

**BEFORE THE HON'BLE CENTRAL ELECTRICITY REGULATORY COMMISSION**  
**NEW DELHI**

PETITION NO. \_\_\_\_\_

**IN THE MATTER OF** : Petition Under Section 62 and 79 (1) (a) of the Electricity Act, 2003 read with Chapter-III of the Central Electricity Regulatory Commission (Conduct of Business) Regulations, 2023 and Regulation-9 read with Chapter-9 of Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2024 for approval of input price of coal supplied from Pakri Barwadih mine for the period from 01.04.2024 to 31.03.2029.

**AND IN THE MATTER OF** :

NTPC Limited

.....Petitioner


Versus

Bihar State Power Holding Company Ltd (BSPHCL) & Ors.

.....Respondents

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पवन देव जामटा/PAWAN DEV JAMTA  
उप महाप्रबन्धक (वाणिज्यिक)  
Deputy General Manager (Commercial)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

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**Filed By**

  
(Petitioner)

Place: Noida

Date: 27.11.2024

पवन देव जामटा/PAWAN DEV JAMTA  
उप महाप्रबन्धक (वाणिज्यिक)  
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**AND IN THE MATTER OF**

NTPC Limited

.....Petitioner

*Versus*

Bihar State Power Holding Company Ltd (BSPHCL) & Ors.

.....Respondents

**MEMO of Parties**

**AND IN THE MATTER OF :**

NTPC Ltd., Through its authorized Representative,  
NTPC Bhawan, Core-7, Scope Complex, 7, Institutional Area, Lodhi Road, New Delhi-110 003

.....Petitioner

*Versus*

Respondents

1. Bihar State Power Holding Company Ltd (BSPHCL), Vidyut Bhawan, Bailey Road, Patna - 800001.
2. North Bihar Power Distribution Company Ltd., Vidyut Bhawan, Bailey Road, Patna-800001
3. South Bihar Power Distribution Company Ltd., Vidyut Bhawan, Bailey Road, Patna 800001

4. Jharkhand Bijlee Vitaran Nigam Ltd.,  
Engineering Building, HEC Township, Dhurwa,  
Ranchi – 834004
5. GRIDCO Ltd.,  
Janpath, Bhubaneshwar – 751022
6. West Bengal State Electricity Distribution  
Company Ltd., Vidyut Bhawan, Bidhannagar,  
Block DJ,  
Sector-II, Salt Lake City,  
Kolkata – 700091
7. Power Department,  
Govt. of Sikkim,  
Kazi Road, Gangtok, Sikkim – 737101
8. Assam Power Distribution Company Ltd  
Bijulee Bhawan, Paltan Bazar,  
Guwahati – 782001
9. Meghalaya Energy Corporation Ltd  
Short Round Road,  
Shillong – 793001
10. Department of Power  
Government of Arunachal Pradesh,  
System operation & Power System  
Communication, SLDC Itanagar,  
Itanagar-791111
11. Power and Electricity Department  
Govt. of Mizoram  
Aizawal, 796001
12. Manipur State Power Distribution Company Ltd.  
Khwai Bazar, Keishampat,  
Imphal 795001
13. Department of Power  
Govt of Nagaland, Electricity House,  
Below A.G Office, Kohima-797001

  
**पवन देव जामटा/PAWAN DEV JAMTA**  
 उपाय महाप्रबन्धक (व्यापारिक)  
 Deputy General Manager (Commercial)  
 एन टी पी सी लिमिटेड/NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)



Nagaland

14. Tripura State Electricity Corporation Limited  
Bidyut Bhawan, North Banamalipur  
Agartala – 700001  
Tripura
15. Uttar Pradesh Power Corporation Ltd.  
Shakti Bhawan, 14, Ashok Marg,  
Lucknow, UP- 226001.
16. Rajasthan Urja Vikas Nigam Limited (RUVNL)  
Vidyut Bhawan, Janpath,  
Jaipur – 302005 (Rajasthan)  
(On Behalf of Discoms of Rajasthan)
17. Tata Power Delhi Distribution Limited,  
NDPL House, Hudson Lines  
Kingsway Camp  
Delhi-110009
18. BSES Rajdhani Power Limited,  
BSES Bhawan, 2nd Floor, B-Block,  
Behind Nehru Place Bus Terminal,  
Nehru Place, New Delhi – 110019
19. BSES Yamuna Power Limited,  
2nd Floor, B Block, Shakti Kiran Building,  
Near Karkardooma Court,  
New Delhi – 110092
20. Haryana Power Purchase Centre,  
Shakti Bhawan, Energy Exchange,  
Room No. 446, Top Floor, Sector-6,  
Panchkula- 134109
21. Punjab State Power Corporation Limited,  
The Mall, Patiala-147001
22. Himachal Pradesh State Electricity Board,  
Vidyut Bhawan,  
Kumar House Complex Building II,  
Shimla – 171004

23. Jammu And Kashmir State Power Development Corporation Limited (JKSPDC Ltd)  
Opposite J&K High Court, Srinagar,  
Jammu and Kashmir -190009.
24. Chandigarh Electricity Department (CED),  
Opp. Divn. No. 2 Industrial Area Ph-1 BBMB  
Complex, Chandigarh - 160002
25. Uttarakhand Power Corporation Limited,  
Urja Bhawan, Kanwali Road,  
Near BalliWalaChowk, Dehradun -248001
26. Madhya Pradesh Power Management Company  
Limited (MPPMCL)  
Block No-11, Ground floor,  
Shakti Bhawan, Vidhyut Nagar, Rampur,  
Jabalpur-482008  
Madhya Pradesh
27. Maharashtra State Electricity Distribution  
Company Limited (MSEDCL)  
Prakashgad, 4th Floor, Bandra (East),  
Mumbai - 400051
28. Gujarat Urja Vikas Nigam limited (GUVNL)  
Vidhyut Bhawan, Race Course,  
Vadodara - 390007
29. Chhattisgarh State Power Distribution Company  
Limited (CSPDCL)  
P.O Sunder Nagar, Dangania,  
Raipur-492013,  
Chhattisgarh
30. Goa Electricity Department (ED), Govt. of Goa  
Aquem Alto, Margao, Goa - 403601
31. DNHDDPDCL,  
1st & 2nd Floor, Vidyut Bhavan,  
Silvassa, Dadar Nagar Haveli - 396230

32. AP Eastern Power Distribution Company Ltd.  
P&T Colony, Seethmmadhara,  
Vishakapatnam, Andhra Pradesh – 530013
33. Southern Power Distribution Company of Andhra Pradesh Ltd (APSPDCL)  
APPCC, Vidyut Soudha, Gunadala,  
Vijayawada, ANDHRA PRADESH – 520004
34. Telangana State Northern Power Distribution Company Ltd.  
H. No 2-5-31/2, Vidyut Bhavan, Nakkalagutta,  
Hanamkonda, Warangal-506001
35. Telangana State Southern Power Distribution Company Ltd.  
Mint Compound, Hyderabad-500063
36. Electricity Department,  
Govt. of Puducherry,  
137, NETAJI SUBASH CHANDRA BOSE  
SALAI,  
Puducherry - 605001
37. Tamil Nadu Generation and Distribution Corporation Ltd.  
NPKRR  
Maaligai, 144, Anna Salai, Chennai-600002
38. Kerala State Electricity Board  
Vaidyuthi Bhavanam,  
Pattom, Trivandrum – 695004, Kerala
39. Power Company of Karnataka Limited (PCKL)  
KPTCL Building, Kaveri Bhavan  
Bangalore-506009 Karnataka
40. Bangalore Electricity Supply Company  
K.R. Circle, Bangalore-506001 Karnataka
41. Mangalore Electricity Supply Company Limited  
(MESCOM, MESCOM BHAVANA, KAVOOR  
CROSS ROAD, BEJAI, Mangalore,  
KARNATAKA – 575004

42. Chamundeshwari Electricity Supply Corporation  
No.29, Corporate Office CESC Mysore,  
Vijayanagar 2nd Stage, Hinkal, Mysuru-570 017
43. Gulbarga Electricity Supply Corporation Station  
Road, Gulbarga, Karnataka-585102
44. Hubli Electricity Supply Company  
Navanagar,  
PB Road, Hubli, Karnataka- 580025

**MOST RESPECTFULLY SHOWETH:**

**SUMMARY OF THE PETITION: 2024-29 Petition for determination of input price of coal supplied from Pakri Barwadih mine.**

(In compliance with CERC notice dated 07.06.2024)

The major highlights of the Pakri Barwadih input price determination petition are as follows: -

1. The present petition is being filed under Section 62 and 79 (1) (a) of the Electricity Act, 2003 read with Chapter-III of the Central Electricity Regulatory Commission (Conduct of Business) Regulations, 2023 and Regulation-9 read with Chapter-9 of Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2024 for approval of input price of coal supplied from Pakri Barwadih mine for the period from 01.04.2024 to 31.03.2029.
2. Pakri Barwadih is an integrated mine (basket type) located at District Hazaribagh, Jharkhand. Pakri Barwadih started commercial operation (COD) on 01.04.2019. In terms of the allotment order, coal supplied from Pakri Barwadih is being used in various end use generating stations of NTPC. The power generated from the end use generating stations is being supplied to the respondents herein.
3. The input price of Pakri Barwadih for the period from 01.04.2019 (COD) to 31.03.2024 is yet to be determined by the Hon'ble Commission in Petition No. 60/MP/2022 (The petition is under consideration of the Hon'ble Commission). The capital cost claimed for determination of input price in petition no. 60/MP/2022 included the projected additional capital expenditure up to 31.03.2024.
4. Subsequently, the true up petition vide affidavit dated 27.11.2024 has been filed for revision of input price of Pakri Barwadih for the tariff period 2019-24 (i.e. COD 01.04.2019 to 31.03.2024) after the true up exercise based on actual expenditures as on 31.03.2024 as per provisions of Regulation 13 of CERC Tariff Regulations 2019 and subsequent second amendment, 2021.

5. The closing capital cost as on 31.03.2024 as per the above mentioned true up petition has been taken as opening capital cost as on 01.04.2024 as per provisions of Tariff Regulation 2024. The capital cost as on 31.03.2029 includes projected additional capital expenditure for FY 2024-25, 2025-26, 2026-27, 2027-28 & 2028-29 the same has been depicted in Form 9 of the Appendix-I along with applicable regulations and justification for the claims. It is humbly requested to approve the projected Additional Capital expenditure claimed during the period of 2024-29.

In the light of above submission and as per the Petition being filed by the Petitioner for determination of input price of Pakri Barwadih Coal Mine project, the Hon'ble Commission may please approve the input price of coal supplied from Pakri Barwadih Coal mine for the tariff period 2024-29 as per provision of Regulation 9 read with Chapter-9 of the CERC Tariff Regulations, 2024.

  
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NTPC Limited

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.....Respondents

**MOST RESPECTFULLY SHOWETH:**

The Petitioner humbly states that:

- 1) The Petitioner herein NTPC Ltd. (hereinafter referred to as '**Petitioner**' or '**NTPC**'), is a company incorporated under provisions of the Company Act, 1956 and a Government Company as defined under Section 2(45) of the Companies Act, 2013. Further, NTPC is a 'Generating Company' as defined under Section 2(28) of the Electricity Act, 2003.
- 2) In terms of Section 79(1)(a) of Electricity Act, 2003, the Hon'ble Commission has been vested with the functions to regulate the tariff of NTPC, being a Generating Company owned and controlled by the Central Government. The regulation of the tariff of NTPC is as provided under Section 79(1)(a) read with Section 61, 62 and 64 of the Electricity Act, 2003 and the Regulations notified by the Hon'ble Commission in exercise of powers under Section 178 read with Section 61 of the Electricity Act, 2003.

  
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EOC, A-8A, Sector-24, Noida-201301 (U.P.)

3) It is submitted that integrated coal mines (both captive mines and basket mines) have been allocated to NTPC for specified end use generating stations, whose tariff is determined by the Commission under Section 62 of the Act. Pakri Barwadih coal mine (hereinafter referred to as '**Pakri Barwadih**') is one such coal mine (basket type) which has been allocated to NTPC Ltd under the Coal Mines (Nationalization) Act, 1973 for use in any of its generating stations. Pakri Barwadih is located in Hazaribagh district of Jharkhand State. The power generated from the end use generating stations is being supplied to the respondents herein above.

4) The Hon'ble Commission has notified the Central Electricity Regulatory Commission (Terms & Conditions of Tariff) Regulations, 2024 (hereinafter 'Tariff Regulations 2024') which came into force from 01.04.2024, specifying the terms & conditions and methodology of tariff determination for the period 01.04.2024 to 31.03.2029.

5) Clause (2) of Regulation 2 of Tariff Regulations 2024, as amended, provides as under:

*"(2) These regulations shall also apply in all cases where a generating company has the arrangement for the supply of coal or lignite from the integrated mine(s) allocated to it, for one or more of its specified end use generating stations, whose tariff is required to be determined by the Commission under section 62 of the Act read with section 79 thereof."*

6) Regulation 9(4) of Tariff Regulations 2024 provides as follows:

*"(4) Where the generating company has the arrangement for the supply of coal or lignite from an integrated mine(s) to one or more of its generating stations, the generating company shall file a petition for determination of the input price of coal or lignite for determining the energy charge along with the tariff petitions for one or more generating stations in accordance with the provision of Chapter 9 of these regulations:*

*Provided that a generating company with integrated mine(s) shall file a petition for determination of the input price of coal or lignite from the integrated mine(s) not later than 90 days from the date of actual commercial operation of the integrated mine(s) in accordance with these regulations."*

In terms of above, the Petitioner is filing the present petition for determination input price of coal supplied from Pakri Barwadih mine for the period from 01.04.2024 to 31.03.2029 as per the Tariff Regulations, 2024.

- 7) It is submitted that Petition No. 60/MP/2022 was filed by the Petitioner before the Hon'ble Commission for determination and approval of input price of coal supplied from Pakri Barwadih coal mine based on the actual capital cost as on COD of Pakri Barwadih (i.e. 01.04.2019) and projected additional capital expenditure for the period from 01.04.2019 to 31.03.2024.
- 8) The said petition is under active consideration of the Hon'ble Commission and the order for approval of input price of coal for Pakri Barwadih for the period from 01.04.2019 to 31.03.2024 is yet to be issued by the CERC in Petition No. 60/MP/2022.
- 9) Subsequently, the petitioner vide affidavit dated 27.11.2024 had filed a separate true up petition for the period 01.04.2019 to 31.03.2024 for revision of input price in line with the applicable provisions of Tariff Regulations 2019 as amended.
- 10) The closing capital cost as on 31.03.2024 as per true up petition has been taken as opening capital cost as on 01.04.2024 as per provisions of Tariff Regulation 2024. The capital cost as on 31.03.2029 includes projected additional capital expenditure for FY 2024-25, 2025-26, 2026-27, 2027-28 & 2028-29 the same has been depicted in Form 9 of the Appendix-I along with applicable regulations and justification for the claims. It is humbly requested to approve the projected Additional Capital expenditure claimed during the period of 2024-29.
- 11) As submitted above, the actual closing capital cost as on 31.03.2024 has been worked out in the above aforesaid true-up petition as Rs. 4,711.16 Cr based on the actual expenditure after truing up exercise for the period 2019-24. Accordingly, the opening capital cost as on 01.04.2024 has been considered as Rs 4,711.16 Cr in the instant petition. The Hon'ble Commission may be pleased to accordingly determine the input price in the present petition for the period 2024-29.



## RE: REVISED COST ESTIMATE

- 12) The investment approval of the Pakri Barwadih Coal Mine project was accorded by NTPC Board at its 360th meeting held on 12.11.2010 at a project cost of Rs. 3193.86 Crs as of price level of 1st Qtr. 2010 for 15 MTPA capacity.
- 13) For acquisition of land, compensation package for Pakri Barwadih mine was approved by Govt of Jharkhand in Feb 2013. Subsequently, in view of demand of the project affected persons for increased compensation, revised Compensation cum R&R package was approved by Jharkhand administration in March 2015. Revised compensation packages were approved by NTPC board as and when these were cleared by Govt of Jharkhand. With the revised compensation packages approved by NTPC Board, overall approved project cost of Pakri Barwadih mining project as on 26.12.2020 was Rs.5044.60 Crs.
- 14) Subsequently, NTPC Board at its 535th meeting held on 07.10.2023 accorded an investment of Rs. 523.92 Crs for doubling of rail track between Hazaribagh and Banadag.
- 15) As mentioned above, the Board of NTPC vide its 360th, 387th, 393rd, 418th, 492nd and 535th meetings had approved a total of Rs. 5,568.60 Crores for meeting the investment requirements of the Project. Relevant Board approvals are attached hereto and marked as **Annexure – A.**
- 16) Subsequently, Revised Cost Estimate (RCE) for Pakri Barwadih was accorded by NTPC Board at its 542nd meeting held on 29.04.2024 at a project cost of Rs. 10,323.09 Crs as of price level of 4th Qtr. 2023. Copy of the RCE approval accorded by NTPC Board is attached as **Annexure - B.**
- 17) It is submitted that the reason for increase in the RCE as compared to the Investment Approval cost is given as under:
- a) Increase in land cost (increase in lease rent for GM Land), registration charges and cost of transfer of GM-JJ land.

- b) Increase in cost of assets on private land.
- c) Increased cost of forest diversion based on demand from the State Government.
- d) Certain scope changes have also led to increase in the projected completion cost of the project. Major scope changes are as under:
  - i) Yard augmentation works at railway siding due to change in design and location of silo.
  - ii) Requirement of additional crushers for increased material handling capacity.
  - iii) Doubling of railway track between Banadag siding and Hazaribagh to support the increased rake dispatch.
  - iv) Last mile connectivity of CHP awarded as separate package with changed layout, drawings etc.
  - v) Completion of works for Nala diversion through WAPCOS and construction of additional check dams as stipulated in forest clearance conditions.
  - vi) Construction of integrated township etc.

A statement showing variation between the Investment Approval cost (including subsequent approvals by the NTPC Board) and the RCE is attached as **Annexure - C**.

