TREND ANANLYSIS OF AMBIENT AIR QUALITY OF JODHPUR CITY
(FROM APRIL-2023 TO MARCH- 2024)

REGIONAL LABORATORY,

RAJASTHAN STATE POLLUTION CONTROL BOARD,
JODHPUR

TABLE OF CONTENT

List of Figures…….....…….……

1. INTRODUCTION

Jodhpur is situated in Western part of Rajasthan, between 26° and 27°31' north latitudes and between 72°55' and 73°52' east longitude. It is bounded on the north by Bikaner and Jaisalmer district, on the south by Pali and Barmer districts, on the east by Pali and Nagaur districts and on the west by Jaisalmer district. According to the **Census of 2011**, the district of Jodhpur has a population of 36,87,165 out of which 19,23,928 are males and 17,63,237 are females. It accounts for 5.38 percent of the State population. The Geographical area of the district is 22,850 sq. km which is 6.68 percent of the total state area. The district ranks 2nd in terms of population and 4th in terms of area and 29th in terms of population density among all districts of the state. The sex ratio of Jodhpur district (916) is lower than the State sex ratio (928) and the literacy rate in Jodhpur district is 65.9 percent which is lower than the State Average (66.1 percent) and it ranks 15th among the other districts of the state. Gender Gap of the literacy rate is 27.2 percent in the district. The western & north-western parts of district are characterized by sand dunes. Sand dunes of transverse, longitudinal and parabolic variety are present and attain a height of 10 to 40 m. There is only one important river in the district, viz., Luni, which enter the district near Bilara and flows for a distance of over 75 kms. Before entering in Barmer district. Jodhpur district lies in the arid western plain Agro-Climatic Zone, according to the classification by Department of Agriculture, Government of Rajasthan. Soils in this zone are desert soils and sand dunes aeolian soil, coarse sand in texture some places calcareous. Commonly grown crops in this zone in kharif season are Pearl millet, Moth bran and Sesame and in Rabi season are wheat, mustard and cumin.

The Finance and Appropriations Bill was presented by Rajasthan Government, March 17, 2023. Where a number of announcements were made. The recent announcement of 19 districts in Rajasthan is the largest announcement. As a result, Rajasthan will now have 50 districts. Jodhpur is also divided into two parts. Jodhpur East and Jodhpur West have been declared as two districts. Phalodi also created as a new district in Jodhpur.

The major sources of air pollution in Jodhpur are road dust, vehicular Emission, construction and demolition activities, industrial emissions etc. State Board inspect industries time to time and take essential measures to control pollution emitted by the Industries. Presence of Particulate Matter in the atmosphere goes particularly high during summer months and during winters when the phenomenon of thermal inversion occurs.

Most of the industrial areas in the cluster are located to the South and South West of Jodhpur city; while Mandore is located to the north of the city. Light and Heavy Industrial Area, Industrial Estate, BNPH, Basni (Phase I & II), Tanawada, Salawas, Sangaria and Bornada are proximal to

each other, mostly sandwiched between NH-112 and NH-65. Mandore Industrial Area is approached by NH-65 and SH–61. **Basni industrial area** has mainly textile, Steel Re-rolling / Wood Seasoning, Handicraft & Guar gum industrial units. **Boranada** industrial area has mainly Metal and Wooden Handicrafts industrial units, **Mandore industrial area** has handicrafts/ oil mills/ Guar gum/ textile / Stone Processing industrial units. **Kankani industrial area** has mainly handicraft / plastic industrial units.

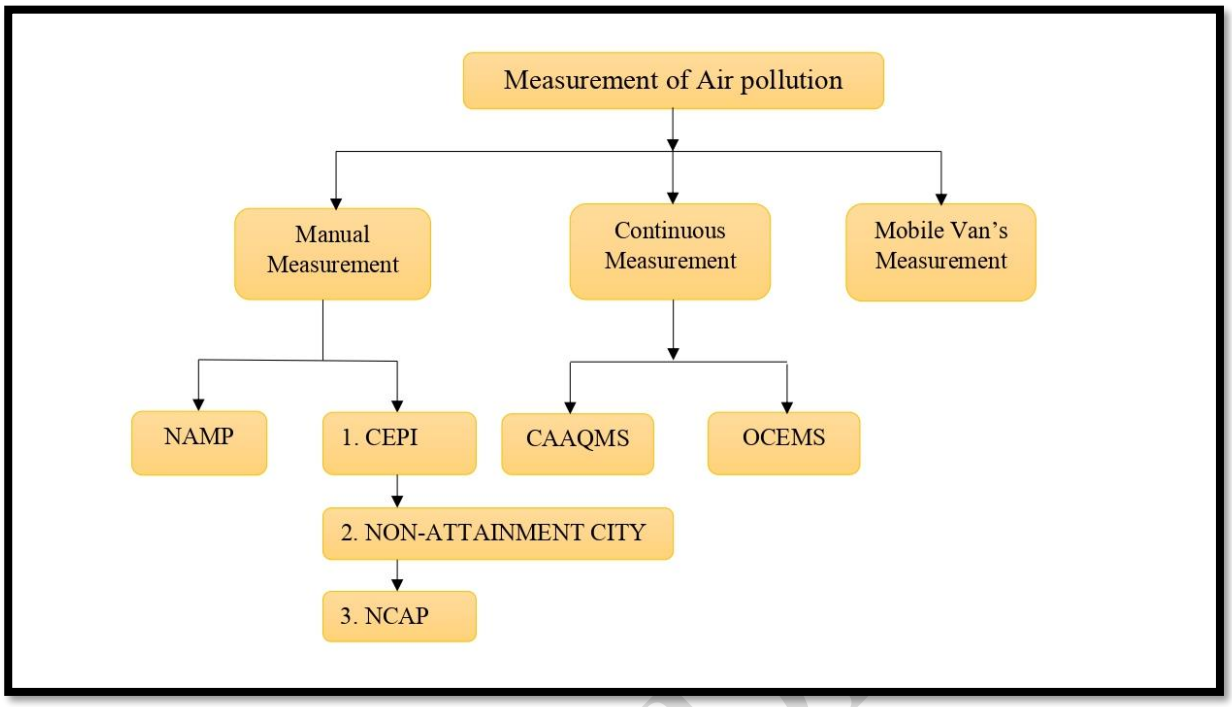
For monitoring of ambient air quality in the Jodhpur, State Board have installed **05 Continuous Ambient Air Quality Monitoring Station (CAAQMS)** at Jodhpur. At the Station Particulate Matter (PM_{10} and $PM_{2.5}$), Gaseous pollutants – SO_2, NOx, O_3, CO, VOC and NH_3 and Meteorological parameters like Temperature, Relative Humidity, Wind Speed, Wind Direction, Pressure, Solar Radiation etc. are measured continuously. Besides it, State Board has also installed **09 Manual Stations** under the **National Air Quality Monitoring Program (NAMP)** at following locations: 1. DIC Office, Jodhpur 2. Housing Board, Jodhpur 3. Kudi Mahila Thana, Jodhpur 4. Maha Mandir, Jodhpur 5. RIICO Office, Basni Industrial Area, Jodhpur 6. Sangaria Police Chowki, Jodhpur 7. Shastri Nagar Thana, Jodhpur 8. Sojati Gate, Jodhpur 9. Soorsagar Thana, Jodhpur. Beside these **two mobile vans** also purchased by the State Board in which continuous air quality measurement equipment (sensors/analyzers) have been installed, hence the mobile vans will work as mobile laboratories and will be deployed temporarily at different places if required.

Air Quality Index (AQI): Air Quality Index is a tool for effective communication of **Air Quality Status** to people in terms, which are easy to understand. It transforms complex air quality data of various pollutants into a single number (index value), nomenclature and colour. There are **six AQI** categories, namely **Good, Satisfactory, Moderately polluted, Poor, Very Poor, and Severe.** Each of these categories is decided based on ambient concentration values of air pollutants and their likely health impacts (known as health breakpoints). AQI sub index and health breakpoints are evolved for eight pollutants **(PM_{10}, $PM_{2.5}$, NO_x, SO_2, CO, O_3, NH_3, and Pb)** for which short-term (up to 24-hours).

Table. 1 Air Quality Index (AQI), colour code and possible health impacts.

AQI	Remark	Colour Code	Possible Health Impacts
0-50	Good		Minimal impact
51-100	Satisfactory		Minor breathing discomfort to sensitive people.
101-200	Moderate		Breathing discomfort to the people with lungs, asthma and heart diseases.
201-300	Poor		Breathing discomfort to most people on prolonged exposure.
301-400	Very Poor		Respiratory illness on prolonged exposure.
401-500	Severe		Affect healthy people and seriously impact those with existing disease.

2. MEASUREMENT OF AIR POLLUTION



A. <u>Manual Measurement of Air pollution:</u>

1. <u>National Air Quality Monitoring Programme (NAMP)</u>:

1. **Central Pollution Control Board (CPCB)** is executing a nation-wide programme of Ambient Air Quality Monitoring known as **National Air Quality Monitoring Programme (NAMP).**
2. **In India (State/Union Territory) 931 stations** are selected for **Air Quality Monitoring** and **in Rajasthan total ten district**, Alwar (03), Bikaner (03), Bharatpur (03), Bhiwadi (03), Chittorgarh (03), Jaipur (09), **Jodhpur (09),** Kota (06), Sikar (03) and Udaipur (03) are selected for Air Quality Monitoring under NAMP.
3. In **Jodhpur City** currently **nine numbers** of Manual Ambient Air Quality Stations are operational under NAMP (Parameters being monitored and analysed are **PM_{10}, $PM_{2.5}$, SO_2 and NOx.**)
4. The **location of Ambient Air Quality Stations in Jodhpur City** are R. O. Office MIA 1st phase Basni, DIC Office, Fire Station, Near Shastri Nagar, Police Thana, Housing Board Office, Choupasni Road, Soorsagar Police Station, Soorsagar, Maha Mandir Police Station, Maha Mandir, Nagar Nigam, North, Near Sojati Gate Police Station, Aashiana Amar Bagh Society, Near Kudi Mahila Thana and JPCRF, Sangariya Police Chowki Jodhpur.

