURE 6.5: MONTHLY VARIATIONS IN CHACTERISTICS OF N-PIT WASTE WATER - pH & CONDUCTIVITY (IN MICRO-SIEMENS)

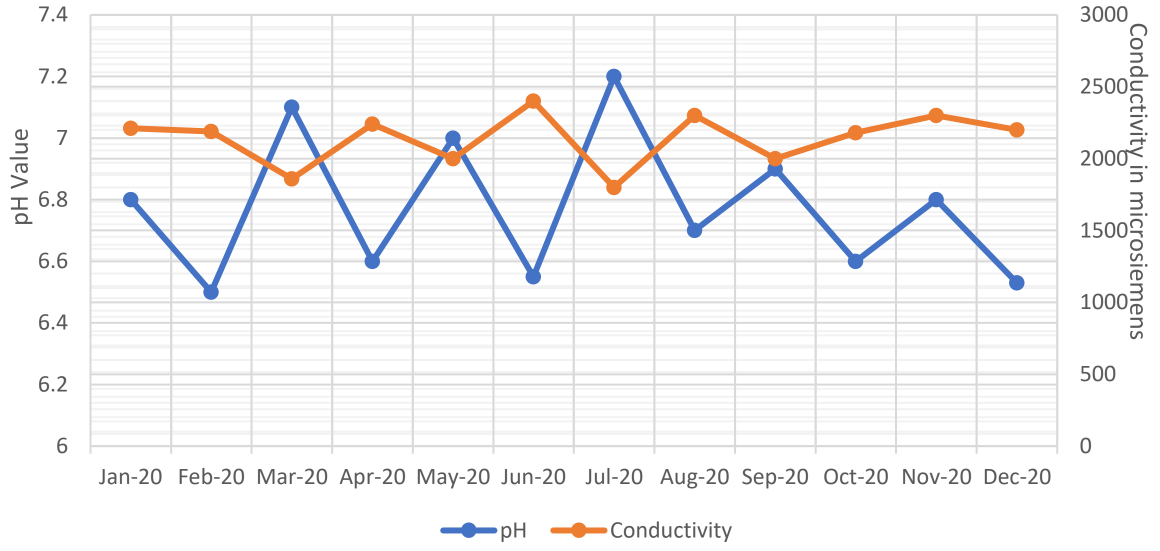


FIGURE 6.6: MONTHLY VARIATIONS IN CHACTERISTICS OF N-PIT WASTE WATER - TOTAL HARDNESS/CALCIUM HARDNESS & MAGNISIUM HARDNESS (IN mg/l)

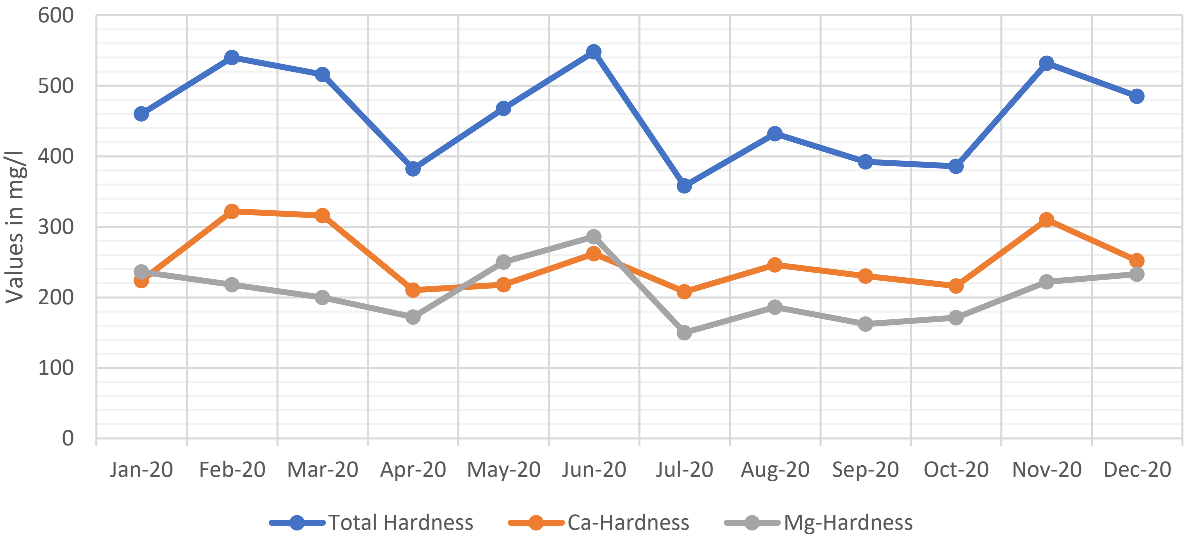


FIGURE 6.7: MONTHLY VARIATIONS IN CHACTERISTICS OF N-PIT WASTE WATER - CHLORIDE & SILICA (IN mg/l)

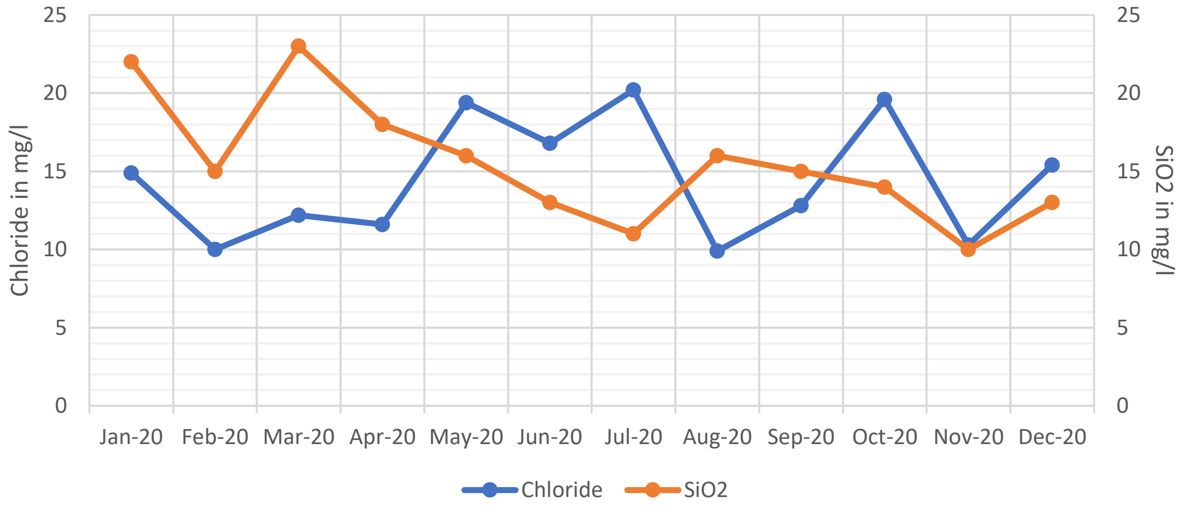
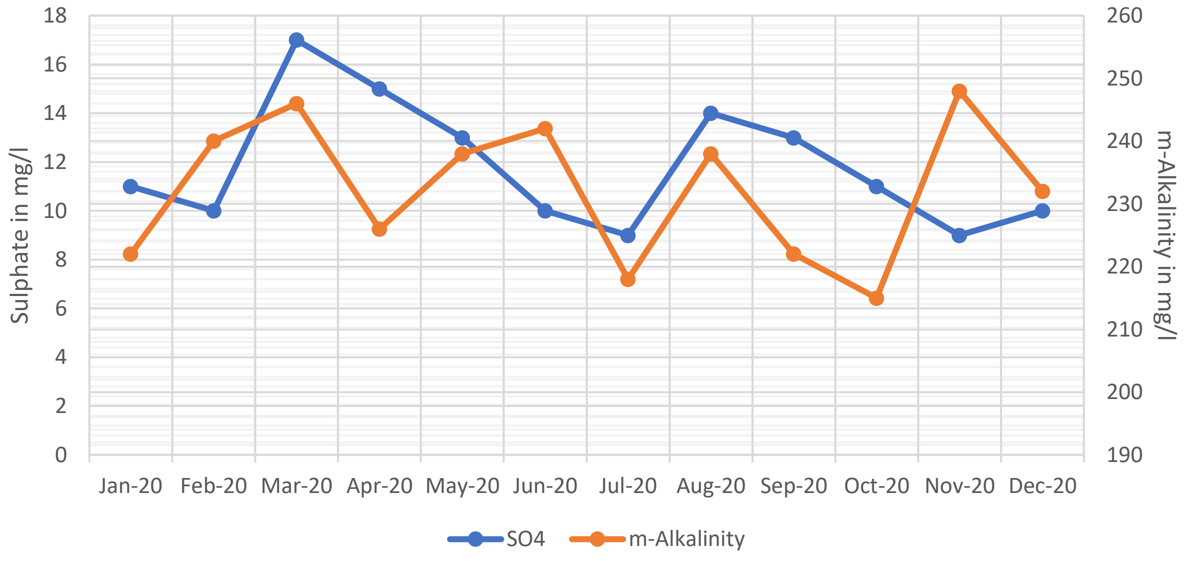


FIGURE 6.8: MONTHLY VARIATIONS IN CHACTERISTICS OF N-PIT WASTE WATER - SULPHATE & M-ALKALINITY (IN mg/l)



### Sludge from WTP Clarifier and Filter Backwash

The sludge generated from WTP Clarifier & filter backwashes is estimated as given below:

- WTP Clarifier: 65 $m^3$/hr
- Recycling through sludge thickeners & centrifuge: 50 $m^3$/hr
- Solid cakes for disposal: 15 $m^3$/hr

The monthly status of quantity of sludge pit waste water generation is presented in Table 6.12. The analysis indicates that the quantity of sludge pit waste water generation at TTPP varies from 10038-16730 m3/month. The characteristics of sludge pit waste water is presented in Table 6.13 and Figure 6.9 to 6.12.

The total sludge generated is being collected in clariflocculator sludge pit. All these wastes are basically rich in suspended solid content. From clariflocculator sludge pit sludge is being pumped to sludge thickener. The thickener overflow is being recycled to the inlet of WTP clarifier. This approach is aimed at conservation of water and at the same time minimization of wastewater disposal. The thickened sludge is being fed to centrifuge. The concentrate of centrifuge along with thickener overflow is being collected in sump from which it is being recycled to the inlet of WTP clarifier. The dried sludge from centrifuge is being disposed semi-manually deploying tipper trucks.

The thickened sludge sump and the thickener overflow/concentrate holding sump has been equipped with agitator to prevent sludge settling at the pit.

In sludge thickener/centrifuge polyelectrolyte is being used, which is often non-edible in nature. Since the thickener overflow is being recycled to the WTP clarifier, part overflow of which is being used in drinking water system. It is essential that polyelectrolyte being used must be of edible quality.

## TABLE 6.12: STATUS OF MONTHLY VARIATIONS IN QUANTITY OF SLUDGE PIT WASTEWATER GENERATION - 2020

| Month | QUANTITY OF SLUDGE PIT WASTEWATER GENERATION (in $m^3$) |
|---|---|
| January | 47040 |
| February | 43680 |
| March | 47040 |
| April | 41280 |
| May | 37200 |
| June | 39840 |
| July | 32880 |
| August | 16560 |
| September | 15840 |
| October | - |
| November | 64320 |
| December | 35760 |

* Environmental Laboratory of APML ; * Sampling Period: 2019-20

## TABLE 6.13: CHACTERISTICS OF SLUDGE PIT WASTEWATER - 2020

| Month | pH | Conductivity in Micro-siemens | Total Hardness in mg/l | Ca-Hardness in mg/l | Mg-Hardness in mg/l | Chloride in mg/l | SiO2 in mg/l | SO4 in mg/l | m-Alkalinity in mg/l |
|---|---|---|---|---|---|---|---|---|---|
| January | 7.7 | 369 | 144 | 48 | 96 | 16.2 | 19 | 10 | 136 |
| February | 8 | 355 | 136 | 46 | 90 | 15.9 | 27 | 15 | 142 |
| March | 7.3 | 329 | 140 | 52 | 88 | 16.8 | 29 | 13 | 138 |
| April | 7.5 | 336 | 146 | 64 | 82 | 17.6 | 24 | 11 | 132 |
| May | 8.2 | 350 | 138 | 50 | 88 | 18.2 | 26 | 14 | 124 |
| June | 7.9 | 382 | 142 | 62 | 82 | 15 | 21 | 12 | 116 |
| July | 7.2 | 342 | 134 | 58 | 76 | 11.4 | 23 | 10 | 120 |
| August | 7 | 318 | 147 | 60 | 87 | 13.7 | 17 | 9 | 128 |
| September | 7.8 | 338 | 136 | 56 | 80 | 15.2 | 22 | 12 | 126 |
| October | 7.6 | 346 | 128 | 54 | 76 | 12.6 | 16 | 10 | 122 |
| November | 7.4 | 310 | 122 | 48 | 74 | 14.8 | 18 | 13 | 118 |
| December | 7.2 | 355 | 130 | 52 | 78 | 15.6 | 20 | 11 | 120 |

* Environmental Laboratory of APML ; * Sampling Period: 2019-20

**FIGURE 6.9: MONTHLY VARIATIONS IN CHACTERISTICS OF SLUDGE PIT WASTE WATER - pH & CONDUCTIVITY (IN MICRO-SIEMENS)**

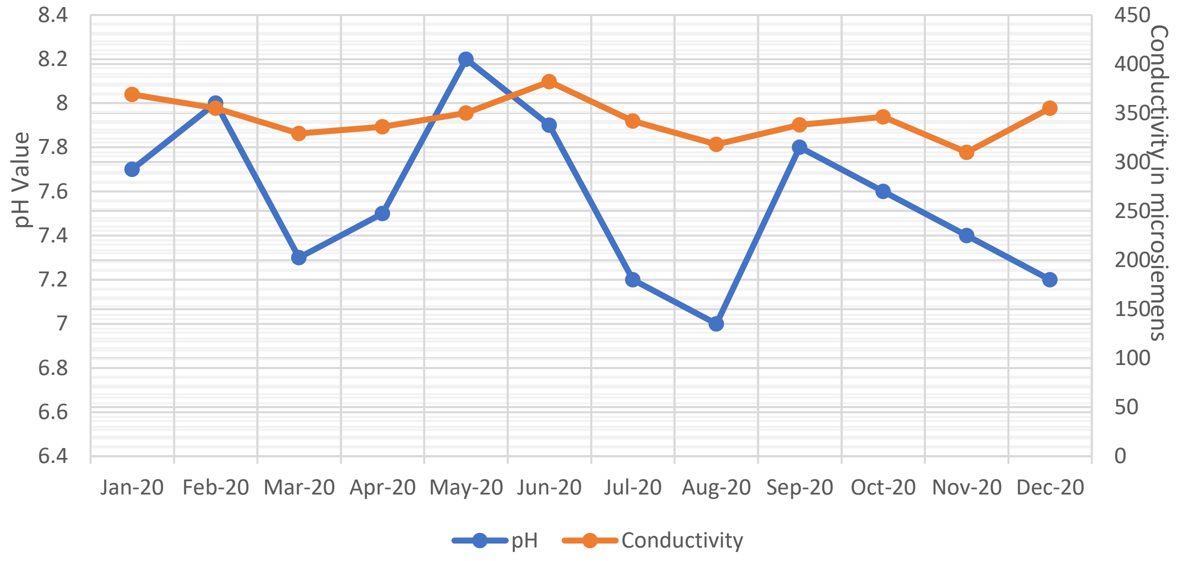


**FIGURE 6.10: MONTHLY VARIATIONS IN CHACTERISTICS OF SLUDGE PIT WASTE WATER - TOTAL HARDNESS/CALCIUM HARDNESS & MAGNISIUM HARDNESS (IN mg/l)**

