



By E-Mail

Ref.No.: MGM/P&E/112/21

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 31<sup>st</sup> March 2021 in respect of Bamebari 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 31<sup>st</sup> March 2021 in respect of Bamebari 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  
Bamebari Iron & Manganese Mines  
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, Chandrasekharpur, 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 31<sup>st</sup> MARCH 2021*

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

**Submitted By:**

**Bamebari 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 31<sup>st</sup> March 2021)*

**PART - A**

(i) Name and Address of the Owner / occupier of the industry operation or process. : **BAMEBARI 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 Ltd.  
P.O.: Bichhakundi, Via : Joda  
Dist : Keonjhar, Orissa – 758 034

(ii) Industry Category : Opencast Mining

(iii) Production Capacity – Units : **83,200 Tonnes Per Annum** (Manganese Ore or 0.832 LTPA (as per Environmental Clearance & Consent To Operate)

(iv) Year of Establishment : 1938

(v) Date of the last environmental statement submitted : 28<sup>th</sup> 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 m<sup>3</sup>/day (Av. figures for 2020-21)

Process : 36.84 m<sup>3</sup>/day (Water sprinkling) (**Total-13446m<sup>3</sup>**)

Cooling : Nil

Domestic : 81.5 m<sup>3</sup>/day (**Total-29747.5m<sup>3</sup>**)

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

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. Water is essentially used for dust suppression and domestic consumption. Entire process of mining is dry methods.*

**(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	<b>Production</b> 92223.00 MT	<b>Production</b> 89839.00 MT
		<b>Despatch</b> 83110.96 MT	<b>Despatch</b> 69894.78 MT

**\*Remarks:** The ore produced from Mine head is used as raw material to produce ferro manganese. Certain ancillary resources used for mining operation during FY 2020-21 is as follows: Diesel (525.481KL), Explosive (115125Kg), Electricity (400088Kw-h from grid & 657Kw-h from DG set). Figures mentioned against the production column (Table 2) represents ROM, which is inclusive of saleable Mn Ore and subgrade ore/mineral reject. **Mineral reject/subgrade ore generated during FY20-21 is 19944.22Tns.**

### 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 ground water table thus potential source of water getting polluted/contaminated is eliminated. Environmental quality parameters are monitored from time to time to assess the water quality of the nearby streams/nallahs and monsoon runoff from the mining areas. 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/HEMMs 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.

**Monitoring Reports for the last quarter of FY 20-21 is enclosed for reference.**

**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 <u>Year (2019-20)</u>	During the current Financial year <u>Year (2020-21)</u>
<b>(i) From Process</b> Waste containing Oil	Nil	Nil
Used Oil (in Ltrs.)	200 Ltrs	140
Cotton Waste (in Kgs)	5 (approx.)	1
Duster (in Nos.)	Nil	Nil
Filters (in Nos.)	45 (approx.)	12
<b>(ii) From pollution control facilities</b>	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. From FY 2020-21, HW generated from contractual operations are managed as per Rule of 2016.

**PART - E**  
**(Solid Wastes)**

	Total Quantity	
	During the previous Financial year <u>Year (2019-20)</u>	During the current Financial year <u>Year (2020-21)</u>
(a) From Process (Overburden material)	221195MT	434824 MT
(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	221195MT	434824 MT

### **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 significant solid **waste** contains lateritic morrum, shale and quartzite, etc.
- Horticultural Waste: Dry leaves and other garden waste and canteen food waste being purely organic and biodegradable in nature are getting composted at our facilities.
- **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.
  - An automatic waste composter has been procured for composting all the biodegradable waste within our facilities.

### **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. Total plantation for FY 2020-21 for the dump and other available fonts was 8765Nos. of local forestry species such as Gambhari, Neem, Mahaneem, Sisam, Karanj, Sal, etc.

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 in respect of Bamebari Iron & Manganese Mine is as follows:

S.No.	Environmental Conservation/ Protection Measures	Expenditure (Lacs-INR)	
		Proposed	Actual
1	Afforestation on Dump slopes (5600 saplings/2Ha)	2.5	4.0
2	Construction/Maintenance of retaining wall (350mtrs)	2.5	2.15
3	Construction/Maintenance of Garland drain, settling pits with check dam	0.80	0.55
4	Env. Awareness/Mines Environment & Mineral Conservation Week Celebration	4.5	5.20
5	Annual Environmental Monitoring	15.0	11.20
6	Installation of Automatic Wheel Wash System	16.0	14.50
7	Development Mango Orchard (1Acrea 500 saplings)	1.60	1.50
8	Rainwater Harvesting Structure/Pond	6.5	5.2
9	Dust Suppression-Mobile Water Tanker	17.5	21.0
10	Operation & Maintenance of STP	3.5	4.20
11	Installation of New Flow Meters	4.5	3.80
12	Annual Water Audit by FICCI	6.5	4.8
13	Hydrogeological Investigation as per CGWA Guidelines	8.0	4.5
14	Restoration of SAL Saplings/Soil Amendment	3.5	3.0
15	Operation & Maintenance of WTP	5.6	3.85
	<b>Total</b>	<b>98.5</b>	<b>89.45</b>

6. In addition, Tata Steel Rural Development Society also undertakes the peripheral development activities with a large magnitude such as extending support in agricultural and other livelihood options, Water Harvesting ponds, etc.

#### **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&CC, 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 IS10500:2012.
2. Topsoils 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 toe wall and garland drain along the dump slope to prevent surface run-off during monsoon.
  - Construction of soak pits for discharge of sanitary sewage.
  - Provision of oil separation pit for effluents coming out of workshop.
  - Native sapling and vetiver plantation in inactive dumps.
  - STP for domestic effluent in Bamebari colony.
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).

**PHOTOGRAPHS OF ENVIRONMENTAL MEASURES AT BAMEBARI**

**PHOTOGRAPHS OF WHEEL WASH FACILITY**



**Fig.1 Automatic Wheel Wash Facility @ Bamebari Iron & Mn Mine**



***Fig.2 Wheel Wash System in Operation at Bamebari Iron & Mn Mine***

### **PHOTOGRAPHS OF AAQ STATIONS (CORE ZONE)**



***Fig.3 AAQ Station Near Project Office (Bamebari Iron & Mn Mine)***



**Fig.4 AAQ Station Near Sorting Yard (Bamebari Iron & Mn Mine)**



**Fig.5 AAQ Station Near Weigh Bridge (Bamebari Iron & Mn Mine)**



**Fig.6 AAQ Station Near Common Boundary of Tiringpahar & Bamebari Iron & Mn Mine.**

Thanking you,

**Date: 27-09-2021**

Yours faithfully,

F: TATA STEEL LTD.

Head  
Mine & Production Planning  
Bamebari Iron & Manganese Mines  
Ferro Alloys Mineral Division

**ECOMEN LABORATORIES PVT. LTD.**

Flat No. 8, 2nd Floor, Arif Chamber-V, Sector H, Aliganj, Lucknow - 226 024

Phone No. : (91-522) 2746282, 2745726 Telefax No.: (91 - 522) 2745726

E-mail: ravi.bhargava@gmail.com, Website: www.ecomen.in, CIN - U74210UP1989PTC010601, GSTIN : 09AAACE6076H1ZI

**ecoMen**  
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/02/21

TEST REPORT ISSUE DATE: 05.02.2021

**Ambient Air Quality Monitoring Report (Core Zone)**

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

Location : AAQMS-1:Office Building

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 <sub>10</sub> (µg/m <sup>3</sup> )	PM <sub>2.5</sub> (µg/m <sup>3</sup> )	SO <sub>2</sub> (µg/m <sup>3</sup> )	NO <sub>2</sub> (µg/m <sup>3</sup> )	CO (mg/m <sup>3</sup> )
1	05.01.2021	67.80	38.46	14.49	26.64	0.42
2	06.01.2021	65.96	40.94	13.61	23.02	0.40
3	12.01.2021	74.18	44.77	11.37	24.76	0.38
4	15.01.2021	68.90	35.48	12.59	23.58	0.44
5	16.01.2021	71.78	40.68	13.63	22.84	0.41
6	19.01.2021	70.86	38.58	12.67	21.60	0.46
7	21.01.2021	67.66	34.57	13.31	18.80	0.40
8	23.01.2021	65.78	37.66	12.53	20.58	0.45
<b>Average</b>		69.12	38.89	13.03	22.73	0.42
<b>Limit as per CPCB notification New Delhi, 18<sup>th</sup>Nov, 2009. for Ambient air quality</b>		100	60	80	80	4.0
<b>Standard Method</b>		IS : 5182 (Part-23) 2006	NAAQM Volume-I by CPCB	IS : 5182 (Part-2) 2001	IS : 5182 (Part-6) 2006	IS : 5182 (Part-10)

\*Theseresults are related only to tested items.

  
Analyst

  
Authorized Signatory

  
Manager (Q)

Ecomen Laboratories Pvt. Ltd.  
Flat No.8 Second Floor Arif Chamber  
Sector-H, Aliganj, Lucknow-226024  
Ph.2746282 Fax-2745726

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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 <sub>3</sub> (µg/m <sup>3</sup> )	O <sub>3</sub> (µg/m <sup>3</sup> )	Pb (µg/m <sup>3</sup> )	Ni (ng/m <sup>3</sup> )	As (ng/m <sup>3</sup> )	Benzene (µg/m <sup>3</sup> )	Benzo(a) pyrene (ng/m <sup>3</sup> )
1	05.01.2021	24.07	14.49	<1.0	1.13	<1.0	<4.0	<0.05
2	06.01.2021	25.14	14.33	<1.0	1.15	<1.0	<4.0	<0.05
3	12.01.2021	22.44	14.40	<1.0	1.16	<1.0	<4.0	<0.05
4	15.01.2021	25.08	14.48	<1.0	1.11	<1.0	<4.0	<0.05
5	16.01.2021	23.62	14.21	<1.0	1.18	<1.0	<4.0	<0.05
6	19.01.2021	20.36	13.25	<1.0	1.23	<1.0	<4.0	<0.05
7	21.01.2021	24.20	15.13	<1.0	1.25	<1.0	<4.0	<0.05
8	23.01.2021	25.33	15.29	<1.0	1.23	<1.0	<4.0	<0.05
<b>Average</b>		23.78	14.45	-	1.18	-	-	-
<b>Limit as per CPCB notification New Delhi, 18<sup>th</sup>Nov, 2009. for Ambient air quality</b>		<b>400</b>	<b>180</b>	<b>1</b>	<b>20</b>	<b>6</b>	<b>5</b>	<b>1</b>
<b>Standard Method</b>		<b>APHA 401 (Indophenol)</b>	<b>IS : 5182 (Part-9) 1974</b>	<b>IS : 5182 (Part-22) 2004</b>	<b>NAAQM Volume-I by CPCB</b>	<b>NAAQM Volume -I by CPCB</b>	<b>IS : 5182 (Part-11)</b>	<b>IS : 5182 (Part-12)</b>

\*These results are related only to tested items.

  
Analyst

  
Authorized Signatory

  
Manager (Q)

**Ecomen Laboratories Pvt. Ltd.**  
Flat No.8 Second Floor Arif Chamber  
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Name of the Mine : Bamebari Iron & Manganese Mine of  
**M/s Tata Steel Limited**

Location : AAQMS-2: Near Mines View Point (Mines 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 <sub>10</sub> (µg/m <sup>3</sup> )	PM <sub>2.5</sub> (µg/m <sup>3</sup> )	SO <sub>2</sub> (µg/m <sup>3</sup> )	NO <sub>2</sub> (µg/m <sup>3</sup> )	CO (mg/m <sup>3</sup> )
1	02.01.2021	75.34	44.78	15.74	26.64	0.36
2	05.01.2021	73.50	47.26	14.86	21.44	0.34
3	10.01.2021	81.72	51.09	12.62	23.18	0.32
4	12.01.2021	76.44	41.80	13.84	22.00	0.38
5	17.01.2021	79.32	47.00	14.88	21.26	0.35
6	20.01.2021	78.40	44.90	13.92	20.02	0.40
7	23.01.2021	75.20	40.89	14.56	17.22	0.34
8	30.01.2021	73.32	43.98	13.78	19.00	0.39
<b>Average</b>		76.66	45.21	14.28	21.35	0.36
<b>Limit as per CPCB notification New Delhi, 18<sup>th</sup>Nov, 2009. for Ambient air quality</b>		<b>100</b>	<b>60</b>	<b>80</b>	<b>80</b>	<b>4.0</b>
<b>Standard Method</b>		<b>IS : 5182 (Part-23) 2006</b>	<b>NAAQM Volume-I by CPCB</b>	<b>IS : 5182 (Part-2) 2001</b>	<b>IS : 5182 (Part-6) 2006</b>	<b>IS : 5182 (Part-10)</b>

\*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  
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SI. No.	Date of Monitoring	Concentration of Pollutant						
		NH <sub>3</sub> (µg/m <sup>3</sup> )	O <sub>3</sub> (µg/m <sup>3</sup> )	Pb (µg/m <sup>3</sup> )	Ni (ng/m <sup>3</sup> )	As (ng/m <sup>3</sup> )	Benzene (µg/m <sup>3</sup> )	Benzo(a) pyrene (ng/m <sup>3</sup> )
1	02.01.2021	20.70	14.65	<1.0	1.07	<1.0	<4.0	<0.05
2	05.01.2021	23.06	14.33	<1.0	1.00	<1.0	<4.0	<0.05
3	10.01.2021	21.94	13.95	<1.0	1.15	<1.0	<4.0	<0.05
4	12.01.2021	21.90	13.21	<1.0	1.37	<1.0	<4.0	<0.05
5	17.01.2021	23.62	14.40	<1.0	0.93	<1.0	<4.0	<0.05
6	20.01.2021	24.84	15.63	<1.0	1.01	<1.0	<4.0	<0.05
7	23.01.2021	21.92	14.37	<1.0	0.96	<1.0	<4.0	<0.05
8	30.01.2021	23.17	15.33	<1.0	1.27	<1.0	<4.0	<0.05
<b>Average</b>		22.64	14.48	-	1.10	-	-	-
<b>Limit as per CPCB notification New Delhi, 18<sup>th</sup>Nov, 2009. for Ambient air quality</b>		400	180	1	20	6	5	1
<b>Standard Method</b>		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

  
Authorized Signatory

  
Manager (Q)

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FORMAT NO. ECO/QS/FORMAT/10

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

TEST REPORT ISSUE DATE: 05.02.2021

**Ambient Air Quality Monitoring Report (Core Zone)**

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

Location : AAQMS-3: Near Weigh Bridge



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 <sub>10</sub> (µg/m <sup>3</sup> )	PM <sub>2.5</sub> (µg/m <sup>3</sup> )	SO <sub>2</sub> (µg/m <sup>3</sup> )	NO <sub>2</sub> (µg/m <sup>3</sup> )	CO (mg/m <sup>3</sup> )
1	05.01.2021	75.34	44.78	15.74	26.64	0.36
2	06.01.2021	73.50	47.26	14.86	21.44	0.34
3	09.01.2021	81.72	51.09	12.62	23.18	0.32
4	13.01.2021	76.44	41.80	13.84	22.00	0.38
5	15.01.2021	79.32	47.00	14.88	21.26	0.35
6	17.01.2021	78.40	44.90	13.92	20.02	0.40
7	24.01.2021	75.20	40.89	14.56	17.22	0.34
8	30.01.2021	73.32	43.98	13.78	19.00	0.39
<b>Average</b>		76.66	45.21	14.28	21.35	0.36
<b>Limit as per CPCB notification New Delhi, 18<sup>th</sup> Nov, 2009. for Ambient air quality</b>		<b>100</b>	<b>60</b>	<b>80</b>	<b>80</b>	<b>4.0</b>
<b>Standard Method</b>		<b>IS : 5182 (Part-23) 2006</b>	<b>NAAQM Volume-I by CPCB</b>	<b>IS : 5182 (Part-2) 2001</b>	<b>IS : 5182 (Part-6) 2006</b>	<b>IS : 5182 (Part-10)</b>

\*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: 05.02.2021

**Ambient Air Quality Monitoring Report (Core Zone)**

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

Location : AAQMS-3: Near Weigh Bridge


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 <sub>3</sub> (µg/m <sup>3</sup> )	O <sub>3</sub> (µg/m <sup>3</sup> )	Pb (µg/m <sup>3</sup> )	Ni (ng/m <sup>3</sup> )	As (ng/m <sup>3</sup> )	Benzene (µg/m <sup>3</sup> )	Benzo(a) pyrene (ng/m <sup>3</sup> )
1	05.01.2021	20.70	14.65	<1.0	1.07	<1.0	<4.0	<0.05
2	06.01.2021	23.06	14.33	<1.0	1.00	<1.0	<4.0	<0.05
3	09.01.2021	21.94	13.95	<1.0	1.15	<1.0	<4.0	<0.05
4	13.01.2021	21.90	13.21	<1.0	1.37	<1.0	<4.0	<0.05
5	15.01.2021	23.62	14.40	<1.0	0.93	<1.0	<4.0	<0.05
6	17.01.2021	24.84	15.63	<1.0	1.01	<1.0	<4.0	<0.05
7	24.01.2021	21.92	14.37	<1.0	0.96	<1.0	<4.0	<0.05
8	30.01.2021	23.17	15.33	<1.0	1.27	<1.0	<4.0	<0.05
Average		22.64	14.48	-	1.10	-	-	-
Limit as per CPCB notification New Delhi, 18 <sup>th</sup> 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/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 : Bamebari 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 <sub>10</sub> (µg/m <sup>3</sup> )	PM <sub>2.5</sub> (µg/m <sup>3</sup> )	SO <sub>2</sub> (µg/m <sup>3</sup> )	NO <sub>2</sub> (µg/m <sup>3</sup> )	CO (mg/m <sup>3</sup> )
1	Jaganathpur (5.01.2021)	75.33	39.84	13.25	19.87	0.74
2	Bandhubaria (5.01.2021)	80.32	41.20	12.38	20.85	0.79
3	Raikara (9.01.2021)	85.63	45.62	14.27	23.58	0.84
<b>Average</b>		80.43	42.22	13.30	21.43	0.79
<b>Limit as per CPCB notification New Delhi, 18<sup>th</sup>Nov, 2009. for Ambient air quality</b>		100	60	80	80	4.0
<b>Standard Method</b>		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/05/21

TEST REPORT ISSUE DATE: 07.02.2021

**Ambient Air Quality Monitoring Report (Buffer Zone)**

Name of the Customer : Bamebari 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

SI.No	Location (Date of Monitoring)	Concentration of Pollutant						
		NH <sub>3</sub> (µg/m <sup>3</sup> )	O <sub>3</sub> (µg/m <sup>3</sup> )	Pb (µg/m <sup>3</sup> )	Ni (ng/m <sup>3</sup> )	As (ng/m <sup>3</sup> )	Benzene (µg/m <sup>3</sup> )	Benzo(a) pyrene (ng/m <sup>3</sup> )
1	Jaganathpur (5.01.2021)	21.8	11.2	<1.0	1.35	<1.0	<4.0	<0.05
2	Bandhubaria (5.01.2021)	23.3	10.28	<1.0	1.10	<1.0	<4.0	<0.05
3	Raikara (9.01.2021)	23.8	11.8	<1.0	1.15	<1.0	<4.0	<0.05
<b>Average</b>		22.97	11.09	-	1.20	-	-	-
<b>Limit as per CPCB notification New Delhi, 18<sup>th</sup>Nov, 2009. for Ambient air quality</b>		400	180	1	20	6	5	1
<b>Standard Method</b>		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)

\*These results are related only to tested items.

