स्टील अथॉरिटी ऑफ इण्डिया लिमिटेड
STEEL AUTHORITY OF INDIA LIMITED
राउरकेला इस्पात कारखाना
ROURKELA STEEL PLANT
बरसुआ लौह खादान - टेलडिही लौह खादान
BARSUA IRON MINES - TALDHI IRON MINES
P.O. TENSA - 770042
E-mail : gmofficebim@gmail.com

60TH YEAR OF PRODUCTION
सेल SAIL
SINCE 1969

Ref. No. BIM/E&L/2023-24/048 Date: 31.05.2023

To,
The Director, IA Division,
Ministry of Environment, Forests and Climate Change,
Indira Paryavaran Bhawan, Jor Bagh Road, Aliganj,
New Delhi – 110003

Sub: Six monthly status of compliance of conditions stipulated in Environmental Clearance (Grant Order of MoEF No. J-11015/351/2006-IA.II(M), dated 29th October 2010 and amendments dated 30.03.2016, dated 03.07.2020 with corrigendum dated 13.07.2020, dated 17.03.2021 and dated 25.01.2022) for the period ending 31st March, 2023.

Sir,

Please find enclosed herewith the updated six monthly compliance report with respect to the conditions stipulated by MoEF&CC, Govt. of India, New Delhi while granting Environmental Clearance to integrated Barsua-Taldih- Kalta Iron Ore Mines of M/s. Steel Authority of India Limited for production of 8.05 MTPA vide MoEF letter No. J-11015/351/2006-IA.II(M), dated 29th October 2010 and Amendments dated 30.03.2016, dated 03.07.2020 with corrigendum dated 13.07.2020, dated 17.03.2021 and dated 25.01.2022 for the period ending 31st March, 2023. The report also contains the updated status of environmental monitoring of air, water and noise pertaining to the period ending 31st March, 2023.

Thanking You,

Yours faithfully,
For SAIL/Barsua-Taldih-Kalta Iron Mines

31.05.2023

(Tilak Patnaik)
General Manager I/c, BIM, KIM & Taldih

Encl : As Above

Copy to:

1. The Dy. Director General of Forest (C), MoEF&CC, Govt. of India, Regional Office (EZ), A/3 Chandrasekharpur, Bhubaneswar-751023 (Odisha)
2. The Regional Director, Central Pollution Control Board, G97V+H5Q, Kasba New Market, Sector E, East Kolkata Twp, Kolkata, West Bengal – 700 107
3. The Member Secretary, Odisha State Pollution Control Board, Paribesh Bhawan, A/118 Nilakantha Nagar, Unit-VIII, Bhubaneswar-751012 (Odisha)

Status of Compliance to Conditions Stipulated in Environmental Clearance of Integrated Barsua – Taldih – Kalta Iron Ore Mining Project of M/s Steel Authority of India Limited located in Village Tantra and within Tohra RF, Tehsil Koira, District Sundargarh, Odisha
(EC order no. J-11015/351/2006-IA.II(M), dt. 29.10.2010 and Amendments vide even letter dated 30.03.2016, dated 03.07.2020 with corrigendum dated 13.07.2020, dated 17.03.2021 and dated 25.01.2022)

(Period: October 2022 to March 2023)

1. EC No. J-11015/351/2006-IA.II(M), dated 29th October, 2010

A. Specific Conditions

(i) The Project proponent shall obtain consent to Establish and Consent to Operate from the State Pollution Control Board, Orissa and effectively implement all the conditions stipulated therein.

Status of Compliance:

Consent to Establish was obtained from SPCB, Odisha for a capacity of 8.05 MTPA for Integrated Barsua – Taldih- Kalta Mining Project (ML-130) Vide No. 609/IND-II-NOC-5182, dated 13.01.2012. Further, Consent to Establish was amended vide even letter dated 05.11.2016, 25.09.2020, 24.08.2021 and 30.11.2022.

Consent to Operate has also been obtained from SPCB, Odisha vide Order no. 6813/IND-I-CON-1(A), dated 26.04.2023 for a quantity of 8.05 MTPA with validity up to 31.03.2024. Necessary actions are being taken to effectively implement the conditions stipulated therein.

(ii) The environmental clearance is subject to grant of approval of the State Land use Department, Government of Orissa for diversion of agricultural land for non-agricultural use.

Status of Compliance:

There is 18.164 Ha of agricultural land present out of 2564.323 Ha of total mine lease area. However, the same is present in the non-mineralized zone of the lease area and not required to be utilized for mining and allied activities till the life of mines. Hence, diversion of agricultural land for non-agricultural purpose doesn't require.

(iii) Necessary Forestry Clearance (FC) under the FC Act, 1980 for an area of 2347.641 ha is forest land involved in the project shall be obtained. Environmental Clearance is subject to grant of FC.

Status of Compliance:

Out of 2564.323 ha amalgamated lease area, 2425.613 ha is Forest Land. Stage-II forest clearance for diversion of forest land over 2341.931 ha in ML – 130 was granted by MoEFCC vide F. No. 8-90/1996-FC(pt.), dated 06.03.2013. MoEFCC vide order no. F.No.8-18/2014-FC dated 23.10.2017 granted Stage-II FC for diversion of entire 77.94 ha of forest land under ML – 162. The remaining 5.742 ha forestland, which was part of ML – 130, is under

occupation of the local Schedule Tribe & Other Traditional Forest Dwellers in village Tantra. Their individual rights have been recognized by granting pattas under Forest Right Act.,2006.

(iv) Environmental Clearance is subject to final order of the Hon'ble Supreme court of India in the matter of Goa Foundation Vs. Union of India in Petition (Civil) No.460 of 2004, as may be applicable to this project.

Status of Compliance:
Agreed

(v) Environmental Clearance is subject to obtaining clearance under the Wildlife (Protection) Act, 1972 from the competent authority, as may be applicable to this project.

Status of Compliance:
No notified National Park / Wildlife Sanctuary / Biosphere Reserve / Tiger Reserve are located within 10 kms from the Mining Lease boundary. Hence it is not applicable to this project.

(vi) The project proponent shall ensure that no natural watercourse and drainage channels except first order channels Id1, Id2, Id3, Id4, Id5, Id6, Id7 and Id8 passing through the mine lease shall be diverted. The channels shall be so diverted that it finally meets its final natural course.

Status of Compliance:
Due precautions are being taken and ensured that no natural watercourse / drainage channels obstructed due to any mining operation at the mines.
So far only Id1, Id2 & Id8 have been diverted and finally meet their final natural course.

(vii) The top soil shall temporarily be stored at earmarked site(s) only and it should not be kept unutilized for long. The topsoil shall be used for land reclamation and plantation.

Status of Compliance:
Though the generation of top soil is very less, it is being stacked separately and used for rehabilitation of dumps and other areas through plantation. During the year 2022-23, 68.65 cbm topsoil was generated and added to the existing 2153.03 cbm topsoil stored at earmarked site out of which 811.04 cbm has been utilised for plantation purpose. The top soil will be utilized for land reclamation and plantation purpose only.

(viii) The OB generated shall be stacked at earmarked dump site(s) only and it should not be kept active for a long period of time and its phase-wise stabilization shall be carried out. The project proponent shall carry out slope stability study through an expert organization like CIMFR, Dhanbad for attaining the proposed height of dump of 60m in three lifts and submit report to the ministry and its Regional Office within three months. Proper terracing of the OB dumps shall be carried out so that the overall slope of the dump shall be maintained to 27°.

Compliance status shall be submitted to the MoEF and its Regional Office located at Bhubaneswar on six monthly basis.

Status of Compliance:

The over burden (OB) / sub-grade ore generated during the mining operations is being stored at earmarked sites only, as per the approved Modification of Mining Plan. Phase wise stabilization with installation of coir mats and broadcasting of grass seeds are carried out as per approved plan. For effective stabilization, terracing of the OB dumps with overall slope of the dump is being maintained to below 27°.

Also, Geo-textile coir matting of 28000 Sq. m has been done in Barsua Block. Plantation has also been carried out over all the old dumps slopes for stabilization and prevention of washout.

Coir Matting at Barsua Block

Plantation over waste dump

Six monthly compliance status is being submitted to MoEF&CC and its Regional Office located at Bhubaneswar regularly.

(ix) Catch drains and siltation ponds of appropriate size shall be constructed around the mine working, mineral and OB dumps to prevent run off of water and flow of sediments directly into the agricultural fields, the first order channels, the Samaj Nallah, the Kuradihi Nallah, and other water bodies. Garland drains, setting tanks and check dams of appropriate size, gradient and length shall be constructed around the mine pit, dumps to prevent run off of water and flow of sediments.

Status of Compliance:

There are 33 nos. of Check dams / Retaining wall / Toe walls provided in Barsua-Taldih-Kalta mines to prevent direct flow of washout to nearby agricultural fields and water bodies. Also the surface runoff from the Barsua Mines has been channelized through a series of Garland drains into 3E pit to prevent direct flow of runoff to nearby water bodies.

During the period, construction of 485 m retaining wall with Garland Drain and settling pit at Taldih A block has been completed and construction of 750 m retaining wall with Garland Drain and settling pit at Barsua block is under progress.

Retaining wall at Taldih A Block

Check Dam near Tantra Village

(x) Dimension of the retaining wall at the toe of the over burden dumps and the OB benches within the mine to check run-off and siltation shall be based on the rain fall data.

Status of Compliance:

Toe walls, garland drains and siltation ponds at the OB Dumps have been constructed to control the surface runoff from the OB dumps. Based on the rainfall of the region, 1.5m to 2.0m width and 1.5m to 2.0m height toe walls were provided.

(xi) The water recovery and spill way system shall be so designed that the natural water resources are not affected and that no spill water goes into the nearby Karo River and other water bodies.

Status of Compliance:

The tailing dam top is at 420.5m AMSL. Maximum settled slime level is at 416.5m AMSL and the spill way is at 418.0m AMSL.

Also a system for recovery and recycling of clean water from the tailing pond has been provided at Barsua Iron Mine under Zero Discharge Project. The quality of overflow water is monitored regularly and found within the norm.

(xii) The project proponent shall carry out conditioning of the ore with water to mitigate fugitive dust emission, without affecting flow of ore in the ore processing and handling areas.

Status of Compliance:

Dry Fog System (DFS) and wet screening arrangements have been provided in the Ore Handling Plant at Barsua Block. Also Mist Cannon & Water injection system has been provided near mobile Crushing & Screening area to mitigate fugitive dust emission.

Dry Fog Dust Suppression (DFDS) in Crusher

Mist cannon in Crushing & Screening Plant

(xiii) The effluent from the ore beneficiation plant shall be treated to conform to the prescribed standards and the tailings slurry shall be transported through a closed pipeline to the tailing dam.

Status of Compliance:

Effluent generated from the ore beneficiation plant is being treated in Thickeners. The clear water to the tune of 60 % is being recycled and the underflow from thickener is discharged into Tailing Pond. Again a system for recovery and recycling of clean water from the tailing pond has been provided under Zero Discharge Project. The quality of the dam seepage water is being monitored and found to be in compliance with the discharge quality standards. Currently tailing slurry from the beneficiation plant is being transported through proper channel to tailing pond.

Thickener for Treatment of Effluent from Beneficiation Plant

(xiv) The project proponent shall take necessary safeguard measures to ensure that there is no leaching from the pond.

Status of Compliance:

The Tailing Pond at Barsua Iron Mine is located on the hard & plain area and is in operation since 1969. As iron ore in the region does not containing any heavy metals and no chemicals are being used in the beneficiation of ore at the mine, leaching of metals from the pond is not expected. The quality of the ground water at downstream of tailing pond is measured regularly.

(xv) The decanted water from the tailing pond shall be re-circulated and there should be zero discharge from the tailing pond.

Status of Compliance:

System for recovery and recycling of decanted water from the tailing pond has been provided at Barsua Iron Mine under Zero Discharge Project.

System for Recovery & Recycling of Tailings Pond Overflow

(xvi) Effective safeguard measures such as regular water sprinkling shall be carried out in critical areas prone to air pollution and having high levels of particulate matter such as crusher zone, loading and unloading point and all transfer points during handling of the ore. Extensive water sprinkling shall be carried out on roads. It should be ensured that the Ambient Air Quality parameters conform to the norms prescribed by the CPCB.

Status of Compliance:

Dry Fog System (DFS) and Mist Cannon have been provided in crushing and screening plant. Also, fixed water sprinklers of about 6 km have been provided in the permanent haul roads. Further, regular water sprinkling is being done with 2 X 28KL highly pressurized mobile water tankers for Barsua Block, 1 X 12 KL & 1 X 10KL mobile water tanker for loading area of Barsua, 2 X 20 KL, 1 X 16 KL & 1 X 10 KL mobile water tankers for Kalta Block and 1 X 12 KL & 1 X 20 KL mobile water tankers for Taldih Block which is sufficient to keep the haul road in wet condition.

Mobile water sprinklers

Fixed water sprinklers

(xvii) Plantation shall be raised in an area of 1658.803 ha including a 7.5m wide green belt in the safety zone around the mining lease, OB dumps, around beneficiation plant, mine benches around tailing ponds, roads etc. by planting the native species in consultation with the local DFO. The density of the trees should be around 2500 plants per Ha. Green belt shall be developed all along the mine lease area in a phased manner and shall be completed within first five years.

Status of Compliance:

Safety Zone plantation over 93.679 ha safety zone area of Barsua-Taldih-Kalta Iron Mines has been completed through State Forest Department. Apart from this, so far 2, 37,865 saplings have been planted covering an area of 115.98 ha since 2010.

Safety Zone Plantation

Plantation over old dumps

During the year 2022-23, plantation of 1500 saplings covering an area of 1.0 Ha at Waste Dump of Barsua Block and 3500 saplings covering an area of 2.0 Ha at Tensa Township has been completed.

However, development of green belt in an area of 1658.803 ha will be completed during conceptual period, after reclamation and rehabilitation of mined out pits, OB dumps and mine benches. The detail of plantation is placed at **Annexure I.**

(xviii) The project authority should implement suitable conservation measures to augment ground water resources in the area in consultation with the Regional Director, Central ground water Board.

Status of Compliance:

A technical feasibility study for hydro-geological, rain water harvesting and augmentation of ground water has been conducted through M/s Tirupati Balajee Maharaj Consultant (P) Ltd. As per recommendation, two (02) nos. of Check dams i.e. one in Kuradih nala near pump house and other at Tantra Village near Taldih Block has already been constructed.

The following measures have also been adapted for conservation and augmentation of ground water.

- The surface run-off generated from the mine is channelized through a series of garland drain to lowest level of pit for ground water recharge.

Barsua Mine Quarry act as settling pit for ground water recharge during Monsoon

- Series of check dams at different strategic locations are being constructed.

(xix) Regular monitoring of ground water level and quality shall be carried out in and around the project area by establishing a network of existing wells and installing new piezometers during the operation. The periodic monitoring [(at least four times in a year pre monsoon (April-May), monsoon (August), post-monsoon (November) and winter (January); once in each season)] shall be carried out in consultation with the SGWB/CGWB and the data thus collected may be sent regularly to the MoEF and its regional office at Bhubaneswar and the Regional Director, CGWB.

Status of Compliance:

Regular monitoring of ground water level and quality is being carried out and the monitoring reports are being submitted regularly. 3 nos. of open wells as well as tube wells have been selected all around the mines viz, Barsua Valley, Tensa and Kalta for regular monitoring of

water levels & quality. Further, 2 Nos. of piezometers have been installed at Barsua valley and Taldih for ground water monitoring. The monitoring results of ground water level and quality are placed as **Annexure – III and Annexure – IV respectively**.

(xx) The ground water and surface water in and around the mine including tailing ponds shall be regularly monitored at strategic locations for heavy metals. The monitoring stations shall be established in consultation with the Regional Director, CGWB and SPCB.

Status of Compliance:

Monitoring for heavy metals in ground water, surface water and tailing pond discharge are being carried out on monthly basis. Water quality for the period from October, 2022 to March, 2023 is placed in **Annexure - V.**

(xxi) Appropriate mitigative measures shall be taken to prevent pollution of the Karo River in consultation with the State Pollution control Board.

Status of Compliance:

Detailed study has been conducted through IIT Kharagpur to assess the impacts of mining on water bodies and suggest measures to minimize the impacts. Some of the recommendations suggested by IIT, Kharagpur like silt traps, check dams, sedimentation ponds, plantation on the slopes have been made at various strategic locations and the same are under continuous implementation at other sites.

Also a system for zero discharge has been provided at Barsua Iron Mines to prevent discharge of tailing pond overflow water to Kuradih nallah.

(xxii) Regular monitoring of the flow rate of the spring and perennial nallahs flowing in and around the project area shall be carried out and records maintained.

Status of Compliance:

Regular monitoring of the flow rate of the spring and perennial nallahs i.e. Kuradih Nalla at Barsua part and Samaj Nalla at Taldih & Kalta part are being done and records are being maintained. Flow rate of spring and perennial nalla for the period from October, 2022 to March, 2023 is placed in **Annexure – IX.**

(xxiii) The project proponent shall obtain necessary prior permission of the competent authorities for drawl of requisite quantity of water (surface water) required for the project.

Status of Compliance:

Department of Water Resources, Govt. of Odisha has allocated 3.406 cusec of Surface Water from Kuradih Nalla in favour of Barsua Iron Mines vide letter No. 4897/WR, dated 15.02.2021.

(xxiv) Suitable rainwater harvesting measures on long term basis shall be planned and implemented in consultation with the Regional Director, CGWB.

Status of Compliance:

A Technical Feasibility Study for hydro-geological, rain water harvesting & augmentation of ground water resources has been conducted through M/s Tirupati Balajee Maharaj Consultant (P) Ltd. Two (02) nos. of Check dams has already been constructed, one in Kuradih nala near pump house and other at Tantra Village near Taldih Block as per recommendation. Also village water bodies are being developed around the lease area for ground water recharge.

Development of water body

(xxv) Vehicular emissions shall be kept under control and regularly monitored. Measures shall be taken for maintenance of vehicles used in mining operation and in transportation of mineral. The vehicles carrying the mineral shall be covered with a tarpaulin and shall not be overloaded.

Status of Compliance:

Pollution Under Control (PUC) certificate is made compulsory for deployment of vehicles in Mines. Scheduled / Preventive maintenance of HEMM and light vehicles are undertaken regularly to keep the vehicular emissions under control. The vehicles used for transportation of ore are covered with tarpaulins and ensured that there is no overloading with the help of weighbridge. The vehicular emission results are placed in **Annexure – VIII.**

(xxvi) Mineral handling area shall be provided with adequate number of high efficiency dust extraction system. Loading and unloading areas including all the transfer points should also have efficient dust control arrangements.

