नालको NALCO
NATIONAL ALUMINIUM COMPANY LIMITED
(A Public Sector Undertaking)
Panchpatmali Bauxite Mine
D A M A N J O D I – 763008
Dist. KORAPUT (ORISSA)
Ph-06853-268001

Ref-NAL/MIN/GGM(Mines)/2023/38 Date: 01.06.2023

To,

Additional Principal Chief Conservator of Forests(Central)
Ministry of Environment, Forests & Climate Change
Eastern Regional Office,
A/3, Chandrasekharpur,
Buhubaneswar-751023

Sub : Submission of six monthly compliance status report on Environmental Clearance conditions for the period 1st April 2022 to 31st March 2023 in respect of Panchpatmali South Block Bauxite Mine, NALCO

Ref.: (1) Env. Clearance Letter no. No. J-11015/78/2010-IA. II(M) Dt. 28-02-2011from MoEF&CC, GOI.
(2) Env Clearance No. J-11015/78/2010-IA. II(M) Dt. 26-10-2018 from MoEF &CC, GOI

Dear Sir,

Please find enclosed herewith the six monthly compliance reports against the conditions of above referred Environmental Clearances for the period 1st April 2022 to 31st March 2023 in respect of Panchpatmali South Block Bauxite Mine, NALCO. This is for your kind information and perusal please.

Thanking you,

Yours faithfully,
01/06/23
(Rasheed Waris)
Group General Manager(Mines)

Encl- As stated

RASHEED WARIS
Group General Manager(Mines)
NALCO Mines, Damanjodi

Copy-(1) The Joint Secretary (IA) -for kind information
Ministry of Environment, Forests
& Climate Change, Govt of India,
Indira Paryavaran Bhawan,Aliganj,
Jorbagh Road, New Delhi-110 003
(2) The Member Secretary, -for kind information
State Pollution Control Board, Odisha
A/118, Nilakantha Nagar,
Bhubanewar- 751 012
(3) The D.F.O. -for kind information
Koraput Division,Koraput

STATUS OF COMPLIANCE TO THE CONDITIONS STIPULATED IN ENV. CLEARANCE FOR BAUXITE PRODUCTION @ 3.15 MTPY WITH RESPECT TO PANCHPATMALI SOUTH BLOCK BAUXITE MINE ,NALCO

(Ministry Letter No. J-11015/78/2010-IA. II(M) Dt. 28-02-2011)

<table>
<tr><th>Sl.No.</th><th>A. Special Conditions</th><th>Status of Compliance as on 31.3.2023</th></tr>
<tr><td>I</td><td>All the conditions stipulated by State Pollution Control Board Odisha in their Consent to Establish shall be effectively implemented.</td><td>The consent to establish for 3.15 MTPY production capacity for South Block was obtained from SPCB, Odisha vide letter no. 16733/Ind-II-NOC-6041, DTD. 21-11-2016. The operation project (South Block) has started operation from 22.5.2017. All the conditions prescribed by SPCB, Odisha are being effectively implemented.</td></tr>
<tr><td>II</td><td>The project proponent shall obtain Consent to Operate from the State Pollution Control Board and effectively implement all the conditions stipulated therein.</td><td>The consent to operate from State Pollution Control Board ,Odisha for operation of South Block has been obtained vide SPCB order No.-. 3515 /IND-I-CON-6387 ,Dtd. 8-03-2022/ CONSENT ORDER NO. 2837, which is valid till 31.3.2024. All the conditions stipulated therein are being implemented.</td></tr>
<tr><td>III</td><td>The environmental clearance is subject to grant of forestry clearance. Necessary forestry clearance under the Forest (Conservation) Act,1980 for an area of 189.552 ha forest land involved in the project shall be obtained before starting mining operation in that area. No mining shall be undertaken in the forest area without obtaining requisite prior forest clearance.</td><td>Stage-II Forest clearance over 110.3 ha of forest land for South Block has already been accorded by MOEF&CC vide Letter No. 8-330/1983-FC (Pt-I) dated 20th July 2011. The Stage-I forest clearance for balance 79.252 Ha was issued by MoEF&CC vide letter No. 8-29/2015-FC Dtd. 19th April 2018. The compliance of the conditions are under progress.</td></tr>
<tr><td>IV</td><td>The project proponent shall ensure that no natural watercourse and / or water resources are obstructed due to any mining operations. Adequate measures shall be taken while diverting seasonal channels emanating from the mine lease, during the course of mining operation.</td><td>No Natural water course exists on hilltop/ plateau top. Mining operation is confined to hill top shall in no way obstruct natural water course. No rain water from the mining area is allowed to flow down below the valley by making provisions for peripheral barriers.</td></tr>
<tr><td>V</td><td>The mining operations shall be confined to the hill tops only and restricted to above ground water table and it should not intersect the groundwater table. In case of working below the ground water table, prior approval of the Ministry of Environment and Forests and the Central Ground Water Authority shall be obtained, for which a detailed hydro-geological study shall be carried out</td><td>It is revealed from a study by RAMKY (in Year 2010) that the ground water table exists below 80 mtr. from the plateau top. As the Mining activities would be limited to only 35 Mtrs from the surface, there will be no impact of Mining operation on the ground water / aquifers.</td></tr>
<tr><td>VI</td><td>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.</td><td>Initially top soil was being removed and was being stored temporarily to be used for concurrent land reclamation and rehabilitation. However these have been started to be reused concurrently from 2020-21.
The top soil generated and stored for reclamation are as follows.
<table>
<tr><th>Year</th><th>Top soil generated (MT)</th><th>Top soil utilized (MT)</th><th>Top soil stored (MT)</th></tr>
<tr><td>2017-18</td><td>10150</td><td>Nil</td><td>10150</td></tr>
<tr><td>2018-19</td><td>31250</td><td>Nil</td><td>31250</td></tr>
<tr><td>2019-20</td><td>14050</td><td>Nil</td><td>14050</td></tr>
<tr><td>2020-21</td><td>41,600</td><td>41,600</td><td>Nil</td></tr>
<tr><td>2021-22</td><td>Nil</td><td>Nil</td><td>Nil</td></tr>
<tr><td>2022-23</td><td>Nil</td><td>Nil</td><td>Nil</td></tr>
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<tr><td>VII</td><td>The overburden (OB) generated shall be temporarily stacked in the identified sites for backfilling. Backfilling shall start from 2021-22 and there shall be no external over burden dumps. The entire excavated area shall be progressively reclaimed by backfilling and afforested. Monitoring and management of rehabilitated areas should continue until the vegetation becomes self-sustaining. Compliance status shall be submitted to the Ministry of Environment and Forest and its Regional Office located at Bhubaneswar on six monthly basis.</td><td>In the initial stages of excavation for the first three years i.e till 2019-20, overburden (Top soil + Laterite) was being excavated and was stacked at designated places, which has started to be rehandled for backfilling of the mined out area from 2020-21. The entire excavated is progressively reclaimed by backfilling and is rehabilitated with afforestation. The plantation in the rehabilitated area will be maintained till the vegetation becomes self sustaining. Compliance status is being submitted to MOEF every six months.

The OB generated (including top soil) and stored for reclamation are as follows.
<table><tr><th>Year</th><th>OB generated (MT)</th><th>OB utilized (MT)</th><th>OB stored (MT)</th></tr><tr><td>2017-18</td><td>96350</td><td>Nil</td><td>96350</td></tr><tr><td>2018-19</td><td>104700</td><td>Nil</td><td>104700</td></tr><tr><td>2019-20</td><td>119950</td><td>Nil</td><td>119950</td></tr><tr><td>2020-21</td><td>158500</td><td>158500</td><td>Nil</td></tr><tr><td>2021-22</td><td>1,65,000</td><td>1,65,000</td><td>Nil</td></tr><tr><td>2022-23</td><td>153390</td><td>153390</td><td>Nil</td></tr></table></td></tr>
<tr><td>viii</td><td>Catch drains and siltation ponds of appropriate size shall be constructed around the mine working, soil and mineral dumps to prevent run off of water and flow of sediments directly into the water bodies. The water so collected shall be utilized for watering the mine area, roads, green belt development etc. the drains shall be regularly desilted, particularly after the monsoon, and maintained properly.

