PRE-FEASIBILITY REPORT
FOR
NANDIRA UG- 0.33 MTY

1. INTRODUCTION

Nandira U/G mine (0.33 Mty) is located in the south-central part of Talcher coalfield, Angul district, Orissa. A project report for "Nandira Pilot Mine" was formulated by the then NCDC and approved by the Board of Director in Feb., 1962 for a capital investment of Rs.14.64 lakh. The development of the inclines was stopped in 1964 due to staggering market. This inclines was re-opened in the year 1969-70 to meet the demand of 0.5-1.0 Mty of superior grade coal for a coal based fertilizer plant to be set up by the Fertilizer Corporation of India (FCI) at Talcher. Subsequently, a feasibility report on Nandira U/G mine for 0.65 Mty production level was formulated by the NCDC and approved by the Govt. in Nov.1973 for an investment of Rs.724.35 lakh. Out of 0.65 Mty of targeted production, 0.50 Mty was linked to FCI, Talcher. In course of the development of the mine, severe difficulties were encountered in supporting the weak roof. Then the Polish Experts were consulted in 1977 to examine the mining technology inclusive of roof support. CdF(I), a subsidiary of the Govt. of France, was subsequently appointed as consultant in Jan, 1981 but the proposal of CdF(I) was ultimately dropped in June, 1989 due to adverse economic condition. To meet the growing demand of superior grade coal from the local market, it was then decided to work with bord and pillar using side discharge loader (SDL) with roof stitching and bolting for the roof support. This method of execution costing Rs.204.12 lakh was approved by the company Board in May, 1986 to increase the production level from 0.1 Mty to 0.18 Mty. The mine has produced 0.16 Mt of coal during 1990-91, against the targeted output of 0.18 Mty. In view of increasing demand of superior grade coal, it was proposed to augment the production of Nandira U/G mine from 0.18 Mty to 0.33 Mty.

- The Project Report (PR) for this project has been formulated with initial capital investment of Rs.17.96 crore in August, 1991 and it was approved by the then SECL Board on its 52nd Meeting on 12/08/1991.

2. STATUS OF THE PROJECT

Project report for Nandira U/G mine (0.33 Mty) has been approved by the then SECL Board on 09.12.1991.

Coal from this project is meeting the demand of Rourkela Steel Plant, Sponge Iron Plant at Keonjhar and other ancillary industries besides basket linkage for Talcher Coalfield.

STATUS OF ENVIRONMENT CLEARANCE

- EC for Nandira UG (0.33 Mty) has been obtained in June, 2007 from MoEF vide letter no J-11015/866/2007-IA.II(M) Dt.18/6/2007.

STATUS OF FOREST CLEARANCE

- Forest clearance was obtained for forest land 325.380 ha on vide letter no F.No-8-74/2004-FC DT-16.6.2009.

3. NEED / JUSTIFICATION FOR THE PROJECT

The Nandira UG mine (0.33 Mty) was obtained the environmental clearance under the provision of EIA Notification, 1994 and subsequent amendments. Now as per Gazette notification S.O 1530(E) on dated 06/04/2018, the projects obtained their environment clearances under EIA notification, 1994 are required to obtain environmental clearances under EIA notification, 2006. So the Form I and PFR is prepared for the extension of validity and regularization of EC under EIA notification, 2006.

Further, due to exhaustion of property in Nandira U/G, the lease area measuring 90.21 Ha was extended to Natraj U/G (New Mine) in the year 2005 and it was further extended upto 13.79 Ha in the NW direction of the mine. Working has been done in its expansion area in the year 2008 for which EC amendment is required.

The Public Hearing already held for the total mine lease area of 370.00 Ha & 483.227 Ha of Nandira Colliery & Natraj Colliery respectively. Since the proposed additional land (i.e.90.21 Ha) is coming from Natraj Colliery (for which the PH already held), the Public Hearing may be exempted for the revision of mine lease area (i.e. 474 Ha) of Nandira Colliery.

4. LOCATION AND COMMUNICATION

The project under study is located in the south-central part of Talcher Coalfield under Talcher Area of MCL. Some particulars are given below:

Coalfield	Talcher
Area	Talcher
District	Angul
Latitudes	20°55'24" to 20°56'24 N
Longitudes	85°05'34" to 85°07'57" E
Toposheet No.	F45 T1

➢ COMMUNICATION

Sl.No.	Item	Particulars
1.	Nearest town	Talcher, about 10 km away.
2.	Nearest road	Talcher - Gopal prasad road is about 8 km in the south 11 km to District HQs at Angul (on NH-42).
3.	National highways	NH-143 passes through Talcher and connects to NH-55. NH-55 is about 26 km via Talcher and about 15 km via NALCO Nagar.
4.	Connection to the state capital	160 km (approx.) to Bhubaneswar via NH-143, NH-55 & NH-16..
5.	Connection to the company HQs	200 km (approx.) to Sambalpur via NH-55.
6.	Nearest railhead	Talcher railway station on branch line of East Coast Railway is at a distance of about 10 km.
7.	Airport	Biju Pattanaik Airport in Bhubaneswar is at a distance of about 160 km.

