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

EMD/GOV/F014/2022-23/3287

29.09.2022

The Member Secretary,
KSPCB, 5" Floor,
#49, Parisara Bhavan, Church Street,
Bangalore - 560 001

Dear Sir,

Reg: Environmental statement for the financial year 2021-22

Ref: Combined Consent Order No. AW-328970 dated 31/12/2021 issued by KSPCB- Validity period 01/07/2021 to 30/06/2026

We are enclosing *herewith* Environmental Statement JSW Steel Limited for the financial year ending 31st March 2022.

May you require any clarification, we will be glad to provide the same.

Thanking You,

Yours faithfully,
For JSW Steel Limited

29.09.2022

JSW STEEL LTD TORANAGALLU-583 123

(Dr. R. T. Srinivasa Rao)
Authorized Signatory &
Associate Vice President
(Environment Management)

29/9/2022

Cc:

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

Better Everyday

JSW STEEL LIMITED

ENVIRONMENTAL STATEMENT

For financial year ending 31st March, 2022

29/9/2022

ENVIRONMENTAL STATEMENT

of

JSW Steel Limited, Toranagallu

for

Financial year ending the 31st March, 2022

(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

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PART-A

GENERAL INFORMATION ABOUT THE PLANT

1.	Name and address of the owner/ occupier of the industryoperation or process	Mr. P.K Murugan, President JSW Vijayanagar & Salem Works JSW Steel Limited , Torangallu, Ballari, Karnataka
1.a	Authorized person for theoccupier	Dr. RT Srinivasa Rao AVP (Environment Management), JSW Steel Limited,Toranagallu, Bellary, Karnataka
2	Industry category	Primary Metallurgical Industry
3	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
3	**Sinter plants**	
	Sinter plant 1	1 x 2.30 MTPA
	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
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 x3600 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 1.2 MTPA
11	**Slab casters**	

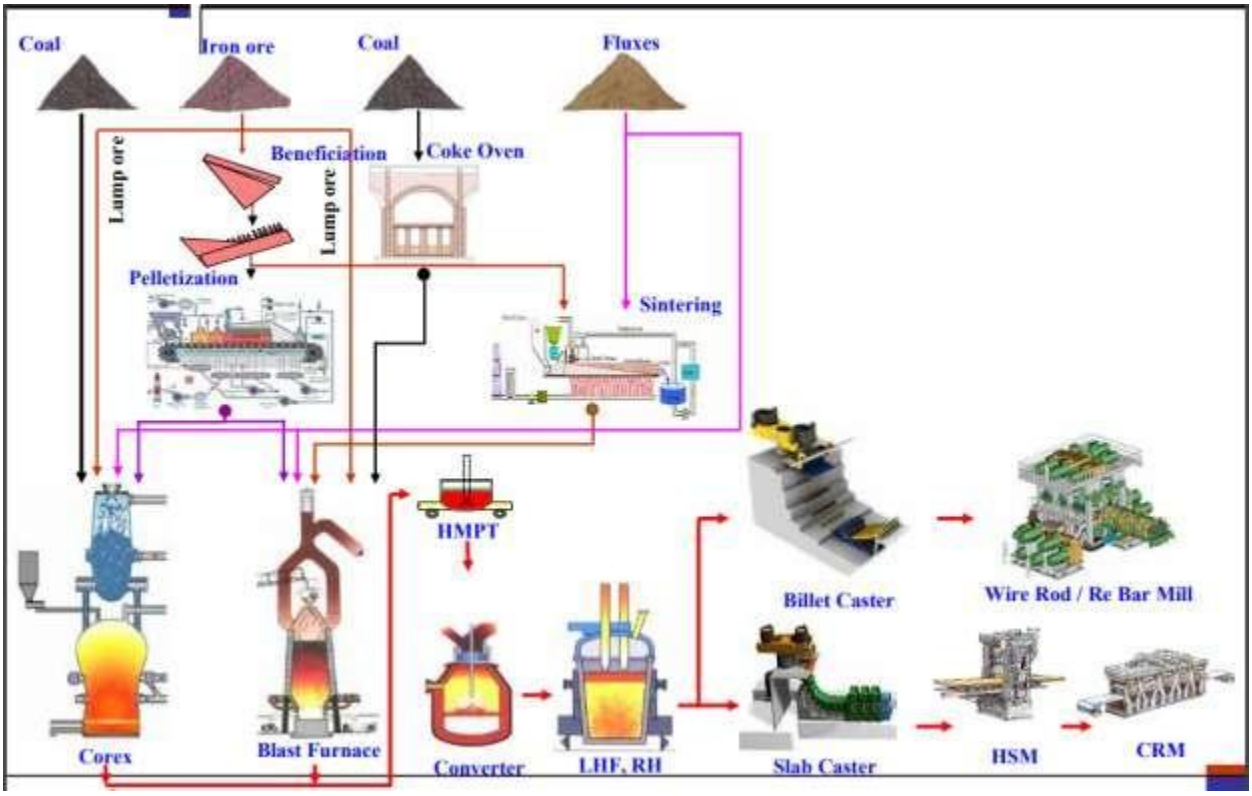
	SMS 1 Slab caster – 5.1 MTPA Slab caster 1 & 2 Slab caster 3 & 4	 2 x 1.05 MTPA 2 x 1.5 MTPA
	SMS 2 Slab caster – 6.4 MTPA Slab caster 5, 6, 7, 8 Slab caster 9	 4 x 1.6 MTPA 1 x 1.45 MTPA
12	**SMS 2 Billet caster**	
	Billet caster 1 Billet Caster 2	1 x 1.5 MTPA 1 X 1.5 MTPA
13	**Lime plant with (Along 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
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) (15 no's - screening plants of 200 TPH)
34	Batch mixing plant	500 m^3/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 1.2 MTPA
53	HSM 1 Up-gradation	From 3.5 MTPA to 4 MTPA
54	Wire Rod Mill 2	1 x 1.2 MTPA
55	Coke Oven 5 (Including CDQ, RO & Benzoyl recovery)	1 x 3 MTPA
56	Raw material handling system upgradation	5 MTPA to 6 MTPA

4 Year of establishment : 1994

5 Date of the last environmental statement submitted : 30.09.2021

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 & non 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.

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.

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.

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.

Lime calcinations: Burnt lime (CaO) is required for steel making. Limestone is burnt in the tall vertical limekilns at a temperature of around 1050^{0}C 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.

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.

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.

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.

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.

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 based power plant.

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.

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.

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	
	During the last Financial Year (2020-21)	During the current Financial Year (2021-22)
Industrial	29272303	28369250
Domestic	1541426	1506526

Water cess assessment paid in Rs.	During the last Financial Year (2020-21)	During the current Financial Year (2021-22)
	NA	NA

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 (2020-21)	During the current Financial Year (2021-22)
Crude Steel	3.01	2.51

C**onsumption of raw material**

Raw material consumption per unit of product

Material	**Unit**	**Total 2020-21**
Coal	million tons	-
a. Hard Coal	tons	28,36,041
b. Semi Hard Coal	tons	13,70,249
c.Semi Soft Coking coal	tons	5,63,113
d. Pet Coke	tons	11,491
d. Coking coal	tons	47,80,893
e. BF Injection coal	tons	16,75,860
f. Corex coal	tons	10,93,307
Coal Fines	tons	6,65,827
Iron ore	million tons	-
a. Iron ore lumps	tons	20,78,664
b. Iron ore fines	tons	2,20,22,990
Fluxes	million tons	-
a. Limestone	tons	33,11,242
b. Dolomite	tons	23,32,745
c. Quartzite	tons	40,030
d. BHQ	tons	1,06,905
e. DRI in IM	tons	1,08,055

PART-C

POLLUTION DISCHARGED TO ENVIRONMENT / UNITOF OUTPUT -

a) **WATER**

b) **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 iscollected in the slime pond located within the plant premises.

