JSW Steel Limited

Vijayanagar Works :
P.O. Vidyanagar - 583 275,
Dist. Ballari, Karnataka, India.
CIN. : L27102MH1994PLC152925
Phone : +91 8395 250 120-30
Fax : +91 8395 250 132/142
Website : www.jsw.in

JSW /ENV/GOV/KSPCB/STM/092024/ Date: 26.09.2024

To,
The Member Secretary,
Karnataka State Pollution Control Board,
5" Floor, #49, Parisara Bhavan, Church Street,
Bangalore - 560 001

Sub: Environmental Statement for the Financial Year 2023-2024

Ref:

1. ***Combined Consent Order No. AW 328970 PCB ID 10357 Dated 31.12.2021***
2. ***Combined Order No. W-341737 PCB ID 11777 Dated 03.02.2024***
3. ***Combined Order No. AW-342445 PCB ID 10357 Dated 14.03.2024***

Dear Sir,

With respect to the above sited subject, we are submitting herewith the Environment Statement FY 2023-2024 report for our Integrated Steel Plant JSW Steel Limited, Vijayanagar Works located at Post Toranagallu, District Bellary, Karnataka.

Submitted for your record please.

Thanking your,
Yours Faithfully,
Authorized Signatory
For **M/s JSW Steel Limited**

Dr. Satish Mishra
Associate Vice President (Environment & Sustainability)

CC :

I. Environmental officer, KSPCB, Regional Office, 4th Main,Kuvempunagara,Bellary 583104
II. Director, Regional Office MoEF (SZ), Kendriya Sadana, IV" Floor, E&F Wing, 17" Main Road, Koramangala, Banglore-560034.
III. Regional Director, CPCB, A-Block, Nisarga Bhavan 1st & 2nd Floor, 7th D Cross, Thimmaiah Road, Shivaji Nagar, Bengaluru – 560079.

ENVIRONMENTAL STATEMENT

For financial Year 2023-2024

BY

JSW STEEL LIMITED

VIJAYANAGAR WORKS

Toranagallu,P.O. Vidyanagar Dist. Bellary Karnataka-583275

ENVIRONMENTAL STATEMENT

Of

JSW STEEL LIMITED,

VIJAYANAGAR WORKS

TORANAGALLU

for

Financial year ending the 31st March, 2023

(In the prescribed Form # 5)

As specified by Rule 14 of The Environment (P) Rules, 1986

&

Notified by G.S.R. # 396 (E) dated 22.4.1993

PART-A

GENERAL INFORMATION ABOUT THE PLANT

Consent Order Details:

1. **Combined Consent Order No. AW 328970 PCB ID 10357 Dated 31.12.2021 for JSW Steel Limited Integrated Steel Plant of capacity 13 MTPA**
2. **Combined Order No. W-341737 PCB ID 11777 Dated 03.02.2024 for Townships merged with JSW Steel Limited**
3. **Combined Order No. AW-342445 PCB ID 10357 Dated 14.03.2024 for JSW Steel Limited Expansion of Integrated Steel Plant from its current capacity of 13 MTPA to 18 MTPA**

1.	Name and address of the owner/ occupier of the industry operation or process	:	**Murugan PK**, President, JSW Steel Limited, Vijayanagar Works, Toranagallu, Bellary, Karnataka
1.a	Authorized person for the occupier	:	**Dr. Satish Mishra** AVP (Environment & Sustainability), JSW Steel Limited, Vijayanagar Works, Toranagallu, Bellary, Karnataka
2	Industry category	:	Primary Metallurgical Industry
	STC Code	:	14 (a)
3a.	Production capacity	:	13 MTPA
b.	Units		

Sl. No.	Manufacturing facilities	Capacity
1	**Ore Beneficiation plants**	
	Ore Beneficiation plant -1	1 x 4.5 MTPA
	Ore Beneficiation plant -2	1 x 2.5 MTPA
		1 x 7.5 MTPA
		1 x 5.0 MTPA
2	**Pellet Plants**	
	Pellet Plant 1	1 x 5.0 MTPA
	Pellet Plant 2	1 x 5.0 MTPA
	Pellet Plant 3	1 x 6.8 MTPA
3	**Sinter plants**	
	Sinter plant 1	1 x 2.30 MTPA

Sl. No.	Manufacturing facilities	Capacity
	Sinter plant 2	1 x 2.30 MTPA
	Sinter plant 3	1 x 5.75 MTPA
	Sinter plant 4	1 x 2.3 MTPA
4	**Coke Oven – Recovery**	
	Coke Oven 3	1 x 1.5 MTPA
	Coke Oven 4	1x 2.0 MTPA
	Coke Oven 5 (Including CDQ, RO & Benzoyl recovery)	1 x 3 MTPA
5	**Hot metal – Corex**	
	Corex 1	1 x 0.85 MTPA
	Corex 2	1 x 0.85 MTPA
6	**Hot metal - Blast Furnace**	
	Blast Furnace 1	1 x 2.5 MTPA
		With 3 x 170 TPD VPSA system
	Blast Furnace 2	1 x 2.17 MTPA
	Blast Furnace 3	1x 3 MTPA
	Blast Furnace 4	1 x3 MTPA
7	Metal Granulation Plant	1 x 2.7 MTPA
8	DRI	1 x1.2 MTPA
9	**Pig casting machine**	
	Pig casting machine 1	1 x 1200 TPD
	Pig casting machine 2	1 x 3600 TPD
	Pig casting machine 3	1 x 3600 TPD
10	**Steel Melting Shop**	
	Steel Melting Shop 1 BOF	1 x 3.8 MTPA
	Steel Melting Shop 2 BOF	1 x 6.4 MTPA
	Steel Melting Shop 3 EAF	1 x 1.5 MTPA
11	**Slab casters**	
	SMS 1 Slab caster – 5.1 MTPA	
	Slab caster 1 & 2	2 x 1.05 MTPA

Sl. No.	Manufacturing facilities	Capacity
	Slab caster 3 & 4	2 x 1.5 MTPA
	SMS 2 Slab caster – 6.4 MTPA	
	Slab caster 5, 6, 7, 8	4 x 1.6 MTPA
	Slab caster 9	1 x 1.45 MTPA
12	**SMS 2 Billet caster**	
	Billet caster 1	1 x 1.5 MTPA
	Billet Caster 2	1 X 1.5 MTPA
13	**Lime plant with (Along Lime Grinding Units)**	
	Lime Calcination plant 1 LGU 1	4 x 300 TPD
		1 x 50 TPD
	Lime Calcination plant 2 LGU 2 & 5	4 x 300 TPD + 3 x 600 TPD
		2 x 400 TPD
	Lime Calcination plant 3 LGU 3 & 4	5x600 TPD
		2 x 400 TPD
14	**Finishing mill**	
	Hot strip mill 1	1 x 3.5 MTPA
	Hot strip mill 2	1 x 5.2 MTPA
15	**Cold Rolling Mill**	
	Cold Rolling Mill 1 – 1.8 MTPA Pickling Line cum Tandem Cold Mill – 1 Continuous Galvanizing Line 2 & 3 Color Coating Line Electrolytic cleaning Line Batch Annealing Furnace Annealing cum Coating Line	1 x 1.8 MTPA 2 x 0.45 MTPA 1 x 0.3 MTPA 1 x 0.7 MTPA 1 x 0.7 MTPA 1 x 0.2 MTPA (Silicon Steel)
	Cold Rolling Mill 2 – 2.3 MTPA Pickling Line cum Tandem Cold Mill – 2 Continuous Galvanizing line 1 Continuous Annealing line 1 & 2	1 x 2.3 MTPA 1 x 0.45 MTPA 2 x 0.95 MTPA
16	**Wire Rod mill**	
	Wire Rod mill 1	1 x 0.6 MTPA

Sl. No.	Manufacturing facilities	Capacity
17	**Bar rod mill**	
	Bar Rod mill 1	1 x 1.0 MTPA
	Bar Rod mill 2	1 x 1.2 MTPA
Auxiliaries		
18	PCF Coal Grinding unit	1 X 2.0 MTPA
19	Lime Briquetting plant (Including Dolo)	1000 Tonnes per month
20	**Captive Power Plants**	
	Captive Power Plants 1	100 MW capacity using BF & Corex gas
	Captive Power Plants 2	130 MW each using BF Gas
	Captive Power Plants 3	1 x 300 MW
		(50% imported coal + 50% Domestic Coal + Mixed/BF Gas)
	Captive Power Plants 4	1 x 300 MW
		(50% imported coal + 50% Domestic Coal + Mixed/BF Gas Gas)
21	Coal Briquetting plant	2 unit of 0.3 MTPA
22	Coke Dry Quenching (CDQ)	4 units of 3.5 MTPA with power plant of 76 MW
23	Coal drier	100 tph (3 nos.)
24	Top gas recovery turbine for BF 3&4	2 unit of 12.4 MW
25	Top gas recovery turbine for BF 1	1 unit of 4 MW
26	JSW air port	1 Number (Runway: 1987m x 30m)
27	STP for Plant Domestic Sewage	1 x 500 KLD
28	Biogas Plant	1 x 1 TPD
		1 x 6 TPD
29	JSW Steel Processing Centre Units	1 x 0.5 MTPA
30	Slime pond	575 acres
31	Waste Heat recovery	At Sinter plants 2, 3&4 & Blast Furnace 3&4
32	Gas fired boilers	4 units of 1 x 60 TPH & 3 x 60 TPH
33	Mobile crushing and screening units	30,000 TPD
		(12 no's- Crushers of 175 TPH)

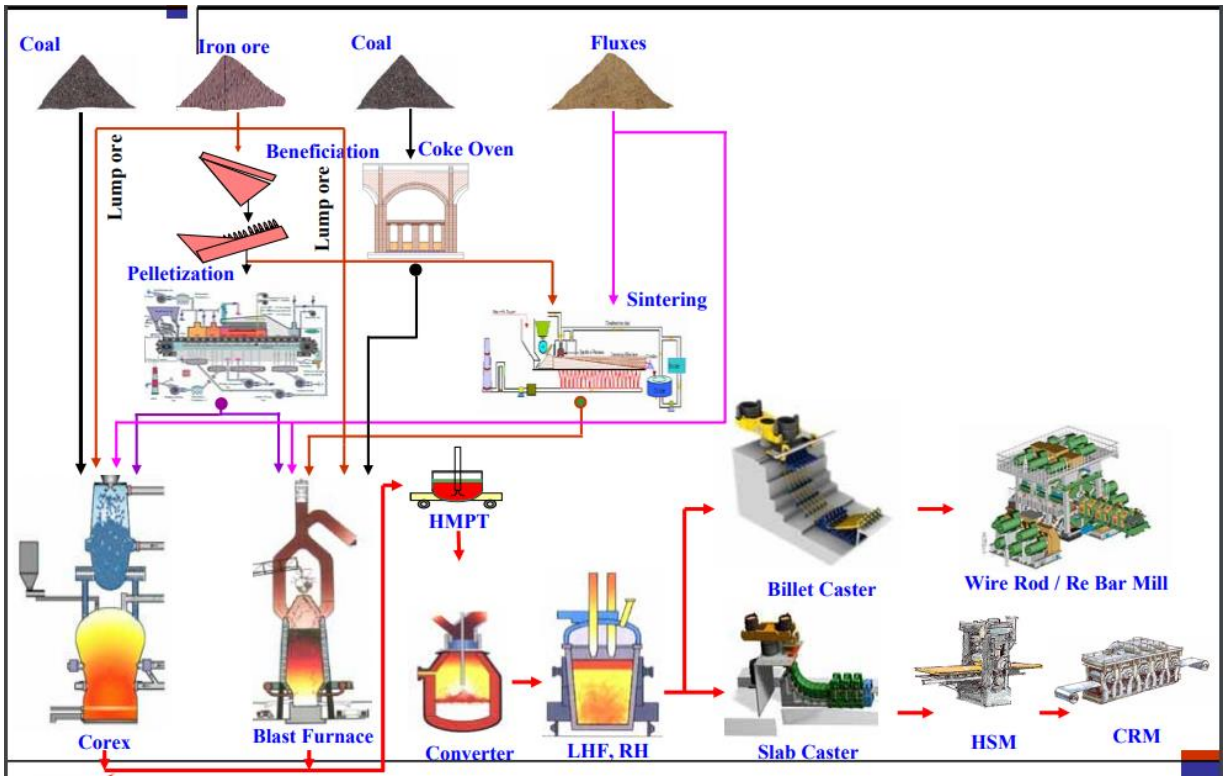
Sl. No.	Manufacturing facilities	Capacity
		(15 no's - screening plants of 200 TPH)
34	Batch mixing plant	500 m3/hr.
35	I-Shop	3000 TPA
36	Rh Degasser at SMS-2	1.9 MTPA
37	Rubber mill at CRM-1	1 unit - 550 rolls per month
38	Auto scarfing of slabs	150000 tonnes per month
39	Recovery of iron ore from slime	1x0.8 MTPA
40	RMHS	1 X 5 MTPA
		1 x 10 MTPA
		With wagon tippler & Stack Reclaimer
41	CCL 1 (Color Coated Line)	1 x 0.6 MTPA
42	Corex slag & clinker Grinding & mixing unit	0.2 MTPA (1x 2 lakh tons per annum)
43	BOF slag crushing plant	80000 TPM
44	Incinerator	1 No 25kg/hr,1 No 1000 kg/hr
45	Micro pellet plant	1 x 0.75 MTPA
46	Mill Scale Briquetting plant	1 x 0.22 MTPA
47	Waste to Wealth Plant	1 x 0.22 MTPA
48	Granulated Iron making slag sand plant	2.5 MTPA
		(1 X 40 TPH, 2 X 125 TPH)
49	BOF Slag sand & aggregate plant	1 x 6 MTPA
50	Alumina kilned LHF Briquetting plant	1 x 0.11 MTPA
51	MSW Plant	1 number
		1 x 10 TPD (Refuse Derived Fuel)
52	SMS 3 (EAF)	1 x 1.5 MTPA
53	HSM 1 Up-gradation	From 3.5 MTPA to 4 MTPA
54	Wire Rod Mill 2	1 x 1.2 MTPA
55	Raw material handling system upgradation	5 MTPA to 6 MTPA

