



Addl. PCCF, MoEFCC,  
Regional Office (ECZ),  
Bungalow No. A-2, Shyamali Colony,  
Ranchi – 834002.

Ref No. - JMB/115/ 002611 /2016

November 25, 2016


SUB: Half Yearly Compliance Report of the conditions of EC issued by MoEFCC, New Delhi to Jamadoba Coal Washery, Tata Steel Limited, Dhanbad for the period April'16 to September'16.

Dear Sir,

We are enclosing herewith compliance report for the period April'16 to September'16 for the EC granted vide letter no.- J-11015/203/2011-IA.II(M) dated- 3<sup>rd</sup> March 2014 issued by Ministry of Environment, Forest and Climate Change, New Delhi. This is for your kind perusal.

Thanking you,

Yours faithfully,

  
24/11/16  
General Manager (Jharia)

Email I.D.- sanjay.rajoria@tatasteel.com

Encl: As above.

Copy to: Member Secretary, Eastern Zonal Office, Southend Conclave, 502, 5<sup>th</sup> Floor 1582, Rajdanga Main Road, Kolkata-700107.

Copy to: Member Secretary, JSPCB, T.A. Division Building (Ground Floor), H.E.C, Dhurwa, Ranchi -834004.

**TATA STEEL LIMITED**

Jharia Collieries Jamadoba 828 112 Dhanbad India

Tel 91 326 2320263/2320265/2320267 Fax 91 326 2320268

Regd. Office Bombay House 24 Homi Mody Street Fort Mumbai 400 001

Tel 91 22 66658282 Fax 91 22 66657724

Corporate Identity Number L27100MH1907PLC000260 Website www.tatasteel.com

**HALF YEARLY COMPLIANCE REPORT**  
**(PERIOD: APRIL'16 – SEPTEMBER'16)**

**JAMADOBA COAL WASHERY**  
**(CAPACITY: EXPANSION FROM 1 TO 2 MTPA RAW COAL**  
**THROUGHPUT)**  
**TEHSIL: JHARIA, DIST: DHANBAD, JHARKHAND**



**TATA STEEL LIMITED, JHARIA DIVISION**

**P.O.- JAMADOBA, DIST. - DHANBAD,**  
**STATE- JHARKHAND, PIN CODE – 828112.**

**ENVIRONMENTAL CLEARANCE GRANTED VIDE LETTER NO. - J-11015/203/2011-  
IA.II(M) DATED- 03.03.2014 ISSUED BY GOVT. OF INDIA, MINISTRY OF  
ENVIRONMENT, FOREST AND CLIMATE CHANGE, NEW DELHI.**

**A. SPECIFIC CONDITIONS:**

- (i) Adequate green belt shall be provided around coal handling and other areas.
  - **Greenery has been developed in many areas around the washery premises. Now a comprehensive green belt development plan to cover the entire washery campus area has been outlined. The expansion work is still in progress and is expected to be completed by September'2017. Therefore the plantation activities will be initiated from next year monsoons only as plant survival rate could be affected during construction phase.**
  
- (ii) Action plan be developed and implemented for abandoned tailing ponds and for their restoration to the original land use.
  - **All the existing tailing ponds are in operation since the washery expansion is yet to be completed. Once the Mechanized Tailing Dewatering System will be installed, the number of ponds will be reduced. Accordingly, the restoration of the abandoned ponds to its original land use will be taken up.**
  
- (iii) Fly ash generated from the captive power plant of the washery be utilized for house construction, roads and such uses, strictly complying to the timeline in the EIA Notification, 2006 and maintaining proper records.
  - **This is not applicable as we have ceased the operation of our captive Jamadoba power plant since April'15.**
  
- (iv) No use of fly ash with sand will take place for stowing in underground mines.
  - **This will be strictly followed for our captive underground mines.**
  
- (v) Transportation of fly ash to be done properly by mechanically covered trucks.
  - **This is not applicable as there is no fly ash being generated since April'15.**
  
- (vi) The proponent shall connect all the villages in the leasehold area with water pipeline connection.
  - **All the villages in the leasehold areas will be supplied safe drinking water through pipeline connection. A network of more than 22000 metres of pipeline connection has been established along with 33 water tanks (capacity of 4500 litres).**

- (vii) The proponent shall expedite and implement the pilot plant to convert mine water into drinking/ domestic water to supply the same to the population of Dhanbad and surrounding areas and shall continue to carry out this activity.
- **Mine water is already being converted into potable water by Tata Steel in our 4 nos. Water Treatments Plants (located at Jamadoba, Digwadih, Bhelatand and Malkera having cumulative capacity of around 8000 KL/D). The treated water is then supplied to our colonies and leasehold villages. This will continue in future too.**
- (viii) Tanks/ponds shall be regularly cleaned and maintained. Plantation activities shall be intensified in the mine areas.
- **Tanks/ ponds are regularly cleaned and maintained by TSRDS. Some of the glimpses of the activities are shown below. Plantation activities are undertaken every year in the barren mine leasehold areas. Further, TSRDS engages with the villagers for plantation in the village lands. In FY16, total 2 nos of ponds were renovated, 4 nos. of new ponds have been constructed in Jamadoba area.**



- (ix) The proponent shall expedite the activities undertaken by TSRDS in over 30 villages in the leasehold area over 15000 households covering a population of about 1.4 lakh.
- **CSR activities of TSRDS are managed by a team of experts who are dedicatedly involved in providing benefits and improving standard of living in over 30 villages. The list of activities are developed in consultation with the village representatives and implemented in a time-bound manner.**
- (x) The CSR cost should be Rs 5 per Tonnes of Coal produced which should be adjusted as per the annual inflation.
- **The proposed CSR expenditure for the entire company is decided as per the new Company Rules. Once the CSR budget for company is fixed, a share of that amount is dedicated and utilized for implementing the CSR activities at our Jharia Division level. The CSR expenditure for FY16 is Rs.646.5 lakhs.**

- (xi) Cost for additional environmental protection measures shall be not less than Rs. 503.00 lakhs. The status of implementation including costs incurred shall be regularly reported to this Ministry and its respective Regional Office in the region as part of the compliance report and also uploaded on the company website.
- **The status of implementation of environmental protection measures including costs will be regularly submitted and the compliance uploaded on company website. Details are mentioned in Point no. xii of General Condition.**
- (xii) The slope of the embankment towards the river shall be at least 1:3 for stability and shall be stabilized with plantation using native species selected from the study area.
- **The washery is about 1.5 kms away from the Damodar River. Hence it is not applicable.**
- (xiii) Top soil shall be stored in the earmarked area and used within a year of its generation for green belt development and for plantation/reclamation.
- **There are no top soil dumps hence it is not applicable.**
- (xiv) No external OB dump shall be created for the expansion project. Monitoring and management of existing reclaimed dumpsites shall continue until the vegetation becomes self-sustaining. Compliance status shall be submitted to the Ministry of Environment & Forests and its respective Regional Office on yearly basis.
- **Not applicable as this is a washery project.**
- (xv) Catch drains and siltation ponds of appropriate size shall be constructed to arrest silt and sediment flows from soil, OB and mineral dumps. The water so collected shall be utilised for watering the mine area, roads, green belt development, etc. The drains shall be regularly desilted and maintained properly.
- **There are no soil or OB dumps in the washery premises. Only the by-products are stored in the stockyards located in the washery premises which are sold off within 2-3 days.**
- (xvi) Garland drains (size, gradient and length) and sump capacity shall 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 shall also provide adequate retention period to allow proper settling of silt material.
- **Garland drains of adequate size and gradient already exist around the washery area to channelize the surface runoff. The runoff is diverted to the tailing ponds and clear water is utilized in the washery.**

