



Ref.No.: MGM/P&E/189/20

Date: 28/6/2020

To,
The Additional Director,
Ministry of Environment and Forest & Climate Change,
Eastern Region Office,
A/3, Chandrasekharpur,
Bhubaneswar-751023

Subject: Submission of half-yearly compliance report on the stipulated environmental clearance terms and conditions in respect of Tiringpahar Manganese Mine of M/s TATA Steel Ltd., for the period from October'2019 to March'2020.

Reference:

- 1) MoEF Letter Ref No: J-11015/87/2004-IA. II(M) DATED 17th Nov 2005.
- 2) MoEF&CC's notification vide S.O-5845 (E), dt. 28th Nov 2018.

Respected Sir,

We are herewith submitting the six-monthly compliance report on the status of the implementation of the conditions stipulated in environmental clearance awarded to us vide MoEF Letter Ref No: **J-11015/87/2004-IA. II(M) DATED 17th Nov 2005** in respect of Tiringpahar Manganese Mine of M/s TATA Steel Ltd. for the period from October'2019 to March'2020 for your kind perusal.

This is in reference to the MoEF&CC's notification vide S.O-5845, dt. 28th Nov 2018, the six-monthly compliance report is being submitted only in soft copy mode, shared with your good office at e-mail @ roez.bsr-mef@nic.in.

We believe the above submission is in order.

Thanking you,

Yours faithfully,

F: TATA STEEL LTD.

Head
Mine & Production Planning
Manganese Group of Mines

Encl: As above.

Copy To:

- 2) The Member Secretary, State Pollution Control Board, A/118, Nilakantha Nagar, Bhubaneswar, Odisha-751012.
- 3) The Regional Officer, State Pollution Control Board, Baniapat, DD College Road, Keonjhar, Odisha-758001.

TATA STEEL LTD.

Ferro Alloys & Minerals Division, Manganese Group of Mines, A/P.O.: Bichhakundi, Via: Joda,
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Corporate Identity Number L27100MH1907PLC000260 website : www.tatasteel.com



Half-Yearly Compliance Report

On

Environmental Clearance Conditions

(MoEF Letter Ref No: - J-11015/87/2004-IA. II(M) DATED 17.11.2005)

Period: October'2019 – March'2020

Submitted By:

Tiringpahar Manganese Mine

M/s. Tata Steel Limited

At/Po:Guruda, Via-Joda

District- Keonjhar, Odisha -758034

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Compliance to the Environment Clearance Letter No: -11015/87/2004-IA. II(M) DATED

17.11.2005 in respect of Expansion of the Tiringpahar Manganese Mine of M/s Tata Steel

Limited for the enhancement of production capacity from 0.43LTPA to 0.85 LTPA in villages

Guruda, Plasha, Khondbond, Jaribahal, Tehsil Barbil, District-Keonjhar, Odisha.

Table. A. Specific Condition:

Sl. No	Specific Condition	Compliance Status (Oct'19 to March'20)
(i)	Mining shall not be undertaken in areas of forestland within the lease for which forestry clearance has not been obtained.	<u>Complied.</u> The mine has obtained forest clearance for 52.348 ha of forest land vide MoEF's letter No 8-80/2004-FC dt 28.03.2007. Forest diversion proposal over an area of 80.826 ha (Sabik forest + Balance forest) has been applied on 19.06.2016; which is under process. The mining operation and allied activities are confined within the approved diverted area only.
(ii)	Topsoil should be stacked properly with proper slope at earmarked site(s) with adequate measures and should be used for reclamation and rehabilitation of mined out area.	<u>Complied.</u> Topsoil generated during mining operation is concurrently used in the development and maintenance of the greenbelt activities.
(iii)	OB and other wastes should be stacked at earmarked sites only and should not be kept active for long periods of time. Plantation should be taken up for soil stabilisation along the slopes of the dump and terraced after every 5-6 m of height and overall slope angle shall be maintained not exceeding 28°. Sedimentation pits shall be constructed at the corners of the garland drains. Retention/toe walls shall be provided at the base of the dumps.	<u>Complied.</u> Overburden dumping is ensured as per the mining plan approved by Indian Bureau of Mines (IBM). The dumps are terraced properly and slope is maintained well within 28°. The dumps are stabilized by plantation of native varieties of forestry saplings such as Sal, Karanj, Neem, Mahaneem, Gambhari, Sisam, etc. During FY 2019-20, total 6500 Nos of saplings and 49400 nos of vetiver slips have been planted during FY 2019-20. The retaining wall and garland drain with sedimentation pit supported with toe wall along the periphery of the OB dump has been constructed to arrest the silt and sediments from surging into the natural stream along with the runoff.
(iv)	Catch drains and siltation ponds of appropriate size should be constructed to arrest silt and sediment flows from soil, OB and mineral dumps. The drains should be regularly desilted and maintained properly. Garland drains (size, gradient & length) and sump capacity should be designed keeping 50% safety margin over and above the peak	<u>Complied.</u> Existing catch drains and garland drains are covering the entire dump slope at low lying part. The catch drains and sedimentation pits are periodically de-silted and maintained properly. Garland drains along the periphery of the dumps have been constructed supported with retention wall/gabion wall to arrest the silt from the runoff.

Six Monthly EC Compliance Report-Tiringpahar Manganese Mine, M/s Tata Steel Limited for Oct'19 – Mar'20

Sl. No	Specific Condition	Compliance Status (Oct'19 to March'20)
	<p>sudden rainfall and maximum discharge in the area adjoining the mine site. Sump capacity should also provide adequate retention period to allow proper settling of silt material.</p> <p>Storm water return system should be provided. Storm water should not be allowed to go to the effluent treatment plant during high rainfall/super cyclone period. A separate storm water sump for this purpose should be created.</p>	
(v)	<p>Dimension of retaining wall at the toe of OB dumps and benches within the mine to check run-off and siltation should be based on the rainfall data.</p>	<p><u>Complied.</u></p> <p>In order to prevent the siltation and check the run-off, retaining wall and garland drain are provided with the dimension as follows: <u>Dimension of the Retaining Wall :</u> Height – 1 to 1.2 mtr. Width – 1 mtr. <u>Dimension of the Garland Drain :</u> Depth –1.20 to 1.5 mtr. Width – 1 to 1.2 mtr.</p>
(vi)	<p>Trace Metals such as Ni, Co, As and Hg should be analyzed in dust fall and soil samples for at least one year during summer, monsoon and winter seasons. If concentrations of these metals are found below the standards then with prior approval of MOEF this specific monitoring could be discontinued.</p>	<p><u>Complied.</u></p> <p>Dust fall analysis and soil quality is analysed for the prescribed parameters. Monitoring results is enclosed as Annexure-I.</p>
(vii)	<p>Mineral and OB transportation shall be in trucks/dumpers covered with tarpaulins.</p> <p>Vehicular emissions should be kept under control and regularly monitored.</p> <p>Suitable measures should be taken to check fugitive emissions from haulage roads & transfer points, etc.</p>	<p><u>Complied.</u></p> <p>All the trucks dispatching mineral from the mine lease are covered with tarpaulin. OB is being transported by shovel – dumper combination from mine face to dumps located near the quarry itself within 1.5 Km. Covering tarpaulins for OB within the mine boundary is not in practice considering the safety aspects on account especially due to frequent manual intervention during unloading.</p> <p>All the trucks are regulated by “Pollution under Control” certificate. Regular water sprinkling by mobile water sprinklers to suppress fugitive emission from haul roads and other potential area like OB dump and stack yard is ensured.</p> <p>The monitoring result is enclosed as Annexure-I.</p>
(viii)	<p>A green belt of adequate width should be raised by planting the native species around ML area. Plantation should also be carried out along roads, OB dump sites etc. in consultation with the local DFO / Agriculture Department. The density of the trees should be not less than 2500 plants per ha.</p>	<p><u>Complied.</u></p> <p>During FY 2019-20, total 7180 Nos of saplings of native forestry varieties and Vertiber slips of 49400 nos have been planted for the slope stabilization and raising greenbelt related activities.</p> <p>Tree density is maintained at the rate of 2500 saplings per ha.</p>

