



To,
The Additional Director
Ministry of Environment and Forests
Eastern Regional Office,
A/3, Chandrasekharpur
Bhubaneswar- 751023

Ref No: MGM/P&E/759/2016

Date: 30.11.2016

Sub: Submission of Six monthly compliance report on implementation of environmental safeguards of Joda West Manganese Mine for the period from April' 16 to September'16.

Ref: Ministry of Environment and Forests Letter No: J-11015/86/2004-IA.II(M) dated 13.09.2005

Dear Sir,

We are herewith submitting the six monthly compliance report in respect of the stipulated environmental clearance conditions of Joda West Manganese Mine for the period from April' 16 to September'16 as per EIA Notification, 2006.

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 LTD.

Agent, Joda West Mine &
Head (Manganese Group of Mines), Joda

Encl: As above

TATA STEEL LIMITED

Sukinda Chromite Mine PO Kalarangiatta Dist Jajpur Odisha 755028
Phone no 91 6726 268763 Fax 91 6726 268734
Registered Office Bombay House 24 Homi Mody Street Fort Mumbai 400 001 India
Tel 91 22 6665 8282 Fax 91 22 66657724
Corporate Identity Number L27100MH1907PLC000260 Website www.tatasteel.com

COMPLIANCE REPORT PERIOD : April' 16 to September' 16

**ENVIRONMENTAL CLEARANCE TO
JODA WEST MANGANESE MINE OF TATA STEEL LIMITED
VIDE MoEF's LETTER NO. J-11015/86/2004-1A.II(M) DATED 13.09.2005
COMMENTS SUBMITTED TO THE
MINISTRY OF ENVIRONMENT & FORESTS,
GOVERNMENT OF INDIA**

Present Status of the Project:-

The Scheme of Mining & Progressive Mine Closure Plan from 2013-14 to 2017-18 over an area of 1437.719 ha. has been approved by Indian Bureau of Mines, Bhubaneswar vide letter no. MS/OTFM/47-ORI/BHU/2012-13, Dt.21.05.2013.

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.	<p>The mine has obtained the Forest Clearance vide MoEF's letter no. F.No.8-89/2004-FC, dt.10.08.2007 over an area of 436.678 ha of forest land.</p> <p>We have applied for forest diversion over an area of 730.635 ha on 25.11.2015.</p> <p>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) 79.239ha. within the mining lease of 1437.719 ha is now termed as forest land. Hence, fresh forest diversion proposal over an area of 79.239 ha has been applied on 20.06.2016</p> <p>The mining operation and allied activities are confined within the approved diverted area only.</p>
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.	<p>No top soil generated during April' 16 to September' 16 due to continuation of mine development within the broken up area only. However, the top soil generated earlier is used for development of park and nursery within the lease-hold area and plantation in the inactive dump slopes within the mine.</p>
3	<p>OB and other wastes should be stacked at earmarked sites only and should not be kept active for long periods of time.</p> <p>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°.</p>	<p>OB and other wastes are being dumped as per approved Scheme of Mine of Joda West Manganese Mine.</p> <p>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 local species.</p> <p>26100 nos. of plant saplings of local species (Gambhari, Chakunda, Mahanimba, Kala Siris, Sisu, Karanj, Jamun</p>

	<p>Sedimentation pits shall be constructed at the corners of the garland drains. Retention/toe walls shall be provided at the base of the dumps.</p>	<p>etc) were planted over an area of 2.8 ha during 2015-16 with survival rate of 82%.</p> <p>During the 2016-17, 21930 nos. of sapling were planted covering an area of 3.6 ha during the year 2016-17.</p> <p>We have also planted 80,000 vetiver slips in inactive dump slopes of quarry H & I during the year 2016-17.</p> <p>Apart from this we have distributed fruit bearing saplings free of cost to our surrounding communities including, school children, villagers, clubs and SHGs under guidance of State Pollution Control Board, Odisha during the year 2016-17.</p> <p>The retaining wall and garland drain with sedimentation pit at corners near toe at low lying area and uplift portion of OB dump has been constructed. Their dimensions are matching the requirements to arrest the run off effectively.</p>
4	<p>Minerals rejects shall be stacked separately at earmarked site/dump only.</p>	<p>The mineral rejects generated during manual processing of manganese ore (i.e. sorting, dressing and sizing) has been stacked separately at earmarked site.</p>
5	<p>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.</p> <p>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.</p> <p>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.</p>	<p>Existing catch drains and garland drains are covering the entire dump slope at bottom part. The run off of garland drains are collected in settling/sedimentation pits. The catch drains and sedimentation pits are periodically desilted and maintained properly.</p> <p>Size, gradient and length of the drains are adequate to take care of the peak flow.</p> <p>A series of check dams and settling pits have been provided for proper settlement of suspended solid in surface runoff.</p>
6	<p>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.</p>	<p>In order to prevent the siltation and check the run-off, retaining wall and garland drain are provided with the dimension as; <u>Dimension of the Retaining Wall :</u></p>

