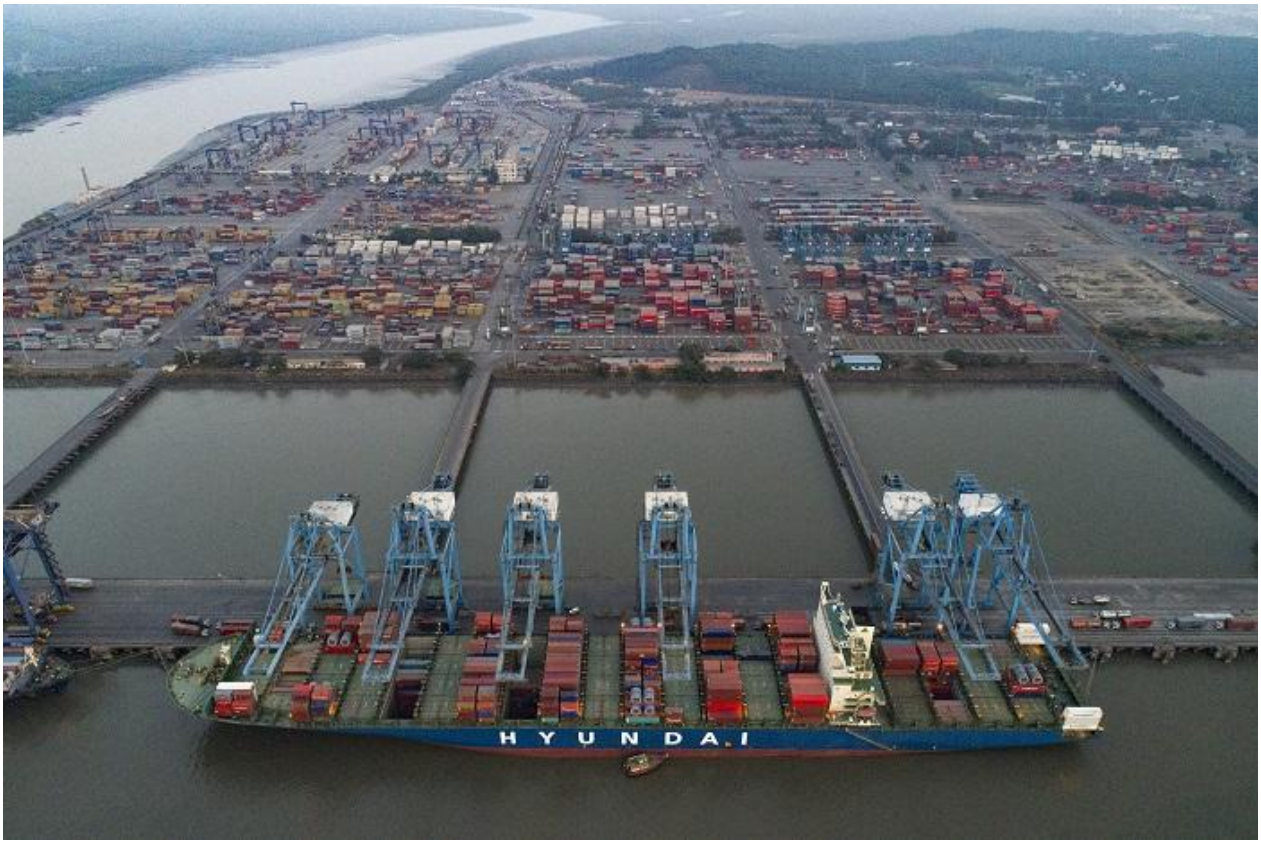


# MONITORING OF ENVIRONMENTAL PLAN FOR JN PORT ENVIRONMENTAL MONITORING REPORT- March, 2025 EXECUTIVE SUMMARY

**REPORT NO: AEC/JNPA/Summary-03/Mar-25**

**MONTH & YEAR: March 2025**

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## 1.0 Ambient Air Monitoring:

