TATA

Regd Post with A/D

Ref.No.: MGM/P&E/688/15 Date : 27/09/2015

The Member Secretary,
State Pollution Control Board, Orissa,
A/118, Nilakantha Nagar,
Bhubaneswar

Sub : Submission of Annual Environment Statement (FORM-V)

Dear Sir,

We are enclosing herewith two sets of Annual Environment Statement in Form-V for Joda West Manganese Mine, M/s TATA Steel Ltd. for the year ending 31st March'2015.

This is for your kind perusal.

Thanking you,

Yours faithfully,

F: TATA STEEL LTD.

Manager
Joda West Manganese Mine.

Encl: as above.

Copy to :

- The Regional Officer, State Pollution Control Board, Baniapat, DD College Road, Keonjhar, Orissa with enclosure.

TATA STEEL LIMITED
Manganese Group of Mines,Joda Ferro Alloys & Minerals Division. At/PO- Bichakundi , Via Joda.
Dist Keonjhar. Odisha-758034
Phone No +91 9238101370
Registered Office: Bombay House ,24 ,Homi Mody Street Fort, Mumbai 400 001,India.
Corporate Identity Number L27100MH1907PLC000260,Website:www.tatasteel.com

ENVIRONMENTAL STATEMENT

2014-15

UNDER RULE 14 OF ENVIRONMENT (PROTECTION) RULES, 1986

In

FORM - V

JODA WEST MANGANESE MINES

TATA STEEL LIMITED

SEPTEMBER 2015

FORM V

[See Rule 14 of Environment (Protection) Rules, 1986]

ENVIRONMENTAL STATEMENT
FOR THE FINANCIAL YEAR ENDING THE 31ST MARCH 2015

PART – A

(i)	Name and Address of the Owner / occupier of the industry operation or process.	:	**JODA WEST MANGANESE MINE** Nominated Owner :- Mr. T.V. Narendran. Managing Director, M/s TATA Steel Ltd. Jamshedpur, Dist- East Singhbhum Jharkhand – 831001 Agent :- Mr. S. N. Jha Head (Manganese Group of Mines), Joda, FA & MD, TATA Steel P.O.: Bichhakundi, Via : Joda Dist : Keonjhar, Orissa – 758034
(ii)	Industry Category	:	Opencast Mining
(iii)	Production Capacity – Units	:	1,80,000 TPA (Manganese Ore)
(iv)	Year of Establishment	:	1933
(v)	Date of the last environmental statement submitted	:	27th Sept'2014 (Vide Letter No.JW/P&E/1052/14, Dt.27.09.2014)

PART – B

Water and Raw Material Consumption

(1) Water Consumption m^3/day

Process : 41.08 m^3/day (Water sprinkling – Avg. during 2014-15)
Cooling : Nil
Domestic : 4632.33 m^3/day (Avg. during 2014-15)

Name of the Products	Process water consumption per unit of product output	
	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.

(2) Raw material consumption

Name of the raw materials	Name of the product	Consumption of raw materials per unit	
		During the previous Financial year	During the current Financial year
Manganese Ore	Manganese Ore	Year – 2013-14 Production :- 139945.977 MT Dispatch :- 177105.520 MT	Year – 2014-15 Production :- 105067.853MT Dispatch :- 69584.560MT

Remarks : Produced Manganese Ore dispatched to Ferro Alloys Plants within India.

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	*The process of Manganese Ore production includes blasting, removal of overburden, breaking and sizing of ore to required size and then transportation to the customer does not require consumption of water. Thus, there is no process discharge from*		

	the mine. *The six month average surface water quality data is enclosed as Annexure – I. It shows that the concentrations of the pollutants are well within the permissible standards.*
(b) Air	*Since this is an open cast Mine, the dust generation is mainly due to the movement of vehicles in the haul roads, drilling activities etc, which is fugitive in nature and cannot be quantified. The fugitive dust is allayed by sprinkling of water by mobile tanker and development of green barrier by plantation around the residential area.* *The monthly average ambient air quality data is enclosed as Annexure – II. It shows that the concentrations of the pollutants are well within the permissible standards.*

PART – D

Hazardous Wastes

[As specified under the Hazardous wastes (Management & Handling) Rules, 1989]