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

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

Parameters	**Concentration of pollutants discharge (mg/l) (100% Recycled)**
pH	7.7
TSS (mg/l)	44.6
Oil & Grease (mg/l)	3.6
COD (mg/l)	56
BOD (mg/l)	15.2

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

The characteristics of water quality parameters being monitored at the individual guard pond outlet and slime pond is given in Annexure II

Water quality parameters are being monitored at the individual guard pond

Parameters	pH	TSS (mg/l)	Oil & Grease (mg/l)	COD (mg/l)	BOD (mg/l)
Guard Pond 1	8.7	40.94	4.0	42.8	10.7
Guard Pond 2	7.62	55.11	3.6	63	16.0
Guard Pond 3	7.71	37.77	3.4	70	18.9

Air:

Quantity of pollutants measured around the plant is given below.

Annexure III.

Ambient Air Quality Monitoring: National Ambient Air Quality Monitoring Programme (NAAQM)

Guidelines for Sampling and Measurement of notified Ambient Air Quality

Parameters (NAAQS 2009)

Under the provisions of the Air (Prevention & Control of Pollution) Act, 1981, the CPCB hasnotified fourth version of National Ambient Air Quality Standards (NAAQS) in 2009. This revised national standard aims to provide uniform air quality for all, irrespective of land usepattern, across the country. There are 12 identified health based parameters, which are to measure at the national level and with a view to have data comparison, need for uniform guidelines for monitoring, sampling, analyses, sample flow chart, data sheet based on standard method has been felt.

NAAQ Standard:

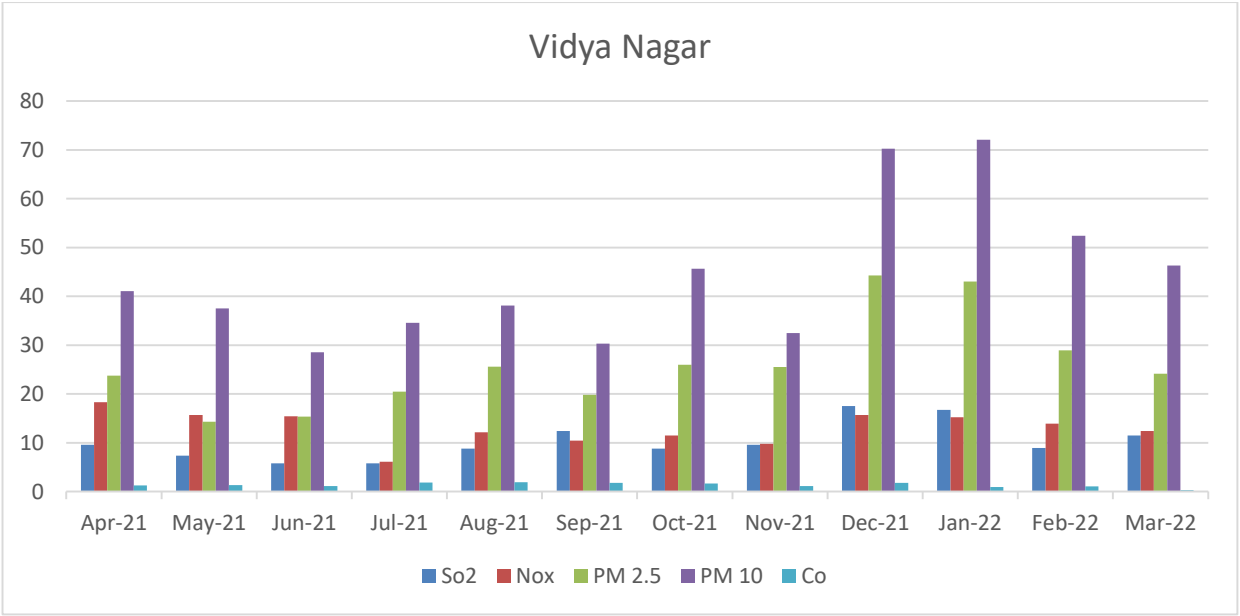
NATIONAL AMBIENT AIR QUALITY STANDARDS (2009)

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), µg/m³	Annual * 24 Hours **	50 80	20 80	-Improved West and Gaeke Method -Ultraviolet Fluorescence
Nitrogen Dioxide (NO_2), µg/m³	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}, µg/m³	Annual * 24 Hours **	60 100	60 100	-Gravimetric -TEOM -Beta attenuation
Particulate Matter (Size less than 2.5µm) or $PM_{2.5}$, µg/m³	Annual * 24 Hours **	40 60	40 60	-Gravimetric -TEOM -Beta attenuation

Continuous Ambient Air Quality Monitoring at 4 stations -FY2021-22

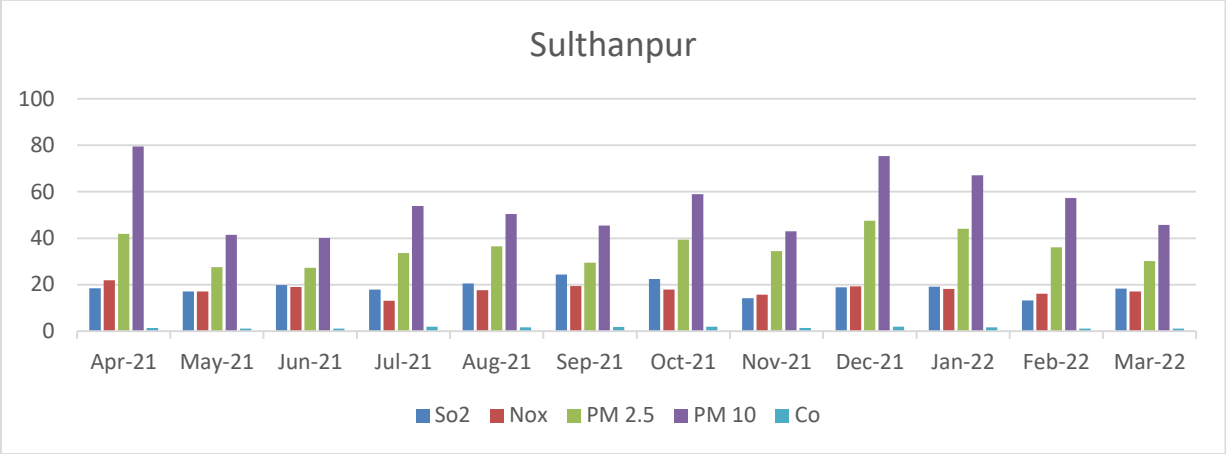
1. Vidyanagar
2. Vaddu
3. Shankar Hill Township
4. 10 MT

Continuous Ambient Air Quality Station Report – Vidyanagar 2021-22



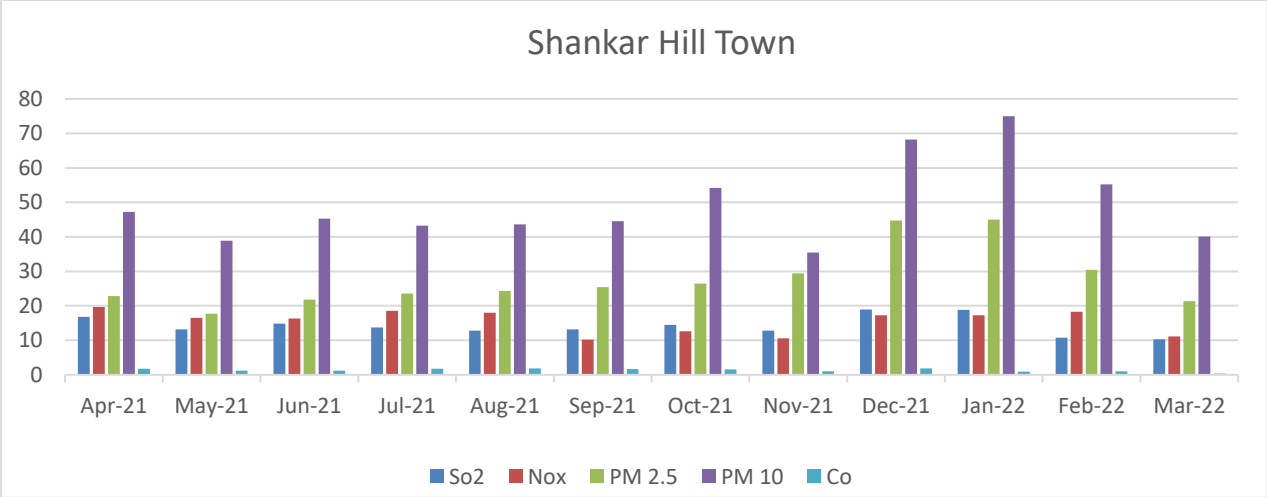
VDN	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22
So2	9.61	7.35	5.8	5.8	8.8	12.42	8.78	9.6	17.49	16.75	8.92	11.51
Nox	18.31	15.66	15.4	6.11	12.13	10.45	11.45	9.78	15.71	15.25	13.91	12.41
PM 2.5	23.75	14.33	15.33	20.47	25.61	19.78	25.98	25.51	44.28	43.05	28.92	24.12
PM 10	41.05	37.49	28.54	34.58	38.1	30.28	45.62	32.48	70.21	72.05	52.4	46.31
Co	1.22	1.31	1.14	1.82	1.91	1.79	1.65	1.12	1.78	0.94	1.04	0.29

