

Compliance Status of Environmental Clearance of West Bokaro Opencast Coal Mine



Drinking Water Project

Tata Steel Ltd.

A. Specific Conditions

- (i) *No mining operations shall be undertaken in the forestland until clearance has been obtained under the provisions of FC Act, 1980.*

Being complied with. However, different forest diversion proposals for mining are made and are in advanced stage of clearances.

- (ii) *The embankment along the River Bokaro shall be designed taking into account the highest flood level, based on past data, along the quarry area at the mine boundary along the River Bokaro so as to guard against mine inundation. The slope of the embankment shall at least 2:1 towards the ML and shall be stabilized by plantation. The height of the embankment shall be at least 5 m higher than the HFL.*

The height of the embankment along the Bokaro River is more than 5 m higher than the HFL. The HFL observed was 336 mts while the lower most level of quarry boundary is 346 mts. At the same time 30 mts solid surface has also been left from river to avoid any ingress of water in the mine pit. The slope of embankment is being maintained in the ratio of 2:1 along with plantation for stabilization.

- (iii) *Topsoil should be stacked properly with proper slope at earmarked site(s) and should not be kept active and shall be used for reclamation and development of green belt.*

Complied with, top soil is removed during excavation of coal, is being stacked separately in available mining area, which is being used for spreading on overburden dump surface for plantation and greenbelt development.

- (iv) *No new external OB dumps shall be created for storing OB. Monitoring and management of existing reclaimed dumpsites should continue until the vegetation becomes self sustaining. Compliance status should be submitted to the Ministry of Environment & Forests and its Regional office located at Bhubaneswar on and yearly basis.*

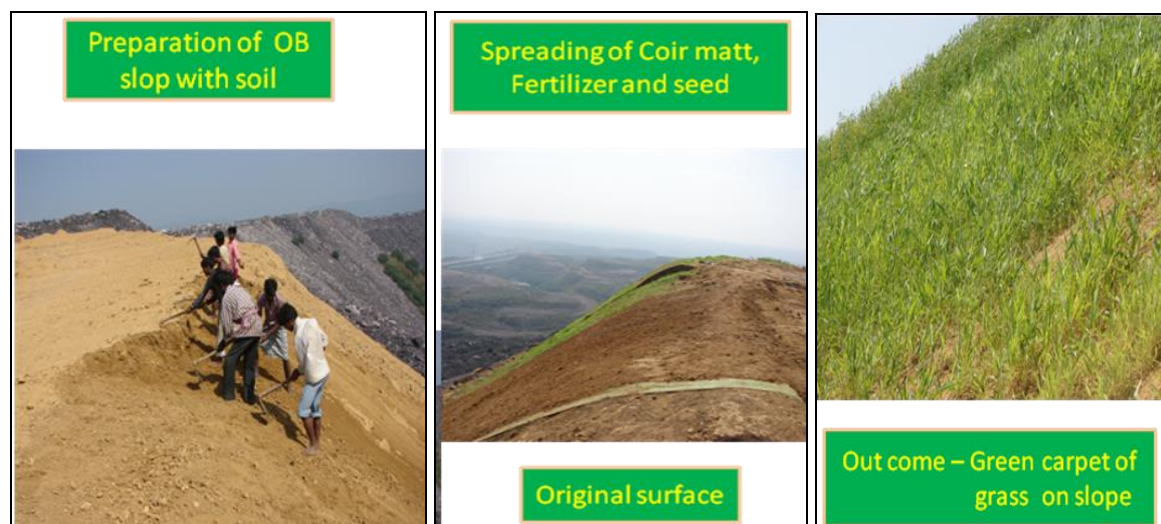
No further new external OB dumps will be created for storing of OB. Since the mined out area in the operating mines are available which is being used for in-pit dumping. The existing reclaimed dump site is being monitored & maintained to sustain vegetation. All the external OB dumps have stabilized over the years and more over, retaining wall has also been provided for further stability. Abandoned dump area has been identified and taken up for reclamation.



Plantation in OB dump

Coir Matting on slope of Overburden dump

One of the output dump area has been taken up for coir matting on the slope. Coir matting, a biodegradable material made up of coconut coir being used to stabilize slope of dump also provided green coverage.



Coir matting with lemon grass in the dump

Mulberry plantation in OB dump

In one of the OB dump area in pilot scale, mulberry plantation is done for development of greenery & stabilization of dumps.



Plantation of mulberry at dump for stabilization & reclamation

- (v) *Catch drains and siltation ponds of appropriate size should be constructed to arrest silt and sediment flows from soil, OB and mineral dumps. The water so collected should be utilized for watering the mine area, roads, green belt development, etc. The drains should be regularly de silted and maintained properly.*

Garland drains (size, gradient and 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 provided adequate retention period to allow proper settling of silt material.

Some of the dump site located in deep most area followed by mine pit of adequate size to arrest sediment from soil, OB. After proper sedimentation the water is being used in spraying & watering to plants. Construction of garland drain is a regular practice to take care of run-off water in the mining operation. The details of garland drain are top

width varies in between 6m to 10m & bottom width is kept at 3m. Depth varies from 2m to 7m. The sump capacity is in order of 48-120 million gallons considering maximum rainfall of 150 mm in 24 hrs which leads to accumulation of 28-48 million gallons water depending upon the catchment area. Accumulated mine pit water being used in industrial and domestic purpose after necessary treatment. One of the de-coaled area of 12 ha in query E site is being used as water storage area to collect rain water, catchment water etc.



Abandoned mine pit as RWH pond



Garland Drain

- (vi) *Dimension of the retaining wall at the toe of the dumps and OB benches within the mine to check run-off and siltation should be based on the rainfall data.*

Complied with. All the dumps are covered with toe wall and garland drains. All the drains are regularly being maintained for silt removal.



