



By E-Mail

Ref.No.: MGM/P&E/109/21

Date: 27/09/2021

To
The Member Secretary,
Odisha State Pollution Control Board,
Paribesh Bhawan,
A/118, Nilakantha Nagar,
Bhubaneswar, 751012

Subject: Submission of Annual Environmental Statement in FORM-V for the year ending 31st March 2021 in respect of Tiringpahar Iron and Manganese Mine of M/s Tata Steel Ltd.

Reference: Rule-14 under Environmental (Protection) Amendment Rule, 1993 (G.S.R.386,22.04.1993)

Dear Sir,

We are hereby submitting the **Annual Environmental Statement** in "FORM-V" prescribed under the above referenced statute, for the year ending 31st March 2021 in respect of Tiringpahar Iron and Manganese Mine of M/s Tata Steel Ltd., At/Po-Bichhakundi, Dist-Keonjhar, Odisha.

This is for your kind information and perusal please. Receipt of the same may please be acknowledged.

Thanking you,

Yours faithfully,
F: TATA STEEL LTD.

Head
Mine & Production Planning
Tiringpahar Iron and Manganese Mine
Ferro Alloys Mineral Division

Enclosure: Annual Environmental Statement (FORM-V) for the Financial Year ending 31st March 2021

Copy To:

- 1) Zonal Office Kolkata, Central Pollution Control Board, South end Conclave, Block 502, 5th and 6th Floors, 1582 Rajdanga Main Road, Kolkata, West Bengal 700107.
- 2) The Regional Officer, State Pollution Control Board, Baniapat, DD College Road, Keonjhar, Odisha-758001.
- 3) MoEF&CC Eastern Regional Office, A/3, Chandrasekharapur, Bhubaneswar-751023

TATA STEEL LTD.

Ferro Alloys & Minerals Division, Manganese Group of Mines, At/P.O.: Bichhakundi, Via: Joda,
Dist: Keonjhar Odisha – 758 034 Tel.: 9238101370, e-mail : mnminesadmin@tatasteel.com
Regd.Office : Bombay House, 24 Homi Modi Street, Mumbai – 400 001 Tel 912266658282, Fax 912266657724
Corporate Identity Number L27100MH1907PLC000260 website : www.tatasteel.com



ANNUAL ENVIRONMENTAL STATEMENT
for FY 2020-21

[FORM – V]

For the year ending 31st MARCH 2021

[Rule-14 under Environmental (Protection) Amendment Rule, 1993]
(G.S.R.386,22.04.1993)

Submitted By:

Tiringpahar Iron & Manganese Mine

M/s. Tata Steel Limited

At/Po: Bichhakundi, Via-Joda

District- Keonjhar, Odisha -758 034

FORM V

[See Rule 14 of Environment (Protection) Amendment Rules, 1993]

ENVIRONMENTAL STATEMENT

for the financial year ending the 31st March 2020

PART - A

- (i) Name and Address of the Owner / occupier of the industry operation or process. : **TIRINGPAHAR IRON & MANGANESE MINE**

Nominated Owner:

Mr. T.V. Narendran
Managing Director, M/s TATA Steel Ltd.
Jamshedpur, Dist- East Singhbhum
Jharkhand – 831 001

Agent:

Mr. Amit Kumar Dubey,
Head(Manganese Group of Mines), Joda, FA
& MD, TATA Steel
P.O.: Bichhakundi, Via : Joda
Dist : Keonjhar, Orissa – 758 034

- (ii) Industry Category : Opencast Mining
- (iii) Production Capacity – Units : **85,000 Tonnes per annum** (Manganese Ore or 0.85 LTPA (as per Environmental Clearance))
- (iv) Year of Establishment : 1972
- (v) Date of the last environmental statement submitted : 28th Sept'2020

PART - B

Water and Raw Material Consumption: Mining is not a manufacturing process thus water is not a raw material essential for production; however, water is used for haul road dust suppression and other support services which are not directly linked with the quantum of production.

- (1) Water Consumption m³/day (Av. figures for 2020-21)
- Process : 45 m³/day (Water sprinkling) (**Total-16425m³**)
- Cooling : Nil
- Domestic : 30.43 m³/day (**Total-11106.95m³**)

Name of the Products	<u>Process water consumption per unit of product output</u>	
	During the previous Financial year	During the current Financial year
	(1)	(2)

(1) Manganese Ore	Nil	Nil
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Remarks: *Manganese Ore is produced by semi mechanized Mining method, which does not involve beneficiation and thus precludes the consumption of water. Unlike manufacturing processes, production from mining doesn't involve water as raw material for any of the operational activities.*

(2) Raw material consumption: Unlike manufacturing processes, mining doesn't involve any such raw materials; However, uses various other resources for ancillary services essential to ensure mining such as Diesel, Electricity and Explosives, etc.

The table below reflects the production and dispatch figures for the last two financial year

Name of the raw materials	Name of the product	Consumption of raw materials per unit	
		During the previous Financial year (Year 2019-20)	During the current Financial year (Year 2020-21)
-Nil-	Manganese Ore	Production 84998.000 MT	Production 84141.000MT
		Despatch 74006.99 MT	Despatch 68052.55 MT

Remarks: *The ore produced from Mine head is used as raw material to produce ferro manganese. Other essential resources used during the reporting period (2019-20) is as follows: Diesel (322.535KL), Explosive (144475 Kg), Electricity (38430 Kw-h from grid & 1314Kw-h from DG set).*

PART - C

Pollution discharged to environment / unit of output (Parameter as specified in the Consents issued)

Pollution	Quantity of pollutants discharged (mass/day)	Concentrations of Pollutants in discharges (mass/volume)	Percentage of variation from prescribed standards with reasons
(a) Water	-Nil-	-Nil-	Not Applicable

There are no direct/indirect source for discharge of effluents/pollutants to the environment. Ground water strata is much below the present pit depth and since mine is operated without intercepting the regional GW table thus potential contamination aspect is eliminated. The environmental quality parameters are monitored, and reports are submitted to SPCB as well as MoEF&CC along with six monthly compliance reports.

(b) Air	-Nil-	-Nil-	Not Applicable
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There is no such point source of emission from the mine. Major source of air pollutants is fugitive dust generated mainly due to the movement of vehicles in the haul roads, drilling/blasting activities etc, which is fugitive in nature and thus has not been quantified (mass/day).

The environmental quality parameters are monitored and reports are submitted to SPCB as well as MoEF&CC along with six monthly compliance reports. Pls. Refer to Enclosure for the last quarter Env Monitoring report.

PART - D
(Hazardous Wastes)

[As specified under the Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016]

Hazardous Wastes	Total Quantity	
	During the previous Financial year	During the current Financial year
	<u>Year (2019-20)</u>	<u>Year (2020-21)</u>
(i) From Process Waste containing Oil	Nil	Nil
Used Oil (in Ltrs.)	225 Ltrs	340Ltrs
Cotton Waste (in Kgs)	5 (approx.)	0.5
Duster (in Nos.)	Nil	Nil
Filters (in Nos.)	45 (approx.)	Nil
(ii) From pollution control facilities	Nil	Nil

Remark: The quantity indicated reflects that of the quantity generated from the departmental HEMM fleets and is exclusive of the major chunk of generation, managed by the outsourced agencies deployed for mining. There exist one common HW storage facility catering to both Bamebari & Tiringpahar Iron & Manganese Mines.

PART - E
(Solid Wastes)

	Total Quantity	
	During the previous Financial year	During the current Financial year
	<u>Year (2019-20)</u>	<u>Year (2020-21)</u>
(a) From Process (Overburden material)	424127.0 MT	312510.0MT
(b) From pollution control facilities	Nil	Nil
(c)		
(1) Quantity recycled or re-utilized within the unit	Nil	Nil
(2) Sold	Nil	Nil
(3) Disposal	424127.0 MT	312510.0MT

PART - F

(Please specify the characterization (in terms of composition and quantum) of hazardous as well as solid wastes and indicate disposal practice adopted for both these categories of wastes)

- **Characterization of Hazardous Waste:** - The significant source of hazardous waste is Used oil (HW-5.1) is mainly Hydrocarbons and consist of lubricants, coolants, transformer oil and hydraulic oil. Lead Acetate batteries are also used in HEMM fleet which are mainly of automotive fuel cells.

- Overburden being the only form of significant solid **waste** contains lateritic morrum, shale and quartzite, etc.
- **Disposal Practice:** -
 - SOLID WASTES -OB dumps are maintained as per the approved scheme of mine plan where proper terraces and peripheral drains are constructed supported with gabion wall/retention wall to arrest the silt/sediments during monsoon season. Once the slope of the dumps is stabilised then the dumps are reclaimed by plantation of native varieties of forestry saplings.
 - USED OIL -The used oil generated at various sources is collected in leak proof barrels and then is kept on an impervious floor with oil catch pit. It is also ensured that the caps of the barrels remain intact and horizontal. The storage area is properly fenced, and caution board displayed. The used oil collected from sites are centrally auctioned to an SPCB authorised/registered recycler for recycling. At present, used oil generated from the departmental HEMM fleet (TSL's fleet of HEMM) are managed by the company through auctioning; however major chunk of generation is due to the contractual operations, managed by outsourced agencies as per applicable norms.
 - Provision of impervious pit for collection of oily waste in the workshop premises in addition to the existing practice of collection at specified barrels.

PART - G

(Impact of pollution abatement measures taken on conservation of natural resources and on the cost of production)

1. Water spraying on haul Roads and Mine Pits is done regularly to suppress the dust.
2. All the haul roads in the mining area are made up of morrum & compacted. Regular repair is being done by dozer & grader after spreading the layer of sweet morrum over it.
3. Wet drilling is practices along with controlled blasting followed for minimal dust generation and prevent fly rocks.
4. During FY 2020-21, around 8640nos of saplings of native forestry species have been planted along the dump slope only.
5. The mine management proactively undertakes various environmental activities for the conservation/protection of environment. The cost incurred towards environmental measures are earmarked in a separate fund center. An abstract on the approximate cost spent towards environmental measures during FY 2020-21, in respect of Tiringpahar Iron & Manganese Mine is summarised in the table as follows:

Table. Environmental Expenditure for 2020-21

S.No.	Environmental Conservation/ Protection Measures	Expenditure (Lacs-INR)	
		Proposed	Actual
1	Afforestation on Dump slopes (5600 saplings/2Ha)	4.20	5.60
2	Construction/Maintenance of retaining wall (840mtrs)/Rain Pass	4.9	4.50
3	Construction/Maintenance of Garland drain, settling pits with check dam	1.20	1.15
4	Env. Awareness/Mines Environment & Mineral Conservation Week Celebration	4.0	3.8

S.No.	Environmental Conservation/ Protection Measures	Expenditure (Lacs-INR)	
		Proposed	Actual
5	Annual Environmental Monitoring	12.0	9.5
6	Installation of Automatic Wheel Wash System	16.0	14.50
7	Rainwater Harvesting Structure/Pond	Nil	Nil
8	Dust Suppression-Mobile Water Tanker	23.0	17.0
9	Annual Water Audit by FICCI	6.5	4.5
10	Hydrogeological Investigation as per CGWA Guidelines	6.0	4.5
11	Restoration of SAL Saplings/Soil Amendment	6.5	4.85
	Total	84.3	69.9

6. In addition, Tata Steel Rural Development Society also undertakes the peripheral development activities with a large magnitude.

PART - H

(Additional measures / investment proposal for environmental protection, abatement of pollution, prevention of pollution)

- a) Garland drains and toe wall around the OB dumping shall be provided to check and channelize surface run-off.
- b) Plantation of forestry species shall be planted over the inactive waste dump slopes to arrest the airborne dust.
- c) Vetiver Plantation has been done in inactive dump slope.
- d) Green belt has been developed along colony and mining.
- e) Soil Conditioning and treatment practices followed for land reclamation
- f) In-House nursery for development of native varieties of forestry saplings.

PART - I

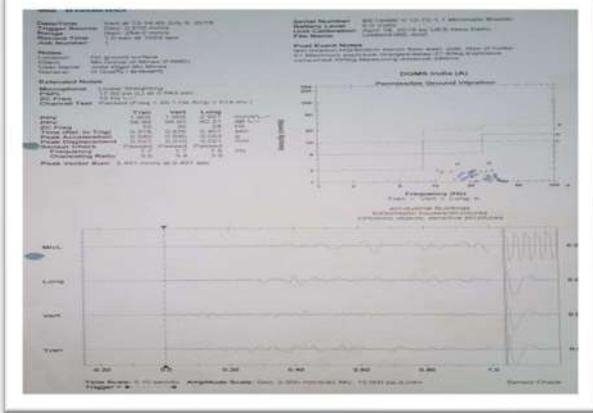
(Any other for improving the quality of environment)

1. With compliance to conditions of Environment Clearance obtained from MoEF, the following monitoring is being done at regular interval.
 - Ground Water Level at nearby bore wells
 - Trace metal in dust fall
 - Ground water quality at lower level
 - Meteorological monitoring
 - Trace metals such as Fe, Cr+6, Cu, Se, As, Cd, Hg, Pb, Zn and Mn at specific locations for both surface water (downstream & upstream) and ground water at lower elevation is being periodically monitored by referring to the standards as per BIS : 10500.
2. Top soils generated during excavation are utilized immediately for nursery development and dump slope plantation.
3. Measures taken to control Air Pollution: -
 - Water sprinkling on the haul road,

- Provision of dust masks to the workmen,
 - Adoption of wet drilling arrangement in the drill machines and
 - Black topped road in the residential colony.
 - Green belt along mining and colony
 - Native sapling and vetiver plantation in inactive dumps.
4. Measures taken to control Water Pollution: -
- Construction of the wall and garland drain along the dump slope to prevent surface runoff during monsoon.
 - Construction of soak pits for discharge of sanitary sewage.
 - Provision of oil separation pit for effluents coming out of workshop at Joribar.
 - Native sapling and vetiver plantation in inactive dumps.
5. Measures taken to control Noise & Ground Vibration: -
- Thick plantation has been developed around the mines and office building to provide a canopy cover
 - Implementation of advance blasting technique(NONEL) to reduce the blast induced ground vibration and
 - Workmen are provided with earmuff while working near heavy earth moving machineries.
6. Measures taken to control Land Degradation: -
- Afforestation around the non-active dump for stabilization and
 - Reclamation and rehabilitation of mined out area as per approved Scheme of Mining.
7. Surveillance of Occupational Health: - Periodical Medical Examination of employees (departmental & contractual) are conducted as per prescribed norms of Mines Rule, 1955. The initial and periodical examination includes blood haematology, blood pressure, detailed cardiovascular assessment, neurological examination etc.
8. The mine is certified with ISO-14001:2015 (Environment Management System).

Safety & Environmental Precautions During Drilling & Blasting





Mining Machineries at Tiringpahar



2 Shovels of (Cap: 1.6 m³ Volvo.)



Best Management Practices:



Impact of Grading -HaulRoad



Haul Road with Safety Berms



Mine Haul Road



Terraces over Dump Slope

Haul Road Dust Suppression Measures:



Grader for Haul Road



Mobile Water Tanker



Fixed Sprinkling System



Mobile Mist Canon for Dust Suppression

PHOTOGRAPHS OF WHEEL WASH FACILITY



Fig.1 Automatic Wheel Wash Facility @ Mine Exit of Guruda Block of Tiringpahar



Fig.2 Automatic Wheel Wash Facility @ Guruda Block of Tiringpahar

PHOTOGRAPHS OF AAQ STATIONS (CORE ZONE)



Fig.3 AAQ Station Near Guruda Sorting Yard (Tiringpahar Iron & Mn Mine)



Fig.4 AAQ Station Near Guruda Pit Office (Tiringpahar Iron & Mn Mine)



Fig.5 AAQ Station Near Mine Viewpoint (Tiringpahar Iron & Mn Mine)



Fig.6 AAQ Station Near Joribar Weigh Bridge (at the common boundary of Bamebari & Tiringpahar)

Thanking you,

Date: 27-09-2021

Yours faithfully,
F: TATA STEEL LTD.

Head
Mine & Production Planning
Tiringpahar Iron and Manganese Mine
Ferro Alloys Mineral Division

ECOMEN LABORATORIES PVT. LTD.

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LABORATORIES PVT. LTD.

