



Sub: Essential Documents Sought (EDS) on 12.9.2015

Proposal No. FP/CG/C/others/7694/2014

viii) Note: The hills of Deposit of Bacheli 5, 10 & 11 A show lot of slope destabilization and no safety zone fencing is seen. What steps have been taken by the NMDC is given.

The following are the stability measures undertaken by NMDC for slope stabilization:

(1) Stability of Measures undertaken for slope stabilization

NMDC Limited, Bailadila Iron Ore Mine, Bacheli complex is operating Deposit-5 and Deposit-10/11 A mines. The Mine lease area details and purpose wise break of Mine Lease area is described below.

S.N.	Particulars	Deposits		
		Deposit-5	Deposit-10	Deposit-11A
1	Mine Lease (Ha.)	540.05	309.34	233.509
2	Mining (Ha.)	167.480	125.52	8.75
3	Waste Dump (Ha.)	47.700	45.500	
4	Infrastructure (Ha.)		46.510	6.2
5	Blank or undisturbed area under (Ha.)	324.870	91.810	186.242

As evidenced from above table more than 50% area of above operating deposits are undisturbed natural forests working as buffer/safety barrier. NMDC limited is taking utmost care at Bailadila Iron Ore Mine, Bacheli Complex for ensuring the stability of leased out areas. The stability of leased out area is essential for safe operations and safety of man and machineries deployed at operating deposits. Till date no slope failure, bench merging etc has been reported from the area. The width and height of operating benches are properly maintained. Bund and drainage systems are maintained properly at mines. The detailed on site geo technical field investigations were conducted by mining Research Cell, Indian Bureau of Mines in October 2005. Following stabilization measures have been under taken for ensuring the stability of waste dumps as per the recommendations and protective measures suggested in



"Report on Geo-Technical Investigation for assessment of stability of Waste Dumps prepared by Mining Research Cell, Indian Bureau of Mines, 2005".

STABILIZATION MEASURES:-

The present dumping practices followed is single stage dumping of waste. The procedure of dumping involved transportation of waste material from the mines to a dump site, which is devoid of mineralization and natural valleys are being utilized for dump site selection.

During the initial years of working of Dep. 5 mine, the waste excavated from the top benches were dumped on the eastern side of the non mineralized mining lease area in central block. This waste dump had become static and has been stabilized by biological methods. Extensive plantation has been carried out over this dumps slope and top by making preparatory pits, transferring enriched soil. The natural growth of grass and local species, on these slopes and stabilized the dump.

Following measures are being undertaken for the stabilization of Waste Dumps

a) Geo Coir Matting:- The present waste dumps are being stabilized by using Geo-coir matting. The waste dumps initially provided with benches and sub benches to add the stability of the waste dumps. After making benches in waste dumps the mixture of good earth, manure and top soil is spread on slopes. Then the Geo textile made up of Coco Coir is being fixed on waste dumps mechanical using bamboo sticks and J and T hooks made up of Iron. After this grass seed and seeds of fast growing species sprayed on the fixed Geo Coir Textile. The root stock of perennial grasses such as Bamboo grass, Khus etc species are also being planted on the Geo- Textile. Till date about 6.0 hectare of waste dump are converted in natural grass field by using Geo coir matting.

b) Braodcast of Grass seeds:- The seeds of grass species and forbs are being purchased from reputed government institutes like CGFRI, Jhansi and CSWRI, Avikanagar. The above purchased seeds of grasses and forbs mixed with manures and fertilizers. After mixing of seeds with fertilizers, their broad cast being done on active waste dumps. The broad cast of grass seed practiced before the onset of monsoon. The broad cast of grass seeds on waste dumps is giving very good result ensuring the binding of loose waste dump soils through the roots of germinating grass and forbs.



PROTECTIVE MEASURES:-

Dump Slopes require adequate protection measures against any possible sliding and they are secured during the entire period of mining.