Continuous Ambient Air Quality Station Report – Sulthanpur 2021-22



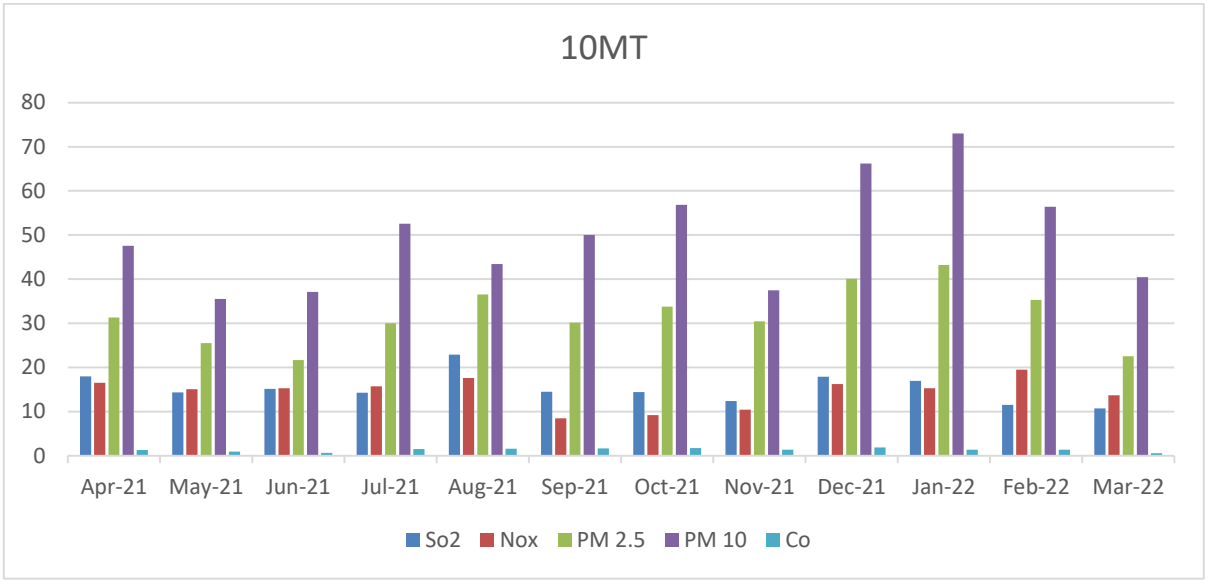
SPR	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22
So2	18.48	17.03	19.88	17.88	20.45	24.37	22.45	14.12	18.91	19.14	13.17	18.27
Nox	21.84	17.05	19.04	13.14	17.62	19.45	17.96	15.73	19.32	18.24	16.11	17.11
PM 2.5	41.86	27.49	27.2	33.65	36.53	29.54	39.45	34.45	47.54	44.04	36.04	30.12
PM 10	79.48	41.48	40.14	53.85	50.39	45.39	58.96	42.96	75.29	67.04	57.29	45.78
Co	1.35	1.03	1.05	1.86	1.59	1.72	1.92	1.31	1.95	1.6	1.12	1.02

Continuous Ambient Air Quality Station Report – Shankar Hill Township – 2021-22



SHT	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22
So2	16.81	13.17	14.81	13.75	12.8	13.12	14.42	12.78	18.91	18.84	10.75	10.24
Nox	19.67	16.48	16.33	18.54	18.01	10.19	12.58	10.58	17.22	17.24	18.24	11.08
PM 2.5	22.84	17.72	21.81	23.55	24.3	25.38	26.45	29.45	44.74	45.04	30.41	21.32
PM 10	47.28	38.84	45.28	43.28	43.61	44.58	54.21	35.42	68.19	75.04	55.21	40.08
Co	1.76	1.22	1.14	1.75	1.79	1.61	1.52	1.01	1.82	0.88	1.02	0.32

Continuous Ambient Air Quality Station Report – 10 MT 2021-22

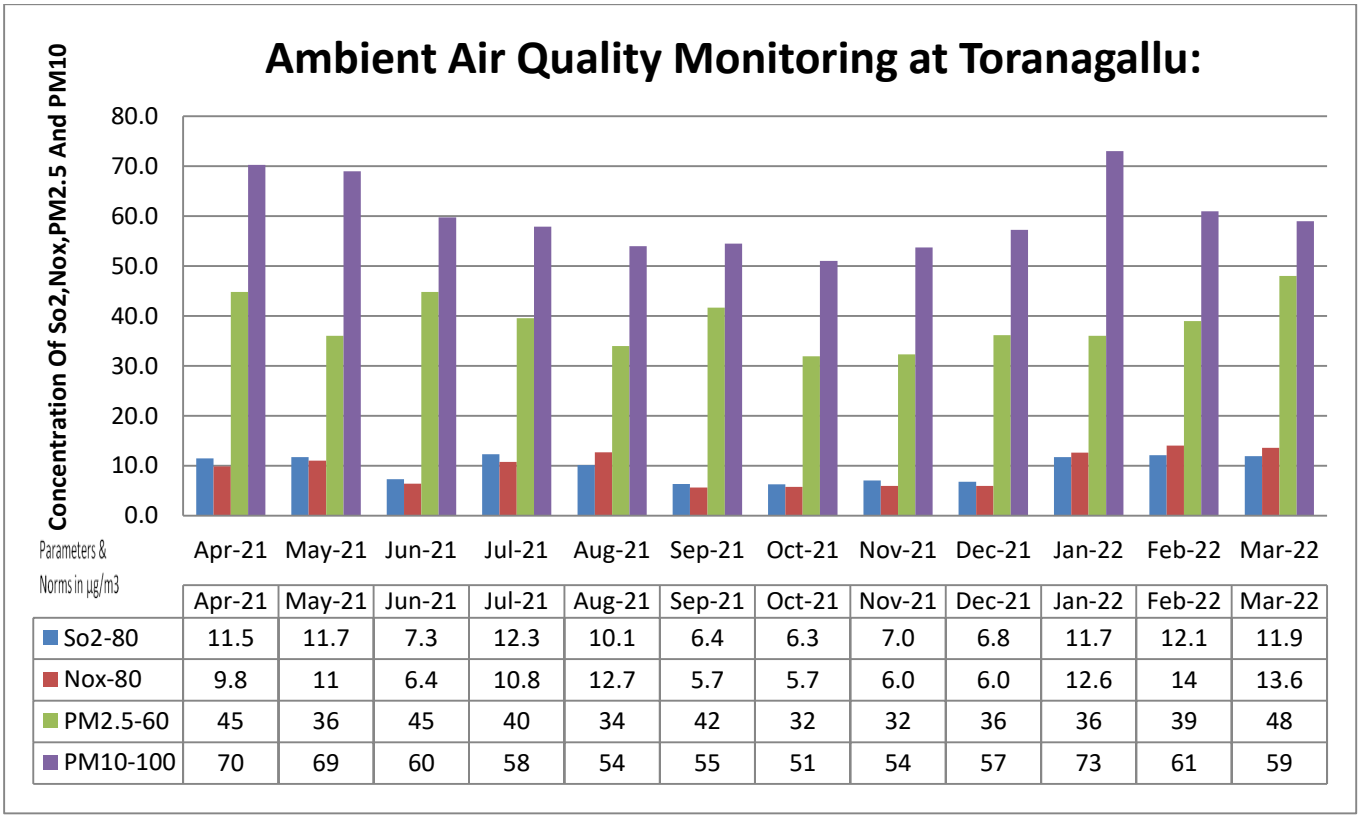


10MT	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22
So2	17.99	14.36	15.14	14.23	22.9	14.51	14.38	12.34	17.9	16.94	11.54	10.74
Nox	16.54	15.07	15.29	15.73	17.62	8.45	9.18	10.45	16.25	15.24	19.47	13.65
PM 2.5	31.28	25.48	21.68	30.02	36.53	30.14	33.76	30.42	40.12	43.24	35.29	22.54
PM 10	47.59	35.48	37.12	52.57	43.39	50.04	56.81	37.47	66.21	73.04	56.44	40.44
Co	1.28	0.91	0.6	1.52	1.59	1.61	1.72	1.32	1.87	1.35	1.35	0.54