An approved Laboratory from Ministry of Environment, Forest and Climate Change, Govt. of India, New Delhi

FORMAT NO. ECO/QS/FORMAT/10

TEST REPORT NO: ECO LAB/AAQ/01/21

TEST REPORT ISSUE DATE: 05.02.2021

Ambient Air Quality Monitoring Report (Core Zone)

Name of the Mine : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited

Location : AAQMS-1: Near Weigh Bridge (Guruda Pit)

Sampling Method : IS: 5182

Instrument Used : RDS, FDS, CO Analyzer & VOC Sampler

Sample Collected By : Ecomen Team in presence of TSL's Representative

Sl. No.	Date of Monitoring	Concentration of Pollutant				
		PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	CO (mg/m ³)
1	03.01.2021	73.50	36.2	15.2	24.6	0.43
2	05.01.2021	66.20	38.3	13.4	24.2	0.42
3	9.01.2021	73.1	41.7	10.4	23.8	0.38
4	11.01.2021	62.50	38.5	9.8	23.4	0.44
5	16.01.2021	64.4	43.3	13.2	19.5	0.51
6	19.01.2021	74.7	35.4	12.6	18.50	0.37
7	23.01.2021	71.6	33.6	13.1	17.40	0.47
8	25.01.2021	66.4	35.3	13.5	19.3	0.44
Average		69.05	37.79	12.65	21.34	0.43
Limit as per CPCB notification New Delhi, 18th Nov, 2009. for Ambient air quality		100	60	80	80	4.0
Standard Method		IS : 5182 (Part-23) 2006	NAAQM Volume-I by CPCB	IS : 5182 (Part-2) 2001	IS : 5182 (Part-6) 2006	IS : 5182 (Part-10)

*These results are related only to tested items.


Analyst


Authorized Signatory


Manager (Q)

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Sample Collected By : Ecomen Team in presence of TSL's Representative

SI. No.	Date of Monitoring	Concentration of Pollutant						
		NH ₃ (µg/m ³)	O ₃ (µg/m ³)	Pb (µg/m ³)	Ni (ng/m ³)	As (ng/m ³)	Benzene (µg/m ³)	Benzo(a) pyrene (ng/m ³)
1	03.01.2021	21.4	12.9	<1.0	1.2	<1.0	<4.0	<0.05
2	05.01.2021	20.6	15.52	<1.0	1.2	<1.0	<4.0	<0.05
3	9.01.2021	19.4	13.64	<1.0	1.3	<1.0	<4.0	<0.05
4	11.01.2021	17.7	16.20	<1.0	1.41	<1.0	<4.0	<0.05
5	16.01.2021	14.3	15.44	<1.0	1.32	<1.0	<4.0	<0.05
6	19.01.2021	17.4	16.4	<1.0	1.54	<1.0	<4.0	<0.05
7	23.01.2021	23.6	11.43	<1.0	1.15	<1.0	<4.0	<0.05
8	25.01.2021	20.2	15.12	<1.0	1.16	<1.0	<4.0	<0.05
Average		19.33	14.58	-	1.29	-	-	-
Limit as per CPCB notification New Delhi, 18 th Nov, 2009. for Ambient air quality		400	180	1	20	6	5	1
Standard Method		APHA 401 (Indophenol)	IS : 5182 (Part-9) 1974	IS : 5182 (Part-22) 2004	NAAQM Volume-I by CPCB	NAAQM Volume-I by CPCB	IS : 5182 (Part-11)	IS : 5182 (Part-12)

*These results are related only to tested items.


Analyst


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FORMAT NO. ECO/QS/FORMAT/10

TEST REPORT NO: ECO LAB/AAQ/02/21

TEST REPORT ISSUE DATE: 05.02.2021

Ambient Air Quality Monitoring Report (Core Zone)

Name of the Mine : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited

Location : AAQMS-1: Near Security Gate (Purunapani Pit)

Sampling Method : IS: 5182

Instrument Used : RDS, FDS, CO Analyzer & VOC Sampler

Sample Collected By : Ecomen Team in presence of TSL's Representative

SI. No.	Date of Monitoring	Concentration of Pollutant				
		PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	CO (mg/m ³)
1	03.01.2021	71.2	34.78	11.70	23.66	0.38
2	05.01.2021	66.40	37.24	12.73	19.42	0.35
3	9.01.2021	65.2	31.19	13.66	18.28	0.33
4	11.01.2021	74.4	31.40	09.58	15.32	0.32
5	16.01.2021	64.32	41.24	09.64	13.36	0.35
6	19.01.2021	58.42	43.20	10.74	11.34	0.41
7	23.01.2021	63.24	32.19	11.54	13.40	0.34
8	25.01.2021	71.42	34.20	13.72	15.30	0.32
Average		66.83	35.68	11.66	16.26	0.35
Limit as per CPCB notification New Delhi, 18 th Nov, 2009. for Ambient air quality		100	60	80	80	4.0
Standard Method		IS : 5182 (Part-23) 2006	NAAQM Volume-I by CPCB	IS : 5182 (Part-2) 2001	IS : 5182 (Part-6) 2006	IS : 5182 (Part-10)

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Sl. No.	Date of Monitoring	Concentration of Pollutant						
		NH ₃ (µg/m ³)	O ₃ (µg/m ³)	Pb (µg/m ³)	Ni (ng/m ³)	As (ng/m ³)	Benzene (µg/m ³)	Benzo(a) pyrene (ng/m ³)
1	03.01.2021	18.50	12.61	<1.0	1.09	<1.0	<4.0	<0.05
2	05.01.2021	17.46	13.34	<1.0	1.02	<1.0	<4.0	<0.05
3	9.01.2021	16.64	12.92	<1.0	1.06	<1.0	<4.0	<0.05
4	11.01.2021	21.40	11.21	<1.0	1.04	<1.0	<4.0	<0.05
5	16.01.2021	13.62	10.432	<1.0	0.92	<1.0	<4.0	<0.05
6	19.01.2021	14.44	16.73	<1.0	0.85	<1.0	<4.0	<0.05
7	23.01.2021	21.62	17.37	<1.0	0.92	<1.0	<4.0	<0.05
8	25.01.2021	21.27	18.43	<1.0	1.22	<1.0	<4.0	<0.05
Average		18.12	14.13	-	1.02	-	-	-
Limit as per CPCB notification New Delhi, 18thNov, 2009. for Ambient air quality		400	180	1	20	6	5	1
Standard Method		APHA 401 (Indophenol)	IS : 5182 (Part-9) 1974	IS : 5182 (Part-22) 2004	NAAQM Volume-I by CPCB	NAAQM Volume-I by CPCB	IS : 5182 (Part-11)	IS : 5182 (Part-12)

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An approved Laboratory from Ministry of Environment, Forest and Climate Change, Govt. of India, New Delhi

FORMAT NO. ECO/QS/FORMAT/10

TEST REPORT NO: ECO LAB/AAQ/05/21

TEST REPORT ISSUE DATE: 07.02.2021

Ambient Air Quality Monitoring Report (Buffer Zone)

Name of the Customer : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited

Sampling Method : IS: 5182

Instrument Used : RDS, FDS, CO Analyzer & VOC Sampler

Sample Collected By : Ecomen Team in presence of TSL's Representative

Sl. No.	Location (Date of Monitoring)	Concentration of Pollutant				
		PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	CO (mg/m ³)
1	Jaribahal (5.01.2021)	72.4	36.4	12.4	19.5	0.62
2	Balda (10.01.2021)	74.6	39.4	12.2	18.62	0.58
3	Palsa (13.01.2021)	80.4	36.4	15.6	21.8	0.48
4	Jajanga (19.01.2021)	72.7	36.5	14.6	19.8	0.65
Average		75.03	37.18	13.70	19.93	0.58
Limit as per CPCB notification New Delhi, 18thNov, 2009. for Ambient air quality		100	60	80	80	4.0
Standard Method		IS : 5182 (Part-23) 2006	NAAQM Volume-I by CPCB	IS : 5182 (Part-2) 2001	IS : 5182 (Part-6) 2006	IS : 5182 (Part-10)

*These results are related only to tested items.

Anshu
Analyst

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Manager (Q)

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An approved Laboratory from Ministry of Environment, Forest and Climate Change, Govt. of India, New Delhi

FORMAT NO. ECO/QS/FORMAT/10

TEST REPORT NO: ECO LAB/AAQ/03/21
TEST REPORT ISSUE DATE: 07.02.2021

Ambient Air Quality Monitoring Report (Buffer Zone)

Name of the Customer : Joda West Iron & Manganese Mine of
M/s Tata Steel Limited

Sampling Method : IS: 5182

Instrument Used : RDS, FDS, CO Analyzer & VOC Sampler

Sample Collected By : Ecomen Team in presence of TSL's Representative

Sl. No.	Location (Date of Monitoring)	Concentration of Pollutant						
		NH ₃ (µg/m ³)	O ₃ (µg/m ³)	Pb (µg/m ³)	Ni (ng/m ³)	As (ng/m ³)	Benzene (µg/m ³)	Benzo (a) pyrene (ng/m ³)
1	Jaribahal (5.01.2021)	19.4	11.3	<1.0	1.42	<1.0	<4.0	<0.05
2	Balda (10.01.2021)	21.7	12.2	<1.0	1.12	<1.0	<4.0	<0.05
3	Palsa (13.01.2021)	22.9	13.8	<1.0	1.14	<1.0	<4.0	<0.05
4	Jajanga (19.01.2021)	22.2	11.8	<1.0	1.10	<1.0	<4.0	<0.05
Average		21.55	12.28	-	1.20	-	-	-
Limit as per CPCB notification New Delhi, 18th Nov, 2009. for Ambient air quality		400	180	1	20	6	5	1
Standard Method		APHA 401 (Indophenol)	IS : 5182 (Part-9) 1974	IS : 5182 (Part-22) 2004	NAAQM Volume-I by CPCB	NAAQM Volume-I by CPCB	IS : 5182 (Part-11)	IS : 5182 (Part-12)

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FORMAT NO. ECO/QS/FORMAT/13

TEST REPORT NO: ECO LAB/AN/03/21

TEST REPORT ISSUE DATE: 07.02.2021

TEST REPORT OF AMBIENT NOISE LEVEL MONITORING

Name of the Customer : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited
Sample Collected By : Ecomen Team using Integrated Sound Level Meter
Instrument Used : Noise Meter (Lutron)

S.No.	Date of Monitoring	Name of Location	Category of Zone	Day Time Leq Value in dB(A)	Night Time Leq Value in dB(A)
1	13-01-2021	Near Screen Plant	Industrial	74.7	44.4
2	15-01-2021	Near Mine Office	Industrial	66.3	43.6
3	21-01-2021	Near Sorting Yard	Industrial	71.8	43.4

Noise (Ambient Standard) as per The Noise Pollution (Regulation and Control) Rules, 2000

Area Code	Category of area	Limit in dB (A) Leq	
		Day Time	Night Time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

Note:

1. Day time is reckoned in between 6:00 AM and 10:00 PM.
2. Night time is reckoned in between 10:00 PM and 6:00 AM
3. Silence zone is defined as area up to 100m around such premises as hospitals, educational institutions & courts. The silence zones are to be declared by a competent authority.
4. Mixed categories of areas should be declared as one of the four above-mentioned categories by the competent authority and the corresponding standard shall apply.

Anand
Analyst

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Manager (Q)

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FORMAT NO. ECO/QS/FORMAT/12 TEST REPORT NO: ECOLAB/Stack1/03/21
TEST REPORT ISSUE DATE: 07.02.2021**TEST REPORT OF FLUE GAS EMISSIONS***

Name of the Customer : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited

Date of Sampling : 17.01.2021

Sample Collected by : Ecomen Team in presence of TSL's Representative

Source of Emission : Exhaust Emission from DG Set

Sampling Method : IS: 11255

Instrument Used : Stack Monitoring Kit

Details of Stack

Material of Construction : M.S.

Stack Attached to : DG Set-01 (Camp)

Capacity : 100 KVA

Stack Height:

i) Above the Platform/ Roof (m) : 10.0

ii) Above the Ground Level (m) : 15.0

Stack Top : Circular

Inside Diameter of Stack (m) : 0.0889

(at sampling point)

Cross Sectional Area of Duct/Stack (m²) : 0.0061

Ambient Air (°C) : 18.0

Flue Gas Temperature (°C) : 174.0

Exit Velocity of Gas (m/sec.) : 9.25

Flow Rate (Nm³/ sec.) : 0.037

Type of Fuel : HSD

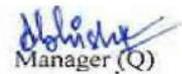
Quantity of Fuel Consumption (lit/hr) : 20-22

Sl. No.	Tests Conducted	Method	<u>Pollutant Concentration in</u> (At 15% O ₂ Correction) in <i>gm/Kw-Hr</i>	Standards as per CPCB in gm/Kw-Hr
1.	Particulate Matter (PM)	IS:11255 (Part-1)	0.055	0.2
2.	Sulphur Dioxide (SO ₂)	IS:11255 (Part-2)	0.031	-
3.	Nitrogen Dioxide (NO _x)	IS:11255 (Part-7)	0.051	4.0 (NO _x +HC)
4.	Hydrocarbon (HC)	IS:13270	1.19	
5.	Carbon Monoxide (CO)	IS:13270	1.12	3.5

*The result is related only to tested item.


Analyst


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FORMAT NO. ECO/QS/FORMAT/09

TEST REPORT NO: ECO LAB/DW/01/21

TEST REPORT ISSUE DATE: 07.02.2021

TEST REPORT OF DRINKING WATER*

Name of the Customer : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited

Address of the Customer : Tiringpahar Iron & Manganese Mine

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 7/1/2021

Date of Sample Receiving : 11/1/2021

Packing of Sample : As per requirement

Date of Analysis : 11/1/2021-16/1/2021

Source of Sample : Supply Water @ Sorting Yard

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	INDIAN STANDARDS as per IS 10500:2012	
					Acceptable Limit	Permissible Limit
1.	Colour (Hazen unit)	APHA, 23 rd Ed. 2017, 2120 B	<5.0	5-100	5.00	15.0
2.	Odour	APHA, 23rd Ed. 2017,2150 B	Agreeable	Qualitative	Agreeable	Agreeable
3.	Taste	APHA, 23rd Ed. 2017,2160 A+B	Agreeable	Qualitative	Agreeable	Agreeable
4.	pH	APHA, 23rd Ed. 2017, 4500 H+A+B	7.23	2.0-12	6.5-8.5	No Relax.
5.	Turbidity as (NTU)	APHA, 23rd Ed. 2017, 2130-A+B	BDL	1-100	1.0	5.0
6.	Total Dissolved Solids as TDS (mg/l)	APHA, 23rd Ed. 2017,2540-C	176	10-10000	500	2000
7.	Alkalinity (mg/l)	APHA, 23rd Ed. 2017,2320 A+B	149	5-1500	200	600
8.	Total Hardness as CaCO ₃ (mg/l)	APHA, 23rd Ed. 2017,2340 A+C	156	5-1500	200.0	600.0
9.	Calcium as Ca (mg/l)	APHA, 23rd Ed. 2017, 3500 Ca A+B	43.6	5 - 1000	75.0	200.0
10.	Magnesium as Mg (mg/l)	APHA, 23rd Ed. 2017, 3500 Mg A+B	12.8	5-1000	30.0	100.0
11.	Chloride as Cl (mg/l)	APHA, 23rd Ed. 2017,4500 Cl A+B	16.2	5-1000	250.0	1000.0
12.	Sulfate as SO ₄ (mg/l)	APHA, 23rd Ed. 2017,4500 SO ₄ - E	21.4	5-200	200.0	400.0
13.	Nitrate Nitrogen as NO ₃ (mg/l)	APHA, 23rd Ed. 2017, 4500 NO ₃ - B	2.4	5-100	45.0 (Max)	No Relax.
14.	Fluorides as F (mg/l)	APHA, 23rd Ed. 2017,4500-C	0.44	0.02-10	1.0	1.5
15.	Copper as Cu (mg/l)	APHA, 23rd Ed. 2017, 3111A+C	BDL	0.04-5	0.05	1.5
16.	Iron as Fe (mg/l)	APHA, 23rd Ed. 2017, 3500 Fe B	0.024	0.02-50	0.3 (Max)	No Relax.
17.	Manganese as Mn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-5	0.10	0.30
18.	Mercury as Hg (mg/l)	APHA, 23rd Ed. 2017, 3112 A+B	BDL	0.001-2	0.001(Max)	No Relax.
19.	Aluminium as Al (mg/l)	APHA, 23rd Ed. 2017, 3500 Al A+B	BDL	0.02-100	0.03 (Max)	0.2
20.	Cadmium as Cd (mg/l)	APHA, 23rd Ed. 2017,3111 A+B	BDL	0.002-2	0.003(Max)	No Relax
21.	Arsenic as As (mg/l)	APHA, 23rd Ed. 2017, 3114 C	BDL	0.01-2	0.01(Max)	No Relax
22.	Lead as Pb (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.02-5	0.01	No Relax.
23.	Zinc as Zn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	0.06	0.02-50	5	15
24.	Selenium as Se (mg/l)	APHA 23 rd Ed.2017 3500 Se-C	BDL	0.01-10	0.01(Max)	No Relax
25.	Chromium as Cr+6 (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.05(Max)	No Relax.
26.	Boron as B (mg/l)	APHA, 23rd Ed. 2017, 4500 B A+C	BDL	0.2-2	0.5	1.0
27.	Cyanide as CN (mg/l)	APHA, 23rd Ed. 2017, 4500 CN-A+C	BDL	0.02-5	0.05	No Relax
28.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-5	0.001	0.002
29.	Anionic Detergents as MBAS (mg/l)	APHA, 23rd Ed. 2017, 5540 A+C	BDL	0.01-5	0.2	1.0
30.	Free Residual Chlorine (mg/l)	APHA, 23rd Ed. 2017, 4500-Cl B	BDL	0.1-5	0.20	1.0
31.	Total coliform (MPN/100 ml)	APHA, 23rd Ed. 2017, A+ B	Absent	1.8	Absent	Absent
32.	E-Coli (Nos/100)	APHA, 23rd Ed. 2017, 9221 A+ F	Absent	1.8	Absent	Absent
33.	Fecal Coliform(MPN/100 ml)	APHA, 23rd Ed. 2017, 9221 E	Absent	1.8	-	-
34.	Pesticide	APHA, 23rd Ed. 2017, 6630 B&C	BDL	2-10	No Relaxation	No Relaxation

*These results are related only to item tested.