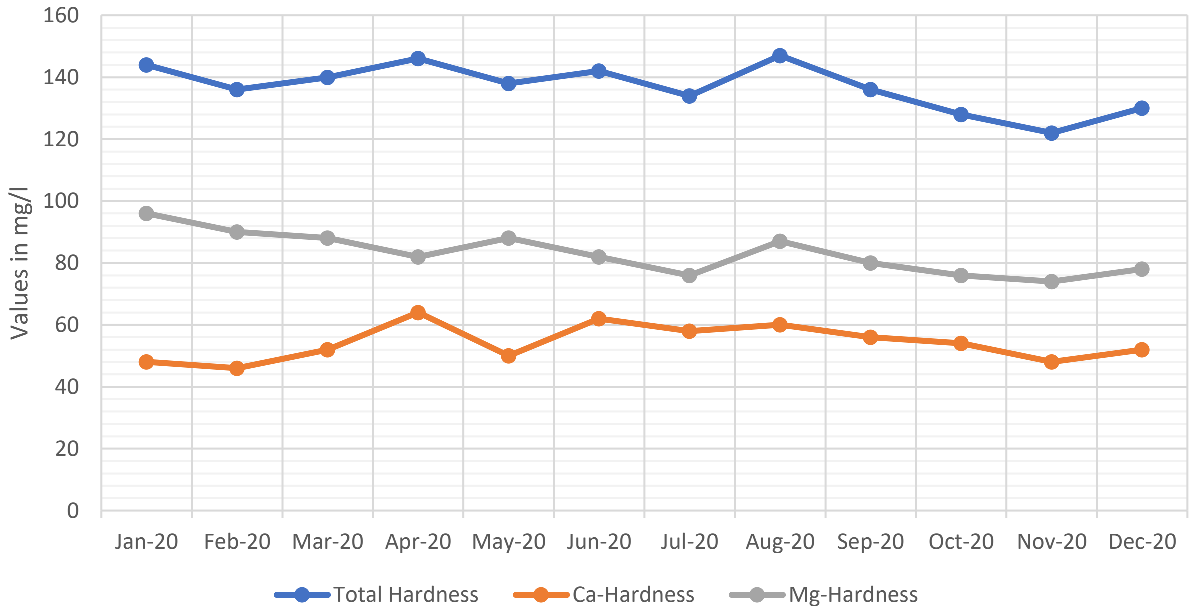


FIGURE 6.11: MONTHLY VARIATIONS IN CHACTERISTICS OF SLUDGE PIT WASTE WATER - CHLORIDE & SILICA (IN mg/l)

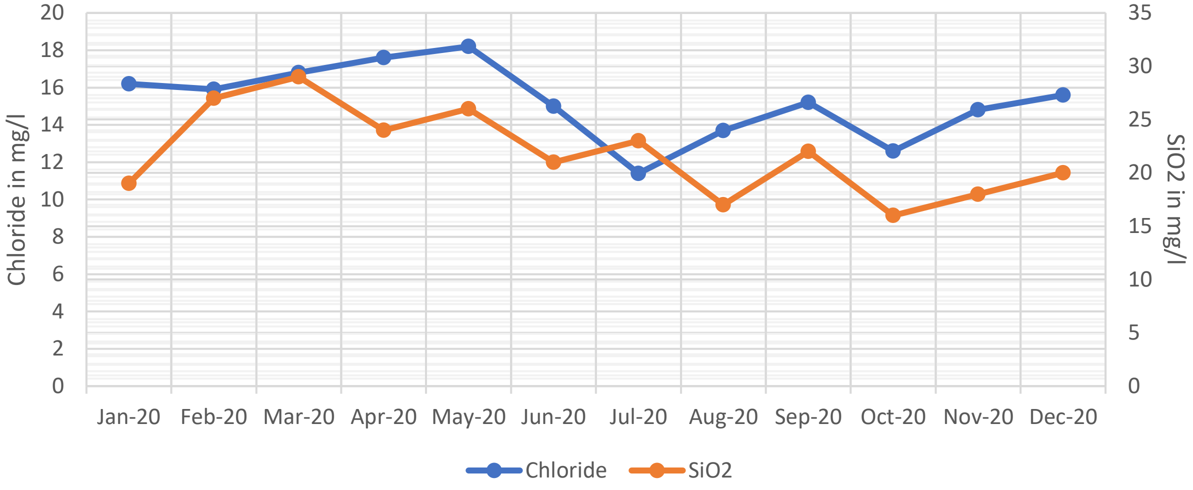
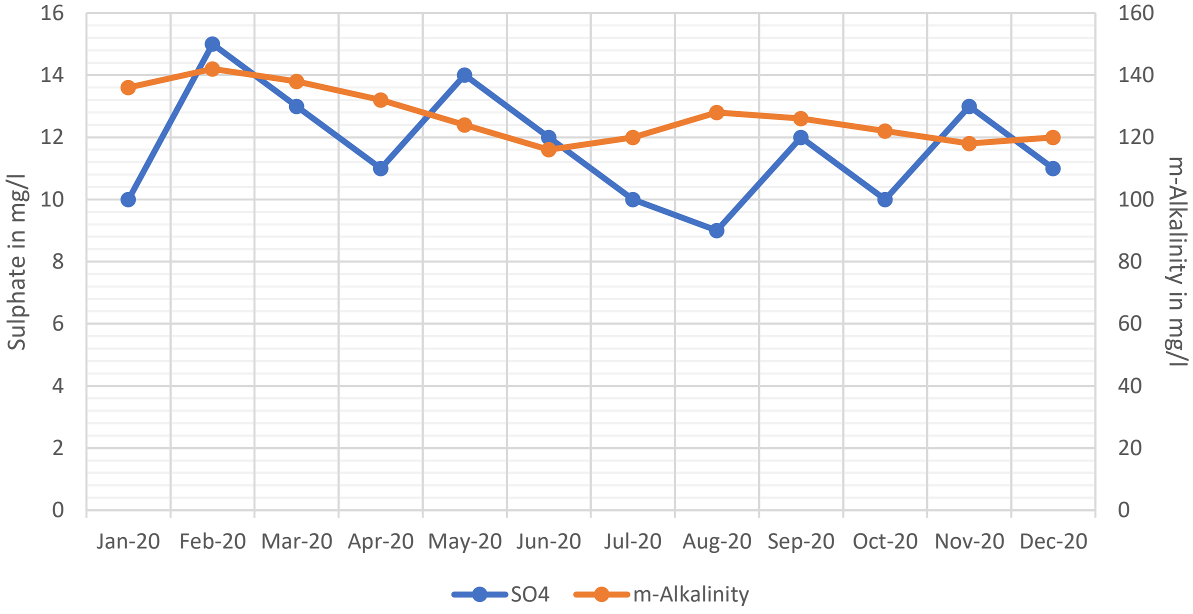


FIGURE 6.12: MONTHLY VARIATIONS IN CHACTERISTICS OF SLUDGE PIT WASTE WATER - SULPHATE & M-ALKALINITY (IN mg/l)



### Boiler System Loss (BSL)

This is an occasional effluent. This effluent is generated only during the boiler startup. Total BSL from each unit is estimated about 20.5 $m^3$/hr i.e. total 102.5 $m^3$/hr from all the units. This BSL has been quenched with cooling tower blow down for bringing down the temperature to acceptable degree for easier handling and disposal. Quenching water requirement is estimated at 45.5 $m^3$/hr per unit i.e. total 227.5 $m^3$/hr from all the units. Thus, total effluent is 330 $m^3$/hr (for all the 5 units) from this source occasionally.

Characteristics of this mixture of two effluents are such that it does not require any treatment before equalization with other treated effluents. Hence, it leads to the central monitoring basin, conceived as the equalization basin for all treated/untreated liquid effluents. It has a BSL Quenching Pit (BSLQP) for each boiler unit. From this pit BSL & CTBD mix is being pumped to the Central Monitoring Basin (CMB).

### Side Stream Filter Wastewater

It is estimated that 25 $m^3$/hr (from all the 5 units) of cooling water side stream filter waste containing suspended solids to a tune of 2500 mg/l is being generated. This effluent is being used for wet ash handling system.

### CHP Dust Suppression & Coal Pile Area Run Off

Coal pile area run off is being generated due to rainfall on the coal stockpile area. This waste stream is thus only being generated during monsoon months. The coal pile yard has been provided with a garland drain to channelize the run off to a properly designed settling pond. The overflow from the settling pond has been led to a sump and from this sump the same is being pumped to the CMB. This effluent, after treatment, is being pumped to CHP reuse tank.

Effluents generated from the coal pile area due to dust suppression system is also being conveyed by the same garland drain and treated in the same settling pond.

There are two settling ponds, one in operation and the other in stand-by mode. One settling pond is being filled, while the other is being excavated. The excavated sludge (fine coal particles) is being sold out.

The inlet trench to the coal pile runoff settling pond has been designed in such a way that during such excessive rainfall the runoff after the initial minutes will get bye passed through a separate drain to a nearby stream allowing only designed flow of runoff to enter the settling pond i.e. the incoming trench to the settling pond has also a by-pass arrangement for diverting the coal pile area cut-off to rain water discharge channel for final disposal through storm water drainage system after initial minutes (10 minutes in this case) of heavy shower when the run-off has been only clear water and meet the permissible standard. The excess water by-pass system is provided with overflow weir control. Properly designed overflow weir has been provided to ensure the heavy downpour by-pass. If necessary, motorized gate for the bypass channel may also be provided as an alternative.

With the above consideration, coal pile area run off is estimated as under:

Total coal stock area : 105741 $m^2$

Rainfall intensity : 55 mm/hr

(design value Considered)

-------------------------------------------------------------

Total runoff : 2115 $m^3$/hr

The above rainfall runoff is calculated considering the unpaved coal stockpile as unpaved area and surface runoff factor of 0.40.

The normal dust suppression effluent from this source is expected to be 30 $m^3$/hr and maximum rainfall runoff contemplated to be allowed to enter the twin settling pond is estimated to be 350 $m^3$/hr. Overflow of the twin settling pond is being collected in a Twin Settling Pond Overflow Sump (TSPOS), from where the clear water is being pumped out to the CHP reuse tank.

In case of necessity, both ponds can also be put into service. Considering the worst scenario of both pumps deployed at the coal settling pond overflow sump to pump out the treated effluent to the CHP reuse tank fails, an overflow trench/pipeline has also been provided from the coal settling pond overflow sump to divert the water to the nearby storm drain.

Following parameters has been considered while designing the settling pond:

The exit of runoff water from the coal settling pond (CSP) is such that the short circuiting of water is avoided. For this purpose, water is allowed to traverse under breast wall located about 5 metre ahead of outlet side of the pond.

- Suitable sized gates have been provided at the inlet and outlet of each chamber.
- Design settling velocity of the coal particles has been arrived after design calculations.
- An inlet distribution chamber for each CHP has been provided for proper mixing of effluents before wastewater entry to ponds.
- Overflow level of CHP is less than or equal to the invert level of inlet channel of CSP.

**Boiler Area & ESP Area Drains (except oily drains)**

Boiler & ESP area floor washing drain generally contains very high TSS. This effluent has led to a collection sump. From this collection sump this wastewater is being pumped to Ash slurry sump. The normal effluent from this source is approx. 15 $m^3$/hr and maximum flow from this source is 100 $m^3$/hr. This is based on the APH & ESP wash water. However, this APH & ESP area wash water is being generated during the operation and maintenance only.

The size of the collection sump has been designed on the basis of the flow 100 $m^3$/hr. This sump has provision for agitation to prevent the settling of the suspended solids.

**Fly Ash Silo Area Drain Wastewater**

This effluent is generated due to dust suppression and floor cleaning in the fly ash silo area. This effluent is being managed by allowing it to a dedicated sump [Ash Silo Area Collection Pit (ASACP)] in the ash silo area. This pump has been provided with sump pump(s) to enable the ash-rich effluent to be sent to the ash slurry sump. Effective agitation system has been employed in this sump to prevent the ash laden particles to settle.

## 6.3 EFFLUENT TREATMENT PLANT

To treat the DM plant wastewater along with effluent generated from floor washing & cleaning is being treated through ETP have been installed. The detail of effluent treatment plant is as follows:

(a) Capacity of ETP: 2 x 25 $m^3$/hr

(b) Name and Size of Unit:

| Sl. No. | ETP Unit ( e.g. Collection tank, equalisation tank, aeration tank etc) | Size of ETP Unit Provided |
|---|---|---|
| 1 | Waste water collection pit-01 | 10 $m^3$<br>(2.7 mL x 2.7 mW x 1.5 mH + 0.5 m FB) |
| 2 | Waste water collection pit-02 | 10 $m^3$<br>(2.7 mL x 2.7 mW x 1.5 mH + 0.5 m FB) |
| 3 | Waste water collection pit-03 | 10 $m^3$<br>(2.7 mL x 2.7 mW x 1.5 mH + 0.5 m FB) |
| 4 | Waste water collection pit-04 | 10 $m^3$<br>(2.7 mL x 2.7 mW x 1.5 mH + 0.5 m FB) |
| 5 | Waste water collection pit-05 | 10 $m^3$<br>(2.7 mL x 2.7 mW x 1.5 mH + 0.5 m FB) |

| Sl. No. | ETP Unit ( e.g. Collection tank, equalisation tank, aeration tank etc) | Size of ETP Unit Provided |
|---|---|---|
| 6 | ETP common collection sump | 50 m³<br>(5.2 mL x 5.2 mW x 2.0 mH + 0.5 m FB) |
| 7 | ETP sludge pit | 5 m³<br>(1.9 mL x 1.9 mW x 1.5 mH + 0.5 m FB) |
| 8 | Central monitoring basin | 200 m³<br>(10.3 mL x 10.3 mW x 2.0 mH + 0.5 m FB) |
| 9 | Dry oil collection drum | 0.5 m³<br>(1.0 m Dia x 0.8 m H. + 0.2 m FB) |
| 10 | Tilted plate interceptor | 2 x 25 m³/hr |
| 11 | Tube settler | (4.5 mL x 2.8 mW x 3.5 mH + 0.5 m FB) |
| 12 | Acid dosing tank | 1.0 m³<br>2.0 (Ø1.2 m x 1.0 m H. + 0.3 m FB) |
| 13 | Alkali dosing tank | 1.0 m³<br>2.0 (Ø1.2 m x 1.0 m H. + 0.3 m FB) |

The P&I diagram of Effluent Treatment Plant (ETP) at Tiroda TPP is presented in Figure 6.13.