		<p>Height – 1 to 1.2 mtr. Width – 1 mtr.</p> <p><u>Dimension of the Garland Drain :</u></p> <p>Depth – 1.20 to 1.5 mtr. Width – 1 to 1.2 mtr.</p> <p>A multi-stage sedimentation basin with check dam had been provided at H'Quarry to prevent direct flow of surface run off to Kundra Nallah, a perennial source of water flowing along the western lease boundary.</p>
7	<p>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 seasons. If concentrations of these metals are found below the standards then with prior approval of MOEF this specific monitoring could be discontinued.</p>	<p>Samples have been analyzed in dust fall & soil during summer season and monsoon season.</p> <p>The detail analysis result is enclosed as Annexure-I (Dust Fall) & Annexure -II (Soil)</p>
8	<p>Mine Mineral and OB transportation shall be in trucks/dumpers covered with tarpaulins.</p> <p>Vehicular emissions should be kept under control and regularly monitored.</p> <p>Suitable measures should be taken to check fugitive emissions from haulage roads & transfer points, etc.</p>	<p>The trucks are being covered with tarpaulin during dispatch of manganese ore from mine to Ferro Alloys Plant and Railway Siding located 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.</p> <p>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.</p> <p>There is provision of water sprinkling by mobile water sprinklers to suppress fugitive emission from haul roads. We have also installed fixed-type water sprinklers along haul road at D-Quarry. The processed manganese ore is being transferred manually; hence there less fugitive emission during transfer of ore.</p> <p>The results of Ambient Air Quality done during the period April’16 to September’16 is enclosed as Annexure-III.</p>
9	<p>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 / Agriculture Department. The density of the trees should be not less than 2500 plants per ha.</p>	<p>Reclamation and plantation programmes have been drawn. We have planted 10.82 Lakh nos. of trees over an area around 218 ha with 74 % survival rate up to 2015-16 at safety zone, OB dump and as avenue plantation. The tree density is maintained at the rate of 3641 saplings per ha.</p> <ul style="list-style-type: none"> • During the year 2015-16, we have planted 26100 nos. of plant saplings over an area of 2.8 ha. • During the 2016-17, 21930 nos. of sapling were

		<p>planted covering an area of 3.6 ha during the year 2016-17.</p> <ul style="list-style-type: none"> Apart from conventional plantation programme we have also planted 3,00,000 of Vetiver slips in inactive dump slopes of D & H quarry till date.
10	Groundwater shall not be used for mine operations. Prior approval of CGWA shall be obtained for using groundwater.	<p>Ground water use permission has been obtained from CGWA vide letter no. 21-4(250)/CGWA/SER/2010-1798, Dt.25.08.2010 for 504 m³ per day.</p> <p>The ground water is not being used for mining and its allied activities. The mine seepage water is being used for nursery development and water sprinkling at mine. The total usage is well within the permissible limit.</p>
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.	<p>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 separate location is being monitored.</p> <p>The ground water level and quality monitoring results are enclosed as Annexure IV & V respectively.</p>
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.	<p>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.</p> <p>The details of analysis result for ground water and surface water with standards are enclosed as Annexure – VI & VII respectively.</p>
14	"Consent to Operate" should be obtained from SPCB before expanding mining activities.	"Consent to operate" has been obtained from State Pollution Control Board, Orissa vide Order no. 3012/IND-I-CON-186 dated 18.02.16 valid 31.03.2021.
15	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	We have deposited Rs.56,30,000/- on 05.07.2006 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. 2,31,24,380 and Rs 3,30,67,537

	<p>identified agencies/institutions and with the 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/tasks 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.</p>	<p>with DFO, Keonjhar, Orissa towards differential payment for implementation of regional Wildlife Management Plan prepared for Bonai & Keonjhar division.</p> <p>Further, Site Specific wildlife management plan has been approved by the memo no. 7726/1WL-SSP-93/2015 dated 31 Aug 2015.</p>												
16	<p>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.</p>	<p>A progressive mine closure plan for the period 2013-14 to 2017-18 has been approved by IBM along with the Scheme of Mining.</p> <p>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.</p>												
Sl. no	B : General Conditions	Compliance Status												
1	<p>No change in mining technology and scope of working should be made without prior approval of the Ministry of Environment & Forests.</p>	<p>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.</p>												
2	<p>No change in the calendar plan including excavation, quantum of manganese ore and waste should be made.</p>	<p>Excavation plan for total excavation, Manganese ore and waste has been prepared and is being strictly adhered. The actual figure for total excavation, manganese ore and waste for the year 2016-17 is given in table below.</p> <p>Table: Plan vs. Actual for year 2016-17 (till sept' 16)</p> <table border="1"> <thead> <tr> <th>Year- 2016-17 (Till Sept' 16)</th> <th>Plan</th> <th>Actual</th> </tr> </thead> <tbody> <tr> <td>Total Excavation (cum)</td> <td>1658000</td> <td>267587</td> </tr> <tr> <td>Production (MT)</td> <td>170000</td> <td>40934</td> </tr> <tr> <td>OB Removal (cum)</td> <td>1578000</td> <td>248331</td> </tr> </tbody> </table>	Year- 2016-17 (Till Sept' 16)	Plan	Actual	Total Excavation (cum)	1658000	267587	Production (MT)	170000	40934	OB Removal (cum)	1578000	248331
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3	<p>Four ambient air quality-monitoring stations should be established in the core zone as well as in the buffer zone for RPM. SPM, SO₂, NO_x. Monitoring. Location of the stations should be decided based on the</p>	<p>Five ambient air quality monitoring stations have been established out of which 2 nos. in core zone (Near Office close proximity to residential and mining area and near H-Quarry) and 3 nos. in buffer zone (at Khandbondh, Bonaikela, Banspani)</p>												