Ambient Air Quality Monitoring (Manual) at 11 stations FY2021-22

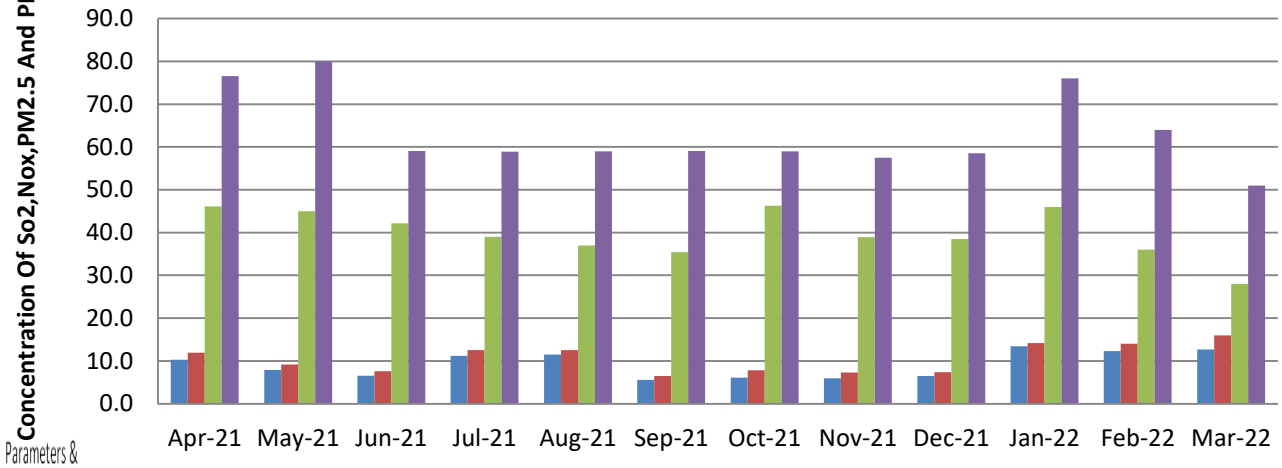
1. Toranagallu
2. Vaddu
3. Basapur
4. Talur
5. Kurekuppa
6. Gadiganur
7. Kuditini
8. Sultanpur
9. Karadidhama
10. Hampi
11. Vidyanagar

Ambient air quality Manual monitoring stations



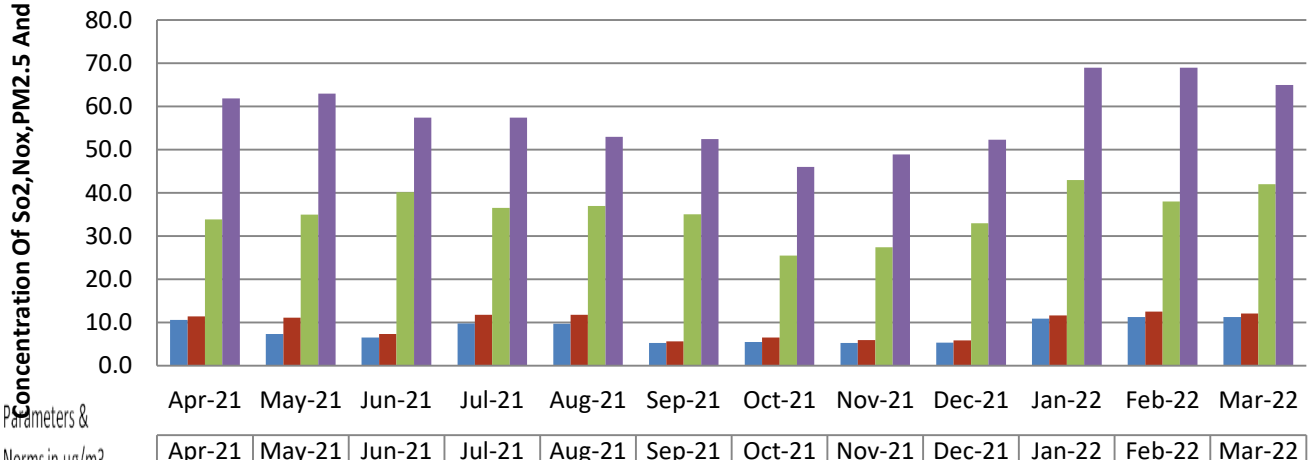
Parameters & Norms in µg/m3	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22
So2-80	11.5	11.7	7.3	12.3	10.1	6.4	6.3	7.0	6.8	11.7	12.1	11.9
Nox-80	9.8	11	6.4	10.8	12.7	5.7	5.7	6.0	6.0	12.6	14	13.6
PM2.5-60	45	36	45	40	34	42	32	32	36	36	39	48
PM10-100	70	69	60	58	54	55	51	54	57	73	61	59

Ambient Air Quality Monitoring at Vaddu:



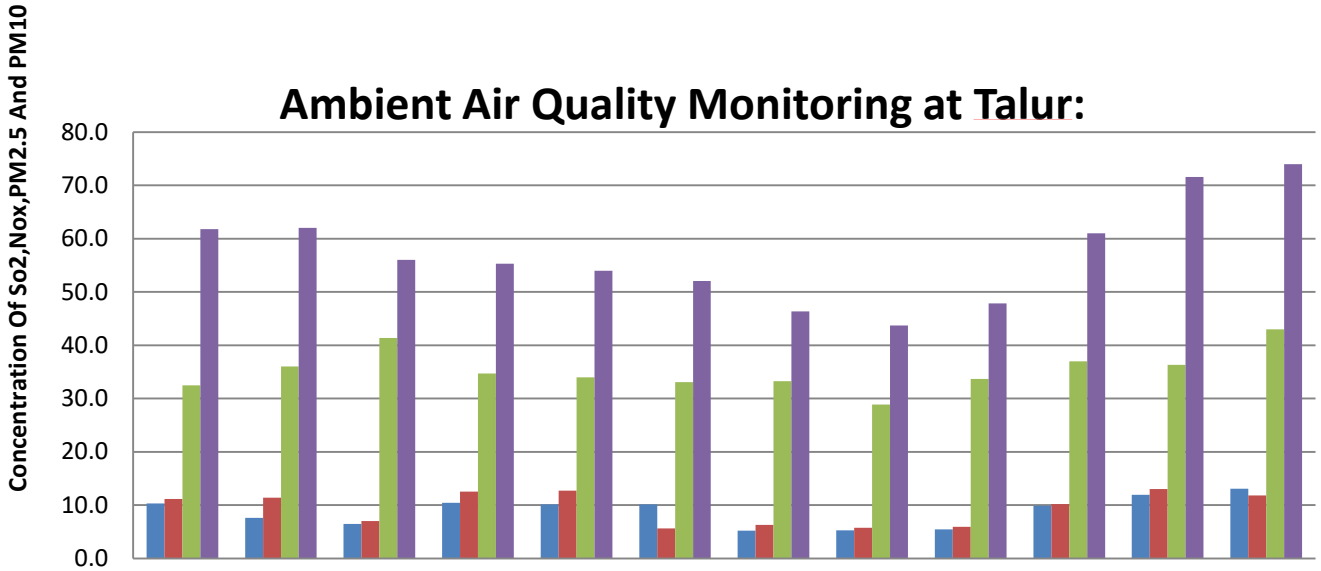
Parameters & Norms in µg/m3	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22
So2-80	10.3	7.9	6.5	11.2	11.5	5.6	6.1	6.0	6.5	13.4	12.3	12.7
Nox-80	12.0	9.2	7.6	12.5	12.5	6.5	7.8	7.3	7.4	14.2	14	16
PM2.5-60	46	45	42	39	37	35	46	39	38	46	36	28
PM10-100	77	80	59	59	59	59	59	57	59	76	64	51

