



**The Addnl. PCCF  
Eastern Regional Office  
Ministry of Environment, Forests & Climate Change,  
Govt. of India  
A/3, Chandrasekharpur  
Bhubaneswar-751 013 (Odisha)**

MD/ENV/491/116/16  
Date: 29.11.2016

Ref: Environmental Clearance letter no. SEIAA-329 (SEIAA-38/11) dated: 29.06.2011

**Sub: Half-yearly compliance status report of Environmental Clearance conditions for the period April'16 - September'16 in respect of Manmora Manganese Mine.**

Dear Sir,

We are herewith submitting the six monthly compliance report in respect of the stipulated Environmental Clearance conditions of Manmora Manganese Mine for the period from **April'16 - September'16** as per EIA Notification, 2006. We are also sending you the soft copy of the report to your good office on email: [mef.or@nic.in](mailto:mef.or@nic.in) for your ready reference.

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

Thanking you,  
Yours faithfully,

f: TATA Steel Limited

f **Head (Planning), OMQ**

Encl : As above

Copy to : The Chairman, Central Pollution Control Board, Southernd Conclave, Block 502, 5<sup>th</sup> & 6<sup>th</sup> Floors, 1582 Rajdanga Main Road, Kolkata - 700107 (W. B.)  
: The Member Secretary, State Pollution Control Board, Paribesh Bhawan, A/118, Nilkanta Nagar, Unit - VIII, Bhubaneswar - 751012 (Odisha)  
: The Regional Officer, State Pollution Control Board, College Road, At/PO-Baniapat, Keonjhar - 758001 (Odisha)

**TATA STEEL LIMITED**

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**COMPLIANCE REPORT PERIOD: APRIL '2016 - SEPTEMBER '2016**

**ENVIRONMENTAL CLEARANCE NO. SEIAA-38/11 OF  
MANMORA MANGANESE MINE OF TATA STEEL LIMITED  
VIDE SEIAA's LETTER NO. SEIAA/329 DATED 29.06.2011**

<b>Sl. No.</b>	<b>Conditions</b>	<b>Compliance</b>
1	The earthen embankments are planned as per WAPCO design; it needs stone walling on both sides to prevent collapse of the embankment as immediately down of the mine are the townships, railway line and some agricultural land.	The outer face as well as the inner face of the embankment has been stone patched as per WAPCO design to prevent collapse of the embankment. Photograph of Stone Pitched Embankment is attached as <b>Annexure-I</b> .
2	Since the mine has been fully worked and mineral resources have been fully removed, mine closure plan should be implemented forthwith reclaiming the mine pits and re-vegetation of the mine lease area.	The Progressive Mine Closure Plan has been prepared and duly approved by IBM under MCRD, 1988 for the period 2015-16 to 2019-20. Green belt development plan has been under taken at the mine with a total of 1000 nos. of sapling planted of local species in the year 2016-17. Photographs of Sapling Plantation at Manmora are attached as <b>Annexure-II</b> .
3	The existing overburden dumps and the entire quantity of waste generated shall be back filled and liquidated within five years and there shall be no external overburden dump in the mining lease area. The back filled area shall be afforested and back filling has to be done in a manner that it is restored to the normal ground level. A complete mine closure plan with afforestation/ re-vegetation component with year wise details submitted to the SEIAA within six months and strictly implemented.	The back filling of opencast void is being done by disposal of slime of Joda East Iron Mine as per the approved mining scheme from Indian Bureau of Mines (IBM) which is under same management control. The vacant area and dump slope has been planted with 1000 nos. of local forestry saplings during 2016-17.
4	The project proponent shall prepare wild life conservation plan in consultation with DFO and adequate safety and mitigation measures should be incorporated to protect the wild life, flora, fauna to mitigate adverse impact.	The site specific wildlife conservation plan for entire lease area of 671.093 ha of Joda East Iron Mine (Within which Manmora lease area of 16.35 ha is included) has been prepared and re-submitted for approval as per the new guidelines. Moreover, ₹ 1,00,66,395/- has been deposited with DFO, Keonjhar, Odisha as the contribution towards implementation of Wild Life Management Plan prepared for Bonai & Keonjhar division during approval of Forest Clearance along with JEIM. The

