

HALF YEARLY ENVIRONMENTAL DATA GENERATION REPORT

Period: April 01, 2025 to September 30, 2025

For



HALDIA PETROCHEMICALS LIMITED
HALDIA: PURBA MEDINIPUR: WEST BENGAL



ENVIROTECH EAST PRIVATE LIMITED
KALIKAPUR, MADURDAHA,
KOLKATA - 700107
PH. : (033) 40635011/ 24438127/24438128



Scientific Research Laboratory
90, Lake East (4th Road), Santoshpur
Kolkata-700075, West Bengal
Tel: (033) 24161311 E Mail: jyotirmoysrl@gmail.com
90,
Lake East (4th Road), Santoshpur
Kolkata-700075, West Bengal
Tel: (033) 24161311 E Mail: jyotirmoysrl@gmail.com

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Recognised by CPCB, Govt. of India under the Environmental (Protection) Act-1986 up to 16.12.2027 vides F. No. LB/99/7/2021-INST-LAB-HO-CPCB-HO/Pvt./1873 Dated-19th December 2024

Recognised by West Bengal Pollution Control Board (Department of Environment, Govt. of West Bengal) Memo No. 1554-5/WPB-S/99 (Part-VII), Dated-26.06.2025, Validity: 30.06.2026.



**HALDIA PETROCHEMICALS LIMITED
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REPORT
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PREFACE

Haldia Petrochemicals Limited, one of the largest petrochemical complexes in India and the only one of its kind in the eastern region, produces ethylene, propylene, and associated liquid stream products for downstream processing into polymers and chemicals.

The scope of the study includes detailed characterization of the environment in and around the HPL complex, covering an area of 10 km radius from the center of the HPL plant for air, noise, effluent, and other environmental parameters. For this purpose, **Scientific Research Laboratory (SRL)**, in association with **Envirotech East Pvt. Ltd.** performed the environmental monitoring, sampling, and reporting, while all analytical testing and laboratory analysis were performed at the facilities of Envirotech East Pvt. Ltd., following well-established and recognized standard procedures and regulatory guidelines.

Scientific Research Laboratory wishes to place on record its deep appreciation for the trust reposed in it by Haldia Petrochemicals Limited for carrying out this study. Our heartiest thanks go to **Mr. Sanjay Bhatnagar**, EVP & Head Plant, **Mr. Anant Charan Mishra**, EVP & Head Plant, and **Mr. Praveen Jain**, Head – HSEF, for their kind cooperation and assistance during the course of the study.

We also appreciate the tireless efforts of **Mr. Subandhu Bhattacharya**, Sr. Manager – Environment Services, and **Mr. Saugata Mahindar**, DGM – Environment Services, without whom it would not have been possible to bring out the final report.

Note: This report represents a collaborative effort between Scientific Research Laboratory (SRL) and Envirotech East Pvt. Ltd. following and adhering to established protocols in compliance with CPCB/NABL guidelines.

Prepared By

(Tarun Sau)
Site In-charge

SRL

Checked by

(Tripti Ghosh)
Technical Manager

SRL

Approved by

(Dr. Jyotirmoy Majumdar)
Chief Executive

SRL

Approved by

(Asoke Kumar Banerjee)
Technical Manager

Envirotech East Pvt. Ltd.



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CHAPTER NO. - 01

INTRODUCTION



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HALDIA PETROCHEMICALS LIMITED – SATELLITE IMAGE





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1.0 INTRODUCTION

1.1 General

Haldia Petrochemicals limited (HPL), Haldia, West Bengal is an integrated Petrochemicals production unit and only petrochemical complex in West Bengal. HPL mainly comprises of Naphtha Cracker Unit (NCU), Pyrolysis Gasoline Hydrogenation unit (PGHU), Py-gas Desulfurisation (PGDS), Butene-1, Benzene Extraction Unit (BEU), Butadiene Extraction Unit (BDEU). The down stream units comprise of Linear Low Density Poly Ethylene (LLDPE), High Density Poly Ethylene (HDPE) and Poly Propylene (PP).

HPL is located at about 58 nautical miles by waterways and 130 Km by roadways from Calcutta and lies in the Haldia Industrial area. Haldia is in Purba Medinipur district, West Bengal between at latitudes $21^{\circ} 56' 10''$ (N) and longitude $88^{\circ} 5' 47''$ (E). The site lies adjacent to the road linking SH 4 and NH 41. Nearest railway, station is Durgachak on the Panskura – Haldia branch line of SE railway.

A comprehensive Environmental Impact Assessment Studies for the Haldia Petrochemicals Complex was carried out in 1991. Due to the rapid urbanisation and industrialisation, the environmental scenario of this area has changed in many respects. HPL started commercial production from the month of August 2001. HPL has entrusted Scientific Research Laboratory, Kolkata, the job of Environmental Data Generation in respect of air, water, noise and solid waste after commissioning of their petrochemical complex at Haldia.

1.2 Study Area

Keeping in view the nature and size of the complex, the various guidelines available, past experience and the original EIA report, it was decided to cover an area of 10 km. radius for the purpose of ambient air monitoring from the center of the plant. Study area covers 196 villages. Field data collection are restricted within the 10 km. radius of the plant center.

1.3 Objective of The Study

The purpose of the present study is to assess the effect of industrial activity on the environment at Haldia. The availability of resources in this area is the result of the interaction between the physical occurrence and the amount of requirement and economic means of their exploitation. Haldia is one of the most industrialized zones in the Bank of Hoogly River. Ambient air quality with respect to $PM_{2.5}$, PM_{10} , SO_2 , NO_x , CO, Benzene, B(a)P, As, Ni, Pb, NH_3 & O_3 has been monitored to evaluate the environmental conditions in and around the complex.



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The Environmental Data Generation work has been undertaken by Laboratory of **Scientific Research Laboratory, Kolkata** for the following:

- Evaluation of present environmental status through comprehensive analysis of various environmental parameters.
- Predict the probable impact on the various environmental factors due to the HPL operation.
- Analysis of the predicted impact vis-à-vis the regulatory environmental standards.
- Assessments of efficacy in process and pollution control systems.

1.4 Contents of the Report

Environmental monitoring for generation of data on meteorology, ambient air and effluent were carried out for the months of **April 2025 to September 2025**. This report contains the data of meteorology during the ambient air monitoring, analysis report of ambient air quality, work zone monitoring results, stack monitoring data, ambient Noise monitoring report, LDAR and effluent analysis report with respect to MoEF & CC and WBPCB parameter specified for Petrochemical industries and HPL respectively.

1.5 Location of the Site

Haldia Petrochemicals complex is in the industrial area of Haldia, which is developed by Haldia Development Authority. Haldia is situated at latitudes 21° 56' 10" (N) and longitude 88° 5' 47" (E) on the confluence of Hoogly and Haldi river in Purba Medinipur district, West Bengal. It is about 58 nautical miles by waterways and 130 km. by roadways from Calcutta. The area is well connected with roads, waterways and railways.

The site is flat and plain, typical of the Ganges's of the delta region. Up to the late 1960s, what is now Haldia was a very rural area. There was small set up of the Calcutta port from sand Heads and back. This was called the "Anchorage Camp" and was near the mouth of the Haldi River. With adequate favorable infrastructure such as roads, railways, waterways, port and power, Haldia has now become a major industrial township in west Bengal, after Durgapur – Asansol region. Haldia planning area is governed by Haldia Notified Area and is bounded by Hooghly, Haldi and Hijli river tidal canal. The total area of Haldia Notified Area is about 326.85 sq. km.



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1.6 Major details of industries, which are contributing to pollution load in Haldia, its distance and location with respect to HPL Complex, are as follows:

Sl. No.	Name of the Industry	Distance from HPL complex	Direction with respect to HPL
1	Adani Wilmer Ltd.	1.0 km	North- West
2	Dhunseri Petrochem & Tea Ltd.	1.0 km	North-East
3	DPM Net Pvt. Ltd.	1.5Km	North
4	Exide Industries Ltd.	2.6 km	East
5	Emani Biotech Ltd.	2.0 km	East
6	Ennore Coke Private Ltd.	4.0 km	East, North-East
7	Electrosteel Casting Ltd.	0.8 Km	North
8	Gokul Refoils & Solvent Ltd.	2.0 km	North- West
9	Greenways Shipping Agencies Pvt. Ltd.	3.5 km	North- West
10	Hindustan Unilever Ltd.	3.5 km	East
11	Hooghly Met Coke & Power Company	1.7 Km	South
12	Indian Oil Corporation Ltd., Haldia Refinery	3.6 km	South
13	IOC Petronas Ltd.	0.6 km	North
14	KoPT/Haldia Dock Complex	4.5 km	South
15	Lalbaba Seamless Tubes Pvt. Ltd.	1.5 km	North- West
16	MCC PTA India Corp. Private Limited	4.0 km	East, North-East
17	M/S West Bengal Waste Management Ltd.	2.5 Km	North-East
18	Manaksia Ltd.	4.2km	East, North-East
19	Marcus Oils Chemical Pvt. Ltd.	0.5 km	North
20	Ruchi Soya Industries Limited	0.5 km	South
21	Reliance Petroleum Ltd.	1.0 km	North
22	R.D.B. Rasayans Ltd.	0.5 km	East
23	SWAL Corporation Ltd.	2.5 km	East
24	Shamon Ispat Ltd.	2.3 km	North- West
25	Shree Renuka Sugars Ltd.	1.5 Km	South- West
26	Sanjana Cryogenic Storages Ltd.	3.5 km	East
27	Tata Chemicals Ltd.	3.0 km	East
28	URAL India Ltd.	2.5 Km	West



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Industrial map





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1.7 Site Environmental Monitoring

Site Environmental monitoring was carried out for six months (**April 2025 to September 2025**) through out the year comprising of two seasons as per MOEF & CC guidelines such as Summer & Monsoon season in respect of

- Effluent Quality
- Stack Emission
- Meteorology
- Ambient Air Quality
- Work Zone Air Quality
- Ambient Noise Quality
- Leak Detection And Repair (LDAR) Program



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CHAPTER NO. – 02

EFFLUENT QUALITY



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Online Treated Effluent Monitoring System

Online BOD & COD analyser



Online TSS analyser





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2.0 EFFLUENT QUALITY

HPL generates liquid waste water from Naphtha Cracker Unit, Butadiene Extraction Unit, Pyrolysis Gasoline Hydrogenation Unit, Benzene Extraction Unit, HDPE, LLDPE, PP, Cooling Tower, DM Water Plant, utilities and off-site buildings. The waste-water generated requires suitable treatment before disposal and a comprehensive waste water management system comprising of collection, treatment, and disposal facilities are provided.

The treatment facilities are divided into two distinct sections, namely, pre- treatment section inside battery limits (ISBL) of the respective units and final treatments in Waste Water Treatment Plant (WWTP)

ISBL Treatment is provided for the following streams

- Spent caustic stream from Naphtha Cracker Units (NCU)
- Neutralization / free oil removal in NCU.
- Polyethylene Plants/Polypropylene Plant ISBL units for removal of Polymers and oil.
- Neutralization for Demineralisation of water plant

WWTP has been broadly designed for following treatment systems

- Oil Recovery System
- Contaminated Rain Water Treatment System
- Sanitary Sewer Treatment System
- Biological Treatment System
- Slop Oil Collection System
- Sludge Handling System
- Final Discharge System

2.1 PRETREATMENT FACILITIES

Spent Caustic from Cracker Unit

Spent caustic stream emerging from cracker unit are highly alkaline and contains high oxygen demand. In the spent caustic treatment plant, Na_2S is converted to sodium thiosulphate by oxidation process. After this treatment the stream is sent to WWTP.

Polyethylene Plants/ Poly Propylene Plant

Wash water and effluent streams from process contain trace hydrocarbon and polymers, which are collected in ISBL and then sent to WWTP after oil skimming and removal.



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2.2 DETAILS OF WASTEWATER TREATMENT PLANT

The treatment facilities are designed for treating process water for reduction of free and emulsified oil, sulphide, phenol, thiosulphate, total suspended solids (TSS), bio-chemical oxygen demand (BOD), chemical oxygen demand (COD) and the contaminated rain water for removal of oil and suspended solids. The treated effluents from WWTP are meeting the discharge standards stipulated by West Bengal Pollution Control Board.

The wastewater treatment plant consists of Physical, Chemical and Biological treatment facilities for removal of oil, suspended solids and biodegradable organic.

Treatment Scheme of WWTP

The physical and chemical treatment scheme consists of the following units:

- Bar Screen and Grit Chamber
- Tilted Plate Interceptor (TPI)
- Equalization Tank
- pH Adjustment Tank
- Flash Mixing Tank
- Flocculation Tank
- Dissolved Air Flotation System

The biological treatment scheme consists of following units:

- Aeration tank
- Secondary Clarifier

The slop oil handling facility consists of the following units:

- Oil Skimmer
- Slop Oil Tank
- Wet slop oil sump

The sludge, handling facility consists of the following units:

- Chemical & Oily Sludge Sump
- Bio-Sludge Sump
- Thickener
- Thickened Sludge Sump
- Centrifuge



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The treatment scheme for treating contaminated rainwater during wet weather flow consists the following units:

- Wet Weather Flow (WWF) Receiving sump
- Screen Chamber
- Grit Chamber
- Surge Pond
- Contaminated Rain Water (CRW) Transfer Sump
- TPI

WWTP has been broadly designed for following treatment systems:

Oil Removal / Recovery system

Pretreated effluent streams from various units are routed to TPI Separators for removal of free oil and suspended solids. The free oil removed from the TPI Separators, is being collected in the wet slop oil sump. The oily sludge from the bottom of TPI separators is routed to the chemical and oily sludge sump. Then the effluent from TPI units is routed (by gravity) to the equalization tank for equalization of flow and modulation of characteristics. Floating oil skimmer is provided to remove the free-oil layer formed in equalization tank. This free oil is being routed to the wet slop oil sump.

HDPE process effluent is directly received to the equalization tank for equalization of flow and its characteristics. An additional facility has been provided at the inlet of equalization tank for pH neutralization. When the equalization tank effluents will be pumped to the pH Adjustment tank where the pH of the effluent is maintained in-between 7.0 to 8.0 by dosing H_2SO_4 or Caustic solution. After achieving the desired level of the pH, the effluent is routed to Flash Mixing Tank where alum solution is added as a coagulant. It requires hydrogen peroxide solution dosing which ensures the low load of sulphides in effluent. The effluent is then routed to Flocculation Tank where addition of de-oiling Polyelectrolyte helps in breaking the oil – water emulsion and formation of alum flocks.

The effluent from flocculation tank is routed to the dissolved air floatation (DAF) tank. Oil skimmer skims off the oily scum generated in the floating tank top. Sludge settled at the bottom of the tank will be removed on periodically. The oily scum and the bottom sludge are routed to the chemical and oily sludge sump and a provision is also made to route the oily scum to wet slop through wet slop oil sump. Finally, DAF effluent is routed to the aeration tank for biological treatment.



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Contaminated Rain Water Treatment System

During wet weather, the contaminated rainwater streams of HPL complex will be received in the surge pond. Floating oil skimmer is provided to remove the free oil layer formed in the surge pond and routed to the wet slop oil sump. Provision is made to send the wastewater from the surge pond to TPI separator as and when required.