BDL = Below Detection Limit

Anshu
Analyst

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FORMAT NO. ECO/QS/FORMAT/09

TEST REPORT NO: ECO LAB/DW/07/21
TEST REPORT ISSUE DATE: 07.02.2021

TEST REPORT OF DRINKING WATER*

Name of the Customer : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited

Address of the Customer : Tiringpahar Iron & Manganese Mine

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 10/1/2021

Date of Sample Receiving : 15/1/2021

Packing of Sample : As per requirement

Date of Analysis : 16/1/2021-21/1/2021

Source of Sample : Borewell Near Highschool (Jajang)

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	INDIAN STANDARDS as per IS 10500:2012	
					Acceptable Limit	Permissible Limit
1.	Colour (Hazen unit)	APHA, 23 rd Ed. 2017, 2120 B	<5.0	5-100	5.00	15.0
2.	Odour	APHA, 23rd Ed. 2017,2150 B	Agreeable	Qualitative	Agreeable	Agreeable
3.	Taste	APHA, 23rd Ed. 2017,2160 A+B	Agreeable	Qualitative	Agreeable	Agreeable
4.	pH	APHA, 23rd Ed. 2017, 4500 H+A+B	7.4	2.0-12	6.5-8.5	No Relax.
5.	Turbidity as (NTU)	APHA, 23rd Ed. 2017, 2130-A+B	BDL	1-100	1.0	5.0
6.	Total Dissolved Solids as TDS (mg/l)	APHA, 23rd Ed. 2017,2540-C	172	10-10000	500	2000
7.	Alkalinity (mg/l)	APHA, 23rd Ed. 2017,2320 A+B	141.3	5-1500	200	600
8.	Total Hardness as CaCO ₃ (mg/l)	APHA, 23rd Ed. 2017,2340 A+C	164.6	5-1500	200.0	600.0
9.	Calcium as Ca (mg/l)	APHA, 23rd Ed. 2017, 3500 Ca A+B	43.8	5 - 1000	75.0	200.0
10.	Magnesium as Mg (mg/l)	APHA, 23rd Ed. 2017, 3500 Mg A+B	12.6	5-1000	30.0	100.0
11.	Chloride as Cl (mg/l)	APHA, 23rd Ed. 2017,4500 Cl A+B	18.5	5-1000	250.0	1000.0
12.	Sulfate as SO ₄ (mg/l)	APHA, 23rd Ed. 2017,4500 SO ₄ - E	29.4	5-200	200.0	400.0
13.	Nitrate Nitrogen as NO ₃ (mg/l)	APHA, 23rd Ed. 2017, 4500 NO ₃ - B	2.8	5-100	45.0 (Max)	No Relax.
14.	Fluorides as F (mg/l)	APHA, 23rd Ed. 2017,4500-C	0.41	0.02-10	1.0	1.5
15.	Copper as Cu (mg/l)	APHA, 23rd Ed. 2017, 3111A+C	BDL	0.04-5	0.05	1.5
16.	Iron as Fe (mg/l)	APHA, 23rd Ed. 2017, 3500 Fe B	0.06	0.02-50	0.3 (Max)	No Relax.
17.	Manganese as Mn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-5	0.10	0.30
18.	Mercury as Hg (mg/l)	APHA, 23rd Ed. 2017, 3112 A+B	BDL	0.001-2	0.001(Max)	No Relax.
19.	Aluminium as Al (mg/l)	APHA, 23rd Ed. 2017, 3500 Al A+B	BDL	0.02-100	0.03 (Max)	0.2
20.	Cadmium as Cd (mg/l)	APHA, 23rd Ed. 2017,3111 A+B	BDL	0.002-2	0.003(Max)	No Relax
21.	Arsenic as As (mg/l)	APHA, 23rd Ed. 2017, 3114 C	BDL	0.01-2	0.01(Max)	No Relax
22.	Lead as Pb (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.02-5	0.01	No Relax.
23.	Zinc as Zn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	0.062	0.02-50	5	15
24.	Selenium as Se (mg/l)	APHA 23 rd Ed.2017 3500 Se-C	BDL	0.01-10	0.01(Max)	No Relax
25.	Chromium as Cr+6 (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.05(Max)	No Relax.
26.	Boron as B (mg/l)	APHA, 23rd Ed. 2017, 4500 B A+C	BDL	0.2-2	0.5	1.0
27.	Cyanide as CN (mg/l)	APHA, 23rd Ed. 2017, 4500 CN-A+C	BDL	0.02-5	0.05	No Relax
28.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-5	0.001	0.002
29.	Anionic Detergents as MBAS (mg/l)	APHA, 23rd Ed. 2017, 5540 A+C	BDL	0.01-5	0.2	1.0
30.	Free Residual Chlorine (mg/l)	APHA, 23rd Ed. 2017, 4500-Cl B	BDL	0.1-5	0.20	1.0
31.	Total coliform (MPN/100 ml)	APHA, 23rd Ed. 2017, A+ B	Absent	1.8	Absent	Absent
32.	E-Coli (Nos/100)	APHA, 23rd Ed. 2017, 9221 A+ F	Absent	1.8	Absent	Absent
33.	Fecal Coliform(MPN/100 ml)	APHA, 23rd Ed. 2017, 9221 E	Absent	1.8	-	-
34.	Pesticide	APHA, 23rd Ed. 2017, 6630 B&C	BDL	2-10	No Relaxation	No Relaxation

*These results are related only to item tested.

BDL = Below Detection Limit

Anshu
Analyst

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Authorized Signatory

Abhishek
Manager (Q)

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FORMAT NO. ECO/QS/FORMAT/09

TEST REPORT NO: ECO LAB/DW/12/21

TEST REPORT ISSUE DATE: 09.02.2021

TEST REPORT OF DRINKING WATER*

Name of the Customer : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited

Address of the Customer : Tiringpahar Iron & Manganese Mine

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 10/1/2021

Date of Sample Receiving : 16/1/2021

Packing of Sample : As per requirement

Date of Analysis : 16/1/2021-21/1/2021

Source of Sample : Borewell Near Joribar Village

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	INDIAN STANDARDS as per IS 10500:2012	
					Acceptable Limit	Permissible Limit
1.	Colour (Hazen unit)	APHA, 23 rd Ed. 2017, 2120 B	<5.0	5-100	5.00	15.0
2.	Odour	APHA, 23rd Ed. 2017,2150 B	Agreeable	Qualitative	Agreeable	Agreeable
3.	Taste	APHA, 23rd Ed. 2017,2160 A+B	Agreeable	Qualitative	Agreeable	Agreeable
4.	pH	APHA, 23rd Ed. 2017, 4500 H+A+B	7.45	2.0-12	6.5-8.5	No Relax.
5.	Turbidity as (NTU)	APHA, 23rd Ed. 2017, 2130-A+B	BDL	1-100	1.0	5.0
6.	Total Dissolved Solids as TDS (mg/l)	APHA, 23rd Ed. 2017,2540-C	210	10-10000	500	2000
7.	Alkalinity (mg/l)	APHA, 23rd Ed. 2017,2320 A+B	142	5-1500	200	600
8.	Total Hardness as CaCO ₃ (mg/l)	APHA, 23rd Ed. 2017,2340 A+C	186	5-1500	200.0	600.0
9.	Calcium as Ca (mg/l)	APHA, 23rd Ed. 2017, 3500 Ca A+B	41.3	5 - 1000	75.0	200.0
10.	Magnesium as Mg (mg/l)	APHA, 23rd Ed. 2017, 3500 Mg A+B	16.7	5-1000	30.0	100.0
11.	Chloride as Cl (mg/l)	APHA, 23rd Ed. 2017,4500 Cl A+B	28.8	5-1000	250.0	1000.0
12.	Sulfate as SO ₄ (mg/l)	APHA, 23rd Ed. 2017,4500 SO ₄ - E	39.2	5-200	200.0	400.0
13.	Nitrate Nitrogen as NO ₃ (mg/l)	APHA, 23rd Ed. 2017, 4500 NO ₃ - B	5.8	5-100	45.0 (Max)	No Relax.
14.	Fluorides as F (mg/l)	APHA, 23rd Ed. 2017,4500-C	0.52	0.02-10	1.0	1.5
15.	Copper as Cu (mg/l)	APHA, 23rd Ed. 2017, 3111A+C	BDL	0.04-5	0.05	1.5
16.	Iron as Fe (mg/l)	APHA, 23rd Ed. 2017, 3500 Fe B	0.024	0.02-50	0.3 (Max)	No Relax.
17.	Manganese as Mn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-5	0.10	0.30
18.	Mercury as Hg (mg/l)	APHA, 23rd Ed. 2017, 3112 A+B	BDL	0.001-2	0.001(Max)	No Relax.
19.	Aluminium as Al (mg/l)	APHA, 23rd Ed. 2017, 3500 Al A+B	BDL	0.02-100	0.03 (Max)	0.2
20.	Cadmium as Cd (mg/l)	APHA, 23rd Ed. 2017,3111 A+B	BDL	0.002-2	0.003(Max)	No Relax
21.	Arsenic as As (mg/l)	APHA, 23rd Ed. 2017, 3114 C	BDL	0.01-2	0.01(Max)	No Relax
22.	Lead as Pb (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.02-5	0.01	No Relax.
23.	Zinc as Zn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	0.25	0.02-50	5	15
24.	Selenium as Se (mg/l)	APHA 23 rd Ed.2017 3500 Se-C	BDL	0.01-10	0.01(Max)	No Relax
25.	Chromium as Cr+6 (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.05(Max)	No Relax.
26.	Boron as B (mg/l)	APHA, 23rd Ed. 2017, 4500 B A+C	BDL	0.2-2	0.5	1.0
27.	Cyanide as CN (mg/l)	APHA, 23rd Ed. 2017, 4500 CN-A+C	BDL	0.02-5	0.05	No Relax
28.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-5	0.001	0.002
29.	Anionic Detergents as MBAS(mg/l)	APHA, 23rd Ed. 2017, 5540 A+C	BDL	0.01-5	0.2	1.0
30.	Free Residual Chlorine (mg/l)	APHA, 23rd Ed. 2017, 4500-Cl B	BDL	0.1-5	0.20	1.0
31.	Total coliform (MPN/100 ml)	APHA, 23rd Ed. 2017, A+ B	Absent	1.8	Absent	Absent
32.	E-Coli (Nos/100)	APHA, 23rd Ed. 2017, 9221 A+ F	Absent	1.8	Absent	Absent
33.	Fecal Coliform (MPN/100 ml)	APHA, 23rd Ed. 2017, 9221 E	Absent	1.8	-	-
34.	Pesticide	APHA, 23rd Ed. 2017, 6630 B&C	BDL	2-10	No Relaxation	No Relaxation

*These results are related only to item tested.

BDL = Below Detection Limit

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FORMAT NO. ECO/QS/FORMAT/10 TEST REPORT NO: ECO LAB/DUSTFALL/03/21

TEST REPORT ISSUE DATE: 09.02.2021

Dust Fall Analysis Report

Name of the Customer : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited
Location : DF-1: Near Sorting Yard (Guruda)
Sampling Method : IS: 5182
Sample Collected By : Ecomen Team in presence of TSL's Representative

Sl. No.	Duration of Monitoring	Concentration of Pollutant (t/km ² /month)				
		Total Dust Fall (t/km ² /month)	Analysis Results			
1	01.01.2021 To 31.01.2021	0.83	Co (%)	Ni (%)	Hg (%)	As (%)
			<0.001	<0.001	<.001	<0.001

*This result is related only to tested item/sample.


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FORMAT NO.: ECO/QS/D/FORMAT/04

TEST REPORT NO.: ECO LAB/Fugitive/01/21

TEST REPORT ISSUE DATE: 09.02.2021

TEST REPORT OF FUGITIVE EMISSION MONITORING

Name of the Customer : Joda West Iron & Manganese Mine of
M/s Tata Steel Limited

Location : 50 mtr from Haul Road (Guruda)

Date of Sampling : 13.01.2021

Sampling Method : IS: 5182(Part 23): 2006

Sample Collected By : Ecomen Team in presence of TSL's Representative

Sl. No.	Test conducted	Standard Method	Unit	Result	Max. Prescribed Standard as per G.S.R. 46(E) dtd. 3 rd Feb 2006 (MoEF&CC)
1.	Suspended Particulate Matter (SPM)	IS : 5182-Part-4	µg/m ³	945	1200 mg/m ³ at 25+5 m from the source of generation
2.	Respirable Particulate Matter (RPM)	IS : 5182-Part-4	µg/m ³	295	500 mg/m ³ at 25+5 m from the source of generation

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FORMAT NO.: ECO/QS/D/FORMAT/04

TEST REPORT NO.: ECO LAB/Fugitive/02/21

TEST REPORT ISSUE DATE: 09.02.2021

TEST REPORT OF FUGITIVE EMISSION MONITORING

Name of the Customer : Joda West Iron & Manganese Mine of
M/s Tata Steel Limited

Location : 100 mtr from Screen Plant (Guruda)

Date of Sampling : 21.01.2021

Sampling Method : IS: 5182(Part 23): 2006

Sample Collected By : Ecomen Team in presence of TSL's Representative

Sl. No.	Test conducted	Standard Method	Unit	Result	Max. Prescribed Standard as per G.S.R. 46(E) dtd. 3 rd Feb 2006 (MoEF&CC)
1.	Suspended Particulate Matter (SPM)	IS : 5182-Part-4	µg/m ³	875	1200 mg/m ³ at 25+5 m from the source of generation
2.	Respirable Particulate Matter (RPM)	IS : 5182-Part-4	µg/m ³	290	500 mg/m ³ at 25+5 m from the source of generation


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FORMAT NO.: ECO/QS/D/FORMAT/04

TEST REPORT NO.: ECO LAB/Fugitive/05/21

TEST REPORT ISSUE DATE: 9.02.2021

TEST REPORT OF FUGITIVE EMISSION MONITORING

Name of the Customer : Joda West Iron & Manganese Mine of
M/s Tata Steel Limited

Location : Near Sorting Yard (Guruda)

Date of Sampling : 25.01.2021

Sampling Method : IS: 5182(Part 23): 2006

Sample Collected By : Ecomen Team in presence of TSL's Representative

Sl. No.	Test conducted	Standard Method	Unit	Result	Max. Prescribed Standard as per G.S.R. 46(E) dtd. 3 rd Feb 2006 (MoEF&CC)
1.	Suspended Particulate Matter (SPM)	IS : 5182-Part-4	µg/m ³	765	1200 mg/m ³ at 25+5 m from the source of generation
2.	Respirable Particulate Matter (RPM)	IS : 5182-Part-4	µg/m ³	236	500 mg/m ³ at 25+5 m from the source of generation


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FORMAT NO. ECO/QS/FORMAT/10

TEST REPORT NO: ECO LAB/05/21

TEST REPORT ISSUE DATE: 09.02.2021

Personal Dust Sampling Analysis Report

Name of the Customer : Tiringpahar Iron & Manganese Mines
M/s Tata Steel Limited

Sampling Method : IS: 5182

Sample Collected By : Ecomen Team in presence of TSL's Representative

Sampling Representative : Departmental & Contractual Mine Workers

Sl. No	Date of Sampling	Name of the Person Sampled	Occupation/ Designation	Personal Number/ Gate Pass Number	Max. Permissible Value (8hr TWA)	Respirable Particulate matter as RPM(mg/m ³) 8-hr TWA
1	06-01-2021	Sudhir Ku Karun	Sorting Labour	TSP/809982/0919	3.0 mg/m ³	2.72
2	08-01-2021	Naresh Singh	Sorting Labour	TSP/751501/0819	(Ref. DGMS (Tech.) (S&T) Circular No.01 Dhanbad, Dated 21st January 2010)	2.25
3	13-01-2021	Krushna Lohar	Mine Foreman	TSL (Departmental)		1.81
4	15-01-2021	Jenaram Pingua	Security supervisor	Contractual		2.56
5	17-01-2021	Amit Kumar	Dumper Operator	-		2.74

Note: In all the above samples concentration of silica in the respirable dust was less than 5%

*These results are related only to tested items.

