



Regd Post with A/D

Ref.No.: MGM/P&E/690/15

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 Tiringpahar 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
Tiringpahar 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

TIRINGPAHAR 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. : **TIRINGPAHAR MANGANESE MINE**

Nominated Owner :-

Mr. T.V. Narendran

Managing Director, M/s TATA Steel Ltd.

Jamshedpur, Dist- East Singhbhum

Jharkhand – 831 001

Agent :-

Mr. S. N. Jha,

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 : 85000 TPA (Manganese Ore)
- (iv) Year of Establishment : 1972
- (v) Date of the last environmental statement submitted : 27th Sept'2014
(Vide Letter No.JW/P&E/1057/14, Dt.27.09.2014)

PART – B

Water and Raw Material Consumption

(1) Water Consumption m³/day

Process	: 7.54 m ³ /day (Water sprinkling – Avg. during 2014-15)
Cooling	: Nil
Domestic	: 52.53 m ³ /day (Avg. during 2014-15)

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.

(2) Raw material consumption

Name of the raw materials	Name of the product	<u>Consumption of raw materials per unit</u>	
		During the previous Financial year	During the current Financial year
		<u>Year – 2013-14</u>	<u>Year – 2014-15</u>
Manganese Ore	Manganese Ore	Production :- 84989.791 MT Dispatch :- 126774.72 MT	Production :- 18622.970 MT Dispatch :- 11302.160 MT

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	<i>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.</i>		

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
	<u>Year – 2012-13</u>	<u>Year – 2013-14</u>
(i) From Process		
Waste Oil (in Ltrs.)	} Nil*	} Nil*
Used Oil (in Ltrs.)		
Cotton Waste (in Kgs)		
Duster (in Nos.)		
Filters (in Nos.)		
(ii) From pollution control facilities	Nil	Nil

* The mine has no facility for maintenance of equipment deployed at the mine itself. Viewing the close proximity and same management control, the equipment of Tiringpahar Mn.Mine are being maintained at Bamebari Mn.Mine

PART – E

Solid Wastes

	Total Quantity	
	During the previous Financial year	During the current Financial year
	<u>Year – 2013-14</u>	<u>Year – 2014-15</u>
(a) From Process (Overburden rejects)	342132 m ³	75007.823 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	342132 m ³	75007.823 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 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.*

The mine has no facility for maintenance of equipment deployed at the mine itself. Viewing the close proximity and same management control, the equipment of Tiringpahar Mn.Mine are being maintained at Bamebari Mn.Mine.

- *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 Arc 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 sweat morrum over it.*
3. *Wet drilling has been implemented in all drills. Controlled blasting pattern is being followed.*
4. *20890 nos. of saplings of various forestry species were planted covering an area of 3.9 Hectare within the leasehold areas of Tiringpahar Mn.Mine with a survival rate of 73.47% during the year 2014-15.*
5. *An amount of Rs. 16,68,407/- was incurred towards environmental management including Environmental Monitoring, Plantation activities and construction of toe-wall, garland drains and check dams.*
6. *In addition, Tata Steel Rural Development Society also undertakes the peripheral development activities with a large magnitude.*
7. *The total expenditure incurred for pollution abatement measures are included in overhead cost. The expenditure for Environment Management during the year 2014-15 was Rs 16,68,407/- (Rs.89.59/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.*
- b) *Plantation of forestry species shall be planted 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*
 - *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*
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 at centralized residential colony within Bamebari Mn.Mine.*
5. *Measures taken to control Noise & Ground Vibration :-*
 - *Thick plantation has been developed around the mines 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*
7. *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 haematology, 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, 60 nos. of employees were examined. During 2012-13, a total no. of 240 employees were examined. During 2013-14 a total no. of 72 employees (Departmental-9 and contractor employees-63) were examined. The employees of Bamebari Manganese Mines and Tiringpahar Manganese Mines are shown together. There are no findings of pneumoconiosis and manganese poisoning which is classified as occupational disease.*
8. *The mine is certified with ISO-14001 (Environment Management System) .*