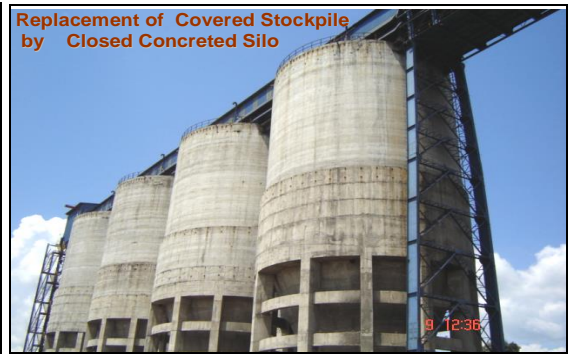
Toe wall & garland drain in the area

- (vii) *Crushers at the CHP should be operated with high efficiency bag filters, water sprinkling system should be provided to check fugitive emissions from crushing operations, conveyor system, haulage roads, transfer points, etc.*

Crusher houses and CHP areas are equipped with dry fog dust suppression system, fixed type dust suppression system are installed at all conveyor networks, haulage roads, & various mineral transfer points. Conventional coal stock yards are replaced with concrete silos for dust controls. Mobile water sprinklers (pressurized water tankers) are used in mine haul roads.



Dry fog system at CHP & crusher area



**Replacement of Covered Stockpile
by Closed Concreted Silo**

Concrete silos for coal storage



Fixed water sprinklers in haul road

(viii) *Drills should be wet operated.*

All the drills are wet operated and interlocked with drill operations.

(ix) *Controlled blasting should be practiced only during day time with use of delay detonators. The mitigative measures for control of ground vibrations and to arrest the fly rocks and boulders should be implemented.*

Controlled blasting is practiced regularly during day time only, by using delay detonators, to further minimize vibration/ dust & formation of fly rocks.

(x) *Area brought under afforestation shall not be less than 1260 ha which includes reclaimed external OB dump (85 ha), backfilled area (974 ha), along ML boundary, along roads, green belt (201 ha), in undisturbed areas and in colony within the mine lease area by planting native species in consultation with the local DFO/ Agriculture Department. The density of the trees should be around 2500 plants per ha.*

Progressive afforestation is practiced as per plan in the area. Last year about 70,000 nos. of saplings planted to cover an additional area of approximately 35 ha. This year a thrust is given for green belt development along the mining lease area and plantation at safety zone. This year about 1 lakhs sapling of local and native species will be planted including OB dumps, along the lease boundary, residential colonies. Voluntary afforestation in surrounding villages is also done involving local community.

TATA Steel is committed to conserve, enhance & restore the biodiversity in its areas of operations and made a biodiversity policy to achieve no net loss of biodiversity over a period of time. In this regard, International Union for Conservation of Nature (IUCN) agency was engaged for assessing the biodiversity in the area and developing an integrated biodiversity management plan for all its mining clusters. Various initiatives

are taken to conserve and restore the bio-diversity in the area in consultation with IUCN & forest officials.



Plantation in surrounding villagers



Biodiversity study & initiatives

- (xi) *A Progressive Closure Plan shall be implemented by reclamation of quarry area of 974 ha which shall be backfilled and afforested by planting native plant species in consultation with the local DFO/ Agriculture Department. The density of the trees should be around 2500 plants per ha. The balance 20 ha of de-coaled area being converted into a water reservoir shall gently slope along the upper benches and stabilized and reclaimed with plantation.*

A progressive closure plan is under revision as per recommendation of Ministry of coal. The revised progressive closure plan includes all plantation details. Afforestation will be done by planting native species in consultation with DFO / Agriculture departments. All the dumps will be stabilized by plantation with a density of 2500 per ha.

- (xii) *A Conservation Plan for endangered species found in and around the project area shall be formulated and for the medicinal plants (in-situ and ex-situ) shall be prepared and implemented in consultation with the State Forest and Wildlife Departments. Separate funds shall be earmarked for implementation of the various activities there under and the status thereof shall be regularly reported to this Ministry and the MoEF Regional Office, Bhubaneswar.*

The project area doesn't have any endangered species found in and around area. However, some of the plants of having medicinal values are conserved by developing an area. Separate fund has been earmarked for implementation of conservation plan along with State Forest and Wildlife Department (if any). Some of the species of medicinal importance are as:



Datura



Sarpagandha



Tulsi



Vinca rosea



Bryophyllum



Aloe vera



Coleus aromaticus



Hemisdesmus indicus (Annantmull)



Zingiber officinalis



Adhatoda vasica



Cymbopogon citratus



Murraya koenigii

To conserve, restore and enhance the medicinal plants in the area, a separate medicinal garden also being prepared at one of the OB dump.

- (xiii) *No groundwater shall be used for the mining/project activities. Additional water required, if any, shall be met by recycling/reuse of the water from the existing activities and from rainwater harvesting measures.*

It is being complied and regularly practiced; no ground water is used for mining & other project activities. All the plants are operated at Zero Liquid Discharge (ZLD) and entire processed water is recycled and reused. An abandoned mine pit is converted into rain water harvesting (RWH) pond. Check dams, rain water harvesting structures are also being constructed in surrounding villages. A separate RWH cum drinking water project is constructed in the area and about 7500 villagers were benefited through pipeline drinking water at doorstep in village.