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Sl. No	Specific Condition	Compliance Status (Oct'19 to March'20)
(ix)	Groundwater shall not be used for mine operations. Prior approval of CGWA shall be obtained for using groundwater.	<u>Complied.</u> The ground water table has not been intersected so far thus no ground water is being used for mining operation.
(x)	Mining will not intersect groundwater. Prior permission of the MOEF and CGWA shall be taken to mine below water table.	<u>Complied.</u> Mining is not intersecting the ground water as the Ground water being at lower level in comparison to existing maximum quarry depth.
(xi)	Regular monitoring of ground water level and quality should be carried out by establishing a network of existing wells and constructing new piezometers. The monitoring should be done for quantity four times a year in pre-monsoon (April / May), monsoon (August). Post-monsoon (November) and winter (January) seasons and for quality in May. Data thus collected should be submitted to the Ministry of Environment & Forests and the Central Ground Water Authority quarterly.	<u>Complied.</u> Ground water table is much below the existing mine workings because of mining operations are confined at hilly topography only. However, ground water level & quality at existing well at nearby villages is being monitored. Monitoring Result is enclosed as Annexure-I.
(xii)	Trace metals such as Fe, Cr+6, Cu, Se, As, Cd, Hg, Pb, Zn and Mn at specific locations for both surface water downstream and in ground water at lower elevations from mine area, shall be periodically monitored in consultation with the OSPCB and State Ground Water Board. Suitable treatment measures shall be undertaken in case levels are found to be higher than permissible limits.	<u>Complied.</u> Trace metals such as Fe, Cr+6, Cu, Se, As, Cd, Hg, Pb, Zn and Mn at specific locations for both surface water (downstream & upstream) and ground water at lower elevation is being periodically monitored by referring to the standards as per BIS: 10500. Monitoring Results are enclosed in Annexure-I.
(xiii)	"Consent to Operate" should be obtained from SPCB before expanding mining activities.	<u>Complied.</u> "Consent to operate" has been obtained from State Pollution Control Board, Orissa vide Order no.115 issued by letter no. 8915 / IND-I-CON-190 dated 29.08.2019 & it is valid up to 31.03.2021.
(xiv)	A Conservation Plan for conservation of endangered fauna including the Indian Elephant found in and around the mine area shall be prepared and implemented in consultation with identified agencies/institutions and with the State Forest Department. The Plan should be dovetailed with that prepared/under implementation/proposed for the endangered fauna found in the Reserve Forest in the buffer zone of the project site. The costs for the specific activities/tasks should be earmarked in the Conservation Plan and shall not be diverted for any other purpose. Year wise status of the implementation of the Plan and the expenditure thereon should be reported to	<u>Complied.</u> We have deposited Rs.25,20,385/- on 14.12.2005 vide SBI DD No -062994 being the contribution towards implementation of Wild Life Management Plan prepared for Bonai & Keonjhar division. Further, as per subsequent demand raised by the forest department, additional amount of Rs. 859615.00 on 27.03.2013 vide SBI DD No.657488 and Rs 38,87,000.00 through RTGS bearing UTR No. HDFCR52015073005436903 on dated 30.07.2015 towards differential payment for implementation of regional Wildlife Management Plan prepared for Bonai & Keonjhar division and the same has been intimated to the DFO, Keonjhar.

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Sl. No	Specific Condition	Compliance Status (Oct'19 to March'20)
	the Ministry of Environment & forests, RO, Bhubaneshwar.	Further, Site Specific Wildlife Management Plan has been approved as per the new guidelines vide Memo No. 7724 /1 WL-SSP-94/2015 dated 03.08.2015. Further, we have deposited an amount of Rs. 2,40,47,000/- dated 09.03.2018 in respect of Tiringpahar Iron & Mn. Mine through NEFT mode towards SSWLCP in Odisha CAMPA vide Ref. No. SBINR5201803900004322.
(xv)	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.	Complied. Scheme of Mining along with progressive mine closure plan for the period from 2014-15 to 2019-20 has been approved by Indian Bureau of Mine (IBM) and modified Mining plan for period 2018-19 to 2019-20 approved by IBM vide letter no. MSM/FM/11-ORI/BHU/2018-19/720 Dt. 03/07/2018. The final mine closure plan along with details of Corpus fund will be submitted to the Ministry of Environment & Forests in advance of final mine closure for approval.

Table. B General Conditions

Sl. No	General Condition	Compliance Status (Oct'19 to March'20)						
i.	No change in mining technology and scope of working should be made without prior approval of the Ministry of Environment & Forests.	Complied. No change in mining technology and scope of working has been made at the mine. If any changes proposed in technology and scope of workings, prior approval shall be sought from Ministry of Environment, Forest & Climate Change.						
ii.	No change in the calendar plan including excavation, quantum of manganese ore and waste should be made.	Complied. Production and excavation volume is regulated vide Mine plan approved by Indian Bureau of Mines. Plan Vs. Actual (2019-20)						
		<table border="1"> <thead> <tr> <th>(2019-20)</th> <th>Plan</th> <th>Actual</th> </tr> </thead> <tbody> <tr> <td>Production (MT)</td> <td>85000</td> <td>84998.000</td> </tr> </tbody> </table>	(2019-20)	Plan	Actual	Production (MT)	85000	84998.000
(2019-20)	Plan	Actual						
Production (MT)	85000	84998.000						
iii.	Four ambient air quality-monitoring stations should be established in the core zone as well as in the buffer zone for RPM. SPM, SO ₂ , NO _x . monitoring. Location of the stations should be decided based on the meteorological data, topographical features, and environmentally and ecologically sensitive targets in consultation with the State Pollution Control Board.	Complied. Five ambient air quality monitoring stations have been established out of which 2 nos. in core zone (Near Purnapani Quarry and Near Guruda mining area) & 3 nos. in buffer zone (at Jaribahal, Palasa & Balda). Frequency of sampling ensured for core zone and buffer zone is twice per week and quarterly basis respectively.						