Ambient Air Quality Monitoring at Basapur:



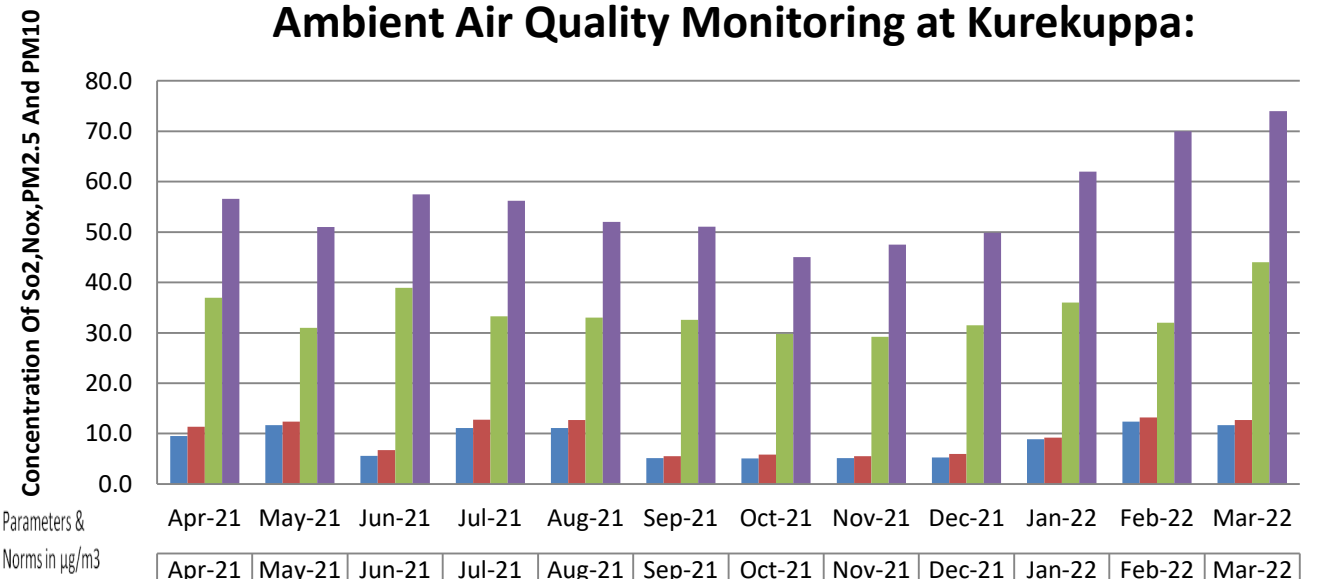
Parameters & Norms in µg/m3	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22
So2-80	10.6	7.3	6.5	9.8	9.7	5.3	5.5	5.2	5.3	10.9	11.3	11.3
Nox-80	11.4	11.1	7.3	11.8	11.8	5.6	6.5	6.0	5.8	11.6	12.5	12.1
PM2.5-60	34	35	40	37	37	35	25	27	33	43	38	42
PM10-100	62	63	57	57	53	52	46	49	52	69	69	65

Ambient Air Quality Monitoring at Talur:



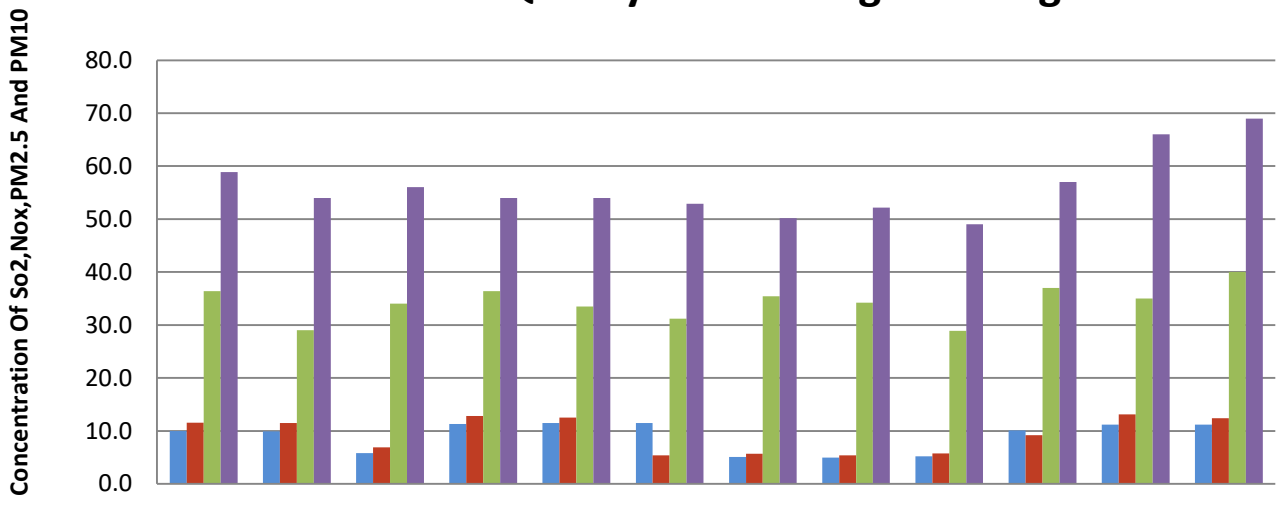
Parameters & Norms in µg/m3	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22
So2-80	10.3	7.6	6.4	10.4	10.1	10.1	5.2	5.2	5.4	9.9	11.9	13.1
Nox-80	11.2	11.4	7.0	12.5	12.7	5.6	6.3	5.7	5.9	10.2	13.0	11.8
PM2.5-60	32	36	41	35	34	33	33	29	34	37	36	43
PM10-100	62	62	56	55	54	52	46	44	48	61	72	74

Ambient Air Quality Monitoring at Kurekuppa:



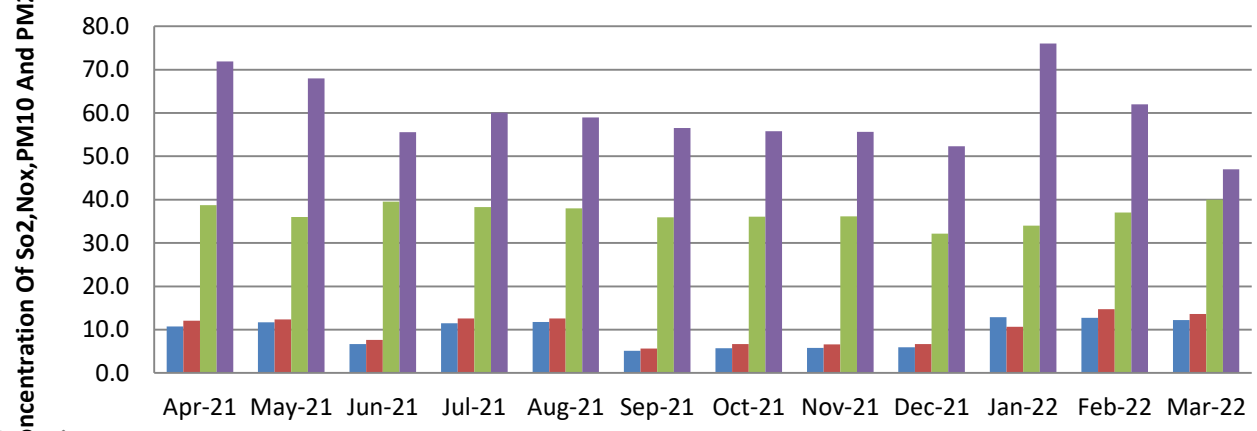
Parameters & Norms in µg/m3	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22
So2-80	9.5	11.7	5.6	11.1	11.1	5.1	5.1	5.1	5.3	8.9	12.4	11.7
Nox-80	11.4	12.4	6.7	12.7	12.7	5.5	5.8	5.5	6.0	9.2	13.2	12.7
PM2.5-60	37	31	39	33	33	33	30	29	31	36	32	44
PM10-100	57	51	57	56	52	51	45	47	50	62	70	74