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		Site Specific Wild Life Conservation Plan has been approved by the PCCF (Wildlife) & Chief Wildlife Warden vide letter no. 3195 dated: 25.04.2016.																																																																						
5	Shelter Belt i.e. Wind Break of 15m width consisting of at least 5 tiers around the lease facing the human habitation, school / agricultural land etc. (if any in the vicinity), in the safety zone / backfilled & reclaimed areas around voids & roads shall be raised. Green belt development and selection of plant species shall be as per CPCB guidelines. Density of the trees has to be around 2500 plants per hectare. Herbs and shrubs shall also form a part of afforestation programme besides tree plantation. Help & guidance of local DFO may be sought in the matter. Details of year-wise afforestation programme including rehabilitation of mined out area shall be submitted to the SEIAA, Odisha within six months.	<p>The afforestation program since 2005-06 to till date is furnished below-</p> <table border="1" data-bbox="810 472 1489 1050"> <thead> <tr> <th>Year of Plantation</th> <th>Saplings Planted (Nos.)</th> <th>Area (ha)</th> <th>Survival Rate (%)</th> <th>Tree Density/ha</th> </tr> </thead> <tbody> <tr> <td>2005-06</td> <td>1500</td> <td>0.50</td> <td>83</td> <td>2490</td> </tr> <tr> <td>2006-07</td> <td>1500</td> <td>0.50</td> <td>80</td> <td>2400</td> </tr> <tr> <td>2007-08</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> </tr> <tr> <td>2008-09</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> </tr> <tr> <td>2009-10</td> <td>11693</td> <td>1.50</td> <td>75</td> <td>5847</td> </tr> <tr> <td>2010-11</td> <td>13060</td> <td>2.30</td> <td>90</td> <td>5110</td> </tr> <tr> <td>2011-12</td> <td>5205</td> <td>1.00</td> <td>88</td> <td>4580</td> </tr> <tr> <td>2012-13</td> <td>4000</td> <td>1.00</td> <td>82</td> <td>4000</td> </tr> <tr> <td>2013-14</td> <td>15500</td> <td>2.50</td> <td>81</td> <td>6200</td> </tr> <tr> <td>2014-15</td> <td>10450</td> <td>1.50</td> <td>85</td> <td>6967</td> </tr> <tr> <td>2015-16</td> <td>1246</td> <td>1.00</td> <td>80</td> <td>1246</td> </tr> <tr> <td>2016-17</td> <td>1000</td> <td>0.00</td> <td>80</td> <td>Gap filling</td> </tr> <tr> <td>Total</td> <td>67908</td> <td>11.80</td> <td>81.5</td> <td>4316</td> </tr> </tbody> </table> <p>Development of green belt and reclamation is being adhered in accordance with Approved Progressive Mine Closure Plan.</p>	Year of Plantation	Saplings Planted (Nos.)	Area (ha)	Survival Rate (%)	Tree Density/ha	2005-06	1500	0.50	83	2490	2006-07	1500	0.50	80	2400	2007-08	-	-	-	-	2008-09	-	-	-	-	2009-10	11693	1.50	75	5847	2010-11	13060	2.30	90	5110	2011-12	5205	1.00	88	4580	2012-13	4000	1.00	82	4000	2013-14	15500	2.50	81	6200	2014-15	10450	1.50	85	6967	2015-16	1246	1.00	80	1246	2016-17	1000	0.00	80	Gap filling	Total	67908	11.80	81.5	4316
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6	The applicant (Project Proponent) will take necessary measures for prevention, control and mitigation of Air Pollution, Noise Pollution and Land Pollution including solid waste management as mentioned by him in Form-1, Final EIA reports and Environment Management Plan (EMP) in compliance with the prescribed statutory norms and standards.	As the entire mineable resource has been depleted, no further mining activities is being undertaken within the lease hold area. However, the production of finished ore will be continued by manual screening and processing of sub-grade mineral and mineral rejects already available at pit head during dry season only. Hence, there is no Air Pollution, Noise Pollution and Land pollution could be observed which emanates from Manmora Mn Mine. Further, to control the air pollution during dry seasons, water sprinkling by mobile water tanker is being done.																																																																						
7	The applicant will take necessary steps for socio-economic development of the people of the area on need based assessment for providing employment, education, health care, drinking water and sanitation, road and communication facilities etc. after a detailed primary socio-economic survey.	The company deploys the Tata Steel Rural Development Society (TSRDS) for socio-economic development of the area on need based assessment by providing employment, education, health care, drinking water and sanitation.																																																																						
8	The applicant will comply to the points,	Most of the commitments made during the Public																																																																						