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Sl. No	General Condition	Compliance Status (Oct'19 to March'20)
	Data on ambient air quality (RPM, SPM, SO ₂ & NO _x .) should be regularly submitted to the Ministry including its Regional office at Bhubaneshwar and the State Pollution Control Board / Central Pollution Control Board once in six months.	The report of ambient air quality monitoring for every month is submitted to State Pollution Control Board on monthly basis. Abstract of the monthly monitoring data on ambient air quality is enclosed as Annexure – I .
iv.	Drills should be wet operated or with dust extractors and controlled blasting should be practiced.	<u>Complied.</u> Wet drilling concept is already in place. Controlled blasting technique with NONEL is being practiced where ever required.
v.	Fugitive dust emissions from all the sources should be controlled regularly monitored and data recorded properly. Water spraying arrangements on haul roads, wagon loading, dumpers/ trucks, loading & unloading points should be provided and properly maintained.	<u>Complied.</u> Effective water sprinkling by mobile water tanker is being done on haul roads. The Fugitive dust emissions monitoring Report of Tiringpahar Mine is attached in Annexure-I .
vi.	Adequate measures should be taken for control of noise levels below 85 dBA in the work environment. Workers engaged in blasting and drilling operations, operations of HEMM, etc should be provided with ear plugs/ muffs.	<u>Complied.</u> Ear plugs & Ear muffs are provided to the workers working in drilling operations & DG operations. Monitoring Result is enclosed as Annexure-I .
vii.	In 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 19 th May, 1993 and 31 st December, 1993 or as amended from time to time. Oil and grease trap should be installed before discharge of workshop effluents.	<u>Complied.</u> No infrastructural facility has been installed for equipment/ vehicle within the lease hold area. The equipment and vehicles deployed in the mine are maintained at Bamebari Mn. Mines which is under same management control. The oil separation system has been provided at workshop at Bamebari and working effectively.
viii.	Environmental laboratory should be established with adequate number and type of pollution monitoring and analysis equipment in consultation with the State Pollution Control Board.	<u>Complied.</u> Environmental Monitoring including sampling and analysis has been outsourced to an NABL Accredited Lab. Presently Visiontek Consultancy Services Pvt. Ltd. an SPCB recognised agency has been engaged for the purpose.
ix.	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.	<u>Complied.</u> Suitable dust masks are being provided to employees (departmental & contractual) engaged in dusty operations. It is also ensured that they use the same. Employees are undergoing Periodical Medical Examination which is inclusive of lungs function test and audiometry. All the personnel are trained on safety in work place and continuous awareness program are being conducted for all employees to avert manganese poisoning. Periodical Medical Examination of employees (departmental & contractual) are conducted as per

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		<p>prescribed norms of Mines Rule, 1955. The initial and periodical examination includes blood haematology, blood pressure, detailed cardiovascular assessment, neurological examination etc. All chest radiographs are being classified for detection of pneumoconiosis, diagnosis and documentation made in accordance to ILO classifications.</p> <p>During FY 2019-20, PME was conducted for 35 contractual employees and 02 departmental employees.</p>																												
x.	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.	<p>Complied.</p> <p>A centralised environmental Management cell has been constituted and one environmental manager is deployed at site supported with the monitoring agency for the implementation of environmental management plan and reporting the progress to the chief Environment, who finally reports to the Head of the organisation.</p>																												
xi.	The funds earmarked for environmental protection measures should be kept in separate account and should not be diverted for other purpose. Year wise expenditure should be reported to the Ministry and its Regional Office located at Bhubaneshwar.	<p>Complied.</p> <p>Funds allocated for environmental management are spent only for environment related purposes and not diverted to any other purpose and the fund allocated for environmental expenditure is earmarked with a specific cost centre maintained for the purpose. The details of Proposed Expenditure for FY 2019-20 as per below:</p> <table border="1"> <thead> <tr> <th>S.No.</th> <th>Activity</th> <th>Expenditure (P)-INR</th> <th>Expenditure (A)-INR</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Retention Wall/ Garland Drains</td> <td>715500</td> <td>725000.00</td> </tr> <tr> <td>2</td> <td>Check dams</td> <td>110530</td> <td>112354.00</td> </tr> <tr> <td>3</td> <td>Settling ponds (Garland drains etc.).</td> <td>30300</td> <td>32500.00</td> </tr> <tr> <td>4</td> <td>Environmental monitoring</td> <td>1500000</td> <td>1620000.00</td> </tr> <tr> <td>5.</td> <td>Afforestation</td> <td>93125</td> <td>95000.00</td> </tr> <tr> <td></td> <td>Total</td> <td>2449455</td> <td>2584854.00</td> </tr> </tbody> </table>	S.No.	Activity	Expenditure (P)-INR	Expenditure (A)-INR	1	Retention Wall/ Garland Drains	715500	725000.00	2	Check dams	110530	112354.00	3	Settling ponds (Garland drains etc.).	30300	32500.00	4	Environmental monitoring	1500000	1620000.00	5.	Afforestation	93125	95000.00		Total	2449455	2584854.00
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xii.	The Regional Office of this Ministry located at Bhubaneshwar shall monitor compliance of the stipulated conditions. The project authorities should extend full cooperation to the officer (s) of the Regional Office by furnishing the requisite data / information/ monitoring reports.	<p>Complied.</p> <p>We shall extend to full co-operation to the officers of the Regional Office by furnishing the requisite date/information/monitoring reports.</p>																												
xiii.	A copy of clearance letter will be marked to the concerned Panchayat/local NGO, if	<p>Complied. Copy of the clearance letter marked to Sarpanch, Gram Panchayat, Jajang on 12.01.2006.</p>																												

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Sl. No	General Condition	Compliance Status (Oct'19 to March'20)
	any, from whom suggestion/representation has been received while processing the proposal.	
xiv.	The State Pollution Control Board should display a copy of the clearance letter at the Regional Office, District Industry Centre and Collector's Office/Tehsildar's Office for 30 days.	This is applicable to State Pollution Control Board, Orissa.
xv.	The project authorities should advertise at least in two local newspapers widely circulated around the project, one of which shall be in the vernacular of the locality concerned within seven days of the issue of the clearance letter informing that the project has been accorded environmental clearance and a copy of the clearance letter is available with the State Pollution Control Board and may also be seen at Web Site of the Ministry of Environment & Forests at http://envfor.nic.in and a copy of the same should be forwarded to the Regional Office of this Ministry located at Bhubaneswar.	<u>Complied.</u> A detail of Environmental Clearance with regard to Tiringpahar Manganese Mine was published in Oriya News Papers Anupam Bharat & Aam Khabar dated 10.01.2006.
xvi.	The Ministry or any other competent authority may stipulate any further condition for environmental protection.	Noted
xvii.	Failure to comply with any of the conditions mentioned above may result in withdrawal of this clearance.	Noted
xviii.	The above conditions will be enforced, inter alia, under the provisions of the Water (Prevention & Control of Pollution) Act, 1974, the Air (Prevention & Control of Pollution) Act, 1991 along with their amendments and rules.	Noted

A. Additional Conditions as per MoEFCC Letter No. 106-9/11/EPE dt. 02.12.2014 issued to all Non-Coal Mining Projects.

Sl. No.	Stipulated Condition	Compliance Status (Oct'19 to March'20)
i.	The project authority shall adopt best mining practices for given conditions in the mining area, adequate number of check dam, retaining wall/ structure, garland drains and settling ponds should be provided to arrest the wash off with rain water in catchment area.	The best scientific method of mining is in practice at Tiringpahar Iron and Manganese Mine. Garland drain and Retaining wall are provided at the toe of the overburden dumps. Settling ponds are done at intervals along the garland drain.

