



By E-Mail

Ref.No.: MGM/P&E/105/21

Date: 26/09/2021

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

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

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

Dear Sir,

We are hereby submitting the **Annual Environmental Statement** in "FORM-V" prescribed under the above referenced statute, for the year ending 31st March 2021 in respect of Joda West 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
Joda West 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 31st MARCH 2021

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

Submitted By:
Joda West Iron & Manganese Mine

M/s. Tata Steel Limited

At/Po: Bichhakundi, Via-Joda

District- Keonjhar, Odisha -758 034

FORM V

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

ENVIRONMENTAL STATEMENT

for the financial year ending the 31st March 2020

PART - A

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

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

Nominated Owner:

Agent:

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

- (ii) Industry Category : Opencast Mining
- (iii) Production Capacity – Units : **180,000 Tonnes per annum** (Manganese Ore or 1.80 LTPA (as per Environmental Clearance)
- (iv) Year of Establishment : 1933
- (v) Date of the last environmental statement submitted : 28th Sept'2020

PART - B

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

(1) Water Consumption m³/day (Av. figures for 2020-21)

Process : 56.65 m³/day (Water sprinkling) (**Total-20677.25m³**)

Cooling : Nil

Domestic : 74.68 m³/day (**Total-27258.2m³**)

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.

(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	<u>Consumption of raw materials per unit</u>	
		During the previous Financial year (Year 2019-20)	During the current Financial year (Year 2020-21)
-Nil-	Manganese Ore	Production 93605.0 MT	Production 109415.000
		Despatch 68821.54 MT	Despatch 73223.96 MT

Remarks: The ore produced from Mine head is used as raw material to produce ferro manganese. Other essential resources used during the reporting period (2019-20) is as follows: Diesel (1081.192KL), Explosive (50125Kg), Electricity (2002235 Kw-h from grid & 4073 Kw-h from DG set).

PART - C

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

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

There are no direct/indirect source for discharge of effluents/pollutants to the environment. Ground water strata is much below the present pit depth and since mine is operated without intervening with the ground water 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. Abstract of Environmental Monitoring results for the last quarter of FY 2020-21 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>
(i) From Process Waste containing Oil	Nil	Nil
Used Oil (in Ltrs.)	600 Ltrs	740
Cotton Waste (in Kgs)	7 (approx.)	1.5
Duster (in Nos.)	Nil	Nil
Filters (in Nos.)	88 (approx.)	15
(ii) From pollution control facilities	Nil	Nil

Remark: The quantity indicated reflects that of the quantity generated from the departmental HEMM fleets and is exclusive of the major chunk of generation, managed by the outsourced agencies deployed for mining.

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)	1452256 MT	2352396 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	1452256 MT	2352396 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 form of significant solid **waste** contains lateritic morrum, shale and quartzite, etc.

- Horticultural Waste: All the horticultural waste, food waste and biodegradable waste is 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.

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. We have planted around 11.54 lakh nos. of trees over an area around 225.9 ha till 2019-20. Including areas over safety zone, OB dump and as avenue plantation. The tree density is maintained at the rate of more than 2500 saplings per ha.
5. During FY 2020-21, Around 14320nos of forestry saplings have been planted.
6. The mine management proactively undertakes various environmental activities for the conservation/protection of environment. The cost incurred towards environmental measures are earmarked in a separate fund center. An abstract on the approximate cost spent towards environmental measures during FY 2020-21 in respect of Joda West Iron & Manganese Mine is summarised in the table as follows:

Table. Environmental Expenditure for 2020-21

S.No.	Environmental Conservation/ Protection Measures	Expenditure (Lacs-INR)	
		Proposed	Actual
1	Afforestation on Dump slopes (5600 saplings/2Ha)	4.5	6.20
2	Construction/Maintenance of retaining wall (1050mtrs)	3.5	2.6
3	Construction/Maintenance of Garland drain, settling pits with check dam	1.20	0.85
4	Env. Awareness/Mines Environment & Mineral Conservation Week Celebration	5.0	5.80

S.No.	Environmental Conservation/ Protection Measures	Expenditure (Lacs-INR)	
		Proposed	Actual
5	Annual Environmental Monitoring	15.0	17.40
6	Installation of Automatic Wheel Wash System	16.0	14.50
7	Development Mango Orchard (1Acrea 700 saplings)	1.50	1.3
8	Rainwater Harvesting Structure/Pond expansion	4.5	5.0
9	Dust Suppression-Mobile Water Tanker	25.5	23.4
10	Operation & Maintenance of STP	3.5	4.10
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	9.0	5.8
14	Development of Nursery @ Mine Site	28.5	21.45
15	Operation & Maintenance of WTP	4.5	3.9
Total		133.2	120.9

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

PART - H

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

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

PART - I

(Any other for improving the quality of environment)

1. With compliance to conditions of Environment Clearance obtained from MoEF&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 BIS : 10500.
2. Top soils generated during excavation are utilized immediately for nursery development and dump slope plantation.
3. Measures taken to control Air Pollution: -
- Water sprinkling on the haul road,
 - Provision of dust masks to the workmen,
 - Adoption of wet drilling arrangement in the drill machines and
 - Black topped road in the residential colony.
 - Green belt along mining and colony
 - Native sapling and vetiver plantation in inactive dumps.
4. Measures taken to control Water Pollution: -
- Construction of 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 work shop.
 - Native sapling and vetiver plantation in inactive dumps.
 - STP for domestic effluent in Joda West 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 ear-muff 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 WHEEL WASH FACILITY

Fig.1 Automatic Wheel Wash Facility @ Joda West Iron & Mn Mine



Fig.2 Wheel Wash System in Operation at Joda West Iron & Mn Mine



PHOTOGRAPHS OF AAQ STATIONS (CORE ZONE)



Fig.3 AAQ Station Near Time Office (Joda West Iron & Mn Mine)



Fig.4 AAQ Station Near D-Quarry Sorting Yard (Joda West Iron & Mn Mine)



Fig.5 AAQ Station Near Screen Plant (Joda West Iron & Mn Mine)



Fig.6 AAQ Station Near Gangeiguda Pit Shelter (Joda West Iron & Mn Mine)



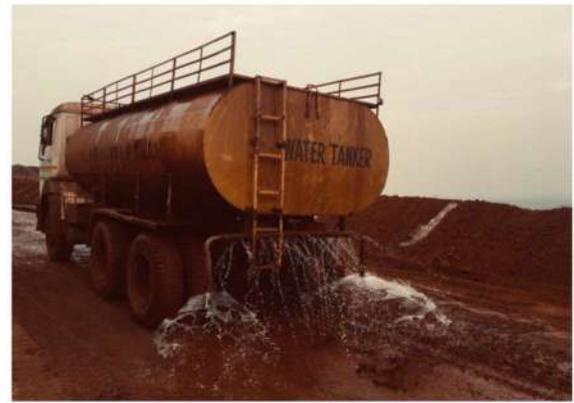
Fig.7 AAQ Station Near Screen Plant (Joda West Iron & Mn Mine)

BEST ENVIRONMENTAL PRACTICES

Haul Road Dust Suppression Measures:



Grader for Haul Road



Grader for Haul Road



Fixed Sprinkling System



Mobile Mist Canon

Special Sustainable Projects (Central Facilities for Mn Group of Mines)



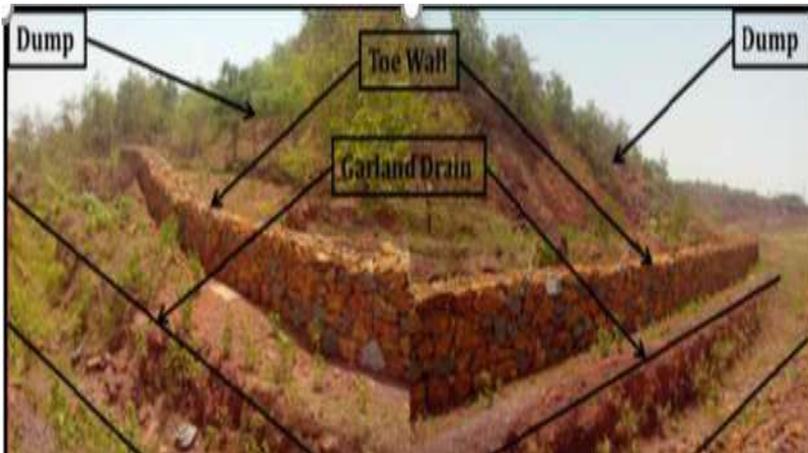
Vertiber Plantation-Slope



RWH-Pisciculture by SHG

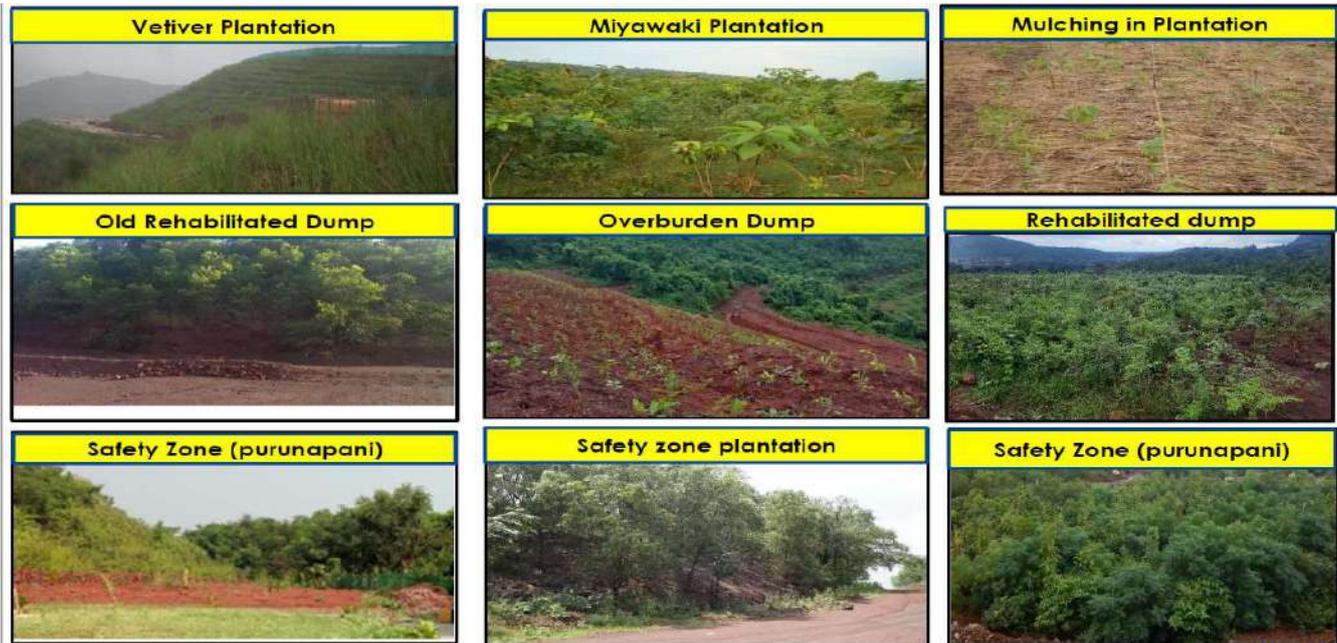


Surface Runoff Management: Network of Garland Drains, Toe Wall & Rain Pass

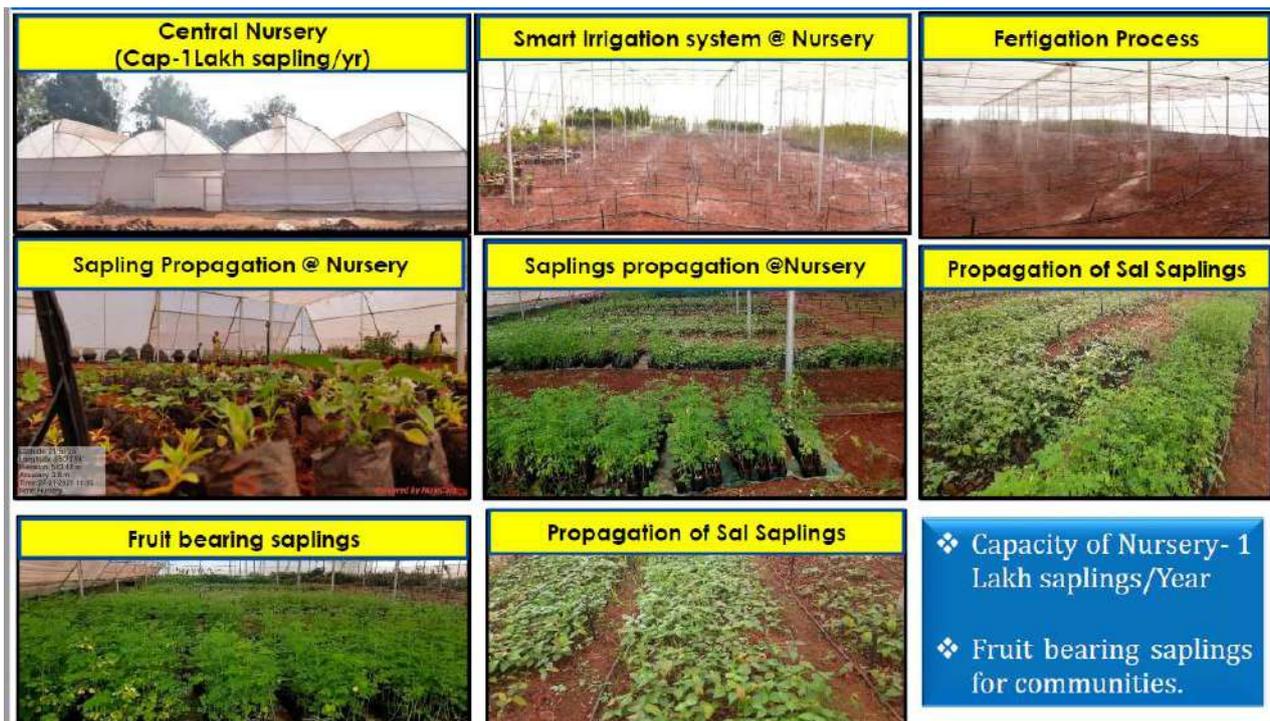


Toe Wall & Garland Drains for Runoff Management

Greenbelt & Afforestation Measures:



Central Nursery at Mn Group of Mines



- Cost of Project: Rs.28.5Lacs
- Capacity of Propagation: 1 Lakh Saplings/Year
- Key Species under Propagation: Sal Trees
- Key Facilities: Automated Irrigation System
- Area under Nursery: 2000-Sq-mtr

Scientific Processes Adopted for Land Rehabilitation-Soil Condition

Lock-Key Arrangements



Lock-Key Arrangements



Mulching Arrangement



Leaf Mould Mulching



Thanking you,

Yours faithfully,

Date: 26/09/2021

F: TATA STEEL LTD.

A handwritten signature in black ink, appearing to be 'Dh', written over the printed name.

Head
Mine & Production Planning
Joda West 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/20/21

TEST REPORT ISSUE DATE: 05.02.2021

Ambient Air Quality Monitoring Report (Core Zone)

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

Location : AAQMS-1: Near Time Office

Sampling Method : IS: 5182

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

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

SI. No.	Date of Monitoring	Concentration of Pollutant				
		PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	CO (mg/m ³)
1	03.01.2021	71.30	36.6	14.9	25.4	0.44
2	05.01.2021	65.6	38.4	13.6	24.0	0.46
3	9.01.2021	72.18	42.7	10.5	22.7	0.36
4	11.01.2021	62.90	35.8	09.3	21.8	0.42
5	16.01.2021	64.8	41.8	13.6	19.4	0.38
6	19.01.2021	65.6	36.8	12.7	19.60	0.39
7	23.01.2021	69.6	34.5	11.1	18.50	0.43
8	25.01.2021	62.2	39.6	11.3	20.8	0.42
Average		66.77	38.28	12.13	21.53	0.41
Limit as per CPCB notification New Delhi, 18th Nov, 2009. for Ambient air quality		100	60	80	80	4.0
Standard Method		IS : 5182 (Part-23) 2006	NAAQM Volume-I by CPCB	IS : 5182 (Part-2) 2001	IS : 5182 (Part-6) 2006	IS : 5182 (Part-10)

*These results are related only to tested items.


Analyst


Authorized Signatory


Manager (Q)

Ecomen Laboratories Pvt. Ltd.
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Sector-H, Aliganj, Lucknow-226024
Ph.2746282 Fax-2745726

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M/s Tata Steel Limited

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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

SI. No.	Date of Monitoring	Concentration of Pollutant						
		NH ₃ (µg/m ³)	O ₃ (µg/m ³)	Pb (µg/m ³)	Ni (ng/m ³)	As (ng/m ³)	Benzene (µg/m ³)	Benzo(a) pyrene (ng/m ³)
1	05.01.2021	21.17	12.69	<1.0	1.1	<1.0	<4.0	<0.05
2	06.01.2021	20.5	14.53	<1.0	1.12	<1.0	<4.0	<0.05
3	12.01.2021	18.5	13.6	<1.0	1.1	<1.0	<4.0	<0.05
4	15.01.2021	17.9	16	<1.0	1.11	<1.0	<4.0	<0.05
5	16.01.2021	15.3	15.4	<1.0	1.12	<1.0	<4.0	<0.05
6	19.01.2021	14.7	12.4	<1.0	1.14	<1.0	<4.0	<0.05
7	21.01.2021	23.3	10.33	<1.0	1.15	<1.0	<4.0	<0.05
8	23.01.2021	20.4	16.1	<1.0	1.17	<1.0	<4.0	<0.05
Average		18.97	13.88	-	1.13	-	-	-
Limit as per CPCB notification New Delhi, 18thNov, 2009. for Ambient air quality		400	180	1	20	6	5	1
Standard Method		APHA 401 (Indophenol)	IS : 5182 (Part-9) 1974	IS : 5182 (Part-22) 2004	NAAQM Volume-I by CPCB	NAAQM Volume-I by CPCB	IS : 5182 (Part-11)	IS : 5182 (Part-12)

*These results are related only to tested items.

Anshu
Analyst

[Signature]
Authorized Signatory

[Signature]
Manager (Q)

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

TEST REPORT ISSUE DATE: 05.02.2021

Ambient Air Quality Monitoring Report (Core Zone)

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

Location : AAQMS-2: H-Quarry Near Shelter

Sampling Method : IS: 5182

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

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

SI. No.	Date of Monitoring	Concentration of Pollutant				
		PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	CO (mg/m ³)
1	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
Average		76.66	45.21	14.28	21.35	0.36
Limit as per CPCB notification New Delhi, 18 th Nov, 2009. for Ambient air quality		100	60	80	80	4.0
Standard Method		IS : 5182 (Part-23) 2006	NAAQM Volume-I by CPCB	IS : 5182 (Part-2) 2001	IS : 5182 (Part-6) 2006	IS : 5182 (Part-10)

*These results are related only to tested items.


Analyst
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Manager (Q)

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

Location : AAQMS-2: Near H-Quarry Shelter

Sampling Method : IS: 5182

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

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

Sl. No.	Date of Monitoring	Concentration of Pollutant						
		NH ₃ (µg/m ³)	O ₃ (µg/m ³)	Pb (µg/m ³)	Ni (ng/m ³)	As (ng/m ³)	Benzene (µg/m ³)	Benzo(a) pyrene (ng/m ³)
1	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
Average		22.64	14.48	-	1.10	-	-	-
Limit as per CPCB notification New Delhi, 18 th Nov, 2009. for Ambient air quality		400	180	1	20	6	5	1
Standard Method		APHA 401 (Indophenol)	IS : 5182 (Part-9) 1974	IS : 5182 (Part-22) 2004	NAAQM Volume-I by CPCB	NAAQM Volume-I by CPCB	IS : 5182 (Part-11)	IS : 5182 (Part-12)

*These results are related only to tested items.

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FORMAT NO. ECO/QS/FORMAT/10

TEST REPORT NO: ECO LAB/AAQ/23/21

TEST REPORT ISSUE DATE: 05.02.2021

Ambient Air Quality Monitoring Report (Core Zone)

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

Location : AAQMS-3: Near Screen Plant (D-Quarry)

Sampling Method : IS: 5182

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

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

SI. No.	Date of Monitoring	Concentration of Pollutant				
		PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	CO (mg/m ³)
1	05.01.2021	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
Average		76.66	45.21	14.28	21.35	0.36
Limit as per CPCB notification New Delhi, 18 th Nov, 2009. for Ambient air quality		100	60	80	80	4.0
Standard Method		IS : 5182 (Part-23) 2006	NAAQM Volume-I by CPCB	IS : 5182 (Part-2) 2001	IS : 5182 (Part-6) 2006	IS : 5182 (Part-10)

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TEST REPORT ISSUE DATE: 05.02.2021

Ambient Air Quality Monitoring Report (Core Zone)

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

Location : AAQMS-3: Near Screen Plant (D-Quarry)

Sampling Method : IS: 5182

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

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

Sl. No.	Date of Monitoring	Concentration of Pollutant						
		NH ₃ (µg/m ³)	O ₃ (µg/m ³)	Pb (µg/m ³)	Ni (ng/m ³)	As (ng/m ³)	Benzene (µg/m ³)	Benzo(a) pyrene (ng/m ³)
1	05.01.2021	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 th Nov, 2009. for Ambient air quality		400	180	1	20	6	5	1
Standard Method		APHA 401 (Indophenol)	IS : 5182 (Part-9) 1974	IS : 5182 (Part-22) 2004	NAAQM Volume-I by CPCB	NAAQM Volume-I by CPCB	IS : 5182 (Part-11)	IS : 5182 (Part-12)

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FORMAT NO. ECO/QS/FORMAT/10

TEST REPORT NO: ECO LAB/AAQ/24/21

TEST REPORT ISSUE DATE: 05.02.2021

Ambient Air Quality Monitoring Report (Core Zone)

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

Location : AAQMS-4: Near Sorting Yard (D-Quarry)

Sampling Method : IS: 5182

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

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

SI. No.	Date of Monitoring	Concentration of Pollutant				
		PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	CO (mg/m ³)
1	05.01.2021	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
Average		76.66	45.21	14.28	21.35	0.36
Limit as per CPCB notification New Delhi, 18 th Nov, 2009. for Ambient air quality		100	60	80	80	4.0
Standard Method		IS : 5182 (Part-23) 2006	NAAQM Volume-I by CPCB	IS : 5182 (Part-2) 2001	IS : 5182 (Part-6) 2006	IS : 5182 (Part-10)

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Location : AAQMS-4: Near Sorting Yard (D-Quarry)

Sampling Method : IS: 5182

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

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

Sl. No.	Date of Monitoring	Concentration of Pollutant						
		NH ₃ (µg/m ³)	O ₃ (µg/m ³)	Pb (µg/m ³)	Ni (ng/m ³)	As (ng/m ³)	Benzene (µg/m ³)	Benzo(a) pyrene (ng/m ³)
1	05.01.2021	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 th Nov, 2009. for Ambient air quality		400	180	1	20	6	5	1
Standard Method		APHA 401 (Indophenol)	IS : 5182 (Part-9) 1974	IS : 5182 (Part-22) 2004	NAAQM Volume-I by CPCB	NAAQM Volume-I by CPCB	IS : 5182 (Part-11)	IS : 5182 (Part-12)

*These results are related only to tested items.

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FORMAT NO. ECO/QS/FORMAT/10

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

TEST REPORT ISSUE DATE: 07.02.2021

Ambient Air Quality Monitoring Report (Buffer Zone)

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

Sampling Method : IS: 5182

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

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

Sl. No.	Location (Date of Monitoring)	Concentration of Pollutant				
		PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	CO (mg/m ³)
1	Banspani (7.01.2021)	75.3	39.8	13.5	19.7	0.72
2	Boneikela (11.01.2021)	80.2	39.20	12.3	20.65	0.73
3	Khondbond (13.01.2021)	81.3	43.2	11.7	23.8	0.81
4	Roida Village (19.01.2021)	72.6	36.62	9.27	17.8	0.82
Average		77.35	39.71	11.69	20.49	0.77
Limit as per CPCB notification New Delhi, 18thNov, 2009. for Ambient air quality		100	60	80	80	4.0
Standard Method		IS : 5182 (Part- 23) 2006	NAAQM Volume-I by CPCB	IS : 5182 (Part-2) 2001	IS : 5182 (Part-6) 2006	IS : 5182 (Part-10)

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FORMAT NO. ECO/QS/FORMAT/10

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

TEST REPORT ISSUE DATE: 07.02.2021

Ambient Air Quality Monitoring Report (Buffer Zone)

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

Sampling Method : IS: 5182

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

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

SI. No.	Location (Date of Monitoring)	Concentration of Pollutant						
		NH ₃ (µg/m ³)	O ₃ (µg/m ³)	Pb (µg/m ³)	Ni (ng/m ³)	As (ng/m ³)	Benzene (µg/m ³)	Benzo (a) pyrene (ng/m ³)
1	Banspani (7.01.2021)	19.8	11.2	<1.0	1.35	<1.0	<4.0	<0.05
2	Boneikela (11.01.2021)	21.3	10.28	<1.0	1.10	<1.0	<4.0	<0.05
3	Khondbond (13.01.2021)	22.4	11.8	<1.0	1.15	<1.0	<4.0	<0.05
4	Roida Village (19.01.2021)	22.6	9.8	<1.0	1.13	<1.0	<4.0	<0.05
Average		21.53	10.77	-	1.18	-	-	-
Limit as per CPCB notification New Delhi, 18thNov, 2009. for Ambient air quality		400	180	1	20	6	5	1
Standard Method		APHA 401 (Indophen ol)	IS : 5182 (Part-9) 1974	IS : 5182 (Part-22) 2004	NAAQM Volume-I by CPCB	NAAQM Volume-I by CPCB	IS : 5182 (Part-11)	IS : 5182 (Part-12)

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FORMAT NO. ECO/QS/FORMAT/13

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

TEST REPORT ISSUE DATE: 07.02.2021

TEST REPORT OF AMBIENT NOISE LEVEL MONITORING

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

Sample Collected By : Ecomen Team using Integrated Sound Level Meter

Instrument Used : Noise Meter (Lutron)

S.No.	Date of Monitoring	Name of Location	Category of Zone	Day Time Leq Value in dB(A)	Night Time Leq Value in dB(A)
1	7-01-2021	Township	Residential	62.3	44.5
2	9-01-2021	Near Hospital	Silence	49.5	39.5
3	13-01-2021	Near Screen Plant	Industrial	73.5	46.2
4	15-01-2021	Near Admin Office	Industrial	63.3	45.6
5	17-01-2021	Near Railway Siding	Industrial	71.2	42.4
6	19-01-2021	Near Sorting Yard	Industrial	69.8	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: 03.02.2021**TEST REPORT OF FLUE GAS EMISSIONS***Name of the Customer : Joda West Iron & Manganese Mine of
M/s Tata Steel LimitedDate of Sampling : 17.01.2021
Sample Collected by : Ecomen Team in presence of TSL's Representative
Source of Emission : Exhaust Emission from DG Set
Sampling Method : IS: 11255
Instrument Used : Stack Monitoring Kit**Details of Stack**Material of Construction : M.S.
Stack Attached to : DG Set-01 (Camp)
Capacity : 100 KVA
Stack Height:
i) Above the Platform/ Roof (m) : 10.0
ii) Above the Ground Level (m) : 15.0
Stack Top : Circular
Inside Diameter of Stack (m) : 0.0889
(at sampling point)
Cross Sectional Area of Duct/Stack (m²) : 0.0061
Ambient Air (°C) : 18.0
Flue Gas Temperature (°C) : 174.0
Exit Velocity of Gas (m/sec.) : 9.25
Flow Rate (Nm³/ sec.) : 0.037
Type of Fuel : HSD
Quantity of Fuel Consumption (lit/hr) : 18-20

Sl. No.	Tests Conducted	Method	<i>Pollutant Concentration in (At 15% O₂ Correction) in gm/Kw-Hr</i>	Standards as per CPCB in gm/Kw-Hr
1.	Particulate Matter (PM)	IS:11255 (Part-1)	0.054	0.2
2.	Sulphur Dioxide (SO ₂)	IS:11255 (Part-2)	0.032	-
3.	Nitrogen Dioxide (NO _x)	IS:11255 (Part-7)	0.053	4.0 (NO _x +HC)
4.	Hydrocarbon (HC)	IS:13270	1.16	
5.	Carbon Monoxide (CO)	IS:13270	1.13	3.5

*The result is related only to tested item.