RWH cum drinking water project at Duni village



Rainwater harvesting structures

- (xiv) *Regular monitoring of groundwater level and quality should be carried out by establishing a network of existing wells and construction of new peizometers. The monitoring for quantity should be done four times a year in pre-monsoon (May), monsoon (August), post-monsoon (November) and winter (January) seasons and for quality in May. Data thus collected should be submitted to the Ministry of Environment & Forests and to the Central Pollution Control Board quarterly within one month of monitoring.*

Regular monitoring of ground water level of existing well is being carried out. The data collected for the month of November 2015 and January 2016 are as follows:

| Sl. No. | LOCATION | MONTH | |
|---------|-----------------|---------------|--------------|
| | | November 2015 | January 2016 |
| 01. | RAJIV NAGAR | 3'8" | 3'6" |
| 02. | JAIRAM HOTEL | 5'4" | 5'5" |
| 03. | SHOPING COMPLEX | 5'4" | 5'2" |
| 04. | JAGARNATH GOPE | 7'8" | 7'6" |
| 05. | HOUSING | 4'8" | 4'7" |
| 06. | MUKUND BERA | 11'4" | 11'8" |
| 07. | DRIVER HUT | 8'5" | 8'6" |
| 08. | 2 NO WELL | 5'4" | 5'6" |
| 09. | 9 NO WELL | 3'0" | 3'2" |
| 10. | PUNDI | 20'9" | 20'6" |
| 11. | DUNI | 11'7" | 5'7" |
| 12. | BANJI | DRY | DRY |
| 13. | KEDLA ROAD | 17'11" | 17'4" |
| 14. | JHARMA BASTI | 4'11" | 5'2" |

- (xv) *The Company shall put up artificial groundwater recharge measures for augmentation of groundwater resource. The project authorities should meet water requirement of nearby village(s) in case the village wells go dry due to dewatering of mine.*

The ground water recharge measures are continuously being taken up. In this year thrust has already been put up to streamline drinking water projects, which includes construction of ponds, bore well, check dams etc. in and around our leasehold areas. The projects also include construction of rain water harvesting structures, installation of water filtration plant, in surrounding villages.



Artificial ground water recharge pit (Bore well) in Bilhore village



Drinking Water system at Atna village

- (xvi) *ETP should also be provided for workshop, coal washery and CHP. There shall be zero discharge of wastewater from CHP and the coal washeries. Effluents from the tailings pond shall be treated to conform to prescribed standards in case of discharge into any water course outside the lease.*

All units such as washeries etc. being operated at Zero liquid discharge (ZLD) No effluent is directly discharged and 100% recycled back after adequate treatment. The water from tailing pond after proper de-silting of tailings is recycled back to washeries to maintain zero discharge. Also the quality of water is being analyzed regularly (monthly). Mechanical tailing dewatering system is in operation which is gradually minimizes the use of tailings ponds. The tailing slurry is handled through high frequency screen and belt press to produce dry tailings and recover water for recycling.



Mechanical tailings de-watering system



Coal transport by conveyor belt



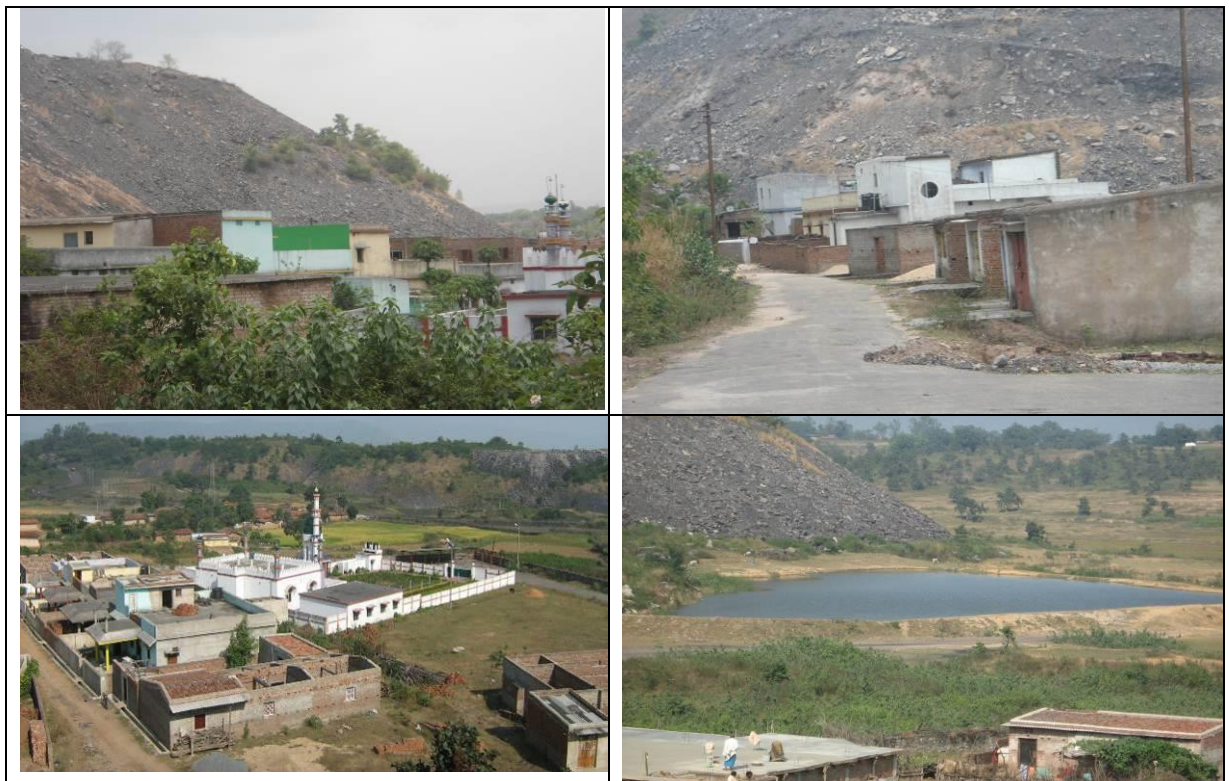
Effluent recycling in washery

- (xvii) *An STP shall be provided for the township/colony to treat the domestic effluents to prescribed standards and for their reuse in project activities.*

Sewage Treatment Plant (STP) is provided in one of the residential block, treated water reused in dust suppression of road. A detailed feasibility is under preparation from ISM Dhanbad.