Township Facilities

Sr	Facility	Capacity (Kilo Litres/Day)	Technology
1	Hill side town STP	1560.00	(MBR Technology)
2	Shankar hill town STP	3000.00	(MBR based Technology)
3	Sunrise valley STP	120.00	(MBR technology)
4	Vidyanagar including sports complex & lake view STPs	1500.00 1000.00 400.00	(MBR based) (Reed Bed based) (MBR based)
5	Vijaya vital nagar	1200.00	SBR technology

4	Year of establishment	:	1994
5	Date of the last environmental statement submitted	:	22.09.2023

PROCESS FLOW SHEET



Process Description for 13 MTPA Integrated Steel plant

The manufacturing process is through the conventional route of blast furnace (BF)-basic oxygen furnace (BOF) route with continuous casting of liquid steel to slabs and / billets followed by steel finishing operations to meet the specific quality and shape requirements of the consumers.

The principal process steps involved are;

(i) Coke making in by-product recovery type coke ovens;

(ii) Agglomeration through Pelletizing & Sintering of iron ore fines with coke and recycled dusts to make pellet & sinter burden for Blast Furnace.

(iii) Iron making in Blast Furnaces (BFs) and COREX units from lump iron ore and agglomerates with coal /coke and fluxing materials;

(iv) Conversion of hot metal to liquid steel by oxygen blowing in BOFs followed by refining of liquid steel in ladle furnaces with addition of alloying materials for micro adjustment of steel chemistry;

(v) Continuous casting of refined liquid steel to slabs/billets in suitable casters;

(vi) Hot rolling and cold rolling operations to produce various types of shaped steel products of desired size and dimensions.

A. Ore beneficiation plant: The alumina content of iron ore is required to be lowered to levels acceptable for iron production in blast furnaces. This is carried out in an ore beneficiation plant where the ore is washed with water to separate the gangue materials. The slime is collected in a slime pond for future use. There are two ore beneficiation plants.

B. Coke making:

Metallurgical coke is used as the reductant for reduction of iron ore to produce hot metal. Metallurgical coke is produced by carbonizing the coking coal at a temperature of around 1200^0C in absence of oxygen atmosphere in closed door multiple tall ovens. The volatile matter is liberated resulting in formation of coke due to carbonization in the ovens. The energy necessary for the carbonization process is provided by the Blast furnace or the coke oven gases.

The crude coke oven gas, having a potential heat value is cooled, separated from tars, naphthalene and ammonia to produce clean coke oven gas for use as plant fuel in various heating applications.

C. Agglomeration:

a) Sintering: Sintering is a high temperature (1200-1300^{0}C) process for agglomeration of iron ore fines with coke breeze and other fluxes like limestone, and recyclable solid wastes like lime fines, BOF sludge, BF flue dusts etc which are blended in base mix yard.

b) **Pelletisation**: Pelletizing is a high temperature operation (1200-1400^{0}C) for agglomeration of iron ore fines (smaller than those used for sintering) with coke breeze & fluxes. The mix is passed through a pelletizing disc where green pellets of 10-12mm dia are produced. These are then sent to indurating furnace to produce pellets.

D. Iron making

a) Blast Furnace: Sized iron ore, pellet, sinter and coke along with other fluxing materials are charged to the tall vertical BF for production of hot metal in presence of hot blast air. The temperature within the furnace is above 1600^{0}C. The gangue minerals present in the iron ore are converted to slag known as BF slag and 'Fe' content of the oxide ore gets converted to molten iron due to reduction of iron oxides of the ore with carbon present in the coke. In order to have adequate carbon for reduction purpose, as well as to reduce coke consumption, powdered coal is injected into the furnace. The hot iron metal after desulphurization with carbide compound is ready for conversion to steel in BOF. For balancing the hot metal production and consumption, provision of pigging of the hot metal becomes necessary. The BF slag is granulated by water jetting and granulated BF slag produced can be used for cement making. The BF gas containing mostly Carbon monoxide (CO) is cleaned in venturi scrubbers, to bring down the dust level in the gas to below 5 mg/N cu m. The cleaned BF gas is used as plant fuel and for heating the BF stoves to produce hot blast air.

b) COREX: Liquid iron is also produced in COREX process using pellets and coal as raw materials. The process also produces a useful by product gas "COREX" gas which is used in mills. COREX

process uses oxygen instead of air used in Blast Furnace. The reduction and melting is carried out in two chambers as done in Blast Furnace.

E. Lime calcinations:

Burnt lime (CaO) is required for steel making. Limestone is burnt in the tall vertical limekilns at a temperature of around 1050^0C to produce burnt lime. The energy required for the endothermic reaction is provided by fuel gases. The burnt lime collected at the bottom of the kilns is screened. Lime dusts are recycled to the Sinter Plant.

F. Steel making: In the Steel Melt Shop (SMS), the desulphurised hot metal along with burnt lime and fluxing agents is charged to the BOF. Carbon present in the hot metal is oxidized by controlled blowing of oxygen. The temperature of BOF is around 1700^0C, with the energy generated by the combustion of carbon present in the hot metal. The BOF gas having carbon monoxide and dust passes through the wet gas cleaning plant, comprising of venturi-scrubber where the dust in the gas is separated due to inertial impaction. The water containing dust is treated in a water treatment plant and recycled to the system. The clean BOF gas depending on 'CO' content is recovered and used as a fuel within the plant.

After tapping of BOF slag, the crude liquid steel is poured and transferred to ladle for further refining and chemistry adjustment in the subsequent steel refining operations. In this special type of ladle, crude liquid steel is vacuum-degasified and chemistry adjusted by addition of micro alloys to produce liquid steel of desired chemistry. Thereafter, the refined liquid steel is continuously cast to the slabs/billets in the casting machines.

G. Hot rolling of slabs / billets: The slabs/billets are reheated to a temperature of around 1250^0C in walking beam type reheating furnace. After descaling of heated slabs/billets/blooms by high pressure water jet, the same is hot rolled in separate mills to produce shaped products like hot rolled coils, wire rods, sections, rebars, plates etc. The products are ready for dispatch. Some of the intermediates like slabs and billets are also sold outside for carrying out finishing operations at the customer end.

H. Cold rolling: The coil from the hot strip mill is further processed in a cold rolling mill to produce value added products. In the CRM, the coils are pickled using hydrochloric acid to remove scales

adhering to the surface of the coils. The pickled coil is further rolled in cold reversing mills to the desired thickness. A portion of the cold rolled coils are then processed in the batch/continuous annealing furnaces to produce annealed steel products. The heat energy for the annealing operation is provided by the fuel gases. The balance portion of the cold rolled coils is coated to produce special coated products. There is a provision for two types of coating of steel viz., galvanizing and color coating. While the galvanized cold rolled products are used mainly in the construction industry, the color coated products find wide application in the white goods sector.

I. **Power Plant**: In the process of manufacture of steel in the CO-BF-COREX-BOF routes, a large volume of fuel gases are generated from COREX, Coke ovens, Blast furnaces and BOF shops. While these gases are used in various heating applications, there will be a surplus amount of gases that can be used to produce power. In this, the surplus gases are burnt in a boiler to raise steam at high pressure which is used to generate power. The process steam required for the process is generated using gaseous fuel.

   The generation of power from the surplus gases is an environment friendly option, as it eliminates the use of coal as the fuel for power generation along with its associated environmental problems like emissions of oxides of nitrogen & sulphur and disposal of fly ash.

J. **JSW steel has the following Thermal power plants:**

- CPP-1: 100MW power plant based on COREX & BF gas.
- CPP-2: 130MW power plant based on heat from BF gas & COREX / Mixed gas.
- CPP-3 & 4: 2X300MW coal & gas based power plant.

K. **Cement Plant**: The granulated slag has puzzolonic properties and can be used in cement making. Thus the granulated slag is finding wide application in the cement industry as a raw material for slag cement. The slag is finely ground and mixed with ground clinker in suitable portion for manufacture of cement. The ground slag also finds application as an admixture in civil construction. A 0.2mtpa cement plant is in operation within JSW Steel complex.

L. **Coal driers**: In order to conserve energy, 6nos of coal driers are installed to reduce the moisture in coal fed to the corex unit.

PART –B

WATER AND RAW MATERIAL CONSUMPTION

i. Water consumption in m^3/d

Type of water	Water consumption in m^3/day	
	During the last Financial Year (2022-23)	During the current Financial Year (2023-24)
Industrial	72673	72517
Domestic (Plant Premises)	3186	3237
Domestic (Townships)	8591	10115

ii. Process water consumption per unit of product

Name of Products	Process water consumption per unit of products (m^3/tcs)	
	During the last Financial Year (2022-23)	During the current Financial Year (2023-24)
Crude Steel	2.40	2.36

Consumption of Raw Material

Raw material consumption per unit of product

Name of Material	Unit	Financial Year 2023-24	
		Crude Steel Production- 11739648 tons	
		Consumption in tons	Rate kg/tcs
Coal			
a. Hard Coal	tons	2890730	246.24
b.Semi Hard Coal	tons	2758372	234.96
c.Semi soft coking coal	tons	214733	18.29
d. Pet Coke	tons	132503	11.29
e. Coking coal	tons	5996338	510.78
f. BF Injection coal	tons	1123829	95.73
g. Corex coal	tons	3073850	261.83
Coal Fines	tons	1839856	156.72
Iron ore			
a. Iron ore lumps	tons	3646400	310.61

b. Iron ore fines	tons	20599824	1754.72
Fluxes			
a. Limestone	tons	3571957	304.26
b. Dolomite	tons	2307695	196.57
c. Quartzite	tons	29968	2.55
d. BHQ	tons	119202	10.15
e. DRI in IM	tons	340278	28.99

PART-C

POLLUTION DISCHARGED TO ENVIRONMENT / UNIT OF OUTPUT

WATER AND AIR

a) Water

All the effluent generated from the steel plant complex is collected in the three number of guard ponds and the slime generated from ore beneficiation plant is collected in the slime pond located within the plant premises.

Water from the above is recycled within the steel plant for dust suppression and other less critical applications.

The yearly average of the water quality parameters being monitored at the guard pond pumping point is as below:

Parameters	**Concentration of pollutants discharge (mg/l) (100% Recycled)**
pH	7.85
TSS (mg/l)	75.02
Oil & Grease (mg/l)	2.52
COD (mg/l)	78.9
BOD (mg/l)	8.97

Note: There is no water discharged and all water recycled within the plant.