Ambient Air Quality Monitoring At Gadiganur:



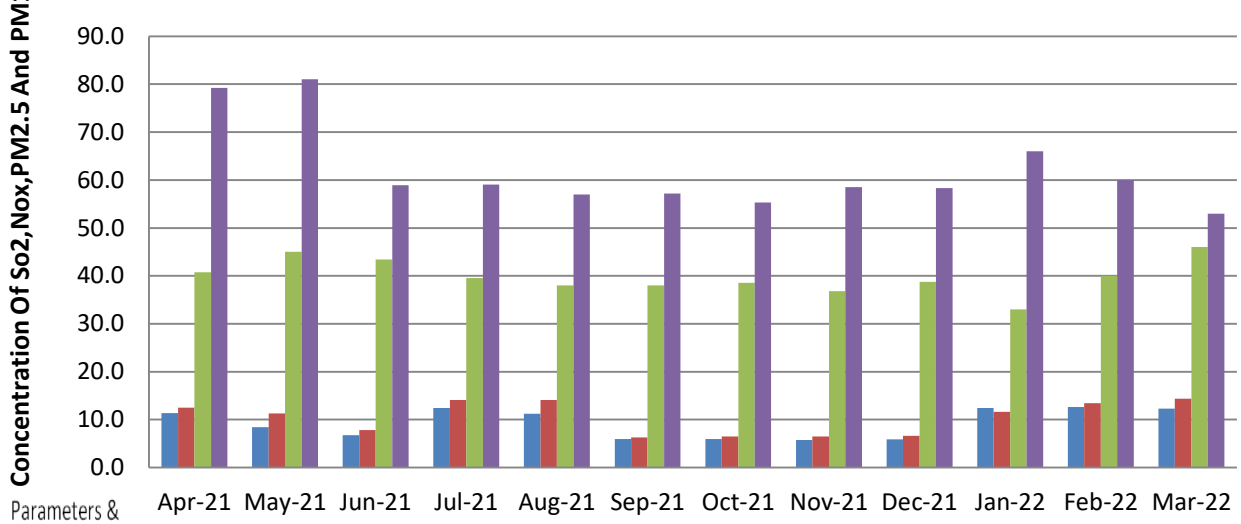
Parameters & Norms in µg/m3	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22
So2-80	10.0	9.9	5.8	11.3	11.5	11.5	5.1	5.0	5.2	10.1	11.2	11.2
Nox-80	11.5	11.5	6.9	12.8	12.5	5.4	5.7	5.3	5.7	9.2	13.1	12.4
PM2.5-60	36	29	34	36	34	31	35	34	29	37	35	40
PM10-100	59	54	56	54	54	53	50	52	49	57	66	69

Ambient Air Quality Monitoring at Kudithini:



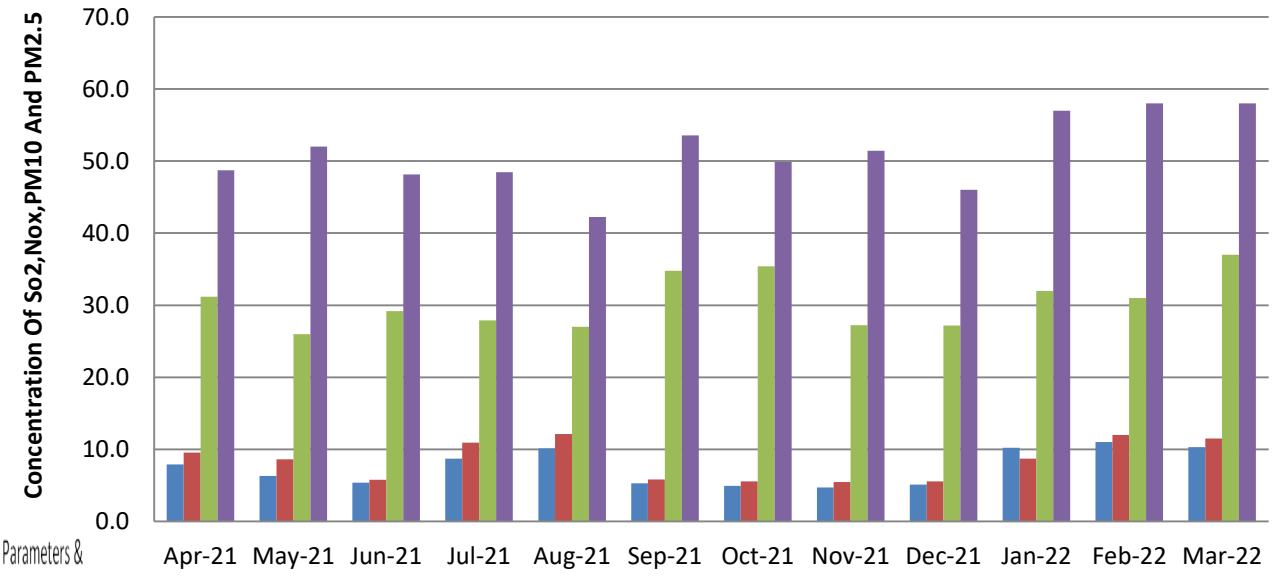
Parameters & Norms in µg/m3	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22
So2-80	10.7	11.7	6.7	11.5	11.8	5.1	5.7	5.8	5.9	12.9	12.7	12.2
Nox-80	12.1	12.4	7.6	12.6	12.6	5.6	6.6	6.6	6.7	10.7	14.7	13.6
PM2.5-60	39	36	40	38	38	36	36	36	32	34	37	40
PM10-100	72	68	56	60	59	56	56	56	52	76	62	47

Ambient Air Quality Monitoring at Sultanpur:



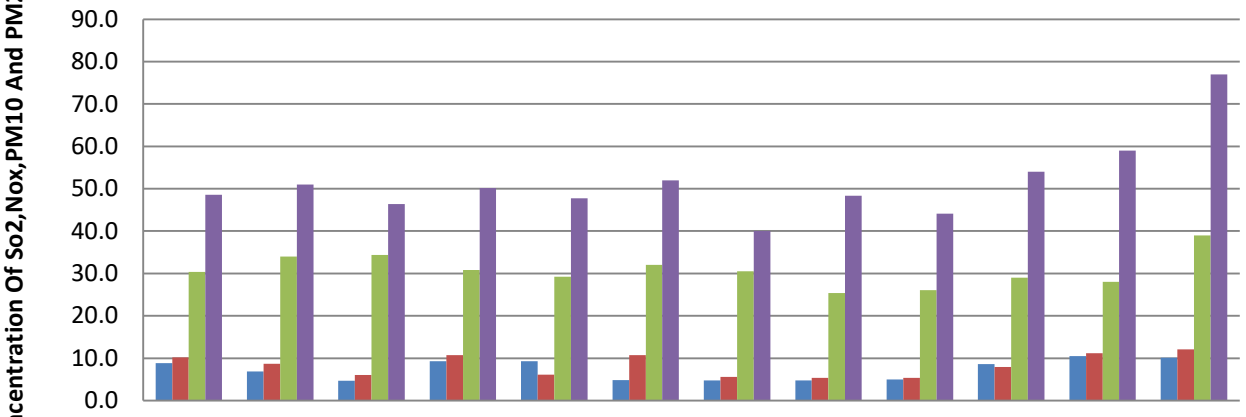
Parameters & Norms in µg/m3	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22
So2-80	11.4	8.4	6.7	12.4	11.2	6.0	5.9	5.7	5.9	12.4	12.6	12.3
Nox-80	12.5	11.3	7.8	14.1	14.1	6.3	6.5	6.5	6.6	11.6	13.4	14.4
PM2.5-60	41	45	43	40	38	38	39	37	39	33	40	46
PM10-100	79	81	59	59	57	57	55	58	58	66	60	53