5. TOPOGRAPHY, DRAINAGE AND CLIMATE

- The project area is pre-dominantly soil covered and gently undulating.
- The general slope is towards north.

- The general elevation of the area varies from 124.29 m to 161.91 m above MSL. The drainage is mainly controlled by the Brahmani river through streams like Bangaru Jhara and Nandira Jhara
- The project area experience a tropical climate with average annual rainfall of 1270 mm and mean minimum daily temperature of 6.7^{0}C and mean maximum daily temperature of 45.5^{0}C . Mean wind speed ranges from 1 km/hr to 8 km/hr.

6. GEOLOGY

The stratigraphic sequence of coal seam and their intervening parting as encountered in different boreholes is given in the following table.

Table 3.1: **Stratigraphic units/sequence of Talcher coalfield, Orissa. (after G.S.I., 1997)**

	Age	Formation	Thickness (m)	Lithology
	Quaternary	Recent	Around 40	Alluvial fills, sand, silt deposits and clay of older alluvium, older and younger flood plain deposits, channel fills, etc.
	Cenozoic	Laterite	Around 40	Laterites, laterised detrital pebble bed.
GONDWANA SUPER GROUP	Upper Permian to Lower Triassic	Undifferentiated Kamthi Formation	Above 575	Fine to medium grained light gray to reddish sandstone and shale at the base and pale greenish sandstones with rare shale and pink clay bands, ferruginous coarse grained to pebbly sandstone at top.
	---------- UNCONFORMITY ----------			
	Upper Permian	Barren Measures/ Formation	Upto 50	Greenish gray to buff colored pebbly, coarse to medium grained highly ferruginous sandstone with variable proportions of fresh K-feldspar.

Lower Permian	Barakar Formation	Upto 500	Medium to coarse-grained grayish feldspathic sandstone, gray to dark gray shale and coal seams.
Lower Permian	Karharbari Formation	Upto 300	Pale brownish yellow colored massive medium to coarse-grained sandstone containing clasts of Talchir shale and coal seams.
Upper Carboniferous to Lower Permian	Talchir Formation	Above 170	Diamictite, sandstone, needle shale, turbidite, rhythmite and varves.
---------- UNCONFORMITY ----------			
Precambrian	Metamorphics		Granites, gneisses and associated supracrustals.

❖ **Structure of Block**

Seam-I is found at depth of about 25m to 110m below the surface. It is almost flat with 20 - 40 dip towards the north. The Leasehold area has been intersected by a network of strike and oblique faults.

7. MINE BOUNDARIES

The adopted surface boundaries of project as per Mining plan and mine closure plan for 0.33 Mty are given below:

North : Surface barrier of Bharatpur OCP is taken as boundary

East : Surface barrier of Balanda OCP is taken as boundary

South : Faults F4-F4 & F1-F1 trending east-west are taken as boundary

West : Line joining boreholes TLR-151, CMTN-28 & CMTN-36

8. MINING TECHNOLOGY

The method of mining in Nandira UG mine is bord & pillar using SDL/LHD and belt conveyors for loading and coal transportation. In future new method of mining may be incorporated or used which suits the geo-mining condition of the mine.

9. PRESENT STATUS OF MINE

The Coal production from Nandira UG mine for last 10 years is given below:

Year	Coal in Mty
2008-09	0.233
2009-10	0.237
2010-11	0.222
2011-12	0.218
2012-13	0.229
2013-14	0.162
2014-15	0.149
2015-16	0.130
2016-17	0.121
2017-18	0.131
TOTAL	**1.832**

Balance coal of existing project is given below.

Balance coal reserve as on 1.9.2018 - 4.80 Mt

10. TARGETED OUTPUT, LIFE, RESERVE, PRODUCTION AND DUMPING SCHEDULE

The project has been planned for a production capacity of 0.33 Mt per annum.

The project will sustain a mine life for a period of 16 years of mining operations as on 01/09/18.

The summarised calendar programme of excavation is given below.

