O/C

TATA

Regd Post with A/D

Ref.No.: MGM/P&E/1381/18 Date: 27/11/2018

To,

The Additional Director,
Ministry of Environment and Forest & Climate Change
Eastern Region Office,
A/3, Chandrasekharpur,
Bhubaneswar-751023

Sub: Submission of Six-monthly EC compliance report on implementation of safeguards in respect of Bamebari Iron and Manganese Mine, M/s TATA Steel Ltd. for the period April to September 2018.

Dear Sir,

We are submitting herewith six-monthly EC compliance report on implementation of safeguards in respect of Bamebari Iron and Manganese Mine, M/s TATA Steel Ltd. for the period April to September 2018 as per EIA notification 2006.

We trust that the measures taken towards environmental safeguards comply with the stipulated conditions. We look forward to your guidance which shall certainly help us in our endeavor for improving upon our environmental management practices.

This is for your kind perusal.

Thanking you,

Yours faithfully,

F: TATA STEEL LTD.

27.11.18

Agent, Bamebari Iron and Manganese Mine &
Head, Manganese Gr. of Mines
Ferro Alloys & Minerals Division,
Joda.

Encl: as above.

Copy to : Zonal Office Kolkata, Central Pollution Control Board

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

COMPLIANCE REPORT PERIOD: Apr'18 to Sept'18

ENVIRONMENTAL CLEARANCE TO BAMEBARI IRON AND MANGANESE MINE OF TATA STEEL LIMITED VIDE MoEF's LETTER NO. J-11015/85/2003-IA. II(M) DATED 17.11.2005 COMMENTS SUBMITTED TO THE MINISTRY OF ENVIRONMENT & FORESTS, GOVERNMENT OF INDIA

Present Status of the Project: -

The Scheme of Mining and Progressive Mine Closure Plan for Bamebari Iron and Manganese Mine over an area 1150.55 ha. (RML – 464 ha & ML – 686.550 ha.) was submitted under Rule No.12, MCDR 1988 for the period 2015-16 to 2019-20 and has been approved by IBM vide letter no. MS/OTFM/32 - ORI/BHU/2014-15, dated 26.03.2015

Sl. no	A: Specific conditions	Compliance status
1	Mining shall not be undertaken in areas of forestland within the lease without the necessary approvals / forestry clearance.	The mine has obtained the Forest Clearance vide MoEF's letter No 8-72/2004-FC dt 25.01.2007 over an area of 145.329 ha of forest land. Further, in accordance to the MoEF & CC Circular dated F.No.8-78/1996-FC, dated.10.03.2015, the forest area as on 25.10.1980 (i.e. Sabik Settlement) 66.126ha within the mining lease of 464 ha is now termed as forest land. Hence, fresh forest diversion proposal over an area of 303.066 ha (Sabik forest+ Balance forest) has been applied on 19.06.2016 The mining operation and allied activities are confined within the approved diverted area only.
2	Topsoil should be stacked properly with proper slope at earmarked site(s) with adequate measures and should be used for reclamation and rehabilitation of mined out area.	There was no generation of top soil was at Bamebari during the period of Apr'18 to Sept' 18.
3	OB and other wastes should be stacked at earmarked sites only and should not be kept active for long periods of time. Plantation should be taken up for soil stabilization along the slopes of the dump and terraced after every 5-6 m of height and overall slope angle shall be maintained not exceeding 28°. Sedimentation pits shall be constructed at the corners of the garland drains. Retention/toe walls shall be provided at the base of the dumps.	OB and other wastes are being dumped as per approved Scheme of Mining. The dump is terraced at every 10m and overall slope is maintained well within 28° as per approved Scheme of Mining. The inactive portion of OB dumps area being stabilized by plantation of native species. In the year 2017-18, we have planted we have panted 8000 nos. of saplings in passive dumps over an area of 1.2 ha. Beside this 60,000 nos. of vetiver sapling were also planted in dumps. In the year 2018-19 (Apr'18 to Sept'18), we have planted about 5556 Nos. of native

		species and 27657 vetiver slips. The final plantation figures for the year 2018-19 will be submitted in the next six-monthly EC compliance report. Local forest species like Gambhari, Chakunda, Mahanimba, Kala Sirs, Sisu etc were used for carrying out plantation in passive dumps. The retaining wall and garland drain with sedimentation pit has been provided in all dumps. Their dimensions are matching the requirements to arrest the run off effectively.
4	Minerals rejects shall be stacked separately at earmarked site/dump only.	The mineral rejects generated during manual processing of manganese ore (i.e. sorting, dressing and sizing) has been stacked separately at earmarked site.
5	Catch drains and siltation ponds of appropriate size should be constructed to arrest silt and sediment flows from soil, OB and mineral dumps. The drains should be regularly desilted and maintained properly. Garland drains (size, gradient & length) and sump capacity should be designed keeping 50% safety margin over and above the peak sudden rainfall and maximum discharge in the area adjoining the mine site. Sump capacity should also provide adequate retention period to allow proper settling of silt material. Storm water return system should be provided. Storm water should not be allowed to go to the effluent treatment plant during high rainfall/super cyclone period. A separate storm water sump for this purpose should be created.	Existing catch drains and garland drains are covering the entire dump slope at low lying part. Size, gradient and length of the drains are adequate to take care of the peak flow. A series of check dams and settling pits have been provided for proper settlement of suspended solid in surface runoff. The garland drain, catch drains and sedimentation pits are periodically de-silted and maintained properly.
6	Dimension of retaining wall at the toe of OB dumps and benches within the mine to check run-off and siltation should be based on the rainfall data.	Retaining wall and garland drain with the dimension as specified below, are provided to prevent the siltation and check the run-off. <u>Dimension of the Retaining Wall</u>: Height – 1 to 1.2 mtr. Width – 1 mtr. <u>Dimension of the Garland Drain</u>: Depth – 1.20 to 1.5 mtr. Width – 1 to 1.2 mtr.
7	Trace Metals such as Ni, Co, As and Hg should be analyzed in dust fall and soil samples for at least one year during summer, monsoon and winter	Samples have been analyzed in dust fall & soil for trace metal in the month of Apr'18 and Sept'18.