Anand
Analyst

Authorized Signatory

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FORMAT NO. ECO/QS/FORMAT/09

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

TEST REPORT ISSUE DATE: 09.02.2021

TEST REPORT OF DRINKING WATER*

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

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

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 7/1/2021

Date of Sample Receiving : 11/1/2021

Packing of Sample : As per requirement

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

Source of Sample : Joda West 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 rd Ed. 2017, 2120 B	<5.0	5-100	5.00	15.0
2.	Odour	APHA, 23rd Ed. 2017,2150 B	Agreeable	Qualitative	Agreeable	Agreeable
3.	Taste	APHA, 23rd Ed. 2017,2160 A+B	Agreeable	Qualitative	Agreeable	Agreeable
4.	pH	APHA, 23rd Ed. 2017, 4500 H+A+B	7.18	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	183	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 ₃ (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	43.0	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	16.4	5-1000	250.0	1000.0
12.	Sulfate as SO ₄ (mg/l)	APHA, 23rd Ed. 2017,4500 SO ₄ - E	20.3	5-200	200.0	400.0
13.	Nitrate Nitrogen as NO ₃ (mg/l)	APHA, 23rd Ed. 2017, 4500 NO ₃ - B	2.6	5-100	45.0 (Max)	No Relax.
14.	Fluorides as F (mg/l)	APHA, 23rd Ed. 2017,4500-C	0.42	0.02-10	1.0	1.5
15.	Copper as Cu (mg/l)	APHA, 23rd Ed. 2017, 3111A+C	BDL	0.04-5	0.05	1.5
16.	Iron as Fe (mg/l)	APHA, 23rd Ed. 2017, 3500 Fe B	0.026	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	0.061	0.02-50	5	15
24.	Selenium as Se (mg/l)	APHA 23 rd Ed.2017 3500 Se-C	BDL	0.01-10	0.01(Max)	No Relax
25.	Chromium as Cr+6 (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.05(Max)	No Relax.
26.	Boron as B (mg/l)	APHA, 23rd Ed. 2017, 4500 B A+C	BDL	0.2-2	0.5	1.0
27.	Cyanide as CN (mg/l)	APHA, 23rd Ed. 2017, 4500 CN-A+C	BDL	0.02-5	0.05	No Relax
28.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-5	0.001	0.002
29.	Anionic Detergents as MBAS (mg/l)	APHA, 23rd Ed. 2017, 5540 A+C	BDL	0.01-5	0.2	1.0
30.	Free Residual Chlorine (mg/l)	APHA, 23rd Ed. 2017, 4500-Cl B	BDL	0.1-5	0.20	1.0
31.	Total coliform (MPN/100 ml)	APHA, 23rd Ed. 2017, A+ B	Absent	1.8	Absent	Absent
32.	E-Coli (Nos/100)	APHA, 23rd Ed. 2017, 9221 A+ F	Absent	1.8	Absent	Absent
33.	Fecal Coliform(MPN/100 ml)	APHA, 23rd Ed. 2017, 9221 E	Absent	1.8	-	-
34.	Pesticide	APHA, 23rd Ed. 2017, 6630 B&C	BDL	2-10	No Relaxation	No Relaxation

*These results are related only to item tested.

BDL = Below Detection Limit

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/05/21

TEST REPORT ISSUE DATE: 09.02.2021

TEST REPORT OF DRINKING WATER*

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

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

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 8/1/2021

Date of Sample Receiving : 11/1/2021

Packing of Sample : As per requirement

Date of Analysis : 11/1/2021-15/1/2021

Source of Sample : Transit House 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 rd Ed. 2017, 2120 B	<5.0	5-100	5.00	15.0
2.	Odour	APHA, 23rd Ed. 2017,2150 B	Agreeable	Qualitative	Agreeable	Agreeable
3.	Taste	APHA, 23rd Ed. 2017,2160 A+B	Agreeable	Qualitative	Agreeable	Agreeable
4.	pH	APHA, 23rd Ed. 2017, 4500 H+A+B	7.4	2.0-12	6.5-8.5	No Relax.
5.	Turbidity as (NTU)	APHA, 23rd Ed. 2017, 2130-A+B	BDL	1-100	1.0	5.0
6.	Total Dissolved Solids as TDS (mg/l)	APHA, 23rd Ed. 2017,2540-C	204	10-10000	500	2000
7.	Alkalinity (mg/l)	APHA, 23rd Ed. 2017,2320 A+B	143	5-1500	200	600
8.	Total Hardness as CaCO ₃ (mg/l)	APHA, 23rd Ed. 2017,2340 A+C	182	5-1500	200.0	600.0
9.	Calcium as Ca (mg/l)	APHA, 23rd Ed. 2017, 3500 Ca A+B	46.2	5 - 1000	75.0	200.0
10.	Magnesium as Mg (mg/l)	APHA, 23rd Ed. 2017, 3500 Mg A+B	16.3	5-1000	30.0	100.0
11.	Chloride as Cl (mg/l)	APHA, 23rd Ed. 2017,4500 Cl A+B	24.8	5-1000	250.0	1000.0
12.	Sulfate as SO ₄ (mg/l)	APHA, 23rd Ed. 2017,4500 SO ₄ - E	39.5	5-200	200.0	400.0
13.	Nitrate Nitrogen as NO ₃ (mg/l)	APHA, 23rd Ed. 2017, 4500 NO ₃ - B	5.9	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	0.021	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	0.23	0.02-50	5	15
24.	Selenium as Se (mg/l)	APHA 23 rd Ed.2017 3500 Se-C	BDL	0.01-10	0.01(Max)	No Relax
25.	Chromium as Cr+6 (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.05(Max)	No Relax.
26.	Boron as B (mg/l)	APHA, 23rd Ed. 2017, 4500 B A+C	BDL	0.2-2	0.5	1.0
27.	Cyanide as CN (mg/l)	APHA, 23rd Ed. 2017, 4500 CN-A+C	BDL	0.02-5	0.05	No Relax
28.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-5	0.001	0.002
29.	Anionic Detergents as MBAS(mg/l)	APHA, 23rd Ed. 2017, 5540 A+C	BDL	0.01-5	0.2	1.0
30.	Free Residual Chlorine (mg/l)	APHA, 23rd Ed. 2017, 4500-Cl B	BDL	0.1-5	0.20	1.0
31.	Total coliform (MPN/100 ml)	APHA, 23rd Ed. 2017, A+ B	Absent	1.8	Absent	Absent
32.	E-Coli (Nos/100)	APHA, 23rd Ed. 2017, 9221 A+ F	Absent	1.8	Absent	Absent
33.	Fecal Coliform (MPN/100 ml)	APHA, 23rd Ed. 2017, 9221 E	Absent	1.8	-	-
34.	Pesticide	APHA, 23rd Ed. 2017, 6630 B&C	BDL	2-10	No Relaxation	No Relaxation

*These results are related only to item tested.

BDL = Below Detection Limit

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/07/21

TEST REPORT ISSUE DATE: 07.02.2021

TEST REPORT OF DRINKING WATER*

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

Address of the Customer : Joda West 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 (Joda West 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 rd Ed. 2017, 2120 B	<5.0	5-100	5.00	15.0
2.	Odour	APHA, 23rd Ed. 2017,2150 B	Agreeable	Qualitative	Agreeable	Agreeable
3.	Taste	APHA, 23rd Ed. 2017,2160 A+B	Agreeable	Qualitative	Agreeable	Agreeable
4.	pH	APHA, 23rd Ed. 2017, 4500 H+A+B	7.3	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	179	10-10000	500	2000
7.	Alkalinity (mg/l)	APHA, 23rd Ed. 2017,2320 A+B	145	5-1500	200	600
8.	Total Hardness as CaCO ₃ (mg/l)	APHA, 23rd Ed. 2017,2340 A+C	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	12.4	5-1000	30.0	100.0
11.	Chloride as Cl (mg/l)	APHA, 23rd Ed. 2017,4500 Cl A+B	18.3	5-1000	250.0	1000.0
12.	Sulfate as SO ₄ (mg/l)	APHA, 23rd Ed. 2017,4500 SO ₄ - E	29.2	5-200	200.0	400.0
13.	Nitrate Nitrogen as NO ₃ (mg/l)	APHA, 23rd Ed. 2017, 4500 NO ₃ - B	2.6	5-100	45.0 (Max)	No Relax.
14.	Fluorides as F (mg/l)	APHA, 23rd Ed. 2017,4500-C	0.42	0.02-10	1.0	1.5
15.	Copper as Cu (mg/l)	APHA, 23rd Ed. 2017, 3111A+C	BDL	0.04-5	0.05	1.5
16.	Iron as Fe (mg/l)	APHA, 23rd Ed. 2017, 3500 Fe B	0.04	0.02-50	0.3 (Max)	No Relax.
17.	Manganese as Mn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-5	0.10	0.30
18.	Mercury as Hg (mg/l)	APHA, 23rd Ed. 2017, 3112 A+B	BDL	0.001-2	0.001(Max)	No Relax.
19.	Aluminium as Al (mg/l)	APHA, 23rd Ed. 2017, 3500 Al A+B	BDL	0.02-100	0.03 (Max)	0.2
20.	Cadmium as Cd (mg/l)	APHA, 23rd Ed. 2017,3111 A+B	BDL	0.002-2	0.003(Max)	No Relax
21.	Arsenic as As (mg/l)	APHA, 23rd Ed. 2017, 3114 C	BDL	0.01-2	0.01(Max)	No Relax
22.	Lead as Pb (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.02-5	0.01	No Relax.
23.	Zinc as Zn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	0.064	0.02-50	5	15
24.	Selenium as Se (mg/l)	APHA 23 rd Ed.2017 3500 Se-C	BDL	0.01-10	0.01(Max)	No Relax
25.	Chromium as Cr+6 (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.05(Max)	No Relax.
26.	Boron as B (mg/l)	APHA, 23rd Ed. 2017, 4500 B A+C	BDL	0.2-2	0.5	1.0
27.	Cyanide as CN (mg/l)	APHA, 23rd Ed. 2017, 4500 CN-A+C	BDL	0.02-5	0.05	No Relax
28.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-5	0.001	0.002
29.	Anionic Detergents as MBAS (mg/l)	APHA, 23rd Ed. 2017, 5540 A+C	BDL	0.01-5	0.2	1.0
30.	Free Residual Chlorine (mg/l)	APHA, 23rd Ed. 2017, 4500-Cl B	BDL	0.1-5	0.20	1.0
31.	Total coliform (MPN/100 ml)	APHA, 23rd Ed. 2017, A+ B	Absent	1.8	Absent	Absent
32.	E-Coli (Nos/100)	APHA, 23rd Ed. 2017, 9221 A+ F	Absent	1.8	Absent	Absent
33.	Fecal Coliform(MPN/100 ml)	APHA, 23rd Ed. 2017, 9221 E	Absent	1.8	-	-
34.	Pesticide	APHA, 23rd Ed. 2017, 6630 B&C	BDL	2-10	No Relaxation	No Relaxation

*These results are related only to item tested.

BDL = Below Detection Limit

Anand
Analyst

Swaraj Swain
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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: 09.02.2021

TEST REPORT OF DRINKING WATER*

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

Address of the Customer : Joda West 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 : 16/1/2021

Packing of Sample : As per requirement

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

Source of Sample : Borewell Near Vegetable Garden

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	INDIAN STANDARDS as per IS 10500:2012	
					Acceptable Limit	Permissible Limit
1.	Colour (Hazen unit)	APHA, 23 rd Ed. 2017, 2120 B	<5.0	5-100	5.00	15.0
2.	Odour	APHA, 23rd Ed. 2017,2150 B	Agreeable	Qualitative	Agreeable	Agreeable
3.	Taste	APHA, 23rd Ed. 2017,2160 A+B	Agreeable	Qualitative	Agreeable	Agreeable
4.	pH	APHA, 23rd Ed. 2017, 4500 H+A+B	7.5	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	203	10-10000	500	2000
7.	Alkalinity (mg/l)	APHA, 23rd Ed. 2017,2320 A+B	149	5-1500	200	600
8.	Total Hardness as CaCO ₃ (mg/l)	APHA, 23rd Ed. 2017,2340 A+C	189	5-1500	200.0	600.0
9.	Calcium as Ca (mg/l)	APHA, 23rd Ed. 2017, 3500 Ca A+B	46.2	5 - 1000	75.0	200.0
10.	Magnesium as Mg (mg/l)	APHA, 23rd Ed. 2017, 3500 Mg A+B	16.4	5-1000	30.0	100.0
11.	Chloride as Cl (mg/l)	APHA, 23rd Ed. 2017,4500 Cl A+B	28.4	5-1000	250.0	1000.0
12.	Sulfate as SO ₄ (mg/l)	APHA, 23rd Ed. 2017,4500 SO ₄ - E	39.5	5-200	200.0	400.0
13.	Nitrate Nitrogen as NO ₃ (mg/l)	APHA, 23rd Ed. 2017, 4500 NO ₃ - B	5.6	5-100	45.0 (Max)	No Relax.
14.	Fluorides as F (mg/l)	APHA, 23rd Ed. 2017,4500-C	0.54	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	0.23	0.02-50	5	15
24.	Selenium as Se (mg/l)	APHA 23 rd Ed.2017 3500 Se-C	BDL	0.01-10	0.01(Max)	No Relax
25.	Chromium as Cr+6 (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.05(Max)	No Relax.
26.	Boron as B (mg/l)	APHA, 23rd Ed. 2017, 4500 B A+C	BDL	0.2-2	0.5	1.0
27.	Cyanide as CN (mg/l)	APHA, 23rd Ed. 2017, 4500 CN-A+C	BDL	0.02-5	0.05	No Relax
28.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-5	0.001	0.002
29.	Anionic Detergents as MBAS(mg/l)	APHA, 23rd Ed. 2017, 5540 A+C	BDL	0.01-5	0.2	1.0
30.	Free Residual Chlorine (mg/l)	APHA, 23rd Ed. 2017, 4500-Cl B	BDL	0.1-5	0.20	1.0
31.	Total coliform (MPN/100 ml)	APHA, 23rd Ed. 2017, A+ B	Absent	1.8	Absent	Absent
32.	E-Coli (Nos/100)	APHA, 23rd Ed. 2017, 9221 A+ F	Absent	1.8	Absent	Absent
33.	Fecal Coliform (MPN/100 ml)	APHA, 23rd Ed. 2017, 9221 E	Absent	1.8	-	-
34.	Pesticide	APHA, 23rd Ed. 2017, 6630 B&C	BDL	2-10	No Relaxation	No Relaxation

*These results are related only to item tested.

BDL = Below Detection Limit

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/DW/13/21

TEST REPORT ISSUE DATE: 09.02.2021

TEST REPORT OF DRINKING WATER*

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

Address of the Customer : Joda West 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 Bichhakundi Basti

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	INDIAN STANDARDS as per IS 10500:2012	
					Acceptable Limit	Permissible Limit
35.	Colour (Hazen unit)	APHA, 23 rd Ed. 2017, 2120 B	<5.0	5-100	5.00	15.0
36.	Odour	APHA, 23rd Ed. 2017,2150 B	Agreeable	Qualitative	Agreeable	Agreeable
37.	Taste	APHA, 23rd Ed. 2017,2160 A+B	Agreeable	Qualitative	Agreeable	Agreeable
38.	pH	APHA, 23rd Ed. 2017, 4500 H+A+B	7.4	2.0-12	6.5-8.5	No Relax.
39.	Turbidity as (NTU)	APHA, 23rd Ed. 2017, 2130-A+B	BDL	1-100	1.0	5.0
40.	Total Dissolved Solids as TDS (mg/l)	APHA, 23rd Ed. 2017,2540-C	235	10-10000	500	2000
41.	Alkalinity (mg/l)	APHA, 23rd Ed. 2017,2320 A+B	170	5-1500	200	600
42.	Total Hardness as CaCO ₃ (mg/l)	APHA, 23rd Ed. 2017,2340 A+C	211	5-1500	200.0	600.0
43.	Calcium as Ca (mg/l)	APHA, 23rd Ed. 2017, 3500 Ca A+B	49.2	5 - 1000	75.0	200.0
44.	Magnesium as Mg (mg/l)	APHA, 23rd Ed. 2017, 3500 Mg A+B	16.6	5-1000	30.0	100.0
45.	Chloride as Cl (mg/l)	APHA, 23rd Ed. 2017,4500 Cl A+B	28.1	5-1000	250.0	1000.0
46.	Sulfate as SO ₄ (mg/l)	APHA, 23rd Ed. 2017,4500 SO ₄ - E	41.3	5-200	200.0	400.0
47.	Nitrate Nitrogen as NO ₃ (mg/l)	APHA, 23rd Ed. 2017, 4500 NO ₃ - B	5.7	5-100	45.0 (Max)	No Relax.
48.	Fluorides as F (mg/l)	APHA, 23rd Ed. 2017,4500-C	0.6	0.02-10	1.0	1.5
49.	Copper as Cu (mg/l)	APHA, 23rd Ed. 2017, 3111A+C	BDL	0.04-5	0.05	1.5
50.	Iron as Fe (mg/l)	APHA, 23rd Ed. 2017, 3500 Fe B	0.035	0.02-50	0.3 (Max)	No Relax.
51.	Manganese as Mn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-5	0.10	0.30
52.	Mercury as Hg (mg/l)	APHA, 23rd Ed. 2017, 3112 A+B	BDL	0.001-2	0.001(Max)	No Relax.
53.	Aluminium as Al (mg/l)	APHA, 23rd Ed. 2017, 3500 Al A+B	BDL	0.02-100	0.03 (Max)	0.2
54.	Cadmium as Cd (mg/l)	APHA, 23rd Ed. 2017,3111 A+B	BDL	0.002-2	0.003(Max)	No Relax
55.	Arsenic as As (mg/l)	APHA, 23rd Ed. 2017, 3114 C	BDL	0.01-2	0.01(Max)	No Relax
56.	Lead as Pb (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.02-5	0.01	No Relax.
57.	Zinc as Zn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	0.28	0.02-50	5	15
58.	Selenium as Se (mg/l)	APHA 23 rd Ed.2017 3500 Se-C	BDL	0.01-10	0.01(Max)	No Relax
59.	Chromium as Cr+6 (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.05(Max)	No Relax.
60.	Boron as B (mg/l)	APHA, 23rd Ed. 2017, 4500 B A+C	BDL	0.2-2	0.5	1.0
61.	Cyanide as CN (mg/l)	APHA, 23rd Ed. 2017, 4500 CN-A+C	BDL	0.02-5	0.05	No Relax
62.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-5	0.001	0.002
63.	Anionic Detergents as MBAS(mg/l)	APHA, 23rd Ed. 2017, 5540 A+C	BDL	0.01-5	0.2	1.0
64.	Free Residual Chlorine (mg/l)	APHA, 23rd Ed. 2017, 4500-Cl B	BDL	0.1-5	0.20	1.0
65.	Total coliform (MPN/100 ml)	APHA, 23rd Ed. 2017, A+ B	Absent	1.8	Absent	Absent
66.	E-Coli (Nos/100)	APHA, 23rd Ed. 2017, 9221 A+ F	Absent	1.8	Absent	Absent
67.	Fecal Coliform (MPN/100 ml)	APHA, 23rd Ed. 2017, 9221 E	Absent	1.8	-	-
68.	Pesticide	APHA, 23rd Ed. 2017, 6630 B&C	BDL	2-10	No Relaxation	No Relaxation

*These results are related only to item tested.

BDL = Below Detection Limit

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

TEST REPORT ISSUE DATE: 09.02.2021

Dust Fall Analysis Report

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

Location : DF-1: Near Sorting Yard (D-Quarry)

Sampling Method : IS: 5182

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

Sl. No.	Duration of Monitoring	Concentration of Pollutant (t/km ² /month)				
		Total Dust Fall (t/km ² /month)	Analysis Results			
1	01.01.2021 To 31.01.2021	0.78	Co (%)	Ni (%)	Hg (%)	As (%)
			<0.001	<0.001	<.001	<0.001

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


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

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

TEST REPORT ISSUE DATE: 09.02.2021

TEST REPORT OF FUGITIVE EMISSION MONITORING

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

Location : 50 mtr from Haul Road (H-Quarry)

Date of Sampling : 16.01.2021

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

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

Sl. No.	Test conducted	Standard Method	Unit	Result	Max. Prescribed Standard as per G.S.R. 46(E) dtd. 3 rd Feb 2006 (MoEF&CC)
1.	Suspended Particulate Matter (SPM)	IS : 5182-Part-4	$\mu\text{g}/\text{m}^3$	830	1200 mg/m^3 at 25+5 m from the source of generation
2.	Respirable Particulate Matter (RPM)	IS : 5182-Part-4	$\mu\text{g}/\text{m}^3$	370	500 mg/m^3 at 25+5 m from the source of generation

Anand
Analyst

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

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

TEST REPORT ISSUE DATE: 09.02.2021

TEST REPORT OF FUGITIVE EMISSION MONITORING

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

Location : 100 mtr from Screen Plant (D-Quarry)

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 rd Feb 2006 (MoEF&CC)
1.	Suspended Particulate Matter (SPM)	IS : 5182-Part-4	µg/m ³	867	1200 mg/m ³ at 25+5 m from the source of generation
2.	Respirable Particulate Matter (RPM)	IS : 5182-Part-4	µg/m ³	315	500 mg/m ³ at 25+5 m from the source of generation


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

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

TEST REPORT ISSUE DATE: 09.02.2021

TEST REPORT OF FUGITIVE EMISSION MONITORING

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

Location : 50 mtrs from Haul Road (D-Quarry)

Date of Sampling : 21.01.2021

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

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

Sl. No.	Test conducted	Standard Method	Unit	Result	Max. Prescribed Standard as per G.S.R. 46(E) dtd. 3 rd Feb 2006 (MoEF&CC)
1.	Suspended Particulate Matter (SPM)	IS : 5182-Part-4	µg/m ³	645	1200 mg/m ³ at 25+5 m from the source of generation
2.	Respirable Particulate Matter (RPM)	IS : 5182-Part-4	µg/m ³	195	500 mg/m ³ at 25+5 m from the source of generation


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

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

TEST REPORT ISSUE DATE: 9.02.2021

TEST REPORT OF FUGITIVE EMISSION MONITORING

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

Location : Near Sorting Yard (D-Quarry)

Date of Sampling : 25.01.2021

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

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

Sl. No.	Test conducted	Standard Method	Unit	Result	Max. Prescribed Standard as per G.S.R. 46(E) dtd. 3 rd Feb 2006 (MoEF&CC)
1.	Suspended Particulate Matter (SPM)	IS : 5182-Part-4	µg/m ³	643	1200 mg/m ³ at 25+5 m from the source of generation
2.	Respirable Particulate Matter (RPM)	IS : 5182-Part-4	µg/m ³	206	500 mg/m ³ at 25+5 m from the source of generation


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FORMAT NO. ECO/QS/FORMAT/10

TEST REPORT NO: ECO LAB/05/21

TEST REPORT ISSUE DATE: 09.02.2021

Personal Dust Sampling Analysis Report

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

Sl. No	Date of Sampling	Name of the Person Sampled	Occupation/ Designation	Personal Number/ Gate Pass Number	Max. Permissible Value (8hr TWA)	Respirable Particulate matter as RPM(mg/m ³) 8-hr TWA
1	05-01-2021	Manju Devi	Sorting Labour	TSP/753281	3.0 mg/m ³	1.72
2	06-01-2021	S.S Palai	Horticulture Supervisor	TSL (Departmental)	(Ref. DGMS (Tech.) (S&T) Circular No.01 Dhanbad, Dated 21st January 2010)	1.35
3	10-01-2021	Jagannath Giri	Mine Foreman	TSL (Departmental)		1.61
4	13-01-2021	Trinatha Mahanta	Security supervisor	SIS		1.46
5	17-01-2021	Rajesh Patra	Dumper Operator	-		1.64

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

*These results are related only to tested items.