Hazardous Wastes	Total Quantity	
	During the previous Financial year	During the current Financial year
	Year – 2013-14	Year – 2014-15
(i) From Process		
Waste Oil (in Ltrs.)	3.625	5.5
Used Oil (in Ltrs.)	78.0	210.10
Cotton Waste (in Kgs)	Nil	Nil
Duster (in Nos.)	Nil	Nil
Filters (in Nos.)	Nil	Nil
(ii) From pollution control facilities	Nil	Nil

PART – E

Solid Wastes

	Total Quantity	
	During the previous Financial year	During the current Financial year
	Year – 2013-14	Year – 2014-15
(a) From Process (Overburden rejects)	1183528.00 m^3	12,41,740.127MT
(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	1183528.00 m^3	12,41,740.127MT

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 composition of hazardous wastes like Waste Oil & used oil are Hydrocarbons, lead and used acids. The composition of the solid wastes (Overburden and rejects) contains lateritic morrum, shale and quartzite.*

- ***Disposal Practice:-***
  - *SOLID WASTES -The overburden is systematically and scientifically dumped on a geologically barren area and the same will be reclaimed by plantation after being declared inactive.*

  - *WASTE OIL -The waste 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. During transfer of waste oil to barrels, a trough is placed underneath in order to prevent land contamination due to oil spillage. Then at a fixed interval, these barrels are returned to Ferro Manganese Plant Stores for final disposal through auction to the authorized party.*

- *USED COTTON WASTES - The used cotton wastes generated at various locations are kept in designated barrels and at a fixed interval, these wastes are handed over to the Shift in-charge of the Furnace Section of FAP, Joda for incinerating in the Electric Are Furnace at a temperature of more than 1100 degree C.*

- *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 has been implemented in all drills. Controlled blasting pattern is being followed.*
4. *One double stage sedimentation basin with check dam had been provided at H'Quarry to prevent direct flow of surface run off to Kundra Nallah, a perennial source of water flowing along the western lease boundary. A multi-stage sedimentation basin with check dam had been provided at H'Quarry to prevent direct flow of surface run off to Kundra Nallah, a perennial source of water flowing along the western lease boundary. We have provided 5 nos. multi stage check dams with settling pits to further arrest the run-off and provide effective run-off management considering peak rainfall data.*
5. *29125 nos. of saplings of various forestry species were planted within the leasehold areas covering an area of 3.2 hectare at Joda West Mn.Mine with a survival rate of 92.67% during the year 2014-15.*
6. *The utilization of environment management for the period Apr'14 to Mar'15 was Rs. 45,27,839/- including Environmental Monitoring, Plantation activities and construction of toe-wall, check dams and garland drains.*
7. *In addition, Tata Steel Rural Development Society also undertakes the peripheral development activities with a large magnitude.*
8. *The total expenditure incurred (including railway siding which are under same management control) for pollution abatement measures are included in overhead cost. The total expenditure for Environment Management during the year 2014-15 was Rs. 45,27,839/- (Rs.43.09/MT) /-(Specific Average)*

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.*
9. *Maintenance of sedimentation basin with check dam at H' Quarry to prevent the direct flow of surface run-off to the nallah. One double stage sedimentation basin with check dam had been provided at H'Quarry to prevent direct flow of surface run off to Kundra Nallah, a perennial source of water flowing along the western lease boundary. A multi-stage sedimentation basin with check dam had been provided at H'Quarry to prevent direct flow of surface run off to Kundra Nallah, a perennial source of water flowing along the western lease boundary. We have provided 5 nos. multi stage check dams with settling pits to further arrest the run-off and provide effective run-off management considering peak rainfall data.*
b) *Plantation of forestry species shall be done over the inactive waste dump slopes to arrest the airborne dust.*

PART – I

Any other particulars for improving the quality of environment.

1. With compliance to conditions of Environment Clearance obtained from MoEF, the following monitoring is being done at regular interval.
   - *Ground Water Level at nearby bore wells*
   - *Trace metal in dust fall*
   - *Ground water quality at lower level*
   - *Meteorological monitoring*
   - *Trace metals such as Fe, Cr+6, Cu, Se, As, Cd, Hg, Pb, Zn and Mn at specific locations for both surface water (downstream & upstream) and ground water at lower elevation is being periodically monitored by referring to the standards as per BIS : 10500.*

2. Top soils generated during excavation are utilized immediately for nursery development and dump slope plantation.

3. Measures taken to control Air Pollution :-
   - *Water sprinkling on the haul road,*
   - *Provision of dust masks to the workmen,*
   - *Adoption of wet drilling arrangement in the drill machines and*
   - *Black topped road in the residential colony*.