FIGURE 6.13 (a): P&I DIAGRAM OF EFFLUENT TREATMENT PLANT AT TIRODA TPP

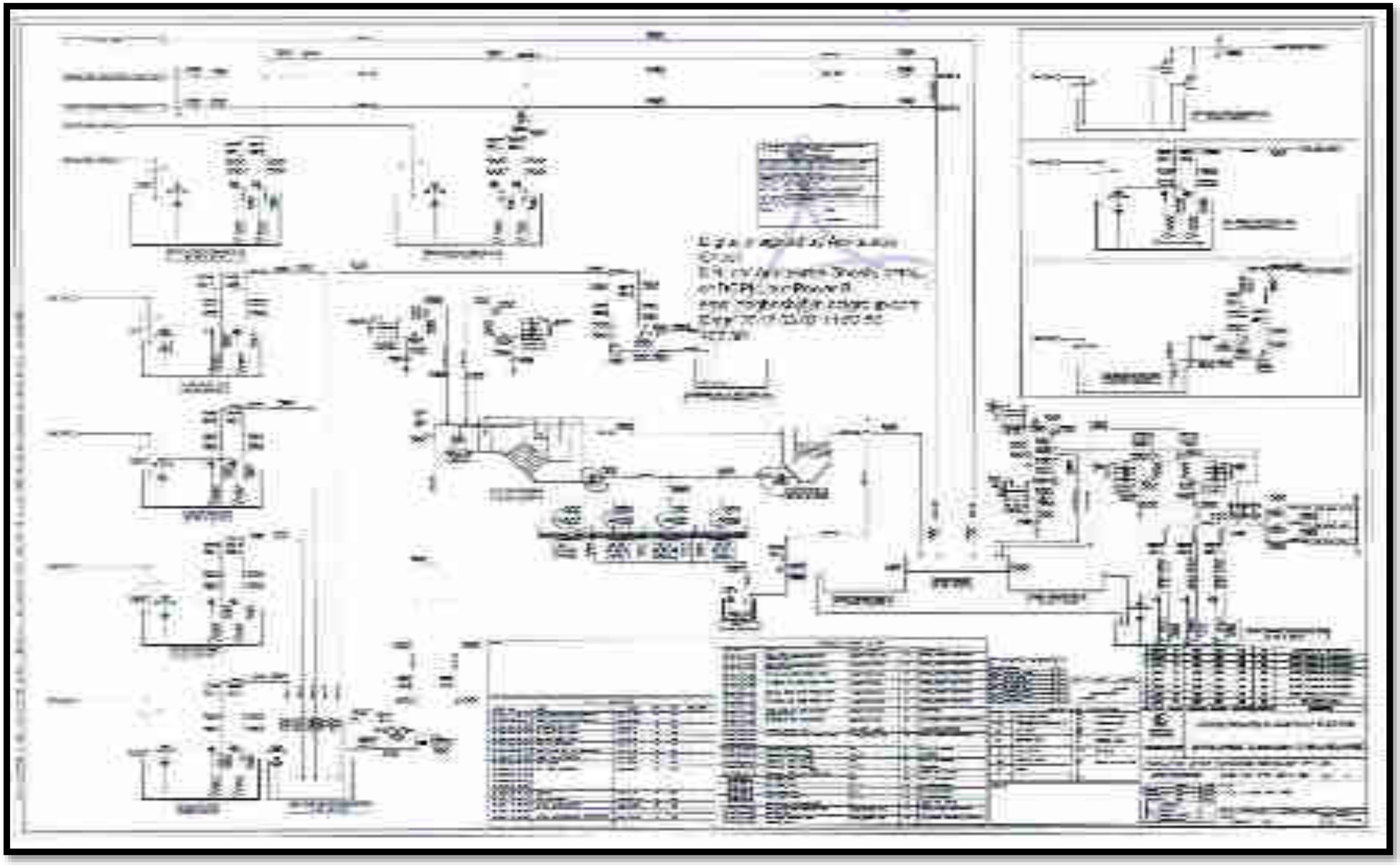
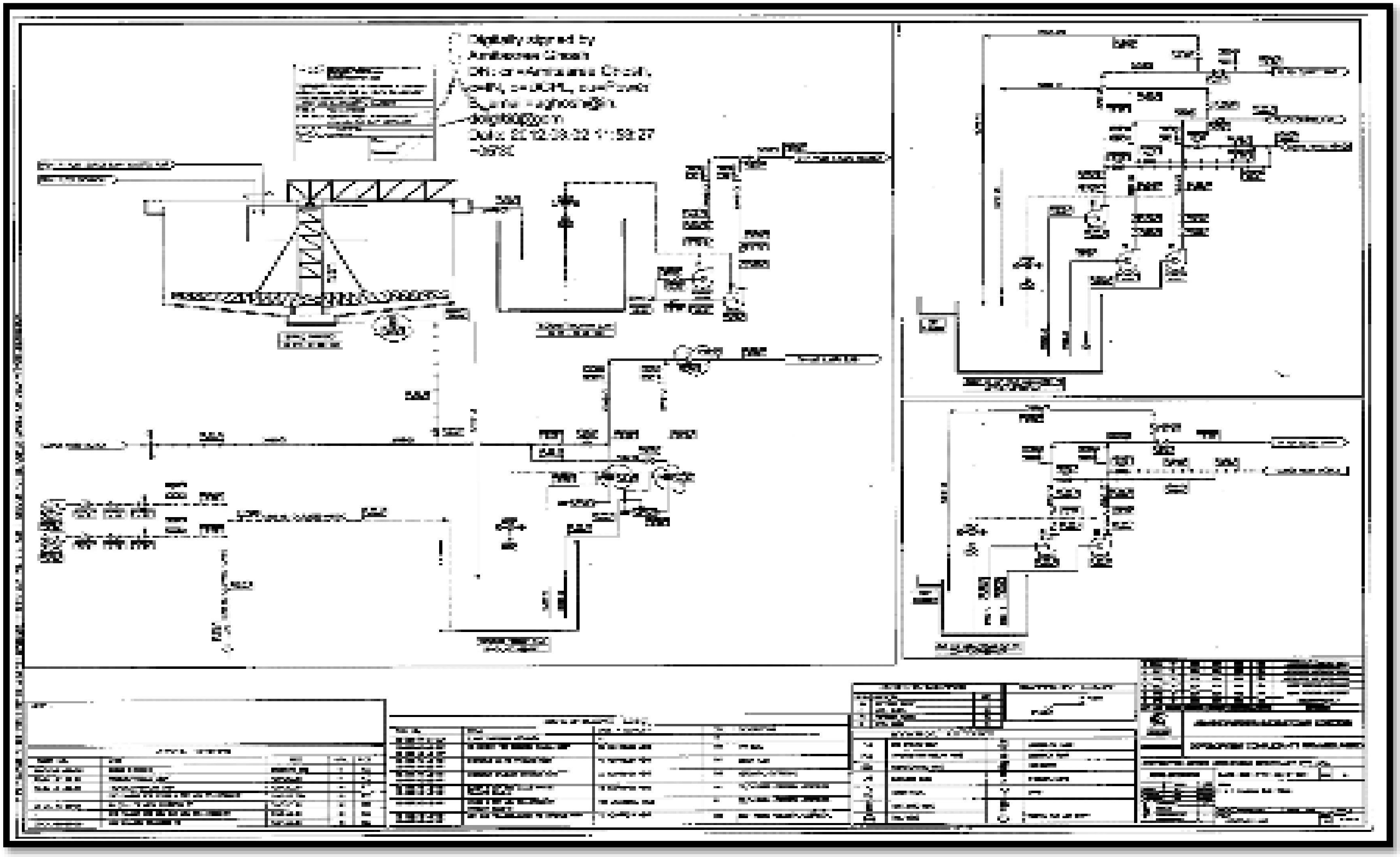


FIGURE 6.13 (b): P&I DIAGRAM OF EFFLUENT TREATMENT PLANT AT TIRODA TPP



The effluent is being led to an oily wastewater collection sump [Fuel Oil Area Oily Wastewater Sump (FOAOWS)] by gravity. From this sump, the oily wastewater is being pumped to Power-House Oily Wastewater Sump (PHOWS) for treatment in TPI type oil water separator. The maximum effluent from fuel oil area is 5 $m^3$/hr. However, during heavy rainfall, the runoff effluent from this area may rise to 15 $m^3$/hr.

There is provision of by-pass arrangement (similar to Coal pile area bypass arrangement, as mentioned earlier) for diverting the FO area run-off to rainwater discharge channel for final disposal through storm water drainage system after initial minutes of heavy shower when the run-off has been only clear water and meet the permissible standard w.r.t. oil & grease content.

The sump inside the FO Pump House collects leakage oil and cleaning water. The sump is provided with necessary pump to evacuate the sump. The discharge of this sump is being pumped out to the inlet of the fuel oil area oily wastewater sump.

### Central Monitoring Basin

Central monitoring basin is acting as an equalization basin for the selected effluent stream as mentioned in earlier section.

The maximum wastewater quantity entering the Central monitoring basin is about 270 $m^3$/hr. The detail of various wastewater stream being discharged in CMB is presented in Table 6.14.

**TABLE 6.14: DETAIL OF VARIOUS WASTEWATER STREAM DISCHARGE AT CMB**

| S. No. | Wastewater Stream | Flow ($m^3$/hr) | Nature of Flow |
|---|---|---|---|
| 1 | Auxiliary Service Waste-Water | 150 | Continuous |
| 2 | DM plant neutralizing pit | 30 | Continuous |
| 3 | TPI Overflow sump | 90 | Intermittent |
| **Total** | | **270** | |

The central monitoring basin has two compartments. The maximum wastewater quantity (except rainfall runoff) entering the central monitoring basin from various sources is 270 $m^3$/hr. This flow has been estimated considering continuous and intermittent effluent. The total detention time of two compartments have been provided 1000 $m^3$ as per CEA’s publication titled ‘Standard Design Criteria/Guidelines for Balance of Plant for Thermal Power Project 2 x 500 MW or above) Section-5 (Water Treatment Plant).

The discharge header of Central monitoring basin disposal pumps has been installed with pH/turbidity & flow monitoring instruments.

## 6.4 SEWAGE TREATMENT PLANT

For the treatment of domestic wastewater of plant as well as the township, conventional and modular sewage treatment plants has been installed to decentralize the sewage treatment system for optimizing the installation and operation cost.

Two conventional STP of 120 KLD of each has been installed within the plant. STP-I is primarily for unit 1, 2 & 3 and STP-II for units 4 & 5. Both the STP has been operationalized for treating the domestic as well as other service wastewater being generated within the plant area.

In addition to this, a modular STP of total capacity 240 KLD has been installed and operationalized in township for treating the domestic wastewater of various sections of township.

### Detail of Sewage Treatment Plant

APML has installed 2 x 120 $M^3$/day capacity MBBR technology based Sewage Treatment Plant for treatment of domestic waste.

**Basis of Design**:

| Item | Particulars |
|---|---|
| Capacity | 2 x 120 $m^3$/day |
| Technology | MBBR |
| Make | Wipro Water |

The sewage is being generated mainly from DM Plant Building, Control Room Building, O&M Office building & Canteen area. For designing the STP following parameters were considered:

**Raw Sewage Characteristics:**

| S. No. | Details | Units | Value |
|---|---|---|---|
| 1 | Flow | $m^3$/day | 120 |
| 2 | BOD | ppm | 300 |
| 3 | COD | ppm | 600 |
| 4 | TSS | ppm | 400 |
| 5 | Oil & Grease | ppm | ~ 60 |

**Outlet characteristics:**

| S. No. | Details | Value | Units |
|---|---|---|---|
| 1 | pH | 7-8.5 | - |
| 2 | BOD | <30 | ppm |
| 3 | COD | <50 | ppm |
| 4 | TSS | <5 | ppm |
| 5 | Oil & grease | Less than 1 | ppm |

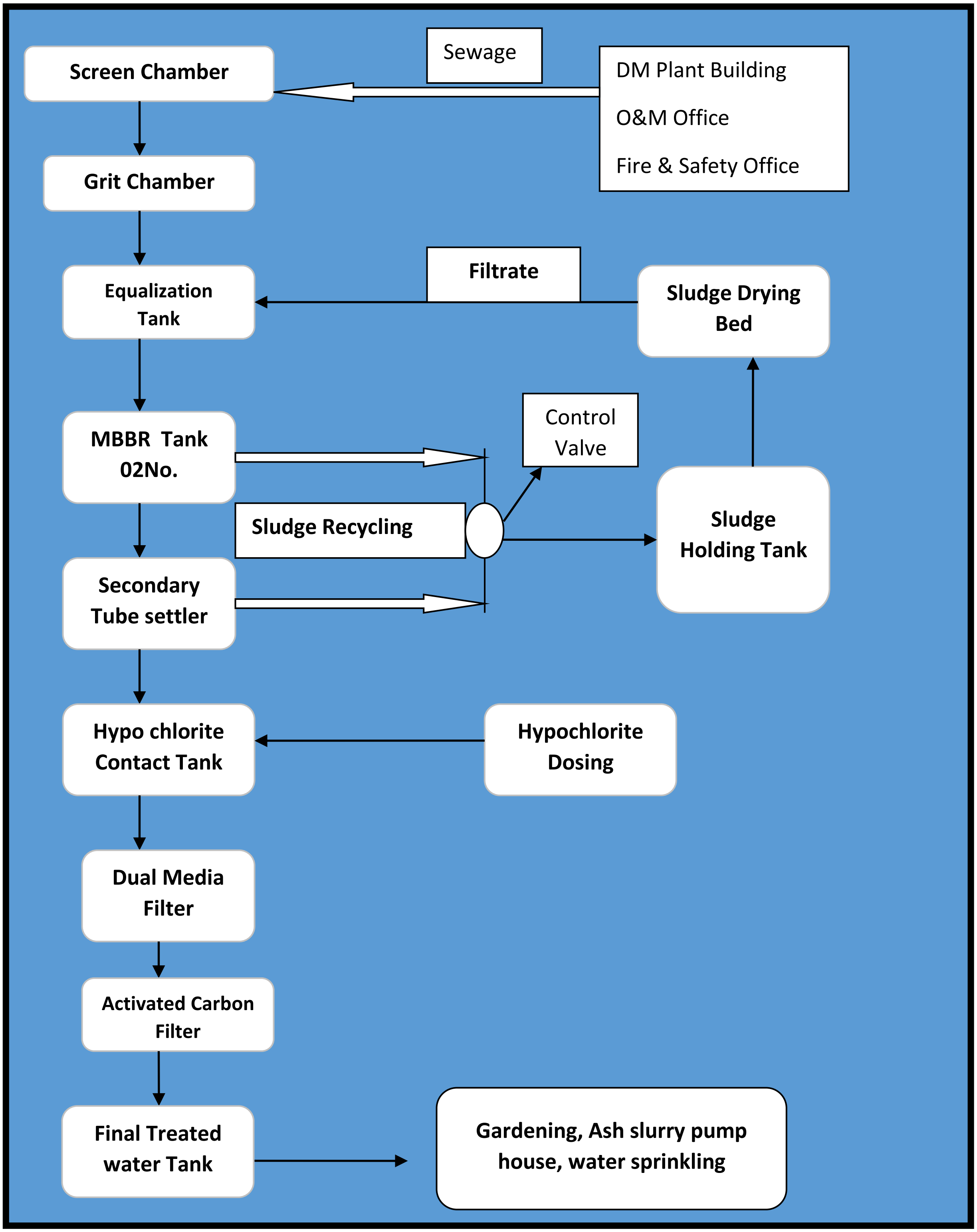
**Treatment Scheme:**

The process flow diagram of STP is presented in Figure 6.14.

**Primary Treatment:** Raw sewage generated is passed through screen chamber. Bar screens has been provided for removing any type of floatable matter in the raw sewage which is being scrapped out and collected in drums. Clear sewage is being collected in **equalization/collection tank** for equalizing the sewage. Aeration grids has been provided for mixing purpose. Equalized sewage is being pumped to MBBR tank for further treatment.