	seasons. If concentrations of these metals are found below the standards then with prior approval of MOEF this specific monitoring could be discontinued.	The detail analysis result is enclosed as **Annexure-VIII (Dust Fall) & IX (Soil)**
8	Mineral and OB transportation shall be in trucks/dumpers covered with tarpaulins. Vehicular emissions should be kept under control and regularly monitored. Suitable measures should be taken to check fugitive emissions from haulage roads & transfer points, etc.	The trucks are being covered with tarpaulin during dispatch of manganese ore from mine to Ferro Alloys Plant and Railway Siding at Joda. OB is being transported by shovel – dumper combination from mine face to dumps located near the quarry itself within 1.5 Km. So, it is not in practice to cover the OB transportation trucks with tarpaulin. All the trucks meant for transportation of mineral from mine to our captive plant & Railway Siding at Joda is bearing the "Pollution under Control' certificate. The emissions are under control. Haul road and other areas having potential for producing air borne dust are sprinkled regularly with help of mobile sprinklers. Beside this fixed sprinkler has also been provided in main haul road in Joribar block of Bamebari Iron and Manganese Mine. The processed manganese ore is being transferred manually; hence there is less fugitive emission during transfer of ore. The report of ambient air quality monitoring done in core zone (quarry, camp and weighbridge) and buffer zone during the period Apr'18 to Sept'18 are enclosed as **Annexure-V & VI** respectively.
9	A green belt of adequate width should be raised by planting the native species around ML area. Plantation should also be carried out along roads, OB dump sites etc. in consultation with the local DFO *I* Agriculture Department. The density of the trees should be not less than 2500 plants per ha.	• Reclamation and plantation programs have been drawn. We have planted around 4.36 lakh nos. of sapling over an area of around 69.7 ha till 2017-18. • During the year 2017-18, 8000 nos. of saplings were planted in passive dump. Beside this around 40,000 nos. vetiver saplings were also planted in inactive dumps of Bamebari and Joribar pit during the year 2017-18. • We have planted about 5556 numbers of saplings and 27657 vetiver slips till Sept'18 in the year 2018-19. The final figure shall be provided at the end of

		the financial year. • The plantation includes the local species forest species like Gambhari, Chakunda, Mahanimba, Kala Sirs, Sisu etc. • Tree density is maintained more than 2500 plants per ha.
10	Groundwater shall not be used for mine operations. Prior approval of CGWA shall be obtained for using groundwater.	Ground water use permission has been obtained from CGWA NOC No. CGWA/NOC/MlN/ORIG/2018/3899, Dated.09.08.2018 @ 130cum/day and not exceeding 47450 cum in a year. The ground water is not being used for mining and its allied activities.
11	Mining will not intersect groundwater. Prior permission of the MOEF and CGWA shall be taken to mine below water table.	Mining is not intersecting the ground water as the Ground water being at lower level in comparison to existing maximum quarry depth.
12	Regular monitoring of ground water level and quality should be carried out by establishing a network of existing wells and constructing new piezometers. The monitoring should be done for quantity four times a year in pre-monsoon (April / May), monsoon (August). Post-monsoon (November) and winter (January) seasons and for quality in May. Data thus collected should be submitted to the MoEF & CGWA quarterly.	Ground water table is much below the existing mine workings because of mining operations are confined at hilly topography only. However, ground water level & quality at existing well at nearby villages are being monitored. The ground water quality monitoring results and level recorded during the month Apr'18 and Sept'18 are enclosed as **Annexure IV & VII** respectively
13	Trace metals such as Fe, Cr+6, Cu, Se, As, Cd, Hg, Pb, Zn and Mn at specific locations for both surface water downstream and in ground water at lower elevations from mine area, shall be periodically monitored in consultation with the OSPCB and State Ground Water Board. Suitable treatment measures shall be undertaken in case levels are found to be higher than permissible limits.	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. The details of analysis result for ground water and surface water with standards are enclosed as **Annexure – IV & I respectively.**
14	"Consent to Operate" should be obtained from SPCB before expanding mining activities.	"Consent to operate" order no.117 vide letter no. 1486/ IND-I-CON-189 dated 19.01.2016 & valid up to 31.03.2021.
15	A Conservation Plan for conservation of endangered fauna including the Indian Elephant found in and around the mine area shall be prepared and implemented in consultation with identified agencies/institutions and with the	We have deposited Rs.45,05,554/- on 15.12.2005 with DFO, Keonjhar, Orissa being the contribution towards implementation of Wild Life Management Plan prepared for Bonai & Keonjhar division. We have also paid additional amount of Rs. 47,74,446 and Rs

<table>
<tr><td></td><td>State Forest Department. The Plan should be dovetailed with that prepared / under implementation / proposed for the endangered fauna found in the Reserve Forest in the buffer zone of the project site. The costs for the specific activities/taslcs should be earmarked in the Conservation Plan and shall not be diverted for any other purpose. Year.wise status of the implementation of the Plan and the expenditure thereon should be reported to the Ministry of Environment & forests, RO, Bhubaneshwar.</td><td>1,06,72,000 with DFO, Keonjhar, Orissa towards differential payment for implementation of regional Wildlife Management Plan prepared for Bonai & Keonjhar division.