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Sl. No.	Stipulated Condition	Compliance Status (Oct'19 to March'20)
ii.	The natural water bodies and or stream which are flowing in and around the village should not be disturbed. The water table should be nurtured so as not go down below the pre-mining period. In case of any water scarcity in the area, the project authorities have to provide water to the villagers for their use. A provision for regular monitoring of water table in open dug well.	Agreed. No water bodies disturbed due to mining activities. The ground water table is being monitored regularly from the open well and tube well of nearby villages.
iii.	The illumination and sound at night at project sites disturb the village in respect of both human and animal population. Consequent sleeping disorder and stress may affect the health in the village located close to mining operation. Habitations have a right to darkness and minimal noise level at night. The Project Proponents must ensure that the biological clock of the village is not disturbed by orienting the floodlights mask way from the village and keeping the noise levels well within prescribed limits for day/ night hours.	The operation of the mine is restricted to the day hours only. Hence, there is no disturbance to the habitats located close to the mining operation. The biological clock of the village is not disturbed.
iv.	The project Authority shall make necessary alternative arrangement, where required, in consultation with state Government to provide alternative areas for livestock grazing. In this case context, the Project Authority should implement the direction of Hon'ble Supreme Court with regard to acquiring grazing land. The sparse tress on such grazing ground, which provides mid-day shelter from the scorching sun, should be scrupulously guarded felling lest the cattle abandon the grazing ground or return home by noon.	Not Applicable. There is no grazing land within the Mine Lease (ML) area.
v.	Where ever blasting is undertaken as part of mining activity, the Project Authority shall carry out vibration studies well before approaching any such habitats or other building to evaluate the zone of influence and impact of blasting on neighbourhood. Within 500 meters of such sites vulnerable to blasting vibration, avoidance of use of explosives and adoption of alternative means of mineral extraction such as ripper/dozer combination/ rock breakers/ surface mineral etc should be seriously considered and practiced wherever practicable. A provision for monitoring of each blast should be made so that impact of blasting on nearby habitation and dwelling unit could be ascertained. The covenant of lease deed under rule 31 of MCR 1960 provided that no mining operation shall be carried out within 50 meters of public works such as public roads and	Deep hole drilling and controlled blasting technique has been adopted in the mine. Vibration study has been done with the help of CIMFR and vibration limit (ppv) found within the limit. Provision for monitoring each blast has been established to ascertain the blast induced vibration (ppv) limit at different distances from the centre of blasting.

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Sl. No.	Stipulated Condition	Compliance Status (Oct'19 to March'20)
	building or inhabited sites except with prior permission from the competent Authority.	
vi.	Main haulage road in the mines should be provided with permanent water sprinkler and other road should be regularly wetted water tanker fitted with sprinkler. Crusher and material transfer points should be invariably be provided with bag filter and or dry fogging system. Belt conveyer fully covered to avoid air borne dust.	The main haulage road, mineral stacking area overburden dumping areas are regularly sprinkled with water by using water tankers and Fixed sprinklers.
vii.	The project Authority shall ensure that productivity of agriculture crops is not affected due to the mining operation. Crop Liability Insurance Policy has to be taken by PP as a precaution to compensate for the crop loss. The impact zone shall be 5 Km from the boundary of mine lease area for insurance policy. In case, several mines are located in cluster mines, formed inter - alia, to sub serve such and objective shall be responsibility for securing such Crop Liability Policy.	Not Applicable. There is no crop land nearby the M.L. area.
viii.	In case any village is located within the mining leasehold which is not likely to be affected due to mining activities during the life of mine, the Expert Appraisal Committee (EAC) should consider the proposal of Environmental Clearance (EC) for reduced mining area. The mining lease may be executed for the area for which EC is accorded. The mining plan also accordingly revised and required stipulation under the MMDR Act 1957 and MCR 1969 met.	Not Applicable
ix.	Transportation of minerals by road passing through the village shall not be allowed. A "bypass" road should be constructed (say leaving a gap of at least 200 m) for the purpose of transportation of minerals so that the impact of sound, dust and accidents could be mitigated. The PP shall bear the cost towards the widening and strengthening of existing public road network in case same is proposed to be used for the project. No road movement should be allowed on existing village road network without appropriately increasing carrying capacity of such road	There is no transportation road passing through any village.
x.	Likewise, alteration or re-routing of foot paths, pagdandies, cart road and village infrastructure/ public utilities or roads (for purpose of land acquisition for mining) shall be avoided to extent possible and in such case acquisition is inevitable, alternative arrangements shall be made first and the only the area can be acquired. In these types of cases	Not Applicable

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Sl. No.	Stipulated Condition	Compliance Status (Oct'19 to March'20)
	Inspection reports by site visit by expert may be insisted upon which should be done through reputed Institutes.	
xi.	<p>The CSR activates by companies including mining establishment has become mandatory up to 2% their financial turn over, socio Economic Development of neighbourhood. Habitats could also be planned and executed by the PPs more systemically based on need based door to door survey by established Social Institute/ Workers on the lines as required under TOR. "R&R Plan// compensation details for Project Affected People (PAP) should be furnished. While preparing the R&R plan, the relevant State/ national Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs and STs and weaker section of society in study, a need bashed sample survey, family-wise, should be undertaken to assess their requirement, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line department of State Government. It may be clearly brought out whether the village including their R&R and socio-economics aspect should be discussed in EIA report.</p>	<p>Tata Steel has taken up many social initiatives for the upliftment of the education, health and other socio-economic development of the neighbouring villages. TSRDS (Tata Steel Rural Development Society) has been pioneering the initiatives through CSR activities.</p> <p>R&R policy has not been applicable for the PP till now.</p>



Head, Mine & Production Planning
 Ferro Alloys Mineral Division
 (Tiringpahar Mn.Mine)
 M/s Tata Steel Limited

Date: 28/6/2020

ENVIRONMENTAL MONITORING RESULTS (OCT'19 to MARCH'20)**Table. 1. SURFACE WATER QUALITY ANALYSIS REPORT****SW1: Kundra Nallah entering Tiringpahar Nallah**