  
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FORMAT NO. ECO/QS/FORMAT/13 TEST REPORT NO: ECO LAB/AN/06/21  
TEST REPORT ISSUE DATE: 07.02.2021**TEST REPORT OF AMBIENT NOISE LEVEL MONITORING**

Name of the Customer : Bamebari Iron & Manganese Mines  
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	5-01-2021	Township	Residential	62.3	43.5
2	5-01-2021	Near Hospital	Silence	48.5	38.5
3	9-01-2021	Mines Area	Industrial	71.4	53.2
4	9-01-2021	Near Market	Commercial	67.3	48.6
5	13-01-2021	Near Canteen	Industrial	68.3	42.4
6	13-01-2021	Near Sorting Yard	Industrial	71.8	44.5

**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/Stack1/08/21  
TEST REPORT ISSUE DATE: 02.02.2021**TEST REPORT OF FLUE GAS EMISSIONS\***

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

Date of Sampling : 13.01.2021

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 (m<sup>2</sup>) : 0.0061

Ambient Air (°C) : 18.0

Flue Gas Temperature (°C) : 174.0

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

Flow Rate (Nm<sup>3</sup>/ sec.) : 0.037

Type of Fuel : HSD

Quantity of Fuel Consumption (lit/hr) : 18-20

Sl. No.	Tests Conducted	Method	<u>Pollutant Concentration in</u> ( At 15% O <sub>2</sub> Correction) in gm/Kw-Hr	Standards as per CPCB in gm/Kw-Hr
1.	Particulate Matter (PM)	IS:11255 (Part-1)	0.050	0.2
2.	Sulphur Dioxide (SO <sub>2</sub> )	IS:11255 (Part-2)	0.028	-
3.	Nitrogen Dioxide (NO <sub>x</sub> )	IS:11255 (Part-7)	0.055	4.0 (NO <sub>x</sub> +HC)
4.	Hydrocarbon (HC)	IS:13270	1.12	
5.	Carbon Monoxide (CO)	IS:13270	1.11	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/09/21

TEST REPORT ISSUE DATE: 09.02.2021

**TEST REPORT OF DRINKING WATER\***

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

Address of the Customer : Bameberi Iron & Manganese Mine (Joda)

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 5/1/2021

Date of Sample Receiving : 09/1/2021

Packing of Sample : As per requirement

Date of Analysis : 09/1/2021-15/1/2021

Source of Sample : Bamebari Canteen Tap water

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	INDIAN STANDARDS as per IS 10500:2012	
					Acceptable Limit	Permissible Limit
1.	Colour (Hazen unit)	APHA, 23 <sup>rd</sup> 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	7.18	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	184	10-10000	500	2000
7.	Alkalinity (mg/l)	APHA, 23rd Ed. 2017,2320 A+B	148	5-1500	200	600
8.	Total Hardness as CaCO <sub>3</sub> (mg/l)	APHA, 23rd Ed. 2017,2340 A+C	158	5-1500	200.0	600.0
9.	Calcium as Ca (mg/l)	APHA, 23rd Ed. 2017, 3500 Ca A+B	43.2	5 – 1000	75.0	200.0
10.	Magnesium as Mg (mg/l)	APHA, 23rd Ed. 2017, 3500 Mg A+B	12.15	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 <sub>4</sub> (mg/l)	APHA, 23rd Ed. 2017,4500 SO <sub>4</sub> - E	20.5	5-200	200.0	400.0
13.	Nitrate Nitrogen as NO <sub>3</sub> (mg/l)	APHA, 23rd Ed. 2017, 4500 NO <sub>3</sub> - B	2.68	5-100	45.0 (Max)	No Relax.
14.	Fluorides as F (mg/l)	APHA, 23rd Ed. 2017,4500-C	0.40	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	0.062	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 <sub>6</sub> H <sub>5</sub> 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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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/09/21

TEST REPORT ISSUE DATE: 09.02.2021

**TEST REPORT OF DRINKING WATER\***

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

Address of the Customer : Bameberi Iron & Manganese Mine (Joda)

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 5/1/2021

Date of Sample Receiving : 09/1/2021

Packing of Sample : As per requirement

Date of Analysis : 09/1/2021-15/1/2021

Source of Sample : Joribar Canteen RO water

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	INDIAN STANDARDS as per IS 10500:2012	
					Acceptable Limit	Acceptable Limit
1.	Colour (Hazen unit)	APHA, 23 <sup>rd</sup> 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	7.3	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	154	5-1500	200	600
8.	Total Hardness as CaCO <sub>3</sub> (mg/l)	APHA, 23rd Ed. 2017,2340 A+C	184	5-1500	200.0	600.0
9.	Calcium as Ca (mg/l)	APHA, 23rd Ed. 2017, 3500 Ca A+B	46.4	5 – 1000	75.0	200.0
10.	Magnesium as Mg (mg/l)	APHA, 23rd Ed. 2017, 3500 Mg A+B	16.52	5-1000	30.0	100.0
11.	Chloride as Cl (mg/l)	APHA, 23rd Ed. 2017,4500 Cl A+B	26.0	5-1000	250.0	1000.0
12.	Sulfate as SO <sub>4</sub> (mg/l)	APHA, 23rd Ed. 2017,4500 SO <sub>4</sub> - E	40.0	5-200	200.0	400.0
13.	Nitrate Nitrogen as NO <sub>3</sub> (mg/l)	APHA, 23rd Ed. 2017, 4500 NO <sub>3</sub> - B	5.6	5-100	45.0 (Max)	No Relax.
14.	Fluorides as F (mg/l)	APHA, 23rd Ed. 2017,4500-C	0.50	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	0.023	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	0.18	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 <sub>6</sub> H <sub>5</sub> 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

*Swaraj Swain*  
Authorized Signatory

*Abhishek*  
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/09

TEST REPORT NO: ECO LAB/DW/11/21

TEST REPORT ISSUE DATE: 09.02.2021

**TEST REPORT OF DRINKING WATER\***

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

Address of the Customer : Bameberi Iron & Manganese Mine (Joda)

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 Temple (Bamebari Camp)

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	INDIAN STANDARDS as per IS 10500:2012	
					Acceptable Limit	Permissible Limit
1.	Colour (Hazen unit)	APHA, 23 <sup>rd</sup> 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	7.1	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	186	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 <sub>3</sub> (mg/l)	APHA, 23rd Ed. 2017,2340 A+C	161	5-1500	200.0	600.0
9.	Calcium as Ca (mg/l)	APHA, 23rd Ed. 2017, 3500 Ca A+B	43.5	5 - 1000	75.0	200.0
10.	Magnesium as Mg (mg/l)	APHA, 23rd Ed. 2017, 3500 Mg A+B	12.1	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 <sub>4</sub> (mg/l)	APHA, 23rd Ed. 2017,4500 SO <sub>4</sub> - E	29.5	5-200	200.0	400.0
13.	Nitrate Nitrogen as NO <sub>3</sub> (mg/l)	APHA, 23rd Ed. 2017, 4500 NO <sub>3</sub> - B	2.8	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	0.02	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	0.068	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 <sub>6</sub> H <sub>5</sub> 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

Anand  
Analyst

Authorized Signatory

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 : Bameberi Iron & Manganese Mine of  
**M/s Tata Steel Limited**

Address of the Customer : Bameberi Iron & Manganese Mine (Joda)

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 : 15/1/2021-21/1/2021

Source of Sample : Bore Well Near Security Barrier (Camp)

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	INDIAN STANDARDS as per IS 10500:2012	
					Acceptable Limit	Permissible Limit
1.	Colour (Hazen unit)	APHA, 23 <sup>rd</sup> 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	218	10-10000	500	2000
7.	Alkalinity (mg/l)	APHA, 23rd Ed. 2017,2320 A+B	156	5-1500	200	600
8.	Total Hardness as CaCO <sub>3</sub> (mg/l)	APHA, 23rd Ed. 2017,2340 A+C	202	5-1500	200.0	600.0
9.	Calcium as Ca (mg/l)	APHA, 23rd Ed. 2017, 3500 Ca A+B	46.8	5 - 1000	75.0	200.0
10.	Magnesium as Mg (mg/l)	APHA, 23rd Ed. 2017, 3500 Mg A+B	16.8	5-1000	30.0	100.0
11.	Chloride as Cl (mg/l)	APHA, 23rd Ed. 2017,4500 Cl A+B	28.2	5-1000	250.0	1000.0
12.	Sulfate as SO <sub>4</sub> (mg/l)	APHA, 23rd Ed. 2017,4500 SO <sub>4</sub> - E	40.5	5-200	200.0	400.0
13.	Nitrate Nitrogen as NO <sub>3</sub> (mg/l)	APHA, 23rd Ed. 2017, 4500 NO <sub>3</sub> - B	5.8	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	0.20	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 <sub>6</sub> H <sub>5</sub> 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

Anand  
Analyst

Authorized Signatory

Manager (Q)

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FORMAT NO. ECO/QS/FORMAT/09

TEST REPORT NO: ECO LAB/DW/13/21  
TEST REPORT ISSUE DATE: 09.02.2021

**TEST REPORT OF DRINKING WATER\***

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

Address of the Customer : Bameberi Iron & Manganese Mine (Joda)

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 : 15/1/2021-21/1/2021

Source of Sample : Bore Well Near Admin Office (Camp)

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	INDIAN STANDARDS as per IS 10500:2012	
					Acceptable Limit	Permissible Limit
1.	Colour (Hazen unit)	APHA, 23 <sup>rd</sup> 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	7.8	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	230	10-10000	500	2000
7.	Alkalinity (mg/l)	APHA, 23rd Ed. 2017,2320 A+B	165	5-1500	200	600
8.	Total Hardness as CaCO <sub>3</sub> (mg/l)	APHA, 23rd Ed. 2017,2340 A+C	213	5-1500	200.0	600.0
9.	Calcium as Ca (mg/l)	APHA, 23rd Ed. 2017, 3500 Ca A+B	49.4	5 – 1000	75.0	200.0
10.	Magnesium as Mg (mg/l)	APHA, 23rd Ed. 2017, 3500 Mg A+B	16.5	5-1000	30.0	100.0
11.	Chloride as Cl (mg/l)	APHA, 23rd Ed. 2017,4500 Cl A+B	28.4	5-1000	250.0	1000.0
12.	Sulfate as SO <sub>4</sub> (mg/l)	APHA, 23rd Ed. 2017,4500 SO <sub>4</sub> - E	40.9	5-200	200.0	400.0
13.	Nitrate Nitrogen as NO <sub>3</sub> (mg/l)	APHA, 23rd Ed. 2017, 4500 NO <sub>3</sub> - B	5.4	5-100	45.0 (Max)	No Relax.
14.	Fluorides as F (mg/l)	APHA, 23rd Ed. 2017,4500-C	0.5	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	0.037	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	0.26	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 <sub>6</sub> H <sub>5</sub> 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

*Anand*  
Analyst

*Swaraj Swain*  
Authorized Signatory

*Abhishek*  
Manager (Q)

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FORMAT NO. ECO/QS/FORMAT/10 TEST REPORT NO: ECO LAB/DUSTFALL/14/21

TEST REPORT ISSUE DATE: 10.02.2021

**Dust Fall Analysis Report**

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

Location : DF-1: Mines Area (Near Sorting Yard)

Sampling Method : IS: 5182

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

SI.No.	Duration of Monitoring	Concentration of Pollutant(t/km2/month)				
		Total Dust Fall (t/km2/month)	Analysis Results			
1	01.01.2021 To 31.01.2021	0.75	Co (%)	Ni (%)	Hg (%)	As (%)
			<0.001	<0.001	<.001	<0.001

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

  
Analyst  
Authorized Signatory  
Manager (Q)

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FORMAT NO.: ECO/QS/D/FORMAT/04 TEST REPORT NO.: ECO LAB/Fugitive/02/21  
TEST REPORT ISSUE DATE: 12.02.2021**TEST REPORT OF FUGITIVE EMISSION MONITORING**

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

Location : L-1 50 mtr from stack yard (Joribar)


Date of Sampling : 13.01.2021

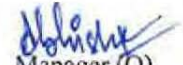
Sampling Method : IS: 5182(Part 23): 2006

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 <sup>rd</sup> Feb 2006 (MoEF&CC)
1.	Suspended Particulate Matter (SPM)	IS : 5182-Part-4	$\mu\text{g}/\text{m}^3$	840	1200 $\text{mg}/\text{m}^3$ at 25+5 m from the source of generation
2.	Respirable Particulate Matter (RPM)	IS : 5182-Part-4	$\mu\text{g}/\text{m}^3$	430	500 $\text{mg}/\text{m}^3$ at 25+5 m from the source of generation

  
Analyst

  
Authorized Signatory

  
Manager (Q)

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FORMAT NO.: ECO/QS/D/FORMAT/04 TEST REPORT NO.: ECO LAB/Fugitive/03/21  
TEST REPORT ISSUE DATE: 12.02.2021**TEST REPORT OF FUGITIVE EMISSION MONITORING**

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

Location : L-1 50mtr from stack yard (Joribar)


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 <sup>rd</sup> Feb 2006 (MoEF&CC)
1.	Suspended Particulate Matter (SPM)	IS : 5182-Part-4	µg/m <sup>3</sup>	740	1200 mg/m <sup>3</sup> at 25+5 m from the source of generation
2.	Respirable Particulate Matter (RPM)	IS : 5182-Part-4	µg/m <sup>3</sup>	250	500 mg/m <sup>3</sup> 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/04/21  
TEST REPORT ISSUE DATE: 12.02.2021


**TEST REPORT OF FUGITIVE EMISSION MONITORING**

Name of the Customer : Bamebari Iron & Manganese Mine of  
**M/s Tata Steel Limited**  
Location : L-1 100mtr from View Point (Joribar)  
Date of Sampling : 17.01.2021  
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 <sup>rd</sup> Feb 2006 (MoEF&CC)
1.	Suspended Particulate Matter (SPM)	IS : 5182-Part-4	µg/m <sup>3</sup>	950	1200 mg/m <sup>3</sup> at 25+5 m from the source of generation
2.	Respirable Particulate Matter (RPM)	IS : 5182-Part-4	µg/m <sup>3</sup>	365	500 mg/m <sup>3</sup> at 25+5 m from the source of generation

  
Analyst

  
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FORMAT NO.: ECO/QS/D/FORMAT/04 TEST REPORT NO.: ECO LAB/Fugitive/05/21  
TEST REPORT ISSUE DATE: 12.02.2021


**TEST REPORT OF FUGITIVE EMISSION MONITORING**

Name of the Customer : Bamebari Iron & Manganese Mine of  
**M/s Tata Steel Limited**  
Location : L-1 20mtr from Haul Road (Joribar)  
Date of Sampling : 19.01.2021  
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 <sup>rd</sup> Feb 2006 (MoEF&CC)
1.	Suspended Particulate Matter (SPM)	IS : 5182-Part-4	$\mu\text{g}/\text{m}^3$	955	1200 $\text{mg}/\text{m}^3$ at 25+5 m from the source of generation
2.	Respirable Particulate Matter (RPM)	IS : 5182-Part-4	$\mu\text{g}/\text{m}^3$	275	500 $\text{mg}/\text{m}^3$ at 25+5 m from the source of generation

  
Analyst

  
Authorized Signatory

  
Manager (Q)

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FORMAT NO. ECO/QS/FORMAT/10

TEST REPORT NO: ECO LAB/02/21

TEST REPORT ISSUE DATE: 07.02.2021

**Personal Dust Sampling Analysis Report**

Name of the Customer : Bamebari 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 <sup>3</sup> ) 8-hr TWA
1	02-01-2021	Lalatendu Lohar	Sorting Labour	TSP/798688/0919	3.0 mg/m <sup>3</sup> (Ref. DGMS (Tech.) (S&T) Circular No.01 Dhanbad, Dated 21st January 2010)	1.63
2	02-01-2021	Santana Munda	Weigh Bridge Operator	TSP/753276/0819		1.45
3	05-01-2021	Bigneswari Malakut	Security Mine	BMM-236		1.36
4	05-01-2021	Johan Hembram	Supervisor Stack yard	MW0719167159		2.1
5	07-01-2021	Saraswati Tanti	Dumper Operator	MWO719166977		1.75

*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/09

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

TEST REPORT ISSUE DATE: 07.02.2021

**TEST REPORT OF WASTE WATER\***

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

Address of the Customer : Bamebari Iron & Manganese Mines (Joda)

Sampling Method : APHA/ IS: 3025

Sample Collected by : Sangram Das

Sample Quantity : As per requirement.

Date of Sampling : 10/1/2021

Date of Sample Receiving : 15/1/2021

Date of Analysis : 16/1/2021 to 20/1/2021

Source of Sample : **Bambari STP Inlet**

Sl. No.	Tests Parameter(s)	Protocol	Result	Limits of Detection
1.	Colour (Hazen unit)	APHA, 23 <sup>rd</sup> Ed. 2017, 2120 B	30.0	5-100
2.	Odour	APHA, 23 <sup>rd</sup> Ed. 2017, 2150 B	Pungent	Agreeable
3.	Particulate sizein ( $\mu$ ) Size	APHA, 23 <sup>rd</sup> Ed. 2017, 2540-D	$\geq 850$	100 - 1200
4.	pH	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 H+ A+B	6.85	2-12
5.	Temperature ( $^{\circ}$ C)	APHA, 23 <sup>rd</sup> Ed. 2017, 2550A+B	31.0	10-100
6.	Oil & Grease as O & G (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 5520 (A+D)	6.5	5-600
7.	Total Residual Chlorine (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500-Cl B	BDL	0.1-5
8.	Ammonical Nitrogen as NH <sub>3</sub> - N(mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 NH <sub>3</sub> A+F	4.80	1-100
9.	Total KjeldahalNirogen as NH <sub>3</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 Norg A+C	24.0	5-100
10.	Free Ammonia as NH <sub>3</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 NH <sub>3</sub> A+F	0.55	0.05-5.0
11.	Biochemical Oxygen Demand as BOD (mg/l) 3days at 27 $^{\circ}$ C	APHA, 23 <sup>rd</sup> Ed. 2017, 5210 A+B	36.0	5-10000
12.	Chemical Oxygen Demand as COD (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 5220 A+C	284.0	5-50000
13.	Arsenic as As (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3114 B	BDL	0.01-2
14.	Mercury as Hg (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.001-2
15.	Lead asPb (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.01-5
16.	Cadmium as Cd (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.02-5
17.	Hexavalent Chromium as Cr <sup>+6</sup> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.05-20
18.	Total Chromium as Cr (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.05-50
19.	Copper as Cu (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.05-5
20.	Zinc as Zn (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	0.042	0.02-50
21.	Selenium as Se (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 Se-A+D	BDL	0.01-1
22.	Nickel as Ni (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.02-5
23.	Fluoride as F (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 F C+D	0.20	0.02-10

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Sl. No.	Tests Parameter(s)	Protocol	Result	Limits of Detection
24.	Dissolved Phosphate as PO <sub>4</sub> (mg/l)	APHA, 23rd Ed. 2017, 4500 - PD	2.05	0.5-100
25.	Sulphide as S <sub>2</sub> -(mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 S <sup>2</sup> -F	0.21	0.1-10
26.	Phenolic Compounds as C <sub>6</sub> H <sub>5</sub> OH (mg/l)	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-10
27.	Bioassay (%)	APHA, 23rd Ed. 2017, 8910 C	80	70 --95-
28.	Manganese as Mn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.01-20
29.	Iron as Fe (mg/l)	APHA, 23rd Ed. 2017, 3500 Fe B	BDL	0.02-100
30.	Nitrate Nitrogen as NO <sub>3</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017,(4500-NO,A+ B)	2.50	5-100

\*The results are related only to item tested. BDL = Below Detection Limit

  
Analyst  
Authorized Signatory  
Manager (Q)**Ecomen Laboratories Pvt. Ltd.**  
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FORMAT NO. ECO/QS/FORMAT/09

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

TEST REPORT ISSUE DATE: 07.02.2021

**TEST REPORT OF WASTE WATER\***

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

Address of the Customer : Bameberi Iron & Manganese Mines (Joda)

Sampling Method : APHA/ IS: 3025

Sample Collected by : Sangram Das

Sample Quantity : As per requirement.

Date of Sampling : 10/1/2021

Date of Sample Receiving : 15/1/2021

Date of Analysis : 16/1/2021 to 20/1/2021

Source of Sample : **Bambari STP Outlet**

Sl. No.	Tests	Protocol	Result	Limits of Detection	G.S.R 422(E)
					Desirable Limit
1.	Colour (Hazen unit)	APHA, 23 <sup>rd</sup> Ed. 2017, 2120 B	<5.0	5-100	-
2.	Odour	APHA, 23 <sup>rd</sup> Ed. 2017, 2150 B	Odourless	Agreeable	Agreeable
3.	Particulate size in (µ)	APHA, 23 <sup>rd</sup> Ed. 2017, 2540-D	250	100 - 1200	Shall pass 850 Micron IS Sieve
4.	pH	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 H+ A+B	7.30	2-12	5.5-9.0
5.	Temperature (°C)	APHA, 23 <sup>rd</sup> Ed. 2017, 2550A+B	30.5	10-100	-
6.	Oil & Grease as O & G (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 5520 (A+D)	BDL	5-600	10.0
7.	Total Residual Chlorine (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500-Cl B	0.50	0.1-5	1.0
8.	Ammonical Nitrogen as NH <sub>3</sub> - N(mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 NH <sub>3</sub> A+F	1.20	1-100	50.0
9.	Total Kjeldahal Nitrogen as NH <sub>3</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 Norg A+C	12.5	5-100	100.0
10.	Free Ammonia as NH <sub>3</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 NH <sub>3</sub> A+F	BDL	0.05-5.0	5.0
11.	Biochemical Oxygen Demand as BOD (mg/l) 3days at 27°C	APHA, 23 <sup>rd</sup> Ed. 2017, 5210 A+B	14.0	5-10000	30.0
12.	Chemical Oxygen Demand as COD (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 5220 A+C	64.8	5-50000	250.0
13.	Arsenic as As (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3114 B	BDL	0.01-2	0.2
14.	Mercury as Hg (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.001-2	0.01
15.	Lead as Pb (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.01-5	0.1
16.	Cadmium as Cd (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.02-5	0.2
17.	Hexavalent Chromium as Cr <sup>+6</sup> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.05-20	0.1
18.	Total Chromium as Cr (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.05-50	2.0
19.	Copper as Cu (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.05-5	2.0
20.	Zinc as Zn (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B		0.02-50	5.0
21.	Selenium as Se (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 Se-A+D	BDL	0.01-1	0.05
22.	Nickel as Ni (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.02-5	2.0
23.	Fluoride as F (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 F C+D	0.20	0.02-10	2.0
24.	Dissolved Phosphate as PO <sub>4</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 - PD	BDL	0.5-100	5.0

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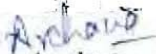

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Sl. No.	Tests	Protocol	Result	Limits of Detection	G.S.R 422(E)
					Desirable Limit
25.	Sulphide as S <sub>2</sub> -(mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 S <sup>2</sup> -F	BDL	0.1-10	2.0
26.	Phenolic Compounds as C <sub>6</sub> H <sub>5</sub> OH (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 5530 A+C	BDL	1-10	1.0
27.	Bioassay (%)	APHA, 23 <sup>rd</sup> Ed. 2017, 8910 C	92%	70 --95	90% survival of fish after 96 hrs. in 100% Effluent
28.	Manganese as Mn (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.01-20	2.0
29.	Iron as Fe (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3500 Fe B	BDL	0.02-100	3.0
30.	Nitrate Nitrogen as NO <sub>3</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017,(4500-NO <sub>3</sub> A+ B)	5.50	5-100	10.0

\*The results are related only to item tested. BDL = Below Detection Limit

  
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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/WW/06/21

TEST REPORT ISSUE DATE: 07.02.2021

### TEST REPORT OF WASTE WATER\*

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

Address of the Customer : Bameberi Iron & Manganese Mines (Joda)

Sampling Method : APHA/ IS: 3025

Sample Collected by : Sangram Das

Sample Quantity : As per requirement.