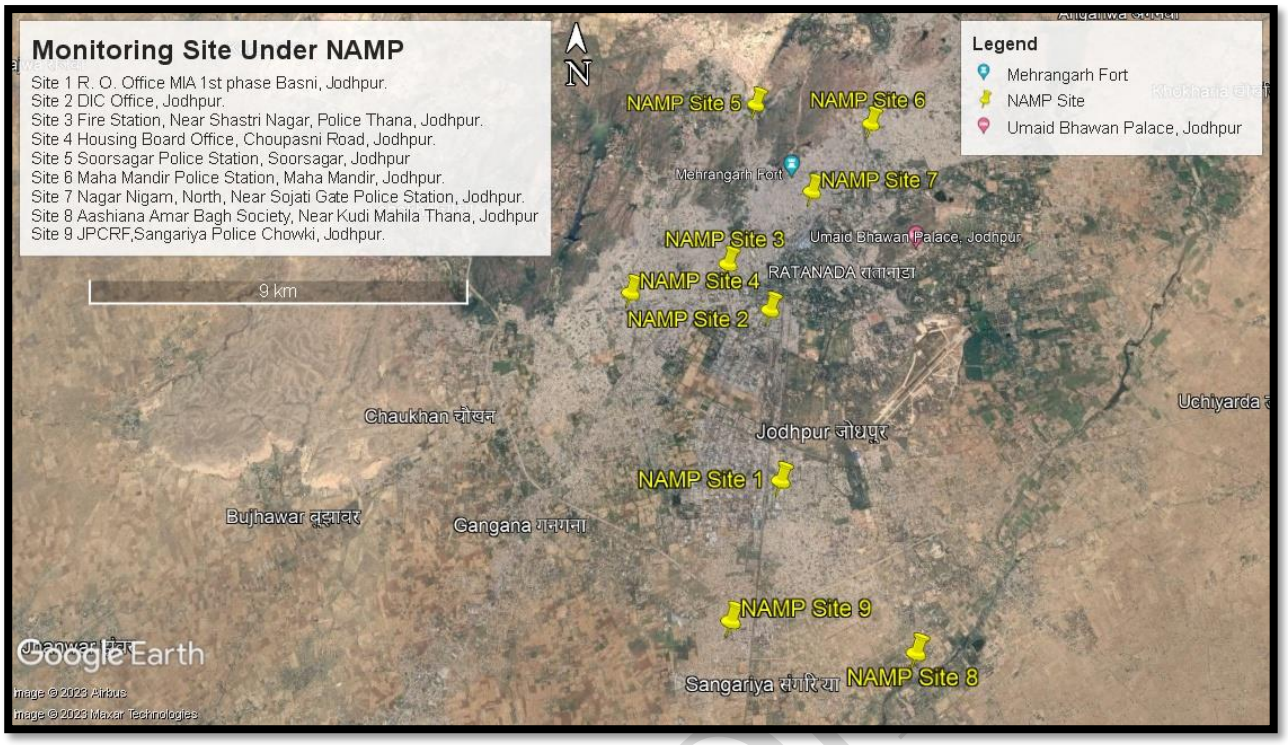


Figure. 1 Monitoring Site under NAMP in Jodhpur City, Rajasthan

Objectives of NAMP:

1. To determine status and **trends of ambient air quality**.
2. To ascertain whether the prescribed ambient air quality standards are violated.
3. To **Identify Non-attainment Cities**.
4. To obtain the knowledge and understanding necessary for developing preventive and corrective measures.
5. To understand the natural cleansing process undergoing in the environment through pollution dilution, dispersion, wind based movement, dry deposition, precipitation and chemical transformation of pollutants generated.

Parameters monitored under NAMP:

1. Under **NAMP** three criteria pollutants viz. **PM_{10}** (Particulate Matter having an aerodynamic diameter less than or equal to 10 μm), **Sulphur dioxide (SO_2)** and **Nitrogen dioxide (NO_2)** were identified for regular monitoring at all locations.

Methods of Measurement:

Table. 2 Air pollutant and Method of Measurement.

S.N	Air Pollutant	Method of Measurement
1.	Particulate Matter – PM 10 (size less than 10 microns)	Gravimetric Method
2.	Nitrogen dioxide (NO_x)	Modified Jacob and Hochheiser Method
3.	Sulphur dioxide (SO_2)	Improved West and Gaeke Method

2. Comprehensive Environment Pollution Index (CEPI)

1. The **Central Pollution Control Board (CPCB)** developed an approach to classify industrial areas based on CEPI scores with an objective to prioritize for improving the environmental quality in these areas, in 2009.
2. CEPI is a rational no., which ranges between 0-100 and captures overall quality of the environment covering **Air, Water and Land** by following algorithm of pollution Sources, Pathways and Receptors, is calculated using the following formula:

$$\mathbf{CEPI = i_{max} + [(100 - i_{max}) \times (i_2/100) \times (i_3/100)]}$$

Where, i_{max} = maximum index (which may be Air EPI or Surface Water EPI or Groundwater EPI); and, i_2 and i_3 are indices for other media

Table. 3 CEPI Scores and Categorisation of Industrial Areas.

S.N	CEPI Scores	Categorisation of Industrial Areas
1.	70 and above	Critically Polluted Areas (CPAs)
2.	Between 60 -70	Severely Polluted Areas (SPAs)
3.	Less than 60	Other Polluted Areas (OPAs)

4. CPCB evaluated CEPI scores of 88 industrial clusters across the country, in 2009 and 43 industrial clusters in 17 states were identified as Critically Polluted Areas (CPAs).
5. SPCBs/PCCs prepared and implemented time bound action plans for improvement of environmental quality in CPAs.
6. CPCB continued CEPI monitoring of 43 CPAs during 2011 and 2013, also.

7. In CEPI evaluation during 2018, following revised CEPI-2016 methodology, 100 Industrial Areas were monitored. Out of 100 Industrial Areas, 38 Industrial Areas were identified as CPAs and 31 were identified as SPAs.
8. The effective implementation of action plans prepared by **SPCBs/PCCs** for **CPAs/SPAs** is carried out by concerned stakeholders and district/state level committees are constituted to review the progress of implementation of action plans.
9. **CEPI score** assessment is carried out by environmental quality monitoring of **ambient air, surface water and groundwater.** Three rounds of monitoring at all the identified locations is being carried out with a gap of at least one day.

A. Ambient Air Quality Monitoring for following parameters:

1. SO_2, NO_2, PM_{10}, $PM_{2.5}$, Lead and Ammonia (for 24 hourly average monitoring values)
2. O_3 , CO (for 1 hourly average and 8 hourly average)
3. Benzene, Benzo (a) Pyrene, Arsenic & Nickel (for 24 hourly average value)

B. Water Quality data of:

1. **Prominent Surface Water bodies** such as outfalls of CETPs, ETPs, FETP, treated effluent drainage, river, canal, ponds, lakes and other such water supply resources flowing through the area or flowing adjoining the Industrial Area.
2. **Ground Water** Quality data of prominent ground water resources such as observation wells of Central Ground Water Board, drinking water wells, hand pumps, bore wells and other such water supply resources located in the industrial cluster/ area under consideration or in the peripheral areas.

C. Basic water quality requirements (for surface water and ground water both) are as follows:

1. **Simple Parameters -** Sanitary Survey, General Appearance, Color, Smell, Transparency and Ecological* (presence of animals like fish, insects etc. only in case of surface water bodies)
2. **Regular Monitoring Parameters -** pH, O&G, Suspended Solids in mg/l, DO (% saturation), COD in mg/l, BOD in mg/l, Electrical Conductivity in µmhos/cm, Total Dissolved Solids, Nitrite–Nitrogen, Nitrate-Nitrogen, (NO2+NO3) total nitrogen in mg/l, Free Ammonia, Total residual chlorine, cyanide, fluoride, chloride, sulphate, sulphides, total hardness, dissolved phosphates, SAR, Total coliforms, Fecal Coliform (MPN/100 ml),
3. **Special Parameters -** Total phosphorous, TKN, Total Ammonia(NH4+NH3)-Nitrogen, Phenols, Surface Active Agents, Anionic detergents, Organo-chlorine pesticides, PAH,

PCB and PCT, Zinc, Nickel, Copper, Hexa-valent chromium, Chromium (Total), Arsenic (Total), Lead, Cadmium, Mercury, manganese, iron, vanadium, selenium, boron.

4. **Bio-assay (zebra Fish) Test -** For specified samples only

Note:

1. DO is not applicable in case of ground waters.
2. DO in eutrophicated waters should include measurements for diurnal variations.
3. Static Bio-assay method may be adopt.

D. **Frequency of Monitoring:** Environmental quality monitoring shall be undertaken by concerned SPCBs on half-yearly basis and data will be placed in the public domain:

Table. 4 Frequency of Monitoring (Season and Period of Monitoring)

S.N	Season	Period of Monitoring
1.	Pre-monsoon	April-June
2.	Post-monsoon	Dec.-Feb.

3. <u>Non-attainment City:</u>

1. **Non-attainment cities (NAC)** are declared nonattainment **if over a 5-year period** they consistently **do not meet the National Ambient Air Quality Standards** (NAAQS) for PM 10 (Particulate matter that is 10 microns or less in diameter) or $N0_2$ (Nitrogen Dioxide).
2. **Central Pollution Control Board (CPCB)** identified **94 non-attainment cities** (NAC) while circulating the draft NCAP in **2018** that was revised to **102 NAC's** in January **2019**. Two more were added to the list in **2020**, taking the total to **124**. The list of cities under NCAP focus now stands at **132 cities in 2021** with a million-plus population.
3. Five cities **Jaipur, Jodhpur, Alwar, Kota and Udaipur** identified as **Non-Attainment cities** in Rajasthan.

4. <u>National Clean Air Programme (NCAP):</u>

1. **The Ministry of Environment, Forest and Climate Change, Government of India** has launched National Clean Air Programme **(NCAP)** in January, 2019 as a long-term, time-bound, **national level strategy** to tackle the air pollution problem across the country in a comprehensive manner.
2. The NCAP **targets to achieve 20% to 30% reduction** in **concentrations of PM_{10}** (particulate matter of diameter between 10 and 2.5 micro meter) and $PM_{2.5}$ (particulate

matter of diameter 2.5 micro meter or less) by the year 2024, **keeping 2017 as the base year for comparison** of concentration.

3. **Central Pollution Control Board (CPCB)** identified **94 non-attainment cities** (NAC) while circulating the draft NCAP in **2018** that was revised to **102** NAC's in January **2019**. Two more were added to the list in **2020**, taking the total to **124**. The list of cities under NCAP focus now stands at **132 cities in 2021** with a million-plus population.
4. **Non-attainment cities (NAC)** are declared nonattainment **if over a 5-year period** they consistently **do not meet the National Ambient Air Quality Standards** (NAAQS) for PM 10 (Particulate matter that is 10 microns or less in diameter) or $N0_2$ (Nitrogen Dioxide).
5. Five cities **Jaipur, Jodhpur, Alwar, Kota and Udaipur** identified as **Non-Attainment cities** in Rajasthan.
6. Currently **eight numbers of hotspot identified in Jodhpur city** to carry out ambient air quality monitoring and Stack Monitoring of industries located in the city area is being carried out regularly.
7. The **location of Ambient Air Quality Stations in Jodhpur City** under **NCAP** are Paota Circle, Mandore Road Bhadwasia ROB to Mata Ka Than Mandir, Akhaliya Chaurah to Kaylana Chaurah to Rajaram Circle, AIIMS Road (up to Pal Road), Senapati Bhawan to Ratanada Sabji Mandi, Around Gandhi Maidan, Ratanada Market to Defence Lab Road, Pali Road, Krishi Mandi Tiraha to National Handloom Road Jodhpur.
8. Stack Monitoring of industries is going **35 industries are identified and yearly monitoring stated**. Shortcoming/Non-compliance Notice are being issued if new units identified. Approx. **162 units are converted on cleaner fuel (Gas or liquid fuel)** used.

The aims of the NCAP are

1. To ensure stringent **implementation of mitigation measures** for prevention, control and abatement of air pollution.
2. To augment and evolve **effective and proficient ambient air quality monitoring** network across the country for ensuring a comprehensive and reliable database.
3. To augment **public awareness** and **capacity-building** measures encompassing data dissemination and public outreach programmes for inclusive public participation and for ensuring trained manpower and infrastructure on air pollution.

Action Plan:

The generic action plan for Jodhpur city was prepared by RSPCB and got approved by CPCB. Salient features of this plant are as under-

A. Main sources of Air Pollution in the city-

1. Road borne dust.
2. Vehicular emissions.
3. Biomass / Crop burning / Garbage–Municipal Solid waste burning.
4. Construction & Demolition activates.
5. Industrial emissions.