Manager,
Tiringpahar Mn.Mine,
M/s.TATA STEEL LTD

Annexure – I
SIX MONTHS AVERAGE OF WATER QUALITY REPORT

TIRINGPAHAR (UPSTREAM) W-1				April'14		May'14		June'14		July'14		Aug'14		Sep'14		Avg 6 months
Sl.	Parameters	Unit	Standards as per	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	11 & U/O	10 & U/O	15 & U/O	12 & U/O	5 & U/O	8 & U/O	10 & U/O	5 & U/O	8.5 & U/O
2	Suspended Solids	mg/l	\$	31	23	24	17	103	119	112	128	124	135	130	118	88.67
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	118	106	106	98	149	168	158	183	174	174	184	162	148.33
5	pH	--	6.5-8.5	7.2	7.1	7.1	7.1	7.1	7.2	7.2	7.2	7.1	7.2	7.3	7.1	7.16
6	Temperature	°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	\$	0.34	0.29	0.29	0.22	0.66	0.85	0.47	0.58	0.55	0.67	0.62	0.58	ND
10	Total Kjeldal Nitrogen as N	mg/l	\$	0.89	0.88	0.78	0.79	1.38	1.25	1.14	1.33	1.19	1.4	1.22	1.22	1.12
11	Free Ammonia as NH ₃	mg/l	\$	ND	ND	ND	ND	ND	ND	0.004	0.005	0.004	0.006	0.005	0.006	ND
12	Dissolved Oxygen	mg/l	4	7.2	7.3	7.3	7.4	7.2	7.4	7.3	7.3	7.4	7.2	7.3	7.3	7.30
13	BOD(3) days at 27°C	mg/l	3	0.97	1.01	0.89	0.94	1.21	1.35	1.17	1.22	1.28	1.18	1.33	1.11	1.14
14	COD	mg/l	\$	2.89	3.18	2.58	2.87	3.87	4.9	3.49	3.74	3.74	3.59	3.81	3.38	3.50
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	0.09	0.11	0.077	0.13	0.11	0.096	0.089	0.12	0.072	0.16	0.058	0.104
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	0.14	0.13	0.13	0.11	0.2	0.17	0.16	0.13	0.27	0.18	0.3	0.14	0.17
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	0.037	0.039	0.031	0.09	0.08	0.074	0.074	0.082	0.069	0.089	0.055	0.06
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 ₆ H ₅ OH	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	\$	0.058	0.048	0.046	0.036	0.077	0.1	0.068	0.13	0.068	0.09	0.084	0.06	0.072
32	Iron as Fe	mg/l	50	0.22	0.19	0.18	0.15	0.48	0.58	0.59	0.63	0.67	0.49	0.74	0.42	0.45
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	0.15	0.14	0.13	0.12	0.16	0.22	0.14	0.19	0.18	0.17	0.24	0.16	0.17

N.B. : \$- No Specific Limit, U/O-Unobjectionable, BDL- Below detection limit, ND-Not detectabl