- (xviii) *R&R shall be based on norms laid down by the State Government and shall not be inferior than that in the National R&R Policy and shall be completed within a specified time - frame.*

The R&R policy designed for the project affected families is adequate & having additional benefits. As a part of R&R policy some of the measures taken are as follows:



R & R facility provided in the area

- (xix) *For monitoring land use pattern and for post mining land use, a time series of land use maps, based on satellite imagery (on a scale of 1: 5000) of the core zone and buffer zone, from the start of the project until end of mine life shall be prepared once*

in 3 years (for any one particular season which is consistent in the time series), and the report submitted to MoEF and its Regional office at Bhubaneswar.

Land use maps are prepared by M/S SPARC Pvt. Ltd, Bhubaneswar for core and buffer zone on the 1:5000 scale by submitting total no. of 55 nos. map sheets along with this report to the ministry office. The next due will be Dec.-2016.

(xx) *A Final Mine Closure Plan along with details of Corpus Fund should be submitted to the Ministry of Environment & Forests for approval 5 years in advance of final mine closure for approval.*

It will be complied five years in advance of final mine closure plan for approval. An adequate fund has been provided separately for final mine closure activity.

(xxi) *Consent to operate shall be obtained before expanding mining operations.*

Consent to operate is being obtained regularly.

B. General Conditions

(i) *No change in mining technology and scope of working should be made without prior approval of the Ministry of Environment and Forests.*

No change in mining technology is done. However, at few locations high wall mining technique will be practiced by considering geological conditions.

(ii) *No change in the calendar plan including excavation, quantum of mineral coal and waste should be made.*

Complied with

(iii) *Four ambient air quality monitoring stations should be established in the core zone as well as in the buffer zone for SPM, RPM, SO₂ and NO_x 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 SPCB.*

Consulted with Regional Officer of Pollution Control Board, by considering the predominate wind direction, base line study and Air modeling one station in buffer zone, and 04 station in core zone has been suggested.

(iv) *Fugitive dust emissions (SPM and RPM) from all the sources should be controlled regularly monitored and data recorded properly. Water spraying arrangement on haul roads, wagon loading, dump trucks (loading and unloading) points should be provided and properly maintained.*

All the strategic locations of operating plants where the possibilities of fugitive dust emissions, has been provided with adequate enclosures, side skirt, chute, seal plate, sealing of transfer points along with adequate dust suppression system. All the sites are monitored regularly (once in a month) and data is kept for record. The haul road, loading and unloading points are provided with pressurized water tanker for water spraying along with chemical dosing, wagon loading does not require any water spraying since the coal is in moist condition.



Fixed and mobile water suppression system

A mobile vacuum cleaner of 20 T capacities is used to recover any spillage during operation immediately. Adequate maintenance of vehicles is done, to avoid any spillage during the transportation.



Mobile vacuum cleaner for spillage control

- (v) *Data on ambient air quality (SPM, RPM, SO₂ and NO_x) should be regularly submitted to the Ministry including its Regional Office at Bhubneshwar and to the State Pollution Control Board and to the Central Pollution Control Board once in six months.*

Being complied with regularly as per the specified frequency

Status of Air Quality: Work Zone

| Core Zone work place as per G.S.R. 742 (E) | Level obtained in $\mu\text{g}/\text{m}^3$ for the month of October 2015 to March 2016 | | | | | | | | Remarks |
|--|--|---------|------------|---------|-----------------|---------|-----------------|---------|--|
| | SPM | | RPM | | NO _x | | SO ₂ | | |
| | Oct. 15 | Mar. 16 | Oct. 15 | Mar. 16 | Oct. 15 | Mar. 16 | Oct. 15 | Mar. 16 | |
| • Mines : | | | | | | | | | The AAQ was found within the prescribed norms. |
| AB | 208 | 370 | 170 | 130 | 17 | 42 | 68 | 17 | |
| SE | 427 | 464 | 154 | 162 | 19 | 37 | 57 | 13 | |
| • Coal Handling Plant (Washery complex) | 367 | 360 | 154 | 138 | 21 | 48 | 69 | 19 | |
| • Railway Siding Chainpur (QLC) | 330 | 273 | 175 | 127 | 23 | 34 | 40 | 12 | |
| Limit ($\mu\text{g}/\text{m}^3$) | 700 | | 300 | | 120 | | 120 | | |

Status of Ambient Air Quality

| As per G.S.R. 826 (E) | Level obtained in $\mu\text{g}/\text{m}^3$ for the month of October 2015 to March 2016 | | | | | | | | Remarks |
|--|---|------------|------------------|------------|-----------------|------------|-----------------|------------|--|
| | PM _{2.5} | | PM ₁₀ | | NO _x | | SO ₂ | | |
| Locations | Oct. 15 | Mar .16 | Oct. 15 | Mar. 16 | Oct. 15 | Mar. 16 | Oct. 15 | Mar. 16 | The AAQ was found within the prescribed norms. |
| Mukundabera check post | 44 | 40 | 61 | 75 | 47 | 31 | 21 | 13 | |
| Banji check post | 41 | 37 | 72 | 75 | 39 | 22 | 15 | <10 | |
| Pundi check post | 40 | 27 | 68 | 60 | 32 | 24 | 19 | 12 | |
| Limit ($\mu\text{g}/\text{m}^3$) | 60 | | 100 | | 80 | | 80 | | |

Continuous online ambient air quality monitoring system is installed at division and being operational. All the analyzers are equipped in mobile van and parameters such as PM₁₀, PM_{2.5}, NO, NO₂, NO_x, CO, SO₂, Wind Speed (in m/s), Wind Direction (in degree) are recorded on every 15 minutes interval. A displayed unit is also, installed at main entrance of division. All the instruments including mobile van is supplied by CPCB authorized agency & approved from USEPA. The data connectivity with CPCB server & transmission facility is being installed.