B. Stack holders for control of Air Pollution.

1. Vehicular emissions control

a) Department of Transport.
b) Traffic Police.
c) Department of food & Supply.
d) NHAI
e) PWD
f) UDH Development authority.

2. Re suspension of road dust & other fugitive emission

a) NHAI
b) PWD
c) UDH development authority.
d) Municipal Corporation.
e) Department of Education.
f) RIICO.

3. Control of emissions from Biomass / Crop burning / Garbage–Municipal Solid waste burning.

a) UDH development authority.
b) Department of Agriculture & Revenue Department.
c) RICCO
d) Municipal Corporation.

4. Control of Air Pollution from Construction & Demolition activities.

a) UDH authority.
b) Municipal Corporation.

5. **Control of Industrial emissions**
    a) Sate Pollution Control Board.
    b) RICCO.
6. **Other Steps for control of Air Pollution**
    a) Calculation of Air Quality Index & Dissemination to common public through website & other media stake holder State Pollution Control Board.
    b) Establishment of Air Quality management division Stake holder State Pollution Control Board.
    c) Setup & publicize helping in the city Stake holder State Pollution Control Board.
    d) Maximum coverage of LPG/PNG for domestic & commercial uses Stake holder State Government.
    e) Monitoring of D.G sets and action against violation Stake holder State Pollution Control Board.
    f) Involvement of industries association in awareness programme (Industrial Area) Stake holder RIICO.

B. <u>Continuous Monitoring:</u>

1. <u>Continuous Ambient Air Quality Monitoring Programme (CAAQMS):</u>

1. **Continuous Ambient Air Quality Monitoring System (CAAQMS)** is a specialized system housed in temperature controlled container and is equipped with all necessary analyzers required for ambient air quality monitoring, calibration equipment, data acquisition (hardware and software) system with complete power backup facility. This system generates real time data and can be remotely managed. The network of **Continuous Ambient Air Quality Monitoring System (CAAQMS)** is expanding in the Jodhpur and at present, 05 CAAQMS stations covering Jodhpur city.
2. Under CAAQMS the **Particulate Matter (PM_{10}& $PM_{2.5}$), Sulphur Dioxide (SO_2), Nitrogen Dioxide (NO_2), Ammonia (NH_3), Carbon Monoxide (CO), Ozone (O_3) and Benzene (C_6H_6) are being monitored at all locations.** The CAAQMS are also equipped with sensors to measure meteorological parameters such as **Wind Speed, Wind Direction, Ambient Temperature, Relative Humidity, Solar Radiation and Rainfall.** The data of these CAAQMS are being used for generating the daily **National Air Quality Index**

(NAQI) of the Jodhpur city. A common display screen is installed near Circuit House, Jodhpur.

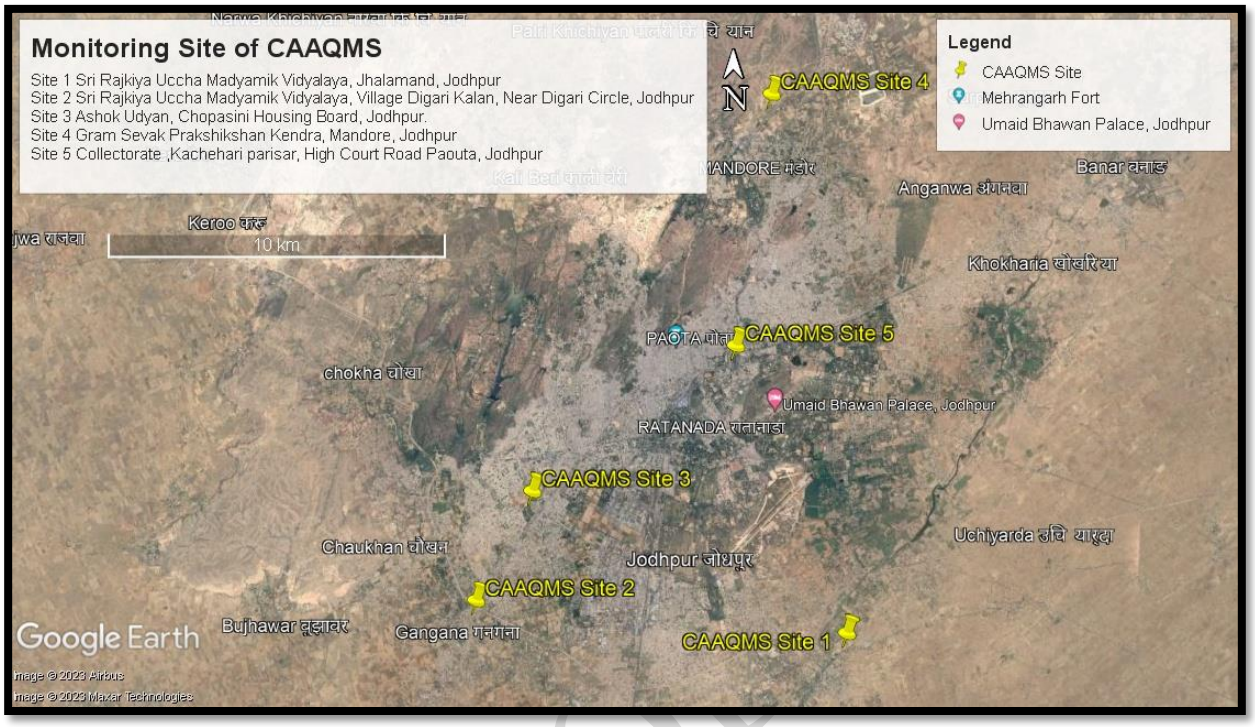


Figure. 2 Monitoring Site of CAAQMS in Jodhpur City, Rajasthan

3. **Currently 05 Numbers of CAAQMS are operational at Jodhpur city** area for ambient air quality monitoring. **The location of stations** are Sri Rajkiya Uccha Madyamik Vidyalaya, Jhalamand, Jodhpur, Digari Kalan, Near Digari Circle, Jodhpur, Ashok Udyan, Chopasini Housing Board, Jodhpur, Gram Sevak Prakshikshan Kendra, Mandore, Jodhpur, Collectorate ,Kachehari parisar, High Court Road Paouta, Jodhpur.

2. <u>Online Continuous Emission Monitoring (OCEMS):</u>

1. Currently **17** Numbers of **OCEMS** are installed in industries to check air emission/pollution online through the server connected with **CPCB and RSPCB.**
2. **Central Pollution Control Board** vide its letter no. B-29016/04/06PCI-1/5401 dated 05.02.2014 issued directions under section 18(1) b of the Water and Air Acts to the **State Pollution Control Boards** and **Pollution Control Committees** for directing the **17 categories** of highly polluting industries such as **Pulp & Paper, Distillery, Sugar, Tanneries, Power Plants, Iron & Steel, Cement, Oil Refineries, Fertilizer, Chloral Alkali Plants, Dye & Dye Intermediate Units, Pesticides, Zinc, Copper, Aluminium, Petrochemicals and Pharma Sector, etc.,** and **Common Effluent Treatment Plants**

(CETP), Sewage Treatment Plants (STPs), Common Bio Medical Waste and Common Hazardous Waste Incinerators for installation of online effluent quality and emission monitoring systems to help tracking the discharges of pollutants from these units.

a) Installation of online emission quality monitoring system in **17 categories** of highly polluting industries and in Common Hazardous waste and Biomedical waste incinerators for measurement of the parameters, **Particulate Matter, NH_3 (Ammonia), SO_2 (Sulphur Dioxide), NO_X (Oxides of Nitrogen)** and other sector specific parameters, not later than by March 31, 2015 and transmission of online data so generated simultaneously to SPCB/PCC and CPCB as well.

b) Installation of surveillance system with industrial grade **IP (Internet Protocol) cameras having PAN, Tilt, Zoom (PTZ)** with leased line real time connection for data streaming and transmission of the same in case of industries claiming **Zero Liquid Discharge (ZLD)**.

c) Ensure regular maintenance and operation of the online system with tamper proof mechanism having facilities for online calibration (onsite/ offsite; Remote).

3. Parameters required to be monitored in the stack emissions using **Continuous Emission Monitoring system**, are industry specific and are specified below:
    a) Particulate Matter.
    b) HF (Fluoride)
    c) NH_3 (as Ammonia)
    d) SO_2 (Sulphur Dioxide)
    e) NO_X (Oxides of Nitrogen)
    f) Cl_2 (Chlorine)
    g) HCl (Hydro Chloric acid) and HF (Hydro Fluoric Acid)
    h) TOC (Total Organic Carbon) / THC (Total Hydro Carbon) / VOC (Volatile Organic Carbon) - CnHm i) Process parameters: Carbon Monoxide, Temperature, Pressure, Flow, Moisture Content, O_2 (Oxygen), CO_2, etc.

C. <u>Mobile Van's Monitoring:</u>

1. Two **mobile vans** have also been purchased by the State Board in which continuous air quality measurement equipment (sensors/analyzers) have been installed, hence the mobile vans will work as mobile laboratories and wi

2. ll be deployed temporarily at different places if required. By operating it for a few days, the air quality there can be measured.
3. The monitoring through **mobile continuous Ambient Air quality Station (CAAQMS)** of identified hotspots, industrial areas, validation of industrial CAAQM data, cluster of Mines/stone crusher/Mineral grinding/any air pollution cluster and petrol pumps for checking effectiveness of vapour Recovery System under jurisdiction.
4. **Continuous Ambient Air Quality Monitoring Station** is being established in the district headquarters of Rajasthan state to measure ambient air quality. At present, 10 such centres are operating in 07 cities of the state namely **Jaipur, Jodhpur, Kota, Pali, Udaipur, Alwar, Bhiwadi and Ajmer** for the last five years.
5. Apart from this, **36** new such centres are being established in the remaining district headquarters of the state. After this, at least one continuous air quality measurement centre will be established in every district of the state.
6. Along with this, Online analyzers have been installed in mobile vans and continuous centres which can measure **particulate matter ($PM_{2.5}$ & PM_{10}), ozone (O_3), ammonia (NH_3), sulfur dioxide (SO_2), oxides of nitrogen (NO_X), benzene (C_6H_6) and Carbon Monoxide (CO) and 07 types of meteorological factors like temperature, humidity, wind speed, wind direction, barometric pressure, solar radiation and amount of rainfall** are tested and give instant results and do not require laboratory for analysis. The results obtained will be continuously displayed on the display boards installed on them.
7. Since the air quality is checked **24x7 in the Mobile Continuous Environmental Measurement Centre,** through which **information about day-to-day changes in air quality** as per the weather and day and night is obtained. If the quantity of air pollutants is found to be more than the prescribed standards, the reasons can be identified and appropriate measures can be taken to resolve it so that the air quality remains as per the prescribed standards throughout the year. In this sequence, as per the entry of South West Monsoon in the state, the action plan for monitoring/measuring the ambient air quality of the state through these mobile vans is proposed by the State Board as follows.