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.

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. Nursery Development: - Local self-help groups are engaged for development of centralized nursery to grow the forestry saplings to facilitate the plantation programme at all the Manganese Mines under same management control.

8. Surveillance of Occupational Health: - *Periodical Medical Examination of employees (departmental & contractual) is conducted as per prescribed norms of Mines Rule, 1955. The initial and periodical examination includes blood hematology, blood pressure, detailed cardiovascular assessment, neurological examination etc. All chest radiographs are being classified for detection of pneumoconiosis, diagnosis and documentation made in accordance to ILO classifications. During 2011-12, 415 nos. of employees were examined while during 2012-13, 301 nos. of employees (contractual and departmental) were examined. During 2013-14 a total no. of 66 employees (Departmental-16 and contractor employees-50) were examined. In 2014-15, a total no. of 58 employees were examined (departmental-5 and contractor- 53). There are no findings of pneumoconiosis and manganese poisoning which is classified as occupational disease.*

9. The mine is certified with ISO-14001 (Environment Management System).

Manager
Joda West Manganese Mine.
M/s.TATA STEEL LTD.

Annexure – I

JODA-WEST (UPSTREAM) W1				April'14		May'14		June'14		July'14		Aug'14		Sep'14		Avg 6 months
Sl.	Parameters	Unit	Standard	1st Report	2nd Report	1st Report	2nd Report	1st Report	2nd Report	1st Report	2nd Report	1st Report	2nd Report	1st Report	2nd Report	W-1
1	Colour & Odour	--	300 & $	CL & U/O	CL & U/O	CL & U/O	CL & U/O	16 & U/O	19 & U/O	15 & U/O	15 & U/O	10 & U/O	10 & U/O	15 & U/O	10 & U/O	**10.63& U/O**
2	Suspended Solids	mg/l	$	34	29	26	22	112	94	141	138	134	169	139	155	**99.42**
3	Particular Size of S.S.	µ(micron)	$	<850	<850	<850	<850	<850	<850	<850	<850	<850	<850	<850	<850	**<850**
4	Dissolved Solids	mg/l	1500	121	112	108	101	149	174	187	176	174	182	181	169	**152.83**
5	PH	-	6.5-8.5	7.1	7.2	7.1	7.1	7.3	7.1	6.9	7.2	7.1	7.3	7.3	7.2	**7.16**
6	Temperature	^{0}C	$	25	25	25	25	25	25	25	25	25	25	25	25	**25.00**
7	Oil & Grease	mg/l	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**ND**
8	Total Residual Chlorine	mg/l	$	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**ND**
9	Amm. Nitrogen as N	mg/l	$	0.38	0.31	0.29	0.25	0.59	0.58	0.65	0.42	0.56	0.49	0.66	0.42	**ND**
10	Total Kjeldal Nitrogen as N	mg/l	$	0.97	0.91	0.85	0.84	1.33	1.37	1.58	1.22	1.44	1.18	1.53	1.11	**1.19**
11	Free Ammonia as NH_3	mg/l	$	ND	ND	ND	ND	ND	ND	0.003	0.004	0.004	0.005	0.005	0.005	**ND**
12	Dissolved Oxygen	mg/l	4	7.3	7.1	7.2	7.3	7.3	7	7.2	7.3	7.3	7.2	7.2	7.3	**7.23**
13	BOD (3) days at 27^{0}C	mg/l	3	1.12	1.09	1.01	0.95	1.33	1.58	1.25	1.37	1.17	1.26	1.08	1.18	**1.20**
14	COD	mg/l	$	3.3	3.27	3.17	2.87	4.87	4.39	3.68	4.04	3.55	3.71	3.21	3.57	**3.64**
15	Arsenic as As	mg/l	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
16	Mercury as Hg	mg/l	$	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
17	Lead as Pb	mg/l	0.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
18	Cadmium as Cd	mg/l	0.01	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
19	Hexa Chromium as Cr^{+6}	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
20	Total Chromium as Cr	mg/l	$	0.13	0.1	0.11	0.074	0.069	0.11	0.078	0.1	0.069	0.12	0.057	0.15	**0.097**
21	Copper as Cu	mg/l	1.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
22	Zinc as Zn	mg/l	15	0.16	0.12	0.13	0.09	0.13	0.14	0.19	0.18	0.16	0.15	0.14	0.2	**0.15**
23	Selenium as Se	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
24	Nickel as Ni	mg/l	$	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
25	Cyanide as CN	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
26	Fluoride as F	mg/l	1.5	0.048	0.041	0.037	0.035	0.09	0.18	0.074	0.11	0.065	0.089	0.048	0.066	**0.07**
27	Diss. Phosphate as P	mg/l	$	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
28	Sulphide as S	mg/l	$	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
29	Phenolic Compounds as C_6H_5OH	mg/l	$	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
30	Bio-assay Test	--	$	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	**98%.**
31	Manganese as Mn	mg/l	$	0.055	0.055	0.042	0.042	0.087	0.16	0.11	0.11	0.1	0.074	0.09	0.065	**0.083**
32	Iron as Fe	mg/l	50	0.27	0.19	0.21	0.14	0.37	0.51	0.84	0.74	0.71	0.69	0.82	0.53	**0.50**
33	Vanadium as V	mg/l	$	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
34	Nitrate as NO_3	mg/l	50	0.18	0.16	0.14	0.13	0.22	0.29	0.28	0.27	0.26	0.22	0.33	0.19	**0.22**