Garland drains, settling tanks and check dams of appropriate size, gradient and length shall be constructed around the mine pit, topsoil dumps and the mineral dumps to prevent run off of water and flow of sediments directly into the water bodies and sump capacity shall be designed keeping 50 % safety margin over and above peak sudden rainfall (based on 50 years data) and maximum discharge in the area adjoining the mine site. Sump capacity shall also provide adequate retention period to allow proper settling of silt material. Sedimentation pits shall be constructed at the corners of the garland drains and desilted at regular intervals</td><td>Siltation ponds of adequate size has been provided to collect sediments from the mineral stock pile area during rain through drains. Rain water accumulated in the sedimentation ponds cannot go out due to peripheral barrier and percolates down through porous mined out surface. Peripheral barriers have been provided on the sides which will prevent any rain water carrying mud and silt from going outside. Inside the mine, sedimentation pits of adequate size are being kept which collect water through drains with natural gradient. Due to porous nature of the mined out surface, the rain water percolates down to recharge the ground water. There will be no waste dumps or OB dumps as concurrent reclamation method has been adopted. The sedimentation pits will be cleaned periodically to maintain the sump capacity to hold water.</td></tr>
<tr><td>Ix</td><td>Dimension of the retaining wall at the OB benches within the mine to check run-off and siltation should be based on the rainfall data.</td><td>No retaining wall is required as the height of initial OB dump would not be more than 4 mtr & all OB excavated shall be used for backfilling.</td></tr>
<tr><td>X</td><td>The project proponent shall develop a 7.5 m wide green belt in the safety zone all around the mining lease. In addition, plantation shall be raised in the backfilled and the reclaimed area, around void roads etc. by planting the native species in consultation with the local DFO / Agriculture Department. The density of the trees should be around 2500 plants per ha. Green belt shall be developed all</td><td>A green belt having minimum width of 7.5 mtr is being developed all around the Mined out area in the safety zone from 2017-18 as per scheme developed in consultation with DFO, Koraput. Native species like Jamun,Rose Apple, Guava, Mangos, Jackfruit ,Tamarind , Karanj, etc are being planted @ 2500 plants /ha for development of the green belt in consultation with DFO. In addition to that plantation is also carried out in the backfilled/reclaimed area. Further the CPCB guideline for green belt development is also taken into account.</td></tr>
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	around the mining lease area in a phased manner and shall be within first five years.	At present plantation is going on for South Block. **As on 31.3.2023** the plantation carried out in different areas are as follows. (i)Backfilled area: 9,990 (i) Conveyor corridor: 1,32,684 (ii)Access road: 1,20,177 (iii)Unused area and under 33 KV line: 87,928. (iv)Hill slopes: 1,82,894 (v) Mining area, safety zone: 50,330 Total trees planted in South Block **as on 31.3.2023** is 5, 84,003.
Xi	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 around loading and unloading point and all transfer point. Extensive water sprinkling shall be carried out on haul roads. It shall be ensured that the Ambient Air Quality parameters conform to the norms prescribed by the Central Pollution Control Board in this regard.	Regular water sprinkling is being done using self propelled mobile water tankers. From January 2017, AAQ monitoring for South Block has been started at 5 locations. These are A11 (View Point,South Block), A12 (Putraghati Village), A13(Bhitara Bhejaput Village), A14(Lachumani Village) and A15(Mundagahrati Village). The AAQ monitoring results conform to the norms prescribed by CPCB. The latest results of ambient air analysis are given at **Annexure-I.**
Xii	The project authority shall implement suitable conservation measures to augment ground water resources in the area in consultation with the Regional Director, Central Ground Water Board.	The plateau top , where the mining operation is confined, stands out about 300 mtr above the surrounding valley areas. The permanent ground water table exists at a depth of below 80 mtr. At present, 2 nos. of rain water harvesting reservoirs have been developed atop the mines. The capacity of the two nos of ponds are as follows. **Sl No. | Decription | Capacity of storage in cum.** 1 | Pond-no-1 | 6156 2 | Pond no-2 | 6300 Also, rooftop rainwater harvesting structures for the Administration Building , Mine Manager's Building and MVT centre have been provided to augment ground water recharging. Further, the method of Mining & the peripheral barrier all around will not allow the storm water from within the mining area to go outside valley areas. The water thus trapped, will percolate down & recharge the ground water. Further as per advice of CGWB, Bhubaneswar , a suitable agency (M/s Geoenvitech Research & Services Pvt Ltd , Bhubaneswar) was appointed for carrying out a hydro-geological study for suggesting measures for rain water harvesting and augmentation of ground water resources. The report has been prepared and recommendations are implemented.
xiii	Regular monitoring of ground water level and quality shall be carried out in and around the mine lease by establishing a network of existing wells and constructing new piezometers during the mining operation. The monitoring shall be carried out four times in a year, pre-monsoon (April-May) , monsoon (August), Post-monsoon (November) and winter (January) and the data thus collected may be sent regularly to the Ministry of	The ground water level was monitored by M/s RAMKY (in Yr 2010) by construction of borewells. It was found that the ground water table exists at a great depth i.e. below 80 mtr. from the plateau top. The ground water quality monitoring is done during April, August, November and January every year. The monitoring locations are (15 nos) MetingiVillage,Chhatamba Village, Jharhiapadar Village, Tentulipadar Village, Ichhapur Village, Mundagarhati Village, Bijaghati Village, Putraghati Village, Putraghati Village, Chararha Village, Kapsiput Village, Jambagurha Village, Shriguda Village,

	Environment and Forest and its Regional Office, Bhubaneswar, the Central Ground Water Authority and the Regional Director, Central Ground Water Board. If at any stage, it is observed that the ground water table is getting depleted due to the mining activity, necessary corrective measures shall be carried out.	KakirigumaVillage,and Sorishapadar Village below the hills.These villages come in the impact zone of both Central and North Block as well as in the South Block. The results for the period Apr22-Mar23 are given at **annexure-II.** The parameters mostly conform to the permissible values as per IS 10500:2012. (drinking water standard). No adverse impact on the water resources of tube wells have been observed. One no of piezometer has been constructed for monitoring of ground water level.
xiv	The project authorities shall practice suitable rainwater harvesting measures on long term basis and shall work out a detailed scheme in consultation with the Regional Director, Central Ground Water Board	The plateau top , where the mining operation is confined, stands out about 300 mtr above the surrounding valley areas. The permanent ground water table exists at a depth of below 80 mtr. At present, 2 nos. of rain water harvesting reservoirs have been developed atop the mines. The capacity of the two nos of ponds are as follows. **Sl No. / Decription / Capacity of storage in cum.** 1 / Pond-no-1 / 6156 2 / Pond no-2 / 6300 Also, rooftop rainwater harvesting structures for the Administration Building ,Mine Manager's Building and MVT centre have been provided to augment ground water recharging. Further, the method of Mining & the peripheral barrier all around will not allow the storm water from within the mining area to go outside valley areas. The water thus trapped, will percolate down & recharge the ground water. Further as per advice of CGWB, Bhubaneswar , a suitable agency (M/s Geoenvitech Research & Services Pvt Ltd , Bhubaneswar) was appointed for carrying out a hydro-geological study for suggesting measures for rain water harvesting and augmentation of ground water resources. The report has been prepared and recommendations are implemented.
Xv	The project proponent shall obtain necessary prior permission of the competent authorities for drawl of requisite quantity of water (surface water and ground water) required for the project	Permission for 0.22 MGD for South Block has been received from State Water Resources Dept Govt of Odisha vide order No. 28682/WR Dtd. 11/12/2019 for drawal of water from Jholaguda Stream.
xvi	Vehicular emissions shall be kept under control and regularly monitored and checked. Measures shall be taken for maintenance of vehicles used in mining operations and in transportation of mineral. The mineral transportation within the mine lease shall be carried out through the covered trucks only and the vehicles carrying the mineral shall not be overloaded.	At present monitoring of exhaust emission of all the vehicles operating at mine is conducted once in six months through an outside agency authorized by SPCB, Odisha. Measures are being taken for maintenance of vehicles used in mining operations and in transportation of mineral. The vehicles carrying the mineral are not overloaded.
xvii	Blasting operation shall be carried out only during the daytime. Controlled blasting shall be practiced. The mitigative measures for control of ground vibrations and to arrest fly rocks and boulders should be implemented.	Blasting has not yet started. In future in case , blasting will be done during shift change over between 1.15PM to 2PM .No blasting will be done beyond day light hours .Further, controlled blasting will be practiced with use of NONELs for sequential blasting to reduce fly