Parameters	Unit	Standard	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20
			1st Report	1st Report	1st Report	1st Report	1st Report	1st Report
Dissolved Oxygen (minimum)	mg/l	4	5.3	5.6	5.6	6.1	6.2	5.8
BOD (3) days at 27°C (max)	mg/l	3	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
Total Coli form	MPN/	5000	140	120	180	190	210	120
pH Value	--	6.0-9.0	7.49	7.42	7.56	7.61	7.66	7.62
Colour (max)	Hazen	300	CL	CL	CL	CL	CL	CL
Total Dissolved Solids	mg/l	1500	126	134	136	144	146	132
Copper as Cu (max)	mg/l	1.5	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Iron as Fe (max)	mg/l	0.5	0.4	0.42	0.42	0.44	0.46	0.41
Chloride (max)	mg/l	600	35.8	42.8	41.6	42.6	44.8	42
Sulphates (SO ₄) (max)	mg/l	400	4.7	4.2	5.6	6.1	6.6	5.8
Nitrate as NO ₃ (max)	mg/l	50	3.1	3.2	3.6	4.2	4.4	4.1
Fluoride as F (max)	mg/l	1.5	0.053	0.056	0.061	0.066	0.064	0.06
Phenolic Compounds as C ₆ H ₅ OH (max)	mg/l	0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium as Cd (max)	mg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Selenium as Se (max)	mg/l	0.05	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic as As	mg/l	0.2	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Cyanide as CN (max)	mg/l	0.05	ND	ND	ND	ND	ND	ND
Lead as Pb(max)	mg/l	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc as Zn(max)	mg/l	15	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Hexa Chromium as Cr ⁺⁶	mg/l	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Anionic Detergents (max)	mg/l	1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2

Table.2. SW2: Kundra Nallah leaving Tiringpahar Nallah

Parameters	Unit	Standards	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20
			1st Report					
Dissolved Oxygen (minimum)	mg/l	4	5.7	6.4	6.2	6.6	6.4	6.4
BOD (3) days at 27°C (max)	mg/l	3	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8

ENVIRONMENTAL MONITORING RESULTS (OCT'19 to MARCH'20)

Parameters	Unit	Standards	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20
			1st Report	1st Report	1st Report	1st Report	1st Report	1st Report
Total Coli form	MPN/	5000	170	150	240	220	240	210
pH Value	--	6.0-9.0	7.65	7.62	7.72	7.68	7.71	7.78
Colour (max)	Hazen	300	CL	CL	CL	CL	CL	CL
Total Dissolved Solids	mg/l	1500	134	148	144	152	158	142
Copper as Cu (max)	mg/l	1.5	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Iron as Fe (max)	mg/l	0.5	0.42	0.48	0.46	0.48	0.52	0.44
Chloride (max)	mg/l	600	50.6	48.1	60.2	61.2	60.2	62
Sulphates (SO ₄) (max)	mg/l	400	6.3	6.6	6.8	7.2	7.1	6.2
Nitrate as NO ₃ (max)	mg/l	50	2.85	2.92	4.2	4.4	4.6	4.6
Fluoride as F (max)	mg/l	1.5	0.061	0.066	0.068	0.071	0.078	0.062
Phenolic Compounds as C ₆ H ₅ OH (max)	mg/l	0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium as Cd (max)	mg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Selenium as Se (max)	mg/l	0.05	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic as As	mg/l	0.2	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Cyanide as CN (max)	mg/l	0.05	ND	ND	ND	ND	ND	ND
Lead as Pb(max)	mg/l	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc as Zn(max)	mg/l	15	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Hexa Chromium as Cr ⁺⁶	mg/l	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Anionic Detergents (max)	mg/l	1.0	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2

Table.3. DRINKING WATER**DW1: Near Office**

Sl.No	Parameters	Unit	IS10500:2012 Norms		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Oct-19
			Desirable Limit	Acceptable Limit in the absence of alternate source							
1.	Total Coli form	MPN/100 ml	Shall not be detectable in any 100ml sample		<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1

ENVIRONMENTAL MONITORING RESULTS (OCT'19 to MARCH'20)

Sl.No	Parameters	Unit	IS10500:2012 Norms		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Oct-19
			Desirable Limit	Acceptable Limit in the absence of alternate source							
	Organism MPN/100ml										
2.	Fecal Coli forms	MPN/100 ml	---	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1
3.	E. Coli	MPN/100 ml	Shall not be detectable in any 100ml sample	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent
4.	Colour (Unit)	Hazen	5	25	CL	CL	CL	CL	CL	CL	CL
5.	Odour	--	Unobjectionable	--	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
6.	Taste	--	Agreeable	--	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
7.	pH value (25°C)		6.5 - 8.5	No Relaxation	7.66	7.78	7.68	7.72	7.78	7.64	7.66
8.	Turbidity	NTU	5	10	<1.0	<1	<1.0	<1.0	<1.0	<1.0	<1.0
(a)	Total Dissolved Solids	mg/l	500	2000	118	124	124	122	126	120	118
(b)	Aluminium (as Al)	mg/l	0.03	0.2	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
9.	Anionic Detergents (as MBAS)	mg/l	0.2	1	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
10.	Boron (as B)	mg/l	1	5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
11.	Calcium (as Ca)	mg/l	75	200	38	38.6	56.8	60.2	64	52	38
12.	Chloride (as Cl)	mg/l	250	1000	44	51.2	51.6	54.8	56	50.8	44
13.	Copper (asCu)	mg/l	0.05	1.5	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02
14.	Fluoride (as F)	mg/l	1	1.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
15.	Residual Free Chlorine	mg/l	0.2(Min.)	---	ND	ND	ND	ND	ND	ND	ND

Annexure-I to Six Monthly Compliance Report on Environmental Clearance-Tiringpahar Manganese Mine-Tata Steel Limited (Oct'19 to March'20)

ENVIRONMENTAL MONITORING RESULTS (OCT'19 to MARCH'20)

Sl.No	Parameters	Unit	IS10500:2012 Norms		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Oct-19
			Desirable Limit	Acceptable Limit in the absence of alternate source							
16.	Iron (as Fe)	mg/l	0.3	1	0.24	0.32	0.38	0.41	0.44	0.36	0.24
17.	Magnesium (as Mg)	mg/l	30	100	16.6	11.8	30.6	31.2	36	32	16.6
18.	Manganese (as Mn)	Hazen	0.1	0.3	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
19.	Mineral Oil	--	0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
20.	Nitrate (as NO ₃)	--	45	100	0.56	1.94	0.71	0.66	0.68	0.68	0.56
21.	Phenolic Compounds (as C ₆ H ₅ OH)		0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
22.	Selenium (as Se)	NTU	0.01	No Relaxation	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
23.	Sulphate (as SO ₄)	mg/l	200	400	3.8	5.2	3.8	4.2	4.8	3.2	3.8
24.	Alkalinity (as CaCO ₃)	mg/l	200	600	66	48.8	72	68	72	70	66
25.	Total Hardness(as CaCO ₃)	mg/l	300	600	74	80.2	81.2	80.8	82	80.4	74
26.	Cadmium (as Cd)	mg/l	0.01	No Relaxation	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
27.	Cyanide (as CN)	mg/l	0.05	No Relaxation	ND	ND	ND	ND	ND	ND	ND
28.	Lead (as Pb)	mg/l	0.05	No Relaxation	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
29.	Mercury (as Hg)	mg/l	0.001	No Relaxation	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
30.	Arsenic (as As)	mg/l	0.05	No Relaxation	<0.01	<0.01	<0.001	<0.001	<0.001	<0.001	<0.01
31.	Zinc (as Zn)	mg/l	5	15	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.01