Date of Sampling : 10/1/2021

Date of Sample Receiving : 15/1/2021

Date of Analysis : 16/1/2021 to 20/1/2021

Source of Sample : **Bambari Workshop Effluent**

Sl. No.	Tests	Protocol	Result	Limits of Detection	G.S.R 422(E)
					Desirable Limit
1.	Colour (Hazen unit)	APHA, 23 <sup>rd</sup> Ed. 2017, 2120 B	<5.0	5-100	-
2.	Odour	APHA, 23 <sup>rd</sup> Ed. 2017, 2150 B	Odourless	Agreeable	Agreeable
3.	Particulate size in (µ)	APHA, 23 <sup>rd</sup> Ed. 2017, 2540-D	250	100 - 1200	Shall pass 850 Micron IS Sieve
4.	pH	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 H+ A+B	7.2	2-12	5.5-9.0
5.	Temperature (°C)	APHA, 23 <sup>rd</sup> Ed. 2017, 2550A+B	24.2	10-100	-
6.	Oil & Grease as O & G (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 5520 (A+D)	BDL	5-600	10.0
7.	Total Residual Chlorine (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500-Cl B	0.18	0.1-5	1.0
8.	Ammonical Nitrogen as NH <sub>3</sub> - N(mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 NH <sub>3</sub> A+F	1.20	1-100	50.0
9.	Total Kjeldahal Nitrogen as NH <sub>3</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 Norg A+C	6.5	5-100	100.0
10.	Free Ammonia as NH <sub>3</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 NH <sub>3</sub> A+F	BDL	0.05-5.0	5.0
11.	Biochemical Oxygen Demand as BOD (mg/l) 3days at 27°C	APHA, 23 <sup>rd</sup> Ed. 2017, 5210 A+B	5.6	5-10000	30.0
12.	Chemical Oxygen Demand as COD (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 5220 A+C	32.8	5-50000	250.0
13.	Arsenic as As (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3114 B	BDL	0.01-2	0.2
14.	Mercury as Hg (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.001-2	0.01
15.	Lead as Pb (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.01-5	0.1
16.	Cadmium as Cd (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.02-5	0.2
17.	Hexavalent Chromium as Cr <sup>+6</sup> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.05-20	0.1
18.	Total Chromium as Cr (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.05-50	2.0
19.	Copper as Cu (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.05-5	2.0
20.	Zinc as Zn (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B		0.02-50	5.0
21.	Selenium as Se (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 Se-A+D	BDL	0.01-1	0.05
22.	Nickel as Ni (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.02-5	2.0
23.	Fluoride as F (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 F C+D	0.05	0.02-10	2.0
24.	Dissolved Phosphate as PO <sub>4</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 - PD	BDL	0.5-100	5.0

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Sl. No.	Tests	Protocol	Result	Limits of Detection	G.S.R 422(E)
					Desirable Limit
25.	Sulphide as S <sub>2</sub> -(mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 S <sup>2</sup> -F	BDL	0.1-10	2.0
26.	Phenolic Compounds as C <sub>6</sub> H <sub>5</sub> OH (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 5530 A+C	BDL	1-10	1.0
27.	Bioassay (%)	APHA, 23 <sup>rd</sup> Ed. 2017, 8910 C	87%	70 --95	90% survival of fish after 96 hrs. in 100% Effluent
28.	Manganese as Mn (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	0.08	0.01-20	2.0
29.	Iron as Fe (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3500 Fe B	1.1	0.02-100	3.0
30.	Nitrate Nitrogen as NO <sub>3</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017,(4500-NO <sub>3</sub> A+ B)	3.50	5-100	10.0

\*The results are related only to item tested.BDL = Below Detection Limit

  
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FORMAT NO. ECO/QS/FORMAT/09

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

TEST REPORT ISSUE DATE:06.02.2021

**TEST REPORT OF SURFACE WATER\***

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

Address of the Customer : Bamebari Iron & Manganese Mine (Joda)

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 20/1/2021

Date of Sample Receiving : 25/1/2021

Date of Analysis : 26/1/2021 to 30/1/2021

Source of Sample : Kassia Nala (out side Lease)

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	IS:2296 Class-C
1.	pH	APHA,23 <sup>rd</sup> Ed.2017,4500H <sup>+</sup> A+B	6.80	2-12	8.5
2.	Colour (Hazen unit)	APHA, 23 <sup>rd</sup> Ed. 2017, 2120 B	12.0	5-100	
3.	Total Dissolved Solids as TDS (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 , 2540C	180.0	5-10000	1500
4.	Dissolved Oxygen as DO (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,4500 A+C	5.80	2-10	4.0(min)
5.	Biochemical Oxygen Demand as BOD (mg/l) 3 days at 27 0C	APHA,23 <sup>rd</sup> Ed.2017 ,5210A+ B	BDL	5-10000	3.0
6.	Nitrate Nitrogen as NO <sub>3</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 NO3- B	6.5	5-100	50.0
7.	Fluorides as F (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,4500 -C	0.20	0.05-10	1.5
8.	Sulfate as SO <sub>4</sub> (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,4500 -SO <sub>4</sub> <sup>2-</sup> E	28.0	1.0-250	400.0
9.	Iron as Fe (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,3500 Fe B	0.082	0.02-50	50.0
10.	Copper as Cu (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111A+B	BDL	0.05-5	1.5
11.	Cadmium as Cd (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111A+B	BDL	0.002-2	0.01
12.	Arsenic as As(mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3114C	BDL	0.01-2	0.2
13.	Chloride as Cl- (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017,4500 Cl A+B	28.0	5-1000	600
14.	Chromium as Cr+6 (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.05-20	0.05
15.	Cyanide as CN (mg/l)	APHA,23 <sup>rd</sup> Ed.2017,4500 ,CN A+D	BDL	0.005-5	0.05
16.	Lead as Pb (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111A+B	BDL	0.01-2	0.1
17.	Selenium as Se (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3500 Se-C	BDL	0.005-1	0.01
18.	Zinc as Zn (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111A+B	0.22	0.02-50	15
19.	Phenolic Compounds as C <sub>6</sub> H <sub>5</sub> OH (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 5530 A+C	BDL	0.004-5	0.005
20.	Total coliform (MPN/100 ml)	APHA,23 <sup>rd</sup> Ed.2017, 9221 A+ B	200.0	1.8	5000
21.	Anionic Detergents (As MBAS)(mg/l) max	APHA 22 <sup>nd</sup> EDN.:2012, 5540 A+C	BDL	0.01-5	-

\*The result are related only to item tested - The parameters are not included in IS: 2296 Class-C,  
BDL – Below Detection Limit

*Anil*  
Analyst

*Ravi*  
Authorized Signatory

*Ravi*  
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FORMAT NO. ECO/QS/FORMAT/09

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

TEST REPORT ISSUE DATE:06.02.2021

**TEST REPORT OF SURFACE WATER\***

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

Address of the Customer : Bamebari Iron & Manganese Mine (Joda)

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 20/1/2021

Date of Sample Receiving : 25/1/2021

Date of Analysis : 26/1/2021 to 30/1/2021

Source of Sample : Intake Point at Tindharia (Baitarani River)

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	IS:2296 Class-C
1.	pH	APHA,23 <sup>rd</sup> Ed.2017,4500H+A+B	7.02	2-12	8.5
2.	Colour (Hazen unit)	APHA, 23 <sup>rd</sup> Ed. 2017, 2120 B	8.5	5-100	
3.	Total Dissolved Solids as TDS (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,2540C	220.0	5-10000	1500
4.	Dissolved Oxygen as DO (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,4500 A+C	5.02	2-10	4.0(min)
5.	Biochemical Oxygen Demand as BOD (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,5210A+ B	BDL	5-10000	3.0
6.	Nitrate Nitrogen as NO <sub>3</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 NO3- B	6.80	5-100	50.0
7.	Fluorides as F (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,4500 -C	0.28	0.05-10	1.5
8.	Sulfate as SO <sub>4</sub> (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,4500 -SO <sub>4</sub> <sup>2-</sup> E	30.0	1.0-250	400.0
9.	Iron as Fe (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,3500 Fe B	0.068	0.02-50	50.0
10.	Copper as Cu (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111A+B	BDL	0.05-5	1.5
11.	Cadmium as Cd (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111A+B	BDL	0.002-2	0.01
12.	Arsenic as As(mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3114C	BDL	0.01-2	0.2
13.	Chloride as Cl- (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111 - A +B	34.0	5-1000	600
14.	Chromium as Cr+6 (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.05-20	0.05
15.	Cyanide as CN (mg/l)	APHA,23 <sup>rd</sup> Ed.2017,4500 ,CN A+D	BDL	0.005-5	0.05
16.	Lead as Pb (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111A+B	BDL	0.01-2	0.1
17.	Selenium as Se (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3500 Se-C	BDL	0.005-1	0.01
18.	Zinc as Zn (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111A+B	0.028	0.02-50	15
19.	Phenolic Compounds as C <sub>6</sub> H <sub>5</sub> OH (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 5530 A+C	BDL	0.004-5	0.005
20.	Total coliform (MPN/100 ml)	APHA,23 <sup>rd</sup> Ed.2017, 9221 A+ B	210.0	1.8	5000
21.	Anionic Detergents (As MBAS)(mg/l) max	APHA 22 <sup>nd</sup> EDN.:2012, 5540 A+C	BDL	0.01-5	-

\*The result are related only to item tested - The parameters are not included in IS: 2296 Class-C

BDL – Below Detection Limit

Analyst

Authorized Signatory

Manager (Q)

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FORMAT NO. ECO/QS/FORMAT/09

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

TEST REPORT ISSUE DATE:06.02.2021

**TEST REPORT OF SURFACE WATER\***

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

Address of the Customer : Bamebari Iron & Manganese Mine (Joda)

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 20/1/2021

Date of Sample Receiving : 25/1/2021

Date of Analysis : 26/1/2021 to 30/1/2021

Source of Sample : Juridi Nalla (Near Jurudi Bridge)

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	IS:2296 Class-C
1.	pH	APHA,23 <sup>rd</sup> Ed.2017,4500H <sup>+</sup> A+B	7.20	2-12	8.5
2.	Colour (Hazen unit)	APHA, 23 <sup>rd</sup> Ed. 2017, 2120 B	10.0	5-100	
3.	Total Dissolved Solids as TDS (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 , 2540C	218.0	5-10000	1500
4.	Dissolved Oxygen as DO (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,4500 A+C	5.50	2-10	4.0(min)
5.	Biochemical Oxygen Demand as BOD (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,5210A+ B	BDL	5-10000	3.0
6.	Nitrate Nitrogen as NO <sub>3</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 NO <sub>3</sub> -B	5.8	5-100	50.0
7.	Fluorides as F (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,4500 -C	0.32	0.05-10	1.5
8.	Sulfate as SO <sub>4</sub> (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,4500 -SO <sub>4</sub> <sup>2-</sup> E	26.0	1.0-250	400.0
9.	Iron as Fe (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,3500 Fe B	0.045	0.02-50	50.0
10.	Copper as Cu (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111A+B	BDL	0.05-5	1.5
11.	Cadmium as Cd (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111A+B	BDL	0.002-2	0.01
12.	Arsenic as As(mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3114C	BDL	0.01-2	0.2
13.	Chloride as Cl <sup>-</sup> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017,4500 Cl A+B	30.0	5-1000	600
14.	Chromium as Cr+6 (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.05-20	0.05
15.	Cyanide as CN (mg/l)	APHA,23 <sup>rd</sup> Ed.2017,4500 ,CN A+D	BDL	0.005-5	0.05
16.	Lead as Pb (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111A+B	BDL	0.01-2	0.1
17.	Selenium as Se (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3500 Se-C	BDL	0.005-1	0.01
18.	Zinc as Zn (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111A+B	0.025	0.02-50	15
19.	Phenolic Compounds as C <sub>6</sub> H <sub>5</sub> OH (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 5530 A+C	BDL	0.004-5	0.005
20.	Total coliform (MPN/100 ml)	APHA,23 <sup>rd</sup> Ed.2017, 9221 A+ B	210.0	1.8	5000
21.	Anionic Detergents (As MBAS)(mg/l) max	APHA 22nd EDN.:2012, 5540 A+C	BDL	0.01-5	-

\*The result are related only to item tested - The parameters are not included in IS: 2296 Class-C

BDL – Below Detection Limit

  
Analyst

  
Authorized Signatory

  
Manager (Q)

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FORMAT NO. ECO/QS/FORMAT/10

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

TEST REPORT ISSUE DATE: 02.02.2021

**Meteorological Data Monitoring Reports**

Name of the Customer : Bamebari 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	36.53	21.82	45.3	13.52	1.6	0	SSE	0
2	02.01.2021	35.8	17.28	68.65	13.01	2.5	0	SSE	0
3	03.01.2021	34.57	15.87	58.35	13.14	0.8	0	SE	0
4	04.01.2021	35.39	14.79	58.11	12.3	1.1	0	SE	0
5	05.01.2021	34.72	16.26	50.2	12.3	1.5	0	SSW	0
6	06.01.2021	34.31	18.64	47.58	14.63	1.2	0	SE	0
7	07.01.2021	36.25	16.35	40.79	8.2	0.6	0	SE	0
8	08.01.2021	35.72	17.21	52.23	12.54	1.8	0	SSE	0
9	09.01.2021	37.35	18.13	75.19	14.65	1.1	0	SW	0
10	10.01.2021	36.09	21.92	61.41	17.9	1.2	0	SE	0
11	11.01.2021	35.91	18.88	77.96	24.19	0.9	0	SSE	0
12	12.01.2021	34.84	19.91	81.75	32.52	2.3	0	SW	0
13	13.01.2021	27.73	17.08	93.73	48.11	1	0	SE	0
14	14.01.2021	33.53	16.22	93.61	25.09	1.4	0	SE	0
15	15.01.2021	33.9	16.12	81.29	17.93	0.8	0	SE	0
16	16.01.2021	36	17.52	65.5	16.4	1.4	0	SE	0
17	17.01.2021	35.06	17.65	72.2	20.09	1	0	SE	0
18	18.01.2021	36.29	19.18	75.09	12.42	0.9	0	SW	0
19	19.01.2021	35.42	19.23	60.63	18.41	1.9	0	SE	0
20	20.01.2021	34.5	20.77	52.84	23.68	1.2	0	SE	0
21	21.01.2021	36.48	23.45	46.19	19.33	1.1	0	SW	0
22	22.01.2021	37.64	20.33	52.23	15.28	1.3	0	SE	0
23	23.01.2021	36.42	20.56	64.2	22.47	1.7	0	SE	0
24	24.01.2021	36.01	21.48	63.64	22.14	1.2	0	SSW	0
25	25.01.2021	36.85	21.07	55.56	17.89	1.5	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	26.01.2021	36.57	19.75	62.01	16.42	1.6	0	SE	0
27	27.01.2021	35.66	19.43	68.34	18.77	1.1	0	SE	0
28	28.01.2021	37.38	20.05	66.13	13.87	1.5	0	SE	0
26	29.01.2021	38.05	20.51	69.36	13.76	1.2	0	SE	0
30	30.01.2021	38.97	24.27	33.81	11.09	3.8	0	SW	0
31	31.01.2021	39.15	25.77	25.59	7.75	1.8	0	SE	0

\*These results are related only to tested items.

  
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FORMAT NO. ECO/QS/FORMAT/13 TEST REPORT NO: ECO LAB/AN/06/21

TEST REPORT ISSUE DATE: 07.02.2021

### TEST REPORT OF OCCUPATIONAL/WORKPLACE NOISE MONITORING

Name of the Customer : Bamebari 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	6-01-2021	Workshop (HEMM)	Maintenance (HEMM)	67.5	85.0
2	6-01-2021	Sorting Yard	Manual Sorting/Sizing	71.4	85.0
3	9-01-2021	Mr. Subudhi Barik	Sorting Labour	69.5	85.0
4	11-01-2021	Mr. Juhan Hembram	Mining Supervisor	71.3	85.0
5	13-01-2021	Near Stack yard	Stacking of ore	68.8	85.0
6	13-01-2021	Mr. Santana Munda	Weighbridge operator	72.5	85.0

*Anand*  
Analyst

*Sru*  
Authorized Signatory

*Abhishek*  
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FORMAT NO. ECO/QS/FORMAT/10

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

TEST REPORT ISSUE DATE: 04.03.2021

**Ambient Air Quality Monitoring Report (Core Zone)**

Name of the Mine : Bamebari Iron & Manganese Mine of  
**M/s Tata Steel Limited**  
Location : AAQMS-1:Office Building  
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 <sub>10</sub> (µg/m <sup>3</sup> )	PM <sub>2.5</sub> (µg/m <sup>3</sup> )	SO <sub>2</sub> (µg/m <sup>3</sup> )	NO <sub>2</sub> (µg/m <sup>3</sup> )	CO (mg/m <sup>3</sup> )
1	04.02.2021	72.36	41.68	16.60	29.09	0.45
2	07.02.2021	70.52	44.16	15.72	25.47	0.43
3	11.02.2021	78.74	47.99	13.48	27.21	0.41
4	13.02.2021	73.46	38.7	14.70	26.03	0.47
5	18.02.2021	76.34	43.9	15.74	25.29	0.44
6	20.02.2021	75.42	41.8	14.78	24.05	0.49
7	25.02.2021	72.22	37.79	15.42	21.25	0.43
8	27.02.2021	70.34	40.88	14.64	23.03	0.48
<b>Average</b>		73.68	42.11	15.14	25.18	0.45
<b>Limit as per CPCB notification New Delhi, 18<sup>th</sup>Nov, 2009. for Ambient air quality</b>		<b>100</b>	<b>60</b>	<b>80</b>	<b>80</b>	<b>4.0</b>
<b>Standard Method</b>	<b>IS : 5182 (Part-23) 2006</b>	<b>NAAQM Volume-I by CPCB</b>	<b>IS : 5182 (Part-2) 2001</b>	<b>IS : 5182 (Part-6) 2006</b>	<b>IS : 5182 (Part-10)</b>	

\*Theseresults are related only to tested items.

  
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LABORATORIES PVT. LTD.