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	concerns and issues raised by the people during public hearing on 01.02.2010 in accordance with the commitments made by him thereon.	Hearing, have been complied suitably and the point wise status report is enclosed as PH commitment implementation report is attached as <b>Annexure-V</b> .
9	The project proponent shall take necessary safeguard measures to ensure that there is no leaching from the tailing pond.	The Tailing dam has been designed by M/s. WAPCOS Ltd. Adequate safeguard measures have been taken to prevent any leaching from the tailing dam. No spill or leaching incidents have taken place to date.
10	The decanted water from the tailing pond shall be re-circulated and there should be zero discharge from the tailing pond.	The disposal of tailings has commenced on trial basis during the period Apr'12 to Sept'12 and is being continued. The slime is stored in the zero discharge slime pond. The decanted water from the slime pond is completely recycled back to beneficiation plant within the Joda East Iron Mine ensuring zero outside discharge.
11	The applicant will take statutory clearance / approval / permissions from the concerned authorities in respect of his project as and when required.	All required statutory clearances/ approvals/ permissions from the concerned authorities in respect of the project have been obtained.
12	For post environment clearance monitoring, the applicant will submit half-yearly compliance report in respect of stipulated terms and conditions of Environment Clearance to the State Environmental Impact Assessment Authority (SEIAA), Orissa on 1 <sup>st</sup> June & 1 <sup>st</sup> December of each calendar year.	Half yearly compliance report for the year 2015-16 in respect of the stipulated terms and conditions of the EC is being submitted herewith to the Regional Office of the Ministry of Environment and Forests, Bhubaneswar vide letter no. MD/ENV/193/116/16 dated: 24.05.2016 and also by e-mail.
13	The core zone should be monitored intensively with nos. of stations as prescribed by CPCB, Delhi. The detailed methodology adopted for analysis of samples shall be clearly indicated.	Ambient Air Quality Monitoring is being done as per CPCB standards and as per guidance of Regional Office of OSPCB. All the monitoring results are being sent to OSPCB on monthly basis. These results are attached as <b>Annexure-III</b> .
14	The proponent shall submit base line data on flora and fauna and CSR activities carried out within three months to the SEIAA.	The base line data on flora & fauna and the list of CSR activities already carried out in the area have been submitted to SEIAA vide our letter No. MD/ENV/519/116/2011 dated: 07/10/2011.
15	The following shall be implemented viz (a) dump run-off should be diverted into a settling pond (b) adequate rain water harvesting and ground water recharging facilities should be developed in the core zone (c) attempt should be made to achieve zero water balance.	Waste dump had become inactive and therefore the slopes have been stabilized by plantation to prevent soil erosion. Catch drains and a garland drain has been provided along the entire dump slope which emanates at low lying part to sedimentation pit. Further, the catch drains and sedimentation pits are

Sl. No.	Conditions	Compliance
		periodically de-silted and maintained properly. Rain water harvesting and ground water recharge facilities have been made at the mine site. After the project is implemented it will be ensured to achieve zero water balance.
16	Maintenance of roads through which transportation are undertaken shall be carried out by the project proponent regularly at its own cost.	All the haul roads are made up of morrum & compacted. Regular repair is being done by dozer & grader after spreading the layer of morrum over it. Water sprinkling arrangement is adequate for suppressing the road dust.
17	Fugitive dust generation shall be controlled. Fugitive dust emission shall be regularly monitored at locations of near human habitation (including schools and other public amenities located nearest to sources of dust generation as applicable) and records shall be submitted to SEIAA, Odisha.	The AAQ (fugitive dust) being monitored at one location (near stack yard) twice in a week. Data on Ambient Air Quality monitoring for every month is being submitted to State Pollution Control Board. Abstract of the monthly monitoring data on ambient air quality is enclosed as <b>Annexure-III</b> . There has been no mining activity at Manmora Mn. Mines during the period April'16 to Sep'16 therefore, no fugitive dust emission monitoring has been carried out.
18	Mineral handling area shall be provided with adequate number of high efficiency dust extraction system. Loading and unloading areas including all the transfer points should also have efficient dust control arrangements. These should be properly maintained and operated.	The mineral handling is only by manual means during dry season only for manual processing (sorting and sizing) and screening of available sub grade and mineral rejects available at pit head. So, water sprinkling over the area is sufficient to allay the dust generation.
19	Transportation shall be done by covering the trucks by tarpaulin or other suitable mechanism so that no spillage of ore / dust takes place.	There was no dispatch during the reporting period.
20	Rain Water Harvesting shall be undertaken to recharge the ground water source.	Rain water harvesting pond has been made at the side of the mining lease under expert consultation of M/s. KRG Foundation, Chennai, to recharge the ground water.
21	Monitoring of ground and surface water quality shall be regularly conducted and records should be maintained and data shall be submitted regularly to the SEIAA.	The ground water quality at existing well outside the lease hold area and surface water quality is being monitored and the analysis results are enclosed as <b>Annexure-IV</b> .
22	The proponent shall ensure that no silt originating due to mining activity is transported in the surface water course.	Waste dump had become inactive and therefore the slopes have been stabilized by plantation to prevent soil erosion. Catch drains and a garland drain has