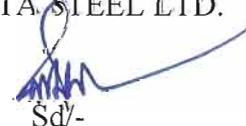
	<p>meteorological data, topographical features, and environmentally and ecologically sensitive targets in consultation with the State Pollution Control Board.</p> <p>Data on ambient air quality (RPM, SPM, SO₂ & NO_x.) should be regularly submitted to the Ministry including its Regional office at Bhubaneswar and the State Pollution Control Board / Central Pollution Control Board once in six. months.</p>	<p>Samples are drawn twice in a week in core zone and once in a quarter in buffer zone to ascertain the 24 hour monitoring average for PM₁₀, PM_{2.5}, SO₂, NO_x, CO, Mn NH₃, BaP, benzene, As, Ni and Pb.and reports are being submitted to OSPCB every month.</p> <p>It was observed that,</p> <p>a) PM₁₀ varies from 31.99 µg/m³ (Aug'16) to 64.30 µg/m³ (April'16) near Office (close proximity to quarry and residential colony) against the standard 100 µg/m³.</p> <p>b) PM₁₀ varies from 31.97 µg/m³ (Aug'16) to 65.40 µg/m³ (April'16) near quarry area against the standard 100 µg/m³.</p> <p>c) PM_{2.5} varies from 15.01 µg/m³ (Aug'15) to 31.90 µg/m³ (April'16) near Office (close proximity to quarry and residential colony) against the standard 60 µg/m³.</p> <p>d) PM_{2.5} varies from 15.04 µg/m³ (Sept'16) to 32.6 µg/m³ (April'16) near quarry area against the standard 60 µg/m³.</p> <p>e) SO₂ varies from 4.0 µg/m³ (Aug'16) to 5 µg/m³ (Jun'16) near office (close proximity to quarry and residential colony) against the standard 80 µg/m³.</p> <p>f) SO₂ varies from 4.0 µg/m³ (Jul, Aug, Sept'16) to 5.30µg/m³ (April'16 and May'16) near quarry area against the standard 80 µg/m³.</p> <p>g) NO_x varies from 9.16 µg/m³ (Aug'16) to 19.50 µg/m³ (April'16) near office (close proximity to quarry and residential colony) against the standard 80 µg/m³.</p> <p>h) NO_x varies from 9.0 µg/m³ (July'16, Aug'16, Sept'16) to 20.90 µg/m³ (Jun'16) near quarry area against the standard 80 µg/m³.</p> <p>i) CO varies from 0.11 mg/m³ (Aug'16) to 0.20 mg/m³ (May'16 and Jun'16) near office (close proximity to quarry and residential colony) against the standard 2 mg/m³.</p> <p>j) CO varies from 0.11 µg/m³ (Aug'16) to 0.22 µg/m³ (June'16) near quarry area against the standard 2 mg/m³</p> <p>Abstract of the monthly monitoring data on ambient air quality and Water quality are enclosed as Annexure – III & VII.</p>
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.
5	Fugitive dust emissions from all the sources should be controlled regularly	Effective water sprinkling by mobile water tanker is being done on haul roads. Additionally we have also

	monitored and data recorded properly. Water spraying arrangements on haul roads, wagon loading, dumpers/trucks, loading & unloading points should be provided and properly maintained.	installed fixed-type water sprinklers along haul road at D-Quarry. The results of Ambient Air Quality done during the period April' 16 to September' 16 is enclosed as Annexure-III .
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 mining operation & DG operations. Rests of operations are below the noise levels of 80 dBA. The details of noise monitoring for the period April' 16 to September' 16 are enclosed as Annexure-VIII .
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 st 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 Joda West & Service equipments of Malda 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 and M/s Mitra S.K. 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 by M/s Mitra S.K. Pvt. is enclosed as Annexure – IX .
9.	Personnel working in dusty areas should wear protective respiratory devices and they should also be provided with adequate training and 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.	Suitable dust masks are being provided to employees (departmental & contractual) engaged in dusty operations. It is also ensured that they use the same. 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 programmes 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. During the calendar year 2015, 57 nos. of employees under went periodical medical examination

		(PME) and 13 went under initial medical examination (IME). 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-X .														
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 Bhubaneswar.	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 year 2015-16 was Rs. 27,48,710/- (Monitoring – Rs 13,35,422/- & Plantation - Rs. 14,13,288/-) against the budget of Rs 14,18,750/- (Monitoring - Rs,12,00,000/- & Plantation - Rs. 2,18,750/-) for Joda West Manganese Mines. The Budget allotted for the year 2016-16 for environment management at Joda West Mn Mine is as follow: <table border="1" data-bbox="760 951 1498 1346"> <thead> <tr> <th>Item</th> <th>Plan (in Rs.) For the 2016-17</th> </tr> </thead> <tbody> <tr> <td>Construction of parapet wall/ retaining wall at toe of dumps</td> <td>48750</td> </tr> <tr> <td>Construction of settling ponds (Garland drains etc.).</td> <td>11700</td> </tr> <tr> <td>Desiltation of settling ponds channels</td> <td>25000</td> </tr> <tr> <td>Afforestation on dumps</td> <td>218750</td> </tr> <tr> <td>Environmental Monitoring</td> <td>1200000</td> </tr> <tr> <td>Total</td> <td>1504200</td> </tr> </tbody> </table>	Item	Plan (in Rs.) For the 2016-17	Construction of parapet wall/ retaining wall at toe of dumps	48750	Construction of settling ponds (Garland drains etc.).	11700	Desiltation of settling ponds channels	25000	Afforestation on dumps	218750	Environmental Monitoring	1200000	Total	1504200
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Total	1504200															
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 / information / monitoring reports	We are providing 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 Chairman, Municipal Council, Joda 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 Joda West Manganese Mine was published in Oriya News Papers Dharitri & Sambad 17.10.2005.
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 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.	Noted

Yours faithfully
F: TATA STEEL LTD.



Sd/-

Agent, Joda West Mn.Mine &
Head (Manganese Group of Mines), Joda

Annexure I

Mitra S. K. Private Limited

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CIN: U51909WB1966PTC023037

T : +91 94370 09815, 94370 09820, 94370 75269
E : barbi@mitrask.co.in
W : www.mitrask.com



Ref.No.BBL/ENV/1315

Date:04/05/2016

DUST FALL ANALYSIS REPORT

Name of the Mines: Joda-West Manganese Mines

Period of Sampling: April' 2016

Sl.No.	Parameters	Location	
		D-Quarry	H-Quarry
1	Nickel (as Ni) in %	<0.0002	<0.0002
2	Cobalt (as Co) in %	<0.0002	<0.0002
3	Mercury (as Hg) in %	<0.00001	<0.00001
4	Arsenic (as As) in %	<0.00003	<0.00003

For Mitra S. K. Private Limited

Authorised Signatory

Checked by:-

H. O.: Shrachi Centre (5th Floor), 74B, Acharya Jagadish Chandra Bose Road, Kolkata – 700 016, West Bengal, India
T: 91 33 22172249 / 4014 3000 / 2265 0006 / 2265 3007 F: 91 33 2265 3008 E: info@mitrask.com W: www.mitrask.com



VCSPL/16/R-1053

Date.: 05.10.2016

DUST FALL MONITORING REPORT FOR THE MONTH OF SEPTEMBER-2016

1. Name of Industry : Joda West Manganese Mines (M/s TATA Steel Limited)
2. Sample collected by : VCSPL Representative in presence of TATA Representative

Sl No.	Parameters	Unit	Analysis Results
			DF-1
1.	Cobalt as Co	%	<0.001
2.	Nickel as Ni	%	<0.001
3.	Mercury as Hg	%	<0.001
4.	Arsenic as As	%	<0.001

Total Dust fall for the month of September-2016=0.340 t/km²/month

For Visiontek Consultancy Services Pvt. Ltd.