Further, Site Specific wildlife management plan has been approved by PCCF, Bhubaneswar, Odisha and Chief Wildlife Warden Odisha.</td></tr>
<tr><td>16</td><td>A Final Mine Closure Plan along with details of Corpus Fund should be submitted to the Ministry of Environment & Forests 5 years in advance of final mine closure for approval.</td><td>Progressive Mine Closure Plan for the period 2015-16 to 2019-20 has been approved by IBM.
The final mine closure plan along with details of Corpus fund will be submitted to the Ministry of Environment & Forests in advance of final mine closure for approval.</td></tr>
<tr><td>Sl.No</td><td>B: General Conditions</td><td>Compliance Status</td></tr>
<tr><td>1</td><td>No change in mining technology and scope of working should be made without prior approval of the Ministry of Environment & Forests.</td><td>No change in mining technology and scope of working has been made at the mine. If any changes proposed in technology and scope of workings, prior approval shall be sought from Ministry of Environment & Forests.</td></tr>
<tr><td>2</td><td>No change in the calendar plan including excavation, quantum of manganese ore and waste should be made.</td><td>Plan for production of Manganese Ore and excavation of waste has been prepared and is being strictly adhered to;
Plan Vs. Actual (2018-19)
<table>
<tr><td></td><td>Plan (2018-19)</td><td>Actual (Till Sept’18)</td></tr>
<tr><td>OB (cum)</td><td>1,37,347</td><td>49,887</td></tr>
<tr><td>Production (MT)</td><td>83,200</td><td>37,251</td></tr>
<tr><td>Total Excavation (cum)</td><td>1,76,500</td><td>64,787</td></tr>
</table></td></tr>
<tr><td>3</td><td>Four ambient air quality-monitoring stations should be established in the core zone as well as in the buffer zone for RPM. SPM, SO2, NOx. monitoring. Location of the stations should be decided based on the meteorological data, topographical features, and environmentally and ecologically sensitive targets in consultation with the State Pollution Control Board.</td><td>Six ambient air quality monitoring stations have been established out of which 3 nos. in core zone (Near Manager’s Office close proximity to residential, near weigh bridge and near mining area) and 3 nos. in buffer zone at Jagannathpur, Bandhuabeda and Raikera.

Samples are drawn twice in a week in core zone and once in a quarter in buffer zone to ascertain the 24hour monitoring average for $PM_{10,}$ $PM_{2.5}$, So_2 & NOx, CO &</td></tr>
</table>

	Data on ambient air quality (RPM, SPM, SO2 & NOx.) should be regularly submitted to the Ministry including its Regional office at Bhubaneshwar and the State Pollution Control Board *I* Central Pollution Control Board once in six. Months.	Mn. It was observed that the environmental monitoring parameters are within the prescribed limits. Ambient air quality monitoring report is being submitted to State Pollution Control Board on monthly basis. Abstract of the monthly monitoring report of ambient air quality for period from Apr'18 to Sept'18 is enclosed as **Annexure-V & VI.**
4	Drills should be wet operated or with dust extractors and controlled blasting should be practiced.	Wet drilling concept is already in place. Controlled blasting technique with NONEL is in practice. Beside this green belt has been developed along mining.
5	Fugitive dust emissions from all the sources should be controlled regularly monitored and data recorded properly. Water spraying arrangements on haul roads, wagon loading, dumpers/ trucks, loading & unloading points should be provided and properly maintained.	Effective water sprinkling by mobile water tanker is being done on haul roads. The Ambient Air Quality monitoring done during the period Sept'18 is enclosed as **Annexure-V & VI.**
6	Adequate measures should be taken for control of noise levels below 85 dBA in the work environment. Workers engaged in blasting and drilling operations, operations of HEMM, etc should be provided with ear plugs/ muffs.	Ear plugs & Ear muffs are provided to the workers working in drilling operations & DG operations. Rests of operations are below the noise levels of 80 dBA. The details of noise monitoring for the period Apr'18 to Sept'18 are enclosed as **Annexure-X.**
7	Industrial waste water (workshop and waste water from the mine) should be properly collected, treated so as to conform to the standards prescribed under GSR 422 (E) dated 191b May, 1993 and 31 II December, 1993 or as amended from time to time. Oil and grease trap should be installed before discharge of workshop effluents.	The oil separation system has been provided at workshop and working effectively. This is being centrally used for maintenance of all the Equipments running at Bamebari & Tiringpahar Mn. Mine.
8	Environmental laboratory should be established with adequate number and type of pollution monitoring and analysis equipment in consultation with the State Pollution Control Board.	It is being done by M/s Visiontek Consultancy Service Pvt. Ltd. (Recognized as "A" category consultant as by State Pollution Control Board, Orissa). The type of pollution monitoring and analysis equipment used by M/s Visiontek Consultancy Service Pvt. Ltd.is enclosed as A**nnexure – XI.**
9	Personnel working in dusty areas should wear protective respiratory devices and they should also be provided with adequate training and	Suitable dust masks are being provided to employees (departmental & contractual) engaged in dusty operations. It is also ensured that they use the same.

	information on safety and health aspects. Occupational health surveillance program of the workers should be undertaken periodically to observe any contractions due to exposure to dust and take corrective measures, if needed.	Employees are undergoing Periodical Medical Examination which is inclusive of lungs function test and audiometry. All the personnel are trained on safety in work place and continuous awareness program are being conducted for all employees to avert manganese poisoning. Periodical Medical Examination of employees (departmental & contractual) are 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. Total 65 contractual employees have undergone PME during Apr'18 to Sept'18. There are no findings of pneumoconiosis and manganese poisoning which is classified as occupational disease.
10	A separate environmental management cell with suitable qualified personnel should be set up under the control of a Senior Executive, who will report directly to the Head of the Organization.	The department is in place and the Head of the department is reporting to General Manager of the division. The organizational structure in place is enclosed as **Annexure-XII**.
11	The funds earmarked for environmental protection measures should be kept in separate account and should not be diverted for other purpose. Year wise expenditure should be reported to the Ministry and its Regional Office located at Bhubaneshwar.	Funds allocated for environmental management are spent only for environment related purposes and not diverted to any other purpose. For the year 2017-18 Rs 5,68,750 was kept for the purpose of construction of parapet wall/ retaining wall at toe of dumps out of which Rs 9,91,107 was used. Rs 1,68,750 was kept for the purpose of construction of Garland drains, settling pits with check dam out of which 1,06,909 was used. Rs 1,25,000 was kept for the purpose of afforestation on dumps out of which Rs. 8,74,221 was used. The cost for construction of structural measures is more than expected as new areas were identified for the construction which was not envisaged during the preparation of budget. The cost for plantation is high as there was a significant increase in the wage of the labors. Rs. 15,00,000 was kept for the Environmental monitoring out of which 9,91,625 was used. Besides