Status of Compliance:

Mineral handing plants have been provided with the dust control measures like Dry Fog System (DFS), Mist Cannon & Water injection system at hopper and other transfer units. Also water spraying is being done at Loading & unloading areas.

(xxvii) Occupational health surveillance program of the workers shall be undertaken periodically to observe any contractions due to exposure of dust and take corrective measures, if needed. Health records of the workers shall be maintained.

Status of Compliance:

Occupational health surveillance programs of the workers are being undertaken periodically to observe any contractions due to exposure of dust. Health records of the workers are maintained. Barsua Iron Mines has been certified with ISO 45001:2018. Copy of certificate enclosed as **Annexure XII**.

(xxviii) Pre-placement medical examination and periodical medical examination of the workers engaged in the project shall be carried out and record maintained. For the purpose, schedule of health examination of the workers should be drawn and followed accordingly.

Status of Compliance:

Pre-placement medical examination and periodical medical examination of the workers engaged in the project are being carried out. During October, 2022 to March, 2023, IME for 351 nos. of contractual employees and PME for 34 nos. of regular employees have been done and records are being maintained. Schedule of health examination of the workers is also drawn and followed accordingly.

(xxix) Sewage treatment plant shall be installed for the colony. ETP shall also be provided for the workshop and the wastewater generated during mining operation.

Status of Compliance:

Individual septic tank with soak pits has been provided in the colony. ETP has been provided for treatment of effluents from the ore beneficiation plant consisting of Thickeners followed by Tailing Pond. About 60% of clear water from the Thickener as overflow, recycled back to the system. The underflow from the Thickener is being drained to the Tailing Pond for further settling of solids. State-of-art Oil & grease traps have been provided for treating the effluents from workshop and garages.

(xxx) The R&R of the project affected people, if any shall be carried out as per the NPRR.

Status of Compliance:

Not Applicable.

(xxxi) Digital processing of the entire lease area using remote sensing technique should be done regularly once in three years for monitoring land use pattern and report submitted to MOEF and its Regional office located at Bhubaneswar.

Status of Compliance:

Digital processing of the entire lease area using remote sensing technique has been studied through satellite imagery i.e. Linear Imaging Self-Scanner during March, 2021 by IIT ISM, Dhanbad. Copy of the report is enclosed as **Annexure - XI.**

(xxxii) Provision shall be made for the housing of construction labour within the site with all necessary infrastructure and construction such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, creche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.

Status of Compliance:

SAIL has well-developed townships at Tensa, Barsuan and Kalta with residential accommodation for its workers with all necessary infrastructure and construction such as LPG gas connection, electricity for cooking, welfare amenities like toilets, drinking water and medical facilities etc. Whenever required, the construction labour are hired from the local villagers and only few are being hired from outside, for which housing facilities along with necessary infrastructure are being provided at the existing colony of the mines.

(xxxiii) The project proponent shall take all precautionary measures during mining operation for conservation and protection of endangered fauna namely elephant, sloth bear, peacock etc. spotted in the study area. All the safeguard measures brought out in the Wildlife Conservation Plan so prepared specific to this project site shall be effectively implemented.

Status of Compliance:

All precautions are undertaken for not to disturb the flora and fauna inside the lease area. All necessary facilities are being extended to the local Forest Department for implementation of the wildlife conservation activities regularly. Also State Government had approved the study report prepared by an expert committee under the chairmanship of RCCF, Rourkela. Accordingly, an amount of Rs.17.82 Crore has been deposited in CAMPA through RTGS on 26.02.2013 as a part of the Site Specific Wildlife Conservation Plan. Also, an amount of Rs.10,69,14,469.00 @ Rs.43,000.00 per Ha. has been deposited in three phases towards implementation of comprehensive wild life management plan prepared for Bonai-Keonjhar forest division.

Again, so far an amount of Rs. 584.92 Lakhs has been incurred in various activities as part of Site Specific Conservation Plan from the fund realised by SAIL.

(xxxiv) The critical parameters such as RSPM (Particulate matter with size less than 10micron i.e., PM10) SO_2 and NOx in the ambient air within the impact zone, peak particle velocity at 300m distance or written the nearest habitation whichever is closer shall be monitored periodically. Further, quality of discharged water shall also be monitored for TDS, DO, PH and TSS. The monitored data shall be uploaded on the website of the company as well as displayed on a display board at the project site at a suitable location near the main gate of the company in public domain.

Status of Compliance:

Critical parameters i.e. PM10, PM2.5, Nox, SO2 and CO in ambient air and relevant parameters in the effluents are being monitored regularly. The effluent quality for the period from October, 2022 to March, 2023 is placed in **Annexure - VI.**

Also 3 Nos. of Continuous Ambient Air Quality Monitoring Stations (CAAQMS) at Barsua-Kalta has been installed and data are being transmitted to SPCB server. The monitored data is being displayed at the main gate of the mines. Copy of EC compliance along with environmental quality data is being uploaded to the company website www.sail.co.in.

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

Status of Compliance:

A Final Mine Closure Plan along with details of corpus fund will be submitted to MoEF&CC, New Delhi 5 years in advance of final mine closure for approval.

B. General Conditions

(i) No change in mining technology and scope of working should be made without prior approval of the MoEF & CC.

Status of Compliance:

Mining is being done in accordance with approved Mining Plan/ Scheme of Mining and Environmental Clearance and its amendments.

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

Status of Compliance:

There is no change in the calendar plan including excavation, quantum of mineral iron ore and waste. ROM production at various mining blocks of Barsua-Taldih-Kalta Iron Mines is kept within permitted capacity of EC / approved Mining Plan.

The quantity of Production for the year 2022-23 is as follows:

PRODUCTION	BIM	TIM	KIM
ROM	2,162,715.00	1,206,100.00	3,187,048.49
Tailings/ Sub-grade Fines	45,9915.57	0.00	0.00

(iii) Four ambient air quality-monitoring stations should be established in the core zone as well as in the buffer zone for RSPM (Particulate matter with size less than 10 micron i.e., PM_{10}), SO_2 and NOx monitoring. Location of the stations should be decided based on the meteorological data, topographical features and environmentally and ecologically sensitive targets and frequency of monitoring should be undertaken in consultation with SPCB.

Status of Compliance:

Four nos. of ambient air quality monitoring stations at Barsua-Taldih-Kalta Iron Mines have been established in the core zone as well as in the buffer zone based on the topography and meteorological conditions of the area. Regular ambient air quality monitoring of key parameters ($PM_{2.5}$, PM_{10}, SO2 and NO_X) to mining industries as per the guidelines of MoEF&CC and CPCB is being done. Moreover, 3 Nos. of Continuous Ambient Air Quality Monitoring Stations (CAAQMS) at Barsua & Kalta have also been commissioned and data are being transmitted to SPCB server.

(iv) Data on ambient air quality RSPM (Particulate matter with size less than 10 micron i.e., PM_{10}), SO_2 and NOx should be regularly submitted to the Ministry of environment and Forest including its Regional office located at Bhubaneswar and the SPCB / CPCB in six months.

Status of Compliance:

Ambient air quality monitoring data ($PM_{2.5}$, PM_{10}, SO_2 and NO_2) is being submitted to MoEF&CC, New Delhi and Regional Office, Bhubaneshwar along with the compliance reports. Air Quality report for the period October, 2022 to March, 2023 is placed as **Annexure – II**. Air quality data is also being submitted to SPCB and CPCB in every six months.

(v) Fugitive dust emissions from all the sources should be controlled regularly. Water spraying arrangement on haul roads, loading and unloading and at transfer points should be provided and properly maintained.

Status of Compliance:

Dry Fog System (DFS) and Mist Cannon have been provided in crushing and screening plant. Also, fixed water sprinklers of about 6 km have been provided in the permanent haul roads. Further, regular water sprinkling is being done with 2 X 28 KL highly pressurized mobile water tankers for Barsua Block, 1 X 12 KL & 1 X 10 KL mobile water tanker for loading area of Barsua, 2 X 20 KL, 1 X 16 KL & 1 X 10 KL mobile water tankers for Kalta Block and 1 X 12 KL & 1 X 20 KL mobile water tankers for Taldih Block.

All these dust control measures installed at the mines are sufficient to control fugitive dust emission.

(vi) Measures should be taken for control of noise levels below 85 dBA in the work environment. Workers engaged in operations of HEMM, etc. should be provided with ear plugs / muffs.

Status of Compliance:

Regular maintenances and periodic checks of the HEMM are being carried out to control noise below 85 dB (A) in the work environment. The operators engaged in blasting/ drilling operations and operator of HEMM are provided with PPEs such as ear plug/ ear muffs with helmet. Use of these protective measures is ensured by educating the workers on ill effect of the prolonged excessive exposure to high Noise levels and daily checks by shift mining

engineers regarding usage of ear plug/ear muffs. The measured noise level in critical areas is placed in **Annexure – VII**.

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

Status of Compliance:

State-of-art Oil & grease traps have been provided for treating the effluents from workshop and garages in the HEMM maintenance unit. Effluents generated from the beneficiation plants are being treated in Thickeners followed by Tailing Ponds. The clear water to the tune of 60% is being recycled and the underflow from thickener is discharged into Tailing Dam.

Oil & Grease trap at F/M Area, Barsua

(viii) Personnel working in dusty areas should wear protective respiratory devices and they should also be provided with adequate training and information on safety and health aspects. Occupational health surveillance program of the workers should be undertaken periodically to observe any contractions due to exposure to dust and take corrective measures, if needed.

Status of Compliance:

Dust masks have been provided to personnel working in dusty areas and ensured by daily checks. Training on safety and health aspects is being imparted on regular basis. A full-fledged Occupational Health Centre (OHC) is run by the mines for regular health surveillance. Periodical Medical Examination (PME) of all workmen working in the mines is being done at our OHC once in every five years/three/one year depending on category.

(ix) A separate environmental management cell with suitable qualified personnel should be set-up under the control of a Senior Executive, who will report directly to the Head of the Organization.

Status of Compliance:

A full-fledged Environment & Lease Department has been established at Barsua Iron Mines to look after environmental aspects headed by a Senior Manager, who reports to Mines Manager. He is further assisted by two officers for environmental management at mines.

(x) The funds earmarked for environmental protection measures should be kept in separate account and should not be diverted for other purpose. Year wise expenditure should be reported to the MoEF&CC and its Regional Office located at Bhubaneswar.

Status of Compliance:

Funds earmarked for environmental protection measures at the mines are booked separately and not being diverted for other purpose. Year wise expenditure for last 3 years on Environmental protection measures is furnished below. The details of expenditure are placed as **Annexure – X**.

Year	Approx. Expenditure
2020-21	398.58 Lakhs
2021-22	422.43 Lakhs
2022-23	315.75 Lakhs

(xi) The project authorities should inform to the Regional Office located at Bhubaneswar regarding date of financial closures and final approval of the project by the concerned authorities and the date of start of land development work.

Status of Compliance:

The Barsua and Kalta Iron Mines are operating since 1960 and 1966 respectively. Development work in Taldih block started since 9th June 2016 and installation of various facilities at Taldih Block are under progress.

(xii) The Regional Office of this Ministry located at Bhubaneswar shall monitor compliance of the stipulated conditions. The project authorities should extend full cooperation to the officer(s) of the Regional Office by furnishing the requisite data / monitoring reports.

Status of Compliance:

Full co-operation is extended to the officer(s) of the regional office of MoEF&CC by furnishing the requisition data information, monitoring reports etc.

(xiii) The project proponent shall submit six monthly reports on the status of compliance of the stipulated environmental clearance conditions including results of monitored data to the MoEF, its Regional Office Bhubaneswar, and the respective Zonal Office of CPCB. The proponent shall upload the status of compliance of the EC conditions on their website and

shall update the same periodically. It shall simultaneously be sent to the regional Office of the MoEF, Bhubaneswar, the respective Zonal Office of CPCB and SPCB.

Status of Compliance:

Six monthly compliance reports on the status of implementation of environmental safeguards are being submitted to MoEF&CC, New Delhi, Regional Office, MoEF&CC, Bhubaneswar, Central Pollution Control Board and State Pollution Control Board.

Copy of the compliance report including environmental quality data is being uploaded to the SAIL web site i.e. www.sail.co.in.

(xiv) A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, Zila Parisad / Municipal corporation, Urban local Body and the Local NGO, if any, from whom suggestions, representations, if any, were received while processing the proposal. The clearance letter shall also be put on the website of the company by the proponent.

Status of Compliance:

Copy of clearance letter was notified in public places and community centers.
A copy of the environmental clearance letter has already been sent to the Panchayat.
The clearance letter has been put on the Company website i.e. www.sail.co.in.

(xv) The State Pollution Control Board should display a copy of the clearance letter at the regional Office, District Industry Centre and the Collector's Office / Tehsildar's Office for 30 days.

Status of Compliance:

Not Applicable

(xvi) The environmental statement for each financial year ending 31st March in Form-V as is maintained to be submitted by the project proponent to the concerned SPCB as prescribed under the EP Rules- 1986, as amended subsequently, shall also be put on the website of the company and shall also be sent to the Regional office of the MoEF, Bhubaneswar by e-mail.

Status of Compliance:

Being complied with.

(xvii) The project authorities should advertise at least in two local newspapers widely circulated, one of which shall be in the vernacular language of the locality concerned, within 7 days of the issue of the clearance letter is available with the SPCB and also at web site of the MoEF at http://envfor.nic.in and a copy of the same should be forwarded to the Regional Office of the Ministry located at Bhubaneswar.

Status of Compliance:

Complied with.

Tilak Patnaik
G.M. I/c. (BIM-TIM-KIM)
SAIL, RSP, BIM

2. EC No. J-11015/351/2006-IA.II(M) dated 30th March, 2016.
Additional conditions in addition to the conditions in EC No. J-11015/351/2006-IA.II(M) on 29th October, 2010

(i) Temporary Permission to change iron ore production (ROM) from three blocks viz. Barsua, Taldih & Kalta in ML-130 Lease from 2.5, 4.25 and 1.3 million TPA to 3.5, 2.05 and 2.5 million TPA respectively, keeping the total iron ore (ROM) production restricted to 8.05 million TPA as specified in the earlier environment clearance for 5 years.

Status of compliance:

The Environmental Clearance was amended vide order no J-11015/351/2006-IA.II(M) dated 03.07.2022 with corrigendum dated 13.07.2020 for continuation of amended provisions of EC amendment dated 30.03.2016 for further two years i.e. up to 31.03.2023. Further EC was amended vide order no J-11015/351/2006-IA.II(M) dated 17.03.2021 for redistribution of production from three blocks viz. Barsua, Taldih & Kalta to 3.5, 1.35 and 3.2 MTPA respectively. Also, Environmental Clearance for Barsua-Taldih-Kalta Iron Mines of M/s SAIL for expansion in production from 8.05 MTPA to 16.0 MTPA (ROM), Topsoil/OB/IB: 3.92 MTPA and handling of 2.0 MTPA sub-grade dumps/tailings (Total excavation: 22.0 MTPA) and installation of new Dry Processing Plant of 7.0 MTPA for Taldih and 4.0 MTPA for Kalta and augmentation of existing 3.5 MTPA Barsua Beneficiation Plant along with adequate loading, siding and associated infrastructure in the amalgamated mine lease area of 2558.581 ha [FC available 2419.871 ha + non-forest land 138.710 ha] out of 2564.323 ha has been obtained from MoEFCC vide letter dated 28.04.2023.

(ii) Permission to operate existing beneficiation plant at the rate 4.5 million TPA instead of 2.5 million TPA for 5 years.

Status of compliance:

The Environmental Clearance was amended vide order no J-11015/351/2006-IA.II(M) dated 03.07.2022 with corrigendum dated 13.07.2020 for continuation of amended provisions of EC amendment dated 30.03.2016 for further two years i.e. up to 31.03.2023.

Also, Environmental Clearance for Barsua-Taldih-Kalta Iron Mines of M/s SAIL for expansion in production from 8.05 MTPA to 16.0 MTPA (ROM), Topsoil/OB/IB: 3.92 MTPA and handling of 2.0 MTPA sub-grade dumps/tailings (Total excavation: 22.0 MTPA) and installation of new Dry Processing Plant of 7.0 MTPA for Taldih and 4.0 MTPA for Kalta and augmentation of existing 3.5 MTPA Barsua Beneficiation Plant along with adequate loading, siding and associated infrastructure in the amalgamated mine lease area of 2558.581 ha [FC available 2419.871 ha + non-forest land 138.710 ha] out of 2564.323 ha has been obtained from MoEFCC vide letter dated 28.04.2023.

(iii) Permission for road transportation of part of iron ore (ROM) from Taldih block to the Barsua Valley (about 11 kms.) and to Barsua beneficiation plant for a period of 5 years till facilities viz. crushing plant, LDBC are erected and commissioned for the Taldih block for 5 years.

Status of compliance:

The Environmental Clearance was amended vide order no J-11015/351/2006-IA.II(M) dated 03.07.2022 with corrigendum dated 13.07.2020 for continuation of amended provisions of EC amendment dated 30.03.2016 for further two years i.e. up to 31.03.2023 and for transportation of entire 2.05 MTPA iron ore excavated at Taldih to Barsua Private / Public Siding till construction of road from Taldih to Barsua Beneficiation Plant.

Also, Environmental Clearance for Barsua-Taldih-Kalta Iron Mines of M/s SAIL for expansion in production from 8.05 MTPA to 16.0 MTPA (ROM), Topsoil/OB/IB: 3.92 MTPA and handling of 2.0 MTPA sub-grade dumps/tailings (Total excavation: 22.0 MTPA) and installation of new Dry Processing Plant of 7.0 MTPA for Taldih and 4.0 MTPA for Kalta and augmentation of existing 3.5 MTPA Barsua Beneficiation Plant along with adequate loading, siding and associated infrastructure in the amalgamated mine lease area of 2558.581 ha [FC available 2419.871 ha + non-forest land 138.710 ha] out of 2564.323 ha has been obtained from MoEFCC vide letter dated 28.04.2023.

(iv) To replace 'outside mine lease area' with 'ML-162 lease and acquired area' in environment clearance, in order to utilize the infrastructure facilities for processing of iron ore produced from ML-130 lease.

Status of compliance:

Deptt. of Steel and Mines, Govt. of Odisha has amalgamated ML–162 with ML–130 vide proceeding No. IV(B) SM-03/2020/10418/SM, Bhubaneswar, Dtd.02.12.2020 covering total area of 2564.323 ha with validity up to 05.01.2030. Lease deed of the Amalgamated Lease was executed on 30.03.2021. Amendment in Environmental Clearance for change in lease area has been obtained from MoEF&CC, New Delhi vide Order No. J-11015/351/2006- IA.II (M) dated 25.01.2022.