Annexure – II



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



Ref.: VCSPL/116/R-1074

Date: 05.10.2016

SOIL QUALITY ANALYSIS REPORT FOR THE MONTH OF SEPTEMBER-2016

1. Name of Industry : Joda West Manganese Mines (M/s TATA Steel Limited)
2. Sampling Location : S-1: H-Quarry
3. Date of Sampling : 22.09.2016
4. Date of Analysis : 23.09.2016 to 26.09.2016
5. Sample collected by : VCSPL Representative in presence of TATA Representative

Sl No.	Parameters	Unit	Analysis Results
			S-1
1.	Cobalt as Co	%	0.0021
2.	Nickel as Ni	%	0.052
3.	Mercury as Hg	%	<0.000002
4.	Arsenic as As	%	<0.000002

For Visiontek Consultancy Services Pvt. Ltd.



Plot No-108, District Centre, Chandrasekharpur, Bhubaneswar-16, Tel-91-674-2744594, 3250790
Email: visiontekin@gmail.com, visiontekin@yahoo.co.in, visiontek@vcspl.org, Visit us at: www.vcspl.org

"Committed For The Better Environment"

Annexure - III AAQ Monitoring

Name of the Mines : JODA WEST MN.MINE, M/S TATA STEEL LTD.

JW (Time office)

Monthly Average	PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	NH ₃ (µg/m ³)	O ₃ (µg/m ³)	CO (mg/m ³)	Pb (µg/m ³)	Ni (ng/m ³)	Mn (µg/m ³)	As (ng/m ³)	Benzene (µg/m ³)	Benzo(a) pyrene (ng/m ³)
Apr-16	64.30	31.90	4.70	19.50	10.7	20.3	0.18	<0.02	<4	0.12	<1	<2.08	<0.4
May-16	57.00	27.00	4.70	19.20	10	19.62	0.2	<0.02	<4	0.12	<1	<2.08	<0.4
Jun-16	51.70	24.70	5.00	19.30	10.00	19.62	0.20	<0.02	<4	0.13	<1	<2.08	<0.4
Jul-16	33.69	15.57	4.12	9.50	<20	<4	0.12	<0.001	<0.01	<0.001	<0.001	<0.001	<0.002
Aug-16	31.99	15.01	4.00	9.16	<20	<4	0.11	<0.001	<0.01	<0.001	<0.001	<0.001	<0.002
Sep-16	33.66	15.81	4.03	9.32	<20	<4	0.12	<0.001	<0.01	<0.001	<0.001	<0.001	<0.002
ANNUAL AVERAGE	45.39	21.67	4.43	14.33	10.23	19.85	0.16	--	--	0.12	--	--	--

Near JW (H quarry)

Monthly Average	PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	NH ₃ (µg/m ³)	O ₃ (µg/m ³)	CO (mg/m ³)	Pb (µg/m ³)	Ni (ng/m ³)	Mn (µg/m ³)	As (ng/m ³)	Benzene (µg/m ³)	Benzo(a) pyrene (ng/m ³)
Apr-16	65.40	32.60	5.30	21.20	10.6	20.7	0.19	<0.02	<4	0.16	<1	<2.08	<0.4
May-16	59.00	30.00	5.30	21.10	10.5	19.6	0.21	<0.02	<4	0.18	<1	<2.08	<0.4
Jun-16	54.30	26.60	5.10	20.90	10.50	19.60	0.22	<0.02	<4	0.15	<1	<2.08	<0.4
Jul-16	35.32	16.41	4.00	9.00	<20	<4	0.12	<0.001	<0.01	<0.001	<0.001	<0.001	<0.002
Aug-16	31.97	15.36	4.00	9.00	<20	<4	0.11	<0.001	<0.01	<0.001	<0.001	<0.001	<0.002
Sep-16	32.49	15.04	4.00	9.00	<20	<4	0.11	<0.001	<0.01	<0.001	<0.001	<0.001	<0.002
ANNUAL AVERAGE	46.41	22.67	4.62	15.03	10.53	19.97	0.16	--	--	0.16	--	--	--

Annexure – IV: Ground Water Level Monitoring

Mitra S. K. Private Limited

ANP O BARBIL, Ward No-6
Dist: Keonjhar, Odisha - 758035
CIN U51909WB1958PTC023037

T : +91 94370 09815, 94370 09820, 94370 75269
E : barbil@mitrask.com
W : www.mitrask.com



Ref. No.BBL/ENV/1393

DATE: 31/05/2016

CERTIFICATE OF ANALYSIS

This is to certify that a sample of "Ground Water Level Monitoring" reading taken by our representative at M/s. Joda West Manganese Mines; P.O: Bichakundi, Dist: Keonjhar, Odisha, in the Presence of a representative of and on account of M/s.Tata Steel Ltd.,has been analysed with the following results:-

Date of Monitoring	Location	Water Level (Below Ground level, in mtrs)
06.05.2016	Well at Kamarjoda Village	11.0
06.05.2016	Well at Dalpahar Village	10.0

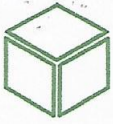
Checked by:-

For Mitra S. K. Private Limited

Authorised Signatory

H. O.: Shrachi Centre (5th Floor), 74B, Acharya Jagadish Chandra Bose Road, Kolkata – 700 016, West Bengal, India
T: 91 33 22172249 / 4014 3000 / 2265 0006 / 2265 0007 F: 91 33 2265 0008 E:info@mitrask.com W: www.mitrask.com





Visiontek Consultancy Services Pvt.Ltd.