Table. 5 Schedule of Mobile Surveillance Centre No. 1

Division	**District (Proposed Centre)**	**Division (Total Testing Centre)**	**Proposed Time Period** (According to the Calculation of 48 hour's monitoring at one centre and time period for going to another centre)
Udaipur	Udaipur (06), Durgapur (02), Banswara (02), Pratapgarh (02), Chittorgarh (02), Rajsamand (02)	16	07 June to 15 July
Jodhpur	Pali (04), Jodhpur (06), Jalore (02), Barmer (04), Sirohi (02), Jaisalmer (02).	20	15 July to 30 August
Bikaner	Bikaner (02), Shri Ganganagar (03), Hanumangarh (03), Churu (02)	10	01 September to 25 September

Table. 6 Schedule of Mobile Surveillance Centre No. 2

Division	**District (Proposed Centre)**	**Division (Total Testing Centre)**	**Proposed Time Period** (According to the Calculation of 48 hour's monitoring at one centre and time period for going to another centre)
Kota	Kota (04), Jhalawar (02), Baran (02), Bundi (02)	10	07 June to 20 July
Ajmer	Tonk (02), Ajmer (02), Bhilwara (02), Nagaur (02)	08	01 July to 20 July
Jaipur	Sikar (02), Jhunjhunu (02), Jaipur (06), Dausa (02), Alwar (08)	20	21 July to 05 September
Bharatpur	Bharatpur (02), Dholpur (02), Karauli (02), Sawai Madhopur (02)	08	06 September to 25 September

3. MONITORING SITE UNDER NAMP

S. No.	Location / address of the station	City	State	Latitude	Longitude	Type of area (Residential / Industrial / Rural / others area)	Station operational since (Month & Year)
1.	R. O. Office MIA 1st phase Basni	Jodhpur	Rajasthan	26.2256	73.013314	Industrial	April - 1995
2.	DIC Office	Jodhpur	Rajasthan	26.26204	73.012203	Industrial	September - 2003
3.	Fire Station, Near Shastri Nagar, Police Thana	Jodhpur	Rajasthan	26.272391	73.002527	Residential	April – 2004
4.	Housing Board Office, Choupasni Road	Jodhpur	Rajasthan	26.26585	72.979314	Residential	September – 2003
5.	Soorsagar Police Station, Soorsagar	Jodhpur	Rajasthan	26.3104	73.010383	Residential	2018
6.	Maha Mandir Police Station, Maha Mandir	Jodhpur	Rajasthan	26.305641	73.038732	Residential	November – 2002
7.	Nagar Nigam, North, Near Sojati Gate Police Station	Jodhpur	Rajasthan	26.289257	73.023364	Residential & Commercial (Mix)	April – 1995
8.	Aashiana Amar Bagh Society, Near Kudi Mahila Thana	Jodhpur	Rajasthan	26.19188	73.041382	Residential	2018
9.	JPCRF,Sangariya Police Chowki	Jodhpur	Rajasthan	26.1979	73.0014	Industrial	2018

4. MONITORING SITE UNDER CAAQMS

Address and Coordinates of CAAQMS Jodhpur						
S.N.	**District**	**Location**	**CAAQMS address**	**Longitude Coordinates (North)**	**Latitude Coordinates (East)**	**Installation Date**
1	Jodhpur	Jhalamand	Sri Rajkiya Uccha Madyamik Vidyalaya, Jhalamand, Jodhpur – 342802	26.215807	73.069455	22/04/2022
2	Jodhpur	Digari	Sri Rajkiya Uccha Madyamik Vidyalaya, Village Digari Kalan, Near Digari Circle, Jodhpur, Rajasthan 342008	26.224428	72.959923	18/04/2022
3	Jodhpur	Ashok Udyan	Ashok Udyan, Chopasini Housing Board, Jodhpur, Rajasthan, 342008	26.253299	72.97651	29/04/2022
4	Jodhpur	Mandore	Gram Sevak Prakshikshan Kendra, Mandore, Jodhpur	26.358704	73.047469	28/05/2022
5	Jodhpur	Collectorate Paouta	Collectorate ,Kachehari parisar, High Court Road Paouta, Jodhpur	26.2918	73.0367	

5. RESULT & DISCUSSION OF NAMP

NAMP YEARLY DATA OF 2023-2024										
S.N	Collection Date	1	2	3	4	5	6	7	8	9
		Nagar Nigam, North, Near Sojati Gate Police Station	R. O. Office MIA 1st phase Basni	Maha Mandir Police Station, Maha Mandir	Housing Board Office, Choupasni Road	Fire Station, Near Shastri Nagar, Police Thana	DIC Office	JPCRF,Sangaria Police Chowki	Aashiana Amar Bagh Society, Near Kudi Mahila Thana	Soorsagar Police Station, Soorsagar
		RSPM (µg/m3)	RSPM (µg/m3)	RSPM (µg/m3)	RSPM (µg/m3)	RSPM (µg/m3)	RSPM (µg/m3)	RSPM (µg/m3)	RSPM (µg/m3)	RSPM (µg/m3)
1	Apr-23	106	89	138	120	109	139	69	120	110
2	May-23	94	101	106	104	110	109	99	97	81
3	Jun-23	102	107	99	101	101	87	70	103	87
4	Jul-23	98	90	108	90	87	79	54	94	112
5	Aug-23	80	78	93	85	91	85	88	86	91
6	Sep-23	98	93	90	109	69	88	88	84	109
7	Oct-23	118	105	128	98	100	98	97	98	105
8	Nov-23	144	173	226	172	216	140	173	118	182
9	Dec-23	132	168	157	145	198	134	140	134	163
10	Jan-24	168	155	148	155	187	151	144	156	143
11	Feb-24	146	149	137	148	175	137	113	124	143
12	Mar-24	144	147	153	156	180	180	122	131	152
Average		**119.20**	**121.32**	**131.88**	**123.62**	**135.17**	**118.99**	**104.62**	**112.00**	**123.10**
Minimum		**80.25**	**78.44**	**90.00**	**85.30**	**69.00**	**79.44**	**53.78**	**84.00**	**81.44**
Maximum		**168.00**	**173.20**	**225.80**	**172.40**	**216.20**	**179.75**	**173.00**	**155.63**	**181.73**

Note: Yellow colour showing that the data are exceed the prescribed Standard.

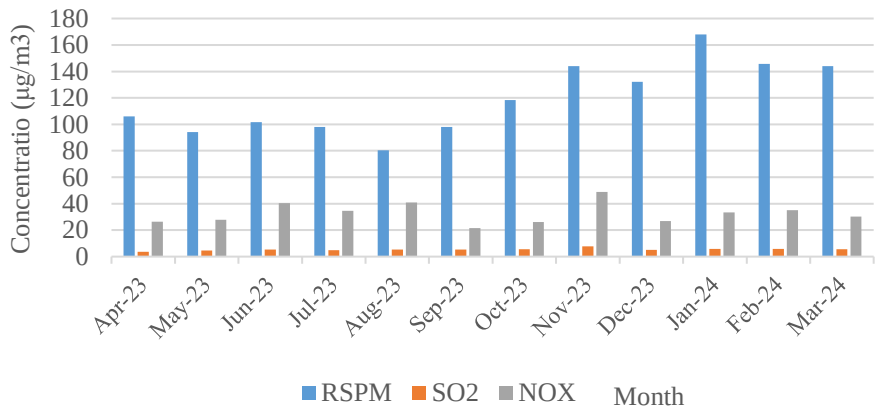
NAMP YEARLY DATA OF 2023-2024											
S.N	Collection Date	1		2		3		4		5	
		Nagar Nigam, North, Near Sojati Gate Police Station, Jodhpur		R. O. Office MIA 1st phase Basni, Jodhpur		Maha Mandir Police Station, Maha Mandir, Jodhpur		Housing Board Office, Choupasni Road, Jodhpur		Fire Station, Near Shastri Nagar, Police Thana, Jodhpur	
		SO_2	NO_X	SO_2	NO_X	SO_2	NO_X	SO_2	NO_X	SO_2	NO_X
1	Apr-23	3.69	26.32	4.10	25.86	3.53	23.97	4.66	27.15	4.14	29.39
2	May-23	4.63	27.75	4.53	28.58	4.70	27.75	4.71	28.07	4.50	26.09
3	Jun-23	5.35	40.44	4.71	36.71	5.52	40.52	5.32	39.30	5.40	39.11
4	Jul-23	4.85	34.69	4.72	33.17	4.71	32.54	4.80	32.53	4.87	31.54
5	Aug-23	5.32	40.97	5.24	41.61	5.14	41.13	5.17	39.65	5.14	40.05
6	Sep-23	5.40	21.56	4.37	20.54	5.13	21.27	5.04	23.10	4.84	21.03
7	Oct-23	5.48	26.15	5.28	26.19	5.50	27.75	5.49	26.12	5.63	27.4
8	Nov-23	7.66	48.97	6.31	40.65	7.20	42.39	6.29	37.53	7.14	45.77
9	Dec-23	5.16	26.97	5.32	31.26	5.94	32.44	5.89	31.05	5.64	34.64
10	Jan-24	5.80	33.40	5.99	35.91	6.11	35.90	5.72	34.45	5.94	37.07
11	Feb-24	5.77	35.17	5.94	33.62	5.63	34.56	5.82	33.66	5.80	33.09
12	Mar-24	5.52	30.15	5.28	27.81	5.81	30.59	5.55	29.28	5.54	29.08
Average		**5.39**	**32.71**	**5.15**	**31.83**	**5.41**	**32.5675**	**5.37**	**31.82**	**5.38**	**32.86**
Minimum		**3.69**	**21.56**	**4.1**	**20.54**	**3.53**	**21.27**	**4.66**	**23.1**	**4.14**	**21.03**
Maximum		**7.66**	**48.97**	**6.31**	**41.61**	**7.2**	**42.39**	**6.29**	**39.65**	**7.14**	**45.77**

Note: Yellow colour showing that the data are exceed the prescribed Standard.

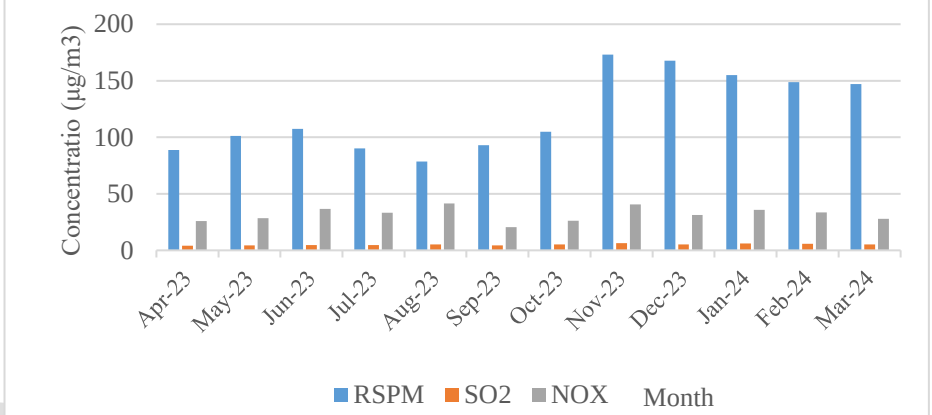
NAMP YEARLY DATA OF 2023-2024									
S.N	Collection Date	6		7		8		9	
		DIC Office, Jodhpur		JPCRF,Sangariya Police Chowki, Jodhpur		Aashiana Amar Bagh Society, Near Kudi Mahila Thana, Jodhpur		Soorsagar Police Station, Soorsagar, Jodhpur	
		SO_2	NO_X	SO_2	NO_X	SO_2	NO_X	SO_2	NO_X
1	Apr-23	4.31	24.90	1.69	10.10	3.63	27.51	3.61	23.60
2	May-23	4.40	25.37	4.73	27.84	4.54	26.89	4.76	30.92
3	Jun-23	4.51	34.63	3.53	25.83	5.13	38.73	4.76	35.45
4	Jul-23	4.05	31.07	3.06	20.43	4.30	30.55	4.45	27.93
5	Aug-23	5.00	39.83	5.39	40.64	4.99	40.96	5.52	42.01
6	Sep-23	5.25	20.61	4.92	19.60	5.34	23.10	5.22	20.16
7	Oct-23	5.40	27.66	5.61	89.76	4.49	24.38	5.52	26.27
8	Nov-23	7.90	41.40	7.63	44.18	7.49	39.85	8.15	45.13
9	Dec-23	5.25	30.72	5.55	30.73	5.80	29.90	5.50	31.59
10	Jan-24	5.66	32.70	6.31	35.72	5.95	32.68	5.63	33.64
11	Feb-24	5.89	34.20	5.07	32.09	5.73	33.22	6.05	34.12
12	Mar-24	4.75	24.91	4.82	24.36	5.73	27.75	5.25	26.26
Average		**5.20**	**30.67**	**4.86**	**33.44**	**5.26**	**31.29**	**5.37**	**31.42**
Minimum		**4.05**	**20.61**	**1.69**	**10.1**	**3.63**	**23.1**	**3.61**	**20.16**
Maximum		**7.9**	**41.4**	**7.63**	**89.76**	**7.49**	**40.96**	**8.15**	**45.13**

Note: Yellow colour showing that the data are exceed the prescribed Standard.