FORMAT NO. ECO/QS/FORMAT/10

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

TEST REPORT ISSUE DATE: 04.03.2021

**Ambient Air Quality Monitoring Report (Core Zone)**

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

Location : AAQMS-1:Office Building

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 <sub>3</sub> (µg/m <sup>3</sup> )	O <sub>3</sub> (µg/m <sup>3</sup> )	Pb (µg/m <sup>3</sup> )	Ni (ng/m <sup>3</sup> )	As (ng/m <sup>3</sup> )	Benzene (µg/m <sup>3</sup> )	Benzo(a) pyrene (ng/m <sup>3</sup> )
1	04.02.2021	21.74	16.17	<1.0	1.16	<1.0	<4.0	<0.05
2	07.02.2021	22.81	16.01	<1.0	1.18	<1.0	<4.0	<0.05
3	11.02.2021	20.11	16.08	<1.0	1.19	<1.0	<4.0	<0.05
4	13.02.2021	22.75	16.16	<1.0	1.14	<1.0	<4.0	<0.05
5	18.02.2021	21.29	15.89	<1.0	1.21	<1.0	<4.0	<0.05
6	20.02.2021	18.03	14.93	<1.0	1.26	<1.0	<4.0	<0.05
7	25.02.2021	21.87	16.81	<1.0	1.28	<1.0	<4.0	<0.05
8	27.02.2021	23.00	16.97	<1.0	1.26	<1.0	<4.0	<0.05
<b>Average</b>		21.45	16.13	-	1.21	-	-	-
<b>Limit as per CPCB notification New Delhi, 18<sup>th</sup>Nov, 2009. for Ambient air quality</b>		400	180	1	20	6	5	1
<b>Standard Method</b>		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/03/21

TEST REPORT ISSUE DATE: 04.03.2021

**Ambient Air Quality Monitoring Report (Core Zone)**

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

Location : AAQMS-2: Near Mines View Point (Mines 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 <sub>10</sub> (µg/m <sup>3</sup> )	PM <sub>2.5</sub> (µg/m <sup>3</sup> )	SO <sub>2</sub> (µg/m <sup>3</sup> )	NO <sub>2</sub> (µg/m <sup>3</sup> )	CO (mg/m <sup>3</sup> )
1	01.02.2021	65.98	32.58	14.10	22.98	0.39
2	03.02.2021	66.10	32.95	14.60	24.05	0.37
3	08.02.2021	68.05	33.15	13.98	24.68	0.35
4	10.02.2021	65.23	36.30	15.20	23.16	0.41
5	15.02.2021	67.12	32.80	14.65	22.60	0.38
6	17.02.2021	66.24	30.95	13.96	24.75	0.43
7	22.02.2021	64.38	33.98	15.05	26.38	0.37
8	24.02.2021	66.20	35.67	14.26	24.38	0.42
<b>Average</b>		66.66	33.54	14.47	24.12	0.39
<b>Limit as per CPCB notification New Delhi, 18<sup>th</sup>Nov, 2009. for Ambient air quality</b>		100	60	80	80	4.0
<b>Standard Method</b>		<b>IS : 5182 (Part-23) 2006</b>	<b>NAAQM Volume-I by CPCB</b>	<b>IS : 5182 (Part-2) 2001</b>	<b>IS : 5182 (Part-6) 2006</b>	<b>IS : 5182 (Part-10)</b>

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FORMAT NO. ECO/QS/FORMAT/10

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

TEST REPORT ISSUE DATE: 04.03.2021

**Ambient Air Quality Monitoring Report (Core Zone)**

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

Location : AAQMS-2: Near Mines View Point (Mines 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 <sub>3</sub> (µg/m <sup>3</sup> )	O <sub>3</sub> (µg/m <sup>3</sup> )	Pb (µg/m <sup>3</sup> )	Ni (ng/m <sup>3</sup> )	As (ng/m <sup>3</sup> )	Benzene (µg/m <sup>3</sup> )	Benzo(a) pyrene (ng/m <sup>3</sup> )
1	01.02.2021	24.15	14.28	<1.0	1.14	<1.0	<4.0	<0.05
2	03.02.2021	23.8	12.86	<1.0	1.22	<1.0	<4.0	<0.05
3	08.02.2021	22.98	13.94	<1.0	1.06	<1.0	<4.0	<0.05
4	10.02.2021	21.9	14.32	<1.0	0.98	<1.0	<4.0	<0.05
5	15.02.2021	24.05	13.86	<1.0	1.04	<1.0	<4.0	<0.05
6	17.02.2021	22.94	13.42	<1.0	1.08	<1.0	<4.0	<0.05
7	22.02.2021	23.16	14.05	<1.0	0.99	<1.0	<4.0	<0.05
8	24.02.2021	24.48	13.64	<1.0	1.10	<1.0	<4.0	<0.05
<b>Average</b>		23.43	13.79	-	1.07	-	-	-
<b>Limit as per CPCB notification New Delhi, 18<sup>th</sup>Nov, 2009. for Ambient air quality</b>		400	180	1	20	6	5	1
<b>Standard Method</b>		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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Analyst

  
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FORMAT NO. ECO/QS/FORMAT/10

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

TEST REPORT ISSUE DATE: 04.03.2021

**Ambient Air Quality Monitoring Report (Core Zone)**

Name of the Mine : Bamebari Iron & Manganese Mine of  
**M/s Tata Steel Limited**  
Location : AAQMS-3: Near Weigh Bridge  
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 <sub>10</sub> (µg/m <sup>3</sup> )	PM <sub>2.5</sub> (µg/m <sup>3</sup> )	SO <sub>2</sub> (µg/m <sup>3</sup> )	NO <sub>2</sub> (µg/m <sup>3</sup> )	CO (mg/m <sup>3</sup> )
1	02.02.2021	74.36	43.68	10.20	20.60	0.42
2	05.02.2021	72.52	46.16	11.34	22.34	0.4
3	09.02.2021	80.74	49.99	12.10	20.96	0.38
4	12.02.2021	75.46	40.70	11.98	19.93	0.44
5	16.02.2021	78.34	45.90	12.05	22.34	0.41
6	19.02.2021	77.42	43.80	12.84	23.90	0.46
7	23.02.2021	74.22	39.79	10.64	22.54	0.4
8	26.02.2021	72.34	42.88	13.05	22.68	0.45
<b>Average</b>		75.68	44.11	11.77	21.91	0.42
<b>Limit as per CPCB notification New Delhi, 18<sup>th</sup> Nov, 2009. for Ambient air quality</b>		<b>100</b>	<b>60</b>	<b>80</b>	<b>80</b>	<b>4.0</b>
<b>Standard Method</b>		<b>IS : 5182 (Part-23) 2006</b>	<b>NAAQM Volume-I by CPCB</b>	<b>IS : 5182 (Part-2) 2001</b>	<b>IS : 5182 (Part-6) 2006</b>	<b>IS : 5182 (Part-10)</b>

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FORMAT NO. ECO/QS/FORMAT/10

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

TEST REPORT ISSUE DATE: 04.03.2021

**Ambient Air Quality Monitoring Report (Core Zone)**

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

Location : AAQMS-3: Near Weigh Bridge

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 <sub>3</sub> (µg/m <sup>3</sup> )	O <sub>3</sub> (µg/m <sup>3</sup> )	Pb (µg/m <sup>3</sup> )	Ni (ng/m <sup>3</sup> )	As (ng/m <sup>3</sup> )	Benzene (µg/m <sup>3</sup> )	Benzo(a) pyrene (ng/m <sup>3</sup> )
1	02.02.2021	19.68	12.30	<1.0	1.12	<1.0	<4.0	<0.05
2	05.02.2021	22.04	11.98	<1.0	1.05	<1.0	<4.0	<0.05
3	09.02.2021	20.92	11.60	<1.0	1.20	<1.0	<4.0	<0.05
4	12.02.2021	20.88	10.86	<1.0	1.42	<1.0	<4.0	<0.05
5	16.02.2021	22.60	12.05	<1.0	0.98	<1.0	<4.0	<0.05
6	19.02.2021	23.82	13.28	<1.0	1.06	<1.0	<4.0	<0.05
7	23.02.2021	20.90	12.02	<1.0	1.01	<1.0	<4.0	<0.05
8	26.02.2021	22.15	12.98	<1.0	1.32	<1.0	<4.0	<0.05
<b>Average</b>		21.62	12.13	-	1.14	-	-	-
<b>Limit as per CPCB notification New Delhi, 18<sup>th</sup> Nov, 2009. for Ambient air quality</b>		400	180	1	20	6	5	1
<b>Standard Method</b>		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/05/21

TEST REPORT ISSUE DATE: 05.03.2021

**Ambient Air Quality Monitoring Report (Buffer Zone)**

Name of the Customer : Bamebari 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

SI.No.	Location (Date of Monitoring)	Concentration of Pollutant				
		PM <sub>10</sub> (µg/m <sup>3</sup> )	PM <sub>2.5</sub> (µg/m <sup>3</sup> )	SO <sub>2</sub> (µg/m <sup>3</sup> )	NO <sub>2</sub> (µg/m <sup>3</sup> )	CO (mg/m <sup>3</sup> )
1	Jaganathpur (12.02.2021)	82.34	41.02	12.16	23.15	0.86
2	Bandhubaria (12.02.2021)	83.20	42.16	11.90	21.35	0.84
3	Raikara (12.02.2021)	80.28	41.30	13.62	22.10	0.92
<b>Average</b>		<b>80.43</b>	<b>81.84</b>	<b>41.49</b>	<b>12.56</b>	<b>22.2</b>
<b>Limit as per CPCB notification New Delhi, 18<sup>th</sup>Nov, 2009. for Ambient air quality</b>		<b>100</b>	<b>60</b>	<b>80</b>	<b>80</b>	<b>4.0</b>
<b>Standard Method</b>		<b>IS : 5182 (Part-23) 2006</b>	<b>NAAQM Volume-I by CPCB</b>	<b>IS : 5182 (Part-2) 2001</b>	<b>IS : 5182 (Part-6) 2006</b>	<b>IS : 5182 (Part-10)</b>

\*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: 05.03.2021

**Ambient Air Quality Monitoring Report (Buffer Zone)**

Name of the Customer : Bamebari 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

SI.No.	Location (Date of Monitoring)	Concentration of Pollutant						
		NH <sub>3</sub> (µg/m <sup>3</sup> )	O <sub>3</sub> (µg/m <sup>3</sup> )	Pb (µg/m <sup>3</sup> )	Ni (ng/m <sup>3</sup> )	As (ng/m <sup>3</sup> )	Benzene (µg/m <sup>3</sup> )	Benzo(a) pyrene (ng/m <sup>3</sup> )
1	Jaganathpur (12.02.2021)	22.60	10.94	<1.0	1.20	<1.0	<4.0	<0.05
2	Bandhubaria (12.02.2021)	20.28	12.53	<1.0	1.05	<1.0	<4.0	<0.05
3	Raikara (12.02.2021)	24.1	11.24	<1.0	1.12	<1.0	<4.0	<0.05
<b>Average</b>		<b>22.32</b>	<b>11.57</b>	<b>-</b>	<b>1.12</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Limit as per CPCB notification New Delhi, 18<sup>th</sup> Nov, 2009. for Ambient air quality</b>		<b>400</b>	<b>180</b>	<b>1</b>	<b>20</b>	<b>6</b>	<b>5</b>	<b>1</b>
<b>Standard Method</b>		<b>APHA 401 (Indophenol)</b>	<b>IS : 5182 (Part-9) 1974</b>	<b>IS : 5182 (Part-22) 2004</b>	<b>NAAQM Volume-I by CPCB</b>	<b>NAAQM Volume-I by CPCB</b>	<b>IS : 5182 (Part-11)</b>	<b>IS : 5182 (Part-12)</b>

\*These results are related only to tested items.

  
Analyst

  
Authorized Signatory

  
Manager (Q)

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FORMAT NO. ECO/QS/FORMAT/13

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

TEST REPORT ISSUE DATE: 05.03.2021

**TEST REPORT OF AMBIENT NOISE LEVEL MONITORING**

Name of the Customer : Bamebari Iron & Manganese Mines  
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	5-02-2021	Township	Residential	63.2	44.3
2	5-02-2021	Near Hospital	Silence	47.6	37.8
3	9-02-2021	Mines Area	Industrial	70.8	52.6
4	9-02-2021	Near Market	Commercial	68.4	47.6
5	13-02-2021	Near Canteen	Industrial	69.4	43.6
6	13-02-2021	Near Sorting Yard	Industrial	72.3	43.7

**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:**

- Day time is reckoned in between 6:00 AM and 10:00 PM.
- Night time is reckoned in between 10:00 PM and 6:00 AM
- 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.
- 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/Stack1/08/21  
TEST REPORT ISSUE DATE: 05.03.2021**TEST REPORT OF FLUE GAS EMISSIONS\***

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

Date of Sampling : 10.02.2021

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 (m<sup>2</sup>) : 0.0061

Ambient Air (°C) : 19.0

Flue Gas Temperature (°C) : 176.0

Exit Velocity of Gas (m/sec.) : 8.95

Flow Rate (Nm<sup>3</sup>/ sec.) : 0.035

Type of Fuel : HSD

Quantity of Fuel Consumption (lit/hr) : 18-20

Sl. No.	Tests Conducted	Method	<i>Pollutant Concentration in ( At 15% O<sub>2</sub> Correction) in gm/Kw-Hr</i>	Standards as per CPCB in gm/Kw-Hr
1.	Particulate Matter (PM)	IS:11255 (Part-1)	0.047	0.2
2.	Sulphur Dioxide (SO <sub>2</sub> )	IS:11255 (Part-2)	0.026	-
3.	Nitrogen Dioxide (NO <sub>x</sub> )	IS:11255 (Part-7)	0.052	4.0 (NO <sub>x</sub> +HC)
4.	Hydrocarbon (HC)	IS:13270	1.10	
5.	Carbon Monoxide (CO)	IS:13270	1.10	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/09/21

TEST REPORT ISSUE DATE: 10.03.2021

**TEST REPORT OF DRINKING WATER\***

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

Address of the Customer : Bameberi Iron & Manganese Mine (Joda)

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 13/2/2021

Date of Sample Receiving : 18/2/2021

Packing of Sample : As per requirement

Date of Analysis : 19/2/2021-25/2/2021

Source of Sample : Bamebari Canteen Tap water

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	INDIAN STANDARDS as per IS 10500:2012	
					Acceptable Limit	Permissible Limit
1.	Colour (Hazen unit)	APHA, 23 <sup>rd</sup> 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	7.2	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	188	10-10000	500	2000
7.	Alkalinity (mg/l)	APHA, 23rd Ed. 2017,2320 A+B	139	5-1500	200	600
8.	Total Hardness as CaCO <sub>3</sub> (mg/l)	APHA, 23rd Ed. 2017,2340 A+C	155	5-1500	200.0	600.0
9.	Calcium as Ca (mg/l)	APHA, 23rd Ed. 2017, 3500 Ca A+B	41.8	5 – 1000	75.0	200.0
10.	Magnesium as Mg (mg/l)	APHA, 23rd Ed. 2017, 3500 Mg A+B	13.23	5-1000	30.0	100.0
11.	Chloride as Cl (mg/l)	APHA, 23rd Ed. 2017,4500 Cl A+B	17.4	5-1000	250.0	1000.0
12.	Sulfate as SO <sub>4</sub> (mg/l)	APHA, 23rd Ed. 2017,4500 SO <sub>4</sub> - E	21.3	5-200	200.0	400.0
13.	Nitrate Nitrogen as NO <sub>3</sub> (mg/l)	APHA, 23rd Ed. 2017, 4500 NO <sub>3</sub> - B	2.74	5-100	45.0 (Max)	No Relax.
14.	Fluorides as F (mg/l)	APHA, 23rd Ed. 2017,4500-C	0.35	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	<b>0.028</b>	0.02-50	0.3 (Max)	No Relax.
17.	Manganese as Mn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	<b>BDL</b>	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	0.070	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 <sub>6</sub> H <sub>5</sub> 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

*Anand*  
Analyst

*Sw*  
Authorized Signatory

*db*  
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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/09/21

TEST REPORT ISSUE DATE: 10.03.2021

**TEST REPORT OF DRINKING WATER\***

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

Address of the Customer : Bameberi Iron & Manganese Mine (Joda)

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 13/2/2021

Date of Sample Receiving : 18/2/2021

Packing of Sample : As per requirement

Date of Analysis : 19/2/2021-25/2/2021

Source of Sample : Joribar Canteen RO water

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	INDIAN STANDARDS as per IS 10500:2012	
					Acceptable Limit	Acceptable Limit
1.	Colour (Hazen unit)	APHA, 23 <sup>rd</sup> 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	223	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 <sub>3</sub> (mg/l)	APHA, 23rd Ed. 2017,2340 A+C	178	5-1500	200.0	600.0
9.	Calcium as Ca (mg/l)	APHA, 23rd Ed. 2017, 3500 Ca A+B	47.3	5 – 1000	75.0	200.0
10.	Magnesium as Mg (mg/l)	APHA, 23rd Ed. 2017, 3500 Mg A+B	17.5	5-1000	30.0	100.0
11.	Chloride as Cl (mg/l)	APHA, 23rd Ed. 2017,4500 Cl A+B	28.4	5-1000	250.0	1000.0
12.	Sulfate as SO <sub>4</sub> (mg/l)	APHA, 23rd Ed. 2017,4500 SO <sub>4</sub> -E	38.7	5-200	200.0	400.0
13.	Nitrate Nitrogen as NO <sub>3</sub> (mg/l)	APHA, 23rd Ed. 2017, 4500 NO <sub>3</sub> -B	5.8	5-100	45.0 (Max)	No Relax.
14.	Fluorides as F (mg/l)	APHA, 23rd Ed. 2017,4500-C	0.45	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	0.20	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 <sub>6</sub> H <sub>5</sub> 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

*Anand*  
Analyst

*Swaraj Swain*  
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/11/21

TEST REPORT ISSUE DATE: 10.03.2021

**TEST REPORT OF DRINKING WATER\***

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

Address of the Customer : Bameberi Iron & Manganese Mine (Joda)

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 06/2/2021

Date of Sample Receiving : 11/2/2021

Packing of Sample : As per requirement

Date of Analysis : 12/2/2021-16/2/2021

Source of Sample : Borewell Near Temple (Bamebari Camp)

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	INDIAN STANDARDS as per IS 10500:2012	
					Acceptable Limit	Permissible Limit
1.	Colour (Hazen unit)	APHA, 23 <sup>rd</sup> 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	7.2	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	189	10-10000	500	2000
7.	Alkalinity (mg/l)	APHA, 23rd Ed. 2017,2320 A+B	158	5-1500	200	600
8.	Total Hardness as CaCO <sub>3</sub> (mg/l)	APHA, 23rd Ed. 2017,2340 A+C	154	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	12.7	5-1000	30.0	100.0
11.	Chloride as Cl (mg/l)	APHA, 23rd Ed. 2017,4500 Cl A+B	19.4	5-1000	250.0	1000.0
12.	Sulfate as SO <sub>4</sub> (mg/l)	APHA, 23rd Ed. 2017,4500 SO <sub>4</sub> - E	30.3	5-200	200.0	400.0
13.	Nitrate Nitrogen as NO <sub>3</sub> (mg/l)	APHA, 23rd Ed. 2017, 4500 NO <sub>3</sub> - B	3.2	5-100	45.0 (Max)	No Relax.
14.	Fluorides as F (mg/l)	APHA, 23rd Ed. 2017,4500-C	0.40	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	0.025	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	0.070	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 <sub>6</sub> H <sub>5</sub> 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

*Sw*  
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*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: 10.03.2021

**TEST REPORT OF DRINKING WATER\***

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

Address of the Customer : Bameberi Iron & Manganese Mine (Joda)

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 06/2/2021

Date of Sample Receiving : 11/2/2021

Packing of Sample : As per requirement

Date of Analysis : 12/2/2021-16/2/2021

Source of Sample : Bore Well Near Security Barrier (Camp)

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	INDIAN STANDARDS as per IS 10500:2012	
					Acceptable Limit	Permissible Limit
1.	Colour (Hazen unit)	APHA, 23 <sup>rd</sup> 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	7.3	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	242	10-10000	500	2000
7.	Alkalinity (mg/l)	APHA, 23rd Ed. 2017,2320 A+B	151	5-1500	200	600
8.	Total Hardness as CaCO <sub>3</sub> (mg/l)	APHA, 23rd Ed. 2017,2340 A+C	214	5-1500	200.0	600.0
9.	Calcium as Ca (mg/l)	APHA, 23rd Ed. 2017, 3500 Ca A+B	43.7	5 - 1000	75.0	200.0
10.	Magnesium as Mg (mg/l)	APHA, 23rd Ed. 2017, 3500 Mg A+B	17.4	5-1000	30.0	100.0
11.	Chloride as Cl (mg/l)	APHA, 23rd Ed. 2017,4500 Cl A+B	26.7	5-1000	250.0	1000.0
12.	Sulfate as SO <sub>4</sub> (mg/l)	APHA, 23rd Ed. 2017,4500 SO <sub>4</sub> - E	38.9	5-200	200.0	400.0
13.	Nitrate Nitrogen as NO <sub>3</sub> (mg/l)	APHA, 23rd Ed. 2017, 4500 NO <sub>3</sub> - B	5.6	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	0.22	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 <sub>6</sub> H <sub>5</sub> 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

Anand  
Analyst

Authorized Signatory

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/09

TEST REPORT NO: ECO LAB/DW/13/21

TEST REPORT ISSUE DATE: 10.03.2021

**TEST REPORT OF DRINKING WATER\***

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

Address of the Customer : Bameberi Iron & Manganese Mine (Joda)

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 06/2/2021

Date of Sample Receiving : 11/2/2021

Packing of Sample : As per requirement

Date of Analysis : 12/2/2021-16/2/2021

Source of Sample : Bore Well Near Admin Office (Camp)

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	INDIAN STANDARDS as per IS 10500:2012	
					Acceptable Limit	Permissible Limit
1.	Colour (Hazen unit)	APHA, 23 <sup>rd</sup> 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	7.6	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	218	10-10000	500	2000
7.	Alkalinity (mg/l)	APHA, 23rd Ed. 2017,2320 A+B	160	5-1500	200	600
8.	Total Hardness as CaCO <sub>3</sub> (mg/l)	APHA, 23rd Ed. 2017,2340 A+C	210	5-1500	200.0	600.0
9.	Calcium as Ca (mg/l)	APHA, 23rd Ed. 2017, 3500 Ca A+B	51.2	5 - 1000	75.0	200.0
10.	Magnesium as Mg (mg/l)	APHA, 23rd Ed. 2017, 3500 Mg A+B	17.4	5-1000	30.0	100.0
11.	Chloride as Cl (mg/l)	APHA, 23rd Ed. 2017,4500 Cl A+B	30.5	5-1000	250.0	1000.0
12.	Sulfate as SO <sub>4</sub> (mg/l)	APHA, 23rd Ed. 2017,4500 SO <sub>4</sub> - E	41.6	5-200	200.0	400.0
13.	Nitrate Nitrogen as NO <sub>3</sub> (mg/l)	APHA, 23rd Ed. 2017, 4500 NO <sub>3</sub> - B	5.8	5-100	45.0 (Max)	No Relax.
14.	Fluorides as F (mg/l)	APHA, 23rd Ed. 2017,4500-C	0.4	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	0.028	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	0.28	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 <sub>6</sub> H <sub>5</sub> 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

*Anand*  
Analyst

*Sw*  
Authorized Signatory

*db*  
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FORMAT NO. ECO/QS/FORMAT/10 TEST REPORT NO: ECO LAB/DUSTFALL/14/21

TEST REPORT ISSUE DATE: 10.03.2021

**DustFall Analysis Report**

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

Location : DF-1: Mines Area (Near Sorting Yard)

Sampling Method : IS: 5182

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

SI.No.	Duration of Monitoring	Concentration of Pollutant (t/km2/month)				
		Total Dust Fall (t/km2/month)	Analysis Results			
1	01.02.2021 To 28.02.2021	0.72	Co (%)	Ni (%)	Hg (%)	As (%)
			<0.001	<0.001	<.001	<0.001

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

  
Analyst  
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Manager (Q)

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

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

TEST REPORT ISSUE DATE: 12.03.2021

**TEST REPORT OF FUGITIVE EMISSION MONITORING**

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



Location : L-1 50 mtr from stack yard (Joribar)