		rocks, boulders & ground vibration. However there is a plan not carry out any blast in future.
xviii	Drills shall either be operated with dust extractors or equipped with water injection system	Drill are being operated with vaccum dust extraction system with provision of water injection for dust suppression.
xix	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. These should be properly maintained and operated.	Crushing & Conveying system is provided with dry fog system. Loading and unloading areas including all the transfer points have efficient dust control arrangements. These are properly maintained and operated. The conveyor to Alumina Refinery is completely covered.
Xx	Sewage treatment plant shall be installed for the colony. ETP shall also be provided for the workshop and wastewater generated during the mining operation	The Mine & Refinery combined township exists 20KM away at Damanjodi where sewerage treatment plant is provided whereas the mine is operating a zero discharge system for effluents where all the waste water is treated,analysed and reused for sprinkling on the haul road for dust suppression and plantation. Effluents from the Mechanical Workshop area is being chanelized through well-designed oil-water separation tank where oil is collected and the clear water is collected in zero discharge sump. There is a canteen waste water disposal system (biological treatment unit) designed, constructed and maintained to treat the canteen waste water. All the treated waste water from canteen and HEMM workshop is used for horticulture & dust suppression.
xxi	Pre-placement medical examination and periodical medical examination of the workers engaged in the project shall be carried out and records maintained. For the purpose, schedule of health examination of the workers should be drawn and following accordingly.	Pre-placement medical examination and periodic medical examination is being done for all employees of Central and North and South Block. During April 2022-March 2023 , 24 employees of South block have been covered under PME. No occupational diseases have so far been detected.
xxii	Provision shall be made for the housing of construction labour within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, crèche etc. the housing may be in the form of temporary structures to be removed after the completion of the project.	All construction laborers /workers come from nearby villages and hence no housing is required.
xxiii	The project proponent shall take all precautionary measure during mining operation for conservation and protection of endangered flora and fauna found in the study area. Action plan for conservation of flora and fauna shall be prepared and implemented in consultation with the State Forest and Wildlife Department. Necessary allocation of funds for implementation of the conservation plan shall be made and the fund so allocated shall be included in the project cost. A copy of action plan shall be submitted to the Ministry of Environment and Forest and its Regional Office, Bhubaneswar.	Site specific wild life conservation plan has been approved by PCCF (Wild life), Bhubaneswar vide letter no.FWL-C-SSP-273/2010/9639 dated 09-11-2010 with a financial implication of Rs 10.43 Cores. The aforesaid amount has already been deposited in Adhoc- CAMPA by NALCO, for implementation of the plan. (Rs 8.15 Crore on 03.12.2010 and Rs 2.28 Crore on 30.3.2011, paid through DD & RTGS, respectively. . The conservation measures suggested are under process of implementation. The copy of action plan has been submitted to MoEF&CC vide letter No. NAL/MIN/GM(Mines)2017/630, Dtd. 12.9.2017. The status of implementation of conservation measures are given in **Annexure-III**.

xxiv	Digital processing of the entire lease area using remote sensing technique shall be carried out regularly once in three years for monitoring land use pattern and report submitted to Ministry of Environment and Forests and its Regional Office, Bhubaneswar	A digital land-use map (shape file) as on 31.3.2021 has been submitted to MoEF&CC, Bhubaneswar on 1st July 2021 vide mail
xxv	The critical parameters such as RSPM (particulate matter with particle size less than 10 µm i.e PM10) and Nox in the ambient air within the impact zone, peak particle velocity at 300 m distance or within the nearest habitation, whichever is closer shall be monitored periodically. Further the quality of discharge water shall also be monitored.[TDS, DO,pH, and Total suspended solids (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 the public domain. The circular No.- J-20012/1/2006-IA.II(M) dtd. 27.5.2009 issued by the Ministry of Environment & Forests , which is available on the website of the Ministry www.envfor.nic.in shall also be referred in this regard for its compliance.	The ambient air quality in and around the Panchpatmali South Block Bauxite Mine is measured at 5 locations every month for RSPM, NOx and SO_2. The treated waste water from canteen and oil water separator are analysed as per general waste discharge standards every month. The results are well within the prescribed parameters. The data is being uploaded in company website www.nalcoindia.com along with half yearly status of environmental clearance.
xxvi	A Final Mine Closure Plan along with details of Corpus Fund shall be submitted to the Ministry of Environment & Forests 5 years in advance of final mine closure for approval.	These shall be submitted to the Ministry of Environment & Forests 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 Ministry of Environment & Forests	The user agency (NALCO) undertakes that there shall be no change in technology and scope of work without prior approval from MoEF&CC.
Ii	No change in the calendar plan including excavation, quantum of mineral bauxite and waste should be made.	The user agency (NALCO) undertakes that there shall be no change in calendar plan including excavation, quantum of Bauxite, Waste/OB generation of work without prior approval from competent authority.
Iii	At least 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 particle size less than 10 µm i.e PM10)&NOx monitoring. Location of the stations should be decided based on the meteorological data, topographical features and environmentally and ecological sensitive targets and frequency of monitoring should be undertaken in consultation with the State Pollution Control Board.	The ambient air quality in and around the Panchpatmali South Block Bauxite Mine is measured at 5 locations every month for PM2.5, PM10, NOx and SO_2 and CO.
Iv	Data on ambient air quality [RSPM (particulate matter with particle size less than 10 µm i.e PM10)&NOx] should be regularly submitted to the Ministry of Environment and Forests including its Regional office located at Bhubaneswar and the State Pollution Control Board /	Data on air quality for the present mining operations is being collected once in every month. Records submitted to statutory authorities once in six months. From January 2017, AAQ monitoring for South Block has been started at 5 locations. These are A11 (View Point,South Block), A12 (Putraghati Village), A13(Bhitara Bhejaput Village), A14(Lachumani

	Central Pollution Control Board once in six month.	Village) and A15(Mundagahrati Village). The AAQ monitoring results conform to the norms prescribed by CPCB. The latest results of ambient air analysis are given at **Annexure-I.**
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.	Water spraying on haul road is being carried out with mobile sprinklers and fixed sprinklers. Loading points of crusher house is provided with dry fog system. Transportation of Bauxite ore is being carried out through a cable belt conveyor provided with hood all along. One fog cannon has been deployed near stockpile for suppression of dust.
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.	Noise monitoring in the present work environment is taken up once every year in the existing work areas. The results are within prescribed norm. Workers are provided with ear plugs /muffs. Besides ambient noise level is also measured at 13 locations. Ambient Noise level monitoring for the period Apr 22 to March 23 is available at **annexure-IV.**
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 effluents.	The Mine is operating a zero discharge system for effluents where all the waste water is treated, analysed and reused for sprinkling on the haul road for dust suppression and plantation. Effluents from the Mechanical Workshop area is being chanelized through well-designed oil-water separation tank where oil is collected and the clear water is collected in zero discharge sump. There is a canteen waste water disposal system (biological treatment unit) designed, constructed and maintained to treat the canteen waste water. All the treated waste water from canteen and HEMM workshop is used for horticulture & dust suppression. The treated waste water from canteen and HEMM workshop area are analysed before being reused. The analysis results for Apr 22-March 23 are available at **Annexure-V.** The above treated water is completely reused without discharging outside.
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 programme of the workers should be undertaken periodically to observe any contractions due to exposure to dust and take corrective measures, if needed	For South Block mine, all employees and contract workers are provided with protective devices. Regular training programmes are held in MVT Center on health and safety aspects for contract workers as well as employees. Pre-placement medical examination and periodic medical examination is being done for all employees of Central and North and South Block. During April 2022-March 2023 , 24 employees of South block have been covered under PME. No occupational diseases have so far been detected.
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.	A Separate Environmental Management Cell being headed by GM(Env), who is reporting directly to GGM(Mines), exists for management of environment.
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 Ministry of Environment and Forests and its Regional Office located at Bhubaneswar	The fund earmarked for environmental protection measures is never diverted for any other purpose. Adequate fund is always allocated to meet the capital & recurring expenses to implement the environmental control measures inclusive of plantation. Many expenditures for Central and North Block and South Block on environment are carried out through common contracts. Hence the total expenditure will be reported jointly. The capital expenditure till date and the recurring expenditure for protection of environment at Panchpatmali Bauxite Mine for the last three years are as follows