Ambient Air Quality Monitoring at Karadidhama:



Parameters & Norms in µg/m3	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22
So2-80	7.9	6	5.4	8.7	10.1	5.3	4.9	4.7	5.1	10.2	11.0	10.3
Nox-80	9.6	8.6	5.7	10.9	12.1	5.8	5.6	5.4	5.5	8.7	12.0	11.5
PM2.5-60	31	26	29	28	27	35	35	27	27	32	31	37
PM10-100	49	52	48	48	42	54	50	51	46	57	58	58

Ambient Air Quality Monitoring at Hampi:



Parameters & Norms in µg/m3	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22
So2-80	8.8	6.9	4.7	9.3	9.3	4.8	4.7	4.8	5.0	8.6	10.5	10.1
Nox-80	10.2	8.7	6.0	10.7	6.1	10.7	5.6	5.4	5.4	7.9	11.2	12.1
PM2.5-60	30	34	34	31	29	32	31	25	26	29	28	39
PM10-100	49	51	46	50	48	52	40	48	44	54	59	77

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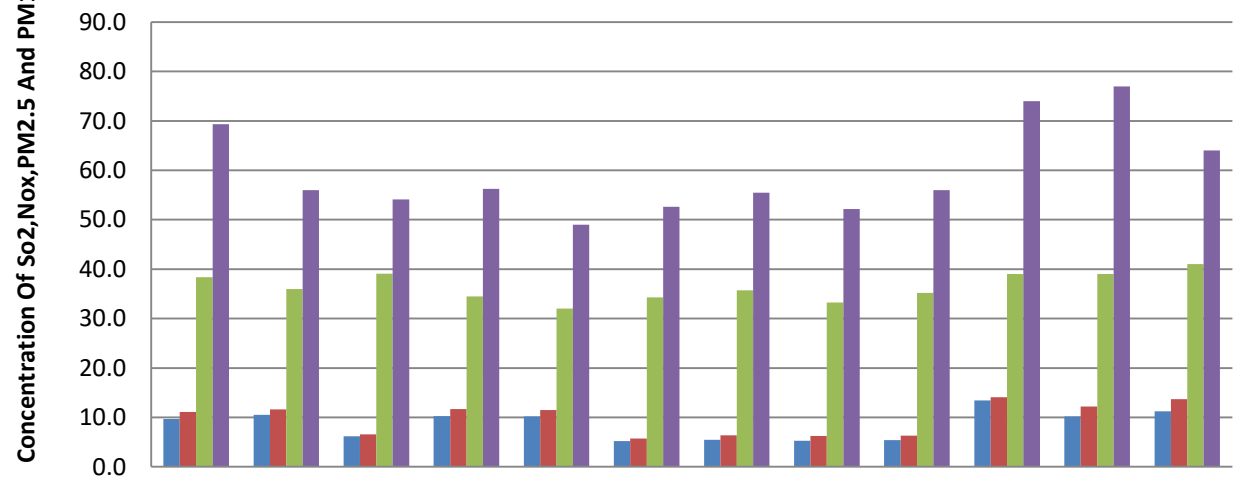
Ambient Air Quality Monitoring at Vidyanagar:



Parameters & Norms in µg/m3	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22
So2-80	9.6	10.5	6.2	10.3	10.2	5.2	5.5	5.2	5.4	13.4	10.2	11.2
Nox-80	11.1	11.6	6.6	11.7	11.5	5.7	6.4	6.2	6.3	14.1	12.2	13.7
PM2.5-60	38	36	39	34	32	34	36	33	35	39	39	41
PM10-100	69	56	54	56	49	53	55	52	56	74	77	64

PART-D

A)HAZARDOUS WASTES

Generation of Hazardous Waste

Sl. No	Waste Category	Waste generated	Qty inMT/A
1	5.1	Used Oil	18.48
2	4.1	Waste Oil	457.48
3	5.2	Oil soaked cotton waste	33.37
4	13.1	Waste pickled liquor	115716.42
5	12.1	Acid residue	214.605
		Alkali residue	
6	13.4	Decanter Tank Tar sludge	490.84
7	13.5	Tar storage tank residue	122.80
8	35.2	Spent ion exchange resin containing toxic metals.	0
9	35.3	ETP sludge	1187.48
10		Impure sulphur	169.32
11	35.4	Oil & grease skimmimg residue(Emulsion Slurry)	792.23
12	35.2	Spent Nickel catalyst	0
13	35.3	Spent carbon from WTP/ETP	0
14	37.1	Oily Sludge from mills	444
15	37.2	Ash from incineration of hazardous waste , flue gas cleaning residue	48.9495
16	33.1	Empty Barrels / containers/liners containing with Hazardous Waste	527.56
17		Discarded plastics container	22.132
18	6.2	Zinc dross	1324.6
19	35.2	Spent Iron Catalyst	0
20	37.2	Sludge from Gas Holder	0
21	35.1	Exhaust Air or Gas Cleaning Residue	0
22	18.4	Chromium Sludge from Water Cooling Tower	85.47
23	35.3	Chemical Sludge from Waste Water Treatment (ZLD Salt)	80041
24	36.2	Filters & filter materials which have organic content	12.975

B) Method of Disposal

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-process provided the oil meets the standards as per Schedule-5 Part-A/B of the Rules.
	3.3	Waste oil	
	5.2	Oil soaked cotton waste	Stored in a secured manner and incinerated in captive incinerator.
	12.1	Waste pickled liquor	Stored in a secured manner and reprocessed in the plant.
	12.1	Acid residue	Treated in ETP
	12.2	Alkali residue	Treated in ETP
	13.3	Decanter tank sludge	Used back in Coke oven
	13.4	Tar storage tank residue	Used back in Coke oven
	34.2	Spent ion exchange resin containing toxic chemicals	Used back in Coke oven
	34.3	1) ETP Sludge	Used back in pellet making.
		2) Impure sulphur	Stored in a secured manner and disposed to TSDF, Bangalore
	34.4	Oil and grease skimming residue	Used back in Coke oven
	35.1	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
	36.1	Sludge from wet scrubbers	Stored in a secured manner and incinerated in captive incinerator.
	36.2	Ash from incinerator in Kg	Stored in a secured manner and disposed to TSDF.
	33.13	1) Discarded plastic containers 2) Discarded MS barrels	Stored in a secured manner and handed over to KSPCB authorized recycler afterwashing.
	35.3	BOD sludge	Reused in Coke oven
		ZLD salt	Sent to TSDF for landfilling at Bangalore
	18.4	Chrome sludge	Sent to TSDF for landfilling at Bangalore
		Zinc dross	Sold to Authorised Recyclers

PART – E **SOLID WASTES**

Generation and Utilization of Solid waste in MT/A

Category	UOM	Solid Waste FY 22	
		Generation	Utilisation
Iron making slag	MT	4621929	4621929
Steel making slag	MT	2719740	2719740
Waste to wealth plant tailings	MT	129668	129668
Sludge	MT	429975	429975
Dust	MT	581878	581878
Millscale	MT	181484	181484
Fly Ash from CPP	MT	201693	201693
Total Tonnage		8866367	8866367
% Utilisation			100

PART –F

Characteristics of Solid Waste

Type of waste	Granulated Slag	Slag	Sludge		Mill scale		Flue dust	Lime dust
Source	**IM**	**BOF**	**BOF**	**COREX**	**BOF**	**HSM**	**BF**	**LCP**
Fe(T)	0.3-0.7	30-35	60-65	65-70	72-74	72-74	-	-
SiO_2	32-35	12-16	2-3	4-5	0.2-0.25	0.2-0.25	8.52	1.8-2.0
Al_2O_3	16-18	7-8	1-1.5	2-3	-	-	2.53	0.4-0.6
CaO	34-36	42-45	14-16	3-4	0.3-0.35	0.3-0.35	3.85	60-65
MgO	6-8	4-8	2-3	1-2	0.1-0.15	0.1-0.15	2.22	1.3-2.0
MnO	0.5-1.5	1-3	0.5-1.0	0.3-0.5	0.1-0.15	0.1-0.15	-	-
TiO_2	0.7-0.9	0.2-0.5	0.1-0.2	0.1-1.0	-	-	0.19	0.2-0.5
S	0.6-1.3	2-3	0.06-0.08	0.07-0.1	0.1-0.15	0.1-0.15	0.32	0.3-0.4
P	-	0.1-0.3	0.06-0.07	0.1-0.2	0.05-1	0.05-1	0.06	0.01-0.02
C	-	-	3-4	16-18	0.3-0.5	0.3-0.5	36.73	-