Date of Sampling : 13.02.2021

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 <sup>rd</sup> Feb 2006 (MoEF&CC)
1.	Suspended Particulate Matter (SPM)	IS : 5182-Part-4	$\mu\text{g}/\text{m}^3$	780	1200 $\text{mg}/\text{m}^3$ at 25+5 m from the source of generation
2.	Respirable Particulate Matter (RPM)	IS : 5182-Part-4	$\mu\text{g}/\text{m}^3$	390	500 $\text{mg}/\text{m}^3$ at 25+5 m from the source of generation

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



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

TEST REPORT NO.: ECO LAB/Fugitive/03/21

TEST REPORT ISSUE DATE: 12.03.2021

**TEST REPORT OF FUGITIVE EMISSION MONITORING**

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

Location : L-1 50mtr from stack yard (Joribar)

Date of Sampling : 13.02.2021

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 <sup>rd</sup> Feb 2006 (MoEF&CC)
1.	Suspended Particulate Matter (SPM)	IS : 5182-Part-4	$\mu\text{g}/\text{m}^3$	780	1200 $\text{mg}/\text{m}^3$ at 25+5 m from the source of generation
2.	Respirable Particulate Matter (RPM)	IS : 5182-Part-4	$\mu\text{g}/\text{m}^3$	265	500 $\text{mg}/\text{m}^3$ at 25+5 m from the source of generation

  
Analyst

  
Authorized Signatory

  
Manager (Q)

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

TEST REPORT NO.: ECO LAB/Fugitive/04/21

TEST REPORT ISSUE DATE: 12.03.2021

**TEST REPORT OF FUGITIVE EMISSION MONITORING**

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



Location : L-1 100mtr from View Point (Joribar)

Date of Sampling : 17.02.2021

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 <sup>rd</sup> Feb 2006 (MoEF&CC)
1.	Suspended Particulate Matter (SPM)	IS : 5182-Part-4	$\mu\text{g}/\text{m}^3$	930	1200 $\text{mg}/\text{m}^3$ at 25+5 m from the source of generation
2.	Respirable Particulate Matter (RPM)	IS : 5182-Part-4	$\mu\text{g}/\text{m}^3$	384	500 $\text{mg}/\text{m}^3$ at 25+5 m from the source of generation

  
Analyst  
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Manager (Q)

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

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

TEST REPORT ISSUE DATE: 12.03.2021

**TEST REPORT OF FUGITIVE EMISSION MONITORING**

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


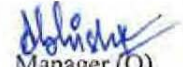
Location : L-1 20mtr from Haul Road (Joribar)

Date of Sampling : 19.02.2021

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 <sup>rd</sup> Feb 2006 (MoEF&CC)
1.	Suspended Particulate Matter (SPM)	IS : 5182-Part-4	$\mu\text{g}/\text{m}^3$	1010	1200 $\text{mg}/\text{m}^3$ at 25+5 m from the source of generation
2.	Respirable Particulate Matter (RPM)	IS : 5182-Part-4	$\mu\text{g}/\text{m}^3$	320	500 $\text{mg}/\text{m}^3$ at 25+5 m from the source of generation

  
Analyst  
Authorized Signatory  
Manager (Q)

Ecomen Laboratories Pvt. Ltd.  
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Sector-H, Aliganj, Lucknow-226024  
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FORMAT NO. ECO/QS/FORMAT/10

TEST REPORT NO: ECO LAB/02/21

TEST REPORT ISSUE DATE: 10.03.2021

**Personal Dust Sampling Analysis Report**

Name of the Customer : Bamebari 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 <sup>3</sup> ) 8-hr TWA
1	03-02-2021	Lalatendu Lohar	Sorting Labour	TSP/798688/0919	3.0 mg/m <sup>3</sup> (Ref. DGMS (Tech.) (S&T) Circular No.01 Dhanbad, Dated 21st January 2010)	1.56
2	03-02-2021	Santana Munda	Weigh Bridge	TSP/753276/0819		1.63
3	06-02-2021	Bigneswari Malakut	Security Mine	BMM-236		1.44
4	06-02-2021	Johan Hembram	Supervisor Stack yard	MW0719167159		1.87
5	08-02-2021	Saraswati Tanti	Dumper Operator	MWO719166977		2.20

**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.

*Anshu*  
Analyst

*[Signature]*  
Authorized Signatory

*[Signature]*  
Manager (Q)

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FORMAT NO. ECO/QS/FORMAT/09

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

TEST REPORT ISSUE DATE: 07.03.2021

**TEST REPORT OF WASTE WATER\***

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

Address of the Customer : BameberIron &Manganese Mines (Joda)

Sampling Method : APHA/ IS: 3025

Sample Collected by : Sangram Das

Sample Quantity : As per requirement.

Date of Sampling : 03/2/2021

Date of Sample Receiving : 08/2/2021

Date of Analysis : 09/2/2021 to 14/2/2021

Source of Sample : **Bamberi STP Inlet**

Sl. No.	Tests Parameter(s)	Protocol	Result	Limits of Detection
1.	Colour (Hazen unit)	APHA, 23 <sup>rd</sup> Ed. 2017, 2120 B	30.0	5-100
2.	Odour	APHA, 23 <sup>rd</sup> Ed. 2017, 2150 B	Pungent	Agreeable
3.	Particulate sizein ( $\mu$ ) Size	APHA, 23 <sup>rd</sup> Ed. 2017, 2540-D	$\geq 850$	100 - 1200
4.	pH	APHA, 23 <sup>rd</sup> Ed. 2017,4500 H+ A+B	6.7	2-12
5.	Temperature ( $^{\circ}$ C)	APHA, 23 <sup>rd</sup> Ed. 2017, 2550A+B	32.2	10-100
6.	Oil & Grease as O & G (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 5520 (A+D)	7.0	5-600
7.	Total Residual Chlorine (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500-Cl B	BDL	0.1-5
8.	Ammonical Nitrogen as NH <sub>3</sub> - N(mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 NH <sub>3</sub> A+F	5.3	1-100
9.	Total KjeldahalNirogen as NH <sub>3</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 Norg A+C	26.4	5-100
10.	Free Ammonia as NH <sub>3</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 NH <sub>3</sub> A+F	0.60	0.05-5.0
11.	Biochemical Oxygen Demand as BOD (mg/l) 3days at 27 $^{\circ}$ C	APHA, 23 <sup>rd</sup> Ed. 2017, 5210 A+B	38.5	5-10000
12.	Chemical Oxygen Demand as COD (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 5220 A+C	340	5-50000
13.	Arsenic as As (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3114 B	BDL	0.01-2
14.	Mercury as Hg (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.001-2
15.	Lead asPb (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.01-5
16.	Cadmium as Cd (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.02-5
17.	Hexavalent Chromium as Cr <sup>+6</sup> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.05-20
18.	Total Chromium as Cr (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.05-50
19.	Copper as Cu (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.05-5
20.	Zinc as Zn (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	0.040	0.02-50
21.	Selenium as Se (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 Se-A+D	BDL	0.01-1
22.	Nickel as Ni (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.02-5
23.	Fluoride as F (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 F C+D	0.25	0.02-10
24.	Dissolved Phosphate as PO <sub>4</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 - PD	2.2	0.5-100

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Sl. No.	Tests Parameter(s)	Protocol	Result	Limits of Detection
25.	Sulphide as S <sub>2</sub> -(mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 S <sup>2</sup> -F	0.25	0.1-10
26.	Phenolic Compounds as C <sub>6</sub> H <sub>5</sub> OH (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 5530 A+C	BDL	1-10
27.	Bioassay (%)	APHA, 23 <sup>rd</sup> Ed. 2017, 8910 C	80	70 --95-
28.	Manganese as Mn (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.01-20
29.	Iron as Fe (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3500 Fe B	BDL	0.02-100
30.	Nitrate Nitrogen as NO <sub>3</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017,(4500-NO,A+ B)	2.75	5-100

\*The results are related only to item tested. BDL = Below Detection Limit

  
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FORMAT NO. ECO/QS/FORMAT/09

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

TEST REPORT ISSUE DATE: 07.03.2021

**TEST REPORT OF WASTE WATER\***

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

Address of the Customer : Bamebari Iron & Manganese Mines (Joda)

Sampling Method : APHA/ IS: 3025

Sample Collected by : Sangram Das

Sample Quantity : As per requirement.

Date of Sampling : 03/2/2021

Date of Sample Receiving : 08/2/2021

Date of Analysis : 09/2/2021 to 14/2/2021

Source of Sample : **Bambari STP Outlet**

Sl. No.	Tests	Protocol	Result	Limits of Detection	G.S.R 422(E)
					Desirable Limit
1.	Colour (Hazen unit)	APHA, 23 <sup>rd</sup> Ed. 2017, 2120 B	<5.0	5-100	-
2.	Odour	APHA, 23 <sup>rd</sup> Ed. 2017, 2150 B	Odourless	Agreeable	Agreeable
3.	Particulate size in (µ)	APHA, 23 <sup>rd</sup> Ed. 2017, 2540-D	245	100 - 1200	Shall pass 850 Micron IS Sieve
4.	pH	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 H+ A+B	7.2	2-12	5.5-9.0
5.	Temperature (°C)	APHA, 23 <sup>rd</sup> Ed. 2017, 2550A+B	30.0	10-100	-
6.	Oil & Grease as O & G (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 5520 (A+D)	BDL	5-600	10.0
7.	Total Residual Chlorine (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500-Cl B	0.48	0.1-5	1.0
8.	Ammonical Nitrogen as NH <sub>3</sub> - N(mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 NH <sub>3</sub> A+F	1.25	1-100	50.0
9.	Total KjeldahalNitrogen as NH <sub>3</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 Norg A+C	12.7	5-100	100.0
10.	Free Ammonia as NH <sub>3</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 NH <sub>3</sub> A+F	BDL	0.05-5.0	5.0
11.	Biochemical Oxygen Demand as BOD (mg/l) 3days at 27°C	APHA, 23 <sup>rd</sup> Ed. 2017, 5210 A+B	13.5	5-10000	30.0
12.	Chemical Oxygen Demand as COD (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 5220 A+C	60.5	5-50000	250.0
13.	Arsenic as As (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3114 B	BDL	0.01-2	0.2
14.	Mercury as Hg (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.001-2	0.01
15.	Lead asPb (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.01-5	0.1
16.	Cadmium as Cd (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.02-5	0.2
17.	Hexavalent Chromium as Cr <sup>+6</sup> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.05-20	0.1
18.	Total Chromium as Cr (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.05-50	2.0
19.	Copper as Cu (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.05-5	2.0
20.	Zinc as Zn (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	0.020	0.02-50	5.0
21.	Selenium as Se (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 Se-A+D	BDL	0.01-1	0.05
22.	Nickel as Ni (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.02-5	2.0
23.	Fluoride as F (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 F C+D	0.25	0.02-10	2.0
24.	Dissolved Phosphate as PO <sub>4</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 - PD	BDL	0.5-100	5.0

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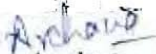

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Sl. No.	Tests	Protocol	Result	Limits of Detection	G.S.R 422(E)
					Desirable Limit
25.	Sulphide as S <sub>2</sub> -(mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 S <sup>2</sup> -F	BDL	0.1-10	2.0
26.	Phenolic Compounds as C <sub>6</sub> H <sub>5</sub> OH (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 5530 A+C	BDL	1-10	1.0
27.	Bioassay (%)	APHA, 23 <sup>rd</sup> Ed. 2017, 8910 C	92%	70 --95	90% survival of fish after 96 hrs. in 100% Effluent
28.	Manganese as Mn (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.01-20	2.0
29.	Iron as Fe (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3500 Fe B	BDL	0.02-100	3.0
30.	Nitrate Nitrogen as NO <sub>3</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017,(4500-NO <sub>3</sub> A+ B)	5.55	5-100	10.0

\*The results are related only to item tested. BDL = Below Detection Limit

  
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FORMAT NO. ECO/QS/FORMAT/09

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

TEST REPORT ISSUE DATE: 07.03.2021

**TEST REPORT OF WASTE WATER\***

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

Address of the Customer : Bamebari Iron & Manganese Mines (Joda)

Sampling Method : APHA/ IS: 3025

Sample Collected by : Sangram Das

Sample Quantity : As per requirement.

Date of Sampling : 03/2/2021

Date of Sample Receiving : 08/2/2021

Date of Analysis : 09/2/2021 to 14/2/2021

Source of Sample : **Bambari Workshop Effluent**

Sl. No.	Tests	Protocol	Result	Limits of Detection	G.S.R 422(E)
					Desirable Limit
1.	Colour (Hazen unit)	APHA, 23 <sup>rd</sup> Ed. 2017, 2120 B	<5.0	5-100	-
2.	Odour	APHA, 23 <sup>rd</sup> Ed. 2017, 2150 B	Odourless	Agreeable	Agreeable
3.	Particulate size in (µ)	APHA, 23 <sup>rd</sup> Ed. 2017, 2540-D	245	100 - 1200	Shall pass 850 Micron IS Sieve
4.	pH	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 H+ A+B	7.3	2-12	5.5-9.0
5.	Temperature (°C)	APHA, 23 <sup>rd</sup> Ed. 2017, 2550A+B	23.8	10-100	-
6.	Oil & Grease as O & G (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 5520 (A+D)	BDL	5-600	10.0
7.	Total Residual Chlorine (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500-Cl B	0.20	0.1-5	1.0
8.	Ammonical Nitrogen as NH <sub>3</sub> - N(mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 NH <sub>3</sub> A+F	1.30	1-100	50.0
9.	Total KjeldahalNitrogen as NH <sub>3</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 Norg A+C	6.7	5-100	100.0
10.	Free Ammonia as NH <sub>3</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 NH <sub>3</sub> A+F	BDL	0.05-5.0	5.0
11.	Biochemical Oxygen Demand as BOD (mg/l) 3days at 27°C	APHA, 23 <sup>rd</sup> Ed. 2017, 5210 A+B	6.2	5-10000	30.0
12.	Chemical Oxygen Demand as COD (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 5220 A+C	34.6	5-50000	250.0
13.	Arsenic as As (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3114 B	BDL	0.01-2	0.2
14.	Mercury as Hg (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.001-2	0.01
15.	Lead asPb (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.01-5	0.1
16.	Cadmium as Cd (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.02-5	0.2
17.	Hexavalent Chromium as Cr <sup>+6</sup> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.05-20	0.1
18.	Total Chromium as Cr (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.05-50	2.0
19.	Copper as Cu (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.05-5	2.0
20.	Zinc as Zn (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	0.025	0.02-50	5.0
21.	Selenium as Se (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 Se-A+D	BDL	0.01-1	0.05
22.	Nickel as Ni (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.02-5	2.0
23.	Fluoride as F (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 F C+D	0.05	0.02-10	2.0
24.	Dissolved Phosphate as PO <sub>4</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 - PD	BDL	0.5-100	5.0

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Sl. No.	Tests	Protocol	Result	Limits of Detection	G.S.R 422(E)
					Desirable Limit
25.	Sulphide as S <sub>2</sub> -(mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 S <sup>2</sup> -F	BDL	0.1-10	2.0
26.	Phenolic Compounds as C <sub>6</sub> H <sub>5</sub> OH (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 5530 A+C	BDL	1-10	1.0
27.	Bioassay (%)	APHA, 23 <sup>rd</sup> Ed. 2017, 8910 C	87%	70 --95	90% survival of fish after 96 hrs. in 100% Effluent
28.	Manganese as Mn (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	0.10	0.01-20	2.0
29.	Iron as Fe (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3500 Fe B	1.2	0.02-100	3.0
30.	Nitrate Nitrogen as NO <sub>3</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017,(4500-NO <sub>3</sub> A+ B)	3.75	5-100	10.0

\*The results are related only to item tested. BDL = Below Detection Limit

  
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FORMAT NO. ECO/QS/FORMAT/09

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

TEST REPORT ISSUE DATE:06.03.2021

**TEST REPORT OF SURFACE WATER\***

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

Address of the Customer : Bamebari Iron & Manganese Mine (Joda)

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 04/2/2021

Date of Sample Receiving : 08/2/2021

Date of Analysis : 09/2/2021 to 14/2/2021

Source of Sample : Kassia Nala (out side Lease)

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	IS:2296 Class-C
1.	pH	APHA,23 <sup>rd</sup> Ed.2017,4500H <sup>+</sup> A+B	6.9	2-12	8.5
2.	Colour (Hazen unit)	APHA, 23 <sup>rd</sup> Ed. 2017, 2120 B	10.0	5-100	
3.	Total Dissolved Solids as TDS (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 , 2540C	192	5-10000	1500
4.	Dissolved Oxygen as DO (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,4500 A+C	6.3	2-10	4.0(min)
5.	Biochemical Oxygen Demand as BOD (mg/l) 3 days at 27 OC	APHA,23 <sup>rd</sup> Ed.2017 ,5210A+ B	BDL	5-10000	3.0
6.	Nitrate Nitrogen as NO <sub>3</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 NO <sub>3</sub> - B	6.7	5-100	50.0
7.	Fluorides as F (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,4500 -C	0.25	0.05-10	1.5
8.	Sulfate as SO <sub>4</sub> (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,4500 -SO <sub>4</sub> <sup>2-</sup> E	30.2	1.0-250	400.0
9.	Iron as Fe (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,3500 Fe B	0.085	0.02-50	50.0
10.	Copper as Cu (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111A+B	BDL	0.05-5	1.5
11.	Cadmium as Cd (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111A+B	BDL	0.002-2	0.01
12.	Arsenic as As(mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3114C	BDL	0.01-2	0.2
13.	Chloride as Cl <sup>-</sup> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017,4500 Cl A+B	31.3	5-1000	600
14.	Chromium as Cr+6 (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.05-20	0.05
15.	Cyanide as CN (mg/l)	APHA,23 <sup>rd</sup> Ed.2017,4500 ,CN A+D	BDL	0.005-5	0.05
16.	Lead as Pb (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111A+B	BDL	0.01-2	0.1
17.	Selenium as Se (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3500 Se-C	BDL	0.005-1	0.01
18.	Zinc as Zn (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111A+B	0.20	0.02-50	15
19.	Phenolic Compounds as C <sub>6</sub> H <sub>5</sub> OH (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 5530 A+C	BDL	0.004-5	0.005
20.	Total coliform (MPN/100 ml)	APHA,23 <sup>rd</sup> Ed.2017, 9221 A+ B	215	1.8	5000
21.	Anionic Detergents (As MBAS)(mg/l) max	APHA 22 <sup>nd</sup> EDN.:2012, 5540 A+C	BDL	0.01-5	-

\*The result are related only to item tested - The parameters are not included in IS: 2296 Class-C

BDL – Below Detection Limit

Anshu  
Analyst

Authorized Signatory

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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/SW/04/21

TEST REPORT ISSUE DATE:06.03.2021

**TEST REPORT OF SURFACE WATER\***

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

Address of the Customer : Bamebari Iron & Manganese Mine (Joda)

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 04/2/2021

Date of Sample Receiving : 08/2/2021

Date of Analysis : 09/2/2021 to 14/2/2021

Source of Sample : Intake Point at Tindharia (Baitarani River)

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	IS:2296 Class-C
1.	pH	APHA,23 <sup>rd</sup> Ed.2017,4500H <sup>+</sup> A+B	7.1	2-12	8.5
2.	Colour (Hazen unit)	APHA, 23 <sup>rd</sup> Ed. 2017, 2120 B	9.5	5-100	
3.	Total Dissolved Solids as TDS (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,2540C	231	5-10000	1500
4.	Dissolved Oxygen as DO (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,4500 A+C	5.5	2-10	4.0(min)
5.	Biochemical Oxygen Demand as BOD (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,5210A+ B	BDL	5-10000	3.0
6.	Nitrate Nitrogen as NO <sub>3</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 NO <sub>3</sub> - B	7.0	5-100	50.0
7.	Fluorides as F (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,4500 -C	0.3	0.05-10	1.5
8.	Sulfate as SO <sub>4</sub> (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,4500 -SO <sub>4</sub> <sup>2-</sup> E	32.5	1.0-250	400.0
9.	Iron as Fe (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,3500 Fe B	0.075	0.02-50	50.0
10.	Copper as Cu (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111A+B	BDL	0.05-5	1.5
11.	Cadmium as Cd (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111A+B	BDL	0.002-2	0.01
12.	Arsenic as As(mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3114C	BDL	0.01-2	0.2
13.	Chloride as Cl <sup>-</sup> (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111 - A +B	37.0	5-1000	600
14.	Chromium as Cr+6 (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.05-20	0.05
15.	Cyanide as CN (mg/l)	APHA,23 <sup>rd</sup> Ed.2017,4500 ,CN A+D	BDL	0.005-5	0.05
16.	Lead as Pb (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111A+B	BDL	0.01-2	0.1
17.	Selenium as Se (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3500 Se-C	BDL	0.005-1	0.01
18.	Zinc as Zn (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111A+B	0.035	0.02-50	15
19.	Phenolic Compounds as C <sub>6</sub> H <sub>5</sub> OH (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 5530 A+C	BDL	0.004-5	0.005
20.	Total coliform (MPN/100 ml)	APHA,23 <sup>rd</sup> Ed.2017, 9221 A+ B	235	1.8	5000
21.	Anionic Detergents (As MBAS)(mg/l) max	APHA 22nd EDN.:2012, 5540 A+C	BDL	0.01-5	-

\*The result are related only to item tested - The parameters are not included in IS: 2296 Class-C

BDL – Below Detection Limit

*Archan*  
Analyst

*Archan*  
Authorized Signatory

*Archan*  
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FORMAT NO. ECO/QS/FORMAT/09