		a. Capital Cost for Environmental Pollution control incurred during 2022-23 - Rs. 225 Lakh b. Recurring cost Note- Backfilling and land reclamation cost is calculated based on the proportionate cost for diesel incurred in handling of overburden material as compared to the total excavation. * The values contain combined expenditure for South Block and Central and North Block. * * The values contain expenditure for South Block only.
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	The MoEF&CC Regional Office shall be kept informed as required.
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 / information / monitoring reports	NALCO undertakes that all co-operations will be extended to the officers of the Regional Office of the Ministry located at Bhubaneswar by furnishing requisite data, information/ monitoring reports.
xiii	The project proponent shall submit six monthly report on the status of compliance of the stipulated environmental clearance conditions including results of monitored data (both in hard copies as well as by e-mail) to the Ministry of Environment and Forests, its Regional Office Bhubaneswar, the respective zonal office of Central Pollution Control Board and State Pollution Control Board. The proponent shall upload the status of compliance of the environmental clearance conditions , including results of monitored data on their website and update the same periodically. It shall simultaneously be sent to the Regional Office of the Ministry of	Six monthly report on the status of the implementation of the stipulated environmental safeguards for present mining operations of South Block is submitted to MoEF, Govt. of India and State Pollution Control Board. The same is uploaded in the website of NALCO (www.nalcoindia.com) as directed.

S. No	Activity	2020-21 (Rs)*	2021-22 (Rs)*	2022-23 (Rs)**
1.	Backfilling and land reclamation*	4,74,00,990	7,44,68,438	119,43,795.88
2.	Environmental Pollution Control	22,78,520	40,41,193	9,38,872.58
3.	Plantation and Horticulture	67,36,291	94,23,930	13,20,017.00
4	Operation and maintenance of Water Sprinkling system & zero discharge system	12,00,000	15,48,846	1,55,082.98
	Total	5,76,15,801.00	8,94,82,407.00	1,43,57,768.85

	Environment & Forests, Bhubaneswar , the respective zonal office of the Central Pollution Control Board and the State Pollution Control Board.	
xiv	A copy of clearance letter shall be marked to concerned Panchyat /ZilaParishad/ Municipal corporation , Urban local body and the Local NGO, if any, from whom suggestion / representation has been received while processing the proposal. The clearance letter shall also be put on the website of the company by the proponent.	No such suggestions / representation have been received from the Panchayat / local NGO, while processing the clearance proposal. The EC has been displayed in the website of NALCO. (www.nalcoindia.com).
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 / Tahsildar's Office for 30 days	Complied.
xvi	The environmental statement for each financial year ending 31st March in Form-V is mandated to be submitted by project proponent to the concerned State Pollution Control Board as prescribed under Environment Protection Act, 1986 ,as amended subsequently, shall also be put on the website of the company along with status of compliance of environment clearance conditions and shall also be sent to the respective Regional Office of Ministry of Environment & Forests , Bhubaneswar by e-mail.	The environment statement for South Block was sent for the year 2021-22 to State Pollution Control Board, Odisha on 30th September 2022 and is also displayed in NALCO's website.
xvii	The project authorities should advertise at least in two local newspapers of the district or state in which the project is located and 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 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 also at web site of the Ministry of Environment and Forest at http://envfor.nic.in and a copy of the same should be forwarded to the Regional Office of the Ministry located at Bhubaneswar.	Complied.

01/06/23

(Rasheed Waris)
Group General Manager(Mines)

RASHEED WARIS
Group General Manager(Mines)
NALCO Mines, Damanjodi

STATUS OF COMPLIANCE TO THE CONDITIONS STIPULATED INAMENDED ENV. CLEARANCE FOR INSTALLATION OF OVERLAND CONVEYOR FOR TRANSPORTATION OF BAUXITE PRODUCTION AND CHANGE IN MINING EQUIPMENT/MACHINERIES FOR SIZING IN PANCHPATMALI SOUTH BLOCK BAUXITE MINE, NALCO

(Ministry Letter No. J-11015/78/2010-IA. II(M) Dt. 26-10-2018)

Sl.No.	Additional Conditions	Status of Compliance as on 31.3.2023
I	Amendment of Environmental Clearance will not be operational till such time the Project Proponent complies with all the statutory requirements and judgment of Hon'ble Supreme Court dated the 2nd August 2017 in Writ Petition (Civil) No. 114 of 2014 in the matter of Common Cause versus Union of India and Ors..	Noted.
Ii	The Department of Mining & Geology, State Government shall ensure that mining operation shall not commence till the entire compensation levied, for illegal mining paid by the Project Proponent through their respective Department of Mining & Geology in strict compliance of judgment of Hon'ble Supreme Court dated the 2nd August 2017 in Writ Petition (Civil) No. 114 of 2014 in the matter of Common Cause versus Union of India and Ors.	Noted. No compensation has been levied on Panchaptmali South Block Bauxite Mine for illegal mining.
Iii	The Project Proponent shall install online Ambient Air Quality Monitoring System and there should be system for display of digital AAQ data within 03 months at least at three locations as per wind direction. Online provisions of pH and turbidity meters at discharge points of STP and ETP and also at water storage ponds in the mining area may be made. Project Proponent should display the result digitally in front of the main Gate of the mine site.	Three nos of online ambient air quality monitoring station have been procured and installed in the core zone and buffer zone of the mine. The waste water from canteens and vehicle wash areas are treated and reused for dust suppression purpose inside Mines and are not discharged outside. Hence installation of online pH and turbidity meters are not applicable in our case.
Iv	Proponent shall appoint an Occupational Health Specialist for Regular and Periodical medical examination of the workers engaged in the Project and maintain records accordingly; also, Occupational health check-ups for workers having some ailments like BP, diabetes, habitual smoking, etc. shall be undertaken once in six months and necessary remedial/preventive measures taken accordingly. The Recommendations of National Institute for Mine workers shall be implemented; The prevention measure for burns, malaria and provision of anti-snake venom including all other paramedical safeguards may be ensured before initiating the mining activities.	The PME of all employees for specified diseases is carried out regularly. During Apr 22-March23 , 24 nos of employees of south block have undergone PME at Panchpatmali Bauxite Mine NALCO. No specified occupational diseases have been detected so far. There is a first aid centre at Mines to render initial medical services and a full-fledged hospital at Township for complete treatment of diseases.
V	Project Proponent shall run an awareness campaign on sanitation for women and utilization of Sanitary Napkin and also to distribute the Sanitary Napkin/pads to the women and provide the training for proper disposal.	Regular awareness is carried out in surrounding villages including women regarding good sanitation practices under Swachh Bharat Mission. Sanitary kits/napkins are being disbursed periodically.

01/04/23

(Rasheed Waris)
Group General Manager(Mines)

RASHEED WARIS
Group General Manager(Mines)
NALCO Mines, Damanjodi

ANNEXURE-I

AMBIENT AIR QUALITY ANALYSIS AT PANCHPATMALI SOUTH BLOCK BAUXITE MINE NALCO

(2022-23)