JODA-WEST (UPSTREAM) W1				Oct'14		Nov'14		Dec'14		Jan'15		Feb'15		March'15		Avg 6 months	Annual
Sl.	Parameters	Unit	Standard	1st Report	2nd Report	1st Report	2nd Report	1st Report	2nd Report	1st Report	2nd Report	1st Report	2nd Report	1st Report	2nd Report	W-1	W-1
1	Colour & Odour	--	300 & $	15 & U/O	CL & U/O	CL & U/O	CL & U/O	CL & U/O	CL & U/O	CL & U/O	CL & U/O	CL & U/O	CL & U/O	CL & U/O	CL & U/O	**CL& U/O**	**6.14& U/O**
2	Suspended Solids	mg/l	$	34	48	39	45	36	39	39	27	32	21	27	19	**33.83**	**66.63**
3	Particular Size of S.S.	µ(micron)	$	<850	<850	<850	<850	<850	<850	<850	<850	<850	<850	<850	<850	**<850**	**<850**
4	Dissolved Solids	mg/l	1500	121	141	137	138	128	127	129	124	114	118	103	109	**124.08**	**138.46**
5	PH	-	6.5-8.5	7.1	7.1	7.2	7.2	7.3	7.2	7.2	7.2	7.2	7.3	7.2	7.2	**7.20**	**7.18**
6	Temperature	^{0}C	$	25	25	24	24	23	23	22	22	24	24	25	25	**23.83**	**24.42**
7	Oil & Grease	mg/l	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**ND**	**ND**
8	Total Residual Chlorine	mg/l	$	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**ND**	**ND**
9	Amm. Nitrogen as N	mg/l	$	0.39	0.51	0.42	0.44	0.38	0.39	0.31	0.33	0.26	0.29	0.22	0.23	**ND**	**ND**
10	Total Kjeldal Nitrogen as N	mg/l	$	0.99	1.19	1.11	1.16	1.05	1.12	1.19	1.15	1.08	1.09	0.97	0.97	**1.09**	**1.14**
11	Free Ammonia as NH_3	mg/l	$	0.005	0.005	0.004	0.005	0.004	0.004	0.003	0.003	0.003	0.002	0.003	0.002	**ND**	**ND**
12	Dissolved Oxygen	mg/l	4	7.3	7.2	7.2	7.1	7.3	7.4	7.2	7.3	7.2	7.2	7.3	7.3	**7.25**	**7.24**
13	BOD (3) days at 27^{0}C	mg/l	3	1.16	1.3	1.21	1.25	1.17	1.19	1.13	1.14	1.19	1.11	1.1	1	**1.16**	**1.18**
14	COD	mg/l	$	3.37	3.89	3.66	3.95	3.58	3.84	3.38	3.11	3.24	3.33	2.97	3.17	**3.46**	**3.55**
15	Arsenic as As	mg/l	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**	**BDL**
16	Mercury as Hg	mg/l	$	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**	**BDL**
17	Lead as Pb	mg/l	0.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**	**BDL**
18	Cadmium as Cd	mg/l	0.01	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**	**BDL**
19	Hexa Chromium as Cr^{+6}	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**	**BDL**
20	Total Chromium as Cr	mg/l	$	0.19	0.21	0.23	0.28	0.19	0.26	0.21	0.12	0.18	0.09	0.14	0.08	**0.18**	**0.14**
21	Copper as Cu	mg/l	1.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**	**BDL**
22	Zinc as Zn	mg/l	15	0.17	0.23	0.21	0.25	0.17	0.21	0.31	0.23	0.25	0.19	0.25	0.16	**0.22**	**0.18**
23	Selenium as Se	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**	**BDL**
24	Nickel as Ni	mg/l	$	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**	**BDL**
25	Cyanide as CN	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**	**BDL**
26	Fluoride as F	mg/l	1.5	0.054	0.072	0.06	0.07	0.05	0.06	0.07	0.07	0.05	0.06	0.04	0.05	**0.06**	**0.07**
27	Diss. Phosphate as P	mg/l	$	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**	**BDL**
28	Sulphide as S	mg/l	$	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**	**BDL**
29	Phenolic Compounds as C_6H_5OH	mg/l	$	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**	**BDL**
30	Bio-assay Test	--	$	98%	97%	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	**97.99%.**	**97.99%.**
31	Manganese as Mn	mg/l	$	0.062	0.081	0.058	0.059	0.047	0.052	0.054	0.054	0.043	0.048	0.037	0.041	**0.05**	**0.07**
32	Iron as Fe	mg/l	50	0.28	0.43	0.39	0.48	0.33	0.42	0.34	0.28	0.29	0.22	0.25	0.19	**0.33**	**0.41**
33	Vanadium as V	mg/l	$	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**	**BDL**
34	Nitrate as NO_3	mg/l	50	0.18	0.31	0.2	0.29	0.17	0.26	0.2	0.19	0.18	0.15	0.16	0.13	**0.20**	**0.21**