		this measure are also being taken for dust suppression for which a cost Rs 4,51,669 has been incurred. The cost incurring towards environmental monitoring and different environmental protection measures during the period 2018-19 shall be given in the next half yearly EC compliance report.
12	The Regional Office of this Ministry located at Bhubaneshwar shall monitor compliance of the stipulated conditions. The project authorities should extend full cooperation to the officer (s) of the Regional Office by furnishing the requisite data *I* information *I* monitoring reports	We are extending full co-operation to the officers of the Regional Office by furnishing the requisite data / information / monitoring reports.
13	A copy of clearance letter will be marked to the concerned Panchayat/local NGO, if any, from whom suggestion/ representation has been received while processing the proposal.	Copy of the clearance letter marked to Sarpanch, Gram Panchayat, Palasa on 12.01.2006.
14	The State Pollution Control Board should display a copy of the clearance letter at the Regional Office, District Industry Centre and Collector's Office/Tehsildar's Office for 30 days.	This is applicable to State Pollution Control Board, Orissa.
15	The project authorities should advertise at least in two local newspapers widely circulated around the project, one of which shall be in the vernacular of the locality concerned within seven days of the issue of the clearance letter informing that the project has been accorded environmental clearance and a copy of the clearance letter is available with the State Pollution Control Board and may also be seen at Web Site of the Ministry of Environment & Forests at http://envfor.nic.in. and a copy of the same should be forwarded to the Regional Office of this Ministry located at Bhubaneswar.	A detail of Environmental Clearance with regard to Bamebari Manganese Mine was published in Oriya News Papers Anupam Bharat & Aam Khabar dated 10.01.2006.
16	The Ministry or any other competent authority may stipulate any further condition for environmental protection.	Noted
17	Failure to comply with any of the conditions mentioned above may result in withdrawal of this clearance.	Noted
18	The above conditions will be	Noted

	enforced, inter alia, under the provisions of the Water (Prevention & Control of Pollution) Act, 1974, the Air (Prevention & Control of Pollution) Act, 1991 along with their amendments and rules.	

Yours faithfully
F: TATA STEEL LTD

27-11-18

Agent, Bamebari Iron and Mn.Mine &
Head (Manganese Group of Mines), Joda

ANNEXURE-I

Surface Water Quality Report (Apr'18 to Sept'18)

Bamebari Iron and Manganese Mine, TATA STEEL LIMITED

Bamebari (Confluence Point at Kassia Nallah)			April'18	May'18	June'18	July'18	Aug-18	Sept-18
Parameters	Unit	Standard	1st Report	1st Report	1st Report	1st Report	1st Report	1st Report
Dissolved Oxygen (minimum)	mg/l	4	5.6	5.3	5.2	5.1	4.9	5.2
BOD (3) days at 27^{0}C (max)	mg/l	3	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
Total Coli form	MPN/ 100 ml	5000	270.0	210.0	320.0	280.0	120.0	150.0
pH Value	--	6.0-9.0	7.18	7.23	7.21	7.26	7.24	7.28
Colour (max)	Hazen	300	CL	CL	6	6	CL	CL
Total Dissolved Solids	mg/l	1500	130	136	126	122	126	128
Copper as Cu (max)	mg/l	1.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Iron as Fe (max)	mg/l	0.5	0.39	0.42	0.42	0.4	0.54	0.51
Chloride (max)	mg/l	600	28	33	25.8	25.2	25	28
Sulphates (SO_4) (max)	mg/l	400	4.9	5.1	4.1	4	5.3	5.5
Nitrate as NO_3 (max)	mg/l	50	1.76	2.04	1.4	1.6	2.1	2.3
Fluoride as F (max)	mg/l	1.5	0.015	0.017	0.016	0.018	0.02	0.022
Phenolic Compounds as C_6H_5OH (max)	mg/l	0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium as Cd (max)	mg/l	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Selenium as Se (max)	mg/l	0.05	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic as As	mg/l	0.2	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cyanide as CN (max)	mg/l	0.05	ND	ND	ND	ND	ND	ND
Lead as Pb(max)	mg/l	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc as Zn(max)	mg/l	15	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Hexa Chromium as Cr^{+6}	mg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Anionic Detergents (max)	mg/l	1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2

Bamebari (Intake Point at Tindharia)			April'18	May'18	June'18	July'18	Aug-18	Sept-18
Parameters	Unit	Standards	1st Report	1st Report	1st Report	1st Report	1st Report	1st Report
Dissolved Oxygen (minimum)	mg/l	4	5.8	5.4	5.8	6	4.8	5.6
BOD (3) days at 27^{0}C (max)	mg/l	3	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
Total Coli form	MPN/ 100 ml	5000	310	350	440	220	150	120
pH Value	--	6.0-9.0	7.24	7.27	7.2	7.18	7.18	7.22
Colour (max)	Hazen	300	CL	CL	6	2	CL	CL
Total Dissolved Solids	mg/l	1500	134	132	130	138	128	132
Copper as Cu (max)	mg/l	1.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Iron as Fe (max)	mg/l	0.5	0.42	0.4	0.46	0.36	0.6	0.56
Chloride (max)	mg/l	600	30	31	26.2	36	28	31
Sulphates (SO_4) (max)	mg/l	400	5.3	5.2	4.2	4.2	4.8	5.1
Nitrate as NO_3 (max)	mg/l	50	1.82	1.96	1.8	1.18	1.5	2.2
Fluoride as F (max)	mg/l	1.5	0.016	0.018	0.021	0.018	0.016	0.018
Phenolic Compounds as C_6H_5OH (max)	mg/l	0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium as Cd (max)	mg/l	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

Selenium as Se (max)	mg/l	0.05	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic as As	mg/l	0.2	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cyanide as CN (max)	mg/l	0.05	ND	ND	ND	ND	ND	ND
Lead as Pb(max)	mg/l	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc as Zn(max)	mg/l	15	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Hexa Chromium as Cr^{+6}	mg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Anionic Detergents (max)	mg/l	1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2

ANNEXURE-II

Waste Water Quality Report (Apr'18 to Sept'18)

Sampling Location: STPW-1:STP (Inlet); STPW-2: STP (Outlet)