(v) To modify the total lease area of ML-130 lease from 2486.391 to 2486.383 ha. as per the joint survey committee report (DGPS survey report) of Govt. of Odisha and the lease deed executed by and between the Govt. of Odisha and SAIL on 13th November, 2014.

Status of compliance:

Based on SAIL's application, Deptt. of Steel and Mines, Govt. of Odisha vide proceeding No. IV(B) SM-03/2020/10418/SM, Bhubaneswar, Dtd.02.12.2020, amalgamated two contiguous Mining Leases viz. ML–130 (2486.383 ha) and ML–162 (77.94 ha) covering total area of 2564.323 ha with validity up to 05.01.2030. Lease deed of the Amalgamated Lease was executed on 30.03.2021. Amendment in Environmental Clearance for change in lease area has been obtained from MoEF&CC, New Delhi vide Order No. J-11015/351/2006- IA.II (M) dated 25.01.2022.

3. EC No. J-11015/351/2006-IA.II(M) dated 3rd July, 2020
Additional conditions in addition to the conditions in EC No. J-11015/351/2006-IA.II(M) on 29th October, 2010

Specific Conditions:

(i) Air pollution control measures, inter alia, include covering of fines transport vehicles with tarpaulin sheets to avoid fugitive dust emission; Deployment of additional mobile water sprinklers; Deployment of vehicle mounted misting cannons at fines handling areas; wheel washing facility for trucks before entering to public road; Regular maintenance of roads to reduce fugitive emissions from roads & vehicular emissions; Regular maintenance of diesel powered vehicles as per manufacturer's guidelines; Construction of concrete approach roads at Kalta & Taldih Mines; etc.

Status of Compliance:

The vehicles used for transportation of ore from Taldih and Kalta Iron Mine are covered with tarpaulins and ensured that there is no overloading with the help of weighbridge. Additional water sprinklers have been deployed in the fines and tailings handling areas. Mist Cannon have been provided near mobile crushing and screening plant. Mechanized wheel washing facility has been provided at the exit point of the mine for the ore transport vehicles at Taldih and Kalta Mines. The wheel washing facilities are integrated with complete recirculation system. All the haulage roads are being maintained properly with grader for smooth movement of vehicles and to reduce fugitive emissions from roads. Scheduled / Preventive maintenance of HEMM and light vehicles are undertaken as per manufacturer's guidelines to keep the vehicular emissions under control. Concrete permanent approach road over 300 m at Taldih Block, Barsua Railway Siding and Roxy Railway Siding has been constructed. The final road profile of NH-520 near Kalta Mine has been recently completed. Subsequently, the matter for NOC for approach permission from Kalta Mine to NH–520 from NHAI has been taken up with National Highways Authority of India (NHAI), Rourkela. As per the direction of the NHAI, Work Order has been placed vide No. KIM/CC/CIVIL/WO-35/2022-23/583, dated 27.10.2022 for approach permission from Kalta Iron Mine to NH-520 and obtaining of provisional NOC for NH access permission. Survey and design of the access road from Kalta Mine to NH – 520 in accordance with the MoRTH guidelines have been completed.

Concrete approach road at Taldih

Wheel Washing Facility at Taldih

(ii) Additional water sprinkling arrangements shall be made at the excavation/ handling/ transportation of sub-grade ore and tailings.

Status of Compliance:

Additional water sprinkling arrangements viz Mobile water sprinklers has been made during excavation/ handling/ transportation of sub-grade ore and tailings.

(iii) An additional amount Rs. 0.0839 Crores, as committed by project proponent shall be earmarked for activities under Corporate Environment Responsibility (CER) and implemented in next two years.

Status of Compliance:

An amount of Rs. 0.10 Crores has been spent towards plantation outside the lease area. In addition to above, drinking water supply facility, health, education and skill development facilities are being provided in the peripheral villages.

(iv) In pursuant to Ministry's O.M No 22-34/2018-IA.III dated 16.01.2020 to comply with the direction made by Hon'ble Supreme Court on 08.01.2020 in W.P. (Civil) No 114/2014 in the matter Common Cause vs Union of India. The mining lease holder shall after ceasing mining operations, undertake re-grassing the mining area and any other area which may have been distributed due to other mining activities and restore the land to a condition which is fit for growth of fooder, flora, fauna etc.

Status of Compliance:

Addendum to the existing lease deed has been executed on 04.06.2020 incorporating the condition that "the mining lease holder (s) shall after ceasing mining operation, undertake re-grassing the mining area and any other area which may have disturbed due to their mining activities and restore the land to a condition which is fit for growth of fodder, flora, fauna etc." in pursuant to judgment of Hon'ble Supreme Court in WP(C) No.114 of 2014.

4. EC No. J-11015/351/2006-IA.II(M) dated 17th March, 2021
Additional conditions in addition to the conditions in EC No. J-11015/351/2006-IA.II(M) on 29th October, 2010.

Specific Conditions:

(i) The Proponent shall submit the additional EMP cost to take care for extraction of 0.7 MTPA ROM and its transportation to Roxy Railway Siding.

Status of Compliance:

The additional EMP cost to take care for extraction of 0.7 MTPA ROM and its transportation to Roxy Railway Siding has been submitted vide letter no. SAIL/RMD/BIM/2021/E&L/200, dated 25.02.2021. The following actions have been taken to control the fugitive dust emission at Kalta Iron Mines.

- Mist Canon at Crushing and Screening Plants has been installed
- 2 (two) nos. additional mobile 16 KL capacity water sprinklers (one at Kalta Mine and other at Roxy Siding) have been deployed.
- Fixed Water Sprinklers has been provided along permanent haul road.

(ii) The Project Proponent also informed that the internal haul road 4.5 km leading to National Highway will be used for next 4 years. The committee permitted to utilize the internal haul road for next 4 years only by which time the conveyor shall be installed.

Status of Compliance:

The internal haul road of 4.5 km leading to National Highway will be used till construction of long distance belt conveyor from Kalta Iron Mines to Roxy Siding.

(iii) Production from Barsua block (3.5 MTPA) shall remain unchanged.

Status of Compliance:

Production from the Barsua Block i.e 3.5 MTPA has remained unchanged.

(iv) Total Production from Mines (8.05 MTPA) shall remain unchanged.

Status of Compliance:

Total production from the Barsua-Taldih-Kalta Iron Mines i.e. 8.05 MTPA has remained unchanged.

(v) No change in M.L. Area (2486.383) or method of mining or mineral transport

Status of Compliance:

Based on SAIL's application, Deptt. of Steel and Mines, Govt. of Odisha vide proceeding No. IV(B) SM-03/2020/10418/SM, Bhubaneswar, Dtd.02.12.2020, amalgamated two contiguous Mining Leases viz. ML–130 (2486.383 ha) and ML–162 (77.94 ha) covering total area of 2564.323 ha with validity up to 05.01.2030. Lease deed of the Amalgamated Lease was executed on 30.03.2021. Amendment in Environmental Clearance for change in lease area

has been obtained from MoEF&CC, New Delhi vide Order No. J-11015/351/2006- IA.II (M) dated 25.01.2022. There is no change in method of mining or mineral transport.

5. EC No. J-11015/351/2006-IA.II(M) dated 25th January, 2022
Additional conditions in addition to the conditions in EC No. J-11015/351/2006-IA.II(M) on 29th October, 2010

A. Additional Specific Conditions

(i) No mining activities will be allowed in the part of forest land involved in the lease area i.e. 5.742 ha for which the forest clearance is not available.

Status of Compliance:
Agreed. There will be no mining activity in the part of forest land involved in the lease area i.e. 5.742 ha for which the forest clearance is not available.

(ii) The project proponent shall ensure the livelihood and food security of the forest dwelling Scheduled Tribes and other traditional forest dwellers and take adequate measures for protection of 5.742 ha of forest land (Part of ML-130).

Status of Compliance:
The 5.742 ha of forest land is situated in the non-mineralized area and will not be utilized till life of the mines.

(iii) The project proponent shall adhere to the recommendation of CSIR-NEERI report on "carrying capacity study for Environmentally Sustainable Iron and Manganese ore mining activity in Keonjhar, Sundargarh and Mayurbhanj districts of Odisha State.

Status of Compliance:
Agreed.

(iv) All other terms and conditions mentioned in the EC letter dated 29.10.2010, 30.03.2016, 03.07.2020 and 17.03.2021 shall remain the same.

Status of Compliance:
Agreed.

B. Recommendation of CSIR-NEERI report on "Carrying Capacity Study for Environmentally Sustainable Iron and Manganese Ore Mining Activity in Keonjhar, Sundargarh and Mayurbhanj districts of Odisha State"

1) Department of Steel & Mines, Govt. of Odisha should prepare 5 years regional plan for annual iron ore requirement from the state, which in turn shall be met from different mines/ zones (e.g. Joda, Koira.) in the state. Accordingly, sustainable annual production (SAP) for each zone/mine may be followed adopting necessary environmental protection measures.

Status of Compliance:

Amalgamated Barsua-Taldih-Kalta Iron Mines will adopt the necessary environmental protection & control measures and abide by the Sustainable Annual Production limit mentioned in Regional Plan prepared by the Department of Steel & Mines, Govt. of Odisha.

2) The expansion or opening of new manganese ore mines may be considered only when the actual production of about 80% is achieved. Further, the mines that have not produced Mn ore for last two years and have no commitment in the current year as well; EC capacity in such cases may be reviewed. The Department of Steel & Mines, Govt. of Odisha shall submit the Annual Report on this issue to the MoEF& CC for further necessary action.

Status of Compliance:

Not Applicable.

3) Analysis of baseline environmental quality data for the year 2014 and 2016 indicates that existing mining activities appear to have little / no potential impact on environmental quality, except on air environment, which was mainly due to re- suspension of road dust. Therefore, all the working mines can continue to operate with strict compliance to monitoring of environmental quality parameters as per EC and CTE/CTO conditions of the respective mine, and implementation of suggested measures for control of road dust and air pollution. Odisha State Pollution Control Board has to ensure the compliance of CTE/CTO. Regional office of the MoEF& CC, Bhubaneswar shall monitor the compliance of the EC conditions. Regional office of the Indian Bureau of Mines (IBM) shall monitor the compliance of mining plan and progressive mine closure plan. Any violation by mine lease holder may invite actions per the provisions of applicable acts.

Status of Compliance:

Mine is ensuring the strict compliance to monitoring of environmental quality parameters and implementation of air pollution control measures as per EC and CTE/CTO conditions. Amalgamated Barsua - Taldih - Kalta iron mines of SAIL is regularly submitting the half-yearly EC and CTO compliance reports to respective authorities. Amalgamated Barsua - Taldih - Kalta iron mines will continue to furnish the required information and extend all support during the site visits by statutory agencies.

4) Considering the existing environmental quality, EC capacity, production rate, iron ore resources availability and transport infrastructure availability, the share of Joda and Koira sector works out to be 70% and 30% respectively for the existing scenario for the year 2015-16. However, for additional EC capacity, it can be 50:50 subject to commensurate infrastructure improvement (viz. SOTM, pollution free road transport, enhancement of rail network etc.) in the respective regions.

Status of Compliance:

Guidelines in this regard as per the direction of State Govt. shall be followed.

5) Continuous monitoring of different environmental quality parameters as per EC and CTE/CTO conditions with respect to air, noise, water (surface & ground water) and soil quality in each region shall be done. The environmental quality parameters should not indicate any adverse impact on the environment. Monitoring within the mines should be done by individual mine lease holders, whereas outside the mine lease area, monitoring should be done by the Govt. of Odisha through various concerned departments/ authorized agencies. Various monitoring / studies should be conducted through national reputed institutes, NABET/ MoEF&CC accredited laboratories/organizations. The reports submitted by individual mine lease holders and study reports prepared by other concerned departments/ agency for each of the regions should be evaluated and examined by SPCB/ MoEF&CC.

Status of Compliance:

Monitoring of different environmental parameters as mentioned in EC/CTE/CTO is being done in the core and buffer zone of the ML area. The reports are submitted along with the Six Monthly Compliance report to the concerned authorities. One CAAQMS stations in core zone and two in buffer zone have been established and real time data transmission is being transmitted to OSPCB server. The monitored data indicates no adverse impact on the environment.

6) Construction of cement concrete road from mine entrance and exit to the main road with proper drainage system and green belt development along the roads and also construction of road minimum 300 m inside the mine should be done. This should be done within one year for existing mines and new mine should have since beginning. The concerned departments should extend full support; wherever the land does not belong to the respective mine lease holders. The Department of Steel & Mines, Govt. of Odisha should ensure the compliance and should not issue the Mining Permits, if mine lease holder has not constructed proper cement concrete road as suggested above.

Status of Compliance:

300 m Concrete approach road from mine entrance and exit to the main road have been provided at Taldih Iron Mines, Barsua Railway Siding and Roxy Railway Siding with proper drainage system. The final road profile of NH-520 near Kalta Mine has been recently completed. Subsequently, the matter for NOC for approach permission from Kalta Mine to NH–520 from NHAI has been taken up with National Highways Authority of India (NHAI),

Rourkela. As per the direction of the NHAI, Work Order has been placed vide No. KIM/CC/CIVIL/WO-35/2022-23/583, dated 27.10.2022 for approach permission from Kalta Iron Mine to NH-520 and obtaining of provisional NOC for NH access permission. Survey and design of the access road from Kalta Mine to NH – 520 in accordance with the MoRTH guidelines have been completed.

Concrete approach road at Taldih

Concrete Approach Road at Barsua Siding

7) In view of high dust pollution and noise generation due to road transport, it is proposed to regulate/guide the movement of iron and manganese ore material based on the EC capacity of the mines. Accordingly, ore transport mode has been suggested, as given below in Table. Table: EC Capacity Based Suggested Ore Transport Mode (SOTM).

Code	EC	Suggested Ore Transport Mode
SOTM 1	≥ 5 MTPA	100% by private railway siding or pipeline for captive mines and 70% for non-captive mines
SOTM 2	Between 3 and < 5 MTPA	Minimum 70% by public railway siding, through conveyer belt and maximum 30% by road – direct to destination or other public railway siding or above options
SOTM 3	Between 1 and < 3 MTPA	Minimum 70% by public railway siding and maximum 30% by road – direct to destination or by other public railway siding or above options
SOTM 4	< 1 MTPA	100% by 10/17 Trucks or above options.

It is mentioned by State Govt. of Odisha that currently about 45% of the iron ore is dispatched using rail network and progressively it will be increased to about 60% by rail/slurry over a period of 5 years, taking into account time required to set up more railway sidings.

In view of present ore transport practices and practical limitations, all the existing mines should ensure adoption of SOTM within next 5 years. New mines or mines seeking expansion should incorporate provision of SOTM in the beginning itself, and should have system in place within next 5 years.

However, the State Govt. of Odisha shall ensure dust free roads in mining areas wherever the road transportation of mineral is involved. The road shoulders shall be paved with fence besides compliance with IRC guidelines. All the roads should have proper drainage system and apart from paving of entire carriage width the remaining right of way should have native plantation (dust capturing species). Further, regular maintenance should also be ensured by the Govt. of Odisha.

Transportation of iron & manganese ore through river (jetty) to nearest Sea port (Sea cargo option) may be explored or connecting Sea ports with Railway network from the mines to be improved further so that burden on existing road and rail network and also pollution thereof can be minimized.

Progress on development of dust free roads, implementation of SOTM, increased use of existing rail network, development of additional railway network/ conveyor belt/ pipelines etc. shall be submitted periodically to MoEF&CC.

Status of Compliance:

Amalgamated Barsua – Taldih – Kalta Iron Mines has an existing EC capacity of 8.05 MTPA and consisting of three blocks namely Barsua, Taldih and Kalta having individual EC capacity of 3.5 MTPA, 1.35 MTPA & 3.2 MTPA respectively.

SAIL has two private railway sidings one at Barsua and other at Roxy for dispatch of iron ore from the Barsua-Taldih–Kalta Mines to SAIL Steel Plants.

Presently the Iron Ore is being transported through closed conveyors from Barsua Iron Mines to Barsua Railway siding and through road from Taldih & Kalta Iron Mines to Barsua & Roxy Railway siding respectively.

Under the proposed expansion of these mines to 16 MTPA ROM, the ore from Taldih & Kalta mines shall be processed and conveyed through closed Conveyor belts to the respective railway sidings in compliance to suggested SOTM.

However, during the construction phase, Taldih Iron Mine shall continue to transport 2.0 MTPA of iron ore through existing transport road to Barsua Railway Siding and Kalta Iron Mines shall continue to transport 4.0 MTPA iron ore through existing transport road to Roxy Siding for which necessary NOC has been obtained from Govt. of Odisha.

Final product is dispatched from the SAIL's private railway siding through rail.

SAIL will abide by the SOTM system as and when the guidelines are formed by the Department of Steel & Mines, Govt. of Odisha in this regard.

The progress on implementation of SOTM is being submitted to MoEF&CC along with six monthly compliance reports.

8) Development of parking plazas for trucks with proper basic amenities/ facilities should be done inside mine. This should be done within one year for existing mines and new mines should have since beginning. Small capacity mines (in terms of lease area or production) not

having enough space within the mine lease areas should develop parking plaza at a common place within the region with requisite facilities.
Responsibility: Individual Mine Lease Holders; Time Period: 1 Year.

Status of Compliance:
Parking plazas have already been developed at Taldih & Kalta Iron Mines with proper basic amenities.

Parking Plaza at Taldih Block

9) Construction of NH 215 as minimum 4 lane road with proper drainage system and plantation and subsequent regular maintenance of the road as per IRC guidelines. Construction of other mineral carrying roads with proper width and drainage system along with road side plantation to be carried out.
Responsibility: Department of Steel &Mines with PWD / NHAI Time Period: 2 Years.

Status of Compliance:
SAIL will extend necessary support if required.

10) Regular vacuum cleaning of all mineral carrying roads aiming at "Zero Dust Re-suspension" may be considered.
Responsibility: PWD/ NHAI/ Mine Lease Holders; Time Period: 3 months for existing roads.

Status of Compliance:
Presently manual cleaning of the concrete approach roads in regular basics and regular washing is done on the roads leading up to the main public road. However, we are in the process of deployment of mechanical road sweeping machine in the internal concrete roads.

11) Expansion of existing mines and new mines should be considered after conducting recent EIA Study (as per the provisions of EIA Notification 2006, as amended time to time) with proper

justification on demand scenario for iron ore requirement and availability of pollution free transport network in the region.
Responsibility: IBM, Department of Steel & Mines and MoEF&CC, New Delhi.

Status of Compliance:
The proposed expansion of Barsua-Taldih-Kalta Iron Mines is (as per the provision of EIA notification 2006, as amended time to time) with justification on demand and supply scenario for iron ore requirement and availability of pollution free transport network in the region.