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FORMAT NO. ECO/QS/FORMAT/10

TEST REPORT NO: ECO LAB/AAQM/04/21

TEST REPORT ISSUE DATE: 02.02.2021

Meteorological Data Monitoring Reports

Name of the Customer : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited
Location : Mines Office
Sample Collected By : Using Automatic Weather Station

Sl. No.	Date of Monitoring	Temperature (°C)		Relative Humidity (%)		Wind Speed m/sec		Wind Direction	Rain fall (mm)
		Max.	Min.	Max.	Min.	Max.	Min.		
1	01.01.2021	32.8	14.4	46.9	13.2	1.8	0	NE	0
2	02.01.2021	32.1	16.5	62.3	13.1	2.4	0	SE	0
3	03.01.2021	33.9	15.3	59.0	13.4	1.3	0	SE	0
4	04.01.2021	35.7	14.7	58.7	12.5	1.5	0	SE	0
5	05.01.2021	35.0	15.9	56.8	12.7	1.6	0	NSE	0
6	06.01.2021	35.3	16.2	49.2	15.03	1.6	0	NS	0
7	07.01.2021	36.2	14.0	61.4	13.6	3.2	0	SE	0
8	08.01.2021	36.4	13.8	52.8	12.74	1.6	0	SSE	0
9	09.01.2021	37.7	12.7	75.8	15.45	1.4	0	SW	0
10	10.01.2021	36.4	11.5	63.0	18.5	1.4	0	SE	0
11	11.01.2021	36.2	13.5	74.6	24.59	0.9	0	SSE	0
12	12.01.2021	35.1	12.5	77.4	32.62	2.5	0	SW	0
13	13.01.2021	28.0	14.6	94.3	48.51	1.7	0	NW	0
14	14.01.2021	33.8	15.8	94.2	25.49	1.6	0	NW	0
15	15.01.2021	34.2	15.7	81.9	18.33	0.8	0	SW	0
16	16.01.2021	36.3	17.1	66.1	16.8	1.8	0	SW	0
17	17.01.2021	36.4	17.3	72.8	20.49	1.0	0	SE	0
18	18.01.2021	38.6	18.8	75.7	12.82	0.9	0	SW	0
19	19.01.2021	38.7	18.8	61.2	18.61	1.9	0	SE	0
20	20.01.2021	34.8	20.4	67.9	24.8	1.2	0	SW	0
21	21.01.2021	36.8	23.45	64.19	21.3	1.2	0	SW	0
22	22.01.2021	37.4	20.33	65.23	15.2	1.3	0	SE	0
23	23.01.2021	38.42	20.56	68.2	22.4	2.7	0	SE	0
24	24.01.2021	43.01	21.48	69.54	18.1	3.2	0	SSW	0
25	25.01.2021	39.85	18.7	55.56	16.8	4.5	0	ESE	0

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Sl. No.	Date of Monitoring	Temperature (°C)		Relative Humidity (%)		Wind Speed m/sec		Wind Direction	Rain fall (mm)
		Max.	Min.	Max.	Min.	Max.	Min.		
26	26.01.2021	38.7	19.75	62.01	15.4	4.6	0	ESE	0
27	27.01.2021	35.6	19.3	68.34	23.7	1.1	0	ESE	0
28	28.01.2021	37.3	20.2	66.13	13.8	1.8	0	NE	0
26	29.01.2021	38.3	18.51	69.36	15.6	1.6	0	NE	0
30	30.01.2021	42.9	21.4	33.81	11.6	3.4	0	NE	0
31	31.01.2021	41.4	21.7	25.59	13.6	2.3	0	SW	0

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FORMAT NO. ECO/QS/FORMAT/13

TEST REPORT NO: ECO LAB/ON/06/21

TEST REPORT ISSUE DATE: 09.02.2021

TEST REPORT OF OCCUPATIONAL/WORKPLACE NOISE MONITORING

Name of the Customer : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited
Sample Collected By : Ecomen Team using Integrated Sound Level Meter
Instrument Used : Noise Meter (Lutron)/Personal Dosimeter
Sampling Duration : 1hr for Workplace/8hr for Personnel

S.No.	Date of Monitoring	Name of Location/Person	Activity/ Occupation	<u>8-hr TWA</u> dB(A)	DGMS Permissible Limit
1	8-01-2021	Sorting Yard	Maintenance (HEMM)	73.2	85.0
2	11-01-2021	Screen Plant	Supervision	72.6	85.0
3	15-01-2021	Mr. Raju Kumar	Manager, Mining	63.4	85.0
4	17-01-2021	Mr. Naresh Singh	Sorting Lbour	70.3	85.0
5	19-01-2021	Near Stack yard	Stacking of ore	66.4	85.0

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FORMAT NO. ECO/QS/FORMAT/10

TEST REPORT NO: ECO LAB/AAQ/04/21

TEST REPORT ISSUE DATE: 07.03.2021

Ambient Air Quality Monitoring Report (Core Zone)

Name of the Mine : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited
Location : AAQMS-1: Near Weigh Bridge (Guruda Pit)
Sampling Method : IS: 5182
Instrument Used : RDS, FDS, CO Analyzer & VOC Sampler
Sample Collected By : Ecomen Team in presence of TSL's Representative

Sl. No.	Date of Monitoring	Concentration of Pollutant				
		PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	CO (mg/m ³)
1	05.02.2021	74.40	32.4	15.3	22.1	0.42
2	07.02.2021	69.60	35.3	16.5	24.2	0.44
3	11.02.2021	71.5	41.7	13.7	19.5	0.32
4	13.02.2021	63.50	36.5	15.4	18.4	0.36
5	19.02.2021	64.8	39.3	13.6	17.20	0.35
6	21.02.2021	74.8	36.4	11.7	17.2	0.47
7	23.02.2021	73.7	37.6	14.6	17.4	0.43
8	25.02.2021	66.8	34.3	13.5	19.6	0.46
Average		69.89	36.69	14.29	19.45	0.41
Limit as per CPCB notification New Delhi, 18th Nov, 2009. for Ambient air quality		100	60	80	80	4.0
Standard Method		IS : 5182 (Part-23) 2006	NAAQM Volume-I by CPCB	IS : 5182 (Part-2) 2001	IS : 5182 (Part-6) 2006	IS : 5182 (Part-10)

*These results are related only to tested items.


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FORMAT NO. ECO/QS/FORMAT/10

TEST REPORT NO: ECO LAB/AAQ/04/21

TEST REPORT ISSUE DATE: 07.03.2021

Ambient Air Quality Monitoring Report (Core Zone)

Name of the Mine : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited

Location : AAQMS-1: Near Weigh Bridge (Guruda Pit)

Sampling Method : IS: 5182

Instrument Used : RDS, FDS, CO Analyzer & VOC Sampler

Sample Collected By : Ecomen Team in presence of TSL's Representative

SI. No.	Date of Monitoring	Concentration of Pollutant						
		NH ₃ (µg/m ³)	O ₃ (µg/m ³)	Pb (µg/m ³)	Ni (ng/m ³)	As (ng/m ³)	Benzene (µg/m ³)	Benzo(a) pyrene (ng/m ³)
1	05.02.2021	21.2	12.6	<1.0	1.3	<1.0	<4.0	<0.05
2	07.02.2021	20.4	15.5	<1.0	1.4	<1.0	<4.0	<0.05
3	11.02.2021	19.7	13.63	<1.0	1.32	<1.0	<4.0	<0.05
4	13.02.2021	17.5	16.22	<1.0	1.43	<1.0	<4.0	<0.05
5	19.02.2021	14.6	14.42	<1.0	1.36	<1.0	<4.0	<0.05
6	21.02.2021	17.5	16.4	<1.0	1.52	<1.0	<4.0	<0.05
7	23.02.2021	18.6	11.42	<1.0	1.12	<1.0	<4.0	<0.05
8	25.02.2021	19.5	15.16	<1.0	1.18	<1.0	<4.0	<0.05
Average		18.63	14.42	-	1.33	-	-	-
Limit as per CPCB notification New Delhi, 18 th Nov, 2009. for Ambient air quality		400	180	1	20	6	5	1
Standard Method		APHA 401 (Indophenol)	IS : 5182 (Part-9) 1974	IS : 5182 (Part-22) 2004	NAAQM Volume-I by CPCB	NAAQM Volume-I by CPCB	IS : 5182 (Part-11)	IS : 5182 (Part-12)

*These results are related only to tested items.


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FORMAT NO. ECO/QS/FORMAT/10

TEST REPORT NO: ECO LAB/AAQ/05/21

TEST REPORT ISSUE DATE: 07.03.2021

Ambient Air Quality Monitoring Report (Core Zone)

Name of the Mine : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited

Location : AAQMS-1: Near Security Gate (Purunapani Pit)

Sampling Method : IS: 5182

Instrument Used : RDS, FDS, CO Analyzer & VOC Sampler

Sample Collected By : Ecomen Team in presence of TSL's Representative

SI. No.	Date of Monitoring	Concentration of Pollutant				
		PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	CO (mg/m ³)
1	05.02.2021	67.2	32.78	10.70	21.66	0.36
2	07.02.2021	64.40	35.24	10.73	17.32	0.34
3	11.02.2021	63.2	29.19	11.56	15.38	0.32
4	13.02.2021	61.4	30.42	09.54	15.34	0.35
5	19.02.2021	64.2	37.4	09.56	13.38	0.38
6	21.02.2021	58.2	43.24	10.72	11.36	0.43
7	23.02.2021	63.6	32.13	11.53	14.40	0.47
8	25.02.2021	63.4	34.25	13.71	14.40	0.51
Average		63.20	34.33	11.01	15.41	0.40
Limit as per CPCB notification New Delhi, 18 th Nov, 2009. for Ambient air quality		100	60	80	80	4.0
Standard Method		IS : 5182 (Part-23) 2006	NAAQM Volume-I by CPCB	IS : 5182 (Part-2) 2001	IS : 5182 (Part-6) 2006	IS : 5182 (Part-10)

*These results are related only to tested items.


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Ambient Air Quality Monitoring Report (Core Zone)

Name of the Mine : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited

Location : AAQMS-1: Near Security Gate (Purunapani Pit)

Sampling Method : IS: 5182

Instrument Used : RDS, FDS, CO Analyzer & VOC Sampler

Sample Collected By : Ecomen Team in presence of TSL's Representative

SI. No.	Date of Monitoring	Concentration of Pollutant						
		NH ₃ (µg/m ³)	O ₃ (µg/m ³)	Pb (µg/m ³)	Ni (ng/m ³)	As (ng/m ³)	Benzene (µg/m ³)	Benzo(a) pyrene (ng/m ³)
1	05.02.2021	15.60	13.5	<1.0	1.02	<1.0	<4.0	<0.05
2	07.02.2021	17.6	13.6	<1.0	0.67	<1.0	<4.0	<0.05
3	11.02.2021	17.6	14.9	<1.0	0.85	<1.0	<4.0	<0.05
4	13.02.2021	19.40	13.21	<1.0	1.04	<1.0	<4.0	<0.05
5	19.02.2021	17.52	10.32	<1.0	0.94	<1.0	<4.0	<0.05
6	21.02.2021	14.46	16.43	<1.0	0.88	<1.0	<4.0	<0.05
7	23.02.2021	18.5	15.37	<1.0	1.02	<1.0	<4.0	<0.05
8	25.02.2021	19.7	16.43	<1.0	1.22	<1.0	<4.0	<0.05
Average		17.55	14.22	-	0.96	-	-	-
Limit as per CPCB notification New Delhi, 18thNov, 2009. for Ambient air quality		400	180	1	20	6	5	1
Standard Method		APHA 401 (Indophenol)	IS : 5182 (Part-9) 1974	IS : 5182 (Part-22) 2004	NAAQM Volume-I by CPCB	NAAQM Volume-I by CPCB	IS : 5182 (Part-11)	IS : 5182 (Part-12)

*These results are related only to tested items.


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FORMAT NO. ECO/QS/FORMAT/10

TEST REPORT NO: ECO LAB/AAQ/07/21

TEST REPORT ISSUE DATE: 07.03.2021

Ambient Air Quality Monitoring Report (Buffer Zone)

Name of the Customer : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited

Sampling Method : IS: 5182

Instrument Used : RDS, FDS, CO Analyzer & VOC Sampler

Sample Collected By : Ecomen Team in presence of TSL's Representative

Sl. No.	Location (Date of Monitoring)	Concentration of Pollutant				
		PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	CO (mg/m ³)
1	Jaribahal (9.02.2021)	67.4	33.4	12.5	21.5	0.52
2	Balda (13.02.2021)	76.4	35.4	12.6	13.2	0.48
3	Palsa (15.02.2021)	83.4	42.4	11.6	17.8	0.42
4	Jajanga (17.02.2021)	69.7	34.6	11.6	11.8	0.43
Average		74.23	36.45	12.08	16.08	0.46
Limit as per CPCB notification New Delhi, 18thNov, 2009. for Ambient air quality		100	60	80	80	4.0
Standard Method		IS : 5182 (Part-23) 2006	NAAQM Volume-I by CPCB	IS : 5182 (Part-2) 2001	IS : 5182 (Part-6) 2006	IS : 5182 (Part-10)

*These results are related only to tested items.


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FORMAT NO. ECO/QS/FORMAT/10

TEST REPORT NO: ECO LAB/AAQ/07/21

TEST REPORT ISSUE DATE: 07.03.2021

Ambient Air Quality Monitoring Report (Buffer Zone)

Name of the Customer : Joda West Iron & Manganese Mine of
M/s Tata Steel Limited

Sampling Method : IS: 5182

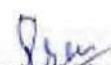
Instrument Used : RDS, FDS, CO Analyzer & VOC Sampler

Sample Collected By : Ecomen Team in presence of TSL's Representative

Sl. No.	Location (Date of Monitoring)	Concentration of Pollutant						
		NH ₃ (µg/m ³)	O ₃ (µg/m ³)	Pb (µg/m ³)	Ni (ng/m ³)	As (ng/m ³)	Benzene (µg/m ³)	Benzo (a) pyrene (ng/m ³)
1	Jaribahal (9.02.2021)	15.4	11.5	<1.0	1.32	<1.0	<4.0	<0.05
2	Balda (13.02.2021)	18.7	12.6	<1.0	1.22	<1.0	<4.0	<0.05
3	Palsa (15.02.2021)	21.9	14.8	<1.0	1.04	<1.0	<4.0	<0.05
4	Jajanga (17.02.2021)	20.2	10.8	<1.0	1.17	<1.0	<4.0	<0.05
Average		19.05	12.43	-	1.19	-	-	-
Limit as per CPCB notification New Delhi, 18thNov, 2009. for Ambient air quality		400	180	1	20	6	5	1
Standard Method		APHA 401 (Indophenol)	IS : 5182 (Part-9) 1974	IS : 5182 (Part-22) 2004	NAAQ M Volume-I by CPCB	NAAQ M Volume-I by CPCB	IS : 5182 (Part-11)	IS : 5182 (Part-12)

*These results are related only to tested items.


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FORMAT NO. ECO/QS/FORMAT/13

TEST REPORT NO: ECO LAB/AN/01/21

TEST REPORT ISSUE DATE: 07.03.2021

TEST REPORT OF AMBIENT NOISE LEVEL MONITORING

Name of the Customer : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited
Sample Collected By : Ecomen Team using Integrated Sound Level Meter
Instrument Used : Noise Meter (Lutron)

S.No.	Date of Monitoring	Name of Location	Category of Zone	Day Time Leq Value in dB(A)	Night Time Leq Value in dB(A)
1	11-02-2021	Near Screen Plant	Industrial	76.7	46.7
2	17-02-2021	Near Mine Office	Industrial	68.2	44.2
3	21-02-2021	Near Sorting Yard	Industrial	70.1	45.4

Noise (Ambient Standard) as per The Noise Pollution (Regulation and Control) Rules, 2000

Area Code	Category of area	Limit in dB (A) Leq	
		Day Time	Night Time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

Note:

1. Day time is reckoned in between 6:00 AM and 10:00 PM.
2. Night time is reckoned in between 10:00 PM and 6:00 AM
3. Silence zone is defined as area up to 100m around such premises as hospitals, educational institutions & courts. The silence zones are to be declared by a competent authority.
4. Mixed categories of areas should be declared as one of the four above-mentioned categories by the competent authority and the corresponding standard shall apply.

Anshu
Analyst

[Signature]
Authorized Signatory

[Signature]
Manager (Q)

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FORMAT NO. ECO/QS/FORMAT/12 TEST REPORT NO: ECOLAB/Stack1/05/21
TEST REPORT ISSUE DATE: 07.03.2021**TEST REPORT OF FLUE GAS EMISSIONS***

Name of the Customer : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited

Date of Sampling : **13.02.2021**

Sample Collected by : Ecomen Team in presence of TSL's Representative

Source of Emission : Exhaust Emission from DG Set

Sampling Method : IS: 11255

Instrument Used : Stack Monitoring Kit

Details of Stack

Material of Construction : M.S.