- (xvii) Dimension of the retaining wall at the toe of the dumps and OB benches within the mine to check run-off and siltation shall be based on the rainfall data.
- **Not applicable as we do not have any opencast mines.**
- (xviii) Crushers at the CHP shall be operated with high efficiency bag filters/water sprinkling system shall be provided to check fugitive emissions from crushing operations, conveyor system which shall be closed, haulage roads, transfer points, etc.
- **The following measures have been implemented:**
    - i) **Dry-fog system at all transfer points of CHP.**
    - ii) **Enclosures around crushers.**
    - iii) **Belts have been covered on top and both sides. These arrangements will protect the coal mass moving on belt from blowing wind. In this way the dust generation would be minimized.**
    - iv) **Fixed water sprinklers on the haulage roads.**
- (xix) Drills shall be wet operated only.
- **Not applicable.**
- (xx) Controlled blasting shall be practiced with use of delay detonators and only during daytime. The mitigative measures for control of ground vibrations and to arrest the fly rocks and boulders shall be implemented.
- **Not applicable.**
- (xxi) The Washery shall be a zero-discharge and no wastewater shall be discharged from the washery into the drains/natural watercourses. No groundwater shall be used for washery operations. Recycled water shall be used for development and maintenance of green belt and in the plant operations.
- **Washery is already operating on a zero-discharge principle. No waste-water is discharged into the drains/ natural water systems. Only mine water is utilized for the washery operations. The recycled water is again used for plant operations and green-belt development.**
- (xxii) The raw coal, washed coal and middling and coal wastes (rejects) shall be stacked properly at earmarked site(s) within sheds/stockyards fitted with wind breakers/shields. Adequate measures shall be taken to ensure that the stored minerals do not catch fire. The storage period shall be not more than 2-3 days.

- **The material is being stacked properly at stockyards located within the washery. We have a well-established system for disposal of rejects/ tailings to consumers so that storage period is not more than 2-3 days.**
- (xxiii) The proponent shall maintain proper records of the ash content of raw (ROM) coal, clean coal, middling and coal rejects along with quantum of raw coal obtained and washed and dispatched every month and the same shall be uploaded on the company website every month.
- **Proper records are already maintained and being uploaded on the company website every month. The records are attached here as Annexure III.**
- (xxiv) All internal roads shall be concreted or black topped and the approach roads used for the project shall be blacked topped. Facilities for parking of trucks carrying raw coal from the linked coalmines shall be created within the Unit.
- **All the internal roads have been concreted while the approach roads are black-topped. There is a facility for parking of trucks within the unit.**
- (xxv) Roads used for coal transportation to the linked DRI/TPP shall be developed with 3-tier avenue plantation using a mix of native species. The trucks used for coal transportation shall be high capacity trucks. Drivers of trucks for coal transportation shall be engaged based on past records of road safety and compliance of safety regulations and shall be suitably sensitized about road safety and maintenance of vehicles to keep vehicular emissions to be within prescribed limits.
- **There is no linked DRI/TPP.**  
**-Raw coal is received via underground coal conveyor belt network and therefore no truck transportation of coal is involved.**  
**-Clean coal is dispatched via rail from the Rail-yard situated on the washery premises. The clean coal is kept in storage bins and directly transferred to the rail wagons through covered coal-conveying system.**  
**-As for the trucks moving within the washery, utilized for shifting of tailings and rejects to storage yard, all the given provisions related to road safety and driver competence are being strictly complied with.**
- (xxvi) The roads (internal/approach and roads used for the project) shall be regularly cleaned with mechanical sweepers and with water sprinklers. A 3-tier avenue plantation shall be developed along the major approach roads, internal roads and nearby roads used by the company.
- **Fixed Water sprinklers have already been installed in the washery premises. Plantation along the road-side is done wherever feasible. A three-tier green belt will be developed along the boundary of washery during the next monsoon period.**
- (xxvii) Green belt shall be developed along the areas such as the washery unit, crushing unit, and stockyards and at transfer points and in between mine operations and habitations.

- **Greenery has been developed in many areas around the washery premises. Green belt will be developed along the boundary of washery during the next monsoon period.**

(xxviii) Hoppers of the coal crushing unit at the crushing shed and washery unit shall be fitted with high efficiency bag filters/Dust extractors and mist spray water sprinkling system shall be installed and operated effectively at all times of operation to check fugitive emissions from crushing operations, transfer points of belt conveyor systems which shall be closed and from transportation roads.

- **Dry-fog system has been already installed to suppress the dust generated at CHP and transfer points of belt conveyor systems. Fixed-type water sprinklers are also installed on the internal roads of the washery. These are operated effectively at all times to check the fugitive emissions.**  
**Fugitive dust emission monitoring is done on half-yearly basis. The values are within the stipulated norms.**

(xxix) The proponent shall ensure that coal such as stones, shale and other wastes of an ash content of 77% or more only shall be dumped into the mine voids. Coal rejects with an ash content of 76% or less shall be fully utilized for power generation in linked TPP.

- **It is being followed.**

(xxx) Regular monitoring of groundwater level and quality including levels of heavy metals such as Hg, Cd, Cr, Se, etc shall be carried out by establishing a network of existing wells and construction of new peizometers. The monitoring for quantity and quality of ground water as per IS: 10500 shall be done four times a year in pre-monsoon (May), monsoon (August), post-monsoon (November) and winter (January) seasons. Proper records of the data thus collected shall be maintained submitted to the Ministry of Environment & Forests and to the Central Pollution Control Board quarterly within one month of monitoring.

- **The monitoring of groundwater level and quality is done four times a year. The groundwater quality report & groundwater level for pre-monsoon (May) and monsoon (August) are provided in Annexure-I.**  
**The monitoring of heavy metals such as Hg, Cd, Cr, Se, etc in the groundwater was done during the hydro-geological study conducted by Indian School of Mines, Dhanbad. Data is provided in Annexure-IV.**

(xxxi) As the entire mine water is proposed to be used for the mine-cum-washery operations, measures shall be taken for recharging ground water in and around the mine in the study area. A Plan for water conservation and recharge measures of ground water along with budgetary provisions be prepared and implemented in consultation with the Central/State Ground Water Board to mitigate the adverse impact of mining which may lead to depletion of ground water in the area. The Company shall put up artificial groundwater recharge measures for augmentation of groundwater resource in case monitoring of groundwater levels indicate decline of water table. Any additional water requirement for mining operation shall be met from rainwater use



only. The project authorities shall meet water requirement of nearby village(s) in case the village wells go dry due to dewatering of mine.