- Making flat top sloping inward to the hill to prevent flood water flow to the outside dump slopes
- After completion of dumping, small terraces formed with peripheral bunds to reduce erosion of gullies.
- At the toe Waste dump, Mesh crated retaining structure/ retaining wall and trench has been constructed for preventing rolling down of boulders and debris down slope.
- Check bunds and check dams have been constructed in natural nallah and water courses.
- Regular dozing is done to maintain the slope gradient which is varying from 25 to 32 degree from the horizontal.
- Dumping with safe sloping & proper drainage at and periphery of the dump.
- Garland drains are made all along the slope of waste dumps to restrict the mixing of waste dump's materials with surface run off.
- Progressive dumping from one end to the other to facilitate concurrent biological reclamation as soon as such area is available.
- Suitable garland and storm water drainage network to facilitate proper flow of precipitation run off and to restrict the mixing of waste dump's materials with surface run off.

Visit to these reclaimed/rehabilitated waste dumps would give an overall impression of an excellent example of a successful waste dump management in harmony with the local environment. These rehabilitated waste dumps became a training ground for environmentalist, forest personnel, NGOs, teachers and students. The multi layered dumps are stable and have remained safe and stable for decades and withstood heavy rain and other forces of the nature.

Besides above measures in core zone following measures have been undertaken for ensuring the stability of buffer zone

- A). Soil Erosion Control and Soil & Water Conservation Work through Dantewada Forest Division:** - Bailadila Iron Ore Mine, Bacheli Complex regularly signing agreement with DFO, Dantewada Forest Division for undertaking the Soil and Water conservation works in Bacheli Forest Range of Dantewada Forest Division. The work involves making of trenches in hills for water conservation, making check dams in different water sources along with



construction of Contour trench, loose boulder check dam, brush wood check dam and seeding etc. The above work envisages maintaining ecological balance and environmental improvement of the area. The work also aims to control the soil erosion of surrounding hills and help in recharge the ground water of the area. The details of above work are summarized below.

Year	Area Covered (Ha)	Amount Spent (Rs. lakhs)
2010- 2011	5534.137 of 19 forest compartments	178.63
2012-2013	4719.074 of 18 forest compartments	184.04
2014-2015	1326.485 of 5 forest compartments and construction of 166 check bunds on nallas flowing in buffer zone of BIOM, Bacheli Complex	106.42 (as 50% advance amount) (Agreement value - 212.84 lakh)

- B). Construction of Contour Bunds through Dantewada Forest Division:** - An Agreement signed with DFO, Dantewada on 24-05-2013 for the construction of 6.0 Contour bunds at the cost of **Rs. 29.52 lakh** in forest compartment no. 1831 and 1832 of Bacheli Forest Range. As per the terms of agreement **Rs.14.76 lakhs** (cheque No. 015355 dated 30-05-2013) and **Rs. 7.38 lakhs** (cheque No. 031288 dated 02-05-2014) was released as an advance payment to DFO, Dantewada. Construction of above 6 contour bunds has been completed.
- C). Construction of 5 additional check bunds through Dantewada Forest Division:** - Agreement signed with DFO, Dantewada on 13-04-2012 for the construction of 5.0 additional check bunds at the cost of **Rs. 23.60 lakh** in core and buffer zone of Bailadila Iron Ore Mine, Bacheli Complex. As per the terms of agreement, **Rs.11.80 lakhs** (cheque No. 015079 dated 04-05-2012); **Rs. 5.90 lakh** (cheque No. 031156 dated 14-08-2014) and **Rs. 1.09 lakhs** (cheque No. 024066 dated 28-12-2012) was released as an advance payment to DFO, Dantewada. Construction of above 5 check bunds has been completed.
- D). Construction of 8 new check bunds through Dantewada Forest Division:** - An Agreement signed with DFO, Dantewada on 16-12-2013 for the construction of 8 new check bunds at the cost of **Rs. 40.00 lakh** in nallas draining towards western side of Deposit-5. As per the terms of agreement **Rs. 20.00 lakhs** (cheque No. 903016 dated 20-12-2013) and **Rs. 10.00 lakhs** (cheque No.



031026 dated 16-06-2014) was released as an advance payment to DFO, Dantewada. Construction of 6.0 check bunds has been completed.