12) Mine-wise Allocation of Annual Production: In case the total requirement of iron ore exceeds the suggested limit for that year, permission for annual production by an individual mine may be decided depending on approved EC capacity (for total actual dispatch) and actual production rate of individual mine during last year or any other criteria set by the State Govt., i.e. Dept. of Steel & Mines. Department of Steel and Mines in consultation with Indian Bureau of Mines-RO should prepare in advance mine-wise annual production scenario as suggested in Table, so that demand for iron ore can be anticipated and actual production/ dispatch does not exceed the suggested annual production. Table: Allocation of Production to Different Mines for 5 Years (as per approved Mining Plan)

Mine Lease	EC Capacity (MTPA)	Suggested Annual Production (MT)				
		2016 - 17	2017 - 18	2018 - 19	2019 – 20	2020 - 21
		Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
Mine 1	X1					
Mine 2	X2					
Mine 3	X3					
Mine n	Xn					
Total	160+dX	105	129	153	177	201

Status of Compliance:
Amalgamated Barsua – Taldih – Kalta Iron Mines will abide by the guidelines issued by the Department of Steel & Mines, Govt. of Odisha in this regard.

13) Expansion of Existing Mines having Validity up to 2020: In view of implementation of MMDR Act 2015, wherein many non-captive mines are expected to be closed by March 2020, total iron ore production scenario has been. It is expected that the non-captive mines having validity till 2020 shall try to maximize their production (limited to EC capacity) in the remaining period. Further, depending upon availability of iron ore resources, these mines may also seek expansion of EC capacity. It may be noted here that total EC capacity of existing 25 working mines having validity up to 2020 is about 85 MTPA, whereas actual production from these mines has been only 44.677 MT (52.6%) during 2015-16 and 57.07 MT (67.1%) during 2016-17. Also, it is expected that these mines would not even be able to achieve ore production as per existing EC capacity till March 2020. Therefore, these existing mines should go for production to the fullest extent to meet the requisite demand from the State.

However, where EC limit is exhausted, application for expansion may be considered. Further, the EC process (i.e. Grant of TOR, Baseline data collection, Mining plan/ scheme approval, Public hearing, preparation of EIA/EMP Report. Appraisal by the EAC and grant of EC) takes about one year time. Under such circumstances, it is suggested that further applications for grant of TOR or grant of EC for expansion of production capacity of the mine should be considered for those existing mines, which have exhausted their capacity subject to consideration of all environmental aspects.
Responsibility: Department of Steel & Mines and MoEF&CC, New Delhi.

Status of Compliance:

Amalgamated Barsua –Taldih - Kalta iron mine is a captive mine of SAIL having Lease validity up to 05.01.2030. For the proposed expansion of the mine, the Mining Plan has been approved by IBM, Bhubaneswar vide letter No. MP/A/39-ORI/BHU/2020-21 dated 01.04.2021 and EC has been granted by MoEF&CC vides F. No. J-11015/351/2006-IA.II(M) dated 28.04.2023.

14) Sustained Iron Ore Production beyond 2020: Considering the implementation of MMDR Act 2015, total production of iron ore in Odisha State is anticipated to be about 111 MT during 2016-17 (actual production was – 102.663 MT), 136 MT during 2017-18, 146 MT during 2018-19 and 146 MT during 2019-20. Then there will be substantial drop in total production (to the tune of 73 MT during 2020-21onwards) due to closure of mines, which are valid up to 2020. Therefore, in order to maintain operation/sustained growth of downstream industries, iron ore mining in the region needs to be continued at a sustainable rate. The State Govt. through Department of Steel and Mines should initiate appropriate action to ensure continued availability of iron ore from the region, as per suggested sustainable annual production.

Status of Compliance:

Amalgamated Barsua – Taldih – Kalta iron mine will continue the production as per the Approved Mining Plan, Environmental Clearance, CTO and as per the direction of State Govt. for sustainable annual production rate.

15) Reserves Estimation–Mining Plan and Exploration: Appropriate actions (geo-technical investigation for qualitative and quantitative resource estimation & other preparations for auction of mines), may be initiated taken into account the existing working mines, and the mines which were operational at some point of time (but closed presently due to various reasons). The total iron ore reserves/ resources available within the total lease area of each mine should be estimated by State Govt./NMET/ GSI (or any other approved agency) with respect to: (i) Total lease area of mine (surface), (ii) Maximum depth to which resources could be available, (iii) Resources below the ground water table (if intersected), (iv) Reserves are to be estimated as per UNFC code with respect to quantity and quality (% Fe content), (v) Maximum mining rate and area for auction (after 2020) will be calculated based on total resources available and proposed life of mine leading to closure of mine in a stipulated time period.

Responsibility: Department of Steel & Mines, IBM and GSI; Time frame: 1 year for the mines to be auctioned for next 2 years. The above mentioned organizations shall ensure the compliance with respect to timelines for implementations.

Status of Compliance:

For Barsua – Taldih - Kalta iron mines geological exploration has been conducted and the resource and reserve estimation have been carried out considering all the old and new boreholes till date as per the records available. Boreholes have been drilled in a regular grid pattern at 100m or 200m interval. Hence, the resources have been estimated using cross sectional area method. The sections have been multiplied with the strike length of influence, and bulk density to arrive at the quantity of mineral resources in tonnes.

16) Depending upon availability of extractable iron ore resources within a mine, mining below the ground water table may be permitted after conducting necessary geological and hydro-geological study by GSI and requisite approval from the CGWB/CGWA (Central Ground Water Board/Authority). This can be explored at least in few mines on trial/pilot basis. Further, within a mine, it will be desirable to operate one pit at a time, and next pit should be opened after extracting maximum possible resources from the first pit, so that the exhausted pit can be used for back filling/ storing of low grade iron ore. However, depending upon the quantity and/or quality of iron/ manganese ore, other mine pits in the same mine lease may also be opened for sustainable scientific mining, as per approved mining plan/scheme of mining by IBM. The Department of Steel & Mines, Govt. of Odisha should initiate the pilot project so that minerals are fully utilized.

Status of Compliance:

There is no intersection of ground water table in Barsua – Taldih – Kalta Iron Mines. The ultimate working depths at the three mining blocks are much above the ground water levels in the respective areas. The mine is being operated as per the approved mining plan.

17) Commercial Utilization of Low Grade Ore: R&D studies towards utilization of low-grade iron ore should be conducted through research/academic institutes like IMMT, Bhubaneswar, NML, Jamshedpur, and concerned metallurgical departments in IITs, NITs etc., targeting full utilization of low-grade iron ore (Fe content up to 45% by 2020 and up to 40% by 2025). In fact, life cycle assessment of whole process including environmental considerations should be done for techno-economic and environmental viability. R&D studies on utilization of mine waste water having high concentration of Fe content for different commercial applications in industries such as cosmetics, pharmaceutical; paint industry should also be explored.
Responsibility: IBM, Dept. of Steel & Mines, Individual Mine Lease Holders.

Status of Compliance:

The low grade ore i.e. mineral rejects are being suitably blended from time to time, wherever possible with high-grade ore and / or feed to the processing plants. In addition to the above, as allowed by Ministry of Mines, Govt. of India in its order dated 16.09.2019 with amendments

on 04.01.2020 & 03.12.2020, the low grade ores and tailings lying at mine pit heads of SAIL Mines are being sold in the open market.

18) The mining activity in Joda-Koira sector is expected to continue for another 100 years, therefore, it will be desirable to develop proper rail network in the region. Rail transport shall not only be pollution free mode but also will be much economical option for iron ore transport. The rail network and/or conveyor belt system up to public railway siding needs to be created. The total length of the conveyor belt system/ rail network to be developed from mines to nearest railway sidings by 11 mines in Joda region is estimated to be about 64 km. Similarly, in Koira region, total length of rail network/ conveyor system for 8 mines (under SOTM 1 & 2) is estimated to be around 95 km. Further, it is suggested to develop a rail network connecting Banspani (Joda region) and Roxy railway sidings in Koira region. Responsibility: Dept. of Steel & Mines, Govt. of Odisha and Concerned Mines along with Indian Railways. Time Period: Maximum 7 years (by 2025). The Department of Steel & Mines, Govt. of Odisha should follow-up with the concerned Departments and railways so that proposed proper rail network is in place by 2025.

Status of Compliance:

We will abide by the directions of Department of Steel & Mines, Govt. of Odisha in this regard.

19) State Govt. of Odisha shall make all efforts to ensure exhausting all the iron & manganese ore resources in the existing working mines and from disturbed mining leases/zones in Joda and Koira region. The criteria suggested shall be applicable while suggesting appropriate lease area and sustainable mining rate. Responsibility: Dept. of Steel & Mines, Govt. of Odisha.

Status of Compliance:

Amalgamated Barsua-Taldih-Kalta Iron Mines will work according to the instructions given by the Department of Steel & Mines, Govt. of Odisha in this regard. Mining will be done as per the IBM approved mining plan.

20) Large and medium mine leases contribute to better implementation of reclamation and rehabilitation plans to sustain the ecology for scientific and sustainable mining. The small leases do not possess scientific capability of environmentally sustainable mining. Therefore, new mine leases having more than 50 ha area should be encouraged, as far as possible. This will ensure inter-generational resource availability to some extent.

Status of Compliance:

Barsua – Taldih – Kalta Iron mines follows scientific and sustainable mining practices as per the approved Mining Plan and will continue to do so in future.

21) **Mining Operations/Process Related:** (i) Appropriate mining process and machinery (viz. right capacity, fuel efficient) should be selected to carry out various mining operations that generate minimal dust/air pollution, noise, waste water and solid waste. e.g. drills should

either be operated with dust extractors or equipped with water injection system. (ii) After commencement of mining operation, a study should be conducted to assess and quantify emission load generation (in terms of air pollution, noise, waste water and solid waste) from each of the mining activity (including transportation) on annual basis. Efforts should be made to further eliminate/ minimize generation of air pollution/dust, noise, waste water, solid waste generation in successive years through use of better technology. This shall be ensured by the respective mine lease holders. (iii) Various machineries/equipment selected (viz. dumpers, excavators, crushers, screen plants etc.) and transport means should have optimum fuel/power consumption, and their fuel/power consumption should be recorded on monthly basis. Further, inspection and maintenance of all the machineries/ equipment/ transport vehicles should be followed as per manufacturer's instructions/ recommended time schedule and record should be maintained by the respective mine lease holders. (iv) Digital processing of the entire lease area using remote sensing technique should be carried out regularly once in 3 years for monitoring land use pattern and mining activity taken place. Further, the extent of pit area excavated should also be demarcated based on remote sensing analysis. This should be done by ORSAC (Odisha Space Applications Centre, Bhubaneswar) or an agency of national repute or if done by a private agency, Bhubaneswar. Expenses towards the same shall be borne by the respective mine lease holders.
Responsibility: Individual Mine Lease Holders.

Status of Compliance:

(i) Excavators of 7.5cum, 5.9cum & 4.5 cum are in use along with 100T, 60T & 50T dumpers for effective shovel-dumper combination. Regular water sprinkling is being done in the excavation areas, haul road, dump areas, loading and unloading areas. All the haulage roads are being maintained properly with grader for smooth movement of vehicles so as to minimize dust/air pollution. All the drills are operated with dust extractors and some of drills are equipped with water injection system. (ii) All efforts are being made to minimize generation of air pollution/dust, noise, waste water, solid waste generation in the mines through use of better technology. The quantification of emission load has been done and sent to State Pollution Control Board on 31.10.2019 and 18.08.2022 (iii) Inspection and maintenance of all the machineries/ equipment/ transport vehicles are being carried out as per manufacturer's instructions/ recommended time schedule and records are being maintained. (iv) Digital processing of the entire lease area using remote sensing technique are being done for monitoring the land use pattern and the mining activity through IIT (ISM), Dhanbad.

22) **Air Environment Related:** (i) Fugitive dust emissions from all the sources should be controlled regularly on daily basis. Water spraying arrangement on haul roads, loading and unloading and at other transfer points should be provided and properly maintained. Further, it will be desirable to use water fogging system to minimize water consumption. It should be ensured that the ambient air quality parameters conform to the norms prescribed by the CPCB in this regard. (ii) The core zone of mining activity should be monitored on daily basis. Minimum four ambient air quality monitoring stations should be established in the core zone

for SPM, PM10, PM2.5, SO2, NOx and CO monitoring. Location of air quality monitoring stations should be decided based on the meteorological data, topographical features and environmentally and ecologically sensitive targets and frequency of monitoring should be undertaken in consultation with the State Pollution Control Board (based on Emission Load Assessment Study). The number of monitoring locations may be more for larger capacity mines and working in larger area. Out of four stations, one should be online monitoring station in the mines having more than 3 MTPA EC Capacity. (iii) Monitoring in buffer zone should be carried out by SPCB or through NABET accredited agency. In addition, air quality parameters (SPM, PM10, PM2.5, SO2, NOx and CO) shall be regularly monitored at locations of nearest human habitation including schools and other public amenities located nearest to source of the dust generation as applicable. Further, 11 continuous air quality monitoring systems may be installed in Joda and Koira regions and one in Baripada/ Rairangpur region. (iv) Emissions from vehicles as well as heavy machinery should be kept under control and regularly monitored. Measures should be taken for regular maintenance of vehicles used in mining operations and in transportation of mineral. (v) The vehicles shall be covered with a tarpaulin and should not be overloaded. Further, possibility of 3 using closed container trucks should be explored for direct to destination movement of iron ore. Air quality monitoring at one location should also be carried out along the transport route within the mine (periodically, near truck entry and exit gate).

Responsibility: Individual Mine Lease Holders and SPCB.

Status of Compliance:

i) Fugitive dust emissions from all the sources are being controlled regularly on daily basis. A network of fixed water sprinklers over 6 km length has been laid on permanent haul roads. Mobile water tankers 28 KL which can cover the entire width of the haul road are in use for dust suppression. All feed hoppers where ore is unloaded and all transfer chutes have been provided with dry-fog dust suppression system. Mist cannons and water injection systems have placed at mobile crushing & Screening plants to prevent and control of fugitive dust emission. Ambient air quality conforms to the CPCB norms.

Mobile water sprinklers

Fixed water sprinklers along haul roads

Wheel Washing Facility at Taldih Mine

Dry fog Dust Suppression in Crusher, Barsua

Mist cannon

Use of wet drilling

ii) The core zone of mining activity is being monitored on daily basis by installing 12 Nos. of Fugitive emission stations through NABET accredited agency. Apart from this four manual ambient air quality monitoring stations have been established for monitoring of PM10, PM2.5, SO2, NOx and CO twice in a week. Three (03) nos. of Continuous Ambient Air Quality monitoring system (CAAQMS) has been installed in consultation with the State Pollution Control Board out of which one is in the core zone and two are in the buffer zone and the data is being transmitted to SPCB server.

CAAQMS installed at Barsua Iron Mine

(iii) Monitoring in buffer zone are being carried out through NABET accredited agency regularly nearest to human habitation.

(iv) Vehicular emission of all the vehicles used in mining activities is being done at regular intervals. Maintenance of mining equipment is done on regular basis. It is mandatory for any vehicle entering the mine premises to have a PUC and valid fitness certificate.

(v) It is ensured that all the vehicles exiting the mine gate are checked for use of tarpaulin cover and are not overloaded.

23) **Noise and Vibration Related:** (i) Blasting operation should be carried out only during daytime. Controlled blasting such as Nonel, should be practiced. The mitigation measures for control of ground vibrations and to arrest fly rocks and boulders should be implemented. (ii) Appropriate measures (detailed in Section 5.4) should be taken for control of noise levels below 85 dBA in the work environment. Workers engaged in operations of HEMM, etc. should be provided with ear plugs/muffs. (iii) Noise levels should be monitored regularly (on weekly basis) near the major sources of noise generation within the core zone. Further, date, time and distance of measurement should also be indicated with the noise levels in the report. The data should be used to map the noise generation from different activities and efforts should be made to maintain the noise levels with the acceptable limits of CPCB (CPCB, 2000) (iv) Similarly, vibration at various sensitive locations should be monitored at least once in month, and mapped for any significant changes due to successive mining operations. Responsibility: Individual Mine Lease Holders.

Status of Compliance:

i) Blasting operations are carried out in day time only and controlled blasting practices are being carried out by using Nonel and Delay techniques so as to ensure minimal ground vibration. ii) Adequate measures are taken for control of work noise levels such as all HEMMs have acoustic cabins with air conditioners and the exhaust manifold have silencers. Noisy Operations have been identified and persons engaged in such operations are provided with earplugs/muffs. (iii) Monitoring of Noise level are being done on weekly basis at the major sources of noise generation within core zone. Necessary efforts are being made to maintain the noise level with in the acceptable limits of CPCB (CPCB, 2000). (iv) All efforts are taken to ensure that blasting due to ground vibrations remain within safe limits by using Nonel and Delay techniques.

24) **Water/Wastewater Related:** (i) In general, the mining operations should be restricted to above ground water table and it should not intersect ground water table. However, if enough resources are estimated below the ground water table, the same may be explored after conducting detailed geological studies by GSI and hydro- geological studies by CGWB or NIH or institute of national repute, and ensuring that no damage to the land stability/ water aquifer system shall happen. The details/ outcome of such study may be reflected/ incorporated in the EIA/EMP report of the mine appropriately. (ii) Natural water course and/ or water resources should not be obstructed due to any mining operations. Regular monitoring

of the flow rate of the springs and perennial nallas should be carried out and records should be maintained. Further, regular monitoring of water quality of nallas and river passing thorough the mine lease area (upstream and downstream locations) should be carried out on monthly basis. iii) Regular monitoring of ground water level and its quality should be carried out within the mine lease area by establishing a network of existing wells and constructing new piezometers during the mining operation. The monitoring should be carried out on monthly basis. (iv) In order to optimize water requirement, suitable conservation measures to augment ground water resources in the area should be undertaken in consultation with Central Ground Water Board (CGWB). (v) Suitable rainwater harvesting measures on long term basis should be planned and implemented in consultation with CGWB, to recharge the ground water source. Further, CGWB can prepare a comprehensive plan for the whole region. (vi) Appropriate mitigation measures (viz. ETP, STP, garland drains, retaining walls, collection of runoff etc.) should be taken to prevent pollution of nearby river/other water bodies. Water quality monitoring study should be conducted by State Pollution Control Board to ensure quality of surface and ground water sources on regular basis. The study can be conducted through NABL/ NABET approved water testing laboratory. However, the report should be vetted by SPCB. (vii) Industrial waste water (workshop and waste water from the mine) should be properly collected, treated in ETP so as to conform to the discharge standards applicable. (viii) Oil and grease trap should be installed before discharge of workshop effluents. Further, sewage treatment plant should be installed for the employees/ colony, wherever applicable. (ix) Mine lease holder should ensure that no silt originating due to mining activity is transported in the surface water course or any other water body. Appropriate measures for prevention and control of soil erosion and management of silt should be undertaken. Quantity of silt/soil generated should be measured on regular basis for its better utilization. (x) Erosion from dumps site should be protected by providing geo-textile matting or other suitable material, and thick plantation of native trees and shrubs should be carried out at the dump slopes. Further, dumps should be protected by retaining walls. (xi) Trenches / garland drain should be constructed at the foot of dumps to arrest silt from being carried to water bodies. Adequate number of check dams should be constructed across seasonal/perennial nallas (if any) flowing through the mine lease areas and silt be arrested. De-silting at regular intervals should be carried out and quantity should be recorded for its better utilization, after proper soil quality analysis. (xii) The water so collected in the reservoir within the mine should be utilized for the sprinkling on hauls roads, green belt development etc. (xiii) There should be zero waste water discharge from the mine. Based on actual water withdrawal and consumption/ utilization in different activities, water balance diagram should be prepared on monthly basis, and efforts should be made to optimize consumption of water per ton of ore production in successive years.