Sl. No.	Monitoring station	Parameter	Norm	Apr'22	May'22	Jun'22	Jul'22	Aug'22	Sep'22	Oct'22	Nov'22	Dec'22	Jan'23	Feb'23	Mar'23	Avg
1	A11 (View point South Block)	RPM (µg / m3)														
		PM 2.5(60µg / m3)	60	35.58	38.65	30.54	19.27	13.83	23.79	24.96	25.42	30.79	30.35	28.52	29.4	27.59
		PM10(100µg / m3)	100	57.52	59.67	52.13	35.42	28.23	46.81	46.44	53.62	59.26	59.65	49.25	48.33	49.69
		NRPM (µg /m3)		61.43	63.37	54.45	40.17	31.91	49.4	48.53	58.98	65.85	64.69	53.85	54.77	53.95
		SPM(µg /m3)		118.95	123.04	106.58	75.59	60.14	96.21	94.97	112.6	125.11	124.34	103.1	103.1	103.64
		SO_2 (80 µg /m3)	80	8.6	8.71	8.27	5.25	4.05	6.82	7.86	7.95	9.21	7.44	9.61	10.23	7.83
		NO_X (80µg /m3)	80	16.95	18.42	20.46	13.45	11.54	14.25	15.81	13.74	16.19	13.79	15.47	18.87	15.75
		CO (2 mg /m3)	2000	0.62	0.7	0.63	0.31	0.32	0.42	0.56	0.56	0.44	0.6	0.31	0.39	0.49
2	A12 (Putraghati village)	RPM (µg / m3)														
		PM 2.5(60µg / m3)	60	32.2	34.76	24.81	15.98	12.04	17.21	21.31	21.61	24.12	28.53	24.31	27.35	23.69
		PM10(100µg / m3)	100	54.27	55.94	40.71	28.61	23.39	32.78	41.31	42.26	50.82	52.24	47.9	47.89	43.18
		NRPM (µg /m3)		57.24	55.94	43.24	34.73	24.21	35.27	43.26	46.26	54.68	55.72	51.91	56.93	46.62
		SPM(µg /m3)		111.51	114.67	83.95	63.34	47.6	68.05	84.57	88.52	105.5	107.96	99.81	104.82	90.03
		SO_2 (80 µg /m3)	80	7.9	7.64	6.78	5.62	4.14	4.75	6.61	6.81	8.55	6.52	8.44	9.04	6.90
		NO_X (80µg /m3)	80	14.34	15.63	13.27	12.54	10.88	9.54	12.95	10.82	14.32	11.81	13.59	15.12	12.90
		CO (2 mg /m3)	2000	0.46	0.42	0.45	0.3	0.26	0.28	0.4	0.43	0.41	0.41	0.33	0.3	0.37
3	A13 (Bhitara Bhejaput village)	RPM (µg / m3)														
		PM 2.5(60µg / m3)	60	33.41	32.95	26.67	17.62	18.25	20.5	18.67	22.39	25.36	27.21	26.49	28.96	24.87
		PM10(100µg / m3)	100	53.19	56.52	42.85	31.53	29.41	35.62	37.53	45.91	52.34	44.82	48.68	49.51	43.99
		NRPM (µg /m3)		56.59	58.45	45.31	36.26	32.34	39.54	40.95	49.14	56.71	48.26	53.79	55.34	47.72
		SPM(µg /m3)		109.78	114.97	88.16	67.79	61.75	75.16	78.48	95.05	109.05	93.08	102.47	104.85	91.72
		SO_2 (80 µg /m3)	80	8.12	8.05	7.14	5.48	5.16	5.36	7.01	7.61	8.09	7.11	8.06	9.15	7.20
		NO_X (80µg /m3)	80	15.42	16.04	15.12	10.82	13.56	10.92	13.24	11.38	13.95	12.28	13.48	16.5	13.56
		CO (2 mg /m3)	2000	0.5	0.5	0.38	0.31	0.35	0.31	0.39	0.4	0.35	0.43	0.3	0.31	0.38
4	A14 (Lachumani village)	RPM (µg / m3)														
		PM 2.5(60µg / m3)	60	31.33	35.88	25.21	14.14	16.46	19.42	20.29	20.96	22.47	31.92	23.62	26.84	24.05
		PM10(100µg / m3)	100	52.31	57.25	46.21	26.74	25.62	37.13	38.29	41.34	46.76	49.16	44.59	50.23	42.97
		NRPM (µg /m3)		55.74	59.81	49.68	31.54	28.63	39.92	40.64	45.72	49.23	53.57	50.24	54.72	46.62
		SPM(µg /m3)		108.05	117.06	95.89	58.28	54.25	77.05	78.93	87.06	95.99	102.73	94.83	104.95	89.59
		SO_2 (80 µg /m3)	80	7.84	7.56	6.42	5.06	5.01	5.67	6.5	6.84	8.26	6.78	8.25	8.46	6.89
		NO_X (80µg /m3)	80	14.83	15.56	13.34	12.13	11.62	11.67	12.21	11.51	13.74	11.44	12.25	14.95	12.94
		CO (2 mg /m3)	2000	0.51	0.46	0.39	0.28	0.3	0.29	0.41	0.42	0.36	0.4	0.29	0.33	0.37
5	A15 (Mundagahrati Village)	RPM (µg / m3)														
		PM 2.5(60µg / m3)	60	30.75	33.24	23.13	16.73	15.32	16.69	21.05	21.84	23.24	29.61	25.44	25.15	23.52
		PM10(100µg / m3)	100	55.93	53.47	45.43	29.23	24.93	31.54	40.68	53.15	49.23	48.71	46.72	47.42	43.87
		NRPM (µg /m3)		59.12	56.42	48.76	34.82	26.88	35.65	42.71	47.68	52.29	51.41	51.46	53.15	46.70
		SPM(µg /m3)		115.05	109.89	94.19	64.05	51.81	67.19	83.39	90.83	101.53	100.12	98.18	100.57	89.73
		SO_2 (80 µg /m3)	80	8.06	7.42	6.35	5.19	5.27	5.72	7.13	7.28	8.08	7.09	8.12	8.22	6.99
		NO_X (80µg /m3)	80	16.21	15.29	13.93	13.57	12.71	10.79	13.13	12.63	14.47	13.56	13.61	13.64	13.63
		CO (2 mg /m3)	2000	0.47	0.4	0.42	0.32	0.32	0.3	0.42	0.41	0.4	0.36	0.31	0.32	0.37

SANJAYA KUMAR PATNAIK
General Manager(Env.)
Bauxite Mine

ANNEXURE-II

GROUND WATER QUALITY ANALYSIS AROUND PANCHPATMALI SOUTH BLOCK BAUXITE MINE (2022-23)

For April 2022

Sl. No	Name of Tests	Permissible Limits	GW-1 Metingi Village	GW-2 Chhatamba Village	GW-3 Panasaput	GW-4 Jhariapadar	GW-5 Tentulipadar	GW-6 Ichhapur	GW-7 Mundagadati	GW-8 Bijaghati Village	GW-9 Putraghati Village	GW-10 Chararha Village	GW-11 Kapsiput Village	GW-12 Jambagurha Village	GW-13 Shriguda Village	GW-14 Kakirigumma Village	GW-15 Sorisha padar Village
1	pH at 30°C	6.5-8.5	6.8	6.9	6.9	6.8	6.8	6.9	6.9	6.8	6.8	6.8	6.8	6.9	6.9	6.8	6.9
2	D.O. (mg/l)	-	3.5	3.2	3.8	4	3.9	3.7	3.2	4	4.1	3.6	3.5	3.8	3.5	3.9	3.9
3	T.D.S (mg/l)	2000	160	60	69	54	40	55	321	93	67	114	32	113	56	33	53
4	Total Hardness. as $CaCo_3$	600	100	60	48	48	42	44	140	50	88	72	40	84	36	40	44
5	Total Alkalinity (as $CaCo_3$) (mg/l)	600	75	16	20	16	20	24	25	28	64	18	16	15	12	20	36
6	B.O.D.	30	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
7	Nitrate as No_3 (mg/l)	45	1.6	2.2	0.98	3.2	1.2	2.5	2	4.6	2.9	2.4	1.6	1.8	2	2.2	2.3
8	Chlorides as Cl (mg/l)	1000	32	8	10	10	15	16	18	20	20	22	8	16	12	8	8
9	Sulphate as SO_4 (mg/l)	400	30	4	8	4	2	5	30	15	4	10	2	25	3	3	4
10	Calcium as Ca (mg/l)	200	29	22	16	18	16	11	32	13	20	19	15	18	10	8	11
11	Magnesium as Mg (mg/l)	100	6.8	1.2	1.9	0.729	0.486	3.88	14.6	4.25	9.2	5.8	0.607	9.7	2.67	4.9	4
12	Turbidity (NTU)	10	1.6	2	12	2	4.8	3.5	2.8	12	10	4.8	3	3.2	2.8	3	5.4
13	Fluoride as F (mg/l)	1.5	<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
14	Phenlic compounds as C_6H_5OH (mg/l)	0.002	<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
15	Arsenic as As (mg/l)	0.01	<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
16	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
17	Lead as Pb (mg/l)	0.05	<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
18	Cadmium as Cd (mg/l)	0.01	<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	Chromium 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
20	Copper as Cu (mg/l)	1.5	<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
21	Zinc as Zn (mg/l)	15	<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	Iron as Fe (mg/l)	1	0.269	0.135	0.226	0.437	0.296	0.362	0.462	0.254	0.338	0.305	0.362	0.229	0.288	0.306	0.397
23	Temperature in 0^C	-	28°C	28°C	29°C	29°C	29°C	28°C	28°C	28°C	29°C	29°C	28°C	28°C	29°C	298°C	29°C
24	Coliform (MPN)	ND in 100ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