- JSW Steel Limited had provided Extensive water recirculation and recovery system to ensure Zero discharge from the plant premises.
- All the process units are equipped with the extensive water recirculation system with treatment facility (ETP), i.e. Clarifier / Thickener, Pressure Filters and cooling tower to recirculate water back to process.
- The treated blow down water from the units taken to three guard ponds GP-01, GP-02 & GP -03 and utilized in the secondary application such as ore washing, dust suppression, fire-fighting, slag quenching and green belt development.

- The details of the guard pond are given below

SN	Guard pond no.	Capacity (m3)	Treated Blow-down water Source
1.	Guard pond #1	1,00,000	CRM 2, LP mills, HSM2, SMS2, PP1, BP1, CPP1, WWP, BF1 &2, Corex 1 &2, SMS 1 , I shop, HSM1
2.	Guard pond #2	1,25,000	DRI & SMS3, BF3, 60 TPH boiler and CPP2, Coke Oven 3, 4 & CDQ, JSWEL, GP3, GP1
3.	Guard pond #3	15,000	BF-4, BRM-2
Total Capacity		**2,40,000 m^3**	

- As stated above, following water pollution control systems have been provided for recycle and reuse of the water.

Water Pollution Control Equipment	Nos
RWTPS	9 Nos
Water Circulation System	8 Nos
Guard Ponds	3 Nos
ETP's	9 Nos
RO Plant	8 Nos
Sewage Treatment Plant (STP) based on MBR technology	7 Nos
ZLD for Coke Ovens	1 Nos
CO2 injection project in SMS -01	1 Nos (500 m^3/Day)
Rapid Clarifier System for ID fan flushing water of SMS-1	1 Nos (800 m^3/Day)

- To sustain Zero Discharge, above latest and advance treatment technologies such as Reverse osmosis -08 Nos, Sewage treatment Plants based on the Membrane Bio Reactor (MBR) technology -07 Nos and Zero Discharge Plant (ZLD) – 02 Nos are provided for Coke oven.
- With the above water pollution control system they are recycling and reusing water back to process and ensure zero discharge.
- The four designated outlets are equipped with the continuous effluent monitoring system which are hooked up to CPCB server.

b) Air:

Quantity of pollutants measured around the plant is given below

Pollutants (Air)	Quantity of pollutants discharged (mass/day)	Concentrations of pollutants discharged (mass / volume)	% of variation from prescribed standards
	T/day	mg/Nm^3	%
Dust emission (PM)	17.84	20.27	-59.4681
SO_2 emission	26.33	212.89	-64.5177
NO_x emission	16.76	136.94	-54.3548

NAAQ Standard:

NATIONAL AMBIENT AIR QUALITY STANDARDS (2009)

Pollutants	Time Weighted Average	Concentration in Ambient Air		Methods of Measurement
		Industrial, Residential, Rural and other Areas	Ecologically Sensitive Area (Notified by Central Government)	
Sulphur Dioxide (SO_2), $\mu g/m^3$	Annual * 24 Hours **	50 80	20 80	-Improved West and Gaeke Method -Ultraviolet Fluorescence
Nitrogen Dioxide (NO_2), $\mu g/m^3$	Annual * 24 Hours **	40 80	30 80	-Jacob & Hochheiser modified ($NaOH$-$NaAsO_2$) Method -Gas Phase Chemiluminescence
Particulate Matter (Size less than 10µm) or PM_{10}, $\mu g/m^3$	Annual * 24 Hours **	60 100	60 100	-Gravimetric -TEOM -Beta attenuation
Particulate Matter (Size less than 2.5µm) or $PM_{2.5}$, $\mu g/m^3$	Annual * 24 Hours **	40 60	40 60	-Gravimetric -TEOM -Beta attenuation

Continuous Ambient Air Quality Monitoring at 06 stations -FY2023-24

JSW Steel Vijayanagar works has installed 06 number of Continuous Ambient Air Quality Monitoring Stations around the JSW Steel Complex. Continuous Emission monitoring of PM_{10}, $PM_{2.5}$, SO_2, NOx & CO is being done at all 06 CAAQMS Stations. The data of all CAAQMS Stations is being transferred to KSPCB Portal.

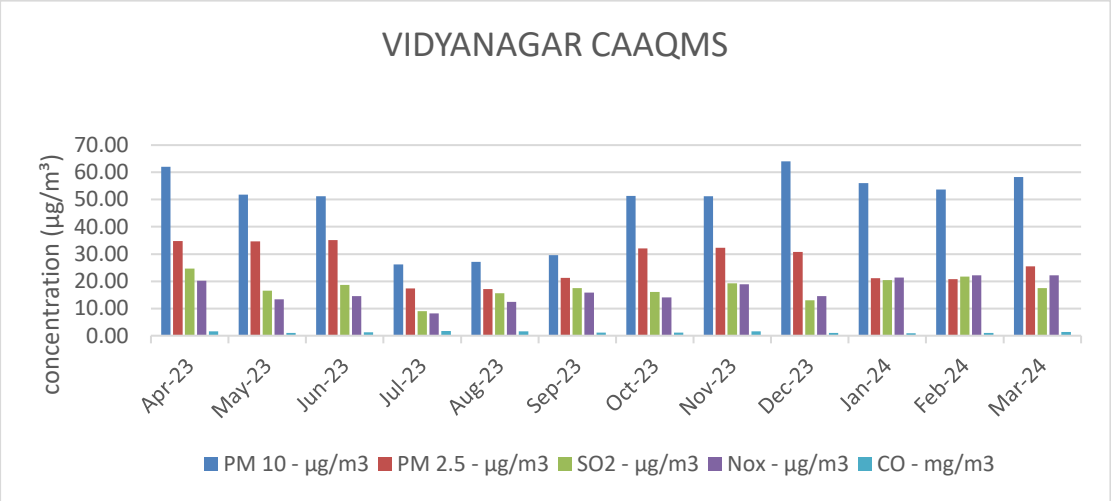
The location details of 06 CAAQMS Stations is as follows:

1. **Vidyanagar**
2. **Vaddu**
3. **Shankar Hill Township**
4. **10 MT**
5. **Sulthanpur**
6. **VV Nagar Township**

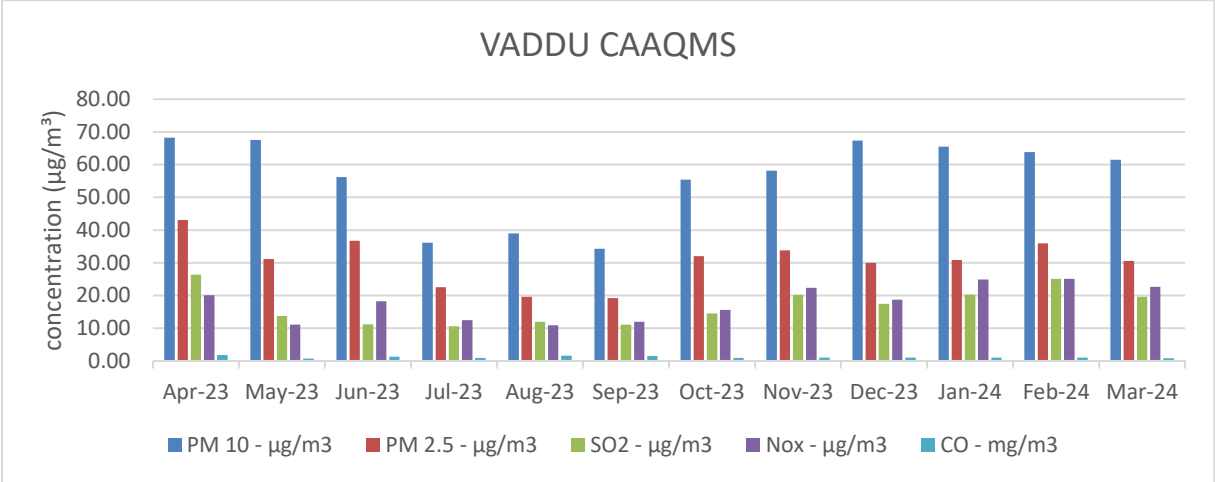
Continuous Ambient Air Quality Monitoring Stations

The data reported here is based on the time weighted average standard of 24 hrs as stipulated in NAAQS 2009.

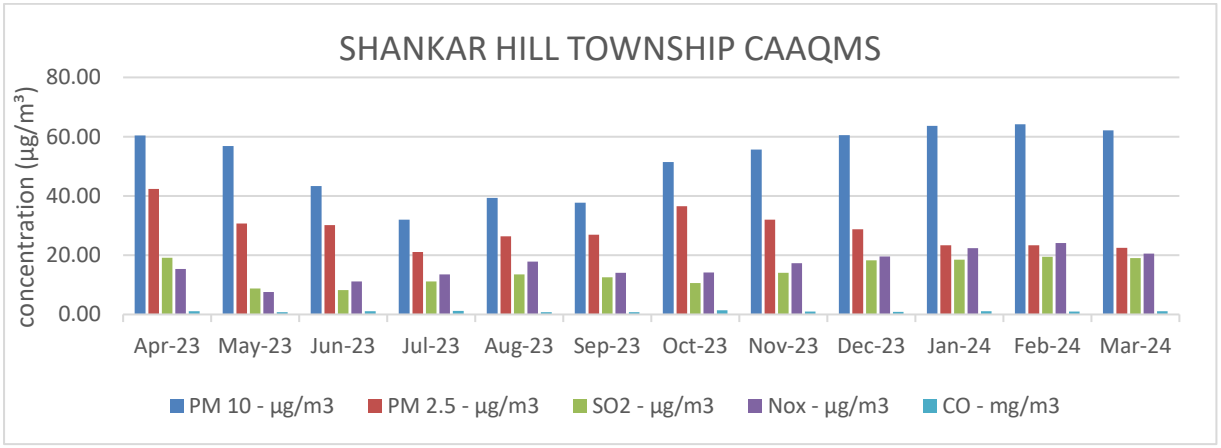
Continuous Ambient Air Quality Station Report – Vidyanagar 2023-24



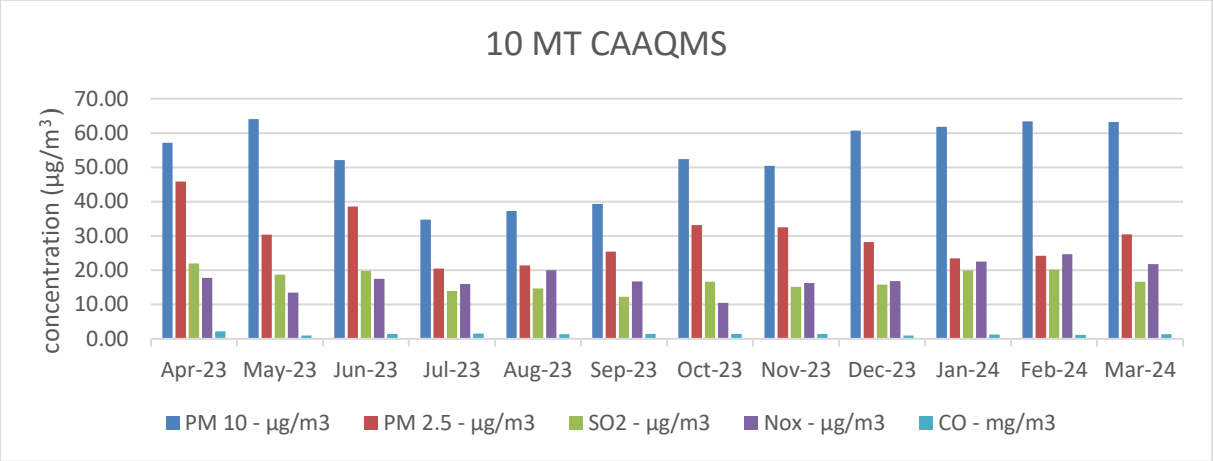
Continuous Ambient Air Quality Station Report – Vaddu 2023-24