Effluent in surge pond is received after passing through Bar Screen & Grit Chamber. The effluent can be routed to equalization tank for processing after passing through TPI-02. If effluent quality is fit for disposal, it can be routed to guard pond via TPI-02.

Sanitary Sewer Treatment System

A dedicated underground sanitary sewer network is provided for entire HPL complex including the captive power plant of HPL Co-generation Ltd. and Nitrogen Plant of M/s Praxair India Pvt. Ltd. Sanitary effluent after collection in various suitable pits, is pumped to Bar screening chambers and then the grit chamber for physical removal of scum and suspended solids. Finally, sewer effluent is pumped to Aeration tank of WWTP for Biological Treatment along with other process effluents.

Biological Treatment System

An integrated biological treatment system has been adopted by HPL for reducing the biodegradable organic content of the effluents. The effluent from the DAF tank is routed to aeration tank operating in extended aeration mode for removal of biodegradable organic matter, resulting in reduction of BOD & COD. Aeration conditions are maintained in the tank by entrainment of the atmospheric air with the help of surface aerators.

The nutrients i.e. urea solution & DAP solution are dosed at the inlet of aeration tank to provide nitrogen, phosphorus for micro-organisms. The overflow from the aeration tank will contain a high concentration of microorganisms. A secondary clarifier helps in separating the microorganism from the liquid streams from the bottom sludge and the over flow is the treated effluent. Then aeration tank effluent is routed under gravity to the clarifier. The clarifier is provided with a sludge scraper, which moves slowly to scrap the bio-solids, which settle at the bottom. The collected sludge is routed to the bio-sludge sump (activated sludge sump).



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Bio – sludge sump flow is divided into two streams; one is routed to aeration tank and the other going to a sludge thickener. The excess sludge is sent to the thickened sludge sump and the balance stream is recycled back to the aeration tank to maintain the range. The overflow from the clarifier is the treated effluent, which is routed to the guard pond. Two Guard ponds (effluent holding capacity of approx. 8,180 m³) are provided to take care of all types of functional eventualities of the Waste Water Treatment Plant (WWTP). If the effluent does not meet the norms, it can be routed to equalization tank via surge pond for re-processing.

Co-generation power plant, cooling tower, nitrogen plant and DM water plant effluent are being collected in Cooling Tower Blow Down (CTBD) and DM waste pond. CTBD and DM waste pond overflow which is totally free of any organics or oil is routed to treated effluent sump along with treated effluent from guard pond for final disposal through a channel.

Effluent from LLDPE, PP, BDEU and PGHU units are received in receiving sump tank from where overflow of the tank is routed to bar screen, grit chamber, surge pond, respectively. Finally, effluent goes to TPI separator for further treatment and there is provision for pumping the effluent directly to the guard pond if effluent quality remains up to the desired level.

Slop Oil Collection System

The slop oil is collected in wet slop oil tank from various units e.g. TPI separators (I and II), equalization tank, floatation tank and surge ponds. Then slop oil is pumped to slop oil tank. The dry slop oil retained in the tank after decantation of water will be disposed as low-grade fuel to external agencies. The decanted water from slop oil tank bottom will be routed to receiving sump by gravity.

Sludge Handling System

The oily sludge from the TPI separator and DAF tank are collected in chemical and oily sludge sump from, where it is routed to sludge thickener. The under flow of the sludge thickener is routed to the thickened sludge sump from where it is pumped to the centrifuge. Dewatering Polyelectrolyte is being dosed in centrifuge to achieved better sludge consistency. Periodically sludge will be collected from centrifuge and is shifted to secure on site storage pit. Latter on the accumulated bio-sludge will be incinerated in incinerator.

2.3 TREATED EFFLUENT QUALITY CHECK

SCIENTIFIC RESEARCH LABORATORY has established an Environmental Laboratory inside HPL in WWTP Laboratory as a third independent party to check the quality of effluent daily as per specifications of effluent standards.



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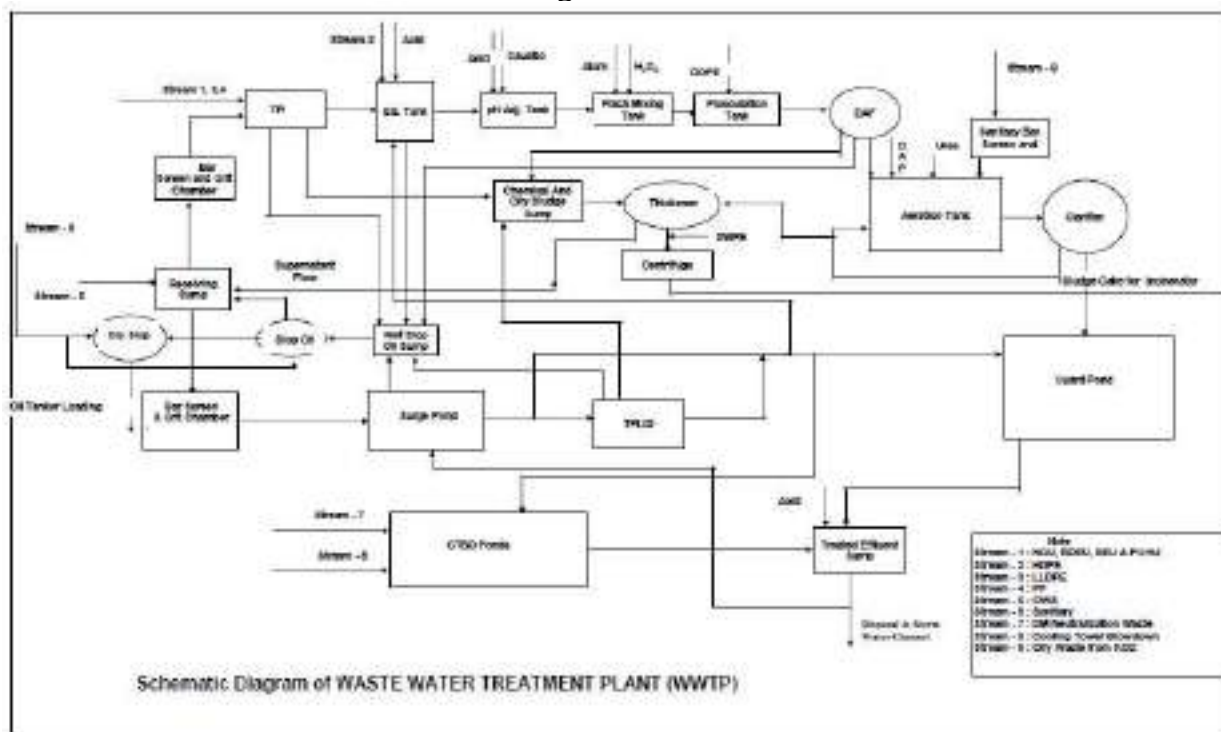
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ON-LINE EFFLUENT MONITORING SYSTEM - The On-line effluent monitoring system was installed & successfully commissioned by M/s. Forbes Marshal in Treated Effluent Discharge line for monitoring of flow, pH, TSS, BOD & COD as per the guideline of CPCB. The online data is sent to CPCB/WBPCB server.

2.4 FINAL DISCHARGE SYSTEM

The treated effluent from WWTP will be discharged into the river Hooghly through Green Belt Canal and the treated effluent maximum extent possible will be utilized for irrigation of green belt developments. The final out fall effluents confirm that there is immense dilution i.e. nearly 20,000 times adjacent to the green belt Canal and more than 25,000 times at the confluence of river Haldi. Since Hooghly and Haldi rivers are tidal in nature, the buffering capacity of the green belt canal will be ensured to hold the treated effluent discharged (via green belt canal) during the high tide period. The final effluent is meeting the WBPCB (MINAS) standards.

Flow diagram of WWTP





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**Enviroftech****2.5 METHODS OF MEASUREMENT**

Sl. No.	Parameters	Specifiction / Standard (method) or technique used	Range of Testing	Methodology
1.	pH	Standard method (APHA)	0.1-14	pH is determined electrometrically using pH meter provided with pH electrode.
2.	TSS	Filtration Standard Method (APHA)	Min. 0.4 – 1000.0 mg/l	Measured Gravimetrically by filtering through GF/C filter paper.
3.	BOD	BOD Incubator method (APHA)	-	The dissolved oxygen content of the sample with or without dilution is measured before and after incubation at 27°C for 3 days.
4.	COD	Dichromate Reflux Method	-	Sample is refluxed in acid solution with known excess of potassium dichromate. After digestion, the remaining $K_2Cr_2O_7$ is titrated with ferrous ammonium sulphate to determine the amount of $K_2Cr_2O_7$ consumed and the oxidizable organic matter is calculated in terms of oxygen equivalent.
5.	Oil & Grease	Non-dispersive Infrared Analysis Method	0.0-200.0 mg/l	Extracted into Carbon tetrachloride after acidification of the sample and Measured Gravimetrically
6.	Phenol	Chloroform Extraction Method (APHA)	0.001-0.25mg/l	Steam distilled sample react with 4 – aminoantipyrine in presence of potassium ferricyanide at pH 7.9 and form a coloured antipyrine dye. The dye is extracted from aqueous solution with $CHCl_3$ and the absorbance is measured at 460 nm using a UV –VIS spectrophotometer.
7.	Sulphide	Iodometric Method (APHA)	0.1-10.0 mg/l	Iodometric titration with Sodium thiosulphate solution using starch as an indicator.



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Sl. No.	Parameters	Specifiction / Standard (method) or technique used	Range of Testing	Methodology
8.	Fluoride	SPADNS Method (APHA)	0.0-1.4 mg/l	Sample mixed with Zirconyl -SPADNS solution and the concentration was measured by the UV-VIS recording spectrophotometer
9.	Cyanide	Colorimetric Method (APHA)	0.02-0.2 mg/l	The alkaline distilled of cyanide is measured by pyridine – barbituric acid reagent using an UV –VIS spectrophotometer
10.	Chromium (cr ⁺⁶)	Colorimetric Method (APHA)	0.01-1.0 mg/l	Determined colorimetrically by reaction with di-phenyl carbazide in acidic solution using spectrophotometer
11.	Total Chromium	Colorimetric Method (APHA)	0.01-1.0 mg/l	Sample is oxidized with potassium permanganate and determined colorimetrically by reaction with di-phenyl carbazide in acidic solution spectrophotometer.
12.	Total Iron	Phenanthroline Method (APHA)	0.05-10.0 mg/l	Iron is reduced to ferrous state by Hydroxyl amine hydrochloride and treated with 1,10-phenanthroline at pH 3.2 to 3.3 and measured spectrophotometrically
13.	Total Zinc	Atomic Absorption Spectrophotometric Method (APHA)	0.005-2.0 mg/l	Zinc is determined by atomic absorption spectrophotometer using air-acetylene flame
14.	Total Copper	Atomic Absorption Spectrophotometric Method (APHA)	0.01-10.0 mg/l	Copper is determined by atomic absorption spectrophotometer using air-acetylene flame
15.	Phosphate (as P)	Stannous Chloride Method (APHA)	0.003-1.0 mg/l	Ammonium molybdate reacts with water sample to form Molybdophosphoric acid and reduced by stannous chloride to intensely coloured molybdenum blue and measured spectrophotometrically.



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**Enviroftech****2.6 WATER CONSUMPTION AND EFFLUENT DISCHARGE**

Sl. No.	Water Consumption	Average Data of April 2025 to September 2025 (KL/Day)	Conditions as per WBPCB's CTOs (700 KTA Ethylene + Coal Fired Boiler + AdPer Ma (butene – 1 Plant) (KL/Day)
1	Industrial cooling + Boiler feed water + Fire water makeup	36595	49203
2	Domestic purpose	1600	1510
3	Processing where by water gets polluted and the pollutants are easily biodegradable	1835	2000
4	*Total Discharge of Effluent (a+b)	5335	8619.4
	a. Treated Effluent from Guard Pond & Surge Pond	3240	
	b. Effluent from CTBD & DM Regeneration Pond (as diluents)	2095	

*Total effluent after expansion will be 8625 KL/Day (as per the condition of Environment Clearance dated 20.03.2018)

2.7 EFFLUENT QUALITY

Half Yearly Average Data of WWTP Outlet
Period of Monitoring: April 2025 to September 2025

Sl. No.	Parameter	Unit	Standards	WWTP Outlet
1.	pH	--	6.5-8.5	7.59
2.	TSS	mg/l	100	19.72
3.	BOD	mg/l	30	10.95
4.	COD	mg/l	250	55.68
5.	Oil & Grease	mg/l	10	<2.0
6.	Phenol	mg/l	1	<0.002
7.	Sulphide	mg/l	2	0.87
8.	Cyanide	mg/l	0.2	<0.02
9.	Fluoride	mg/l	5	0.78
10.	Total Chromium	mg/l	2	<0.05
11.	Chromium (Cr ⁺⁶)	mg/l	0.1	<0.05
12.	Iron as Fe	mg/l	1.0	0.53
13.	Zinc as Zn	mg/l	1.0	0.11
14.	Copper as Cu	mg/l	1.0	<0.05
15.	Phosphate as P	mg/l	5.0	0.75
16.	FRC	mg/l	0.5	<0.1
17.	Temperature	°C	Not>10°C higher than intake	28.93

Note: All values are in mg/l except pH.



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Monthly Average Data of WWTP Outlet

Sl.No.	Parameter	WWTP Outlet					
		Apr'25	May'25	June'25	July'25	Aug'25	Sep'25
1.	pH	7.49	7.62	7.77	7.49	7.64	7.53
2.	TSS	18.75	22.20	21.16	18.60	18.00	19.60
3.	BOD	12.50	14.00	12.58	8.80	8.40	9.40
4.	COD	59.00	80.20	59.68	45.20	44.60	45.40
5.	Oil & Grease	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
6.	Phenol	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
7.	Sulfide	<0.5	<0.5	0.87	<0.5	<0.5	<0.5
8.	Cyanide	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
9.	Fluoride	0.83	0.82	0.72	0.74	0.76	0.78
10.	Total Chromium	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
11.	Hexavalent Chromium	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
12.	Iron as Fe	0.33	0.55	0.88	0.55	0.31	0.58
13.	Zinc as Zn	0.11	0.17	0.17	0.16	0.05	0.02
14.	Copper as Cu	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
15.	Phosphate as P	1.13	<0.05	0.36	0.84	0.96	0.47
16.	FRC	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
17.	Temperature	27.20	28.00	31.40	27.20	31.40	28.40

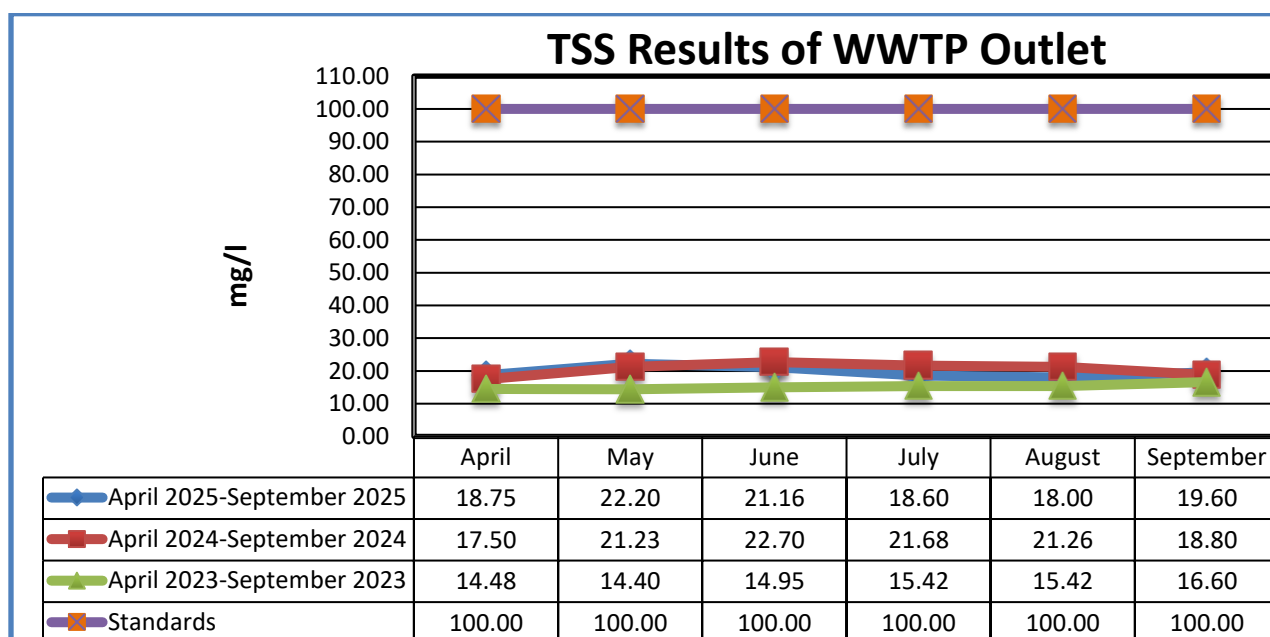
Note: 1) All values are in mg/l except pH & Temperature.