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FORMAT NO. ECO/QS/FORMAT/09

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

TEST REPORT ISSUE DATE: 09.02.2021

TEST REPORT OF WASTE WATER*

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

Address of the Customer : **Joda West 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 : Bichhakundi **STP Inlet**

Sl. No.	Tests Parameter(s)	Protocol	Result	Limits of Detection
1.	Colour (Hazen unit)	APHA, 23 rd Ed. 2017, 2120 B	17.0	5-100
2.	Odour	APHA, 23 rd Ed. 2017, 2150 B	Pungent	Agreeable
3.	Particulate sizein (μ) Size	APHA, 23 rd Ed. 2017, 2540-D	≥ 850	100 - 1200
4.	pH	APHA, 23 rd Ed. 2017, 4500 H+ A+B	7.1	2-12
5.	Temperature ($^{\circ}$ C)	APHA, 23 rd Ed. 2017, 2550A+B	26.0	10-100
6.	Oil & Grease as O & G (mg/l)	APHA, 23 rd Ed. 2017, 5520 (A+D)	5.7	5-600
7.	Total Residual Chlorine (mg/l)	APHA, 23 rd Ed. 2017, 4500-Cl B	BDL	0.1-5
8.	Ammonical Nitrogen as NH ₃ - N(mg/l)	APHA, 23 rd Ed. 2017, 4500 NH ₃ A+F	4.7	1-100
9.	Total Kjeldahal Nitrogen as NH ₃ (mg/l)	APHA, 23 rd Ed. 2017, 4500 Norg A+C	23.2	5-100
10.	Free Ammonia as NH ₃ (mg/l)	APHA, 23 rd Ed. 2017, 4500 NH ₃ A+F	0.58	0.05-5.0
11.	Biochemical Oxygen Demand as BOD (mg/l) 3days at 27 $^{\circ}$ C	APHA, 23 rd Ed. 2017, 5210 A+B	36.4	5-10000
12.	Chemical Oxygen Demand as COD (mg/l)	APHA, 23 rd Ed. 2017, 5220 A+C	276.4	5-50000
13.	Arsenic as As (mg/l)	APHA, 23 rd Ed. 2017, 3114 B	BDL	0.01-2
14.	Mercury as Hg (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.001-2
15.	Lead as Pb (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.01-5
16.	Cadmium as Cd (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.02-5
17.	Hexavalent Chromium as Cr ⁺⁶ (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.05-20
18.	Total Chromium as Cr (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.05-50
19.	Copper as Cu (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.05-5

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Sl. No.	Tests Parameter(s)	Protocol	Result	Limits of Detection
20.	Zinc as Zn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	0.046	0.02-50
21.	Selenium as Se (mg/l)	APHA, 23rd Ed. 2017, 4500 Se-A+D	BDL	0.01-1
22.	Nickel as Ni (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.02-5
23.	Fluoride as F (mg/l)	APHA, 23rd Ed. 2017, 4500 F C+D	0.23	0.02-10
24.	Dissolved Phosphate as PO ₄ (mg/l)	APHA, 23rd Ed. 2017, 4500 - PD	2.09	0.5-100
25.	Sulphide as S ₂ -(mg/l)	APHA, 23 rd Ed. 2017, 4500 S ² -F	0.23	0.1-10
26.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-10
27.	Bioassay (%)	APHA, 23rd Ed. 2017, 8910 C	82.3	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 ₃ (mg/l)	APHA, 23 rd Ed. 2017,(4500-NO,A+ B)	2.52	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: 07.02.2021

TEST REPORT OF WASTE WATER*

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

Address of the Customer : **Joda West 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 : Bichhakundi **STP Outlet**

Sl. No.	Tests	Protocol	Result	Limits of Detection	G.S.R 422(E)
					Desirable Limit
1.	Colour (Hazen unit)	APHA, 23 rd Ed. 2017, 2120 B	<5.0	5-100	-
2.	Odour	APHA, 23 rd Ed. 2017, 2150 B	Odourless	Agreeable	Agreeable
3.	Particulate size in (μ)	APHA, 23 rd Ed. 2017, 2540-D	250	100 - 1200	Shall pass 850 Micron IS Sieve
4.	pH	APHA, 23 rd Ed. 2017, 4500 H+ A+B	7.3	2-12	5.5-9.0
5.	Temperature (°C)	APHA, 23 rd Ed. 2017, 2550A+B	25.5	10-100	-
6.	Oil & Grease as O & G (mg/l)	APHA, 23 rd Ed. 2017, 5520 (A+D)	BDL	5-600	10.0
7.	Total Residual Chlorine (mg/l)	APHA, 23 rd Ed. 2017, 4500-Cl B	0.50	0.1-5	1.0
8.	Ammonical Nitrogen as NH ₃ - N(mg/l)	APHA, 23 rd Ed. 2017, 4500 NH ₃ A+F	1.30	1-100	50.0
9.	Total Kjeldahal Nitrogen as NH ₃ (mg/l)	APHA, 23 rd Ed. 2017, 4500 Norg A+C	12.4	5-100	100.0
10.	Free Ammonia as NH ₃ (mg/l)	APHA, 23 rd Ed. 2017, 4500 NH ₃ A+F	BDL	0.05-5.0	5.0
11.	Biochemical Oxygen Demand as BOD (mg/l) 3days at 27°C	APHA, 23 rd Ed. 2017, 5210 A+B	12.0	5-10000	30.0
12.	Chemical Oxygen Demand as COD (mg/l)	APHA, 23 rd Ed. 2017, 5220 A+C	52.8	5-50000	250.0
13.	Arsenic as As (mg/l)	APHA, 23 rd Ed. 2017, 3114 B	BDL	0.01-2	0.2
14.	Mercury as Hg (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.001-2	0.01
15.	Lead as Pb (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.01-5	0.1
16.	Cadmium as Cd (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.02-5	0.2
17.	Hexavalent Chromium as Cr ⁺⁶ (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.1
18.	Total Chromium as Cr (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.05-50	2.0
19.	Copper as Cu (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.05-5	2.0

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Sl. No.	Tests	Protocol	Result	Limits of Detection	G.S.R 422(E)
					Desirable Limit
20.	Zinc as Zn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B		0.02-50	5.0
21.	Selenium as Se (mg/l)	APHA, 23rd Ed. 2017, 4500 Se-A+D	BDL	0.01-1	0.05
22.	Nickel as Ni (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.02-5	2.0
23.	Fluoride as F (mg/l)	APHA, 23rd Ed. 2017, 4500 F C+D	0.20	0.02-10	2.0
24.	Dissolved Phosphate as PO ₄ (mg/l)	APHA, 23rd Ed. 2017, 4500 - PD	BDL	0.5-100	5.0
25.	Sulphide as S ₂ -(mg/l)	APHA, 23 rd Ed. 2017, 4500 S ² - F	BDL	0.1-10	2.0
26.	Phenolic Compounds as C ₆ H ₅ 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 ₃ (mg/l)	APHA, 23 rd Ed. 2017,(4500-NO ₃ A+ B)	5.40	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: 09.02.2021

TEST REPORT OF WASTE WATER*

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

Address of the Customer : Joda West 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 : **Joda West Workshop Effluent (After Skimming)**

Sl. No.	Tests	Protocol	Result	Limits of Detection	G.S.R 422(E)
					Desirable Limit
1.	Colour (Hazen unit)	APHA, 23 rd Ed. 2017, 2120 B	<5.0	5-100	-
2.	Odour	APHA, 23 rd Ed. 2017, 2150 B	Odourless	Agreeable	Agreeable
3.	Particulate size in (µ)	APHA, 23 rd Ed. 2017, 2540-D	250	100 - 1200	Shall pass 850 Micron IS Sieve
4.	pH	APHA, 23 rd Ed. 2017, 4500 H+ A+B	7.2	2-12	5.5-9.0
5.	Temperature (°C)	APHA, 23 rd Ed. 2017, 2550A+B	24.2	10-100	-
6.	Oil & Grease as O & G (mg/l)	APHA, 23 rd Ed. 2017, 5520 (A+D)	BDL	5-600	10.0
7.	Total Residual Chlorine (mg/l)	APHA, 23 rd Ed. 2017, 4500-Cl B	0.07	0.1-5	1.0
8.	Ammonical Nitrogen as NH ₃ - N(mg/l)	APHA, 23 rd Ed. 2017, 4500 NH ₃ A+F	1.03	1-100	50.0
9.	Total Kjeldahal Nitrogen as NH ₃ (mg/l)	APHA, 23 rd Ed. 2017, 4500 Norg A+C	6.1	5-100	100.0
10.	Free Ammonia as NH ₃ (mg/l)	APHA, 23 rd Ed. 2017, 4500 NH ₃ A+F	BDL	0.05-5.0	5.0
11.	Biochemical Oxygen Demand as BOD (mg/l) 3days at 27°C	APHA, 23 rd Ed. 2017, 5210 A+B	5.2	5-10000	30.0
12.	Chemical Oxygen Demand as COD (mg/l)	APHA, 23 rd Ed. 2017, 5220 A+C	32.8	5-50000	250.0
13.	Arsenic as As (mg/l)	APHA, 23 rd Ed. 2017, 3114 B	BDL	0.01-2	0.2
14.	Mercury as Hg (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.001-2	0.01
15.	Lead as Pb (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.01-5	0.1
16.	Cadmium as Cd (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.02-5	0.2
17.	Hexavalent Chromium as Cr ⁺⁶ (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.1
18.	Total Chromium as Cr (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.05-50	2.0
19.	Copper as Cu (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.05-5	2.0

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Sl. No.	Tests	Protocol	Result	Limits of Detection	G.S.R 422(E)
					Desirable Limit
20.	Zinc as Zn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B		0.02-50	5.0
21.	Selenium as Se (mg/l)	APHA, 23rd Ed. 2017, 4500 Se-A+D	BDL	0.01-1	0.05
22.	Nickel as Ni (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.02-5	2.0
23.	Fluoride as F (mg/l)	APHA, 23rd Ed. 2017, 4500 F C+D	0.05	0.02-10	2.0
24.	Dissolved Phosphate as PO ₄ (mg/l)	APHA, 23rd Ed. 2017, 4500 - PD	BDL	0.5-100	5.0
25.	Sulphide as S ₂ -(mg/l)	APHA, 23 rd Ed. 2017, 4500 S ² -F	BDL	0.1-10	2.0
26.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-10	1.0
27.	Bioassay (%)	APHA, 23rd Ed. 2017, 8910 C	87%	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	1.21	0.01-20	2.0
29.	Iron as Fe (mg/l)	APHA, 23rd Ed. 2017, 3500 Fe B	1.8	0.02-100	3.0
30.	Nitrate Nitrogen as NO ₃ (mg/l)	APHA, 23 rd Ed. 2017,(4500-NO ₃ A+ B)	3.20	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:09.02.2021

TEST REPORT OF SURFACE WATER*

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

Address of the Customer : Joda West 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 : Sona River (U/p Stream of H-Quarry)

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	IS:2296 Class-C
1.	pH	APHA,23 rd Ed.2017,4500H ⁺ A+B	6.50	2-12	8.5
2.	Colour (Hazen unit)	APHA, 23 rd Ed. 2017, 2120 B	23.0	5-100	
3.	Total Dissolved Solids as TDS (mg/l)	APHA,23 rd Ed.2017 , 2540C	430.0	5-10000	1500
4.	Dissolved Oxygen as DO (mg/l)	APHA,23 rd Ed.2017 ,4500 A+C	5.80	2-10	4.0(min)
5.	Biochemical Oxygen Demand as BOD (mg/l) 3 days at 27 °C	APHA,23 rd Ed.2017 ,5210A+ B	BDL	5-10000	3.0
6.	Nitrate Nitrogen as NO ₃ (mg/l)	APHA, 23 rd Ed. 2017, 4500 NO ₃ - B	7.5	5-100	50.0
7.	Fluorides as F (mg/l)	APHA,23 rd Ed.2017 ,4500 -C	0.30	0.05-10	1.5
8.	Sulfate as SO ₄ (mg/l)	APHA,23 rd Ed.2017 ,4500 -SO ₄ ²⁻ E	28.0	1.0-250	400.0
9.	Iron as Fe (mg/l)	APHA,23 rd Ed.2017 ,3500 Fe B	2.4	0.02-50	50.0
10.	Copper as Cu (mg/l)	APHA,23 rd Ed.2017, 3111A+B	BDL	0.05-5	1.5
11.	Cadmium as Cd (mg/l)	APHA,23 rd Ed.2017, 3111A+B	BDL	0.002-2	0.01
12.	Arsenic as As(mg/l)	APHA,23 rd Ed.2017, 3114C	BDL	0.01-2	0.2
13.	Chloride as Cl ⁻ (mg/l)	APHA, 23 rd Ed. 2017,4500 Cl A+B	28.0	5-1000	600
14.	Chromium as Cr+6 (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.05
15.	Cyanide as CN (mg/l)	APHA,23 rd Ed.2017,4500 ,CN A+D	BDL	0.005-5	0.05
16.	Lead as Pb (mg/l)	APHA,23 rd Ed.2017, 3111A+B	BDL	0.01-2	0.1
17.	Selenium as Se (mg/l)	APHA,23 rd Ed.2017, 3500 Se-C	BDL	0.005-1	0.01
18.	Zinc as Zn (mg/l)	APHA,23 rd Ed.2017, 3111A+B	0.20	0.02-50	15
19.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA,23 rd Ed.2017, 5530 A+C	BDL	0.004-5	0.005
20.	Total coliform (MPN/100 ml)	APHA,23 rd Ed.2017, 9221 A+ B	212.0	1.8	5000
21.	Anionic Detergents (As MBAS)(mg/l) max	APHA 22 nd 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

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Analyst

Authorized Signatory

Abhishek
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FORMAT NO. ECO/QS/FORMAT/09

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

TEST REPORT ISSUE DATE:09.02.2021

TEST REPORT OF SURFACE WATER*

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

Address of the Customer : Joda West 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 : Sona River (D/n Stream of H-Quarry)

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	IS:2296 Class-C
1.	pH	APHA,23 rd Ed.2017,4500H ⁺ A+B	7.02	2-12	8.5
2.	Colour (Hazen unit)	APHA, 23 rd Ed. 2017, 2120 B	8.5	5-100	
3.	Total Dissolved Solids as TDS (mg/l)	APHA,23 rd Ed.2017 ,2540C	405.0	5-10000	1500
4.	Dissolved Oxygen as DO (mg/l)	APHA,23 rd Ed.2017 ,4500 A+C	6.1	2-10	4.0(min)
5.	Biochemical Oxygen Demand as BOD (mg/l)	APHA,23 rd Ed.2017 ,5210A+ B	BDL	5-10000	3.0
6.	Nitrate Nitrogen as NO ₃ (mg/l)	APHA, 23 rd Ed. 2017, 4500 NO ₃ - B	6.4	5-100	50.0
7.	Fluorides as F (mg/l)	APHA,23 rd Ed.2017 ,4500 –C	0.23	0.05-10	1.5
8.	Sulfate as SO ₄ (mg/l)	APHA,23 rd Ed.2017 ,4500 –SO ₄ ²⁻ E	30.0	1.0-250	400.0
9.	Iron as Fe (mg/l)	APHA,23 rd Ed.2017 ,3500 Fe B	2.56	0.02-50	50.0
10.	Copper as Cu (mg/l)	APHA,23 rd Ed.2017, 3111A+B	BDL	0.05-5	1.5
11.	Cadmium as Cd (mg/l)	APHA,23 rd Ed.2017, 3111A+B	BDL	0.002-2	0.01
12.	Arsenic as As(mg/l)	APHA,23 rd Ed.2017, 3114C	BDL	0.01-2	0.2
13.	Chloride as Cl ⁻ (mg/l)	APHA,23 rd Ed.2017, 3111 – A +B	34.0	5-1000	600
14.	Chromium as Cr+6 (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.05
15.	Cyanide as CN (mg/l)	APHA,23 rd Ed.2017,4500 ,CN A+D	BDL	0.005-5	0.05
16.	Lead as Pb (mg/l)	APHA,23 rd Ed.2017, 3111A+B	BDL	0.01-2	0.1
17.	Selenium as Se (mg/l)	APHA,23 rd Ed.2017, 3500 Se-C	BDL	0.005-1	0.01
18.	Zinc as Zn (mg/l)	APHA,23 rd Ed.2017, 3111A+B	0.028	0.02-50	15
19.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA,23 rd Ed.2017, 5530 A+C	BDL	0.004-5	0.005
20.	Total coliform (MPN/100 ml)	APHA,23 rd Ed.2017, 9221 A+ B	210.0	1.8	5000
21.	Anionic Detergents (As MBAS)(mg/l) max	APHA 22 nd 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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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 : Joda West Iron & Manganese Mine of
M/s Tata Steel Limited

Address of the Customer : Joda West 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 : Mine Pit Water (D-Quarry)

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	IS:2296 Class-C
1.	pH	APHA,23 rd Ed.2017,4500H ⁺ A+B	7.20	2-12	8.5
2.	Colour (Hazen unit)	APHA, 23 rd Ed. 2017, 2120 B	10.0	5-100	
3.	Total Dissolved Solids as TDS (mg/l)	APHA,23 rd Ed.2017 , 2540C	214.0	5-10000	1500
4.	Dissolved Oxygen as DO (mg/l)	APHA,23 rd Ed.2017 ,4500 A+C	5.50	2-10	4.0(min)
5.	Biochemical Oxygen Demand as BOD (mg/l)	APHA,23 rd Ed.2017 ,5210A+ B	BDL	5-10000	3.0
6.	Nitrate Nitrogen as NO ₃ (mg/l)	APHA, 23 rd Ed. 2017, 4500 NO ₃ - B	BDL	5-100	50.0
7.	Fluorides as F (mg/l)	APHA,23 rd Ed.2017 ,4500 -C	0.32	0.05-10	1.5
8.	Sulfate as SO ₄ (mg/l)	APHA,23 rd Ed.2017 ,4500 -SO ₄ ²⁻ E	26.0	1.0-250	400.0
9.	Iron as Fe (mg/l)	APHA,23 rd Ed.2017 ,3500 Fe B	0.085	0.02-50	50.0
10.	Copper as Cu (mg/l)	APHA,23 rd Ed.2017, 3111A+B	BDL	0.05-5	1.5
11.	Cadmium as Cd (mg/l)	APHA,23 rd Ed.2017, 3111A+B	BDL	0.002-2	0.01
12.	Arsenic as As(mg/l)	APHA,23 rd Ed.2017, 3114C	BDL	0.01-2	0.2
13.	Chloride as Cl ⁻ (mg/l)	APHA, 23 rd Ed. 2017,4500 Cl A+B	30.0	5-1000	600
14.	Chromium as Cr+6 (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.05
15.	Cyanide as CN (mg/l)	APHA,23 rd Ed.2017,4500 ,CN A+D	BDL	0.005-5	0.05
16.	Lead as Pb (mg/l)	APHA,23 rd Ed.2017, 3111A+B	BDL	0.01-2	0.1
17.	Selenium as Se (mg/l)	APHA,23 rd Ed.2017, 3500 Se-C	BDL	0.005-1	0.01
18.	Zinc as Zn (mg/l)	APHA,23 rd Ed.2017, 3111A+B	0.025	0.02-50	15
19.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA,23 rd Ed.2017, 5530 A+C	BDL	0.004-5	0.005
20.	Total coliform (MPN/100 ml)	APHA,23 rd Ed.2017, 9221 A+ B	Absent	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

[Signature]
Authorized Signatory

[Signature]
Manager (Q)

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FORMAT NO. ECO/QS/FORMAT/10

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

TEST REPORT ISSUE DATE: 02.02.2021

Meteorological Data Monitoring Reports

Name of the Customer : Joda West 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	36.8	21.4	45.9	13.92	1.6	0	SE	0
2	02.01.2021	36.1	16.9	69.3	13.41	2.5	0	NE	0
3	03.01.2021	34.9	15.5	59.0	13.54	0.8	0	SW	0
4	04.01.2021	35.7	14.4	58.7	12.7	1.1	0	SW	0
5	05.01.2021	35.0	15.9	50.8	12.7	1.5	0	SSW	0
6	06.01.2021	34.6	18.2	48.2	15.03	1.2	0	NS	0
7	07.01.2021	36.6	16.0	41.4	8.6	0.6	0	SE	0
8	08.01.2021	36.0	16.8	52.8	12.94	1.8	0	SSE	0
9	09.01.2021	37.7	17.7	75.8	15.05	1.1	0	SW	0
10	10.01.2021	36.4	21.5	62.0	18.3	1.2	0	SE	0
11	11.01.2021	36.2	18.5	78.6	24.59	0.9	0	SSE	0
12	12.01.2021	35.1	19.5	82.4	32.92	2.3	0	SW	0
13	13.01.2021	28.0	16.7	94.3	48.51	1.0	0	NE	0
14	14.01.2021	33.8	15.8	94.2	25.49	1.4	0	SE	0
15	15.01.2021	34.2	15.7	81.9	18.33	0.8	0	SE	0
16	16.01.2021	36.3	17.1	66.1	16.8	1.4	0	NE	0
17	17.01.2021	35.4	17.3	72.8	20.49	1.0	0	SE	0
18	18.01.2021	36.6	18.8	75.7	12.82	0.9	0	SW	0
19	19.01.2021	35.7	18.8	61.2	18.81	1.9	0	SE	0
20	20.01.2021	34.8	20.4	45.9	24.08	1.2	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.		
21	21.01.2021	36.8	23.45	46.19	21.3	1.1	0	SW	0
22	22.01.2021	37.4	20.33	52.23	15.2	1.3	0	SE	0
23	23.01.2021	38.42	20.56	64.2	22.4	1.7	0	SE	0
24	24.01.2021	38.01	21.48	63.64	22.1	1.2	0	SSW	0
25	25.01.2021	36.85	21.07	55.56	17.8	1.5	0	SE	0
26	26.01.2021	36.7	19.75	62.01	21.4	1.6	0	SE	0
27	27.01.2021	35.6	19.43	68.34	23.7	1.1	0	SE	0
28	28.01.2021	37.3	20.05	66.13	13.8	1.5	0	SE	0
26	29.01.2021	38.3	20.51	69.36	15.6	1.2	0	SE	0
30	30.01.2021	38.9	24.4	33.81	11.6	3.8	0	SW	0
31	31.01.2021	39.4	25.7	25.59	13.4	1.8	0	SE	0

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FORMAT NO. ECO/QS/FORMAT/13

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

TEST REPORT ISSUE DATE: 09.02.2021

TEST REPORT OF OCCUPATIONAL/WORKPLACE NOISE MONITORING

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

Sample Collected By : Ecomen Team using Integrated Sound Level Meter
Instrument Used : Noise Meter (Lutron)/Personal Dosimeter

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

S.No.	Date of Monitoring	Name of Location/Person	Activity/ Occupation	8-hr TWA dB(A)	DGMS Permissible Limit
1	7-01-2021	Workshop (HEMM)	Maintenance (HEMM)	64.5	85.0
2	9-01-2021	Screen Plant	Supervision	73.4	85.0
3	13-01-2021	Mr. Jagannat Giri	Mining Foreman	64.5	85.0
4	14-01-2021	Mr. Suresh Naik	Sorting Labour	71.1	85.0
5	15-01-2021	Near Stack yard	Stacking of ore	68.6	85.0


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FORMAT NO. ECO/QS/FORMAT/13

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

TEST REPORT ISSUE DATE: 09.02.2021

TEST REPORT OF GROUND WATER LEVEL

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

Sample Collected By : Ecomen Team using Integrated Sound Level Meter
Instrument Used : Ecomen Representative using Water Level Indicator

Frequency of Sampling : Fort-nightly

S.No.	Location	Structure Type	Water Level (mbgl)	
			3-01-2021	23-01-2021
1	Well at Roida Village	Open dug Well	17.4	17.3
2	Well at Joda Market	Open dug Well	13.2	13.1
3	Well at Municipality (Joda)	Open dug Well	9.8	10.2
4	Well at Bichhakundi Basti	Open dug Well	11.4	11.3

*mbgl-mtr below ground level

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FORMAT NO. ECO/QS/FORMAT/10

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

TEST REPORT ISSUE DATE: 05.03.2021

Ambient Air Quality Monitoring Report (Core Zone)

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

Location : AAQMS-1: Near Time Office

Sampling Method : IS: 5182

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

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

Sl. No.	Date of Monitoring	Concentration of Pollutant				
		PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	CO (mg/m ³)
1	02.02.2021	69.5	32.5	12.2	21.2	0.41
2	06.02.2021	67.6	37.4	12.6	23.2	0.38
3	8.02.2021	76.44	48.2	08.5	21.4	0.39
4	12.02.2021	60.11	39.7	14.2	27.2	0.47
5	15.02.2021	69.23	46.4	11.3	17.5	0.44
6	19.02.2021	71.22	30.6	13.4	16.4	0.38
7	22.02.2021	65.22	39.7	11.8	19.7	0.45
8	27.02.2021	61.87	41.4	12.1	22.1	0.41
Average		67.64	39.48	12.01	21.53	0.41
Limit as per CPCB notification New Delhi, 18th Nov, 2009. for Ambient air quality		100	60	80	80	4.0
Standard Method		IS : 5182 (Part-23) 2006	NAAQM Volume-I by CPCB	IS : 5182 (Part-2) 2001	IS : 5182 (Part-6) 2006	IS : 5182 (Part-10)

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FORMAT NO. ECO/QS/FORMAT/10

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

TEST REPORT ISSUE DATE: 05.03.2021

Ambient Air Quality Monitoring Report (Core Zone)

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

Location : AAQMS-1: Near Time Office

Sampling Method : IS: 5182

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

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

SI. No.	Date of Monitoring	Concentration of Pollutant						
		NH ₃ (µg/m ³)	O ₃ (µg/m ³)	Pb (µg/m ³)	Ni (ng/m ³)	As (ng/m ³)	Benzene (µg/m ³)	Benzo(a) pyrene (ng/m ³)
1	02.02.2021	25.2	13.59	<1.0	1.3	<1.0	<4.0	<0.05
2	06.02.2021	21.5	13.44	<1.0	1.42	<1.0	<4.0	<0.05
3	8.02.2021	17.6	11.54	<1.0	1.12	<1.0	<4.0	<0.05
4	12.02.2021	16.9	14.5	<1.0	1.18	<1.0	<4.0	<0.05
5	15.02.2021	19.4	13.76	<1.0	1.16	<1.0	<4.0	<0.05
6	19.02.2021	17.4	15.32	<1.0	1.19	<1.0	<4.0	<0.05
7	22.02.2021	27.5	11.66	<1.0	1.11	<1.0	<4.0	<0.05
8	27.02.2021	22.1	12.13	<1.0	1.14	<1.0	<4.0	<0.05
Average		20.95		-	1.20	-	-	-
Limit as per CPCB notification New Delhi, 18th Nov, 2009. for Ambient air quality		400	180	1	20	6	5	1
Standard Method		APHA 401 (Indophenol)	IS : 5182 (Part-9) 1974	IS : 5182 (Part-22) 2004	NAAQM Volume-I by CPCB	NAAQM Volume-I by CPCB	IS : 5182 (Part-11)	IS : 5182 (Part-12)