#### **RE: REVISED MINING PLAN**

- 18) It is submitted that the Mining Plan (First Revision) for the Pakri Barwadih coal block comprising of West & East part and North-West part was approved by MoC, GoI for peak rated capacity of 18 MTPA on 07.03.2016. Copy of the Mining Plan dated 07.03.2016 is attached as **Annexure - D**.
- 19) Subsequently, in compliance to the directions of the Ministry of Coal (MoC) and Ministry of Power (MoP) to all producers to raise the Peak Rated Capacity (PRC) of captive mines and make all out efforts to increase the production of coal from captive mines in a fair and transparent manner, second revision of Mining Plan of Pakri Barwadih West & East part



and North-West was approved in September, 2023 with revised peak rated capacity of 22 MTPA (19 MTPA of West & East part and 3 MTPA of North-West part). Copy of the Mining Plan (Second Revision) attached as **Annexure – E**.

- 20) Subsequent to the second revision in the Mining Plan, approvals of statutory clearances like Environment Clearance (EC), Forest Clearance (Stage II), Consent to Operate (CTO) & Consent to Establish (CTE) were received in March, 2024.
- 21) Accordingly, all the tariff calculations in this true up petition are in terms of the Mining Plan (Second Revision) approved in September, 2023.
- 22) As brought out above, the capital cost claimed in the instant petition is based on the opening capital cost as on 01.04.2024 considered as above and projected estimated capital expenditures claimed for the period 2024-29 under Regulation 41 and Regulation 42 of the Tariff Regulations, 2024. The input price has been calculated based on parameters provided in Tariff Regulations, 2024, as amended as depicted below:
- A. **Debt: Equity ratio:** 70:30.
- B. **Base rate of return on equity:** This has been considered as 14%.
- C. **Rate of interest on loan:** It has been considered based on actual weighted average rate of interest of the project.
- D. **Depreciation:** Straight line depreciation has been calculated as per life of assets mentioned in **Appendix III** to CERC Tariff Regulations, 2024.
- E. **O&M expenses:** O&M expenses have been claimed based on actual O&M expenses for the year 2023-24 and the same has been escalated @ 5.25% per year for subsequent years. It is further submitted that the O&M expenses are subject to truing up in terms of Tariff Regulations, 2024, as amended.
- F. **Statutory expenses:** These expenses have been indicated as applicable as on date. Any increase or decrease in statutory expenses shall be submitted at the time of truing up. It is submitted that GST @ 5% is applicable on coal along with GST Compensation Cess @ Rs. 400/- per Ton.

G. **Additional Capitalization:** The year-wise projected additional capital expenditure has been claimed under the Form-9 of the tariff forms and enclosed as part of Appendix-I herewith.

H. **Mining Charge:**

- i. Tariff Regulations, 2024, provides that MDO mining charge shall be allowed as part of input price of coal.
- ii. MDO mining charge has been claimed as per the Letter of Award issued to MDO and the agreement signed with the MDO.
- iii. In terms of the agreement signed with MDO, mining fee is subject to escalation based on pre-defined formula.
- iv. The mining charges for the tariff period from 01.04.2024 to 31.03.2029 has been claimed based on the mining charge claimed for FY 2023-24 after taking into consideration the escalation paid to MDO in terms of the MDO Agreement during FY 2023-24. Mining Charges has been escalated @ 5.25% per year for subsequent years.
- v. It is submitted that for future period, Hon'ble Commission may be pleased to allow to bill the input price of coal based on quarterly escalated price of MDO to avoid accumulation of arrears. Detailed calculation in regard to escalation of MDO price shall be submitted before the Hon'ble Commission at the time of truing up.
- vi. It is also submitted that the contract with MDO also contains the provisions for adjustment of mining fee based on actual stripping ratio. However, the clause (4) of Regulation 51 of Tariff Regulations, 2024, provides for adjustment of input price of coal in case shortfall of overburden removal during any year is not made good by the generating company by adjusting such shortfall against excess of overburden removal, if any, during the subsequent three years. Therefore, adjustment of input price of coal due to shortfall in overburden removal shall be submitted before the Hon'ble Commission at the time of truing up. Hon'ble Commission may be pleased to allow the same.

  
पवन देव जामटा/PAWAN DEV JAMTA  
उप महाप्रबन्धक (वणिज्यिक)  
Deputy General Manager (Commercial)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

I. **Mine Closure Expenses:** It is submitted that the mine closure expenses claimed for the tariff period from 01.04.2024 to 31.03.2029 are as per the provisions of the Regulations 48 of Tariff Regulations, 2024 and are based on the amounts to be deposited in the Escrow Account for respective years as per the Mining Plan.

J. **Annual Target Quantity (ATQ):**

- i. It is submitted that sub-clause (5) of Regulation 3 of CERC Tariff Regulations, 2024 defines that the ATQ in respect of an integrated mine(s) means the quantity of coal or lignite to be extracted during a year from such integrated mine(s) corresponding to 85% of the quantity specified in the Mining Plan.
- ii. Further, the sub-clause (2) of Regulation 39 of CERC Tariff Regulations, 2024 provides that the Run of Mine Cost of coal in case of integrated mine allocated through allotment route under Coal Mines (Special Provisions) Act, 2015 shall be worked out as under:

*ROM Cost = [(Annual Extraction Cost / (ATQ or Actual production whichever is higher) + Mining Charge] + (Fixed Reserve Price).*

- iii. As mentioned above, the ROM Cost is also dependent on the actual production of coal during a year. However, the details of actual production for the tariff period 2024-29 shall be available in due course of time. In view of the same, the quantity specified in the Mining Plan has been considered as ATQ for calculation of the ROM Cost in the instant Petition. However, same shall be replaced with the ATQ or Actual production quantity in terms of the Regulation 39 (2) of CERC Tariff Regulations, 2024 during truing up.

23) The Petitioner further respectfully submits that the wage/ salary revision of the employees of the Petitioner will be due with effect from 01.01.2027. As per Regulation 36(1)(8) of the Tariff Regulations 2024, the impact on account of implementation of wage/ pay revision shall be allowed at the time of truing up of tariff. The Petitioner therefore craves liberty to



approach the Hon'ble Commission for allowing the impact on account of implementation of wage/ pay revision of the employees of the Petitioner with effect from 01.01.2027, based on the actual payments whenever paid by it.

- 24) The petitioner has accordingly calculated the input price for supply of coal from Pakri Barwadih mine for 2024-29 period based on the above and the same is enclosed as **Appendix-I** to this petition.

**RE: FILING FEE**

- 25) It is submitted that the Petitioner has already paid the requisite filing fee. The proof of payment of fees is being submitted in Form I specified under Regulation 12 of the Central Electricity Regulatory Commission (Payment of Fees) Regulations, 2012, as amended from time to time. Further Regulation 94 (1) of Tariff Regulations 2024 provides that the application fee and publication expenses may be allowed to be recovered directly from the beneficiaries at the discretion of the Hon'ble Commission. Accordingly, it is prayed that Hon'ble Commission may be pleased to allow recover filing fee and publication fee directly from the beneficiaries.
- 26) It is submitted that the Petitioner has uploaded the copy of the Petition at CERC site (Saudamini), the access of which is available to all the Respondents mentioned herein above and therefore the petition stands served to all the respondents. Further, the petitioner has also posted the Petition on the company website i.e. [www.ntpc.co.in](http://www.ntpc.co.in).
- 27) It is submitted that the petitioner is filing this input price determination petition subject to the outcome of its various appeals/ petitions pending before different courts. Besides, the petition filed by NTPC for determination of capital base as on 31.03.2024 through true-up exercise is pending before the Hon'ble Commission and would take some time. The Petitioner, therefore, reserves its right to amend the tariff petition as per the outcome in such appeals/ petitions, if required.

- 28) Apart from the above-mentioned submissions, NTPC wishes to inform this Hon'ble Commission that the instant mine/assets are in the process of being transferred by NTPC to a fully owned subsidiary by the name of "NTPC Mining Limited (NML)" in terms of a Business Transfer Agreement (BTA) signed on 17.08.2023. It is stated that the modalities of transfer are still under way and NTPC undertakes to inform as well as substitute in its place its subsidiary as the Petitioner in the instant petition once the transfer is complete in all respects.
- 29) The Petitioner undertakes to submit any further information or clarification which may be required by this Hon'ble Commission for adjudication of the present petition.

#### Prayers

In the light of the above submissions, the Petitioner, therefore, prays that the Hon'ble Commission may be pleased to:

- i) Approve input price of coal of Pakri Barwadih Coal Mine for the tariff period 2024 - 29 as per provision of Regulation 9 (4) read with Chapter 9 of Tariff Regulations, 2024.
- ii) Allow the recovery of filing fees as & when paid to the Hon'ble Commission and publication expenses from the beneficiaries;
- iii) Allow the recovery of pay/wage revision under O&M expenses as and when applicable;
- iv) Condone any error/omission in the petition and to grant an opportunity to the Petitioner to rectify the same;
- v) Permit the Petitioner to make such further submission(s), addition(s) and alteration(s) to this Petition as may be necessary from time to time;
- vi) Pass any other order as it may deem fit in the circumstances mentioned above.



(Petitioner)

पवन देव जामटा/PAWAN DEV JAMTA  
उप महाप्रबन्धक (वाणिज्यिक)  
Deputy General Manager (Commercial)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

Place: Noida

Date: 27.11.2024



**BEFORE THE HON'BLE CENTRAL ELECTRICITY REGULATORY COMMISSION**  
**NEW DELHI**

**PETITION NO.....**

**IN THE MATTER OF**



**AND  
IN THE MATTER OF**

: Petition Under Section 62 and 79 (1) (a) of the Electricity Act, 2003 read with Chapter-III of the Central Electricity Regulatory Commission (Conduct of Business) Regulations, 2023 and Regulation-9 read with Chapter-9 of Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2024 for approval of input price of coal supplied from Pakri Barwadih mine for the period from 01.04.2024 to 31.03.2029.

NTPC Limited

.....Petitioner

Versus

Bihar State Power Holding Company Ltd & others

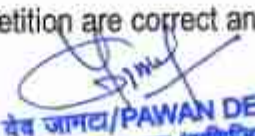
.....Respondents

**AFFIDAVIT**

I, Pawan Dev Jamta, son of Mohinder Singh Jamta aged about 40 years, resident of C-181, NTPC Samridhi Township, Sector 33, Noida do solemnly affirm and state as under:

1. That I am the Deputy General Manager (Commercial) in NTPC Ltd. and am well conversant with the facts of the case and am competent to swear the present affidavit.
2. That the accompanying Petition under Section 62 and 79 (1) (a) of the Electricity Act, 2003, has been filed by my authorized representative under my instruction and the contents of the same are true and correct to the best of my knowledge and belief.
3. That the annexures annexed to the Petition are correct and true copies of the respective originals.



  
**पवन देव जाम्टा/PAWAN DEV JAMTA**  
उप महाप्रबन्धक (वणिज्यिक)  
Deputy General Manager (Commercial)  
एन टी पी सी लिमिटेड / NTPC LIMITED  
PHC, A-8A, Sector-24, Noida-201301 (U.P.)

4. That the Deponent has not filed any other Petition or Appeal before any other forum or court of law with respect to the subject matter of the dispute.

  
(Deponent)

पवन देव जामटा/PAWAN DEV JAMTA  
उप महाप्रबन्धक (वणिज्यिक)  
Deputy General Manager (Commercial)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
FOC, A-8A, Sector-24, Noida-201301 (U.P.)

#### Verification

I, Pawan Dev Jamta, the deponent above named, do hereby verify that the contents of the above affidavit are true to the best of my knowledge, no part of it is false and nothing material has been concealed therefrom.

Verified at Noida (UP) on this ..... day of..... 2024.

  
(Deponent)

पवन देव जामटा/PAWAN DEV JAMTA  
उप महाप्रबन्धक (वणिज्यिक)  
Deputy General Manager (Commercial)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
FOC, A-8A, Sector-24, Noida-201301 (U.P.)



ATTESTED  
YOGENDRA SINGH  
NOTARY NOIDA  
G.B. NAGAR (U.P.) INDIA

27 NOV 2024

## APPENDIX-I



पवन देव जामटा/PAWAN DEV JAMTA  
रूप महाप्रबन्धक (वाणिज्यिक)  
Deputy General Manager (Commercial)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

**Petition No : .....**

**TARIFF FILING FORMS (INTEGRATED MINE)**

**FOR DETERMINATION OF INPUT PRICE**

**FOR**

**PAKRI BARWADIH COAL MINE**

**(FOR THE PERIOD:  
01.04.2024 TO 31.03.2029)**

  
पवन देव जामटा/PAWAN DEV JAMTA  
उप महाप्रबन्धक (वर्ग निर्यात)  
Deputy General Manager (Commercial)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

**PART-IV**  
**Checklist of Main Tariff Forms and other information for tariff filing for**  
**Integrated Mine**

Form No.	Title of Tariff Filing Forms (Integrated Mine)	Tick
FORM- 1	Summary of Input Price	✓
FORM -1A	Summary of ROM Cost	✓
FORM -1B	Summary of Additional Charges	N/A
FORM-2	Statement showing claimed Capital Cost	✓
FORM-2A	Statement showing claimed Return on Equity	✓
FORM-2B	Statement showing claimed O&M cost	✓
FORM- 3	Mine Characteristics/Important Details as per Mine Plan	✓
FORM- 3A	Normative Parameters considered for Input Price computation	✓
FORM- 4	Details of Foreign loans	**
FORM- 4A	Details of Foreign Equity	N/A
FORM-5	Abstract of Admitted Capital Cost for the existing Integrated Mine	N/A
FORM- 6	Financial Package up to date of commercial operation & up to Peak rated capacity	**
FORM- 7	Details of Integrated Mine Specific Loans	N/A
FORM- 8	Details of Allocation of corporate loans to Integrated Mine	✓
FORM-9	Year wise Statement of Additional Capitalization after date of commercial operation up to/ beyond achieving Peak rated Capacity	✓
FORM- 10	Financing of Additional Capitalization	✓
FORM- 11	Calculation of Depreciation	✓
FORM- 12	Statement of Depreciation	✓
FORM- 13	Calculation of Weighted Average Rate of Interest on Actual Loans	✓
FORM- 14	Draw Down Schedule for Calculation of IDC & Financing Charges	N/A
FORM- 15	Non-Tariff Income	**
FORM- 16	Details of Applicable Statutory Charges	✓
FORM-17	Details of Mine Closure expenses	✓
FORM- 18	Details for GCV Adjustment	**

\*\* Shall be submitted at the time of truing up.

  
**पवन देव जामटा/PAWAN DEV JAMTA**  
 Deputy General Manager (Commercial)  
 एन टी पी सी लिमिटेड/NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)



PART-IV		
<u>List of Supporting Forms / documents for tariff filing for Integrated Mine</u>		
Form No.	Title of Tariff Filing Forms (Integrated Mine)	Tick
FORM-A	Abstract of Capital Cost Estimates and cost on date of commercial operation of the Integrated Mine	N/A
FORM-B	Break-up of Capital Cost for New Integrated Mine	N/A
FORM-C	Break-up of Construction/Supply/Service Packages	N/A
FORM-D	Details of Assets De-capitalized during the period	**
FORM-E	Reconciliation of Capitalization claimed vis-à-vis books of accounts	✓
FORM-F	Statement showing details of items/assets/works claimed under Exclusions	**
FORM-G	Statement of Capital cost	✓
FORM-H	Statement of Capital Works in Progress	✓
FORM-I	Calculation of Interest on Normative Loan	✓
FORM-J	Calculation of Interest on Working Capital	✓
FORM-K	Incidental Expenditure up to date of commencement of Production and up to Actual/anticipated date of commercial operation	N/A
FORM-L	Expenditure under different packages up to date of commencement of Production and up to Actual/anticipated date of commercial operation	N/A
FORM-M	Actual cash expenditure	N/A
FORM-N	Statement of Liability flow	**

\*\* Shall be submitted at the time of truing up.

<u>List of supporting documents for tariff filing for Integrated Mine</u>		
S. No.	Information / Document	Tick
1	Certificate of Incorporation, Certificate for Commencement of Business, Memorandum of Association, & Articles of Association ( For New Integrated Mine setup by a company making application for the first time to CERC)	N/A
2	A. Mine wise and Corporate audited Balance Sheet and Profit & Loss Accounts with all the Schedules & annexures on date of commercial operation of the Mine for the new mine & for the relevant years. B. Mine wise and Corporate audited Balance Sheet and Profit & Loss Accounts with all the Schedules & annexures for the existing mine for relevant years.	**
3	Copies of relevant loan Agreements	N/A
4	Copies of the approval of Competent Authority for the Capital Cost and Financial package.	✓
5	Copies of the Equity participation agreements and necessary approval for the foreign equity.	N/A
6	List of End use generating plant to whom supplies made/to be made and quantity supplied / to be supplied	**
7	Integrated Mine shall submit copy of Cost Audit Report along with cost accounting records, cost details, statements, schedules etc. for the Integrated Mine and subsequently consolidated at Company level as submitted to the Govt. of India from the date of commencement of production in case of a new mine or first two years i.e. 2019-20 and 2020-21 at the time of mid-term true-up in 2021-22 and for balance period of tariff period 2019-24 at the time of final true-up in 2024-25. In case of initial tariff filing the latest available Cost Audit Report should be furnished.	**
8	Any other relevant information, (Please specify)	-
9	Reconciliation with Balance sheet of any actual capitalization or additional capitalization year on year basis duly audited	**
10.	Integrated mine is maintaining the records to be submitted frequently to the Coal Controller Office. Copy of Same should be furnished to the Commission at the time of submission to CCO. Forms may be suitably modified to furnish relevant important information for input price determination	**

\*\* Shall be submitted at the time of truing up.

Summary of Input Price								PART-IV FORM- 1
Name of the Petitioner: NTPC Ltd								
Name of the Integrated Mine: Pakri Barwadih								
Place (Region/District/State): ER/ Hazaribagh/ Jharkhand								
S. No.	Particulars	Unit	Existing 2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
1	2	3	4	5	6	7	8	9
1.1	ROM Cost as per Form 1 A	Rs/Tonne	1693.09	1812.85	1912.37	2025.30	2113.47	2208.57
1.2	Additional Charges/Surface Transportation Charges#	Rs/Tonne	207.44	211.04	158.08	41.59	50.94	53.62
	<b>Input Price</b>	Rs/Tonne	1900.52	2023.89	2070.45	2066.89	2164.41	2262.18
1.3	Statutory Charges	Rs/Tonne	806.06	925.91	928.29	927.75	933.79	939.78
1.4	<b>Total input price</b>	Rs/Tonne	<b>2706.59</b>	<b>2949.80</b>	<b>2998.74</b>	<b>2994.64</b>	<b>3098.19</b>	<b>3201.96</b>
								(Petitioner)

# Surface Transportation Charges claimed based on surface transportation charges claimed for FY 2023-24 and road transportation envisaged as per the mine plan.