Responsibility: Individual Mine Lease Holders, SPCB and CGWB.

Status of Compliance:

(i) Based on observations from nearby wells and water bodies, the minimum depth of water table is 404 mRL and maximum depth of water table is 593 mRL. Based on the Conceptual

Plan, the ultimate pit depth will be 617mRL hence, throughout the course of mining operations, the ground water table will remain Undisturbed and the mining operation will not intersect ground water table. (ii) No natural water course will be obstructed due to mining operations. Regular monitoring of the flow rate of the spring and perennial nallahs i.e. Kuradih Nalla at Barsua part and Samaj Nalla at Taldih & Kalta part are being done and records are being maintained. Further, water quality of Kuradih Nalla & Samaj Nalla at upstream and downstream locations with respect to Barsua, Taldih & Kalta Mines are being carried out on monthly basis. (iii) Regular monitoring of ground water level and quality is being carried out on monthly basis. Three numbers of open wells as well as tube wells have been selected all around the mines viz, Barsua Valley, Tensa and Kalta for regular monitoring of water levels & quality. Further, 2 Nos. of piezometers have been installed at Barsua valley and Taldih for ground water monitoring. (iv) During monsoon, accumulated mine pit water is not discharged outside and is allowed to seep through to augment the ground water resources. (v) Two (02) nos. of Check dams i.e. one in Kuradih Nalla near pump house and other at Tantra Village has been constructed which helps in augmentation of ground water resources. Further rooftop rainwater harvesting structures are being planned in the Administrative office, School Building and Guest House. (vi) Appropriate mitigation measures (viz. Garland drains, retaining walls, collection of runoff etc.) are taken to prevent pollution of nearby river/other water bodies. The water quality monitoring is being carried out on monthly basis by NABL accredited laboratory. (vii) There is no industrial wastewater being generated at Barsua – Taldih – Kalta Iron Mines. Maintenance of HEMMs is done centrally at Workshop. (viii) Oil and Grease trap is provided for the workshop at Barsua – Taldih – Kalta Iron Mine. The treated water is used for gardening and floor washing. (ix) Through a series of retention wall, garland drain, settling pits and check dams, it is ensured that no silt originating due to mining activity is transported in the surface water course or any other water body. (x) Adequate measures to prevent soil erosion like grass plantation/coir matting on dump slopes are practiced. Further plantation with native species is done on all old dump slopes. Dumps are protected by retaining walls. (xi) Retaining wall with Garland drain has been constructed at the foot of the dumps to arrest silt. Check dams have been constructed for retention of suspended solids and allowing flow of clear water. This prevents contamination of outside water bodies from the wash-offs of the lease area. The check dams are periodically de-silted to keep them efficient. (xii) The mine pit water is allowed to seep through to augment the ground water resources. (xiii) System for recovery and recycling of decanted water from the tailing pond has been provided at Barsua Iron Mine under Zero Discharge Project and it will be maintained in the future as well. Efforts are being made to reduce the specific water consumption in successive years.

Thickener for Treatment of Effluent from Beneficiation Plant

System for Recovery & Recycling of Tailings Pond Overflow

25) **Land/ Soil/ Overburden Related** (i) The top soil should temporarily be stored at earmarked site(s) only and it should not be kept unutilized for long (not more than 3 years or as per provisions mentioned in the mine plan/ scheme). The topsoil should be used for land reclamation and plantation appropriately. (ii) Fodder plots should be developed in the non-mineralized area in lieu of use of grazing land, if any. (iii) Over burden/ low grade ore should be stacked at earmarked dump site(s) only and should not be kept active for long period. The dump height should be decided on case to case basis, depending on the size of mine and quantity of waste material generated. However, slope stability study should be conducted for larger heights, as per IBM approved mine plan and DGMS guidelines. The OB dump should be scientifically vegetated with suitable native species to prevent erosion and surface run off. In critical areas, use of geo textiles should be undertaken for stabilization of the dump. Monitoring and management of rehabilitated areas should continue until the vegetation becomes self-sustaining. Proper records should be maintained regarding species, their growth, area coverage etc. (iv) Catch drains and siltation ponds of appropriate size should be constructed to arrest silt and sediment flows from mine operation, soil, OB and mineral dumps. The water so collected can be utilized for watering the mine area, roads, green belt development etc. The drains should be regularly de-silted, particularly after monsoon and should be maintained properly. Appropriate documents should be maintained. Garland drain of appropriate size, gradient and length should be constructed for mine pit, soil. OB and mineral dumps and sump capacity should be designed with appropriate safety margin based on long term rainfall data. Sump capacity should be provided for adequate retention period to allow proper settling of silt material. Sedimentation pits should be constructed at the corners of the garland drains and de-silted at regular intervals. (v) Backfilling should be done as per approved mining plan/scheme. There should be no OB dumps outside the mine lease area. The backfilled area should be afforested, aiming to restore the normal ground level. Monitoring and management of rehabilitated areas should continue till the vegetation is established and becomes self-generating. (vi) Hazardous waste such as, waste oil, lubricants, resin, and coal tar etc. should be disposed off as per provisions of Hazardous Waste Management Rules, 2016, as amended from time to time.

Responsibility: Individual Mine Lease Holders.

Status of Compliance:

(i) Preservation of topsoil: During the developmental stage, it is likely that we may encounter some amount of topsoil. Topsoil will be stored temporarily and will be utilized in afforestation and horticultural activities. (ii) Fodder plots will be developed in the buffer area for use as grazing land. (iii) OB/ low grade Ore are stacked at earmarked dump sites as per the approved Mining Plan. Dump stability study is under progress by NIT, Rourkela. As per the recommendation, the height of the dump will be maintained. The measures like geo-textile coir matting, grassing are already being implemented to take care of any erosion and for its stabilization. The plantation is monitored and maintained till it becomes self-sustaining. The records pertaining to plantation – species name, growth, area coverage is maintained at the mine.

Coir Matting at Barsua Block

Dry Boulder wall at Waste Dump, Taldih

(iv) Garland drains, Check dams and settling pits have been provided at appropriate places to arrest silt and sediment flows to ensure that only clear water will leave from lease boundary. The structures are regularly de-silted and maintained properly. Garland drains has been constructed for the dumps as per approved mine plan. Settling pits of adequate capacity has been provided. (v) Back filling of the area will be done as per the approved Mining Plan. The afforestation of the dumps will be done accordingly. (vi) Hazardous wastes management is being done as per the provisions of Hazardous Waste management & handling Rules, 2016.

26) **Ecology/Biodiversity (Flora-Fauna) Related:** (i) As per the Red List of IUCN (International Union for Conservation of Nature), six floral species and 21 faunal species have been reported to be under threatened, vulnerable & endangered category. Protection of these floral and faunal species should be taken by the State Forest & Wildlife Department on priority, particularly in the mining zones, if any. (ii) The mines falling within 5-10 km of the Karo-Karampada Elephant corridor buffer need to take precautionary measures during mining activities. The forest and existing elephant corridor routes are to be protected and conserved. Improvement of habitat by providing food, water and space for the elephants is required to be ensured to avoid Man-Elephant conflicts. Though as per the records of State Forest Department, movement of elephants in the Karo-Karampada elephant corridor within 10 km

distance from the mines in Joda and Koira is not observed, the Forest Department shall further record and ensure that elephant's movement is not affected due to mining activities. (iii) All precautionary measures should be taken during mining operation for conservation and protection of endangered fauna namely elephant, sloth bear etc. spotted in the study area. Action plan for conservation of flora and fauna should be prepared and implemented in consultation with the State Forest and Wildlife Department within the mine lease area, whereas outside the mine lease area, the same should be maintained by State Forest Department. (iv) Afforestation is to be done by using local and mixed species saplings within and outside the mining lease area. The reclamation and afforestation is to be done in such a manner like exploring the growth of fruit bearing trees which will attract the fauna and thus maintaining the biodiversity of the area. As afforestation done so far is very less, forest department needs to identify adequate land and do afforestation by involving local people in a time bound manner. (v) Green belt development carried out by mines should be monitored regularly in every season and parameters like area under vegetation/plantation, type of plantation, type of tree species /grass species/scrubs etc., distance between the plants and survival rate should be recorded. (vi) Green belt is an important sink of air pollutants including noise. Development of green cover in mining area will not only help reducing air and noise pollution but also will improve the ecological conditions and prevent soil erosion to a greater extent. Further, selection of tree species for green belt should constitute dust removal/dust capturing plants since plants can act as efficient biological filters removing significant amounts of particulate pollution. Thus, the identified native trees in the mine area may be encouraged for plantation. Tree species having small leaf area, dense hair on leaf surface (rough surface), deep channels on leaves should be included for plantation. (vii) Vetiver plantation on inactive dumps may be encouraged as the grass species has high strength of anchoring besides medicinal value. (viii) Details of compensatory afforestation done should be recorded and documented by respective forest divisions, and State Forest Department should present mine-wise annual status, along with expenditure details. (ix) Similarly, Wildlife Department is also required to record and document annual status of wildlife in the region and should identify the need for wildlife management on regional level. (x) Maintenance of the ecology of the region is prime responsibility of the State Forest and Wildlife Department. They need to periodically review the status and identify the need for further improvement in the region. The required expenditure may be met from the funds already collected in the form of compensatory afforestation and wildlife management. Further, additional fund, if required can be sought from DMF.

Responsibility: Individual Mine Lease Holders and State Forest & Wildlife Department.

Status of Compliance:

(i) The identified threatened, vulnerable and endangered species are being conserved and protected as per the Approved Site Specific Wildlife Conservation Plans (SSWCP) prepared for the area. There are two (02) SSWCP approved by Chief Wildlife Warden, Odisha and the details of the same are given in subsequent point (iii). (ii) Adequate precautionary measures during mining activities are being taken to protect elephant corridor routes. (iii) Two Site

Specific wildlife conservation plans (SSWCP) were approved by Chief Wildlife Warden, Odisha vide dated 25.02.2013 for 2486.313 ha & 13.01.2016 for 77.94 ha. An amount of Rs.17.82 Crores & Rs. 9.84 Crores were deposited for implementation of approved SSWCPs in Buffer Zone of Barsua-Taldih-Kalta Iron Mines. (iv) Efforts are being made continually for afforestation by using local and mixed species saplings within and outside the mining lease area to enhance the biodiversity of the region. (v) Green belt development done is monitored till it becomes self-sustaining. (vi) Green belt development is being done by using native species in consultation with State Forest Department. (vii) Coir matting with bamboo plantation has been done over the OB dumps in order to stabilize the dumps. (viii) It is in the scope of State Forest Department. (ix) It is in the scope of State Wildlife Department. (x) It is in the scope of State Forest and Wildlife Department.

27) **Socio-Economic Related:** (i) Public interaction should be done on regular basis and social welfare activities should be done to meet the requirements of the local communities. Further, basic amenities and infrastructure facilities like education, medical, roads, safe drinking water, sanitation, employment, skill development, training institute etc. should be developed to alleviate the quality of life of the people of the region. (ii) Land outees and land losers/affected people, if any, should be compensated and rehabilitated as per the national/ state policy on Resettlement and Rehabilitation. (iii) The socio-economic development in the region should be focused and aligned with the guidelines/initiatives of Govt. of India/ NITI Aayog / Hon'ble Prime Minister's Vision centering around prosperity, equality, justice, cleanliness, transparency, employment, respect to women, hope etc. This can be achieved by providing adequate and quality facilities for education, medical and developing skills in the people of the region. District administration in association with mine lease holders should plan for "Samagra Vikas" of these blocks well as other blocks of the district. While planning for different schemes in the region, the activities should be prioritized as per Pradhan Mantri Khanij Kshetra Kalyan Yojna (PMKKKY), notified by Ministry of Mines, Govt. of India, vide letter no. 16/7/2017-M.VI (Part), dated September 16, 2015.
Responsibility: District Administration and Individual Mine Lease Holders.

Status of Compliance:

(i) Social welfare activities to meet the requirements of the local communities are done through CSR department for the people residing near the Project. They interact regularly with the local communities to identify their needs and requirement and accordingly plan the yearly activities. Further, SAIL has well developed township at Tensa and Kalta with infrastructure facilities like school, hospital, RO plant for drinking water, training institute, etc. (ii) There is no case of displacement of people due to the project. (iii) SAIL is already supporting the State Government in facilitating the development of schools, conducting health camps, construction of medical facilities, provision of training and skill development programs, etc. and will continue to extend support in future too.

28) **Road Transport Related:** (i) All the mine lease holders should follow the suggested ore transport mode (SOTM), based on its EC capacity within next 5 years. (ii) The mine lease holders should ensure construction of cement road of appropriate width from and to the entry and exit gate of the mine, as suggested in Chapter 10. Further, maintenance of all the roads should be carried out as per the requirement to ensure dust free road transport. (iii) Transportation of ore should be done by covering the trucks with tarpaulin or other suitable mechanism so that no spillage of ore/dust takes place. Further, air quality in terms of dust, PM10 should be monitored near the roads towards entry & exit gate on regular basis, and be maintained within the acceptable limits.
Responsibility: Individual Mine Lease Holders and Dept. of Steel & Mines.

Status of Compliance:

(i) Barsua-Taldih-Kalta Iron Mines will abide by the SOTM system as and when the guidelines are formed by the Department of Steel & Mines, Govt. of Odisha in this regard. (ii) 300 m Concrete approach road from mine entrance and exit to the main road has been provided at Taldih Iron Mines, Barsua Railway Siding and Roxy Railway Siding with proper drainage system and Maintenance of these roads is being done regularly to ensure dust-free road transport. The final road profile of NH-520 near Kalta Mine has been recently completed. Subsequently, the matter for NOC for approach permission from Kalta Mine to NH–520 from NHAI has been taken up with National Highways Authority of India (NHAI), Rourkela. As per the direction of the NHAI, Work Order has been placed vide No. KIM/CC/CIVIL/WO-35/2022-23/583, dated 27.10.2022 for approach permission from Kalta Iron Mine to NH-520 and obtaining of provisional NOC for NH access permission. Survey and design of the access road from Kalta Mine to NH – 520 in accordance with the MoRTH guidelines have been completed. (iii) It is ensured that all the vehicles exiting the mine gate are checked for use of tarpaulin cover and are not overloaded to avoid spillage of ore during transportation. Also wheel washing system has been provided at the exit points of the mines in order to control dust emission.

29) **Occupational Health Related:** (i) 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 periodically. (ii) Occupational health surveillance program for all the employees/workers (including casual workers) should be undertaken periodically (on annual basis) to observe any changes due to exposure to dust, and corrective measures should be taken immediately, if needed. (iii) Occupational health and safety measures related awareness programs including identification of work related health hazard, training on malaria eradication, HIV and health effects on exposure to mineral dust etc., should be carried out for all the workers on regular basis. A full time qualified doctor should be engaged for the purpose. Periodic monitoring (on 6 monthly basis) for exposure to respirable minerals dust on the workers should be conducted, and record should be maintained including health record of all the workers. Review of impact of various health measures undertaken (at an interval of 3 years or less) should be conducted followed by follow-up of actions, wherever required.

Occupational health centre should be established near mine site itself. Responsibility: Individual Mine Lease Holders and District Administration (District Medical Officer).

Status of Compliance:

(i) Personal Protective Equipment for working in dusty areas are provided to all personnel. Periodic training on safety and health aspects is carried out at the vocational training Centre. (ii) Initial Medical Examination & Periodic Medical Examinations are conducted for all employees at the BIM and KIM Hospital periodically and records are maintained. This is being carried out in compliance to Mines Act, 1952 & Rules 1956 and amendments thereto. The occupational health surveillance shows that there is no occurrence of any kind of occupational health diseases. (iii) Awareness programs on Occupational Health and Safety are being done regularly by BIM hospital, Tensa and IGH, Rourkela. Similar programs are arranged at site level to include all the contract workers as well. A full-time Occupational Health Centre has been established for periodic health check-up of employees and contract workers. All the health records are maintained.

30) Reporting of Environmental Sustainability Achievement: All the mines should prepare annual environmental sustainability report (ESR), highlighting the efforts made towards environmental protection with respect to different environmental components vis-à-vis production performance of the mine on monthly basis. The data collected as per EC and CTE/ CTO conditions should be utilized to prepare the annual sustainability report. The mines performing high with effective environmental safeguards may be suitably recognized/ rewarded. "Star Rating Format" formulated by the Ministry of Mines along with environmental sustainability report may be used.

Status of Compliance:

Following the highest standards of governance and reporting, SAIL annually publishes an annual Integrated Report which includes achievements and performances of all the units of SAIL including Barsua-Taldih-Kalta Iron Mines on environmental and sustainability fronts. "Star Rating Format" formulated by the Ministry of Mines is also filled and submitted annually. It also highlights the performance of the mine with respect to different environmental components.

31) Environmental Monitoring Requirements at Regional Level: Apart from strict compliance and monitoring by individual mine lease holder, there is a need for simultaneous monitoring in each of the regions by competent expert agencies under the guidance/ supervision of concerned regulatory agency. Details of the studies required to be done on regular basis (continuously for 5 years) through responsible agency (organization of national/state repute) and time frame are suggested in Table.