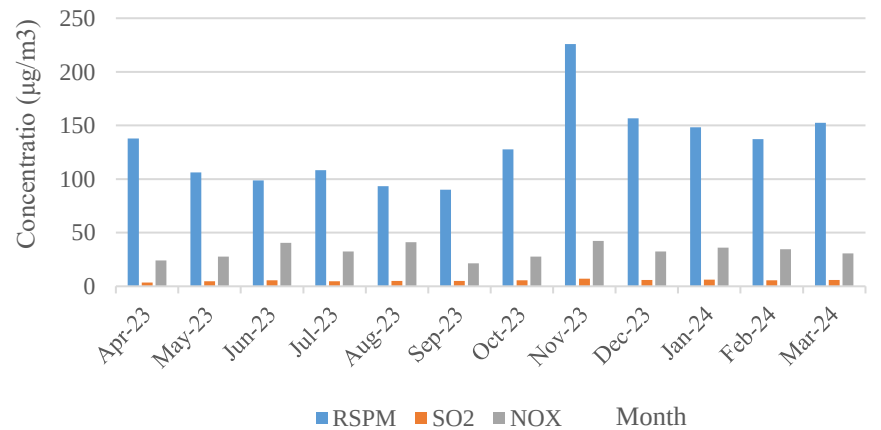
RSPM, SO_2 & NO_X concentration in µg/m^3 at Nagar Nigam, North, Near Sojati Gate Police Station, Jodhpur City, Rajasthan



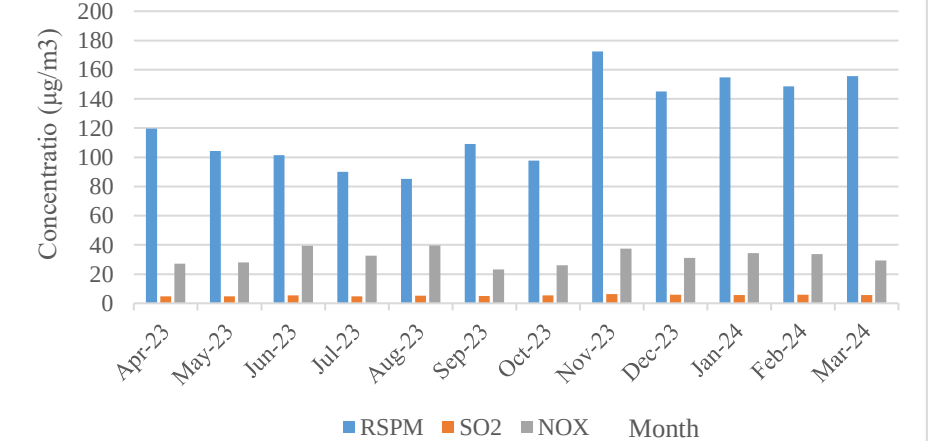
RSPM, SO_2 & NO_X concentration in µg/m^3 at R. O. Office MIA 1st phase Basni, Jodhpur City, Rajasthan



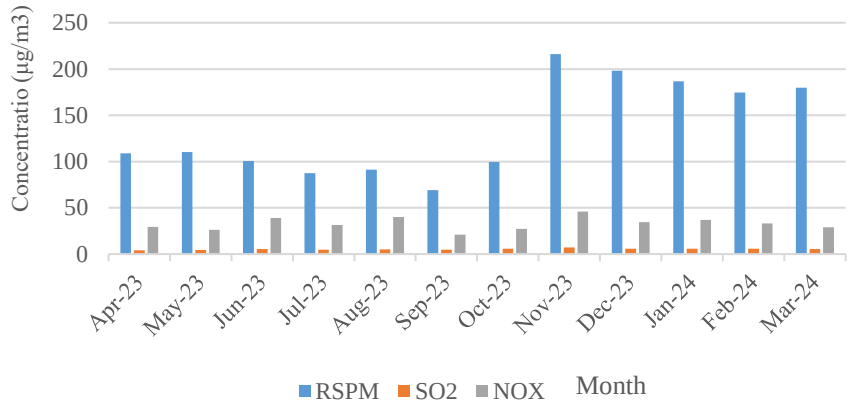
RSPM, SO_2 & NO_X concentration in µg/m^3 at Maha Mandir Police Station, MahaMandir, Jodhpur City Rajasthan



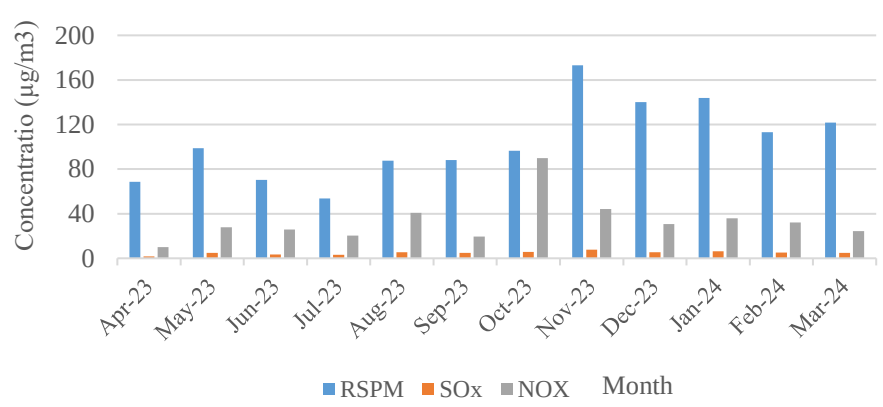
RSPM, SO_2 & NO_X concentration in µg/m^3 at Housing Board Office, Choupasni Road, Jodhpur City Rajasthan



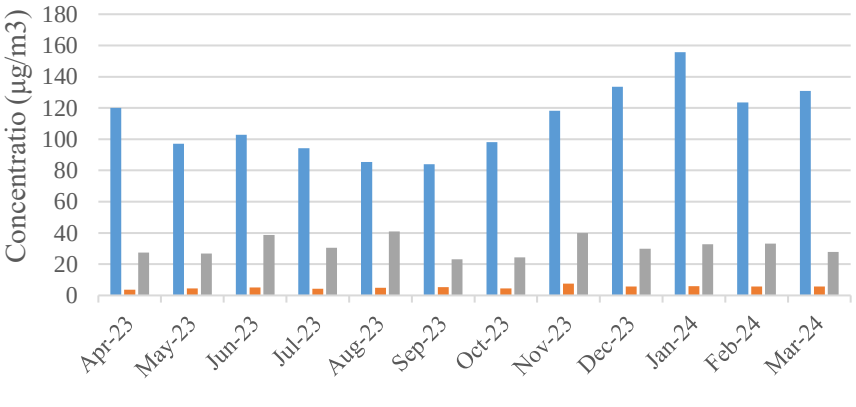
RSPM, SO_2 & NO_X concentration in µg/m^3 at Fire Station, Near Shastri Nagar, P+6olice Thana, Jodhpur City, Rajasthan



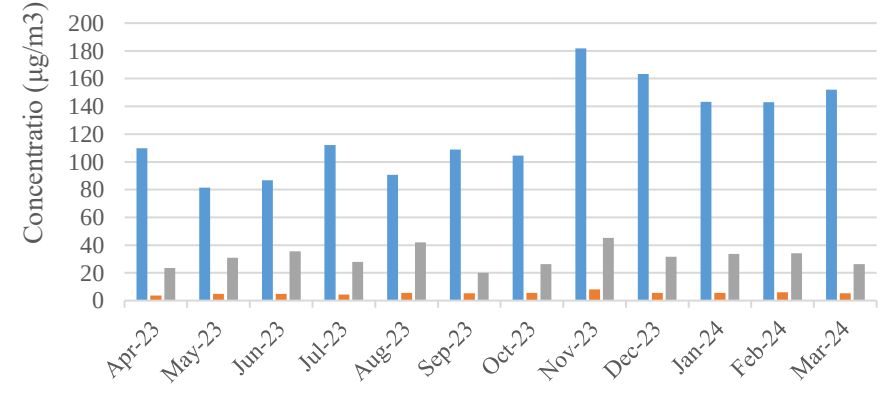
RSPM, SO_2 & NO_X concentration in µg/m^3 at JPCRF,Sangariya Police Chowki, Jodhpur City, Rajasthan



RSPM, SO_2 & NO_X concentration in µg/m^3 at Aashiana Amar Bagh Society, Near Kudi Mahila Thana, Jodhpur City, Rajasthan



RSPM, SO_2 & NO_X concentration in µg/m^3 at Soorsagar Police Station, Soorsagar, Jodhpur City, Rajasthan



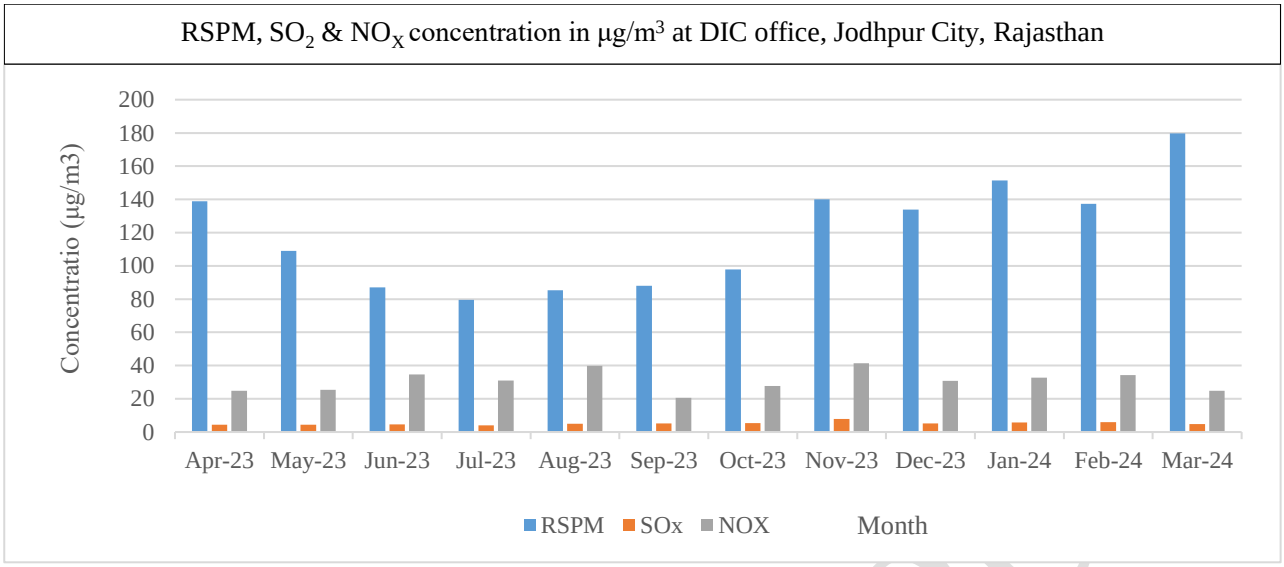


Figure. 3 Comparative Graph of RSPM, SO_2 & NO_X concentration (µg/m^3) of different location at Jodhpur (Rajasthan).