(An Enviro Engineering Consulting Cell)



ISO 14001:2004
ISO 9001: 2008
OHSAS 18001:2007

Ref.: VCS.P/L/16/R-895

Date.: 05.09.2016

GROUND WATER (LABEL) QUALITY ANALYSIS REPORT FOR THE MONTH OF AUGUST-2016

1. Name of Industry : Joda West Manganese Mines (M/s TATA Steel Limited)
2. Sampling Location : GW-1: Kumar Joda, GW2-Baneikala Basti
3. Date of sampling : 20.08.2016
4. Date of analysis : 22.08.2016 to 24.08.2016
5. Sample collected by : VCSPL Representative in presence of TATA Representative

Sl No	Name of Village	Date	Unit	Result
1	Kumar Joda	04.08.2016	Mt./bgl	2.8
2	Baneikala Basti	20.08.2016	Mt./bgl	3.2

For Visiontek Consultancy Services Pvt. Ltd.



Annexure – V: Ground Water Quality Monitoring

Mitra S. K. Private Limited

ASP O, BARBIL Ward No-6
Dist: Keonjhar, Odisha - 756036
CIN: U51909WB1956PTC023037

T: +91 94370 00615, 94370 00220, 94370 76269
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W: www.mitrask.com

Ref. No. BBL/ENV/1303



DATE: 04/05/2016

CERTIFICATE OF ANALYSIS

This is to certify that a sample of "Ground Water" drawn by our representative on 08/04/2016 at Joda West Manganese Mines ; P.O: Bichakundi, Dist: Keonjhar, Odisha in the Presence of a representative of and on account of M/s. Tata Steel Ltd , has been analyzed with the following results:-

MICROBIOLOGICAL ANALYSIS OF WATER AS PER IS: 10500 - 1991

Sl No.	Test Parameters	Norms as per IS: 10500-1991	Results
1	Total Coliform Organism MPN/100ml	10 (MAX)	5
2	Faecal Coliforms	Absent	Absent
3	E. Coli	Absent	Absent

CHEMICAL ANALYSIS OF WATER AS PER IS: 10500 - 1991

Sl No.	Test Parameters	Norms as per IS: 10500-1991		Results
		Desirable Limit	Permissible Limit	
1	Colour (Hazen Unit)	5	25	<1.0
2	Odour	Unobjectionable	--	Unobjectionable
3	Taste	Agreeable	--	Agreeable
4	Turbidity in NTU	5	10	<1.0
5	pH value (26°C)	6.5 - 8.5	No Relaxation	7.45
6	Total Hardness(as CaCO ₃) in mg/l	300	600	17.52
7	Iron (as Fe) in mg/l	0.3	1	<0.05
8	Chloride (as Cl) in mg/l	250	1000	7.5
9	Fluoride (as F) in mg/l	1	1.5	<0.10
10	Residual Free Chlorine in mg/l	0.2(Min.)	---	<0.10
11	Total Dissolved Solids in mg/l	500	2000	24
12	Calcium (as Ca) in mg/l	75	200	3.55
13	Magnesium (as Mg) in mg/l	30	100	2.86
14	Copper (asCu) in mg/l	0.05	1.5	<0.02
15	Manganese (as Mn) in mg/l	0.1	0.3	<0.02
16	Sulphate (as SO ₄) in mg/l	200	400	<1.0
17	Nitrate (as NO ₃) in mg/l	45	100	2.1
18	Phenolic Compounds (as C ₆ H ₅ OH) in mg/l	0.001	0.002	<0.001
19	Mercury (as Hg) in mg/l	0.001	No Relaxation	<0.001
20	Cadmium (as Cd) in mg/l	0.01	No Relaxation	<0.002
21	Selenium (as Se) in mg/l	0.01	No Relaxation	<0.005
22	Arsenic (as As) in mg/l	0.05	No Relaxation	<0.01
23	Cyanide (as CN) in mg/l	0.05	No Relaxation	<0.01
24	Lead (as Pb) in mg/l	0.05	No Relaxation	<0.005
25	Zinc (as Zn) in mg/l	5	15	0.04
26	Anionic Detergents (as MBAS) in mg/l	0.2	1	<0.02
27	Chromium (as Cr ⁺⁶) in mg/l	0.1	No Relaxation	<0.01
28	Mineral Oil	---	---	<0.01
29	Alkalinity (as CaCO ₃) in mg/l	200	600	12.24
30	Aluminium (as Al) in mg/l	0.03	0.2	<0.01
31	Boron (as B) in mg/l	1	5	<0.5
32	PAH	---	---	<0.0001
33	Pesticide	---	---	<0.00001

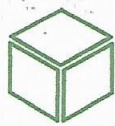
SAMPLING LOCATION : Well at Kumarjora (Joda West)

Checked by: 

For Mitra S. K. Private Limited
Authorized Signatory

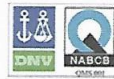
H. O. : Shraichi Centre (5th Floor), 74B, Acharya Jagadish Chandra Bose Road, Kolkata - 700 016, West Bengal, India
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Visiontek Consultancy Services Pvt.Ltd.