TIRINGPAHAR (UPSTREAM) W-1				Oct'14		Nov'14		Dec'14		Jan'15		Feb'15		March'15		Avg 6 months	Annual
Sl.	Parameters	Unit	Standards as per	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 & \$	10 & U/O	12 & 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	5.9& U/O	5.05& U/O
2	Suspended Solids	mg/l	\$	53	58	49	38	43	36	28	20	21	18	24	14	33.50	61.08
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	151	163	121	129	118	121	118	104	125	109	117	97	122.75	135.54
5	pH	--	6.5-8.5	7.1	7.1	7.3	7.2	7.2	7.3	7.2	7.1	7.2	7.2	7.2	7.3	7.20	7.18
6	Temperature	°C	\$	24	24	24	24	24	23	22	22	24	24	25	25	23.75	24.38
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	\$	0.52	0.58	0.39	0.29	0.36	0.26	0.23	0.25	0.21	0.28	0.18	0.21	ND	ND
10	Total Kjeldal Nitrogen as N	mg/l	\$	1.4	1.47	1.22	0.87	1.18	0.79	1.02	0.87	0.97	0.96	0.89	0.89	1.04	1.08
11	Free Ammonia as NH ₃	mg/l	\$	0.003	0.004	0.004	0.003	0.004	0.004	0.002	0.003	0.002	0.003	0.002	0.003	ND	ND
12	Dissolved Oxygen	mg/l	4	7.2	7.1	7.2	7.3	7.3	7.4	7.4	7.4	7.3	7.3	7.3	7.3	7.29	7.30
13	BOD(3) days at 27°C	mg/l	3	1.19	1.21	1.14	1.17	1.06	1.11	0.9	1	1.1	1.1	1	1	1.08	1.11
14	COD	mg/l	\$	3.65	3.72	3.39	3.52	3.28	3.46	2.65	2.65	2.37	3.38	2.87	3.27	3.18	3.34
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	\$	0.16	0.19	0.14	0.13	0.13	0.11	0.15	0.09	0.12	0.1	0.1	0.086	0.13	0.11
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	0.15	0.17	0.18	0.18	0.14	0.17	0.24	0.16	0.19	0.13	0.16	0.11	0.17	0.17
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	0.065	0.077	0.05	0.05	0.04	0.06	0.06	0.06	0.05	0.05	0.05	0.04	0.05	0.06
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 ₆ H ₅ OH	mg/l	\$	BDL	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%	97.99%
31	Manganese as Mn	mg/l	\$	0.069	0.072	0.057	0.046	0.048	0.042	0.038	0.039	0.041	0.027	0.034	0.021	0.04	0.06
32	Iron as Fe	mg/l	50	0.33	0.35	0.29	0.28	0.26	0.26	0.22	0.21	0.19	0.21	0.16	0.17	0.24	0.34
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	0.24	0.18	0.19	0.16	0.16	0.14	0.14	0.11	0.18	0.09	0.14	0.16	0.16

N.B. : \$- No Specific Limit, U/O-Unobjectionable, BDL- Below detection limit, ND-Not detectable

TIRINGPAHAR (DOWNSTREAM) W-2				April'14		May'14		June'14		July'14		Aug'14		Sep'14		Avg 6 months
Sl.	Parameters	Unit	Standards as per	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	13 & U/O	11 & U/O	18 & U/O	14 & U/O	5 & U/O	9 & U/O	12 & U/O	7 & U/O	9.5 & U/O
2	Suspended Solids	mg/l	\$	36	27	27	19	107	125	118	131	132	142	144	126	94.50
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	111	111	101	155	174	166	189	181	181	192	169	154.25
5	pH	--	6.5-8.5	7.2	7.2	7.1	7.1	7.2	7.2	7.2	7.3	7.2	7.2	7.2	7.2	7.19
6	Temperature	°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	\$	0.37	0.32	0.31	0.27	0.71	0.89	0.54	0.63	0.63	0.71	0.67	0.61	ND
10	Total Kjeldal Nitrogen as N	mg/l	\$	0.95	0.94	0.81	0.86	1.45	1.28	1.27	1.41	1.31	1.48	1.28	1.3	1.20
11	Free Ammonia as NH ₃	mg/l	\$	ND	ND	ND	ND	ND	ND	0.005	0.007	0.006	0.006	0.006	0.005	ND
12	Dissolved Oxygen	mg/l	4	7.1	7.2	7.2	7.3	7.1	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.25
13	BOD(3) days at 27°C	mg/l	3	1.04	1.13	0.95	0.99	1.28	1.41	1.25	1.28	1.35	1.24	1.39	1.16	1.21
14	COD	mg/l	\$	3.98	3.26	3.65	2.94	3.94	5.12	3.56	3.85	3.96	3.71	3.89	3.51	3.78
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	0.092	0.15	0.12	0.1	0.095	0.14	0.079	0.21	0.063	0.121
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	0.17	0.15	0.15	0.12	0.24	0.19	0.2	0.15	0.33	0.21	0.38	0.17	0.21
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	0.055	0.044	0.041	0.036	0.1	0.087	0.085	0.082	0.094	0.073	0.099	0.062	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 ₆ H ₅ OH	mg/l	\$	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
30	Bio-assay Test	--	\$	98%	98%	98%	98%	98%	97%	98%	98%	97%	98%	97%	98%	97.9%
31	Manganese as Mn	mg/l	\$	0.061	0.056	0.055	0.041	0.091	0.11	0.074	0.14	0.074	0.11	0.091	0.08	0.082
32	Iron as Fe	mg/l	50	0.28	0.22	0.22	0.18	0.52	0.65	0.66	0.69	0.79	0.55	0.82	0.47	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	0.19	0.16	0.15	0.13	0.19	0.25	0.16	0.21	0.21	0.19	0.29	0.19	0.19