6. NAMP RESULT & DISCUSSION

Near Sojati Gate Police Station, Jodhpur:

1. The annual (April – 2023 to March 2024) minimum, maximum and average concentration of (**RSPM, PM-10 µg/m^3**) was found 80.25 µg/m^3, 168.00 µg/m^3 and 119.20 µg/m^3 respectively.
2. The minimum, maximum and average concentration of **SO_2** was found 3.69 µg/m^3, 7.66 µg/m^3 and 5.39 µg/m^3.
3. The minimum, maximum and average concentration of **NO_X** was found 21.56 µg/m^3, 48.97 µg/m^3 and 32.71 µg/m^3.

R. O. Office MIA 1st phase Basni, Jodhpur:

1. The minimum, maximum and average concentration of **(RSPM, PM-10 µg/m^3)** was found 78.44 µg/m^3, 173.20 µg/m^3 and 121.32 µg/m^3.
2. The minimum, maximum and average concentration of **SO_2** was found 4.1 µg/m^3, 6.31 µg/m^3 and 5.15 µg/m^3.
3. The minimum, maximum and average concentration of **NO_X** was found 20.54 µg/m^3, 41.61 µg/m^3 and 31.83 µg/m^3.

Maha Mandir Police Station, Jodhpur:

1. The minimum, maximum and average concentration of **(RSPM, PM-10 µg/m^3)** was found 90 µg/m^3, 226 µg/m^3 and 131.91 µg/m^3.
2. The minimum, maximum and average concentration of **SO_2** was found 3.53 µg/m^3, 7.2 µg/m^3 and 5.41 µg/m^3.
3. The minimum, maximum and average concentration of **NO_X** was found 21.27 µg/m^3, 42.39 µg/m^{3}and 32.56 µg/m^3.

Housing Board Office, Choupasni Road, Jodhpur:

1. The minimum, maximum and average concentration of **(RSPM, PM-10 µg/m^3)** was found 85.30 µg/m^3, 172.40 µg/m^3 and 123.62 µg/m^3.
2. The minimum, maximum and average concentration of **SO_2** was found 4.66 µg/m^3, 6.29 µg/m^3 and 5.37 µg/m^3.
3. The minimum, maximum and average concentration of **NO_X** was found 23.1 µg/m^3, 39.65 µg/m^3 and 31.82 µg/m^3.

Fire Station, Near Shastri Nagar, Police Thana, Jodhpur:

1. The minimum, maximum and average concentration of (**RSPM, PM-10 µg/m^3**) was found 69 µg/m^3, 216.20 µg/m^3 and 135.17 µg/m^3.
2. The minimum, maximum and average concentration of **SO_2** was found 4.14 µg/m^3, 7.14 µg/m^3 and 5.38 µg/m^3
3. The minimum, maximum and average concentration of **NO_X** was found 21.03 µg/m^3, 45.77 µg/m^3 and 32.86 µg/m^3.

DIC Office, Jodhpur:

1. The minimum, maximum and average concentration of **(RSPM, PM-10 µg/m^3)** was found 79.44 µg/m^3, 179.75 µg/m^3 and 118.99 µg/m^3.
2. The minimum, maximum and average concentration of **SO_2** was found 4.05 µg/m^3, 7.9 µg/m^3 and 5.20 µg/m^3.
3. The minimum, maximum and average concentration of **NO_X** was found 20.61 µg/m^3, 41.4 µg/m^3 and 30.67 µg/m^3.

JPCRF, Sangariya Police Chowki, Jodhpur:

1. The minimum, maximum and average concentration of **(RSPM, PM-10 µg/m^3)** was found 53.78 µg/m^3, 173 µg/m^3 and 104.62 µg/m^3.
2. The minimum, maximum and average concentration of **SO_2** was found 1.69 µg/m^3, 7.63 µg/m^3 and 4.86 µg/m^3.
3. The minimum, maximum and average concentration of **NO_X** was found 10.1 µg/m^3, 89.76 µg/m^3 and 33.44 µg/m^3.

Aashiana Amar Bagh Society, Near Kudi Mahila Thana, Jodhpur:

1. The minimum, maximum and average concentration of **(RSPM, PM-10 µg/m^3)** was found 84 µg/m^3, 155.63 µg/m^3 and 112 µg/m^3.
2. The minimum, maximum and average concentration of **SO_2** was found 3.63 µg/m^3, 7.49 µg/m^3 and 5.26 µg/m^3.
3. The minimum, maximum and average concentration of **NO_X** was found 23.1 µg/m^3, 40.90 µg/m^3 and 31.29 µg/m^3.

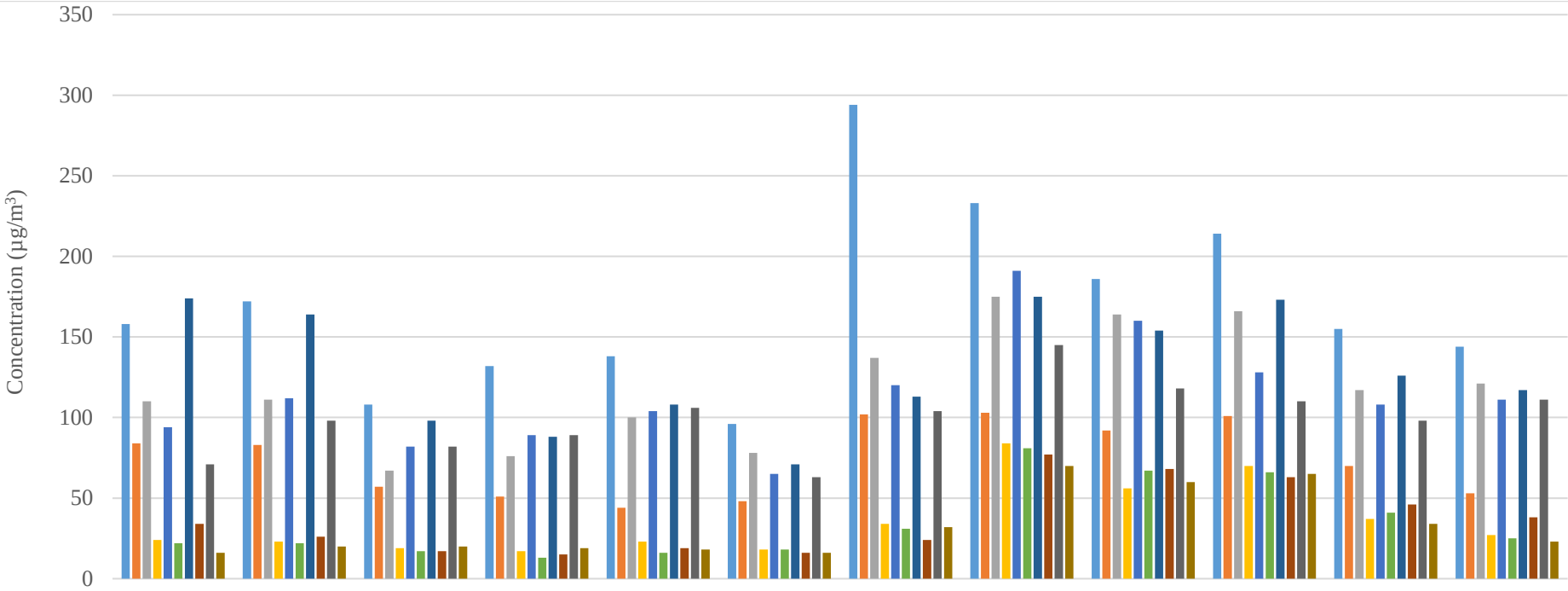
Soorsagar Police Station, Soorsagar, Jodhpur:

1. The minimum, maximum and average concentration of (**RSPM, PM-10 µg/m^3**) was found 81.44 µg/m^3, 181.73 µg/m^3 and 123.10 µg/m^3.
2. The minimum, maximum and average concentration of **SO_2** was found 3.61 µg/m^3, 8.15 µg/m^3 and 5.37 µg/m^3.
3. The minimum, maximum and average concentration of **NO_X** was found 20.16 µg/m^3, 45.13 µg/m^3 and 31.42 µg/m^3.

7. RESULT & DISCUSSION OF CAAQMS

CAAQMS YEARLY DATA OF 2023-2024											
S.N.	Month	1		2		3		4		5	
		RSPCB CAAQMS JODHPUR - Collectorate		RSPCB CAAQMS `JODHPUR - Ashok Udyan		RSPCB CAAQMS JODHPUR - Digari		RSPCB CAAQMS JODHPUR - Jhalamand		RSPCB CAAQMS JODHPUR - Mandore	
		PM10	PM2.5	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5
		µg/m^3	µg/m^3	µg/m^3	µg/m^3	µg/m^3	µg/m^3	µg/m^3	µg/m^3	µg/m^3	µg/m^3
1	Apr-23	158	84	110	24	94	22	174	34	71	16
2	May-23	172	83	111	23	112	22	164	26	98	20
3	Jun-23	108	57	67	19	82	17	98	17	82	20
4	Jul-23	132	51	76	17	89	13	88	15	89	19
5	Aug-23	138	44	100	23	104	16	108	19	106	18
6	Sep-23	96	48	78	18	65	18	71	16	63	16
7	Oct-23	294	102	137	34	120	31	113	24	104	32
8	Nov-23	233	103	175	84	191	81	175	77	145	70
9	Dec-23	186	92	164	56	160	67	154	68	118	60
10	Jan-24	214	101	166	70	128	66	173	63	110	65
11	Feb-24	155	70	117	37	108	41	126	46	98	34
12	Mar-24	144	53	121	27	111	25	117	38	111	23
Maximum		294	103	175	84	191	81	175	77	145	70
Minimum		96	44	67	17	65	13	71	15	63	16
Average		169	74	119	36	114	35	130	37	100	33

Note: Yellow colour showing that the data are exceed the prescribed Standard.