ENVIRONMENTAL MONITORING RESULTS (OCT'19 to MARCH'20)

Sl.No	Parameters	Unit	IS10500:2012 Norms		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Oct-19
			Desirable Limit	Acceptable Limit in the absence of alternate source							
32.	Chromium (as Cr ⁺⁶)	mg/l	0.05	No Relaxation	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.01
33.	Poly Aromatic Hydrocarbon as PAH	mg/l	<0.0001	--	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
34.	Pesticide	µg/l	Absent	0.001	Absent	Absent	Absent	Absent	Absent	Absent	Absent

Table.4. GROUND WATER
Ground Water Quality (Biffer Zone)

Sl. No	Parameter	Unit	Standards as per IS: 10500:2012 Amended on 2015 & 2018		Palsa Village (Open Well)		Sandhya Guta (Bore Well)	
			Acceptable Limit	Permissible Limit	Nov-19	Mar-20	Nov-19	Mar-20
<i>Essential Characteristics</i>								
1	Colour	Hazen	5	15	CL	CL	CL	CL
2	Odour	--	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3	Taste	--	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Turbidity	NTU	1	5	1.2	1.4	2.1	1.5
5	pH Value	--	6.5-8.5	No Relaxation	7.56	7.2	7.64	7.46
6	Total Hardness (as CaCO ₃)	mg/l	200	600	110.0	112.0	116.0	128.0
7	Iron (as Fe)	mg/l	1.0	No Relaxation	0.28	0.24	0.26	0.25
8	Chloride (as Cl)	mg/l	250	1000	48.0	43.6	38.2	54.0
9	Residual, free Chlorine	mg/l	0.2	1	ND	ND	ND	ND

ENVIRONMENTAL MONITORING RESULTS (OCT'19 to MARCH'20)

Sl. No	Parameter	Unit	Standards as per IS: 10500:2012 Amended on 2015 & 2018		Palsa Village (Open Well)		Sandhya Guta (Bore Well)	
			Acceptable Limit	Permissible Limit	Nov-19	Mar-20	Nov-19	Mar-20
<i>Desirable Characteristics</i>								
10	Dissolved Solids	mg/l	500	2000	146.0	196.0	152.0	164.0
11	Calcium (as Ca)	mg/l	75	200	38.8	41.5	44.2	47.2
12	Magnesium (as Mg)	mg/l	30	100	16.6	14	18.2	19.5
13	Copper (as Cu)	mg/l	0.05	1.5	<0.05	<0.02	<0.05	<0.02
14	Manganese (as Mn)	mg/l	0.1	0.3	0.032	0.021	0.036	0.016
15	Sulphate (as SO ₄)	mg/l	200	400	4.6	4.1	4.2	5.2
16	Nitrate (as NO ₃)	mg/l	45	No Relaxation	0.26	0.28	0.21	0.26
17	Fluoride (as F)	mg/l	1.0	1.5	0.018	0.018	0.022	0.024
18	Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	0.001	0.002	<0.001	<0.001	<0.001	<0.001
19	Mercury (as Hg)	mg/l	0.001	No Relaxation	<0.002	<0.002	<0.002	<0.002
20	Cadmium (as Cd)	mg/l	0.003	No Relaxation	<0.01	<0.01	<0.01	<0.01
21	Selenium (as Se)	mg/l	0.01	No Relaxation	<0.001	<0.001	<0.001	<0.001
22	Arsenic (as As)	mg/l	0.01	No Relaxation	<0.004	<0.004	<0.004	<0.004
23	Cyanide (as CN)	mg/l	0.05	No Relaxation	<0.01	<0.01	<0.01	<0.01
24	Lead (as Pb)	mg/l	0.01	No Relaxation	<0.01	<0.01	<0.01	<0.01
25	Zinc (as Zn)	mg/l	5	15	1.26	2.1	1.31	3.6

ENVIRONMENTAL MONITORING RESULTS (OCT'19 to MARCH'20)

Sl. No	Parameter	Unit	Standards as per IS: 10500:2012 Amended on 2015 & 2018		Palsa Village (Open Well)		Sandhya Guta (Bore Well)	
			Acceptable Limit	Permissible Limit	Nov-19	Mar-20	Nov-19	Mar-20
26	Anionic Detergents (as MBAS)	mg/l	--	--	<0.2	<0.2	<0.2	<0.2
27	Chromium (as Cr ⁺⁶)	mg/l	0.5	No Relaxation	<0.05	<0.01	<0.05	<0.01
28	Mineral Oil	mg/l	200	600	<0.01	<0.01	<0.01	<0.01
29	Alkalinity	mg/l	0.03	0.2	128.0	131.0	136.0	130.0
30	Aluminium as (Al)	mg/l	0.5	2.4	<0.01	<1.0	<0.01	<1.0
31	Boron (as B)	mg/l	--	--	<0.5	<0.1	<0.5	<0.1
32	Poly Aromatic Hydrocarbon as PAH	mg/l	<0.0001	--	<0.0001	<0.0001	<0.0001	<0.0001
33	Pesticide	µg/l	Absent		Absent	Absent	Absent	Absent

AAQ MONITORING (CORE ZONE)**Table.5. AAQ1: Purunapani**

Monthly Average	PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO _x (µg/m ³)	O ₃ (µg/m ³)	CO mg/m ³	NH ₃ (µg/m ³)	Pb (µg/m ³)	Ni (ng/m ³)	As (ng/m ³)	C ₆ H ₆ (µg/m ³)	BaP (ng/m ³)	Mn µg/m ³
Oct-19	38.51	18.24	6.81	9.39	6.16	0.14	24.28	< 0.001	< 0.01	< 0.001	< 0.001	< 0.002	< 0.001
Nov-19	42.83	25.70	5.36	10.23	6.44	0.19	24.02	< 0.001	< 0.01	< 0.001	< 0.001	< 0.002	< 0.001
Dec-19	60.84	36.51	7.49	16.23	8.16	0.50	24.28	< 0.001	< 0.01	< 0.001	< 0.001	< 0.002	< 0.001
Jan-20	63.02	37.81	8.38	16.16	8.18	0.45	21.84	< 0.001	< 0.01	< 0.001	< 0.001	< 0.002	< 0.001
Feb-20	63.08	37.85	11.28	16.99	9.34	0.53	25.23	< 0.001	< 0.01	< 0.001	< 0.001	< 0.002	< 0.001
Mar-20	63.31	37.99	9.27	15.40	8.20	0.47	24.03	< 0.001	< 0.01	< 0.001	< 0.001	< 0.002	< 0.001