(An Enviro Engineering Consulting Cell)



ISO 14001:2004
ISO 9001: 2008
OHSAS 18001:2007

Ref.: VCSPL/161R-893

Date: 05.09.2016

GROUND WATER QUALITY ANALYSIS REPORT FOR THE MONTH OF AUGUST-2016

1. Name of Industry : Joda West Manganese Mines (M/s TATA Steel Limited)
2. Sampling Location : **GW-1: Pramabasti**
GW-2: Open well Kumar joda
3. Date of sampling : 20.08.2016
4. Date of analysis : 22.08.2016 to 26.08.2016
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
Essential Characteristics						
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	7.12	7.18
6	Total Hardness (as CaCO ₃)	APHA 2340 C	mg/l	300	126	135
7	Iron (as Fe)	APHA 3500Fe, B	mg/l	0.3	0.21	0.18
8	Chloride (as Cl)	APHA 4500Cl B	mg/l	250	28.0	34.0
9	Residual, free Chlorine	APHA 4500Cl, B	mg/l	0.2	ND	ND
Desirable Characteristics						
10	Dissolved Solids	APHA 2540 C	mg/l	500	186	205
11	Calcium (as Ca)	APHA 3500Ca B	mg/l	75	33.3	36.1
12	Magnesium (as Mg)	APHA 3500Mg B	mg/l	30	10.4	10.9
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	0.012	0.014
15	Sulphate (as SO ₄)	APHA 4500 SO ₄ ²⁻ E	mg/l	200	4.6	5.2
16	Nitrate (as NO ₃)	APHA 4500 NO ₃ E	mg/l	45	2.4	2.6
17	Fluoride (as F)	APHA 4500F C	mg/l	1.0	0.018	0.016
18	Phenolic Compounds (as C ₆ H ₅ 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 ⁺⁶)	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	111	120
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

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


 For Visiontek Consultancy Services Pvt. Ltd.



Annexure – VI: Trace Metal Analysis in Ground Water

Mitra S. K. Private Limited

AMP O. BARBIL Ward No-6
Dist: Keonjhar Odisha - 759035
CIN: U51909WB1956PTC023037

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Ref. No. BBL/ENV/1308

DATE: 04/05/2016

CERTIFICATE OF ANALYSIS

This is to certify that a sample of "Ground Water" drawn by our representative on 08/04/2016 at **Joda West Manganese Mines ; P.O: Bichakundi, Dist: Keonjhar, Odisha** in the Presence of a representative of and on account of **M/s. Tata Steel Ltd.**, has been analyzed with the following results:-

TRACE METAL ANALYSIS OF WATER AS PER IS: 10500 - 1991

Sl No.	Test Parameters	Norms as per IS: 10500-1991		Results
		Desirable Limit	Permissible Limit	
1	Iron (as Fe) in mg/l	0.3	1	<0.05
2	Chromium (as Cr ⁺⁶) in mg/l	0.1	No Relaxation	<0.01
3	Copper (asCu) in mg/l	0.05	1.5	<0.02
4	Selenium (as Se) in mg/l	0.01	No Relaxation	<0.005
5	Arsenic (as As) in mg/l	0.05	No Relaxation	<0.01
6	Cadmium (as Cd) in mg/l	0.01	No Relaxation	<0.002
7	Mercury (as Hg) in mg/l	0.001	No Relaxation	<0.001
8	Lead (as Pb) in mg/l	0.05	No Relaxation	<0.005
9	Zinc (as Zn) in mg/l	5	15	<0.02
10	Manganese (as Mn) in mg/l	0.1	0.3	<0.02

SAMPLING LOCATION :- Bore Well at Bichkundi Camp

For Mitra S. K. Private Limited

Checked by:-

H. O.: Shrachi Centre (5th Floor), 74B, Acharya Jagadish Chandra Bose Road, Kolkata – 700 016, West Bengal, India
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Authorized Signatory





Ref.: V.E.S.P.L/bbtr-894

Date.: 05.09.2016

GROUND WATER (TRESS METAL) QUALITY ANALYSIS REPORT FOR THE MONTH OF AUGUST-2016

1. Name of Industry : Joda West Manganese Mines (M/s TATA Steel Limited)
2. Sampling Location : GW-1: Pramabasti
3. Date of sampling : 20.08.2016
4. Date of analysis : 22.08.2016 to 24.08.2016
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
1	Iron (as Fe)	APHA 3500Fe, B	mg/l	0.3	0.21
2	Copper (as Cu)	APHA 3111 B,C	mg/l	0.05	< 0.05
3	Manganese (as Mn)	APHA 3500Mn B	mg/l	0.1	0.012
4	Chromium (as Cr ⁺⁶)	APHA 3500Cr B	mg/l	0.05	< 0.05
5	Mercury (as Hg)	APHA 3500 Hg	mg/l	0.001	< 0.001
6	Cadmium (as Cd)	APHA 3111 B,C	mg/l	0.01	< 0.01
7	Selenium (as Se)	APHA 3114 B	mg/l	0.01	< 0.001
8	Arsenic (as As)	APHA 3114 B	mg/l	0.05	< 0.001
9	Lead (as Pb)	APHA 3111 B,C	mg/l	0.05	< 0.01
10	Zinc (as Zn)	APHA 3111 B,C	mg/l	5	<0.05


 For Visiontek Consultancy Services Pvt. Ltd.