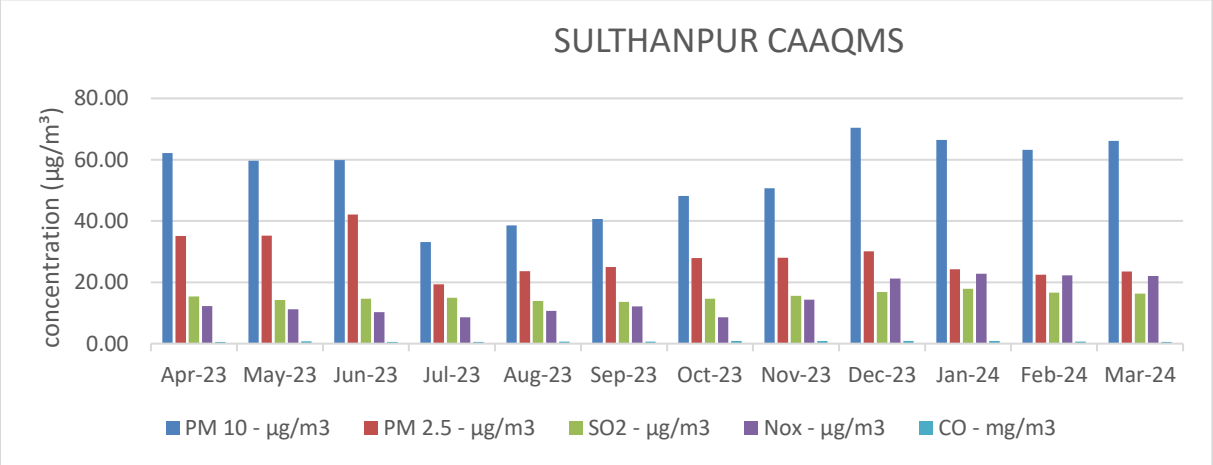
Continuous Ambient Air Quality Station Report – Shankar Hill Township 2023-24



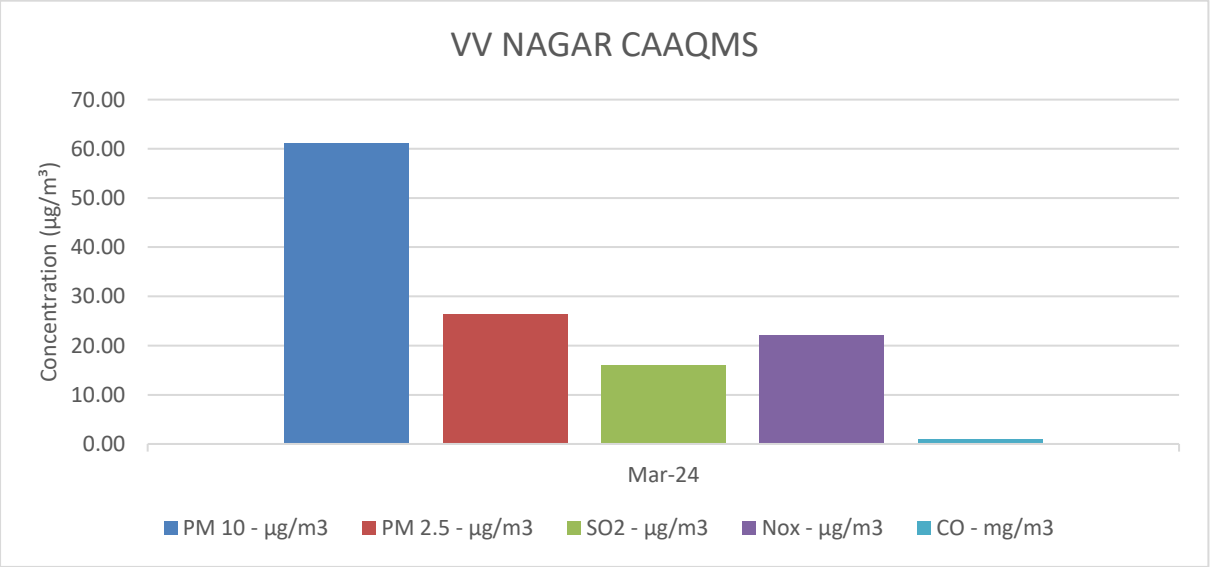
Continuous Ambient Air Quality Station Report – 10 MT 2023-24



Continuous Ambient Air Quality Station Report – Sulthanpur 2023-24



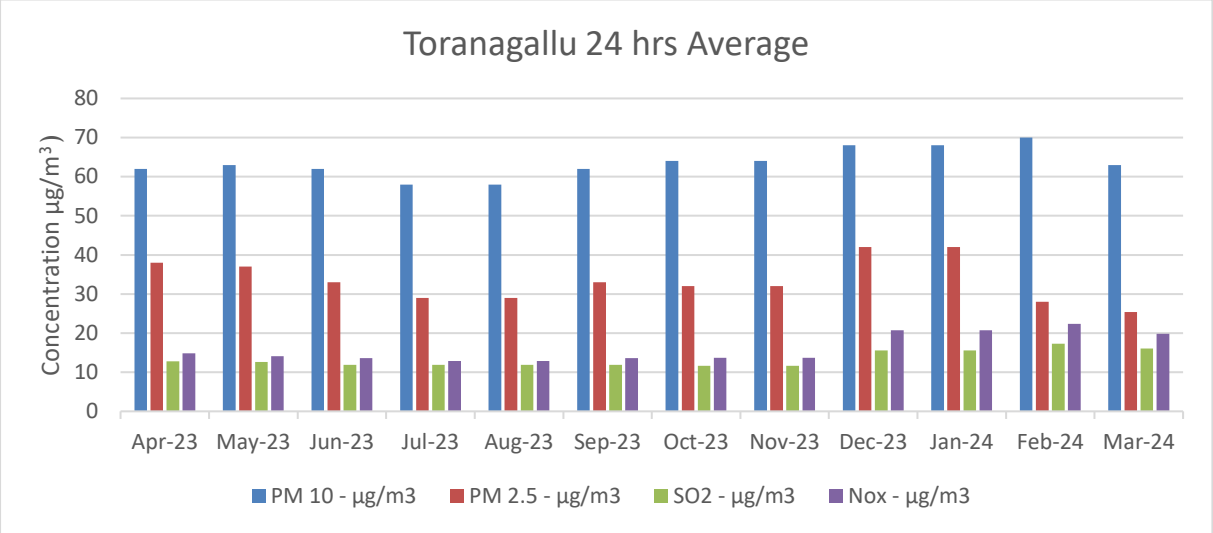
Continuous Ambient Air Quality Station Report – VV Nagar Township 2023-24

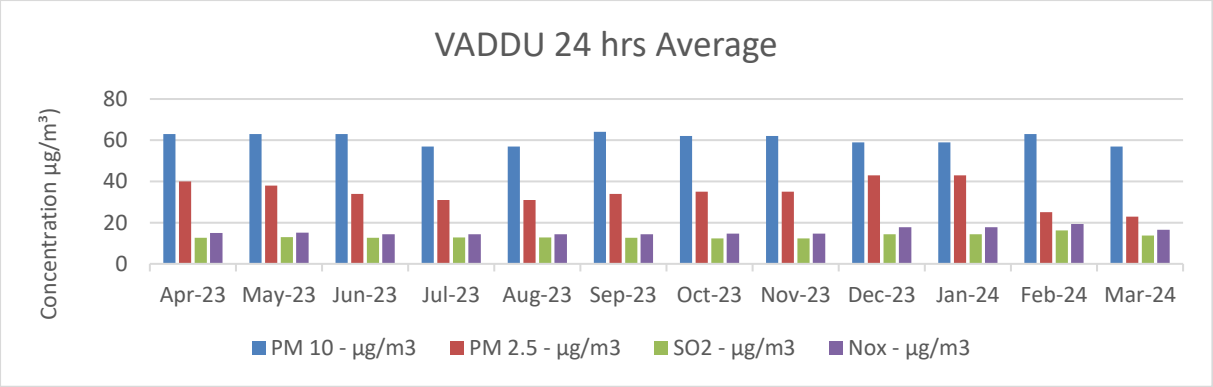


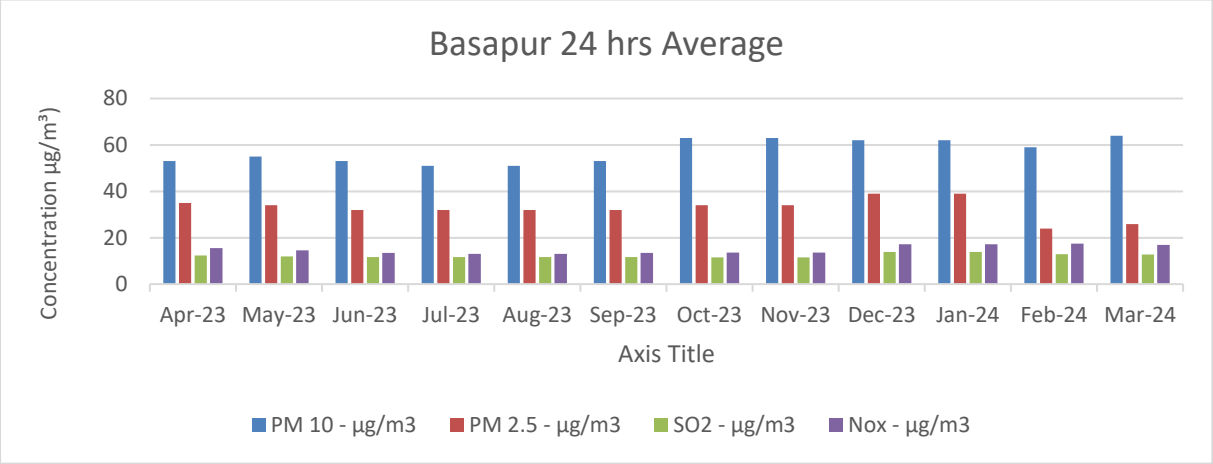
We have installed 11 number of manual monitoring stations at nearby villages

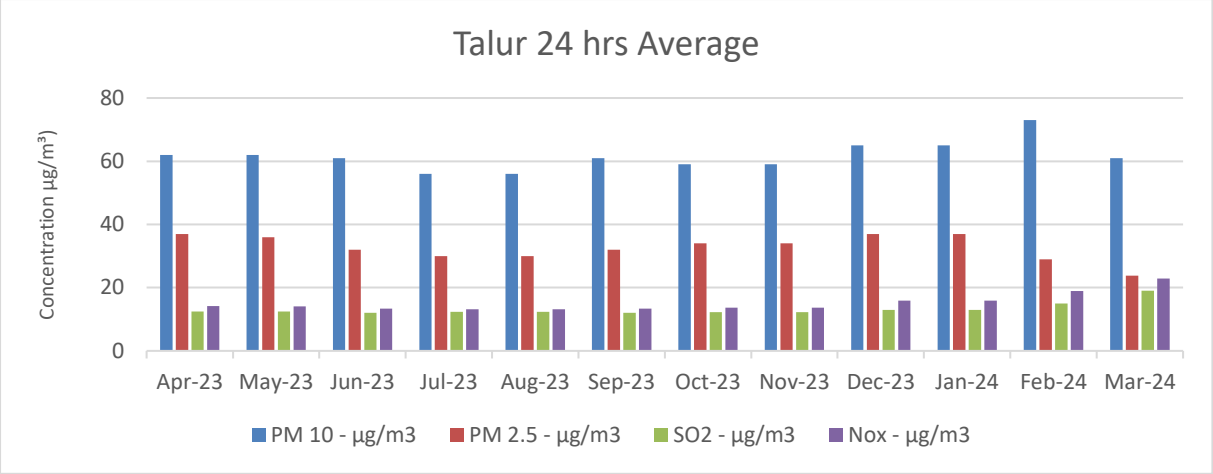
1. Toranagallu
2. Vaddu
3. Basapur
4. Talur
5. Kurekuppa
6. Gadiganur
7. Kuditini
8. Sultanpur
9. Karadidhama
10. Hampi
11. Vidyanagar