**Table 1.** Monthly average values of Air Quality parameters at various stations in JNP Area during March, 2025.

| Parameters | | Port (Port Operation) Area | | | | | | | | Residential area | Eco Sensitive area |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | NAAQS | IMC | NSFT-NG | SEZ | APM | BMCT | NSDT-CB | DP World | BPCL | RC | EC |
| $PM_{10}$ | 100 | 176.5 | 176.32 | 167.59 | 170.78 | 171.73 | 178.1 | 149.46 | 116.27 | 152.67 | 85.37 |
| $PM_{2.5}$ | 60 | 52.93 | 49.77 | 33.65 | 43.76 | 47.91 | 45.92 | 51.38 | 38.44 | 42.45 | 47.32 |
| $SO_2$ | 80 | 7.14 | 7.01 | 6.85 | 6.17 | 7.61 | 7.1 | 10.96 | 8.0478 | 7.5056 | 6.22 |
| $NO_2$ | 80 | 29.16 | 51.03 | 25.05 | 32.72 | 30.57 | 44.72 | 67.46 | 52.4 | 42.99 | 29.995 |
| $NH_3$ | 400 | 67.42 | 46.05 | 69.53 | 51.28 | 58.66 | 36.17 | 33.6 | 62.4 | 24.19 | 23.115 |
| $O^3$ | 100 | 12.24 | 48.16 | 30.17 | 25.71 | 34.32 | 15.75 | 20.88 | 32.78 | 16.56 | 11.54 |
| Pb | 0.5 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |
| As | 6 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| Ni | 20 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| $C_6H_6$ | 5 | 2.79 | 2.81 | 2.58 | 2.69 | 2.61 | 2.36 | 2 | 2.66 | 1.93 | 1.43 |
| B(a)P | 1 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| CO | 4 | 1.12 | 1.05 | 0.91 | 1 | 1.02 | 0.87 | 0.76 | 0.85 | 0.79 | 0.56 |
| AQI | | 151 | 151 | 145 | 147 | 147 | 152 | 143 | 111 | 135 | 85 |

| Date | $PM_{10}$ | $PM_{2.5}$ | $SO_2$ | $NO_2$ | $NH_3$ | $O_3$ | $C_6H_6$ | CO | $C_7H_8$ | NO | $NO_x$ | AQI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 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 /$m^3$ | µg /$m^3$ | Remarks: |
| NAAQS | 100 | 60 | 80 | 80 | 400 | 100 | 5 | 2 | -- | -- | -- | |
| Mar-25 | 126.38 | 18.18 | 6.74 | 77.21 | 9.31 | 21.68 | 1.3 | 2.52 | 5.5 | 22.51 | 99.72 | 118 |

IMC - Indian Molasses Company, NSFT-NGC –Nhava Sheva Free Port Terminal-North Gate Complex, SEZ Special Economic Zone, APM- A.P. Moller, BMCT- Bharat Mumbai Container Terminals, NSDT CB- Nhava Sheva Distribution Terminal-Coastal Berth, DP World - Dubai Ports International, BPCL- Bharat Petroleum Corporation Limited, RC-Residential Complex, EC- Elephanta Caves

## Conclusion:

- The ambient air quality assessment across Port (port operation), residential, and eco-sensitive areas shows encouraging trends in several key pollutants. Most parameters, including $SO_2$, CO, $O_3$, Pb, As, Ni, and B(a)P, are well within the National Ambient Air Quality Standards (NAAQS), indicating effective pollution control measures and compliance by industries and transport systems. This reflects positively on the current environmental management practices and regulatory frameworks in place around the port and nearby areas.
- Fine particulate matter ($PM_{2.5}$), although close to the prescribed limit in some areas, remains under control and poses a lower health risk. Similarly, nitrogen dioxide ($NO_2$) and ammonia ($NH_3$) levels are within safe limits in most monitoring locations, suggesting that vehicular and Port emissions are reasonably well-regulated. The consistent absence or low levels of toxic heavy metals and carcinogenic compounds like benzene and benzo(a)pyrene also highlight a low contribution from hazardous Port emissions.
- The eco-sensitive area (EC) demonstrates the best air quality, with the lowest $PM_{10}$ and $NO_2$ levels and an AQI of 85, categorized as "Satisfactory." This is a positive sign of conservation efforts and minimal pollution spillover from the nearby Port zones. The residential and semi-Port areas also show moderate air quality, indicating a balanced approach between development and environmental health.
- The air quality data for March 25 indicates that $PM_{10}$ levels (126.38 µg/m³) exceeded the NAAQS limit, leading to an AQI of 118, categorized as moderate. All other pollutants, including $PM_{2.5}$, $SO_2$, $NO_2$, $NH_3$, $O_3$, $C_6H_6$, and CO, were well within permissible limits. Overall, the air quality was

moderately polluted, with particulate matter ($PM_{10}$) being the primary contributor.

- In conclusion, the results portray a relatively clean air environment with specific areas for improvement. With continued focus on reducing particulate matter and localized emissions, especially from port-related activities, the region has a strong potential to achieve better overall air quality. The current status supports sustainable growth and aligns with national goals for clean air and environmental protection.

**Solution towards the Green port:**

- Implement shore power (cold ironing) to reduce ship emissions at berth.
- Promote use of cleaner fuels like LNG or biofuels in port operations.
- Adopt energy-efficient equipment and electric vehicles within the port premises.
- Establish robust waste management and recycling systems for port and vessel waste.
- Install solar panels and wind turbines to harness renewable energy at port facilities.
- Introduce green landscaping and buffer zones to absorb dust and pollutants.
- Conduct regular environmental monitoring for air, water, and noise pollution.
- Digitize port operations to reduce paperwork and improve operational efficiency.
- Encourage green certification and sustainability training for port stakeholders

## 2.0 Marine Water Quality:

Observed concentration ranges of Marine Water for various parameters for JNP area during tidal cycle (For March, 2025.).