2) Frequency of monitoring

a) Sl. No. 1 – 11 : Weekly

a) Sl. No. 12 - 17 : Monthly

Graphical Representation of Effluent





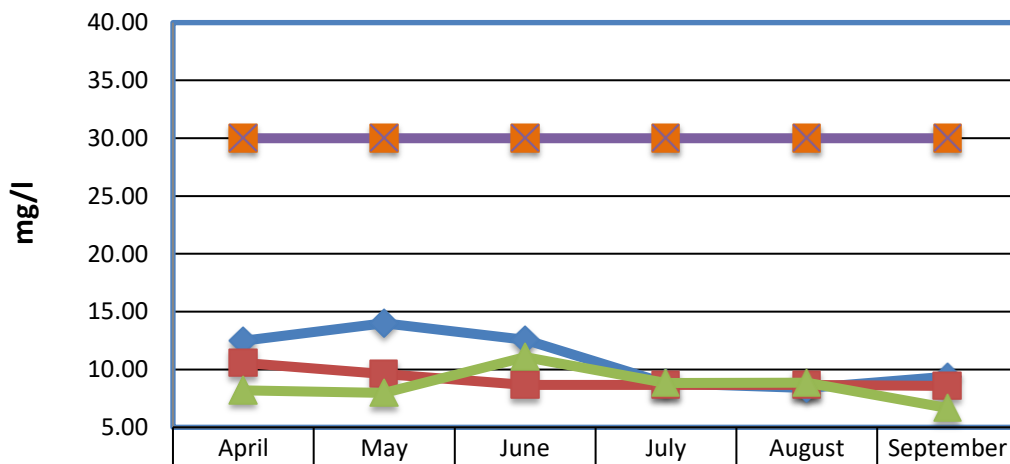
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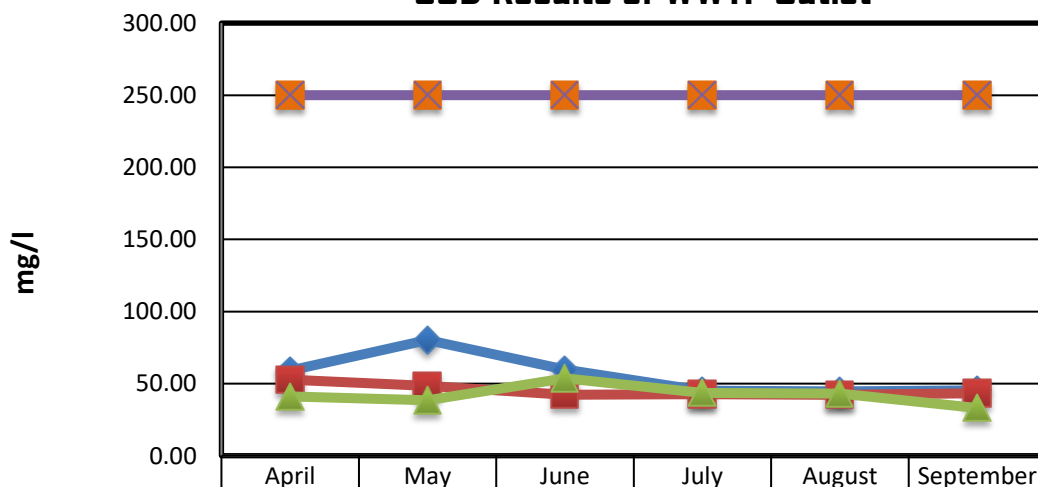
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BOD Results of WWTP Outlet



April 2025-September 2025	12.50	14.00	12.58	8.80	8.40	9.40
April 2024-September 2024	10.57	9.61	8.67	8.68	8.68	8.58
April 2023-September 2023	8.20	7.97	11.07	8.84	8.87	6.67
Standards	30.00	30.00	30.00	30.00	30.00	30.00

COD Results of WWTP Outlet



April 2025-September 2025	59.00	80.20	59.68	45.20	44.60	45.40
April 2024-September 2024	52.70	48.48	42.27	42.61	42.29	43.26
April 2023-September 2023	41.15	38.52	53.67	43.45	43.19	33.07
Standards	250.00	250.00	250.00	250.00	250.00	250.00



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CHAPTER NO. – 03

GASEOUS EMISSION

(STACK MONITORING)



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Envirotech

**Online Stack Monitoring System at CPP
Online SO_x, NO_x & CO analyser**



Online Stack Monitoring System at CFB



Online PM analyser (CPP)





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3.0 GASEOUS EMISSION

GENERAL INFORMATION ABOUT STACK

Sl. No.	Particulars	CFB	Auxiliary Boiler (2 Nos.)	GT & HRSG (2 Nos.)	PGHU	PGDS	*NCU (9 Nos.)	EDG
1	Stack height from ground level	140.00 mt.	54.3 mt.	45 mt.	33 mt.	30 mt.	40 mt.	17.2 mt.
2	Sampling port from ground level	81.50 mt.	36.5 mt.	30.5 mt.	24.95 mt.	19.70 mt.	--	16.4
3	Stack made by	Concrete	MS	MS	MS	MS	MS	MS
4	Diameter of the stack at sampling point	7.21 m	2.3 m	3.6 m	0.95 m	1.06 m	2.1 m	0.30 m
5	Shape of the stack	Circular	Circular	Circular	Circular	Circular	--	Circular
6	Area of the stack	40.81 m ²	4.1527 m ²	10.17 m ²	0.7091 m ²	0.883 m ²	--	0.0707 m ²
7	Whether stack is attached with permanent ladder & platform	Yes	Yes	Yes	Yes	Yes	Yes	Yes
8	Type of Fuel	Coal	CBFS, RFG & Naphtha	Naphtha & RFG	RFG	RFG	RFG	HSD
9	Fuel consumption (Rated)	3 x 28.27 t/hr.	7.2 (Naphtha)	9.65(Naphtha)	---	1.44 KTA (0.16T/Hr.)	2F-201 – 1440 & 2F-202 to 2F-209 – 3202 T/Month	800 lt./hr.
10	Capacity (Rated)	3 x 120 TPH	120 TPH	GT-34.5 MW; HRSG-120 TPH SHP & 22 TPH MP	60 TPH	30 TPH	2F-201 – 13.50 & 2F-202 to 2F-209 – 32.00 T/Hrs.	1500 KVA
12	Whether stack is attached with emission control device	Bag Filter, ESP	No	No	No	No	No	NO

*CPCB Emission Regulations Part-Three for stack is not applicable for NCU. The Licensor did not provide any provision for Iso-Kinetic sampling of flue gas for measurement of PM. However, gas sampling can be done for SO₂, NO_x & CO.



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Emission Standards of Stacks

Unit	Standards	SO ₂	NO _x	CO	Hg	PM
NCU	MoEF & CC notification 9 th November'2012	50	350	150		
PGHU	Standard as per WBPCB					10
PGDS			250	100		05
CPP Stacks	Standard as per WBPCB		100 ppm of 15% excess O ₂			50
CFB	Standard as per CPCB	100	100		0.03	30
EDG						150
All units are expressed as mg/Nm ³ Correction Factor: (a) 3 % O ₂ for NCU, PGHU & PGDS, (b) 6% O ₂ for CFB						

Methodology of Stack Sampling & analysis

Sl. No.	Parameters	Specifiction / Standard (method) or technique used	Range of Testing	Methodology
1.	Particulate matter	Emission Regulations, Part – Three, COINDS/18/1984-85 (chapter 2 & 3)	1 mg/m ³ & above	Sampling using stack kit
2.	Nitrogen Oxides	EPA method-7	2-400 mg/m ³	Absorption in hydrogen peroxide- sulphuric acid solution using EPA flask & spectrophotometric analysis
3.	Sulfur-di-oxide	Emission Regulations, Part – Three, COINDS/18/1984-85 (chapter 4)/EPA method-6	3.4mg-80,000 mg/m ³	Absorption in hydrogen peroxide solution & titration using Ba-perchlorate
4.	Carbon Monoxide (CO)	IS: 5182 (Part 10): 1999 (First Revision)	0.05 – 200 ppm	Sampling of CO in gas sampling tubes & analysis by Non-dispersive Infrared Absorption Method.
5.	Mercury (Hg)	EPA Method – 29	0.1 µg	Analysis by VGA.



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**Envirotech****Monitoring Frequency**

Major source of pollutants from various stacks and parameters monitored are as follows:

Sl. No.	Unit	No. of Stack	Parameters	Frequency of Monitoring
1.	Naphtha Cracker Unit	09	SO ₂ , NO _x , CO	Once in a month
2.	Pyrolysis Gasoline Hydrogenation Unit	01	SO ₂ , NO _x , CO, PM	Once in a month
3.	Py-gas Desulfurisation Unit	01	SO ₂ , NO _x , CO, PM	Once in a month
4.	CFB	01	SO ₂ , NO _x , CO, PM	Once in a month
5.	CPP – Auxiliary Boiler & HRSG	04	SO ₂ , NO _x , CO, PM	Once in a month
6.	CPP – Emergency DG	01	SO ₂ , NO _x , CO, PM	Quarterly

STACK MONITORING RESULTS**(April 2025 to September 2025)****Half-Yearly Average Results**

NCU (Naphtha Cracker Unit)	Temp. (°C)	SO ₂ (mg/Nm ³)	NO _x (mg/Nm ³)
	135	11	24

A.Naphtha Cracker Unit (NCU)**Half-Yearly Average Results**

Furnace Heater No.	Temp. (°C)	SO ₂ (mg/Nm ³)	NO _x (mg/Nm ³)
2F – 201	149	9	26
2F – 202	115	10	24
2F – 203	141	11	25
2F – 204	125	10	23
2F – 205	115	12	26
2F – 206	149	10	24
2F – 207	128	12	23
2F – 208	170	12	21
2F – 209	123	13	20



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**Envirotech****Stack Monitoring Results – Location Wise**

Sl.No.	Furnace Heater No.	Unit	Month of Monitoring	Temp. (°C)	Results	
					SO ₂ (mg/Nm ³)	NO _x (mg/Nm ³)
1	2F-201	NCU	April 25	147	12	23
2			July 25	149	9	<20
3			August 25	148	7	28
4			September 25	152	9	<20
1	2F-202		April 25	114	9	<20
2			July 25	119	17	24
3			August 25	116	8	22
4			September 25	112	7	25
1	2F-203		April 25	134	15	26
2			July 25	107	11	24
3			August 25	173	10	27
4			September 25	150	9	<20
1	2F-204		April 25	133	9	<20
2			July 25	134	12	<20
3			August 25	114	8	<20
4			September 25	118	10	23
1	2F-205		April 25	132	15	<20
2			July 25	109	13	27
3			August 25	110	9	26
4			September 25	108	9	24
1	2F-206		April 25	151	13	23
2			July 25	150	7	<20
3			August 25	150	12	<20
4			September 25	143	8	26
1	2F-207		April 25	121	15	23
2			July 25	132	13	<20
3			August 25	132	8	<20
1	2F-208		April 25	165	16	27
2			July 25	173	11	<20
3			August 25	171	10	<20
4			September 25	172	11	<20
1	2F-209		April 25	118	18	24
2			July 25	126	14	20
3			August 25	125	11	21
4			September 25	123	7	<20

All values are corrected with 3% Oxygen

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B. Pyrolysis Gasoline Hydrogenation Unit (PGHU - 4F-101)
(April 2025 to September 2025)

Half-Yearly Average Results

Furnace Heater No.	Temp. (°C)	SO ₂ (mg/Nm ³)	NO _x (mg/Nm ³)	PM (mg/Nm ³)
4F - 101	292	37	55	4.36

Month Wise Report

Sl. No.	Furnace Heater No.	Unit	Date Of Monitoring	Temp. (°C)	Results		
					SO ₂ (mg/Nm ³)	NO _x (mg/Nm ³)	PM (mg/Nm ³)
1	4F-101	PGHU	April 25	284	34	67	5.01
2			June 25	305	32	46	3.65
3			July 25	297	45	56	3.85
4			August 25	291	34	54	4.74
5			September 25	285	39	51	4.55

All values are calculated to 3% O₂ dry basis

C. Pyrolysis Gasoline De Sulphurisation Unit (PGDS - 4F-201)
(April 2025 to September 2025)

Half-Yearly Average Results

Furnace Heater No.	Temp. (°C)	SO ₂ (mg/Nm ³)	NO _x (mg/Nm ³)	PM (mg/Nm ³)
4F - 201	317	33	47	3.67

Month Wise Report

Sl. No.	Furnace Heater No.	Unit	Date Of Monitoring	Temp. (°C)	Results		
					SO ₂ (mg/Nm ³)	NO _x (mg/Nm ³)	PM (mg/Nm ³)
1	4F - 201	PGDS	April 25	315	25	53	3.38
2			June 25	327	37	52	2.86
3			July 25	312	34	52	4.23
4			August 25	309	36	40	3.93
5			September 25	320	35	37	3.96

All values Calculated to 3% O₂ dry basis



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D. Captive Power Plant**(April 2025 to September 2025)****Half-Yearly Average Results**

Furnace /Heater Name	Temp. (°c)	SO ₂ (mg/Nm ³)	NO _x (mg/Nm ³)	PM (mg/Nm ³)
Auxiliary Boiler # 01	142	18	30	18.95
GT & HRSG #2	193	19	37	10.55
Emergency DG	119	14	30	21.36

Month Wise Report

Sl. No.	Furnace Heater No.	Date Of Monitoring	Temp. (°c)	SO ₂ (mg/Nm ³)	NO _x (mg/Nm ³)	PM (mg/Nm ³)
1	Auxiliary Boiler # 01	April 25	145	24	27	9.26
		June 25	146	16	32	19.65
		July 25	140	20	35	27.85
		August 25	140	18	25	18.96
		September 25	141	12	29	19.01
2.	GT & HRSG #2	April 25	192	18	31	8.70
		June 25	191	26	34	7.78
		July 25	195	17	40	9.21
		August 25	194	15	46	12.36
		September 25	192	17	33	14.69
3.	Emergency DG	July 25	119	14	30	21.36