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	Measures for prevention and control of soil erosion and management of silt shall be undertaken. Protection of dumps against erosion shall be carried out with geo-textile matting or other suitable material and thick plantation of native trees and shrubs shall be carried out at the dump slopes. Dump shall be protected by retaining wall.	<p>been provided along the entire dump slope which emanates at low lying part to sedimentation pit. Further, the catch drains and sedimentation pits are periodically de-silted and maintained properly. The afforestation program since 2005-06 to till date has been undertaken to stabilize the waste dump slope and vacant areas. The details are furnished below:</p> <table border="1" data-bbox="815 555 1485 1133"> <thead> <tr> <th>Year of Plantation</th> <th>Saplings Planted (Nos.)</th> <th>Area (ha)</th> <th>Survival Rate (%)</th> <th>Tree Density/ha</th> </tr> </thead> <tbody> <tr> <td>2005-06</td> <td>1500</td> <td>0.50</td> <td>83</td> <td>2490</td> </tr> <tr> <td>2006-07</td> <td>1500</td> <td>0.50</td> <td>80</td> <td>2400</td> </tr> <tr> <td>2007-08</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> </tr> <tr> <td>2008-09</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> </tr> <tr> <td>2009-10</td> <td>11693</td> <td>1.50</td> <td>75</td> <td>5847</td> </tr> <tr> <td>2010-11</td> <td>13060</td> <td>2.30</td> <td>90</td> <td>5110</td> </tr> <tr> <td>2011-12</td> <td>5205</td> <td>1.00</td> <td>88</td> <td>4580</td> </tr> <tr> <td>2012-13</td> <td>4000</td> <td>1.00</td> <td>82</td> <td>4000</td> </tr> <tr> <td>2013-14</td> <td>15500</td> <td>2.50</td> <td>81</td> <td>6200</td> </tr> <tr> <td>2014-15</td> <td>10450</td> <td>1.50</td> <td>85</td> <td>6967</td> </tr> <tr> <td>2015-16</td> <td>1246</td> <td>1.00</td> <td>80</td> <td>1246</td> </tr> <tr> <td>2016-17</td> <td>1000</td> <td>0.00</td> <td></td> <td>Gap Filling</td> </tr> <tr> <td>Total</td> <td>66908</td> <td>11.8</td> <td>81.5</td> <td>4316</td> </tr> </tbody> </table> <p>The retaining wall of 710 mtr. has been provided at the toe of the waste dump.</p>	Year of Plantation	Saplings Planted (Nos.)	Area (ha)	Survival Rate (%)	Tree Density/ha	2005-06	1500	0.50	83	2490	2006-07	1500	0.50	80	2400	2007-08	-	-	-	-	2008-09	-	-	-	-	2009-10	11693	1.50	75	5847	2010-11	13060	2.30	90	5110	2011-12	5205	1.00	88	4580	2012-13	4000	1.00	82	4000	2013-14	15500	2.50	81	6200	2014-15	10450	1.50	85	6967	2015-16	1246	1.00	80	1246	2016-17	1000	0.00		Gap Filling	Total	66908	11.8	81.5	4316
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23	Trenches/ garland drains shall be constructed at foot of dumps to arrest silt from being carried to water bodies. Adequate check dams shall be constructed across the seasonal/perennial nallahs (if any) flowing through the ML area and silts be arrested. De-silting at regular intervals shall be carried out.	Catch drains and garland drains are covering the entire dump slope at toe part. Similarly, a garland drain with settling pit has been provided near the railway track and causeway near railway culverts for directing the flow of surface run-offs after settling.																																																																						
24	Provision shall be made for the housing of labourers within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, crèche etc. The housing may in the form of temporary structures to be removed after the completion of the project.	Housing facilities for the employees has been provided within a centralized camp at Joda East beyond the mining lease hold area.																																																																						
25	Occupational health and safety measures for the workers including identification of work related hazards, training on malaria eradication, HIV and healthy effects on	PME of employees (departmental & contractual) of Manmora Mn Mine are conducted as per prescribed norms of Mines Rule, 1955 at Joda East Iron Mine covering the workers identified for Manmora aong																																																																						