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

TEST REPORT ISSUE DATE:06.03.2021

**TEST REPORT OF SURFACE WATER\***

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

Address of the Customer : Bamebari Iron & Manganese Mine (Joda)

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 04/2/2021

Date of Sample Receiving : 08/2/2021

Date of Analysis : 09/2/2021 to 14/2/2021

Source of Sample : Juridi Nalla (Near Jurudi Bridge)

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	IS:2296 Class-C
1.	pH	APHA,23 <sup>rd</sup> Ed.2017,4500H <sup>+</sup> A+B	7.1	2-12	8.5
2.	Colour (Hazen unit)	APHA, 23 <sup>rd</sup> Ed. 2017, 2120 B	10.0	5-100	
3.	Total Dissolved Solids as TDS (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 , 2540C	226	5-10000	1500
4.	Dissolved Oxygen as DO (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,4500 A+C	5.7	2-10	4.0(min)
5.	Biochemical Oxygen Demand as BOD (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,5210A+ B	BDL	5-10000	3.0
6.	Nitrate Nitrogen as NO <sub>3</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 NO <sub>3</sub> - B	6.0	5-100	50.0
7.	Fluorides as F (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,4500 -C	0.35	0.05-10	1.5
8.	Sulfate as SO <sub>4</sub> (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,4500 -SO <sub>4</sub> <sup>2-</sup> E	28.5	1.0-250	400.0
9.	Iron as Fe (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,3500 Fe B	0.050	0.02-50	50.0
10.	Copper as Cu (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111A+B	BDL	0.05-5	1.5
11.	Cadmium as Cd (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111A+B	BDL	0.002-2	0.01
12.	Arsenic as As(mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3114C	BDL	0.01-2	0.2
13.	Chloride as Cl <sup>-</sup> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017,4500 Cl A+B	34.3	5-1000	600
14.	Chromium as Cr+6 (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.05-20	0.05
15.	Cyanide as CN (mg/l)	APHA,23 <sup>rd</sup> Ed.2017,4500 ,CN A+D	BDL	0.005-5	0.05
16.	Lead as Pb (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111A+B	BDL	0.01-2	0.1
17.	Selenium as Se (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3500 Se-C	BDL	0.005-1	0.01
18.	Zinc as Zn (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111A+B	0.030	0.02-50	15
19.	Phenolic Compounds as C <sub>6</sub> H <sub>5</sub> OH (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 5530 A+C	BDL	0.004-5	0.005
20.	Total coliform (MPN/100 ml)	APHA,23 <sup>rd</sup> Ed.2017, 9221 A+ B	210.0	1.8	5000
21.	Anionic Detergents (As MBAS)(mg/l) max	APHA 22nd EDN.:2012, 5540 A+C	BDL	0.01-5	-

\*The result are related only to item tested - The parameters are not included in IS: 2296 Class-C

BDL – Below Detection Limit

Anand  
Analyst

Authorized Signatory

Abhishek  
Manager (Q)

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FORMAT NO. ECO/QS/FORMAT/10

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

TEST REPORT ISSUE DATE: 02.03.2021

**Meteorological Data Monitoring Reports**Name of the Customer : Bamebari 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	28.6	24.5	88.2	42.6	4.4	1.8	S	0.4
2	02.02.2021	32.5	25.3	86.5	46.8	4.5	1.9	SSW	0.6
3	03.02.2021	30.8	23.6	87.4	52.1	3.8	2.1	S	0.5
4	04.02.2021	32.9	22.6	82.6	50.3	2.9	1.8	SSW	0.8
5	05.02.2021	30.9	24.1	78.6	54.6	4.1	2.4	SSW	0.4
6	06.02.2021	31.1	23.5	81.6	42.3	2.8	1.9	SS	0.7
7	07.02.2021	29.8	24.3	83.8	51.2	3.7	2.1	WSW	0.5
8	08.02.201	31.4	22.4	88.2	48.6	3.6	2.3	SSW	1.2
9	09.02.2021	29.8	23.5	87.6	47.6	4.2	2.1	SSW	0.8
10	10.02.2021	31.8	22.8	88.7	46.2	5.1	1.9	SE	0.6
11	11.02.2021	30.5	21.6	85.8	42.8	4.3	0.8	SE	0.7
12	12.02.2021	28.9	24.6	86.3	39.8	4.8	0.9	SE	0.6
13	13.02.2021	30.8	24.3	83.4	42.1	2.9	1.1	SE	0.8
14	14.02.2021	32.4	25.2	87.2	48.5	3.8	1.8	WSW	0.9
15	15.02.2021	30.8	24.8	88.3	47.3	3.5	1.1	SW	1.1
16	16.02.2021	29.7	23.9	87.6	46.2	4.2	1.2	SW	0.9
17	17.02.2021	28.9	24.8	89.6	41.8	4.1	0.9	SW	0.6
18	18.02.2021	31.5	24.2	90.5	42.8	3.7	0.8	SW	1.2
19	19.02.2021	30.8	23.9	88.6	47.6	3.8	1.1	WSW	0.9
20	20.02.2021	34.2	24.1	76.5	42.8	3.5	1.2	WSW	1.1
21	21.02.2021	32.7	24.4	91.2	44.6	3.8	0.9	WSW	0.9
22	22.02.2021	32.4	23.9	88.6	43.8	4.2	1.2	SW	1.1
23	23.02.2021	30.6	22.8	86.5	42.9	4.6	0.9	SW	1.2
24	24.02.2021	31.2	23.1	87.3	44.5	2.9	0.9	SW	0.9
25	25.02.2021	33.4	23.2	84.6	50.2	2.8	1.1	WSW	0.9
26	26.02.2021	32.6	24.2	86.8	52.0	4.1	0.9	SW	1.1
27	27.02.2021	31.5	22.5	88.5	46.2	3.8	1.2	WSW	1.0
28	28.02.2021	30.8	23.7	87.6	47.9	3.1	1.1	SE	1.1

These results are related only to tested items.

Anshu  
Analyst

Authorized Signatory

Manager (Q)

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FORMAT NO. ECO/QS/FORMAT/13

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

TEST REPORT ISSUE DATE: 07.03.2021

**TEST REPORT OF OCCUPATIONAL/WORKPLACE NOISE MONITORING**


Name of the Customer : Bamebari 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	8-02-2021	Workshop (HEMM)	Maintenance (HEMM)	68.3	85.0
2	8-02-2021	Sorting Yard	Manual Sorting/Sizing	72.4	85.0
3	11-02-2021	Mr. Subudhi Barik	Sorting Labour	70.6	85.0
4	11-02-2021	Mr. Juhan Hembram	Mining Supervisor	73.2	85.0
5	13-02-2021	Near Stack yard	Stacking of ore	69.5	85.0
6	13-02-2021	Mr. Santana Munda	Weighbridge operator	73.2	85.0

  
Analyst  
Authorized Signatory  
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/02/21

TEST REPORT ISSUE DATE: 02.04.2021

**Ambient Air Quality Monitoring Report (Core Zone)**

Name of the Customer : M/s Bameberi Iron & Manganese Mines of  
**M/s Tata Steel Limited**  
Location : AAQMS-1: Office Building  
Sampling Method : IS: 5182  
Instrument Used : RDS, FDS, CO Analyzer & VOC Sampler  
Sample Collected By : Ecomen Team in presence of TATA  
Representative

SI. No.	Date of Monitoring	Concentration of Pollutant				
		PM <sub>10</sub> (µg/m <sup>3</sup> )	PM <sub>2.5</sub> (µg/m <sup>3</sup> )	SO <sub>2</sub> (µg/m <sup>3</sup> )	NO <sub>2</sub> (µg/m <sup>3</sup> )	CO (mg/m <sup>3</sup> )
1	05.03.2021	67.80	38.46	14.49	26.64	0.42
2	06.03.2021	65.96	40.94	13.61	23.02	0.40
3	12.03.2021	74.18	44.77	11.37	24.76	0.38
4	15.03.2021	68.90	35.48	12.59	23.58	0.44
5	16.03.2021	71.78	40.68	13.63	22.84	0.41
6	19.03.2021	70.86	38.58	12.67	21.60	0.46
7	21.03.2021	67.66	34.57	13.31	18.80	0.40
8	23.03.2021	65.78	37.66	12.53	20.58	0.45
<b>Average</b>		69.12	38.89	13.03	22.73	0.42
<b>Limit as per CPCB notification New Delhi, 18<sup>th</sup> Nov, 2009. for Ambient air quality</b>		<b>100</b>	<b>60</b>	<b>80</b>	<b>80</b>	<b>4.0</b>
<b>Standard Method</b>		<b>IS : 5182 (Part-23) 2006</b>	<b>NAAQM Volume-I by CPCB</b>	<b>IS : 5182 (Part-2) 2001</b>	<b>IS : 5182 (Part-6) 2006</b>	<b>IS : 5182 (Part-10)</b>

\*This results are related only to tested items.

  
Analyst  
Authorized Signatory  
Manager (Q)

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FORMAT NO. ECO/QS/FORMAT/10

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

TEST REPORT ISSUE DATE: 02.04.2021

**Ambient Air Quality Monitoring Report (Core Zone)**

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

Location : AAQMS-1: Office Building

Sampling Method : IS: 5182

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

Sample Collected By : Ecomen Team in presence of TATA  
Representative

SI. No.	Date of Monitoring	Concentration of Pollutant						
		NH <sub>3</sub> (µg/m <sup>3</sup> )	O <sub>3</sub> (µg/m <sup>3</sup> )	Pb (µg/m <sup>3</sup> )	Ni (ng/m <sup>3</sup> )	As (ng/m <sup>3</sup> )	Benzene (µg/m <sup>3</sup> )	Benzo(a) pyrene (ng/m <sup>3</sup> )
1	05.03.2021	24.07	14.49	<1.0	1.13	<1.0	<4.0	<0.05
2	06.03.2021	25.14	14.33	<1.0	1.15	<1.0	<4.0	<0.05
3	12.03.2021	22.44	14.40	<1.0	1.16	<1.0	<4.0	<0.05
4	15.03.2021	25.08	14.48	<1.0	1.11	<1.0	<4.0	<0.05
5	16.03.2021	23.62	14.21	<1.0	1.18	<1.0	<4.0	<0.05
6	19.03.2021	20.36	13.25	<1.0	1.23	<1.0	<4.0	<0.05
7	21.03.2021	24.20	15.13	<1.0	1.25	<1.0	<4.0	<0.05
8	23.03.2021	25.33	15.29	<1.0	1.23	<1.0	<4.0	<0.05
<b>Average</b>		23.78	14.45	-	1.18	-	-	-
<b>Limit as per CPCB notification New Delhi, 18<sup>th</sup>Nov, 2009. for Ambient air quality</b>		<b>400</b>	<b>180</b>	<b>1</b>	<b>20</b>	<b>6</b>	<b>5</b>	<b>1</b>
<b>Standard Method</b>		<b>APHA 401 (Indophenol)</b>	<b>IS : 5182 (Part-9) 1974</b>	<b>IS : 5182 (Part-22) 2004</b>	<b>NAAQM Volume-I by CPCB</b>	<b>NAAQM Volume-I by CPCB</b>	<b>IS : 5182 (Part-11)</b>	<b>IS : 5182 (Part-12)</b>

\*This results are related only to tested items.

  
Analyst

  
Authorized Signatory

  
Manager (Q)

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FORMAT NO. ECO/QS/FORMAT/10

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

TEST REPORT ISSUE DATE: 02.04.2021

**Ambient Air Quality Monitoring Report (Core Zone)**

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

Location : AAQMS-2: Near Mines View Point (Mines Pit)

Sampling Method : IS: 5182

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

Sample Collected By : Ecomen Team in presence of TATA  
Representative

SI. No.	Date of Monitoring	Concentration of Pollutant				
		PM <sub>10</sub> (µg/m <sup>3</sup> )	PM <sub>2.5</sub> (µg/m <sup>3</sup> )	SO <sub>2</sub> (µg/m <sup>3</sup> )	NO <sub>2</sub> (µg/m <sup>3</sup> )	CO (mg/m <sup>3</sup> )
1	02.03.2021	75.34	44.78	15.74	26.64	0.36
2	05.02.2021	73.50	47.26	14.86	21.44	0.34
3	10.02.2021	81.72	51.09	12.62	23.18	0.32
4	12.02.2021	76.44	41.80	13.84	22.00	0.38
5	17.02.2021	79.32	47.00	14.88	21.26	0.35
6	20.02.2021	78.40	44.90	13.92	20.02	0.40
7	23.02.2021	75.20	40.89	14.56	17.22	0.34
8	30.02.2021	73.32	43.98	13.78	19.00	0.39
<b>Average</b>		76.66	45.21	14.28	21.35	0.36
<b>Limit as per CPCB notification New Delhi, 18<sup>th</sup> Nov, 2009. for Ambient air quality</b>		<b>100</b>	<b>60</b>	<b>80</b>	<b>80</b>	<b>4.0</b>
<b>Standard Method</b>		<b>IS : 5182 (Part-23) 2006</b>	<b>NAAQM Volume-I by CPCB</b>	<b>IS : 5182 (Part-2) 2001</b>	<b>IS : 5182 (Part-6) 2006</b>	<b>IS : 5182 (Part-10)</b>

\*This results are related only to tested items.

  
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FORMAT NO. ECO/QS/FORMAT/10

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

TEST REPORT ISSUE DATE: 02.04.2021

**Ambient Air Quality Monitoring Report (Core Zone)**

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

Location : AAQMS-2: Near Mines View Point (Mines Pit)

Sampling Method : IS: 5182

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

Sample Collected By : Ecomen Team in presence of TATA  
Representative

SI. No.	Date of Monitoring	Concentration of Pollutant						
		NH <sub>3</sub> (µg/m <sup>3</sup> )	O <sub>3</sub> (µg/m <sup>3</sup> )	Pb (µg/m <sup>3</sup> )	Ni (ng/m <sup>3</sup> )	As (ng/m <sup>3</sup> )	Benzene (µg/m <sup>3</sup> )	Benzo(a) pyrene (ng/m <sup>3</sup> )
1	02.03.2021	20.70	14.65	<1.0	1.07	<1.0	<4.0	<0.05
2	05.02.2021	23.06	14.33	<1.0	1.00	<1.0	<4.0	<0.05
3	10.02.2021	21.94	13.95	<1.0	1.15	<1.0	<4.0	<0.05
4	12.02.2021	21.90	13.21	<1.0	1.37	<1.0	<4.0	<0.05
5	17.02.2021	23.62	14.40	<1.0	0.93	<1.0	<4.0	<0.05
6	20.02.2021	24.84	15.63	<1.0	1.01	<1.0	<4.0	<0.05
7	23.02.2021	21.92	14.37	<1.0	0.96	<1.0	<4.0	<0.05
8	30.02.2021	23.17	15.33	<1.0	1.27	<1.0	<4.0	<0.05
<b>Average</b>		22.64	14.48	-	1.10	-	-	-
<b>Limit as per CPCB notification New Delhi, 18<sup>th</sup>Nov, 2009. for Ambient air quality</b>		<b>400</b>	<b>180</b>	<b>1</b>	<b>20</b>	<b>6</b>	<b>5</b>	<b>1</b>
<b>Standard Method</b>		<b>APHA 401 (Indophenol)</b>	<b>IS : 5182 (Part-9) 1974</b>	<b>IS : 5182 (Part-22) 2004</b>	<b>NAAQM Volume-I by CPCB</b>	<b>NAAQM Volume-I by CPCB</b>	<b>IS : 5182 (Part-11)</b>	<b>IS : 5182 (Part-12)</b>

\*This results are related only to tested items.

  
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FORMAT NO. ECO/QS/FORMAT/10

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

TEST REPORT ISSUE DATE: 02.04.2021

**Ambient Air Quality Monitoring Report (Core Zone)**

Name of the Customer : M/s Bameberi Iron & Manganese Mines of  
**M/s Tata Steel Limited**  
 Location : AAQMS-3: Near Weigh Bridge  
 Sampling Method : IS: 5182  
 Instrument Used : RDS, FDS, CO Analyzer & VOC Sampler  
 Sample Collected By : Ecomen Team in presence of TATA  
 Representative

SI. No.	Date of Monitoring	Concentration of Pollutant				
		PM <sub>10</sub> (µg/m <sup>3</sup> )	PM <sub>2.5</sub> (µg/m <sup>3</sup> )	SO <sub>2</sub> (µg/m <sup>3</sup> )	NO <sub>2</sub> (µg/m <sup>3</sup> )	CO (mg/m <sup>3</sup> )
1	05.03.2021	75.34	44.78	15.74	26.64	0.36
2	06.03.2021	73.50	47.26	14.86	21.44	0.34
3	09.03.2021	81.72	51.09	12.62	23.18	0.32
4	13.03.2021	76.44	41.80	13.84	22.00	0.38
5	15.03.2021	79.32	47.00	14.88	21.26	0.35
6	17.03.2021	78.40	44.90	13.92	20.02	0.40
7	24.03.2021	75.20	40.89	14.56	17.22	0.34
8	30.03.2021	73.32	43.98	13.78	19.00	0.39
<b>Average</b>		76.66	45.21	14.28	21.35	0.36
<b>Limit as per CPCB notification New Delhi, 18<sup>th</sup> Nov, 2009. for Ambient air quality</b>		<b>100</b>	<b>60</b>	<b>80</b>	<b>80</b>	<b>4.0</b>
<b>Standard Method</b>		<b>IS : 5182 (Part-23) 2006</b>	<b>NAAQM Volume-I by CPCB</b>	<b>IS : 5182 (Part-2) 2001</b>	<b>IS : 5182 (Part-6) 2006</b>	<b>IS : 5182 (Part-10)</b>

\*This results are related only to tested items.

  
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 Authorized Signatory

  
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FORMAT NO. ECO/QS/FORMAT/10

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

TEST REPORT ISSUE DATE: 02.04.2021

**Ambient Air Quality Monitoring Report (Core Zone)**

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

Location : AAQMS-3: Near Weigh Bridge

Sampling Method : IS: 5182

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

Sample Collected By : Ecomen Team in presence of TATA  
Representative

SI. No.	Date of Monitoring	Concentration of Pollutant						
		NH <sub>3</sub> (µg/m <sup>3</sup> )	O <sub>3</sub> (µg/m <sup>3</sup> )	Pb (µg/m <sup>3</sup> )	Ni (ng/m <sup>3</sup> )	As (ng/m <sup>3</sup> )	Benzene (µg/m <sup>3</sup> )	Benzo(a) pyrene (ng/m <sup>3</sup> )
1	05.03.2021	20.70	14.65	<1.0	1.07	<1.0	<4.0	<0.05
2	06.03.2021	23.06	14.33	<1.0	1.00	<1.0	<4.0	<0.05
3	09.03.2021	21.94	13.95	<1.0	1.15	<1.0	<4.0	<0.05
4	13.03.2021	21.90	13.21	<1.0	1.37	<1.0	<4.0	<0.05
5	15.03.2021	23.62	14.40	<1.0	0.93	<1.0	<4.0	<0.05
6	17.03.2021	24.84	15.63	<1.0	1.01	<1.0	<4.0	<0.05
7	24.03.2021	21.92	14.37	<1.0	0.96	<1.0	<4.0	<0.05
8	30.03.2021	23.17	15.33	<1.0	1.27	<1.0	<4.0	<0.05
<b>Average</b>		22.64	14.48	-	1.10	-	-	-
<b>Limit as per CPCB notification New Delhi, 18<sup>th</sup>Nov, 2009. for Ambient air quality</b>		<b>400</b>	<b>180</b>	<b>1</b>	<b>20</b>	<b>6</b>	<b>5</b>	<b>1</b>
<b>Standard Method</b>		<b>APHA 401 (Indophenol)</b>	<b>IS : 5182 (Part-9) 1974</b>	<b>IS : 5182 (Part-22) 2004</b>	<b>NAAQM Volume-I by CPCB</b>	<b>NAAQM Volume-I by CPCB</b>	<b>IS : 5182 (Part-11)</b>	<b>IS : 5182 (Part-12)</b>

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FORMAT NO. ECO/QS/FORMAT/10

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

TEST REPORT ISSUE DATE: 02.04.2021

**Ambient Air Quality Monitoring Report (Buffer Zone)**

Name of the Customer : M/s Bameberi Iron & Manganese Mines 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 TATA  
Representative

SI. No.	Date of Monitoring	Concentration of Pollutant				
		PM <sub>10</sub> (µg/m <sup>3</sup> )	PM <sub>2.5</sub> (µg/m <sup>3</sup> )	SO <sub>2</sub> (µg/m <sup>3</sup> )	NO <sub>2</sub> (µg/m <sup>3</sup> )	CO (mg/m <sup>3</sup> )
1	Jaganathpur 05.03.2021	75.33	39.84	13.25	19.87	0.74
2	Bandhubaria. 05.03.2021	80.32	41.20	12.38	20.85	0.79
3	Raikara 09.03.2021	85.63	45.62	14.27	23.58	0.84
<b>Average</b>		80.43	42.22	13.30	21.43	0.79
<b>Limit as per CPCB notification New Delhi, 18<sup>th</sup>Nov, 2009. for Ambient air quality</b>		<b>100</b>	<b>60</b>	<b>80</b>	<b>80</b>	<b>4.0</b>
<b>Standard Method</b>		IS : 5182 (Part-23) 2006	NAAQM Volume-I by CPCB	IS : 5182 (Part-2) 2001	IS : 5182 (Part-6) 2006	IS : 5182 (Part-10)

\*This results are related only to tested items.