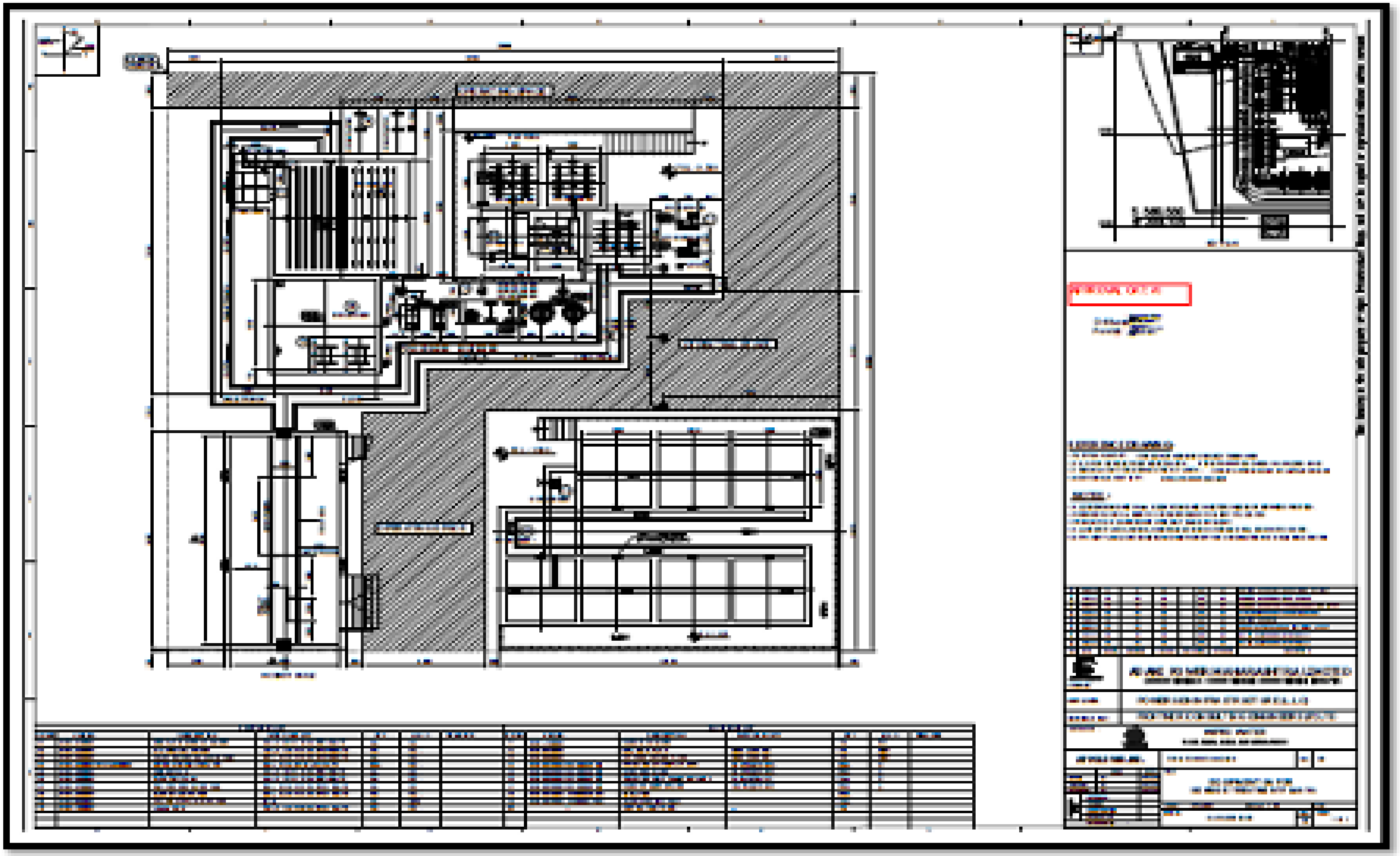
**Secondary Treatment:** The **Moving Bed Bio-film Reactor (MBBR)** had been filled with specified quantity of bio media made of light weight plastic material to enhance the surface area for bio-growth. Oxygen required for the bacterial growth is being supplied through Fine Bubble Diffuser Systems. The system envisages better oxygen transfer because of fine bubbles and increased contact with the sewage. The overflow from MBBR tank is gravitating to Secondary Tube Settler for solid – liquid separation. The tube settler has been provided to increase surface area. This unit has been provided to arrest the sludge from leaving the system. The arrested sludge is being pumped backed to the MBBR tank to maintain the growth of biomass in system and excess sludge is being taken to the **Sludge Holding tank.** Collected sludge is being pumped to the **sludge drying bed**. Filtrate from drying bed is being taken to the equalization cum collection tank. Clear overflow from tube settler is gravitated to further tertiary treatment. Dried sludge is being used as manure.

## FIGURE 6.14: PROCESS FLOW DIAGRAM FOR STP



**<u>Tertiary Treatment:</u>** Over flow from the tube settler is being gravitated to **chlorine contact tank** where provision has been made for hypochlorite dosing as required for disinfection. Dosing is being done by pumping. Treated sewage is being pumped to dual media filter and then to **pressure sand filter** followed by **activated carbon filter**. Treated sewage from carbon filter is being fed to final treated tank and then this treated water is being used for gardening and flushing. The P&I diagram of STP is presented in Figure 6.15.

FIGURE 6.15: P&I DIAGRAM OF STP AT TIRODA TPP



## 6.5 CHARACTERISTICS OF TREATED WASTEWATER

Sample is being taken manually at the outlet and tested in the Environmental Laboratory for parameters viz., pH, suspended solids, oil & grease content, BOD, COD, etc. as per requirement of MPCB. Necessary sampling ports with bib-cock have been provided at both discharge headers of the central monitoring basin outlet pumps. At the inlet of Central monitoring basin provision has been made for acid and alkali dosing for pH correction. The characteristic of treated effluent is presented in Table 6.15 & 6.16.

**TABLE 6.15: WASTEWATER CHARACTERISTICS OF TTPP – TREATED EFFLUENT WATER (OUTLET)**

| Sl. No. | Parameters | Unit | MPCB Limit | Month of Sampling | | |
|---|---|---|---|---|---|---|
| | | | | Mar | Jun | Sep |
| 1 | pH value at 25$^0$C | - | 5.5-9.0 | 7.85 | 7.80 | 7.55 |
| 2 | TSS | mg/l | 100 | 20 | 22 | 18 |
| 3 | TDS | mg/l | 2100 | 654 | 320 | 130 |
| 4 | COD | mg/l | 250 | 124.5 | 118.3 | 52.5 |
| 5 | BOD at 27$^0$C for 3 days | mg/l | 100 | 17.4 | 16.5 | 9.4 |
| 6 | Oil & Grease | mg/l | 10 | <4 | <4 | <4 |
| 7 | Copper (as Cu) | mg/l | - | - | 0.012 | <0.010 |
| 8 | Iron (as Fe) | mg/l | - | - | 0.27 | 0.20 |
| 9 | Manganese (as Mn) | mg/l | - | - | 0.12 | 0.05 |
| 10 | Mercury (as Hg) | mg/l | - | - | <0.001 | <0.001 |
| 11 | Cadmium (as Cd) | mg/l | - | - | <0.001 | <0.001 |
| 12 | Selenium (as Se) | mg/l | - | - | 0.011 | 0.010 |
| 13 | Arsenic (as As) | mg/l | - | - | <0.01 | <0.01 |
| 14 | Cyanide (as CN) | mg/l | - | - | <0.005 | <0.005 |
| 15 | Lead (as Pb) | mg/l | - | - | <0.001 | <0.001 |
| 16 | Zine (as Zn) | mg/l | - | - | 3.2 | 2.3 |
| 17 | Total Chromium (as Cr) | mg/l | - | - | 0.014 | 0.011 |

* Sampling Period: 2016-17

### TABLE 6.16: CHARACTERISTICS OF TREATED WATER - STILLING CHAMBER (OUTLET)

| Sl. No. | Parameters | Unit | MPCB Limit | Month of Sampling | | |
|---|---|---|---|---|---|---|
| | | | | Mar | Jun | Sep |
| 1 | pH value at $25^0$C | - | 5.5-9.0 | 6.85 | 6.9 | 6.8 |
| 2 | TSS | mg/l | 100 | 34 | 40 | 36 |
| 3 | TDS | mg/l | 2100 | 682 | 640 | 622 |
| 7 | Copper (as Cu) | mg/l | 3 | 0.054 | 0.038 | 0.032 |
| 8 | Iron (as Fe) | mg/l | 3 | 0.41 | 0.35 | 0.30 |
| 9 | Manganese (as Mn) | mg/l | 2 | 0.011 | 0.18 | 0.15 |
| 10 | Mercury (as Hg) | mg/l | 0.05 | <0.001 | <0.001 | <0.001 |
| 11 | Cadmium (as Cd) | mg/l | 2 | 0.011 | 0.010 | 0.010 |
| 12 | Selenium (as Se) | mg/l | 0.05 | 0.018 | 0.015 | 0.012 |
| 13 | Arsenic (as As) | mg/l | 0.2 | 0.043 | 0.036 | 0.027 |
| 14 | Cyanide (as CN) | mg/l | 0.2 | <0.005 | <0.005 | <0.005 |
| 15 | Lead (as Pb) | mg/l | 0.1 | 0.012 | 0.010 | 0.010 |
| 16 | Zine (as Zn) | mg/l | 5 | 5.1 | 4.8 | 3.7 |
| 17 | Total Chromium (as Cr) | mg/l | 2 | 0.046 | 0.037 | 0.026 |

* Sampling Period: 2016-17

The treated effluent quality at CMB is being also monitored through on-line continuous quality monitoring system (CEQMS). The monthly variation in treated effluent quality of ETP is presented in Table 6.17.

### TABLE 6.17: MONTHLY VARIATION OF CHARACTERISTICS OF TREATED EFFLUENT (ETP OUTLET)

| Month of Sampling | Parameters | | | | |
|---|---|---|---|---|---|
| | pH | BOD (3 days at 27 ◦c) | COD | Oil & Grease | TSS |
| **Permissible Limits** | **(5.5-9.0)** | **30 mg/l** | **250 mg/l** | **10 mg/l** | **100mg/l** |
| Jan | 8.1 | 8 | 56 | <3 | 60 |
| Feb | 8.1 | 8 | 56 | <2 | 70 |
| Mar | 7.9 | 16 | 72 | < 4 | 70 |
| Apr | 7.8 | 20 | 60 | <4 | 60 |
| May | 8.6 | 8 | 20 | <4 | 90 |
| Jun | 7.9 | 12 | 64 | <4 | 30 |
| July | 7.9 | 12 | 56 | <4 | 40 |
| Aug | 8.4 | 18 | 88 | <3 | 28 |
| Sep | 8.1 | 10 | 78 | 4.5 | 50 |
| Oct | 7.3 | 17 | 80 | 4.1 | 70 |
| Nov | 8.3 | 10 | 60 | 4.2 | 30 |

* Sampling Period: 2016-17

The treated wastewater is being reused for CHP dust Suppression System and balance effluent, if any, is being disposed to ash slurry sump and zero discharge condition is being maintained.

The characteristics of treated wastewater and the extent of deviation from the waste water discharge standards prescribed by MPCB are presented in Table 6.18. The analysis reveals that the pollutant load in treated wastewater is well within the prescribed limits.

### TABLE 6.18: ASSESSMENT OF COMPLIANCE OF WASTEWATER DISCHARGE STANDARD

| Sl. No. | Parameters | Permissible Limit | Pollutant Concentration at Outlet of ETP | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | I | %D | II | %D | III | %D |
| 1 | pH | 5.5-9.0 | 7.85 | * | 7.8 | * | 7.55 | * |
| 2 | BOD 3 days 27$^{O}$C: mg/l | 30 | 17.4 | * | 16.5 | * | 9.4 | * |
| 3 | COD, mg/l | 250 | 124.5 | * | 118.3 | * | 52.5 | * |
| 4 | TSS, mg/l | 100 | 20 | * | 22 | * | 18 | * |
| 5 | TDS, mg/l | 2100 | 654 | | 320 | * | 130 | * |
| 6 | Oil and Grease, mg/l | 10 | <4 | * | <4 | * | <4 | * |

Period of Sampling: I – Mar, 2016, II –June, 2016; III – Sep, 2016

* indicates that the concentration is within maximum permissible limit; %D: Percentage deviation with respect to maximum permissible limit

Separate energy meter have been provided to track the energy consumption of ETP. Status of monthly electricity consumption of ETP is presented in Table 6.19.

### TABLE 6.19: STATUS OF ELECTRICITY CONSUMPTION OF ETP

| Months | Electricity Consumption (kWh) |
|---|---|
| January | 111.8 |
| February | 104.0 |
| March | 134.2 |
| April | 153.6 |
| May | 91.9 |
| June | 91.2 |
| July | 88.1 |
| August | 94.5 |
| September | 98.2 |
| October | 82 |
| November | 166.2 |
| December | - |
| **Total** | **1215.7** |

* Sampling Period: 2016-17

Characteristics of Treated Sewage is presented in Table 6.20-6.21.

### TABLE 6.20: CHARACTERISTICS OF TREATED SEWAGE AT STP-I

| Sl. No. | Parameters | Unit | MPCB Limit | Month of Sampling | | |
|---|---|---|---|---|---|---|
| | | | | Mar | Jun | Sep |
| 1 | pH value at 25$^{0}$C | - | - | 7.35 | 7.30 | 7.25 |
| 2 | TSS | mg/l | 500 | 22 | 18 | 22 |
| 3 | TDS | mg/l | 2100 | 204 | 180 | 294 |
| 4 | Dissolved Oxygen | | > 4.0 | 5.7 | 5.6 | 5.2 |
| 5 | COD | mg/l | 100 | 53.5 | 48.8 | 68.6 |
| 6 | BOD at 27$^{0}$C for 3 days | mg/l | 30 | 11.8 | 10.2 | 16.3 |
| 7 | Oil & Grease | mg/l | 10 | <4 | <4 | <4 |

* Sampling Period: 2016-17

### TABLE 6.21: CHARACTERISTICS OF TREATED SEWAGE AT STP-II

| Sl. No. | Parameters | Unit | MPCB Limit | Month of Sampling | | |
|---|---|---|---|---|---|---|
| | | | | Mar | Jun | Sep |
| 1 | pH value at 25$^{0}$C | - | - | 7.55 | 7.40 | 7.10 |
| 2 | TSS | mg/l | 500 | 20 | 16 | 10 |
| 3 | TDS | mg/l | 2100 | 374 | 260 | 358 |
| 4 | Dissolved Oxygen | | > 4.0 | 5.5 | 5.6 | 5.7 |
| 5 | COD | mg/l | 100 | 56.8 | 51.4 | 27.5 |
| 6 | BOD at 27$^{0}$C for 3 days | mg/l | 30 | 12.4 | 11.7 | 6.4 |
| 7 | Oil & Grease | mg/l | 10 | <4 | <4 | <4 |

* Sampling Period: 2016-17

The monthly variations of characteristics of treated domestic wastewater at main plant STP-I and II are presented in Table 6.22-6.23. The analysis reveals that the treated effluent quality of domestic wastewater is well within the prescribed limits of MPCB.

### TABLE 6.22: MONTHLY VARIATIONS IN CHARACTERISTICS OF TREATED SEWAGE AT STP-I

| Sampling Period | Parameters | | |
|---|---|---|---|
| | BOD (3 days at 27 ◦c) | COD | TSS |
| **Permissible Limits** | **30 mg/l** | **250 mg/l** | **500mg/l** |
| Jan | 12 | 28 | 20 |
| Feb | 8 | 20 | 20 |
| Mar | 24 | 32 | 10 |
| Apr | 8 | 12 | 20 |
| May | 12 | 20 | 10 |
| Jun | 12 | 32 | 20 |
| July | 16 | 66 | 20 |
| Aug | 8 | 42 | 20 |
| Sep | 10 | 39 | 35 |
| Oct | 18 | 65 | 30 |
| Nov | 16 | 34 | 27 |

### TABLE 6.23: MONTHLY VARIATIONS IN CHARACTERISTICS OF TREATED SEWAGE AT STP-II

| Sampling Period | Parameters | | |
|---|---|---|---|
| | BOD (3 days at 27 ◦c) | COD | TSS |
| **Permissible Limits** | **30 mg/l** | **250 mg/l** | **500 mg/l** |
| Jan | 8 | 20 | 40 |
| Feb | 10 | 40 | 10 |
| Mar | 8 | 40 | 10 |
| Apr | 24 | 80 | 30 |
| May | 8 | 20 | 20 |
| Jun | 16 | 24 | 30 |
| July | 10 | 72 | 22 |
| Aug | 4 | 40 | 22 |
| Sep | 8 | 59 | 20 |
| Oct | 14 | 68 | 20 |
| Nov | 14 | 42 | 35 |

* Sampling Period: 2016-17

The long term trend of monthly variations of characteristics of treated domestic wastewater at main plant STP-I and II are presented in Table 6.24-6.29. The analysis reveals that the treated effluent quality of domestic wastewater is well within the prescribed limits of MPCB (Figure 6.16-6.25).