Bamebari Iron and Manganese Mine, TATA STEEL LIMITED

Sl. No	Parameter	Unit	Standards (In land Surface water)	Apr-18		May-18		Jun-18		Jul-18		Aug-18		Sep-18	
				STPW-1	STPW-2	STPW-1	STPW-2	STPW-1	STPW-2	STPW-1	STPW-2	STPW-1	STPW-2	STPW-1	STPW-2
1	Colour & Odour	Hazen	Colourless/Odourless as far as practicable	04 & pungent smell	CL & U/O	08 & pungent smell	CL & U/O	04 & pungent smell	CL & U/O	04 & pungent smell	CL & U/O	04 & pungent smell	CL & U/O	04& pungent smell	CL & U/O
2	Suspended Solids	mg/l	100	176	20	194	16	176	20	189	14	64	22	178	19
3	Particulate size of SS		Shall pass 850 micron IS Sieve	< 850	< 850	< 850	< 850	< 850	< 850	< 850	< 850	< 850	< 850	< 850	< 850
4	pH Value	--	5.5-9.0	6.34	7.16	6.52	7.22	6.34	7.16	6.54	7.21	6.56	6.94	6.89	7.28
5	Temperature	^{0}C	Shall not exceed 50C above the receiving water temperature	25	25	25	25	25	25	25	25	21	21	26	26
6	Oil & Grease(max)	mg/l	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
7	Total Residual Chlorine	mg/l	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
8	Ammonical Nitrogen (as N)	mg/l	50	4.2	ND	4.6	ND	4.2	ND	4.1	ND	3.2	0.7	3.8	ND
9	Total Kjeldahl nitrogen (as NH3)	mg/l	100	10.2	0.98	11.4	1.1	10.2	0.98	11.6	1.18	6.6	1.8	9.8	9.7
10	Free ammonia (as NH3)	mg/l	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
11	BOD(3 days at 270C (max)	mg/l	30	34.0	5.2	39.0	6.2	34.0	5.2	30.6	5.8	20	4	29.8	4.6
12	Chemical Oxygen Demand as COD	mg/l	250	136.0	16.0	148.0	22.0	136.0	16.0	142	18	90	12	132	15
13	Arsenic as As	mg/l	0.2	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
14	Mercury (Hg)	mg/l	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
15	Lead as Pb(max)	mg/l	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

16	Cadmium as Cd (max)	mg/l	2	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
17	Hexavalent Chromium as Cr+6	mg/l	0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
18	Total Chromium (Cr)	mg/l	2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
19	Copper as Cu (max)	mg/l	3	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
20	Zinc as Zn(max)	mg/l	5	0.26	<0.05	0.32	<0.05	0.26	<0.05	0.28	<0.05	0.13	<0.05	0.28	<0.05
21	Selenium (Se) (max)	mg/l	0.05	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
22	Nickel (Ni)	mg/l	3	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
23	Cyanide as CN (max)	mg/l	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
24	Fluoride as F (max)	mg/l	2	0.110	0.011	0.134	0.013	0.110	0.011	0.11	0.01	0.13	0.016	0.08	0.02
25	Dissolved Phosphates (P)	mg/l	5	0.32	<0.05	0.38	<0.05	0.32	<0.05	0.28	<0.05	0.36	0.07	0.21	<0.05
26	Sulphide (S)	mg/l	2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
27	Phenolic Compounds as C6H5OH (max)	mg/l	1	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
28	Bio-assay test		90% survival of fish after 96 hours in 100% effluent	83% survival of fishes	98% survival of fishes	80% survival of fishes	98% survival of fishes	83% survival of fishes	98% survival of fishes	92% survival of fishes	96% survival of fishes	81% survival of fishes	98% survival of fishes	92% survival of fishes	96% survival of fishes
29	Manganese (Mn)	mg/l	2	0.03	<0.005	0.038	<0.005	0.03	<0.005	0.026	<0.005	0.008	<0.005	0.025	<0.005
30	Iron as Fe (max)	mg/l	3	1.24	0.21	1.12	0.22	1.24	0.21	1.21	0.28	0.94	0.2	0.98	0.21
31	Vanadium (V)	mg/l	0.2	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
32	Nitrate Nitrogen	mg/l	10	2.08	0.72	2.24	0.66	2.08	0.72	2.12	0.52	2.4	0.7	2.5	0.51

ANNEXURE-III

Drinking Water Quality Report (Apr'18 to Sept'18)

Bamebari Iron and Manganese Mine, TATA STEEL LIMITED

Sampling Location: Near Canteen								
MICROBIOLOGICAL ANALYSIS OF WATER AS PER IS: 10500 - 1991								
Sl No.	Test Parameters	Norms as per IS:10500-1991	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18
1	Total Coliform Organism MPN/100ml	10 (MAX)	<2	<2	<2	<2	<2	<2
2	Faecal Coliforms	Absent	Absent	Absent	Absent	Absent	Absent	Absent
3	E. Coli	Absent	Absent	Absent	Absent	Absent	Absent	Absent

CHEMICAL ANALYSIS OF WATER AS PER IS: 10500 – 1991

Sl No.	Test Parameters	Norms as per IS: 10500-1991							
		Desirable Limit	Permissible Limit						
1	Colour (Hazen Unit)	5	25	CL	CL	CL	CL	CL	CL
2	Odour	Unobjectionable	--	U/O	U/O	U/O	U/O	U/O	U/O
3	Taste	Agreeable	--	AL	AL	AL	AL	AL	AL
4	pH value (250C)	6.5 - 8.5	No Relaxation	7.22	7.16	7.2	7.18	7.06	7.45
5	Turbidity in NTU	5	10	<2.0	<2.0	<2.0	<2.0	< 2.0	<2.0
6	Total Dissolved Solids in mg/l	500	2000	62	67	62	60	59	59
7	Aluminium (as Al) in mg/l	0.03	0.2	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
8	Anionic Detergents (as MBAS) in mg/l	0.2	1	<0.2	ND	ND	ND	<0.2	ND
9	Boron (as B) in mg/l	1	5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
10	Calcium (as Ca) in mg/l	75	200	10.4	11.2	10.8	10.2	8	11.5
11	Chloride (as Cl) in mg/l	250	1000	11	12	11.6	11.4	13	13.5
12	Copper (asCu) in mg/l	0.05	1.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
13	Fluoride (as F) in mg/l	1	1.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
14	Residual Free Chlorine in mg/l	0.2(Min.)	---	ND	ND	ND	ND	ND	ND