Stack Attached to : DG Set-01 (Camp)

Capacity : 100 KVA

Stack Height:

i) Above the Platform/ Roof (m) : 10.0

ii) Above the Ground Level (m) : 15.0

Stack Top : Circular

Inside Diameter of Stack (m) : 0.0889

(at sampling point)

Cross Sectional Area of Duct/Stack (m²) : 0.0061

Ambient Air (°C) : 18.0

Flue Gas Temperature (°C) : 174.0

Exit Velocity of Gas (m/sec.) : 9.25

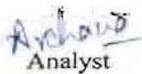
Flow Rate (Nm³/ sec.) : 0.037

Type of Fuel : HSD

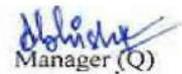
Quantity of Fuel Consumption (lit/hr) : 20-22

Sl. No.	Tests Conducted	Method	<u>Pollutant Concentration in</u> (At 15% O ₂ Correction) in <i>gm/Kw-Hr</i>	Standards as per CPCB in gm/Kw-Hr
1.	Particulate Matter (PM)	IS:11255 (Part-1)	0.062	0.2
2.	Sulphur Dioxide (SO ₂)	IS:11255 (Part-2)	0.035	-
3.	Nitrogen Dioxide (NO _x)	IS:11255 (Part-7)	0.053	4.0 (NO _x +HC)
4.	Hydrocarbon (HC)	IS:13270	1.24	
5.	Carbon Monoxide (CO)	IS:13270	1.13	3.5

*The result is related only to tested item.


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FORMAT NO. ECO/QS/FORMAT/09

TEST REPORT NO: ECO LAB/DW/03/21
TEST REPORT ISSUE DATE: 07.03.2021

TEST REPORT OF DRINKING WATER*

Name of the Customer : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited
Address of the Customer : Tiringpahar Iron & Manganese Mine
Sampling Method : APHA/ IS: 3025
Sample Collected by : Swaraj Swain
Sample Quantity : As per requirement.
Date of Sampling : 8/2/2021
Date of Sample Receiving : 11/2/2021
Packing of Sample : As per requirement
Date of Analysis : 11/2/2021-15/2/2021
Source of Sample : Supply Water @ Sorting Yard

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	INDIAN STANDARDS as per IS 10500:2012	
					Acceptable Limit	Permissible Limit
1.	Colour (Hazen unit)	APHA, 23 rd Ed. 2017, 2120 B	<5.0	5-100	5.00	15.0
2.	Odour	APHA, 23rd Ed. 2017,2150 B	Agreeable	Qualitative	Agreeable	Agreeable
3.	Taste	APHA, 23rd Ed. 2017,2160 A+B	Agreeable	Qualitative	Agreeable	Agreeable
4.	pH	APHA, 23rd Ed. 2017, 4500 H+A+B	7.45	2.0-12	6.5-8.5	No Relax.
5.	Turbidity as (NTU)	APHA, 23rd Ed. 2017, 2130-A+B	BDL	1-100	1.0	5.0
6.	Total Dissolved Solids as TDS (mg/l)	APHA, 23rd Ed. 2017,2540-C	170	10-10000	500	2000
7.	Alkalinity (mg/l)	APHA, 23rd Ed. 2017,2320 A+B	145	5-1500	200	600
8.	Total Hardness as CaCO ₃ (mg/l)	APHA, 23rd Ed. 2017,2340 A+C	153	5-1500	200.0	600.0
9.	Calcium as Ca (mg/l)	APHA, 23rd Ed. 2017, 3500 Ca A+B	43.8	5 - 1000	75.0	200.0
10.	Magnesium as Mg (mg/l)	APHA, 23rd Ed. 2017, 3500 Mg A+B	12.4	5-1000	30.0	100.0
11.	Chloride as Cl (mg/l)	APHA, 23rd Ed. 2017,4500 Cl A+B	16.0	5-1000	250.0	1000.0
12.	Sulfate as SO ₄ (mg/l)	APHA, 23rd Ed. 2017,4500 SO ₄ - E	21.5	5-200	200.0	400.0
13.	Nitrate Nitrogen as NO ₃ (mg/l)	APHA, 23rd Ed. 2017, 4500 NO ₃ - B	2.6	5-100	45.0 (Max)	No Relax.
14.	Fluorides as F (mg/l)	APHA, 23rd Ed. 2017,4500-C	0.42	0.02-10	1.0	1.5
15.	Copper as Cu (mg/l)	APHA, 23rd Ed. 2017, 3111A+C	BDL	0.04-5	0.05	1.5
16.	Iron as Fe (mg/l)	APHA, 23rd Ed. 2017, 3500 Fe B	0.022	0.02-50	0.3 (Max)	No Relax.
17.	Manganese as Mn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-5	0.10	0.30
18.	Mercury as Hg (mg/l)	APHA, 23rd Ed. 2017, 3112 A+B	BDL	0.001-2	0.001(Max)	No Relax.
19.	Aluminium as Al (mg/l)	APHA, 23rd Ed. 2017, 3500 Al A+B	BDL	0.02-100	0.03 (Max)	0.2
20.	Cadmium as Cd (mg/l)	APHA, 23rd Ed. 2017,3111 A+B	BDL	0.002-2	0.003(Max)	No Relax
21.	Arsenic as As (mg/l)	APHA, 23rd Ed. 2017, 3114 C	BDL	0.01-2	0.01(Max)	No Relax
22.	Lead as Pb (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.02-5	0.01	No Relax.
23.	Zinc as Zn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	0.08	0.02-50	5	15
24.	Selenium as Se (mg/l)	APHA 23 rd Ed.2017 3500 Se-C	BDL	0.01-10	0.01(Max)	No Relax
25.	Chromium as Cr+6 (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.05(Max)	No Relax.
26.	Boron as B (mg/l)	APHA, 23rd Ed. 2017, 4500 B A+C	BDL	0.2-2	0.5	1.0
27.	Cyanide as CN (mg/l)	APHA, 23rd Ed. 2017, 4500 CN-A+C	BDL	0.02-5	0.05	No Relax
28.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-5	0.001	0.002
29.	Anionic Detergents as MBAS (mg/l)	APHA, 23rd Ed. 2017, 5540 A+C	BDL	0.01-5	0.2	1.0
30.	Free Residual Chlorine (mg/l)	APHA, 23rd Ed. 2017, 4500-Cl B	BDL	0.1-5	0.20	1.0
31.	Total coliform (MPN/100 ml)	APHA, 23rd Ed. 2017, A+ B	Absent	1.8	Absent	Absent
32.	E-Coli (Nos/100)	APHA, 23rd Ed. 2017, 9221 A+ F	Absent	1.8	Absent	Absent
33.	Fecal Coliform(MPN/100 ml)	APHA, 23rd Ed. 2017, 9221 E	Absent	1.8	-	-
34.	Pesticide	APHA, 23rd Ed. 2017, 6630 B&C	BDL	2-10	No Relaxation	No Relaxation

*These results are related only to item tested.

BDL = Below Detection Limit

Anshu
Analyst

Sw
Authorized Signatory

Abhishek
Manager (Q)

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FORMAT NO. ECO/QS/FORMAT/09

TEST REPORT NO: ECO LAB/DW/07/21

TEST REPORT ISSUE DATE: 07.03.2021

TEST REPORT OF DRINKING WATER*

Name of the Customer : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited

Address of the Customer : Tiringpahar Iron & Manganese Mine

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 8/2/2021

Date of Sample Receiving : 11/2/2021

Packing of Sample : As per requirement

Date of Analysis : 11/2/2021-15/2/2021

Source of Sample : Borewell Near Highschool (Jajang)

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	INDIAN STANDARDS as per IS 10500:2012	
					Acceptable Limit	Permissible Limit
1.	Colour (Hazen unit)	APHA, 23 rd Ed. 2017, 2120 B	<5.0	5-100	5.00	15.0
2.	Odour	APHA, 23rd Ed. 2017,2150 B	Agreeable	Qualitative	Agreeable	Agreeable
3.	Taste	APHA, 23rd Ed. 2017,2160 A+B	Agreeable	Qualitative	Agreeable	Agreeable
4.	pH	APHA, 23rd Ed. 2017, 4500 H+A+B	7.34	2.0-12	6.5-8.5	No Relax.
5.	Turbidity as (NTU)	APHA, 23rd Ed. 2017, 2130-A+B	BDL	1-100	1.0	5.0
6.	Total Dissolved Solids as TDS (mg/l)	APHA, 23rd Ed. 2017,2540-C	176	10-10000	500	2000
7.	Alkalinity (mg/l)	APHA, 23rd Ed. 2017,2320 A+B	138.5	5-1500	200	600
8.	Total Hardness as CaCO ₃ (mg/l)	APHA, 23rd Ed. 2017,2340 A+C	161.4	5-1500	200.0	600.0
9.	Calcium as Ca (mg/l)	APHA, 23rd Ed. 2017, 3500 Ca A+B	43.4	5 - 1000	75.0	200.0
10.	Magnesium as Mg (mg/l)	APHA, 23rd Ed. 2017, 3500 Mg A+B	12.5	5-1000	30.0	100.0
11.	Chloride as Cl (mg/l)	APHA, 23rd Ed. 2017,4500 Cl A+B	18.4	5-1000	250.0	1000.0
12.	Sulfate as SO ₄ (mg/l)	APHA, 23rd Ed. 2017,4500 SO ₄ 2- E	31.4	5-200	200.0	400.0
13.	Nitrate Nitrogen as NO ₃ (mg/l)	APHA, 23rd Ed. 2017, 4500 NO ₃ - B	2.3	5-100	45.0 (Max)	No Relax.
14.	Fluorides as F (mg/l)	APHA, 23rd Ed. 2017,4500-C	0.44	0.02-10	1.0	1.5
15.	Copper as Cu (mg/l)	APHA, 23rd Ed. 2017, 3111A+C	BDL	0.04-5	0.05	1.5
16.	Iron as Fe (mg/l)	APHA, 23rd Ed. 2017, 3500 Fe B	0.21	0.02-50	0.3 (Max)	No Relax.
17.	Manganese as Mn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-5	0.10	0.30
18.	Mercury as Hg (mg/l)	APHA, 23rd Ed. 2017, 3112 A+B	BDL	0.001-2	0.001(Max)	No Relax.
19.	Aluminium as Al (mg/l)	APHA, 23rd Ed. 2017, 3500 Al A+B	BDL	0.02-100	0.03 (Max)	0.2
20.	Cadmium as Cd (mg/l)	APHA, 23rd Ed. 2017,3111 A+B	BDL	0.002-2	0.003(Max)	No Relax
21.	Arsenic as As (mg/l)	APHA, 23rd Ed. 2017, 3114 C	BDL	0.01-2	0.01(Max)	No Relax
22.	Lead as Pb (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.02-5	0.01	No Relax.
23.	Zinc as Zn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	0.064	0.02-50	5	15
24.	Selenium as Se (mg/l)	APHA 23 rd Ed.2017 3500 Se-C	BDL	0.01-10	0.01(Max)	No Relax
25.	Chromium as Cr+6 (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.05(Max)	No Relax.
26.	Boron as B (mg/l)	APHA, 23rd Ed. 2017, 4500 B A+C	BDL	0.2-2	0.5	1.0
27.	Cyanide as CN (mg/l)	APHA, 23rd Ed. 2017, 4500 CN-A+C	BDL	0.02-5	0.05	No Relax
28.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-5	0.001	0.002
29.	Anionic Detergents as MBAS (mg/l)	APHA, 23rd Ed. 2017, 5540 A+C	BDL	0.01-5	0.2	1.0
30.	Free Residual Chlorine (mg/l)	APHA, 23rd Ed. 2017, 4500-Cl B	BDL	0.1-5	0.20	1.0
31.	Total coliform (MPN/100 ml)	APHA, 23rd Ed. 2017, A+ B	Absent	1.8	Absent	Absent
32.	E-Coli (Nos/100)	APHA, 23rd Ed. 2017, 9221 A+ F	Absent	1.8	Absent	Absent
33.	Fecal Coliform(MPN/100 ml)	APHA, 23rd Ed. 2017, 9221 E	Absent	1.8	-	-
34.	Pesticide	APHA, 23rd Ed. 2017, 6630 B&C	BDL	2-10	No Relaxation	No Relaxation

*These results are related only to item tested.

BDL = Below Detection Limit

Anshu
Analyst

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Authorized Signatory

Abhishek
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FORMAT NO. ECO/QS/FORMAT/09

TEST REPORT NO: ECO LAB/DW/10/21

TEST REPORT ISSUE DATE: 09.03.2021

TEST REPORT OF DRINKING WATER*

Name of the Customer : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited

Address of the Customer : Tiringpahar Iron & Manganese Mine

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 8/2/2021

Date of Sample Receiving : 11/2/2021

Packing of Sample : As per requirement

Date of Analysis : 11/2/2021-15/2/2021

Source of Sample : Borewell Near Joribar Village

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	INDIAN STANDARDS as per IS 10500:2012	
					Acceptable Limit	Permissible Limit
1.	Colour (Hazen unit)	APHA, 23 rd Ed. 2017, 2120 B	<5.0	5-100	5.00	15.0
2.	Odour	APHA, 23rd Ed. 2017,2150 B	Agreeable	Qualitative	Agreeable	Agreeable
3.	Taste	APHA, 23rd Ed. 2017,2160 A+B	Agreeable	Qualitative	Agreeable	Agreeable
4.	pH	APHA, 23rd Ed. 2017, 4500 H+A+B	7.4	2.0-12	6.5-8.5	No Relax.
5.	Turbidity as (NTU)	APHA, 23rd Ed. 2017, 2130-A+B	BDL	1-100	1.0	5.0
6.	Total Dissolved Solids as TDS (mg/l)	APHA, 23rd Ed. 2017,2540-C	212	10-10000	500	2000
7.	Alkalinity (mg/l)	APHA, 23rd Ed. 2017,2320 A+B	143	5-1500	200	600
8.	Total Hardness as CaCO ₃ (mg/l)	APHA, 23rd Ed. 2017,2340 A+C	176	5-1500	200.0	600.0
9.	Calcium as Ca (mg/l)	APHA, 23rd Ed. 2017, 3500 Ca A+B	41.7	5 - 1000	75.0	200.0
10.	Magnesium as Mg (mg/l)	APHA, 23rd Ed. 2017, 3500 Mg A+B	16.4	5-1000	30.0	100.0
11.	Chloride as Cl (mg/l)	APHA, 23rd Ed. 2017,4500 Cl A+B	28.5	5-1000	250.0	1000.0
12.	Sulfate as SO ₄ (mg/l)	APHA, 23rd Ed. 2017,4500 SO ₄ - E	39.2	5-200	200.0	400.0
13.	Nitrate Nitrogen as NO ₃ (mg/l)	APHA, 23rd Ed. 2017, 4500 NO ₃ - B	5.4	5-100	45.0 (Max)	No Relax.
14.	Fluorides as F (mg/l)	APHA, 23rd Ed. 2017,4500-C	0.53	0.02-10	1.0	1.5
15.	Copper as Cu (mg/l)	APHA, 23rd Ed. 2017, 3111A+C	BDL	0.04-5	0.05	1.5
16.	Iron as Fe (mg/l)	APHA, 23rd Ed. 2017, 3500 Fe B	0.026	0.02-50	0.3 (Max)	No Relax.
17.	Manganese as Mn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-5	0.10	0.30
18.	Mercury as Hg (mg/l)	APHA, 23rd Ed. 2017, 3112 A+B	BDL	0.001-2	0.001(Max)	No Relax.
19.	Aluminium as Al (mg/l)	APHA, 23rd Ed. 2017, 3500 Al A+B	BDL	0.02-100	0.03 (Max)	0.2
20.	Cadmium as Cd (mg/l)	APHA, 23rd Ed. 2017,3111 A+B	BDL	0.002-2	0.003(Max)	No Relax
21.	Arsenic as As (mg/l)	APHA, 23rd Ed. 2017, 3114 C	BDL	0.01-2	0.01(Max)	No Relax
22.	Lead as Pb (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.02-5	0.01	No Relax.
23.	Zinc as Zn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	0.21	0.02-50	5	15
24.	Selenium as Se (mg/l)	APHA 23 rd Ed.2017 3500 Se-C	BDL	0.01-10	0.01(Max)	No Relax
25.	Chromium as Cr+6 (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.05(Max)	No Relax.
26.	Boron as B (mg/l)	APHA, 23rd Ed. 2017, 4500 B A+C	BDL	0.2-2	0.5	1.0
27.	Cyanide as CN (mg/l)	APHA, 23rd Ed. 2017, 4500 CN-A+C	BDL	0.02-5	0.05	No Relax
28.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-5	0.001	0.002
29.	Anionic Detergents as MBAS(mg/l)	APHA, 23rd Ed. 2017, 5540 A+C	BDL	0.01-5	0.2	1.0
30.	Free Residual Chlorine (mg/l)	APHA, 23rd Ed. 2017, 4500-Cl B	BDL	0.1-5	0.20	1.0
31.	Total coliform (MPN/100 ml)	APHA, 23rd Ed. 2017, A+ B	Absent	1.8	Absent	Absent
32.	E-Coli (Nos/100)	APHA, 23rd Ed. 2017, 9221 A+ F	Absent	1.8	Absent	Absent
33.	Fecal Coliform (MPN/100 ml)	APHA, 23rd Ed. 2017, 9221 E	Absent	1.8	-	-
34.	Pesticide	APHA, 23rd Ed. 2017, 6630 B&C	BDL	2-10	No Relaxation	No Relaxation

*These results are related only to item tested.