## TABLE 6.24: MONTHLY VARIATIONS IN CHARACTERISTICS OF TREATED SEWAGE AT STP -1

| Parameter | Unit | MPCB Standards | Jan-18 | Feb-18 | Mar-18 | Apr-18 | May-18 | Jun-18 | Jul-18 | Aug-18 | Sep-18 | Oct-18 | Nov-18 | Dec-18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| pH Value | -- | 5.5-9.0 | 7.7 | 7.7 | 8 | 7.33 | 7.4 | 7.5 | 7.7 | 7.6 | 7.4 | 7.3 | 7.1 | 7.1 |
| TSS | mg / l | 500 | 24 | 38 | 38 | 24 | 34 | 36 | 44 | 68 | 20 | 56 | 52 | 64 |
| TDS | mg / l | 2100 | 278 | 354 | 308 | 232 | 222 | 320 | 316 | 176 | 160 | 220 | 266 | 275 |
| COD | mg / l | 100 | 29.4 | 50 | 39.5 | 50 | 60 | 68.6 | 40 | 50 | 40 | 50 | 60 | 40 |
| BOD at 27$^{0}$C for 3 days | mg / l | 30 | 10 | 11 | 8 | 15 | 12 | 12 | 10 | 14 | 15 | 11 | 11 | 10 |

## TABLE 6.25: MONTHLY VARIATIONS IN CHARACTERISTICS OF TREATED SEWAGE AT STP -2

| Parameter | Unit | MPCB Standards | Jan-18 | Feb-18 | Mar-18 | Apr-18 | May-18 | Jun-18 | Jul-18 | Aug-18 | Sep-18 | Oct-18 | Nov-18 | Dec-18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| pH Value | -- | 5.5-9.0 | 7.8 | 7.5 | 7.5 | 7.5 | 7.5 | 7.3 | 7.5 | 7.3 | 7.5 | 7.2 | 7.6 | 7.6 |
| TSS | mg / l | 500 | 32 | 44 | 34 | 36 | 42 | 42 | 46 | 52 | 40 | 54 | 36 | 36 |
| TDS | mg / l | 2100 | 254 | 422 | 318 | 344 | 368 | 292 | 332 | 288 | 268 | 174 | 292 | 312 |
| COD | mg / l | 100 | 39.2 | 60 | 30 | 40 | 70 | 88 | 80 | 40 | 30 | 20 | 70 | 20 |
| BOD at 27$^{0}$C for 3 days | mg / l | 30 | 11 | 10 | 11 | 17 | 13 | 14 | 11 | 12 | 19 | 14 | 12 | 7 |

## TABLE 6.26: MONTHLY VARIATIONS IN CHARACTERISTICS OF TREATED SEWAGE AT STP -1

| Parameter | Unit | MPCB Standards | Jan-19 | Feb-19 | Mar-19 | Apr-19 | May-19 | Jun-19 | Jul-19 | Aug-19 | Sep-19 | Oct-19 | Nov-19 | Dec-19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| pH Value | -- | 5.5-9.0 | 7.6 | 7.3 | 7.2 | 7.4 | 7.4 | 7.8 | 7.1 | 7.2 | 7.5 | 7.1 | 7.5 | 7.4 |
| TSS | mg / l | 50 | 56 | 72 | 48 | 36 | 28 | 34 | 52 | 32 | 34 | 23 | 39 | 27 |
| TDS | mg / l | 2100 | 312 | 376 | 396 | 388 | 256 | 220 | 266 | 342 | 431 | 186 | 310 | 299 |
| COD | mg / l | 100 | 40 | 58 | 46 | 42 | 32 | 42 | 60 | 50 | 60 | 32 | 58 | 59 |
| BOD at 27$^{0}$C for 3 days | mg / l | 30 | 12 | 13 | 12.5 | 14 | 10 | 12 | 11 | 14 | 15 | 16 | 17 | 10 |

## TABLE 6.27: MONTHLY VARIATIONS IN CHARACTERISTICS OF TREATED SEWAGE AT STP-02

| Parameter | Unit | MPCB Standards | Jan-19 | Feb-19 | Mar-19 | Apr-19 | May-19 | Jun-19 | Jul-19 | Aug-19 | Sep-19 | Oct-19 | Nov-19 | Dec-19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| pH Value | -- | 5.5-9.0 | 7.8 | 7.7 | 7.3 | 7.7 | 7.2 | 7.4 | 7.6 | 7.3 | 7.1 | 7.3 | 7.3 | 7 |
| TSS | mg / l | 50 | 32 | 44 | 36 | 32 | 37 | 46 | 36 | 34 | 24 | 41 | 26 | 40 |
| TDS | mg / l | 2100 | 568 | 280 | 272 | 420 | 292 | 248 | 292 | 373 | 178 | 233 | 355 | 233 |
| COD | mg / l | 100 | 50 | 29 | 58 | 56 | 41 | 54 | 70 | 40 | 30 | 54 | 38 | 68 |
| BOD at 27$^{0}$C for 3 days | mg / l | 30 | 11 | 10 | 14 | 19 | 11 | 14 | 12 | 11 | 16 | 12 | 20 | 12 |

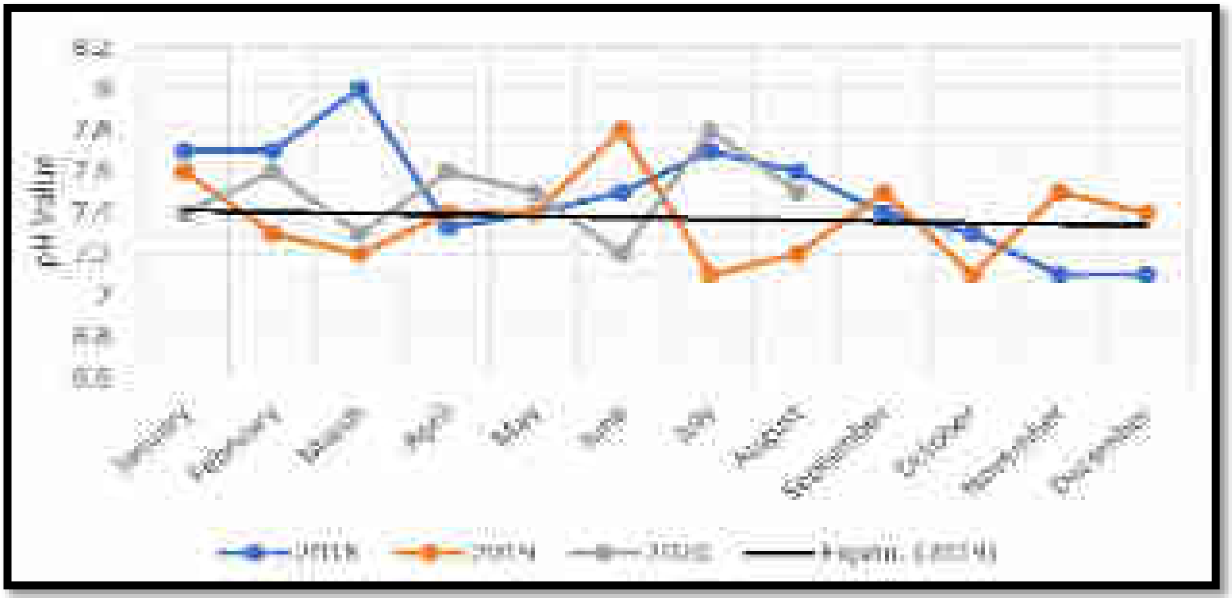
## TABLE 6.28: MONTHLY VARIATIONS IN CHARACTERISTICS OF TREATED SEWAGE AT STP -1

| Parameter | Unit | MPCB Standards | Jan-20 | Feb-20 | Mar-20 | Apr-20 | May-20 | Jun-20 | Jul-20 | Aug-20 | Sep-20 | Oct-20 | Nov-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| pH Value | -- | 5.5-9.0 | 7.4 | 7.6 | 7.3 | 7.6 | 7.5 | 7.2 | 7.8 | 7.5 | --- | --- | --- |
| TSS | mg / l | 500 | 27 | 19 | 20 | 25 | 19 | 38 | 11 | 26 | 25 | 16 | 17 |
| TDS | mg / l | 2100 | 303 | 260 | 249 | 301 | 294 | 358 | 350 | 207 | --- | --- | --- |
| COD | mg / l | 100 | 48 | 40 | 50 | 55 | 50 | 40 | 58 | 50 | 40 | 30 | 28 |
| BOD at $27^0$C for 3 days | mg / l | 30 | 17 | 14 | 19 | 24 | 18 | 17 | 20 | 22 | 14 | 18 | 12 |

## TABLE 6.29: MONTHLY VARIATIONS IN CHARACTERISTICS OF TREATED SEWAGE AT STP-02

| Parameter | Unit | MPCB Standards | Jan-20 | Feb-20 | Mar-20 | Apr-20 | May-20 | Jun-20 | Jul-20 | Aug-20 | Sep-20 | Oct-20 | Nov-20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| pH Value | -- | 5.5-9.0 | 7.5 | 7.4 | 7.4 | 7.5 | 7.7 | 7.3 | 7.7 | 7.4 | --- | --- | --- |
| TSS | mg / l | 500 | 39 | 15 | 34 | 68 | 36 | 33 | 41 | 18 | 16 | 21 | 31 |
| TDS | mg / l | 2100 | 224 | 319 | 306 | 244 | 271 | 215 | 282 | 197 | --- | --- | --- |
| COD | mg / l | 100 | 65 | 30 | 40 | 78 | 40 | 48 | 50 | 60 | 20 | 50 | 48 |
| BOD at $27^0$C for 3 days | mg / l | 30 | 15 | 11 | 16 | 13 | 15 | 14 | 10 | 24 | 11 | 16 | 19 |

## FIGURE 6.16: MONTHLY VARIATIONS IN CHARACTERISTICS OF TREATED SEWAGE AT STP 1 - pH



## FIGURE 6.17: MONTHLY VARIATIONS IN CHARACTERISTICS OF TREATED SEWAGE AT STP 2 - pH

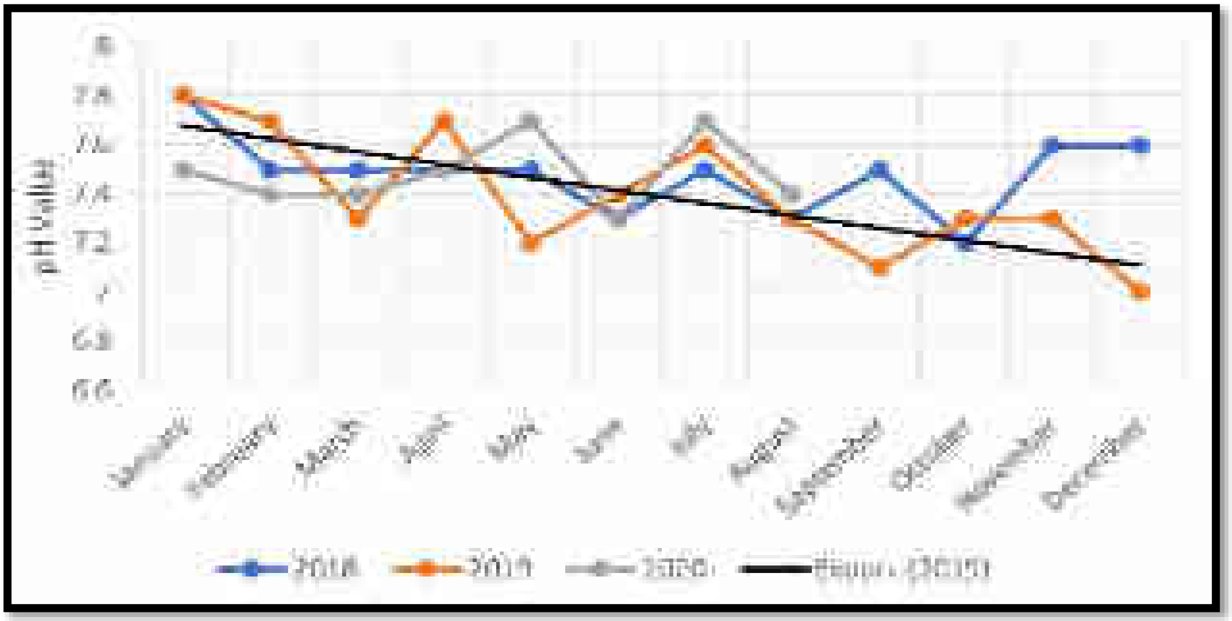


FIGURE 6.18: MONTHLY VARIATIONS IN CHARACTERISTICS OF TREATED SEWAGE AT STP 1 – TSS (mg/l)

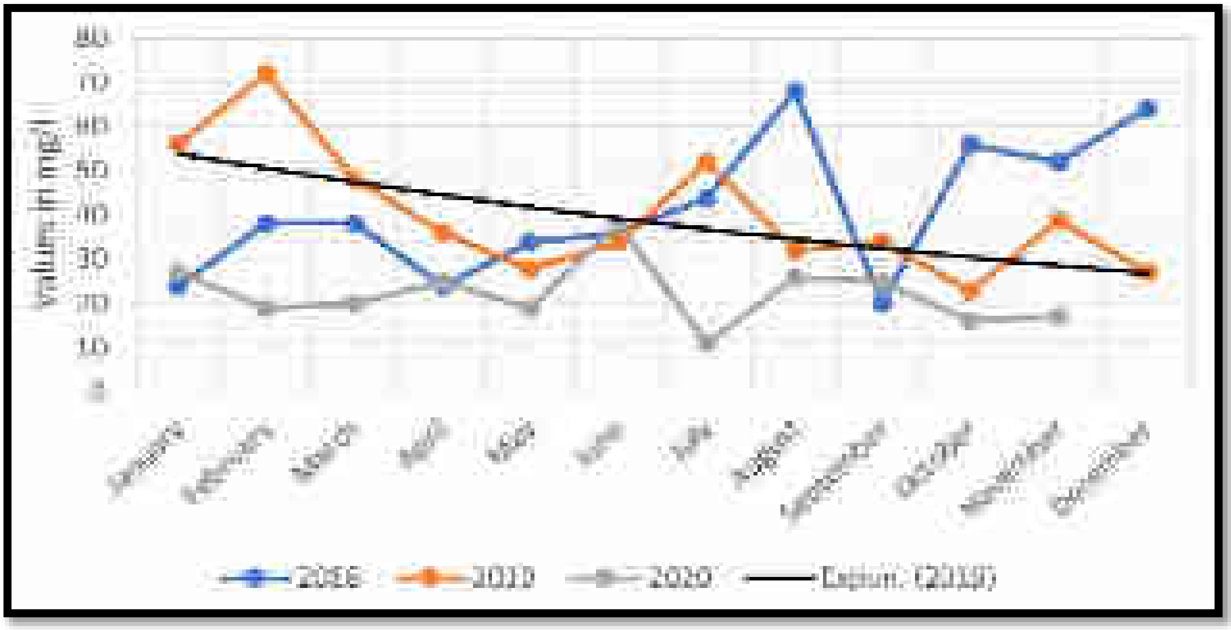


FIGURE 6.19: MONTHLY VARIATIONS IN CHARACTERISTICS OF TREATED SEWAGE AT STP 2 – TSS (mg/l)