15	Iron (as Fe) in mg/l	0.3	1	0.12	0.11	0.1	0.11	0.12	0.11
16	Magnesium (as Mg) in mg/l	30	100	2.9	2.9	2.12	2.18	1.9	2.56
17	Manganese (as Mn) in mg/l	0.1	0.3	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
18	Mineral Oil mg/l	0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
19	Nitrate (as NO3) in mg/l	45	100	0.56	0.64	0.58	0.56	0.9	0.35
20	Phenolic Compounds (as C6H5OH) in mg/l	0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
21	Selenium (as Se) in mg/l	0.01	No Relaxation	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
22	Sulphate (as SO4) in mg/l	200	400	1.48	1.64	1.58	1.61	2.1	1.23
23	Alkalinity (as CaCO3) in mg/l	200	600	34	36	32	30	27	25.8
24	Total Hardness (as CaCO3) in mg/l	300	600	38	40	36	34	28	31
25	Cadmium (as Cd) in mg/l	0.01	No Relaxation	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
26	Cyanide (as CN) in mg/l	0.05	No Relaxation	ND	ND	ND	ND	ND	ND
27	Lead (as Pb) in mg/l	0.05	No Relaxation	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
28	Mercury (as Hg) in mg/l	0.001	No Relaxation	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
29	Arsenic (as As) in mg/l	0.05	No Relaxation	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
30	Zinc (as Zn) in mg/l	5	15	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
31	Chromium (as Cr+6) in mg/l	0.05	No Relaxation	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
32	Poly Aromatic Hydrocarbon as PAH	--	--	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
33	Pesticide	Absent	0.001	Absent	Absent	Absent	Absent	Absent	Absent

ANNEXURE-IV

Ground Water Analysis Report as per IS:10500-1991

Sampling Location: GW1: Palsa Village OW (Apr'18 to Sept'18)

Bamebari Iron and Manganese Mine, M/S TATA STEEL LIMITED

Sl. No	Parameter	Unit	Standards as per IS: 10500, 1991	Analysis Result	
				May-18	Aug-18
Essential Characteristics					
1	Colour	Hazen	5	CL	CL
2	Odour	--	U/O	U/O	U/O
3	Taste	--	Agreeable	Agreeable	Agreeable
4	Turbidity	NTU	5	<0.2	<0.2
5	pH Value	--	6.5-8.5	7.38	7.24
6	Total Hardness (as $CaCO_3$)	mg/l	300	162.0	144.0
7	Iron (as Fe)	mg/l	0.3	0.26	0.19
8	Chloride (as Cl)	mg/l	250	42.0	38.0
9	Residual, free Chlorine	mg/l	0.2	ND	ND
Desirable Characteristics					
10	Dissolved Solids	mg/l	500	248.0	222.0
11	Calcium (as Ca)	mg/l	75	44.1	38.9
12	Magnesium (as Mg)	mg/l	30	12.6	11.4
13	Copper (as Cu)	mg/l	0.05	<0.05	<0.05
14	Manganese (as Mn)	mg/l	0.1	0.015	<0.005
15	Sulphate (as SO_4)	mg/l	200	5.3	5.4
16	Nitrate (as NO_3)	mg/l	45	1.94	2.5
17	Fluoride (as F)	mg/l	1	0.018	0.014
18	Phenolic Compounds (as C_6H_5OH)	mg/l	0.001	<0.001	<0.001
19	Mercury (as Hg)	mg/l	0.001	<0.001	<0.001
20	Cadmium (as Cd)	mg/l	0.01	<0.001	<0.001

21	Selenium (as Se)	mg/l	0.01	<0.001	<0.001
22	Arsenic (as As)	mg/l	0.05	<0.001	<0.001
23	Cyanide (as CN)	mg/l	0.05	ND	ND
24	Lead (as Pb)	mg/l	0.05	<0.001	<0.001
25	Zinc (as Zn)	mg/l	5	<0.05	<0.05
26	Anionic Detergents (as MBAS)	mg/l	0.2	<0.2	<0.2
27	Chromium (as Cr^{+6})	mg/l	0.05	<0.05	<0.05
28	Mineral Oil	mg/l	0.01	<0.01	<0.01
29	Alkalinity	mg/l	200	146.0	130.0
30	Aluminium as(Al)	mg/l	0.03	<0.001	<0.001
31	Boron (as B)	mg/l	1	<0.01	<0.01
32	Poly Aromatic Hydrocarbon as PAH	µg/l	--	<0.001	<0.001
33	Pesticide	mg/l	Absent	Absent	Absent

GW2: Sandhy Guta BW

Sl. No	Parameter	Unit	Standard as per IS - 10500:1991	Analysis Result	
				May-18	Aug-18
1	Colour	Hazen	5	CL	CL
2	Odour	--	U/O	U/O	U/O
3	Taste	--	Agreeable	Agreeable	Agreeable
4	Turbidity	NTU	5	<0.2	<0.2
5	pH Value	--	6.5-8.5	7.36	7.20
6	Total Hardness (as $CaCO_3$)	mg/l	300	140.0	142.0
7	Iron (as Fe)	mg/l	0.3	0.25	0.16
8	Chloride (as Cl)	mg/l	250	39.0	32.0
9	Residual, free Chlorine	mg/l	0.2	ND	ND