N.B. : \$- No Specific Limit, U/O-Unobjectionable, BDL- Below detection limit, ND-Not detectable

TIRINGPAHAR (DOWNSTREAM) W-2				Oct'14		Nov'14		Dec'14		Jan'15		Feb'15		March'15		Avg 6 months	Annual
Sl.	Parameters	Unit	Standards as per	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 & \$	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	CL & U/O	5.62 & U/O
2	Suspended Solids	mg/l	\$	29	32	52	41	47	39	31	23	26	21	29	17	32.25	63.38
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	114	117	128	133	122	127	122	111	131	115	123	101	120.33	137.29
5	pH	--	6.5-8.5	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.3	7.2	7.2	7.2	7.21	7.20
6	Temperature	°C	\$	25	25	24	24	24	23	22	22	24	24	25	25	23.92	24.46
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	\$	0.34	0.39	0.44	0.33	0.41	0.29	0.27	0.28	0.24	0.33	0.2	0.25	ND	ND
10	Total Kjeldal Nitrogen as N	mg/l	\$	0.94	0.98	1.28	0.94	1.21	0.86	1.11	0.94	1.1	1.1	0.94	0.94	1.03	1.11
11	Free Ammonia as NH ₃	mg/l	\$	0.005	0.005	0.003	0.003	0.004	0.004	0.002	0.002	0.003	0.003	0.002	0.003	ND	ND
12	Dissolved Oxygen	mg/l	4	7.2	7.2	7.2	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.2	7.2	7.26	7.25
13	BOD(3) days at 27°C	mg/l	3	1.16	1.18	1.17	1.22	1.1	1.17	1	1.07	1.15	1.16	1.1	1.11	1.13	1.17
14	COD	mg/l	\$	3.39	3.41	3.46	3.65	3.31	3.51	2.89	2.79	2.54	3.52	2.94	3.43	3.24	3.51
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	\$	0.11	0.13	0.17	0.15	0.15	0.12	0.18	0.13	0.16	0.11	0.13	0.092	0.14	0.13
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	0.14	0.16	0.21	0.22	0.18	0.19	0.27	0.19	0.22	0.17	0.18	0.14	0.19	0.20
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	0.042	0.047	0.05	0.05	0.04	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.05	0.06
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 ₆ H ₅ OH	mg/l	\$	BDL	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%	98.00%	97.99%
31	Manganese as Mn	mg/l	\$	0.055	0.059	0.062	0.051	0.051	0.048	0.046	0.046	0.049	0.033	0.041	0.026	0.05	0.06
32	Iron as Fe	mg/l	50	0.22	0.27	0.31	0.31	0.3	0.29	0.26	0.24	0.22	0.24	0.18	0.2	0.25	0.38
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	0.2	0.23	0.2	0.22	0.19	0.18	0.17	0.16	0.14	0.2	0.10	0.16	0.18	0.19

N.B. : \$- No Specific Limit, U/O-Unobjectionable, BDL- Below detection limit, ND-Not detectable

Annexure – II
(Air Quality Monitoring Report)