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	<p>exposure to mineral dust etc. shall be carried out. The proponent shall engage a full time qualified doctor who is trained in occupational health. Periodic monitoring of exposure to respirable mineral dust on the workers shall be conducted and record maintained including health record of workers. Awareness programme for workers on impact of mining on their health and precautionary measures like use of personal equipments etc. shall be carried out periodically. Review of impact of various health measures undertaken (at interval of five years or less) shall be conducted followed by follow up action wherever required. Occupational Health Center shall be established near the mine itself.</p>	<p>with employees of Joda East Iron Mine. 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 2015-16, a total no. of 152 employees (Departmental-16 and contractor employees-136) were examined. There are no findings of pneumoconiosis and manganese poisoning which is classified as occupational disease.</p>
26	<p>The Environmental Clearance is subject to Forest Clearance under Forest (Conservation) Act, 1980.</p>	<p>Forest clearance over the entire forest area of 9.373 Ha within the lease has been granted along with FC of Joda East Iron Mine vide letter no. F. No. 8-32/1993-FC (vol-II), dated 24.09.2007.</p>
27	<p>The mining operation shall be restricted to above ground water table and it should not intersect the ground water table.</p>	<p>Mining is not intersecting the ground water as the ground water being at lower level in comparison to existing maximum quarry depth. No further mine development will be in place due exhaustion of mineable resource.</p>
28	<p>The top soil shall be temporarily be stored at earmarked site (s) only and it should not be kept unutilized for long (not more than 3 years). The top soil shall be used for land reclamation and plantation.</p>	<p>No top soil was generated during the reporting period because there was no mine development work undertaken due to exhaustion of mineable resource.</p>
29	<p>The fund earmarked for the environment protection measures shall be judiciously utilized. Under no circumstances this funds shall be diverted for other purposes. Year-wise expenditure for this fund should be reported to the SEIAA, Odisha.</p>	<p>Funds allocated for environmental management are spent only for environment related purposes and not diverted to any other purpose. The utilization of environment management for the period April'15 to March'16 was Rs. 6,05,111 for Manmora Manganese Mines. Moreover, where replacing the loose boulder retaining wall with cemented retaining wall at strategic points in the cost included in mining operation.</p>
30	<p>The critical parameters in the ambient air within the impact zone, peak particle velocity at 300m</p>	<p>The critical parameters in the Ambient Air Quality are being analyzed. The monthly average of</p>

Sl. No.	Conditions	Compliance
	<p>distance or within the nearest habitation, whichever is closer shall be monitored periodically. Further, quality of discharge water shall be monitored {[TDS, DO, pH and Total suspended solids (TSS)}. The monitored data shall be uploaded on the website of the company as well as displayed on a display board at the project site at a suitable location near main gate of the company in public domain. The Circular No. J-20012/1/2006-IA.II(M), dated 27.05.2009 issued by MoEF which is available on the website of Ministry <a href="http://www.envfor.nic.in">www.envfor.nic.in</a> shall also be referred in this regard for its compliance.</p>	<p>analysis is enclosed as <b>Annexure-IV</b>: AAQ monitoring report. There is no blasting operation being carried out within lease hold area as there is no mine developmental work due to exhaustion of mineable resource. There is no generation of mine drainage water as the mine is working at high hill slope area and does not intersect the ground water table. The monitoring data has been displayed on a board near entrance of the mine.</p>
31	<p>The project proponent shall obtain necessary prior permission of the competent authorities for drawl of requisite quantity of water (surface water and ground water) required for the project.</p>	<p>Water required for water sprinkling and drinking water during dry season is being supplied from Joda East Iron Mine which has got the surface water drawl permission from competent authority.</p>
32	<p>The above mentioned stipulated conditions shall be complied in time bound manner. Failure to comply with any of the conditions mentioned above may result withdrawal of this environmental clearance and attract penal action under the provisions of Environmental Protection (EP) Act, 1986.</p>	<p>All the conditions mentioned above are complied.</p>



**Annexure-I: Stone Pitched Embankment**



**Annexure-II: Plantation**



**Annexure-III: Ambient Air Quality Report (April'16-September'16)**

**Core Zone**

Month	Manmora Slime Dam					Near Rain Water Harvesting					Near New Slime Dam					Near Equipment Maintenance				
	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>	CO	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>	CO	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>	CO	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>	CO
Apr'16	52.44	30.52	4.29	9.39	0.16	48.64	28.37	4.12	10.19	0.13	55.12	32.32	5.29	12.41	0.20	61.33	36.67	6.00	12.76	0.19
May'16	50.99	27.43	4.24	9.48	0.15	47.59	24.94	4.12	9.57	0.13	53.69	29.41	4.93	12.07	0.19	60.24	34.10	5.98	12.89	0.20
Jun'16	51.13	25.40	4.38	10.13	0.17	49.04	24.11	4.20	9.62	0.14	52.28	26.01	4.59	10.90	0.18	58.53	29.96	5.29	11.58	0.20
Jul'16	35.49	16.65	4.03	9.19	0.13	34.64	16.24	4.00	9.00	0.12	37.41	17.85	4.04	9.18	0.13	39.11	18.86	4.25	9.68	0.16
Aug'16	31.64	15.11	4.08	9.30	0.12	29.57	14.24	4.00	9.00	0.11	32.98	15.81	4.14	9.51	0.13	34.28	16.56	4.33	9.77	0.14
Sep'16	32.32	15.00	4.06	9.22	0.12	33.06	15.74	4.17	9.76	0.13	30.71	14.09	4.00	9.00	0.11	35.39	16.99	4.37	10.52	0.14