**Annexure – VII (Water Quality Monitoring) (UPSTREAM)
Water Quality Monitoring) (DOWNSTREAM)**

Joda West (kundra Nala Entering H Quarry)			April'16	May'16	June'16	
Parameters	Unit	Standard	1st Report	1st Report	1st Report	2nd Report
Colour	Hazen	5	<1.0	<1.0	<1.0	<1.0
Odour	-	Unobjecti onable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable
pH at 26°C	-	5.5-9.0	6.84	6.97	6.95	7.1
Total Dissolved Solids	mg/l	-	58	63	68	108
Copper as Cu	mg/l	3.0	<0.02	<0.02	<0.02	<0.02
Fluoride as F	mg/l	2.0	0.23	0.2	0.27	0.31
Total Residual Chlorine	mg/l	1.0	<0.1	<0.1	<0.1	<0.1
Iron as Fe	mg/l	3.0	0.57	1.32	1.18	1.8
Manganese as Mn	mg/l	2.0	<0.02	<0.02	0.06	0.11
Nitrate as NO ₃	mg/l	10.0	<0.5	1.16	<0.5	<0.5
Phenolic Compounds as C ₆ H ₅ OH	mg/l	1.0	<0.001	<0.001	<0.001	<0.001
Selenium as Se	mg/l	0.05	<0.005	<0.005	<0.005	<0.005
Cadmium as Cd	mg/l	2.0	<0.001	<0.001	<0.001	<0.001
Cyanide as CN	mg/l	0.2	<0.01	<0.01	<0.01	<0.01
Lead as Pb	mg/l	0.1	<0.005	<0.005	<0.005	<0.005
Mercury as Hg	mg/l	0.01	<0.001	<0.001	<0.001	<0.001
Nickel as Ni	mg/l	3.0	<0.02	<0.02	<0.02	<0.02
Arsenic as As	mg/l	0.2	<0.01	<0.01	<0.01	<0.01
Total Chromium as Cr	mg/l	2.0	<0.01	<0.01	<0.01	<0.01
Zinc as Zn	mg/l	5.0	<0.02	<0.02	<0.02	<0.02
Hexavalent Chromium as Cr ⁺⁶	mg/l	0.1	<0.01	<0.01	<0.01	<0.01
Vanadium as V	mg/l	0.2	<0.2	<0.2	<0.2	<0.2
Total Suspended Solids	mg/l	50 / 100	6.2	47.8	9.1	12.7
Temperature	°C	-	28	28	28	28
Dissolved Oxygen	mg/l	-	5.1	6.2	6.1	5.8
BOD	mg/l	30	<2.0	3.1	<2.0	<2.0
COD	mg/l	250	<4.0	20.1	<4.0	<4.0
Oil & Grease	mg/l	10	<1.4	<1.4	<1.4	<1.4
Ammonical Nitrogen as N	mg/l	50	<0.1	<0.1	<0.1	<0.1
Total Kjeldahl Nitrogen as N	mg/l	100	<0.3	<0.3	<0.3	<0.3
Sulphide as S	mg/l	2.0	<0.1	<0.1	<0.1	<0.1
Free Ammonia as NH ₃	mg/l	5.0	<0.1	<0.1	<0.1	<0.1
Particulate Size of Suspended Solids	mg/l	Passes through 850 um IS sieve	Passes through 850 um IS sieve	Passes through 850 um IS sieve	Passes through 850 um IS sieve	Passes through 850 um IS sieve
Bio-assay	mg/l	All fishes survive after 96 hrs in 100% effluent	All fishes survive after 96 hrs in 100% effluent	All fishes survive after 96 hrs in 100% effluent	All fishes survive after 96 hrs in 100% effluent	All fishes survive after 96 hrs in 100% effluent
Dissolved Phosphates as PO ₄	mg/l	5.0	<0.05	<0.05	<0.05	<0.05

JODA-WEST (DOWN STREAM) (kundra Nala Entering H Quarry)				April'16	May'16	June'16	
Sl.	Parameters	Unit	Standards	1st Report	1st Report	1st Report	2nd Report
1	Colour	Hazen	5	<1.0	<1.0	<1.0	<1.0
2	Odour	--	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable
3	pH at 26°C	--	5.5-9.0	6.78	6.48	6.7	6.9
4	Total Dissolved Solids	mg/l	-	54	68	67	10.3
5	Copper as Cu	mg/l	3.0	<0.02	<0.02	<0.02	<0.02
6	Fluoride as F	mg/l	2.0	0.14	0.33	0.23	0.29
7	Total Residual Chlorine	mg/l	1.0	<0.1	<0.1	<0.1	<0.1
8	Iron as Fe	mg/l	3.0	0.90	1.6	0.89	1.3
9	Manganese as Mn	mg/l	2.0	<0.02	0.05	0.03	0.08
10	Nitrate as NO ₃	mg/l	10.0	<0.5	1.27	0.55	<0.5
11	Phenolic Compounds as C ₆ H ₅ OH	mg/l	1.0	<0.001	<0.001	<0.001	<0.001
12	Selenium as Se	mg/l	0.05	<0.005	<0.005	<0.005	<0.005
13	Cadmium as Cd	mg/l	2.0	<0.001	<0.001	<0.001	<0.001
14	Cyanide as CN	mg/l	0.2	<0.01	<0.01	<0.01	<0.01
15	Lead as Pb	mg/l	0.1	<0.005	<0.005	<0.005	<0.005
16	Mercury as Hg	mg/l	0.01	<0.001	<0.001	<0.001	<0.001
17	Nickel as Ni	mg/l	3.0	<0.02	<0.02	<0.02	<0.02
18	Arsenic as As	mg/l	0.2	<0.01	<0.01	<0.01	<0.01
19	Total Chromium as Cr	mg/l	2.0	<0.01	<0.01	<0.01	<0.01
20	Zinc as Zn	mg/l	5.0	<0.02	<0.02	<0.02	<0.02
21	Hexavalent Chromium as Cr ⁺⁶	mg/l	0.1	<0.01	<0.01	<0.01	<0.01
22	Vanadium as V	mg/l	0.2	<0.2	<0.2	<0.2	<0.2
23	Total Suspended Solids	mg/l	50 / 100	6.9	34.8	7.1	11.6
24	Temperature	°C	-	28	28	28	28
25	Dissolved Oxygen	mg/l	-	6.0	6.4	6.0	6.2
26	BOD	mg/l	30	<2.0	<2.0	<2.0	<2.0
27	COD	mg/l	250	<4.0	12.0	<4.0	<4.0
28	Oil & Grease	mg/l	10	<1.4	<1.4	<1.4	<1.4
29	Ammonical Nitrogen as N	mg/l	50	<0.1	<0.1	<0.1	<0.1
30	Total Kjeldahl Nitrogen as N	mg/l	100	<0.3	<0.3	<0.3	<0.3
31	Sulphide as S	mg/l	2.0	<0.1	<0.1	<0.1	<0.1
32	Free Ammonia as NH ₃	mg/l	5.0	<0.1	<0.1	<0.1	<0.1
33	Particulate Size of Suspended Solids	mg/l	Passes through 850 um IS sieve	Passes through 850 um IS sieve	Passes through 850 um IS sieve	Passes through 850 um IS sieve	Passes through 850 um IS sieve
34	Bio-assay	mg/l	All fishes survive after 96 hrs in 100% effluent	All fishes survive after 96 hrs in 100% effluent	All fishes survive after 96 hrs in 100% effluent	All fishes survive after 96 hrs in 100% effluent	All fishes survive after 96 hrs in 100% effluent
35	Dissolved Phosphates as PO ₄	mg/l	5.0	<0.05	<0.05	<0.05	<0.05