  
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FORMAT NO. ECO/QS/FORMAT/10

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

TEST REPORT ISSUE DATE: 02.04.2021

**Ambient Air Quality Monitoring Report (Buffer Zone)**

Name of the Customer : M/s Bameberi Iron & Manganese Mines 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 TATA  
Representative

SI. No.	Date of Monitoring	Concentration of Pollutant						
		NH <sub>3</sub> (µg/m <sup>3</sup> )	O <sub>3</sub> (µg/m <sup>3</sup> )	Pb (µg/m <sup>3</sup> )	Ni (ng/m <sup>3</sup> )	As (ng/m <sup>3</sup> )	Benzene (µg/m <sup>3</sup> )	Benzo (a) pyrene (ng/m <sup>3</sup> )
1	Jaganathpur 05.03.2021	21.8	11.2	<1.0	1.35	<1.0	<4.0	<0.05
2	Bandhubaria 05.03.2021	23.3	10.28	<1.0	1.10	<1.0	<4.0	<0.05
3	Raikara 09.03.2021	23.8	11.8	<1.0	1.15	<1.0	<4.0	<0.05
Average		22.97	11.09	-	1.20	-	-	-
Limit as per CPCB notification New Delhi, 18 <sup>th</sup> 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/06/21

TEST REPORT ISSUE DATE: 05.04.2021

**TEST REPORT OF AMBIENT NOISE LEVEL MONITORING**

Name of the Customer : Bamebari Iron & Manganese Mines 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	6-03-2021	Township	Residential	64.2	43.8
2	6-03-2021	Near Hospital	Silence	46.2	35.8
3	10-03-2021	Mines Area	Industrial	69.4	53.6
4	10-03-2021	Near Market	Commercial	70.3	46.3
5	13-03-2021	Near Canteen	Industrial	68.5	44.2
6	13-03-2021	Near Sorting Yard	Industrial	73.4	42.8

**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/Stack1/08/21  
TEST REPORT ISSUE DATE: 05.04.2021**TEST REPORT OF FLUE GAS EMISSIONS\***

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

Date of Sampling : 08.03.2021

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 (m<sup>2</sup>) : 0.0061

Ambient Air (°C) : 19.5

Flue Gas Temperature (°C) : 175.0

Exit Velocity of Gas (m/sec.) : 8.74

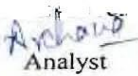
Flow Rate (Nm<sup>3</sup>/ sec.) : 0.032

Type of Fuel : HSD

Quantity of Fuel Consumption (lit/hr) : 18-20

Sl. No.	Tests Conducted	Method	<u>Pollutant Concentration in</u> ( At 15% O <sub>2</sub> Correction) in <i>gm/Kw-Hr</i>	Standards as per CPCB in <i>gm/Kw-Hr</i>
1.	Particulate Matter (PM)	IS:11255 (Part-1)	0.045	0.2
2.	Sulphur Dioxide (SO <sub>2</sub> )	IS:11255 (Part-2)	0.024	-
3.	Nitrogen Dioxide (NO <sub>x</sub> )	IS:11255 (Part-7)	0.050	4.0 (NO <sub>x</sub> +HC)
4.	Hydrocarbon (HC)	IS:13270	1.12	
5.	Carbon Monoxide (CO)	IS:13270	1.05	3.5

\*The result is related only to tested item.

  
Analyst

  
Authorized Signatory

  
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/09

TEST REPORT NO: ECO LAB/DW/09/21  
TEST REPORT ISSUE DATE: 10.04.2021

**TEST REPORT OF DRINKING WATER\***

Name of the Customer : Bameberi Iron & Manganese Mine of  
**M/s Tata Steel Limited**  
Address of the Customer : Bameberi Iron & Manganese Mine (Joda)  
Sampling Method : APHA/ IS: 3025  
Sample Collected by : Swaraj Swain  
Sample Quantity : As per requirement.  
Date of Sampling : 01/3/2021  
Date of Sample Receiving : 04/3/2021  
Packing of Sample : As per requirement  
Date of Analysis : 05/3/2021-10/3/2021  
Source of Sample : Bamebari Canteen Tap water

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	INDIAN STANDARDS as per IS 10500:1991(Reaff:2012)	
					Desirable	Permissible
1.	Colour (Hazen unit)	APHA, 23 <sup>rd</sup> 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	7.2	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	202	10-10000	500	2000
7.	Alkalinity (mg/l)	APHA, 23rd Ed. 2017,2320 A+B	156	5-1500	200	600
8.	Total Hardness as CaCO <sub>3</sub> (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	47.2	5 – 1000	75.0	200.0
10.	Magnesium as Mg (mg/l)	APHA, 23rd Ed. 2017, 3500 Mg A+B	14.09	5-1000	30.0	100.0
11.	Chloride as Cl (mg/l)	APHA, 23rd Ed. 2017,4500 Cl A+B	20.5	5-1000	250.0	1000.0
12.	Sulfate as SO <sub>4</sub> (mg/l)	APHA, 23rd Ed. 2017,4500 SO42- E	16.5	5-200	200.0	400.0
13.	Nitrate Nitrogen as NO <sub>3</sub> (mg/l)	APHA, 23rd Ed. 2017, 4500 NO3- B	2.5	5-100	45.0	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	0.022	0.02-50	0.3	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	No Relax.
19.	Aluminium as Al (mg/l)	APHA, 23rd Ed. 2017, 3500 Al A+B	BDL	0.02-100	0.03	0.2
20.	Cadmium as Cd (mg/l)	APHA, 23rd Ed. 2017,3111 A+B	BDL	0.002-2	0.003	No Relax
21.	Arsenic as As (mg/l)	APHA, 23rd Ed. 2017, 3114 C	BDL	0.01-2	0.01	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	0.065	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	No Relax
25.	Chromium as Cr+6 (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.05	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 <sub>6</sub> H <sub>5</sub> 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

*Anand*  
Analyst

*Swaraj Swain*  
Authorized Signatory

*Abhishek*  
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/09

TEST REPORT NO: ECO LAB/DW/09/21

TEST REPORT ISSUE DATE: 10.04.2021

**TEST REPORT OF DRINKING WATER\***

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

Address of the Customer : Bameberi Iron & Manganese Mine (Joda)

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 04/3/2021

Date of Sample Receiving : 06/3/2021

Packing of Sample : As per requirement

Date of Analysis : 07/3/2021-10/3/2021

Source of Sample : Joribar Canteen RO water

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	INDIAN STANDARDS as per IS 10500:1991(Reaff:2012)	
					Desirable	Permissible
1.	Colour (Hazen unit)	APHA, 23 <sup>rd</sup> 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	7.3	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	168	5-1500	200	600
8.	Total Hardness as CaCO <sub>3</sub> (mg/l)	APHA, 23rd Ed. 2017,2340 A+C	188	5-1500	200.0	600.0
9.	Calcium as Ca (mg/l)	APHA, 23rd Ed. 2017, 3500 Ca A+B	48.0	5 – 1000	75.0	200.0
10.	Magnesium as Mg (mg/l)	APHA, 23rd Ed. 2017, 3500 Mg A+B	16.5	5-1000	30.0	100.0
11.	Chloride as Cl (mg/l)	APHA, 23rd Ed. 2017,4500 Cl A+B	56.0	5-1000	250.0	1000.0
12.	Sulfate as SO <sub>4</sub> (mg/l)	APHA, 23rd Ed. 2017,4500 SO <sub>4</sub> - E	74.0	5-200	200.0	400.0
13.	Nitrate Nitrogen as NO <sub>3</sub> (mg/l)	APHA, 23rd Ed. 2017, 4500 NO <sub>3</sub> - B	8.5	5-100	45.0	No Relax.
14.	Fluorides as F (mg/l)	APHA, 23rd Ed. 2017,4500-C	0.50	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	0.021	0.02-50	0.3	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	No Relax.
19.	Aluminium as Al (mg/l)	APHA, 23rd Ed. 2017, 3500 Al A+B	BDL	0.02-100	0.03	0.2
20.	Cadmium as Cd (mg/l)	APHA, 23rd Ed. 2017,3111 A+B	BDL	0.002-2	0.003	No Relax
21.	Arsenic as As (mg/l)	APHA, 23rd Ed. 2017, 3114 C	BDL	0.01-2	0.01	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	0.11	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	No Relax
25.	Chromium as Cr+6 (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.05	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 <sub>6</sub> H <sub>5</sub> 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

*Anand*  
Analyst

*Swaraj Swain*  
Authorized Signatory

*Abhishek*  
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/09

TEST REPORT NO: ECO LAB/DW/11/21

TEST REPORT ISSUE DATE: 10.04.2021

**TEST REPORT OF DRINKING WATER\***

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

Address of the Customer : Bameberi Iron & Manganese Mine (Joda)

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 06/3/2021

Date of Sample Receiving : 09/3/2021

Packing of Sample : As per requirement

Date of Analysis : 11/3/2021-15/3/2021

Source of Sample : Borewell Near Temple (Bamebari Camp)

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	INDIAN STANDARDS as per IS 10500:2012	
					Acceptable Limit	Permissible Limit
1.	Colour (Hazen unit)	APHA, 23 <sup>rd</sup> 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	7.3	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	184	10-10000	500	2000
7.	Alkalinity (mg/l)	APHA, 23rd Ed. 2017,2320 A+B	163	5-1500	200	600
8.	Total Hardness as CaCO <sub>3</sub> (mg/l)	APHA, 23rd Ed. 2017,2340 A+C	160	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	13.2	5-1000	30.0	100.0
11.	Chloride as Cl (mg/l)	APHA, 23rd Ed. 2017,4500 Cl A+B	23.2	5-1000	250.0	1000.0
12.	Sulfate as SO <sub>4</sub> (mg/l)	APHA, 23rd Ed. 2017,4500 SO <sub>4</sub> - E	32.4	5-200	200.0	400.0
13.	Nitrate Nitrogen as NO <sub>3</sub> (mg/l)	APHA, 23rd Ed. 2017, 4500 NO <sub>3</sub> - B	3.4	5-100	45.0 (Max)	No Relax.
14.	Fluorides as F (mg/l)	APHA, 23rd Ed. 2017,4500-C	0.40	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	<b>0.027</b>	0.02-50	0.3 (Max)	No Relax.
17.	Manganese as Mn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	<b>BDL</b>	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	0.060	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 <sub>6</sub> H <sub>5</sub> 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

*Anand*  
Analyst

*Swaraj Swain*  
Authorized Signatory

*Abhishek*  
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/09

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

TEST REPORT ISSUE DATE: 10.04.2021

**TEST REPORT OF DRINKING WATER\***

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

Address of the Customer : Bameberi Iron & Manganese Mine (Joda)

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 06/3/2021

Date of Sample Receiving : 09/3/2021

Packing of Sample : As per requirement

Date of Analysis : 11/3/2021-15/3/2021

Source of Sample : Bore Well Near Security Barrier (Camp)

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	INDIAN STANDARDS as per IS 10500:2012	
					Acceptable Limit	Permissible Limit
1.	Colour (Hazen unit)	APHA, 23 <sup>rd</sup> 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	7.2	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	233	10-10000	500	2000
7.	Alkalinity (mg/l)	APHA, 23rd Ed. 2017,2320 A+B	147	5-1500	200	600
8.	Total Hardness as CaCO <sub>3</sub> (mg/l)	APHA, 23rd Ed. 2017,2340 A+C	210	5-1500	200.0	600.0
9.	Calcium as Ca (mg/l)	APHA, 23rd Ed. 2017, 3500 Ca A+B	41.8	5 – 1000	75.0	200.0
10.	Magnesium as Mg (mg/l)	APHA, 23rd Ed. 2017, 3500 Mg A+B	16.8	5-1000	30.0	100.0
11.	Chloride as Cl (mg/l)	APHA, 23rd Ed. 2017,4500 Cl A+B	27.4	5-1000	250.0	1000.0
12.	Sulfate as SO <sub>4</sub> (mg/l)	APHA, 23rd Ed. 2017,4500 SO <sub>4</sub> - E	37.6	5-200	200.0	400.0
13.	Nitrate Nitrogen as NO <sub>3</sub> (mg/l)	APHA, 23rd Ed. 2017, 4500 NO <sub>3</sub> - B	5.4	5-100	45.0 (Max)	No Relax.
14.	Fluorides as F (mg/l)	APHA, 23rd Ed. 2017,4500-C	0.45	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	0.24	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 <sub>6</sub> H <sub>5</sub> 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

Anand  
Analyst

Authorized Signatory

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FORMAT NO. ECO/QS/FORMAT/09

TEST REPORT NO: ECO LAB/DW/13/21

TEST REPORT ISSUE DATE: 10.04.2021

**TEST REPORT OF DRINKING WATER\***

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

Address of the Customer : Bameberi Iron & Manganese Mine (Joda)

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 06/3/2021

Date of Sample Receiving : 09/3/2021

Packing of Sample : As per requirement

Date of Analysis : 11/3/2021-15/3/2021

Source of Sample : Bore Well Near Admin Office (Camp)

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	INDIAN STANDARDS as per IS 10500:2012	
					Acceptable Limit	Permissible Limit
1.	Colour (Hazen unit)	APHA, 23 <sup>rd</sup> 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	226	10-10000	500	2000
7.	Alkalinity (mg/l)	APHA, 23rd Ed. 2017,2320 A+B	155	5-1500	200	600
8.	Total Hardness as CaCO <sub>3</sub> (mg/l)	APHA, 23rd Ed. 2017,2340 A+C	204	5-1500	200.0	600.0
9.	Calcium as Ca (mg/l)	APHA, 23rd Ed. 2017, 3500 Ca A+B	48.6	5 - 1000	75.0	200.0
10.	Magnesium as Mg (mg/l)	APHA, 23rd Ed. 2017, 3500 Mg A+B	18.3	5-1000	30.0	100.0
11.	Chloride as Cl (mg/l)	APHA, 23rd Ed. 2017,4500 Cl A+B	33.4	5-1000	250.0	1000.0
12.	Sulfate as SO <sub>4</sub> (mg/l)	APHA, 23rd Ed. 2017,4500 SO <sub>4</sub> - E	39.8	5-200	200.0	400.0
13.	Nitrate Nitrogen as NO <sub>3</sub> (mg/l)	APHA, 23rd Ed. 2017, 4500 NO <sub>3</sub> - B	5.6	5-100	45.0 (Max)	No Relax.
14.	Fluorides as F (mg/l)	APHA, 23rd Ed. 2017,4500-C	0.4	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	0.025	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	0.30	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 <sub>6</sub> H <sub>5</sub> 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

Anand  
Analyst

Authorized Signatory

Manager (Q)

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FORMAT NO. ECO/QS/FORMAT/10

TEST REPORT NO: ECO LAB/DUSTFALL/14/21



TEST REPORT ISSUE DATE: 10.04.2021

**Dust Fall Analysis Report**

Name of the Customer : Bamebari Iron &Manganese Mine of  
**M/s Tata Steel Limited**  
Location : DF-1: Mines Area (Near Sorting Yard)  
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 <sup>2</sup> /month)				
		Total Dust Fall (t/km <sup>2</sup> /month)	Analysis Results			
1	01.03.2021 To 31.03.2021	0.75	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/02/21

TEST REPORT ISSUE DATE: 02.04.2021

**TEST REPORT OF FUGITIVE EMISSION MONITORING**

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


Location : L-1 50 mtr from stack yard (Joribar)

Date of Sampling : 10.03.2021

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 <sup>rd</sup> Feb 2006 (MoEF&CC)
1.	Suspended Particulate Matter (SPM)	IS : 5182-Part-4	µg/m <sup>3</sup>	840	1200 mg/m <sup>3</sup> at 25+5 m from the source of generation
2.	Respirable Particulate Matter (RPM)	IS : 5182-Part-4	µg/m <sup>3</sup>	410	500 mg/m <sup>3</sup> 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/03/21

TEST REPORT ISSUE DATE: 12.03.2021

**TEST REPORT OF FUGITIVE EMISSION MONITORING**

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


Location : L-1 50mtr from stack yard (Joribar)

Date of Sampling : 13.02.2021

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 <sup>rd</sup> Feb 2006 (MoEF&CC)
1.	Suspended Particulate Matter (SPM)	IS : 5182-Part-4	$\mu\text{g}/\text{m}^3$	780	1200 $\text{mg}/\text{m}^3$ at 25+5 m from the source of generation
2.	Respirable Particulate Matter (RPM)	IS : 5182-Part-4	$\mu\text{g}/\text{m}^3$	265	500 $\text{mg}/\text{m}^3$ 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/04/21

TEST REPORT ISSUE DATE: 12.03.2021

**TEST REPORT OF FUGITIVE EMISSION MONITORING**

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


Location : L-1 100mtr from View Point (Joribar)

Date of Sampling : 17.02.2021

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 <sup>rd</sup> Feb 2006 (MoEF&CC)
1.	Suspended Particulate Matter (SPM)	IS : 5182-Part-4	$\mu\text{g}/\text{m}^3$	930	1200 $\text{mg}/\text{m}^3$ at 25+5 m from the source of generation
2.	Respirable Particulate Matter (RPM)	IS : 5182-Part-4	$\mu\text{g}/\text{m}^3$	384	500 $\text{mg}/\text{m}^3$ 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: 12.03.2021

**TEST REPORT OF FUGITIVE EMISSION MONITORING**

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


Location : L-1 20mtr from Haul Road (Joribar)

Date of Sampling : 19.02.2021

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 <sup>rd</sup> Feb 2006 (MoEF&CC)
1.	Suspended Particulate Matter (SPM)	IS : 5182-Part-4	µg/m <sup>3</sup>	1010	1200 mg/m <sup>3</sup> at 25+5 m from the source of generation
2.	Respirable Particulate Matter (RPM)	IS : 5182-Part-4	µg/m <sup>3</sup>	320	500 mg/m <sup>3</sup> at 25+5 m from the source of generation

  
Analyst  
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FORMAT NO. ECO/QS/FORMAT/10

TEST REPORT NO: ECO LAB/02/21

TEST REPORT ISSUE DATE: 10.04.2021

**Personal Dust Sampling Analysis Report**

Name of the Customer : Bamebari Iron & Manganese Mines of  
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 <sup>3</sup> ) <b>8-hr TWA</b>
1	04-03-2021	Lalatendu Lohar	Sorting Labour	TSP/798688/0919	3.0 mg/m <sup>3</sup>	1.75
2	04-03-2021	Santana Munda	Weigh Bridge Operator	TSP/753276/0819	(Ref. DGMS (Tech.) (S&T) Circular No.01 Dhanbad, Dated 21st January 2010)	1.69
3	13-03-2021	Bigneswari Malakut	Security Mine	BMM-236		1.55
4	13-03-2021	Johan Hembram	Supervisor Stack yard	MW0719167159		1.95
5	22-03-2021	Saraswati Tanti	Dumper Operator	MW0719166977		2.40

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

\*Theseresults are related only to tested items.

*Ankush*  
Analyst

*[Signature]*  
Authorized Signatory

*[Signature]*  
Manager (Q)

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FORMAT NO. ECO/QS/FORMAT/09

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

TEST REPORT ISSUE DATE: 05.04.2021

**TEST REPORT OF WASTE WATER\***

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

Address of the Customer : Bamebari Iron & Manganese Mines (Joda)

Sampling Method : APHA/ IS: 3025

Sample Collected by : Sangram Das

Sample Quantity : As per requirement.

Date of Sampling : 10/3/2021

Date of Sample Receiving : 12/3/2021

Date of Analysis : 12/3/2021 to 18/3/2021

Source of Sample : **Bamberi STP Inlet**

Sl. No.	Tests	Protocol	Result	Limits of Detection
1.	Colour (Hazen unit)	APHA, 23 <sup>rd</sup> Ed. 2017, 2120 B	30.0	5-100
2.	Odour	APHA, 23 <sup>rd</sup> Ed. 2017, 2150 B	Pungent	Agreeable
3.	Particulate sizein ( $\mu$ ) Size	APHA, 23 <sup>rd</sup> Ed. 2017, 2540-D	$\geq 850$	100 - 1200
4.	pH	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 H+ A+B	6.85	2-12
5.	Temperature ( $^{\circ}$ C)	APHA, 23 <sup>rd</sup> Ed. 2017, 2550A+B	31.0	10-100
6.	Oil & Grease as O & G (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 5520 (A+D)	6.5	5-600
7.	Total Residual Chlorine (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500-Cl B	BDL	0.1-5
8.	Ammonical Nitrogen as NH <sub>3</sub> - N(mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 NH <sub>3</sub> A+F	4.80	1-100
9.	Total Kjeldahal Nitrogen as NH <sub>3</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 Norg A+C	24.0	5-100
10.	Free Ammonia as NH <sub>3</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 NH <sub>3</sub> A+F	0.55	0.05-5.0
11.	Biochemical Oxygen Demand as BOD (mg/l) 3days at 27 $^{\circ}$ C	APHA, 23 <sup>rd</sup> Ed. 2017, 5210 A+B	36.0	5-10000
12.	Chemical Oxygen Demand as COD (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 5220 A+C	284.0	5-50000
13.	Arsenic as As (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3114 B	BDL	0.01-2
14.	Mercury as Hg (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.001-2
15.	Lead as Pb (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.01-5
16.	Cadmium as Cd (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.02-5
17.	Hexavalent Chromium as Cr <sup>+6</sup> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.05-20
18.	Total Chromium as Cr (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.05-50
19.	Copper as Cu (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.05-5
20.	Zinc as Zn (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	0.042	0.02-50
21.	Selenium as Se (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 Se-A+D	BDL	0.01-1
22.	Nickel as Ni (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.02-5
23.	Fluoride as F (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 F C+D	0.20	0.02-10
24.	Dissolved Phosphate as PO <sub>4</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 - PD	2.05	0.5-100
25.	Sulphide as S <sub>2</sub> -(mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 S <sup>2-</sup> F	0.21	0.1-10

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26.	Phenolic Compounds as C <sub>6</sub> H <sub>5</sub> OH (mg/l)	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-10
27.	Bioassay (%)	APHA, 23rd Ed. 2017, 8910 C	80	70 --95-
28.	Manganese as Mn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.01-20
29.	Iron as Fe (mg/l)	APHA, 23rd Ed. 2017, 3500 Fe B	BDL	0.02-100
30.	Nitrate Nitrogen as NO <sub>3</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017,(4500-NO,A+ B)	2.50	5-100

\*The results are related only to item tested. BDL = Below Detection Limit

*Anshu*  
Analyst

*[Signature]*  
Authorized Signatory

*[Signature]*  
Manager (Q)

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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/09

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

TEST REPORT ISSUE DATE: 05.04.2021

**TEST REPORT OF WASTE WATER\***

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

Address of the Customer : Bamebari Iron & Manganese Mines (Joda)

Sampling Method : APHA/ IS: 3025

Sample Collected by : Sangram Das

Sample Quantity : As per requirement.