NO_x value calculated to 15% O₂ dry basis**E. Coal Fired Boiler (CFB)****(April 2025 to September 2025)****Half-Yearly Average Results**

Temp. (°c)	SO ₂ (mg/Nm ³)	NO _x (mg/Nm ³)	PM (mg/Nm ³)
137	42	58	21.14

Month Wise Report

Sl. No.	Date Of Monitoring	Temp. (°c)	SO ₂ (mg/Nm ³)	NO _x (mg/Nm ³)	PM (mg/Nm ³)	Hg (mg/Nm ³)	
						Particulate	Gaseous
1	April 25	137	34	46	17.04		
2	June 25	136	50	84	23.24		
3	July 25	137	40	51	21.76	0.0068	0.0052
4	August 25	136	39	59	20.33		
5	September 25	137	46	50	23.32		

All values Calculated to 6% O₂ dry basis



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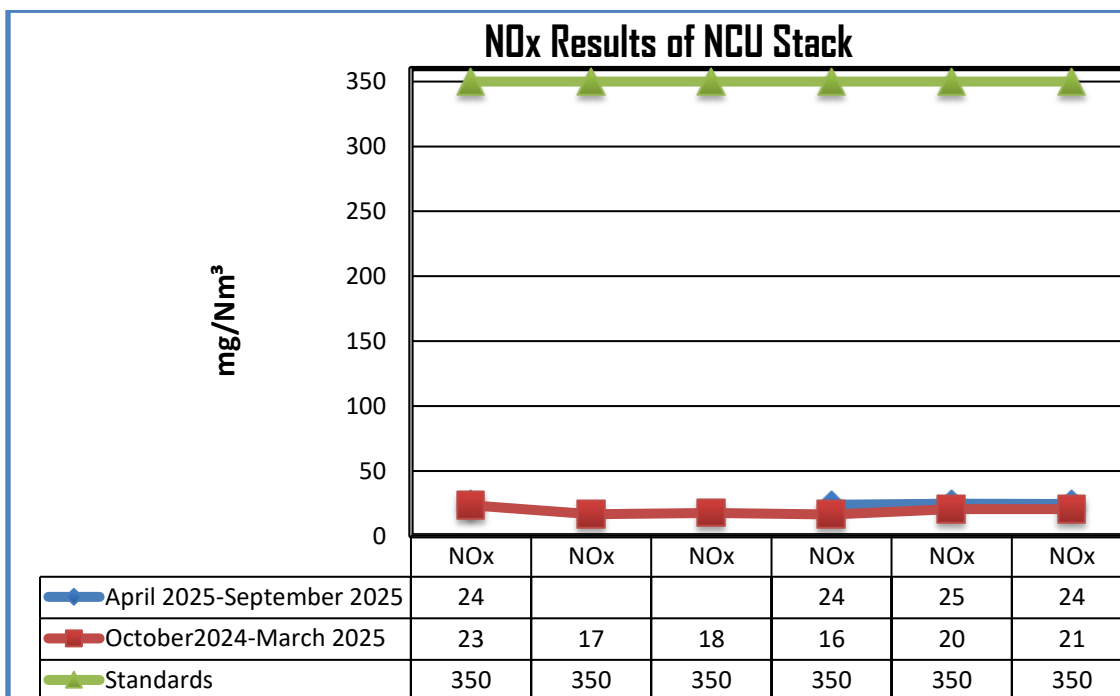
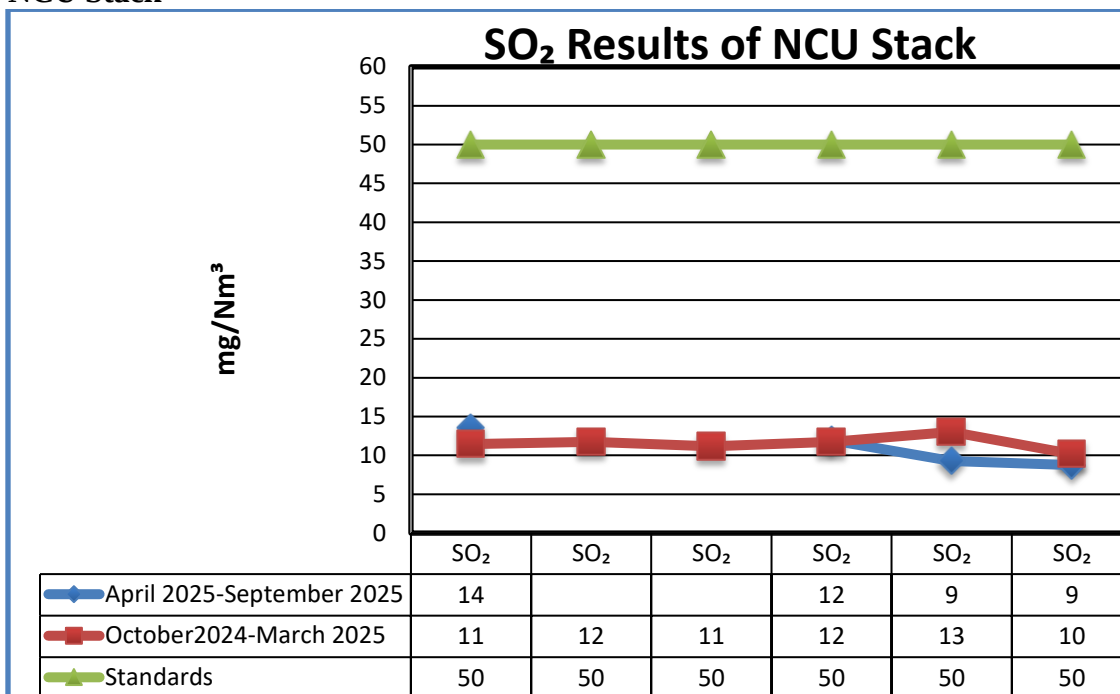
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Graphical Representation of Stack

A. NCU Stack



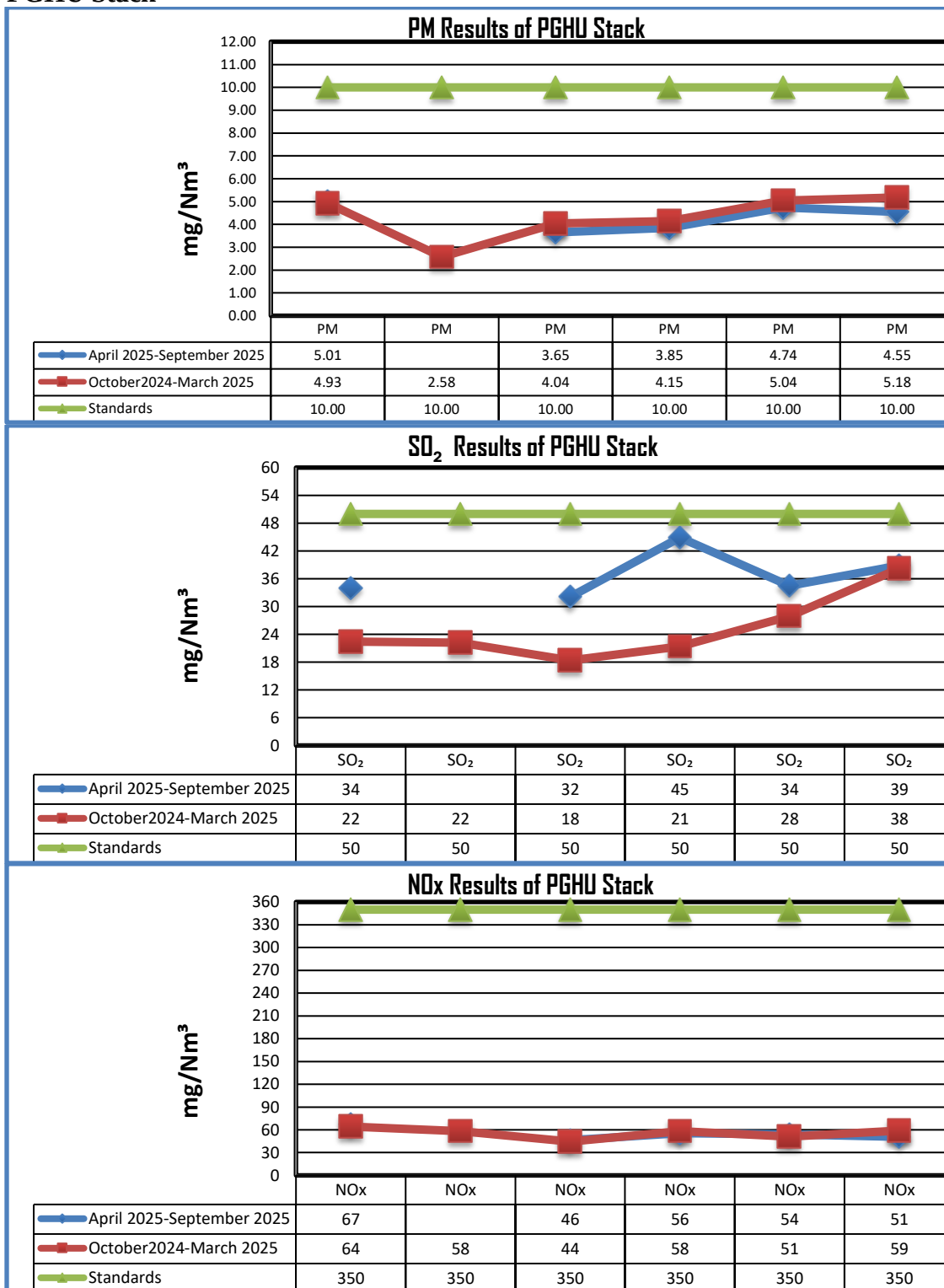


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B. PGHU Stack



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D. Auxilliary Boiler #1 Stack



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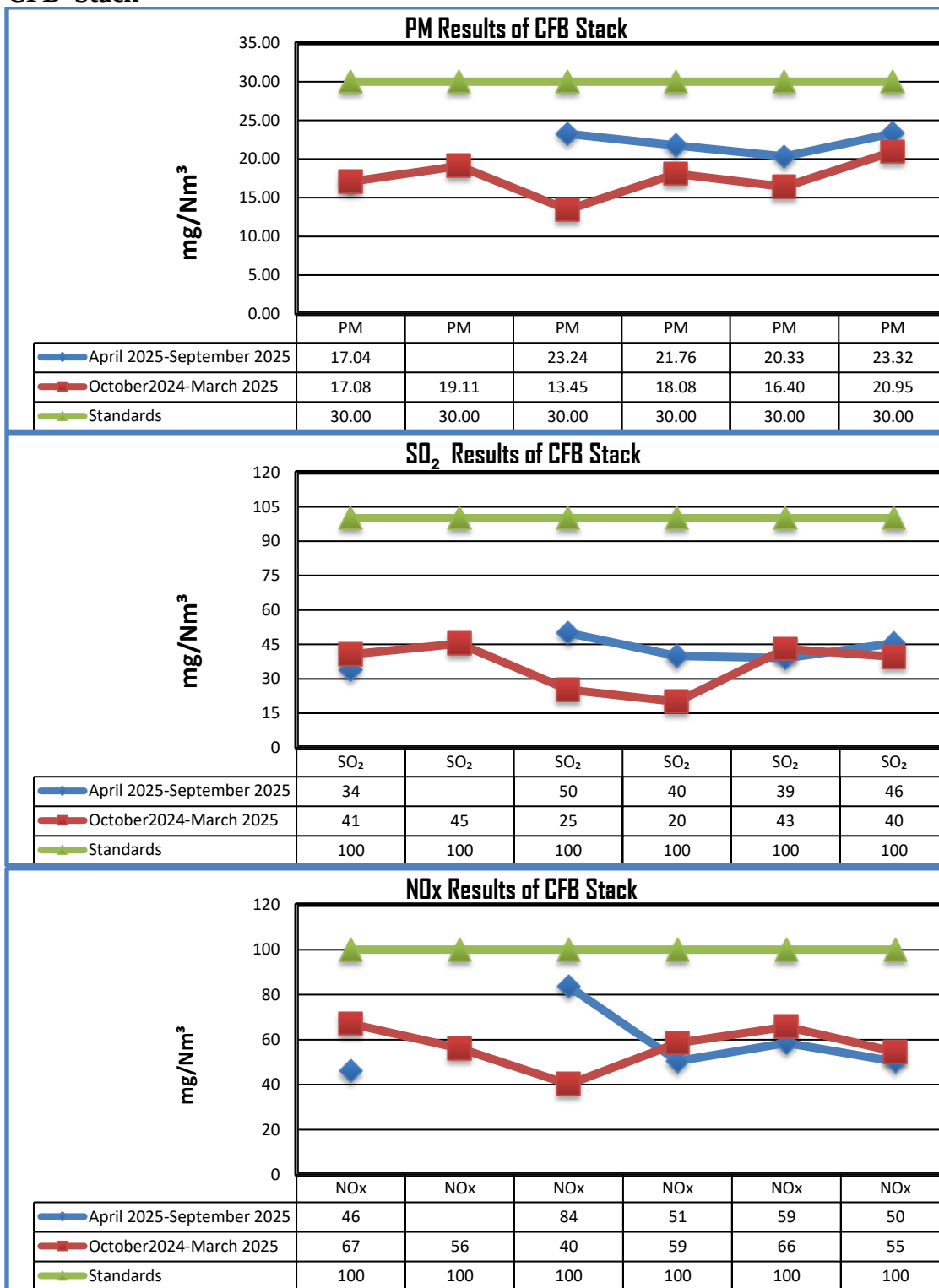
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E. GT & HRSG #2 Stack



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CHAPTER NO. – 04
METEOROLOGY

4. METEOROLOGY

The following Meteorological parameters:

- Temperature (Dry & Wet Bulb),
- Relative Humidity
- Wind Speed And Direction
- Atmospheric Pressure
- Cloud Cover (Visual Inspection)
- Rainfall

Following instruments are used for conducting meteorological data recording:

Temperature and relative humidity : Dry & Wet Bulb Thermometer and Sychrometric Chart
 Wind direction and wind velocity : Wind - Vane and Cup Counter Anemometer
 Rainfall : Rain Gauge
 Atmospheric Pressure : Barometer
 Wind direction was recorded in all the sixteen directions.