BDL = Below Detection Limit

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Analyst

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FORMAT NO. ECO/QS/FORMAT/10 TEST REPORT NO: ECO LAB/DUSTFALL/03/21

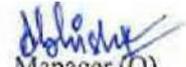
TEST REPORT ISSUE DATE: 09.03.2021

Dust Fall Analysis Report

Name of the Customer : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited
Location : DF-1: Near Sorting Yard (Guruda)
Sampling Method : IS: 5182
Sample Collected By : Ecomen Team in presence of TSL's Representative

Sl. No.	Duration of Monitoring	Concentration of Pollutant (t/km ² /month)				
		Total Dust Fall (t/km ² /month)	Analysis Results			
1	01.02.2021 To 28.02.2021	0.84	Co (%)	Ni (%)	Hg (%)	As (%)
			<0.001	<0.001	<.001	<0.001

*This result is related only to tested item/sample.


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FORMAT NO.: ECO/QS/D/FORMAT/04

TEST REPORT NO.: ECO LAB/Fugitive/01/21

TEST REPORT ISSUE DATE: 09.03.2021

TEST REPORT OF FUGITIVE EMISSION MONITORING

Name of the Customer : Joda West Iron & Manganese Mine of
M/s Tata Steel Limited

Location : 50 mtr from Haul Road (Guruda)

Date of Sampling : 15.02.2021

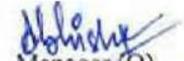
Sampling Method : IS: 5182(Part 23): 2006

Sample Collected By : Ecomen Team in presence of TSL's Representative

Sl. No.	Test conducted	Standard Method	Unit	Result	Max. Prescribed Standard as per G.S.R. 46(E) dtd. 3 rd Feb 2006 (MoEF&CC)
1.	Suspended Particulate Matter (SPM)	IS : 5182-Part-4	$\mu\text{g}/\text{m}^3$	942	1200 mg/m^3 at 25+5 m from the source of generation
2.	Respirable Particulate Matter (RPM)	IS : 5182-Part-4	$\mu\text{g}/\text{m}^3$	297	500 mg/m^3 at 25+5 m from the source of generation


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FORMAT NO.: ECO/QS/D/FORMAT/04

TEST REPORT NO.: ECO LAB/Fugitive/02/21

TEST REPORT ISSUE DATE: 09.03.2021

TEST REPORT OF FUGITIVE EMISSION MONITORING

Name of the Customer : Joda West Iron & Manganese Mine of
M/s Tata Steel Limited

Location : 100 mtr from Screen Plant (Guruda)

Date of Sampling : 23.02.2021

Sampling Method : IS: 5182(Part 23): 2006

Sample Collected By : Ecomen Team in presence of TSL's Representative

Sl. No.	Test conducted	Standard Method	Unit	Result	Max. Prescribed Standard as per G.S.R. 46(E) dtd. 3 rd Feb 2006 (MoEF&CC)
1.	Suspended Particulate Matter (SPM)	IS : 5182-Part-4	µg/m ³	861	1200 mg/m ³ at 25+5 m from the source of generation
2.	Respirable Particulate Matter (RPM)	IS : 5182-Part-4	µg/m ³	176	500 mg/m ³ at 25+5 m from the source of generation


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FORMAT NO.: ECO/QS/D/FORMAT/04

TEST REPORT NO.: ECO LAB/Fugitive/05/21

TEST REPORT ISSUE DATE: 9.03.2021

TEST REPORT OF FUGITIVE EMISSION MONITORING

Name of the Customer : Joda West Iron & Manganese Mine of
M/s Tata Steel Limited

Location : Near Sorting Yard (Guruda)

Date of Sampling : 25.02.2021

Sampling Method : IS: 5182(Part 23): 2006

Sample Collected By : Ecomen Team in presence of TSL's Representative

Sl. No.	Test conducted	Standard Method	Unit	Result	Max. Prescribed Standard as per G.S.R. 46(E) dtd. 3 rd Feb 2006 (MoEF&CC)
1.	Suspended Particulate Matter (SPM)	IS : 5182-Part-4	µg/m ³	760	1200 mg/m ³ at 25+5 m from the source of generation
2.	Respirable Particulate Matter (RPM)	IS : 5182-Part-4	µg/m ³	156	500 mg/m ³ at 25+5 m from the source of generation


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FORMAT NO. ECO/QS/FORMAT/10

TEST REPORT NO: ECO LAB/05/21

TEST REPORT ISSUE DATE: 09.03.2021

Personal Dust Sampling Analysis Report

Name of the Customer : Tiringpahar Iron & Manganese Mines
M/s Tata Steel Limited
Sampling Method : IS: 5182
Sample Collected By : Ecomen Team in presence of TSL's Representative
Sampling Representative : Departmental & Contractual Mine Workers

Sl. No	Date of Sampling	Name of the Person Sampled	Occupation/ Designation	Personal Number/ Gate Pass Number	Max. Permissible Value (8hr TWA)	Respirable Particulate matter as RPM(mg/m ³) 8-hr TWA
1	05-02-2021	Sudhir Ku Karun	Sorting Labour	TSP/809982/0919	3.0 mg/m ³	1.74
2	07-02-2021	Naresh Singh	Sorting Labour	TSP/751501/0819	(Ref. DGMS (Tech.) (S&T) Circular No.01 Dhanbad, Dated 21st January 2010)	2.45
3	16-02-2021	Krushna Lohar	Mine Foreman	TSL (Departmental)		1.83
4	19-02-2021	Jenaram Pingua	Security supervisor	Contractual		2.76
5	23-02-2021	Amit Kumar	Dumper Operator	-		1.4

Note: In all the above samples concentration of silica in the respirable dust was less than 5%

*These results are related only to tested items.

Ankush
Analyst

[Signature]
Authorized Signatory

[Signature]
Manager (Q)

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FORMAT NO. ECO/QS/FORMAT/10

TEST REPORT NO: ECO LAB/AAQM/04/21

TEST REPORT ISSUE DATE: 02.02.2021

Meteorological Data Monitoring Reports

Name of the Customer : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited
Location : Mines Office
Sample Collected By : Using Automatic Weather Station

Sl. No.	Date of Monitoring	Temperature (°C)		Relative Humidity (%)		Wind Speed m/sec		Wind Direction	Rain fall (mm)
		Max.	Min.	Max.	Min.	Max.	Min.		
1	01.02.2021	32.6	13.4	46.9	14.2	2.8	0	NE	0
2	02.02.2021	32.5	13.5	63.3	15.1	3.4	0	ESE	0
3	03.02.2021	33.7	12.3	61.0	12.4	2.3	0	SE	0
4	04.02.2021	35.5	12.7	63.7	12.6	1.6	0	SE	0
5	05.02.2021	35.3	11.9	58.8	12.5	1.7	0	NSE	0
6	06.02.2021	35.6	10.2	51.2	15.6	1.6	0	NSE	0
7	07.02.2021	36.8	11.0	53.4	12.3	3.2	0	SE	0
8	08.02.2021	37.4	12.8	57.8	12.7	1.6	0	SSE	0
9	09.02.2021	37.7	12.5	75.4	15.4	1.5	0	SE	0
10	10.02.2021	34.4	11.6	63.4	18.5	1.6	0	SE	0
11	11.02.2021	36.2	14.5	74.5	24.9	2.3	0	SSE	0
12	12.02.2021	35.1	13.5	78.4	32.62	2.4	0	SW	0
13	13.02.2021	38.0	16.6	97.3	48.51	1.5	0	NW	0
14	14.02.2021	37.8	15.8	96.2	25.49	1.9	0	NW	0
15	15.02.2021	34.2	15.7	83.9	18.33	0.8	0	SW	0
16	16.02.2021	36.3	17.1	65.1	16.8	3.8	0	SW	0
17	17.02.2021	36.4	17.3	73.8	20.49	7.0	0	SE	0
18	18.02.2021	38.6	18.8	75.7	12.82	8.9	0	SE	0
19	19.02.2021	38.7	18.8	61.2	18.61	13.9	0	SE	0
20	20.02.2021	34.8	20.4	67.9	24.8	16.2	0	SW	0
21	21.02.2021	36.8	19.5	60.19	21.3	19.2	0	SW	0
22	22.02.2021	41.3	19.3	61.23	15.2	21.3	0	SE	0
23	23.02.2021	38.4	18.5	63.2	22.4	3.7	0	SW	0
24	24.02.2021	43.0	20.8	64.54	18.1	3.2	0	SW	0
25	25.02.2021	39.85	18.7	55.56	16.8	4.5	0	SE	0

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Sl. No.	Date of Monitoring	Temperature (°C)		Relative Humidity (%)		Wind Speed m/sec		Wind Direction	Rain fall (mm)
		Max.	Min.	Max.	Min.	Max.	Min.		
26	26.02.2021	38.7	15.5	63.01	15.4	18.6	0	SE	0
27	27.02.2021	35.6	16.3	72.34	23.7	19.1	0	NW	0
28	28.02.2021	37.3	19.2	76.13	13.8	3.9	0	NW	0

*These results are related only to tested items.


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An approved Laboratory from Ministry of Environment, Forest and Climate Change, Govt. of India, New Delhi

FORMAT NO. ECO/QS/FORMAT/13

TEST REPORT NO: ECO LAB/ON/06/21

TEST REPORT ISSUE DATE: 09.03.2021

TEST REPORT OF OCCUPATIONAL/WORKPLACE NOISE MONITORING

Name of the Customer : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited
Sample Collected By : Ecomen Team using Integrated Sound Level Meter
Instrument Used : Noise Meter (Lutron)/Personal Dosimeter
Sampling Duration : 1hr for Workplace/8hr for Personnel

S.No.	Date of Monitoring	Name of Location/Person	Activity/ Occupation	8-hr TWA dB(A)	DGMS Permissible Limit
1	7-02-2021	Sorting Yard	Maintenance (HEMM)	73.7	85.0
2	11-02-2021	Screen Plant	Supervision	70.6	85.0
3	14-02-2021	Mr. Raju Kumar	Manager, Mining	66.2	85.0
4	18-02-2021	Mr. Naresh Singh	Sorting Lbour	69.3	85.0
5	24-02-2021	Near Stack yard	Stacking of ore	64.2	85.0

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Analyst

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An approved Laboratory from Ministry of Environment, Forest and Climate Change, Govt. of India, New Delhi

FORMAT NO. ECO/QS/FORMAT/10

TEST REPORT NO: ECO LAB/AAQ/04/21

TEST REPORT ISSUE DATE: 09.04.2021

Ambient Air Quality Monitoring Report (Core Zone)

Name of the Mine : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited
Location : AAQMS-1: Near Weigh Bridge (Guruda Pit)
Sampling Method : IS: 5182
Instrument Used : RDS, FDS, CO Analyzer & VOC Sampler
Sample Collected By : Ecomen Team in presence of TSL's Representative

Sl. No.	Date of Monitoring	Concentration of Pollutant				
		PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	CO (mg/m ³)
1	05.03.2021	70.2	35.2	15.4	23.6	0.42
2	06.03.2021	64.40	34.3	13.3	25.2	0.44
3	12.03.2021	71.1	40.7	10.6	26.8	0.36
4	15.03.2021	62.90	31.5	9.4	27.4	0.47
5	16.03.2021	59.4	29.8	13.6	21.5	0.53
6	19.03.2021	71.7	35.3	12.8	18.0	0.54
7	21.03.2021	71.5	37.9	13.3	17.60	0.41
8	23.03.2021	66.0	34.3	13.9	19.7	0.36
Average		67.15	34.33	13.40	19.20	0.46
Limit as per CPCB notification New Delhi, 18th Nov, 2009. for Ambient air quality		100	60	80	80	4.0
Standard Method		IS : 5182 (Part-23) 2006	NAAQM Volume-I by CPCB	IS : 5182 (Part-2) 2001	IS : 5182 (Part-6) 2006	IS : 5182 (Part-10)

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TEST REPORT NO: ECO LAB/AAQ/04/21

TEST REPORT ISSUE DATE: 09.04.2021

Ambient Air Quality Monitoring Report (Core Zone)

Name of the Mine : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited

Location : AAQMS-1: Near Weigh Bridge (Guruda Pit)

Sampling Method : IS: 5182

Instrument Used : RDS, FDS, CO Analyzer & VOC Sampler

Sample Collected By : Ecomen Team in presence of TSL's Representative

SI. No.	Date of Monitoring	Concentration of Pollutant						
		NH ₃ (µg/m ³)	O ₃ (µg/m ³)	Pb (µg/m ³)	Ni (ng/m ³)	As (ng/m ³)	Benzene (µg/m ³)	Benzo(a) pyrene (ng/m ³)
1	05.03.2021	21.3	12.3	<1.0	1.14	<1.0	<4.0	<0.05
2	06.03.2021	18.6	14.5	<1.0	1.16	<1.0	<4.0	<0.05
3	12.03.2021	17.5	13.4	<1.0	1.3	<1.0	<4.0	<0.05
4	15.03.2021	17.3	16.24	<1.0	1.41	<1.0	<4.0	<0.05
5	16.03.2021	14.8	14.4	<1.0	1.02	<1.0	<4.0	<0.05
6	19.03.2021	17.7	17.4	<1.0	1.5	<1.0	<4.0	<0.05
7	21.03.2021	21.6	11.63	<1.0	1.15	<1.0	<4.0	<0.05
8	23.03.2021	20.2	15.17	<1.0	1.18	<1.0	<4.0	<0.05
Average		18.58	14.65	-	1.21	-	-	-
Limit as per CPCB notification New Delhi, 18thNov, 2009. for Ambient air quality		400	180	1	20	6	5	1
Standard Method		APHA 401 (Indophenol)	IS : 5182 (Part-9) 1974	IS : 5182 (Part-22) 2004	NAAQM Volume-I by CPCB	NAAQM Volume-I by CPCB	IS : 5182 (Part-11)	IS : 5182 (Part-12)

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FORMAT NO. ECO/QS/FORMAT/10

TEST REPORT NO: ECO LAB/AAQ/05/21

TEST REPORT ISSUE DATE: 09.04.2021

Ambient Air Quality Monitoring Report (Core Zone)

Name of the Mine : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited

Location : AAQMS-1: Near Security Gate (Purunapani Pit)

Sampling Method : IS: 5182

Instrument Used : RDS, FDS, CO Analyzer & VOC Sampler

Sample Collected By : Ecomen Team in presence of TSL's Representative

SI. No.	Date of Monitoring	Concentration of Pollutant				
		PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	CO (mg/m ³)
1	05.03.2021	69.2	33.7	11.75	23.6	0.41
2	06.03.2021	71.40	39.4	13.7	19.2	0.35
3	12.03.2021	70.2	31.9	15.6	18.2	0.39
4	15.03.2021	65.4	31.43	09.8	14.3	0.38
5	16.03.2021	59.2	29.24	09.4	14.36	0.37
6	19.03.2021	56.52	33.20	12.74	17.34	0.43
7	21.03.2021	61.64	36.19	10.54	15.40	0.35
8	23.03.2021	70.62	34.20	14.2	18.30	0.33
Average		62.00	33.21	11.72	16.35	0.37
Limit as per CPCB notification New Delhi, 18 th Nov, 2009. for Ambient air quality		100	60	80	80	4.0
Standard Method		IS : 5182 (Part-23) 2006	NAAQM Volume-I by CPCB	IS : 5182 (Part-2) 2001	IS : 5182 (Part-6) 2006	IS : 5182 (Part-10)

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Ambient Air Quality Monitoring Report (Core Zone)

Name of the Mine : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited

Location : AAQMS-1: Near Security Gate (Purunapani Pit)

Sampling Method : IS: 5182

Instrument Used : RDS, FDS, CO Analyzer & VOC Sampler

Sample Collected By : Ecomen Team in presence of TSL's Representative

Sl. No.	Date of Monitoring	Concentration of Pollutant						
		NH ₃ (µg/m ³)	O ₃ (µg/m ³)	Pb (µg/m ³)	Ni (ng/m ³)	As (ng/m ³)	Benzene (µg/m ³)	Benzo(a) pyrene (ng/m ³)
1	05.03.2021	18.0	15.61	<1.0	1.06	<1.0	<4.0	<0.05
2	06.03.2021	16.46	12.34	<1.0	1.03	<1.0	<4.0	<0.05
3	12.03.2021	16.42	14.92	<1.0	1.05	<1.0	<4.0	<0.05
4	15.03.2021	21.41	11.21	<1.0	1.04	<1.0	<4.0	<0.05
5	16.03.2021	15.62	10.32	<1.0	0.96	<1.0	<4.0	<0.05
6	19.03.2021	16.54	13.3	<1.0	0.87	<1.0	<4.0	<0.05
7	21.03.2021	21.68	14.7	<1.0	0.94	<1.0	<4.0	<0.05
8	23.03.2021	19.27	15.43	<1.0	1.26	<1.0	<4.0	<0.05
Average		18.28	13.44	-	1.01	-	-	-
Limit as per CPCB notification New Delhi, 18th Nov, 2009. for Ambient air quality		400	180	1	20	6	5	1
Standard Method		APHA 401 (Indophenol)	IS : 5182 (Part-9) 1974	IS : 5182 (Part-22) 2004	NAAQM Volume-I by CPCB	NAAQM Volume-I by CPCB	IS : 5182 (Part-11)	IS : 5182 (Part-12)

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FORMAT NO. ECO/QS/FORMAT/10

TEST REPORT NO: ECO LAB/AAQ/06/21

TEST REPORT ISSUE DATE: 09.04.2021

Ambient Air Quality Monitoring Report (Buffer Zone)

Name of the Customer : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited

Sampling Method : IS: 5182

Instrument Used : RDS, FDS, CO Analyzer & VOC Sampler

Sample Collected By : Ecomen Team in presence of TSL's Representative

Sl. No.	Location (Date of Monitoring)	Concentration of Pollutant				
		PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	CO (mg/m ³)
1	Jaribahal (8.02.2021)	70.4	34.4	14.9	16.5	0.61
2	Balda (10.02.2021)	68.6	31.4	12.7	18.2	0.52
3	Palsa (14.02.2021)	76.4	39.3	16.7	17.3	0.44
4	Jajanga (18.01.2021)	73.5	36.4	15.6	13.8	0.37
Average		72.23	35.38	14.98	16.45	0.49
Limit as per CPCB notification New Delhi, 18thNov, 2009. for Ambient air quality		100	60	80	80	4.0
Standard Method		IS : 5182 (Part-23) 2006	NAAQM Volume-I by CPCB	IS : 5182 (Part-2) 2001	IS : 5182 (Part-6) 2006	IS : 5182 (Part-10)

*These results are related only to tested items.