- **More than 50% of the water pumped out during underground mining activity is re-circulated back into the mine for the purpose of stowing. Backfilling of mine voids by stowing is done using sand which is having the porosity to hold the underground water thus helping aquifer to retain the underground water.**

**Further, there are a number of ponds existing on the surface of the mining lease which act as natural reservoirs for recharging ground water. These ponds/ tanks are regularly cleaned and maintained by our CSR department. As per the hydro-geological report, the variation in the ground water level is only seasonal.**

**The water requirement of the nearby villages is being met by the company already. Now piped drinking water is being provided.**

**(xxxii)** ETP shall also be provided for treatment of effluents from workshop, CHP and an STP shall be provided in the colony and the treated effluents shall be used for green belt development. Outflow of rainfall, if any, from the mine shall meet prescribed norms and the water quality of such discharge including levels of heavy metals such as Hg, Cd, Cr., Se, etc shall be monitored at the exit points and records maintained thereof and also uploaded on the company website. Online monitoring equipment shall be installed by the proponent to ensure that the water quality parameters of mine water discharge are well within the General Discharge Standards under EP, Rules, 1986.

- **No effluent is discharged outside of the washery. There is no separate workshop in the washery premises. A central workshop exists in Jamadoba Colliery with adequate Oil and Grease Trap. A Sewage Treatment Plant (STP) has been installed in one of the colonies of Jharia Division and its treated water used for gardening. Other colonies will also be covered with STPs in the near future.**

**(xxxiii)** Besides carrying out regular periodic health check-up of their workers, 10% of the workers identified from workforce engaged in active mining operations shall be subjected to health check-up for occupational diseases and hearing impairment, if any, through a recognised agency found in the district, and the results reported to this Ministry and to DGMS.

- **Not applicable. Though PME is done for washery workers periodically at our OH centre.**

**(xxxiv)** For monitoring land use pattern and for post mining land use, a time series of landuse 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 concerned Regional Office in the region.

- **Not applicable.**

(xxxv) Land oustees shall be compensated as per the norms laid out R&R Policy of CIL or the National R&R Policy or R&R Policy of the State Government whichever is higher.

- **Not applicable.**

(xxxvi) A Final Mine Closure Plan along with details of Corpus Fund shall be submitted to the Ministry of Environment & Forests five year before mine closure for approval. Habitat Restoration Plan of the mine area shall be carried out using a mix of native species found in the original ecosystem, which were conserved in-situ and ex-situ in an identified area within the lease for reintroduction in the mine during mine reclamation and at the post mining stage for habitat restoration and for development of grasslands.

- **Not applicable.**

(xxxvii) Corporate Environment Responsibility:

a) The Company shall have a well laid down Environment Policy approved by the Board of Directors.

b) The Environment Policy shall prescribe for standard operating process/procedures to bring into focus any infringements/deviation/violation of the environmental or forest norms/conditions.

c) The hierarchical system or Administrative Order of the company to deal with environmental issues and for ensuring compliance with the environmental clearance conditions shall be furnished.

d) To have proper checks and balances, the company shall have a well laid down system of reporting of non-compliances/violations of environmental norms to the Board of Directors of the company and/or shareholders or stakeholders at large.

- **The Company already has an Environment Policy approved by the Managing Director and it addresses all the issues mentioned.**

**Every month, the environmental legal compliance is submitted by Jharia Division to VP (Raw Materials) for onward submission and further review to MD and Head Office, Mumbai. Therefore, the status of adherence to the policy and compliance to Environmental laws and regulations is regularly discussed at higher levels. Any non-compliance noticed is corrected at divisional level. If any issue is beyond our control, it is brought to the notice of higher management through the above channel.**

**B. GENERAL CONDITIONS:**

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

- **The points mentioned in the EC letter will be strictly followed.**

(ii) No change in the calendar plan of production for quantum of mineral coal shall be made.

- **It will be strictly followed.**

(iii) Four ambient air quality monitoring stations shall be established in the core zone as well as in the buffer zone for PM10, PM2.5, SO2 and NOx monitoring. Location of the stations shall be decided based on the meteorological data, topographical features and environmentally and ecologically sensitive targets in consultation with the State Pollution Control Board. Monitoring of heavy metals such as Hg, As, Ni, Cd, Cr, etc carried out at least once in six months.

- **The Air quality monitoring stations are:**

- (i) **Jamadoba Group Office (Core Zone)**
- (ii) **New Village Colony, Jamadoba (Buffer Zone)**
- (iii) **Digwadih 12 No. Colony (Buffer Zone)**
- (iv) **6&7 Pits Kalimandir area (Buffer Zone)**

**Monitoring of heavy metals in ambient air is being performed by an independent laboratory (accredited by NABL) once in six months. The results are enclosed as Annexure-II.**

(iv) Data on ambient air quality (PM10, PM 2.5, SO2 and NOx) and heavy metals such as Hg, As, Ni, Cd, Cr and other monitoring data shall be regularly submitted to the Ministry including its concerned Regional Office and to the State Pollution Control Board and the Central Pollution Control Board once in six months. Random verification of samples through analysis from independent laboratories recognized under the EPA rules, 1986 shall be furnished as part of compliance report.

- **Ambient air quality report (PM10, PM 2.5, SO2 and NOx) for the period from April'16 to September'16 is attached as Annexure-I. Additionally, M/s SGS India Pvt Ltd (an NABL accredited Laboratory) has done monitoring on ambient air quality (PM10, PM 2.5, SO2 and NOx) and heavy metals in the month of June'16. The results are enclosed as Annexure-II.**

- (v) Adequate measures shall be taken for control of noise levels below 85 dBA in the work environment. Workers engaged in blasting and drilling operations, operation of HEMM, etc shall be provided with ear plugs/muffs.
- **Regular noise survey is being conducted in the underground work environment. Workers are provided with ear-plugs/ muffs in high noise areas. The noise levels monitored in the month of June'16 is given below:**

Sl. No.	Equipment/ Location	Distance in mtr.	Leq (in dB "A")	Working Hours
1.	CHP (Control Room)	-	77.2	8 hrs/Shift
2.	PTS (Control Room)	-	70.0	
3.	Discharge of Conveyor-6 to Conveyor- 1	2 m.	77.3	
4.	Dense pump pit Stand- I floor	2 m.	80.6	
5.	Screen floor Stand – II vibrating Screen - 211- <sup>1</sup> to 211- <sup>4</sup>	4 m.	81.3	
6.	Loco Shed	-	68.7	
7.	Primary Magnetic Separator No- 1 & 2	2 m.	82.2	
8.	Centrifuge Section Screen bowl	-	85.2	

- (vi) Industrial wastewater (workshop and wastewater from the mine) shall 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 shall be installed before discharge of workshop effluents.
- **No waste-water is discharged outside the washery premises. 100% water is recirculated back for re-use in the washery. There is a central workshop and garage in Jamadoba where oil and grease trap has been provided.**
- (vii) Vehicular emissions shall be kept under control and regularly monitored. Vehicles used for transporting the mineral shall be covered with tarpaulins and optimally loaded.
- **Only the vehicles having valid PUC certificates are being allowed to operate. Coal transportation through trucks is done only from BCCL mines till washery and it is ensured that only optimally loaded trucks with proper tarpaulin cover are allowed into the washery premises.**
- (viii) Monitoring of environmental quality parameters shall be carried out through establishment of adequate number and type of pollution monitoring and analysis equipment in consultation with SPCB and data got analysed through a laboratory recognized under EP Rules, 1986.
- **We have a fully equipped Environment Cell Laboratory with qualified personnel. Laboratory has been recognized and registered with the Jharkhand State Pollution**