पवन देव जामटा/PAWAN DEV JAMTA  
उप महाप्रबन्धक (वाणिज्यिक)  
Deputy General Manager (Commercial)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

# Summary of ROM Cost

PART-IV  
FORM-1A

Name of the Petitioner: NTPC Ltd

Name of the Integrated Mine: Pukli Barwadih

Place (Region/District/State): ER/ Hazratnagar/ Jharkhand


Amount in Rs Lakh

S. No.	Particulars	Unit	Existing 2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
1	2	3	4	5	6	7	8	9
1.1	Depreciation	Rs Lakh	20,334.02	23,568.80	26,555.81	29,225.84	31,520.22	32,887.45
1.2	Interest on Loan	Rs Lakh	(6,487.63)	21,435.40	22,848.43	23,683.19	24,127.33	23,279.31
1.3	Return on Equity	Rs Lakh	22,771.32	26,812.18	30,002.84	32,881.87	35,570.85	37,141.10
1.4	Interest on Working Capital	Rs Lakh	1,752.14	1,867.29	1,962.00	2,006.88	2,121.87	2,219.60
1.5	Other Expenses including mining charges	Rs Lakh	28,189.30	28,868.24	31,226.87	32,866.28	34,581.36	36,407.87
1.6	Mine closure expense	Rs Lakh	975.60	550.92	589.14	632.83	688.19	800.13
1.8	Total Annual Extraction Cost (Sum of above 1.1 to 1.6)	Rs Lakh	95,914.00	1,03,638.80	1,13,285.19	1,21,236.22	1,28,592.72	1,32,727.54
2.0	Annual Target Quantity (ATQ)	Tonne	1,55,00,000	1,55,00,000	1,60,00,000	1,60,00,000	1,65,00,000	1,65,00,000
2.8	Annual Extraction cost per tonne (1.8 in Rs/2.8)	Rs/Tonne	635.90	668.58	708.03	757.73	779.25	804.41
4.0	Mining charges <sup>4</sup>	Rs/Tonne	1,087.19	1,144.27	1,204.14	1,267.57	1,334.12	1,404.16
6.0	Total Resource Price	Rs/Tonne	-	-	-	-	-	-
6.8	ROM cost (3.0+4.0)	Rs/Tonne	1,693.09	1,812.85	1,912.17	2,025.30	2,113.47	2,208.57

(Petitioner)


<sup>4</sup> Mining Charges claimed are based on Mining Charges claimed for the year 2023-24 and the same has been escalated @ 5.25% per year for subsequent years.

पवन देव जामटा/PAWAN DEV JAMTA  
उप महाप्रबन्धक (वाणिज्यिक)  
Deputy General Manager (Commercial)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)


Statement showing claimed capital cost						PART-IV FORM-2
Name of the Petitioner: NTPC Ltd						
Name of the Integrated Mine: Pakri Barwadih						
						Amount in Rs Lakhs
S. No.	Particulars	2024-25	2025-26	2026-27	2027-28	2028-29
1	2	3	4	5	6	7
1	Opening Capital Cost	4,71,115.62	5,71,578.00	6,07,500.81	6,83,545.81	7,14,349.81
2	Add: Addition during the year/period	1,00,462.38	35,922.81	76,045.00	30,804.00	30,905.00
3	Less: De-capitalization during the year/period	-	-	-	-	-
4	Add: Discharges of Liability during the year/period	-	-	-	-	-
5	Closing Capital Cost (1+2-3+4)	5,71,578.00	6,07,500.81	6,83,545.81	7,14,349.81	7,45,254.81
6	Average Capital Cost	5,21,346.81	5,89,539.41	6,45,523.31	6,98,947.81	7,29,802.31
						 (Petitioner)

पवन देव जामटा/PAWAN DEV JANTI  
 एवं महाप्रबन्धक (वणिज्यिक)  
 Deputy General Manager (Commercial)  
 एन टी पी सी लिमिटेड / NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)




Statement showing claimed Return on Equity						PART- IV FORM-2A
Name of the Petitioner: NTPC Ltd						
Name of the Integrated Mine: Pakri Barwadih						
						Amount in Rs Lakhs
Sr	Particulars	2014-25	2025-26	2026-27	2027-28	2028-29
1	2	3	4	5	6	7
A)	Return on Equity					
1	Opening Equity	1,41,334.69	1,71,473.40	1,82,250.34	2,05,063.74	2,14,304.94
2	Add: Increase in equity due to addition during the year / period	30,138.71	10,776.84	22,813.50	9,241.20	9,271.50
3	Less: Decrease due to De-capitalization during the year / period	-	-	-	-	-
4	Add: Increase due to discharges during the year / period	-	-	-	-	-
5	Closing Equity (1+2-3+4)	1,71,473.40	1,82,250.34	2,05,063.74	2,14,304.94	2,23,576.44
6	Average Equity	1,56,404.04	1,76,861.82	1,93,656.99	2,09,684.34	2,18,940.69
7	Rate of ROE (Pre Tax)	16.964	16.964	16.964	16.964	16.964
8	Total ROE	26,532.38	30,002.84	32,851.97	35,570.85	37,141.10
						 (Petitioner)


पवन देव जामटा/PAWAN DEV JAMTA  
उप महाप्रबन्धक (वणिज्यिक)  
Deputy General Manager (Commercial)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

Statement showing claimed O&M cost					PART-IV FORM-2B	
Name of the Petitioner: NTPC Ltd.						
Name of the Integrated Mine: Pakri Barwadih						
Amount in Rs Lakhs						
S. No.	Particulars	2014-25	2015-26	2016-27	2017-28	2018-29
1	2	3	4	5		7
1	Opening Capital Cost					
2	Add: Addition during the year/period					
3	Less: De-capitalization during the year/period					
4	Add: Discharges of Liability during the year/period					
5	Closing Capital Cost (1+2-3+4)					
6	Average Capital Cost					
7	O&M Expenses (based on actual O&M expenses for FY 2023-24 escalated at the rate of 5.25% per annum) in terms of Regulation 46*	28,236.28	29,718.89	31,278.93	32,921.06	34,649.42
8	Annual Charge of Agency(ies) Other Than MDO <sup>†</sup>	1,432.95	1508.18	1587.36	1670.70	1758.41
9	Total Claimed O&M Expenses	29,669.24	31,226.87	32,866.28	34,591.76	36,407.83
 (Petitioner)						
<small>*O&amp;M expenses claimed based on actual O&amp;M expenses for the year 2023-24 and the same has been escalated @ 5.25% per year for subsequent years.  <sup>†</sup> Annual Charges of Agency(ies) other than MDO claimed based on actual expenses for the year 2023-24 and the same has been escalated @ 5.25% per year for subsequent years.</small>						

पवन देव जामटा/PAWAN DEV JAMTA  
 उपा महाप्रबन्धक (वाणिज्यिक)  
 Deputy General Manager (Commercial)  
 एन टी पी सी लिमिटेड/NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)

Mine Characteristics/Important Details as per Approved Mine Plan (Mine Plan dated 21.09.2023)		PART- IV FORM-3	
Name of the Petitioner: NTPC Ltd.			
Name of the Integrated Mine: Pakri Barwadih			
Sr No	Parameters	Values	
1	Mining plan/Mine closure plan Revision number and date of revision, if any	Mining Plan (First Revision) No.: 13016/29/2003-CA-I(Part), Dated: 07.03.2016 Mining Plan (Second Revision) dated 21.09.2023.	
2	Peak rated Capacity	19 MTPA (East West Block)	
3	Year in which proposed to be achieved	10th Year (from the base year 2023-24)	
4	Mineable reserves (Opencast)	503.38 Million Metric Tonnes	
5	Mining area land - Acquired/ Leased	4209.84 Ha	
6	If Leased - Period and terms of lease	N/A	
7	Mining Block Area	3943.76 Ha	
8	Type of Mining	Opencast	
9	Method of Mining	Opencast (Shovel - Dumper Combination)	
10	Mine life in Years	29 Years (as per approved mining plan from base year i.e 2023-24)	
11	Scheduled date of commercial operation as per Investment approval	N/A	
12	Distance of Loading Point from mine end	30 Kms (Approx) upto Banadag siding	
13	Gross Calorific value (GCV in Kcal/Kg) of coal as per Geological Report, Range ,Mean	2491 to 6321, 4385.5	
14	Specific gravity of coal (Avg)(Calculated from GR)	1.65	
15	Main Equipments	Shovel, Dumper, Drill, Dozer, Grader	
16	Other Important Parameters as deemed necessary	High inclination, (1 in 4), Highly faulted (19 faults), Densely inhabited (27 villages), High stripping ratio, Poor Law & Order, Maoist infested area	
<b>CALENDER PRODUCTION PROGRAMME DURING THIS TARIFF PERIOD*</b>			
Production Year/s	Coal Production (Mt)	OB Removal (Mm <sup>3</sup> )	Stripping Ratio (m <sup>3</sup> /t)
2024-25	15.50	61.54	3.97
2025-26	16.00	63.52	3.97
2026-27	16.00	63.52	3.97
2027-28	16.50	65.51	3.97
2028-29	16.50	65.51	3.97
<b>ACTUAL PRODUCTION ACHIEVED DURING THIS TARIFF PERIOD</b>			
Production Year/s	Coal Production (Mt)	OB Removal (Mm <sup>3</sup> )	Stripping Ratio (m <sup>3</sup> /t)
2024-25	Shall be provided at the time of truing up		
2025-26			
2026-27			
2027-28			
2028-29			
 (Petitioner)			

पवन देव जामटा/PAWAN DEV JAMTA  
 उपा महाप्रबन्धक (वाणिज्यिक)  
 Deputy General Manager (Commercial)  
 एन टी पी सी लिमिटेड /NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)

Normative parameters considered for Input Price computations							PART- IV FORM-3A
Name of the Petitioner: NTPC Ltd							
Name of the Integrated Mine: Pakri Barwadih							
Particulars	Unit	Existing 2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
1	2	3	4	5	6	7	8
Base Rate of Return on Equity	%	14	14	14	14	14	14
Effective Tax Rate	%	17.472	17.472	17.472	17.472	17.472	17.472
Input Cost of Coal for WC	in days	7	7	7	7	7	7
Consumption of stores and spares % of O&M	%	15	15	15	15	15	15
One Month O&M Expenses	Rs lakh	2349.11	2472.44	2602.24	2738.86	2882.65	3033.99
Rate of Interest on Working Capital	%	12.00	11.90	11.90	11.90	11.90	11.90
							 (Petitioner)

पवन देव जामटा/PAWAN DEV JAMTA  
 उपाय महाप्रबन्धक (वणिज्यिक)  
 Deputy General Manager (Commercial)  
 एन टी पी सी लिमिटेड/NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)



Year wise Statement of Additional Capitalisation after date of Commercial operation as referred subject to Peak load Capacity								Part IV Form B
Name of the Promoter: NTPC Ltd.								
Name of the Integrated Mine: Pabai Barwadih								
Date of Commercial Operation: 01.04.2017								
Financial Year 2024-25								
S. No.	Head of Work / Equipment	ACE Claimed (Proposed)				Regulation under which claimed	Justification	Admitted Cost by the Commission, if any
		Accepted Costs	Un-discharged Liability included in column 3	Cost Incr.	EDC included in col. 5			
1	2	3	4	(5 = 3 + 4)	6	7	8	9
1	Land	10,077.00	-	10,077.00	-	42 (1104)	Expenditure projected to be incurred for progressive land acquisition as per mine plan. Expenditure includes purchase of land, structures, trees & assets attached over land acquired as per Chapter VII (Ch. No. 5.1 to 5.5) of mine plan dated 07.03.2016. Waiver Commission may be pleased to allow the capitalisation.	
2	Mine Development expenditure: Railway siding	19,804.00	-	19,804.00	-	42 (1000)	Chapter VII (Ch. No. 5.14) of the mine plan (07.03.2016) requires the Coal at location through Railway Siding and Handling Handling railway line. Chapter V (Ch. No. 5.8) of Revised Mine Plan (01.08.2017) includes the provision of doubling of Railway Network to cater the enhanced coal production capacity of the mine. The proposed capitalisation is as per approved mine plan towards construction of railway siding, yard augmentation work, for doubling from Handling to Handling.  Construction of Railway siding was awarded to Railways. Railway siding work is partly completed to facilitate safe loading.  Yard augmentation Work was awarded to Railway on deposit basis on 20.04.2017 to facilitate rapid loading and unloading of Coal through Rail. Work is under progress, completion expected by the end of 2024-25.  Work on doubling of Handling Handling line is also under progress.	
3	Mine Development expenditure: Rapid Loading Sls	20,604.00	-	20,604.00	-	42 (1100)	Chapter VII (Ch. No. 5.14) of the mine plan (07.03.2016) requires that the Railway wagon shall be loaded by rapid loading system. The proposed capitalisation is towards installation of rapid loading system as per approved mine plan.  Waiver Commission may be pleased to allow the capitalisation.	
4	Buildings & Structures	18,115.00	-	18,115.00	-	42 (1000)	It is submitted that chapter VII of mine plan (dated 07.03.2016) provides that office buildings and associated buildings, equipment housed, recreational colony etc. shall be provided to serve mine support functions such as engineering, mine operations & services, mine administration etc. The expenditure is for construction of buildings along with associated facilities as per the mine plan. Waiver Commission may be pleased to allow the capitalisation.	
5	Procurement of Furniture for Office Buildings	940.00	-	940.00	-	42 (1000)	It is submitted that chapter VII of mine plan (07.03.2016) provides that office building shall be provided along with provision and comprise. The expenditure is for Procurement of Furniture and IT equipment for Office Buildings.	

  
 पवन देव जामटा/PAWAN DEV JAMTA  
 उपाय महाप्रबन्धक (शासित/निर्देशक)  
 Deputy General Manager (Commercial)  
 एन टी पी सी लिमिटेड / NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)

Year wise Statement of Additional Capitalization after date of Commercial operation on full rated capacity								Part-IV
Name of the Promoter: NTPC Ltd								Form-B
Name of the Integrated Mine: Pakri Borewadi								
Date of Commercial Operation: 01.04.2019								
Financial Year 2024-25								
S. No.	Head of Work/ Equipment	A/C Claimed (Proposed)				Regulations under which claimed	Justification	Amount in Rs Lakhs
		Actual basis	Un-discharged Liability included in column 3	Cash basis	ERC included in col. 3			
1	2	3	4	(5 = 3 + 4)	6	7	8	9
6	Coal Handling Plant	720.00	-	720.00	-	43 (XIII)	Chapter VII of the mine plan (07.03.2016) stipulates regarding Coal transportation through CHP. CHP was purchase and capitalised up to 79-100 in previous tariff period. Remaining period works of CHP has been considered under this head.	
7	Mine Development expenditure: Construction of Roads & Drains	2,380.00	-	2,380.00	-	42 (XI)	Expenditure towards construction of roads and drains for sustained operation of mine as per approved Mining Plan dated 07.03.2016 (Clause 00, 15 & 16 under Chapter VII). These expenditure includes major payments required for carrying the Coal Dispatch requirements from Mines up to Railway, along with conveyor roadways up to siding as provided in the Chapter VII of the Mine Plan.	
8	Mine Development expenditure: Mining Dip Side Area	2,000.00	-	2,000.00	-	42 (XI)	Clause no. 4.3.3 under Chapter VI of mine plan (07.03.2016) estimates requirement of further exploration for negative pricing of CB along with infrastructure and detailed exploration beyond 300 m depth to convert additional reserves to proved category. This work was partly capitalised during 2019-24. The expenditure is towards the further exploration activities carried out in terms of mine plan. Further Commission may be allowed to allow the capitalization.	
9	Environment monitoring Equipments	300.00	-	300.00	-	42 (XI)	It is assumed that chapter X (ie. 10.5.6) of mine plan (07.03.2016) provides for establishment of air quality monitoring station within the mining area. Further Commission may be allowed to allow the capitalization.	
Total		5,000.00	-	5,000.00	-			

पवन देव जामटा/PAWAN DEV JAMTA  
 उप महाप्रबन्धक (वणिज्यिक)  
 Deputy General Manager (Commercial)  
 एन टी पी सी लिमिटेड/NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)

Year wise Statement of Additional Capitalization after date of Commercial operation as indicated against Park road Capacity								Part-2
Name of the Park/road: NTPC 1st								Form-2
Name of the Integrated Urban Park/road:								
Date of Commercial Operation: 01.04.2018								
Financial Year: 2017-18								
Amount in Rs Lakhs								
S. No.	Head of Work / Equipment	Actual Cost	Credit Charge Liability included in column 3	Cost Incurred (3+4)	ERC included in col. 5	Regulations under which raised	Justification	Admitted Cost by the Commission, if any
1	2	3	4	(3+4)	5	6	7	8
1	Land	30,022.00	-	30,022.00	-	42 (130)	Expenditure proposed to be incurred for preparation and acquisition as per title plan. Expenditure includes payment of land, structure, trees & water attached area. Land acquired as per Chapter IV (b) No. 5.1 to 5.3 of title plan dated 07.05.2016. The Commission may be pleased to allow the expenditure.	
2	Buildings & Structures	3,011.41	-	3,011.41	-	42 (130)	It is estimated that chapter VII of title plan dated 07.05.2016 provides for office buildings and associated buildings, equipment, electrical, ventilation system etc. shall be provided to serve other support functions such as engineering, room equipment & storage, water infrastructure etc. The expenditure for the construction of buildings along with associated facilities is as per the title plan. The title plan remains may be pleased to allow the expenditure.	
3	Procurement of Furniture for Office Buildings	200.00	-	200.00	-	42 (130)	It is estimated that chapter VII of title plan (07.05.2016) provides that office building shall be provided along with furniture and equipment. The expenditure is for Procurement of Furniture and IT equipment for Office buildings.	
4	Minor Development expenditure: Construction of Roads & Drains	1,100.00	-	1,100.00	-	42 (130)	Expenditure towards construction of roads and drains for improved operation of mine as per approved Mining Plan dated 07.05.2016 (Chapter No. 15 & 16 under Chapter VII). These expenditure include minor payments required for carrying the Civil Disputes Impassement from Mine up to highway along the conveyor roadway as is being as provided in the Chapter VII of the Mining Plan.	
5	Minor Development expenditure: Mining-Top Side Area	685.00	-	685.00	-	42 (130)	Clause No. 4.3.1 under Chapter IV of title plan (07.05.2016) mentions requirement of better exploration for negative pricing of ore & infrastructure and detailed exploration beyond 100m depth to control indicated reserves to be provided. The work was partly completed during 2017-18. The expenditure is towards the better exploration and infrastructure set against of title plan. The title plan remains may be pleased to allow the expenditure.	
Total		33,922.41	-	33,922.41	-			