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FORMAT NO. ECO/QS/FORMAT/10

TEST REPORT NO: ECO LAB/AAQ/06/21
TEST REPORT ISSUE DATE: 09.04.2021**Ambient Air Quality Monitoring Report (Buffer Zone)**

Name of the Customer : Joda West Iron & Manganese Mine of
M/s Tata Steel Limited

Sampling Method : IS: 5182

Instrument Used : RDS, FDS, CO Analyzer & VOC Sampler

Sample Collected By : Ecomen Team in presence of TSL's Representative

Sl. No.	Location (Date of Monitoring)	Concentration of Pollutant						
		NH ₃ (µg/m ³)	O ₃ (µg/m ³)	Pb (µg/m ³)	Ni (ng/m ³)	As (ng/m ³)	Benzene (µg/m ³)	Benzo (a) pyrene (ng/m ³)
1	Jaribahal (8.02.2021)	16.4	11.7	<1.0	1.44	<1.0	<4.0	<0.05
2	Balda (10.02.2021)	19.7	12.6	<1.0	1.36	<1.0	<4.0	<0.05
3	Palsa (14.02.2021)	18.4	12.5	<1.0	1.39	<1.0	<4.0	<0.05
4	Jajanga (18.01.2021)	22.3	11.6	<1.0	1.42	<1.0	<4.0	<0.05
Average		19.20	12.10	-	1.40	-	-	-
Limit as per CPCB notification New Delhi, 18th Nov, 2009. for Ambient air quality		400	180	1	20	6	5	1
Standard Method		APHA 401 (Indoph enol)	IS : 5182 (Part-9) 1974	IS : 5182 (Part-22) 2004	NAAQM Volume-I by CPCB	NAAQM Volume-I by CPCB	IS : 5182 (Part-11)	IS : 5182 (Part-12)

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FORMAT NO. ECO/QS/FORMAT/13

TEST REPORT NO: ECO LAB/AN/05/21

TEST REPORT ISSUE DATE: 09.04.2021

TEST REPORT OF AMBIENT NOISE LEVEL MONITORING

Name of the Customer : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited
Sample Collected By : Ecomen Team using Integrated Sound Level Meter
Instrument Used : Noise Meter (Lutron)

S.No.	Date of Monitoring	Name of Location	Category of Zone	Day Time Leq Value in dB(A)	Night Time Leq Value in dB(A)
1	15-03-2021	Near Screen Plant	Industrial	73.2	47.4
2	19-03-2021	Near Mine Office	Industrial	65.9	46.2
3	22-03-2021	Near Sorting Yard	Industrial	71.4	45.4

Noise (Ambient Standard) as per The Noise Pollution (Regulation and Control) Rules, 2000

Area Code	Category of area	Limit in dB (A) Leq	
		Day Time	Night Time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

Note:

1. Day time is reckoned in between 6:00 AM and 10:00 PM.
2. Night time is reckoned in between 10:00 PM and 6:00 AM
3. Silence zone is defined as area up to 100m around such premises as hospitals, educational institutions & courts. The silence zones are to be declared by a competent authority.
4. Mixed categories of areas should be declared as one of the four above-mentioned categories by the competent authority and the corresponding standard shall apply.

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FORMAT NO. ECO/QS/FORMAT/12 TEST REPORT NO: ECOLAB/Stack1/01/21
TEST REPORT ISSUE DATE: 09.04.2021**TEST REPORT OF FLUE GAS EMISSIONS***

Name of the Customer : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited

Date of Sampling : 11.03.2021

Sample Collected by : Ecomen Team in presence of TSL's Representative

Source of Emission : Exhaust Emission from DG Set

Sampling Method : IS: 11255

Instrument Used : Stack Monitoring Kit

Details of Stack

Material of Construction : M.S.

Stack Attached to : DG Set-01 (Camp)

Capacity : 100 KVA

Stack Height:

i) Above the Platform/ Roof (m) : 10.0

ii) Above the Ground Level (m) : 15.0

Stack Top : Circular

Inside Diameter of Stack (m) : 0.0889

(at sampling point)

Cross Sectional Area of Duct/Stack (m²) : 0.0061

Ambient Air (°C) : 18.0

Flue Gas Temperature (°C) : 174.0

Exit Velocity of Gas (m/sec.) : 9.25

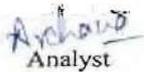
Flow Rate (Nm³/ sec.) : 0.037

Type of Fuel : HSD

Quantity of Fuel Consumption (lit/hr) : 20-22

Sl. No.	Tests Conducted	Method	<u>Pollutant Concentration in</u> (At 15% O ₂ Correction) in <i>gm/Kw-Hr</i>	Standards as per CPCB in gm/Kw-Hr
1.	Particulate Matter (PM)	IS:11255 (Part-1)	0.055	0.2
2.	Sulphur Dioxide (SO ₂)	IS:11255 (Part-2)	0.032	-
3.	Nitrogen Dioxide (NO _x)	IS:11255 (Part-7)	0.056	4.0 (NO _x +HC)
4.	Hydrocarbon (HC)	IS:13270	1.17	
5.	Carbon Monoxide (CO)	IS:13270	1.13	3.5

*The result is related only to tested item.


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FORMAT NO. ECO/QS/FORMAT/09

TEST REPORT NO: ECO LAB/DW/01/21

TEST REPORT ISSUE DATE: 09.04.2021

TEST REPORT OF DRINKING WATER*

Name of the Customer : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited

Address of the Customer : Tiringpahar Iron & Manganese Mine

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 9/3/2021

Date of Sample Receiving : 12/3/2021

Packing of Sample : As per requirement

Date of Analysis : 12/3/2021-16/3/2021

Source of Sample : Supply Water @ Sorting Yard

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	INDIAN STANDARDS as per IS 10500:2012	
					Acceptable Limit	Permissible Limit
1.	Colour (Hazen unit)	APHA, 23 rd Ed. 2017, 2120 B	<5.0	5-100	5.00	15.0
2.	Odour	APHA, 23rd Ed. 2017,2150 B	Agreeable	Qualitative	Agreeable	Agreeable
3.	Taste	APHA, 23rd Ed. 2017,2160 A+B	Agreeable	Qualitative	Agreeable	Agreeable
4.	pH	APHA, 23rd Ed. 2017, 4500 H+A+B	7.34	2.0-12	6.5-8.5	No Relax.
5.	Turbidity as (NTU)	APHA, 23rd Ed. 2017, 2130-A+B	BDL	1-100	1.0	5.0
6.	Total Dissolved Solids as TDS (mg/l)	APHA, 23rd Ed. 2017,2540-C	170	10-10000	500	2000
7.	Alkalinity (mg/l)	APHA, 23rd Ed. 2017,2320 A+B	146	5-1500	200	600
8.	Total Hardness as CaCO ₃ (mg/l)	APHA, 23rd Ed. 2017,2340 A+C	156.5	5-1500	200.0	600.0
9.	Calcium as Ca (mg/l)	APHA, 23rd Ed. 2017, 3500 Ca A+B	43.4	5 - 1000	75.0	200.0
10.	Magnesium as Mg (mg/l)	APHA, 23rd Ed. 2017, 3500 Mg A+B	12.6	5-1000	30.0	100.0
11.	Chloride as Cl (mg/l)	APHA, 23rd Ed. 2017,4500 Cl A+B	15.8	5-1000	250.0	1000.0
12.	Sulfate as SO ₄ (mg/l)	APHA, 23rd Ed. 2017,4500 SO ₄ - E	21.6	5-200	200.0	400.0
13.	Nitrate Nitrogen as NO ₃ (mg/l)	APHA, 23rd Ed. 2017, 4500 NO ₃ - B	2.3	5-100	45.0 (Max)	No Relax.
14.	Fluorides as F (mg/l)	APHA, 23rd Ed. 2017,4500-C	0.42	0.02-10	1.0	1.5
15.	Copper as Cu (mg/l)	APHA, 23rd Ed. 2017, 3111A+C	BDL	0.04-5	0.05	1.5
16.	Iron as Fe (mg/l)	APHA, 23rd Ed. 2017, 3500 Fe B	0.026	0.02-50	0.3 (Max)	No Relax.
17.	Manganese as Mn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-5	0.10	0.30
18.	Mercury as Hg (mg/l)	APHA, 23rd Ed. 2017, 3112 A+B	BDL	0.001-2	0.001(Max)	No Relax.
19.	Aluminium as Al (mg/l)	APHA, 23rd Ed. 2017, 3500 Al A+B	BDL	0.02-100	0.03 (Max)	0.2
20.	Cadmium as Cd (mg/l)	APHA, 23rd Ed. 2017,3111 A+B	BDL	0.002-2	0.003(Max)	No Relax
21.	Arsenic as As (mg/l)	APHA, 23rd Ed. 2017, 3114 C	BDL	0.01-2	0.01(Max)	No Relax
22.	Lead as Pb (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.02-5	0.01	No Relax.
23.	Zinc as Zn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	0.08	0.02-50	5	15
24.	Selenium as Se (mg/l)	APHA 23 rd Ed.2017 3500 Se-C	BDL	0.01-10	0.01(Max)	No Relax
25.	Chromium as Cr+6 (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.05(Max)	No Relax.
26.	Boron as B (mg/l)	APHA, 23rd Ed. 2017, 4500 B A+C	BDL	0.2-2	0.5	1.0
27.	Cyanide as CN (mg/l)	APHA, 23rd Ed. 2017, 4500 CN-A+C	BDL	0.02-5	0.05	No Relax
28.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-5	0.001	0.002
29.	Anionic Detergents as MBAS (mg/l)	APHA, 23rd Ed. 2017, 5540 A+C	BDL	0.01-5	0.2	1.0
30.	Free Residual Chlorine (mg/l)	APHA, 23rd Ed. 2017, 4500-Cl B	BDL	0.1-5	0.20	1.0
31.	Total coliform (MPN/100 ml)	APHA, 23rd Ed. 2017, A+ B	Absent	1.8	Absent	Absent
32.	E-Coli (Nos/100)	APHA, 23rd Ed. 2017, 9221 A+ F	Absent	1.8	Absent	Absent
33.	Fecal Coliform(MPN/100 ml)	APHA, 23rd Ed. 2017, 9221 E	Absent	1.8	-	-
34.	Pesticide	APHA, 23rd Ed. 2017, 6630 B&C	BDL	2-10	No Relaxation	No Relaxation

*These results are related only to item tested.

BDL = Below Detection Limit

Anshu
Analyst

Dr. Swaraj Swain
Authorized Signatory

Dr. Swaraj Swain
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An approved Laboratory from Ministry of Environment, Forest and Climate Change, Govt. of India, New Delhi

FORMAT NO. ECO/QS/FORMAT/09

TEST REPORT NO: ECO LAB/DW/07/21

TEST REPORT ISSUE DATE: 09.04.2021

TEST REPORT OF DRINKING WATER*

Name of the Customer : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited

Address of the Customer : Tiringpahar Iron & Manganese Mine

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 8/3/2021

Date of Sample Receiving : 12/3/2021

Packing of Sample : As per requirement

Date of Analysis : 12/3/2021-16/3/2021

Source of Sample : Borewell Near Highschool (Jajang)

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	INDIAN STANDARDS as per IS 10500:2012	
					Acceptable Limit	Permissible Limit
1.	Colour (Hazen unit)	APHA, 23 rd Ed. 2017, 2120 B	<5.0	5-100	5.00	15.0
2.	Odour	APHA, 23rd Ed. 2017,2150 B	Agreeable	Qualitative	Agreeable	Agreeable
3.	Taste	APHA, 23rd Ed. 2017,2160 A+B	Agreeable	Qualitative	Agreeable	Agreeable
4.	pH	APHA, 23rd Ed. 2017, 4500 H+A+B	7.38	2.0-12	6.5-8.5	No Relax.
5.	Turbidity as (NTU)	APHA, 23rd Ed. 2017, 2130-A+B	BDL	1-100	1.0	5.0
6.	Total Dissolved Solids as TDS (mg/l)	APHA, 23rd Ed. 2017,2540-C	170	10-10000	500	2000
7.	Alkalinity (mg/l)	APHA, 23rd Ed. 2017,2320 A+B	141.3	5-1500	200	600
8.	Total Hardness as CaCO ₃ (mg/l)	APHA, 23rd Ed. 2017,2340 A+C	154.6	5-1500	200.0	600.0
9.	Calcium as Ca (mg/l)	APHA, 23rd Ed. 2017, 3500 Ca A+B	42.5	5 - 1000	75.0	200.0
10.	Magnesium as Mg (mg/l)	APHA, 23rd Ed. 2017, 3500 Mg A+B	12.4	5-1000	30.0	100.0
11.	Chloride as Cl (mg/l)	APHA, 23rd Ed. 2017,4500 Cl A+B	16.5	5-1000	250.0	1000.0
12.	Sulfate as SO ₄ (mg/l)	APHA, 23rd Ed. 2017,4500 SO ₄ - E	29.4	5-200	200.0	400.0
13.	Nitrate Nitrogen as NO ₃ (mg/l)	APHA, 23rd Ed. 2017, 4500 NO ₃ - B	2.5	5-100	45.0 (Max)	No Relax.
14.	Fluorides as F (mg/l)	APHA, 23rd Ed. 2017,4500-C	0.46	0.02-10	1.0	1.5
15.	Copper as Cu (mg/l)	APHA, 23rd Ed. 2017, 3111A+C	BDL	0.04-5	0.05	1.5
16.	Iron as Fe (mg/l)	APHA, 23rd Ed. 2017, 3500 Fe B	0.08	0.02-50	0.3 (Max)	No Relax.
17.	Manganese as Mn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-5	0.10	0.30
18.	Mercury as Hg (mg/l)	APHA, 23rd Ed. 2017, 3112 A+B	BDL	0.001-2	0.001(Max)	No Relax.
19.	Aluminium as Al (mg/l)	APHA, 23rd Ed. 2017, 3500 Al A+B	BDL	0.02-100	0.03 (Max)	0.2
20.	Cadmium as Cd (mg/l)	APHA, 23rd Ed. 2017,3111 A+B	BDL	0.002-2	0.003(Max)	No Relax
21.	Arsenic as As (mg/l)	APHA, 23rd Ed. 2017, 3114 C	BDL	0.01-2	0.01(Max)	No Relax
22.	Lead as Pb (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.02-5	0.01	No Relax.
23.	Zinc as Zn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	0.064	0.02-50	5	15
24.	Selenium as Se (mg/l)	APHA 23 rd Ed.2017 3500 Se-C	BDL	0.01-10	0.01(Max)	No Relax
25.	Chromium as Cr+6 (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.05(Max)	No Relax.
26.	Boron as B (mg/l)	APHA, 23rd Ed. 2017, 4500 B A+C	BDL	0.2-2	0.5	1.0
27.	Cyanide as CN (mg/l)	APHA, 23rd Ed. 2017, 4500 CN-A+C	BDL	0.02-5	0.05	No Relax
28.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-5	0.001	0.002
29.	Anionic Detergents as MBAS (mg/l)	APHA, 23rd Ed. 2017, 5540 A+C	BDL	0.01-5	0.2	1.0
30.	Free Residual Chlorine (mg/l)	APHA, 23rd Ed. 2017, 4500-Cl B	BDL	0.1-5	0.20	1.0
31.	Total coliform (MPN/100 ml)	APHA, 23rd Ed. 2017, A+ B	Absent	1.8	Absent	Absent
32.	E-Coli (Nos/100)	APHA, 23rd Ed. 2017, 9221 A+ F	Absent	1.8	Absent	Absent
33.	Fecal Coliform(MPN/100 ml)	APHA, 23rd Ed. 2017, 9221 E	Absent	1.8	-	-
34.	Pesticide	APHA, 23rd Ed. 2017, 6630 B&C	BDL	2-10	No Relaxation	No Relaxation

*These results are related only to item tested.