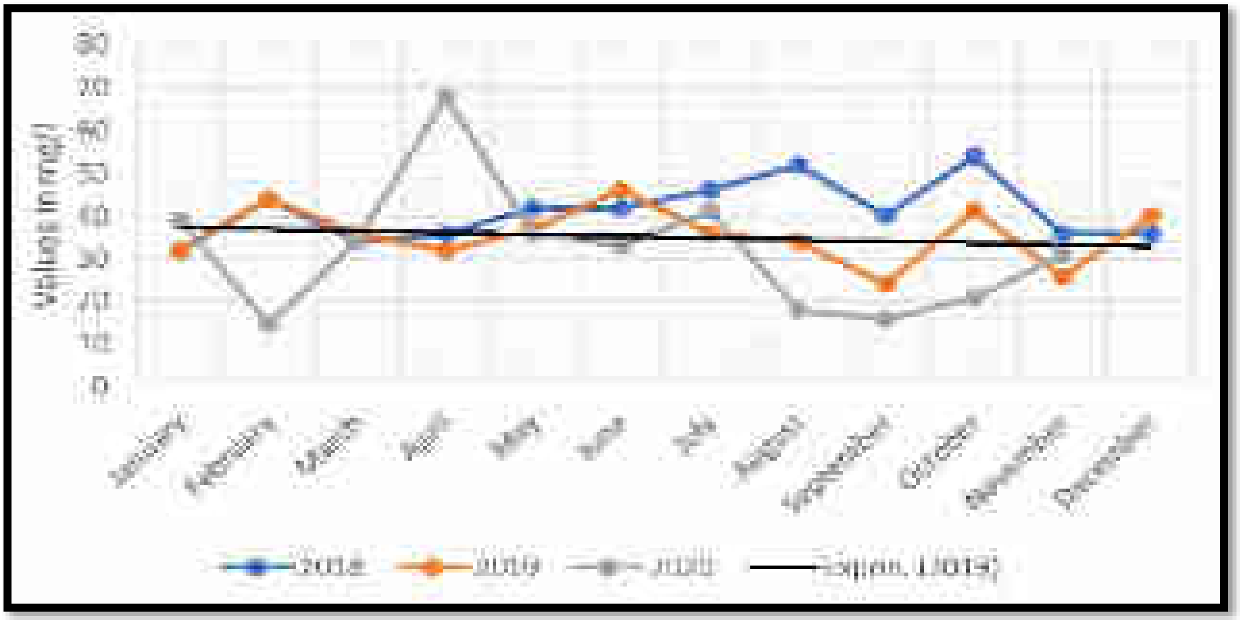


FIGURE 6.20: MONTHLY VARIATIONS IN CHARACTERISTICS OF TREATED SEWAGE AT STP 1 – TDS (mg/l)

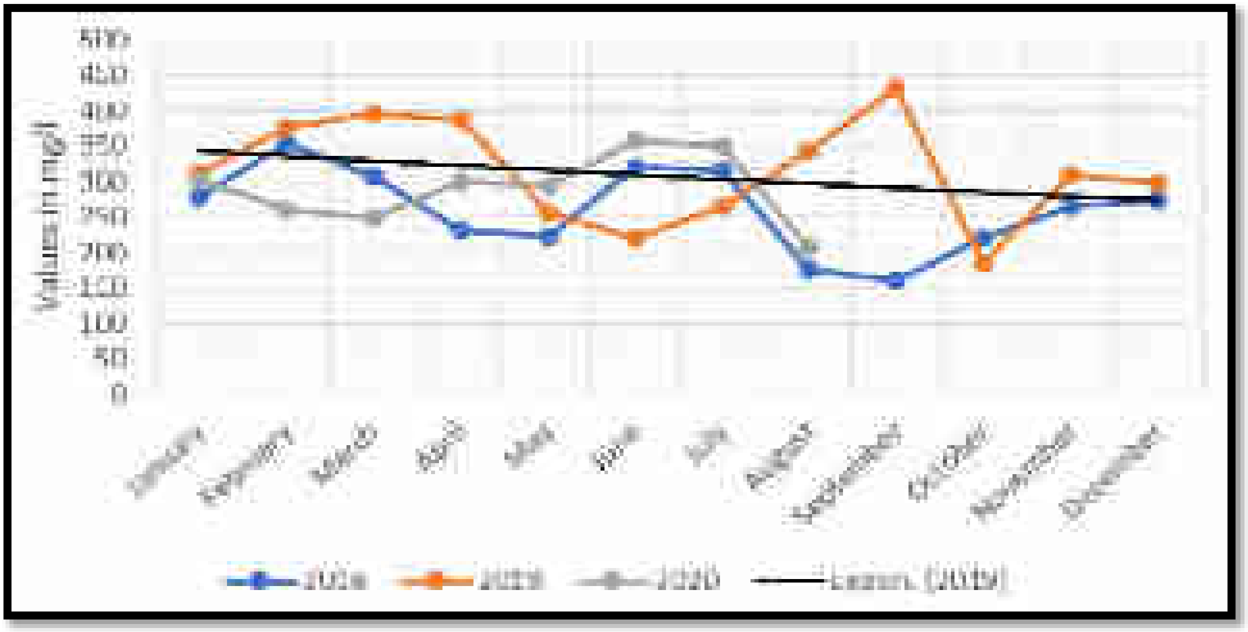


FIGURE 6.21: MONTHLY VARIATIONS IN CHARACTERISTICS OF TREATED SEWAGE AT STP 2 – TDS (mg/l)

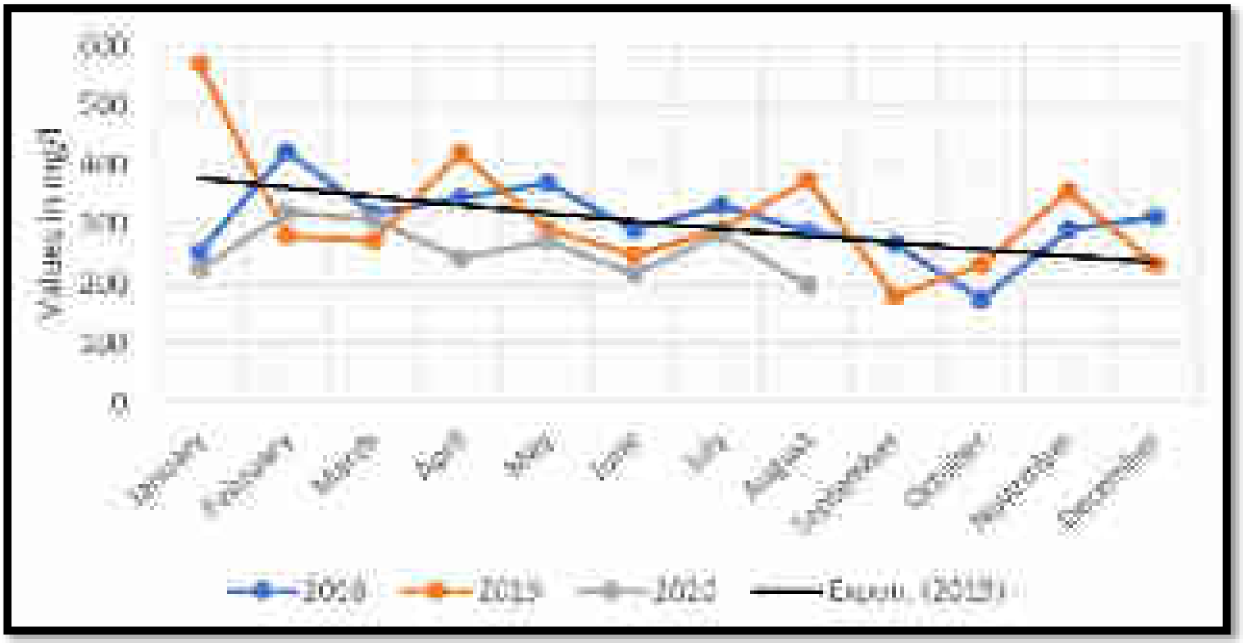


FIGURE 6.22: MONTHLY VARIATIONS IN CHARACTERISTICS OF TREATED SEWAGE AT STP 1 – COD(mg/l)

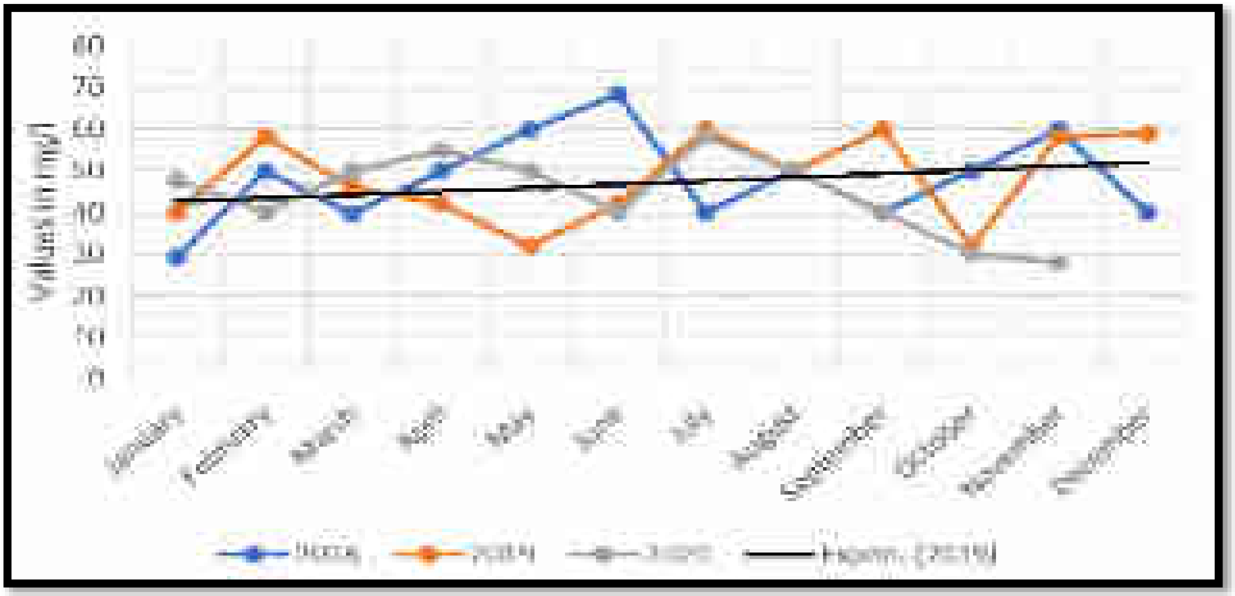
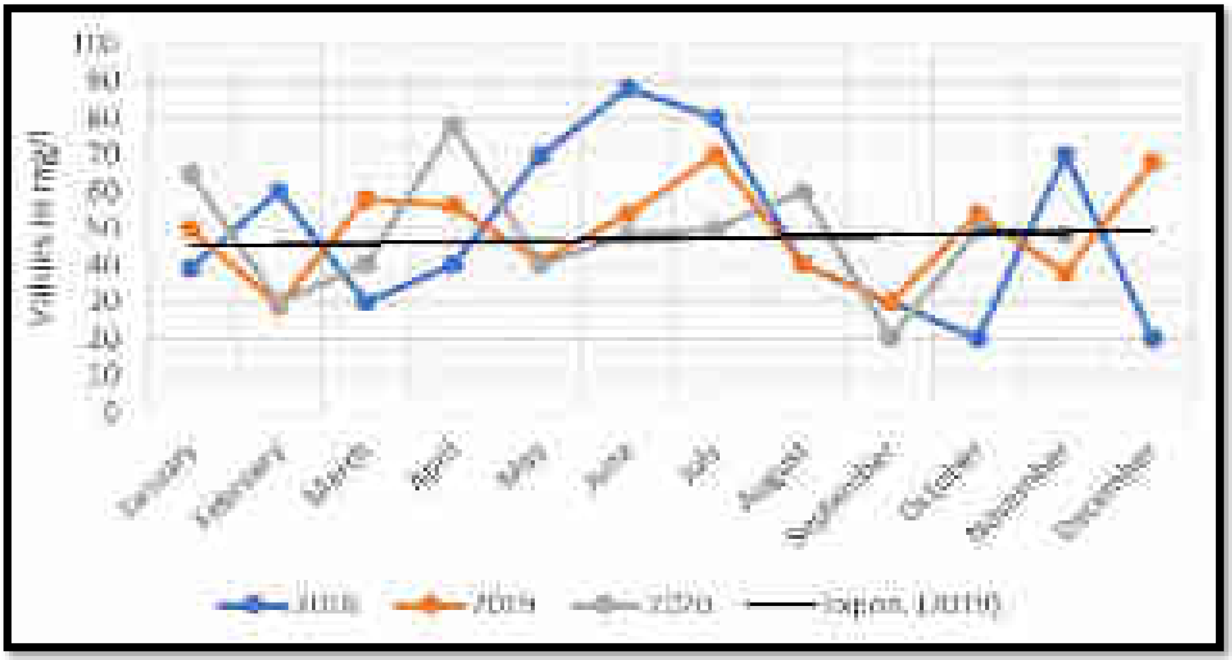
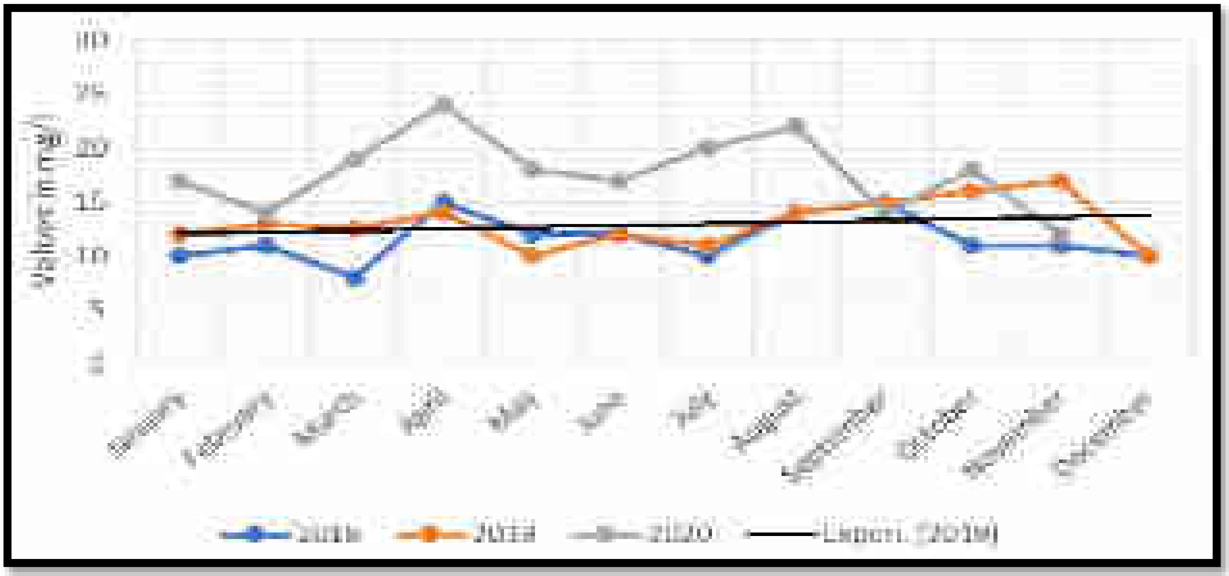


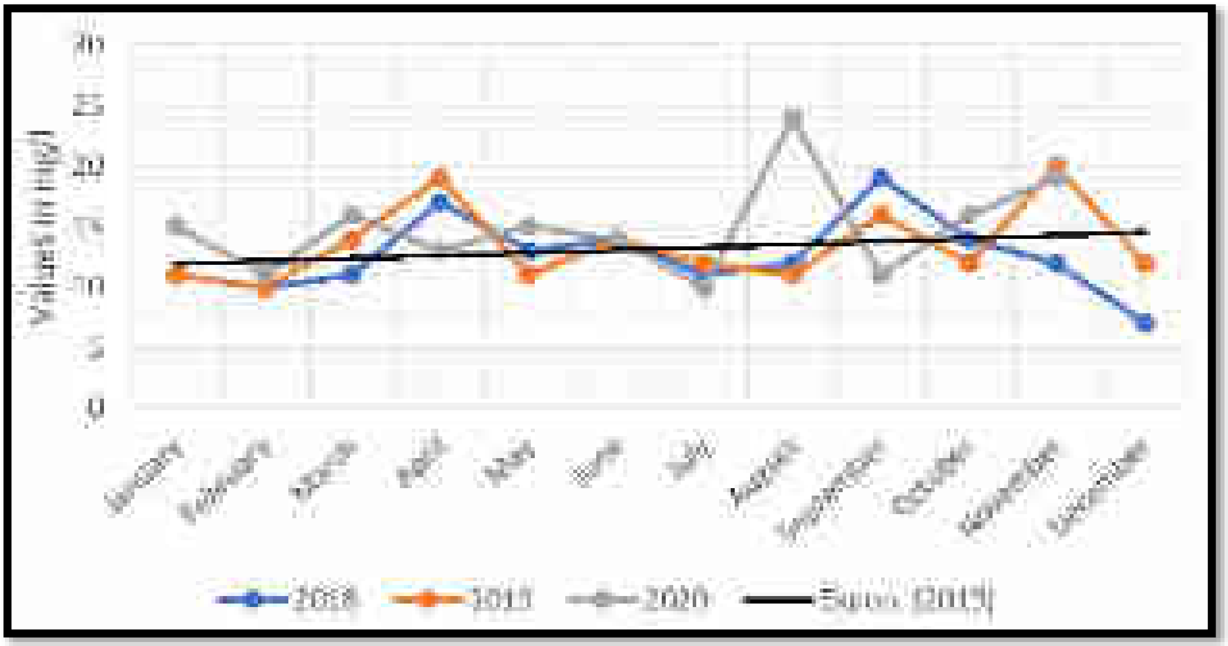
FIGURE 6.23: MONTHLY VARIATIONS IN CHARACTERISTICS OF TREATED SEWAGE AT STP 2 – COD(mg/l)



## FIGURE 6.24: MONTHLY VARIATIONS IN CHARACTERISTICS OF TREATED SEWAGE AT STP 1 – BOD(mg/l)



## FIGURE 6.25: MONTHLY VARIATIONS IN CHARACTERISTICS OF TREATED SEWAGE AT STP 2 – BOD(mg/l)



Separate energy meters have been provided to track the energy consumption of both the STPs. Status of electricity consumption of STPs is presented in Table 6.30.