**Control Board vide letter ref no. B-3922, dated-30.08.2012. The monitoring and analysis is also done at regular intervals by a NABL accredited laboratory.**

**We have also installed a Continuous Ambient Air Quality Monitoring Station at Jamadoba for online monitoring with data transfer to JSPCB, Ranchi.**

- (ix) Personnel working in dusty areas shall wear protective respiratory devices and they shall also be provided with adequate training and information on safety and health aspects.
  - **Persons working in dusty area have been provided with dust masks & have been given awareness training on safety & health aspects. Regular PME (Periodic Medical Examinations) are being done.**
  
- (x) Occupational health surveillance programme of the workers shall be undertaken periodically to observe any contractions due to exposure to dust and to take corrective measures, if needed and records maintained thereof. The quality of environment due to outsourcing and the health and safety issues of the outsourced manpower should be addressed by the company while outsourcing.
  - **The occupational health surveillance programme of the workers is done regularly by our Occupational Health Department, Tata Central Hospital, Jamadoba. We have a PME (Periodic Medical Examination) centre approved by DGMS where annually 20% of the workers identified from workforce engaged in active mining operations are subjected to full medical checkup including hearing impairment checkup, etc. These results are regularly submitted to DGMS as per mines rules. Contractual workers health examination is also done by PME centre.**
  
- (xi) A separate environmental management cell with suitable qualified personnel shall be set up under the control of a Senior Executive, who will report directly to the Head of the company.
  - **We have a separate Environmental Management Cell with three qualified personnel. (one Head and two Managers). The reporting of Environmental Cell is directly to General Manager of the Division.**
  
- (xii) The funds earmarked for environmental protection measures shall be kept in separate account and shall not be diverted for other purpose. Year-wise expenditure shall be reported to this Ministry and its Regional Office at Bhubaneswar.
  - **The Environment Cell has a separate fund for Environmental protection measures and for complying with legal requirements. The annual environmental expenditure for the financial year 2015-16 is Rs. 186.79 lakhs. The details are given below-**

<b>S.No.</b>	<b>Environment Management Activity</b>	<b>Expenditure in Lakhs</b>
1	Tailings Management System	102
2	Dust suppression system	4.8
3	Housekeeping measures includes removing spillage,	16

	improvement of roads	
4	Spillage control measures	2
5	Mechanical dewatering system	3
6	Water spraying on roads for dust control	5
7	Chemical Dewatering	5
8	Augmentation of recycling pump house	5
9	Making potable water in Water Treatment Plant & Supply to colonies	33.76
10	Horticultural activities including green belt development and regular lawn and garden maintenance	9.34
11	Plantation of saplings and maintenance	0.89
	Total Cost incurred	186.79

(xiii) The Project authorities shall 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>.

- **It has been complied with.**

(xiv) A copy of the environmental clearance letter shall be marked to concerned Panchayat/Zila Parishad, Municipal Corporation or Urban Local Body and local NGO, if any, from whom any suggestion/representation has been received while processing the proposal. A copy of the clearance letter shall also be displayed on the company's website.

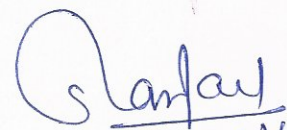
- **It has been complied with.**

(xv) A copy of the clearance letter shall be displayed on the website of the concerned State Pollution Control Board. The EC letter shall also be displayed at the Regional Office, District Industry Centre and Collector's Office/Tehsildar's Office for 30 days.

- **It has been complied with.**

(xvi) The clearance letter shall be uploaded on the company's website. The compliance status of the stipulated EC conditions shall also be uploaded by the project authorities on their website and updated at least once every six months so as to bring the same in the public domain. The monitoring data of environmental quality parameters (air, water, noise and soil) and critical pollutants such as PM10, PM2.5, SO2 and NOx (ambient and stack if any) and critical sectoral parameters shall also be displayed at the entrance of the project premises and mines office and in corporate office and on the company's website.

- **The clearance letter has been uploaded on the company's website. The compliance status (as Half-yearly compliance report) is being uploaded in company's website (Enclosed as Annexure-III). The display of information near the washery's office has been provided.**
  
- (xvii) The project proponent shall submit six monthly reports on the status of compliance of the stipulated environmental clearance conditions (both in hard copy and in e-mail) to the respective Regional Office of the MOEF, the respective Zonal offices of CPCB and the SPCB.
  
- **It is being complied.**
  
- (xviii) The Regional Office of this Ministry located at Bhopal 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.
  
- **It will be complied with.**
  
- (xix) The environmental statement for each financial year ending 31st March in Form-V is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be uploaded on the company's website along with the status of compliance of EC conditions and shall be sent to the respective Regional Offices of the MOEF by E-mail.
  
- **The environmental statement for financial year 2015-16 has been submitted to JSPCB on 23<sup>rd</sup> September 2016 and it is also uploaded on the company website (Annexure- III) as well as sent to MOEF by email at ro.ranchi-mef@gov.in on 30<sup>th</sup> September 2016.**

  
24/11/16  
**General Manager (Jharia)**



**AIR QUALITY REPORT**  
**Core zone & Buffer zone**

Period- April'16 to June'16

Core zone (as per Air quality standards for coal mines in EPA Notification, 1988)							
Location	Latitude/ Longitude	Date	Weather Condition	SPM 24 Hourly Limit- 700 µg/m <sup>3</sup>	RSPM 24 Hourly Limit- 300 µg/m <sup>3</sup>	SO <sub>2</sub> 24 Hourly Limit- 120 µg/m <sup>3</sup>	NO <sub>x</sub> 24 Hourly Limit-120 µg/m <sup>3</sup>
Jamadoba Group Office	23°42'15.3" N/ 86°24'11" E	04.04.16	Clear	248.9	133.2	24.4	22.1
		19.05.16	Clear	225.7	121.4	18.9	21.4
		08.06.16	Clear	227.4	119.3	19.5	23.5
Buffer zone (as per NAAQS 2009 for ambient air quality standards)							
Location	Latitude/ Longitude	Date	Weather Condition	PM10 24 Hourly Limit- 100µg/m <sup>3</sup>	PM2.5 24 Hourly Limit- 60µg/m <sup>3</sup>	SO <sub>2</sub> 24 Hourly Limit-80µg/m <sup>3</sup>	NO <sub>2</sub> 24 Hourly Limit-80µg/m <sup>3</sup>
Digwadih 12 No. Colony	23°41'42" N/ 86°24'45.3" E	20.04.16	Clear	97.6	54.4	12.5	15.6
		18.05.16	Clear	97.5	49.8	11.1	13.2
		22.06.16	Rainy	85.2	39.6	5.1	7.6
New Village Colony, Jamadoba	23°41'51" N/ 86°23'19" E	21.04.16	Clear	91.7	56.7	13.6	11.4
		13.05.16	Clear	98.5	52.9	12.4	13.3
		20.06.16	Clear	91.2	48.7	8.9	11.3
6&7 Pits Kalimandir colony	23°43'15" N/ 86°24'12" E	25.04.16	Clear	89.7	48.3	10.5	9.8
		14.05.16	Rainy	84.2	42.1	11.2	10.2
		24.06.16	Clear	93.3	49.7	7.8	9.8

*Ambit*  
23.11.16  
Manager (Environment)