A. Abstract of monitored meteorological data (Half-Yearly Max. & Min.):

Location: WWTP (Roof of Environmental Laboratory), HPL Plant

Monitoring Period: April 2025 to September 2025

Monitoring Frequency: Twice in a week

Wind Velocity (Km/hr)		Temperature (O ⁰ C)		RH (%)		Predominant Wind Direction		Rainfall (mm)	Calm (%)	
Max.	Min.	Max.	Min.	Max.	Min.	Day	Night		Day	Night
26.0	2.3	37.0	25.0	92.0	52.0	SSE	SSW	269.72	0.00	0.00

B. Abstract of monitored meteorological data (Monthly Max. & Min.):

Month	Wind Velocity (Km/hr)		Temperature (⁰ C)		RH (%)		Predominant Wind Direction		Rainfall (mm)	Calm (%)	
	Max	Min.	Max.	Min.	Max.	Min.	Day	Night	Monthly	Day	Night
APRIL-2025	26.0	2.3	36.0	25.0	89.0	52.0	SSE	SSE	72.90	0.0	0.0
MAY-2025	23.7	2.4	36.0	26.0	92.0	53.0	SSE	WSW	176.90	0.0	0.0
JUNE-2025	19.4	2.3	37.0	26.0	92.0	52.0	SSE	SSW	285.00	0.0	0.0
JULY-2025	16.7	3.1	37.0	26.0	92.0	52.0	SSE	SSW	385.00	0.0	0.0
AUGUST-2025	15.2	4.1	34.5	26.5	92.0	62.0	SSE	SSW	402.70	0.0	0.0
SEPTEMBER-2025	18.8	2.8	34.5	26.5	92.0	62.0	SSE	ESE	295.80	0.0	0.0



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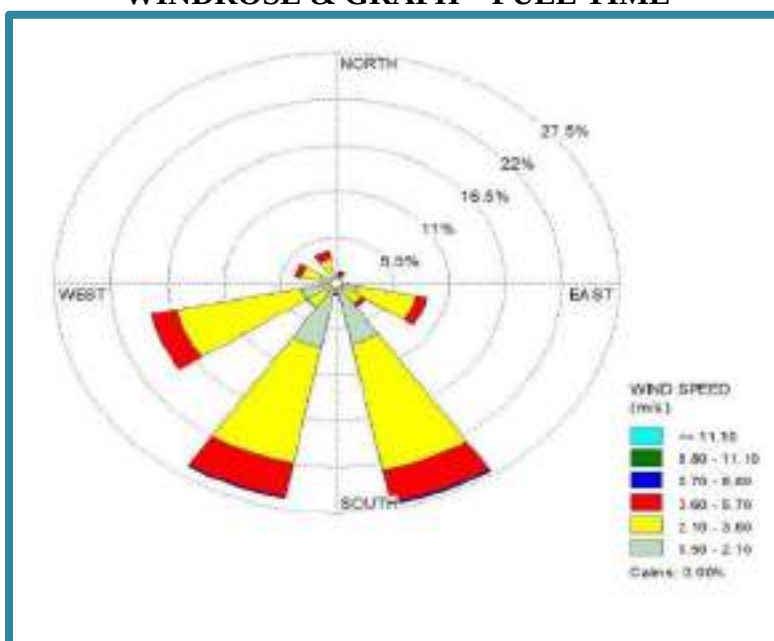
C. Meteorological Observation:

WINDROSE-FREQUENCY TABLE – FULL TIME

(Period: April 2025 to September 2025)

WIND DIRECTION	VELOCITY (in m/sec) RANGES						SUM%
	0.5<V<=2.1	2.1<V<=3.6	3.6<V<=5.7	5.7<V<=8.8	8.8<V<=11.1	V>=11.1	
N	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NNE	0.35	0.62	0.35	0.21	0.00	0.00	1.52
NE	0.21	0.00	0.00	0.00	0.00	0.00	0.21
ENE	0.49	0.07	0.00	0.00	0.00	0.00	0.55
E	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ESE	2.22	5.75	1.04	0.00	0.00	0.00	9.00
SE	0.90	2.08	0.49	0.00	0.00	0.00	3.46
SSE	7.41	15.31	3.95	0.28	0.00	0.00	26.94
S	0.69	0.69	0.21	0.00	0.00	0.00	1.59
SSW	7.83	14.06	4.09	0.21	0.00	0.00	26.18
SW	1.39	2.08	0.07	0.00	0.00	0.00	3.53
WSW	3.53	12.33	2.56	0.00	0.00	0.00	18.42
W	0.00	0.07	0.00	0.00	0.00	0.00	0.07
WNW	1.80	1.73	0.69	0.00	0.00	0.00	4.23
NW	0.07	0.28	0.07	0.00	0.00	0.00	0.42
NNW	0.83	2.15	0.90	0.00	0.00	0.00	3.88
SUM%	27.70	57.20	14.40	0.69	0.00	0.00	100.00
CALM	(0.00<=V<=0.5)						0.00
							100.00

WINDROSE & GRAPH – FULL TIME





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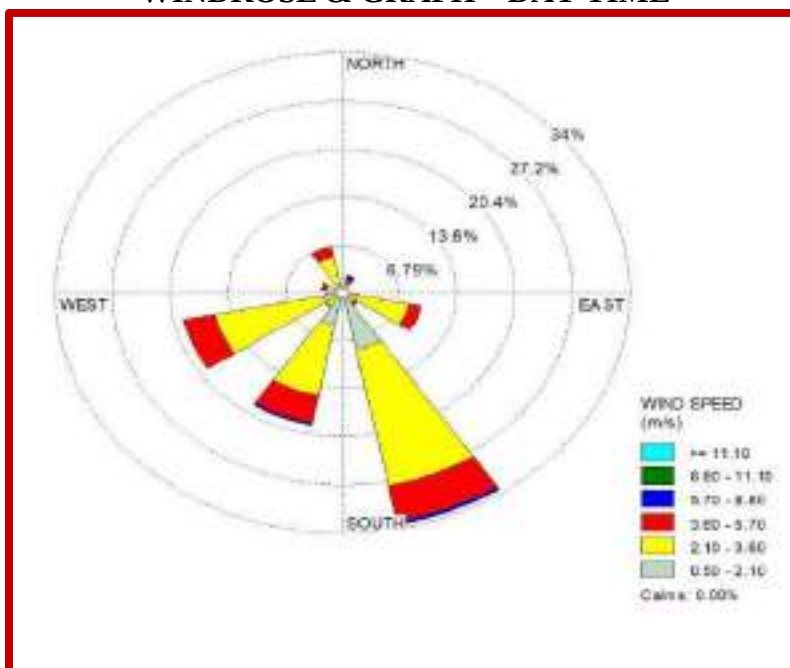


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WINDROSE-FREQUENCY TABLE – DAY TIME

WIND DIRECTION	VELOCITY (in m/sec) RANGES						SUM%
	0.5<V<=2.1	2.1<V<=3.6	3.6<V<=5.7	5.7<V<=8.8	8.8<V<=11.1	V>=11.1	
N	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NNE	0.61	0.97	0.61	0.36	0.00	0.00	2.54
NE	0.24	0.00	0.00	0.00	0.00	0.00	0.24
ENE	0.12	0.12	0.00	0.00	0.00	0.00	0.24
E	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ESE	1.94	6.17	1.45	0.00	0.00	0.00	9.56
SE	0.48	1.33	0.48	0.00	0.00	0.00	2.30
SSE	8.23	19.49	5.09	0.48	0.00	0.00	33.29
S	0.24	0.48	0.12	0.00	0.00	0.00	0.85
SSW	4.72	10.05	3.87	0.36	0.00	0.00	19.01
SW	0.73	1.70	0.12	0.00	0.00	0.00	2.54
WSW	2.42	12.95	3.75	0.00	0.00	0.00	19.13
W	0.00	0.12	0.00	0.00	0.00	0.00	0.12
WNW	0.61	1.45	0.61	0.00	0.00	0.00	2.66
NW	0.12	0.36	0.12	0.00	0.00	0.00	0.61
NNW	1.57	3.75	1.57	0.00	0.00	0.00	6.90
SUM%	22.03	58.96	17.80	1.21	0.00	0.00	100.00
CALM	(0.00<=V<=0.5)						0.00
							100.00

WINDROSE & GRAPH – DAY TIME





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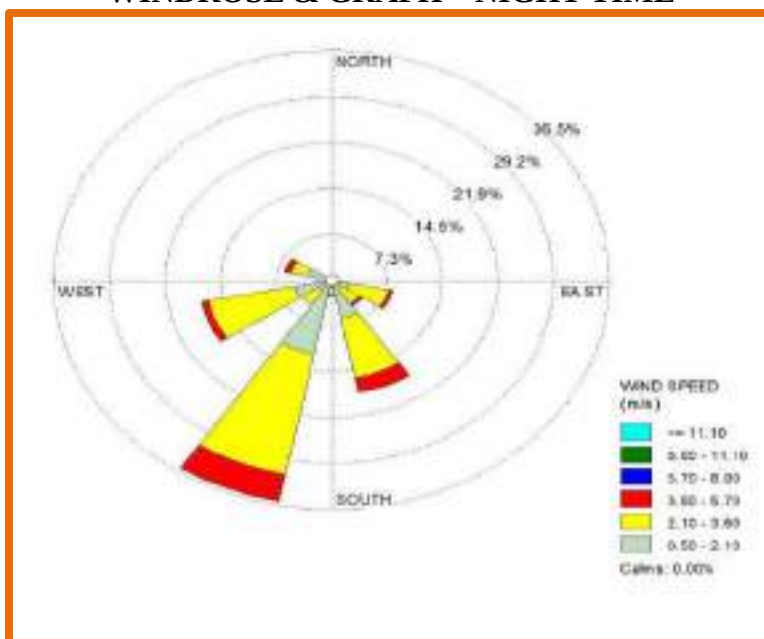


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WINDROSE-FREQUENCY TABLE – NIGHT TIME

WIND DIRECTION	VELOCITY (in m/sec) RANGES						SUM%
	0.5<V<=2.1	2.1<V<=3.6	3.6<V<=5.7	5.7<V<=8.8	8.8<V<=11.1	V>=11.1	
N	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NNE	0.00	0.16	0.00	0.00	0.00	0.00	0.16
NE	0.16	0.00	0.00	0.00	0.00	0.00	0.16
ENE	0.97	0.00	0.00	0.00	0.00	0.00	0.97
E	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ESE	2.59	5.18	0.49	0.00	0.00	0.00	8.25
SE	1.46	3.07	0.49	0.00	0.00	0.00	5.02
SSE	6.31	9.55	2.43	0.00	0.00	0.00	18.29
S	1.29	0.97	0.32	0.00	0.00	0.00	2.59
SSW	11.97	19.42	4.37	0.00	0.00	0.00	35.76
SW	2.27	2.59	0.00	0.00	0.00	0.00	4.85
WSW	5.02	11.49	0.97	0.00	0.00	0.00	17.48
W	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WNW	3.56	2.10	0.81	0.00	0.00	0.00	6.47
NW	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NNW	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUM%	35.60	54.53	9.87	0.00	0.00	0.00	100.00
CALM	(0.00<=V<=0.5)						0.65
							100.00

WINDROSE & GRAPH – NIGHT TIME





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CHAPTER NO. – 05

AMBIENT AIR

QUALITY



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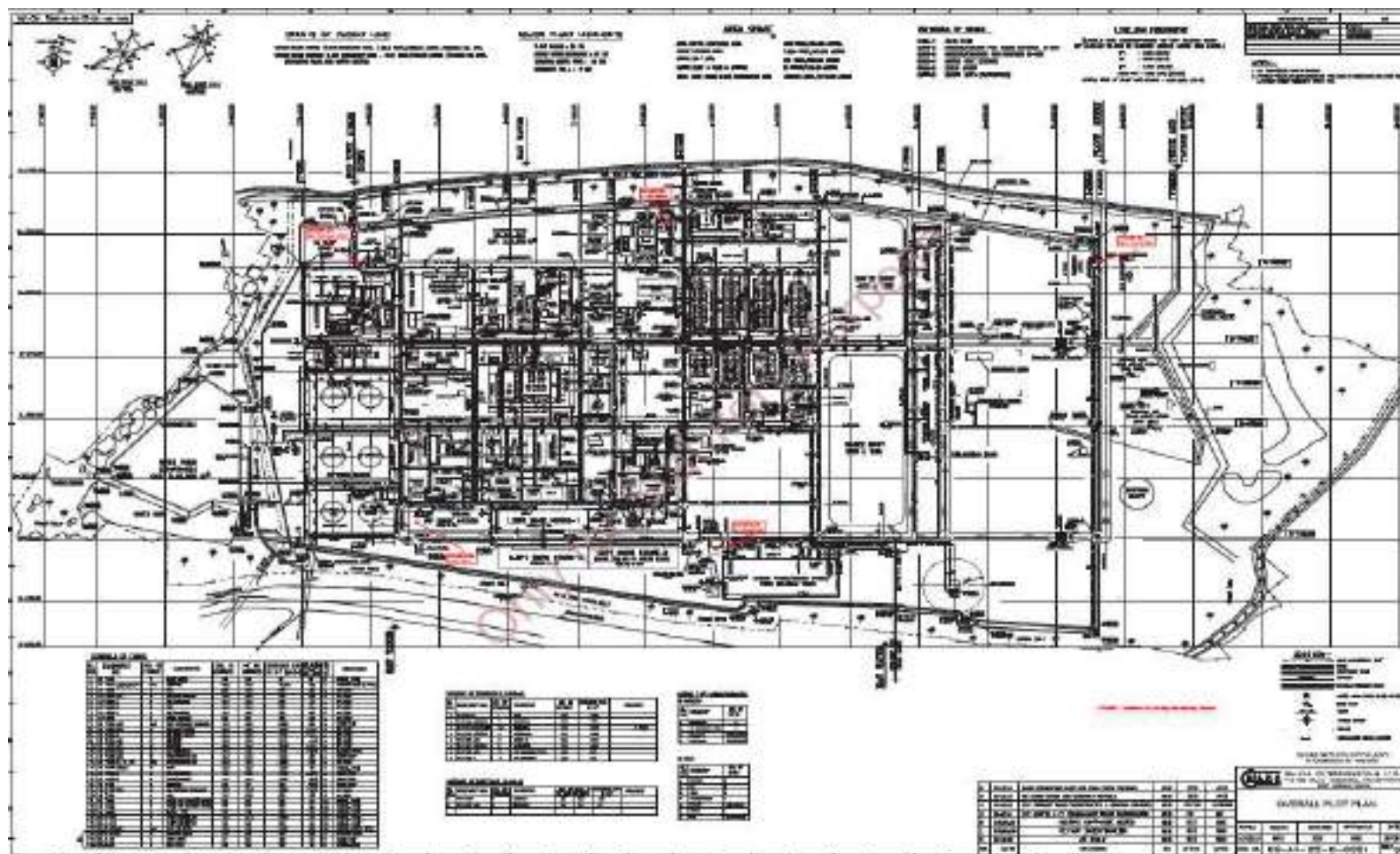
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5.0 AMBIENT AIR QUALITY

Ambient Air Quality Monitoring stations (AAQMS) In-side 5 Location





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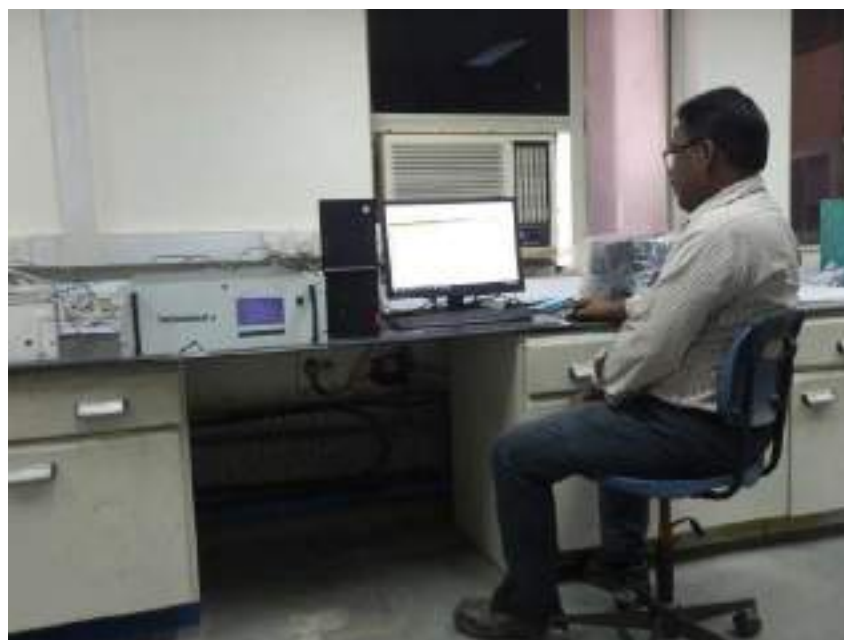