### TABLE 6.30: STATUS OF ELECTRICITY CONSUMPTION OF STP

| Months | Electricity Consumption (in kWh) | | |
|---|---|---|---|
| | STP1 (I/C1) | STP2 (I/C2) | Total |
| January | 210.2 | - | 210.2 |
| February | 297.7 | | 297.7 |
| March | 184 | | 184 |
| April | 0.086 | 179.2 | 179.3 |
| May | 2.28 | 213.4 | 215.7 |
| June | 0.853 | 216 | 216.9 |
| July | - | 206 | 206.0 |
| August | - | 215 | 215.0 |
| September | - | 199 | 199.0 |
| October | 0.496 | 207 | 207.5 |
| November | - | 227 | 227.0 |
| **Total** | | | **2357.8** |

*STP Energy Meter Installed since April2016; * Sampling Period: 2016-17

Recommendations to improve water/wastewater management at TTPP include: water flow measurement/ quantification at strategic locations such as inlet, outlet and recirculation lines. STP within the plant being utilize for treating the domestic waste being generated from canteen, administrative building and other service area of the plant. Maintenance of recovery of ash water and reuse in ash handling/ other uses should be prioritized.

# 7.0 RECYCLING & REUSE OF WASTEWATER

Tiroda TPP have adopted various measures for recycling and reuse of wastewater for enhancing the efficiency of water use as well as minimization of freshwater consumption besides maintaining the zero liquid discharge (ZLD). The prime measures which have been adopted for the purpose are discussed in subsequent sections.

## 7.1 WATER CONSERVATION MEASURES

The use of high volumes of water in the thermal power plants necessitates undertaking water conservation measures. A precursor to undertaking these is a systematic water audit and quantifying water flows at each pumping station and drawing up a water balance. Water audits facilitate in quantifying the inflows and outflows, the losses or wastage which can be optimised by taking appropriate water conservation measures. The following measures have been undertaken for conserving water in Tiroda TPP:

a. **Increasing Cycles of Concentration (COC):** Maximum water loss in the thermal power plants occurs in the cooling towers, in the form of evaporation. Make up water is provided to compensate for this evaporation loss, the blow down losses and drift losses. There is a requirement of 135 $m^3$/hr cooling water flow to the condenser to generate 1 MW. The expected evaporation ratio for every 1 MW of power generation is 2.0 $m^3$/hr. Since the water is circulated many times in the closed loop, the concentration of dissolved solids increases over a period of time. The cycles of concentration (COC) is the ratio of dissolved solids in the circulating water to the make-up water. Cooling towers of Tiroda TPP are designed for a COC of around 5.5. By increasing COC, the blow down quantity can be reduced by external water treatment and adding water treatment chemicals, COC of 6 and even more can be reached Increasing COC results in significant saving of water in TPPs.

b. **Optimising ash-water ratio**: Around 45-50 per cent of the total water use is consumed in ash handling. Using the condenser outlet water instead of freshwater reduces the intake of freshwater. Bottom ash and fly ash is flushed by high pressure water while low pressure water is used for ash hopper filling. Bottom ash and fly ash can be handled separately or together by mixing in a common pit. The ash slurry is then evacuated by a series of ash slurry disposal pumps to an ash dyke. Typical design ash water ratios are around 1:5 for fly ash and 1:8 for bottom ash. However, in the Tiroda TPP the actual ash water ratio of 1:5 is being maintained for bottom ash disposal and high concentration disposal system (HCDS) for fly ash to reduce the dilution of ash slurry resulting in energy conservation as well as water conservation. For every percent reduction of ash water ratio, there is a saving potential of 180 to 200 m3/hr of water required for ash disposal in Tiroda TPP.

c. **Recycling ash water from the ash dyke:** Once the ash gets settled in the dykes, the decanted water can be recycled and re-used for ash handling purpose after minor treatment. Accordingly, ash water recovery system has been installed and operational. Presently AWRS is operational with 60% ash water recovery efficiency which can be enhanced upto 70% recovery efficiency by effective maintenance of collection and treatment system along with minimization of leakages and other losses during collection and transportation of the same.

d. **Using air cooled condensers:** in water scarce areas. A typical 660 MW unit requires approx. 18 MCM of water per year with water cooled condenser. This requirement can be brought down to only 3 MCM with air cooled condenser. However, there is a corresponding 12 per cent increase in capital costs in using air cooled condenser. There are two types of air cooled condenser are available based on means of draft creation - mechanical and natural draft air cooled condenser. Accordingly, the possibility of using air cooled condensers in Tiroda TPP may also be explored.

e. **Reducing leaks and over-flows:** Leakages from valves, taps, fire fighting hoses, underground fire fighting lines, cooling tower basin, gardening hoses area also a source of water loss. Overflows from cooling towers of AC plants, and overhead tanks due to non-functioning of float systems are also a common feature in thermal power plants. There lies a possibility of reducing the water consumption by plugging the leakages.

f. **Wastewater recycling:** Studies across various power plants have indicated a high per capita availability of water. A 25 per cent reduction in the running hours for the water pumps may reduce the overuse of water. The pumps also operate at lower efficiencies as compared to their design values. The corresponding problem with overuse of water lies in the high amount of wastewater generated.

The installation and efficient operation of wastewater treatment plants at Tiroda TPP enable recycling 100 per cent of the wastewater generated which are being used for purposes like gardening, green belt development, dust suppression and fire fighting, etc.

## 7.2 RECYCLING/REUSE OF WASTEWATER

Water is one of the key input requirements for thermal power generation. Water security for thermal power plants due to depleting freshwater resources are one of the prime concerns for sustainable power generation and conservation of natural resources. This problem is expected to be aggravated more in future. Thus, there is an urgent need to minimise consumptive water requirement for thermal power plants.

Accordingly various measures have been adopted in Tiroda TPP for recycling/reuse of waste-water for reducing the consumptive use of water as well as to achieve zero liquid discharge. The prime measures being adopted for the purpose in Tiroda TPP are presented in Table 7.1.

**TABLE 7.1: WATER CONSERVATION AND RECYCLING/REUSE PRACTICES ADOPTED AT TTPP**

| Sr. No. | Department | Water Recycling Practices |
|---|---|---|
| 1 | **CHP** | Wastewater from coal settling pit of stacker - I reused in Sprinkling |
| 2 | | DH-1 settling pit for sprinkling |
| 3 | | Wagon Tippler & Track Hopper wastewater reused in Stack Reclaimer - II settling pit for sprinkling |
| 4 | **Operation** | Change of source of water for Mill Reject System from service water to fore bay water |
| 5 | **Environment** | Treated water from STPs reused in green belt maintenance (monthly value take from flow meter). |
| 6 | | Excess water from CTBD reused in water sprinkling on road and civil activities. |
| 7 | **AHP** | Wastewater from ESP vacuum pump reused in AHP at Unit # 4 &5. |
| 8 | **Chemistry** | Ro reject is completely reused in CHP for dust suppression. |
| 9 | | Wastewater from sludge pit of unit 4 & 5 transfer to PTP for reuses. |
| 10 | | Wastewater from DM plant N - pit reused in AHP |
| 11 | | Wastewater (Unit 1 , 2 & 3) PTP being recycled |
| 12 | **AHP** | Seepage water diverted to Stilling chamber |
| | | Ash Dyke Seepage Water Recycled through AWRS system |
| 13 | **Horticulture** | Reuses of CTBD for green belt development |

## 7.3 ASH WATER RE-CIRCULATION SYSTEM

Ash Water Recovery System (AWRS) is established to reduce the quantity of intake raw water. The P&I Diagram of AWRS is presented in Annexure V. Decanted ash water from ash pond is re-circulated to the plant area by using 3x100% capacity pumps through carbon steel pipes from ash dyke to plant area (Figure 7.1).

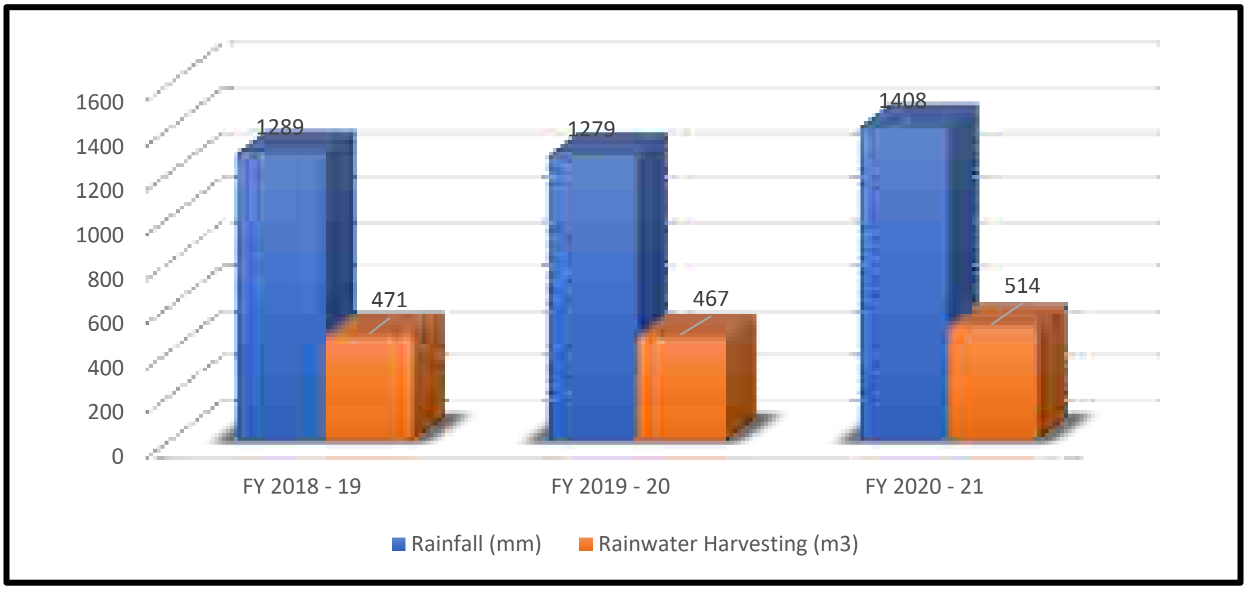
This water is used in the ash handling system of capacity 1200m$^3$/hr. The cycle of concentration is maintained through continuous blow down of ash water from the system. Normal make up to the ash water system is from CW blow down water and CMB discharge water. During ash water recovery the extra water from CT blow down is led to PT clarifier to reduce the quantity of intake raw water.

FIGURE 7.1 : VIEW OF ASH WATER RECOVERY SYSTEM AT TIRODA TPP (5x660 MW)

## 7.4 RAINWATER HARVESTING SYSTEM

Rainwater Harvesting System (RWHS) have been developed at Tiroda TPP. The detail of developed RWHS is presented in Table 7.2. Rainwater Harvesting Structure of Tanks near Shantiniketan Gate, Cooling Tower 3 and Gate No. 2 have the potential of 439.54 $m^3$ ground water recharge. The Rainwater Harvesting trend through Admin Building Pond & Rainwater Structures at Tiroda TPP for 2018-19 to 2020-21 is presented in Figure 7.2. The Rainwater harvesting potential of APML township have been assessed which work out to be 29167 $m^3$ (Table 7.3).

**FIGURE 7.2: RAINWATER HARVESTING THROUGH ADMIN BUIDLING POND & RAINWATER STRUCTURE AT PLANT**



## TABLE 7.2: GROUNDWATER RECHARGE THROUGH RAINWATER HARVESTING AT TIRODA TPP

| Sr. No. | Month | Monthly Rainfall (mm) | Area of Rainwater Harvesting Structure (03 x 9m2) in m2 | Area of Rainwater Harvesting Structure near admin building in m2 | Run off Coefficient for commercial & industrial areas as per CGWB Manual | Rainwater Harvesting Potential for Rainwater Harvesting Structure of Tanks near Shantiniketan Gate, Cooling Tower 3 and Gate No. 2 (Litre) RWH (Lits.) = Area x Rainfall x Run off Coefficient | Rainwater Harvesting Potential for Rainwater Harvesting Structure of Tanks near Shantiniketan Gate, Cooling Tower 3 and Gate No. 2 (Litre) RWH (Lits.) = Area x Rainfall x Run off Coefficient | Rainwater Harvesting (Lit.) |
|---|---|---|---|---|---|---|---|---|
| 1 | Apr-20 | 12.6 | 12 | 394 | 0.9 | 136.08 | 4467.96 | 4604.04 |
| 2 | May-20 | 11.2 | 12 | 394 | 0.9 | 120.96 | 3971.52 | 4092.48 |
| 3 | Jun-20 | 233.6 | 12 | 394 | 0.9 | 2522.88 | 82834.56 | 85357.44 |
| 4 | Jul-20 | 236.7 | 12 | 394 | 0.9 | 2556.36 | 83933.82 | 86490.18 |
| 5 | Aug-20 | 557.7 | 12 | 394 | 0.9 | 6023.16 | 197760.42 | 203783.58 |
| 6 | Sep-20 | 46.9 | 12 | 394 | 0.9 | 506.52 | 16630.74 | 17137.26 |
| 7 | Oct-20 | 34.6 | 12 | 394 | 0.9 | 373.68 | 12269.16 | 12642.84 |
| 8 | Nov-20 | 12.8 | 12 | 394 | 0.9 | 138.24 | 4538.88 | 4677.12 |
| 9 | Dec-20 | 0 | 12 | 394 | 0.9 | 0 | 0 | 0 |
| 10 | Jan-20 | 20.2 | 12 | 394 | 0.9 | 218.16 | 7162.92 | 7381.08 |
| 11 | Feb-20 | 9.4 | 12 | 394 | 0.9 | 101.52 | 3333.24 | 3434.76 |
| 12 | Mar-21 | 27.2 | 12 | 394 | 0.9 | 293.76 | 9645.12 | 9938.88 |
| **Total (Litres)** | | | | | | | | **439539.66** |
| **Total (KL)** | | | | | | | | **439.54** |

## TABLE 7.3: RAINWATER HARVESTING POTENTIAL AT APML TOWNSHIP

| Sl. No. | Name of Building | No. of Building | Area of Rainwater Harvesting Structure (ft2) | Average Rainfall (mm) | Run off Coefficient for commercial & industrial areas as per CGWB Manual | Rainwater Harvesting Potential (Litre) |
|---|---|---|---|---|---|---|
| 1 | II BHK | 18 | 465 | 1300 | 0.9 | 9786245 |
| 2 | III BHK | 6 | 576 | 1300 | 0.9 | 4044981 |
| 3 | Club House Building | 1 | 4470 | 1300 | 0.9 | 5230204 |
| 4 | AVT School | 1 | 1004 | 1300 | 0.9 | 1174349 |
| 5 | Bachelor Hostel | 1 | 5459 | 1300 | 0.9 | 6387156 |
| 6 | Shopping Centre | 1 | 502 | 1300 | 0.9 | 587175 |
| 7 | VILLA - 1 | 1 | 836 | 1300 | 0.9 | 978625 |
| 8 | VILLA - 2 | 1 | 836 | 1300 | 0.9 | 978625 |
| **Total (Litre)** | | | | | | **29167361** |
| **Total ($m^3$)** | | | | | | **29167** |

# 8.0 ACTION PLAN FOR WATER MANAGEMENT

The Government of India, in its National Water Mission (NWM) under the National Action Plan on Climate Change (NAPCC), has emphasized the need to develop a framework for optimizing water use efficiency by 20 per cent, through regulatory mechanisms with differential entitlements and pricing. It further emphasizes the need to focus on integrated water resource management through water conservation, wastewater minimization, etc. This require power sector especially coal based thermal power plant being one of the major water intensive industrial sector to optimize their water use efficiency and enhance water conservation, recycling, and reuse measures. Accordingly, to enhance the water use efficiency and conservation measures in Tiroda TPP the cost effective action plan has been formulated and discussed in subsequent sections.