*These 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: 05.03.2021

Ambient Air Quality Monitoring Report (Core Zone)

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

Location : AAQMS-2: H-Quarry Near Shelter

Sampling Method : IS: 5182

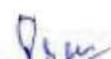
Instrument Used : RDS, FDS, CO Analyzer & VOC Sampler

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

SI. No.	Date of Monitoring	Concentration of Pollutant				
		PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	CO (mg/m ³)
1	02.02.2021	71.36	47.54	13.72	23.42	0.31
2	06.02.2021	78.60	43.86	16.45	26.24	0.36
3	8.02.2021	88.71	55.04	17.24	25.81	0.32
4	12.02.2021	72.42	49.78	16.21	24.06	0.35
5	15.02.2021	76.35	49.21	18.11	27.23	0.31
6	19.02.2021	74.46	51.90	17.21	24.26	0.38
7	22.02.2021	78.29	42.94	19.21	16.72	0.40
8	27.02.2021	71.65	47.62	11.58	23.40	0.39
Average		76.48	48.48	14.21	23.89	0.35
Limit as per CPCB notification New Delhi, 18 th Nov, 2009. for Ambient air quality		100	60	80	80	4.0
Standard Method		IS : 5182 (Part-23) 2006	NAAQM Volume-I by CPCB	IS : 5182 (Part-2) 2001	IS : 5182 (Part-6) 2006	IS : 5182 (Part-10)

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

TEST REPORT ISSUE DATE: 05.03.2021

Ambient Air Quality Monitoring Report (Core Zone)

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

Location : AAQMS-2: Near H-Quarry Shelter

Sampling Method : IS: 5182

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

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

SI. No.	Date of Monitoring	Concentration of Pollutant						
		NH ₃ (µg/m ³)	O ₃ (µg/m ³)	Pb (µg/m ³)	Ni (ng/m ³)	As (ng/m ³)	Benzene (µg/m ³)	Benzo(a) pyrene (ng/m ³)
1	02.02.2021	22.40	16.44	<1.0	1.09	<1.0	<4.0	<0.05
2	06.02.2021	25.08	15.21	<1.0	1.35	<1.0	<4.0	<0.05
3	8.02.2021	26.94	16.45	<1.0	1.12	<1.0	<4.0	<0.05
4	12.02.2021	21.56	12.41	<1.0	1.47	<1.0	<4.0	<0.05
5	15.02.2021	27.52	16.45	<1.0	1.03	<1.0	<4.0	<0.05
6	19.02.2021	28.54	18.83	<1.0	1.21	<1.0	<4.0	<0.05
7	22.02.2021	29.42	15.32	<1.0	0.99	<1.0	<4.0	<0.05
8	27.02.2021	26.27	17.89	<1.0	1.32	<1.0	<4.0	<0.05
Average		25.96	16.12	-	1.19	-	-	-
Limit as per CPCB notification New Delhi, 18 th Nov, 2009. for Ambient air quality		400	180	1	20	6	5	1
Standard Method		APHA 401 (Indophenol)	IS : 5182 (Part-9) 1974	IS : 5182 (Part-22) 2004	NAAQM Volume-I by CPCB	NAAQM Volume-I by CPCB	IS : 5182 (Part-11)	IS : 5182 (Part-12)

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FORMAT NO. ECO/QS/FORMAT/10

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

TEST REPORT ISSUE DATE: 05.03.2021

Ambient Air Quality Monitoring Report (Core Zone)

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

Location : AAQMS-3: Near Screen Plant (D-Quarry)

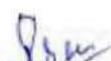
Sampling Method : IS: 5182

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

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

SI. No.	Date of Monitoring	Concentration of Pollutant				
		PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	CO (mg/m ³)
1	02.02.2021	78.44	42.72	19.54	26.74	0.32
2	06.02.2021	71.50	42.63	17.56	24.34	0.39
3	8.02.2021	85.12	57.12	14.62	25.68	0.31
4	12.02.2021	76.44	45.10	13.84	23.03	0.36
5	15.02.2021	74.42	47.40	13.48	27.54	0.32
6	19.02.2021	79.41	42.80	16.62	23.04	0.39
7	22.02.2021	72.27	46.99	15.26	15.52	0.35
8	27.02.2021	78.34	47.38	12.13	19.03	0.40
Average		76.99	46.51	15.38	23.11	0.35
Limit as per CPCB notification New Delhi, 18 th Nov, 2009. for Ambient air quality		100	60	80	80	4.0
Standard Method	IS : 5182 (Part-23) 2006	NAAQM Volume-I by CPCB	IS : 5182 (Part-2) 2001	IS : 5182 (Part-6) 2006	IS : 5182 (Part-10)	

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FORMAT NO. ECO/QS/FORMAT/10

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

TEST REPORT ISSUE DATE: 05.03.2021

Ambient Air Quality Monitoring Report (Core Zone)

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

Location : AAQMS-3: Near Screen Plant (D-Quarry)

Sampling Method : IS: 5182

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

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

SI. No.	Date of Monitoring	Concentration of Pollutant						
		NH ₃ (µg/m ³)	O ₃ (µg/m ³)	Pb (µg/m ³)	Ni (ng/m ³)	As (ng/m ³)	Benzene (µg/m ³)	Benzo(a) pyrene (ng/m ³)
1	02.02.2021	23.62	16.55	<1.0	1.06	<1.0	<4.0	<0.05
2	06.02.2021	21.26	14.76	<1.0	1.20	<1.0	<4.0	<0.05
3	8.02.2021	21.91	12.55	<1.0	1.05	<1.0	<4.0	<0.05
4	12.02.2021	21.92	16.24	<1.0	1.27	<1.0	<4.0	<0.05
5	15.02.2021	24.72	13.50	<1.0	0.97	<1.0	<4.0	<0.05
6	19.02.2021	27.48	13.23	<1.0	0.93	<1.0	<4.0	<0.05
7	22.02.2021	25.21	15.67	<1.0	1.24	<1.0	<4.0	<0.05
8	27.02.2021	22.41	14.43	<1.0	1.19	<1.0	<4.0	<0.05
Average		23.56	14.61	-	1.11	-	-	-
Limit as per CPCB notification New Delhi, 18 th Nov, 2009. for Ambient air quality		400	180	1	20	6	5	1
Standard Method		APHA 401 (Indophenol)	IS : 5182 (Part-9) 1974	IS : 5182 (Part-22) 2004	NAAQM Volume-I by CPCB	NAAQM Volume-I by CPCB	IS : 5182 (Part-11)	IS : 5182 (Part-12)

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FORMAT NO. ECO/QS/FORMAT/10

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

TEST REPORT ISSUE DATE: 05.03.2021

Ambient Air Quality Monitoring Report (Core Zone)

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

Location : AAQMS-4: Near Sorting Yard (D-Quarry)

Sampling Method : IS: 5182

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

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

SI. No.	Date of Monitoring	Concentration of Pollutant				
		PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	CO (mg/m ³)
1	02.02.2021	65.32	42.78	16.34	28.90	0.31
2	06.02.2021	77.50	45.24	12.96	22.87	0.39
3	8.02.2021	82.21	56.29	14.72	22.38	0.40
4	12.02.2021	72.11	51.80	13.54	22.43	0.32
5	15.02.2021	74.23	47.34	13.68	25.62	0.35
6	19.02.2021	75.49	54.10	14.62	23.42	0.33
7	22.02.2021	78.20	39.80	15.36	21.22	0.34
8	27.02.2021	72.62	46.77	12.98	13.00	0.37
Average		73.63	48.01	14.27	22.48	0.35
Limit as per CPCB notification New Delhi, 18th Nov, 2009. for Ambient air quality		100	60	80	80	4.0
Standard Method		IS : 5182 (Part-23) 2006	NAAQM Volume-I by CPCB	IS : 5182 (Part-2) 2001	IS : 5182 (Part-6) 2006	IS : 5182 (Part-10)

*These results are related only to tested items.


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FORMAT NO. ECO/QS/FORMAT/10

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

TEST REPORT ISSUE DATE: 05.03.2021

Ambient Air Quality Monitoring Report (Core Zone)

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

Location : AAQMS-4: Near Sorting Yard (D-Quarry)

Sampling Method : IS: 5182

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

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

SI. No.	Date of Monitoring	Concentration of Pollutant						
		NH ₃ (µg/m ³)	O ₃ (µg/m ³)	Pb (µg/m ³)	Ni (ng/m ³)	As (ng/m ³)	Benzene (µg/m ³)	Benzo(a) pyrene (ng/m ³)
1	02.02.2021	22.74	19.65	<1.0	1.03	<1.0	<4.0	<0.05
2	06.02.2021	26.86	13.53	<1.0	1.07	<1.0	<4.0	<0.05
3	8.02.2021	25.64	12.59	<1.0	1.09	<1.0	<4.0	<0.05
4	12.02.2021	21.91	13.53	<1.0	1.44	<1.0	<4.0	<0.05
5	15.02.2021	20.62	16.10	<1.0	0.99	<1.0	<4.0	<0.05
6	19.02.2021	28.54	14.33	<1.0	1.05	<1.0	<4.0	<0.05
7	22.02.2021	26.62	17.87	<1.0	0.91	<1.0	<4.0	<0.05
8	27.02.2021	29.18	16.23	<1.0	1.31	<1.0	<4.0	<0.05
Average		25.26	15.47	-	1.11	-	-	-
Limit as per CPCB notification New Delhi, 18 th Nov, 2009. for Ambient air quality		400	180	1	20	6	5	1
Standard Method		APHA 401 (Indophenol)	IS : 5182 (Part-9) 1974	IS : 5182 (Part-22) 2004	NAAQM Volume-I by CPCB	NAAQM Volume-I by CPCB	IS : 5182 (Part-11)	IS : 5182 (Part-12)

*These results are related only to tested items.


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FORMAT NO. ECO/QS/FORMAT/10

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

TEST REPORT ISSUE DATE: 09.03.2021

Ambient Air Quality Monitoring Report (Buffer Zone)

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

Sampling Method : IS: 5182

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

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

Sl. No.	Location (Date of Monitoring)	Concentration of Pollutant				
		PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	CO (mg/m ³)
1	Banspani (6.02.2021)	73.3	45.8	16.9	17.7	0.71
2	Boneikela (12.02.2021)	81.7	33.20	14.6	23.75	0.78
3	Khondbond (16.02.2021)	88.2	48.2	9.7	26.5	0.80
4	Roida Village (20.02.2021)	71.4	37.42	11.27	16.2	0.86
Average		78.65	41.15	13.11	21.03	0.78
Limit as per CPCB notification New Delhi, 18thNov, 2009. for Ambient air quality		100	60	80	80	4.0
Standard Method		IS : 5182 (Part- 23) 2006	NAAQM Volume-I by CPCB	IS : 5182 (Part-2) 2001	IS : 5182 (Part-6) 2006	IS : 5182 (Part-10)

*These results are related only to tested items.


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FORMAT NO. ECO/QS/FORMAT/10

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

TEST REPORT ISSUE DATE: 09.03.2021

Ambient Air Quality Monitoring Report (Buffer Zone)

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

Sampling Method : IS: 5182

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

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

SI. No.	Location (Date of Monitoring)	Concentration of Pollutant						
		NH ₃ (µg/m ³)	O ₃ (µg/m ³)	Pb (µg/m ³)	Ni (ng/m ³)	As (ng/m ³)	Benzene (µg/m ³)	Benzo (a) pyrene (ng/m ³)
1	Banspani (6.02.2021)	17.2	10.2	<1.0	1.39	<1.0	<4.0	<0.05
2	Boneikela (12.02.2021)	26.7	11.48	<1.0	1.12	<1.0	<4.0	<0.05
3	Khondbond (16.02.2021)	25.2	12.3	<1.0	1.05	<1.0	<4.0	<0.05
4	Roida Village (20.02.2021)	26.1	9.4	<1.0	1.21	<1.0	<4.0	<0.05
Average		23.80	10.84	-	1.19	-	-	-
Limit as per CPCB notification New Delhi, 18thNov, 2009. for Ambient air quality		400	180	1	20	6	5	1
Standard Method		APHA 401 (Indophen ol)	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/01/21

TEST REPORT ISSUE DATE: 07.03.2021

TEST REPORT OF AMBIENT NOISE LEVEL MONITORING

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

Sample Collected By : Ecomen Team using Integrated Sound Level Meter

Instrument Used : Noise Meter (Lutron)

S.No.	Date of Monitoring	Name of Location	Category of Zone	Day Time Leq Value in dB(A)	Night Time Leq Value in dB(A)
1	7-02-2021	Township	Residential	61.2	41.22
2	10-02-2021	Near Hospital	Silence	47.2	36.5
3	13-02-2021	Near Screen Plant	Industrial	74.1	40.45
4	16-01-2021	Near Admin Office	Industrial	63.1	43.7
5	17-01-2021	Near Railway Siding	Industrial	70.5	43.8
6	21-01-2021	Near Sorting Yard	Industrial	67.7	42.3

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

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

Note:

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

Anshu
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Authorized Signatory*Shree*
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FORMAT NO. ECO/QS/FORMAT/12 TEST REPORT NO: ECOLAB/Stack1/01/21
TEST REPORT ISSUE DATE: 04.03.2021**TEST REPORT OF FLUE GAS EMISSIONS***Name of the Customer : Joda West Iron & Manganese Mine of
M/s Tata Steel LimitedDate of Sampling : 19.02.2021
Sample Collected by : Ecomen Team in presence of TSL's Representative
Source of Emission : Exhaust Emission from DG Set
Sampling Method : IS: 11255
Instrument Used : Stack Monitoring Kit**Details of Stack**Material of Construction : M.S.
Stack Attached to : DG Set-01 (Camp)
Capacity : 100 KVA
Stack Height:
i) Above the Platform/ Roof (m) : 10.0
ii) Above the Ground Level (m) : 15.0
Stack Top : Circular
Inside Diameter of Stack (m) : 0.0889
(at sampling point)
Cross Sectional Area of Duct/Stack (m²) : 0.0061
Ambient Air (°C) : 18.0
Flue Gas Temperature (°C) : 174.0
Exit Velocity of Gas (m/sec.) : 9.25
Flow Rate (Nm³/ sec.) : 0.037
Type of Fuel : HSD
Quantity of Fuel Consumption (lit/hr) : 18-20

Sl. No.	Tests Conducted	Method	<i>Pollutant Concentration in (At 15% O₂ Correction) in gm/Kw-Hr</i>	Standards as per CPCB in gm/Kw-Hr
1.	Particulate Matter (PM)	IS:11255 (Part-1)	0.051	0.2
2.	Sulphur Dioxide (SO ₂)	IS:11255 (Part-2)	0.037	-
3.	Nitrogen Dioxide (NO _x)	IS:11255 (Part-7)	0.050	4.0 (NO _x +HC)
4.	Hydrocarbon (HC)	IS:13270	1.19	
5.	Carbon Monoxide (CO)	IS:13270	1.18	3.5

*The result is related only to tested item.

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Analyst

Authorized Signatory

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FORMAT NO. ECO/QS/FORMAT/09

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

TEST REPORT ISSUE DATE: 07.03.2021

TEST REPORT OF DRINKING WATER*

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

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

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 08/2/2021

Date of Sample Receiving : 14/2/2021

Packing of Sample : As per requirement

Date of Analysis : 16/2/2021-21/2/2021

Source of Sample : Joda West 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 rd Ed. 2017, 2120 B	<5.0	5-100	5.00	15.0
2.	Odour	APHA, 23rd Ed. 2017,2150 B	Agreeable	Qualitative	Agreeable	Agreeable
3.	Taste	APHA, 23rd Ed. 2017,2160 A+B	Agreeable	Qualitative	Agreeable	Agreeable
4.	pH	APHA, 23rd Ed. 2017, 4500 H+A+B	7.29	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	185	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 ₃ (mg/l)	APHA, 23rd Ed. 2017,2340 A+C	167	5-1500	200.0	600.0
9.	Calcium as Ca (mg/l)	APHA, 23rd Ed. 2017, 3500 Ca A+B	52.0	5 - 1000	75.0	200.0
10.	Magnesium as Mg (mg/l)	APHA, 23rd Ed. 2017, 3500 Mg A+B	13.4	5-1000	30.0	100.0
11.	Chloride as Cl (mg/l)	APHA, 23rd Ed. 2017,4500 Cl A+B	17.7	5-1000	250.0	1000.0
12.	Sulfate as SO ₄ (mg/l)	APHA, 23rd Ed. 2017,4500 SO ₄ - E	22.6	5-200	200.0	400.0
13.	Nitrate Nitrogen as NO ₃ (mg/l)	APHA, 23rd Ed. 2017, 4500 NO ₃ - B	2.7	5-100	45.0 (Max)	No Relax.
14.	Fluorides as F (mg/l)	APHA, 23rd Ed. 2017,4500-C	0.47	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 ₆ H ₅ OH (mg/l)	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-5	0.001	0.002
29.	Anionic Detergents as MBAS (mg/l)	APHA, 23rd Ed. 2017, 5540 A+C	BDL	0.01-5	0.2	1.0
30.	Free Residual Chlorine (mg/l)	APHA, 23rd Ed. 2017, 4500-Cl B	BDL	0.1-5	0.20	1.0
31.	Total coliform (MPN/100 ml)	APHA, 23rd Ed. 2017, A+ B	Absent	1.8	Absent	Absent
32.	E-Coli (Nos/100)	APHA, 23rd Ed. 2017, 9221 A+ F	Absent	1.8	Absent	Absent
33.	Fecal Coliform(MPN/100 ml)	APHA, 23rd Ed. 2017, 9221 E	Absent	1.8	-	-
34.	Pesticide	APHA, 23rd Ed. 2017, 6630 B&C	BDL	2-10	No Relaxation	No Relaxation

*These results are related only to item tested.

BDL = Below Detection Limit

Anand
Analyst

Swaraj Swain
Authorized Signatory

Abhishek
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FORMAT NO. ECO/QS/FORMAT/09

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

TEST REPORT ISSUE DATE: 07.03.2021

TEST REPORT OF DRINKING WATER*

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

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

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 8/2/2021

Date of Sample Receiving : 14/2/2021

Packing of Sample : As per requirement

Date of Analysis : 16/2/2021-21/2/2021

Source of Sample : Transit House 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 rd Ed. 2017, 2120 B	<5.0	5-100	5.00	15.0
2.	Odour	APHA, 23rd Ed. 2017,2150 B	Agreeable	Qualitative	Agreeable	Agreeable
3.	Taste	APHA, 23rd Ed. 2017,2160 A+B	Agreeable	Qualitative	Agreeable	Agreeable
4.	pH	APHA, 23rd Ed. 2017, 4500 H+A+B	7.8	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	274	10-10000	500	2000
7.	Alkalinity (mg/l)	APHA, 23rd Ed. 2017,2320 A+B	175	5-1500	200	600
8.	Total Hardness as CaCO ₃ (mg/l)	APHA, 23rd Ed. 2017,2340 A+C	196	5-1500	200.0	600.0
9.	Calcium as Ca (mg/l)	APHA, 23rd Ed. 2017, 3500 Ca A+B	48.5	5 - 1000	75.0	200.0
10.	Magnesium as Mg (mg/l)	APHA, 23rd Ed. 2017, 3500 Mg A+B	19.2	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 ₄ (mg/l)	APHA, 23rd Ed. 2017,4500 SO ₄ - E	37.2	5-200	200.0	400.0
13.	Nitrate Nitrogen as NO ₃ (mg/l)	APHA, 23rd Ed. 2017, 4500 NO ₃ - B	5.6	5-100	45.0 (Max)	No Relax.
14.	Fluorides as F (mg/l)	APHA, 23rd Ed. 2017,4500-C	0.57	0.02-10	1.0	1.5
15.	Copper as Cu (mg/l)	APHA, 23rd Ed. 2017, 3111A+C	BDL	0.04-5	0.05	1.5
16.	Iron as Fe (mg/l)	APHA, 23rd Ed. 2017, 3500 Fe B	0.022	0.02-50	0.3 (Max)	No Relax.
17.	Manganese as Mn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-5	0.10	0.30
18.	Mercury as Hg (mg/l)	APHA, 23rd Ed. 2017, 3112 A+B	BDL	0.001-2	0.001(Max)	No Relax.
19.	Aluminium as Al (mg/l)	APHA, 23rd Ed. 2017, 3500 Al A+B	BDL	0.02-100	0.03 (Max)	0.2
20.	Cadmium as Cd (mg/l)	APHA, 23rd Ed. 2017,3111 A+B	BDL	0.002-2	0.003(Max)	No Relax
21.	Arsenic as As (mg/l)	APHA, 23rd Ed. 2017, 3114 C	BDL	0.01-2	0.01(Max)	No Relax
22.	Lead as Pb (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.02-5	0.01	No Relax.
23.	Zinc as Zn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	0.29	0.02-50	5	15
24.	Selenium as Se (mg/l)	APHA 23 rd Ed.2017 3500 Se-C	BDL	0.01-10	0.01(Max)	No Relax
25.	Chromium as Cr+6 (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.05(Max)	No Relax.
26.	Boron as B (mg/l)	APHA, 23rd Ed. 2017, 4500 B A+C	BDL	0.2-2	0.5	1.0
27.	Cyanide as CN (mg/l)	APHA, 23rd Ed. 2017, 4500 CN-A+C	BDL	0.02-5	0.05	No Relax
28.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-5	0.001	0.002
29.	Anionic Detergents as MBAS(mg/l)	APHA, 23rd Ed. 2017, 5540 A+C	BDL	0.01-5	0.2	1.0
30.	Free Residual Chlorine (mg/l)	APHA, 23rd Ed. 2017, 4500-Cl B	BDL	0.1-5	0.20	1.0
31.	Total coliform (MPN/100 ml)	APHA, 23rd Ed. 2017, A+ B	Absent	1.8	Absent	Absent
32.	E-Coli (Nos/100)	APHA, 23rd Ed. 2017, 9221 A+ F	Absent	1.8	Absent	Absent
33.	Fecal Coliform (MPN/100 ml)	APHA, 23rd Ed. 2017, 9221 E	Absent	1.8	-	-
34.	Pesticide	APHA, 23rd Ed. 2017, 6630 B&C	BDL	2-10	No Relaxation	No Relaxation

*These results are related only to item tested.

BDL = Below Detection Limit

Anand
Analyst

Swaraj Swain
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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/01/21

TEST REPORT ISSUE DATE: 08.03.2021

TEST REPORT OF DRINKING WATER*

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

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

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 09/2/2021

Date of Sample Receiving : 14/2/2021

Packing of Sample : As per requirement

Date of Analysis : 16/2/2021-21/2/2021

Source of Sample : Borewell Near Temple (Joda West 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 rd Ed. 2017, 2120 B	<5.0	5-100	5.00	15.0
2.	Odour	APHA, 23rd Ed. 2017,2150 B	Agreeable	Qualitative	Agreeable	Agreeable
3.	Taste	APHA, 23rd Ed. 2017,2160 A+B	Agreeable	Qualitative	Agreeable	Agreeable
4.	pH	APHA, 23rd Ed. 2017, 4500 H+A+B	7.5	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	147	5-1500	200	600
8.	Total Hardness as CaCO ₃ (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	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	17.3	5-1000	250.0	1000.0
12.	Sulfate as SO ₄ (mg/l)	APHA, 23rd Ed. 2017,4500 SO ₄ - E	28.2	5-200	200.0	400.0
13.	Nitrate Nitrogen as NO ₃ (mg/l)	APHA, 23rd Ed. 2017, 4500 NO ₃ - B	2.1	5-100	45.0 (Max)	No Relax.
14.	Fluorides as F (mg/l)	APHA, 23rd Ed. 2017,4500-C	0.46	0.02-10	1.0	1.5
15.	Copper as Cu (mg/l)	APHA, 23rd Ed. 2017, 3111A+C	BDL	0.04-5	0.05	1.5
16.	Iron as Fe (mg/l)	APHA, 23rd Ed. 2017, 3500 Fe B	0.05	0.02-50	0.3 (Max)	No Relax.
17.	Manganese as Mn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-5	0.10	0.30
18.	Mercury as Hg (mg/l)	APHA, 23rd Ed. 2017, 3112 A+B	BDL	0.001-2	0.001(Max)	No Relax.
19.	Aluminium as Al (mg/l)	APHA, 23rd Ed. 2017, 3500 Al A+B	BDL	0.02-100	0.03 (Max)	0.2
20.	Cadmium as Cd (mg/l)	APHA, 23rd Ed. 2017,3111 A+B	BDL	0.002-2	0.003(Max)	No Relax
21.	Arsenic as As (mg/l)	APHA, 23rd Ed. 2017, 3114 C	BDL	0.01-2	0.01(Max)	No Relax
22.	Lead as Pb (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.02-5	0.01	No Relax.
23.	Zinc as Zn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	0.064	0.02-50	5	15
24.	Selenium as Se (mg/l)	APHA 23 rd Ed.2017 3500 Se-C	BDL	0.01-10	0.01(Max)	No Relax
25.	Chromium as Cr+6 (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.05(Max)	No Relax.
26.	Boron as B (mg/l)	APHA, 23rd Ed. 2017, 4500 B A+C	BDL	0.2-2	0.5	1.0
27.	Cyanide as CN (mg/l)	APHA, 23rd Ed. 2017, 4500 CN-A+C	BDL	0.02-5	0.05	No Relax
28.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-5	0.001	0.002
29.	Anionic Detergents as MBAS (mg/l)	APHA, 23rd Ed. 2017, 5540 A+C	BDL	0.01-5	0.2	1.0
30.	Free Residual Chlorine (mg/l)	APHA, 23rd Ed. 2017, 4500-Cl B	BDL	0.1-5	0.20	1.0
31.	Total coliform (MPN/100 ml)	APHA, 23rd Ed. 2017, A+ B	Absent	1.8	Absent	Absent
32.	E-Coli (Nos/100)	APHA, 23rd Ed. 2017, 9221 A+ F	Absent	1.8	Absent	Absent
33.	Fecal Coliform(MPN/100 ml)	APHA, 23rd Ed. 2017, 9221 E	Absent	1.8	-	-
34.	Pesticide	APHA, 23rd Ed. 2017, 6630 B&C	BDL	2-10	No Relaxation	No Relaxation

*These results are related only to item tested.