E). Reclamation works. Bailadila Iron Ore mine has made following payments with DFO, Dantewada for the reclamation of leased out Mining Leases:- At

present, all the mining benches are active and no passive areas are available for undertaking reclamation & rehabilitation. However, the mined out areas or free areas whenever will be available shall be undertaken for reclamation / rehabilitation. On the completed benches (or berms), peripheral bunds will be made and shrubs like Agave and phoenix will be planted. Recommended grasses will be grown on the slopes by spraying manure slurry mixed with seeds. Shrubs and native species of trees will be planted over the terraces after preparing the ground by making small pits and adding some soil with manure. The slope will be suitably stabilized and dense plantation of trees will be undertaken once the green cover / biomass are established. The water bodies will be developed to attract wild life. Once the top surface gets stabilized and infiltration of rain water increases thick and steady growth of natural vegetation can be ensured. The top of the hill already have local species of trees to survive against the wind and fog during rainy days. Besides above Bailadila Iron Ore Mine, Bacheli Complex has made following payments for the reclamation of mined out, waste dump and infrastructure area of Deposit-5, Deposit-10 and Deposit-10 Float ore Mining leases.

S.N.	Particulars	Deposit-5	Deposit-10	Deposit-10 Float Ore
1	Reclamation of Mining Areas	Rs.16,74,800 through Demand draft no. 197290 dated 19/07/2007 for reclamation of 167.480 hectare area	Rs. 12,55,200 through Demand draft no. 197290 dated 19/07/2007 for reclamation of 125.52 hectare area	
2	Waste Dumps and Infrastructure	Rs.4,74,800 through Demand draft no. 197355 dated	Rs.9,20,100 through Demand draft no. 197355 dated 15/09/2007 for reclamation of	Rs. 8,99, 000/- through Demand draft no. 197355 dated 15/09/2007 for reclamation of



	15/09/2007 for reclamation of waste dumps and infrastructure in 47.70 hectare area	waste dumps and infrastructure in 92.01 hectare area	infrastructure in 142.80
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- (2) **Measures undertaken for Fencing, protection and regeneration of safety zone area:-** Bailadila Iron Ore Mine, Bacheli Complex has deposited payments with Chhattisgarh State Forest Department for carrying out the Fencing, protection and regeneration of safety zone area of Deposit-5, Deposit-10 and Deposit-10 Float Ore Mining Leases as per following details.

S.N.	Particulars
1	<p><u>Deposit-5 Mining Lease</u></p> <p>Bailadila Iron Ore Mine Bacheli Complex has deposited Rs. 4,13,58,344.00 through demand draft no. 887653 dated 06/05/1999 with DFO, Dantewada Forest Division in response to his letter no. Carto./368 dated 03/04/1999.</p> <p>Rs. 4,13,58,344.00 deposited for following works</p> <ol style="list-style-type: none"> Fencing of Safety zone of 7.66 hectare area Protection of Safety Zone 7.66 hectare area Regeneration in safety zone 7.66 hectare area Plantation in 11.49 hectare (1.5 times of safety zone of 7.66 hectare area) of degraded forest elsewhere. Plantation in 798.51 hectare degraded forest area else where
2	<p><u>Deposit-10 and Deposit-10 Float Ore Mining Lease</u></p> <p>Bailadila Iron Ore Mine Bacheli Complex has deposited Rs. 2,57,32,610.00 through demand draft no. 865364 dated 25/06/1998 with DFO, Sukuma Forest Division in response to his letter no. Carto./942 dated 12/06/1998.</p> <p>Rs. 2,57,32,610.00 deposited for following works</p> <ol style="list-style-type: none"> Fencing of combined Safety zone (9.48 ha.) of Deposit-10 and Deposit-10 Float Ore Mining Lease Protection of combined Safety zone (9.48 ha.) of Deposit-10 and Deposit-10 Float Ore Mining Lease



	III. Regeneration in combined Safety zone (9.48 ha.) of Deposit-10 and Deposit-10 Float Ore Mining Lease
	IV. Plantation in 11.49 hectare (1.5 times of safety zone of 9.48 ha. area) of degraded forest elsewhere.
	V. Plantation in 668.52 hectare degraded forest area else where

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18/9/15

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