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On-Line Ambient Air Quality Monitoring Station at South Control Room



On-Line Hydrocarbon Analyzer at Central Laboratory



Ambient Air Quality Monitoring stations (AAQMS)

A. In Side Ambient Air Quality Monitoring stations (Five locations):

Sl. No.	Station Code	Station Name	Direction from the center of the plant
1	AAQMS - 1	Central Laboratory	North
2	AAQMS - 2	Gate No. 1	East
3	AAQMS - 3	South Control Room	South
4	AAQMS - 4	PP Ware House	South – West
5	AAQMS - 5	CPP Entry Gate	North - West

B. Out Side Ambient Air Quality Monitoring stations (Six locations):

Sl. No.	Station Code	Name of Station	Direction from HPL Complex	Distance from HPL Complex (km)
1.	AAQMS – 6	Nandarampur	North	2.6 Km
2.	AAQMS – 7	Basudevpur	North- East	5.0 Km
3.	AAQMS – 8	Haldia Bhavan	South	6.0 Km
4.	AAQMS – 9	Hatiberia (Swati Complex)	South of South-West	4.0 Km
5.	AAQMS – 10	IOC Township	South	5.0 Km
6.	AAQMS – 11	Manaharpur	West of North-West	3.5 Km

C. Methodology of Ambient Air Sampling & Analysis

Sl. No.	Parameters	Unit	Specification / Standard (method) or technique used	Range of Testing	Methodology
1	Particulate Matter (PM ₁₀)	µg/m ³	IS: 5182(Part 23): 2006	1 µg/m ³ & above	Sampling of PM ₁₀ using Respirable Dust Sampler
2	Particulate Matter (PM _{2.5})	µg/m ³	USEPA 40 CFR Parts 53 & 58	2 µg/m ³ & above	Sampling of PM _{2.5} using Ambient Fine Dust Sampler,
3	Sulphur Dioxide (SO ₂)	µg/m ³	IS:5182 (Part-2):2006 (First Revision)	4 µg /m ³ & above	Absorption in Na-tetrachloromercurate solution followed by Spectrophotometric analysis
4	Oxides of Nitrogen (NO _x)	µg/m ³	IS:5182 (Part-6):2006 (First Revision)	10 µg /m ³ & above	Absorption in sodium hydroxide & Na-arsenite solution followed by Spectrophotometric analysis



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Sl. No.	Parameters	Unit	Specifiction / Standard (method) or technique used	Range of Testing	Methodology
5	Ozone (O ₃)	µg/m ³	Methods of air sampling and examination, Third Edition, Edited by James P. Lodge, Method 411.	8.2 µg /m ³ & above	Micro-amounts of O ₃ liberate iodine when absorbed in a 1% solution of potassium iodide buffered at pH 6.8(± 0.2). The liberated iodine is determined Spectrophotometrically by measuring the absorption of triiodide ion at 352 nm.
6	Ammonia (NH ₃)	µg/m ³	Method of Air Sampling & examination, Third Edition, Edited by James P. Lodge, Method 401	5 µg /m ³ & above	Ammonia is absorb in dilute H ₂ SO ₄ & measured colorimetrically by reaction with phenol & alkaline sodium hypochlorite to produce indophenols, a blue dye.
7	Lead (Pb)	µg/m ³	Method of Air Sampling & examination, Third Edition, Edited by James P. Lodge, Method 303A, 822	0.01 µg /m ³ & above	Lead is determined by Atomic Absorption Spectrophotometer using air-acetylene flame.
8	Benzene (C ₆ H ₆)	µg/m ³	IS: 5182(Part 11): 2006	0.042 µg /m ³ & above	Absorption on activated charcoal, desorption by carbon disulphide & analysis by GC using FID.
9	Arsenic (As)	ng/m ³	Standard Method-APHA, 20 th Edition,	0.14 ng /m ³ & above	Standard Method-APHA, 20 th Edition, 1998 by Atomic Absorption Spectrophotometer using vapour generation assembly (VGA)
10	Nickel (Ni)	ng/m ³	Method of Air Sampling & examination, Third Edition, Edited by James P. Lodge, Method 303A, 822	2.8 ng /m ³ & above	Nickel is determined by Atomic Absorption Spectrophotometer using air-acetylene flame



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Sl. No.	Parameters	Unit	Specifiction / Standard (method) or technique used	Range of Testing	Methodology
11	Benzo (a) Pyrene (BaP), Particulate phase only	ng/m ³	IS: 5182(Part 12): 2009	0.11 ng /m ³ & above	Benzo(a)pyrene and other polynuclear hydrocarbons are extracted from the particulate matter using a non-polar solvent cyclohexane, which extracts less extraneous material than a more polar solvent. The extract is concentrated and analyzed by Gas Chromatograph – Mass Spectrometer.
12	Carbon Monoxide (CO)	mg/m ³	IS: 5182 (Part 10): 1999 (First Revision)	0.01 mg /m ³ & above	Sampling of CO in gas sampling tubes & analysis by NDIR

D. National Ambient Air Quality Standards

Sl. No.	Parameters		Time Weighted Average	Ambient air concentration (µg/m³)	
		Unit		Industrial, Residential, Rural & Other Area	Ecologically Sensitive Area
1	Sulphur Dioxide (SO ₂)	µg/m³	Annual*	50	20
			24 hours**	80	80
2	Nitrogen Dioxide (NO ₂)		Annual*	40	30
			24 hours**	80	80
3	Particulate Matter (PM ₁₀)		Annual*	60	60
			24 hours**	100	100
4	Particulate Matter (PM _{2.5})		Annual*	40	40
			24 hours**	60	60
5	Ozone (O ₃)		8 hours**	100	100
			1 hours**	180	180
6	Lead (Pb)		Annual*	0.50	0.50
			24 hours**	1.0	1.0
7	Carbon monoxide (CO)	mg/m³	8 hours**	02	02
			1 hours**	04	04



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Sl. No.	Parameters	Unit	Time Weighted Average	Ambient air concentration ($\mu\text{g}/\text{m}^3$)	
				Industrial, Residential, Rural & Other Area	Ecologically Sensitive Area
8	Ammonia (NH_3)	$\mu\text{g}/\text{m}^3$	Annual*	100	100
			24 hours**	400	400
9	Benzene (C_6H_6)	ng/m^3	Annual*	05	05
10	Benzo(a)Pyrene (BaP)		Annual*	01	01
11	Arsenic (As)		Annual*	06	06
12	Nickel (Ni)		Annual*	20	20

* Annual arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform intervals.

** 24 hourly or 08 hourly monitored values, as applicable, shall be complied with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive days of monitoring.

Note.-Whenever and wherever monitoring results on two consecutive days of monitoring exceed the limits specified above for the respective category, it shall be considered adequate reason to institute regular or continuous monitoring and further investigation.



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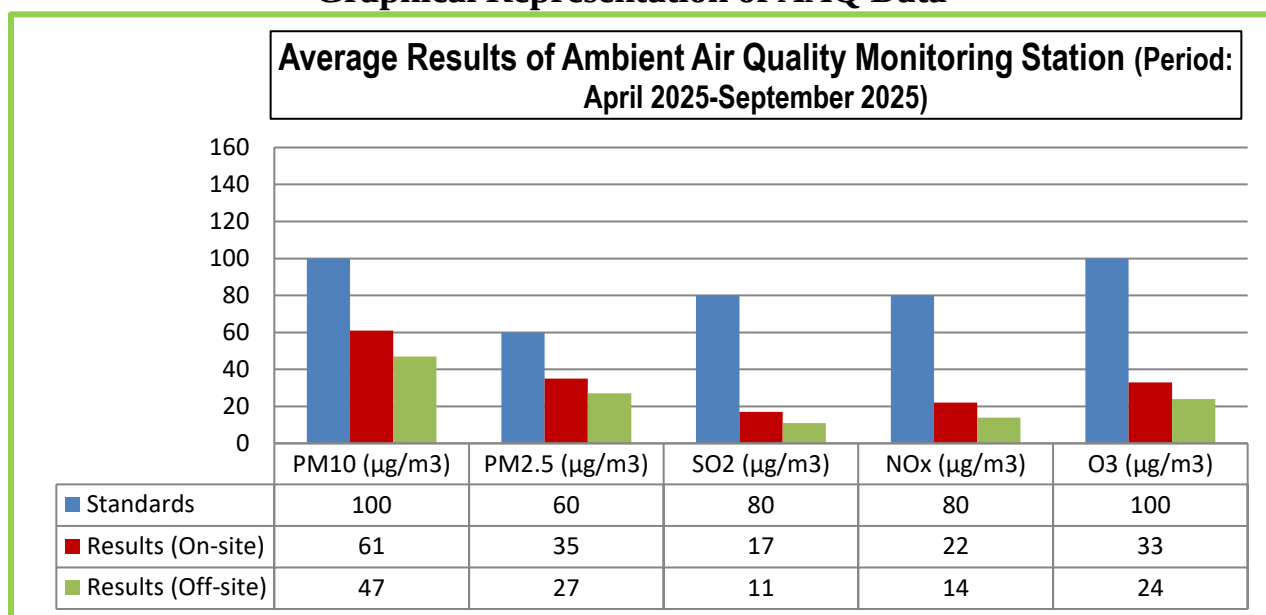
MONTHLY AVERAGE RESULTS OF AMBIENT AIR QUALITY (On-site Plant)

Month	PM ₁₀ ($\mu\text{g}/\text{m}^3$)	PM _{2.5} ($\mu\text{g}/\text{m}^3$)	SO ₂ ($\mu\text{g}/\text{m}^3$)	NO ₂ ($\mu\text{g}/\text{m}^3$)	O ₃ ($\mu\text{g}/\text{m}^3$)	NH ₃ ($\mu\text{g}/\text{m}^3$)	Pb ($\mu\text{g}/\text{m}^3$)	C ₆ H ₆ ($\mu\text{g}/\text{m}^3$)	As (ng/m^3)	BaP (ng/m^3)	Ni (ng/m^3)	CO (mg/m^3)
Apr 25	84	49	17	22	35	<20	0.15	2.0	4.9	<0.8	<18	0.57
May 25	68	39	16	22	34	<20	0.14	1.2	4.8	<0.8	<18	0.50
June 25	67	38	17	22	34	<20	0.14	1.5	4.2	<0.8	<18	0.55
July 25	48	27	17	22	32	<20	0.13	1.1	3.9	<0.8	<18	0.46
Aug 25	53	27	17	22	33	<20	0.14	1.4	4.4	<0.8	<18	0.57
Sep 25	48	26	17	22	33	<20	0.15	1.2	4.7	<0.8	<18	0.54
Average	61	35	17	22	33	<20	0.14	1.4	4.5	<0.8	<18	0.53

MONTHLY AVERAGE RESULTS OF AMBIENT AIR QUALITY (Off-site Plant)

Month	PM ₁₀ ($\mu\text{g}/\text{m}^3$)	PM _{2.5} ($\mu\text{g}/\text{m}^3$)	SO ₂ ($\mu\text{g}/\text{m}^3$)	NO ₂ ($\mu\text{g}/\text{m}^3$)	O ₃ ($\mu\text{g}/\text{m}^3$)	NH ₃ ($\mu\text{g}/\text{m}^3$)	Pb ($\mu\text{g}/\text{m}^3$)	C ₆ H ₆ ($\mu\text{g}/\text{m}^3$)	As (ng/m^3)	BaP (ng/m^3)	Ni (ng/m^3)	CO (mg/m^3)
Apr 25	72	40	10	13	25	<20	0.09	1.5	2.4	<0.8	<18	0.43
May 25	49	29	11	14	25	<20	0.08	0.7	2.1	<0.8	<18	0.42
June 25	54	30	11	14	25	<20	0.07	1.2	2.1	<0.8	<18	0.44
July 25	37	22	12	15	22	<20	0.07	0.7	2.8	<0.8	<18	0.37
Aug 25	38	20	11	13	23	<20	0.07	1.0	2.3	<0.8	<18	0.50
Sep 25	34	20	11	14	24	<20	0.08	0.5	2.4	<0.8	<18	0.43
Average	47	27	11	14	24	<20	0.08	0.9	2.3	<0.8	<18	0.43

Graphical Representation of AAQ Data





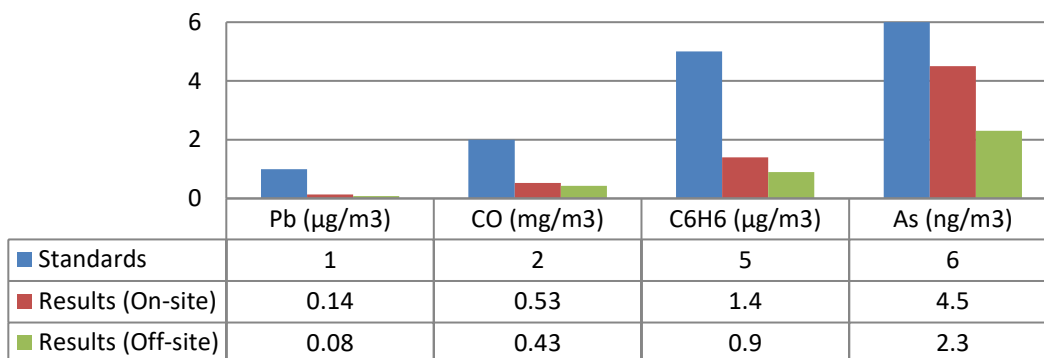
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Average Results of Ambient Air Quality Monitoring Station
(Period: April 2025-September 2025)



Monthly wise Report of Ambient Air Quality Monitoring Station

MONTHLY AVERAGE RESULTS OF AMBIENT AIR QUALITY (On-site Plant)												
Station Name & Code: Central Laboratory (AAQMS-1)												
Month	PM ₁₀ ($\mu\text{g}/\text{m}^3$)	PM _{2.5} ($\mu\text{g}/\text{m}^3$)	SO ₂ ($\mu\text{g}/\text{m}^3$)	NO ₂ ($\mu\text{g}/\text{m}^3$)	O ₃ ($\mu\text{g}/\text{m}^3$)	NH ₃ ($\mu\text{g}/\text{m}^3$)	Pb ($\mu\text{g}/\text{m}^3$)	C ₆ H ₆ ($\mu\text{g}/\text{m}^3$)	As (ng/m^3)	BaP (ng/m^3)	Ni (ng/m^3)	CO (mg/m^3)
Apr 25	82	49	16	22	35	<20	0.14	1.9	5.0	<0.8	<18	0.57
May 25	70	40	16	22	34	<20	0.14	1.2	4.8	<0.8	<18	0.51
June 25	66	38	18	22	34	<20	0.14	1.5	4.2	<0.8	<18	0.55
July 25	47	27	17	23	32	<20	0.12	1.1	3.8	<0.8	<18	0.47
Aug 25	52	26	16	22	33	<20	0.14	1.4	4.4	<0.8	<18	0.57
Sep 25	47	27	17	21	33	<20	0.15	1.1	4.7	<0.8	<18	0.54
Average	61	35	17	22	34	<20	0.14	1.4	4.5	<0.8	<18	0.53

Note: All parameters are 24 hrs. sampling basis except CO & Ozone 8 hrs. sampling basis.