Sl. No	Study Component/ Action Plan	Responsibility	Monitoring and reporting Time frame (Approx.)
1	Environmental quality monitoring with respect to Air, Water, Noise and Soil quality in each region (Joda, Koira, and Baripada/Rairangpur) as per specified frequency shall be done by a third party and / or laboratory approved /recognized by NABET / CPCB / SPCB /MoEF&CC. All the water bodies (rivers, nallas, ponds, etc.) shall be monitored. National / state level research / academic institutes may be involved initially for couple of years to streamline the activity. The report shall be brought out annually by june each year. The study shall be conducted in consultation with MOEF&CC- RO.	SPCB	Continuous annually
	Installation of online ambient air quality moitor for PM_{10}, $PM_{2.5}$, SOx, NOx, within the mine having more than 3 MTPA EC capacity.	Respective mine lease holders	Continuous annually
	Installation of online ambient air quality monitoring for PM_{10}, $PM_{2.5}$, SOx, NOx in the Joda and Koira region (total 11 locations.)	SPCB	Continuous annually
2	Status of flora and fauna in each of the regions shall be assessed on annual basis. Changes, if any, taking place in the region shall be conducted in consultation with state forest and wildlife department.	State Forest & Wildlife Dept.	Annually in mining zone and once in 3 years in the region
3	Socio-economic study incorporating Developments taking place in each of the region, CSR initiatives made by the mining companies shall be conducted on annual basis. Further, micro level developmental needs shall be clearly brought out in the report for each region. The study shall be conducted in consultation with district administration.	Respective District Administration	Annually
4	A detailed hydro-geological study in each of the regions shall be conducted in an integrated manner in consultation with Regional Director, Central ground Water Board. Accordingly, all project proponents shall implement suitable conservation measures to augment groundwater resources in the area.	SPCB	Once in 2 years
5	The State Govt. shall ensure construction and maintenance of dust free roads/ appropriate rail network for transportation of ore from mines to the consumer end.	Department of Steel and Mines	12 months for road network and 5-7 years for rail network.

6	Construction and maintenance of dust free roads from respective mine to the main road.	Respective Mine lease Holder	Continuous 6 months
7	Traffic/road inspection study addressing the condition of traffic/ roads leading to different mine and connecting to different railway sidings shall be undertaken on annual basis. Further, detailed traffic study shall be undertaken on every 5 yearly basis to ensure adequacy of road/ rail infrastructure in each of the regions. The study can be undertaken through national/state level research/academic institutes (such as CSIRCRRI, New Delhi)	Dept. of Steel & Mines	Continuous 6 months
8	Assessment of Land/ land cover changes in each of the regions, with particular focus on mining areas, afforestation activities, variation in flow path of various water bodies etc. using remote sensing data	ORSAC	Annuallly
9	R&D Studies for utilization of low-grade iron ore.	Dept. of Steel and Mines through R&D/ Academic Institutions	Up to 45% by 2020 and up to 40% by 2025.

The data so generated for the region should be made available on the website of Department of Steel & Mines and also at MoEF & CC website, so that it can be effectively utilized by Individual Mine Lease Holders for preparing EIA/ EMP reports. This will meet the requirement for separate one season baseline environmental quality data collection by the individual proponents, if the mine proposed is in the same study region. Further, MoEF & CC (through EAC) can also utilize the data base available in evaluating the proposals for expansion of existing mines or new mines while granting ToR or EC to the mine, taking an holistic view of the region. State Govt. of Odisha should bring out an integrated environmental sustainability report for each of the regions (mainly for Joda and Koira region) incorporating ESR of individual mines and data collected in the region through various agencies, once in 5 years, to plan level of scientific and sustainable mining for the Next 5 years.

Status of Compliance:

The compliance is mentioned below against the relevant sections: (1) Barsua-Taldih-Kalta Iron Mines will abide by the directions of SPCB in this regard if any. There are three CAAQMS stations already functioning for continuous monitoring of air quality. Also fugitive emissions within the mines are monitoring by NABL accredited laboratory on daily basics. (2) Study of the biological environment has been conducted by the expert and list of flora and fauna has been prepared. (3) CSR activities are conducted as per the plan prepared on annual

basis by SAIL corporate office, New Delhi. We will abide by the directions of District Administration in this regard, if any. (4) We will abide by the directions of SPCB in this regard, if any. (5) We will abide by the directions of Department of Steel and Mines in this regard, if any. (6) The construction of cement concrete approach road from the mine exit road to the main road has been completed. Also installed wheel washing facility at the exit points of the mine. (7) We will abide by the directions of Department of Steel and Mines in this regard, if any. (8) Digital processing of the entire lease area using remote sensing technique are being done every year for monitoring the land use pattern and the mining activity through IIT (ISM), Dhanbad. (9) The low-grade ore shall be auctioned and sold to outside parties as per the order of Ministry of Mines, Govt. of India vides F. No. 16/30/2019-M.VI, dated 16th September, 2019

32) Institutional Mechanism for Implementation of Environmentally Sustainable Mining: The present study is not a one-time study, but a process to ensure environmentally sustainable mining activities in the region on long term basis. Looking into the large-scale mining activities and long term perspective for mining vis-à-vis environmentally sustainable mining and upliftment of people of the region, there is a need to create an agency, who will integrate all the aspects relating to sustainable mining in the region on long term basis. It could be a SPV of Govt. of Odisha or a cell within the overall control and supervision of Dept. of Steel & Mines, with members from IBM, GSI, OSPCB, MoEF&CC-RO and other concerned Departments and Mine Owners (EZMA), District Administration. It is found that the strong database available for the region needs to be taken into account to map and establish environmental quality of the region on daily, monthly, seasonal and annual basis. Further, the efforts and initiatives of the mines towards environmental protection as well as upliftment of the people of the region are required to be integrated, and a systematic plan at the block/regional level needs to be framed for the overall benefit of the local society, region, district, state and the country as a whole. It will be desirable to have proper environmental quality data management and analysis by NEERI or any other agency for next 5 years (six monthly compliance reports followed by field verification) ensuring sustainable mining practices in the region leading to an overall development of the region. District Mineral Funds should be utilized appropriately for various developmental activities/needs of the region. Further, an environmental sustainability report incorporating environmental status of region coupled with social upliftment may be brought out by SPCB or any other authorized agency on annual basis. This report can be used for supporting the regional EIA study, and also need for environmental quality monitoring by individual mine seeking environmental clearance for new mine/ expansion of mine, including public hearing. Since, outcome of the above study reports shall be in the overall interest of all the stakeholders (including local population) of the region, further planning for the region shall warrant cooperation and assistance of all the stakeholders (mine operators, industries, transporters, State & Central Government Offices, MoEF & CC, CPCB, SPCB, Dept. of Steel & Mines, IBM, IMD, NGOs and local people) in sharing the relevant data/information/ reports/documents etc. to continuously improve upon

the environmentally sustainable development plan for economic growth in mining sector as well as for improvement in quality of life of the people of the region.

Status of Compliance:

Steel Authority of India Limited will extend support in every aspect towards environmentally sustainable development plan for economic growth in mining sector as well as for improvement in quality of life of the people of the region in line with the directions of the State Government.

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Tilak Patnaik
G.M. I/c. (BIM-TIM-KIM)
SAIL, RSP, BIM

Annexure - I

BARSUA-TALDIH-KALTA IRON MINE

DETAILS OF PLANTATION

YEAR	INSIDE MINING LEASE			OUTSIDE MINING LEASE		
	No. of trees	Area in Ha.	Rate of survival in %	No. of trees	Area in Ha.	Rate of survival in %
2010-11				8450	3.86	85.27
2011-12	25000	8.00	73.60	4600	3.02	65.43
2012-13	25000	10.00	85.00	1780	0.80	70.00
2013-14	25480	10.20	85.00	1620	1.20	90.00
2014-15	0	0.00		7400	3.30	71.89
2015-16	11600	16.00	50.00	8700	5.00	80.17
2016-17	8000	5.00	85.00	9985	3.50	80.00
2017-18	500	0.40	75.00	17750	8.40	70.41
2018-19	300	0.20	85.00	11700	4.90	79.15
2019-20				45000	21.20	46.67
2020-21				13000	5.50	81.15
2021-22				7000	2.50	77.00
2022-23	1500	1.00	100.00	3500	2.00	80.00
TOTAL	**97380**	**50.800**	**78.08**	**140485**	**65.180**	**67.41**

Apart from above, the following plantation has been done through State Forest Department

1. Safety Zone Plantation of 32073 saplings over an area of 93.679 Ha
2. 1.5 times safety zone plantation of 28104 saplings over an area of 140.519 Ha
3. Compensatory Afforestation of 1237179 saplings over an area of 6122.269 Ha

Annexure - II

BARSUA-TALDIH-KALTA IRON MINES

DETAIL ANALYSIS OF AIR QUALITY MONITORING

Location	OCTOBER 2022					'NOVEMBER 2022					'DECEMBER 2022					'JANUARY 2023					'FEBRUARY 2023					'MARCH 2023				
	RSPM (PM_{10})	$PM_{2.5}$	SO_2	NO_x	CO	RSPM (PM_{10})	$PM_{2.5}$	SO_2	NO_x	CO	RSPM (PM_{10})	$PM_{2.5}$	SO_2	NO_x	CO	RSPM (PM_{10})	$PM_{2.5}$	SO_2	NO_x	CO	RSPM (PM_{10})	$PM_{2.5}$	SO_2	NO_x	CO	RSPM (PM_{10})	$PM_{2.5}$	SO_2	NO_x	CO
Unit	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**mg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**mg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**mg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**mg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**mg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**µg/m3**	**mg/m3**
A) Ambient Air Quality in Residential, rural & other areas.																														
Norm as per NAAQS	**100**	**60**	**80**	**80**	**4**	**100**	**60**	**80**	**80**	**4**	**100**	**60**	**80**	**80**	**4**	**100**	**60**	**80**	**80**	**4**	**100**	**60**	**80**	**80**	**4**	**100**	**60**	**80**	**80**	**4**
A 1	35.66	19.32	6.41	13.80	0.34	53.58	27.32	7.22	12.50	0.44	53.60	26.82	7.31	11.75	0.45	52.24	29.86	7.39	12.17	0.39	53.90	29.85	10.27	17.30	0.44	54.94	33.02	9.57	17.09	0.33
A 2	40.86	21.98	6.84	15.34	0.58	61.01	30.69	8.33	13.82	0.80	61.04	34.39	8.66	14.44	0.70	67.16	39.62	8.93	14.31	0.64	68.06	44.31	13.76	21.28	0.71	73.41	43.02	13.18	23.38	0.64
A 3	34.23	17.96	5.88	13.26	0.37	46.29	24.37	7.16	12.28	0.42	51.12	25.02	7.11	11.23	0.43	50.94	25.75	7.25	11.51	0.34	51.43	28.61	10.13	16.21	0.42	54.63	30.33	9.72	17.46	0.35
A 4	46.17	24.43	7.32	17.65	0.69	65.21	34.19	8.77	16.35	0.94	62.26	31.71	6.90	12.82	0.62	77.37	46.46	10.42	15.60	0.79	75.24	45.74	15.09	20.81	0.87	83.01	48.02	14.09	26.55	0.72

*** unit in µg/m^3**

Note : Ambient Air Quality Monitoring was conducted as per MoEF Notification No. GSR 826(E), dtd.16.11.2009.

B) Results of Fusitive Emission / Work Zone Quality.

	OCTOBER 2022		'NOVEMBER 2022		'DECEMBER 2022		'JANUARY 2023		'FEBRUARY 2023		'MARCH 2023	
Norm as per IBM	1200 µg/m3		1200 µg/m3		1200 µg/m3		1200 µg/m3		1200 µg/m3		1200 µg/m3	
Actual(PM)	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
F 1	70.21	421.4	298	622.2	532	693.5	527.9	732.4	592.12	751.8	546.8	815.7
F 2	74.68	425.7	383	542.5	410.7	882.2	542.1	808.6	619.98	785.1	590.4	811.9
F 3	58.21	231.4	250	408.2	308.4	468.6	321.4	562.9	437.97	618.6	387.9	591.7
F 4	63.23	431.7	293	617.1	512.4	682.9	546.6	742.4	592.69	729.5	619.4	811.7
F 5	64.51	443.9	316	596.7	527.2	727.5	549.1	789.3	617.15	723.8	617.2	785
F 6	54.2	305.6	248	427.8	319.2	535.6	308.9	508.6	419.27	619.1	417.6	540.6
F 7	84.42	742.6	733	908.8	819.4	961.8	746.6	943.5	782.29	945.2	808.1	941
F 8	72.43	639.7	687	805.1	788.7	897	696.5	869.2	702.45	832.4	696.5	846.2
F 9	51.21	435.7	409	791.3	618.4	785.3	549.7	723.4	569.85	732.3	608.5	754.6
F 10	88.21	611.7	614	801.3	718.2	896.7	68.42	746.9	619.82	792.3	643.5	996.9
F 11	62.56	321.4	246	442.3	317.3	509.7	354.9	515.2	417.49	592.7	396.5	544
F 12	108.7	779.3	732	913.3	779.8	953.9	743.6	936.4	796.52	954.6	784.6	937.4

*** unit in µg/m^3**

Note : Fusitive emission standards as per MoEF Notification No. GSR 809(E), dtd.4.10.2010 on iron ore mining and processing. Particulate matter (PM)-1200 µg/m^3 at a distance of 25±2m. In the pre dominant downward direction from the source of generation .

NB :

Locations :

A 1 : Tensa Hospital, Tensa
A 2 : Barsua valley, Township
A 3 : Tantara Village
A 4 : Mine Site Office (KIM)

F1 : Ore Handling plant(BIM)
F2: Excavation & loading (BIM)
F3 : Haul Road(BIM)
F4 : Dump Area(BIM)

F5 : Stock pile & Loading(B/V, BIM)
F6 : Haul Road (TIM)
F7 : Mobile Screening Area (TIM)
F8 : Excavation Area(TIM)

F9: Drilling Area (KIM)
F10: Excavation (KIM)
F11: Haul Road Area (KIM)
F12: Mobile Crushing & Screening Area (KIM)

Annexure – III

BARSUA-TALDIH-KALTA IRON MINE

GROUND WATER LEVEL MEASUREMENTS			
Month	Water level below the Ground Surface (in meters)		
	Locations		
	Barsua Valley	Zero Pount, Tensa	Kalta Bast, Kalta
OCTOBER' 2022	0.36	1.60	1.095
NOVEMBER' 2022	0.38	1.62	1.115
DECEMBER' 2022	0.50	1.64	1.333
JANUARY' 2023	0.44	1.66	1.135
FEBRUARY' 2023	0.50	1.68	0.939
MARCH' 2023	1.40	1.83	0.844

Annexure -IV

BARSUA-TALDIH-KALTA IRON MINE

WATER QUALITY OF GROUND WATER

Sl.No.	Parameters V	'OCTOBER 2022			NOVEMBER 2022			'DECEMBER 2022			'JANUARY 2023			'FEBRUARY 2023			'MARCH 2023		
		GW1	GW 2	GW3	GW1	GW2	GW3	GW1	GW2	GW3	GW1	GW2	GW3	GW1	GW2	GW3	GW1	GW2	GW3
1	pH	6.34	6.12	5.74	6.65	6.2	5.65	5.93	5.81	6.05	6.7	6.2	5.92	7	7	7	6.18	5.95	5.95
2	Colour(Hazen unit)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	7	24	<1.0
3	Turbidity (NTU)	5	4	<1.0	1.7	6.9	1.6	5.2	6.3	1.3	3.2	9.7	1.1	3.4	1.4	<1.2	2.9	3.2	<1.0
4	Temperature ^{0}C	28.2°c	28.2°c	28.5°c	28°c	28.1°c	28.2°c	20°c	21°c	21°c	27.6°c	27.6°c	27.5°c	23°c	23°c	22°c	29°c	28.6°c	28.9°c
5	Total Hardness as $CaCO_3$,mg/l	92	148	76	140	140	48	96	140	88	148	136	56	68	168	84	92	148	88
6	Alkalinity as $CaCO_3$,mg/l	80	116	60	140	124	32	96	116	80	156	116	44	80	168	80	92	128	92
7	Chlorides as Cl , mg/l	4	8	4	2	4	4	5	20	4	8	12	4	4	4	4	4	12	8
8	Calcium as Ca, mg/l	37	40	17.6	25.6	43	12.8	24	35	24	32	37	11	19	48	18	19	35	18
9	Magnesium as Mg, mg/l	<0.243	12	7.8	18.5	7.7	3.9	9	13	7	77	11	7	5	12	10	11	15	11
10	Residual Free Chlorine, mg/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
11	Sulphate as SO_4,mg/l	<1.0	5	2	5	9	5	<1.0	11	<1.0	3	6	5	<1.0	6	2	<1.0	4.8	1.8
12	Nitrate as NO_3, mg/l	8.613	7.09	2.12	1.8	1.6	1.4	1.2	1.8	2.2	0.125	0.092	0.025	1.6	1.2	1	2.9	2.7	3
13	Iron as Fe,mg/l	0.269	0.228	0.167	0.262	0.108	0.098	0.38	0.13	0.066	0.35	0.621	0.66	0.239	0.05	0.08	0.482	0.409	0.281
14	Copper as Cu,mg/l	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
15	Manganese as Mn,mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.05	0.07	0.788	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
16	Phenolic Compounds C_6H_5OH, mg/l	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001
17	Zinc as Zn, mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.116	0.14	0.108	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
18	Cadmium as Cd, mg/l	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
19	Arsenic as As, mg/l	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01
20	Cyanide as CN, mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
21	Lead as pb	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
22	Total Chromium as Cr^{+6}, mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
23	Mineral oil ,mg/l	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
24	Fluoride as F, mg/l	0.247	0.269	0.089	<0.5	<0.5	<0.1	0.241	<0.1	0.042	<0.01	<0.01	0.06	<0.5	<0.5	0.088	<0.1	0.168	<0.1
25	Selenium as Se, mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.5
26	Total Dissolved solids (mg/l)	86	155	77	132	156	68	86	147	80	141	155	80	71	156	88	90	144	88
27	Aluminium as Al mg/l	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
28	Boron as B mg/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1	<0.01	<0.01	<1.0
29	Odour	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
30	Taste	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
31	Mercury as Hg, mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
32	Anionic detergent	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.01	<0.01	<1.0

NB :

GW 1 : Hand pump at Zero point : (BIM)

GW 2 : Hand pump at Banka Bazar B/Valley

GW 3 : Hand Pump at Kalta Village (KIM)