JODA-WEST (DOWN STREAM) W2				April'14		May'14		June'14		July'14		Aug'14		Sep'14		Avg 6 months
Sl.	Parameters	Unit	Standards	1st Report	2nd Report	1st Report	2nd Report	1st Report	2nd Report	1st Report	2nd Report	1st Report	2nd Report	1st Report	2nd Report	W-2
1	Colour & Odour	--	300 & $	CL & U/O	CL & U/O	CL & U/O	CL & U/O	17 & U/O	21 & U/O	15 & U/O	18 & U/O	12 & U/O	10 & U/O	15 & U/O	12 & U/O	**11.38& U/O**
2	Suspended Solids	mg/l	$	39	33	29	28	118	104	153	144	141	171	153	161	**106.17**
3	Particular Size of S.S.	µ(micron)	$	<850	<850	<850	<850	<850	<850	<850	<850	<850	<850	<850	<850	**<850**
4	Dissolved Solids	mg/l	1500	126	117	111	106	156	179	199	188	183	181	194	174	**159.50**
5	pH	-	6.5-8.5	7.2	7.2	7.1	7.2	7.2	6.9	7	7.2	7.1	7.2	7.2	7.2	**7.14**
6	Temperature	^{0}C	$	25	25	25	25	25	25	25	25	25	25	25	25	**25.00**
7	Oil & Grease	mg/l	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**ND**
8	Total Residual Chlorine	mg/l	$	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**ND**
9	Amm. Nitrogen as N	mg/l	$	0.41	0.33	0.33	0.29	0.64	0.65	0.71	0.56	0.63	0.53	0.71	0.48	**ND**
10	Total Kjeldal Nitrogen as N	mg/l	$	1.05	0.98	0.92	0.89	1.39	1.46	1.65	1.28	1.52	1.22	1.59	1.17	**1.26**
11	Free Ammonia as NH_3	mg/l	$	ND	ND	ND	ND	ND	ND	0.004	0.005	0.004	0.004	0.005	0.005	**ND**
12	Dissolved Oxygen	mg/l	4	7.2	7.2	7.2	7.3	7.2	6.8	7.2	7.2	7.2	7.2	7.2	7.3	**7.18**
13	BOD (3) days at 27^{0}C	mg/l	3	1.17	1.14	1.1	1.02	1.41	1.74	1.31	1.41	1.24	1.33	1.11	1.21	**1.27**
14	COD	mg/l	$	3.38	3.35	3.22	2.95	4.95	4.56	3.76	4.18	3.62	3.85	3.34	3.64	**3.73**
15	Arsenic as As	mg/l	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
16	Mercury as Hg	mg/l	$	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
17	Lead as Pb	mg/l	0.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
18	Cadmium as Cd	mg/l	0.01	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
19	Hexa Chromium as Cr^{+6}	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
20	Total Chromium as Cr	mg/l	$	0.15	0.13	0.12	0.078	0.077	0.12	0.086	0.12	0.075	0.13	0.063	0.18	**0.111**
21	Copper as Cu	mg/l	1.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
22	Zinc as Zn	mg/l	15	0.19	0.16	0.15	0.11	0.16	0.17	0.21	0.21	0.19	0.17	0.17	0.26	**0.18**
23	Selenium as Se	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
24	Nickel as Ni	mg/l	$	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
25	Cyanide as CN	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
26	Fluoride as F	mg/l	1.5	0.053	0.044	0.041	0.039	0.1	0.2	0.082	0.11	0.073	0.095	0.055	0.072	**0.08**
27	Diss. Phosphate as P	mg/l	$	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
28	Sulphide as S	mg/l	$	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
29	Phenolic Compounds as C_6H_5OH	mg/l	$	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
30	Bio-assay Test	--	$	98%	98%	98%	98%	97%	98%	98%	98%	98%	98%	97%	98%	**97.9%.**
31	Manganese as Mn	mg/l	$	0.063	0.061	0.049	0.054	0.09	0.18	0.12	0.13	0.11	0.81	0.1	0.71	**0.206**
32	Iron as Fe	mg/l	50	0.31	0.22	0.25	0.17	0.41	0.56	0.93	0.82	0.76	0.77	0.86	0.59	**0.55**
33	Vanadium as V	mg/l	$	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
34	Nitrate as NO_3	mg/l	50	0.21	0.19	0.18	0.15	0.25	0.32	0.33	0.29	0.29	0.26	0.37	0.22	**0.26**