	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24
CAAQMS - Collectorate PM10 µg/m3	158	172	108	132	138	96	294	233	186	214	155	144
CAAQMS - Collectorate PM2.5 µg/m3	84	83	57	51	44	48	102	103	92	101	70	53
CAAQMS - Ashok Udyan PM10 µg/m3	110	111	67	76	100	78	137	175	164	166	117	121
CAAQMS - Ashok Udyan PM2.5 µg/m3	24	23	19	17	23	18	34	84	56	70	37	27
CAAQMS - Digari PM10 µg/m3	94	112	82	89	104	65	120	191	160	128	108	111
CAAQMS - Digari PM2.5 µg/m3	22	22	17	13	16	18	31	81	67	66	41	25
CAAQMS - Jhalamand PM10 µg/m3	174	164	98	88	108	71	113	175	154	173	126	117
CAAQMS - Jhalamand PM2.5 µg/m3	34	26	17	15	19	16	24	77	68	63	46	38
CAAQMS - Mandore PM10 µg/m3	71	98	82	89	106	63	104	145	118	110	98	111
CAAQMS - Mandore PM2.5 µg/m3	16	20	20	19	18	16	32	70	60	65	34	23

Figure. 4 CAAQMS Comparative graph of PM $_{10}$ & PM $_{2.5}$ (µg/m^3) of different location in Jodhpur, Rajasthan

8. CAAQMS RESULT

1. **RSPCB CAAQMS JODHPUR – Collectorate, Jodhpur**:

   The annual (April – 2023 to March 2024) minimum, maximum and average concentration of PM 10 was found 96 µg/m^3, 294 µg/m^3, 169 µg/m^3 and PM 2.5 was found 44 µg/m^3, 103 µg/m^3 and 74 µg/m^3 respectively.

2. **RSPCB CAAQMS JODHPUR - Ashok Udyan, Jodhpur:**

   The annual (April – 2023 to March 2024) minimum, maximum and average concentration of PM 10 found 67 µg/m^3, 175 µg/m^3, 119 µg/m^3 and PM 2.5 was found 17 µg/m^3 84 µg/m^3 and 36 µg/m^3 respectively.

3. **RSPCB CAAQMS JODHPUR – Digari, Jodhpur:**

   The annual (April – 2023 to March 2024) minimum, maximum and average concentration of PM 10 was found 65 µg/m^3, 191 µg/m^3, 114 µg/m^3 and PM 2.5 was found 13 µg/m^3, 81 µg/m^3 and 35 µg/m^3 respectively.

4. **RSPCB CAAQMS JODHPUR – Jhalamand, Jodhpur:**

   The annual (April – 2023 to March 2024) minimum, maximum and average concentration of PM 10 was found 71 µg/m^3, 175 µg/m^3, 130 µg/m^3 and PM 2.5 was found 15 µg/m^3, 77 µg/m^3 and 37 µg/m^3 respectively.

5. **RSPCB CAAQMS JODHPUR – Mandore, Jodhpur:**

   The annual (April – 2023 to March 2024) minimum, maximum and average concentration of PM 10 was found 63 µg/m^3, 145 µg/m^3, 100 µg/m^3 and PM 2.5 was found 100 µg/m^3, 70 µg/m^{3}and 33 µg/m^3 respectively.

9. CONCLUSION OF NAMP & CAAQMS

NAMP Conclusion:

1. The annual (April – 2023 to March 2024) average concentration of gaseous pollutants (SO_2 and NO_x) of different location like as DIC Office, Jodhpur (5.20 µg/m^3 and 30.67 µg/m^3), Housing Board, Jodhpur (5.37 µg/m^3 and 31.82 µg/m^3), Kudi Mahila Thana, Jodhpur (5.26 µg/m^3 and 31.29 µg/m^3), Maha Mandir, Jodhpur (5.41 µg/m^3 and 32.56 µg/m^3), RIICO Office, Basni Industrial Area, Jodhpur (5.15 µg/m^3 and 31.83 µg/m^3), Sangaria Police Chowki, Jodhpur (4.86 µg/m^3 and 33.44 µg/m^3), Shastri Nagar Thana, Jodhpur (5.38 µg/m^3 and 32.86 µg/m^3), Sojati Gate, Jodhpur (5.39 µg/m^3 and 32.71 µg/m^3), Soorsagar Thana, Jodhpur (5.37 µg/m^3 and 31.42 µg/m^3) respectively.
2. The concentration of NO_x and SO_2 µg/m^3 was **well under the NAAQS prescribed limits** defined by India's CPCB.
3. The annual (April – 2023 to March 2024) average concentration of Particulate Matter (PM 10 µg/m^3) of different location like as DIC Office, Jodhpur (118.99 µg/m^3), Housing Board, Jodhpur (123.62 µg/m^3), Kudi Mahila Thana, Jodhpur (112 µg/m^3), Maha Mandir, Jodhpur (131.88 µg/m^3), RIICO Office, Basni Industrial Area, Jodhpur (121.32 µg/m^3), Sangaria Police Chowki, Jodhpur (104.62 µg/m^3), Shastri Nagar Thana, Jodhpur (135.14 µg/m^3), Sojati Gate, Jodhpur (119.20 µg/m^3), Soorsagar Thana, Jodhpur (123.10 µg/m^3) respectively.
4. The concentration of Particulate Matter (PM 10, µg/m^3) was **exceed under the NAAQS prescribed limits**.

CAAQMS Conclusion:

1. The annual (April – 2023 to March 2024) average concentrations of Particulate Matter (PM 2.5 & PM 10) of different location like as Collectorate, Jodhpur (74 µg/m^3 and 169 µg/m^3), Ashok Udyan, Jodhpur (36 µg/m^3 and 119 µg/m^3), Digari, Jodhpur (35 µg/m^3 and 114 µg/m^3), Jhalamand, Jodhpur (37 µg/m^3 and 130 µg/m^3), Mandore, Jodhpur (33 µg/m^3, 100 µg/m^3).
2. The concentration of Particulate Matter (PM 2.5 & PM 10 µg/m^3) **was exceed under the NAAQS prescribed limits**.

10. Five year Comparative data of NAMP from 2019 to 2023

	DIC Office, Jodhpur	Housing Board, Jodhpur	Kudi Mahila Thana,	Maha Mandir, Jodhpur	RO Office, Jodhpur	Sangaria Police Chowki, Jodhpur	Shastri Nagar Thana, Jodhpur	Sojati Gate, Jodhpur	Soorsagar Thana, Jodhpur	Annual Average
Year	**PM-10**	**PM-10**	**PM-10**	**PM-10**	**PM-10**	**PM-10**	**PM-10**	**PM-10**	**PM-10**	**PM-10**
2019	221.01	180.90	211.1	252.62	257.18	188.01	280.79	210.38	229.76	225.75
2020	165.17	142.17	142.4	148.68	132.04	134.84	226.68	209.96	141.28	160.35
2021	181.18	181.28	171.4	189.15	195.30	149.02	228.12	214.47	140.20	183.35
2022	190.67	147.68	115.2	158.80	150.55	139.18	183.65	148.81	133.02	151.95
2023	115.55	115.39	110.4	135.90	116.40	105.98	129.02	117.08	126.17	119.10
Average	174.71	153.48	150.09	177.02	170.29	143.40	209.65	180.13	154.08	168.10

Year	**2019**	**2020**	**2021**	**2022**	**2023**
Annual Average Concentration of PM ($\mu g/m^3$)	225.75	160.35	183.35	151.95	119.10

	DIC Office, Jodhpur	Housing Board, Jodhpur	Kudi Mahila Thana,	Maha Mandir, Jodhpur	RO Office, Jodhpur	Sangaria Police Chowki, Jodhpur	Shastri Nagar Thana, Jodhpur	Sojati Gate, Jodhpur	Soorsagar Thana, Jodhpur	Annual Average
Year	**NOx**	**NOx**	**NOx**	**NOx**	**NOx**	**NOx**	**NOx**	**NOx**	**NOx**	**NOx**
2019	25.26	24.53	24.61	24.16	24.40	23.76	24.87	24.08	23.63	24.37
2020	26.67	23.34	24.15	23.03	23.97	24.43	25.79	25.33	24.75	24.61
2021	17.77	16.42	18.88	16.84	16.32	16.25	18.00	17.49	16.18	17.13
2022	30.47	31.98	27.65	26.91	29.12	29.04	38.01	28.12	28.72	30.00
2023	29.79	31.03	30.28	31.52	31.12	32.07	32.81	32.24	31.48	31.37
Average	25.99	25.46	25.11	24.49	24.99	25.11	27.89	25.45	24.95	25.49

Year	**2019**	**2020**	**2021**	**2022**	**2023**
Annual Average Concentration of NOx ($\mu g/m^3$)	24.37	24.61	17.13	30	31.37

	DIC Office, Jodhpur	Housing Board, Jodhpur	Kudi Mahila Thana,	Maha Mandir, Jodhpur	RO Office, Jodhpur	Sangaria Police Chowki, Jodhpur	Shastri Nagar Thana, Jodhpur	Sojati Gate, Jodhpur	Soorsagar Thana, Jodhpur	Annual Average
Year	**SO_2**	**SO_2**	**SO_2**	**SO_2**	**SO_2**	**SO_2**	**SO_2**	**SO_2**	**SO_2**	**SO_2**
2019	6.70	6.58	6.36	6.34	6.75	6.65	6.68	6.38	6.55	6.55
2020	5.53	5.01	4.77	4.66	4.90	5.02	5.81	5.40	4.76	5.09
2021	3.68	3.01	3.34	3.53	3.30	3.24	4.35	4.07	3.38	3.54
2022	6.24	6.62	5.14	5.58	5.50	6.16	6.50	5.69	5.37	5.87
2023	5.12	5.18	5.08	5.26	5.00	4.65	5.26	5.30	5.38	5.14
Average	5.45	5.28	4.94	5.07	5.09	5.15	5.72	5.37	5.09	5.24

***Note:** Yellow row showing the five year average concentration of PM 10, NOx and SO_2.

Year	**2019**	**2020**	**2021**	**2022**	**2023**
Annual Average Concentration of SO_2 ($\mu g/m^3$)	6.55	5.09	3.54	5.87	5.14

S.N	**Five Year NAMP Concentration of PM-10, NOx and SO_2**	**Annual Average Concentration ($\mu g/m^3$)**
1	Five Year Annual Average Concentration of PM-10 ($\mu g/m^3$)	168.10
2	Five Year Annual Average Concentration of NOx ($\mu g/m^3$)	25.49
3	Five Year Annual Average Concentration of SO_2 ($\mu g/m^3$)	5.14

*Five Year Annual Concentration of PM-10, SOx and NOx from January, 2019 to December, 2023)

11. PM_{10} & $PM_{2.5}$ Comparative data of CAAQMS from April, 2022 to March, 2024

S. N.	Month	1		2		3		4		5		Annual Average Concentration of PM-10 (µg/m3)
		RSPCB CAAQMS JODHPUR - Collectorate		RSPCB CAAQMS `JODHPUR - Ashok Udyan		RSPCB CAAQMS JODHPUR - Digari		RSPCB CAAQMS JODHPUR - Jhalamand		RSPCB CAAQMS JODHPUR - Mandore		
		PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}
		µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m3
1	Apr-22	192	87	-	-	-	-	-	-	-	-	
2	May-22	226	103	-	-	-	-	-	-	-	-	
3	Jun-22	168	74	-	-	-	-	-	-	-	-	
4	Jul-22	72	34	-	-	-	-	-	-	-	-	
5	Aug-22	95	39	-	-	-	-	-	-	-	-	
6	Sep-22	96	44	-	-	-	-	-	-	-	-	
7	Oct-22	159	76	-	-	-	-	-	-	-	-	
8	Nov-22	182	80	165	65	158	64	216	67	-	-	
9	Dec-22	155	73	140	58	195	63	180	58	-	-	
10	Jan-23	152	69	142	60	161	59	177	64	-	-	
11	Feb-23	194	89	175	52	158	52	201	59	-	-	
12	Mar-23	134	65	100	28	97	28	162	39	-	-	
Average		**152**	**69**	**144**	**53**	**154**	**53**	**187**	**57**	**0**	**0**	**159.25**