Annexure-V

BARSUA-TALDIH-KALTA IRON MINE

WATER QUALITY OF STREAM SAMPLES/SURFACE WATER

Sl.No.	Parameters	'OCTOBER 2022						'NOVEMBER 2022						DECEMBER 2022					
		SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 1	SW 2	SW 3	SW 4	SW 5	SW 6
1	pH	6.5	6.47	6.4	6.41	6.15	6.4	6.33	6.4	6.61	6.72	6.24	6.22	6.58	6.39	6.66	6.18	6.03	6.26
2	Temperature	28.0°C	28.3°C	28.5°C	28.4°C	27.9°C	28.6°C	28.5°C	28.7°C	28.8°C	28.6°C	28.6°C	28.7°C	20°C	20°C	21°C	21°C	20°C	21°C
3	Turbidity(NTU)	2	<1.0	4	1	<1.0	9.1	1.1	2.2	1.5	1.4	1.5	1.4	<1.0	2.3	1.7	<1.0	1.7	<1.0
4	Residual Free Chlorine mg/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
5	Alkalinity as CaCo3 mg/l	20	20	20	32	24	20	16	20	24	20	20	36	12	24	12	24	44	20
6	Chloride as Cl mg/l	4	4	4	4	4	4	6	6	6	2	2	2	4	4	4	4	8	4
7	Total Hardness as CaCo3 mg/l	28	40	36	40	28	28	20	16	24	24	32	44	20	24	20	36	52	36
8	Calcium as Ca mg/l	8	6.4	6.4	11	5	3.2	8	6.4	6.4	6.4	4.8	6.4	6	3	3	6	11	5
9	Magnesium as Mg mg/l	2	6	5	3	4	5	<0.243	<0.243	1.9	1.9	4.8	6.8	0.972	4	3	5	6	5
10	Sulphate as So4 mg/l	3	3	4	3	2	4	2	<1.0	<1.0	1	4	6	8	<1.0	8	10	15	12
11	Nitrate as No3 mg/l	2.25	3.2	1.96	2.88	3.56	4.28	0.835	2.202	0.964	2.162	3.226	2.068	4.6	4.8	3.9	4.4	3.5	5.6
12	Fluoride as F mg/l	<0.1	<0.1	<1.0	<1.0	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
13	Total dissolve Solids mg/l	27	22	23	40	34	29	40	25	34	32	29	34	29	22	20	27	45	23
14	Total Suspended Solids mg/l	18	20	18	20	22	16	7	8	6	5	6	4	25	30	22	18	16	14
15	D.O.	4.2	4	4.2	4	3.9	3.9	4.2	4.3	4	4.2	4.4	4.1	3.9	3.8	3.9	3.9	3.8	3.9
16	COD	47	56	54	62	48	55	60	80	102	142	80	102	40	62	80	95	45	58
17	Oil and Grease mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
18	Iron as Fe mg/l	0.269	0.36	0.562	0.329	0.305	0.88	0.336	0.269	0.562	0.662	0.872	0.605	<0.05	<0.05	<0.05	<0.05	0.096	<0.05
19	Copper as Cu mg/l	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
20	Zinc as Zn mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
21	Aluminium as Al mg/l	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
22	Boron as B mg/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
23	Manganese as Mn mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
24	Lead as Pb mg/l	<0.1	<0.1	0.1	0.1	0.1	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
25	Cadmium as Cd mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
26	Arsenic as As mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	0.585	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
27	Mercury as Hg mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
28	Nickel as Ni mg/l	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
29	Chromium as Cr +6mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
30	Phenolic compound mg/l	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002	<0.00	<0.002	<0.002
31	Cyanide as CN mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
32	Sulphide as S mg/l	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T
33	Free Ammonia as N mg/l	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T
34	Kjeldahl Nitrogen as N mg/l	13	14	13	13	14	15	4	5	3	4	2	5	15	18	20	22	18	20
35	Ammonia as N mg/l	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	N.T	N.T	N.T	N.T	N.T	N.T

NB :

SW 1: Kuradih Nala US : BIM

SW 2: Kuradih Nala DS : BIM

SW 3: Samaj Nallah US : Near Tantra

SW 4: Samaj Nallah DS : Near Phuljhar

SW 5: Samaj Nallah US : KIM

SW 6 : Samaj Nallah DS : KIM

N.T: Not Traceable

Annexure-V

BARSUA-TALDIH-KALTA IRON MINE

WATER QUALITY OF STREAM SAMPLES/SURFACE WATER

Sl.No.	Parameters	'JANUARY 2023						'FEBRUARY 2023						'MARCH 2023					
		SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 1	SW 2	SW 3	SW 4	SW 5	SW 6
1	pH	6.22	6.25	6.04	6.17	6.25	6.4	7	7	7	7	7	7	5.94	5.95	5.87	5.98	6.4	6.26
2	Temperature	27°c	26.9°c	26.9°c	26.9°c	27.2°c	27.0°c	23°c	23°c	23°c	23°c	23°c	23°c	28.6°c	28.5°c	28.6°c	28.6°c	28.9°c	28.7°c
3	Turbidity(NTU)	1.7	1.1	1.5	1.1	<1.0	1.1	1.4	1.3	1.2	2.2	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4	Residual Free Chlorine mg/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
5	Alkalinity as CaCo3 mg/l	24	32	28	32	24	44	16	20	24	24	24	36	20	28	20	28	24	44
6	Chloride as Cl mg/l	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	16
7	Total Hardness as CaCo3 mg/l	28	20	24	40	20	56	60	24	24	36	28	32	20	20	28	24	28	56
8	Calcium as Ca mg/l	6.4	4.8	6.4	8	6.4	11	6	5	5	6	5	8	5	5	9.6	6.4	3	11
9	Magnesium as Mg mg/l	2.9	2	2	4.86	0.97	7	11	3	3	5	4	3	19	19	0.972	1.944	5	7
10	Sulphate as So4 mg/l	2	<1.0	8	<1.0	8	3	5	1	<1.0	2	1	2	<1.0	<1.0	<1.0	2	<1.0	<1.0
11	Nitrate as No3 mg/l	2.5	2.2	2	2.1	2.3	2.8	5.6	6.8	5.5	7.2	5.3	6	1.2	2.3	1.6	2.9	3.2	2.6
12	Fluoride as F mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1.0	<1.0	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
13	Total dissolve Solids mg/l	27	24	38	33	33	24	35	23	36	30	6	9	25	22	29.9	28.6	24	51
14	Total Suspended Solids mg/l	6	8	10	6	8	8	6	8	7	10	4.1	3.8	2	3	2	4	5	7
15	D.O.	3.9	4	3.8	3.9	3.8	3.8	4	3.9	4.2	3.9	4.1	3.8	3.6	3.8	3.5	3.9	4	3.6
16	COD	22	24	28	30	16	18	57	82	40	57	49	65	56	73	56	81	65	88
17	Oil and Grease mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
18	Iron as Fe mg/l	<0.02	<0.02	0.266	0.129	0.06	0.24	<0.02	<0.02	0.196	0.117	0.08	0.192	<0.02	<0.02	0.298	0.134	<0.02	<0.02
19	Copper as Cu mg/l	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
20	Zinc as Zn mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
21	Aluminium as Al mg/l	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
22	Boron as B mg/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
23	Manganese as Mn mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	0.08	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
24	Lead as Pb mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Cadmium as Cd mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
26	Arsenic as As mg/l	<0.01	<0.01	<0.01	0.585	<0.01	0.585	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
27	Mercury as Hg mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
28	Nickel as Ni mg/l	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
29	Chromium as Cr +6mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
30	Phenolic compound mg/l	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
31	Cyanide as CN mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
32	Sulphide as S mg/l	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T
33	Free Ammonia as N mg/l	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T
34	Kjeldahl Nitrogen as N mg/l	8	10	7	12	16	10	5.6	5	5	5.3	5.6	5.35	5.6	6.1	5.9	7	6.1	7.3
35	Ammonia as N mg/l	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

NB :
SW 1: Kuradih Nala US : BIM
SW 2: Kuradih Nala DS : BIM
SW 3: Samaj Nallah US : Near Tantra
SW 4: Samaj Nallah DS : Near Phuljhar
SW 5: Samaj Nallah US : KIM
SW 6 : Samaj Nallah DS : KIM
N.T: Not Traceable

Annexure-VI

BARSUA-TALDIH-KALTA IRON MINES

WATER QUALITY OF EFFLUENT WATER

Sl.No.	Parameters	OCTOBER 2022		NOVEMBER 2022		DECEMBER 2022		JANUARY 2023		FEBRUARY 2023		MARCH 2023	
		EW 1	EW 2	EW 1	EW 2	EW 1	EW 2	EW 1	EW 2	EW 1	EW 2	EW 1	EW 2
1	pH	5.2	6.49	6.32	6.36	6.25	6.26	5.2	6.49	6.5	6.5	5.9	5.9
2	Temperature	27.5°c	28°c	20°c	20°c	20°c	20°c	27.5°c	28°c	23°c	23°c	28.8°c	28.6°c
3	Selenium as Se, mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
4	Total Residual Chloride mg/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
5	Alkalinity as CaCo3 mg/l	20	36	36	36	32	40	44	52	20	88	10	88
6	Chloride as Cl mg/l	4	4	2	2	4	4	4	4	4	4	4	4
7	Total Hardness as CaCo3 mg/l	24	40	44	36	32	52	52	68	20	100	20	92
8	Calcium as Ca mg/l	6.4	8	6.4	8	8	10	13	16	5	19	6	19
9	Magnesium as Mg mg/l	1.944	4.86	6.8	3.88	3	7	5	7	2	13	0.972	10.7
10	Sulphide as S mg/l	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	<1.0	<1.0
11	Nitrate as No3 mg/l	4.569	2.021	2.6	2.2	5.8	5.4	5.8	6.6	6.6	5.2	8.6	4.5
12	Fluoride as F mg/l	<0.10	<0.10	<0.1	<0.1	<0.1	<0.1	<1.0	<1.0	<0.1	<0.1	<0.1	<0.1
13	Total dissolve Solids mg/l	38	45	38	32	29	40	51	57	24	79	11	64
14	Suspended Solids mg/l	30	25	9	12	85	38	28	10	12	8	8	40
15	B.O.D (3 days at 27 ^{O}C) mg/l	<3.0	<3.0	27	10	16	12	4	3.6	<3.0	<3.0	10.2	8.6
16	C.O.D	200	104	80		82	62	20	18	90	65	74	55
17	Oil and Grease mg/l	<0.1	<0.1	0.98	0.86	4.8	1.05	0.862	0.224	<0.1	<0.1	4	2
18	Total Chromium as Cr mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.04	<0.04	<0.05	<0.05
19	Copper as Cu mg/l	<0.04	<0.04	<0.03	<0.03	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
20	Zinc as Zn mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	0.06	<0.01	<0.01	<0.01	<0.01
21	Boron as B mg/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
22	Odour	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
23	Colour	Agreeable	Agreeable	10	14	70	22	18	7	9	12	15	5
24	Lead as Pb mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Cadmium as Cd mg/l	<0.01	<0.01	<0.003	<0.003	<0.002	<0.002	<0.01	<0.01	<0.01	<0.01	<0.003	<0.003
26	Arsenic as As mg/l	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
27	Mercury as Hg mg/l	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.001	<0.001	<0.002	<0.002	<0.001	<0.001
28	Nickel as Ni mg/l	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
29	Hexavalent Chromium as Cr^{+6} mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
30	Phenolic compound As C_6H_5OH mg/l	<0.001	<0.001	<0.002	<0.002	<0.001	<0.001	0.16	0.35	0.2	0.1	<1.0	<1.0
31	Cyanide as CN mg/l	<0.05	<0.05	0.008	0.008	0.05	0.05	<0.2	<0.2	<0.05	<0.05	<0.2	<0.2
32	Dissolved Phosphate as P mg/l	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
33	Ammonical Nitrogen as N mg/l	<0.02	<0.02	<0.02	<0.02	1.5	0.5	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
34	Total Kjeldahl Nitrogen as N mg/l	4	3	4	10	12	7	10	6	5	8	9	5.3
35	Free Ammonia as NH_3 mg/l	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T	N.T
36	Iron as Fe mg/l	<0.02	<0.02	0.629	0.422	0.378	<0.05	0.445	0.092	0.562	0.08	0.469	0.082

NB :
EW 1: Tailing Dam (Before) Discharge
EW 2: Tailing Dam (After) Discharge
N.T: Not Traceable

Annexure-VII

BARSUA-TALDIH-KALTA IRON MINE

DETAIL MONITORING OF NOISE QUALITY

Sl. No.	LOCATION	OCTOBER 2022		NOVEMBER 2022		DECEMBER 2022		JANUARY 2023		FEBRUARY 2023		MARCH 2023	
		Day time Leq. dB (A)	Night time Leq. dB (A)	Day time Leq. dB (A)	Night time Leq. dB (A)	Day time Leq. dB (A)	Night time Leq. dB (A)	Day time Leq. dB (A)	Night time Leq. dB (A)	Day time Leq. dB (A)	Night time Leq. dB (A)	Day time Leq. dB (A)	Night time Leq. dB (A)
1	Tensa Hospital	43.2	37.3	44.4	32.1	42.2	33.3	41.3	35.4	42.1	31.3	41.4	30.2
2	VTC Tensa	56.1	47.2	53.2	43.3	55.3	44.5	55.2	45.1	55.4	44.2	56.3	46.1
3	Barsua Valley Township	52.1	42.4	52.5	41.2	53.1	42.4	50	41.2	51.2	40	49.3	39.4
4	Tantra Village (TIM)	53.3	41.2	51.2	40.3	52.5	41.1	50.4	39.3	52.2	41.3	50.3	39.2
5	Guest House Kalta	46.2	42.1	44.2	41.3	46.5	40.1	45.4	40.2	43.4	40	44.1	41.2

Annexure-VII

BARSUA-TALDIH-KALTA IRON MINE

DETAIL MONITORING OF NOISE QUALITY

Sl. No.	LOCATION	OCTOBER 2022		NOVEMBER 2022		DECEMBER 2022		JANUARY 2023		FEBRUARY 2023		MARCH 2023	
		Day time Leq. dB (A)	Night time Leq. dB (A)	Day time Leq. dB (A)	Night time Leq. dB (A)	Day time Leq. dB (A)	Night time Leq. dB (A)	Day time Leq. dB (A)	Night time Leq. dB (A)	Day time Leq. dB (A)	Night time Leq. dB (A)	Day time Leq. dB (A)	Night time Leq. dB (A)
1	Drilling (BIM)	71.4-73.2	-	71.1-73.4	-	71.7-72.5	-	73.1-74	-	72.2-73.3	-	72.1-73.2	-
2	Excavation & Loading (BIM)	72.1-73.2	61.2-63.3	71.3-74.1	62.1-64.4	71.3-72.2	62.2-63	72.2-74.1	60.1-63.3	72.3-73.1	62.1-63.3	72.1-73.2	61.2-63.2
3	Haul Road (BIM)	70.2-73.4	61.3-62.3	72.2-74.3	61.3-64.2	72.2-73.4	62.2-63.2	71.3-74.1	61.1-62.3	72.2-73.2	62.3-63.2	71.1-73.2	61.4-63.5
4	Secondary Crusher (BIM)	71.1-73.4	61.3-63.3	72.3-73.6	62.2-64.2	71.5-74.3	62.2-64.1	72.2-73.4	60.3-60.5	72.3-73.2	62.2-63.5	72.2-73.2	62.1-63.2
5	Wagon Loading Area (B/V)	72.2-73.1	62.1-62.4	72.4-73.3	62.2-64.3	71.1-73.1	62.3-64.3	71.6-74.6	61.23-62.40	72.1-73.1	62.4-63.5	72.2-73.2	62.1-63.2
6	Haul Road (TIM)	71.1-73.2	61.2-63.3	72.1-73.2	62.2-63.1	69.6-72.2	61.1-63.2	71.4-73.2	61.2-63.2	71.3-73.4	62.4-63.2	72.2-74.1	63.1-63.2
7	Crushing & Screening (TIM)	72.1-73.2	61.1-63.2	72.1-73.4	62.3-64.4	70.2-73.1	61.0-62.4	72.1-73.4	60.5-63.1	72.2-73.4	62.1-63.0	71.1-74.3	62.0-64.1
8	Excavation Area (TIM)	72.2-73.2	61.3-63.2	72.2-74.2	63.1-64.2	71.0-74.2	60.1-63.5	72.1-73.2	61.3-63.2	72.1-73.2	62.2-62.3	72.0-74.4	62.3-64.5
9	Drilling (KIM)	71.2-73.1	-	72.4-73.4	-	72.5-73.1	-	72.5-74.1	-	72.2-73.4	-	72.1-73.5	-
10	Excavation & Loading (KIM)	71.1-73.3	62.1-62.2	72.1-74.1	62.4-65.3	65.5-73.2	56.5-62.6	72.0-73.6	60.2-62.4	72.2-73.3	62.1-63.3	71.2-73.2	62.2-63.3
11	Haul Road (KIM)	72.1-73.3	62.3-64.1	72.4-74.4	62.3-65.3	69.4-71.8	61.2-67.2	71-73.1	62.3-63.4	72.2-72.5	62.1-64.4	72.1-72.6	62.3-63.1
12	Crushing & Screening (KIM)	71.3-73.2	61.1-63.2	72.1-74.1	62.4-64.3	70.4-74.3	60.3-68.1	71.2-73.3	61.1-62.4	72.3-73.6	62.3-63.4	71.1-73.1	61.1-63.5

Annexure - VIII

BARSUA-TALDIH-KALTA IRON MINES

RESULTS OF VEHICULAR EMMISSION

SL. NO	Vehicle Registration No. / I.D. No.	Model No.	RESULTS Smoke Density (Light Absorption coefficient unit 1/meter) 3rd Qtr. 2022-23	Permissible Emission Limit As per National Register of Motor Vehicles
1	OR 14S 3752	HPD-103	0.27	1.62
2	OD 14E 8392	WS-100	0.26	2.45
3	OD 14M 4886	HPD-101	0.26	1.62
4	OD 14M 4885	HPD-102	0.26	1.62
5	OR 14T 4191	HPD-90	0.26	2.45
6	OR 14W 9579	HPD-98	0.26	2.45
7	OR 14Y 3496	Maintenance Van	4.26	2.45
8	OR 14X 3345	HL 770 7A	0.26	2.45
9	OD 14Y 8824	F-150	0.27	2.45
10	OR 14W 9578	HPD-97	0.27	2.45
11	Dumper (50T)	HPD-104	1.27	2.45
12	Dumper (50T)	HPD-105	1.26	2.45
13	Motor Grader BG-825-25135	MG-07	1.29	2.45
14	Tyre Holder (BEML)	BL-14TH	1.31	2.45
15	SHOVEL (BE-1000)	EX-22	1.32	2.45
16	OD 09L 2849	DPV-150	0.27	1.62
17	OD 33T 3059	DPV-175	0.27	1.62
18	OD 33T 3029	DPV-172	0.28	1.62
19	OD 09L 2769	DPV-153	0.27	1.62
20	OD 09L 0599	DPV-145	0.26	1.62
21	OD 33T 3079	DPV-174	0.27	1.62
22	OD 09L 2869	DPV-146	0.26	1.62
23	OD 14J 7583	DPV-119	0.26	2.45
24	OD 09L 2779	DPV-151	0.27	1.62
25	OD 09L 2759	DPV-152	0.26	1.62
26	OD 33Y 7619	WL-45	0.25	2.45
27	OD 33Z 6449	-	0.27	1.62
28	OD 33L 3929	DPV-132	0.27	2.45
29	OD 09N 8509	DPV-217	0.26	1.62
30	OD 33F 4969	DPV-63	0.27	2.45
31	OD 09N 8549	DPV-222	0.26	1.62
32	OD 14J 7585	DPV-110	0.24	2.45
33	OD 09N 8529	DPV-218	0.27	1.62
34	OD 33G 4269	DPV-98	0.27	2.45
35	OD 09N 8479	DPV-223	0.27	1.62
36	OD 33H 0369	DPV-103	0.26	2.45
37	OD 09N 8489	DPV-224	0.26	1.62
38	OD 33H 0409	DPV-99	0.27	2.45
39	OD 33H 0419	DPV-102	0.26	2.45
40	OD 33Z 6409	-	0.25	1.62