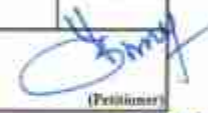
Year-wise Statement of Additional Capitalization after date of Commercial operation up to/beyond achieving Peak rated Capacity								Form IV Form-9
Name of the Project: NTPC Ltd								
Name of the Integrated Mine-Pilot Plant:								
Date of Commercial Operation: 01.04.2019								
Financial Year 2026-27								Amount in Rs Lakhs
S.No.	Head of Work/ Equipment	ACE Claimed (Project)				Regulations under which claimed	Justification	Admitted Cost by the Commission, if any
		Amortised	Ex-discharged Liability included in column 3	Cash basis	IDC included in col. 5			
1	2	3	4	(5 = 3 + 4)	6	7	8	9
1	Land	30,710.00	-	30,710.00	-	43 (I)(a)	Expenditure projected to be incurred for progressive land acquisition as per mine plan. Expenditure includes payment of land, structures, trees & assets attached over land acquired as per Chapter IV (Sec. No. 5.1 to 5.7) of mine plan (dated-07.03.2016). Hoche Commission may be pleased to allow the capitalization.	
2	Mine Development expenditure: Railway Siding	43,325.00	-	43,325.00	-	42 (I)(a)	Chapter VII (Sec. No. 7.14) of the mine plan (07.03.2016) stipulates for Coal transportation through Railway Siding and Bounding Harbours railway line. Chapter V (Sec. No. 5.8) of Revised Mine Plan (21.09.2023) includes the provision of doubling of Railway Network to cater the enhanced coal production capacity of the mine. The proposed capitalization is as per approved mine plan towards construction of railway siding, yard augmentation work, line doubling from Bounding to Bounding. Construction of Railway siding was awarded to Railways. Railway siding work is partly completed to facilitate coal loading. Yard augmentation Work was awarded to Railway on deposit basis on 29.04.2023 to facilitate rapid loading and transport of Coal through Rail. Work is under progress, completion expected by the end of 2024-25. Work on doubling of Bounding-Harbhough line is also under progress.	
Total		76,845.00	-	76,845.00	-			

  
 Pawan Dev Jamta

पवन देव जामटा/PAWAN DEV JAMTA  
 सहायक महाप्रबन्धक (वाणिज्यिक)  
 Deputy General Manager (Commercial)  
 एन टी पी सी लिमिटेड/NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)



Year wise Statement of Additional Capitalization after date of Commercial operation in subsequent achieving Peak rated Capacity								Part-IV Form-9
Name of the Petitioner: NTPC Ltd.								
Name of the Integrated Mine: Pakti Barwadih								
Date of Commercial Operation: 01.04.2018								
Financial Year: 2027-28								
S. No.	Head of Work / Equipment	ACE Claimed (Projected)				Regulations under which claimed	Justification	Admitted Cost by the Commission, if any.
		Accrued basis	Un-discharged Liability included in column 3	Cash basis	IBC included in col. 3			
1	2	3.00	4.00	(5 = 3 - 4)	6	7	8	9
1	Land	10,894.00	-	10,894.00	-	62 (COO)	Expenditure projected to be incurred for progressive land acquisition as per mine plan. Expenditure includes payment of land, structures, trees & assets attached over land acquired as per Chapter IX (Sr. No. 9.1 to 9.5) of mine plan (dated 07.01.2016). Hon'ble Commission may be pleased to allow for capitalization.	
	Total	10,894.00	-	10,894.00	-			

  
 पवन देव जामटा/PAWAN DEV JAMTA  
 उप महाप्रबन्धक (वाणिज्यिक)  
 Deputy General Manager (Commercial)  
 एन टी पी सी लिमिटेड/NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)

Year wise Statement of Additional Capitalization after date of Commercial operation as indicated against Peak rated Capacity								Part-D Form-1
Name of the Promoter: NTPC Ltd								
Name of the Integrated Mine: Palat Barnadih								
Date of Commercial Operation: 01.04.2019								
Financial Year: 2025-26								Amount in Rs Lakhs
S. No.	Head of Work / Equipment	ACE Claimed (Provisional)				Registration number which claimed	Justification	Admitted Cost for the Commission, if any
		Accrued basis	Cost charged Liability included as clause 3	Cash basis	IBC included as vol. 3			
1	2	3	4	(5 = 3 + 4)	6	7	8	9
1	Land	30,905.00	-	30,905.00	-	42 (F)(A)	Expenditure projected to be incurred for progressive land acquisition as per mine plan. Expenditure includes payment of land, encumbrance, taxes & aware attached (over land acquired as per Chapter IX (Sec. No. 9.1 to 9.5) of mine plan (dated 07.03.2016). Hardly Commission may be placed to allow the capitalization	
Total		30,905.00	-	30,905.00	-			

  
 Pawan Dev Jamta

पवन देव जामटा/PAWAN DEV JAMTA  
 उप महाप्रबन्धक (वाणिज्यिक)  
 Deputy General Manager (Commercial)  
 एन टी पी सी लिमिटेड/NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)

**Financing of Additional Capitalization**

Name of the Petitioner: NTPC Ltd.

Name of the Integrated Mine: Pakri Barwadih

Date of Commercial Operation: 01.04.2019

(Amount in Rs Lakh)

Financial Year (Starting from COD)	Actual					Admitted				
	2024-25	2025-26	2026-27	2027-28	2028-29	2024-25	2025-26	2026-27	2027-28	2028-29
1	2	3	4	5	6	7	8	9	10	11
Amount capitalized in Work/ Equipment	Add cap proposed to be funded in Debt:Equity ratio of 70:30									
Financing Details										
Loan-1										
Loan-2										
Loan-3 and so on										
Total Loan										
Equity										
Internal Resources										
Others (Pl. specify)										
Total										

(Petitioner)

पवन देव जामटा/PAWAN DEV JAMTA  
 उपा महाप्रबन्धक (वाणिज्यिक)  
 Deputy General Manager (Commercial)  
 एन टी सी लिमिटेड/NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)





Statement of Depreciation							PART- IV FORM- 12
Name of the Petitioner: NTPC Ltd							
Name of the Integrated Mine: Pideri Barwadih							
							(Amount in Rs Lakh)
S. No.	Particulars	Existing 2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
1	2	3	4	5	6	7	8
1.	Opening Capital Cost	4,23,929.38	4,71,115.62	5,71,578.00	6,07,500.81	6,83,545.81	7,14,349.81
2.	Closing Capital Cost	4,71,115.62	5,71,578.00	6,07,500.81	6,83,545.81	7,14,349.81	7,45,254.81
3.	Average Capital Cost	4,47,522.50	5,21,346.81	5,89,539.41	6,45,523.31	6,98,947.81	7,29,802.31
4.	Freehold land	29,308.13	29,308.13	29,308.13	29,308.13	29,308.13	29,308.13
4A	Assets having zero salvage value	1,25,622.06	1,49,410.06	1,51,195.06	1,96,530.06	1,96,530.06	1,96,530.06
5.	Rate of depreciation	4.54%	4.52%	4.50%	4.53%	4.51%	4.52%
6.	Depreciable value	4,01,584.75	4,74,907.25	5,39,779.46	5,95,230.92	6,45,984.20	6,75,205.97
7.	Balance useful life at the beginning of the period	28.00	28	27	26	25	24
8.	Remaining depreciable value	3,62,928.22	4,13,919.24	4,55,222.65	4,84,118.30	5,05,645.75	5,03,437.28
9.	Depreciation (for the period)	20,334.02	23,568.80	26,555.81	29,225.84	31,520.22	32,987.45
10.	Depreciation (annualized)	20,334.02	23,568.80	26,555.81	29,225.84	31,520.22	32,987.45
11.	Cumulative depreciation at the end of the period	60,990.55	84,556.81	1,11,112.62	1,40,338.47	1,71,858.69	2,04,846.15
12.	Less: Cumulative depreciation adjustment on account of de-capitalization	2.53	-	-	-	-	-
13.	Net Cumulative depreciation at the end of the period	60,988.01	84,556.81	1,11,112.62	1,40,338.47	1,71,858.69	2,04,846.15

  
(Petitioner)


पवन देव जामटा/PAWAN DEV JAMTA  
ज्येष्ठ महाप्रबन्धक (व्यावसायिक)  
Deputy General Manager (Commercial)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

**Calculation of Weighted Average Rate of Interest on Actual Loans**

Name of the Company		NTPC LTD.				PART-IV
Name of the Coal Mine		Pakri Barwadih				FORM-13
Sl. no.	Particulars	1.4.2014 to 31.03.2015	1.4.2015 to 31.03.2016	1.4.2016 to 31.03.2017	1.4.2017 to 31.03.2018	(Rs. in Lacs) 1.4.2018 to 31.03.2019
1	<b>Bond - 54</b>					
	Gross Drawal opening	26600.00	26600.00	26600.00	26600.00	26600.00
	Cumulative repayment of drawal till prev yr	15660.00	26600.00	26600.00	26600.00	26600.00
	Net Loan opening	10940.00	0.00	0.00	0.00	0.00
	Increase/decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/decrease due to ACE	0.00	0.00	0.00	0.00	0.00
	Total	10940.00	0.00	0.00	0.00	0.00
	Repayment of loan during the year	10940.00	0.00	0.00	0.00	0.00
	Net loan closing	0.00	0.00	0.00	0.00	0.00
	Average net loan	5320.00	0.00	0.00	0.00	0.00
	Rate of interest on loan	8.5200%	8.5200%	8.5200%	8.5200%	8.5200%
	Interest on loan	452.26	0.00	0.00	0.00	0.00
2	<b>Bond - 57</b>					
	Gross Drawal opening	800.00	800.00	800.00	800.00	800.00
	Cumulative repayment of drawal till prev yr	0.00	0.00	800.00	800.00	800.00
	Net Loan opening	800.00	800.00	0.00	0.00	0.00
	Increase/decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/decrease due to ACE	0.00	0.00	0.00	0.00	0.00
	Total	800.00	800.00	0.00	0.00	0.00
	Repayment of loan during the year	0.00	800.00	0.00	0.00	0.00
	Net loan closing	800.00	0.00	0.00	0.00	0.00
	Average net loan	800.00	400.00	0.00	0.00	0.00
	Rate of interest on loan	8.2200%	8.2200%	8.2200%	8.2200%	8.2200%
	Interest on loan	65.76	32.88	0.00	0.00	0.00
3	<b>Bond - 58</b>					
	Gross Drawal opening	3300.00	3300.00	3300.00	3300.00	3300.00
	Cumulative repayment of drawal till prev yr	0.00	0.00	0.00	3300.00	3300.00
	Net Loan opening	3300.00	3300.00	3300.00	0.00	0.00
	Increase/decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/decrease due to ACE	0.00	0.00	0.00	0.00	0.00
	Total	3300.00	3300.00	3300.00	0.00	0.00
	Repayment of loan during the year	0.00	0.00	3300.00	0.00	0.00
	Net loan closing	3300.00	3300.00	0.00	0.00	0.00
	Average net loan	3300.00	3300.00	1650.00	0.00	0.00
	Rate of interest on loan	8.0800%	8.0800%	8.0800%	8.0800%	8.0800%
	Interest on loan	266.64	266.64	133.32	0.00	0.00
4	<b>Bond - 61</b>					
	Gross Drawal opening	2000.00	2000.00	2000.00	2000.00	2000.00
	Cumulative repayment of drawal till prev yr	666.67	666.67	666.67	1333.33	1333.33
	Net Loan opening	1333.33	1333.33	1333.33	666.67	666.67
	Increase/decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/decrease due to ACE	0.00	0.00	0.00	0.00	0.00
	Total	1333.33	1333.33	1333.33	666.67	666.67
	Repayment of loan during the year	0.00	0.00	666.67	0.00	0.00
	Net loan closing	1333.33	1333.33	666.67	666.67	666.67
	Average net loan	1333.33	1333.33	1000.00	666.67	666.67
	Rate of interest on loan	8.1300%	8.1300%	8.1300%	8.1300%	8.1300%
	Interest on loan	108.40	108.40	81.30	54.20	54.20
5	<b>Bond - 64</b>					
	Gross Drawal opening	4300.00	4300.00	4300.00	4300.00	4300.00
	Cumulative repayment of drawal till prev yr	0.00	0.00	0.00	0.00	0.00
	Net Loan opening	4300.00	4300.00	4300.00	4300.00	4300.00
	Increase/decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/decrease due to ACE	0.00	0.00	0.00	0.00	0.00
	Total	4300.00	4300.00	4300.00	4300.00	4300.00
	Repayment of loan during the year	0.00	0.00	0.00	0.00	0.00
	Net loan closing	4300.00	4300.00	4300.00	4300.00	4300.00
	Average net loan	4300.00	4300.00	4300.00	4300.00	4300.00
	Rate of interest on loan	7.5200%	7.5200%	7.5200%	7.5200%	7.5200%
	Interest on loan	323.36	323.36	323.36	323.36	323.36

**Calculation of Weighted Average Rate of Interest on Actual Loans**

Name of the Company		NTPC LTD,				PART-IV
Name of the Coal Mine		Pakri Barwadih				FORM-13
(Rs. in Lacs)						
Sl. no.	Particulars	1.4.2024 to 31.03.2025	1.4.2025 to 31.03.2026	1.4.2026 to 31.03.2027	1.4.2027 to 31.03.2028	1.4.2028 to 31.03.2029
	2					
6	Bond - 46					
	Gross Drawl opening	6000.00	6000.00	6000.00	6000.00	6000.00
	Cumulative repayment of drawl till prev yr	0.00	0.00	0.00	0.00	0.00
	Net Loan opening	6000.00	6000.00	6000.00	6000.00	6000.00
	Increase/decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/decrease due to ACE	0.00	0.00	0.00	0.00	0.00
	Total	6000.00	6000.00	6000.00	6000.00	6000.00
	Repayment of loan during the year	0.00	0.00	0.00	0.00	0.00
	Net loan closing	6000.00	6000.00	6000.00	6000.00	6000.00
	Average net loan	6000.00	6000.00	6000.00	6000.00	6000.00
	Rate of interest on loan	7.4000%	7.4000%	7.4000%	7.4000%	7.4000%
	Interest on loan	444.00	444.00	444.00	444.00	444.00
7	Bond - 57					
	Gross Drawl opening	21521.00	21521.00	21521.00	21521.00	21521.00
	Cumulative repayment of drawl till prev yr	0.00	0.00	0.00	0.00	0.00
	Net Loan opening	21521.00	21521.00	21521.00	21521.00	21521.00
	Increase/decrease due to FERV	0.00	0.00	0.00	0.00	0.00
	Increase/decrease due to ACE	0.00	0.00	0.00	0.00	0.00
	Total	21521.00	21521.00	21521.00	21521.00	21521.00
	Repayment of loan during the year	0.00	0.00	0.00	0.00	21521.00
	Net loan closing	21521.00	21521.00	21521.00	21521.00	0.00
	Average net loan	21521.00	21521.00	21521.00	21521.00	10760.50
	Rate of interest on loan	8.1300%	8.1300%	8.1300%	8.1300%	8.1300%
	Interest on loan	1752.70	1752.70	1752.70	1752.70	896.35
8	Bond - 72 (Refinancing of PFC Loan T-6)					
	Gross Drawl opening	7300.00	7300.00	7300.00	7300.00	7300.00
	Cumulative repayment of drawl till prev yr	0.00	0.00	7300.00	7300.00	7300.00
	Net Loan opening	7300.00	7300.00	0.00	0.00	0.00
	Increase/decrease due to FERV					
	Increase/decrease due to ACE					
	Total	7300.00	7300.00	0.00	0.00	0.00
	Repayment of loan during the year	0.00	7300.00	0.00	0.00	0.00
	Net loan closing	7300.00	0.00	0.00	0.00	0.00
	Average net loan	7300.00	3650.00	0.00	0.00	0.00
	Rate of interest on loan	6.5150%	6.5150%	6.5150%	6.5150%	6.5150%
	Interest on loan	475.44	240.72	0.00	0.00	0.00
9	Bond - 72 (Refinancing of PFC Loan T-12)					
	Gross Drawl opening	3500.00	3500.00	3500.00	3500.00	3500.00
	Cumulative repayment of drawl till prev yr	0.00	0.00	3500.00	3500.00	3500.00
	Net Loan opening	3500.00	3500.00	0.00	0.00	0.00
	Increase/decrease due to FERV					
	Increase/decrease due to ACE					
	Total	3500.00	3500.00	0.00	0.00	0.00
	Repayment of loan during the year	0.00	3500.00	0.00	0.00	0.00
	Net loan closing	3500.00	0.00	0.00	0.00	0.00
	Average net loan	3500.00	1750.00	0.00	0.00	0.00
	Rate of interest on loan	6.8700%	6.8700%	6.8700%	6.8700%	6.8700%
	Interest on loan	240.45	120.23	0.00	0.00	0.00
10	Bond - 74					
	Gross Drawl opening	20000.00	20000.00	20000.00	20000.00	20000.00
	Cumulative repayment of drawl till prev yr	0.00	0.00	0.00	0.00	0.00
	Net Loan opening	20000.00	20000.00	20000.00	20000.00	20000.00
	Increase/decrease due to FERV					
	Increase/decrease due to ACE					
	Total	20000.00	20000.00	20000.00	20000.00	20000.00
	Repayment of loan during the year	0.00	0.00	0.00	0.00	0.00
	Net loan closing	20000.00	20000.00	20000.00	20000.00	20000.00
	Average net loan	20000.00	20000.00	20000.00	20000.00	20000.00
	Rate of interest on loan	6.9000%	6.9000%	6.9000%	6.9000%	6.9000%
	Interest on loan	1380.00	1380.00	1380.00	1380.00	1380.00

  
**PAWAN DEV JAMI**  
 उप. महाप्रबन्धक (वाणिज्यिक)  
 Deputy General Manager (Commercial)  
 एन.टी.पी.सी. लिमिटेड / NTPC LIMITED  
 B-2, A-2A, Sector-24, Noida-201301 (U.P.)