Date of Sampling : 10/3/2021

Date of Sample Receiving : 12/3/2021

Date of Analysis : 12/3/2021 to 18/3/2021

Source of Sample : **Bambari STP Outlet**

Sl. No.	Tests	Protocol	Result	Limits of Detection	G.S.R 422(E)
					Desirable Limit
1.	Colour (Hazen unit)	APHA, 23 <sup>rd</sup> Ed. 2017, 2120 B	<5.0	5-100	-
2.	Odour	APHA, 23 <sup>rd</sup> Ed. 2017, 2150 B	Odourless	Agreeable	Agreeable
3.	Particulate size in (μ)	APHA, 23 <sup>rd</sup> Ed. 2017, 2540-D	250	100 - 1200	Shall pass 850 Micron IS Sieve
4.	pH	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 H+ A+B	7.30	2-12	5.5-9.0
5.	Temperature (°C)	APHA, 23 <sup>rd</sup> Ed. 2017, 2550A+B	30.5	10-100	-
6.	Oil & Grease as O & G (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 5520 (A+D)	BDL	5-600	10.0
7.	Total Residual Chlorine (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500-Cl B	0.50	0.1-5	1.0
8.	Ammonical Nitrogen as NH <sub>3</sub> - N(mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 NH <sub>3</sub> A+F	1.20	1-100	50.0
9.	Total Kjeldahal Nitrogen as NH <sub>3</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 Norg A+C	12.5	5-100	100.0
10.	Free Ammonia as NH <sub>3</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 NH <sub>3</sub> A+F	BDL	0.05-5.0	5.0
11.	Biochemical Oxygen Demand as BOD (mg/l) 3days at 27°C	APHA, 23 <sup>rd</sup> Ed. 2017, 5210 A+B	14.0	5-10000	30.0
12.	Chemical Oxygen Demand as COD (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 5220 A+C	64.8	5-50000	250.0
13.	Arsenic as As (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3114 B	BDL	0.01-2	0.2
14.	Mercury as Hg (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.001-2	0.01
15.	Lead as Pb (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.01-5	0.1
16.	Cadmium as Cd (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.02-5	0.2
17.	Hexavalent Chromium as Cr <sup>+6</sup> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.05-20	0.1
18.	Total Chromium as Cr (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.05-50	2.0
19.	Copper as Cu (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.05-5	2.0
20.	Zinc as Zn (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B		0.02-50	5.0
21.	Selenium as Se (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 Se-A+D	BDL	0.01-1	0.05
22.	Nickel as Ni (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.02-5	2.0
23.	Fluoride as F (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 F C+D	0.20	0.02-10	2.0
24.	Dissolved Phosphate as PO <sub>4</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 - PD	BDL	0.5-100	5.0
25.	Sulphide as S <sub>2</sub> -(mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 S <sup>2-</sup> -F	BDL	0.1-10	2.0

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26.	Phenolic Compounds as C <sub>6</sub> H <sub>5</sub> OH (mg/l)	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-10	1.0
27.	Bioassay (%)	APHA, 23rd Ed. 2017, 8910 C	92%	70 --95	90% survival of fish after 96 hrs. in 100% Effluent
28.	Manganese as Mn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.01-20	2.0
29.	Iron as Fe (mg/l)	APHA, 23rd Ed. 2017, 3500 Fe B	BDL	0.02-100	3.0
30.	Nitrate Nitrogen as NO <sub>3</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017,(4500-NO <sub>3</sub> A+ B)	5.50	5-100	10.0

\*The results are related only to item tested. BDL = Below Detection Limit

*Anshu*  
Analyst

*[Signature]*  
Authorized Signatory

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FORMAT NO. ECO/QS/FORMAT/09

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

TEST REPORT ISSUE DATE: 05.04.2021

### TEST REPORT OF WASTE WATER\*

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

Address of the Customer : Bameberi Iron & Manganese Mines (Joda)

Sampling Method : APHA/ IS: 3025

Sample Collected by : Sangram Das

Sample Quantity : As per requirement.

Date of Sampling : 10/3/2021

Date of Sample Receiving : 12/3/2021

Date of Analysis : 12/3/2021 to 18/3/2021

Source of Sample : **Bambari Workshop Effluent**

Sl. No.	Tests	Protocol	Result	Limits of Detection	G.S.R 422(E)
					Desirable Limit
1.	Colour (Hazen unit)	APHA, 23 <sup>rd</sup> Ed. 2017, 2120 B	<5.0	5-100	-
2.	Odour	APHA, 23 <sup>rd</sup> Ed. 2017, 2150 B	Odourless	Agreeable	Agreeable
3.	Particulate size in (µ)	APHA, 23 <sup>rd</sup> Ed. 2017, 2540-D	241	100 - 1200	Shall pass 850 Micron IS Sieve
4.	pH	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 H+ A+B	7.2	2-12	5.5-9.0
5.	Temperature (°C)	APHA, 23 <sup>rd</sup> Ed. 2017, 2550A+B	24.5	10-100	-
6.	Oil & Grease as O & G (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 5520 (A+D)	BDL	5-600	10.0
7.	Total Residual Chlorine (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500-Cl B	0.18	0.1-5	1.0
8.	Ammonical Nitrogen as NH <sub>3</sub> - N(mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 NH <sub>3</sub> A+F	1.26	1-100	50.0
9.	Total KjeldahalNitrogen as NH <sub>3</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 Norg A+C	6.5	5-100	100.0
10.	Free Ammonia as NH <sub>3</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 NH <sub>3</sub> A+F	BDL	0.05-5.0	5.0
11.	Biochemical Oxygen Demand as BOD (mg/l) 3days at 27°C	APHA, 23 <sup>rd</sup> Ed. 2017, 5210 A+B	6.4	5-10000	30.0
12.	Chemical Oxygen Demand as COD (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 5220 A+C	33.8	5-50000	250.0
13.	Arsenic as As (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3114 B	BDL	0.01-2	0.2
14.	Mercury as Hg (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.001-2	0.01
15.	Lead asPb (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.01-5	0.1
16.	Cadmium as Cd (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.02-5	0.2
17.	Hexavalent Chromium as Cr <sup>+6</sup> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.05-20	0.1
18.	Total Chromium as Cr (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.05-50	2.0
19.	Copper as Cu (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.05-5	2.0
20.	Zinc as Zn (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	0.027	0.02-50	5.0
21.	Selenium as Se (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 Se-A+D	BDL	0.01-1	0.05
22.	Nickel as Ni (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.02-5	2.0
23.	Fluoride as F (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 F C+D	0.05	0.02-10	2.0
24.	Dissolved Phosphate as PO <sub>4</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 - PD	BDL	0.5-100	5.0
25.	Sulphide as S <sub>2</sub> -(mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 S <sup>2-</sup> -F	BDL	0.1-10	2.0

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Sl. No.	Tests	Protocol	Result	Limits of Detection	G.S.R 422(E)
					Desirable Limit
26.	Phenolic Compounds as C <sub>6</sub> H <sub>5</sub> OH (mg/l)	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-10	1.0
27.	Bioassay (%)	APHA, 23rd Ed. 2017, 8910 C	90%	70 --95	90% survival of fish after 96 hrs. in 100% Effluent
28.	Manganese as Mn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	0.12	0.01-20	2.0
29.	Iron as Fe (mg/l)	APHA, 23rd Ed. 2017, 3500 Fe B	1.3	0.02-100	3.0
30.	Nitrate Nitrogen as NO <sub>3</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017,(4500-NO <sub>3</sub> A+ B)	3.4	5-100	10.0

\*The results are related only to item tested. BDL = Below Detection Limit

  
Analyst  
Authorized SignatoryEcomen Laboratories Pvt. Ltd.  
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FORMAT NO. ECO/QS/FORMAT/09

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

TEST REPORT ISSUE DATE:06.04.2021

**TEST REPORT OF SURFACE WATER\***

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

Address of the Customer : Bamebari Iron & Manganese Mine (Joda)

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 03/3/2021

Date of Sample Receiving : 07/3/2021

Date of Analysis : 08/2/2021 to 12/3/2021

Source of Sample : Kassia Nala (out side Lease)

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	IS:2296 Class-C
1.	pH	APHA,23 <sup>rd</sup> Ed.2017,4500H <sup>+</sup> A+B	7.0	2-12	8.5
2.	Colour (Hazen unit)	APHA, 23 <sup>rd</sup> Ed. 2017, 2120 B	10.0	5-100	
3.	Total Dissolved Solids as TDS (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 , 2540C	208	5-10000	1500
4.	Dissolved Oxygen as DO (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,4500 A+C	6.5	2-10	4.0(min)
5.	Biochemical Oxygen Demand as BOD (mg/l) 3 days at 27 OC	APHA,23 <sup>rd</sup> Ed.2017 ,5210A+ B	BDL	5-10000	3.0
6.	Nitrate Nitrogen as NO <sub>3</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 NO <sub>3</sub> - B	6.6	5-100	50.0
7.	Fluorides as F (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,4500 -C	0.3	0.05-10	1.5
8.	Sulfate as SO <sub>4</sub> (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,4500 -SO <sub>4</sub> <sup>2-</sup> E	31.4	1.0-250	400.0
9.	Iron as Fe (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,3500 Fe B	0.080	0.02-50	50.0
10.	Copper as Cu (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111A+B	BDL	0.05-5	1.5
11.	Cadmium as Cd (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111A+B	BDL	0.002-2	0.01
12.	Arsenic as As(mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3114C	BDL	0.01-2	0.2
13.	Chloride as Cl <sup>-</sup> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017,4500 Cl A+B	32.5	5-1000	600
14.	Chromium as Cr+6 (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.05-20	0.05
15.	Cyanide as CN (mg/l)	APHA,23 <sup>rd</sup> Ed.2017,4500 ,CN A+D	BDL	0.005-5	0.05
16.	Lead as Pb (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111A+B	BDL	0.01-2	0.1
17.	Selenium as Se (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3500 Se-C	BDL	0.005-1	0.01
18.	Zinc as Zn (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111A+B	0.22	0.02-50	15
19.	Phenolic Compounds as C <sub>6</sub> H <sub>5</sub> OH (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 5530 A+C	BDL	0.004-5	0.005
20.	Total coliform (MPN/100 ml)	APHA,23 <sup>rd</sup> Ed.2017, 9221 A+ B	225	1.8	5000
21.	Anionic Detergents (As MBAS)(mg/l) max	APHA 22 <sup>nd</sup> EDN.:2012, 5540 A+C	BDL	0.01-5	-

\*The result are related only to item tested - The parameters are not included in IS: 2296 Class-C

BDL – Below Detection Limit

Anshu  
Analyst

Authorized Signatory

Abhishek  
Manager (Q)

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FORMAT NO. ECO/QS/FORMAT/09

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

TEST REPORT ISSUE DATE:06.04.2021

**TEST REPORT OF SURFACE WATER\***

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

Address of the Customer : Bamebari Iron & Manganese Mine (Joda)

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 03/3/2021

Date of Sample Receiving : 07/3/2021

Date of Analysis : 08/3/2021 to 12/3/2021

Source of Sample : Intake Point at Tindharia (Baitarani River)

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	IS:2296 Class-C
1.	pH	APHA,23 <sup>rd</sup> Ed.2017,4500H <sup>+</sup> A+B	7.3	2-12	8.5
2.	Colour (Hazen unit)	APHA, 23 <sup>rd</sup> Ed. 2017, 2120 B	9.4	5-100	
3.	Total Dissolved Solids as TDS (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,2540C	238	5-10000	1500
4.	Dissolved Oxygen as DO (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,4500 A+C	5.7	2-10	4.0(min)
5.	Biochemical Oxygen Demand as BOD (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,5210A+ B	BDL	5-10000	3.0
6.	Nitrate Nitrogen as NO <sub>3</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 NO <sub>3</sub> - B	7.3	5-100	50.0
7.	Fluorides as F (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,4500 -C	0.3	0.05-10	1.5
8.	Sulfate as SO <sub>4</sub> (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,4500 -SO <sub>4</sub> <sup>2-</sup> E	33.5	1.0-250	400.0
9.	Iron as Fe (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,3500 Fe B	0.085	0.02-50	50.0
10.	Copper as Cu (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111A+B	BDL	0.05-5	1.5
11.	Cadmium as Cd (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111A+B	BDL	0.002-2	0.01
12.	Arsenic as As(mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3114C	BDL	0.01-2	0.2
13.	Chloride as Cl <sup>-</sup> (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111 - A +B	38.5	5-1000	600
14.	Chromium as Cr+6 (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.05-20	0.05
15.	Cyanide as CN (mg/l)	APHA,23 <sup>rd</sup> Ed.2017,4500 ,CN A+D	BDL	0.005-5	0.05
16.	Lead as Pb (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111A+B	BDL	0.01-2	0.1
17.	Selenium as Se (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3500 Se-C	BDL	0.005-1	0.01
18.	Zinc as Zn (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111A+B	0.030	0.02-50	15
19.	Phenolic Compounds as C <sub>6</sub> H <sub>5</sub> OH (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 5530 A+C	BDL	0.004-5	0.005
20.	Total coliform (MPN/100 ml)	APHA,23 <sup>rd</sup> Ed.2017, 9221 A+ B	225	1.8	5000
21.	Anionic Detergents (As MBAS)(mg/l) max	APHA 22nd EDN.:2012, 5540 A+C	BDL	0.01-5	-

\*The result are related only to item tested - The parameters are not included in IS: 2296 Class-C

BDL – Below Detection Limit

Anand  
Analyst

Authorized Signatory

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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/SW/05/21

TEST REPORT ISSUE DATE:06.04.2021

**TEST REPORT OF SURFACE WATER\***

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

Address of the Customer : Bamebari Iron & Manganese Mine (Joda)

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 03/3/2021

Date of Sample Receiving : 07/3/2021

Date of Analysis : 08/3/2021 to 12/3/2021


Source of Sample : Juridi Nalla (Near Jurudi Bridge)

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	IS:2296 Class-C
1.	pH	APHA,23 <sup>rd</sup> Ed.2017,4500H <sup>+</sup> A+B	7.2	2-12	8.5
2.	Colour (Hazen unit)	APHA, 23 <sup>rd</sup> Ed. 2017, 2120 B	10.0	5-100	
3.	Total Dissolved Solids as TDS (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 , 2540C	233	5-10000	1500
4.	Dissolved Oxygen as DO (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,4500 A+C	6.1	2-10	4.0(min)
5.	Biochemical Oxygen Demand as BOD (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,5210A+ B	BDL	5-10000	3.0
6.	Nitrate Nitrogen as NO <sub>3</sub> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 4500 NO <sub>3</sub> - B	5.8	5-100	50.0
7.	Fluorides as F (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,4500 -C	0.30	0.05-10	1.5
8.	Sulfate as SO <sub>4</sub> (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,4500 -SO <sub>4</sub> <sup>2-</sup> E	29.8	1.0-250	400.0
9.	Iron as Fe (mg/l)	APHA,23 <sup>rd</sup> Ed.2017 ,3500 Fe B	0.045	0.02-50	50.0
10.	Copper as Cu (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111A+B	BDL	0.05-5	1.5
11.	Cadmium as Cd (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111A+B	BDL	0.002-2	0.01
12.	Arsenic as As(mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3114C	BDL	0.01-2	0.2
13.	Chloride as Cl <sup>-</sup> (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017,4500 Cl A+B	35.7	5-1000	600
14.	Chromium as Cr+6 (mg/l)	APHA, 23 <sup>rd</sup> Ed. 2017, 3111 A+B	BDL	0.05-20	0.05
15.	Cyanide as CN (mg/l)	APHA,23 <sup>rd</sup> Ed.2017,4500 ,CN A+D	BDL	0.005-5	0.05
16.	Lead as Pb (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111A+B	BDL	0.01-2	0.1
17.	Selenium as Se (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3500 Se-C	BDL	0.005-1	0.01
18.	Zinc as Zn (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 3111A+B	0.028	0.02-50	15
19.	Phenolic Compounds as C <sub>6</sub> H <sub>5</sub> OH (mg/l)	APHA,23 <sup>rd</sup> Ed.2017, 5530 A+C	BDL	0.004-5	0.005
20.	Total coliform (MPN/100 ml)	APHA,23 <sup>rd</sup> Ed.2017, 9221 A+ B	220	1.8	5000
21.	Anionic Detergents (As MBAS)(mg/l) max	APHA 22nd EDN.:2012, 5540 A+C	BDL	0.01-5	-

\*The result are related only to item tested - The parameters are not included in IS: 2296 Class-C

BDL – Below Detection Limit

  
Analyst

  
Authorized Signatory

  
Manager (Q)

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FORMAT NO. ECO/QS/FORMAT/10

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

TEST REPORT ISSUE DATE: 02.04.2021

**Meteorological Data Monitoring Reports**

Name of the Customer : Bamebari 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	36.53	21.82	45.3	13.52	1.6	0	SSE	0
2	02.03.2021	35.8	17.28	68.65	13.03	2.5	0	SSE	0
3	03.03.2021	34.57	15.87	58.35	13.14	0.8	0	SE	0
4	04.03.2021	35.39	14.79	58.11	12.3	1.1	0	SE	0
5	05.03.2021	34.72	16.26	50.2	12.3	1.5	0	SSW	0
6	06.03.2021	34.31	18.64	47.58	14.63	1.2	0	SE	0
7	07.03.2021	36.25	16.35	40.79	8.2	0.6	0	SE	0
8	08.03.2021	35.72	17.21	52.23	12.54	1.8	0	SSE	0
9	09.03.2021	37.35	18.13	75.19	14.65	1.1	0	SW	0
10	10.03.2021	36.09	21.92	61.41	17.9	1.2	0	SE	0
11	11.03.2021	35.91	18.88	77.96	24.19	0.9	0	SSE	0
12	12.03.2021	34.84	19.91	81.75	32.52	2.3	0	SW	0
13	13.03.2021	27.73	17.08	93.73	48.11	1	0	SE	0
14	14.03.2021	33.53	16.22	93.61	25.09	1.4	0	SE	0
15	15.03.2021	33.9	16.12	81.29	17.93	0.8	0	SE	0
16	16.03.2021	36	17.52	65.5	16.4	1.4	0	SE	0
17	17.03.2021	35.06	17.65	72.2	20.09	1	0	SE	0
18	18.03.2021	36.29	19.18	75.09	12.42	0.9	0	SW	0
19	19.03.2021	35.42	19.23	60.63	18.41	1.9	0	SE	0
20	20.03.2021	34.5	20.77	52.84	23.68	1.2	0	SE	0
21	21.03.2021	36.48	23.45	46.19	19.33	1.1	0	SW	0
22	22.03.2021	37.64	20.33	52.23	15.28	1.3	0	SE	0
23	23.03.2021	36.42	20.56	64.2	22.47	1.7	0	SE	0
24	24.03.2021	36.01	21.48	63.64	22.14	1.2	0	SSW	0
25	25.03.2021	36.85	21.07	55.56	17.89	1.5	0	SE	0
26	26.03.2021	36.57	19.75	62.01	16.42	1.6	0	SE	0
27	27.03.2021	35.66	19.43	68.34	18.77	1.1	0	SE	0
28	28.03.2021	37.38	20.05	66.13	13.87	1.5	0	SE	0
26	29.03.2021	38.05	20.51	69.36	13.76	1.2	0	SE	0
30	30.03.2021	38.97	24.27	33.81	11.09	3.8	0	SW	0
31	31.03.2021	39.15	25.77	25.59	7.75	1.8	0	SE	0

These results are related only to tested items.

  
Analyst

  
Authorized Signatory

  
Manager (Q)

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FORMAT NO. ECO/QS/FORMAT/13

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

TEST REPORT ISSUE DATE: 05.04.2021

### TEST REPORT OF OCCUPATIONAL/WORKPLACE NOISE MONITORING

Name of the Customer : Bamebari 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	3-03-2021	Workshop (HEMM)	Maintenance (HEMM)	67.6	85.0
2	3-03-2021	Sorting Yard	Manual Sorting/Sizing	71.8	85.0
3	09-03-2021	Mr. Subudhi Barik	Sorting Labour	69.6	85.0
4	09-03-2021	Mr. Juhan Hembram	Mining Supervisor	72.4	85.0
5	13-03-2021	Near Stack yard	Stacking of ore	68.3	85.0
6	13-03-2021	Mr. Santana Munda	Weighbridge operator	72.4	85.0

*Anshu*  
Analyst

*[Signature]*  
Authorized Signatory

*[Signature]*  
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