	Desirable Characteristics				
10	Dissolved Solids	mg/l	500	221.0	207.0
11	Calcium (as Ca)	mg/l	75	38.1	39.3
12	Magnesium (as Mg)	mg/l	30	10.9	10.7
13	Copper (as Cu)	mg/l	0.05	<0.05	<0.05
14	Manganese (as Mn)	mg/l	0.1	0.013	0.01
15	Sulphate (as SO_4)	mg/l	200	5.5	4.7
16	Nitrate (as NO_3)	mg/l	45	2.16	2.2
17	Fluoride (as F)	mg/l	1	0.020	0.012
18	Phenolic Compounds (as C_6H_5OH)	mg/l	0.001	<0.001	<0.001
19	Mercury (as Hg)	mg/l	0.001	<0.001	<0.001
20	Cadmium (as Cd)	mg/l	0.01	<0.001	<0.001
21	Selenium (as Se)	mg/l	0.01	<0.001	<0.001
22	Arsenic (as As)	mg/l	0.05	<0.001	<0.001
23	Cyanide (as CN)	mg/l	0.05	ND	ND
24	Lead (as Pb)	mg/l	0.05	<0.001	<0.001
25	Zinc (as Zn)	mg/l	5	<0.05	<0.05
26	Anionic Detergents (as MBAS)	mg/l	0.2	<0.2	<0.2
27	Chromium (as Cr^{+6})	mg/l	0.05	<0.05	<0.05
28	Mineral Oil	mg/l	0.01	<0.01	<0.01
29	Alkalinity	mg/l	200	128.0	127.0
30	Aluminium as (Al)	mg/l	0.03	<0.001	<0.001
31	Boron (as B)	mg/l	1	<0.01	<0.01
32	Poly Aromatic Hydrocarbon as PAH	µg/l	--	<0.001	<0.001
33	Pesticide	mg/l	Absent	Absent	Absent

ANNEXURE-V

Ambient Air Quality (AAQ) Monitoring Report (CORE ZONE)

(Apr'18 to Sept'18)

Bamebari Iron and Manganese Mine, M/S TATA STEEL LTD.

Bamebari Camp

Monthly Average	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NOx ($\mu g/m^3$)	O_3 ($\mu g/m^3$)	CO mg/m^3)	NH_3 ($\mu g/m^3$)	Pb ($\mu g/m^3$)	Ni (ng/m^3)	As (ng/m^3)	C_6H_6 ($\mu g/m^3$)	BaP (ng/m^3)	Mn $\mu g/m^3$)
Apr-18	56.56	27.28	4.60	12.00	6.55	0.34	22.07	< 0.001	< 0.01	< 0.001	< 0.001	< 0.002	< 0.001
May-18	46.06	22.06	4.40	10.75	<4.0	0.31	< 20.0	< 0.001	< 0.01	< 0.001	< 0.001	< 0.002	< 0.001
Jun-18	48.30	23.90	4.08	11.06	7.80	0.34	< 20.0	< 0.001	< 0.01	< 0.001	< 0.001	< 0.002	< 0.001
Jul-18	44.98	22.51	3.63	9.95	8.70	0.30	< 20.0	< 0.001	< 0.01	< 0.001	< 0.001	< 0.002	< 0.001
Aug-18	46.79	20.65	4.17	11.80	6.74	0.25	23.07	< 0.001	< 0.01	< 0.001	< 0.001	< 0.002	< 0.001
Sep-18	40.01	21.50	4.20	9.69	5.25	0.21	< 20.0	< 0.001	< 0.01	< 0.001	< 0.001	< 0.002	< 0.001

Mines Pit

Monthly Average	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NOx ($\mu g/m^3$)	O_3 ($\mu g/m^3$)	CO mg/m^3)	NH_3 ($\mu g/m^3$)	Pb ($\mu g/m^3$)	Ni (ng/m^3)	As (ng/m^3)	C_6H_6 ($\mu g/m^3$)	BaP (ng/m^3)	Mn $\mu g/m^3$)
Apr-18	61.18	29.66	4.94	13.44	7.24	0.40	23.48	< 0.001	< 0.01	< 0.001	< 0.001	< 0.002	< 0.001
May-18	50.99	24.53	4.38	11.45	<4.0	0.36	< 20.0	< 0.001	< 0.01	< 0.001	< 0.001	< 0.002	< 0.001
Jun-18	40.66	20.94	4.00	10.30	<4.0	0.31	< 20.0	< 0.001	< 0.01	< 0.001	< 0.001	< 0.002	< 0.001
Jul-18	40.11	20.14	3.00	9.48	7.80	0.28	< 20.0	< 0.001	< 0.01	< 0.001	< 0.001	< 0.002	< 0.001
Aug-18	56.40	20.14	3.00	9.50	<4.0	0.27	< 20.0	< 0.001	< 0.01	< 0.001	< 0.001	< 0.002	< 0.001
Sep-18	37.57	18.79	4.20	10.10	<4.0	0.24	< 20.0	< 0.001	< 0.01	< 0.001	< 0.001	< 0.002	< 0.001

Weigh Bridge

Monthly Average	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NOx ($\mu g/m^3$)	O_3 ($\mu g/m^3$)	CO mg/m^3)	NH_3 ($\mu g/m^3$)	Pb ($\mu g/m^3$)	Ni (ng/m^3)	As (ng/m^3)	C_6H_6 ($\mu g/m^3$)	BaP (ng/m^3)	Mn $\mu g/m^3$)
Apr-18	66.49	32.75	5.38	15.25	7.03	0.44	24.92	< 0.001	< 0.01	< 0.001	< 0.001	< 0.002	< 0.001
May-18	55.43	27.03	4.63	12.60	5.60	0.41	<20.0	< 0.001	< 0.01	< 0.001	< 0.001	< 0.002	< 0.001
Jun-18	53.01	26.58	4.31	12.14	5.10	0.39	< 20.0	< 0.001	< 0.01	< 0.001	< 0.001	< 0.002	< 0.001
Jul-18	51.46	25.29	3.70	12.14	5.10	0.39	< 20.0	< 0.001	< 0.01	< 0.001	< 0.001	< 0.002	< 0.001
Aug-18	58.88	32.74	4.26	11.98	8.83	0.31	< 20.0	< 0.001	< 0.01	< 0.001	< 0.001	< 0.002	< 0.001
Sep-18	49.64	24.10	4.27	11.71	8.70	0.30	< 20.0	< 0.001	< 0.01	< 0.001	< 0.001	< 0.002	< 0.001

ANNEXURE-VI

Ambient Air Quality (AAQ) Monitoring Report (BUFFER ZONE)

(Apr'18 to Sept'18)

Bamebari Iron and Manganese Mine, M/S TATA STEEL LTD.