Norm as per IS 10500:2012

For August 2022

Sl No	Name of Tests	Permissible Limits	GW-1 Metingi Village	GW-2 Chhatamba Village	GW-3 Panasaput	GW-4 Jhariapadar	GW-5 Tentulipadar	GW-6 Ichhapur	GW-7 Mundagadati	GW-8 Bijaghati Village	GW-9 Putraghati Village	GW-10 Chararha Village	GW-11 Kapsiput Village	GW-12 Jambagurha Village	GW-13 Shriguda Village	GW-14 Kakirigumma Village	GW-15 Sorishapadar Village
1	pH at 30°C	6.5-8.5	6.6	6.8	6.9	6.7	6.8	6.9	6.6	6.7	6.8	6.8	6.73	6.7	6.6	6.8	6.8
2	D.O. (mg/l)	-	3.8	3.9	4	4	4.2	4.1	3.8	3.8	3.7	3.5	3.5	3.6	3.9	4	3.9
3	T.D.S (mg/l)	2000	232	66	76	49	98	327	389	107	96	461	361	66	100.9	64	75
4	Total Hardness. as $CaCo_3$	600	106	44	48	20	80	216	132	48	64	216	132	40	36	32	28
5	Total Alkalinity (as $CaCo_3$) (mg/l)	600	52	52	40	2-	28	164	32	40	72	92	64	8	4	4	12
6	B.O.D.	30	<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
7	Nitrate as No_3 (mg/l)	45	2.8	2.6	3.4	3.2	3.3	3.3	2.5	2.3	2.2	2.8	2.9	2.6	1.6	2.2	2.3
8	Chlorides as Cl (mg/l)	1000	44	4	8	8	20	36	100	20	12	108	32	4	8	16	8
9	Sulphate as SO_4 (mg/l)	400	<1.0	2	4	1	8	10	75	10	2	10.8	90	15	3	2	10
10	Calcium as Ca (mg/l)	200	27.2	11.2	11.2	8	17.6	59	38	11	16	53	32	9	8	9.6	8
11	Magnesium as Mg (mg/l)	100	12	3.88	4.86	<0.243	8.7	16.5	8.7	4.9	5.8	20.4	12.6	3.8	6.8	1.944	1.9
12	Turbidity (NTU)	10	4.2	4.6	4.5	5.8	3.5	72	65	96	8.8	6.5	4.6	5.8	10.8	12.6	25
13	Fluoride as F (mg/l)	1.5	<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
14	Phenlic compounds as C_6H_5OH (mg/l)	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
15	Arsenic as As (mg/l)	0.01	<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
16	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
17	Lead as Pb (mg/l)	0.05	<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
18	Cadmium as Cd (mg/l)	0.01	<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	Chromium 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
20	Copper as Cu (mg/l)	1.5	<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
21	Zinc as Zn (mg/l)	15	<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	Iron as Fe (mg/l)	1	0.323	0.306	0.225	0.116	0.106	0.152	0.246	0.288	0.303	0.298	0.304	0.306	0.304	0.225	0.362
23	Temperature in 0C	-	28°C	28°C	26°C	26°C	28°C	27°C	28°C	27°C	26°C	25°C	27°C	26°C	26°C	26°C	28°C
24	Coliform (MPN)	ND in 100ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

Norm as per IS 10500:2012

SANJAYA KUMAR PATNAIK
General Manager(Env.)
Kalahandi Bauxite Mine

For Nov 2022

Sl. No	Name of Tests	Permissible Limits	GW-1 Metingi Village	GW-2 Chhatamba Village	GW-3 Panasaput	GW-4 Jhariapadar	GW-5 Tentulipadar	GW-6 Ichhapur	GW-7 Mundagadati	GW-8 Bijaghati Village	GW-9 Putraghati Village	GW-10 Chararha Village	GW-11 Kapsiput Village	GW-12 Jambagurha Village	GW-13 Shriguda Village	GW-14 Kakiriguma Village	GW-15 Sorishapadar Village
1	pH at 30°C	6.5-8.5	6.9	6.9	6.8	6.8	6.9	6.9	6.8	6.9	6.9	6.8	6.8	6.9	6.9	6.9	6.8
2	D.O. (mg/l)	-	4.5	4.3	4.5	4.4	4.2	4.1	4.1	4.2	4.6	4.4	4.4	4.5	4.2	4.3	4.4
3	T.D.S (mg/l)	2000	175	69	65	317	96	124	316	84	92	120	132	63	4	169	166
4	Total Hardness. as $CaCo_3$	600	92	56	50	126	52	84	80	32	68	78	74	44	26	72	78
5	Total Alkalinity (as $CaCo_3$) (mg/l)	600	36	48	42	68	40	64	78	30	90	42	24	50	22	46	22
6	B.O.D.	30	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
7	Nitrate as No_3 (mg/l)	45	1.2	1.6	1	0.9	0.86	0/42	1.1	1.08	1.2	1.5	1.4	1.3	0.8	1.1	2.8
8	Chlorides as Cl (mg/l)	1000	36	2	10	82	6	18	100	10	2	16	24	2	4	40	48
9	Sulphate as SO_4 (mg/l)	400	10	3	2	20	3	5	12	<1.0	<1.0	10.2	8.6	<1.0	2	8	9
10	Calcium as Ca (mg/l)	200	22	11	16	30	11	22	18	10	17.6	18	17.6	11	5.6	20	20.8
11	Magnesium as Mg (mg/l)	100	8.7	6.8	2.4	12.2	5.8	6.8	8.3	1.5	5.8	7.8	7.8	7.3	2.9	5.3	6.3
12	Turbidity (NTU)	10	1	12	11	<1.0	1.3	1.2	3.5	4.2	1.1	1.3	1.2	1.2	1.3	2.8	1.2
13	Fluoride as F (mg/l)	1.5	0.09	0.06	0.05	0.243	0.161	0.082	0.08	0.112	0.06	0.07	0.122	0.226	0.227	0.221	0.162
14	Phenlic compounds as C_6H_5OH (mg/l)	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
15	Arsenic as As (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
16	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
17	Lead as Pb (mg/l)	0.05	<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
18	Cadmium as Cd (mg/l)	0.01	<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	Chromium 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
20	Copper as Cu (mg/l)	1.5	<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
21	Zinc as Zn (mg/l)	15	<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	Iron as Fe (mg/l)	1	<0.05	<0.05	<0.05	<0.05	0.16	0.13	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
23	Temperature in 0^C	-	18°C	18°C	18°C	18°C	18°C	18°C	20°C	20°C	20°C	20°C	20°C	20°C	20°C	20°C	20°C
24	Coliform (MPN)	ND in 100ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