**Buffer Zone**

Month	Baneikela					Birkela					Khuntpani					Joda Colony (VTC)				
	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>	CO	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>	CO	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>	CO	PM <sub>10</sub>	PM <sub>2.5</sub>	SO <sub>2</sub>	NO <sub>x</sub>	CO
Apr'16	54.90	27.85	4.70	11.10	0.18	58.05	29.40	4.40	10.70	0.16	51.85	26.50	4.10	10.15	0.15	51.05	26.00	4.55	10.95	0.17
May'16	48.80	24.40	4.30	9.90	0.14	50.55	25.00	4.20	9.80	0.15	49.55	24.65	4.00	9.60	0.14	50.00	24.80	4.00	9.90	0.15
Jun'16	49.05	24.50	4.00	9.40	0.14	51.25	25.65	4.00	9.30	0.15	48.60	24.00	4.00	9.10	0.14	47.60	23.45	4.00	9.20	0.13
Jul'16	35.65	16.95	4.00	9.00	0.12	33.85	16.40	4.00	9.00	0.12	31.30	15.20	4.00	9.00	0.12	33.05	16.05	4.00	9.00	0.11
Aug'16	29.00	13.50	4.00	9.00	0.10	27.60	12.20	4.00	9.00	0.10	27.65	12.50	4.00	9.00	0.10	26.25	11.35	4.00	9.00	0.10
Sep'16	34.05	15.70	4.00	9.00	0.10	32.85	15.00	4.00	9.00	0.10	27.50	12.20	4.00	9.00	0.10	28.10	12.85	4.00	9.00	0.10

Unit of measurement for all parameters except CO is  $\mu\text{g}/\text{m}^3$ . Co is in  $\text{mg}/\text{m}^3$

*Dikranian*  
Lab-in-charge

## Annexure-IV: Ground Water Quality Report (As per BIS 10500:1991)



**Visiontek Consultancy Services Pvt.Ltd.**  
(An Enviro Engineering Consulting Cell)



Ref.: VCSPL/16/R-532

Date.: 07.07.2016

### GROUND WATER QUALITY ANALYSIS REPORT FOR THE MONTH OF JUNE-2016

1. Name of Industry : **Joda East Iron Mines ( M/s TATA Steel Limited)**
2. Sampling location : **GW-1: Khuntpani Village;  
GW-2: Bounsapani Village.**
3. Date of sampling : 29.06.2016
4. Date of analysis : 30.06.2016 to 05.07.2016
5. Sample collected by : VCSPL Representative in presence of TATA Representative

Sl. No	Parameter	Testing Methods	Unit	Standard as per IS -10500:1991	Analysis Results	
					GW-1	GW-2
<b>Essential Characteristics</b>						
1	Colour	APHA 2120 B, C	Hazen	5	CL	CL
2	Odour	APHA 2150 B	--	U/O	U/O	U/O
3	Taste	APHA 2160 C	--	Agreeable	AL	AL
4	Turbidity	APHA 2130 B	NTU	5	<2	<2
5	pH Value	APHA 4500H' B	--	6.5-8.5	7.2	7.3
6	Total Hardness (as CaCO <sub>3</sub> )	APHA 2340 C	mg/l	300	128.0	140.0
7	Iron (as Fe)	APHA 3500Fe, B	mg/l	0.3	0.24	0.28
8	Chloride (as Cl <sup>-</sup> )	APHA 4500Cl B	mg/l	250	8.0	10.0
9	Residual, free Chlorine	APHA 4500Cl, B	mg/l	0.2	ND	ND
<b>Desirable Characteristics</b>						
10	Dissolved Solids	APHA 2540 C	mg/l	500	194.0	204.0
11	Calcium (as Ca)	APHA 3500Ca B	mg/l	75	33.7	38.1
12	Magnesium (as Mg)	APHA 3500Mg B	mg/l	30	10.7	10.9
13	Copper (as Cu)	APHA 3111 B,C	mg/l	0.05	<0.001	<0.001
14	Manganese (as Mn)	APHA 3500Mn B	mg/l	0.1	<0.005	<0.005
15	Sulphate (as SO <sub>4</sub> <sup>2-</sup> )	APHA 4500 SO <sub>4</sub> <sup>2-</sup> E	mg/l	200	7.2	6.7
16	Nitrate (as NO <sub>3</sub> <sup>-</sup> )	APHA 4500 NO <sub>3</sub> <sup>-</sup> E	mg/l	45	5.1	4.6
17	Fluoride (as F)	APHA 4500F C	mg/l	1.0	0.16	0.18
18	Phenolic Compounds (as C <sub>6</sub> H <sub>5</sub> OH)	APHA 5530 B,D	mg/l	0.001	<0.001	<0.001
19	Mercury (as Hg)	APHA 3500 Hg	mg/l	0.001	<0.001	<0.001
20	Cadmium (as Cd)	APHA 3111 B,C	mg/l	0.01	<0.001	<0.001
21	Selenium (as Se)	APHA 3114 B	mg/l	0.01	<0.001	<0.001
22	Arsenic (as As)	APHA 3114 B	mg/l	0.05	<0.001	<0.001
23	Cyanide (as CN <sup>-</sup> )	APHA 4500 CN <sup>-</sup> C,D	mg/l	0.05	ND	ND
24	Lead (as Pb)	APHA 3111 B,C	mg/l	0.05	<0.01	<0.01
25	Zinc (as Zn)	APHA 3111 B,C	mg/l	5	<0.05	<0.05
26	Anionic Detergents (as MBAS)	APHA 5540 C	mg/l	0.2	<0.2	<0.2
27	Chromium (as Cr <sup>6+</sup> )	APHA 3500Cr B	mg/l	0.05	<0.05	<0.05
28	Mineral Oil	APHA 5220 B	mg/l	0.01	<0.001	<0.001
29	Alkalinity	APHA 2320 B	mg/l	200	110.0	121.0
30	Aluminium as (Al)	APHA 3500Al B	mg/l	0.03	<0.001	<0.001
31	Boron (as B)	APHA 4500B, B	mg/l	1	<0.01	<0.01
32	Poly Aromatic Hydrocarbon as PAH	APHA 6440 B	µg/l	--	<0.0001	<0.0001
33	Pesticide	APHA 6630 B,C	mg/l	Absent	Absent	Absent
34	Total Coli form	APHA 9221 B	MPN/100 ml	Not more than 10MPN/100 ml	<2	<2