**AIR QUALITY REPORT**  
**Core zone & Buffer zone**

Period- July'16 to September'16

Core zone (as per Air quality standards for coal mines in EPA Notification, 1988)							
Location	Latitude/ Longitude	Date	Weather Condition	SPM 24 Hourly Limit- 700 µg/m <sup>3</sup>	RSPM 24 Hourly Limit- 300 µg/m <sup>3</sup>	SO <sub>2</sub> 24 Hourly Limit- 120 µg/m <sup>3</sup>	NO <sub>x</sub> 24 Hourly Limit-120 µg/m <sup>3</sup>
Jamadoba Group Office	23°42'15.3" N/ 86°24'11" E	15.07.2016	Rainy	189.5	104.3	15.6	18.4
		02.08.2016	Rainy	134.6	78.8	12.7	14.3
		06.09.2016	Rainy	154.6	69.2	13.2	10.3
Buffer zone (as per NAAQS 2009 for ambient air quality standards)							
Location	Latitude/ Longitude	Date	Weather Condition	PM10 24 Hourly Limit- 100µg/m <sup>3</sup>	PM2.5 24 Hourly Limit- 60µg/m <sup>3</sup>	SO <sub>2</sub> 24 Hourly Limit-80µg/m <sup>3</sup>	NO <sub>2</sub> 24 Hourly Limit-80µg/m <sup>3</sup>
Digwadih 12 No. Colony	23°41'42" N/ 86°24'45.3" E	12.07.2016	Rainy	81.2	34.6	8.6	9.1
		18.08.2016	Rainy	61.5	28.9	8.9	10.6
		13.09.2016	Rainy	72.3	34.5	7.4	8.4
New Village Colony, Jamadoba	23°41'51" N/ 86°23'19" E	26.07.2016	Rainy	84.3	32.6	7.5	10.4
		22.08.2016	Rainy	67.9	35.8	13.6	14.4
		08.09.2016	Rainy	81.1	32.8	9.7	7.5
6&7 Pits Kalimandir colony	23°43'15" N/ 86°24'12" E	11.07.2016	Rainy	89.2	46.5	9.8	12.3
		23.08.2016	Rainy	56.3	33.2	10.2	12.3
		14.09.2016	Clear	82.4	37.5	10.2	9.8

*Ambit*  
23.11.16  
Manager (Environment)

**Ground Water Quality Analysis (Hand Pump & Dugwell)  
Monsoon Season- August 2016**

S.No	Date	Location	Time	Sample Parameter			
				Depth in meter (m)	pH	Electrical Conductivity, $\mu\text{S/m}$	Total Hardness (as $\text{CaCO}_3$ ), mg/l
1	24.08.16	Purnadih (Jorapokhar)	10:20AM	0.62	7.0	860	728
2	24.08.16	Bhowra 13 No	10:30AM	1.39	7.2	670	612
3	24.08.16	Mohalbani Basti	10:45AM	2.50	7.1	702	576
4	24.08.16	Digwadih 12 No	11:00AM	1.30	7.2	504	416
5	24.08.16	Digwadih 10 No F & J	11:20AM	2.51	7.2	903	886
6	24.08.16	Kalimela Shivmandir	12:20PM	0.96	7.4	776	658
7	24.08.16	Kalimela Kalimandir	12:25PM	1.94	7.3	1010	864
8	24.08.16	Lower Dungari	12:35PM	1.41	7.1	686	536
9	24.08.16	Upper Dungari	12:50PM	1.04	7.2	662	489
10	25.08.16	Pattia Basti	11:10AM	2.12	7.1	1003	804
11	25.08.16	Kenduadih Basti	11:30AM	0.68	7.2	948	842
12	24.08.16	Jorapokhar Kushtand	10:10AM	2.54	7.2	888	788
13	24.08.16	Jamadoba 3 No	01:00PM	1.10	7.2	846	716
14	24.08.16	6&7 Pits (Ayodhya Nagri)	12:00PM	1.19	7.3	740	642

*Ankit* 23.11.16  
Manager (Environment)



**Ground Water Quality Analysis (Hand Pump & Dugwell)  
Pre-Monsoon Season- May 2016**

S.No	Date	Location	Time	Sample Parameter			
				Depth in meter (m)	pH	Electrical Conductivity, $\mu\text{S/m}$	Total Hardness (as $\text{CaCO}_3$ ), mg/l
1	17.05.16	Purnadih (Jorapokhar)	09:40AM	9.10	6.91	798	608
2	17.05.16	Bhowra 13 No	09:50AM	3.30	7.00	451	396
3	17.05.16	Mohalbani Basti	10:20AM	9.40	6.97	354	278
4	17.05.16	Digwadih 12 No	10:40AM	8.10	7.00	300	262
5	17.05.16	Digwadih 10 No F & J	10:20AM	10.20	7.13	780	612
6	17.05.16	Kalimela Shivmandir	11:20AM	1.70	7.76	549	501
7	17.05.16	Kalimela Kalimandir	11:25AM	4.50	7.03	610	586
8	17.05.16	Lower Dungari	11:35AM	9.00	7.14	487	412
9	17.05.16	Upper Dungari	12:00PM	4.40	6.63	423	396
10	17.05.16	Pattia Basti	12:20PM	6.70	6.97	523	488
11	17.05.16	Kenduadih Basti	12:30PM	3.10	7.04	571	493
12	17.05.16	Jorapokhar Kushtand	12:50PM	5.10	7.57	638	548
13	17.05.16	Jamadoba 3 No	01:00PM	3.40	8.06	609	508
14	17.05.16	6&7 Pits (Ayodhya Nagri)	01:20PM	4.80	7.42	541	496

*Ankur* 23.11.16  
Manager (Environment)

## Test Report

Print Date : 08/07/2016

SAMPLE DRAWN BY SGS INDIA PVT. LTD.

Report No : KE16-003241.001

JOE No : KE16-003241

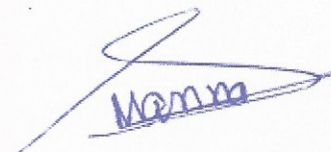
Report Control No : KER0000043631

Sample Described by Customer as : Ambient Air

**Client Name** : TATA STEEL LTD  
**Client Address** : Jharia Division  
 : Jamadoba, Jealgoma  
**City** : Dhanbad  
**Postal Code** : 828112  
**State** : Jharkhand  
**Country** : India  
**Sample Type** : AMBIENT\_AIR  
**Received** : 28/06/2016  
**Marks on Sample** : Water Treatment Plant, Malkera  
**Sampling Date** : 23.06.2016 to 24.06.2016, time - 12.30 pm to 12.30 pm  
**Test Start/End Date** : 28/06/2016 - 08/07/2016

Analysis	Method	Result	Unit	Requirement/Limit NAAQS	
				Min	Max
Sulphur Dioxide (SO <sub>2</sub> )	IS 5182 (Part 02) : Reaff. 2006	BDL(DL:5)	ug/m <sup>3</sup>	-	80
Nitrogen Dioxide (NO <sub>2</sub> )	IS 5182 (Part 06) : 2006	10.1	ug/m <sup>3</sup>	-	80
Particulate Matter (PM <sub>10</sub> )	IS 5182 (Part 23) : 2006	82.5	ug/m <sup>3</sup>	-	100
Particulate Matter (PM <sub>2.5</sub> )	USEPA CFR (40) Appendix - L	40.3	ug/m <sup>3</sup>	-	60
Arsenic as As	40CFR 50	BDL(DL:2)	ng/m <sup>3</sup>	-	-
Nickel as Ni	40CFR 50	BDL(DL:2)	ng/m <sup>3</sup>	-	-
Chromium (as Cr)	IS:5182 (Part-22):2004	<5	ng/m <sup>3</sup>	-	-
Cadmium (as Cd)	IS:5182 (Part-22):2004	<5	ng/m <sup>3</sup>	-	-

Per pro SGS India Private Ltd



**S\_MANNA**  
Authorized Signatory

\*\*\*\*End of Report\*\*\*\*

Page 1 of 1

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## Test Report

Print Date : 08/07/2016

SAMPLE DRAWN BY SGS INDIA PVT. LTD.