ENVIRONMENTAL MONITORING RESULTS (OCT'19 to MARCH'20)**Table.6. AAQ2: Guruda Pit**

Monthly Average	PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO _x (µg/m ³)	O ₃ (µg/m ³)	CO mg/m ³	NH ₃ (µg/m ³)	Pb (µg/m ³)	Ni (ng/m ³)	As (ng/m ³)	C ₆ H ₆ (µg/m ³)	BaP (ng/m ³)	Mn µg/m ³
Oct-19	40.40	18.89	5.03	9.74	5.40	0.145	22.02	< 0.001	< 0.01	< 0.001	< 0.001	< 0.002	< 0.001
Nov-19	43.09	25.85	8.27	11.44	6.54	0.22	22.47	< 0.001	< 0.01	< 0.001	< 0.001	< 0.002	< 0.001
Dec-19	61.37	36.82	7.62	13.48	8.01	0.56	24.18	< 0.001	< 0.01	< 0.001	< 0.001	< 0.002	< 0.001
Jan-20	67.78	40.67	7.37	13.23	8.33	0.61	28.94	< 0.001	< 0.01	< 0.001	< 0.001	< 0.002	< 0.001
Feb-20	67.53	40.52	8.90	14.03	8.94	0.64	26.80	< 0.001	< 0.01	< 0.001	< 0.001	< 0.002	< 0.001
Mar-20	60.71	36.43	8.61	12.54	8.80	0.49	23.37	< 0.001	< 0.01	< 0.001	< 0.001	< 0.002	< 0.001

Table. 8. Buffer Zone -Ambient Air Quality (Joribahal)

Parameters	Method of Measurement	NAAQS-2009	OCT-19	NOV-19	DEC-19	JAN-20	FEB-20	MAR-20
PM ₁₀	Gravimetric method	100(µg/m ³)	44	50.2	58.8	60.6	64.8	56
PM _{2.5}	Gravimetric method	60 (µg/m ³)	24.64	28.112	35.28	36.36	38.88	33.6
SO ₂	Improved West Gaeke method.	80 (µg/m ³)	6.8	7.4	6.4	6.6	7.6	7.9
NO _x	Jacob & Hochhelser modified (Na-	80(µg/m ³)	11.4	11.8	10.8	11.2	10.8	12.2
CO	NDIR Spectroscopy method	4(mg/m ³)	0.55	0.52	0.56	0.61	6.8	0.68
O ₃	Chemical Method	100	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
NH ₃	Indo Phenol Blue Method	400	<20.0	<20.0	<20.0	<20.0	24.8	<20.0
As	AAS Method	6ng/m ³	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ni	AAS Method	20µg/m ³	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pb	AAS Method	1µg/m ³	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
C ₆ H ₆	Gas Chromatography	5µg/m ³	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bap	Gas Chromatography	1ng/m ³	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
HC	GC Method		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

ENVIRONMENTAL MONITORING RESULTS (OCT'19 to MARCH'20)**Table.9. Balada Village**

Parameters	Method of Measurement	NAAQS-2009	OCT-19	NOV-19	DEC-19	JAN-20	FEB-20	MAR-20
PM₁₀	Gravimetric method	100($\mu\text{g}/\text{m}^3$)	48	51.8	62.2	68.2	68.2	58
PM_{2.5}	Gravimetric method	60 ($\mu\text{g}/\text{m}^3$)	26.88	29.008	37.32	40.92	40.92	34.8
SO₂	Improved West Gaeke method.	80 ($\mu\text{g}/\text{m}^3$)	6.2	6.6	5.6	7.1	7.1	8.4
NO_x	Jacob & Hochhelser modified (Na-Arsenite) method	80($\mu\text{g}/\text{m}^3$)	10	11.4	9.8	12.6	12.6	12.4
CO	NDIR Spectroscopy method	4(mg/m³)	0.52	0.56	0.62	0.72	0.72	0.68
O3	Chemical Method	100 ($\mu\text{g}/\text{m}^3$)	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
NH3	Indo Phenol Blue Method	400 ($\mu\text{g}/\text{m}^3$)	<20.0	<20.0	<20.0	<20.0	26.2	<20.0
As	AAS Method	6ng/m³	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ni	AAS Method	20$\mu\text{g}/\text{m}^3$	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pb	AAS Method	1$\mu\text{g}/\text{m}^3$	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
C6H6	Gas Chromatography	5$\mu\text{g}/\text{m}^3$	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bap	Gas Chromatography	1ng/m³	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
HC	GC Method		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

Table.10. Palasa Village

Parameters	Method of Measurement	NAAQS-2009	OCT-19	NOV-19	DEC-19	JAN-20	FEB-20	MAR-20
PM₁₀	Gravimetric method	100($\mu\text{g}/\text{m}^3$)	46	49.6	64.8	70.6	71.2	60.2
PM_{2.5}	Gravimetric method	60 ($\mu\text{g}/\text{m}^3$)	25.76	27.776	38.88	42.36	42.72	36.12
SO₂	Improved West Gaeke method.	80 ($\mu\text{g}/\text{m}^3$)	6.9	7.1	6.4	6.6	8.4	9.8
NO_x	Jacob & Hochhelser modified (Na-Arsenite) method	80($\mu\text{g}/\text{m}^3$)	10.4	11.6	10.8	12.4	13.8	11.8
CO	NDIR Spectroscopy method	4(mg/m³)	0.54	0.58	0.66	0.88	8.2	0.82

ENVIRONMENTAL MONITORING RESULTS (OCT'19 to MARCH'20)

Parameters	Method of Measurement	NAAQS-2009	OCT-19	NOV-19	DEC-19	JAN-20	FEB-20	MAR-20
O3	Chemical Method	100 (µg/m³)	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
NH3	Indo Phenol Blue Method	400 (µg/m³)	<20.0	<20.0	<20.0	<20.0	25.8	<20.0
As	AAS Method	6ng/m³	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ni	AAS Method	20µg/m³	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pb	AAS Method	1µg/m³	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
C6H6	Gas Chromatography	5µg/m³	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bap	Gas Chromatography	1ng/m³	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
HC	GC Method		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

Table.11. FUGITIVE EMISSION RESULTS (SPM)

Location	Parameter	Method of Measurement	unit	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20
Near Sorting Yard (Guruda Block)	SPM	Gravimetric Method	µg/m ³	326.8	348.8	351.2	368.8	412.2	706.2
Near Stack Yard (Guruda Block)	SPM	Gravimetric Method	µg/m ³	368.4	392.6	396.2	406.2	412.6	552.2
Near Haul Road (Guruda Block)	SPM	Gravimetric Method	µg/m ³	418.2	446.8	478.8	488.6	492.6	518.8