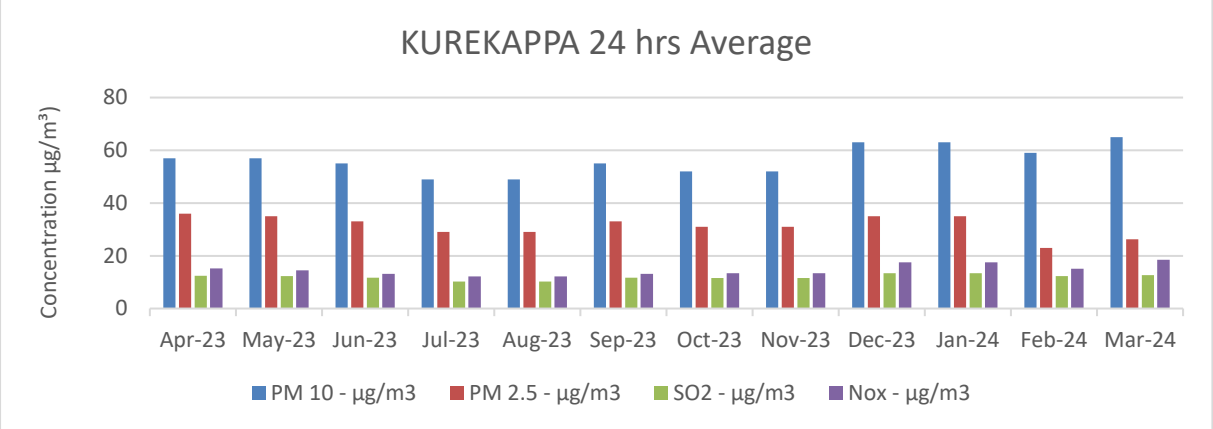
Ambient Air Quality Manual Monitoring Stations

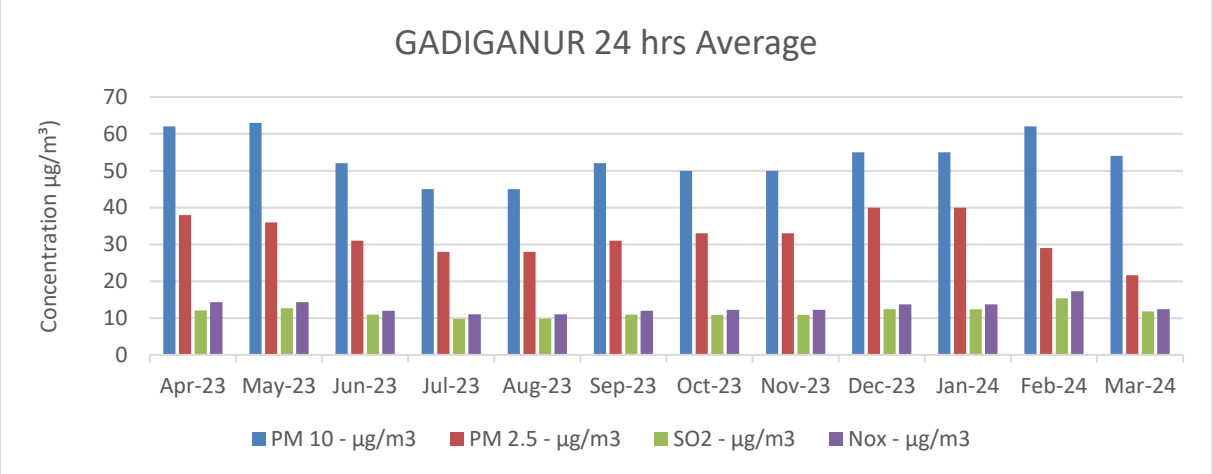


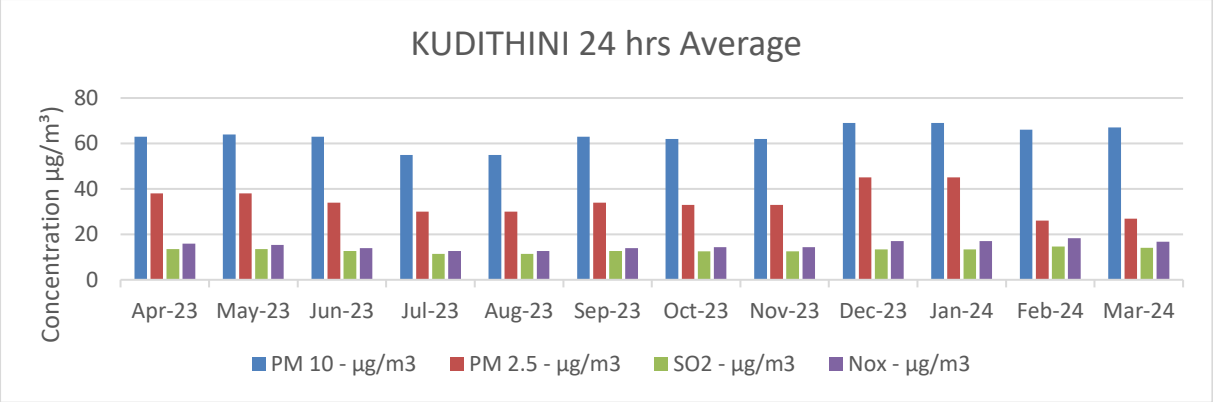


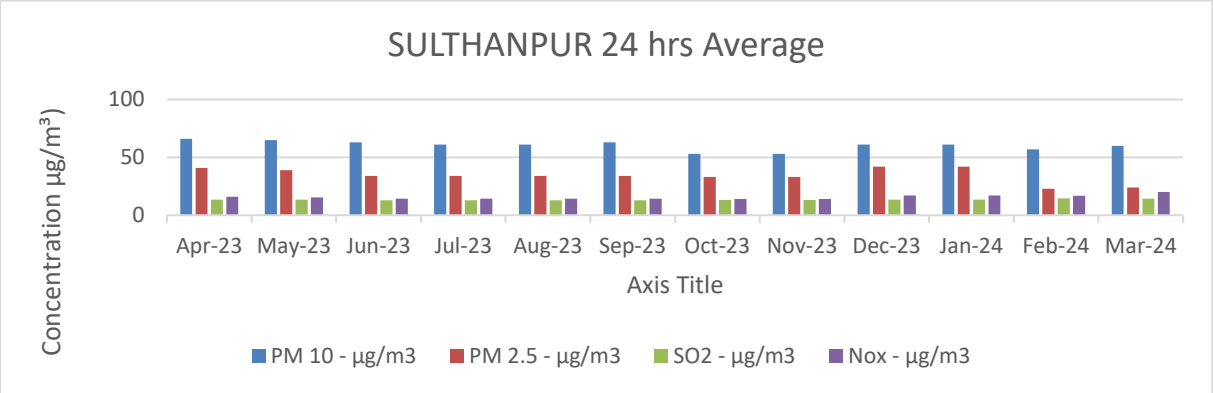


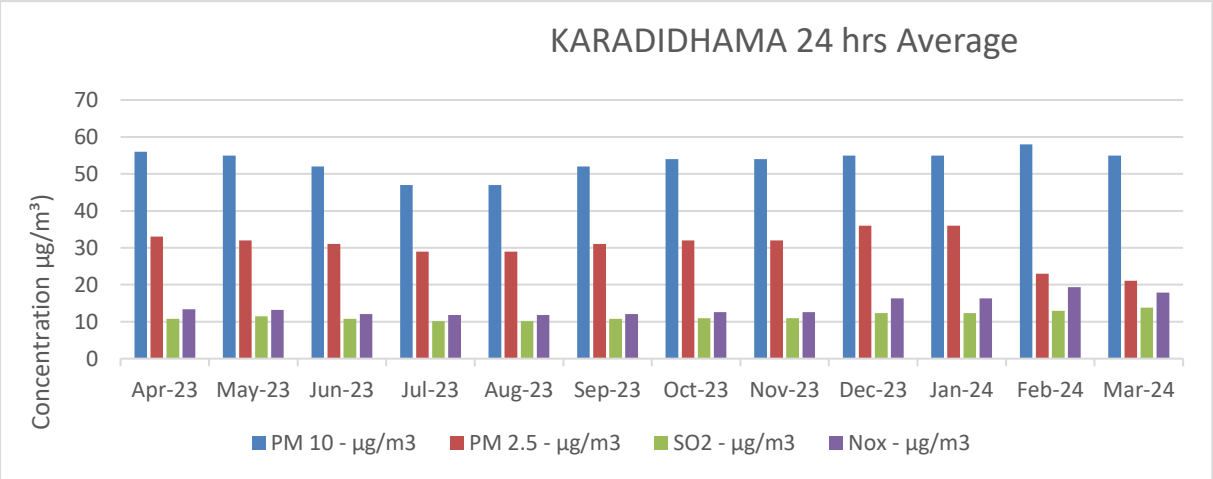

Talur 24 hrs Average
Concentration µg/m³)
80
60
40
20
0
Apr-23
May-23
Jun-23
Jul-23
Aug-23
Sep-23
Oct-23
Nov-23
Dec-23
Jan-24
Feb-24
Mar-24
PM 10 - µg/m3
PM 2.5 - µg/m3
SO2 - µg/m3
Nox - µg/m3

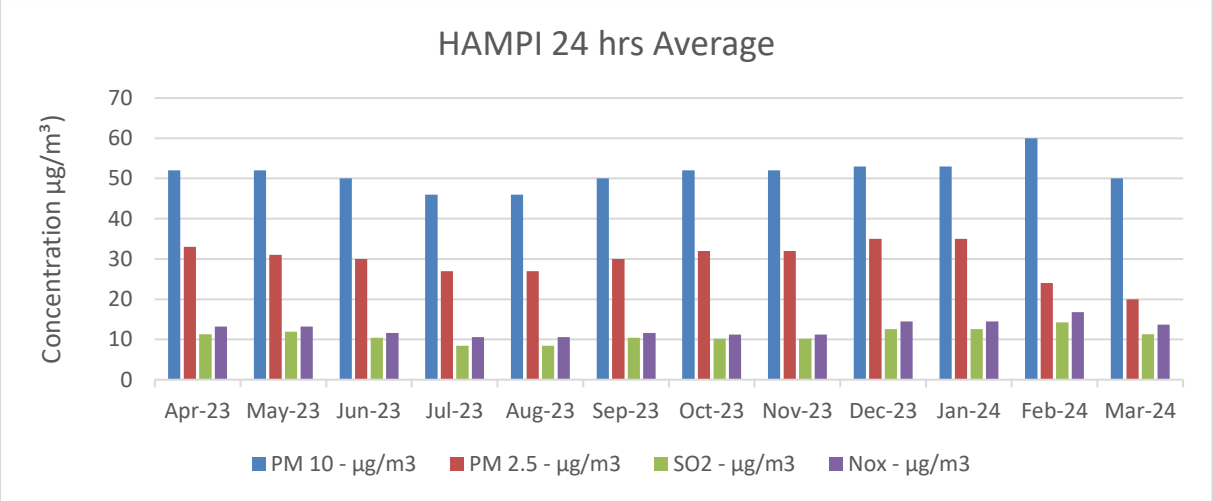

KUREKAPPA 24 hrs Average
Concentration µg/m³)
80
60
40
20
0
Apr-23
May-23
Jun-23
Jul-23
Aug-23
Sep-23
Oct-23
Nov-23
Dec-23
Jan-24
Feb-24
Mar-24
PM 10 - µg/m3
PM 2.5 - µg/m3
SO2 - µg/m3
Nox - µg/m3

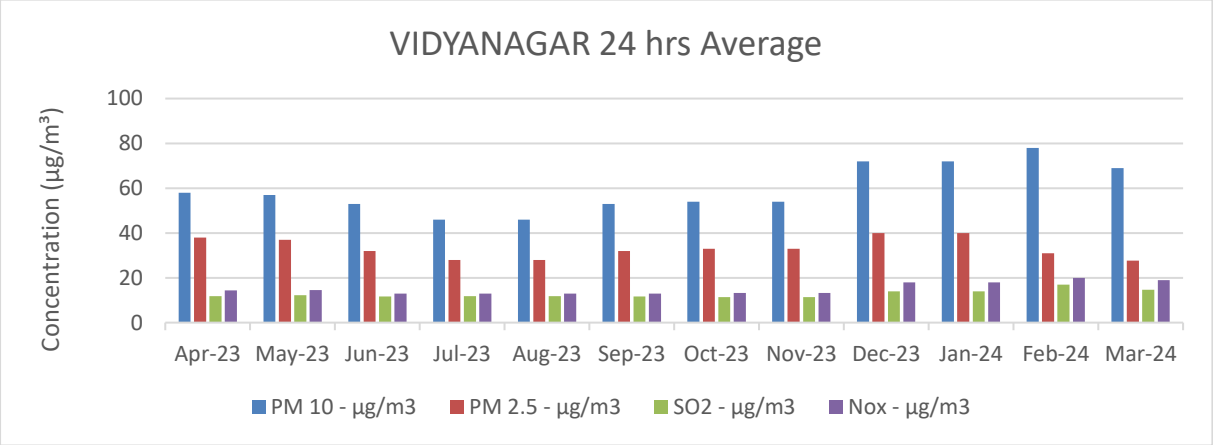

GADIGANUR 24 hrs Average
Concentration µg/m³)
70
60
50
40
30
20
10
0
Apr-23
May-23
Jun-23
Jul-23
Aug-23
Sep-23
Oct-23
Nov-23
Dec-23
Jan-24
Feb-24
Mar-24
PM 10 - µg/m3
PM 2.5 - µg/m3
SO2 - µg/m3
Nox - µg/m3