Continuous Ambient Air Quality machine (CAAQMS) for data monitoring system

Data monitoring from an NABL accredited external agency is attached as an annexure

Online emission monitoring for FBC based 2x10MW captive power plant is installed at for PM, SO₂ & NO_x monitoring in stack and continuously being transmitted to JSPCB server. Electro Static Precipitator (ESP) is attached with the power plant and is regularly being maintained. The quality & quantity of emission is maintained well within limit as per standard. The approval for data connectivity permission to CPCB is awaited to vendor. All the data of PM, SO_x & NO_x are working smoothly.



Continuous Emission Monitoring for Power House for PM, Sox & NOx data

- (vi) Adequate measures should be taken for control of noise levels below 85 db(A) in the work environment. Workers engaged in blasting and drilling operations, operation of HEMM, etc should be provided with ear plugs/ muffs.

Control measures are being taken up to keep noise level well within limit in working environment by providing adequate enclosure/ separation to the various high noise sources, proper maintenance, provision of control room, operator's a/c cabin etc. In addition all the persons are provided with PPEs such as ear plug/ muff during work. Warning signs in local language are also displayed at various areas in mines & plant. An adequate green belt is also maintained in the area.



Noise control measures in the area

- (vii) Industrial wastewater (workshop and wastewater from the mine) should be properly collected, treated so as to conform to the standards prescribed under GSR 422 (E) dated 19th May 1993 and 31st December 1993 or as amended from time to time before discharge. Oil and grease trap should be installed before discharge of workshop effluents.

The Industrial wastewaters generated from various operations are handled through effluent management system provided in all operational dept. with the objective to treat the effluent and recycle the clear water. The HEMM maintenance shops have been provided with oil trap arrangement to recover the oil during washing of equipments. The recovered used oil during washing is sold to authorized recycler as per guideline and the effluent generated is checked for quality and recycled -reused in the system.



Oil trap in mines

Zero Effluent Discharge (ZLD) being maintained at all units including captive power plant (2x10MW FBC). A web camera (ip: 117.244.160.6) along with flow

meter is installed at discharge end and all data being regularly submitted to state pollution control board, approval for data submission to central pollution control is awaited.



Online Effluent Monitoring System installed at site



Live web camera footage installed at discharge point

- (viii) *Vehicular emissions should be kept under control and regularly monitored Vehicles used for transporting the mineral should be covered with tarpaulins and optimally loaded.*

Vehicular emission is kept under control by regularly monitoring & maintenance of vehicles. Overloading of vehicles is avoided during mineral transport. All the vehicles during transport of material covered with tarpaulin sheet. In future, the mineral transportation will be done by Pipe conveyor.



Introduced upgraded mode of transportation- Pipe conveyor to eliminate spillage/dust/unsafe condition



Transportation of mineral

- (ix) *Environmental laboratory should be established with adequate number and type of pollution monitoring and analysis equipment in consultation with the State Pollution Control Board.*

A full-fledged Environmental laboratory is functioning with adequate number of pollution monitoring and analysis instruments. Accreditation of laboratory from State Pollution Control Board is under process.

- (x) *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 programme of the workers should be undertaken periodically to observe any contractions due to exposure to dust and to take corrective measures, if needed.*

All dusty areas such as crushers etc are provided with dry fog system and fixed dust sprinklers so as to eliminate dust from source. All haul roads, are equipped with fixed and mobile dust sprinklers. All drill operations are wet only. The operators of various HEMM being operated inside the mines are provided with air-condition cabins. In addition dust mask has been provided to the personnel working in dusty area. The persons have been imparted necessary training on safe work practices and appraised the adverse consequences on health in case of any violation of the practices. Occupation health surveillance programme is being conducted on regular basis in our Hospital for health check up as per the coal mines rule. The health awareness programme is also being conducted regularly in all the departments.

- (xi) *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 company.*

A separate Environment Management Cell is in place with qualified person reporting to Top management.

- (xii) *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 this Ministry and its Regional Office at Bhubaneswar.*

The Environmental Management Cell of West Bokaro division having separate fund for environmental protection measures / compliance to legal requirement. Besides above all other departments are having budgetary provision for environmental protection measures in their working area. The year wise expenditure on the above subject is reported to State pollution control Board. The expenditure occurred during the financial year 2015-2016 is approx. Rs. 1500.00 Lakh.

- (xiii) *The Regional Office of this Ministry located at Bhubaneswar shall monitor compliance of the stipulated conditions. The Project authorities shall extend full cooperation to the office(s) of the Regional Office by furnishing the requisite data/information/monitoring reports.*

Being complied with.

- (xiv) *A copy of the clearance letter will be marked to concerned Panchayat/ local NGO, if any, from whom any suggestion/representation has been received while processing the proposal.*

Complied with.

- (xv) *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.*

Complied with.

- (xvi) *The Project authorities should advertise at least in two local newspapers widely circulated around the project, one of which shall be in the vernacular language of the locality concerned within seven days 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 the website of the ministry of Environment & Forests at <http://envfor.nic.in>.*

Complied with.