TIRINGPAHAR 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	Guruda Pit	48.78	28.52	4.03	10.60	0.13	0.57	5.69	BDL	BDL	0.63	BDL	BDL	BDL
May'14	Guruda Pit	41.22	21.03	4.00	10.39	0.10	0.48	5.34	BDL	BDL	0.40	BDL	BDL	BDL
June'14	Guruda Pit	34.25	20.29	4.00	9.56	0.11	0.55	5.48	BDL	BDL	0.41	BDL	BDL	BDL
JULY'14	Guruda Pit	29.25	17.53	4.00	9.51	0.11	0.49	4.78	BDL	BDL	0.38	BDL	BDL	BDL
AUG'14	Guruda Pit	28.13	17.25	4.13	9.19	0.10	0.42	4.83	BDL	BDL	0.46	BDL	BDL	BDL
SEP'14	Guruda Pit	35.44	20.96	4.02	9.86	0.11	0.55	5.87	BDL	BDL	0.46	BDL	BDL	BDL
6 Months Avgs	Guruda Pit	36.18	20.93	4.03	9.85	0.11	0.51	5.33	BDL	BDL	0.46	BDL	BDL	BDL
Oct'14	Guruda Pit	46.78	27.30	4.23	11.36	0.14	0.62	6.06	BDL	BDL	0.60	BDL	BDL	BDL
Nov'14	Guruda Pit	44.75	26.43	4.03	11.49	0.12	0.64	5.55	BDL	BDL	0.58	BDL	BDL	BDL
Dec'14	Guruda Pit	50.33	29.53	4.06	11.78	0.14	0.65	5.69	BDL	BDL	0.60	BDL	BDL	BDL
January'15	Guruda Pit	48.33	28.02	4.11	10.98	0.13	0.68	5.39	BDL	BDL	0.63	BDL	BDL	BDL
Feb'15	Guruda Pit	41.13	24.58	4.03	9.70	0.11	0.58	5.14	BDL	BDL	0.49	BDL	BDL	BDL
March'15	Guruda Pit	40.00	23.66	4.00	10.18	0.11	0.46	5.03	BDL	BDL	0.58	BDL	BDL	BDL
6 Months Avgs	Guruda Pit	45.22	26.59	4.08	10.91	0.13	0.61	5.48	BDL	BDL	0.58	BDL	BDL	BDL
ANNUAL Avgs	Guruda Pit	40.70	23.76	4.05	10.38	0.12	0.56	5.40	BDL	BDL	0.52	BDL	BDL	BDL

TIRINGPAHAR 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	Purunapani	43.67	25.30	4.00	10.07	0.11	0.52	5.24	BDL	BDL	0.59	BDL	BDL	BDL
May'14	Purunapani	36.78	21.60	4.00	9.67	0.10	0.46	5.19	BDL	BDL	0.41	BDL	BDL	BDL
June'14	Purunapani	30.00	18.43	4.00	9.33	0.11	0.51	5.21	BDL	BDL	0.38	BDL	BDL	BDL
JULY'14	Purunapani	25.50	15.00	4.00	9.23	0.10	0.43	4.59	BDL	BDL	0.34	BDL	BDL	BDL
AUG'14	Purunapani	24.88	15.13	4.00	9.11	0.10	0.38	4.83	BDL	BDL	0.42	BDL	BDL	BDL
SEP'14	Purunapani	31.56	18.78	4.00	9.61	0.11	0.52	5.56	BDL	BDL	0.42	BDL	BDL	BDL
6 Months Avgs	Purunapani	32.06	19.04	4.00	9.50	0.11	0.47	5.10	BDL	BDL	0.43	BDL	BDL	BDL
Oct'14	Purunapani	44.33	25.72	4.11	10.99	0.13	0.58	5.80	BDL	BDL	0.56	BDL	BDL	BDL
Nov'14	Purunapani	40.38	23.79	4.00	11.01	0.11	0.58	5.16	BDL	BDL	0.53	BDL	BDL	BDL
Dec'14	Purunapani	45.67	26.90	4.00	11.33	0.12	0.60	5.40	BDL	BDL	0.54	BDL	BDL	BDL
January'15	Purunapani	45.22	26.37	4.02	10.62	0.12	0.64	5.19	BDL	BDL	0.58	BDL	BDL	BDL
Feb'15	Purunapani	36.50	21.73	4.00	9.40	0.11	0.54	5.04	BDL	BDL	0.45	BDL	BDL	BDL
March'15	Purunapani	35.56	21.08	4.00	9.80	0.11	0.43	5.00	BDL	BDL	0.54	BDL	BDL	BDL
6 Months Avgs	Purunapani	41.28	24.26	4.02	10.53	0.11	0.56	5.26	BDL	BDL	0.53	BDL	BDL	BDL
ANNUAL Avgs	Purunapani	36.67	21.65	4.01	10.01	0.11	0.52	5.18	BDL	BDL	0.48	BDL	BDL	BDL