BDL = Below Detection Limit

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/02/21

TEST REPORT ISSUE DATE: 08.03.2021

TEST REPORT OF DRINKING WATER*

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

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

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 09/2/2021

Date of Sample Receiving : 14/2/2021

Packing of Sample : As per requirement

Date of Analysis : 16/2/2021-21/2/2021

Source of Sample : Borewell Near Vegetable Garden

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	INDIAN STANDARDS as per IS 10500:2012	
					Acceptable Limit	Permissible Limit
1.	Colour (Hazen unit)	APHA, 23 rd Ed. 2017, 2120 B	<5.0	5-100	5.00	15.0
2.	Odour	APHA, 23rd Ed. 2017,2150 B	Agreeable	Qualitative	Agreeable	Agreeable
3.	Taste	APHA, 23rd Ed. 2017,2160 A+B	Agreeable	Qualitative	Agreeable	Agreeable
4.	pH	APHA, 23rd Ed. 2017, 4500 H+A+B	7.2	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	207	10-10000	500	2000
7.	Alkalinity (mg/l)	APHA, 23rd Ed. 2017,2320 A+B	153	5-1500	200	600
8.	Total Hardness as CaCO ₃ (mg/l)	APHA, 23rd Ed. 2017,2340 A+C	181	5-1500	200.0	600.0
9.	Calcium as Ca (mg/l)	APHA, 23rd Ed. 2017, 3500 Ca A+B	45.2	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 ₄ (mg/l)	APHA, 23rd Ed. 2017,4500 SO ₄ - E	37.3	5-200	200.0	400.0
13.	Nitrate Nitrogen as NO ₃ (mg/l)	APHA, 23rd Ed. 2017, 4500 NO ₃ - B	5.8	5-100	45.0 (Max)	No Relax.
14.	Fluorides as F (mg/l)	APHA, 23rd Ed. 2017,4500-C	0.58	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	0.022	0.02-50	0.3 (Max)	No Relax.
17.	Manganese as Mn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-5	0.10	0.30
18.	Mercury as Hg (mg/l)	APHA, 23rd Ed. 2017, 3112 A+B	BDL	0.001-2	0.001(Max)	No Relax.
19.	Aluminium as Al (mg/l)	APHA, 23rd Ed. 2017, 3500 Al A+B	BDL	0.02-100	0.03 (Max)	0.2
20.	Cadmium as Cd (mg/l)	APHA, 23rd Ed. 2017,3111 A+B	BDL	0.002-2	0.003(Max)	No Relax
21.	Arsenic as As (mg/l)	APHA, 23rd Ed. 2017, 3114 C	BDL	0.01-2	0.01(Max)	No Relax
22.	Lead as Pb (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.02-5	0.01	No Relax.
23.	Zinc as Zn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	0.25	0.02-50	5	15
24.	Selenium as Se (mg/l)	APHA 23 rd Ed.2017 3500 Se-C	BDL	0.01-10	0.01(Max)	No Relax
25.	Chromium as Cr+6 (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.05(Max)	No Relax.
26.	Boron as B (mg/l)	APHA, 23rd Ed. 2017, 4500 B A+C	BDL	0.2-2	0.5	1.0
27.	Cyanide as CN (mg/l)	APHA, 23rd Ed. 2017, 4500 CN-A+C	BDL	0.02-5	0.05	No Relax
28.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-5	0.001	0.002
29.	Anionic Detergents as MBAS(mg/l)	APHA, 23rd Ed. 2017, 5540 A+C	BDL	0.01-5	0.2	1.0
30.	Free Residual Chlorine (mg/l)	APHA, 23rd Ed. 2017, 4500-Cl B	BDL	0.1-5	0.20	1.0
31.	Total coliform (MPN/100 ml)	APHA, 23rd Ed. 2017, A+ B	Absent	1.8	Absent	Absent
32.	E-Coli (Nos/100)	APHA, 23rd Ed. 2017, 9221 A+ F	Absent	1.8	Absent	Absent
33.	Fecal Coliform (MPN/100 ml)	APHA, 23rd Ed. 2017, 9221 E	Absent	1.8	-	-
34.	Pesticide	APHA, 23rd Ed. 2017, 6630 B&C	BDL	2-10	No Relaxation	No Relaxation

*These results are related only to item tested.

BDL = Below Detection Limit

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/03/21

TEST REPORT ISSUE DATE: 08.03.2021

TEST REPORT OF DRINKING WATER*

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

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

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 09/2/2021

Date of Sample Receiving : 14/2/2021

Packing of Sample : As per requirement

Date of Analysis : 16/2/2021-21/2/2021

Source of Sample : Borewell Near Bichhakundi Basti

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	INDIAN STANDARDS as per IS 10500:2012	
					Acceptable Limit	Permissible Limit
35.	Colour (Hazen unit)	APHA, 23 rd Ed. 2017, 2120 B	<5.0	5-100	5.00	15.0
36.	Odour	APHA, 23rd Ed. 2017,2150 B	Agreeable	Qualitative	Agreeable	Agreeable
37.	Taste	APHA, 23rd Ed. 2017,2160 A+B	Agreeable	Qualitative	Agreeable	Agreeable
38.	pH	APHA, 23rd Ed. 2017, 4500 H+A+B	8.0	2.0-12	6.5-8.5	No Relax.
39.	Turbidity as (NTU)	APHA, 23rd Ed. 2017, 2130-A+B	BDL	1-100	1.0	5.0
40.	Total Dissolved Solids as TDS (mg/l)	APHA, 23rd Ed. 2017,2540-C	285	10-10000	500	2000
41.	Alkalinity (mg/l)	APHA, 23rd Ed. 2017,2320 A+B	184	5-1500	200	600
42.	Total Hardness as CaCO ₃ (mg/l)	APHA, 23rd Ed. 2017,2340 A+C	253	5-1500	200.0	600.0
43.	Calcium as Ca (mg/l)	APHA, 23rd Ed. 2017, 3500 Ca A+B	47.2	5 - 1000	75.0	200.0
44.	Magnesium as Mg (mg/l)	APHA, 23rd Ed. 2017, 3500 Mg A+B	18.7	5-1000	30.0	100.0
45.	Chloride as Cl (mg/l)	APHA, 23rd Ed. 2017,4500 Cl A+B	22.3	5-1000	250.0	1000.0
46.	Sulfate as SO ₄ (mg/l)	APHA, 23rd Ed. 2017,4500 SO ₄ - E	44.2	5-200	200.0	400.0
47.	Nitrate Nitrogen as NO ₃ (mg/l)	APHA, 23rd Ed. 2017, 4500 NO ₃ - B	6.1	5-100	45.0 (Max)	No Relax.
48.	Fluorides as F (mg/l)	APHA, 23rd Ed. 2017,4500-C	0.4	0.02-10	1.0	1.5
49.	Copper as Cu (mg/l)	APHA, 23rd Ed. 2017, 3111A+C	BDL	0.04-5	0.05	1.5
50.	Iron as Fe (mg/l)	APHA, 23rd Ed. 2017, 3500 Fe B	0.032	0.02-50	0.3 (Max)	No Relax.
51.	Manganese as Mn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-5	0.10	0.30
52.	Mercury as Hg (mg/l)	APHA, 23rd Ed. 2017, 3112 A+B	BDL	0.001-2	0.001(Max)	No Relax.
53.	Aluminium as Al (mg/l)	APHA, 23rd Ed. 2017, 3500 Al A+B	BDL	0.02-100	0.03 (Max)	0.2
54.	Cadmium as Cd (mg/l)	APHA, 23rd Ed. 2017,3111 A+B	BDL	0.002-2	0.003(Max)	No Relax
55.	Arsenic as As (mg/l)	APHA, 23rd Ed. 2017, 3114 C	BDL	0.01-2	0.01(Max)	No Relax
56.	Lead as Pb (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.02-5	0.01	No Relax.
57.	Zinc as Zn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	0.21	0.02-50	5	15
58.	Selenium as Se (mg/l)	APHA 23 rd Ed.2017 3500 Se-C	BDL	0.01-10	0.01(Max)	No Relax
59.	Chromium as Cr+6 (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.05(Max)	No Relax.
60.	Boron as B (mg/l)	APHA, 23rd Ed. 2017, 4500 B A+C	BDL	0.2-2	0.5	1.0
61.	Cyanide as CN (mg/l)	APHA, 23rd Ed. 2017, 4500 CN-A+C	BDL	0.02-5	0.05	No Relax
62.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-5	0.001	0.002
63.	Anionic Detergents as MBAS(mg/l)	APHA, 23rd Ed. 2017, 5540 A+C	BDL	0.01-5	0.2	1.0
64.	Free Residual Chlorine (mg/l)	APHA, 23rd Ed. 2017, 4500-Cl B	BDL	0.1-5	0.20	1.0
65.	Total coliform (MPN/100 ml)	APHA, 23rd Ed. 2017, A+ B	Absent	1.8	Absent	Absent
66.	E-Coli (Nos/100)	APHA, 23rd Ed. 2017, 9221 A+ F	Absent	1.8	Absent	Absent
67.	Fecal Coliform (MPN/100 ml)	APHA, 23rd Ed. 2017, 9221 E	Absent	1.8	-	-
68.	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/01/21

TEST REPORT ISSUE DATE: 09.03.2021

Dust Fall Analysis Report

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

Location : DF-1: Near Sorting Yard (D-Quarry)

Sampling Method : IS: 5182

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

Sl. No.	Duration of Monitoring	Concentration of Pollutant (t/km ² /month)				
		Total Dust Fall (t/km ² /month)	Analysis Results			
1	01.02.2021 To 28.02.2021	0.76	Co (%)	Ni (%)	Hg (%)	As (%)
			<0.001	<0.001	<.001	<0.001

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


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

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

TEST REPORT ISSUE DATE: 10.03.2021

TEST REPORT OF FUGITIVE EMISSION MONITORING

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

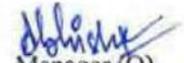
Location : 50 mtr from Haul Road (H-Quarry)

Date of Sampling : 15.02.2021

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

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

Sl. No.	Test conducted	Standard Method	Unit	Result	Max. Prescribed Standard as per G.S.R. 46(E) dtd. 3 rd Feb 2006 (MoEF&CC)
1.	Suspended Particulate Matter (SPM)	IS : 5182-Part-4	$\mu\text{g}/\text{m}^3$	837	1200 mg/m^3 at 25+5 m from the source of generation
2.	Respirable Particulate Matter (RPM)	IS : 5182-Part-4	$\mu\text{g}/\text{m}^3$	385	500 mg/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

ecoMen
LABORATORIES PVT. LTD.

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

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

TEST REPORT ISSUE DATE: 10.03.2021

TEST REPORT OF FUGITIVE EMISSION MONITORING

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

Location : 100 mtr from Screen Plant (D-Quarry)

Date of Sampling : 16.02.2021

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

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

Sl. No.	Test conducted	Standard Method	Unit	Result	Max. Prescribed Standard as per G.S.R. 46(E) dtd. 3 rd Feb 2006 (MoEF&CC)
1.	Suspended Particulate Matter (SPM)	IS : 5182-Part-4	$\mu\text{g}/\text{m}^3$	894	1200 mg/m^3 at 25+5 m from the source of generation
2.	Respirable Particulate Matter (RPM)	IS : 5182-Part-4	$\mu\text{g}/\text{m}^3$	342	500 mg/m^3 at 25+5 m from the source of generation


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

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

TEST REPORT ISSUE DATE: 10.03.2021

TEST REPORT OF FUGITIVE EMISSION MONITORING

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

Location : 50 mtrs from Haul Road (D-Quarry)

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 rd Feb 2006 (MoEF&CC)
1.	Suspended Particulate Matter (SPM)	IS : 5182-Part-4	$\mu\text{g}/\text{m}^3$	688	1200 mg/m^3 at 25+5 m from the source of generation
2.	Respirable Particulate Matter (RPM)	IS : 5182-Part-4	$\mu\text{g}/\text{m}^3$	205	500 mg/m^3 at 25+5 m from the source of generation


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

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

TEST REPORT ISSUE DATE: 10.03.2021

TEST REPORT OF FUGITIVE EMISSION MONITORING

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

Location : Near Sorting Yard (D-Quarry)

Date of Sampling : 22.02.2021

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

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

Sl. No.	Test conducted	Standard Method	Unit	Result	Max. Prescribed Standard as per G.S.R. 46(E) dtd. 3 rd Feb 2006 (MoEF&CC)
1.	Suspended Particulate Matter (SPM)	IS : 5182-Part-4	$\mu\text{g}/\text{m}^3$	721	1200 mg/m^3 at 25+5 m from the source of generation
2.	Respirable Particulate Matter (RPM)	IS : 5182-Part-4	$\mu\text{g}/\text{m}^3$	216	500 mg/m^3 at 25+5 m from the source of generation

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FORMAT NO. ECO/QS/FORMAT/10

TEST REPORT NO: ECO LAB/01/21

TEST REPORT ISSUE DATE: 10.03.2021

Personal Dust Sampling Analysis Report

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

Sl. No	Date of Sampling	Name of the Person Sampled	Occupation/ Designation	Personal Number/ Gate Pass Number	Max. Permissible Value (8hr TWA)	Respirable Particulate matter as RPM(mg/m ³) 8-hr TWA
1	06-02-2021	Manju Devi	Sorting Labour	TSP/753281	3.0 mg/m ³	1.77
2	08-02-2021	S.S Palai	Horticulture Supervisor	TSL (Departmental)	(Ref. DGMS (Tech.) (S&T) Circular No.01 Dhanbad, Dated 21st January 2010)	1.56
3	11-02-2021	Jagannath Giri	Mine Foreman	TSL (Departmental)		1.81
4	14-02-2021	Trinatha Mahanta	Security supervisor	SIS		1.43
5	18-02-2021	Rajesh Patra	Dumper Operator	-		1.30

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

*These results are related only to tested items.

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FORMAT NO. ECO/QS/FORMAT/09

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

TEST REPORT ISSUE DATE: 09.03.2021

TEST REPORT OF WASTE WATER*

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

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

Sampling Method : APHA/ IS: 3025

Sample Collected by : Sangram Das

Sample Quantity : As per requirement.

Date of Sampling : 10/2/2021

Date of Sample Receiving : 15/2/2021

Date of Analysis : 17/2/2021 to 21/2/2021

Source of Sample : Bichhakundi **STP Inlet**

Sl. No.	Tests Parameter(s)	Protocol	Result	Limits of Detection
1.	Colour (Hazen unit)	APHA, 23 rd Ed. 2017, 2120 B	19.0	5-100
2.	Odour	APHA, 23 rd Ed. 2017, 2150 B	Pungent	Agreeable
3.	Particulate sizein (μ) Size	APHA, 23 rd Ed. 2017, 2540-D	≥ 850	100 - 1200
4.	pH	APHA, 23 rd Ed. 2017, 4500 H+ A+B	8.2	2-12
5.	Temperature ($^{\circ}$ C)	APHA, 23 rd Ed. 2017, 2550A+B	29.2	10-100
6.	Oil & Grease as O & G (mg/l)	APHA, 23 rd Ed. 2017, 5520 (A+D)	6.1	5-600
7.	Total Residual Chlorine (mg/l)	APHA, 23 rd Ed. 2017, 4500-Cl B	BDL	0.1-5
8.	Ammonical Nitrogen as NH ₃ - N(mg/l)	APHA, 23 rd Ed. 2017, 4500 NH ₃ A+F	4.3	1-100
9.	Total Kjeldahal Nitrogen as NH ₃ (mg/l)	APHA, 23 rd Ed. 2017, 4500 Norg A+C	26.4	5-100
10.	Free Ammonia as NH ₃ (mg/l)	APHA, 23 rd Ed. 2017, 4500 NH ₃ A+F	0.62	0.05-5.0
11.	Biochemical Oxygen Demand as BOD (mg/l) 3days at 27 $^{\circ}$ C	APHA, 23 rd Ed. 2017, 5210 A+B	36.7	5-10000
12.	Chemical Oxygen Demand as COD (mg/l)	APHA, 23 rd Ed. 2017, 5220 A+C	256.7	5-50000
13.	Arsenic as As (mg/l)	APHA, 23 rd Ed. 2017, 3114 B	BDL	0.01-2
14.	Mercury as Hg (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.001-2
15.	Lead as Pb (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.01-5
16.	Cadmium as Cd (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.02-5
17.	Hexavalent Chromium as Cr ⁺⁶ (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.05-20
18.	Total Chromium as Cr (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.05-50
19.	Copper as Cu (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.05-5

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Sl. No.	Tests Parameter(s)	Protocol	Result	Limits of Detection
20.	Zinc as Zn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	0.049	0.02-50
21.	Selenium as Se (mg/l)	APHA, 23rd Ed. 2017, 4500 Se-A+D	BDL	0.01-1
22.	Nickel as Ni (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.02-5
23.	Fluoride as F (mg/l)	APHA, 23rd Ed. 2017, 4500 F C+D	0.29	0.02-10
24.	Dissolved Phosphate as PO ₄ (mg/l)	APHA, 23rd Ed. 2017, 4500 - PD	2.72	0.5-100
25.	Sulphide as S ₂ -(mg/l)	APHA, 23 rd Ed. 2017, 4500 S ² -F	0.31	0.1-10
26.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-10
27.	Bioassay (%)	APHA, 23rd Ed. 2017, 8910 C	87.6	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 ₃ (mg/l)	APHA, 23 rd Ed. 2017,(4500-NO,A+ B)	2.82	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/02/21

TEST REPORT ISSUE DATE: 09.03.2021

TEST REPORT OF WASTE WATER*

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

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

Sampling Method : APHA/ IS: 3025

Sample Collected by : Sangram Das

Sample Quantity : As per requirement.

Date of Sampling : 10/2/2021

Date of Sample Receiving : 15/2/2021

Date of Analysis : 17/2/2021 to 21/2/2021

Source of Sample : Bichhakundi **STP Outlet**

Sl. No.	Tests	Protocol	Result	Limits of Detection	G.S.R 422(E)
					Desirable Limit
1.	Colour (Hazen unit)	APHA, 23 rd Ed. 2017, 2120 B	<5.0	5-100	-
2.	Odour	APHA, 23 rd Ed. 2017, 2150 B	Odourless	Agreeable	Agreeable
3.	Particulate size in (μ)	APHA, 23 rd Ed. 2017, 2540-D	283	100 - 1200	Shall pass 850 Micron IS Sieve
4.	pH	APHA, 23 rd Ed. 2017, 4500 H+ A+B	7.1	2-12	5.5-9.0
5.	Temperature (°C)	APHA, 23 rd Ed. 2017, 2550A+B	25.8	10-100	-
6.	Oil & Grease as O & G (mg/l)	APHA, 23 rd Ed. 2017, 5520 (A+D)	BDL	5-600	10.0
7.	Total Residual Chlorine (mg/l)	APHA, 23 rd Ed. 2017, 4500-Cl B	0.57	0.1-5	1.0
8.	Ammonical Nitrogen as NH ₃ - N(mg/l)	APHA, 23 rd Ed. 2017, 4500 NH ₃ A+F	1.41	1-100	50.0
9.	Total Kjeldahal Nitrogen as NH ₃ (mg/l)	APHA, 23 rd Ed. 2017, 4500 Norg A+C	16.3	5-100	100.0
10.	Free Ammonia as NH ₃ (mg/l)	APHA, 23 rd Ed. 2017, 4500 NH ₃ A+F	BDL	0.05-5.0	5.0
11.	Biochemical Oxygen Demand as BOD (mg/l) 3days at 27°C	APHA, 23 rd Ed. 2017, 5210 A+B	14.1	5-10000	30.0
12.	Chemical Oxygen Demand as COD (mg/l)	APHA, 23 rd Ed. 2017, 5220 A+C	57.8	5-50000	250.0
13.	Arsenic as As (mg/l)	APHA, 23 rd Ed. 2017, 3114 B	BDL	0.01-2	0.2
14.	Mercury as Hg (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.001-2	0.01
15.	Lead as Pb (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.01-5	0.1
16.	Cadmium as Cd (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.02-5	0.2
17.	Hexavalent Chromium as Cr ⁺⁶ (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.1
18.	Total Chromium as Cr (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.05-50	2.0
19.	Copper as Cu (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.05-5	2.0

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Sl. No.	Tests	Protocol	Result	Limits of Detection	G.S.R 422(E)
					Desirable Limit
20.	Zinc as Zn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B		0.02-50	5.0
21.	Selenium as Se (mg/l)	APHA, 23rd Ed. 2017, 4500 Se-A+D	BDL	0.01-1	0.05
22.	Nickel as Ni (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.02-5	2.0
23.	Fluoride as F (mg/l)	APHA, 23rd Ed. 2017, 4500 F C+D	0.26	0.02-10	2.0
24.	Dissolved Phosphate as PO ₄ (mg/l)	APHA, 23rd Ed. 2017, 4500 - PD	BDL	0.5-100	5.0
25.	Sulphide as S ₂ -(mg/l)	APHA, 23 rd Ed. 2017, 4500 S ² -F	BDL	0.1-10	2.0
26.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-10	1.0
27.	Bioassay (%)	APHA, 23rd Ed. 2017, 8910 C	95%	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 ₃ (mg/l)	APHA, 23 rd Ed. 2017,(4500-NO ₃ A+ B)	5.67	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/03/21

TEST REPORT ISSUE DATE: 09.03.2021

TEST REPORT OF WASTE WATER*

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

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

Sampling Method : APHA/ IS: 3025

Sample Collected by : Sangram Das

Sample Quantity : As per requirement.

Date of Sampling : 10/2/2021

Date of Sample Receiving : 15/2/2021

Date of Analysis : 17/2/2021 to 21/2/2021

Source of Sample : **Joda West Workshop Effluent (After Skimming)**

Sl. No.	Tests	Protocol	Result	Limits of Detection	G.S.R 422(E)
					Desirable Limit
1.	Colour (Hazen unit)	APHA, 23 rd Ed. 2017, 2120 B	<5.0	5-100	-
2.	Odour	APHA, 23 rd Ed. 2017, 2150 B	Odourless	Agreeable	Agreeable
3.	Particulate size in (µ)	APHA, 23 rd Ed. 2017, 2540-D	281	100 - 1200	Shall pass 850 Micron IS Sieve
4.	pH	APHA, 23 rd Ed. 2017, 4500 H+ A+B	7.3	2-12	5.5-9.0
5.	Temperature (°C)	APHA, 23 rd Ed. 2017, 2550A+B	24.2	10-100	-
6.	Oil & Grease as O & G (mg/l)	APHA, 23 rd Ed. 2017, 5520 (A+D)	BDL	5-600	10.0
7.	Total Residual Chlorine (mg/l)	APHA, 23 rd Ed. 2017, 4500-Cl B	0.09	0.1-5	1.0
8.	Ammonical Nitrogen as NH ₃ - N(mg/l)	APHA, 23 rd Ed. 2017, 4500 NH ₃ A+F	1.02	1-100	50.0
9.	Total Kjeldahal Nitrogen as NH ₃ (mg/l)	APHA, 23 rd Ed. 2017, 4500 Norg A+C	6.7	5-100	100.0
10.	Free Ammonia as NH ₃ (mg/l)	APHA, 23 rd Ed. 2017, 4500 NH ₃ A+F	BDL	0.05-5.0	5.0
11.	Biochemical Oxygen Demand as BOD (mg/l) 3days at 27°C	APHA, 23 rd Ed. 2017, 5210 A+B	5.9	5-10000	30.0
12.	Chemical Oxygen Demand as COD (mg/l)	APHA, 23 rd Ed. 2017, 5220 A+C	37.8	5-50000	250.0
13.	Arsenic as As (mg/l)	APHA, 23 rd Ed. 2017, 3114 B	BDL	0.01-2	0.2
14.	Mercury as Hg (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.001-2	0.01
15.	Lead as Pb (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.01-5	0.1
16.	Cadmium as Cd (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.02-5	0.2
17.	Hexavalent Chromium as Cr ⁺⁶ (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.1
18.	Total Chromium as Cr (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.05-50	2.0
19.	Copper as Cu (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.05-5	2.0

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Sl. No.	Tests	Protocol	Result	Limits of Detection	G.S.R 422(E)
					Desirable Limit
20.	Zinc as Zn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B		0.02-50	5.0
21.	Selenium as Se (mg/l)	APHA, 23rd Ed. 2017, 4500 Se-A+D	BDL	0.01-1	0.05
22.	Nickel as Ni (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.02-5	2.0
23.	Fluoride as F (mg/l)	APHA, 23rd Ed. 2017, 4500 F C+D	0.07	0.02-10	2.0
24.	Dissolved Phosphate as PO ₄ (mg/l)	APHA, 23rd Ed. 2017, 4500 - PD	BDL	0.5-100	5.0
25.	Sulphide as S ₂ -(mg/l)	APHA, 23 rd Ed. 2017, 4500 S ² -F	BDL	0.1-10	2.0
26.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-10	1.0
27.	Bioassay (%)	APHA, 23rd Ed. 2017, 8910 C	89%	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	1.25	0.01-20	2.0
29.	Iron as Fe (mg/l)	APHA, 23rd Ed. 2017, 3500 Fe B	1.5	0.02-100	3.0
30.	Nitrate Nitrogen as NO ₃ (mg/l)	APHA, 23 rd Ed. 2017,(4500-NO ₃ A+ B)	3.24	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/SW/01/21

TEST REPORT ISSUE DATE:10.03.2021

TEST REPORT OF SURFACE WATER*

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

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

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 19/2/2021

Date of Sample Receiving : 24/2/2021

Date of Analysis : 25/2/2021 to 29/2/2021

Source of Sample : Sona River (U/p Stream of H-Quarry)