Annexure-I

Ambient Air Quality Monitoring

Bholgadha Village

Mitra S. K. Private Limited

3, Pagladanga Road, P-48,
 Udayan Industrial Estate,
 Kolkata 700015.
 Tel. : 91 33 23230072 Fax : 91 33 23230078.
 Email : info@mitrask.com
 Web : www.mitrask.com



wh/c

TEST REPORT

| | | |
|---|----------------------------------|---------------------------|
| Name & Address of the Customer : | Report No. | : C/15-16/337 |
| Tata Steel Limited, | Date | : 19.09.2015 |
| West Bokaro Division, Ghatotand, | Sample No. | : MSK/KOL/ENV/A/15-16/337 |
| Jharkhand, Pin No-825314. | Date of receipt of sample | : 14.09.2015 |
| | Date(s) of performance | : 14.09.2015-19.09.2015 |
| | Ref. No. & Date | : NA |

We hereby certify that the following sample drawn by us from the customer has been analyzed with the following results:

| | | |
|----|--|---------------------------------------|
| 1. | Description of sample <i>(As declared by customer)</i> | : Ambient Air |
| 2. | Sample Mark <i>(if any, given by the customer)</i> | : NA |
| 3. | Date of sampling | : 10/11.09.2015 (14.00 hrs-14.00 hrs) |
| 4. | Place of sampling | : Bholgadha Village |
| 5. | Environmental conditions during sampling | : See the 2 nd page |
| 6. | Sampling Plan & Procedures used | : See the 2 nd page |

Report prepared by:

Signature :
 Name : Asim Kumar Jana
 Designation : Office Assistant

for **Mitra S. K. Private Limited**
 Signature :
 Name : Pradyip Bag
 Designation : Executive Chemist
Authorized Signatory

- The results relate only to the specific test(s).
- This Test Report shall not be reproduced except in full, without the permission of Mitra S.K. Private Limited.
- The reserved part of sample(s), except perishable sample(s), shall be retained for 15 days & 1 year (10) from the date of issue of the Test Report.
- Microbiological sealed pack water sample(s) shall be retained for 15 days & food sample(s) shall be retained for 10 days after analysis.

Head Office: Shreeji Centre (5th floor), 74B, A.J.C. Bose Road, Kolkata - 700 016, West Bengal, India.
 Tel. : 91 33 40342020 / 22692091 / 22692007 Fax : 91 33 22692059
 Email : info@mitrask.com Website: www.mitrask.com

Page 1 of 2




msk
✓

Report No. : C/15-16/337
Sample No. : MSK/KOL/ENV/A/15-16/337


Analysis Result

| Location : Bholgadha Village | | Date of sampling : 10/11.09.2015(14.00 hrs-14.00 hrs) | | |
|---|---|---|-------|----------------------------------|
| Sampling Done by: T.Mondal/S.Mondal | | Sampling done as per : CPCB Guidelines (Volume-1) | | |
| Environmental Condition : | | | | |
| 1) Temperature : 26-37 °C | | 2) Barometric Pressure: 731 mm of Hg | | 3) Rain Fall : Nil |
| Sl. No. | POLLUTANT | RESULT | LIMIT | METHOD OF TEST REFERENCE |
| 1 | Particulate matter (<10µm) in µg/m ³ | 64 | 100 | IS 5182 : Part.23-2006 |
| 2 | Particulate matter (<2.5µm) in µg/m ³ | 26 | 60 | USEPA CFR-40, Part-50 Appendix L |
| 3 | Sulphur di oxide (SO ₂) in µg/m ³ | 4.6 | 80 | IS 5182 : Part.2-2001 |
| 4 | Nitrogen di oxide (NO ₂) in µg/m ³ | 29.8 | 80 | IS 5182 : Part.6-2006 |
| NOTE: Limit as per CPCB notification, New Delhi, 18th November 2009, for Ambient air quality | | | | |

Report prepared by:

Signature : 
Name : Asim Kumar Jana
Designation : Office Assistant

for Mitra S. K. Private Limited

Signature : 
Name : Pradip Bag
Designation : Executive Chemist
Authorized Signatory



WBG
WIT

TEST REPORT

Name & Address of the Customer :
Tata Steel Limited,
West Bokaro Division, Ghatotand,
Jharkhand, Pin No-825314.

Report No. : C/15-16/334
Date : 19.09.2015
Sample No. : MSK/KOL/ENV/A/15-16/334
Date of receipt of sample : 14.09.2015
Date(s) of performance : 14.09.2015-19.09.2015
Ref. No. & Date : NA


We hereby certify that the following sample drawn by us from the customer has been analyzed with the following results:

| | | |
|----|---|---------------------------------------|
| 1. | Description of sample (As declared by customer) | :Ambient Air |
| 2. | Sample Mark (if any, given by the customer) | :NA |
| 3. | Date of sampling | : 08/09.09.2015 (12.30 hrs-12.30 hrs) |
| 4. | Place of sampling | : Puranpaneya Village |
| 5. | Environmental conditions during sampling | :See the 2 nd page |
| 6. | Sampling Plan & Procedures used | :See the 2 nd page |

Report prepared by:

Signature : 
Name :Asim Kumar Jana
Designation :Office Assistant

for Mitra S. K. Private Limited

Signature : 
Name :Pradip Bag
Designation :Executive Chemist
Authorized Signatory

- The results relate only to the issue(s) tested.
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- The retained part of sample(s), except perishable sample(s), shall be retained for 15 days & 1 year (10r) from the date of issue of the Test Report.
- Microbiological sealed pack water sample(s) shall be retained for 15 days & food sample(s) shall be retained for 10 days after analysis.