Note: CL : Colourless, AL: Agreeable, U/O : Unobjectionable, ND: Not Detected.



For Visiontek Consultancy Services Pvt. Ltd.

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**"Committed For The Better Environment"**

# Annexure-IV: Ground Water Quality Report (As per BIS 10500:1991).....Cont.



**Visiontek Consultancy Services Pvt.Ltd.**  
(An Enviro Engineering Consulting Cell)



Ref.: VCSPL/116/R-977

Date: 08.10.2016

## GROUND WATER QUALITY ANALYSIS REPORT FOR THE MONTH OF SEPTEMBER-2016

1. Name of Industry : **Joda East Iron Mines ( M/s TATA Steel Limited)**
2. Sampling location : **GW-1: Khuntpani Village;  
GW-2: Bounsapani Village.**
3. Date of sampling : 14.09.2016
4. Date of analysis : 15.09.2016 to 21.09.2016
5. Sample collected by : VCSPL Representative in presence of TATA Representative

Sl No	Parameter	Testing Methods	Unit	Standard as per IS -10500:1991	Analysis Results	
					GW-1	GW-2
<b>Essential Characteristics</b>						
1	Colour	APHA 2120 B, C	Hazen	5	CL	CL
2	Odour	APHA 2150 B	--	U/O	U/O	U/O
3	Taste	APHA 2160 C	--	Agreeable	AL	AL
4	Turbidity	APHA 2130 B	NTU	5	<2	<2
5	pH Value	APHA 4500H <sup>+</sup> B	--	6.5-8.5	7.2	7.4
6	Total Hardness (as CaCO <sub>3</sub> )	APHA 2340 C	mg/l	300	132.0	136.0
7	Iron (as Fe)	APHA 3500Fe, B	mg/l	0.3	0.26	0.29
8	Chloride (as Cl )	APHA 4500Cl B	mg/l	250	12.0	16.0
9	Residual, free Chlorine	APHA 4500Cl, B	mg/l	0.2	ND	ND
<b>Desirable Characteristics</b>						
10	Dissolved Solids	APHA 2540 C	mg/l	500	210.0	232.0
11	Calcium (as Ca )	APHA 3500Ca B	mg/l	75	39.3	40.9
12	Magnesium (as Mg)	APHA 3500Mg B	mg/l	30	8.3	8.3
13	Copper (as Cu)	APHA 3111 B,C	mg/l	0.05	<0.05	<0.05
14	Manganese (as Mn)	APHA 3500Mn B	mg/l	0.1	<0.005	<0.005
15	Sulphate (as SO <sub>4</sub> )	APHA 4500 SO <sub>4</sub> <sup>2-</sup> E	mg/l	200	7.4	6.9
16	Nitrate (as NO <sub>3</sub> )	APHA 4500 NO <sub>3</sub> <sup>-</sup> E	mg/l	45	4.8	4.2
17	Fluoride (as F)	APHA 4500F C	mg/l	1.0	0.15	0.19
18	Phenolic Compounds (as C <sub>6</sub> H <sub>5</sub> OH)	APHA 5530 B,D	mg/l	0.001	<0.001	<0.001
19	Mercury (as Hg)	APHA 3500 Hg	mg/l	0.001	<0.001	<0.001
20	Cadmium (as Cd)	APHA 3111 B,C	mg/l	0.01	<0.001	<0.001
21	Selenium (as Se)	APHA 3114 B	mg/l	0.01	<0.001	<0.001
22	Arsenic (as As)	APHA 3114 B	mg/l	0.05	<0.001	<0.001
23	Cyanide (as CN)	APHA 4500 CN C,D	mg/l	0.05	ND	ND
24	Lead (as Pb)	APHA 3111 B,C	mg/l	0.05	<0.01	<0.01
25	Zinc (as Zn)	APHA 3111 B,C	mg/l	5	<0.05	<0.05
26	Anionic Detergents (as MBAS)	APHA 5540 C	mg/l	0.2	<0.2	<0.2
27	Chromium (as Cr <sup>6+</sup> )	APHA 3500Cr B	mg/l	0.05	<0.05	<0.05
28	Mineral Oil	APHA 5220 B	mg/l	0.01	<0.01	<0.01
29	Alkalinity	APHA 2320 B	mg/l	200	114.0	126.0
30	Aluminium as( Al)	APHA 3500Al B	mg/l	0.03	<0.001	<0.001
31	Boron (as B)	APHA 4500B, B	mg/l	1	<0.01	<0.01
32	Poly Aromatic Hydrocarbon as PAH	APHA 6440 B	µg/l	--	<0.0001	<0.0001
33	Pesticide	APHA 6630 B,C	mg/l	Absent	Absent	Absent
34	Total Coli form	APHA 9221 B	MPN/100 ml	Not more than 10MPN/100 ml	<2	<2