Norm as per IS 10500:2012

SANJAYA KUMAR PATNAIK
General Manager(Env.)
Bauxite Mine
-763008

For Jan 2023

Sl. No	Name of Tests	Permissible Limits	GW-1 Metingi Village	GW-2 Chhatamba Village	GW-3 Panasaput	GW-4 Jhariapadar	GW-5 Tentulipadar	GW-6 Ichhapur	GW-7 Mundagadati	GW-8 Bijaghati Village	GW-9 Putraghati Village	GW-10 Chararha Village	GW-11 Kapsiput Village	GW-12 Jambagurha Village	GW-13 Shriguda Village	GW-14 Kakirigumma Village	GW-15 Sorisha padar Village
1	pH at 30°C	6.5-8.5	6.6	6.8	6.7	6.8	6.6	6.8	6.7	6.8	6.8	6.8	6.6	6.8	6.7	6.8	6.8
2	D.O. (mg/l)	-	3.2	3.6	3.8	3.2	3.3	3.8	3.6	3.5	3.7	3.6	3.2	3.4	3.8	3.9	3.7
3	T.D.S (mg/l)	2000	179	58	15	8	140	201	87	14	136	35	21	9	31	39	39
4	Total Hardness, as $CaCo_3$	600	104	16	16	12	140	200	76	4	84	24	24	16	28	32	32
5	Total Alkalinity (as $CaCo_3$) (mg/l)	600	20	8	12	8	116	160	64	8	28	12	20	12	16	36	16
6	B.O.D.	30	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
7	Nitrate as No_3 (mg/l)	45	4.6	3.8	4.2	4	3.2	2.9	2.6	2.2	2	2.5	2	2.8	1.8	2.9	3
8	Chlorides as Cl (mg/l)	1000	68	4	4	4	4	8	36	4	4	4	4	4	4	4	4
9	Sulphate as SO_4 (mg/l)	400	30	6	<1.0	<1.0	6	12	2	<1.0	18	2	<1.0	<1.0	3	2	4
10	Calcium as Ca (mg/l)	200	32	6.4	6.4	6.4	33.6	38.4	22	1.6	18	3.2	8	6	11	8	5
11	Magnesium as Mg (mg/l)	100	5.8	<0.243	<0.243	<0.243	13.6	25.3	5	<0.243	9.7	3.8	9.8	<0.243	<0.243	2.9	4.8
12	Turbidity (NTU)	10	<1.0	1.3	<1.0	<1.0	<1.0	7.8	1	<1.0	4.2	1.3	40	<1.0	<1.0	<1.0	7
13	Fluoride as F (mg/l)	1.5	<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
14	Phenlic compounds as C_6H_5OH (mg/l)	0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
15	Arsenic as As (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
16	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
17	Lead as Pb (mg/l)	0.05	< 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
18	Cadmium as Cd (mg/l)	0.01	< 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	Chromium 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
20	Copper as Cu (mg/l)	1.5	< 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
21	Zinc as Zn (mg/l)	15	< 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	Iron as Fe (mg/l)	1	0.762	0.286	<0.5	<0.5	0.527	0.203	0.362	0.09	0.116	0.102	0.116	<0.05	0.462	0.386	0.662
23	Temperature in 0C	-	20.2°C	20.6°C	21.5°C	19.6°C	20.5°C	20.6°C	19.8°C	20.8°C	20.8°C	21.1°C	20.6°C	20.8°C	20.2°C	19.9°C	19.8°C
24	Coliform (MPN)	ND in 100ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

Norm as per IS 10500:2012

SANJAYKUMAR PATNAIK
General Manager(Env.)
Panchpatmali Bauxite Mine

ANNEXURE-III

STATUS OF ACTION PLAN FOR WILD LIFE MANAGEMENT IN THE CORE ZONE OF THE PANCHPATMALI SOUTH BLOCK BAUXITE MINE

(Taken up by NALCO,the user agency)

SL.NO.	Action plan	Status
1	Plantation 80 ha with stone wall fencing	Mining activities have started at South Block in May 2017. Development of haul roads, peripheral barriers, etc have started in South Block in order to enable excavation of bauxite. Backfilling and plantation of mined out area has started from year 2021-22.
2	Provision of Van Sahayaks (two nos) to watch plantation	Already 7 no of watch and ward is provided to look after plantation done in south block along access roads, conveyor corridor, slopes, etc.
3	Noise pollution control	At present blasting has not started in South Block. All noise pollution control measures like use of NONEL in blasting,etc will be undertaken when blasting is adopted. At present other control measures like maintenance of vehicles, plantation of trees in mine periphery, provision of ear plug and ear muff to workers, etc. are being taken.
4	Dust pollution control	Use of mobile sprinklers is undertaken for suppression of dust in haul roads and stockpile areas. Dry fog system has been adopted in crushers. One fog cannon has been installed for dust suppression in stockpile area. Plantation along periphery,etc. is being taken up to prevent propagation of dust.
5	Water pollution control	All water pollution control measures like diversion of runoff to pit to prevent discharge of rain water down below the valley, treatment of vehicle wash water & canteen waste water , recycling of treated waste water, etc have been undertaken. 12 nos of check dams have already been constructed down below the valley to retain washout if any.
6	Contour trench staged to prevent soil loss and promote growth of grass	After reclamation and rehabilitation, the surface will become almost flat. Wherever required contour trenches will be provided.
7	Grass seeding to prevent soil erosion	There will be no soil loss from the mined out area as it will be surrounded by a in-situ peripheral barrier all around. However grass turfing with native grass species are being provided to prevent soil erosion wherever there will be slopes in the mined out area.
8	Water harvesting structure for wild life	Two nos of rain water harvesting structure already provided in South block. More nos will be provided as the mining progresses.
9	Barbed wire fencing to prevent falling of animal into the pit.	The mined out area will be almost flat after reclamation and rehabilitation for any animal to fall down into the pit. However wherever any such situation arises barbed wire fencing will be provided.
10	Fire line 12 km	Every year fire lines 5.5 km long on the western side and 3.6 km long on the eastern side of South Block are being provided depending upon the requirement to prevent spread of fire to the access road plantation and slope plantation during summer.
11	Fire watchers 2 nos	Fire watchers (7 nos) are provided throughout the year to report on fire incidence to fire brigade and also to fight minor fires.
12	Light pollution	High mast light is provided only along the haul road and stockpile area for safe working. It will not have any effect on other areas.
13	Signage	Signage have been put at strategic locations highlighting importance of maintaining environment.
14	Garbage management	Non-biodegradable waste is collected and dumped in mined out area. Biodegradable waste like canteen waste, etc. are collected and treated in 3 nos of biogas plants located in the Mines.

15	Awareness	Awareness among the employees and workers being created by organising mass plantation drives during celebration of World Environment Day, Vana Mahotsav Week, etc. Besides villagers in the surrounding area are being distributed fruit bearing trees every year to create awareness about importance of tree plantation and they are also explained about having compassion towards wildlife for maintaining a healthy ecosystem in the region.

01/04/23

(Rasheed Waris)
Group General Manager(Mines)

RASHEED WARIS
Group General Manager(Mines)
NALCO Mines, Damanjodi

ANNEXURE-IV

AMBIENT NOISE LEVEL MEASUREMENT IN AND AROUND PANCHPATMALI SOUTH BLOCK BAUXITE MINE FOR 2022-23

Sl. No.	Monitoring station code & its direction	Date	Noise level dB(A)		Date	Noise level dB(A)		Date	Noise level dB(A)		Date	Noise level dB(A)	
			Day	Night		Day	Night		Day	Night		Day	Night
1	View Point- S	21.04.2022	39.6	28.6	22.08.2022	44.8	30.9	19.11.2022	47.1	37.5	17.01.2023	48.7	34.8
2	Putraghati Village SW	21.04.2022	42.8	29.9	22.08.2022	43.2	39.4	19.11.2022	47.2	39.1	17.01.2023	47.2	37.1
3	Bhitara Bhejaput Village- NW	21.04.2022	46.8	36.5	23.08.2022	50.2	31.6	22.11.2022	53.1	39.3	18.01.2023	44.2	31.5
4	Lachumani Village- SW	21.04.2022	51.5	34.6	23.08.2022	52.3	38.4	22.11.2022	39.5	35.2	18.01.2023	43.1	34.2
5	Mundagahrati Village- NE	21.04.2022	46.6	36.5	23.08.2022	47.1	40.2	22.11.2022	35.1	39.3	19.01.2022	44.5	41.2
6	Near bridge 01 of cable belt conveyor	21.04.2022	39.6	28.6	23.08.2022	53.2	39.1	22.11.2022	31.2	31.4	18.01.2023	46.2	42.8
7	Below bridge 02 of cable belt conveyor	21.04.2022	42.8	29.9	23.08.2022	49.2	34.2	22.11.2022	33.2	33.3	18.01.2023	48.9	33.6
8	Near bridge 03 of cable belt conveyor	21.04.2022	46.8	36.5	23.08.2022	51.1	38.8	22.11.2022	37.5	37.1	18.01.2023	51.6	37.5
9	Near bridge 04 of cable belt conveyor	22.04.2022	43.8	43.5	23.08.2022	47.2	43.1	22.11.2022	41.3	39.6	18.01.2023	53.6	40.1
10	Below bridge 05 of cable belt conveyor	22.04.2022	46.5	39.5	23.08.2022	50.9	42.6	22.11.2022	34.3	33.5	18.01.2023	98.2	37.8
11	At kardiguda village Near bridge 04 of cable belt conveyor	22.04.2022	501	38.6	23.08.2022	52.6	34.1	22.11.2022	37.1	33.2	18.01.2023	49.5	37.6
12	Near bridge 06 of cable belt conveyor	22.04.2022	52.3	39.1	23.08.2022	48.1	38.2	22.11.2022	41.3	35.6	18.01.2023	48.2	33.5
13	Discharge gantry bridge	22.04.2022	53.5	40.7	23.08.2022	53.2	37.8	22.11.2022	33.1	39.4	18.01.2023	51.5	33.9