3, Pogliadanga Road, P-48,
Udayan Industrial Estate,
Kolkata 700015.
Tel. : 91 33 23230072, Fax : 91 33 23230078.
Email : msk@msk.com
Web : www.mitrask.com



Report No. : C/15-16/334
Sample No. : MSK/KOL/ENV/A/15-16/334

Analysis Result

| Location : Puranpaneya Village | | Date of sampling : 08/09.09.2015 (12.30 hrs-12.30 hrs) | | |
|--|---|--|-------|-----------------------------------|
| Sampling Done by: T.Mondal/S.Mondal | | Sampling done as per : CPCB Guidelines (Volume-1) | | |
| Environmental Condition : | | | | |
| 1) Temperature : 26-36 °C | | 2) Barometric Pressure: 732 mm of Hg | | 3) Rain Fall : Nil |
| Sl. No. | POLLUTANT | RESULT | LIMIT | METHOD OF TEST REFERENCE |
| 1 | Particulate matter (<10µm) in µg/m ³ | 77 | 100 | IS 5182 : Part.23-2006 |
| 2 | Particulate matter (<2.5µm) in µg/m ³ | 31 | 60 | USEPA CFR-40, Part-50 Appendix L. |
| 3 | Sulphur di oxide (SO ₂) in µg/m ³ | 5.9 | 80 | IS 5182 : Part.2-2001 |
| 4 | Nitrogen di oxide (NO ₂) in µg/m ³ | 29.6 | 80 | IS 5182 : Part.6-2006 |
| NOTE: Limit as per CPCB notification, New Delhi, 18th November 2009, for Ambient air quality | | | | |

Report prepared by:

Signature : *Asim*
Name : Asim Kumar Jana
Designation : Office Assistant

for Mitra S. K. Private Limited

Signature : *P. Bag*
Name : Pradip Bag
Designation : Executive Chemist
Authorized Signatory

Mitra S. K. Private Limited

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 Email : mitrasklab@mitrask.com
 Web : www.mitrask.com

**TEST REPORT**


Name & Address of the Customer :
 Tata Steel Limited,
 West Bokaro Division, Ghatotand,
 Jharkhand, Pin No-825314.

Report No. : C/15-16/128
Date : 02.06.2015
Sample No. : MSK/KOL/ENV/A/15-16/128
Date of receipt of sample : 27.05.2015
Date(s) of performance : 27.05.2015-02.06.2015
Ref. No. & Date : NA


We hereby certify that the following sample drawn by us from the customer has been analyzed with the following results:

| | | |
|----|---|---------------------------------------|
| 1. | Description of sample (As declared by customer) | : Ambient Air |
| 2. | Sample Mark (if any, given by the customer) | : NA |
| 3. | Date of sampling | : 24/25.05.2015 (12.30 hrs-11.30 hrs) |
| 4. | Place of sampling | : Atna Basti |
| 5. | Environmental conditions during sampling | : See the 2 nd page |
| 6. | Sampling Plan & Procedures used | : See the 2 nd page |

Report prepared by:

Signature : 
 Name : Asim Kumar Jana
 Designation : Office Assistant

for **Mitra S. K. Private Limited**

Signature : 
 Name : Pradip Bag
 Designation : Executive Chemist
Authorized Signatory

- The results relate only to the item(s) tested.
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- The reserved part of sample(s), except perishable sample(s), shall be retained for 13 days & 1 year (Air) from the date of issue of the Test Report.
- Microbiological sealed pack water sample(s) shall be retained for 15 days & food sample(s) shall be retained for 10 days after analysis.

Head Office: Shreeji Conno 3rd floor, 74B, A.J.C. Bose Road, Kolkata - 700 014, West Bengal, India.
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 Email : info@mitrask.com Website : www.mitrask.com

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Mitra S. K. Private Limited

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Email : mitrasklab@mitrask.com
Web : www.mitrask.com

Doc No: MSK/GEN/1004



Report No. : C/15-16/128
Sample No. : MSK/KOL/ENV/A/15-16/128


Analysis Result

| Location : Atma Basti | | Date of sampling : 24/25.05.2015 (12.30 hrs-11.30 hrs) | | |
|---|---|--|-------|----------------------------------|
| Sampling Done by: A.Roy /U.Metya | | Sampling done as per : CPCB Guidelines (Volume-1) | | |
| Environmental Condition : | | | | |
| 1) Temperature : 28-44 °C 2) Barometric Pressure: 732 mm of Hg 3) Rain Fall : Nil | | | | |
| Sl. No. | POLLUTANT | RESULT | LIMIT | METHOD OF TEST REFERENCE |
| 1 | Particulate matter (<10µm) in µg/m ³ | 64 | 100 | IS 5182 : Part.23-2006 |
| 2 | Particulate matter (<2.5µm) in µg/m ³ | 34 | 60 | USEPA CFR-40, Part-50 Appendix L |
| 3 | Sulphur di oxide (SO ₂) in µg/m ³ | 4.3 | 80 | IS 5182 : Part.2-2001 |
| 4 | Nitrogen di oxide (NO ₂) in µg/m ³ | 26.3 | 80 | IS 5182 : Part.6-2006 |
| NOTE: Limit as per CPCB notification, New Delhi, 18th November 2009, for Ambient air quality | | | | |

Report prepared by:

Signature : 
Name : Asim Kumar Jana
Designation : Office Assistant

for Mitra S. K. Private Limited

Signature : 
Name : Pradip Bag
Designation : Executive Chemist
Authorized Signatory

Head Office: Shreechi Centre (5th floor), 74B, A.J.C. Bose Road, Kolkata - 700 016, West Bengal, India.
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Page 3 of 2

Effluent Quality Monitoring

Q-AB Mines

Mitra S. K. Private Limited

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Web : www.mitrask.com



TEST REPORT

Name & Address of the Customer :
Tata Steel Limited,
West Bokaro Division, Ghatotand,
Jharkhand, Pin No-825314.