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	IS:2296 Class-C
1.	pH	APHA,23 rd Ed.2017,4500H ⁺ A+B	6.8	2-12	8.5
2.	Colour (Hazen unit)	APHA, 23 rd Ed. 2017, 2120 B	24.5	5-100	
3.	Total Dissolved Solids as TDS (mg/l)	APHA,23 rd Ed.2017 , 2540C	476.0	5-10000	1500
4.	Dissolved Oxygen as DO (mg/l)	APHA,23 rd Ed.2017 ,4500 A+C	5.90	2-10	4.0(min)
5.	Biochemical Oxygen Demand as BOD (mg/l) 3 days at 27 °C	APHA,23 rd Ed.2017 ,5210A+ B	BDL	5-10000	3.0
6.	Nitrate Nitrogen as NO ₃ (mg/l)	APHA, 23 rd Ed. 2017, 4500 NO ₃ - B	7.7	5-100	50.0
7.	Fluorides as F (mg/l)	APHA,23 rd Ed.2017 ,4500 -C	0.35	0.05-10	1.5
8.	Sulfate as SO ₄ (mg/l)	APHA,23 rd Ed.2017 ,4500 -SO ₄ ²⁻ E	27.4	1.0-250	400.0
9.	Iron as Fe (mg/l)	APHA,23 rd Ed.2017 ,3500 Fe B	2.6	0.02-50	50.0
10.	Copper as Cu (mg/l)	APHA,23 rd Ed.2017, 3111A+B	BDL	0.05-5	1.5
11.	Cadmium as Cd (mg/l)	APHA,23 rd Ed.2017, 3111A+B	BDL	0.002-2	0.01
12.	Arsenic as As(mg/l)	APHA,23 rd Ed.2017, 3114C	BDL	0.01-2	0.2
13.	Chloride as Cl- (mg/l)	APHA, 23 rd Ed. 2017,4500 Cl A+B	28.2	5-1000	600
14.	Chromium as Cr+6 (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.05
15.	Cyanide as CN (mg/l)	APHA,23 rd Ed.2017,4500 ,CN A+D	BDL	0.005-5	0.05
16.	Lead as Pb (mg/l)	APHA,23 rd Ed.2017, 3111A+B	BDL	0.01-2	0.1
17.	Selenium as Se (mg/l)	APHA,23 rd Ed.2017, 3500 Se-C	BDL	0.005-1	0.01
18.	Zinc as Zn (mg/l)	APHA,23 rd Ed.2017, 3111A+B	0.21	0.02-50	15
19.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA,23 rd Ed.2017, 5530 A+C	BDL	0.004-5	0.005
20.	Total coliform (MPN/100 ml)	APHA,23 rd Ed.2017, 9221 A+ B	216.0	1.8	5000
21.	Anionic Detergents (As MBAS)(mg/l) max	APHA 22 nd 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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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/03/21

TEST REPORT ISSUE DATE:10.03.2021

TEST REPORT OF SURFACE WATER*

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

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

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 19/2/2021

Date of Sample Receiving : 24/2/2021

Date of Analysis : 26/2/2021 to 29/2/2021

Source of Sample : Sona River (D/n Stream of H-Quarry)

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	IS:2296 Class-C
1.	pH	APHA,23 rd Ed.2017,4500H ⁺ A+B	7.30	2-12	8.5
2.	Colour (Hazen unit)	APHA, 23 rd Ed. 2017, 2120 B	8.7	5-100	
3.	Total Dissolved Solids as TDS (mg/l)	APHA,23 rd Ed.2017 ,2540C	408.0	5-10000	1500
4.	Dissolved Oxygen as DO (mg/l)	APHA,23 rd Ed.2017 ,4500 A+C	6.5	2-10	4.0(min)
5.	Biochemical Oxygen Demand as BOD (mg/l)	APHA,23 rd Ed.2017 ,5210A+ B	BDL	5-10000	3.0
6.	Nitrate Nitrogen as NO ₃ (mg/l)	APHA, 23 rd Ed. 2017, 4500 NO ₃ - B	7.3	5-100	50.0
7.	Fluorides as F (mg/l)	APHA,23 rd Ed.2017 ,4500 -C	0.27	0.05-10	1.5
8.	Sulfate as SO ₄ (mg/l)	APHA,23 rd Ed.2017 ,4500 -SO ₄ ²⁻ E	36.0	1.0-250	400.0
9.	Iron as Fe (mg/l)	APHA,23 rd Ed.2017 ,3500 Fe B	2.52	0.02-50	50.0
10.	Copper as Cu (mg/l)	APHA,23 rd Ed.2017, 3111A+B	BDL	0.05-5	1.5
11.	Cadmium as Cd (mg/l)	APHA,23 rd Ed.2017, 3111A+B	BDL	0.002-2	0.01
12.	Arsenic as As(mg/l)	APHA,23 rd Ed.2017, 3114C	BDL	0.01-2	0.2
13.	Chloride as Cl ⁻ (mg/l)	APHA,23 rd Ed.2017, 3111 - A +B	37.0	5-1000	600
14.	Chromium as Cr+6 (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.05
15.	Cyanide as CN (mg/l)	APHA,23 rd Ed.2017,4500 ,CN A+D	BDL	0.005-5	0.05
16.	Lead as Pb (mg/l)	APHA,23 rd Ed.2017, 3111A+B	BDL	0.01-2	0.1
17.	Selenium as Se (mg/l)	APHA,23 rd Ed.2017, 3500 Se-C	BDL	0.005-1	0.01
18.	Zinc as Zn (mg/l)	APHA,23 rd Ed.2017, 3111A+B	0.032	0.02-50	15
19.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA,23 rd Ed.2017, 5530 A+C	BDL	0.004-5	0.005
20.	Total coliform (MPN/100 ml)	APHA,23 rd Ed.2017, 9221 A+ B	213.0	1.8	5000
21.	Anionic Detergents (As MBAS)(mg/l) max	APHA 22 nd 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

Dobind
Manager (Q)

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FORMAT NO. ECO/QS/FORMAT/09

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

TEST REPORT ISSUE DATE:10.03.2021

TEST REPORT OF SURFACE WATER*

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

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

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 19/2/2021

Date of Sample Receiving : 24/2/2021

Date of Analysis : 25/2/2021 to 29/2/2021

Source of Sample : Mine Pit Water (D-Quarry)

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	IS:2296 Class-C
1.	pH	APHA,23 rd Ed.2017,4500H ⁺ A+B	7.24	2-12	8.5
2.	Colour (Hazen unit)	APHA, 23 rd Ed. 2017, 2120 B	10.0	5-100	
3.	Total Dissolved Solids as TDS (mg/l)	APHA,23 rd Ed.2017 , 2540C	225.0	5-10000	1500
4.	Dissolved Oxygen as DO (mg/l)	APHA,23 rd Ed.2017 ,4500 A+C	5.58	2-10	4.0(min)
5.	Biochemical Oxygen Demand as BOD (mg/l)	APHA,23 rd Ed.2017 ,5210A+ B	BDL	5-10000	3.0
6.	Nitrate Nitrogen as NO ₃ (mg/l)	APHA, 23 rd Ed. 2017, 4500 NO ₃ - B	BDL	5-100	50.0
7.	Fluorides as F (mg/l)	APHA,23 rd Ed.2017 ,4500 -C	0.38	0.05-10	1.5
8.	Sulfate as SO ₄ (mg/l)	APHA,23 rd Ed.2017 ,4500 -SO ₄ ²⁻ E	29.0	1.0-250	400.0
9.	Iron as Fe (mg/l)	APHA,23 rd Ed.2017 ,3500 Fe B	0.089	0.02-50	50.0
10.	Copper as Cu (mg/l)	APHA,23 rd Ed.2017, 3111A+B	BDL	0.05-5	1.5
11.	Cadmium as Cd (mg/l)	APHA,23 rd Ed.2017, 3111A+B	BDL	0.002-2	0.01
12.	Arsenic as As(mg/l)	APHA,23 rd Ed.2017, 3114C	BDL	0.01-2	0.2
13.	Chloride as Cl ⁻ (mg/l)	APHA, 23 rd Ed. 2017,4500 Cl A+B	35.0	5-1000	600
14.	Chromium as Cr+6 (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.05
15.	Cyanide as CN (mg/l)	APHA,23 rd Ed.2017,4500 ,CN A+D	BDL	0.005-5	0.05
16.	Lead as Pb (mg/l)	APHA,23 rd Ed.2017, 3111A+B	BDL	0.01-2	0.1
17.	Selenium as Se (mg/l)	APHA,23 rd Ed.2017, 3500 Se-C	BDL	0.005-1	0.01
18.	Zinc as Zn (mg/l)	APHA,23 rd Ed.2017, 3111A+B	0.030	0.02-50	15
19.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA,23 rd Ed.2017, 5530 A+C	BDL	0.004-5	0.005
20.	Total coliform (MPN/100 ml)	APHA,23 rd Ed.2017, 9221 A+ B	Absent	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

[Signature]
Authorized Signatory

[Signature]
Manager (Q)

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FORMAT NO. ECO/QS/FORMAT/10

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

TEST REPORT ISSUE DATE: 03.03.2021

Meteorological Data Monitoring Reports

Name of the Customer : Joda West 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	37.8	22.4	44.8	13.83	1.6	0	SE	0
2	02.02.2021	35.2	15.8	67.3	13.45	2.4	0	NE	0
3	03.02.2021	36.7	15.4	58.5	13.64	0.9	0	SW	0
4	04.02.2021	34.6	15.3	59.6	13.6	1.2	0	SW	0
5	05.02.2021	35.0	15.9	50.8	12.7	1.7	0	SSW	0
6	06.02.2021	34.7	18.7	48.6	15.04	1.6	0	NS	0
7	07.02.2021	36.6	16.0	41.4	8.9	0.7	0	SE	0
8	08.02.2021	36.0	16.8	52.8	12.94	1.8	0	SSE	0
9	09.02.2021	37.7	17.7	75.8	15.05	1.1	0	SW	0
10	10.02.2021	36.7	23.5	67.0	18.3	1.2	0	SE	0
11	11.02.2021	36.3	18.5	78.6	24.59	0.9	0	SSE	0
12	12.02.2021	37.2	19.7	87.4	32.92	2.3	0	SW	0
13	13.02.2021	28.3	16.7	97.3	45.51	1.0	0	NE	0
14	14.02.2021	35.8	15.8	91.2	27.49	1.4	0	SE	0
15	15.02.2021	34.2	15.7	86.3	15.33	0.9	0	SE	0
16	16.02.2021	35.3	17.1	66.1	16.8	1.5	0	NE	0
17	17.02.2021	35.4	18.3	72.8	20.49	1.0	0	SE	0
18	18.02.2021	36.6	19.8	75.7	12.82	0.8	0	SW	0
19	19.02.2021	35.7	19.4	64.2	18.81	1.9	0	SE	0
20	20.02.2021	34.8	21.4	43.9	24.08	1.2	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.		
21	21.02.2021	32.8	21.45	47.12	21.7	1.2	0	SW	0
22	22.02.2021	34.4	20.13	51.23	15.1	1.3	0	SE	0
23	23.02.2021	32.42	20.86	64.2	22.3	1.5	0	SE	0
24	24.02.2021	36.01	21.28	62.64	22.2	1.2	0	SSW	0
25	25.02.2021	33.55	21.32	54.36	17.6	1.4	0	SE	0
26	26.02.2021	34.7	19.45	62.01	21.2	1.7	0	SE	0
27	27.02.2021	33.2	18.43	67.32	23.5	1.2	0	SE	0
28	28.02.2021	34.32	19.02	61.13	13.4	1.4	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/ON/01/21

TEST REPORT ISSUE DATE: 09.03.2021

TEST REPORT OF OCCUPATIONAL/WORKPLACE NOISE MONITORING

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

Sample Collected By : Ecomen Team using Integrated Sound Level Meter
Instrument Used : Noise Meter (Lutron)/Personal Dosimeter

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

S.No.	Date of Monitoring	Name of Location/Person	Activity/ Occupation	8-hr TWA dB(A)	DGMS Permissible Limit
1	7-02-2021	Workshop (HEMM)	Maintenance (HEMM)	67.8	85.0
2	10-02-2021	Screen Plant	Supervision	72.1	85.0
3	13-02-2021	Mr. Jagannat Giri	Mining Foreman	68.2	85.0
4	14-02-2021	Mr. Suresh Naik	Sorting Labour	75.4	85.0
5	15-02-2021	Near Stack yard	Stacking of ore	65.2	85.0


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FORMAT NO. ECO/QS/FORMAT/13

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

TEST REPORT ISSUE DATE: 09.03.2021

TEST REPORT OF GROUND WATER LEVEL

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

Sample Collected By : Ecomen Team using Integrated Sound Level Meter
Instrument Used : Ecomen Representative using Water Level Indicator

Frequency of Sampling : Fort-nightly

S.No.	Location	Structure Type	Water Level (mbgl)	
			3-02-2021	20-02-2021
1	Well at Roida Village	Open dug Well	17.3	16.1
2	Well at Joda Market	Open dug Well	14.1	13.5
3	Well at Municipality (Joda)	Open dug Well	10.3	10.7
4	Well at Bichhakundi Basti	Open dug Well	11.8	11.2

*mbgl-mtr below ground level


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FORMAT NO. ECO/QS/FORMAT/10

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

TEST REPORT ISSUE DATE: 07.04.2021

Ambient Air Quality Monitoring Report (Core Zone)

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

Location : AAQMS-1: Near Time Office

Sampling Method : IS: 5182

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

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

SI. No.	Date of Monitoring	Concentration of Pollutant				
		PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	CO (mg/m ³)
1	04.03.2021	75.2	37.7	15.5	25.9	0.5
2	06.03.2021	69.2	39.8	14.2	24.8	0.48
3	10.03.2021	76.38	43.7	11.1	23.13	0.4
4	12.03.2021	68.7	36.9	9.9	22.4	0.44
5	18.03.2021	68.6	42.9	14.1	20	0.43
6	20.03.2021	69.4	38.4	13.6	20.3	0.45
7	25.03.2021	72.8	35.6	12.2	19.4	0.49
8	27.03.2021	65.2	41.5	12.5	22.1	0.45
Average		70.69	39.56	12.89	22.25	0.46
Limit as per CPCB notification New Delhi, 18th Nov, 2009. for Ambient air quality		100	60	80	80	4.0
Standard Method		IS : 5182 (Part-23) 2006	NAAQM Volume-I by CPCB	IS : 5182 (Part-2) 2001	IS : 5182 (Part-6) 2006	IS : 5182 (Part-10)

*These results are related only to tested items.


Analyst


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Manager (Q)

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FORMAT NO. ECO/QS/FORMAT/10

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

TEST REPORT ISSUE DATE: 07.04.2021

Ambient Air Quality Monitoring Report (Core Zone)

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

Location : AAQMS-1: Near Time Office

Sampling Method : IS: 5182

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

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

SI. No.	Date of Monitoring	Concentration of Pollutant						
		NH ₃ (µg/m ³)	O ₃ (µg/m ³)	Pb (µg/m ³)	Ni (ng/m ³)	As (ng/m ³)	Benzene (µg/m ³)	Benzo(a) pyrene (ng/m ³)
1	04.03.2021	21.1	12.9	<1.0	1.2	<1.0	<4.0	<0.05
2	06.03.2021	20.4	14.3	<1.0	1.2	<1.0	<4.0	<0.05
3	10.03.2021	18.3	13.5	<1.0	1.3	<1.0	<4.0	<0.05
4	12.03.2021	17.3	16.2	<1.0	1.3	<1.0	<4.0	<0.05
5	18.03.2021	13.3	15.6	<1.0	1.2	<1.0	<4.0	<0.05
6	20.03.2021	11.7	12.5	<1.0	1.14	<1.0	<4.0	<0.05
7	25.03.2021	17.3	10.3	<1.0	1.12	<1.0	<4.0	<0.05
8	27.03.2021	17.4	16.2	<1.0	1.13	<1.0	<4.0	<0.05
Average		17.10	13.94	-	1.2	-	-	-
Limit as per CPCB notification New Delhi, 18 th Nov, 2009. for Ambient air quality		400	180	1	20	6	5	1
Standard Method		APHA 401 (Indophenol)	IS : 5182 (Part-9) 1974	IS : 5182 (Part-22) 2004	NAAQM Volume-I by CPCB	NAAQM Volume-I by CPCB	IS : 5182 (Part-11)	IS : 5182 (Part-12)

*These results are related only to tested items.

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Analyst

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

FORMAT NO. ECO/QS/FORMAT/10

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

TEST REPORT ISSUE DATE: 07.04.2021

Ambient Air Quality Monitoring Report (Core Zone)

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

Location : AAQMS-2: H-Quarry Near Shelter

Sampling Method : IS: 5182

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

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

SI. No.	Date of Monitoring	Concentration of Pollutant				
		PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	CO (mg/m ³)
1	04.03.2021	77.34	41.4	15.8	25.64	0.32
2	06.03.2021	71.50	43.6	14.8	23.44	0.34
3	10.03.2021	81.7	50.9	11.6	19.18	0.32
4	12.03.2021	74.4	41.80	10.84	21.12	0.36
5	18.03.2021	65.32	47.2	13.8	18.36	0.31
6	20.03.2021	64.42	44.62	14.2	20.02	0.29
7	25.03.2021	59.26	43.7	14.43	17.24	0.36
8	27.03.2021	63.2	41.6	13.48	19.32	0.39
Average		69.64	44.35	13.62	20.54	0.34
Limit as per CPCB notification New Delhi, 18 th Nov, 2009. for Ambient air quality		100	60	80	80	4.0
Standard Method		IS : 5182 (Part-23) 2006	NAAQM Volume-I by CPCB	IS : 5182 (Part-2) 2001	IS : 5182 (Part-6) 2006	IS : 5182 (Part-10)

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

TEST REPORT ISSUE DATE: 07.04.2021

Ambient Air Quality Monitoring Report (Core Zone)

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

Location : AAQMS-2: Near H-Quarry Shelter

Sampling Method : IS: 5182

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

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

SI. No.	Date of Monitoring	Concentration of Pollutant						
		NH ₃ (µg/m ³)	O ₃ (µg/m ³)	Pb (µg/m ³)	Ni (ng/m ³)	As (ng/m ³)	Benzene (µg/m ³)	Benzo(a) pyrene (ng/m ³)
1	04.03.2021	20.62	16.02	<1.0	1.05	<1.0	<4.0	<0.05
2	06.03.2021	21.04	14.54	<1.0	1.02	<1.0	<4.0	<0.05
3	10.03.2021	19.94	13.63	<1.0	1.13	<1.0	<4.0	<0.05
4	12.03.2021	17.90	13.53	<1.0	1.34	<1.0	<4.0	<0.05
5	18.03.2021	16.52	18.40	<1.0	0.92	<1.0	<4.0	<0.05
6	20.03.2021	24.64	17.63	<1.0	1.05	<1.0	<4.0	<0.05
7	25.03.2021	21.82	16.37	<1.0	0.98	<1.0	<4.0	<0.05
8	27.03.2021	21.97	16.33	<1.0	1.29	<1.0	<4.0	<0.05
Average		20.56	15.81	-	1.10	-	-	-
Limit as per CPCB notification New Delhi, 18thNov, 2009. for Ambient air quality		400	180	1	20	6	5	1
Standard Method		APHA 401 (Indophenol)	IS : 5182 (Part-9) 1974	IS : 5182 (Part-22) 2004	NAAQM Volume-I by CPCB	NAAQM Volume-I by CPCB	IS : 5182 (Part-11)	IS : 5182 (Part-12)

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FORMAT NO. ECO/QS/FORMAT/10

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

TEST REPORT ISSUE DATE: 07.04.2021

Ambient Air Quality Monitoring Report (Core Zone)

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

Location : AAQMS-3: Near Screen Plant (D-Quarry)

Sampling Method : IS: 5182

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

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

Sl. No.	Date of Monitoring	Concentration of Pollutant				
		PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	CO (mg/m ³)
1	04.03.2021	73.42	44.90	13.84	21.26	0.38
2	06.03.2021	71.50	40.89	14.88	20.02	0.36
3	10.03.2021	67.78	43.98	13.92	23.34	0.38
4	12.03.2021	78.44	41.80	13.84	19.23	0.39
5	18.03.2021	71.32	47.5	15.23	21.21	0.41
6	20.03.2021	75.32	36.92	16.23	20.04	0.43
7	25.03.2021	75.24	36.82	14.5	17.21	0.44
8	27.03.2021	73.36	38.98	11.23	19.24	0.45
Average		73.30	41.47	14.21	20.19	0.41
Limit as per CPCB notification New Delhi, 18 th Nov, 2009. for Ambient air quality		100	60	80	80	4.0
Standard Method	IS : 5182 (Part-23) 2006	NAAQM Volume-I by CPCB	IS : 5182 (Part-2) 2001	IS : 5182 (Part-6) 2006	IS : 5182 (Part-10)	

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Ambient Air Quality Monitoring Report (Core Zone)

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

Location : AAQMS-3: Near Screen Plant (D-Quarry)

Sampling Method : IS: 5182

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

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

SI. No.	Date of Monitoring	Concentration of Pollutant						
		NH ₃ (µg/m ³)	O ₃ (µg/m ³)	Pb (µg/m ³)	Ni (ng/m ³)	As (ng/m ³)	Benzene (µg/m ³)	Benzo(a) pyrene (ng/m ³)
1	04.03.2021	16.72	14.62	<1.0	1.09	<1.0	<4.0	<0.05
2	06.03.2021	27.34	14.34	<1.0	1.04	<1.0	<4.0	<0.05
3	10.03.2021	21.92	13.76	<1.0	1.18	<1.0	<4.0	<0.05
4	12.03.2021	19.57	13.82	<1.0	1.42	<1.0	<4.0	<0.05
5	18.03.2021	23.64	14.42	<1.0	0.86	<1.0	<4.0	<0.05
6	20.03.2021	24.53	15.63	<1.0	1.05	<1.0	<4.0	<0.05
7	25.03.2021	20.18	14.42	<1.0	0.92	<1.0	<4.0	<0.05
8	27.03.2021	23.16	15.46	<1.0	1.23	<1.0	<4.0	<0.05
Average		22.13	14.56	-	1.10	-	-	-
Limit as per CPCB notification New Delhi, 18 th Nov, 2009. for Ambient air quality		400	180	1	20	6	5	1
Standard Method		APHA 401 (Indophenol)	IS : 5182 (Part-9) 1974	IS : 5182 (Part-22) 2004	NAAQM Volume-I by CPCB	NAAQM Volume-I by CPCB	IS : 5182 (Part-11)	IS : 5182 (Part-12)

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TEST REPORT ISSUE DATE: 07.04.2021

Ambient Air Quality Monitoring Report (Core Zone)

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

Location : AAQMS-4: Near Sorting Yard (D-Quarry)

Sampling Method : IS: 5182

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

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

SI. No.	Date of Monitoring	Concentration of Pollutant				
		PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	CO (mg/m ³)
1	04.03.2021	75.23	44.78	18.23	25.43	0.43
2	06.03.2021	73.34	47.26	14.81	21.46	0.34
3	10.03.2021	81.62	51.09	17.62	23.38	0.34
4	12.03.2021	74.34	40.80	16.54	21.20	0.38
5	18.03.2021	71.32	47.02	17.58	19.26	0.39
6	20.03.2021	72.40	44.92	18.62	18.02	0.42
7	25.03.2021	67.43	45.63	16.76	23.24	0.44
8	27.03.2021	73.42	38.98	15.67	19.00	0.41
Average		73.64	45.06	16.98	21.37	0.39
Limit as per CPCB notification New Delhi, 18 th Nov, 2009. for Ambient air quality		100	60	80	80	4.0
Standard Method		IS : 5182 (Part-23) 2006	NAAQM Volume-I by CPCB	IS : 5182 (Part-2) 2001	IS : 5182 (Part-6) 2006	IS : 5182 (Part-10)

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

Location : AAQMS-4: Near Sorting Yard (D-Quarry)

Sampling Method : IS: 5182

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

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

SI. No.	Date of Monitoring	Concentration of Pollutant						
		NH ₃ (µg/m ³)	O ₃ (µg/m ³)	Pb (µg/m ³)	Ni (ng/m ³)	As (ng/m ³)	Benzene (µg/m ³)	Benzo(a) pyrene (ng/m ³)
1	04.03.2021	19.72	16.62	<1.0	1.23	<1.0	<4.0	<0.05
2	06.03.2021	21.04	18.42	<1.0	1.08	<1.0	<4.0	<0.05
3	10.03.2021	19.64	17.76	<1.0	1.19	<1.0	<4.0	<0.05
4	12.03.2021	19.60	16.23	<1.0	1.32	<1.0	<4.0	<0.05
5	18.03.2021	21.52	15.42	<1.0	0.92	<1.0	<4.0	<0.05
6	20.03.2021	22.64	17.65	<1.0	1.06	<1.0	<4.0	<0.05
7	25.03.2021	20.92	14.38	<1.0	0.98	<1.0	<4.0	<0.05
8	27.03.2021	19.18	15.32	<1.0	1.24	<1.0	<4.0	<0.05
Average		20.53	16.48	-	1.13	-	-	-
Limit as per CPCB notification New Delhi, 18thNov, 2009. for Ambient air quality		400	180	1	20	6	5	1
Standard Method		APHA 401 (Indophenol)	IS : 5182 (Part-9) 1974	IS : 5182 (Part-22) 2004	NAAQM Volume-I by CPCB	NAAQM Volume-I by CPCB	IS : 5182 (Part-11)	IS : 5182 (Part-12)

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FORMAT NO. ECO/QS/FORMAT/10

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

TEST REPORT ISSUE DATE: 09.04.2021

Ambient Air Quality Monitoring Report (Buffer Zone)

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

Sampling Method : IS: 5182

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

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

Sl. No.	Location (Date of Monitoring)	Concentration of Pollutant				
		PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	CO (mg/m ³)
1	Banspani (9.03.2021)	75.7	41.2	11.5	19.5	0.74
2	Boneikela (11.03.2021)	80.4	39.40	11.4	18.63	0.71
3	Khondbond (15.03.2021)	71.3	39.2	11.6	23.2	0.76
4	Roida Village (19.03.2021)	76.6	38.62	9.34	17.4	0.83
Average		76.00	39.61	10.96	19.68	0.76
Limit as per CPCB notification New Delhi, 18thNov, 2009. for Ambient air quality		100	60	80	80	4.0
Standard Method		IS : 5182 (Part- 23) 2006	NAAQM Volume-I by CPCB	IS : 5182 (Part-2) 2001	IS : 5182 (Part-6) 2006	IS : 5182 (Part-10)

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TEST REPORT ISSUE DATE: 09.04.2021

Ambient Air Quality Monitoring Report (Buffer Zone)

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

Sampling Method : IS: 5182

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

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

SI. No.	Location (Date of Monitoring)	Concentration of Pollutant						
		NH ₃ (µg/m ³)	O ₃ (µg/m ³)	Pb (µg/m ³)	Ni (ng/m ³)	As (ng/m ³)	Benzene (µg/m ³)	Benzo (a) pyrene (ng/m ³)
1	Banspani (9.03.2021)	17.8	11.6	<1.0	1.32	<1.0	<4.0	<0.05
2	Boneikela (11.03.2021)	21.5	10.38	<1.0	1.05	<1.0	<4.0	<0.05
3	Khondbond (15.03.2021)	21.7	11.4	<1.0	1.19	<1.0	<4.0	<0.05
4	Roida Village (19.03.2021)	22.8	9.2	<1.0	1.15	<1.0	<4.0	<0.05
Average		20.95	10.65	-	1.18	-	-	-
Limit as per CPCB notification New Delhi, 18thNov, 2009. for Ambient air quality		400	180	1	20	6	5	1
Standard Method		APHA 401 (Indophen ol)	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/02/21

TEST REPORT ISSUE DATE: 09.04.2021

TEST REPORT OF AMBIENT NOISE LEVEL MONITORING

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

Sample Collected By : Ecomen Team using Integrated Sound Level Meter

Instrument Used : Noise Meter (Lutron)

S.No.	Date of Monitoring	Name of Location	Category of Zone	Day Time Leq Value in dB(A)	Night Time Leq Value in dB(A)
1	5-03-2021	Township	Residential	62.6	48.7
2	6-03-2021	Near Hospital	Silence	49.4	41.5
3	8-03-2021	Near Screen Plant	Industrial	78.4	48.2
4	9-03-2021	Near Admin Office	Industrial	61.2	46.4
5	11-03-2021	Near Railway Siding	Industrial	77.0	43.4
6	15-03-2021	Near Sorting Yard	Industrial	75.4	47.5

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.