KUDITHINI 24 hrs Average
Concentration µg/m³)
80
60
40
20
0
Apr-23
May-23
Jun-23
Jul-23
Aug-23
Sep-23
Oct-23
Nov-23
Dec-23
Jan-24
Feb-24
Mar-24
PM 10 - µg/m3
PM 2.5 - µg/m3
SO2 - µg/m3
Nox - µg/m3


SULTHANPUR 24 hrs Average
Concentration µg/m³)
100
50
0
Apr-23
May-23
Jun-23
Jul-23
Aug-23
Sep-23
Oct-23
Nov-23
Dec-23
Jan-24
Feb-24
Mar-24
Axis Title
PM 10 - µg/m3
PM 2.5 - µg/m3
SO2 - µg/m3
Nox - µg/m3


KARADIDHAMA 24 hrs Average
Concentration µg/m³)
70
60
50
40
30
20
10
0
Apr-23
May-23
Jun-23
Jul-23
Aug-23
Sep-23
Oct-23
Nov-23
Dec-23
Jan-24
Feb-24
Mar-24
PM 10 - µg/m3
PM 2.5 - µg/m3
SO2 - µg/m3
Nox - µg/m3


HAMPI 24 hrs Average
Concentration µg/m³)
70
60
50
40
30
20
10
0
Apr-23
May-23
Jun-23
Jul-23
Aug-23
Sep-23
Oct-23
Nov-23
Dec-23
Jan-24
Feb-24
Mar-24
PM 10 - µg/m3
PM 2.5 - µg/m3
SO2 - µg/m3
Nox - µg/m3


VIDYANAGAR 24 hrs Average
Concentration (µg/m³)
100
80
60
40
20
0
Apr-23
May-23
Jun-23
Jul-23
Aug-23
Sep-23
Oct-23
Nov-23
Dec-23
Jan-24
Feb-24
Mar-24
PM 10 - µg/m3
PM 2.5 - µg/m3
SO2 - µg/m3
Nox - µg/m3

PART-D

HAZARDOUS WASTES

METHOD OF DISPOSAL

Hazardous Waste Generation in MT/A

Sl. No	Waste Category	Waste generated	Qty in MT/A 23-24	Qty in MT/A 22-23
(a) From Process				
1	5.1	Used Oil	43.77	33.6
2	4.1	Waste Oil	457.16	269.49
3	5.2	Oil soaked cotton waste	95.70	83.34
4	13.1	Waste pickled liquor	130797.50	127989.25
5	12.1	Acid residue	282.26	198.33
		Alkali residue		
6	13.4	Decanter Tank Tar sludge	481.77	542.51
7	13.5	Tar storage tank residue	38.24	167.06
8	35.2	Spent ion exchange resin containing toxic metals (Spent Nickel catalyst).	0	0
9	35.4	Oil & grease skimming residue (Emulsion Slurry)	1138.10	1193.5
10	35.2	Spent Ion Exchange Resin containing toxic metals (Spent Nickel catalyst)	0	0
11	35.3	Spent carbon from WTP/ETP	0	0
12	37.1	Oily Sludge from mills (Sludge from wet scrubber)	363.875	386.95
13	37.2	Ash from incineration of hazardous waste , flue gas cleaning residue	70.61	58.39
14	33.1	Empty Barrels / containers/liners containing with Hazardous Waste	582.98	499.67
15	33.1	Discarded plastics container	43.64	5.46
16	6.2	Zinc fines or dust or Ash or skimming in dispersible forms (Zinc dross)	2565.06	1603.07
17	35.2	Spent Iron Catalyst	0	43.74
18	18.4	Chromium Sludge from Water Cooling Tower	104.47	104.71
19	36.2	Spent carbon or filter medium (Filters & filter materials which have organic compound)	40.64	22.45
(b) From Pollution Control Facilites				

Sl. No	Waste Category	Waste generated	Qty in MT/A 23-24	Qty in MT/A 22-23
1	35.3	Chemical Sludge from Waste water treatment (ETP sludge)	1082.12	1247.97
2	35.3	Chemical Sludge from Waste water treatment (Impure sulphur)	1227.89	437.05
3	35.3	Chemical Sludge from Waste Water Treatment (ZLD Salt)	72.35	597.83

PART - E

SOLID & OTHER WASTES

Generation and Utilization of Solid waste in MT/A

Category	UOM	Solid Waste FY'24	
		Generation	Utilisation
Iron Making Slag	MT	4696266	4696266
Steel Making Slag	MT	2748307	2748307
Sludge	MT	490288	490288
Dust	MT	567,680	567,680
Mill scale	MT	150001.97	150001.97
Fly Ash from CPP	MT	188378.64	188378.64
Total Tonnage	MT	8840921.61	8840921.61
% Utilisation	**100**		

Solid Wastes from Townships in MT/A

Category	UOM	Total Quantity (2022-2023)	Total Quantity (2023-2024)
Municipal Solid Waste	MT	6570	5840
Horticulture Waste	MT	2920	2190

Other wastes in MT/A

Category	UOM	Total Quantity (During the previous financial year 2022-2023)	Total Quantity (During the current financial year 2023-2024)
E-waste	MT	4.55	21.89
Battery Waste	MT	14.22	243.71

PART –F

CHARACTERISTICS OF WASTE

Method of disposal of Hazardous Wastes

Hazardous Wastes			Method of Handling & Disposal
1. From Process	**Waste Category**	**Waste generated**	
	5.1	Used oil	Collected in leak proof containers & disposed to CPCB registered & KSPCB authorized re-processer.
	4.1	Waste oil	
	5.2	Oil soaked cotton waste	Stored in a secured manner and incinerated in captive incinerator.
	13.1	Waste pickled liquor	Stored in a secured manner and reprocessed in the plant.
	12.1	Acid residue	Treated in ETP
	12.1	Alkali residue	Treated in ETP
	13.4	Decanter tank sludge	Used back in Coke oven
	13.5	Tar storage tank residue	Used back in Coke oven
	35.2	Spent ion exchange resin containing toxic chemicals	Used back in Coke oven
	35.4	Oil and grease skimming residue	Used back in Coke oven
	36.2	Filter and filter materials which have organic compounds	Stored in a secured manner and incinerated in captive incinerator
	35.2	Spent catalyst	Used back in Blast furnace
	35.3	Spent carbon from WTP/ETP	Used back in Micro Pellet Plant
	37.1	Sludge from wet scrubbers	Stored in a secured manner and incinerated in captive incinerator.
	37.2	Ash from incinerator in Kg	Stored in a secured manner and disposed to TSDF.
	33.1	Discarded plastic containers	Stored in a secured manner and handed over to KSPCB authorized recycler after washing.
	33.1	Discarded MS barrels	
	18.4	Chrome sludge	Sent to TSDF for landfilling at Bangalore
	6.2	Zinc dross	Sold to Authorised Recyclers
2. From Pollution Control Facilities	35.3	BOD sludge	Reused in Coke oven
		ZLD salt	Sent to TSDF for landfilling at Bangalore
	35.3	1) ETP Sludge	Used back in pellet making.
	35.3	2) Impure sulphur	Stored in a secured manner and disposed to TSDF

Generation, Chemical Composition and disposal of Solid Wastes

Sl. No.	Type of Waste	Typical Chemical Analysis (and size)	Mode of Utilization/ Disposal
Blast Furnace (BF)			
1	Blast Furnace Air Cooled Slag	CaO- 35.84, SiO2-32.78, Al2O3-17.82, MgO-6.59, FeO-0.66, MnO- 1.0, TiO2-0.89, Na2O-0.17, K2O-0.45, S-0.605	For Road making purpose as a sub base material. Currently it is used for bund construction.
2	Blast Furnace Granulated slag	CaO- 35.84, SiO2-32.78, Al2O3-17.82, MgO-6.59, FeO-0.66, MnO- 1.0, TiO2-0.89, Na2O-0.17, K2O-0.45, S-0.605	Selling to Cement Making Plants and as slag sand, an alternate of river sand.
3	Blast Furnace Flue Dust	Fe(t)-32.25;SiO2-2.96;Al2O3-4.57;CaO-3.25;MgO-1.42;TiO2-0.11;P2O5-0.11;SO3-0.66;Na2O-0.26;K2O-0.15;ZnO-0.99;LOI-39.04	Re-used in waste to wealth to recover Fe & C
4	Blast Furnace Sludge	Fe(t)-27.13;SiO2-3.91;Al2O3-4.31;CaO-4.76;MgO-1.64;TiO2-0.11;P2O5-0.11;SO3-0.69;Na2O-0.18;K2O-0.25;ZnO-0.64;LOI-44.26	Re-used in waste to wealth to recover Fe & C
5	Blast furnace bag filter dust	Fe(t)-57.03, Fe (M)-1.22, FeO-7.496, C-9.87, S-0.089;SiO2-1.06;Al2O3-0.039;CaO-6.90; MgO-0.83;TiO2-0.027;P2O5-0.006;Na2O-0.010;K2O-0.077;SO3-0.01ZnO-0.001	Reused in micro pellet plant, further to sinter making
Corex			
6	Corex Slag (Dry Pit Slag)	CaO- 35.84, SiO2-32.78, Al2O3-17.82, MgO-6.59, FeO-0.66, MnO- 1.0, TiO2-0.89, Na2O-0.17, K2O-0.45, S-0.605	For Road making purpose as a sub base material. Currently it is used for bund construction.
7	Corex Granulated slag	CaO- 35.84, SiO2-32.78, Al2O3-17.82, MgO-6.59, FeO-0.66, MnO- 1.0, TiO2-0.89, Na2O-0.17, K2O-0.45, S-0.605	Selling to Cement Making Plants and as slag sand, an alternate of river sand.
8	Corex Coal Drying Plant Coal Dust	FC= 58-62%,Ash =10-13%,VM= 26-30%	Re-used in Blast Furnace for Pulverized Coal Injection (PCI).
9	Corex GCP Sludge	Sio2-8.74, Fe2O3-58.44, Al2O3-5.21, CaO-5.195, MgO-1.843,TiO2-0.190, Na2O-0.003,K2O-0.152, P2O5-0.238, C-18.278, S-0.455	Re-used in waste to wealth to recover Fe & C
10	Corex classifier sludge	Sio2-8.73, Fe2O3-52.70, Al2O3-5.855, CaO-7.26, MgO-2.47,TiO2-0.232, Na2O-0.002,K2O-0.183, P2O5-0.308,	Reused in micro pellet plant, further to sinter making
11	Corex bag house dust	Fe(t)-51.10, Fe (M)-0.43, FeO-2.18, C-3.11, S-0.118;SiO2-5.90;Al2O3-5.02;CaO-9.647; MgO-2.192;TiO2-0.176;P2O5-0.070;Na2O-0.061;K2O-0.098;SO3-0.106;ZnO-0.001	Reused in micro pellet plant, further to sinter making