### Calculation of Weighted Average Rate of Interest on Actual Loans

Name of the Company		NTPC LTD.				PART-IV
Name of the Coal Mine		Pakri Barwadih				FORM-13
(Rs. in Lacs)						
Sl. no.	Particulars	1.4.2024 to 31.03.2025	1.4.2025 to 31.03.2026	1.4.2026 to 31.03.2027	1.4.2027 to 31.03.2028	1.4.2028 to 31.03.2029
2						
11	Bank - TB					
	Gross Draw opening	41800.00	41800.00	41800.00	41800.00	41800.00
	Cumulative repayment of draw till prev yr	0.00	0.00	0.00	0.00	0.00
	Net Loan opening	41800.00	41800.00	41800.00	41800.00	41800.00
	Increase/decrease due to FERV					
	Increase/decrease due to ACE					
	Total	41,800.00	41,800.00	41,800.00	41,800.00	41,800.00
	Repayment of loan during the year	0.00	0.00	0.00	0.00	0.00
	Net loan closing	41800.00	41800.00	41800.00	41800.00	41800.00
	Average net loan	41800.00	41800.00	41800.00	41800.00	41800.00
	Rate of interest on loan	7.4700%	7.4700%	7.4700%	7.4700%	7.4700%
	Interest on loan	3122.46	3122.46	3122.46	3122.46	3122.46
12	CORPORATION BANK-III					
	Gross Draw opening	10000.00	10000.00	10000.00	10000.00	10000.00
	Cumulative repayment of draw till prev yr	0.00	0.00	0.00	0.00	0.00
	Net Loan opening	10000.00	10000.00	10000.00	10000.00	10000.00
	Increase/decrease due to FERV					
	Increase/decrease due to ACE					
	Total	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00
	Repayment of loan during the year	0.00	0.00	0.00	0.00	0.00
	Net loan closing	10000.00	10000.00	10000.00	10000.00	10000.00
	Average net loan	10000.00	10000.00	10000.00	10000.00	10000.00
	Rate of interest on loan	8.1000%	8.1000%	8.1000%	8.1000%	8.1000%
	Interest on loan	810.00	810.00	810.00	810.00	810.00
13	HDFC BANK LIMITED-IX D-1					
	Gross Draw opening	4900.00	4900.00	4900.00	4900.00	4900.00
	Cumulative repayment of draw till prev yr	0.00	408.33	816.67	1225.00	1633.33
	Net Loan opening	4900.00	4491.67	4083.33	3675.00	3266.67
	Increase/decrease due to FERV					
	Increase/decrease due to ACE					
	Total	4,900.00	4,491.67	4,083.33	3,675.00	3,266.67
	Repayment of loan during the year	408.33	408.33	408.33	408.33	408.33
	Net loan closing	4,491.67	4,083.33	3,675.00	3,266.67	2,858.33
	Average net loan	4,690.00	4,288.00	3,879.17	3,471.67	3,062.50
	Rate of interest on loan	7.9500%	7.9500%	7.9500%	7.9500%	7.9500%
	Interest on loan	373.75	341.20	293.89	259.83	227.50
14	HDFC BANK LIMITED-IX D-4 (Refinancing of Vijaya Bank IV)					
	Gross Draw opening	178.69	178.69	178.69	178.69	178.69
	Cumulative repayment of draw till prev yr	0.00	14.89	29.78	44.67	59.56
	Net Loan opening	178.69	163.80	148.91	134.02	119.13
	Increase/decrease due to FERV					
	Increase/decrease due to ACE					
	Total	178.69	163.80	148.91	134.02	119.13
	Repayment of loan during the year	14.89	14.89	14.89	14.89	14.89
	Net loan closing	163.80	148.91	134.02	119.13	104.24
	Average net loan	171.24	156.35	141.46	126.57	112.18
	Rate of interest on loan	8.3750%	8.3750%	8.3750%	8.3750%	8.3750%
	Interest on loan	14.24	12.50	11.21	9.84	8.58
15	HDFC BANK LIMITED-IX D-4 (Refinancing of Vijaya Bank V)					
	Gross Draw opening	4142.86	4142.86	4142.86	4142.86	4142.86
	Cumulative repayment of draw till prev yr	0.00	345.24	690.48	1035.71	1380.95
	Net Loan opening	4142.86	3797.62	3452.38	3107.14	2761.90
	Increase/decrease due to FERV					
	Increase/decrease due to ACE					
	Total	4,142.86	3,797.62	3,452.38	3,107.14	2,761.90
	Repayment of loan during the year	345.24	345.24	345.24	345.24	345.24
	Net loan closing	3,797.62	3,452.38	3,107.14	2,761.90	2,416.66
	Average net loan	3,970.24	3,625.00	3,280.00	2,934.52	2,589.28
	Rate of interest on loan	8.3750%	8.3750%	8.3750%	8.3750%	8.3750%
	Interest on loan	333.33	304.69	271.43	236.61	207.14



**Calculation of Weighted Average Rate of Interest on Actual Loans**

Name of the Company		NTPC LTD.				PART-IV
Name of the Coal Mine		Pakri Barwadih				FORM-13
(Rs. in Lacs)						
Sl. no.	Particulars	1.4.2014 to 31.03.2015	1.4.2015 to 31.03.2016	1.4.2016 to 31.03.2017	1.4.2017 to 31.03.2018	1.4.2018 to 31.03.2019
	2					
16	HDFC BANK LIMITED-IX D-4 (Refinancing of Canara Bank III)					
	Gross Drawal opening	6400.00	6400.00	6400.00	6400.00	6400.00
	Cumulative repayment of drawal till prev yr	0.00	533.33	1066.67	1600.00	2133.33
	Net Loan opening	6400.00	5866.67	5333.33	4800.00	4266.67
	Increase/decrease due to FERV					
	Increase/decrease due to ACE					
	Total	6400.00	5866.67	5333.33	4800.00	4266.67
	Repayment of loan during the year	533.33	533.33	533.33	533.33	533.33
	Net loan closing	5866.67	5333.33	4800.00	4266.67	3733.33
	Average net loan	6133	5600	5067	4533	4000
	Rate of interest on loan	8.4000%	8.4000%	8.4000%	8.4000%	8.4000%
	Interest on loan	515	470	426	381	336
17	HDFC BANK LIMITED-IX D-10					
	Gross Drawal opening	15000.00	15000.00	15000.00	15000.00	15000.00
	Cumulative repayment of drawal till prev yr	0.00	1250.00	2500.00	3750.00	5000.00
	Net Loan opening	15000.00	13750.00	12500.00	11250.00	10000.00
	Increase/decrease due to FERV					
	Increase/decrease due to ACE					
	Total	15000.00	13750.00	12500.00	11250.00	10000.00
	Repayment of loan during the year	1250.00	1250.00	1250.00	1250.00	1250.00
	Net loan closing	13750.00	12500.00	11250.00	10000.00	8750.00
	Average net loan	14375	13125	11875	10625	9375
	Rate of interest on loan	7.9500%	7.9500%	7.9500%	7.9500%	7.9500%
	Interest on loan	1143	1043	944	845	743
18	HDFC BANK LIMITED-III					
	Gross Drawal opening	1000	1000	1000	1000	1000
	Cumulative repayment of drawal till prev yr	333	444	556	667	778
	Net Loan opening	667	556	444	333	222
	Increase/decrease due to FERV					
	Increase/decrease due to ACE					
	Total	667	556	444	333	222
	Repayment of loan during the year	111	111	111	111	111
	Net loan closing	556	444	333	222	111
	Average net loan	611	500	389	278	167
	Rate of interest on loan	7.9500%	7.9500%	7.9500%	7.9500%	7.9500%
	Interest on loan	49	40	31	22	13
19	HDFC BANK LIMITED V					
	Gross Drawal opening	2600	2600	2600	2600	2600
	Cumulative repayment of drawal till prev yr	0	289	578	867	1156
	Net Loan opening	2600	2311	2022	1733	1444
	Increase/decrease due to FERV					
	Increase/decrease due to ACE					
	Total	2600	2311	2022	1733	1444
	Repayment of loan during the year	289	289	289	289	289
	Net loan closing	2311	2022	1733	1444	1156
	Average net loan	2450	2167	1878	1589	1306
	Rate of interest on loan	7.9500%	7.9500%	7.9500%	7.9500%	7.9500%
	Interest on loan	195	172	145	120	103
20	J&K IV					
	Gross Drawal opening	1900	1900	1900	1900	1900
	Cumulative repayment of drawal till prev yr	633	844	1056	1267	1478
	Net Loan opening	1267	1056	844	633	422
	Increase/decrease due to FERV					
	Increase/decrease due to ACE					
	Total	1267	1056	844	633	422
	Repayment of loan during the year	211	211	211	211	211
	Net loan closing	1056	844	633	422	211
	Average net loan	1161	958	739	528	317
	Rate of interest on loan	7.9500%	7.9500%	7.9500%	7.9500%	7.9500%
	Interest on loan	93	79	59	42	23

**Calculation of Weighted Average Rate of Interest on Actual Loans**

Name of the Company		NTPC LTD.				PART-IV
Name of the Coal Mine		Pakri Barwadih				FORM-13
(Rs. in Lacs)						
Sl. no.	Particulars	1.4.2014 to 31.03.2015	1.4.2015 to 31.03.2016	1.4.2016 to 31.03.2017	1.4.2017 to 31.03.2018	1.4.2018 to 31.03.2019
	2					
21	PNB-III					
	Gross Drawal opening	3500	3500	3500	3500	3500
	Cumulative repayment of drawal till prior yr	1167	1556	1944	2333	2722
	Net Loan opening	2333	1944	1556	1167	778
	Increase/decrease due to FERV					
	Increase/decrease due to ACE					
	Total	2,333.33	1,944.44	1,555.56	1,166.67	777.78
	Repayment of loan during the year	388.89	388.89	388.89	388.89	388.89
	Net loan closing	1,944.44	1,555.56	1,166.67	777.78	388.89
	Average net loan	2,139	1,750	1,361	972	583
	Rate of interest on loan	7.9000%	7.9000%	7.9000%	7.9000%	7.9000%
	Interest on loan	169	138	108	77	46
22	PNB-IV					
	Gross Drawal opening	4200	4200	4200	4200	4200
	Cumulative repayment of drawal till prior yr	3,155.56	4,200.00	4,200.00	4,200.00	4,200.00
	Net Loan opening	1,044.44	0.00	0.00	0.00	0.00
	Increase/decrease due to FERV					
	Increase/decrease due to ACE					
	Total	1,044.44	0.00	0.00	0.00	0.00
	Repayment of loan during the year	1,044.44				
	Net loan closing	0.00	0.00	0.00	0.00	0.00
	Average net loan	522	0	0	0	0
	Rate of interest on loan	7.9000%	7.9000%	7.9000%	7.9000%	7.9000%
	Interest on loan	41	0	0	0	0
23	SBI-VIII					
	Gross Drawal opening	7929	7929	7929	7929	7929
	Cumulative repayment of drawal till prior yr	2943	3524	4405	5286	6167
	Net Loan opening	5286	4405	3524	2643	1762
	Increase/decrease due to FERV					
	Increase/decrease due to ACE					
	Total	5,286	4,405	3,524	2,643	1,762
	Repayment of loan during the year	881	881	881	881	881
	Net loan closing	4,405	3,524	2,643	1,762	881
	Average net loan	4,845	3,964	3,083	2,202	1,321
	Rate of interest on loan	8.2000%	8.2000%	8.2000%	8.2000%	8.2000%
	Interest on loan	397	295	253	181	108
24	SBI-IX D-2.6.6.9					
	Gross Drawal opening	20000	20000	20000	20000	20000
	Cumulative repayment of drawal till prior yr	6667	8889	11111	13333	15555
	Net Loan opening	13333	11111	8889	6667	4445
	Increase/decrease due to FERV					
	Increase/decrease due to ACE					
	Total	13,332.40	11,111.18	8,888.96	6,666.73	4,444.51
	Repayment of loan during the year	2222	2222	2222	2222	2222
	Net loan closing	11,111.18	8,888.96	6,666.73	4,444.51	2,222.29
	Average net loan	12,222	10,000	7,778	5,556	3,333
	Rate of interest on loan	8.2000%	8.2000%	8.2000%	8.2000%	8.2000%
	Interest on loan	7,002	820	638	434	273
25	SBI-IX D-6					
	Gross Drawal opening	1300	1300	1300	1300	1300
	Cumulative repayment of drawal till prior yr	433	578	722	867	1011
	Net Loan opening	867	722	578	433	289
	Increase/decrease due to FERV					
	Increase/decrease due to ACE					
	Total	866.67	722.23	577.78	433.34	288.89
	Repayment of loan during the year	144	144	144	144	144
	Net loan closing	722.23	577.78	433.34	288.89	144.45
	Average net loan	794	630	509	361	217
	Rate of interest on loan	8.2000%	8.2000%	8.2000%	8.2000%	8.2000%
	Interest on loan	65	53	41	30	18

  
**पवन देव जामेश/PWAN DEV JAI**  
 डिप्टी कमर्शियल मैनेजर (वित्त/विकास)  
 Dip., Commercial Manager (Commercial)  
 एन.टी.पी.सी. लिमिटेड / NTPC LIMITED  
 EOC-2013, Sector-28, Noida-201301 (U.P.)

**Calculation of Weighted Average Rate of Interest on Actual Loans**

Name of the Company Name of the Coal Mine		NTPC LTD. Pakri Barwadih				PART-IV FORM-13
Sl. no.	Particulars	1.4.2014 to 31.03.2015	1.4.2015 to 31.03.2016	1.4.2016 to 31.03.2017	1.4.2017 to 31.03.2018	(Rs. in Lacs) 1.4.2018 to 31.03.2019
	2					
26	SBI-X					
	Gross Drawl opening	17300	17300	17300	17300	17300
	Cumulative repayment of drawl till prev yr	0	1922	3844	5767	7689
	Net Loan opening	17300	15378	13456	11533	9611
	Increase/decrease due to FERV					
	Increase/decrease due to ACE					
	Total	17,300.00	15,377.78	13,455.56	11,533.33	9,611.11
	Repayment of loan during the year	1922	1922	1922	1922	1922
	Net loan closing	15,377.78	13,455.56	11,533.33	9,611.11	7,688.89
	Average net loan	16,139	14,417	12,494	10,572	8,650
	Rate of interest on loan	8.2000%	8.2000%	8.2000%	8.2000%	8.2000%
	Interest on loan	1,346	1,182	1,029	867	709
27	Bank of India-IV (Refinancing of Bank of India III)					
	Gross Drawl opening	20000	20000	20000	20000	20000
	Cumulative repayment of drawl till prev yr	0	1333	2667	4000	5333
	Net Loan opening	20000	18667	17333	16000	14667
	Increase/decrease due to FERV					
	Increase/decrease due to ACE					
	Total	20,000.00	18,666.67	17,333.33	16,000.00	14,666.67
	Repayment of loan during the year	1,333.33	1,333.33	1,333.33	1,333.33	1,333.33
	Net loan closing	18,666.67	17,333.33	16,000.00	14,666.67	13,333.33
	Average net loan	19,333	18,000	16,667	15,333	14,000
	Rate of interest on loan	8.3500%	8.3500%	8.3500%	8.3500%	8.3500%
	Interest on loan	1,614	1,509	1,382	1,280	1,169
28	RDFC VII D-1					
	Gross Drawl opening	3500	3500	3500	3500	3500
	Cumulative repayment of drawl till prev yr	0	0	0	389	778
	Net Loan opening	3500	3500	3500	3111	2722
	Increase/decrease due to FERV					
	Increase/decrease due to ACE					
	Total	3,500.00	3,500.00	3,500.00	3,111.11	2,722.22
	Repayment of loan during the year			388.89	388.89	388.89
	Net loan closing	3,500.00	3,500.00	3,111.11	2,722.22	2,333.33
	Average net loan	3,500	3,500	3,300	2,917	2,528
	Rate of interest on loan	7.9500%	7.9500%	7.9500%	7.9500%	7.9500%
	Interest on loan	278	278	263	232	201
29	RDFC VII D-5					
	Gross Drawl opening	1500	1500	1500	1500	1500
	Cumulative repayment of drawl till prev yr	0	0	0	167	333
	Net Loan opening	1500	1500	1500	1333	1167
	Increase/decrease due to FERV					
	Increase/decrease due to ACE					
	Total	1,500.00	1,500.00	1,500.00	1,333.33	1,166.67
	Repayment of loan during the year			166.67	166.67	166.67
	Net loan closing	1,500.00	1,500.00	1,333.33	1,166.67	1,000.00
	Average net loan	1,500	1,500	1,417	1,250	1,083
	Rate of interest on loan	7.9500%	7.9500%	7.9500%	7.9500%	7.9500%
	Interest on loan	119	119	113	99	80
30	RDFC XI					
	Gross Drawl opening	17000	17000	17000	17000	17000
	Cumulative repayment of drawl till prev yr	0	0	0	0	1417
	Net Loan opening	17000	17000	17000	17000	15583
	Increase/decrease due to FERV					
	Increase/decrease due to ACE	0	0	0	0	0
	Total	17,000.00	17,000.00	17,000.00	17,000.00	15,583.33
	Repayment of loan during the year				1,416.67	1,416.67
	Net loan closing	17,000.00	17,000.00	17,000.00	15,583.33	14,166.67
	Average net loan	17,000	17,000	17,000	16,293	14,879
	Rate of interest on loan	7.8400%	7.8400%	7.8400%	7.8400%	7.8400%
	Interest on loan	1,332	1,332	1,333	1,277	1,166