Anshu
Analyst*[Signature]*
Authorized Signatory*[Signature]*
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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/12 TEST REPORT NO: ECOLAB/Stack1/01/21
TEST REPORT ISSUE DATE: 03.04.2021**TEST REPORT OF FLUE GAS EMISSIONS***Name of the Customer : Joda West Iron & Manganese Mine of
M/s Tata Steel LimitedDate of Sampling : 16.03.2021
Sample Collected by : Ecomen Team in presence of TSL's Representative
Source of Emission : Exhaust Emission from DG Set
Sampling Method : IS: 11255
Instrument Used : Stack Monitoring Kit**Details of Stack**Material of Construction : M.S.
Stack Attached to : DG Set-01 (Camp)
Capacity : 100 KVA
Stack Height:
i) Above the Platform/ Roof (m) : 10.0
ii) Above the Ground Level (m) : 15.0
Stack Top : Circular
Inside Diameter of Stack (m) : 0.0889
(at sampling point)
Cross Sectional Area of Duct/Stack (m²) : 0.0061
Ambient Air (°C) : 18.0
Flue Gas Temperature (°C) : 174.0
Exit Velocity of Gas (m/sec.) : 9.25
Flow Rate (Nm³/ sec.) : 0.037
Type of Fuel : HSD
Quantity of Fuel Consumption (lit/hr) : 18-20

Sl. No.	Tests Conducted	Method	<i>Pollutant Concentration in (At 15% O₂ Correction) in gm/Kw-Hr</i>	Standards as per CPCB in gm/Kw-Hr
1.	Particulate Matter (PM)	IS:11255 (Part-1)	0.061	0.2
2.	Sulphur Dioxide (SO ₂)	IS:11255 (Part-2)	0.034	-
3.	Nitrogen Dioxide (NO _x)	IS:11255 (Part-7)	0.056	4.0 (NO _x +HC)
4.	Hydrocarbon (HC)	IS:13270	1.19	
5.	Carbon Monoxide (CO)	IS:13270	1.14	3.5

*The result is related only to tested item.

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/DW/04/21

TEST REPORT ISSUE DATE: 09.04.2021

TEST REPORT OF DRINKING WATER*

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

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

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 5/3/2021

Date of Sample Receiving : 09/3/2021

Packing of Sample : As per requirement

Date of Analysis : 10/3/2021-14/3/2021

Source of Sample : Joda West 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 rd Ed. 2017, 2120 B	<5.0	5-100	5.00	15.0
2.	Odour	APHA, 23rd Ed. 2017,2150 B	Agreeable	Qualitative	Agreeable	Agreeable
3.	Taste	APHA, 23rd Ed. 2017,2160 A+B	Agreeable	Qualitative	Agreeable	Agreeable
4.	pH	APHA, 23rd Ed. 2017, 4500 H+A+B	7.16	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	174	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 ₃ (mg/l)	APHA, 23rd Ed. 2017,2340 A+C	151	5-1500	200.0	600.0
9.	Calcium as Ca (mg/l)	APHA, 23rd Ed. 2017, 3500 Ca A+B	43.6	5 - 1000	75.0	200.0
10.	Magnesium as Mg (mg/l)	APHA, 23rd Ed. 2017, 3500 Mg A+B	12.5	5-1000	30.0	100.0
11.	Chloride as Cl (mg/l)	APHA, 23rd Ed. 2017,4500 Cl A+B	16.8	5-1000	250.0	1000.0
12.	Sulfate as SO ₄ (mg/l)	APHA, 23rd Ed. 2017,4500 SO ₄ - E	20.4	5-200	200.0	400.0
13.	Nitrate Nitrogen as NO ₃ (mg/l)	APHA, 23rd Ed. 2017, 4500 NO ₃ - B	2.8	5-100	45.0 (Max)	No Relax.
14.	Fluorides as F (mg/l)	APHA, 23rd Ed. 2017,4500-C	0.46	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	0.024	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	0.063	0.02-50	5	15
24.	Selenium as Se (mg/l)	APHA 23 rd Ed.2017 3500 Se-C	BDL	0.01-10	0.01(Max)	No Relax
25.	Chromium as Cr+6 (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.05(Max)	No Relax.
26.	Boron as B (mg/l)	APHA, 23rd Ed. 2017, 4500 B A+C	BDL	0.2-2	0.5	1.0
27.	Cyanide as CN (mg/l)	APHA, 23rd Ed. 2017, 4500 CN-A+C	BDL	0.02-5	0.05	No Relax
28.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-5	0.001	0.002
29.	Anionic Detergents as MBAS (mg/l)	APHA, 23rd Ed. 2017, 5540 A+C	BDL	0.01-5	0.2	1.0
30.	Free Residual Chlorine (mg/l)	APHA, 23rd Ed. 2017, 4500-Cl B	BDL	0.1-5	0.20	1.0
31.	Total coliform (MPN/100 ml)	APHA, 23rd Ed. 2017, A+ B	Absent	1.8	Absent	Absent
32.	E-Coli (Nos/100)	APHA, 23rd Ed. 2017, 9221 A+ F	Absent	1.8	Absent	Absent
33.	Fecal Coliform(MPN/100 ml)	APHA, 23rd Ed. 2017, 9221 E	Absent	1.8	-	-
34.	Pesticide	APHA, 23rd Ed. 2017, 6630 B&C	BDL	2-10	No Relaxation	No Relaxation

*These results are related only to item tested.

BDL = Below Detection Limit

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/05/21

TEST REPORT ISSUE DATE: 09.04.2021

TEST REPORT OF DRINKING WATER*

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

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

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 5/3/2021

Date of Sample Receiving : 09/3/2021

Packing of Sample : As per requirement

Date of Analysis : 10/3/2021-14/3/2021

Source of Sample : Transit House 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 rd Ed. 2017, 2120 B	<5.0	5-100	5.00	15.0
2.	Odour	APHA, 23rd Ed. 2017,2150 B	Agreeable	Qualitative	Agreeable	Agreeable
3.	Taste	APHA, 23rd Ed. 2017,2160 A+B	Agreeable	Qualitative	Agreeable	Agreeable
4.	pH	APHA, 23rd Ed. 2017, 4500 H+A+B	7.5	2.0-12	6.5-8.5	No Relax.
5.	Turbidity as (NTU)	APHA, 23rd Ed. 2017, 2130-A+B	BDL	1-100	1.0	5.0
6.	Total Dissolved Solids as TDS (mg/l)	APHA, 23rd Ed. 2017,2540-C	210	10-10000	500	2000
7.	Alkalinity (mg/l)	APHA, 23rd Ed. 2017,2320 A+B	141	5-1500	200	600
8.	Total Hardness as CaCO ₃ (mg/l)	APHA, 23rd Ed. 2017,2340 A+C	167	5-1500	200.0	600.0
9.	Calcium as Ca (mg/l)	APHA, 23rd Ed. 2017, 3500 Ca A+B	46.1	5 - 1000	75.0	200.0
10.	Magnesium as Mg (mg/l)	APHA, 23rd Ed. 2017, 3500 Mg A+B	16.2	5-1000	30.0	100.0
11.	Chloride as Cl (mg/l)	APHA, 23rd Ed. 2017,4500 Cl A+B	24.4	5-1000	250.0	1000.0
12.	Sulfate as SO ₄ (mg/l)	APHA, 23rd Ed. 2017,4500 SO ₄ - E	39.2	5-200	200.0	400.0
13.	Nitrate Nitrogen as NO ₃ (mg/l)	APHA, 23rd Ed. 2017, 4500 NO ₃ - B	6.3	5-100	45.0 (Max)	No Relax.
14.	Fluorides as F (mg/l)	APHA, 23rd Ed. 2017,4500-C	0.56	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	0.26	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 ₆ H ₅ OH (mg/l)	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-5	0.001	0.002
29.	Anionic Detergents as MBAS(mg/l)	APHA, 23rd Ed. 2017, 5540 A+C	BDL	0.01-5	0.2	1.0
30.	Free Residual Chlorine (mg/l)	APHA, 23rd Ed. 2017, 4500-Cl B	BDL	0.1-5	0.20	1.0
31.	Total coliform (MPN/100 ml)	APHA, 23rd Ed. 2017, A+ B	Absent	1.8	Absent	Absent
32.	E-Coli (Nos/100)	APHA, 23rd Ed. 2017, 9221 A+ F	Absent	1.8	Absent	Absent
33.	Fecal Coliform (MPN/100 ml)	APHA, 23rd Ed. 2017, 9221 E	Absent	1.8	-	-
34.	Pesticide	APHA, 23rd Ed. 2017, 6630 B&C	BDL	2-10	No Relaxation	No Relaxation

*These results are related only to item tested.

BDL = Below Detection Limit

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/07/21

TEST REPORT ISSUE DATE: 07.04.2021

TEST REPORT OF DRINKING WATER*

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

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

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 07/03/2021

Date of Sample Receiving : 10/03/2021

Packing of Sample : As per requirement

Date of Analysis : 11/3/2021-14/3/2021

Source of Sample : Borewell Near Temple (Joda West 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 rd Ed. 2017, 2120 B	<5.0	5-100	5.00	15.0
2.	Odour	APHA, 23rd Ed. 2017,2150 B	Agreeable	Qualitative	Agreeable	Agreeable
3.	Taste	APHA, 23rd Ed. 2017,2160 A+B	Agreeable	Qualitative	Agreeable	Agreeable
4.	pH	APHA, 23rd Ed. 2017, 4500 H+A+B	7.6	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	167.5	10-10000	500	2000
7.	Alkalinity (mg/l)	APHA, 23rd Ed. 2017,2320 A+B	143.2	5-1500	200	600
8.	Total Hardness as CaCO ₃ (mg/l)	APHA, 23rd Ed. 2017,2340 A+C	158.8	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	12.6	5-1000	30.0	100.0
11.	Chloride as Cl (mg/l)	APHA, 23rd Ed. 2017,4500 Cl A+B	18.4	5-1000	250.0	1000.0
12.	Sulfate as SO ₄ (mg/l)	APHA, 23rd Ed. 2017,4500 SO ₄ - E	26.2	5-200	200.0	400.0
13.	Nitrate Nitrogen as NO ₃ (mg/l)	APHA, 23rd Ed. 2017, 4500 NO ₃ - B	2.8	5-100	45.0 (Max)	No Relax.
14.	Fluorides as F (mg/l)	APHA, 23rd Ed. 2017,4500-C	0.44	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	0.06	0.02-50	0.3 (Max)	No Relax.
17.	Manganese as Mn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-5	0.10	0.30
18.	Mercury as Hg (mg/l)	APHA, 23rd Ed. 2017, 3112 A+B	BDL	0.001-2	0.001(Max)	No Relax.
19.	Aluminium as Al (mg/l)	APHA, 23rd Ed. 2017, 3500 Al A+B	BDL	0.02-100	0.03 (Max)	0.2
20.	Cadmium as Cd (mg/l)	APHA, 23rd Ed. 2017,3111 A+B	BDL	0.002-2	0.003(Max)	No Relax
21.	Arsenic as As (mg/l)	APHA, 23rd Ed. 2017, 3114 C	BDL	0.01-2	0.01(Max)	No Relax
22.	Lead as Pb (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.02-5	0.01	No Relax.
23.	Zinc as Zn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	0.061	0.02-50	5	15
24.	Selenium as Se (mg/l)	APHA 23 rd Ed.2017 3500 Se-C	BDL	0.01-10	0.01(Max)	No Relax
25.	Chromium as Cr+6 (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.05(Max)	No Relax.
26.	Boron as B (mg/l)	APHA, 23rd Ed. 2017, 4500 B A+C	BDL	0.2-2	0.5	1.0
27.	Cyanide as CN (mg/l)	APHA, 23rd Ed. 2017, 4500 CN-A+C	BDL	0.02-5	0.05	No Relax
28.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-5	0.001	0.002
29.	Anionic Detergents as MBAS (mg/l)	APHA, 23rd Ed. 2017, 5540 A+C	BDL	0.01-5	0.2	1.0
30.	Free Residual Chlorine (mg/l)	APHA, 23rd Ed. 2017, 4500-Cl B	BDL	0.1-5	0.20	1.0
31.	Total coliform (MPN/100 ml)	APHA, 23rd Ed. 2017, A+ B	Absent	1.8	Absent	Absent
32.	E-Coli (Nos/100)	APHA, 23rd Ed. 2017, 9221 A+ F	Absent	1.8	Absent	Absent
33.	Fecal Coliform(MPN/100 ml)	APHA, 23rd Ed. 2017, 9221 E	Absent	1.8	-	-
34.	Pesticide	APHA, 23rd Ed. 2017, 6630 B&C	BDL	2-10	No Relaxation	No Relaxation

*These results are related only to item tested.

BDL = Below Detection Limit

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/08/21

TEST REPORT ISSUE DATE: 09.04.2021

TEST REPORT OF DRINKING WATER*

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

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

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 07/03/2021

Date of Sample Receiving : 10/03/2021

Packing of Sample : As per requirement

Date of Analysis : 11/3/2021-14/3/2021

Source of Sample : Borewell Near Vegetable Garden

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	INDIAN STANDARDS as per IS 10500:2012	
					Acceptable Limit	Permissible Limit
1.	Colour (Hazen unit)	APHA, 23 rd Ed. 2017, 2120 B	<5.0	5-100	5.00	15.0
2.	Odour	APHA, 23rd Ed. 2017,2150 B	Agreeable	Qualitative	Agreeable	Agreeable
3.	Taste	APHA, 23rd Ed. 2017,2160 A+B	Agreeable	Qualitative	Agreeable	Agreeable
4.	pH	APHA, 23rd Ed. 2017, 4500 H+A+B	7.5	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	203	10-10000	500	2000
7.	Alkalinity (mg/l)	APHA, 23rd Ed. 2017,2320 A+B	149	5-1500	200	600
8.	Total Hardness as CaCO ₃ (mg/l)	APHA, 23rd Ed. 2017,2340 A+C	189	5-1500	200.0	600.0
9.	Calcium as Ca (mg/l)	APHA, 23rd Ed. 2017, 3500 Ca A+B	46.2	5 - 1000	75.0	200.0
10.	Magnesium as Mg (mg/l)	APHA, 23rd Ed. 2017, 3500 Mg A+B	16.4	5-1000	30.0	100.0
11.	Chloride as Cl (mg/l)	APHA, 23rd Ed. 2017,4500 Cl A+B	28.4	5-1000	250.0	1000.0
12.	Sulfate as SO ₄ (mg/l)	APHA, 23rd Ed. 2017,4500 SO ₄ - E	39.5	5-200	200.0	400.0
13.	Nitrate Nitrogen as NO ₃ (mg/l)	APHA, 23rd Ed. 2017, 4500 NO ₃ - B	5.6	5-100	45.0 (Max)	No Relax.
14.	Fluorides as F (mg/l)	APHA, 23rd Ed. 2017,4500-C	0.54	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	0.23	0.02-50	5	15
24.	Selenium as Se (mg/l)	APHA 23 rd Ed.2017 3500 Se-C	BDL	0.01-10	0.01(Max)	No Relax
25.	Chromium as Cr+6 (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.05(Max)	No Relax.
26.	Boron as B (mg/l)	APHA, 23rd Ed. 2017, 4500 B A+C	BDL	0.2-2	0.5	1.0
27.	Cyanide as CN (mg/l)	APHA, 23rd Ed. 2017, 4500 CN-A+C	BDL	0.02-5	0.05	No Relax
28.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-5	0.001	0.002
29.	Anionic Detergents as MBAS(mg/l)	APHA, 23rd Ed. 2017, 5540 A+C	BDL	0.01-5	0.2	1.0
30.	Free Residual Chlorine (mg/l)	APHA, 23rd Ed. 2017, 4500-Cl B	BDL	0.1-5	0.20	1.0
31.	Total coliform (MPN/100 ml)	APHA, 23rd Ed. 2017, A+ B	Absent	1.8	Absent	Absent
32.	E-Coli (Nos/100)	APHA, 23rd Ed. 2017, 9221 A+ F	Absent	1.8	Absent	Absent
33.	Fecal Coliform (MPN/100 ml)	APHA, 23rd Ed. 2017, 9221 E	Absent	1.8	-	-
34.	Pesticide	APHA, 23rd Ed. 2017, 6630 B&C	BDL	2-10	No Relaxation	No Relaxation

*These results are related only to item tested.

BDL = Below Detection Limit

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Analyst

Swaraj Swain
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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/13/21

TEST REPORT ISSUE DATE: 09.02.2021

TEST REPORT OF DRINKING WATER*

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

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

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 07/03/2021

Date of Sample Receiving : 10/03/2021

Packing of Sample : As per requirement

Date of Analysis : 11/3/2021-14/3/2021

Source of Sample : Borewell Near Bichhakundi Basti

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	INDIAN STANDARDS as per IS 10500:2012	
					Acceptable Limit	Permissible Limit
35.	Colour (Hazen unit)	APHA, 23 rd Ed. 2017, 2120 B	<5.0	5-100	5.00	15.0
36.	Odour	APHA, 23rd Ed. 2017,2150 B	Agreeable	Qualitative	Agreeable	Agreeable
37.	Taste	APHA, 23rd Ed. 2017,2160 A+B	Agreeable	Qualitative	Agreeable	Agreeable
38.	pH	APHA, 23rd Ed. 2017, 4500 H+A+B	7.65	2.0-12	6.5-8.5	No Relax.
39.	Turbidity as (NTU)	APHA, 23rd Ed. 2017, 2130-A+B	BDL	1-100	1.0	5.0
40.	Total Dissolved Solids as TDS (mg/l)	APHA, 23rd Ed. 2017,2540-C	210	10-10000	500	2000
41.	Alkalinity (mg/l)	APHA, 23rd Ed. 2017,2320 A+B	165	5-1500	200	600
42.	Total Hardness as CaCO ₃ (mg/l)	APHA, 23rd Ed. 2017,2340 A+C	202	5-1500	200.0	600.0
43.	Calcium as Ca (mg/l)	APHA, 23rd Ed. 2017, 3500 Ca A+B	46.5	5 - 1000	75.0	200.0
44.	Magnesium as Mg (mg/l)	APHA, 23rd Ed. 2017, 3500 Mg A+B	16.2	5-1000	30.0	100.0
45.	Chloride as Cl (mg/l)	APHA, 23rd Ed. 2017,4500 Cl A+B	26.4	5-1000	250.0	1000.0
46.	Sulfate as SO ₄ (mg/l)	APHA, 23rd Ed. 2017,4500 SO ₄ - E	41.5	5-200	200.0	400.0
47.	Nitrate Nitrogen as NO ₃ (mg/l)	APHA, 23rd Ed. 2017, 4500 NO ₃ - B	5.2	5-100	45.0 (Max)	No Relax.
48.	Fluorides as F (mg/l)	APHA, 23rd Ed. 2017,4500-C	0.4	0.02-10	1.0	1.5
49.	Copper as Cu (mg/l)	APHA, 23rd Ed. 2017, 3111A+C	BDL	0.04-5	0.05	1.5
50.	Iron as Fe (mg/l)	APHA, 23rd Ed. 2017, 3500 Fe B	0.038	0.02-50	0.3 (Max)	No Relax.
51.	Manganese as Mn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-5	0.10	0.30
52.	Mercury as Hg (mg/l)	APHA, 23rd Ed. 2017, 3112 A+B	BDL	0.001-2	0.001(Max)	No Relax.
53.	Aluminium as Al (mg/l)	APHA, 23rd Ed. 2017, 3500 Al A+B	BDL	0.02-100	0.03 (Max)	0.2
54.	Cadmium as Cd (mg/l)	APHA, 23rd Ed. 2017,3111 A+B	BDL	0.002-2	0.003(Max)	No Relax
55.	Arsenic as As (mg/l)	APHA, 23rd Ed. 2017, 3114 C	BDL	0.01-2	0.01(Max)	No Relax
56.	Lead as Pb (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.02-5	0.01	No Relax.
57.	Zinc as Zn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	0.32	0.02-50	5	15
58.	Selenium as Se (mg/l)	APHA 23 rd Ed.2017 3500 Se-C	BDL	0.01-10	0.01(Max)	No Relax
59.	Chromium as Cr+6 (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.05(Max)	No Relax.
60.	Boron as B (mg/l)	APHA, 23rd Ed. 2017, 4500 B A+C	BDL	0.2-2	0.5	1.0
61.	Cyanide as CN (mg/l)	APHA, 23rd Ed. 2017, 4500 CN-A+C	BDL	0.02-5	0.05	No Relax
62.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-5	0.001	0.002
63.	Anionic Detergents as MBAS(mg/l)	APHA, 23rd Ed. 2017, 5540 A+C	BDL	0.01-5	0.2	1.0
64.	Free Residual Chlorine (mg/l)	APHA, 23rd Ed. 2017, 4500-Cl B	BDL	0.1-5	0.20	1.0
65.	Total coliform (MPN/100 ml)	APHA, 23rd Ed. 2017, A+ B	Absent	1.8	Absent	Absent
66.	E-Coli (Nos/100)	APHA, 23rd Ed. 2017, 9221 A+ F	Absent	1.8	Absent	Absent
67.	Fecal Coliform (MPN/100 ml)	APHA, 23rd Ed. 2017, 9221 E	Absent	1.8	-	-
68.	Pesticide	APHA, 23rd Ed. 2017, 6630 B&C	BDL	2-10	No Relaxation	No Relaxation

*These results are related only to item tested.

BDL = Below Detection Limit

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Analyst

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FORMAT NO. ECO/QS/FORMAT/10 TEST REPORT NO: ECO LAB/DUSTFALL/04/21

TEST REPORT ISSUE DATE: 09.04.2021

Dust Fall Analysis Report

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

Sl. No.	Duration of Monitoring	Concentration of Pollutant (t/km ² /month)				
		Total Dust Fall (t/km ² /month)	Analysis Results			
1	01.03.2021 To 31.03.2021	0.92	Co (%)	Ni (%)	Hg (%)	As (%)
			<0.001	<0.001	<.001	<0.001

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


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

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

TEST REPORT ISSUE DATE: 09.04.2021

TEST REPORT OF FUGITIVE EMISSION MONITORING

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

Location : 50 mtr from Haul Road (H-Quarry)

Date of Sampling : 19.03.2021

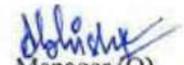
Sampling Method : IS: 5182(Part 23): 2006

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

Sl. No.	Test conducted	Standard Method	Unit	Result	Max. Prescribed Standard as per G.S.R. 46(E) dtd. 3 rd Feb 2006 (MoEF&CC)
1.	Suspended Particulate Matter (SPM)	IS : 5182-Part-4	$\mu\text{g}/\text{m}^3$	842	1200 mg/m^3 at 25+5 m from the source of generation
2.	Respirable Particulate Matter (RPM)	IS : 5182-Part-4	$\mu\text{g}/\text{m}^3$	285	500 mg/m^3 at 25+5 m from the source of generation


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

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

TEST REPORT ISSUE DATE: 09.04.2021

TEST REPORT OF FUGITIVE EMISSION MONITORING

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

Location : 100 mtr from Screen Plant (D-Quarry)

Date of Sampling : 19.03.2021

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

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

Sl. No.	Test conducted	Standard Method	Unit	Result	Max. Prescribed Standard as per G.S.R. 46(E) dtd. 3 rd Feb 2006 (MoEF&CC)
1.	Suspended Particulate Matter (SPM)	IS : 5182-Part-4	µg/m ³	910	1200 mg/m ³ at 25+5 m from the source of generation
2.	Respirable Particulate Matter (RPM)	IS : 5182-Part-4	µg/m ³	314	500 mg/m ³ at 25+5 m from the source of generation


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

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

TEST REPORT ISSUE DATE: 09.04.2021

TEST REPORT OF FUGITIVE EMISSION MONITORING

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

Location : 50 mtrs from Haul Road (D-Quarry)

Date of Sampling : 21.03.2021

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

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

Sl. No.	Test conducted	Standard Method	Unit	Result	Max. Prescribed Standard as per G.S.R. 46(E) dtd. 3 rd Feb 2006 (MoEF&CC)
1.	Suspended Particulate Matter (SPM)	IS : 5182-Part-4	$\mu\text{g}/\text{m}^3$	670	1200 mg/m^3 at 25+5 m from the source of generation
2.	Respirable Particulate Matter (RPM)	IS : 5182-Part-4	$\mu\text{g}/\text{m}^3$	182	500 mg/m^3 at 25+5 m from the source of generation


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

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

TEST REPORT ISSUE DATE: 9.04.2021

TEST REPORT OF FUGITIVE EMISSION MONITORING

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

Location : Near Sorting Yard (D-Quarry)

Date of Sampling : 25.03.2021

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

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

Sl. No.	Test conducted	Standard Method	Unit	Result	Max. Prescribed Standard as per G.S.R. 46(E) dtd. 3 rd Feb 2006 (MoEF&CC)
1.	Suspended Particulate Matter (SPM)	IS : 5182-Part-4	µg/m ³	612	1200 mg/m ³ at 25+5 m from the source of generation
2.	Respirable Particulate Matter (RPM)	IS : 5182-Part-4	µg/m ³	170	500 mg/m ³ at 25+5 m from the source of generation


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FORMAT NO. ECO/QS/FORMAT/10

TEST REPORT NO: ECO LAB/01/21

TEST REPORT ISSUE DATE: 09.04.2021

Personal Dust Sampling Analysis Report

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

Sampling Method : IS: 5182

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

Sampling Representative : Departmental & Contractual Mine Workers

Sl. No	Date of Sampling	Name of the Person Sampled	Occupation/ Designation	Personal Number/ Gate Pass Number	Max. Permissible Value (8hr TWA)	Respirable Particulate matter as RPM(mg/m ³) 8-hr TWA
1	06-03-2021	Manju Devi	Sorting Labour	TSP/753281	3.0 mg/m ³	1.68
2	09-03-2021	S.S Palai	Horticulture Supervisor	TSL (Departmental)	(Ref. DGMS (Tech.) (S&T) Circular No.01 Dhanbad, Dated 21st January 2010)	1.52
3	12-03-2021	Jagannath Giri	Mine Foreman	TSL (Departmental)		1.82
4	15-03-2021	Trinatha Mahanta	Security supervisor	SIS		1.42
5	19-03-2021	Rajesh Patra	Dumper Operator	-		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: 09.04.2021

TEST REPORT OF WASTE WATER*

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

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

Sampling Method : APHA/ IS: 3025

Sample Collected by : Sangram Das

Sample Quantity : As per requirement.