BZ-1 : Jagannathpur

Monthly Average	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NOx ($\mu g/m^3$)	CO mg/m^3)	O_3 ($\mu g/m^3$)	NH_3 ($\mu g/m^3$	BaP (ng/m^3)	C_6H_6 ($\mu g/m^3$)	As (ng/m^3)	Ni (ng/m^3)	Pb ($\mu g/m^3$)
Aug-18	27.1	12.5	<4.0	<9.0	<0.1	<4.0	<20.0	<0.002	<0.001	<0.001	<0.01	<0.001

BZ-2 : Bandhubaria

Monthly Average	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NOx ($\mu g/m^3$)	CO mg/m^3)	O_3 ($\mu g/m^3$)	NH_3 ($\mu g/m^3$	BaP (ng/m^3)	C_6H_6 ($\mu g/m^3$)	As (ng/m^3)	Ni (ng/m^3)	Pb ($\mu g/m^3$)
Aug-18	25.8	13.2	<4.0	<9.0	<0.1	<4.0	<20.0	<0.002	<0.001	<0.001	<0.01	<0.001

BZ-3 : Raikara

Monthly Average	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NOx ($\mu g/m^3$)	CO mg/m^3)	O_3 ($\mu g/m^3$)	NH_3 ($\mu g/m^3$	BaP (ng/m^3)	C_6H_6 ($\mu g/m^3$)	As (ng/m^3)	Ni (ng/m^3)	Pb ($\mu g/m^3$)
Aug-18	27.1	13.1	<4.0	<9.0	<0.1	<4.0	<20.0	<0.002	<0.001	<0.001	<0.01	<0.001

ANNEXURE-VII

GROUND WATER LEVEL (Apr'18 to Sept'18)

Bamebari Iron and Manganese Mine, M/S TATA STEEL LIMITED

SL.NO	Monitoring Date	Location	Analysis Result (MT/BGL)
1	May-18	Nimera Village	10.5
2	May-18	Bababari	12.5
3	Aug-18	Nimera village OW	3.1
4	Aug-18	Bambabari BW	3.3

ANNEXURE-VIII

DUST FALL MONITORING (Apr'18 to Sept'18)

Bamebari Iron and Manganese Mine, M/S TATA STEEL LIMITED

MONTH	Total Dust Fall (t/km2/month)	Analysis Result			
		Co (%)	Ni(%)	Hg(%)	As (%)
May-18	0.506	<0.001	<0.001	<0.001	<0.001
Aug-18	0.512	<0.001	<0.001	<0.001	<0.001

ANNEXURE-IX

Soil QualityAnalysis Report (Apr'18 to Sept'18)

Bamebari Iron and Manganese Mine, M/S TATA STEEL LIMITED

MONTH	Co (%)	Ni(%)	Hg(%)	As (%)
May-18	0.017	0.047	<0.000002	<0.000002
Aug-18	0.014	0.041	<0.000002	<0.000002

ANNEXURE-X

Ambient Noise Monitoring Report (Apr'18 to Sept'18)

Bamebari Iron and Manganese Mine, M/S TATA STEEL LIMITED

AAQ				Day Time
Sl. No	Date	Name of Location	Unit	Result
1	May-18	Township	db	50.2
2		Hospital		41.38
3		Mines Area		60.2
CPCB Standard				75
EQUIPMENT				
Sl. No	Date	Name of Location	Unit	Day Time Result
1	May-18	OD-09F-2105(Truck)	db	54.8
2		L&T Komastuk 260		60.2
3		Volvo EC 210BLC		56.2
4		OD09A56666		84.8
5		JH-05B9458		85.2
6		Volvo EC 212 BLC		84.2
7		OD-09F-2108(Truck)		84.6
CPCB Standard				75

ANNEXURE-XI

LIST OF ENVIRONMENTAL MONITORING EQUIPMENT

Bamebari Iron and Manganese Mine, M/S TATA STEEL LIMITED

LIST OF ENVIRONMENTAL MONITORING EQUIPMENT		
Ambient Air Quality		
Sl.No.	Name of the Instrument	Parameter
1	Respirable Dust sampler	PM_{10}
2	Fine Particulate Sampler	$PM_{2.5}$
3	Spectrophotometer UV-Visible range	SO_2,NO_x
4	NDIR	CO
5	AAS	Manganese
Other Paraphernalia for analysis of air quality are also available in the laboratory.		
Water Quality		
Sl.No.	Name of the Instrument	Parameter
1	Analytical weighing Balance	Used for weighing the chemicals
2	Micro Balance	Used for weighing CRMs
3	AAS with VGA and Hallow cathode lamps	All Heavy metals (Arsenic, Mercury, Selenium, Cadmium, Chromium, Cobalt, Iron, Lead, Manganese, Zinc, Aluminium, etc..)
4	Spectrophotometer UV-Visible range	Nitrate, Nitrite, Sulphate, Chromium(VI),Fluoride, Cyanide, Phenolic compounds
5	Flame Photometer	Sodium ,Potassium
6	Ion Analyzer	Fluoride
7	BOD Incubator	BOD
8	COD Digester	COD
9	Furnace	Total volatile solids, Fixed solids
10	Hot Air Oven	Total Suspended Solids, Total Dissolved Solids
11	pH meter	pH
12	Conductivity meter	Conductivity
13	Turbidity Meter	Turbidity
14	Bacteriological Incubator	Total coli form and fecal coli form
15	Autoclave	sterilization
16	Microscope	Bacteriological colony count
17	Magnetic stirrer	Stirring purpose
18	Vacuum filtration unit	Rapid filtration
19	Water Bath	Boiling and evaporation purpose
20	Cadmium reduction column	Nitrate
21	Fluoride distillation unit	Fluoride
22	Kjeldal flask	Ammonia and Organic Nitrogen
23	Hot Plate	Digestion
24	Pizometer	Water level monitoring
25	Aquarium	Bio assay test

ANNEXURE-XII

ORGANIZATION STRUCTURE

Bamebari Iron and Manganese Mine, M/S TATA STEEL LIMITED