ENVIRONMENTAL MONITORING RESULTS (OCT'19 to MARCH'20)**Table. 12. PERSONAL DUST SAMPLING (Oct'19 to Dec'19)**

Name of the Person	Personal Number	Oct-2019	Name of the Person	Personal Number	NOV-2019	Name of the Person	Personal Number	DEC-2019
		PM ($\mu\text{g}/\text{m}^3$)			PM ($\mu\text{g}/\text{m}^3$)			PM ($\mu\text{g}/\text{m}^3$)
Sudhir Kumar Karun	TSP/809982/0919	8.8	Gopabandhu Patra	TSP/798825/0919	8.1	Sudhir Kumar Karun	TSP/809982/0919	9.6
Naresh Singh	TSP/751501/0819	8.2	Martha Dungding	TSP/798847/0919	7.8	Naresh Singh	TSP/751501/0819	9.2
Krushna Lohar	TSP/811500/0919	7.8	Naresh Singh	TSP/751501/0819	7.6	Krushna Lohar	TSP/811500/0919	9.1
Ravi Kumar Gope	TSP/811202/0919	7.4	Ravi Kumar Gope	TSP/811202/0919	7.8	Tamina Bai	MWO719164188	8.2
Chanu Munda	TSP/753803/0819	8.4	Chanu Munda	TSP/753803/0819	8.3	Cham Munda	MW1216072525	8.6

Table. 13. PERSONAL DUST SAMPLING 9Jan'20 to March'20)

Name of the Person	Personal Number	Jan-20	Name of the Person	Personal Number	Feb-20	Name of the Person	Personal Number	Mar-20
		PM ($\mu\text{g}/\text{m}^3$)			PM ($\mu\text{g}/\text{m}^3$)			PM ($\mu\text{g}/\text{m}^3$)
Sudhir Kumar Karun	TSP/809982/0919	9.2	Sudhir Kumar Karun	TSP/809982/0919	9.6	Suresh Naik	TSP/801522/0919	4.2
Naresh Singh	TSP/751501/0819	8.8	Naresh Singh	TSP/751501/0819	8.2	Kumari Patra	TSP/801276/0919	4.1
Krushna Lohar	TSP/811500/0919	8.6	Krushna Lohar	TSP/811500/0919	8.4	Laxmi Munda	TSP/775944/0819	3.9
Tamina Bai	MWO719164188	8.4	Tamina Bai	MWO719164188	8.2	Jema Patra	TSP/775945/0819	3.6
Cham Munda	MW1216072525	8.1	Cham Munda	MW1216072525	7.8	Rajesh Patra	TSP/785783/0819	4
Silibanti Munda	MWO719164349	8.8	Silibanti Munda	MWO719164349	7.9	Sitara Hessa	TSP/770136/0819	4.2
Amit Dungdung	M00719164536	9.1	Amit Dungdung	M00719164536	8.4	Ajay Das	TSP/770126/0819	4.4

ENVIRONMENTAL MONITORING RESULTS (OCT'19 to MARCH'20)

Name of the Person	Personal Number	Jan-20	Name of the Person	Personal Number	Feb-20	Name of the Person	Personal Number	Mar-20
		PM ($\mu\text{g}/\text{m}^3$)			PM ($\mu\text{g}/\text{m}^3$)			PM ($\mu\text{g}/\text{m}^3$)
Jenaram Pingua	MW1216072560	9.2	Jenaram Pingua	MW1216072560	9.1	Sarjen Kulei	TSP/770178/0819	4.8

Table. 14. DG SET EMISSION

Sampling Location: 100 KVA DG SET (Purunapani)				Dec-19	Mar-20
SL.No	Parameters Analyzed	Unit	CPCB LIMIT	Result	Result
1	Stack Temperature	$^{\circ}\text{C}$	.....	131	136
2	Velocity	m/Sec	.....	15.1	15
3	Concentration Of Particulate Matter As PM	mg/Nm^3	50	31.2	36
4	Oxides of Nitrogen as Nox	mg/Nm^3	400	66.8	70
5	Carbon Monoxide as CO	mg/Nm^3	150	32.6	34
6	Non Methyl Hydrocarbon as C	mg/Nm^3	....	6.2	6.8

Table.15. AMBIENT NOISE LEVEL

Location ID	Location	Day time Equivalent						Standard as per CPCB	Night time Equivalent						Standard as per CPCB
		Noise Level in dB (A) Leq							Noise Level in dB(A) Leq						
		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20		Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	
N-3	Mines Area	66	68.8	68.8	71.2	69.6	65	75	52	54.6	56.4	61.2	58.8	52	70

ENVIRONMENTAL MONITORING RESULTS (OCT'19 to MARCH'20)**Table.16. EQUIPMENT NOISE (Oct'19 to Dec'19):**

Name of Location	Unit	Result OCT-19	Name of Location	Result NOV-19	Name of Location	Result DEC-19
Volvo EC 300 DL (Shovel-1)	dB	72.8	Drojer (OR09H5949/0919)	70.8	OD-09C-5167	73.2
OR-09M-7869(JCB)		71.4	Prima (OD09C5167)	72.6	OD-09C-1373	72.8
OD-09C-5166		70.8	JCB (OD09K3140)	73.8	OD-09K-3118	73.6
OR-09L-8475		72.6	PRIMA LX (OD09A4692)	74.6	OD009A-6540	72.2

Table.17. EQUIPMENT NOISE (Jan'20 to March'20):

Name of Location	Unit	Result Jan-19	Name of Location	Result Feb'20	Name of Location	Result Mar'20
OD-09C-5167	dB	74.8	OD-09C-5167	76.8	OD-09C-5167	78
OD-09C-1373		75.2	OD-09C-1373	74.6	OD-09C-1373	76.6
OD-09K-3118		75.6	OD-09K-3118	75.2	OD-09K-3118	80.2
OD009A-6540		76.2	OD009A-6540	75.8	OD009A-6540	81.8

Table. 18. Dust Fall Analysis:

Date of Sampling	Total Dust Fall (t/km ² /month)	Analysis Result			
		Co (%)	Ni(%)	Hg(%)	As (%)
01.12.2019 TO 31.12.2019	0.44	<0.001	<0.001	<0.001	<0.001
01.12.2019 TO 31.12.2019	0.51	<0.001	<0.001	<0.001	<0.001

Table. 19. SOIL QUALITY ANALYSIS:

	Co (%)	Ni(%)	Hg(%)	As (%)
Dec-2019	0.038	0.058	<0.000002	<0.000002
Mar-20	0.044	0.056	<0.000002	<0.000002

ENVIRONMENTAL MONITORING RESULTS (OCT'19 to MARCH'20)

Table. 20. GROUND WATER QUALITY (TRACE METALS)- Panchayat Office Borewell

Parameters	Iron as Fe	Copper as Cu	Manganese as Mn	Hexavalent Chromium as Cr ⁶⁺	Mercury as Hg	Cadmium as Cd	Selenium as Se	Arsenic as As	Lead as Pb	Zinc as Zn
November-19	0.28	<0.02	0.016	<0.05	<0.002	<0.01	<0.001	<0.004	<0.01	<0.05

Table. 21 GROUND WATER (LEVEL) ANALYSIS A. GWL1 : Palsa Village Open Well B. GWL2 : Sandhya Guta BW

Parameters	Unit	Analysis Result
November-19	GWL1	10.2
	GWL2	11.1