Date of Sampling : 07/3/2021

Date of Sample Receiving : 10/3/2021

Date of Analysis : 11/3/2021 to 25/3/2021

Source of Sample : Bichhakundi **STP Inlet**

Sl. No.	Tests Parameter(s)	Protocol	Result	Limits of Detection
1.	Colour (Hazen unit)	APHA, 23 rd Ed. 2017, 2120 B	19.0	5-100
2.	Odour	APHA, 23 rd Ed. 2017, 2150 B	Pungent	Agreeable
3.	Particulate sizein (μ) Size	APHA, 23 rd Ed. 2017, 2540-D	≥ 850	100 - 1200
4.	pH	APHA, 23 rd Ed. 2017, 4500 H+ A+B	7.43	2-12
5.	Temperature ($^{\circ}$ C)	APHA, 23 rd Ed. 2017, 2550A+B	27.0	10-100
6.	Oil & Grease as O & G (mg/l)	APHA, 23 rd Ed. 2017, 5520 (A+D)	6.2	5-600
7.	Total Residual Chlorine (mg/l)	APHA, 23 rd Ed. 2017, 4500-Cl B	BDL	0.1-5
8.	Ammonical Nitrogen as NH ₃ - N(mg/l)	APHA, 23 rd Ed. 2017, 4500 NH ₃ A+F	4.8	1-100
9.	Total Kjeldahal Nitrogen as NH ₃ (mg/l)	APHA, 23 rd Ed. 2017, 4500 Norg A+C	23.6	5-100
10.	Free Ammonia as NH ₃ (mg/l)	APHA, 23 rd Ed. 2017, 4500 NH ₃ A+F	0.52	0.05-5.0
11.	Biochemical Oxygen Demand as BOD (mg/l) 3days at 27 $^{\circ}$ C	APHA, 23 rd Ed. 2017, 5210 A+B	36.2	5-10000
12.	Chemical Oxygen Demand as COD (mg/l)	APHA, 23 rd Ed. 2017, 5220 A+C	262.4	5-50000
13.	Arsenic as As (mg/l)	APHA, 23 rd Ed. 2017, 3114 B	BDL	0.01-2
14.	Mercury as Hg (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.001-2
15.	Lead as Pb (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.01-5
16.	Cadmium as Cd (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.02-5
17.	Hexavalent Chromium as Cr ⁺⁶ (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.05-20
18.	Total Chromium as Cr (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.05-50
19.	Copper as Cu (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.05-5

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Sl. No.	Tests Parameter(s)	Protocol	Result	Limits of Detection
20.	Zinc as Zn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	0.046	0.02-50
21.	Selenium as Se (mg/l)	APHA, 23rd Ed. 2017, 4500 Se-A+D	BDL	0.01-1
22.	Nickel as Ni (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.02-5
23.	Fluoride as F (mg/l)	APHA, 23rd Ed. 2017, 4500 F C+D	0.21	0.02-10
24.	Dissolved Phosphate as PO ₄ (mg/l)	APHA, 23rd Ed. 2017, 4500 - PD	2.06	0.5-100
25.	Sulphide as S ₂ -(mg/l)	APHA, 23 rd Ed. 2017, 4500 S ² -F	0.21	0.1-10
26.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-10
27.	Bioassay (%)	APHA, 23rd Ed. 2017, 8910 C	85	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 ₃ (mg/l)	APHA, 23 rd Ed. 2017,(4500-NO,A+ B)	2.48	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: 09.04.2021

TEST REPORT OF WASTE WATER*

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

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

Sampling Method : APHA/ IS: 3025

Sample Collected by : Sangram Das

Sample Quantity : As per requirement.

Date of Sampling : 07/3/2021

Date of Sample Receiving : 10/3/2021

Date of Analysis : 11/3/2021 to 14/3/2021

Source of Sample : Bichhakundi **STP Outlet**

Sl. No.	Tests	Protocol	Result	Limits of Detection	G.S.R 422(E)
					Desirable Limit
1.	Colour (Hazen unit)	APHA, 23 rd Ed. 2017, 2120 B	<5.0	5-100	-
2.	Odour	APHA, 23 rd Ed. 2017, 2150 B	Odourless	Agreeable	Agreeable
3.	Particulate size in (μ)	APHA, 23 rd Ed. 2017, 2540-D	250	100 - 1200	Shall pass 850 Micron IS Sieve
4.	pH	APHA, 23 rd Ed. 2017, 4500 H+ A+B	7.4	2-12	5.5-9.0
5.	Temperature (°C)	APHA, 23 rd Ed. 2017, 2550A+B	26.2	10-100	-
6.	Oil & Grease as O & G (mg/l)	APHA, 23 rd Ed. 2017, 5520 (A+D)	BDL	5-600	10.0
7.	Total Residual Chlorine (mg/l)	APHA, 23 rd Ed. 2017, 4500-Cl B	0.56	0.1-5	1.0
8.	Ammonical Nitrogen as NH ₃ - N(mg/l)	APHA, 23 rd Ed. 2017, 4500 NH ₃ A+F	1.34	1-100	50.0
9.	Total Kjeldahal Nitrogen as NH ₃ (mg/l)	APHA, 23 rd Ed. 2017, 4500 Norg A+C	12.8	5-100	100.0
10.	Free Ammonia as NH ₃ (mg/l)	APHA, 23 rd Ed. 2017, 4500 NH ₃ A+F	BDL	0.05-5.0	5.0
11.	Biochemical Oxygen Demand as BOD (mg/l) 3days at 27°C	APHA, 23 rd Ed. 2017, 5210 A+B	11.4	5-10000	30.0
12.	Chemical Oxygen Demand as COD (mg/l)	APHA, 23 rd Ed. 2017, 5220 A+C	52.4	5-50000	250.0
13.	Arsenic as As (mg/l)	APHA, 23 rd Ed. 2017, 3114 B	BDL	0.01-2	0.2
14.	Mercury as Hg (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.001-2	0.01
15.	Lead as Pb (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.01-5	0.1
16.	Cadmium as Cd (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.02-5	0.2
17.	Hexavalent Chromium as Cr ⁺⁶ (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.1
18.	Total Chromium as Cr (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.05-50	2.0
19.	Copper as Cu (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.05-5	2.0

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Sl. No.	Tests	Protocol	Result	Limits of Detection	G.S.R 422(E)
					Desirable Limit
20.	Zinc as Zn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B		0.02-50	5.0
21.	Selenium as Se (mg/l)	APHA, 23rd Ed. 2017, 4500 Se-A+D	BDL	0.01-1	0.05
22.	Nickel as Ni (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.02-5	2.0
23.	Fluoride as F (mg/l)	APHA, 23rd Ed. 2017, 4500 F C+D	0.20	0.02-10	2.0
24.	Dissolved Phosphate as PO ₄ (mg/l)	APHA, 23rd Ed. 2017, 4500 - PD	BDL	0.5-100	5.0
25.	Sulphide as S ₂ -(mg/l)	APHA, 23 rd Ed. 2017, 4500 S ² - F	BDL	0.1-10	2.0
26.	Phenolic Compounds as C ₆ H ₅ 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 ₃ (mg/l)	APHA, 23 rd Ed. 2017,(4500-NO ₃ A+ B)	5.40	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: 09.02.2021

TEST REPORT OF WASTE WATER*

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

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

Sampling Method : APHA/ IS: 3025

Sample Collected by : Sangram Das

Sample Quantity : As per requirement.

Date of Sampling : 7/3/2021

Date of Sample Receiving : 10/3/2021

Date of Analysis : 11/3/2021 to 14/3/2021

Source of Sample : **Joda West Workshop Effluent (After Skimming)**

Sl. No.	Tests	Protocol	Result	Limits of Detection	G.S.R 422(E)
					Desirable Limit
1.	Colour (Hazen unit)	APHA, 23 rd Ed. 2017, 2120 B	<5.0	5-100	-
2.	Odour	APHA, 23 rd Ed. 2017, 2150 B	Odourless	Agreeable	Agreeable
3.	Particulate size in (μ)	APHA, 23 rd Ed. 2017, 2540-D	250	100 - 1200	Shall pass 850 Micron IS Sieve
4.	pH	APHA, 23 rd Ed. 2017, 4500 H+ A+B	7.2	2-12	5.5-9.0
5.	Temperature (°C)	APHA, 23 rd Ed. 2017, 2550A+B	24.2	10-100	-
6.	Oil & Grease as O & G (mg/l)	APHA, 23 rd Ed. 2017, 5520 (A+D)	BDL	5-600	10.0
7.	Total Residual Chlorine (mg/l)	APHA, 23 rd Ed. 2017, 4500-Cl B	0.05	0.1-5	1.0
8.	Ammonical Nitrogen as NH ₃ - N(mg/l)	APHA, 23 rd Ed. 2017, 4500 NH ₃ A+F	1.02	1-100	50.0
9.	Total Kjeldahal Nitrogen as NH ₃ (mg/l)	APHA, 23 rd Ed. 2017, 4500 Norg A+C	6.4	5-100	100.0
10.	Free Ammonia as NH ₃ (mg/l)	APHA, 23 rd Ed. 2017, 4500 NH ₃ A+F	BDL	0.05-5.0	5.0
11.	Biochemical Oxygen Demand as BOD (mg/l) 3days at 27°C	APHA, 23 rd Ed. 2017, 5210 A+B	5.3	5-10000	30.0
12.	Chemical Oxygen Demand as COD (mg/l)	APHA, 23 rd Ed. 2017, 5220 A+C	32.4	5-50000	250.0
13.	Arsenic as As (mg/l)	APHA, 23 rd Ed. 2017, 3114 B	BDL	0.01-2	0.2
14.	Mercury as Hg (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.001-2	0.01
15.	Lead as Pb (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.01-5	0.1
16.	Cadmium as Cd (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.02-5	0.2
17.	Hexavalent Chromium as Cr ⁺⁶ (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.1
18.	Total Chromium as Cr (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.05-50	2.0
19.	Copper as Cu (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.05-5	2.0

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Sl. No.	Tests	Protocol	Result	Limits of Detection	G.S.R 422(E)
					Desirable Limit
20.	Zinc as Zn (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B		0.02-50	5.0
21.	Selenium as Se (mg/l)	APHA, 23rd Ed. 2017, 4500 Se-A+D	BDL	0.01-1	0.05
22.	Nickel as Ni (mg/l)	APHA, 23rd Ed. 2017, 3111 A+B	BDL	0.02-5	2.0
23.	Fluoride as F (mg/l)	APHA, 23rd Ed. 2017, 4500 F C+D	0.05	0.02-10	2.0
24.	Dissolved Phosphate as PO ₄ (mg/l)	APHA, 23rd Ed. 2017, 4500 - PD	BDL	0.5-100	5.0
25.	Sulphide as S ₂ -(mg/l)	APHA, 23 rd Ed. 2017, 4500 S ² - F	BDL	0.1-10	2.0
26.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA, 23rd Ed. 2017, 5530 A+C	BDL	1-10	1.0
27.	Bioassay (%)	APHA, 23rd Ed. 2017, 8910 C	87%	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	1.25	0.01-20	2.0
29.	Iron as Fe (mg/l)	APHA, 23rd Ed. 2017, 3500 Fe B	1.6	0.02-100	3.0
30.	Nitrate Nitrogen as NO ₃ (mg/l)	APHA, 23 rd Ed. 2017,(4500-NO ₃ A+ B)	3.2	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:09.04.2021

TEST REPORT OF SURFACE WATER*

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

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

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 12/3/2021

Date of Sample Receiving : 15/3/2021

Date of Analysis : 16/3/2021 to 20/3/2021

Source of Sample : Sona River (U/p Stream of H-Quarry)

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	IS:2296 Class-C
1.	pH	APHA,23 rd Ed.2017,4500H ⁺ A+B	7.12	2-12	8.5
2.	Colour (Hazen unit)	APHA, 23 rd Ed. 2017, 2120 B	25.0	5-100	
3.	Total Dissolved Solids as TDS (mg/l)	APHA,23 rd Ed.2017 , 2540C	442.0	5-10000	1500
4.	Dissolved Oxygen as DO (mg/l)	APHA,23 rd Ed.2017 ,4500 A+C	5.80	2-10	4.0(min)
5.	Biochemical Oxygen Demand as BOD (mg/l) 3 days at 27 °C	APHA,23 rd Ed.2017 ,5210A+ B	BDL	5-10000	3.0
6.	Nitrate Nitrogen as NO ₃ (mg/l)	APHA, 23 rd Ed. 2017, 4500 NO ₃ - B	7.8	5-100	50.0
7.	Fluorides as F (mg/l)	APHA,23 rd Ed.2017 ,4500 -C	0.27	0.05-10	1.5
8.	Sulfate as SO ₄ (mg/l)	APHA,23 rd Ed.2017 ,4500 -SO ₄ ²⁻ E	28.4	1.0-250	400.0
9.	Iron as Fe (mg/l)	APHA,23 rd Ed.2017 ,3500 Fe B	2.6	0.02-50	50.0
10.	Copper as Cu (mg/l)	APHA,23 rd Ed.2017, 3111A+B	BDL	0.05-5	1.5
11.	Cadmium as Cd (mg/l)	APHA,23 rd Ed.2017, 3111A+B	BDL	0.002-2	0.01
12.	Arsenic as As(mg/l)	APHA,23 rd Ed.2017, 3114C	BDL	0.01-2	0.2
13.	Chloride as Cl ⁻ (mg/l)	APHA, 23 rd Ed. 2017,4500 Cl A+B	18.0	5-1000	600
14.	Chromium as Cr+6 (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.05
15.	Cyanide as CN (mg/l)	APHA,23 rd Ed.2017,4500 ,CN A+D	BDL	0.005-5	0.05
16.	Lead as Pb (mg/l)	APHA,23 rd Ed.2017, 3111A+B	BDL	0.01-2	0.1
17.	Selenium as Se (mg/l)	APHA,23 rd Ed.2017, 3500 Se-C	BDL	0.005-1	0.01
18.	Zinc as Zn (mg/l)	APHA,23 rd Ed.2017, 3111A+B	0.22	0.02-50	15
19.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA,23 rd Ed.2017, 5530 A+C	BDL	0.004-5	0.005
20.	Total coliform (MPN/100 ml)	APHA,23 rd Ed.2017, 9221 A+ B	218.0	1.8	5000
21.	Anionic Detergents (As MBAS)(mg/l) max	APHA 22 nd 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

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FORMAT NO. ECO/QS/FORMAT/09

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

TEST REPORT ISSUE DATE:09.04.2021

TEST REPORT OF SURFACE WATER*

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

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

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 12/3/2021

Date of Sample Receiving : 15/3/2021

Date of Analysis : 16/3/2021 to 20/3/2021

Source of Sample : Sona River (D/n Stream of H-Quarry)

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	IS:2296 Class-C
1.	pH	APHA,23 rd Ed.2017,4500H ⁺ A+B	7.43	2-12	8.5
2.	Colour (Hazen unit)	APHA, 23 rd Ed. 2017, 2120 B	25	5-100	
3.	Total Dissolved Solids as TDS (mg/l)	APHA,23 rd Ed.2017 ,2540C	403.0	5-10000	1500
4.	Dissolved Oxygen as DO (mg/l)	APHA,23 rd Ed.2017 ,4500 A+C	6.2	2-10	4.0(min)
5.	Biochemical Oxygen Demand as BOD (mg/l)	APHA,23 rd Ed.2017 ,5210A+ B	BDL	5-10000	3.0
6.	Nitrate Nitrogen as NO ₃ (mg/l)	APHA, 23 rd Ed. 2017, 4500 NO ₃ - B	6.1	5-100	50.0
7.	Fluorides as F (mg/l)	APHA,23 rd Ed.2017 ,4500 -C	0.21	0.05-10	1.5
8.	Sulfate as SO ₄ (mg/l)	APHA,23 rd Ed.2017 ,4500 -SO ₄ ²⁻ E	30.7	1.0-250	400.0
9.	Iron as Fe (mg/l)	APHA,23 rd Ed.2017 ,3500 Fe B	2.52	0.02-50	50.0
10.	Copper as Cu (mg/l)	APHA,23 rd Ed.2017, 3111A+B	BDL	0.05-5	1.5
11.	Cadmium as Cd (mg/l)	APHA,23 rd Ed.2017, 3111A+B	BDL	0.002-2	0.01
12.	Arsenic as As(mg/l)	APHA,23 rd Ed.2017, 3114C	BDL	0.01-2	0.2
13.	Chloride as Cl ⁻ (mg/l)	APHA,23 rd Ed.2017, 3111 - A +B	19.2	5-1000	600
14.	Chromium as Cr+6 (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.05
15.	Cyanide as CN (mg/l)	APHA,23 rd Ed.2017,4500 ,CN A+D	BDL	0.005-5	0.05
16.	Lead as Pb (mg/l)	APHA,23 rd Ed.2017, 3111A+B	BDL	0.01-2	0.1
17.	Selenium as Se (mg/l)	APHA,23 rd Ed.2017, 3500 Se-C	BDL	0.005-1	0.01
18.	Zinc as Zn (mg/l)	APHA,23 rd Ed.2017, 3111A+B	0.023	0.02-50	15
19.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA,23 rd Ed.2017, 5530 A+C	BDL	0.004-5	0.005
20.	Total coliform (MPN/100 ml)	APHA,23 rd Ed.2017, 9221 A+ B	202.0	1.8	5000
21.	Anionic Detergents (As MBAS)(mg/l) max	APHA 22 nd 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

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FORMAT NO. ECO/QS/FORMAT/09

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

TEST REPORT ISSUE DATE:09.04.2021

TEST REPORT OF SURFACE WATER*

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

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

Sampling Method : APHA/ IS: 3025

Sample Collected by : Swaraj Swain

Sample Quantity : As per requirement.

Date of Sampling : 12/3/2021

Date of Sample Receiving : 15/3/2021

Date of Analysis : 16/3/2021 to 20/3/2021

Source of Sample : Mine Pit Water (D-Quarry)

Sl. No.	TESTS	PROTOCOL	RESULT	Detection Range	IS:2296 Class-C
1.	pH	APHA,23 rd Ed.2017,4500H ⁺ A+B	7.34	2-12	8.5
2.	Colour (Hazen unit)	APHA, 23 rd Ed. 2017, 2120 B	13.0	5-100	
3.	Total Dissolved Solids as TDS (mg/l)	APHA,23 rd Ed.2017 , 2540C	202.0	5-10000	1500
4.	Dissolved Oxygen as DO (mg/l)	APHA,23 rd Ed.2017 ,4500 A+C	5.50	2-10	4.0(min)
5.	Biochemical Oxygen Demand as BOD (mg/l)	APHA,23 rd Ed.2017 ,5210A+ B	BDL	5-10000	3.0
6.	Nitrate Nitrogen as NO ₃ (mg/l)	APHA, 23 rd Ed. 2017, 4500 NO ₃ - B	BDL	5-100	50.0
7.	Fluorides as F (mg/l)	APHA,23 rd Ed.2017 ,4500 -C	0.30	0.05-10	1.5
8.	Sulfate as SO ₄ (mg/l)	APHA,23 rd Ed.2017 ,4500 -SO ₄ ²⁻ E	21.2	1.0-250	400.0
9.	Iron as Fe (mg/l)	APHA,23 rd Ed.2017 ,3500 Fe B	1.2	0.02-50	50.0
10.	Copper as Cu (mg/l)	APHA,23 rd Ed.2017, 3111A+B	BDL	0.05-5	1.5
11.	Cadmium as Cd (mg/l)	APHA,23 rd Ed.2017, 3111A+B	BDL	0.002-2	0.01
12.	Arsenic as As(mg/l)	APHA,23 rd Ed.2017, 3114C	BDL	0.01-2	0.2
13.	Chloride as Cl ⁻ (mg/l)	APHA, 23 rd Ed. 2017,4500 Cl A+B	30.2	5-1000	600
14.	Chromium as Cr+6 (mg/l)	APHA, 23 rd Ed. 2017, 3111 A+B	BDL	0.05-20	0.05
15.	Cyanide as CN (mg/l)	APHA,23 rd Ed.2017,4500 ,CN A+D	BDL	0.005-5	0.05
16.	Lead as Pb (mg/l)	APHA,23 rd Ed.2017, 3111A+B	BDL	0.01-2	0.1
17.	Selenium as Se (mg/l)	APHA,23 rd Ed.2017, 3500 Se-C	BDL	0.005-1	0.01
18.	Zinc as Zn (mg/l)	APHA,23 rd Ed.2017, 3111A+B	0.021	0.02-50	15
19.	Phenolic Compounds as C ₆ H ₅ OH (mg/l)	APHA,23 rd Ed.2017, 5530 A+C	BDL	0.004-5	0.005
20.	Total coliform (MPN/100 ml)	APHA,23 rd Ed.2017, 9221 A+ B	Absent	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

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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 : Joda West 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	33.5	19.4	52.9	13.2	1.7	0	SE	0
2	02.03.2021	36.2	16.9	69.4	13.5	2.4	0	NE	0
3	03.03.2021	34.7	15.6	66.0	13.3	0.6	0	SW	0
4	04.03.2021	35.6	16.9	61.7	12.4	1.8	0	SW	0
5	05.03.2021	35.0	15.7	53.8	12.6	2.5	0	SSW	0
6	06.03.2021	34.6	18.2	48.2	15.4	3.2	0	NS	0
7	07.03.2021	36.6	16.2	41.6	8.5	4.6	0	SE	0
8	08.03.2021	36.0	16.8	54.8	12.4	2.2	0	SSE	0
9	09.03.2021	37.7	19.7	75.6	13.5	1.4	0	SW	0
10	10.03.2021	37.4	20.5	62.0	19.3	1.8	0	SE	0
11	11.03.2021	36.2	17.5	78.6	24.59	2.9	0	SSE	0
12	12.03.2021	35.1	19.5	82.4	32.92	2.6	0	SW	0
13	13.03.2021	28.0	16.7	94.3	48.51	1.4	0	NE	0
14	14.03.2021	43.2	15.4	94.2	25.49	1.9	0	SE	0
15	15.03.2021	38.8	15.6	83.9	18.33	1.8	0	SE	0
16	16.03.2021	36.3	17.3	76.1	16.8	1.6	0	NE	0
17	17.03.2021	39.9	17.4	77.8	20.49	1.3	0	SE	0
18	18.03.2021	40.2	18.8	75.9	12.82	4.9	0	SW	0
19	19.03.2021	40.1	18.8	71.2	18.81	1.9	0	SE	0
20	20.03.2021	41.3	20.4	85.9	24.8	2.2	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.		
21	21.03.2021	36.8	23.45	46.19	21.3	1.3	0	SW	0
22	22.03.2021	37.4	20.33	52.23	15.2	1.4	0	SE	0
23	23.03.2021	38.4	20.56	64.2	22.4	1.6	0	SE	0
24	24.03.2021	39.3	21.48	63.64	22.1	2.2	0	SSW	0
25	25.03.2021	36.85	21.07	55.56	17.8	2.5	0	SE	0
26	26.03.2021	41.7	19.75	62.01	21.4	2.6	0	SE	0
27	27.03.2021	35.6	19.43	68.34	23.7	2.3	0	SE	0
28	28.03.2021	39.3	20.05	66.13	13.8	1.6	0	SE	0
26	29.03.2021	39.3	20.51	69.36	15.6	1.8	0	SE	0
30	30.03.2021	41.9	24.4	33.81	11.6	3.4	0	SW	0
31	31.03.2021	43.4	25.7	25.59	13.4	3.8	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/ON/06/21

TEST REPORT ISSUE DATE: 09.04.2021

TEST REPORT OF OCCUPATIONAL/WORKPLACE NOISE MONITORING

Name of the Customer : Joda West 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	5-03-2021	Workshop (HEMM)	Maintenance (HEMM)	66.5	85.0
2	11-03-2021	Screen Plant	Supervision	72.4	85.0
3	15-03-2021	Mr. Jagannat Giri	Mining Foreman	68.5	85.0
4	16-03-2021	Mr. Suresh Naik	Sorting Labour	70.3	85.0
5	19-03-2021	Near Stack yard	Stacking of ore	69.5	85.0


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FORMAT NO. ECO/QS/FORMAT/13

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

TEST REPORT ISSUE DATE: 09.04.2021

TEST REPORT OF GROUND WATER LEVEL

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

Sample Collected By : Ecomen Team using Integrated Sound Level Meter
Instrument Used : Ecomen Representative using Water Level Indicator

Frequency of Sampling : Fort-nightly

S.No.	Location	Structure Type	Water Level (mbgl)	
			7-03-2021	26-03-2021
1	Well at Roida Village	Open dug Well	17.5	17.4
2	Well at Joda Market	Open dug Well	13.4	13.4
3	Well at Municipality (Joda)	Open dug Well	9.9	9.6
4	Well at Bichhakundi Basti	Open dug Well	11.6	11.5

*mbgl-mtr below ground level

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