MONTHLY AVERAGE RESULTS OF AMBIENT AIR QUALITY (On-site Plant)												
Station Name & Code: Gate No.1 (AAQMS-2)												
Month	PM ₁₀ ($\mu\text{g}/\text{m}^3$)	PM _{2.5} ($\mu\text{g}/\text{m}^3$)	SO ₂ ($\mu\text{g}/\text{m}^3$)	NO ₂ ($\mu\text{g}/\text{m}^3$)	O ₃ ($\mu\text{g}/\text{m}^3$)	NH ₃ ($\mu\text{g}/\text{m}^3$)	Pb ($\mu\text{g}/\text{m}^3$)	C ₆ H ₆ ($\mu\text{g}/\text{m}^3$)	As (ng/m^3)	BaP (ng/m^3)	Ni (ng/m^3)	CO (mg/m^3)
Apr 25	85	50	17	23	35	<20	0.15	2.1	4.9	<0.8	<18	0.56
May 25	69	39	16	23	34	<20	0.15	1.2	5.0	<0.8	<18	0.50
June 25	66	39	19	22	35	<20	0.13	1.5	4.0	<0.8	<18	0.55
July 25	49	27	16	22	32	<20	0.13	1.2	4.0	<0.8	<18	0.46
Aug 25	51	28	17	23	35	<20	0.14	1.4	4.1	<0.8	<18	0.57
Sep 25	49	27	17	23	32	<20	0.15	1.2	4.6	<0.8	<18	0.54
Average	61	35	17	23	34	<20	0.14	1.4	4.5	<0.8	<18	0.53

Note: All parameters are 24 hrs. sampling basis except CO & Ozone 8 hrs. sampling basis.



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MONTHLY AVERAGE RESULTS OF AMBIENT AIR QUALITY (On-site Plant)

Station Name & Code: SCR (AAQMS-3)

Month	PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	O ₃ (µg/m ³)	NH ₃ (µg/m ³)	Pb (µg/m ³)	C ₆ H ₆ (µg/m ³)	As (ng/m ³)	BaP (ng/m ³)	Ni (ng/m ³)	CO (mg/m ³)
Apr 25	85	48	17	21	34	<20	0.15	2.0	5.0	<0.8	<18	0.54
May 25	68	39	17	23	35	<20	0.14	1.2	4.6	<0.8	<18	0.50
June 25	67	38	17	21	34	<20	0.13	1.5	3.9	<0.8	<18	0.55
July 25	46	26	17	22	32	<20	0.12	1.0	3.8	<0.8	<18	0.47
Aug 25	52	27	16	22	32	<20	0.14	1.4	4.5	<0.8	<18	0.58
Sep 25	48	25	17	22	31	<20	0.15	1.2	4.7	<0.8	<18	0.54
Average	61	34	17	22	33	<20	0.14	1.4	4.4	<0.8	<18	0.53

Note: All parameters are 24 hrs. sampling basis except CO & Ozone 8 hrs. sampling basis.

MONTHLY AVERAGE RESULTS OF AMBIENT AIR QUALITY (On-site Plant)

Station Name & Code: PPWH (AAQMS-4)

Month	PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	O ₃ (µg/m ³)	NH ₃ (µg/m ³)	Pb (µg/m ³)	C ₆ H ₆ (µg/m ³)	As (ng/m ³)	BaP (ng/m ³)	Ni (ng/m ³)	CO (mg/m ³)
Apr 25	86	50	17	23	34	<20	0.15	2.0	5.0	<0.8	<18	0.58
May 25	66	38	17	22	33	<20	0.14	1.0	5.1	<0.8	<18	0.50
June 25	66	37	16	22	33	<20	0.14	1.5	4.1	<0.8	<18	0.55
July 25	48	26	17	21	31	<20	0.13	1.2	3.8	<0.8	<18	0.47
Aug 25	54	27	18	21	33	<20	0.14	1.4	4.2	<0.8	<18	0.58
Sep 25	46	26	16	21	33	<20	0.15	1.1	4.7	<0.8	<18	0.55
Average	61	34	17	22	33	<20	0.14	1.4	4.5	<0.8	<18	0.54

Note: All parameters are 24 hrs. sampling basis except CO & Ozone 8 hrs. sampling basis.

MONTHLY AVERAGE RESULTS OF AMBIENT AIR QUALITY (On-site Plant)

Station Name & Code: CPP Entry Gate (AAQMS-5)

Month	PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	O ₃ (µg/m ³)	NH ₃ (µg/m ³)	Pb (µg/m ³)	C ₆ H ₆ (µg/m ³)	As (ng/m ³)	BaP (ng/m ³)	Ni (ng/m ³)	CO (mg/m ³)
Apr 25	83	48	17	21	34	<20	0.15	2.0	4.9	<0.8	<18	0.57
May 25	69	41	16	21	36	<20	0.14	1.2	4.7	<0.8	<18	0.51
June 25	71	39	16	21	33	<20	0.14	1.7	4.5	<0.8	<18	0.55
July 25	50	28	17	22	32	<20	0.14	1.2	4.2	<0.8	<18	0.46
Aug 25	54	28	17	23	34	<20	0.15	1.4	4.6	<0.8	<18	0.56
Sep 25	49	27	18	22	33	<20	0.14	1.2	4.6	<0.8	<18	0.55
Average	63	35	17	22	34	<20	0.15	1.5	4.6	<0.8	<18	0.53

Note: All parameters are 24 hrs. sampling basis except CO & Ozone 8 hrs. sampling basis.



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MONTHLY AVERAGE RESULTS OF AMBIENT AIR QUALITY (Off-site Plant)

Station Name & Code: IOC Township (AAQMS-10)

Month	PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	O ₃ (µg/m ³)	NH ₃ (µg/m ³)	Pb (µg/m ³)	C ₆ H ₆ (µg/m ³)	As (ng/m ³)	BaP (ng/m ³)	Ni (ng/m ³)	CO (mg/m ³)
Apr 25	73	41	10	14	26	<20	0.09	1.6	2.5	<0.8	<18	0.44
May 25	49	29	11	14	25	<20	0.09	0.8	2.1	<0.8	<18	0.43
Average	61	35	11	14	25	<20	0.09	1.2	2.3	<0.8	<18	0.43

Note: All parameters are 24 hrs. sampling basis except CO & Ozone 8 hrs. sampling basis.

MONTHLY AVERAGE RESULTS OF AMBIENT AIR QUALITY (Off-site Plant)

Station Name & Code: Manaharpur (AAQMS-11)

Month	PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	O ₃ (µg/m ³)	NH ₃ (µg/m ³)	Pb (µg/m ³)	C ₆ H ₆ (µg/m ³)	As (ng/m ³)	BaP (ng/m ³)	Ni (ng/m ³)	CO (mg/m ³)
Apr 25	71	39	10	13	24	<20	0.08	1.4	2.2	<0.8	<18	0.43
May 25	49	29	10	14	24	<20	0.07	0.7	2.0	<0.8	<18	0.42
Average	60	34	10	14	24	<20	0.08	1.1	2.1	<0.8	<18	0.42

Note: All parameters are 24 hrs. sampling basis except CO & Ozone 8 hrs. sampling basis.

MONTHLY AVERAGE RESULTS OF AMBIENT AIR QUALITY (Off-site Plant)

Station Name & Code: Nandarampur (AAQMS-6)

Month	PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	O ₃ (µg/m ³)	NH ₃ (µg/m ³)	Pb (µg/m ³)	C ₆ H ₆ (µg/m ³)	As (ng/m ³)	BaP (ng/m ³)	Ni (ng/m ³)	CO (mg/m ³)
June 25	53	29	10	14	23	<20	0.07	1.1	2.0	<0.8	<18	0.43
July 25	35	21	11	13	21	<20	0.07	0.6	2.6	<0.8	<18	0.35
Average	44	25	11	13	22	<20	0.07	0.9	2.3	<0.8	<18	0.39

Note: All parameters are 24 hrs. sampling basis except CO & Ozone 8 hrs. sampling basis.

MONTHLY AVERAGE RESULTS OF AMBIENT AIR QUALITY (Off-site Plant)

Station Name & Code: Near CPT Hospital (AAQMS-8)

Month	PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	O ₃ (µg/m ³)	NH ₃ (µg/m ³)	Pb (µg/m ³)	C ₆ H ₆ (µg/m ³)	As (ng/m ³)	BaP (ng/m ³)	Ni (ng/m ³)	CO (mg/m ³)
June 25	56	31	12	15	26	<20	0.08	1.3	2.2	<0.8	<18	0.45
July 25	38	22	13	16	23	<20	0.08	0.7	2.9	<0.8	<18	0.38
Average	47	27	12	16	25	<20	0.08	1.0	2.6	<0.8	<18	0.41

Note: All parameters are 24 hrs. sampling basis except CO & Ozone 8 hrs. sampling basis.

MONTHLY AVERAGE RESULTS OF AMBIENT AIR QUALITY (Off-site Plant)

Station Name & Code: Basudebpur (AAQMS-7)

Month	PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	O ₃ (µg/m ³)	NH ₃ (µg/m ³)	Pb (µg/m ³)	C ₆ H ₆ (µg/m ³)	As (ng/m ³)	BaP (ng/m ³)	Ni (ng/m ³)	CO (mg/m ³)
Aug 25	38	20	11	14	23	<20	0.08	1.0	2.4	<0.8	<18	0.50
Sep 25	33	20	12	15	23	<20	0.08	0.5	2.6	<0.8	<18	0.43
Average	36	20	12	15	23	<20	0.08	0.8	2.5	<0.8	<18	0.47

Note: All parameters are 24 hrs. sampling basis except CO & Ozone 8 hrs. sampling basis.



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MONTHLY AVERAGE RESULTS OF AMBIENT AIR QUALITY (Off-site Plant)

Station Name & Code: Hatiberia Swati Complex (AAQMS-9)

Month	PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	O ₃ (µg/m ³)	NH ₃ (µg/m ³)	Pb (µg/m ³)	C ₆ H ₆ (µg/m ³)	As (ng/m ³)	BaP (ng/m ³)	Ni (ng/m ³)	CO (mg/m ³)
Aug 25	37	20	11	13	23	<20	0.07	1.0	2.2	<0.8	<18	0.49
Sep 25	34	20	10	13	24	<20	0.07	0.5	2.3	<0.8	<18	0.43
Average	36	20	11	13	23	<20	0.07	0.7	2.2	<0.8	<18	0.46

Note: All parameters are 24 hrs. sampling basis except CO & Ozone 8 hrs. sampling basis.

On-line Hydrocarbon Analyzer

One no. On-line Hydrocarbon Analyzer was installed & commissioned on January 2007. The On-line Hydrocarbon Analyzer was located at Central Laboratory. Monitoring of ambient air quality has been carried out at Central Laboratory (Inside the plant). The identified location monitoring is carried out every one hour for Total Hydrocarbon, Methane & Non Methane Hydrocarbon. The study area has been considered as an industrial area. The results for the month of **April 2025 to September 2025** are given.

Average results of On-line Hydrocarbon Analyzer

Location : Central Laboratory

Month	THC (ppm)	CH ₄ (ppm)	NMHC (ppm)
Apr-25	2.15	1.56	0.60
May-25	1.69	1.28	0.41
Jun-25	0.87	0.53	0.35
Jul-25	1.03	0.63	0.39
Aug-25	2.68	1.66	1.01
Sep-25	2.96	1.81	1.15
Average	3.26	2.54	0.72

On-line Ambient Air Quality Monitoring Station (AAQMS)

One On-line Ambient Air Quality Monitoring station was installed & commissioned on 29 February 2008. The on-line AAQMS was located at South Control Room. AAQMS contains four analyzers (PM_{2.5}, SO₂ & H₂S, NO_x, and Hydrocarbon analyzer) for ambient air quality analysis and five sensors (Wind Speed, Wind Direction, Relative Humidity, Pressure and Temperature) for monitoring of meteorological parameters. AAQMS contains five analyzers (PM₁₀, NH₃, O₃, CO & Benzene) was installed on August 2018. The study area has been considered as an industrial area. The results for the month of **April 2025 to September 2025** are given.

Average results of On-line Ambient Air Quality Monitoring Station (AAQMS) Location : South Control Room

Month	PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	H ₂ S (µg/m ³)	NO _x (µg/m ³)	NH ₃ (µg/m ³)	O ₃ (µg/m ³)	Benzene (µg/m ³)	CO (mg/m ³)
Apr-25	68.00	33.52	15.36	11.40	28.93	11.32	29.25	2.76	1.48
May-25	40.25	19.00	15.61	8.31	23.69	11.97	74.92	2.76	0.62
Jun-25	50.00	16.78	9.27	5.49	23.83	11.94	72.14	2.76	0.45
Jul-25	43.00	17.14	7.14	5.01	24.47	11.85	46.27	2.76	0.48
Aug-25	46.13	17.44	10.16	5.00	24.06	11.89	44.16	2.76	0.82
Sep-25	49.00	16.98	11.06	5.01	21.37	12.23	45.47	2.76	0.54
Average	49.40	20.14	11.43	6.70	24.39	11.87	52.03	2.76	0.73

Month	WS (m/s)	Wind Degree	Temperature (°C)	RH (%)	Pressure (mbar)	THC (PPM)	CH ₄ (PPM)	NMHC (PPM)
Apr-25	3.71	352.05	25.05	49.81	765.40	2.95	1.92	1.04
May-25	3.31	239.79	27.39	32.56	765.06	1.83	1.25	0.58
Jun-25	1.42	147.21	33.91	33.55	765.00	2.75	1.99	0.76
Jul-25	3.68	158.63	31.40	74.12	728.20	2.43	1.87	0.57
Aug-25	4.19	146.69	29.04	87.82	714.33	3.97	2.06	1.99
Sep-25	4.68	164.36	29.60	87.07	714.60	3.93	2.27	1.78
Average	3.50	201.45	29.40	60.82	742.10	2.97	1.89	1.12



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CHAPTER NO. – 06

VENT EMISSION
& WORK ZONE AIR
QUALITY



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6.0 VENT EMISSION AND WORK ZONE AIR QUALITY

A. Methods of measurement

Sl. No.	Parameters	Standards of measurement	Range of Testing	Methodology
1.	Benzene	Method no. 12, OSHA	0.04 ppm & above	Absorption on activated charcoal, desorption by carbon disulphide & analysis by GC using FID
2.	Butadiene	Method no. 56, OSHA	0.09 ppm & above	Absorption on activated charcoal, desorption by carbon disulphide & analysis by GC using FID
3.	Hexane	Methods of Air Sampling and Examination, Third Edition. Edited by James P. Lodge, Method 109	0.05 ppm & above	Absorption on activated charcoal, desorption by carbon disulphide & analysis by GC using FID

Benzene Emission from Vent of Benzene Extraction Unit. (April 2025 to September 2025)

Plant	Location	Standard	Month
BEU	PCV-60142B	5.0 mg/Nm ³	All results are well below the standards in all months (<0.1µg/m ³)

Work Zone Monitoring Results Half-Yearly Average Results (April 2025 to September 2025)

Plant	Standard (ppm)	Average Results (ppm)
Benzene Extraction Unit	1.0	0.120
Butadiene Extraction Unit	1.0	0.183
Hexane Area	500.0	9.248

Standards as per OSHA (TWA for 8 hrs. exposure)

Work Zone Monitoring Results Monthly Wise Report

Month			Apr-25	May-25	Jun-25	Jul-25	Aug-25	Sep-25	Half-Yearly Average
Sl. No.	Plant	Location	Results (ppm)						
BENZENE									
1	BEU	5P – 02 A & B Hartcut Feed Pump(BEU)	0.066	NA	NA	0.046	0.051	0.045	0.052
2		Benzene Sampling Point (050-SP-108)& 5P-07 A & B(BEU)	0.228	NA	NA	0.172	0.181	0.172	0.188
BUTADIENE									
4	BDEU	Butadiene Extension Unit	0.144	NA	NA	0.102	0.106	0.097	0.112
5		BDEU Sampling Point	0.296	NA	NA	0.238	0.247	0.234	0.254
HEXANE									
6	HDPE	V- 2405 Draining Point	8.95	NA	NA	7.41	7.65	7.28	7.82
7		Flaker House(Ground Floor)	11.78	NA	NA	10.28	10.49	10.14	10.67



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CHAPTER NO. – 07

AMBIENT NOISE

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7.0 AMBIENT NOISE

In order to establish ambient noise levels for the Study Area, measurement of noise levels were performed at seven locations. i.e 5 (Five) Nos. of identified main noise generation units and 5 (Five) locations at the boundary wall (1 meter away from the boundary walls). Noise monitoring was measured in decibel unit i.e. Leq dB(A) where A denotes the frequency weighting in the measurement of noise and corresponds to frequency response characteristics of the human ear and Leq is an energy mean of the noise level, over a specified period. Monitoring was carried out once in a season in each location.