Calculation of Weighted Average Rate of Interest on Actual Loans						
Name of the Company		NTPC LTD,				PART-IV
Name of the Coal Mine		Pakri Barwadih				FORM-13
(Rs. in Lacs)						
Sl. no.	Particulars	1.4.2014 to 31.03.2015	1.4.2015 to 31.03.2016	1.4.2016 to 31.03.2017	1.4.2017 to 31.03.2018	1.4.2018 to 31.03.2019
	2					
26	JPV Eqs. 5400 Million Brand IV					
	Gross Drawal opening	7,300.00	7,300.00	7,300.00	7,300.00	7,300.00
	Cumulative repayment of drawal till prev yr	-	-	-	-	1,043
	Net Loan opening	7,300.00	7,300.00	7,300.00	7,300.00	6,257.14
	Increase/decrease due to FERV					
	Increase/decrease due to ACE					
	Total	7,300.00	7,300.00	7,300.00	7,300.00	6,257.14
	Repayment of loan during the year				1,042.86	1,042.86
	Net loan closing	7,300.00	7,300.00	7,300.00	6,257.14	5,214.29
	Average net loan	7,300	7,300	7,300	6,779	5,736
	Rate of interest on loan	1.2189%	1.2189%	1.2189%	1.2189%	1.2189%
	Interest on loan	89	89	89	81	70
	Gross Drawal opening	3,18,471	3,23,671	3,27,471	3,31,471	3,35,471
	Cumulative repayment of drawal till prev yr	37,658	61,231	84,719	1,01,130	1,18,181
	Net Loan opening	2,80,813	2,62,440	2,42,752	2,30,341	2,17,290
	Increase/decrease due to FERV	-	-	-	-	-
	Increase/decrease due to ACE	4,000	4,000	4,000	4,000	4,000
	Total	2,85,813	2,66,440	2,46,752	2,34,341	2,21,290
	Repayment of loan during the year	21,466	31,122	13,688	9,222	30,243
	Net loan closing	2,64,347	2,35,318	2,33,064	2,25,119	1,85,356
	Average net loan	2,72,037	2,52,496	2,34,547	2,23,816	2,00,254
	Rate of interest on loan	7.3366%	7.2389%	7.2555%	7.1429%	7.2181%
	Interest on loan	19,958	18,404	17,163	16,209	14,453

  
 पवन देव जामटा/PAWAN DEV JAMTA  
 Deputy General Manager (Commercial)  
 एन टी सी लिमिटेड/NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)



### Interest Rate Statement FY 2023-24

Bank Loan	Interest Rate	Applicable from	Applicable upto
Bank Of India-IV	8.00%	01-Apr-23	31-Mar-24
Corporation Bank-III	8.10%	11-Jan-24	31-Mar-24
HDFC Bank Limited-III	7.95%	01-Jun-23	31-Mar-24
HDFC Bank Limited-V	7.95%	01-Jun-23	31-Mar-24
HDFC Bank Limited-VII	7.95%	01-Jun-23	31-Mar-24
HDFC Bank Limited-XI	7.84%	11-Mar-24	31-Mar-24
HDFC Bank Limited-XII D-3	7.60%	13-Mar-24	31-Mar-24
HDFC Bank Limited-XII D-4	7.60%	13-Mar-24	31-Mar-24
HDFC-IX	7.95%	01-Jun-23	31-Mar-24
ICICI Bank-VII	8.00%	13-Sep-23	31-Mar-24
Jammu & Kashmir Bank-IV	7.98%	01-Apr-23	31-Mar-24
PNB-IV	7.90%	01-Apr-23	31-Mar-24
Punjab National Bank III	7.90%	01-Apr-23	31-Mar-24
State Bank of India - IX	8.20%	14-Feb-24	31-Mar-24
State Bank of India - VIII	8.20%	14-Feb-24	31-Mar-24
State Bank of India - X	8.20%	25-Dec-23	31-Mar-24

  
**पवन देव जामटा/PAWAN DEV JAMTA**  
 उपाय महाप्रबन्धक (वित्तियक)  
 Deputy General Manager (Commercial)  
**एन टी पी सी लिमिटेड/NTPC LIMITED**  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)

<b>NTPC Ltd.</b>			
<b>Pakri Barwadih Integrated Mine</b>			
<b>Details of International Finance:</b>			
<b>Particulars</b>			
	<b>JPY Eqs. \$400 Million Drest II</b>	<b>JPY Eqs. \$400 Million Drest III</b>	<b>JPY Eqs. \$400 Million Drest IV</b>
Source of Loan			
Channel			
Currency	<b>JPY</b>	<b>JPY</b>	<b>JPY</b>
Amount of loan sanctioned	13,89,20,00,000	14,77,68,00,000	14,22,62,00,000
Amount of Gross Loan	13,89,20,00,000	14,77,68,00,000	14,22,62,00,000
Interest Type	<b>Floating</b>	<b>Floating</b>	<b>Floating</b>
Fixed Interest Rate, if applicable	-	-	-
Base Rate, if floating interest*	<b>6M Compounded TONA</b>	<b>6M Compounded TONA</b>	<b>6M Compounded TONA</b>
Margin, if floating interest rate	3.30000%	1.30000%	3.30000%
Are there any Caps / Floor	<b>No</b>	<b>No</b>	<b>No</b>
If above is Yes, specify Caps / Floor	-	-	-
Maturity Period	<b>4</b>	<b>4</b>	<b>4</b>
Start/termin effective from	<b>31-Aug-2023</b>	<b>31-Aug-2023</b>	<b>31-Aug-2023</b>
Repayment period	<b>Years</b>	<b>Years</b>	<b>Years</b>
Repayment effective from	<b>31-Aug-2027</b>	<b>31-Aug-2027</b>	<b>31-Aug-2027</b>
Repayment frequency	<b>Seven times</b>	<b>Seven times</b>	<b>Seven times</b>
Repayment installment	1,96,43,71,429	2,11,88,37,143	2,03,66,62,877
	-	-	-
Base Exchange Rate -	8.5857	8.5806	8.5788
Are foreign currency loans hedged	-	-	-
If above is Yes, specify details			
Pakri Barwadih CMB	18.28%	0.24%	8.85%

  
**पवन देव जामटा/PAWAN DEV JAISWA**  
 Deputy General Manager (Commercial)  
 एन टी पी सी लिमिटेड/NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)

**Form 8- Domestic Bonds- Details of Allocation of corporate loans to various projects**

Particulars	58
Series	58
Source of Loan1	BONDS
Currency2	INR
Amount of Loan sanctioned	30000
Interest Type5	Fixed
Fixed Interest Rate, if applicable	8.10%
Base Rate, if Floating Interest7	N/A
Margin, if Floating Interest8	N/A
Are there any Caps/Floor9	No
If above is yes specify cap/floor	N/A
Moratorium Period10	5
Moratorium effective from #	31-12-2015
Repayment Period11	Bullet Repayment
Repayment effective from	31-12-2020
Repayment Frequency12	Bullet Repayment
Repayment Instalment13, 14	30000
Base Exchange Rate16	N/A
Door to Door Maturity	5
Paid Barwadhi CMB	1,000

  
**पवन देव जामटा/PAWAN DEV JAMTA**  
 (सह-प्रबन्धक (वित्त/फाइनेंस))  
 General Manager (Co-ordinator)  
 एन टी पी सी लिमिटेड / NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)

Form 8- Domestic Bonds- Details of Allocation of corporate loans to various projects						
Particulars	54	57	60	61	64	66
Series	54	57	60	61	64	66
Source of Loan	BONDS	BONDS	BONDS	BONDS	BONDS	BONDS
Currency	INR	INR	INR	INR	INR	INR
Amount of Loan sanctioned	1000000	80000	1000000	1000000	700000	3000000
Interest Type	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
Fixed Interest Rate, if applicable	8.45%	8.15%	8.05%	8.12%	7.45%	7.27%
Base Rate, if Floating Interest	N/A	N/A	N/A	N/A	N/A	N/A
Margin, if Floating Interest	N/A	N/A	N/A	N/A	N/A	N/A
Are there any Cap/Floor	No	No	No	No	No	No
It exists in any specific cap/floor	N/A	N/A	N/A	N/A	N/A	N/A
Maturity Period	10	10	10	5	15	15
Maturity effective from	25-02-2023	15-12-2018	05-05-2028	27-05-2021	05-11-2028	14-12-2018
Repayment Period	Installments Due on 25/02/2023, 25/02/2024 & 25/02/2025	Bullet Repayment	Bullet Repayment	Installments Due on 27/05/2021, 27/05/2025 & 27/05/2031	Bullet Repayment	Bullet Repayment
Repayment effective from	25-02-2023	15-12-2018	05-05-2028	27-05-2021	05-11-2028	14-12-2018
Repayment Frequency	Installments Due on 25/02/2023, 25/02/2024 & 25/02/2025	Bullet Repayment	Bullet Repayment	Installments Due on 27/05/2021, 27/05/2025 & 27/05/2031	Bullet Repayment	Bullet Repayment
Repayment Installment	Installments 1st - 288,138.61 2nd - 412,273.22 3rd - 412,273.22	100000	100000	Installments 1st - 35,758.50 2nd - 35,758.50 3rd - 35,758.50	70000	300000
Base Exchange Rate	N/A	N/A	N/A	N/A	N/A	N/A
Days to Date Maturity	10	10	10	5	15	15
Face Amount OIB	25,000	800	3,000	2,000	4,500	6,000

  
**पवन देव जाम्टा/PAWAN DEV JAMTA**  
 उप महाप्रबन्धक (वित्त/मिनिस्ट्र)  
 Deputy General Manager (Commercial)  
 एन टी पी सी लिमिटेड/NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)

	Form 8- Domestic Bonds- Details of Allocation of corporate loans to various projects			
Particulars	67	72	74	78
Series	67	72	74	78
Series of Loan	BONDS	BONDS	BONDS	BONDS
Currency	INR	INR	INR	INR
Amount of Loan sanctioned	400000	4,00,000	3,99,600	2,00,000
Interest Type	Fixed	Fixed	Fixed	Fixed
Fixed Interest Rate, if applicable	8.30%	5.45%	6.87%	7.44%
Base Rate, if Floating Interest	N/A	N/A	N/A	N/A
Margin, if Floating Interest	N/A	N/A	N/A	N/A
Are there any Caps/Floor	No	No	No	No
If above is yes specify cap/floor	N/A	N/A	N/A	N/A
Maturity Period	10	5	15 Years and 1 day	10
Maturity effective from	15-01-2019	15-10-2020	20-04-2021	25-08-2022
Repayment Period	Bullet Repayment	Bullet Repayment	Bullet Repayment	Bullet Repayment
Repayment effective from	15-01-2020	15-10-2020	21-04-2021	25-08-2022
Repayment Frequency	Bullet Repayment	Bullet Repayment	Bullet Repayment	Bullet Repayment
Repayment Installment	400000	4,00,000	3,99,600	2,00,000
Base Exchange Rate	N/A	N/A	N/A	N/A
Debt to GNP Statutory	18	5	15 Years and 1 day	10
Debt Serviceable CRR	21.531	10.888	28.926	41.830

  
 पवन देव जन्ता/PAWAN DEV JANTA  
 उप महाप्रबन्धक (वर्गिकीकरण)  
 Deputy General Manager (Commercial)  
 एन टी पी सी लिमिटेड/NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)



NTPC Ltd.

Pakri Barwadih Integrated Mine

Details of RoI of International Finance:

Name of the Loan	From	To	No of Days	Floating Rate of Interest	Product	Weighted Average Rate of Interest
JPY Exp. \$400 Million Drawl II	15-11-2022	31-03-2024	138.00	1.21218%	1.97	1.2155%
JPY Exp. \$400 Million Drawl III	15-11-2022	31-03-2024	138.00	1.21218%	1.67	1.2155%
JPY Exp. \$400 Million Drawl IV	22-12-2022	31-03-2024	101.00	1.21886%	1.23	1.2222%

  
पवन देव जमिटा/PAWAN DEV JAMTA  
उप महाप्रबन्धक (वार्मिडिफिकेशन)  
Deputy General Manager (Commercial)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EOG, A-8A, Sector-24, Noida-201301 (U.P.)

Refinancing of loans during 2019-24


NTPC Ltd.


Pakri Barwadih Integrated Mine

(Amount in Lakhs)

2020-21

Existing loan	Existing Rate	Date of Refinancing	Revised Loan	Revised Rate	Refinanced amount	Gain	Gain Sharing
Vijaya bank-IV	7.1500%	24-08-2020	HDFC IX	0.003	178.89	0.8500%	0.4250%
Vijaya bank-V	7.1500%	24-08-2020	HDFC IX	0.003	4,142.85	0.8500%	0.4250%
Canara Bank-III	7.2000%	24-08-2020	HDFC IX	0.003	9,400.00	0.8000%	0.4000%
PFC T-8	7.6000%	15-10-2020	Bonds - 72	0.0645	7300	2.3300%	1.1150%
PFC T-12	8.3300%	15-10-2020	Bonds - 72	0.0645	3500	2.7600%	1.3800%
Bank of India III	6.7000%	27-12-2020	Bank of India IV	0.00%	20000	0.7000%	0.3500%

  
 पवन देव जामटा/PAWAN DEV JAMTA  
 उपायुक्त महाप्रबन्धक (व्यापारिक)  
 Deputy General Manager (Commercial)  
 एन टी पी सी लिमिटेड/NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)

Non-Tariff Income						PART-IV FORM- 15	
Name of the Petitioner: NTPC Ltd							
Name of the Integrated Mine: Pakri Barwadih							
S. No.	Parameters	Existing 2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
1.	Income from sale of washery rejects, if and as	Shall be submitted at the time of truing up.					
2.	Profit from supply of coal to CIL or merchant						
3.	Income from rent of land or buildings						
4.	Income from sale of scrap						
5.	Income from advertisements						
6.	Others *						
 (Petitioner)							

पवन देव जामटा/PAWAN DEV JAMTA  
 उपायुक्त (व्यावसायिक) (सांख्यिक)  
 Deputy General Manager (Commercial)  
 एन टी पी सी लिमिटेड/NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)

Details of Applicable Statutory Charges							PART-IV FORM-16
Name of the Petitioner: NTPC Ltd							
Name of the Integrated Mine: Pakri Barwadih							
Particulars	Applicable Rate	Quantity	Amount (2024-25)	Amount (2025-26)	Amount (2026-27)	Amount (2027-28)	Amount (2028-29)
Royalty	% of CIL Price	14%	173.60	173.60	173.60	173.60	173.60
GST under Reverse Charge Mechanism	% of Royalty	18%	31.25	31.25	31.25	31.25	31.25
District Mineral Foundation (DMF)	% of Royalty	30%	52.08	52.08	52.08	52.08	52.08
GST under Reverse Charge Mechanism	% of DMF	18%	9.37	9.37	9.37	9.37	9.37
National Mineral Exploration Trust (NMET)	% of Royalty	2%	3.47	3.47	3.47	3.47	3.47
GST under Reverse Charge Mechanism	% of NMET	18%	0.62	0.62	0.62	0.62	0.62
Management Fee	Rs per tonne		1.00	1.00	1.00	1.00	1.00
GST under Reverse Charge Mechanism	Rs per tonne	18%	0.18	0.18	0.18	0.18	0.18
COVID 19 FUND	Rs per tonne	10.00	2.67	2.67	2.67	2.67	2.67
GST under Reverse Charge Mechanism	% of COVID 19 Fund	18%	0.48	0.48	0.48	0.48	0.48
Forest Tax	Rs per tonne	22.80	22.80	22.80	22.80	22.80	22.80
GST under Reverse Charge Mechanism	% of Forest Tax	18%	4.10	4.10	4.10	4.10	4.10
Composite User Fee	User Fee Rs 600/- per Daily stay		-	-	-	-	-
GST under Reverse Charge Mechanism	% of Composite User fees	18%	-	-	-	-	-
Mineral bearing land Cess	Rs per tonne	100.00	100.00	100.00	100.00	100.00	100.00
GST under Reverse Charge Mechanism	% of Mineral bearing Cess	18%	18.00	18.00	18.00	18.00	18.00
GST Compensation Tax	Rs per tonne	400.00	400.00	400.00	400.00	400.00	400.00
GST on MDD price	% of Mining Charges	18%	201.36	211.87	222.99	234.70	247.02
GST after adjusting Input Tax Credit	% of Total Taxable Value of Goods	8%	-105.58	-111.12	-116.95	-123.08	-129.56
GST on Transportation Charges	5% on transportation and 18% on handling & reloading		10.55	7.80	2.08	2.55	2.68
<b>Total</b>			<b>825.91</b>	<b>828.29</b>	<b>825.75</b>	<b>833.79</b>	<b>939.79</b>


  
(Petitioner)

पवन देव जामटा/PAWAN DEV JAMTA  
रूप महाप्रबन्धना (वाणिज्यिक)  
Dep. General Manager (Commercial)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
ECC, A-8A, Sector-24, Noida-201501 (U.P.)

Details of Mine Closure Expenses						PART- IV FORM- 17
Name of the Petitioner (NTPC Ltd)						
Name of the Integrated Mine: Pakri Barwadih						
Amount in Rs Lakhs						
1. Amount Deposited in Escrow Account prior to date of Commercial Operation (Rs)		PV				1784
2. Life of Mining year which amount is to be recovered (Yrs)		n				33
3. Borrowing Rate per year (%)		i				8.17%
4. Amount receivable per Year (Rs)		$P = PV \times i / (1+i)^n$				137.34
5. Deposit after the date of Commercial operation - when mine closure is in charge of Generating Company itself						
Production Year No. (i)	Amount of Deposit in Escrow account (ii)	Date of Deposit in Escrow account (iii)	Interest Earned/Accrued in Escrow account (iv)	Amount received from Escrow account towards Mine closure (v)	Admissible Mine closure expense (vi)	
9	381.48				381.48	
10	400.47				400.47	
11	420.49				420.49	
12	441.51				441.51	
13	463.59				463.59	
6. Deposit after the date of Commercial operation - when mine closure is in charge of Mine Developer & Operator (MDO)						
Production Year No. (i)	Amount of Deposit in Escrow account (ii)	Date of Deposit in Escrow account (iii)	Borrowing rate at weighted average rate of interest of actual loan (iv)	Interest Earned/Accrued in Escrow account (v)	Amount received from Escrow account towards Mine closure (vi)	Adjustment to be made in Input price as a part of Mine closure expense (vii)
9	381.48		104.60	177.34		17.55
10	400.47		211.79	193.67		30.72
11	420.49		254.30	209.89		44.40
12	441.51		286.27	227.15		58.32
13	463.59		319.74	245.10		71.64
<p>Note: (i) Year wise deposit amounts in the Escrow Account considered based on the Mining Plan and actual amount deposited shall be submitted at the time of mining up.</p> <p>(ii) Rate of interest in escrow account has been provisionally taken as 8% and the actual interest shall be submitted at the time of mining up.</p>						

  
 पवन देव जाम्टा/PAWAN DEV JAMTA  
 उप महाप्रबन्धक (भारतीय कोयला)  
 Deputy General Manager (Coal India)  
 एन टी पी सी लिमिटेड/NTPC LIMITED  
 EOC, A-2A, Sector-24, Noida-201301 (U.P.)