| Sr. No. | Parameter | Unit | Observed Range | Prescribed Limits |
|---|---|---|---|---|
| 1 | Temperature | °C | 27.8-29.8 | - |
| 2 | pH | - | 7.74-7.83 | 6.5 - 9.0 |
| 3 | Salinity | ppt | 22.10-24.50 | - |

| | | | | |
|---|---|---|---|---|
| 4 | Turbidity | NTU | 16.6-240 | - |
| 5 | TDS | mg/L | 29891-49961 | - |
| 6 | TSS | mg/L | 269-383<br>30216-50344 | - |
| 7 | TS | mg/L | 4.02 - 4.95 | - |
| 8 | DO | mg/L | 27.2 - 92.1 | 3.0 mg/L(min.) or 40% of saturation value |
| 9 | COD | mg/L | 0. 65 - 2.88 | - |
| 10 | BOD | mg/L | 0.0153.0.0787 | 5 |
| 11 | Ammonia | mg/L | 0.010-0.032 | - |
| 12 | Phenol | mg/L | 0.067-0.772 | - |
| 13 | Oil & Grease | mg/L | 138-526 | 10 (max.) |
| 14 | Total Plate Count | CFU/ml | 94-482 | - |
| 15 | Fecal Coliforms | MPN/100ml | 27.8-29.8 | 500 (max.) |

The water quality analysis shows an overall positive status, with key parameters such as pH, dissolved oxygen (DO), biological oxygen demand (BOD), and fecal coliforms well within permissible limits, indicating a healthy aquatic environment and minimal organic pollution. The high levels of DO reflect good oxygenation, supporting aquatic life. Parameters like salinity, TDS, and turbidity show natural variation, likely influenced by tidal and environmental factors. While oil and grease levels are elevated, this presents an opportunity for targeted pollution control and improvement. Overall, the water quality supports ecological sustainability with scope for enhanced management in specific areas.

## 3.0 Continuous Marine Water Quality Monitoring;

A Continuous Marine Water Quality Monitoring system was installed at the JNPA berth bridge location to monitor parameters such as Temperature, pH, Dissolved Oxygen, Ammonia, Conductivity, Nitrate, Salinity, Turbidity, and Total Dissolved Solids. These parameters are found satisfactory as per prescribed limits.

## 3.0 Marine Ecology (Flora and Fauna):

| Sr. No. | Parameter | Observed Range | Criteria |
|---|---|---|---|
| 1 | Net Primary Productivity | 35.00 - 52.42 mgC/$m^3$/day | <1500 mg C/m3/day at surface |
| 2 | Chlorophyll A | 0.3738-1.3884 mg/m3<br>45.32-162.90 µg/L<br>615.58-959.99 | <4 mg/m3 (Oligotrophic class),<br>4-10 mg/m3 (Mesotrophic class),<br>>10 mg/m3 (Eutrophic class) |
| 3 | Phosphate | 34.50-90.3 | 0.1-90 µg/L |
| 4 | Nitrate | 9.76-34.68 mg/$m^3$ | 1.0-500 µg/L |
| 5 | Nitrite | 38.2 – 58.10 | <125 µg/ L |
| 6 | Particulate Organic Carbon | 35.00 - 52.42 mgC/$m^3$/day | 10-100 mg/m3 |
| 7 | Silicate | 0.3738-1.3884 mg/m3 | 10-5000 µg/L |

The water quality parameters indicate a healthy and productive aquatic environment. Net primary productivity (35.00–52.42 mgC/m³/day) is well below the threshold of 1500 mgC/m³/day, suggesting a balanced ecosystem with adequate biological activity. Chlorophyll-a levels (0.3738–1.3884 mg/m³) fall within the oligotrophic to mesotrophic range, indicating a moderate nutrient level conducive to a thriving aquatic community. Phosphate, nitrate, and nitrite concentrations are within acceptable limits, supporting the idea of minimal pollution and good nutrient cycling. Particulate organic carbon and silicate levels further suggest healthy conditions for marine productivity. Overall, these parameters reflect a stable and sustainable aquatic system, supporting biodiversity and ecosystem health.

## 4.0 Drinking Water Quality:

The drinking water quality assessment at 22 stations within the JNPA Port shows that all parameters meet the IS 10500:2012 standards, ensuring safe, clean, and palatable water. The water is free from chemical and microbiological contamination, with low levels of heavy metals and toxic elements, indicating effective treatment and distribution systems. The absence of pathogenic organisms reflects a high

standard of hygiene and environmental management. Overall, the results confirm that the drinking water is safe and suitable for daily consumption.

## 5.0 Monitoring Performance of Sewage Treatment Plant

The performance evaluation of the JNPA and POC sewage treatment plants (STPs) for March 2025 confirms their efficient operation, effectively removing organic load, toxic pollutants, and heavy metals. The treated effluents comply with discharge standards, and bioassay results show that the final effluents are non-toxic. These outcomes highlight the well-maintained treatment infrastructure and responsible environmental management at JNPA port, ensuring sustainability and regulatory compliance.