Note: CL : Colourless, AL: Agreeable, U/O : Unobjectionable, ND: Not Detected.

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**Annexure-V: Action plan for implementation of commitments made during public hearing on 1/2/2010 for Manmora Mn Mine**

<b>Issues raised by public</b>	<b>Commitment of the project proponent</b>	<b>Detail work to be done</b>	<b>Target Date</b>	<b>Fund Allocated (In Lakh)</b>	<b>Status as on 01<sup>st</sup> May 2016</b>
<b>Road &amp; Communication</b>	During last 3-4 years Tata Steel has spent more than 12 Crores for construction of roads to improve communication in Joda area. Further Tata Steel is planning to strengthen the roads in subsequent period.	Repairing and resurfacing of main road at Joda and Banspani area.	31.03.11	300	Completed
		Repairing and resurfacing of roads at Banspani Railway station, Ranasal Ghati to Dharanidhar Chowk, Fountainpark to Dharanidhar Chowk.		200	
<b>Hospital Health care</b> /	Tata Steel is already having a 45 bedded hospital and there is a plan to increase the capacity further by 20 beds and also adding laparoscopic surgery facility in the hospital.	Provision of Laparoscopic surgery facility.	30.04.10	17	Completed
	Responding to the sale of medicines, it was agreed to make necessary arrangements with the help of local medical shops near to the hospital.	Getting permission from Govt. for 20 more beds.	30.09.10	0.1	Application has been submitted for getting permission and approval is awaited.
		Construction of new building for accommodation of 20 more beds.	31.03.11	80	Completed
	Responding to the demand for free medical service, it was agreed to provide the same to the patients coming through Tata Steel Rural Development Society, even if those people do not have BPL cards.	Provision of free medical facility for the patients coming through TSRDS, even if those people do not have BPL cards.	Already implemented	138	Completed. To have better quality control of the medicines and better patient compliance, the medicines are purchased locally and made available through the hospital.

**Annexure-V: Action plan for implementation of commitments made during public hearing on 1/2/2010 for Manmora Mn Mine.....Cont.**

<b>Educational infrastructure</b>	Tata Steel has always been committed in developing the educational infrastructure in and around the area they operate for strengthening the educational qualities by way of providing better class rooms, good teachers and other necessary infrastructure like g desks / benches / tables and this is a continuous process. Further, responding to the demands of the people of Kamarjoda, Khuntpani and Banspani regarding educational facilities, it was agreed to provide more infrastructural facilities like class room, desks / benches / tables.	Construction of more class rooms in the village Kamarjoda, Khuntpani and Banspani	31.12.10	24	Completed
	Replying for opening a general college at Joda, Sri Verma suggested / proposed the people of Joda to form a committee. It was further proposed that this committee should get the land allocated from the Government after which necessary classrooms will be constructed phase-wise by Tata Steel.	Provision of desks benches & tables in the village Kamarjoda, Khuntpani and Banspani.	31.10.10	6	Completed
		Construction of classrooms for proposed college.	Within 10 months from the date of receiving land for construction	50	Land has not been provided by the State Govt. At the same time the infrastructure facilities at Joda Women's College and Badbil College has been strengthened. Also arrangements have been made to have XI and XII standard education in Tata DAV School which is already constructed
			<b>Total</b>	<b>815.1</b>	