JODA-WEST (DOWN STREAM) W2				Oct'14		Nov'14		Dec'14		Jan'15		Feb'15		March'15		Avg 6 months	Annual
Sl.	Parameters	Unit	Standards	1st Report	2nd Report	1st Report	2nd Report	1st Report	2nd Report	1st Report	2nd Report	1st Report	2nd Report	1st Report	2nd Report	W-2	W-2
1	Colour & Odour	--	300 & $	17 & U/O	CL & U/O	CL & U/O	CL & U/O	CL & U/O	CL & U/O	CL & U/O	CL & U/O	CL & U/O	CL & U/O	CL & U/O	CL & U/O	**4.8 & U/O**	**6.92& U/O**
2	Suspended Solids	mg/l	$	38	55	44	49	41	42	42	31	38	25	30	22	**38.08**	**72.13**
3	Particular Size of S.S.	µ(micron)	$	<850	<850	<850	<850	<850	<850	<850	<850	<850	<850	<850	<850	**<850**	**<850**
4	Dissolved Solids	mg/l	1500	126	147	144	142	132	131	138	130	121	122	109	116	**129.83**	**144.67**
5	pH	-	6.5-8.5	7.1	7.2	7.2	7.2	7.3	7.1	7.3	7.2	7.2	7.2	7.3	7.2	**7.21**	**7.18**
6	Temperature	^{0}C	$	25	25	24	24	23	23	22	22	24	24	25	25	**23.83**	**24.42**
7	Oil & Grease	mg/l	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**ND**	**ND**
8	Total Residual Chlorine	mg/l	$	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**ND**	**ND**
9	Amm. Nitrogen as N	mg/l	$	0.44	0.58	0.49	0.51	0.41	0.42	0.34	0.36	0.29	0.31	0.27	0.27	**ND**	**ND**
10	Total Kjeldal Nitrogen as N	mg/l	$	1.07	1.26	1.15	1.21	1.1	1.15	1.28	1.22	1.11	1.14	1.1	1.02	**1.15**	**1.21**
11	Free Ammonia as NH_3	mg/l	$	0.005	0.004	0.004	0.005	0.004	0.004	0.002	0.003	0.003	0.003	0.003	0.002	**ND**	**ND**
12	Dissolved Oxygen	mg/l	4	7.2	7.1	7.2	7.1	7.3	7.3	7.2	7.3	7.2	7.2	7.2	7.2	**7.21**	**7.20**
13	BOD (3) days at 27^{0}C	mg/l	3	1.19	1.34	1.23	1.31	1.21	1.22	1.18	1.19	1.22	1.15	1.14	1.06	**1.20**	**1.23**
14	COD	mg/l	$	3.41	3.93	3.73	4.1	3.64	4.91	3.45	3.15	3.37	3.4	3.18	3.24	**3.63**	**3.68**
15	Arsenic as As	mg/l	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**	**BDL**
16	Mercury as Hg	mg/l	$	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**	**BDL**
17	Lead as Pb	mg/l	0.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**	**BDL**
18	Cadmium as Cd	mg/l	0.01	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**	**BDL**
19	Hexa Chromium as Cr^{+6}	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**	**BDL**
20	Total Chromium as Cr	mg/l	$	0.22	0.23	0.26	0.31	0.22	0.29	0.25	0.14	0.2	0.1	0.17	0.09	**0.21**	**0.16**
21	Copper as Cu	mg/l	1.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**	**BDL**
22	Zinc as Zn	mg/l	15	0.19	0.27	0.25	0.29	0.21	0.24	0.34	0.27	0.29	0.22	0.29	0.19	**0.25**	**0.22**
23	Selenium as Se	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**	**BDL**
24	Nickel as Ni	mg/l	$	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**	**BDL**
25	Cyanide as CN	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**	**BDL**
26	Fluoride as F	mg/l	1.5	0.059	0.076	0.07	0.07	0.06	0.07	0.07	0.07	0.06	0.06	0.05	0.05	**0.06**	**0.07**
27	Diss. Phosphate as P	mg/l	$	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**	**BDL**
28	Sulphide as S	mg/l	$	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**	**BDL**
29	Phenolic Compounds as C_6H_5OH	mg/l	$	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**	**BDL**
30	Bio-assay Test	--	$	98%	97%	98%	98%	98%	98%	98%	98%	98%	98%	98%	98%	**97.99%**	**97.99%.**
31	Manganese as Mn	mg/l	$	0.066	0.085	0.063	0.066	0.052	0.057	0.061	0.061	0.048	0.053	0.041	0.047	**0.06**	**0.13**
32	Iron as Fe	mg/l	50	0.31	0.46	0.42	0.54	0.38	0.49	0.38	0.32	0.32	0.26	0.28	0.24	**0.37**	**0.46**
33	Vanadium as V	mg/l	$	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**	**BDL**
34	Nitrate as NO_3	mg/l	50	0.21	0.36	0.23	0.32	0.21	0.29	0.26	0.21	0.21	0.18	0.19	0.17	**0.24**	**0.25**