Report No : KE16-003241.002

JOE No : KE16-003241

Report Control No : KER0000043631

Sample Described by Customer as : Ambient Air

**Client Name** : TATA STEEL LTD  
**Client Address** : Jharia Division  
 : Jamadoba, Jealgoma  
**City** : Dhanbad  
**Postal Code** : 828112  
**State** : Jharkhand  
**Country** : India  
**Sample Type** : AMBIENT\_AIR  
**Received** : 28/06/2016  
**Marks on Sample** : Bhelatand Officers Colony  
**Sampling Date** : 23.06.2016 to 24.06.2016, time - 01.00 pm to 01.00 pm  
**Test Start/End Date** : 28/06/2016 - 08/07/2016

Analysis	Method	Result	Unit	Requirement/Limit NAAQS	
				Min	Max
Sulphur Dioxide (SO <sub>2</sub> )	IS 5182 (Part 02) : Reaff. 2006	BDL(DL:5)	ug/m <sup>3</sup>	-	80
Nitrogen Dioxide (NO <sub>2</sub> )	IS 5182 (Part 06) : 2006	10.2	ug/m <sup>3</sup>	-	80
Particulate Matter (PM <sub>10</sub> )	IS 5182 (Part 23) : 2006	66.3	ug/m <sup>3</sup>	-	100
Particulate Matter (PM <sub>2.5</sub> )	USEPA CFR (40) Appendix - L	32.7	ug/m <sup>3</sup>	-	60
Arsenic as As	40CFR 50	BDL(DL:2)	ng/m <sup>3</sup>	-	-
Nickel as Ni	40CFR 50	BDL(DL:2)	ng/m <sup>3</sup>	-	-
Chromium (as Cr)	IS:5182 (Part-22):2004	<5	ng/m <sup>3</sup>	-	-
Cadmium (as Cd)	IS:5182 (Part-22):2004	<5	ng/m <sup>3</sup>	-	-

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**S\_MANNA**  
Authorized Signatory

\*\*\*\*End of Report\*\*\*\*

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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 7 days (in case of perishable items) and 30 days for all other samples from the date of issue of report. The samples from regulatory bodies are to be retained as specified. This document cannot be reproduced except in full, without prior written approval of the Company.

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**Annexure-III**

**Upload of compliance report on company's website**

Corporate Citizen | Envir. X

www.tatasteelindia.com/corporate-citizen/environment-compliance-reports.asp

- Environment Statement for the financial year ending March'2016 for 6&7\_ Pits Colliery
- Environment Statement for the financial year ending March'2016 for Lagla\_ Mahal
- Environment Statement for the financial year ending March'2016 for Maha\_ Sahajuri
- Environment Statement for the financial year ending March'2016 for Sijua\_ Colliery
- Environment Statement for the financial year ending March'2016 for\_ Bhelatand A. Colliery
- Environment Statement for the financial year ending March'2016 for\_ Bhelatand Coal Washery
- Environment Statement for the financial year ending March'2016 for\_ Digwadih Colliery
- Environment Statement for the financial year ending March'2016 for\_ Jamadoba Coal Washery
- Environment Statement for the financial year ending March'2016 for\_ Jamadoba Colliery
- Half Yearly EC Compliance Report of Lagla Mahal Sand Lease for Oct'15-Mar'16
- Half Yearly EC Compliance Report of Mahal Sahajuri Sand Lease for Oct'15- Mar'16
- Half Yearly EC Compliance Report of Preamsingdhih Sand Lease for Dec'15 Mar'16
- Half Yearly EC Compliance Report of 6&7 Pits Colliery for Oct'15-Mar'16
- Half Yearly EC Compliance Report of Digwadih Colliery for Oct'15-Mar'16
- Half Yearly EC Compliance Report of Jamadoba Coal Washery for Oct'15-Mar'16



**Annexure-III**

**Upload of Ash% and Despatch details of Jamadoba Coal Washery on company's website (Specific condition no. xxiii)**

The screenshot shows the Tata Steel website's 'Environment Compliance Reports' page. The navigation menu includes 'Corporate', 'Global Network', 'Products & Processes', 'Corporate Citizen', 'Investors', 'Careers', 'Media', and 'Contact'. The main content area features a list of reports, with the first report, 'Ash percentage and Quantity-Jamadoba Washery Apr-Sep 2016', highlighted by a red rectangular box.

Ash percentage and Quantity-Jamadoba Washery Apr-Sep 2016.pdf 1 / 1

Jamadoba Coal Washery - Ash % and Quantity of raw coal and products (April'2016 to September'2016)								
Parameter	Item	Apr'16	May'16	Jun'16	Jul'16	Aug'16	Sep'16	
Ash (%)	Raw coal	33.94	34.17	34.76	34.53	35.14	36.03	
	Clean Coal	18.10	18.15	18.16	18.10	18.12	18.06	
	Two Product rejects	-	-	58.17	55.55	56.36	59.22	
	Tailings	-	-	-	41.15	40.72	43.04	
Quantity (Tonnes)	Raw coal received	81971	95344	83261	61914	59952	50034	
	Raw coal T'put	80080	94916	83720	61636	58867	50567	
	Clean coal production	38658	48694	40544	27927	26667	22961	
	Clean coal Despatched	JSR	35288	46614	42974	31337	23286	23263
		HMC	0.00	0.00	0.00	0.00	0.00	0.00
	2 PR production	24358	27461	27622	22082	18686	15823	
	2 PR Despatch	0	1712	29240	43066	53232	14593	
	Tailings Production	19503	20766	17828	13137	14998	13055	
Tailings Despatch	0	1506	1502	9043	8517	26440		