Details for GCV Adjustment*					PART- IV FORM- 18
Name of the Petitioner: NTPC Ltd.					
Name of the Integrated Mine: Pakri Barwadih					
	2024-25	2025-26	2026-27	2027-28	2028-29
1. Declared GCV of Coal (Kcal/Kg)	Shall be submitted at the time of bring up.				
2. Weighted Average GCV of Coal extracted in the year as reported to CCO (Kcal/Kg)					
 (Petitioner)					

**पवन देव जामटा/PAWAN DEV JAMTA**  
 एन एन डी सी लिमिटेड (वाणिज्यिक)  
 Deputy General Manager (Commercial)  
 एन टी पी सी लिमिटेड/NTPC LIMITED  
 EOC, A-BA, Sector-24, Noida-201301 (U.P.)

Reconciliation of capitalization claimed vis-à-vis books of accounts							PART- IV FORM- E
Name of the Petitioner: NTPC Ltd							
Name of the Integrated Mine: Pabai Barwadih							
							(Amount in Rs. Lakh)
S. No.	Particulars	As on 01.04.2024	2024-25	2025-26	2026-27	2027-28	2028-29
1	2	3	4	5	6	7	8
1	Closing Gross Block as per IND AS	4,88,271.55					
	Ind-AS Adjustment - Leasehold Land	35,671.28					
	Ind-AS Adjustment - Leasehold Building	12.12					
	Ind-AS Adjustment - PPE	-297.90					
2	Ind-AS Adjustment - Site Remediation cost	16,633.00					
3	Closing Gross Block as per I GAAP	5,05,286.18					
4	Opening Gross Block as per IND AS	4,74,310.78					
5	Add/Less: Adjustments towards Accruals	9,900.88					
6	Opening Gross Block as per I GAAP	4,99,508.10					
7	Total Additions as per books (G = 2-6)	24,857.90					
8	Less: Additions pertaining to other Mines (gross Mine wise breakdown)	-					
8.1	Chait Barwa	-					
8.2	Korandoi	-					
8.3	Coal mining HQ	-					
8.4	PD-NV	1,221.08					
9	Net Additions pertaining to lessee Mine	23,636.25					
10	Less: Excesses (gross not allowable / not claimed)	-18,718.32					
11	Net Additional Capital Expenditure Claimed (on accrual basis) (I GAAP)	4,917.93					
12	Less: Un-discharged Liabilities	10,341.73					
13	Add: Discharge of un-discharged liabilities	14,873.17					
14	Net Additional Capital Expenditure Claimed (on cash basis)	47,190.24					

Shall be submitted at the time of filing up.

  
(Petitioner)

पवन देव जामटा/PAWAN DEV JAMTA  
उप महाप्रबन्धक (व्यापारिक)  
Deputy General Manager (Commercial)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

Statement of Cashflow (To be given for relevant dates and year wise)					PART- IV FORM- G				
Name of the Petitioner: NTPC Ltd.									
Name of the Integrated Mine: Pabai Barwadih					Statement in Rs. Lakhs				
S. No.	Particulars	As on 31.03.2024			2024-25	2025-26	2026-27	2027-28	2028-29
		Accrual Basis	Discharged Liabilities	Cash Basis					
A	(a) Opening Gross Block Amount as per books (Indian GAAP)	4,34,063.26	33,367.83	1,83,294.00					
	(b) Amount of IDC in Add above	1,01,568.77	-	1,01,568.77					
	(c) Amount of FC in Add above	-	-	-					
	(d) Amount of FFRV in Add above	-	-	-					
	(e) Amount of Hedging Cost in Add above	-	-	-					
	(f) Amount of BDC in Add above	3,781.98	-	3,781.98					
B	(a) Addition in Gross Block Amount during the period (Discharge provisions Indian GAAP)	27,629.11	6,956.01	15,338.51					
	(b) Amount of IDC in Add above	-	-	-					
	(c) Amount of FC in Add above	-	-	-					
	(d) Amount of FFRV in Add above	-	-	-					
	(e) Amount of Hedging Cost in Add above	-	-	-					
	(f) Amount of BDC in Add above	-	-	-					
C	(a) Addition in Gross Block Amount during the period (Transferred from CWIPs Indian GAAP)	6,827.30	1,203.49	3,561.06					
	(b) Amount of IDC in Add above	-	-	-					
	(c) Amount of FC in Add above	-	-	-					
	(d) Amount of FFRV in Add above	-	-	-					
	(e) Amount of Hedging Cost in Add above	-	-	-					
	(f) Amount of BDC in Add above	-	-	-					
D	(a) Deletion in Gross Block Amount during the period (Indian GAAP)	-	-	-					
	(b) Amount of IDC in Del above	-	-	-					
	(c) Amount of FC in Del above	-	-	-					
	(d) Amount of FFRV in Del above	-	-	-					
	(e) Amount of Hedging Cost in Del above	-	-	-					
	(f) Amount of BDC in Del above	-	-	-					
E	(a) Closing Gross Block Amount as per books (Indian GAAP)	4,90,289.67	46,286.93	4,21,755.69					
	(b) Amount of IDC in Add above	1,01,568.77	-	1,01,568.77					
	(c) Amount of FC in Add above	-	-	-					
	(d) Amount of FFRV in Add above	-	-	-					
	(e) Amount of Hedging Cost in Add above	-	-	-					
	(f) Amount of BDC in Add above	3,781.98	-	3,781.98					


Shall be submitted at the time of testing up.

  
Petitioner

(To be submitted at the time of filing up.)

पवन देव जामटा/PAWAN DEV JAMTA  
उप महाप्रबन्धक (वाणिज्यिक)  
Dep. General Manager (Commercial)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

Statement of Capital Works in Progress (To be given for relevant dates and year wise)					PART-IV FORM-B				
Name of the Petitioner: NTPC Ltd									
Name of the Integrated Block: Pakri Barwadih					(Amount in Rs. Lakhs)				
S. No.	Particulars	As on 01.04.2024			2024-25	2025-26	2026-27	2027-28	2028-29
		Accrual Basis	Un-discharged Liabilities	Cash Basis					
A	a) Opening CWIP as per books (Indian GAAP)	23,874.96	2,980.28	20,894.68	Should be submitted at the time of filing up.				
	b) Amount of IDC in A(a) above	1,342.42	-	1,342.42					
	c) Amount of FC in A(a) above	-	-	-					
	d) Amount of PERV in A(a) above	-	-	-					
	e) Amount of Hedging Cost in A(a) above	-	-	-					
	f) Amount of BEDC in A(a) above	-	-	-					
B	a) Addition in CWIP during the period (Indian GAAP)	24,165.91	2,776.82	31,429.16					
	b) Amount of IDC in B(a) above	2,263.38	-	2,263.38					
	c) Amount of FC in B(a) above	-	-	-					
	d) Amount of PERV in B(a) above	-	-	-					
	e) Amount of Hedging Cost in B(a) above	-	-	-					
	f) Amount of BEDC in B(a) above	-	-	-					
C	a) Transferred to Gross Block Amount during the period (Indian GAAP)	4,057.10	1,003.49	5,043.61					
	b) Amount of IDC in C(a) above	-	-	-					
	c) Amount of FC in C(a) above	-	-	-					
	d) Amount of PERV in C(a) above	-	-	-					
	e) Amount of Hedging Cost in C(a) above	-	-	-					
	f) Amount of BEDC in C(a) above	-	-	-					
D	a) Closing CWIP as per books (Indian GAAP)	41,983.78	4,763.61	37,280.17					
	b) Amount of IDC in D(a) above	2,667.77	-	2,667.77					
	c) Amount of FC in D(a) above	-	-	-					
	d) Amount of PERV in D(a) above	-	-	-					
	e) Amount of Hedging Cost in D(a) above	-	-	-					
	f) Amount of BEDC in D(a) above	-	-	-					

  
(Petitioner)

  
(Petitioner)

पवन देव जामटा/PAWAN DEV JAMTA  
उप महाप्रबन्धक (वाणिज्यिक)  
Deputy General Manager (Commercial)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)



**Calculation of Interest on Normative Loan**

**PART- IV  
FORM- I**

Name of the Petitioner: NTPC Ltd

Name of the Integrated Mine: Pakri Barwadih

(Amount in Rs Lakh)

S. No.	Particulars	Existing 2023-24	2024-25	2025-26	2026-27	2027-28	2028-29
1	2	3	4	5	6	7	8
1	Gross Normative loan – Opening	2,96,750.57	3,29,780.94	4,00,104.60	4,25,350.57	4,78,482.07	5,00,044.87
2	Cumulative repayment of Normative loan up to previous year	40,656.53	-60,908.01	84,556.81	1,11,112.62	1,40,338.47	1,71,858.69
3	Net Normative loan – Opening	2,56,094.04	2,68,792.92	3,15,547.79	3,14,137.94	3,38,143.60	3,28,186.18
4	Add: Increase due to addition during the year	22,758.60	70,323.67	25,145.97	53,231.50	21,562.80	21,633.50
5	Less: Decrease due to de-capitalisation during the year	195.58	-	-	-	-	-
6	Add: Increase due to discharges during the year / period	10,467.36	-	-	-	-	-
6A	Less: repayment during the period	20,334.02	23,568.80	26,555.81	29,225.84	31,520.22	32,987.45
7	Net Normative loan – Closing	2,68,790.39	3,15,547.79	3,14,137.94	3,38,143.60	3,28,186.18	3,16,832.22
8	Average Normative loan	2,62,442.21	3,02,170.36	3,14,842.87	3,26,140.77	3,33,164.89	3,22,509.20
9	Weighted average rate of interest	7.58%	7.3366%	7.2889%	7.2555%	7.2420%	7.2182%
10	Interest on Loan	19,887.63	21,435.40	22,948.47	23,663.19	24,127.73	23,279.31

  
(Petitioner)

**पवन देव जामटा/PAWAN DEV JAMTA**  
उप महाप्रबन्धक (वर्ग-1/अ) )  
Dep., General Manager (Commercial)  
एन टी सी लिमिटेड /NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)



## Annexure - A



### INTER OFFICE MEMO

From: Company Secretary

To: Shri S.N Goel  
ED (Fuel Security)

Ref: 01/SEC/BM/8

Dated: 16.12.2010

Sub: Investment Approval for Pakri Barwadih Coal Mining  
Project, Rated Production Capacity of 15 MTPA

Kindly find enclosed an extract from the minutes of 360<sup>th</sup> Meeting of the Board of Directors held on Friday, November 12, 2010 on the above subject for your information and necessary action.

  
(A.K. RASTOGI)

Encl: As above

1 Gn/B, ICD & CR

2 AGM (PDS)

3 AGM (CM)

4 AGM (Contract)

  
18/12



पवन देव जागटा/PAWAN DEV JAMTA  
उप महाप्रबन्धक (वाणिज्यिक)  
Deputy General Manager (Commercial)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

EXTRACTS FROM THE MINUTES OF 360<sup>TH</sup> MEETING OF THE BOARD OF DIRECTORS HELD ON FRIDAY, NOVEMBER 12, 2010

3019 Item No.360.2.3 Investment Approval for Pakri Barwadih Coal Mining Project, Rated Production Capacity of 15 MTPA

Executive Director (Fuel Security) informed that the Project Sub-Committee of the Board had, in its 68th meeting held earlier in the day, considered the investment proposal for Pakri Barwadih Coal Mining Project and recommended the same for approval of the Board.

He then explained salient features of the proposal like location of the mine, status of land availability, statutory clearances and infrastructure development, demand-supply scenario etc. Executive Director (Fuel Security) further informed that total capital expenditure by NTPC for Pakri Barwadih coal block had been estimated as ₹ 3193.86 Crore as of 1st quarter 2010 price level including interest during construction (IDC) on Senior Debt of ₹ 142.19 Crore, Financing Charges (FC) of ₹ 8.61 Crore and Working Capital Margin money of ₹ 27.07 Crore.

Executive Director (Fuel Security) then informed that total production cost per tonne at 85% capacity utilization worked out to ₹ 1085.13 as under:

	Rs./tonne
MDO Base Mining Fee of ₹ 738/tonne, escalated to March, 2010, as per PV given in Bid	763.62
Additional charges payable to MDO towards O&M of extended CHP (tentative as mentioned in Award Proposal, to be finalized)	6.26
Service Tax on MDO Fee (@15.30%)	78.01
NTPC Operating cost (Revenue expenditure including interest on Working Capital)	64.55
NTPC Investment (₹ 3193.86Cr) servicing cost a. Interest : ₹ 88.47 b. Depreciation & Amortisation of land value : ₹ 106.00	174.47
Total production Cost (excluding Royalty & SED)	1085.13

Executive Director (Fuel Security) then stated that as per Tariff Regulation 2008-14, Rate of Return notified by CERC was 16% (post-tax) which after grossing up with applicable Income-tax rate, worked out to 23.9593%. Taking Return on Equity as 23.9593% (pre-tax), Transfer Price of coal from Pakri Barwadih Mine worked out to ₹ 1272.51 / tonne.



पवन देव जामटा/PAWAN DEV JAMTA  
उप महाप्रबन्धक (वर्किंग कोल)  
Deputy General Manager (Working Coal)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

Executive Director (Fuel Security) also informed that while appraising the Project's projected performance, Infrastructure Development Finance Company Limited (IDFC) concluded that the Project if implemented through outsourced model, could be considered as financially viable.

The Board, after discussions, passed the following resolution:

Resolved that the Investment Approval be and is hereby accorded for Pakri Barwadih Coal Mining Project (15 Million Tonnes Per Annum) at Infrastructure Development Finance Company Limited (IDFC) appraised current estimated cost as of 1st quarter 2010 price level of ₹ 3193.88 Crore including Interest During Construction (IDC), Financing Charges (FC) of ₹ 150.60 Crore ( ₹ 142.19 Cr + ₹ 8.51 Cr) and Working Capital Margin (WCM) of ₹ 27.07 Crore, as per the memorandum submitted before the Board.

XXXX



पवन देव जगटा/PAWAN DEV JAMTA  
उप महाप्रबन्धक (एन टी पी सी)  
Dep. General Manager (NTPC Ltd.)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)





Copy: ED(F.T)  
Gm (Coal Mining)  
may please see  
Normal  
14/11

INTER OFFICE MEMO

FROM : COMPANY SECRETARY

REF. NO. : 01: SEC: BM:8

DATED : 12.11.2012

TO: Shri N.K. Sharma  
ED (R&R, Safety & CSR)

CC: G M (Fin. Budget)

SUBJECT: Proposal for approval of additional provisions for payment to claimant to claimant on Government Land and Forest Land for Pakri Barwadih Coal Block.

Please find enclosed an extract from the Minutes of 388<sup>th</sup> Meeting of the Board of Directors held on Wednesday, 7<sup>th</sup> November 2012 on the above subject for your information and necessary action.

  
(A.K. RASTOGI)

Encl.: As above

org: Azm (R&R)

copy: Brand file

  
पवन देव जाम्टा/PAWAN DEV JAMTA  
वाम महाप्रबन्धक (R&R, Safety & CSR)  
Dept. General Manager (Coal Mining)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EOC, A-BA, Sector-24, Noida-201301 (U.P.)

EXTRACTS FROM THE MINUTES OF 387TH MEETING OF THE  
BOARD OF DIRECTORS HELD ON FRIDAY, 26TH OCTOBER 2012

Item No.387.2.8 Proposal for approval of additional provisions for  
payment to claimants on Government Land and Forest  
Land for Pakri Barwadih Coal Block

XX	XX	XX	XX	XX	XX	XX
XX	XX	XX	XX	XX	XX	XX

The Board, after discussions, passed the following resolution:

Resolved that the proposal for additional provisions of Rs. 40 Crore for  
payment to claimants, settled on Government land for more than 30  
years and dwellers on forest land eligible under relevant Forest Act,  
for Pakri Barwadih coal block, as detailed in the Memorandum  
submitted before the Board, be and is hereby approved.

Further resolved that the Chairman & Managing Director be and is  
hereby authorized to approve any subsequent re-appropriation /  
modification within total provisions for land acquisition and  
Rehabilitation Action Plan (RAP) as per State Government guidelines  
issued from time to time.

XXXX

*[Signature]*

*[Signature]*  
पवन देव जामात/PAWAN DEV JAMTA  
उप-प्रबन्धक (सी. ई. २४४)  
Dep. Secy. (C.E. 244) (Generalist)  
एन टी पी सी लिमिटेड/ NTPC LIMITED  
EOC, A-2A, Sector-24, Noida-201301 (U.P.)



INTER OFFICE MEMO

From: Dy. Co. Secretary

To: GM (HR) I/c

→ CC: ED (FT)

Ref: 01:SEC:BM:8

Dated: 28.03.2013

**Sub.: Revised Compensation cum R&R package as approved by Government of Jharkhand (GOJ) for Pakri-Barwadih Coal Mining Project**

Please find enclosed extracts from the minutes of 393<sup>rd</sup> Meeting of the Board of Directors held on March 22, 2013 on the above subject for your information and necessary action.

Nandini Sarkar  
(N. Sarkar)

Encl: As above

Gm/cm  
Srinanth

Bond mts file  
General file  
A  
29/3

  
पवन देव जाम्टा/PAWAN DEV JAMTA  
उप महाप्रबन्धक (मानव संसाधन)  
Deputy General Manager (Human Resource)  
एन टी पी लिमिटेड, NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

**EXTRACTS FROM THE MINUTES OF 393<sup>RD</sup> MEETING OF THE BOARD  
OF THE DIRECTORS HELD ON FRIDAY, MARCH 22, 2013**

**Item No.393.2.9      Revised Compensation cum R&R package as  
approved by Government of Jharkhand (GOJ)  
for Pakri-Barwadih Coal Mining Project**

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The Board, after discussions, passed the following resolution:

Resolved that the Revised Compensation cum R&R package as approved by Government of Jharkhand (GOJ) for Pakri Barwadih coal mining project involving an additional tentative financial expenditure of Rs.10041 Million (excluding Rs.15593 Million already approved) as broadly detailed in the Memorandum submitted before the Board be and is hereby approved.

Further resolved that the Chairman & Managing Director be and is hereby authorized to approve any subsequent re-appropriations in the overall approved investment amount of Rs. 25634 Million.

Further resolved that Executive Director (Fuel Transportation) be and is hereby authorized to take further necessary action in the above matter.