Report No. : C/15-16/92
Date : 22.09.15
Sample No. : MSK/KOL/ENV/P&E/15-16/92
Date of receipt of sample : 15.09.15
Date(s) of performance : 15.09.15-22.09.15
Ref. No. & Date : Not Applicable

We hereby certify that the following sample collected from the customer has been analyzed with the following results:

| | | |
|----|---|--|
| 1. | Description of sample (As declared by customer) | : Effluent Water |
| 2. | Sample Mark (if any, given by the customer) | : B |
| 3. | Date of sampling | : 11.09.15 |
| 4. | Place of sampling | : AB Mines Water |
| 5. | Environmental conditions during sampling | : NA |
| 6. | Sampling Plan & Procedures used | : APHA 22 nd Edition 1060 B,C |

Report prepared by:

Signature

Name

: Asim Kumar Jana

Designation

: Office Assistant

for Mitra S. K. Private Limited

Signature

Name

: Bodhisatta Maiti

Designation

: Executive Chemist

Authorized Signatory

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- Microbiological testing path water sample(s) shall be retained for 15 days & food sample(s) shall be retained for 10 days after analysis.

Head Office: Service Centre (5th floor), 74B, A.J.C. Bose Road, Kolkata - 700 016, West Bengal, India.
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
Report No. : C/15-16/92

Sample No. : MSK/KOL/ENV/P&E/15-16/92


Analysis Result

| Serial No. | Test Parameter | Test Method | Result |
|------------|---|---|--------|
| 1. | pH at 26°C | APHA 22 nd edition, 4500-H+B | 7.89 |
| 2. | TSS in mg/l | APHA 22 nd edition, 2540D | 7.5 |
| 3. | TDS in mg/l | APHA 22 nd edition, 2540C | 956 |
| 4. | BOD in mg/l | APHA 22 nd edition, 5210B | <2.0 |
| 5. | COD in mg/l | APHA 22 nd edition, 5220B | <4.0 |
| 6. | Oil & Grease in mg/l | APHA 22 nd edition, 5520B | <1.4 |
| 7. | Phenolic Compounds as C ₆ H ₅ OH in mg/l | APHA 22 nd edition, 5530C | <0.001 |

Report prepared by:

Signature : 
 Name : Asim Kumar Jana
 Designation : Office Assistant

for Mitra S. K. Private Limited

Signature : 
 Name : Bodhisatta Maiti
 Designation : Executive Chemist
 Authorized Signatory

Heavy metal analysis of coal, as per CTO condition

Inspectorate Griffith India Pvt. Ltd.
 Dhanbad Laboratory
 Opposite Dhansar Post office, Dhansar,
 Dhanbad, Jharkhand - 828106
 Tel : (0326) 230 6351 / 3127
 Tele/Fax : (0326) 230 3127
 E-Mail: dhanbadlab@inspectorate.co.in



TEST REPORT

PAGE 1 OF 1


TEST REPORT NO. : IGIDHB LAB/2015/TR - 02053 DATE: 29/12/2015
 *NAME & ADDRESS OF CUSTOMER : M/S- TATA STEEL LTD. NATURAL RESOURCES DIVISION, WEST BOKARO
 *CUSTOMERS REFERENCE : DHB/C&C/2015/0046 DATE: 19/12/2015
 *CUSTOMER'S REFERENCE (POST/COURIER/PAGE/EMAIL)
 SAMPLE PARTICULARS : COAL (MATERIAL TO BE TESTED)
 SAMPLE RECEIPT DATE : 19.12.2015
 NO. OF SAMPLE(S) : 04 no.(s)
 SAMPLE DESCRIPTION : SAMPLE RECEIVED FROM TATA STEEL LTD. WEST BOKARO
 CONDITION OF SAMPLE : AS IT IS
 *PARAMETERS TESTED : Heavy Metal (Hg, Ni, Cd) on AAS
 TEST METHOD : Hg - ASTM D 12041-1987 Rfmd 1998, (Ni & Cd) - BY AAS
 (ASTM / IS / ISO / OTHERS)

TEST RESULTS

| ANALYSIS COMMENCEMENT DATE: | | 19.12.2015 | | ANALYSIS COMPLETION DATE: | | 29/12/2015 | |
|--|--------------------------|------------|--------|---------------------------|--|------------|--|
| TEST PARAMETERS | | | | | | | |
| SAMPLE REF / ID (Customer) | SAMPLE CODE (Laboratory) | Hg | Ni | Cd | | | |
| | | ppm | ppm | ppm | | | |
| RC/QA/WI/D/S - 15.12.2015 | C 1225B | 0.129 | 18.170 | 0.175 | | | |
| MIDDUNG COAL VIII ,B-SHIFT D/S- 15.12.2015 | C 12259 | 0.078 | 16.30 | 3.500 | | | |
| REJECTION COAL VIII ,B-SHIFT D/S- 15.12.2015 | C 12260 | 0.084 | 19.20 | 1.900 | | | |
| WP/D5/W,D/S-15.12.2015 | C 12261 | 0.362 | 19.569 | <0.010 | | | |

REMARKS: 1) SAMPLE SUBMITTED BY TATA STEEL LTD. 2) SAMPLE TESTED AT OUR BBSR LAB.

*Indicates information supplied by the customer for which the laboratory has no control.
 Enclosures ()

PREPARED BY

 SANDEEP JAMUAR
 Sr. Office Assistant

AUTHORISED SIGNATORY

 S. BANERJEE
 Technical Manager

SAMPLES NOT OWNED BY THE LABORATORY. RESULTS RELATE TO THE SAMPLE TESTED ONLY.

THE CONTENTS OF THE REPORT SHALL NOT BE REPRODUCED EITHER IN FULL OR IN PART WITHOUT PRIOR WRITTEN CONSENT OF THE ISSUING AUTHORITY.



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