Head JCPP  
 JAMADOBA WASHERY

**Annexure-IV Groundwater quality with respect to heavy metal concentrations (specific condition no. xxx)**

**Sampling Time: July 2014**

S No	Parameter/ Location	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16	W17	W18	W19	W20	W21	W22	W23	W24	IS 10500 (2012)	
1.	pH	8.92	8.36	8.03	9.13	8.31	8.88	8.86	8.79	9.25	8.52	8.49	8.8	8.60	8.15	8.18	8.52	8.36	8.46	8.64	8.60	8.72	8.25	8.34	8.37	6.5-8.5	
2.	Colour, Hazen	3	3	4	1	1	7	4	4	15	4	1	3	3	4	1	2	4	4	4	1	3	4	2	4	5	
3.	Temperature, 0C	31.3	31.3	31.5	31.8	31.3	31.8	31.3	31.5	31.8	30.8	30.5	30.6	28.3	28.4	28.5	28.4	28.4	28.4	28.5	28.6	28.5	28.5	28.5	28.4	--	
4.	EC,	427	808	1236	817	782	473	639	536	919	1056	738	1326	1267	753	717	548	578	333	1158	1582	771	1170	926	1016	--	
5.	TDS, mg/l	301	571	877	579	550	338	452	378	653	745	515	940	887	536	508	388	411	237	820	1.12 ppt	546	828	654	718	500	
6.	Total Hardness (as CaCO3), mg/l	262	392	440	290	420	160	324	328	404	424	416	448	530	330	400	342	614	258	516	470	468	402	380	250	200	
7.	MPN, N/100 ml	<4	<4	<4	<2	<2	<170	<4	<2	<350	<4	Nil	<4	<4	<4	<2	Nil	<2	<2	<4	<2	<4	<4	<2	<4	--	
8.	Lead, Pb (mg/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.01
9.	Zinc, Zn(mg/l)	0.03 5	0.06 5	0.06 1	0.10 8	0.10 2	0.11 3	0.07 4	0.07 1	0.02 1	0.06 4	0.09 9	0.05 1	0.07 4	0.05 4	0.09 7	0.10 5	0.04 5	0.03 1	0.04 5	0.08 7	0.03 5	0.03 4	0.09 9	0.04 5	5	
10.	Iron, Fe(mg/l)	0.01 5	0.02 4	0.02 9	0.03 5	0.08 1	0.08 1	0.03 1	0.01 9	0.00 9	0.03 1	0.06 1	0.03 2	0.02 5	0.03 1	0.06 1	0.08 1	0.01 5	0.01 1	0.06 4	0.08 1	0.03 1	0.02 4	0.08 1	0.03 2	0.3	
11.	Copper, Cu(mg/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1.5
12.	Cadmium, Cd (mg/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.003
13.	Cyanide,CN(mg/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.05
14.	Mercury,Hg(mg/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.001
15.	Nickel, Ni(mg/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
16.	Arsenic, As(mg/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.01
17.	Chromium, Cr (mg/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.05

W1	Johar Par 7 No.(W)	W7	Lower Dungri (W)	W13	Purnadih Bastii (W)	W19	Digwadih 10 No. F&J School (W)
W2	Kali Mandir(W)	W8	Upper Dungri Basti (W)	W14	Bhowra 13 No. (W)	W20	Bhaga Anil Talkies(H/P)
W3	Kali Mandir (W)	W9	Jore Side	W15	Trilok Nath Madhya Vidyalaya (T/W)	W21	6 & 7 Pit Ayodhya Nagri (W)
W4	Tisco Colony (H/P)	W10	Jamadoba (W)	W16	Mahul bani (T/W)	W22	Kendnadih Bastii (W)
W5	Lower Dungri (H/P)	W11	Joraphokar (T/W)	W17	Mahulbani Basti	W23	Kendnadih Bastii (Tubewell)
W6	Lower Dungri (Pond Water)	W12	Joraphokar (Well)	W18	Digwadih 12 No. Officers Colony (W)	W24	Pattiya Basti(W)



**Annexure-IV Groundwater quality with respect to heavy metal concentrations (specific condition no. xxx)**
**Sampling Time: October 2014**

S No	Parameter/ Location	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16	W17	W18	W19	W20	W21	W22	W23	W24	IS 10500 (2012)	
1.	pH	7.4	7.2	7.1	7.8	7.2	7.1	7.32	7.1	7.3	7.3	7.2	7.53	7.42	7.15	6.8	7	7.36	7.46	7.64	7.6	7.72	7.25	7.34	7.37	6.5-8.5	
2.	Colour, Hazen	1	2	3	1	1	3	2	3	6	3	1	2	2	3	1	1	2	3	2	1	2	3	1	3	5	
3.	Temperature, 0C	24.3	24.2	23.8	25.4	24.8	25.2	24.8	26.2	25.8	25.6	26.4	25.7	26.2	25.3	26.1	24.6	24.6	25.4	26.5	26.6	24.5	26.5	26.5	25.4	--	
4.	EC,	656	550	1036	635	612	767	586	450	984	897	654	837	984	612	715	450	530	278	1065	1412	653	1078	674	812	--	
5.	TDS, mg/l	352	280	610	326	298	403	302	226	458	438	389	423	523	329	412	245	356	213	698	1003	534	645	346	324	500	
6.	Total Hardness (as CaCO <sub>3</sub> ), mg/l	200	210	324	235	310	214	228	320	276	356	310	435	315	297	350	330	213.36	73.6	141.53	132.6	110.5	89.23	96.26	66.81	200	
7.	MPN, N/100 ml	<4	<4	<4	<2	<2	<170	<4	<2	<350	<4	Nil	<4	<4	<4	<2	Nil	<2	<2	<4	<2	<4	<4	<2	<4	--	
8.	Lead, Pb (mg/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.01
9.	Zinc, Zn(mg/l)	0.02	0.015	0.05	0.04	0.102	0.12	0.015	0.02	0.010	0.032	0.023	0.008	0.025	0.006	0.024	0.020	0.008	0.005	0.015	0.006	0.014	0.008	0.007	0.016	5	
10.	Iron, Fe(mg/l)	0.009	0.008	0.02	0.015	0.081	0.06	0.008	0.007	BDL	0.012	0.018	0.005	0.009	0.007	0.017	0.028	0.004	BDL	0.005	0.015	0.009	0.010	0.006	0.008	0.3	
11.	Copper, Cu(mg/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1.5
12.	Cadmium, Cd (mg/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.003
13.	Cyanide,CN(mg/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.05
14.	Mercury,Hg(mg/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.001
15.	Nickel, Ni(mg/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
16.	Arsenic, As(mg/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.01
17.	Chromium, Cr (mg/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.05

W1	Johar Par 7 No.(W)	W7	Lower Dungri (W)	W13	Purnadih Bastii (W)	W19	Digwadih 10 No. F&J School (W)
W2	Kali Mandir(W)	W8	Upper Dungri Basti (W)	W14	Bhowra 13 No. (W)	W20	Bhaga Anil Talkies(H/P)
W3	Kali Mandir (W)	W9	Jore Side	W15	Trilok Nath Madhya Vidyalaya (T/W)	W21	6 & 7 Pit Ayodhya Nagri (W)
W4	Tisco Colony (H/P)	W10	Jamadoba (W)	W16	Mahul bani (T/W)	W22	Kendnadih Bastii (W)
W5	Lower Dungri (H/P)	W11	Joraphokar (T/W)	W17	Mahulbani Basti	W23	Kendnadih Bastii (Tubewell)
W6	Lower Dungri (Pond Water)	W12	Joraphokar (Well)	W18	Digwadih 12 No. Officers Colony (W)	W24	Pattiya Basti(W)