S.No.	Month	1		2		3		4		5		Annual Average Concentration of PM-10 (µg/m3)
		RSPCB CAAQMS JODHPUR - Collectorate		RSPCB CAAQMS `JODHPUR - Ashok Udyan		RSPCB CAAQMS JODHPUR - Digari		RSPCB CAAQMS JODHPUR - Jhalamand		RSPCB CAAQMS JODHPUR - Mandore		
		PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}
		µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m3
1	Apr-23	158	84	110	24	94	22	174	34	71	16	
2	May-23	172	83	111	23	112	22	164	26	98	20	
3	Jun-23	108	57	67	19	82	17	98	17	82	20	
4	Jul-23	132	51	76	17	89	13	88	15	89	19	
5	Aug-23	138	44	100	23	104	16	108	19	106	18	
6	Sep-23	96	48	78	18	65	18	71	16	63	16	
7	Oct-23	294	102	137	34	120	31	113	24	104	32	
8	Nov-23	233	103	175	84	191	81	175	77	145	70	
9	Dec-23	186	92	164	56	160	67	154	68	118	60	
10	Jan-24	214	101	166	70	128	66	173	63	110	65	
11	Feb-24	155	70	117	37	108	41	126	46	98	34	
12	Mar-24	144	53	121	27	111	25	117	38	111	23	
Average		**169**	**74**	**119**	**36**	**114**	**35**	130	**37**	100	**33**	**126**

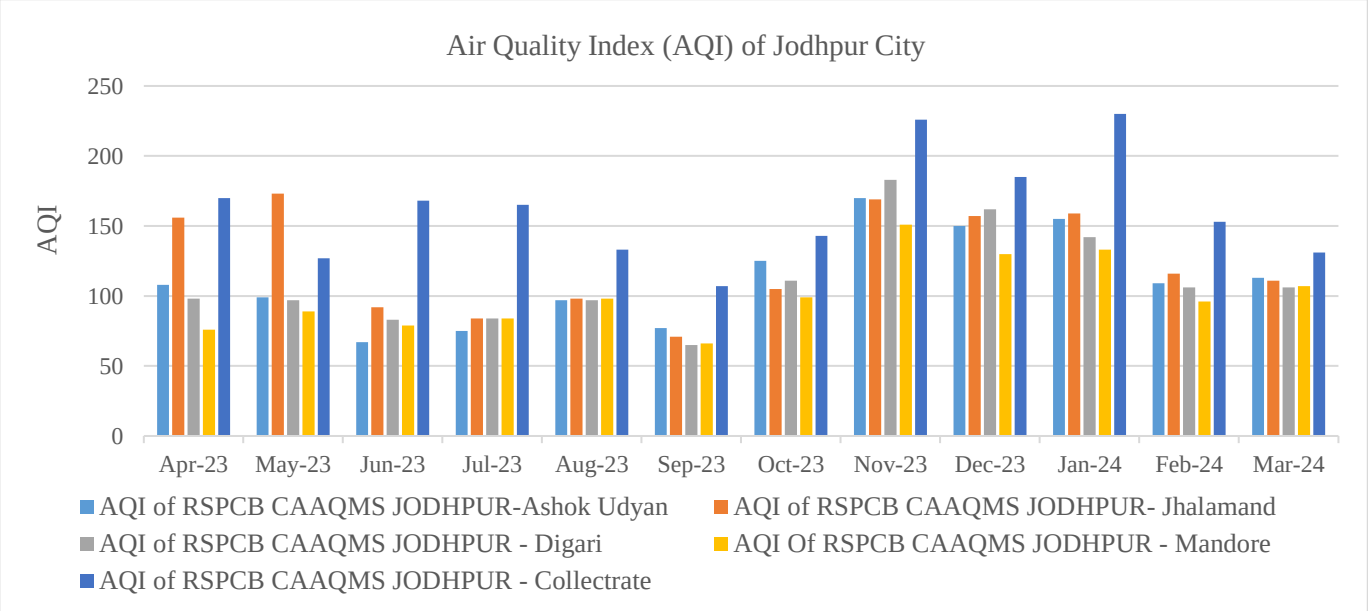
***Note:** New CAAQMS installed at Jodhpur in year, 2022

1. Particulate Matter (PM_{10}) Concentration from April, 2022 to March, 2023 found **159.25 µg/m³** according to CAAQMS data.
2. Particulate Matter (PM_{10}) Concentration from April, 2023 to March, 2024 found **126 µg/m³** according to CAAQMS data.

12. Air Quality Index (AQI) of Jodhpur City from April, 2023 to March, 2024

S.N	Month	AQI of RSPCB CAAQMS JODHPUR-Ashok Udyan	AQI of RSPCB CAAQMS JODHPUR-Jhalamand	AQI of RSPCB CAAQMS JODHPUR - Digari	AQI Of RSPCB CAAQMS JODHPUR - Mandore	AQI of RSPCB CAAQMS JODHPUR - Collectrate	Total Overall Average AQI
1.	April-2023	108	156	98	76	170	
2.	May-2023	99	173	97	89	127	
3.	June-2023	67	92	83	79	168	
4.	July-2023	75	84	84	84	165	
5.	Aug-2023	97	98	97	98	133	
6.	Sept-2023	77	71	65	66	107	
7.	Oct-2023	125	105	111	99	143	
8.	Nov-2023	170	169	183	151	226	
9.	Dec-2023	150	157	162	130	185	
10.	Jan-2024	155	159	142	133	230	
11.	Feb-2024	109	116	106	96	153	
12.	March-2024	113	111	106	107	131	
Annual Average (AQI)		**112**	**124**	**111**	**101**	**162**	**122**

Note: All the CAAQMS site, data from April, 2023 to March, 2024 the Annual average Air Quality Index (AQI) of Jodhpur City found **122**, which found **Unhealthy for sensitive Groups** according to National Ambient Air Quality Monitoring System (NAAQMS).



National Ambient Air Standards are the standards for ambient air quality set by the Central Pollution Control Board with the objective of arresting the deterioration of air quality.

Pollutants	Time-weighted average	Concentration in		Method of measurement
		Industrial, Residential, Rural &other Areas	Ecologically Sensitive Areas(Notified by Central Govt.)	
PM10	Annual Average	60 µg /m^3	60 µg/m^3	Beta Attenuation Gravimetric TOEM
	24hours	100 µg/m^3	100 µg/m^3	
PM2.5	Annual Average	40 µg/m^3	40 µg/m^3	Beta Attenuation Gravimetric TOEM
	24hours	60 µg/m^3	60 µg/m^3	
Carbon Monoxide (CO)	8hours	2.0 mg/m^3	2.0 mg/m^3	Non Dispersive Infra Red (NDIR) Spectroscopy
	1hour	4.0 mg/m^3	4.0 mg/m^3	
Sulfur Dioxide (SO_2)	Annual Average	50 µg/m^3	20 µg/m^3	Improved West and Gaeke Method Ultraviolet Fluorescence
	24hours	80 µg/m^3	80 µg/m^3	
Nitrogen Dioxide (NO_2)	Annual Average	40 µg/m^3	30 µg/m^3	Jacob & Hochheiser Modified (NaOH-NaAsO2) Method Gas Phase Chemiluminescence
	24hours	80µg/m^3	80 µg/m^3	
Ammonia (NH_3)	Annual Average	100 µg/m^3	100 µg/m^3	Chemiluminescence Indophenol blue method
	24hours	400 µg/m^3	400 µg/m^3	
Ozone(O_3)	8 hour Average	100 µg/m^3	100 µg/m^3	UV Photometric Chemiluminescence Chemical Method
	1hours	180 µg/m^3	180 µg/m^3	
Benzene (C_6H_6)	Annual Average	05 µg/ m^3	05 µg/m^3	Gas Chromatography based continuous analyzer-Adsorption and Description followed by GC analysis
	24hours	-	-	
Annual Arithmetic mean of minimum 104 measurements in a year taken twice a week 24 hourly at uniform interval.				

The current National Ambient Air Quality Standards were notified on 18 November 2009. Prior to the November 2009 standards, India had set Air Quality standards on 11 April 1994, and this was later revised on 14 October 1998. The 2009 standards further lowered the maximum permissible limits for pollutants and made the standards uniform across the nation.

14. RECOMMENDATIONS & REMEDIAL MEASURES FOR CONTROL OF AIR POLLUTION

1. Increase the public transport (city bus, metro etc.) in place of individual vehicle.
2. Use of electric vehicles in place of diesel vehicle.
3. Complete banned on movement of older vehicle (15 years old).
4. Two raw plantation both side of main roads of city and development of city parks & green belt by plantation at gauchar land.
5. Increase the rooftop garden in city area.
6. Water spray during morning & evening by using treated CETP / CSTP water so that fugitive air pollution may be control.
7. Cleaning of road side dust with adequate/alternative technology and auto sweeper vacuum machine may be used.
8. Strict action for burning of municipal solid waste.
9. Schedule inspection, sampling & monitoring of air polluting industries to be carried out by RSPCB & strict action may be taken against the defaulter unit.
10. Regular stack holder meeting to be conducted related to air pollution & water pollution, by using mitigation measures and technology upgradation approach.
11. Strict compliance of new standards laid down by MOEF & CC, CPCB and RSPCB.
12. Reuse of solid waste in highway, over bridge & other low laying area.
13. Construction and demolition waste/building material to be covered at the time of transportation.
14. Increase Multi-Story Parking in Market Area which is implemented in foreign country.
15. Construction of Bypass, One-way for traffic management in metropolitan cities.
16. Over Bridge, Under Bridge and Ring Roads to be provided as desired places.
17. MCP, JDA and Housing Board to be take mandatory decision for construction of Multi-storey building Construction.

15. THE TEAM - PREPARATION OF REPORT (APRIL, 2023 TO MARCH, 2024)

Name and Address of the Institution	Rajasthan State Pollution Control Board, M.I.A. 1st Phase, Basni, Basni, Jodhpur, Rajasthan
Regional Officer	Smt. Shilpi Sharma (Regional Officer, RSPCB, Jodhpur)
Lab In charge	Sh. Deepak Ojha Supdt. Scientific Officer & Lab In charge Regional Laboratory, Jodhpur
Report Writing, Data Compilation, Analysis and Tabulation	Sh. Deepak Ojha (Supdt. Scientific Officer) Sh. Devendra Singh Bikundia (Senior Scientific Officer) Sh. Jitendra Saraswat (Junior Scientific Officer) Smt. Ritu Sharma (Junior Scientific Officer) Smt. Kavita Charan (Junior Scientific Officer) Sh. Deepak Panwar (AOS) Sh. Narendra Kumar Kadela (Young Intern)
Supporting Staff	Sh. Kuldeep Singh (Scientific Assistant) Sh. Dileep Sankhala (Scientific Assistant) Sh. Nitin Joshi (Scientific Assistant) Sh. Rafikh Khan (Field Assistant) Sh. Rajendra Singh (Lab Attended) Sh. Umar Khan (Data Entry Operator) Sh. Shyam Giri (Field Assistant) & All NAMP field Staff.

16. PHOTOGRAPHS DURING VISIT

Figure. 5 $PM_{2.5}$ Calibration & Continuous Ambient Air Quality Monitoring Station (CAAQMS) visit at Mandore & Jhalamand, Jodhpur (Rajasthan) by Board Officials.