Annexure-II (Ambient Air Quality Monitoring Report)

JODA-WEST Monthly Avgs	Location	PM10 µg/m3	PM2.5 µg/m3	SO2 µg/m3	NOx µg/m3	CO mg/m3	Mn µg/m3	O3 µg/m3	Pb µg/m3	NH3 µg/m3	Benzene µg/m3	Benzo(a) Pyrene ng/m3	Arsenic ng/m3	Nickel ng/m3
April'14	Mines Office	53.89	30.76	4.11	11.06	0.15	0.62	6.07	BDL	BDL	0.68	BDL	BDL	BDL
May'14	Mines Office	46.67	27.28	4.08	10.87	0.11	0.59	5.91	BDL	BDL	0.47	BDL	BDL	BDL
June'14	Mines Office	37.63	23.13	4.04	9.96	0.12	0.59	5.96	BDL	BDL	0.47	BDL	BDL	BDL
JULY'14	Mines Office	32.25	19.49	4.06	9.99	0.12	0.55	5.26	BDL	BDL	0.45	BDL	BDL	BDL
AUG'14	Mines Office	30.75	19.11	4.13	9.28	0.10	0.45	5.10	BDL	BDL	0.49	BDL	BDL	BDL
SEP'14	Mines Office	38.11	22.43	4.07	10.12	0.12	0.59	6.27	BDL	BDL	0.49	BDL	BDL	BDL
6 Months Avgs	Mines Office	**39.88**	**23.70**	**4.08**	**10.21**	**0.12**	**0.56**	**5.76**	**BDL**	**BDL**	**0.51**	**BDL**	**BDL**	**BDL**
Oct'14	Mines Office	49.78	28.48	4.41	11.71	0.16	0.66	6.32	BDL	BDL	0.64	BDL	BDL	BDL
Nov'14	Mines Office	48.63	28.36	4.06	11.94	0.13	0.68	5.98	BDL	BDL	0.62	BDL	BDL	BDL
Dec'14	Mines Office	53.89	30.78	4.17	12.23	0.16	0.70	6.10	BDL	BDL	0.64	BDL	BDL	BDL
January'15	Mines Office	52.56	30.31	4.29	11.46	0.15	0.72	5.76	0.00007	BDL	0.68	BDL	BDL	BDL
Feb'15	Mines Office	44.50	26.40	4.11	10.06	0.12	0.62	5.28	BDL	BDL	0.53	BDL	BDL	BDL
March'15	Mines Office	42.89	25.03	4.04	10.57	0.12	0.49	5.13	BDL	BDL	0.62	BDL	BDL	BDL
6 Months Avgs	Mines Office	**48.71**	**28.23**	**4.18**	**11.33**	**0.14**	**0.65**	**5.76**	**BDL**	**BDL**	**0.62**	**BDL**	**BDL**	**BDL**
ANNUAL Avgs	**Mines Office**	**44.29**	**25.96**	**4.13**	**10.77**	**0.13**	**0.61**	**5.76**	**BDL**	**BDL**	**0.57**	**BDL**	**BDL**	**BDL**