CALENDER PROGRAMME

Year	Coal in Mty
2018-19	0.21
2019-20	0.33
2020-21	0.33
2021-22	0.33
2022-23	0.33
2023-24	0.33
2024-25	0.33
2025-26	0.33
2026-27	0.33

Year	Coal in Mty
2027-28	0.33
2028-29	0.33
2029-30	0.33
2030-31	0.33
2031-32	0.33
2032-33	0.24
2033-34	0.06
Total	**4.80**

11. LAND REQUIREMENT

(a) Break-up of land involved (During-Mining):

Area in Ha

	Existing Land	Additional Land	Total
Forest	325.38	72.63	398.01
Non-Forest	44.62	31.37	75.99
Total	**370.00**	***104.00**	**474.00**
Outside Mining Lease Area	33.91	0.00	33.91
Total land Required	**403.91**	**104.00**	**507.91**

NB: * Out of 104 Ha expansion area 90.21Ha land was taken from Natraj UG (forest 72.63 Ha and non-forest 17.58 Ha) and rest 13.79 Ha taken from adjacent acquired area.

(b) POST MINING LAND USE:

Area in Ha

S.No	Item/Purpose	Plantation	Un-disturbed Forest	Built up Area	Un disturbed land	Total
1.	Mine Surface	---	398.01	---	65.99	464.00
2.	Surface Infrastructure (within ML area)	2.00	---	8.00	---	10.00
	Mine Lease Area (1+2)	2.00	398.01	8.00	65.99	474.00
3.	Surface Infrastructure (outside ML area) (Existing Colony and Future Colony)	6.98	---	26.93	---	33.91
Total Land Requirement (1+2+3)		**8.98**	**398.01**	**34.93**	**65.99**	**507.91**

12. WATER DEMAND AND SUPPLY ARRANGEMENT

The water supply arrangement basically includes potable and industrial water demand of the project.

(Fig. In KLD)

	Existing
Potable	620
Industrial	660
Total	**1280**

This is a running mine currently manpower is residing in the existing colony. There is no additional requirement of manpower.

Potable water is used after treatment by pressure filter plant installed at the project. Industrial water demand is being met from mine water.

13. PUMPING AND DRAINAGE

At Nandira mine there are 03 (three) 1000 GPM pumps which discharge water directly to the surface. Out of these three, two are discharging to surface through boreholes (11L & 40L) and the third one (Main dip) through the main incline. The discharge of this 3rd pump is used for fire fighting and also fed to the surface pressure filter for using as drinking water.

14. COAL WINNING AND TRANSPORTATION

It is envisaged to extract coal by caving (slicing) method. Solid blasting is in practice which will be continued for depillaring. Coal loading is done by side discharge loaders (SDLs) for loading into conveyors. Coal won from faces is brought to surface by a series of belt conveyors. There are two types of underground transportation system. Coal is being transported through pony belts, gate belts and main trunk belt conveyors. In the district, coal is loaded by SDLs onto the pony belts which discharges to the district main belts, then through gate belts and trunk belts. In this way, coal is transported upto the surface ground bunker, 1100 tonne capacity by belt conveyors. Under the bunker two vibratory feeder feed coal to the 20te bunker through reclaim belt conveyor. Coal is unloaded on to the trucks through vibratory feeder. One 80HP Direct haulage is installed on the surface for transportation of material to underground. From the ground bunker the coal is further transported to 20te despatch bunker by the reclaim belt from where it is dispatched by local trucks.

In the mine haulages are used only for material supply, track line laid up to the districts. Presently one surface direct haulage and six nos. of underground haulages are in use for the purpose.

15. MANPOWER

Existing manpower is 1441. No additional manpower is required for the project.

16. POWER SUPPLY

Power supply at 11kV comes from south Balanda sub-station of the area to Nandira sub-station, located at the mine sites, equipped with a transformer of 1 MVA (11/3.3 kV) capacity.

17. COAL HANDLING & DESPATCH ARRANGEMENT

Existing System

Coal from the face is loaded by SDLs into belt conveyors and transported to a ground bunker of 1100 tonne capacity. From the bunker coal is transferred to stock / siding by tippers.

Washing

There is no provision of coal washing in this project.

Dispatch

Coal from face is loaded by SDL into pony belts/gate and it is transported to surface via series of trunk belts up to the surface bunker.

Coal mined out of Nandira U/G mine is directly loaded into trucks for further dispatch to railway siding and some of the coal is transported via trucks to the end use plants for customers.

18. WORKSHOP AND STORE

There is workshop with the following facilities:

1. Machine Shop
2. Casting Shop

3. Electrical Repairing Shop
4. Black-smith Shop
5. Welding Shop

19. CIVIL CONSTRUCTION

It is an existing mine so further no civil construction is required.