Annexure - VIII

BARSUA-TALDIH-KALTA IRON MINES

RESULTS OF VEHICULAR EMMISSION				
SL. NO	Vehicle Registration No. / I.D. No.	Model No.	RESULTS Smoke Density (Light Absorption coefficient unit 1/meter) 4th Qtr. 2022-23	Permissible Emission Limit As per National Register of Motor Vehicles
1	OR 14S 3752	HPD-103	1.27	1.62
2	OD 14E 8392	WS-100	1.26	2.45
3	OD 14M 4886	HPD-101	1.27	1.62
4	OD 14M 4885	HPD-102	1.28	1.62
5	OR 14T 4191	HPD-90	1.27	2.45
6	OR 14W 9579	HPD-98	1.27	2.45
7	OR 14Y 3496	Maintenance Van	1.27	2.45
8	OR 14X 3345	HL 770 7A	1.27	2.45
9	OD 14Y 8824	F-150	1.27	2.45
10	OR 14W 9578	HPD-97	1.26	2.45
11	Dumper (50T)	HPD-104	1.25	2.45
12	Dumper (50T)	HPD-105	1.27	2.45
13	Motor Grader BG-825-25135	MG-07	1.28	2.45
14	Tyre Holder (BEML)	BL-14TH	1.3	2.45
15	SHOVEL (BE-1000)	EX-22	1.31	2.45
16	OD 09L 0559	DPV-144	1.27	1.62
17	OD 09L 2799	DPV-148	1.27	1.62
18	OD 09L 0639	DPV-139	1.27	1.62
19	OD 33T 3089	DPV-171	1.26	1.62
20	OD 09L 2839	DPV-147	1.27	1.62
21	OD 09H 3419	DPV-128	1.28	2.45
22	OD 33G 2854	DPV-84	1.27	2.45
23	OD 33H 0469	DPV-105	1.27	2.45
24	OD 33T 3009	DPV-166	1.27	1.62
25	OD 33AC 4170	DPV-321	1.26	1.62
26	OD 33L 3899	DPV-134	1.27	2.45
27	OD 33G 4279	DPV-95	1.26	2.45
28	OD 33L 1109	DPV-115	1.27	2.45
29	OR 02BM 5769	DPV-41	1.27	2.45
30	OD 33F 4939	DPV-64	1.27	2.45
31	OD 33F 5029	DPV-66	1.27	2.45
32	OD 33G 6289	DPV-96	1.27	2.45
33	OD 33AA 3509	HL-04	1.27	2.45
34	OD 33AC 4749	WATER TANKER	0.7	1.26
35	OD 33Z 6419	TATA TRIPPER	1.27	1.62
36	OD 33Q 9649	LOADER	1.27	2.45
37	OD 33Z 6459	TATA TRIPPER	1.27	1.62
38	OD 33Z 6429	TATA TRIPPER	1.27	1.62
39	OD 33G 2856	TATA TRIPPER	1.27	1.62
40	OD 33Z 6439	TATA TRIPPER	1.27	1.62

Annexure-IX

BARSUA-TALDIH-KALTA IRON MINE

FLOW RATE OF PERENNIAL NALLAH			
Month	Locations		
	Kuradih Nallah (in m^3/Sec)	Samaj Nallah, Taldih (in m^3/Sec)	Samaj Nallah, Kalta (in m^3/Sec)
OCTOBER' 2022	3.198	0.242	0.747
NOVEMBER' 2022	2.685	0.336	0.348
DECEMBER' 2022	1.781	0.189	0.262
JANUARY' 2023	1.424	0.150	0.283
FEBRUARY' 2023	2.298	0.304	0.333
MARCH' 2023	2.019	0.289	0.261

Annexure- X

BARSUA-TALDIH-KALTA IRON MINE

TOTAL EXPENDITURE INCURRED FOR ENVIRONMENTAL PROTECTION MEASURES DURING THE YEAR 2022-23.

Sl. No.	Environmental Protection Measures	Amount (in Lakhs)
1	House Keeping of CAAQMS & Maintenance of Garden	19.47
2	Plantation	3.80
3	Water Spraying	65.75
4	Environmental Monitoring	17.67
5	Maintenance of CAAQMS	17.70
6	Construction / Repairing of check dams/ toe wall	32.16
7	Construction of Muncipal Waste Disposal Yard	43.59
8	Payment for Protection Watchers	43.04
9	Operational cost of Motor Grader	9.16
10	Purchase of LED Display Board	3.07
11	De-silting and development of water body	7.25
12	Monitoring of Protection measures	8.17
13	Expenditure towards Environmental Management Cell	43.54
14	Conducting Awareness Programme	1.41
Total		**315.78**

LAND USE AND LAND COVER MAP OF BARSUA-TALDIH-KALTA (ML-130) & ML-139 MINING LEASES AREA OF BARSUA & KALTA IRON MINES, ODISHA

Sponsored by

Steel Authority of India Limited

Raw Materials Division

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Introduction

Land Use Land Cover Land studies are carried out to reveal how much of a region is covered by forests, wetlands, impervious surfaces, agriculture, and other land and water types. The water types include wetlands or open water. The Land Use information describes how people use the landscape. Such uses include developmental use, conservation related use, or mixed uses.

Land use and land cover map of Barsua Iron Mines, Odisha have been developed from Linear Imaging Self scanning Sensor (LISS) data obtained from Indian Remote Sensing satellite- Resource sat-2, LISS-IV (2021) sensor and Cartosat (2021) sensor. The satellite images so obtained were processed applying supervised classification method have using the Erdas Imagine software. The Land Use Land Cover has been classified into six classes, which are built-up land, open forest, dense forest, agricultural land, wasted land and water body. The areas under each of these classes were estimated on the basis of the pixel grid cell process in Erdas Imagine software following the rules of NRSC/ISRO Land Use and Cover Monitoring. The theme of Barsua Iron Mines, Odisha LULC is given in the following **Table 1**.

Table-1. Descriptions of land use and land cover classes (Source- NRSC/ISRO)

Sl.	Description-1	Description-2	Remark
1.	Built-up Land	Urban	Residential, Mixed built up, Public / Semi Public, Communication, Public utilities /facility, Commercial, Transportation, Reclaimed land, Vegetated Area, Recreational, Industrial, Industrial / Mine dump, Ash/ Cooling pond.
		Rural	Rural.
		Mining	Mine / Quarry, Abandoned Mine Pit, Land fill area.
2.	Agriculture Land	Crop land	Kharif, Rabi, Zaid, Two cropped, More than two cropped.
		Plantation	Plantation-Agricultural, Horticultural, Agro Horticultural.

		Fallow	Current and Long Fallow.
		Current Shifting cultivation	Current Shifting cultivation.
3.	Forest Land	Evergreen/Semi evergreen	Dense / Closed and Open category of Evergreen / Semi evergreen.
		Deciduous	Dense / Closed and Open category of Deciduous and Tree Clad Area.
		Forest Plantation	Forest Plantation.
		Scrub Forest	Scrub Forest, Forest Blank, Current &Abandoned Shifting Cultivation.
		Swamp/ Mangroves	Dense / Closed & Open Mangrove.
4.	Barren/ uncultivable/ Wastelands	Salt Affected Land	Slight, Moderate & Strong Salt Affected Land.
		Gullied/ Ravinous Land	Gullied, Shallow ravine & Deep ravine area.
		Scrub land	Dense / Closed and Open category of scrub land.
		Sandy area	Desertic, Coastal, Riverine sandy area.
		Barren rocky	Barren rocky.
		Rann	Rann.
5.	Wetlands/Water Bodies	Inland Wetland	Inland Natural and Inland Manmade wetland
		Coastal Wetland	Coastal Natural and Coastal Manmade wetland
		River / Stream / canals	Perennial & Dry River/stream and line & unlined canal/drain
		Water bodies	Perennial, Dry, Kharif, Rabi &Zaid extent of lake/pond and reservoir and tanks

Built-up land: It is an area of human habitation developed due to non-agricultural use and that has a cover of buildings, transport and communication, utilities in association with water, vegetation and vacant land. LULC map consists of 3 classes under built-up viz., urban, rural and mining. In this region, ore mining town have emerged Barsua Iron Mines.

Forest: The term forest is used to refer to land with a tree canopy cover of more than 10 percent and area of more than 0.5 ha. Forests are determined by both the presence of trees and the absence of other predominant land uses. The trees should be able to reach a minimum height of 5 m. The two categories i.e. open forest and dense forest is predominant in Barsua Iron Mines.

Wasted land or Wet land: Wasted lands are those areas where the water table is at, near, or above the land surface for a significant part of most years. The hydrologic regime is such that aquatic or hydrophyte vegetation usually is established, although alluvial and tidal flats may be no vegetated. Wastelands frequently are associated and topographic lows, even in mountainous regions.

Water body: This category comprises areas with surface water in the form of ponds, river, lakes, tanks and reservoirs. Rivers/streams are natural course of water flowing on the land surface along a definite channel/slope regularly or intermittently towards a sea in most cases or in to a lake or an inland basin in desert areas or a marsh or another river. Canals are artificial watercourse constructed for irrigation, navigation or to drain out excess water from agricultural lands.

Agricultural land: These are the lands primarily used for farming and for production of food, fiber, and other commercial and horticultural crops. Agricultural Land may be defined broadly as land used primarily for production of food and fiber. These are the areas with standing crop as on the date of Satellite overpass. Cropped areas appear in bright red to red in color with varying shape and size in a contiguous to noncontiguous pattern. They are widely distributed indifferent terrains; prominently appear in the irrigated are as irrespective of the source of irrigation. It includes Kharif, Rabi and Zaid croplands along with areas under double or triple crops.

1. Barsua- Taldih- Kalta area land use and land cover (ML-130):

The Barsua- Taldih- Kalta mining area (2472.561 ha) was classified for land use and land cover by using supervised classification technique. Seven classes are identified over the study area namely dense forest (1493.722 ha), open forest (272.976 ha), water bodies (2.704 ha), agricultural land and plantation (10.350 ha), barren land/waste land (272.976 ha), mining land (303.441 ha) and built-up (50.684 ha) shown in Figure-1.

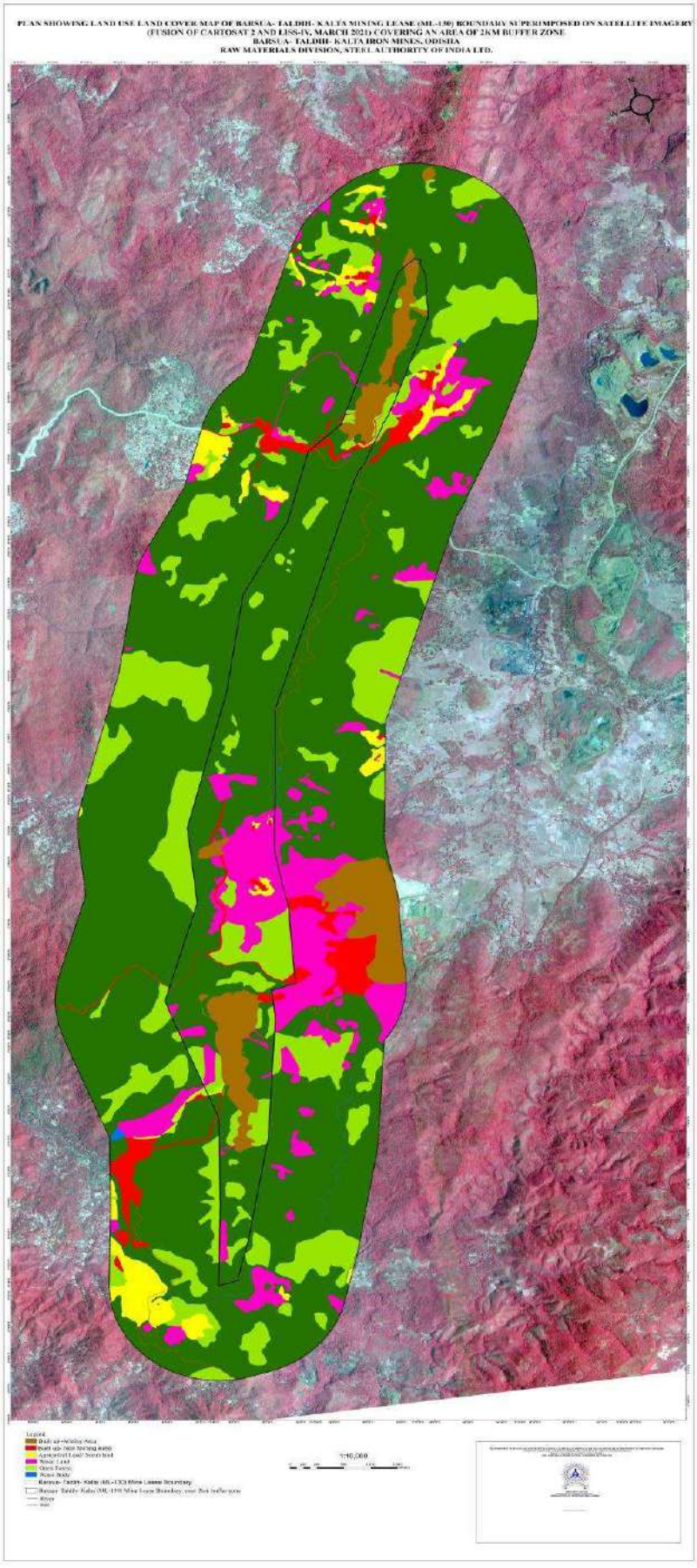

Figure: 1. Land use Land cover map of Barsua-Taldih- Kalta Mine Lease (ML-130)

Accuracy assessment was carried out using 100 points, from field data, existing maps and land cover map of (Bhuvan ISRO). Then location of the 100 points was chosen using random stratified method to represent different land cover classes of the area. The land cover mapping of the images, ancillary data and the result of visual interpretation was integrated with the classification result using GIS in order to improve the classification accuracy of the classified image.

The summary of the land use land cover classifications is shown in the Table 2. The classification distributions are shown in the Figure 2.

Table 2: Land use land cover classifications of ML-130 Lease

LU/LC classes	ML-130 Mining Lease (ha)
Built-up Land	**50.684**
Agriculture Land	**10.350**
Dense forest	**1493.722**
Open Forest	**338.684**
Water body	**2.704**
Waste land	**272.976**
Mining	**303.441**
Total Area (ha)	**2472.561**

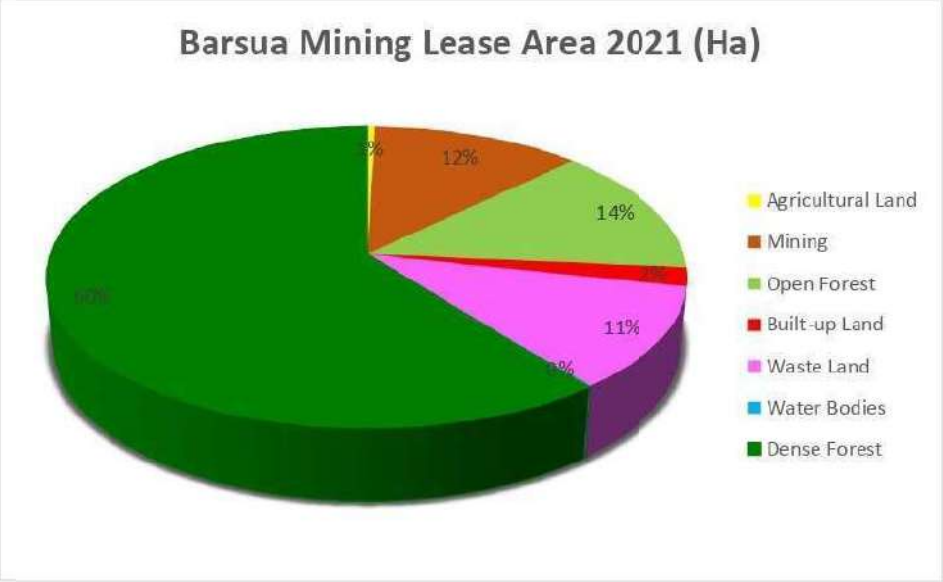

Figure 2: Land use distribution of Barsua-Taldih-Kalta (ML-130) Iron Mines

Certificate of Registration

OCCUPATIONAL HEALTH & SAFETY MANAGEMENT SYSTEM - ISO 45001:2018

This is to certify that:

Barsua Iron Mine
Raw Materials Division
Steel Authority Of India Limited
P.O. Tensa
Dist Sundergarh 770 042
Orissa
India

Holds Certificate No: **OHS 713196**

and operates an Occupational Health and Safety Management System which complies with the requirements of ISO 45001:2018 for the following scope:

Opencast Mining, Processing and Dispatch of Iron Ore Lumps and Fines.

For and on behalf of BSI:

Michael Lam - Managing Director Assurance, APAC

Original Registration Date: 2019-08-23
Latest Revision Date: 2022-07-10

Effective Date: 2022-08-23
Expiry Date: 2025-08-22

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Certificate No: **OHS 713196**

Location	Registered Activities
Barsua Iron Mine Raw Materials Division Steel Authority Of India Limited P.O. Tensa Dist Sundergarh 770 042 Orissa India	Opencast Mining, Processing and Dispatch of Iron Ore Lumps and Fines.
Taldih Mines Raw Materials Division Steel Authority Of India Limited Orissa India	Opencast Mining, Processing and Dispatch of Iron Ore Lumps and Fines.

Original Registration Date: 2019-08-23
Latest Revision Date: 2022-07-10

Effective Date: 2022-08-23
Expiry Date: 2025-08-22