Sl. No.	Type of Waste	Typical Chemical Analysis (and size)	Mode of Utilization/ Disposal
Direct Reduced Iron (DRI)			
12	DRI sludge	Tfe % - 76.32 ; Mfe % - 44.90 ; Carbon – 1.55% ; Sulphur – 0.010, SiO2-7.02, Al2O3-3.58, CaO-1.7, MgO-0.224,	Re-used in base mix further to Sinter plant.
13	Product fines	Tfe % - 83.22 ; Mfe % - 76.31 ; Metz – 91.70 FeO – 8.91% ; Carbon – 2.78% ; Sulphur - 0.006.	Re-used in base mix further to Sinter plant
14	Oxide fines	Fe(T) – 63.64% , FeO- 1.61% , SiO2 - 3.51%, Al2O3 - 1.79%, CaO-1.74%, MgO-0.31%, MnO-0.05%, TiO2-0.15%, P – 0.033%, Na2O- 0.023%, K2O-0.216%, ZNO-0.003%, LOI-1.04%	Re-used in base mix further to Sinter plant
Steel Melting Shop – 1&2 (SMS-1&2 BOF)			
15	Fume Extraction System(FES) Dust	T.Fe – 30.46,Fe (M)- 2.4, FeO-6.32,CaO - 32.31%,MgO –5.707,SiO2 – 4.77%,Al2O3 – 2.07%, C- 5.84, S-0.632, P2O5-0.312,	Re-used in micro pellet plant further to sinter making
16	Mill Scale	Fe (T)-70.72,FeO-49.76, Fe(M)-10.06, C-0.240, S-0.007, SiO2-1.33, Al2O3-0.38, CaO-0.76, MgO-0.361, MnO-1.386, TiO2-0.026,P-0.029	Used for mill scale briquetting for further use in BOF as coolant
17	GCP sludge	Fe(T) – 67.10% ,Fe (M)- 34.75 FeO- 34.51% , SiO2 – 2.38%, Al2O3 – 0.53%, CaO-13.02%, MgO-3.214%, MnO-0.084%, TiO2-0.057%, P2O5 – 0.114%, Na2O- 0.004%, K2O-0.158%, ZnO-0.061%, C-1.80%, S-0.093.	Re-used in micro pellet plant further to sinter making
18	Ladle Furnace(LF) Slag	Fe2O3-4.40, SiO2-3.27, Al2O3-35.0, CaO-42.0, MgO-9.90, MnO-1.95, TiO2-0.250, P2O5-0.110, K2O-0.015, Na2O-0.030,	Re-used in micro pellet plant further to sinter making
19	BOF slag	Fe2O3-23.0, SiO2-12.11, Al2O3-1.63, CaO-45.16, MgO-8.38, MnO-3.12, TiO2-0.580, P2O5-2.27, K2O-0.020, Na2O-0.003,	Used in micro pellet plant, blast furnace and sinter as source of flux, as scrap in BOF and bund construction
Steel Melting Shop - 3 (SMS-3 EAF)			
20	Fume Extraction System(FES) Dust	Fe2O3-68.60, SiO2-3.44, Al2O3-0.57, CaO-11.20, MgO-5.16, MnO-0.705, TiO2-0.065, P2O5-0.454, K2O-2.53, Na2O-1.01,	Used in mill scale briquetting plant further in SMS
21	Electric Arc Furnace (EAF) slag	CaO – 28-32, MgO – 5 - 7,SiO2 – 14 -16, Fe – 20 - 24,Al2 o3 – 3 - 5,P2O5 – 0.5 - 0.8	Used as scrap in BOF and For Road making purpose as a sub base material & for making sub base of Inter plant railway network.

Sl. No.	Type of Waste	Typical Chemical Analysis (and size)	Mode of Utilization/ Disposal
22	Ladle Furnace(LF) Slag	Fe2O3-4.40, SiO2-3.27, Al2O3-35.0, CaO-42.0, MgO-9.90, MnO-1.95, TiO2-0.250, P2O5-0.110, K2O-0.015, Na2O-0.030,	Re-used in micro pellet plant further to sinter making
23	Mill scale	Fe (T)-73.73,FeO-49.86, Fe(M)-12.35, C-0.243, S-0.007, SiO2-1.72, Al2O3-0.35, CaO-0.26, MgO-0.109, MnO-2.310, TiO2-0.043,P-0.043	Used for mill scale briquetting for further use in BOF as coolant
24	Combustion Chamber Dust	Fe (T)- 67.69, SiO2 -2.61, Al2O3-1.02, CaO-4.21, MgO-1.07, MnO- 0.026, TiO2-0.094, P-0.108, S-0.013, Na2O-0.048, K2O- 0.032, Total alkali-0.08, ZnO-0.001, Mfe-2.81, FeO-43.01	
Hot Strip Mill- 1&2 (HSM-1&2):			
25	Mill Scale	Fe (T)-69.84,FeO-57.16, Fe(M)-13.270, C-0.240, S-0.008, SiO2-4.17, Al2O3-1.17, CaO-3.25, MgO-0.477, MnO-0.354, TiO2-0.046,P-0.007, Na2O-2.083, K2O-0.023	Used for mill scale briquetting for further use in BOF as coolant
26	Sludge	Fe (T)-67.57,FeO-14.14, Fe(M)-0.52, C-0.71, S-0.010, SiO2-1.50, Al2O3-0.37, CaO-0.83, MgO-0.54, MnO-0.52, TiO2-0.016,P2O5-0.106, Na2O-0, K2O-0.018	Used for mill scale briquetting for further use in BOF as coolant
Wire Rod mill			
27	Mill scale	Fe (T)-73.75,FeO-59.68, Fe(M)-2.10, C-0.179, S-0.008, SiO2-0.6, Al2O3-0.11, CaO-0.15, MgO-0.080, MnO-0.627, TiO2-0.010,P-0.013,	Used for mill scale briquetting for further use in BOF as coolant
28	Sludge	Fe (T)-69.53,FeO-56.01, Fe(M)-0.009, C-2.14, S-0.031, SiO2-1.58, Al2O3-0.79, CaO-0.72, MgO-0.268, MnO-0.333, TiO2-0.023,P2O5-0.044,	Re-used in micro pellet plant further to sinter making
Bar rod mill			
29	Mill scale	Fe (T)-73.75,FeO-59.68, Fe(M)-2.10, C-0.179, S-0.008, SiO2-0.6, Al2O3-0.11, CaO-0.15, MgO-0.080, MnO-0.627, TiO2-0.010,P-0.013,	Used for mill scale briquetting for further use in BOF as coolant
30	sludge	Fe (T)-69.53,FeO-56.01, Fe(M)-0.009, C-2.14, S-0.031, SiO2-1.58, Al2O3-0.79, CaO-0.72, MgO-0.268, MnO-0.333, TiO2-0.023,P2O5-0.044,	Re-used in micro pellet plant further to sinter making
Lime calcinations Plant :			
31	Dolo (Dolime) Fines	CaO: 51.31, MgO: 40.26, SiO2: 1.04, Al2O3: 0.23, Fe2O3: 0.26, LOI: 4.73	Re-used in CRM, Corex, and Sinter Plant.
32	Lime Fines	CaO: 93.12, MgO: 1.05, SiO2: 1.19, R2O3: 1.60, LOI: 3.89	Re-used in CRM, Corex, and Sinter Plant.
33	Bag house Fines (Lime/Dolo dust)	CaO: 38.86, MgO: 11.94, SiO2: 6.85, Al2O3-2.08, MnO-0.069, P2O5-0.076, LOI-35.77	Re-used in micro pellet plant further to sinter making
Refractory:			

Sl. No.	Type of Waste	Typical Chemical Analysis (and size)	Mode of Utilization/ Disposal
34	Used Refractory Bricks	MgC birck MgO:97%, CaO:1.5%, Fe2O3:0.5%, SiO2:0.7%, Al2O3:0.2%, HA Brick Al2O3:70%, Fe2O3:3%	Sold to authorized recycler
35	Refractory Dust	MgO:75%, Fe2O3:3.6%, CaO:20%, SiO2:0.6%, Al2O3:0.3% Castable : Al2O3:85-90%, Fe2O3:1.5%, CaO:06%	Used in bund construction
Cold Rolling Mill (CRM-1&2) :			
36	Iron Oxide from Acid Regeneration Plant(ARP)	Fe2O3-98.21, SiO2-0.314, Al2O3-0.340, CaO-0.034, MnO-0.318,	Re-used in Mill Scale Briquetting Plant & PP-2.
37	Zinc dross	Recoverable Zn-85%, Impurities-15%	Selling to Authorized Recyclers/Re processor
38	Effluent Treatment Plant (ETP) Sludge	Fe2O3-39.81, SiO2-6.27, Al2O3-0.65, CaO-14.60, MgO-3.11, TiO2-0.030, Na2O-0.160, P2O5-0.810, LOI-33.07, C-14.95	Re-used in micro pellet plant further to sinter making
Coke Ovens			
39	CDQ dust	FC-85.34, VM-0.99, Ash-13.67	Re-used in micro pellet plant further to sinter making
Power Plant:			
40	Bottom Ash	Silica:41-42%, Aluminum Oxide: 20-22%, Iron Oxide: 5.04%, Calcium Oxide: 1.7 %, Magnesium Oxide: 0.94%, SO2+SO3: 0.54%, Na2O+K2O: 0.92%, Titanium Oxide: 0.44%, Phosphorus Pentoxide: 0.32%, Loss of Ignition: 29.82%	Used for bricks manufacturing
41	Fly Ash	Silica:50-55%, Aluminum Oxide: 20-25%, Iron Oxide: 6.22%, Calcium Oxide:1.5-2%, Magnesium Oxide: 0.2-0.3%, SO2+SO3: 0.48%, Na2O+K2O: 0.975%, Titanium Oxide: 0.18%, Phosphorus Pentoxide: 0.24%, Loss of Ignition: 14.23%	Sold to Cement Making

Other Wastes

Category	UOM	Disposal
E-waste	MT	Sent to Authorised E-waste recyclers/vendors
Battery Waste	MT	Sent to Authorised Battery waste recyclers/vendors

PART – G

IMPACT OF THE POLLUTION CONTROL MEASURES

TAKEN ON CONSERVATION OF NATURAL RESOURCES

CONSERVATION OF NATURAL RESOURCES

A. WATER ENVIRONMENT

JSW receives water from Tunga Bhadra (TB) Dam and Almatti Dam. Our Vijayanagar plant has launched a comprehensive water stewardship initiative aimed at maximising effluent treatment and increasing the use of treated water from sewage treatment plants. This approach includes immediate actions and long-term technological advancements to conserve and recycle water resources. Currently, our efforts are focused on enhancing effluent treatment and increasing the use of treated water from sewage treatment plants. This includes reusing secondary water and minimising process losses. We are addressing water leakage and seepage to prevent wastage and improving RO system efficiency. We are also implementing measures to control and reduce wastewater discharge as well as maximising recycling from guard ponds. By conducting water audits, we further identify areas for improvement. These efforts have reduced freshwater consumption by approximately 2,500 m3/day in process units, mainly through efficient reuse of process blow down water. Process effluents are collected and settled in three separate guard ponds, with the water reused in secondary processes and horticultural activities.RO plants have been installed at various sites to efficiently reuse and recycle process effluents, significantly decreasing freshwater use. Sewage water is treated through our sewage treatment plant and utilised for both RO feed and horticultural purposes. To optimise wastewater discharge, we are minimising discharge and maximising recycling. This involves improving the Cycles of Concentration (CoC) in our cooling towers to reduce wastewater blow down, lowering filter backwash frequency, and increasing the use of guard pond water in processes. We are also exploring using wastewater in secondary processes to replace freshwater. By implementing treatment and recycling facilities, we have achieved Zero Liquid Discharge, with approximately 42,850 m3/day of effluent re-circulated and reused at the plant. Desilting one guard pond has enhanced its capacity, improving effluent neutralisation and supporting increased secondary usage. Going forward, our short-term goals include streamlining processes for efficient water use, implementing advanced RO technology for better water treatment, and expanding guard pond capacity for maximum water retention. Through continuous innovation and a holistic

approach to water stewardship, we aim to set new standards in responsible water management within the industrial sector, safeguarding valuable resources for future generations.

Water Pollution Control Measures implemented:

JSW Steel adopts a structured management approach, awareness, and technological intervention, to not only conserve water but also provide safe and steady water resources for industrial as well as human use within its operations. The Company has taken extensive initiatives in this direction.

JSW Steel has been conserving water through following strategies:

- Selection of advanced water treatment technologies like Reverse osmosis (R.O), Membrane Bio Reactor (MBR), Ceramic ultra-filter membranes, evaporator etc.
- Increased capacity utilisation of recycled water in Reverse Osmosis (RO) plants , Increase in 2,046 m3/day water availability
- Water recovery and recycling initiatives
- Increased utilisation of recycled water which has increased >88% capacity utilization of RO plants.
- Control monitoring for optimisation at different shop floors with savings of 1,573 m^3/day water usage
- Commissioned RO Plant at CRM-1 & WRM-2 with installed capacity of 2000 & 1000 m^3/day respectively. RO Plant at CRM-1 is having potential freshwater savings of 2,500 m^3/day.
- Sustained Zero Liquid Discharge
- Water footprint assessment and reduction exercises
- Rainwater harvesting.
- Reuse of blowdown water in secondary use like slag quenching, gardening, iron ore washing, firefighting, dust suppression etc

The following are the major Water Pollution Control systems installed in JSW Steel:

Sl no	Systems	Quantity(nos)
1	Water recirculation	18
2	ETP	9
3	Guard pond	3
4	RO water plant	8

The blow down (treated water) from the above systems (water recirculation, ETP & RO) are collected in three guard ponds.