20. DIVERSION OF ROAD AND DRAINAGE

No re-alignment of road and surface water course is proposed.

21. ENVIRONMENTAL MANAGEMENT

Routine Environment monitoring is done for the existing project. Four air as well as noise monitoring station were selected for the monitoring on fortnightly basis. Monthly once drinking water quality is measured and surface water quality is measured on quarterly basis.

22. SAFETY MANAGEMENT AND CONSERVATION

a) DETAILS OF FENCING AROUND ABANDONED QUARRY INDICATING THE LENGTH OF THE FENCING

Not Applicable.

b) MINE ENTRY SEALING ARRANGEMENTS AND SUBSIDENCE MANAGEMENT FOR UG MINES

SEALING DETAILS

Prior to designing any mine seals, the hydro- geological study must be done. This study determines if a hydraulic head could build up behind the seal and estimate what it would be. The estimated hydraulic head must be used in seal design calculations.

The thickness of mine sealing will be 100cm RCC (M20) with nominal reinforcement. For incline entry, the mine path of 5m will be filled with debris and clay before sealing the mine.

The inclines & shafts will be effectively sealed so that illegal mining from these openings and safety hazards due to fire and water, are prevented in the abandoned mine. The area around the mine shall be fenced and shall be guarded.

The land which may be damaged due to subsidence after depillaring, if any, will be properly restored with adoption of sound subsidence management. The land which will be subsided, will be restored by filling up soils/sands with proper leveling and grading. The land on the surface may be affected slightly due to subsidence after depillaring. Measures will be taken to strengthen this land. The damage if any will be made up by filing the cracks properly and then by fresh plantation.

c) PROVIDING ONE TIME LIGHTING ARRANGEMENT.

Adequate provision will be made for lighting the installations near strategic places by 2x250W HPSV lamps.

d) SLOPE STABILITY ARRANGEMENTS

Not Applicable.

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23. REHABILITATION AND RESETTLEMENT

No Village habitation is located on the surface of this mine. So resettlement and rehabilitation for displaced families are not necessary.

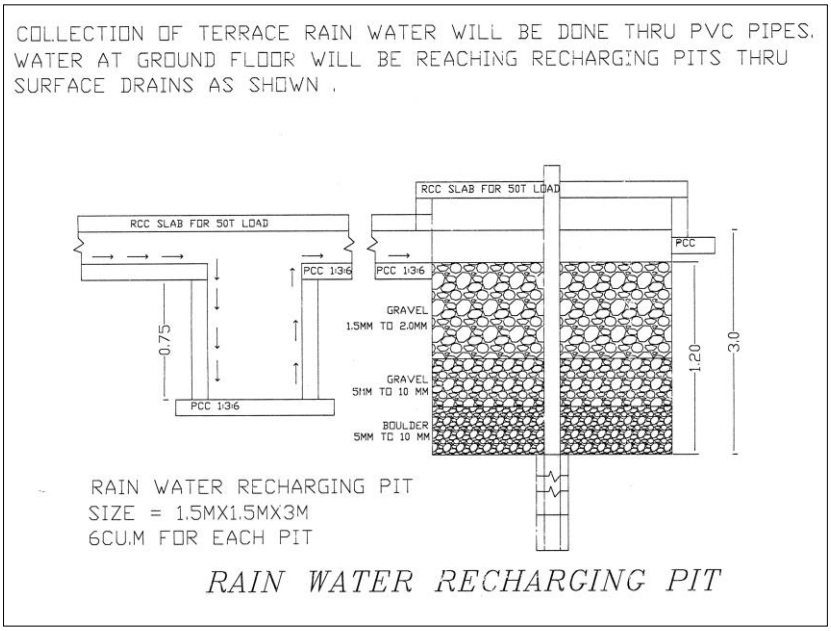
24. RAIN WATER HARVESTING

Rain water is naturally pure water except where it becomes acidic due to industrial pollution. The rapid exploitation of ground water as well as surface water due to the industrial developmental projects, increase in population resulted in acute scarcity of fresh water availability. It has become necessary to conserve this valuable natural resource for sustainable development.

Conservation of this valuable natural resource can be done by collecting this rain water scientifically and utilizing it either for drinking purposes or ground water recharging purposes.

Scientifically & technically designed system which helps us to collect and utilize the rain water effectively through various steps and collectively termed as “Rain Water Harvesting”.

The various steps/methods are roof top catchments, check dams, percolation pond, storage tanks, etc.