**Annexure-IV Groundwater quality with respect to heavy metal concentrations (specific condition no. xxx)**

**Sampling Time: January 2015**

S No	Parameter/ Location	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16	W17	W18	W19	W20	W21	W22	W23	W24	IS 10500 (2012)	
1.	pH	7.8	7.31	7.21	7.88	7.44	7.50	7.45	7.2	8.80	7.58	7.36	7.96	7.55	6.95	6.98	7.12	7.56	7.24	7.92	7.13	7.63	7.7	7.15	6.63	6.5-8.5	
2.	Colour, Hazen	2	4	4	2	1	6	3	5	10	4	2	3	5	4	2	2	4	3	5	3	2	4	2	3	5	
3.	Temperature, 0C	27.2	26	25.7	29.3	26.2	28.1	31.3	31.5	31.2	30.8	30.5	30.6	28.9	28.5	28.6	27.6	27.4	27.1	27.4	29.4	29.3	28.8	29.6	28.6	--	
4.	EC,	758	1604	1949	1756	1408	1353	1218	1967	1812	1791	1531	996	2470	1414	1435	1804	1556	698	2190	1737	1498	1191	1453	727	--	
5.	TDS, mg/l	453	806	979	607	704	685	764	983	934	895	957	607	1234	710	719	933	1085	864	1097	868	750	595	726	361	500	
6.	Total Hardness (as CaCO3), mg/l	220	298	348	94.5	328	240.6	238	376	380	366	300	560	360	320	370	478	360	346	500	570	386	242	270	170	200	
7.	MPN, N/100 ml	<4	<4	<4	<2	<2	<170	<4	<2	<350	<4	Nil	<4	<4	<4	<2	Nil	<2	<2	<4	<2	<4	<4	<2	<4	--	
8.	Lead, Pb (mg/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.01
9.	Zinc, Zn(mg/l)	0.03 5	0.03 5	0.05	0.04	0.10 2	0.12	0.05	0.07	0.02 1	0.06 4	0.08	0.04	0.05 5	0.03 4	0.06 4	0.06 5	0.03 0	0.01 6	0.03 5	0.06 0	0.02 3	0.01 8	0.01 0	0.02 8	0.02 8	5
10.	Iron, Fe(mg/l)	0.01 5	0.01 5	0.02	0.01 5	0.08 1	0.06	0.01 5	0.01 4	0.00 9	0.03 1	0.05	0.01 8	0.01 8	0.02 1	0.05	0.07 0	0.02 0	0.00 8	0.05 5	0.06 8	0.02 4	0.01 8	0.06 6	0.02 5	0.3	
11.	Copper, Cu(mg/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1.5
12.	Cadmium, Cd (mg/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.003
13.	Cyanide,CN(mg/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.05
14.	Mercury,Hg(mg/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.001
15.	Nickel, Ni(mg/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
16.	Arsenic, As(mg/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.01
17.	Chromium, Cr (mg/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.05

W1	Johar Par 7 No.(W)	W7	Lower Dungri (W)	W13	Purnadih Bastii (W)	W19	Digwadih 10 No. F&J School (W)
W2	Kali Mandir(W)	W8	Upper Dungri Basti (W)	W14	Bhowra 13 No. (W)	W20	Bhaga Anil Talkies(H/P)
W3	Kali Mandir (W)	W9	Jore Side	W15	Trilok Nath Madhya Vidyalaya (T/W)	W21	6 & 7 Pit Ayodhya Nagri (W)
W4	Tisco Colony (H/P)	W10	Jamadoba (W)	W16	Mahul bani (T/W)	W22	Kendnadih Bastii (W)
W5	Lower Dungri (H/P)	W11	Joraphokar (T/W)	W17	Mahulbani Basti	W23	Kendnadih Bastii (Tubewell)
W6	Lower Dungri (Pond Water)	W12	Joraphokar (Well)	W18	Digwadih 12 No. Officers Coloney (W)	W24	Pattiya Basti(W)

**Annexure-IV Groundwater quality with respect to heavy metal concentrations (specific condition no. xxx)**

**Date of Sampling: May 2015**

S No	Parameter/ Location	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16	W17	W18	W19	W20	W21	W22	W23	W24	IS 10500 (2012)	
1.	pH	8.2	8.15	7.85	8.4	7.65	7.8	8.01	7.8	8.9	8.4	8.1	8.78	8.1	8.2	8.2	8.2	8.01	8.24	8.92	8.13	8.63	8.7	8.15	8.23	6.5-8.5	
2.	Colour, Hazen	3	4	4	2	2	7	4	5	10	4	3	3	5	4	3	3	5	4	6	4	3	5	3	4	5	
3.	Temperature, 0C	28.1	27.1	27.9	28.1	28.9	28.8	29.8	30.1	30.8	29.8	29.4	30.8	29.8	28.6	28.4	28.2	28.4	29.1	30.4	28.4	30.3	29.8	30.6	29.6	--	
4.	EC,	956	1768	1956	1810	1528	1485	1820	1983	2150	1810	1617	1256	2500	1537	1534	1848	1630	896	2320	2023	1784	1326	1678	1023	--	
5.	TDS, mg/l	546	886	1100	876	745	715	895	923	986	923	876	689	1312	783	836	1015	1324	986	1289	1167	874	875	874	564	500	
6.	Total Hardness (as CaCO3), mg/l	250	330	370	278	425	314	256	385	397	435	388	534	563	345	460	480	376.6	356.9	520.9	601.1	411.4	280.5	307	184.2	200	
7.	MPN, N/100 ml	<4	<4	<4	<2	<2	<170	<4	<2	<350	<4	Nil	<4	<4	<4	<2	Nil	<2	<2	<4	<2	<4	<4	<2	<4	--	
8.	Lead, Pb (mg/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.01
9.	Zinc, Zn(mg/l)	0.040	0.042	0.10	0.09	0.25	0.19	0.06	0.085	0.035	0.084	0.17	0.09	0.085	0.040	0.060	0.080	0.050	0.043	0.056	0.130	0.043	0.025	0.020	0.046	5	
10.	Iron, Fe(mg/l)	0.025	0.027	0.08	0.045	0.08	0.12	0.02	0.027	0.019	0.05	0.09	0.022	0.024	0.065	0.104	0.120	0.070	0.015	0.085	0.159	0.086	0.049	0.089	0.055	0.3	
11.	Copper, Cu(mg/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1.5
12.	Cadmium, Cd (mg/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.003
13.	Cyanide,CN(mg/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.05
14.	Mercury,Hg(mg/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.001
15.	Nickel, Ni(mg/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
16.	Arsenic, As(mg/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.01
17.	Chromium, Cr (mg/l)	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.05

W1	Johar Par 7 No.(W)	W7	Lower Dungri (W)	W13	Purnadih Bastii (W)	W19	Digwadih 10 No. F&J School (W)
W2	Kali Mandir(W)	W8	Upper Dungri Basti (W)	W14	Bhowra 13 No. (W)	W20	Bhaga Anil Talkies(H/P)
W3	Kali Mandir (W)	W9	Jore Side	W15	Trilok Nath Madhya Vidyalaya (T/W)	W21	6 & 7 Pit Ayodhya Nagri (W)
W4	Tisco Colony (H/P)	W10	Jamadoba (W)	W16	Mahul bani (T/W)	W22	Kendnadih Bastii (W)
W5	Lower Dungri (H/P)	W11	Jorphokar (T/W)	W17	Mahulbani Basti	W23	Kendnadih Bastii (Tubewell)
W6	Lower Dungri (Pond Water)	W12	Jorphokar (Well)	W18	Digwadih 12 No. Officers Colony (W)	W24	Pattiya Basti(W)