PART – G

IMPACT OF THE POLLUTION CONTROL MEASURES TAKEN ON CONSERVATION OF NATURAL RESOURCES

CONSERVATION OF NATURAL RESOURCES

A. WATER ENVIRONMNET

JSW receives water from Tung Bhadra (TB) Dam and Almatti Dam. Specific water consumption is slightly increased due to larger share of Almatti water which is a high TDS water (300-400 mg/l). JSW has implemented number of water conservation measures with best available technologies to minimise water demand. JSW has invested in extensive instrumentation in water flow measurement to monitor water useon an hourly basis. The plant has also implemented a number of wastewater recyclingmeasures to recycle for iron ore beneficiation, horticulture and fire water use. The company recycles close to 50000 m^3/day of water which leads to substantial cost savings, while also greening the surroundings.

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.
- Water recovery and recycling initiatives
- Achieve global benchmarks
- 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, fire fighting, 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	6

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(m3)	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 m3

Recycling of water up to 40,000 -45000 m3/day in non-critical applications through all the guard ponds.

Reverse osmosis plant for recycle of blowdown water:

Sl no	Location	Capacity(m 3/day)	Feed source
1	HSM #1	2200	Guard pond-1,HSM1,CRM1,SMS1
2	JSWEL.	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
Total capacity		20700	

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

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(m3/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	2500	MBR Technology. Recycled to 5 MTPA process and Green belt
6	Lake view	400	MBR Reused for Green belt
7	Sun rise Valley	900	MBR. Reused for Green Belt
Total capacity		10500 m3/day	

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 0.56 kg/tcs in 2021-22 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 dust emission.
The details of Air pollution control measures implemented are as follows:

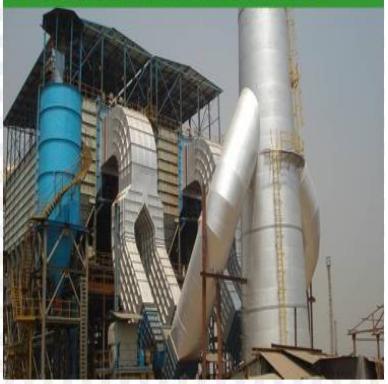
a. Environmental Friendly Iron ore transportation through pipe conveyors at JSW Vijayanagar works – 25 MTPA- 24 Km length to improve ambient air quality of the region. This is being extended to 83 KM.
b. Installation of MEROS/ High Efficiency Baghouse after ESP in Sinter Plant 2 to achieve emissions below the European BAT norms of 10 mg / NM3
c. Installation of SOPECO technology in recovery coke ovens to achieve charging Electrostatic precipitators - 18 nos.
d. Bag houses – 250 nos.
e. ESP- 18 nos
f. Scrubbers -22 nos. emission less than 16 seconds.
g. Wind Curtains – 3.2 KM
h. Dry fog systems in 160 Junction Houses of Raw Material Handling systems
i. High efficiency ESPs/ Bag filters in Pellet Plant, up gradation of SMS 1 & SMS 2 secondary dedusting.
j. In addition to the above all the internal roads have been paved and concreted and tree plantation done on either sides of the road
k. Vacuum sweeping of the roads and road wetting is done on regular basis.
l. 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

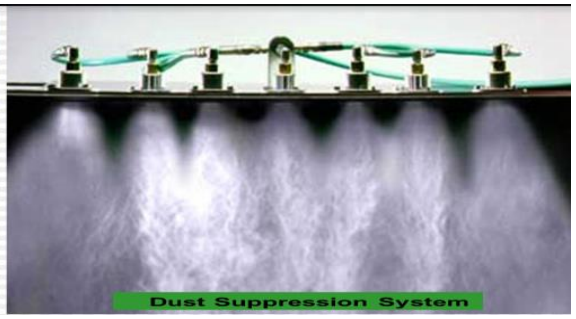
PIPE CONVEYOR(24 KMS)

Dust Suppression System

Vacuum sweeping in shops

Vacuum sweeping on roads

Raw Material Yard Dust suppression.



A. SOLID WASTE MANAGEMENT

a. During the year 2021-22, waste utilization was given a fillip with the “waste to wealth” plant. This processes iron bearing dusts & sludge (from Corex, BF GCP etc) to produceiron and carbon concentrate for use in pellet plant -1 and sinter plant -1.

b. Micro pellet plant and mill scale briquetting plants operated above their designed capacities. During the year micro pellet plant operated at 1950 TPD against its capacity1650 TPD. Similarly, the mill scale briquetting operated at 750 TPD against its capacityof 550 TPD by optimizing their feeding recipe.

c. 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 various waste handling facility viz. Micro pellet plant, mill scale briquetting plant, waste to wealth plant and slime recovery plant.

d. 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 lakh tonnes of slag sand sold to construction industry.

e. 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.

f. Carbon recovery from low Fe dust and sludge has been initiated during this year fromthe Waste to wealth plant. Further the carbon concentrate utilized in sinter making.

PART – H

ADDITIONAL MEASURES / INVESTMENT PROPOSAL FOR ENVIRONMENTAL PROTECTION

Proposed Investment (2022-23) for environment protection in JSW Steel Limited (Capex 22-23)

Sl. No	Project Title	Budget required (Rs. in Crs.)
	a) Dedusting system at 7J105 DDS – 7MT Coke Drive Junction House - (JH's 7JH31, 5JH22, 5JH22A, 5JH22B, 7JH106,CSP) Capacity:330000 M3/hr b) Dedusting system at Coke drive Junction House - 5JNT1 DDS – 5MT Coke Drive (JH's 4JH13A,5JNT1,N-JNT1,N-JNT2,N-JNT3)Capacity:285000 M3/hr c) Dedusting system at Coke drive Junction House - 5JH12 DDS–5MT Coke Drive (JH's 4JH12,4JH13, 4JH58 & 4JH59) Capacity:330000 M3/hr	13.16
4	Installing of 7J44 New De -Dusting System of Capacity 150000 M3/hour (Jucntion Houses of 7JH44,44A,44B,44C,44D & 7JH45)	4.75
5	Upgradation of ESP2	15
6	Storage Building bag filter Capacity enhancement	15
7	STP treated water from township (HST and Vidyanagar) to plant	7.36
8	Replacement of V.V.Nagar STP pipeline with higher size	1.28
9	GP2 desilting	3
10	GP4 -25000 m3 guard pond to be proposed for 5mtpa plant	1.3
11	SMS2 ID fan Impeller wash water recycling (Intsllation of actiflo to recycle 1200 M3/day of ID fan water)	2.5
12	STP treated water from steel plant STP to SMS3	1.16
13	Incinerator-500 kg/h Phase 2	5
14	Retrofitting and Shifting of Vaddu AAQMS Contatiner to new location	0.28
15	Procurement of Laboratory analysers for water testing	0.17
16	Procurement of CEMS dust monitors & sample handling system	0.6
17	Phase 1: Blow down measurement of individual departments	0.75
18	Vertical fall arrester for Stacks	0.8
	Grand Total	**72.11**

PART – I

MISCELLANEOUS

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 2021-22 is given below:

Key Performance Indicators	
Year	**2021-22**
Parameters	
Sp water consumption (m^3/tcs)	2.51
Dust emission (kg/tcs)	0.56
SO2 emission (kg/tcs)	2.42
NOx emission (kg/tcs)	1.42
Solid Waste Utilization (%)	100
Sp Energy Consumption (Gcal / tcs)	6.08