Norm			
Category of area/zone		Limits in dB(A) Leq	
		Day time	Night time
(A)	Industrial area	75	70
(B)	Commercial area	65	55
(C)	Residential area	55	45
(D)	Silence zone	50	40

SANJAYA KUMAR PATNAIK
General Manager(Env.)
Panchpatmali Bauxite Mine
NALCO, Damanjodi-763008

ANNEXURE-V

WASTE WATER ANALYSIS AT PANCHPATMALI SOUTH BLOCK BAUXITE MINE (2022-23)

Sl. No.	Parameter	NORM	WW1												WW2												Average	
			Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	WW1	WW2
1	Temperature (ºC)	-	30	28	28	15	30	28	22	20	20	21.8	28 3	28	30	28	28	15	30	28	22	20	20	21 6	28 6	28	24 280	24 260
2	pH Value	5.5-9.0	7	7	6 8	7	7	7	7	7	7	7	7	7	7	7	6 8	7	7	7	7	7	7	7 2	6 9	6 9	6 980	7.000
3	Dissolve Oxygen, mg/l	-	3 9	1 2	3 8	3 9	3 8	3 8	3 9	3 8	3 4	3 5	6	3 5	3 8	1	3 7	3 8	3 7	3 89	3 8	3 7	3 8	3 3	6 8	3 6	3 500	3 449
4	Total Dissolved Solids, mg/l	-	53	143	102	118	123	92	109	208	144	50	179	229	51	151	120	109	135	98	80 7	204	143	66	175	252	114 160	115 756
5	Total Hardness (as $CaCO_3$), mg/l	-	30	88	68	72	52	60	52	68	106	24	152	84	14	72	68	64	52	44	48	62	110	20	144	84	62 000	55 400
6	Suspended Solids mg/l	100	10	10	10	6	18	18	12	13	12	20	7	2	18	16	12	8	20	20	18	10	10	22	11	1	12 900	15 400
7	B O D mg/l 3 days at	30	<3.0	<3.0	<3.0	<3.0	< 3.0	18	24	15	17	<3.0	18	21	<3.0	<3.0	<3.0	<3.0	< 3.0	15	18	10	12	<3.0	24	16	<3.0	<3.0
8	C O D mg/l	-	6	57	4	27	8	210	120	60	64	75	57	106	8	60	6	81	7	90	88	45	56	60	65	82	63 100	50 100
9	Nitrate (as NO3), mg/l	-	2 5	2 8	4 8	9 5	7 6	8 6	4 6	1 5	5 5	4 8	4 5	4 5	2 8	18 1	6 6	5 8	8 2	7 8	3 8	1 8	6 8	4 5	5 6	8 6	5 220	6 620
10	Chloride as Cl – mg/l	-	20	56	8	16	12	10	32	46	17	20	16	128	16	60	16	12	32	12	12	54	17	16	16	132	23 700	24 700
11	Sulphate (as SO4), mg/l	-	5	3	8	5	8	6	1	25	12 6	4	4	8 5	7	<1 0	6	4	10	18	<1 0	22	13 7	3	4	8 8	7 760	10 463
12	Calcium (as Ca), mg/l	-	7 2	19 2	20 8	20 8	12 8	16	13	19	29 6	8	35	25 6	4	23 2	17 6	16	16	16	11 2	17	28 8	5	37	25 6	16 640	15 480
13	Magnesium (as Mg), mg/l	-	2 9	9 72	3 9	4 9	4 8	4 8	4 8	4 86	7 8	0 97	16	4 86	0 97	0 972	5 9	5 8	2 9	0 97	4 8	4 86	9 2	1 94	13	4 86	4 945	3 831
14	Fluoride as F , mg/l	2	1	<0 1	<0 1	<0 1	<0.1	0 73	<0 1	0 262	<0 1	<0 1	0 42	< 0 1	1 2	<0 1	<0 1	<0 1	<0 1	0 77	<0 1	0 29	0 12	<0 1	<0 1	< 0 1	0 662	0 595
15	Phenolic Compounds, (as C_6H_5OH) ,mg/l	1	<0 0 01	<0 00 2	<0 0 02	<0 0 02	< 0.002	<0 00 2	<0 0 02	<0 00 1	<0.01	< 1.0	< 1.0	0.06	<0 00 1	<0 00 2	<0 0 02	<0 0 02	< 0 002	<0 0 02	<0 0 02	<0 00 1	<0.01	< 1.0	< 1.0	0.09	<0.001	<0.001
16	Arsenic (as As), mg/l	0.2	<0 0 5	<0.05	<0 0 1	<0 0 5	< 0.01	<0.05	<0 0 5	<0.01	<0.2	< 0.01	< 0.2	< 0.01	<0.05	<0.05	<0 0 1	<0 0 5	< 0.01	<0 0 5	<0 0 5	<0.01	<0.2	< 0.01	< 0.2	< 0.01	<0.05	<0.05
17	Mercury (as Hg), mg/l	0.01	<0 0 01	<0 00 1	<0 0 01	<0 0 01	< 0.001	<0 00 1	<0 0 01	<0 00 1	<0.01	< 0.001	< 0.01	< 0.01	<0 00 1	<0 00 1	<0 0 01	<0 0 01	< 0.001	<0 0 01	<0 0 01	<0 00 1	<0.01	< 0 00	< 0.01	< 0.01	<0.001	<0.001
18	Lead (as Pb), mg/l	0.1	<0 0 1	<0.01	<0 0 1	<0 0 1	< 0.01	<0.01	<0 0 1	<0.01	<0.1	< 0.01	< 0.1	< 0.01	<0.01	<0.01	<0 0 1	<0 0 1	< 0.01	<0 0 1	<0 0 1	<0.01	<0.1	< 0.01	< 0.1	< 0.01	<0.01	<0.01
19	Cadmium (as Cd), mg/l	2	<0 0 01	<0.01	<0 0 1	<0 0 1	< 0.003	<0.01	<0 0 1	<0.01	<0 00 3	< 0.01	< 0.002	< 0.01	<0 00 1	<0.01	<0 0 1	<0 0 1	< 0.003	<0 0 1	<0 0 1	<0.01	<0 00 3	< 0.01	< 0.002	< 0.01	<0.01	<0.01
20	Chromium (as Cr^{+6}), mg/l	0.1	<0 0 5	<0.05	<0 0 5	<0 0 5	< 0.05	<0.05	<0 0 5	<0.05	<0.1	< 0.05	< 0.1	< 0 05	<0.05	<0.05	<0 0 5	<0 0 5	< 0.05	<0 0 5	<0 0 5	<0.05	<0.1	< 0.05	< 0.1	< 0.05	<0.05	<0.05
21	Copper (as Cu), mg/l	3	<0.0 4	<0.04	<0.0 4	<0 0 3	< 0.04	<0.04	<0.0 4	<0.04	<0.04	< 0.04	< 0.04	< 0.04	<0.04	<0.04	<0.0 4	<0.0 3	< 0.04	<0.0 4	<0.0 4	<0.04	<0.04	< 0.04	< 0.04	< 0.04	<0.04	<0.04
22	Zinc (as Zn) mg/l	5	<0.0 1	<0.01	<0.0 1	<0.0 1	< 0.01	<0.01	<0.0 1	<0.01	<0.01	< 0.01	< 0.01	< 0.01	<0.01	<0.01	<0.0 1	<0.0 1	< 0.01	<0.0 1	<0.0 1	<0.01	<0.01	< 0.01	< 0.01	< 0.01	<0.01	<0.01
23	Iron (as Fe), mg/l	3	0 6	<0.1	0 83	0 03	0 96	1	0 67	0 226	0 36	1	2 29	0 203	1 058	<0.1	0 98	1 22	0 89	1 2	0 56	0 38	0 45	0 65	2 27	0 215	0 629	0 821
24	Oil and grease	10	1	8 8	2 6	13	<0.1	2 5	<0.1	4 8	0 96	<0.1	2	2 4	1 2	9	2 9	10	<0.1	2 8	<0.1	2 6	0 9	<0.1	1 6	1 6	4 8089	4 199

WW1-treated water from Canteen

WW2-treated water from HEMM area

HEMM area

* Parameters are within permissible norms

NT- Not traceable

SANJAYA KUMAR PATNAIK