Sl no	Guard pond no	Capacity(m^3)	Source
1	#1	100000	CRM2 , LP Mills,HSM2,SMS 2 , PP1,BP1,CPP1, WWP , BF1&2,Corex1&2,SMS1,I Shop,HSM1,
2	#2	125000	DRI &SMS-3, BF-3, 60 TPH Boiler &CPP-2,Coke Oven-3,4 & CDQ, JSWEL, GP-3 ,GP1
3	#3	15000	BF-4, BRM-2, L&T Colony
Total capacity		240000 m^3	

Recycling of water up to 40,000 -45000 m^3/day in non-critical applications through all the guard ponds.

Reverse osmosis plant for recycle of blow down water:

Sl no	Location	Capacity (m^3/day)	Feed source
1	HSM #1	2200	Guard pond-1,HSM1,CRM1,SMS1
2	JSW EL	4050	JSWEL
3	Coke oven 3& 4 ZLD	4300	Coke oven
4	CRM #2	6900	CRM2,HSM2, Shankar Hill town & VV Nagar STP
5	DRI	2400	DRI,SMS3,BOC
6	BRM-2	850	BRM2
7	CRM-1	2000	CRM-1
8	WRM-2	1000	WRM-2
Total capacity		**23700**	

Water Pollution Control Systems in JSW Steel

Ceramic Membrane
First in World

RO Plant

Guard Pond

ZLD Plant at Coke oven
First in World

Membrane Bio-reactor

CRM 1 RO

WRM 2 RO

The following Sewage Treatment plants were implemented at town ship and the treated sewage was ZLD at Coke ovens recovered and reused.

Sl.No	STP Location	Capacity(m^3/day)	Technology / Recycle & Reuse
1	Vidyanagar	1500	MBR upgraded from FAB. Recycled to 5 MTPA process and Green belt
2		1000	Reed bed. Reused for Green belt
3	VV Nagar	1200	SAFF technology Recycled in CRM-2 process through ETP and R.O plants
4	Shankar Hill town	3000	MBR Technology. Recycled in CRM-2 process through R.O plants
5	Hill Side Township	1560	MBR Technology. Recycled to 5 MTPA process and Green belt
6	Lake view	400	MBR Reused for Green belt
7	Sun rise Valley	120	MBR. Reused for Green Belt

B. AIR Environment

In an integrated Steel Plant, dust emissions are the major air emission concerns. Various efforts to control the particulate (dust) stack emissions have resulted in reduction of emissions to 0.45 kg/tcs in 2023-24 The reduction was possible by carrying out capital repairs of ESP at Pellet and sinter plants. We have taken extensive air pollution control measures in the plant to control the dustemission.

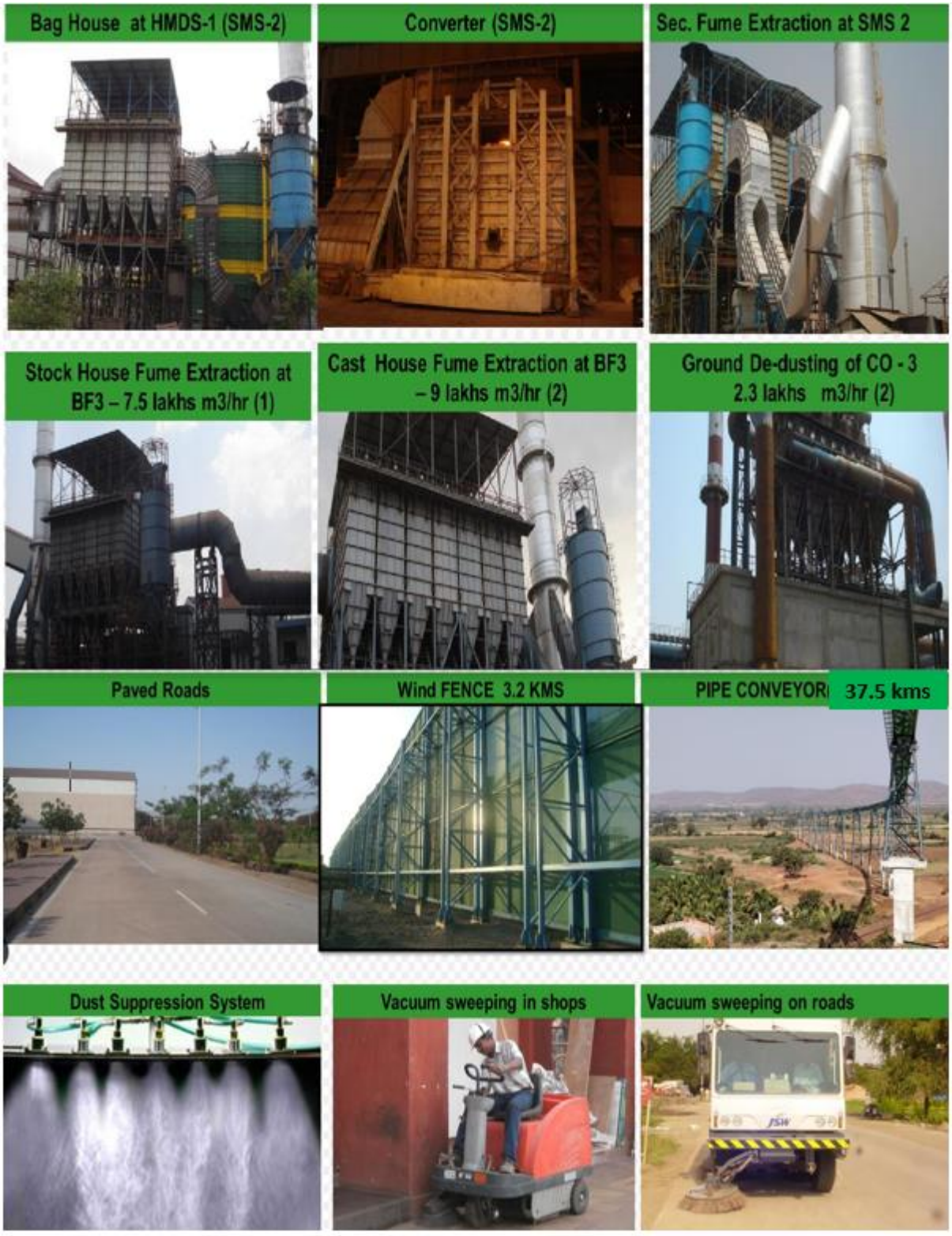
The details of Air pollution control measures implemented are as follows:

a. Environmental Friendly Iron ore transportation through pipe conveyors at JSW Vijayanagar works - 37.5 KM stretch of the Pipe conveyor with a capacity 24 MTPA has been commissioned. This is being extended to 84 KM.
b. Installation of SOPRECO: Two batteries of CO 3 and 4, Reduction in charging emissions
c. Commissioned high efficiency bag filter in Sinter Plant which shall reduce in emissions by 0.03 kg/tcs; reduction in stack emissions by more than 40 mg/Nm^3.
d. For work zone emissions reduction, Commissioned a dedusting system of 1,40,000 m^3/hr capacity at RMHS, covering around 15 dust sources.
e. Installation of MEROS/ High Efficiency Baghouse after ESP in Sinter Plant 2 to achieve emissions below the European BAT norms of 10 mg / NM^3
f. The following Air pollution control system to meet the emissions.

Air Pollution Control Equipments	**Nos**
Electrostatic Precipitators	18 Nos
Bag Houses	250 Nos
Scrubbers	31 Nos
Wind Curtains	3.2 Kms
Dry fog systems in Junction Houses of Raw Material Handling systems RMHS	160 Nos

g. High efficiency ESPs/ Bag filters in Pellet Plant, up gradation of SMS 1 & SMS 2 secondary dedusting.
h. In addition to the above all the internal roads have been paved and concreted and tree plantation done on either sides of the road
i. Vacuum sweeping of the roads and road wetting is done on regular basis.
j. Vacuum sweepers are being operated in the shop floors to capture all fugitive dust.

With the above air pollution control measure insignificant air quality impact on the surrounding villages is envisaged.


Bag House at HMDS-1 (SMS-2)
Converter (SMS-2)
Sec. Fume Extraction at SMS 2
Stock House Fume Extraction at BF3 – 7.5 lakhs m3/hr (1)
Cast House Fume Extraction at BF3 – 9 lakhs m3/hr (2)
Ground De-dusting of CO - 3 2.3 lakhs m3/hr (2)
Paved Roads
Wind FENCE 3.2 KMS
PIPE CONVEYOR 37.5 kms
Dust Suppression System
Vacuum sweeping in shops
Vacuum sweeping on roads

C. SOLID WASTE MANAGEMENT

- During the year 2023-24, waste utilization was given a fillip with the “waste to wealth” plant. This processes iron bearing dusts & sludge (from Corex, BF GCP etc) to produce iron and carbon concentrate for use in pellet plant -1 and sinter plant -1.
- Commissioned 300 TPD LHF Briquetting Plant that resulted in 200 TPD used in cement plant and 100 TPD used in steelmaking process as synthetic material. Slurry generated from SMS is being utilised through the pellet plant.
- The utilization of solid waste (dust & sludge) was enhanced to 100% during the year. 100% utilization of sludge and dust reached by utilizing it in variouswaste handling facility viz. Micro pellet plant, mill scale briquetting plant, waste to wealth plant and slime recovery plant.
- With encouraging results & its acceptance in the market and higher demand, the capacity of slag sand plant improved to 80 TPH. With this nearly two lakhtonnes of slag sand sold to construction industry.
- Steam aging process has been developed by R&D department for accelerated weathering of steel slag using steam to convert steel slag into high quality aggregates. The trial for steam aging on large scale has been initiated in the plant. Further to this technical feasibility is under discussion with the technology suppliers. Further, an analytical method for determining the effectiveness of the weathering has been developed & included in BIS 383.
- Carbon recovery from low Fe dust and sludge has been initiated during this year from the Waste to wealth plant. Further the carbon concentrate utilized in sinter making.
- Increase in waste utilisation by innovating various processes in agglomeration and iron making resulted in 1.35 million tonnes of waste has been utilised which has replaced 1.05 million tonnes of iron ore

PART – H

ADDITIONAL MEASURES / INVESTMENT PROPOSAL FOR ENVIRONMENTAL PROTECTION

Proposed Investment (2024-25) for environment protection in JSW Steel Limited (Capex 24-25)

S.No.	Project Title	Budget (Rs. in Crs)
1	Legal compliance	4.80
2	Monitoring & Reporting	2.00
3	Water Saving/Effluent/Sewage treatment - Own	2.25
4	Noise control	0.50
5	Air Pollution control	0.25
6	Waste Management - Reduce/Recycle/Reuse	2.00
Grand Total		**11.8**

Environmental initiatives

- Installed two batteries in Coke Oven-3 and 4 using the SOPRECO technology.
- Commissioned a new dedusting system with a capacity of 1, 60,000 m^3/h in Blast Furnace-1 Sinter Fines (SF) building.
- Installed source-mounted dedusting system in Sinter Fines Conveyor in Sinter Plant-1.
- Installed source-mounted dedusting units at RMHS.
- Developed an in-house dust suppression system at RMHS.
- Developed a solid waste digital dashboard for effective tracking of Non - hazardous/hazardous waste.
- Conducted drone-based air quality mapping for stockyards.
- Implemented AI cameras for monitoring fugitive emissions
- Tree plantation for improving overall biodiversity index Planted 19.62 lakh trees till March 2024

PART – I

MISCELLANEOUS

Following is a list of some of the activities/projects carried out in the area of environment management

1. Key Performance Indicators:

The key environment performance parameters for Iron & Steel industry is being measured for benchmarking with best practices in the industry. Though, there are no regulatory norms, these parameters provide a guide for overall improvements. The KPI for 2023-24 is given below:

Key Performance Indicators	
Year	**2023-24**
Parameters	
Specific water consumption (m^3/tcs)	2.36
Dust emission (kg/tcs)	0.45
SO_2 emission (kg/tcs)	2.32
NO_x emission (kg/tcs)	1.38
Solid Waste Utilization (%)	100
Specific Energy Consumption (Gcal / tcs)	6.23

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