RAIN WATER RECHARGING PIT

22/09/2018

SANTOSH KUMAR MOHANTY

Date: 22/9/2018

Signature of the applicant PROJECT OFFICER(NM

With Name and Full Address NANDIRA COLLIERY, MCL

Place: NANDIRA COLLIERY
TALCHER AREA

(Project Proponent / Authorized Signatory)

Project Officer (M&M)
MCL, Nandira Colliery

F. No. 8-74/2004-FC
Government of India
Ministry of Environment and Forests
(F.C. Division)

Paryavaran Bhawan,
CGO Complex, Lodhi Road,
New Delhi – 110 003.
Dated: 16th June, 2009

To

The Principal Secretary (Forests),
Government of Orissa,
Bhubaneshwar.

Final approval

Sub: Diversion of 325.38 ha of forest land for renewal of Nandira Underground Mining Lease for coal mining in Talcher area in favour of M/s Mahanadi Coalfields Limited in Angul district, Orissa.

Sir,

I am directed to refer to State Government's letter No. 10F(Cons.)89/2004/1164/F&E dated 04.08.2004 on the above-mentioned subject wherein prior approval of the Central Government for diversion of 325.38 ha of forest land for renewal of Nandira Underground Mining Lease for coal mining in Talcher area in favour of M/s Mahanadi Coalfields Limited in Angul district, Orissa, was sought, in accordance with Section 2 of the Forest (Conservation) Act, 1980. After careful consideration of the proposal by the Forest Advisory Committee constituted by the Central Government under Section-3 of the said Act, in-principle approval for the said Mining Lease was granted vide this Ministry's letter of even number dated 12th /14th January, 2005 subject to fulfillment of certain conditions. The State Government has furnished compliance report in respect of the conditions stipulated in the in-principle approval and has requested the Central Government to grant final approval.

2. In this connection, I am directed to say that on the basis of the compliance report furnished by the State Government vide letter No. 10F(Cons)-58/2009-9001/F&E dated 16.05.2009, approval of the Central Government is hereby granted under Section-2 of the Forest (Conservation) Act, 1980 for diversion of 325.38 ha of forest land for renewal of Nandira Underground Mining Lease for coal mining in Talcher area in favour of M/s Mahanadi Coalfields Limited in Angul district, Orissa, subject to fulfillment of the following conditions:-

1. Legal status of forest land shall remain unchanged.
2. Wherever possible and technically feasible, the User Agency shall undertake afforestation measures in the blanks within the lease area (if the density is less than 0.4 area shall be afforested) as well as along the roads in consultation with the State Forest Department at the project cost.

3. The forest land shall not be used for any purpose other than as specified in the proposal.
4. The approval under the Forest (Conservation) Act, 1980 is in addition to the clearance under the Environmental Protection Act, 1986 and all other rules / regulations applicable to such project. .
5. The user agency will make arrangement for free supply of coal to labourers and staff working on the project site so as to avoid any pressure on the adjacent forest areas.
6. The period of permission for lease under the Forest (Conservation) Act, 1980 will be 20 years subject to valid mining lease under MCD Act, 1957.
7. Demarcation of mining lease area will be done on the ground at project cost using four feet high reinforced cement concrete pillars with serial numbers, forward and back bearings and distance from pillar to pillar at every 20 Meters.
8. The User Agency shall take up Afforestation inside the forest area in 100 m radius from the permitted lease area in consultation with the forest department if density of growth is less than 0.4.
9. No damage to the flora and fauna of the area shall be caused.
10. The user agency shall bear the cost of damage if any to the plantations existing and raised by the forest department on the surface.
11. It shall be ensured that no labor camps are set up inside the forest area.
12. Action initiated against officials for violation of the Forest (Conservation) Act, 1980, shall be completed and shall be reported to the Ministry/Regional Office, Bhubaneshwar. .
13. Any other condition that the State Govt. or the Chief Conservator of Forests (Central), Regional Office, Bhubaneshwar may impose from time to time for protection and improvement of flora and fauna in the forest area, shall also be applicable.

Yours faithfully,

(B.K. Singh)
Sr. Assistant Inspector General of Forests

Copy to:

1. The PCCF, Government of Orissa, Bhubaneshwar.
2. The Nodal Officer, O/o PCCF, Bhubaneshwar.
3. The Chief Conservator of Forests (Central), Regional Office, Bhubaneshwar.
4. The User Agency.
5. The Monitoring Cell, FC Division, MoEF, New Delhi.
6. Guard File.

(B.K. Singh)
Sr. Assistant Inspector General of Forests