## 8.1 POTENTIAL AREAS FOR ENHANCING WATER USE EFFICIENCY

On the basis of present water budgeting study for Tiroda TPP following potential area have been identified for enhancing water use efficiency and conservation measures:

- Enhancing the water use efficiency of cooling towers by enhancing the CoC initially to around 6, and later to maybe even more by various interventions, including the use of stabilizing chemicals and disinfectants, thus saving a large quantity of fresh water needed as make-up.

- Improving the recycling/reuse potential of Cooling Tower Blow Down (CTBD) water besides being used for ash handling by effective treatment to reduce fresh water needed as make-up.

- Enhancing the recovery of ash water from 60% to 70% by checking the leakages and effective maintenance of AWRS including chemical dosing etc. Efficient recapturing and recycling ash water has a significant potential for water savings.

- Minimization of leakages and losses of water in systems would lead to help in enhancing the water use efficiency and reduce fresh water consumption.

- Potential utilization of guard pond water after appropriate treatment.

## 8.2 ACTION PLAN FOR POTENTIAL REUSE OF CTBD

As discussed in earlier chapters, the major quantity of water utilized in Tiroda TPP is for CT makeup. The other water consuming area covers boiler feed water, service water and domestic water.

Out of two reservoir 1st one process water @ 4551m$^3$/hr from which CT makeup water consumption accounts 3667 m$^3$/hr (about 80%) for Unit no 1,2 and 3.

2nd one Process @2857 m$^3$/hr water from which CT makeup consumption only 2667 m$^3$/hr (about 93%) for unit no 4 and 5.

Based on the detail assessment of water quality and consumption pattern of Tiroda TPP the following points found to be quite significant with respect to potential water recycling, water footprint reduction and at the same time reducing freshwater consumption on long term sustainable basis with an overall objective of meeting zero liquid discharge facility:

1. 1st Stage CW consumption 80. 5 % of total water Treated from Reservoir 1 is used for CW makeup.

2. 2nd stage CW consumption 93.3% of Total water process from Reservoir 2

3. The total CW Blowdown as per estimated water balance diagram has been found to be around 1205 m$^3$/hr. On the basis of discussions held with concerned officials of APML as well as exploration made from present water budgeting study it has been observed that this CTBD water is an enormous opportunity for recycling and ruse purpose and can give rise to meet the objective of the proposed water Budgeting study.

4. Initially it was considered that entire CTBD water may be recycled with 85% recovery and rest will be utilized in ash handling plant and suppression of dust in CHP. For the purpose raw water transportation/treatment cost may be estimated based on the data available with APML. Based on the payback philosophy the cost of proposed treatment system for potential recycling/reuse of CTBD can be worked out. However subsequently based on detailed discussions with concerned officials of APML and details exploration of the present CTBD generation and its recycling/reuse pattern it has been ultimately suggested that cost-effective treatment system may be designed for 50 % of CTBD (i.e. around 600 m$^3$/hr) for potential reuse of the same to reduce the fresh water requirement for CT makeup. Remaining 50% of the CTBD water can be utilized in AHP as per present practices.

5. Accordingly proposed treatment scheme using CTBD water (@600m$^3$/hr) has been worked out based on Conventional followed by Advance Technology for recycle and reuse with 85 -87% recovery. In this scheme detail of treatment cost/project cost, O&M cost has been also worked out to understand the Capex and Opex and Payback period by analyzing typical raw water transportation cost, treatment cost, Manpower, Chemical and Energy Cost, etc.

### 8.2.1 Design Parameters for Treatment of CTBD Water for Potential Recycling

**Source of Water:** CTBD water

**Design Capacity:** 600 m$^3$/hr

**Cooling Tower Water Chemistry:** to understand cooling tower makeup water chemistry the quality of raw water, CTBD water as well as cooling tower makeup water presently being used have been considered.

***Raw Water Quality:***

| Parameter | Value | Unit |
|---|---|---|
| pH | 8.2-8.6 | - |
| TDS | 105-220 | mg/l |
| Total Hardness | 95-135 | mg/l |
| Ca Hardness | 45-90 | mg/l |
| Silica | 12-18 | mg/l |
| Iron | 0.1-0.9 | mg/l |

***Cooling Tower Makeup Water Quality:***

| Parameter | Value | Unit |
|---|---|---|
| pH | 7.5-8.5 | - |
| TDS | 105-220 | mg/l |
| Total Hardness | 120-160 | mg/l |
| Ca Hardness | 60-90 | mg/l |
| Silica | 15-30 | mg/l |

***CTBD Water Quality:***

Average CTBD water quality of Tiroda TPP have been considered as design basis for the proposed 600 m$^3$/hr Water Recycling Plant with 85 % Recovery:

| Parameter | Value | Unit |
|---|---|---|
| pH | 7.5-8.5 | - |
| Turbidity | 6-15 max | NTU |
| TDS | 870-1350 | mg/l |
| Total Hardness | 460-790 | mg/l |
| Ca Hardness | 300-340 | mg/l |
| Silica | 75-90 | mg/l |

***Design Basis of the Proposed CTBD Water Recycling Plant:***

Input Data as per CTBD water quality parameters: As mentioned above.

To be considered as design basis for water recycling project with an objective of 85 % Recovery.

### 8.2.2 CTBD Water Treatment Philosophy

The cooling tower blow down (CTBD) water first transferred by gravity flow to an underground storage reservoir of capacity 600 m$^3$. The storage reservoir will serve as an intermediate storage facility with a retention time of 1 hr for feeding to Proposed Water Recycling Plant.

From this reservoir by transfer pump the CTBD water will be first feed into a Pressure sand filter unit to reduce the Turbidity of the water below <5 NTU level. (Back wash once in a day for 30 minutes in a Day – 300 m$^3$/day- back wash water will be utilized with RO Final reject in AHP/CHP or any other suitable use like green belt development, etc)

After reduction of turbidity of the water it will be allow to pass through Activated Carbon Filter. The purpose of passing through ACF is to remove the any traces of organics, Oil and Grease color, odour causing chemicals etc from the CTBD water. Here Pre-treatment of the UF -RO system will be completed. (ACF back wash frequency once in 7 – 10 days and back wash water may be utilized for Guard Pond, Green belt development, Road washings etc)

From this part the pre-treated water will be feed to UF- RO systems (2 stage) to achieve 85 % recovery.

The Ultrafiltration units will be provided to take care of any colloidal impurities, Silica, any traces Oil and Grease, Virus Bacteria from the water which may be very much harmful to RO membrane systems.

After Ultrafiltration units High Capacity Cartridge Filter will be in the system (0.25 - 0.5-micron range) to finer tuning of further fine suspended impurities if any from the RO Feed water.

From here with High Pressure Pump the water will be feed into the 1st Stage RO membrane systems (membrane capable of handling high level silica upto 150-200 ppm). Feed flow – 600 $m^3$/hr.

The permeate will be 420 $m^3$/hr with 70 % recovery and will be kept for storage and reuse purpose as per plant need

(May be feed to DM, or CT Make Up etc). The water quality for the permeate: pH 6.5-7.5, TDS < 130 mg/l, Total Hardness- < 50 mg/l, CaH < 30 mg/l, Silica- Nil. Iron Nil.

From 1st Stage reject flow will be 180 m3/hr- Which will be the feed flow to 2nd stage RO(same configuration as before).

Expected TDS at the 2nd stage of RO feed: 4,200 mg/l (max). After 2nd stage RO we will get another 50 % recovery @ 90 $m^3$/hr- Which may be add to the suitable storage facility for recycle and reuse as per plant need. The Product water quality after 50 % recovery at the 2nd stage: pH- 6.5-7.5 , TDS < 200 mg/l, TH , 70 mg/l, CaH < 50 mg/l, Silica – Nil. Iron -Nil.

The reject from the 2nd stage will be 90 m3/hr – may be utilized in Ash Pond quenching/ Gurad Pond.

Expected TDS of 2nd stage RO reject-5,500- 8,200 mg/l max.

Total recovery: 1st Stage 420 $m^3$/hr+ 2nd stage 90 m3/hr= 510 $m^3$/hr (85% of 600 $m^3$/hr).

### 8.2.3 Summary of Proposed CTBD Water Treatment Scheme

The schematic diagram of proposed CTBD water treatment system for Tiroda TPP is presented in Figure 8.1.

***Treatment* Process Schematic:**

Design Flow Considered: 600 $m^3$/hr

CTBD Water -→ Transfer by Gravity-> Intermediate Storage Reservoir (Capacity- 600 $m^3$) for further Treatment.

***Dimension of the reservoir***: 20 M(L) x 15 M(W) x 2 M (H) plus 0.5 M (Free Board Height)

Transfer Pump-> Pressure Sand Filter/Multi Grade Filter-> Activated Carbon Filter-> Ultrafiltration Units-> MCF-> 1st Stage RO→ Permeate (70 % Recovery)-> Product Water Storage( 420 $m^3$/hr);

**Product Water Quality after 1st Stage RO:** pH 6.5-7.5, TDS<130 mg/l, TH< 50 mg/l, Fe – Nil, Silica - Nil

**Reject from 1st Stage(180 $m^3$/hr)->** MCF→ 2nd stage RO- Recovery 50 % i.e 90 $m^3$/hr

**Product Water Quality after 2nd Stage RO:** pH 6.5-7.5, TDS <200 mg/l, TH <70 mg/l, Iron Nil. Silica – Nil.

**Reject from 2nd Stage and UF -RO Cleaning** – 90-110$m^3$/hr- Back to AHP/CHP

**Total Recovery:** 1st Stage – 420 $m^3$/hr + 90 $m^3$/hr from 2nd Stage= 510 $m^3$/hr (85% of 600 $m^3$/hr design flow)

**Back Wash:** Filter backwash for 30 minutes per day i.e. 300 $m^3$/hr, ACF Back wash for 30 minutes (300 $m^3$- Once in 5 days) to AHP/CHP

### 8.2.4 Cost-benefit Analysis

The typical capital as well as operational cost of proposed treatment system for potential recycling/reuse of CTBD have been worked out as follows:

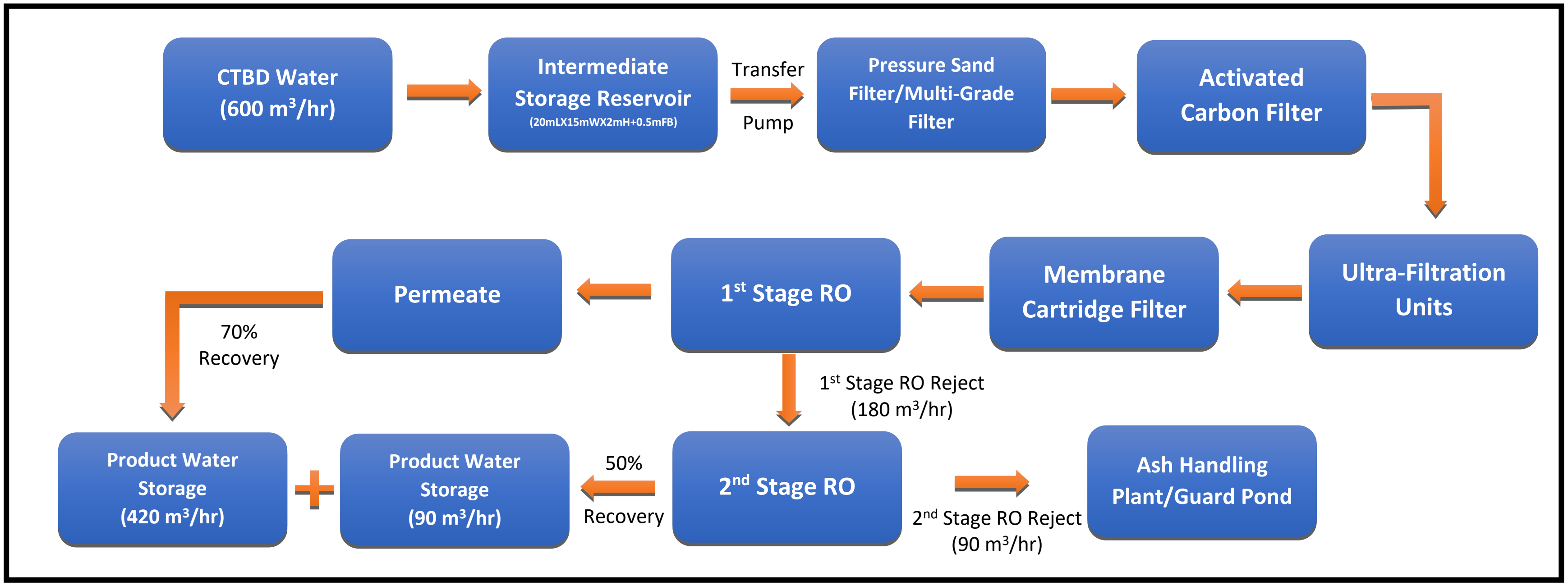
Capex: 16-18 Crore (Approx.)

Opex: Chemical Cost- INR 8000-9000/day
Manpower Cost- INR 3000/day
Energy Cost - INR 10000-12000/day
Total - INR 24000/day (Approx.)

Raw Water Treatment Cost: Rs 15/$m^3$
For 600 $m^3$/hr: Rs 15 x 600 : Rs 9,000/hr
Per Month: Rs 9,000x 24 x 30= 64.8 Lacs/month
Typical Payback- around 30 months

At the same time plant will be able to achieve a significant water conservation measures through CTBD recycling thereby reducing fresh water consumption of about 11520 $m^3$/day (4147200 $m^3$/year) for CT makeup on sustainable basis.

## FIGURE 8.1: SCHEMATIC FLOW DIAGRAM OF PROPOSED CTBD WATER RECYCLING PLANT



**For Recycling & Reuse of CTBD Water:**

**Design Flow Considered:** 600 $m^3$/hr.

Total Recovery (85%) = 1st Stage RO 420 $m^3$/hr. + 2nd Stage RO 90 $m^3$/hr. = 510 $m^3$/hr.

**1st Stage RO Water Quality:**

pH = 6.5-7.5 ; TDS = 130 mg/l ; Ca-Hardness = 30 mg/l ; Total Hardness = 50 mg/l ; $SiO_2$ = Nil

**2nd Stage RO Water Quality:**

pH = 6.5-7.5 ; TDS = 200 mg/l ; Ca-Hardness = 50 mg/l ; Total Hardness = 70 mg/l ; $SiO_2$ = Nil

**Type of Membrane ->** High Fouling/Brackish Water Type (DOW/ Hydronautics /GE Equiv.)

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