Joda West (kundra Nala Entering H Quarry)			July'16		Aug '16		Sept '16		Oct '16	
Parameter	Standards as per IS-2296:1992 Class 'C'	Unit	1st Report	2nd Report	1st Report	2nd Report	1st Report	2nd Report	1st Report	2nd Report
Dissolved Oxygen (minimum)	4	mg/l	6.2	6.1	5.9	6.2	6.2	6.0	6.0	5.9
BOD (3) days at 27°C (max)	3	mg/l	<2	<2	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
Total Coli form	5000	MPN/100 ml	430	540	220	350	540	450	420.0	450.0
pH Value	6.0-9.0		7.1	7.2	7.2	7.1	7.18	7.2	7.2	7.2
Colour (max)	300	Hazen	30	35	32	26	20	13	6.0	5.0
Total Dissolved Solids	1500	mg/l	118	122	124	120	120.0	125.0	125.0	126.0
Copper as Cu (max)	1.5	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Iron as Fe (max)	0.5	mg/l	0.48	0.42	0.76	0.78	0.68	0.66	0.6	0.6
Chloride (max)	600	mg/l	16	18	22	21	22.0	24.0	23.0	22.0
Sulphates (SO ₄) (max)	400	mg/l	5.8	5.2	4.2	4.8	5.0	4.6	4.9	4.8
Nitrate as NO ₃ (max)	50	mg/l	2.5	2.4	1.8	2.1	1.7	1.6	1.9	2.0
Fluoride as F (max)	1.5	mg/l	0.024	0.02	0.018	0.016	0.018	0.0	0.0	0.0
Phenolic Compounds as C ₆ H ₅ OH (max)	0.005	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium as Cd (max)	0.01	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Selenium as Se (max)	0.05	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic as As	0.2	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cyanide as CN (max)	0.05	mg/l	ND	ND	ND	ND	ND	ND	ND	ND
Lead as Pb(max)	0.1	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc as Zn(max)	15	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Hexa Chromium as Cr ⁺⁶	0.05	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Anionic Detergents (max)	1	mg/l	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total Suspended Solids		mg/l			180	192	80.0	74.0	42.0	28.0
Turbidity in		NTU			250	210	120.0	100.0	42.0	40.0
E. coli		MPN/100ml			Absent	Absent	Absent	Absent	Absent	Absent

JODA-WEST (DOWN STREAM) (kundra Nala Entering H Quarry)			July'16		Aug '16		Sept '16		Oct '16	
Parameter	Standards as per IS-2296:1992 Class 'C'	Unit	1st Report	2nd Report	1st Report	2nd Report	1st Report	2nd Report	1st Report	2nd Report
Dissolved Oxygen (minimum)	4	mg/l	6.3	6	6	6.1	6.3	6.2	6.1	5.6
BOD (3) days at 27°C (max)	3	mg/l	<2	2.1	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
Total Coli form	5000	MPN/100 ml	410	520	270	430	540	510	350	420
pH Value	6.0-9.0		7.2	7.3	7.2	7.2	7.25	7.3	7.22	7.16
Colour (max)	300	Hazen	28	37	34	28	21	15	8	6
Total Dissolved Solids	1500	mg/l	120	124	128	124	124.0	130.0	128	124
Copper as Cu (max)	1.5	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Iron as Fe (max)	0.5	mg/l	0.42	0.37	0.8	0.84	0.70	0.72	0.65	0.68
Chloride (max)	600	mg/l	15	20	24	22	24.0	28.0	25	26
Sulphates (SO ₄) (max)	400	mg/l	5.6	5.3	4.5	5.1	5.2	4.8	5.1	5.2
Nitrate as NO ₃ (max)	50	mg/l	2.3	2.2	1.9	2.3	1.9	1.8	2.1	2.2
Fluoride as F (max)	1.5	mg/l	0.022	0.018	0.016	0.019	0.018	0.0	0.022	0.02
Phenolic Compounds as C ₆ H ₅ OH (max)	0.005	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium as Cd (max)	0.01	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Selenium as Se (max)	0.05	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic as As	0.2	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cyanide as CN (max)	0.05	mg/l	ND	ND	ND	ND	ND	ND	ND	ND
Lead as Pb(max)	0.1	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc as Zn(max)	15	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Hexa Chromium as Cr ⁺⁶	0.05	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Anionic Detergents (max)	1	mg/l	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Total Suspended Solids		mg/l			160	198	92.0	96.0	48	34
Turbidity in		NTU			280	210	130.0	110.0	56	48
E. coli		MPN/100ml			Absent	Absent	Absent	Absent	Absent	Absent

ANNEXURE - VIII**RESULT OF NOISE LEVEL MONITORING AT DIFFERENT LOCATION**

Joda West			May'16			Aug'16
Sl.No.	Sampling Location	Parameter	Max	Min	Avg.	Avg.
1	Township	dB (A) in Day Time	54.7	36.3	47.8	51
2	Hospital	dB (A) in Day Time	48.9	34.5	42.8	48
3	Mines Area	dB (A) in Day Time	73.5	38.9	54.9	68

Joda West			May'16			Aug16
Sl.No.	Sampling Location	Parameter	Max	Min	Avg.	Avg.
1	Township	dB (A) in Night Time	44.6	33.8	39.6	45
2	Hospital	dB (A) in Night Time	39.6	33.2	37.5	29
3	Mines Area	dB (A) in Night Time	46.7	34.8	42.7	48

Annexure - IX
LIST OF ENVIRONMENTAL MONITORING EQUIPMENT

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 – X
Organizational Structure**