BDL = Below Detection Limit

Anshu
Analyst

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Authorized Signatory

Abhishek
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An approved Laboratory from Ministry of Environment, Forest and Climate Change, Govt. of India, New Delhi

FORMAT NO. ECO/QS/FORMAT/09

TEST REPORT NO: ECO LAB/DW/12/21

TEST REPORT ISSUE DATE: 09.04.2021

TEST REPORT OF DRINKING WATER*

Name of the Customer : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited

Address of the Customer : Tiringpahar Iron & Manganese Mine

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 8/3/2021

Date of Sample Receiving : 12/3/2021

Packing of Sample : As per requirement

Date of Analysis : 12/3/2021-16/3/2021

Source of Sample : Borewell Near Joribar Village

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	INDIAN STANDARDS as per IS 10500:2012	
					Acceptable Limit	Permissible Limit
1.	Colour (Hazen unit)	APHA, 23 rd Ed. 2017, 2120 B	<5.0	5-100	5.00	15.0
2.	Odour	APHA, 23rd Ed. 2017,2150 B	Agreeable	Qualitative	Agreeable	Agreeable
3.	Taste	APHA, 23rd Ed. 2017,2160 A+B	Agreeable	Qualitative	Agreeable	Agreeable
4.	pH	APHA, 23rd Ed. 2017, 4500 H+A+B	7.28	2.0-12	6.5-8.5	No Relax.
5.	Turbidity as (NTU)	APHA, 23rd Ed. 2017, 2130-A+B	BDL	1-100	1.0	5.0
6.	Total Dissolved Solids as TDS (mg/l)	APHA, 23rd Ed. 2017,2540-C	213	10-10000	500	2000
7.	Alkalinity (mg/l)	APHA, 23rd Ed. 2017,2320 A+B	143	5-1500	200	600
8.	Total Hardness as CaCO ₃ (mg/l)	APHA, 23rd Ed. 2017,2340 A+C	182	5-1500	200.0	600.0
9.	Calcium as Ca (mg/l)	APHA, 23rd Ed. 2017, 3500 Ca A+B	41.3	5 - 1000	75.0	200.0
10.	Magnesium as Mg (mg/l)	APHA, 23rd Ed. 2017, 3500 Mg A+B	15.4	5-1000	30.0	100.0
11.	Chloride as Cl (mg/l)	APHA, 23rd Ed. 2017,4500 Cl A+B	29.6	5-1000	250.0	1000.0
12.	Sulfate as SO ₄ (mg/l)	APHA, 23rd Ed. 2017,4500 SO ₄ - E	39.8	5-200	200.0	400.0
13.	Nitrate Nitrogen as NO ₃ (mg/l)	APHA, 23rd Ed. 2017, 4500 NO ₃ - B	8.6	5-100	45.0 (Max)	No Relax.
14.	Fluorides as F (mg/l)	APHA, 23rd Ed. 2017,4500-C	0.58	0.02-10	1.0	1.5
15.	Copper as Cu (mg/l)	APHA, 23rd Ed. 2017, 3111A+C	BDL	0.04-5	0.05	1.5
16.	Iron as Fe (mg/l)	APHA, 23rd Ed. 2017, 3500 Fe B	0.027	0.02-50	0.3 (Max)	No Relax.
17.	Manganese as Mn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-5	0.10	0.30
18.	Mercury as Hg (mg/l)	APHA, 23rd Ed. 2017, 3112 A+B	BDL	0.001-2	0.001(Max)	No Relax.
19.	Aluminium as Al (mg/l)	APHA, 23rd Ed. 2017, 3500 Al A+B	BDL	0.02-100	0.03 (Max)	0.2
20.	Cadmium as Cd (mg/l)	APHA, 23rd Ed. 2017,3111 A+B	BDL	0.002-2	0.003(Max)	No Relax
21.	Arsenic as As (mg/l)	APHA, 23rd Ed. 2017, 3114 C	BDL	0.01-2	0.01(Max)	No Relax
22.	Lead as Pb (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.02-5	0.01	No Relax.
23.	Zinc as Zn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	0.31	0.02-50	5	15
24.	Selenium as Se (mg/l)	APHA 23 rd Ed.2017 3500 Se-C	BDL	0.01-10	0.01(Max)	No Relax
25.	Chromium as Cr+6 (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.05(Max)	No Relax.
26.	Boron as B (mg/l)	APHA, 23rd Ed. 2017, 4500 B A+C	BDL	0.2-2	0.5	1.0
27.	Cyanide as CN (mg/l)	APHA, 23rd Ed. 2017, 4500 CN-A+C	BDL	0.02-5	0.05	No Relax
28.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-5	0.001	0.002
29.	Anionic Detergents as MBAS(mg/l)	APHA, 23rd Ed. 2017, 5540 A+C	BDL	0.01-5	0.2	1.0
30.	Free Residual Chlorine (mg/l)	APHA, 23rd Ed. 2017, 4500-Cl B	BDL	0.1-5	0.20	1.0
31.	Total coliform (MPN/100 ml)	APHA, 23rd Ed. 2017, A+ B	Absent	1.8	Absent	Absent
32.	E-Coli (Nos/100)	APHA, 23rd Ed. 2017, 9221 A+ F	Absent	1.8	Absent	Absent
33.	Fecal Coliform (MPN/100 ml)	APHA, 23rd Ed. 2017, 9221 E	Absent	1.8	-	-
34.	Pesticide	APHA, 23rd Ed. 2017, 6630 B&C	BDL	2-10	No Relaxation	No Relaxation

*These results are related only to item tested.

BDL = Below Detection Limit

Anchal
Analyst

Authorized Signatory

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FORMAT NO. ECO/QS/FORMAT/10 TEST REPORT NO: ECO LAB/DUSTFALL/06/21

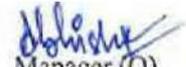
TEST REPORT ISSUE DATE: 09.04.2021

Dust Fall Analysis Report

Name of the Customer : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited
Location : DF-1: Near Sorting Yard (Guruda)
Sampling Method : IS: 5182
Sample Collected By : Ecomen Team in presence of TSL's Representative

Sl. No.	Duration of Monitoring	Concentration of Pollutant (t/km ² /month)				
		Total Dust Fall (t/km ² /month)	Analysis Results			
1	01.03.2021 To 31.03.2021	0.76	Co (%)	Ni (%)	Hg (%)	As (%)
			<0.001	<0.001	<.001	<0.001

*This result is related only to tested item/sample.


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FORMAT NO.: ECO/QS/D/FORMAT/04

TEST REPORT NO.: ECO LAB/Fugitive/01/21

TEST REPORT ISSUE DATE: 09.04.2021

TEST REPORT OF FUGITIVE EMISSION MONITORING

Name of the Customer : Joda West Iron & Manganese Mine of
M/s Tata Steel Limited

Location : 50 mtr from Haul Road (Guruda)

Date of Sampling : 17.03.2021

Sampling Method : IS: 5182(Part 23): 2006

Sample Collected By : Ecomen Team in presence of TSL's Representative

Sl. No.	Test conducted	Standard Method	Unit	Result	Max. Prescribed Standard as per G.S.R. 46(E) dtd. 3 rd Feb 2006 (MoEF&CC)
1.	Suspended Particulate Matter (SPM)	IS : 5182-Part-4	$\mu\text{g}/\text{m}^3$	920	1200 mg/m^3 at 25+5 m from the source of generation
2.	Respirable Particulate Matter (RPM)	IS : 5182-Part-4	$\mu\text{g}/\text{m}^3$	193	500 mg/m^3 at 25+5 m from the source of generation


Analyst


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ecomen
LABORATORIES PVT. LTD.

FORMAT NO.: ECO/QS/D/FORMAT/04

TEST REPORT NO.: ECO LAB/Fugitive/02/21

TEST REPORT ISSUE DATE: 09.04.2021

TEST REPORT OF FUGITIVE EMISSION MONITORING

Name of the Customer : Joda West Iron & Manganese Mine of
M/s Tata Steel Limited

Location : 100 mtr from Screen Plant (Guruda)

Date of Sampling : 19.03.2021

Sampling Method : IS: 5182(Part 23): 2006

Sample Collected By : Ecomen Team in presence of TSL's Representative

Sl. No.	Test conducted	Standard Method	Unit	Result	Max. Prescribed Standard as per G.S.R. 46(E) dtd. 3 rd Feb 2006 (MoEF&CC)
1.	Suspended Particulate Matter (SPM)	IS : 5182-Part-4	µg/m ³	850	1200 mg/m ³ at 25+5 m from the source of generation
2.	Respirable Particulate Matter (RPM)	IS : 5182-Part-4	µg/m ³	145	500 mg/m ³ at 25+5 m from the source of generation


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FORMAT NO.: ECO/QS/D/FORMAT/04

TEST REPORT NO.: ECO LAB/Fugitive/05/21

TEST REPORT ISSUE DATE: 9.04.2021

TEST REPORT OF FUGITIVE EMISSION MONITORING

Name of the Customer : Joda West Iron & Manganese Mine of
M/s Tata Steel Limited

Location : Near Sorting Yard (Guruda)

Date of Sampling : 25.03.2021

Sampling Method : IS: 5182(Part 23): 2006

Sample Collected By : Ecomen Team in presence of TSL's Representative

Sl. No.	Test conducted	Standard Method	Unit	Result	Max. Prescribed Standard as per G.S.R. 46(E) dtd. 3 rd Feb 2006 (MoEF&CC)
1.	Suspended Particulate Matter (SPM)	IS : 5182-Part-4	µg/m ³	745	1200 mg/m ³ at 25+5 m from the source of generation
2.	Respirable Particulate Matter (RPM)	IS : 5182-Part-4	µg/m ³	152	500 mg/m ³ at 25+5 m from the source of generation

Ankush
Analyst

[Signature]
Authorized Signatory

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Manager (Q)

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FORMAT NO. ECO/QS/FORMAT/10

TEST REPORT NO: ECO LAB/01/21

TEST REPORT ISSUE DATE: 09.04.2021

Personal Dust Sampling Analysis Report

Name of the Customer : Tiringpahar Iron & Manganese Mines
M/s Tata Steel Limited
Sampling Method : IS: 5182
Sample Collected By : Ecomen Team in presence of TSL's Representative
Sampling Representative : Departmental & Contractual Mine Workers

Sl. No	Date of Sampling	Name of the Person Sampled	Occupation/ Designation	Personal Number/ Gate Pass Number	Max. Permissible Value (8hr TWA)	Respirable Particulate matter as RPM(mg/m ³) 8-hr TWA
1	08-03-2021	Sudhir Ku Karun	Sorting Labour	TSP/809982/0919	3.0 mg/m ³	1.68
2	10-03-2021	Naresh Singh	Sorting Labour	TSP/751501/0819	(Ref. DGMS (Tech.) (S&T) Circular No.01 Dhanbad, Dated 21st January 2010)	2.20
3	14-03-2021	Krushna Lohar	Mine Foreman	TSL (Departmental)		1.64
4	16-03-2021	Jenaram Pingua	Security supervisor	Contractual		2.3
5	19-03-2021	Amit Kumar	Dumper Operator	-		2.45

Note: In all the above samples concentration of silica in the respirable dust was less than 5%

*These results are related only to tested items.

Ankush
Analyst

[Signature]
Authorized Signatory

[Signature]
Manager (Q)

Ecomen Laboratories Pvt. Ltd.
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ECOMEN LABORATORIES PVT. LTD.

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An approved Laboratory from Ministry of Environment, Forest and Climate Change, Govt. of India, New Delhi

FORMAT NO. ECO/QS/FORMAT/10

TEST REPORT NO: ECO LAB/AAQM/04/21

TEST REPORT ISSUE DATE: 09.04.2021

Meteorological Data Monitoring Reports

Name of the Customer : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited
Location : Mines Office
Sample Collected By : Using Automatic Weather Station

Sl. No.	Date of Monitoring	Temperature (°C)		Relative Humidity (%)		Wind Speed m/sec		Wind Direction	Rain fall (mm)
		Max.	Min.	Max.	Min.	Max.	Min.		
1	01.03.2021	36.4	15.4	46.9	13.2	1.3	0	SE	0
2	02.03.2021	35.6	17.5	62.3	13.1	2.5	0	NSE	0
3	03.03.2021	36.4	18.3	59.0	13.4	5.3	0	NS	0
4	04.03.2021	37.5	16.7	58.7	12.5	1.3	0	NW	0
5	05.03.2021	35.4	17.9	56.8	12.7	1.9	0	NW	0
6	06.03.2021	35.4	19.3	49.2	15.03	1.8	0	SW	0
7	07.03.2021	36.4	15.4	61.4	13.6	3.4	0	SW	0
8	08.03.2021	36.8	17.8	52.8	12.74	3.2	0	SE	0
9	09.03.2021	37.2	18.7	75.8	15.45	1.8	0	SW	0
10	10.03.2021	36.9	13.9	63.0	18.5	1.9	0	SE	0
11	11.03.2021	36.9	15.8	74.6	24.59	2.1	0	SSE	0
12	12.03.2021	35.4	15.7	77.4	32.62	2.3	0	SW	0
13	13.03.2021	37.4	16.4	94.3	48.51	1.8	0	SE	0
14	14.03.2021	33.8	15.8	94.2	25.49	1.4	0	NW	0
15	15.03.2021	34.5	15.5	81.9	18.33	0.5	0	SW	0
16	16.03.2021	36.2	17.2	66.1	16.8	1.5	0	ESE	0
17	17.03.2021	36.3	17.4	72.8	20.49	1.4	0	ESE	0
18	18.03.2021	38.4	14.8	75.7	12.82	0.7	0	ESE	0
19	19.03.2021	38.5	13.8	61.2	18.61	1.5	0	SE	0
20	20.03.2021	39.4	25.4	67.9	24.8	1.6	0	SW	0
21	21.03.2021	36.8	23.5	64.19	21.3	1.2	0	SW	0
22	22.03.2021	37.4	20.3	65.23	15.2	1.3	0	SE	0
23	23.03.2021	38.42	20.6	68.2	22.4	2.7	0	SE	0
24	24.03.2021	43.01	19.8	69.54	18.1	3.2	0	SSW	0
25	25.03.2021	41.5	18.7	55.56	16.8	4.5	0	ESE	0
26	26.03.2021	37.7	19.5	62.01	15.4	4.6	0	ESE	0
27	27.03.2021	39.6	21.3	68.34	15.7	1.1	0	ESE	0

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Sl. No.	Date of Monitoring	Temperature (°C)		Relative Humidity (%)		Wind Speed m/sec		Wind Direction	Rain fall (mm)
		Max.	Min.	Max.	Min.	Max.	Min.		
28	28.03.2021	40.3	20.2	66.13	12.8	1.8	0	NE	0
26	29.03.2021	40.2	18.43	69.36	15.4	1.6	0	NE	0
30	30.03.2021	42.3	21.4	33.81	11.8	3.4	0	NE	0
31	31.03.2021	41.5	21.7	25.59	15.4	2.3	0	SW	0

*These results are related only to tested items.


Analyst
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FORMAT NO. ECO/QS/FORMAT/13

TEST REPORT NO: ECO LAB/ON/06/21

TEST REPORT ISSUE DATE: 09.04.2021

TEST REPORT OF OCCUPATIONAL/WORKPLACE NOISE MONITORING

Name of the Customer : Tiringpahar Iron & Manganese Mine of
M/s Tata Steel Limited

Sample Collected By : Ecomen Team using Integrated Sound Level Meter

Instrument Used : Noise Meter (Lutron)/Personal Dosimeter

Sampling Duration : 1hr for Workplace/8hr for Personnel

S.No.	Date of Monitoring	Name of Location/Person	Activity/ Occupation	8-hr TWA dB(A)	DGMS Permissible Limit
1	8-03-2021	Sorting Yard	Maintenance (HEMM)	73.4	85.0
2	11-03-2021	Screen Plant	Supervision	67.8	85.0
3	15-03-2021	Mr. Raju Kumar	Manager, Mining	63.5	85.0
4	17-03-2021	Mr. Naresh Singh	Sorting Lbour	70.7	85.0
5	19-03-2021	Near Stack yard	Stacking of ore	64.4	85.0

Anshu
Analyst

Ravi
Authorized Signatory

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Abhishek
Manager (Q)