The monitoring locations in plant boundary for ambient noise level are as follows:

Sl.No.	Location Details	Location Code	Direction from the plant Center
1.	Near Gate No.-1	AN 1	East of north east
2.	Near Gate No.-3	AN 2	East of south east
3.	South Gate	AN 3	South
4.	CPP	AN4	North of north west
5.	North Gate	AN5	North

24 hours Noise (Ambient Noise) Standards (CPCB & WBPCB Standards)

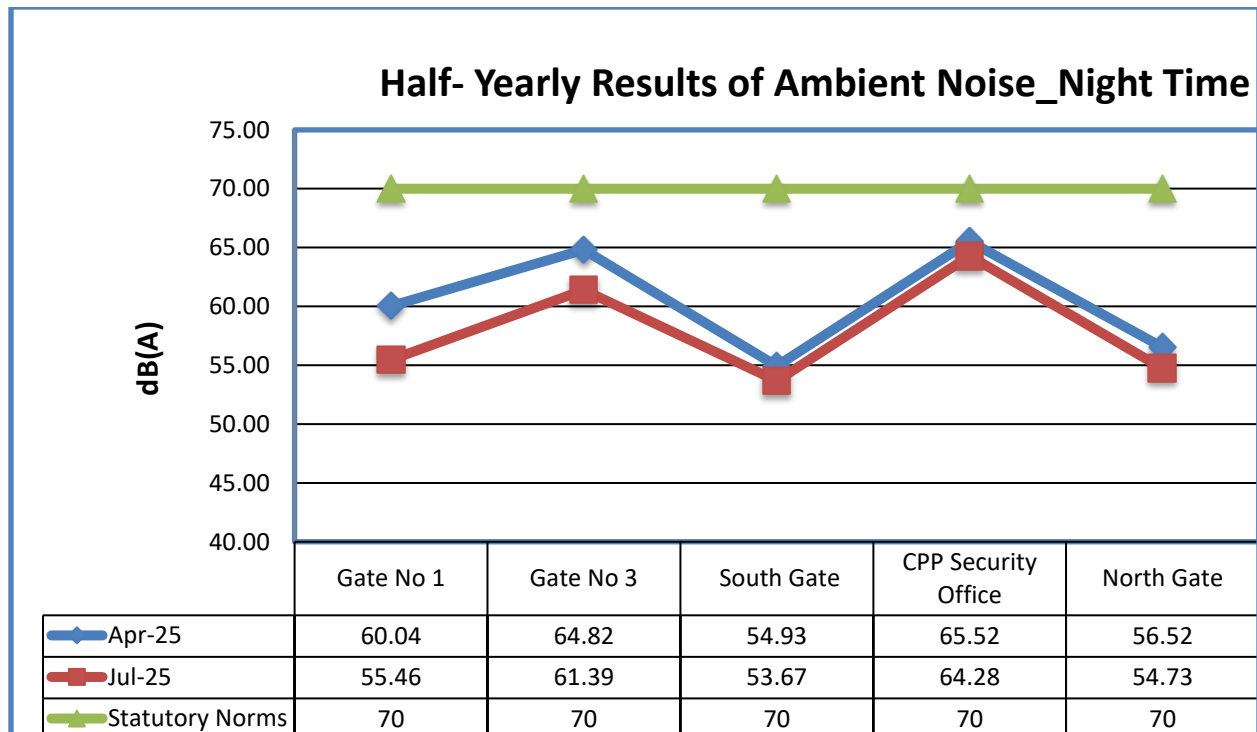
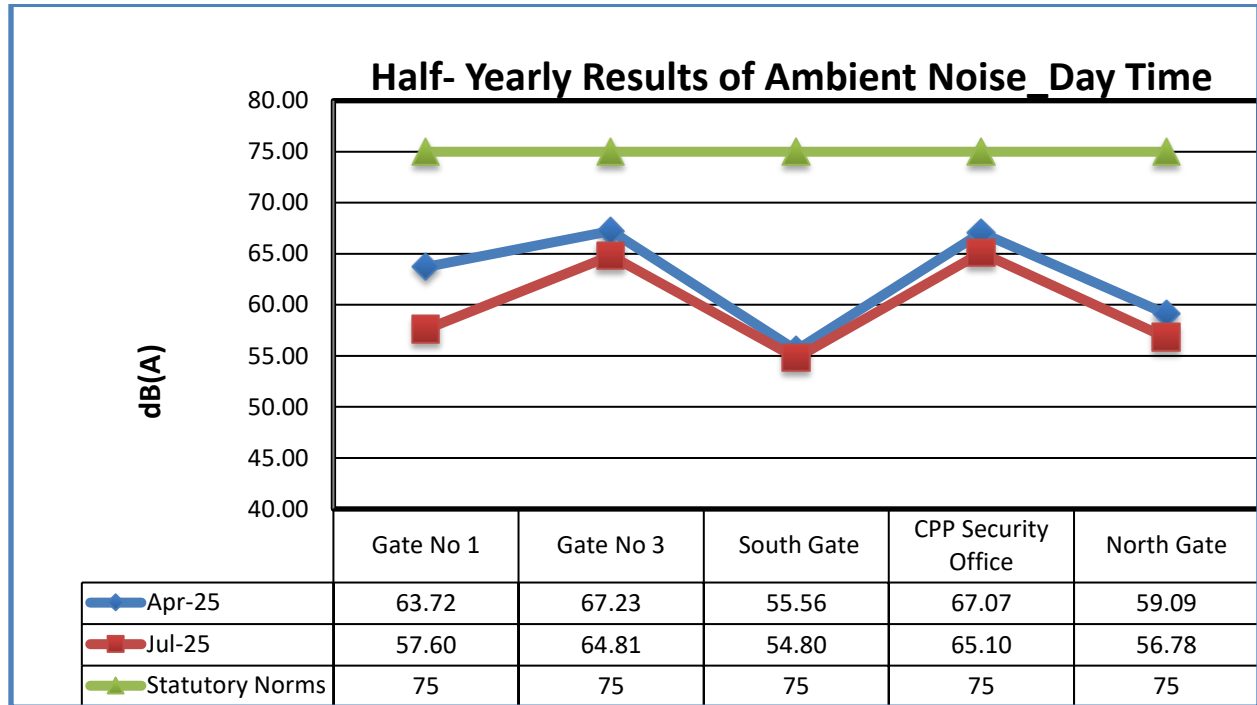
Duration	Unit are dB(A)			
	Industrial	Commercial	Residential	Silence
DAY (6 am to 10 pm)	75	65	55	50
NIGHT (10 pm to 6 am)	70	55	45	40

Ambient Noise Level (Average) April 2025 to September 2025

LOCATION	April 2025		July 2025	
	Day	Night	Day	Night
Near Gate No-1	63.72	60.04	57.60	55.46
Near Gate No-3	67.23	64.82	64.81	61.39
Near South Gate	55.56	54.93	54.80	53.67
Near CPP Security Office	67.07	65.52	65.10	64.28
Near North Gate	59.09	56.52	56.78	54.73

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Graphical Representation of Ambient Noise Data





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CHAPTER NO. – 08
LEAK DETECTION
UNDER LDAR
PROGRAM

8.0 LDAR PROGRAM

Fugitive emission monitoring

Fugitive Emission Sources:

Fugitive emission sources include leaks of hydrocarbon vapors from process equipment and evaporation of hydrocarbons from open areas, rather than through a stack or vent. Fugitive emission sources include valves of all types, flanges, pump seals, process drains, cooling towers, and oil/water separators. Normally, control of fugitive emissions involves minimizing leaks and spills through equipment changes, procedure changes, and improved monitoring, housekeeping, and maintenance practices.

Fugitive emission monitoring:

The technique which has been used to detect and control emissions from equipment leaks is known as Leak Detection and Repair (LDAR) Programme. The method which is used in LDAR program is Stratified Emission Factor Method. In this method the screening values are distributed in different ranges, like

- 0-1000 ppmv
- 1001-10,000 ppmv
- Over 10,000 ppmv

Emission factors for each screening value range have been generated from data gathered during previous EPA studies. These stratified emission factors represent the leak rate measured during fugitive emission testing. Their development incorporated the statistical methods used by EPA in developing other emission factors. The emission factor for each discrete interval, by equipment type and service, is presented in the table.

Emission Factors(kg/hr/source) for Screening value range (ppmv)				
Source	Service	0-1000	1001-10000	Over- 100000
Valves	Gas/Vapor	0.00014	0.00165	0.0451
	Light liquid	0.00028	0.00963	0.0852
	Heavy liquid	0.00023	0.00023	0.00023
Pump	Light liquid	0.00198	0.0335	0.437
	Heavy liquid	0.0038	0.0926	0.3885
Compressor seals	Gas/Vapor	0.01132	0.264	1.608
Pressure relief devices	Gas/Vapor	0.0114	0.279	1.691
Source	Service	0-1000	1001-10000	Over- 100000
Flanges, connections	All	0.00002	0.00875	0.0375
Open-ended lines	All	0.00013	0.00876	0.01195

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Reference: USEPA Handbook on Control Techniques for Fugitive VOC Emissions from Chemical Process Facilities. EPA/625/R-93/005, March 1994.

All screening values must be recorded according to the applicable ranges. The product of the appropriate emission factor and the number of components in each screening value range and source type. The total emission rate is the sum of all the emission rates for each value range and source type.

$EE = (NL1 * SEF1) + (NL2 * SEF2) + (NL3 * SEF3)$
EE=emission estimate
NL1= number leaking in first range (0-1000)
NL2= number of leaking in second range (1001-10,000)
NL3= number of leaking component in third range(over 10,000)
SEF1= stratified emission factor for first range
SEF2= stratified emission factor for second range
SEF3= stratified emission factor for third range

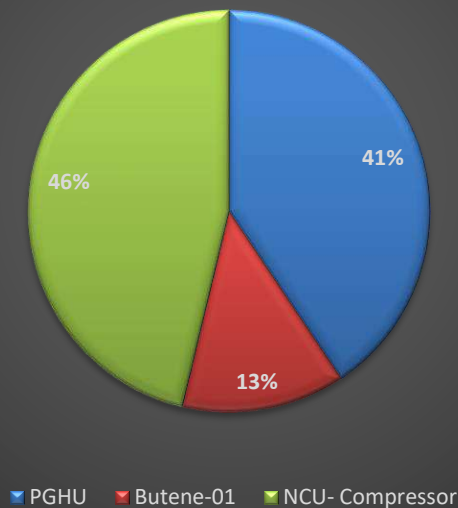
LDAR program has been adopted for identifying the leakage valves, pumps and flanges and quantifying the total VOC emitted from those equipments of different units. The points where the emission is over 1 ppm are considered as leaking points. Based on those identified points the total VOC emission will be estimated for each unit.

Total VOC emission from PGHU, Butene-01 & NCU- Compressor

Location	Computed Emission Estimates (EE) Actual Unit – Ton/Annum	Computed Emission Estimates (EE) in 100%
PGHU	0.130	40.63
Butene-01	0.042	13.13
NCU- Compressor	0.148	46.25
Total	0.320	100

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**Computed Emission Estimated (EE)
Period: April 2025 to September 2025**



Total VOC emission from PGHU, Butene-01, NCU- Compressor

1. Total VOC emission from PGHU measured in April 2025:

No of points checked: 918

No of leaking (VOC>1ppm) points: 148

No of non leaking points: 770

Number of Source Screened(ppmv)					Computed Emission Estimates (EE)
Source	Service	0-1000	1001-10000	Over 10,000	Per Source Type(kg/hr)
Pump	Light liquid	1	0	0	0.00198
	Heavy liquid	0	0	0	0
Valve	Gas/Vapor	2	0	0	0
	Light liquid	37	0	0	0.01092
	Heavy liquid	0	0	0	0
Flange	All	108	0	0	0.00216
Total					0.015 (kg/hr)
					10.843 (kg/month) / 0.130 (Ton/Annum)

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2. Total VOC emission from Butene-01 measured in July 2025:

No of points checked: 636

No of leaking (VOC>1ppm) points: 89

No of non leaking points: 547

Number of Source Screened(ppmv)					Computed Emission Estimates (EE)
Source	Service	0-1000	1001-10000	Over 10,000	Per Source Type(kg/hr)
Pump	Light liquid	0	0	0	0
	Heavy liquid	0	0	0	0
Valve	Gas/Vapor	0	0	0	0
	Light liquid	12	0	0	0.00336
	Heavy liquid	0	0	0	0
Flange	All	77	0	0	0.00154
Total					0.0049 (kg/hr)
					3.528 (kg/month) / 0.042 (Ton/Annum)

3. Total VOC emission from NCU- Compressor in September 2025:

No of points checked: 1073

No of leaking (VOC>1ppm) points: 181

No of non leaking points: 892

Number of Source Screened(ppmv)					Computed Emission Estimates (EE)
Source	Service	0-1000	1001-10000	Over 10,000	Per Source Type(kg/hr)
Pump	Light liquid	4	0	0	0.00792
	Heavy liquid	0	0	0	0
Valve	Gas/Vapor	47	0	0	0.00658
	Light liquid	0	0	0	0
	Heavy liquid	0	0	0	0
Flange	All	130	0	0	0.0026
Total					0.0171 (kg/hr)
					12.312 (kg/month) / 0.148 (Ton/Annum)