JODA-WEST Monthly Avgs	Location	PM10 µg/m3	PM2.5 µg/m3	SO2 µg/m3	NOx µg/m3	CO mg/m3	Mn µg/m3	O3 µg/m3	Pb µg/m3	NH3 µg/m3	Benzene µg/m3	Benzo(a) Pyrene ng/m3	Arsenic ng/m3	Nickel ng/m3
April'14	H. Quarry	60.56	33.82	4.59	11.89	0.20	0.71	7.03	BDL	BDL	0.78	BDL	BDL	BDL
May'14	H. Quarry	45.56	27.43	4.36	11.52	0.14	0.69	6.92	BDL	BDL	0.59	BDL	BDL	BDL
June'14	H. Quarry	45.00	27.55	4.25	10.71	0.13	0.67	6.51	BDL	BDL	0.56	BDL	BDL	BDL
JULY'14	H. Quarry	38.00	22.11	4.26	10.76	0.13	0.65	6.03	BDL	BDL	0.54	BDL	BDL	BDL
AUG'14	H. Quarry	37.50	23.24	4.13	9.80	0.12	0.52	5.85	BDL	BDL	0.58	BDL	BDL	BDL
SEP'14	H. Quarry	46.11	26.50	4.31	10.87	0.14	0.68	7.08	BDL	BDL	0.58	BDL	BDL	BDL
6 Months Avgs	H. Quarry	**45.45**	**26.78**	**4.32**	**10.93**	**0.14**	**0.65**	**6.57**	**BDL**	**BDL**	**0.60**	**BDL**	**BDL**	**BDL**
Oct'14	H. Quarry	56.56	32.04	4.80	12.39	0.21	0.74	6.88	BDL	BDL	0.73	BDL	BDL	BDL
Nov'14	H. Quarry	57.75	32.80	4.48	12.95	0.18	0.78	6.84	BDL	BDL	0.72	BDL	BDL	BDL
Dec'14	H. Quarry	61.67	34.12	4.63	13.01	0.21	0.80	6.94	BDL	BDL	0.74	BDL	BDL	BDL
January'15	H. Quarry	60.44	34.19	4.86	12.39	0.20	0.82	6.77	0.00018	BDL	0.78	BDL	BDL	BDL
Feb'15	H. Quarry	50.63	28.89	4.48	10.85	0.15	0.71	5.81	BDL	BDL	0.62	BDL	BDL	BDL
March'15	H. Quarry	50.33	29.07	4.34	11.39	0.16	0.58	5.69	BDL	BDL	0.72	BDL	BDL	BDL
6 Months Avgs	H. Quarry	**56.23**	**31.85**	**4.60**	**12.16**	**0.19**	**0.74**	**6.49**	**BDL**	**BDL**	**0.72**	**BDL**	**BDL**	**BDL**
ANNUAL Avgs	**H. Quarry**	**50.84**	**29.31**	**4.46**	**11.54**	**0.16**	**0.70**	**6.53**	**BDL**	**BDL**	**0.66**	**BDL**	**BDL**	**BDL**