XXXXX

*Nandini Sarker*

  
**पवन देव जामटा/PAWAN DEV JANTA**  
 Deputy General Manager (Commercial)  
**एन टी पी सी लिमिटेड/NTPC LIMITED**  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)



## INTER OFFICE MEMO

From: ED & Co. Secretary

To: Shri S. Ghosh  
ED (HR)

Ref.: 01:SEC:BM:8

Dated: 26.03.2015

**Sub.: Revised Compensation & special assistance Package to encroachers  
for Pakri-Barwadih Coal Mining Project**

Please find enclosed extracts from the minutes of 418<sup>th</sup> meeting of the Board of Directors held on Wednesday, 25<sup>th</sup> March, 2015 on the above subject for your information and necessary action.

  
(A.K. RASTOGI)

Encl: As above

  
पवन देव जामटा/PAWAN DEV JAMTA  
एनटीपीसी (एनटीपीसी)  
Director, Manpower  
NTPC Ltd. NTPC Ltd.  
A-3A, Sector-24, Noida-201301 (U.P.)



EXTRACTS FROM THE MINUTES OF 418<sup>th</sup> MEETING OF THE BOARD OF  
DIRECTORS HELD ON WEDNESDAY, 25<sup>th</sup> MARCH 2015

Item No.418.2.1 Revised Compensation & Special assistance  
package to encroachers for Pakri-Barwadih Coal  
Mining Project

XX	XX	XX	XX	XX	XX
XX	XX	XX	XX	XX	XX


The Board, after discussions, passed the following resolution:

Resolved that the Revised Compensation and Special assistance package to encroachers, as decided in the meeting with Government of Jharkhand (GOJ) for Pakri-Barwadih Coal Mining Project, involving an additional tentative financial expenditure of Rs. 3542 Million (over and above the already approved Rs. 25634 Million), as broadly detailed in the Memorandum placed before the Board, be and is hereby approved.

Further resolved that the Chairman & Managing Director be and is hereby authorized to approve any subsequent re-appropriations in the overall approved amount of Rs. 29176 Million towards Land and R&R.

Further resolved that Regional Executive Director (Coal Mining) be and is hereby authorized to take further necessary action in the above matter.

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पवन देव जामटा/PAWAN DEV JAMTA  
उप महाप्रबन्धक (आर्थिक विभाग)  
Deputy General Manager (Commercial)  
एन टी सी लिमिटेड/NTSC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)



**INTER OFFICE MEMO**

**FROM :** COMPANY SECRETARY

**TO:** Shri Prashant Kashyap  
HOP (Pakri Barwadih)

Through  
email  
only

**REF. NO. :** 01: SEC: BM: 8

**DATED :** 1.1.2021

**SUBJECT:** Additional Land Compensation on account of delayed land payment and indexation of R&R Benefits including Investment approval for Phase IV, V for Pakri Barwadih Coal Mining Projects at Hazaribagh

Please find enclosed extracts from the minutes of 492<sup>nd</sup> Meeting of the Board of Directors held on Saturday, 26<sup>th</sup> December 2020 on the above subject for your information and necessary action.

**(Nandini Sarkar)**

**Encl.: As above**

पवन देव जामटा/PAWAN DEV JAMTA  
उप महाप्रबन्धक (भारत खनिज)  
Deputy General Manager (Coal & Minerals)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EDC, A-8A, Sector-24, Noida-201301 (U.P.)

EXTRACTS FROM THE MINUTES OF 492<sup>ND</sup> MEETING OF THE BOARD OF DIRECTORS HELD ON SATURDAY, 26<sup>TH</sup> DECEMBER, 2020

Item no. 492.2.7 Additional Land Compensation on account of delayed land payment and indexation of R&R Benefits including Investment approval for Phase IV, V for Pakri Barwadih Coal Mining Projects at Hazaribagh

XX XX XX XX XX XX XX XX XX XX XX XX  
XX XX XX XX XX XX XX XX XX XX XX XX

The Board, after discussion, passed the following resolution:

Resolved that special assistance package for additional land compensation including land for Ph.-I to Ph.-V, in line with the Minutes of Meeting with Govt. of Jharkhand dated 15.12.2020 for Pakri Barwadih Coal Mining Project involving total tentative financial implication of Rs. 3699.8 Million towards additional land compensation on account of delayed payment and Ph.-IV to Ph.-V land of PB (excluding PB-NW) be and is hereby approved.

Further resolved that special assistance package for additional land compensation for LA land, in line with the Minutes of Meeting with Govt. of Jharkhand dated 15.12.2020 for Pakri Barwadih Coal Mining Project involving total tentative financial implication of Rs. 110 Million towards additional land compensation on account of delayed payment be and is hereby approved.

Further resolved that special assistance package for additional R&R benefits, in line with the Minutes of Meeting with Govt. of Jharkhand dated 15.12.2020 for Pakri Barwadih Coal Mining Project involving total tentative financial implication of Rs. 714.5 Million towards indexation of R&R benefits to Homestead Oustees be and is hereby approved.

Further resolved that the Chairman & Managing Director be and is hereby authorized to approve any subsequent re-appropriation in the overall approved amount of Rs. 33700.6 Million (29176.3 Million + 3699.8 Million + 110 Million + 714.5 Million) towards land and R&R cost of Pakri Barwadih Coal Mining Project.

Further resolved that Executive Director (PB, CB & Badam) be and is hereby authorized to take further necessary action in the above matter.

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*Nandini Sarker*

*[Signature]*  
पवन देव जामटा/PAWAN DEV JAMTA  
एन एच सी लिमिटेड (एन एच सी लिमिटेड)  
Dep-1, General Manager (P&A) (NTPC)  
एन एच सी लिमिटेड, NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)



**INTER OFFICE MEMO**

**FROM :** COMPANY SECRETARY

**TO:** Shri Animesh Jain  
CGM (Coal Mining)

Through  
email  
only

**REF. NO. :** 01: SEC: BM: 8

**DATED :** 17.10.2023

**SUBJECT:** Investment Approval for doubling of rail track between Banadag Railway siding to Hazaribagh Railway Station for Pakri Barwadih Coal Mining Project (PBCMP) of NTPC

Please find enclosed extracts from the Minutes of 535<sup>th</sup> Meeting of the Board of Directors held on Saturday, 7<sup>th</sup> October 2023 on the above subject for your information and necessary action.

  
(Arun Kumar)

**Encl.: As above**

  
पवन देव जामटा/PAWAN DEV JAMTA  
उप महाप्रबन्धक (कार्मिक) /  
Deputy General Manager (Organisational)  
एन टी पी सी लिमिटेड / NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)



**EXTRACTS FROM THE MINUTES OF 535<sup>TH</sup> MEETING OF THE BOARD OF DIRECTORS HELD ON SATURDAY, 7<sup>TH</sup> OCTOBER, 2023**

**Item no. 535.2.6 Investment Approval for doubling of rail track between Banadag Railway siding to Hazaribagh Railway Station for Pakri Barwadih Coal Mining Project (PBCMP) of NTPC**

XX XX XX XX XX XX XX XX XX XX XX XX

The Board felt the need to delegate suitably the powers to approve similar investment approval proposals. The Board then authorized Director (Fuel) to work out suitable delegation and place proposal before the Board for approval.

XX XX XX XX XX XX XX XX XX XX XX XX

The Board, after discussion, passed the following resolution:

Resolved that the investment approval be and is hereby accorded to undertake doubling of the rail track between Banadag Railway siding to Hazaribagh Railway Station at an estimated cost of Rs.523.92 Crore for Pakri Barwadih Coal Mining Project as per the memorandum submitted before the Board.

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*Rumor*

  
पवन देव जामटा/PAWAN DEV JAMTA  
उप महाप्रबन्धक (वर्तमान)  
Dep. General Manager (Commercial)  
एन टी पी सी लिमिटेड, NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)



## Annexure - B



### INTER OFFICE MEMO

FROM : Company Secretary

TO : Sh. Animesh Jain  
RED (Coal Mining)

Through  
email  
only

REF. NO. : 01/ SEC/ BM/ 8

DATED : 20.05.2024

SUBJECT: Revised Cost Estimate (RCE-I) for Pakri Barwadih Coal Mining Project

Please find enclosed extract from the minutes of 542<sup>nd</sup> Meeting of the Board of Directors held on Monday, 29<sup>th</sup> April 2024 on the above subject for your information and necessary action.

(Ritu Arora)

Encl.: As above

पवन देव जाम्टा / PAWAN DEV JAMTA  
उप महाप्रबन्धक (व्यापारिक)  
Deputy General Manager (Commercial)  
एन टी पी सी लिमिटेड / NTPC LIMITED  
EDC, A-8A, Sector-24, Noida-201301 (U.P.)

EXTRACTS FROM THE MINUTES OF 542<sup>ND</sup> MEETING OF THE BOARD OF  
DIRECTORS HELD ON MONDAY, 29<sup>TH</sup> APRIL 2024

11831 Item No. 542.2.4 Revised Cost Estimate (RCE-I) for Pakri Barwadih  
Coal Mining Project

The Board, after discussion, passed the following resolution:

**"Resolved** that the proposal of revised cost estimate (RCE-I) for Pakri Barwadih Coal Mining Project for ₹ 10,323.09 Crore (including IDC of ₹ 1,269 Crores, WC of ₹ 27.07 Crores and EDC of ₹ 72.79 Crores) as per the memorandum submitted to the Board, be and is hereby approved for investment approval.

**Further resolved** that the Chairman & Managing Director be and is hereby authorized to take further action, as be considered necessary, in this regard."

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पवन देव जामटा/PAWAN DEV JANTA  
जल-सहायक निदेशक (नदी नदी)  
District General Manager, Chhatisgarh  
एन टी सी लिमिटेड, NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

## Annexure - C

Statement showing variation between Investment Approval (including subsequent NTPC Board approvals) and RCE					
Amount in Rs Crores					
Sl. No	Particulars	Total approved cost including PR cost and additional amount subsequently approved by NTPC Board	Reference of Board Approval	RCE-I Cost	Total variation w.r.t. IA
		A		B	C=(B-A)
1	Land	1,575.88	492nd Board dated 26.12.2020	2,199.44	623.56
2	Buildings				
i	Service (Admin Building)	6.78	360th Board dated 12.11.2010	321.15	308.38
ii	Residential	5.99			
3	Plant & Machinery				
i	HEMM	-			
ii	Other than HEMM	1,090.12	360th Board dated 12.11.2010	1,524.73	434.61
	Total	1,090.12		1,524.73	434.61
4	Furniture & Fixings	0.80	360th Board dated 12.11.2010	33.34	32.54
5	Railway Sidings	675.35	360th Board dated 12.11.2010 535th Board dated 07.10.23	906.59	221.24
6	Vehicles	0.67	360th Board dated 12.11.2010	0.66	-0.01
7	Prospecting & Boring	20.94	360th Board dated 12.11.2010	-51.51	30.56
8	Development				
i	Capital Outlay in Mines	1,835.86	360th Board dated 12.11.2010 & 492nd Board dated 26.12.2020	3,713.02	1,877.16
ii	Roads and Culverts	14.66	360th Board dated 12.11.2010	71.23	56.56
iii	Water Supply & Sewerage	0.64	360th Board dated 12.11.2010	0.64	-
iv	PR Preparation Cost & So Studies	8.16	360th Board dated 12.11.2010	21.94	13.78
v	Miscellaneous Provisions			20.00	20.00
	Total i to v	5,235.86		8,954.23	3,718.38
9	Revenue Exp. Capitalised	97.91	360th Board dated 12.11.2010	64.19	-33.72
10	Upfront Fee	8.80	360th Board dated 12.11.2010	8.60	-
11	Less Depreciation Capitalised	-		-	-
12	IDC on senior debt	199.16	360th Board dated 12.11.2010 535th Board dated 07.10.23	1,389.00	1,069.84
13	Working Capital Margin Money	27.07	360th Board dated 12.11.2010 535th Board dated 07.10.23	27.07	-
	Grand Total	5,568.80		10,323.09	4,754.50

Annexure - D

**NTPC LIMITED**



SCOPE COMPLEX, 7 INSTITUTIONAL AREA, LODHI ROAD, NEW DELHI-110003

**REVISED MINING PLAN AND MINE CLOSURE PLAN**  
(1st Revision)

FOR

**PAKRI BARWADIH COAL BLOCK**

NorthKaranapura Coalfield, Distt. - Hazaribagh, Jharkhand

**Opencast – 18.00 Mtpa**

**Block area - 4695 Ha**

**January – 2016**

(Incorporating clarifications to the observations of Standing Committee)

Volume-I

Text & Annexures

जॉर्जेन पी.एम. एन.टी.पी.सी.  
अवर सचिव

*Sanjiv*  
**SANJIV KUMAR SINGH**  
Recognised Qualified Person  
No. 34C- / (15)/2009-CPAM  
Ministry of Coal, Govt. of India

Prepared By:

**SANJIV KUMAR SINGH**

(RQP NO.:34011/ (15)/2009 – CPAM)

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Fax:011-24367089,E-mail:sanjivkumarsingh01@ntpc.co.in

पवन देव जामटा/PAWAN DEVI JAMTA  
Dep. Secy. (Commercial)  
एन टी पी सी लिमिटेड NTPC LIMITED  
EOG, A-8A, Sector-24, Noida-201301 (U.P.)



# NTPC LIMITED



SCOPE COMPLEX, 7 INSTITUTIONAL AREA, LODHI ROAD, NEW DELHI-110003

## REVISED MINING PLAN AND MINE CLOSURE PLAN (1st Revision)

FOR

**PAKRI BARWADIH COAL BLOCK**  
North Karanpura Coalfield, Distt. - Hazaribagh, Jharkhand

**Opencast – 18.00 Mtpa**

**Block area - 4695 Ha**

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Volume-I  
Text & Annexures

*Sanjiv*  
SANJIV KUMAR SINGH  
Recognised Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India


Prepared By:

**SANJIV KUMAR SINGH**

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पवन देव जामटा/PAWAN DEV JAMTA  
उप महाप्रबन्धक (वित्तिक) /  
Depy. General Manager (Commercial)  
एन टी पी सी लिमिटेड / NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

# OBSERVATIONS & COMPLIANCE TO OBSERVATIONS

*Sanjay*  
SANJAY KUMAR SINGH  
Recognised Qualified Person  
No. 25011/15/2008-CHAM  
Ludhiana, Dist. Gurgaon, Haryana

*Sanjay*  
पवन देव जामटा/PAWAN DEV JAMTA  
उप-मालिक (वॉलेंटियर)  
Deputy Chairman (Volunteer)  
एन टी पी सी लिमिटेड  
EOC, A-8A, Sector-22, Gurgaon-201301 (U.P.)

Pointwise Compliance to MoC's observation issued vide letter no. 34011/05/2015/CPAM(Pt) dated 28<sup>th</sup> December 2015 on Revised Mining Plan & Mine Closure Plan – 1st Revision of Pakri Barwadih Coal Block

Sl. No	Ref Para	Observations	Compliance to the Observations
1	Sum 1(h)	ROM to be produced per year as per the mining plan should also be envisaged.	ROM to be produced per year is 18 Mt and the same has been incorporated in para 1(h) of Summarised Data. ROM Quantity: <ul style="list-style-type: none"> <li>503.38 Mt from West and East Quarry</li> <li>138.96 Mt from NW Quarry</li> <li>Total = 642.34 Mt</li> </ul>
2	Sum 1 (l) & 1 (m)	It appears from the annexure XIV that the lease has been acquired under CBA, while at Summary item 1 (l) under the heading period for which mining lease has been granted it is indicated as not applicable, this needs to be reconciled.	Mining Lease is not applicable since mining area land is being acquired by NTPC under CBA Act.
3	Sum 1 (l)	No Expiry has been indicated against the date of expiry of earlier mining lease, while at para 2(d) date of expiry of the lease has been indicated as 2033, this needs to be reconciled.	Mining Lease is not applicable since mining area land is being acquired by NTPC under CBA Act. The same has been reconciled at para 2(d) of Summarised Data.
4	Sum 2 (f)	As per the calendar plan of the approved mining plan proposed year of start of production appears to be 2008-09, while at para 2(f) of	The proposed year of start of the production as per present Revised Mining Plan (1st Revision) is 2016-17.

*Sanjiv Kumar Singh*  
**SANJIV KUMAR SINGH**  
 Recognised Qualified Person  
 No. 34011/15/2009-CPAM  
 Ministry of Coal, Govt. of India

Page 1 of 35

*Pawan Dev Jaiswal*  
**Pawan Dev Jaiswal/PAWANA**  
 General Manager (U.P.)  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)

Pointwise Compliance to MoC's observation issued vide letter no. 34011/05/2015/CPAM(Pt) dated 28<sup>th</sup> December 2015 on Revised Mining Plan & Mine Closure Plan – 1st Revision of Pakri Barwadih Coal Block

Sl. No	Ref Para	Observations	Compliance to the Observations															
5	Sum 2 (m)	Reason for delay in starting of the project should be envisaged in the item under reference.	<p>Reasons for delay in starting of the project as per Approved Mining Plan are as under;</p> <p>a) Delay in issuance of NoC on jungle jhari land by Distt Administration due to which Forest Clearance was delayed.</p> <p>b) Revision of evacuation corridor on advice of FAC, MoEF</p> <p>c) Delay in land acquisition: There was delay in physical verification &amp; Certification of land records, disbursement of land compensation by Hazaribagh Distt. Administration took more time due to old / non availability of land records, inadequate State manpower at Distt/Block level, law &amp; order problem etc.</p> <p>d) Non-performance by the earlier MDO. NTPC finally terminated the MDO contract wef 22.06.2014.</p> <p>The same has been now incorporated at para 2(m) of Summrised Data.</p>															
6	Sum 2(o)	The reason for increase in Land area from 384 to 485 Ha and reduction in land area outside block from 259 Ha to 267 Ha should be elaborated in the reference para and chapter IX of the mining plan.	<p>There is a net increase in block area from 4626 Ha to 4695 Ha in comparison to the Approved Mining Plan as mentioned in the Table below. (reference para considered is 2 (p))</p> <p>Reasons for change Area is given below:</p> <table><tr><th>Particulars</th><th>Approved Mining Plan</th><th>Revised Mining Plan</th><th>+/- (Ha)</th><th>Reason</th></tr><tr><td>Block Area excluding Area 'A'</td><td>3943</td><td>3943</td><td></td><td>No Change</td></tr><tr><td>Area 'A'</td><td>384</td><td>485</td><td>101</td><td>Detailed survey of Area 'A' at the time of detailed exploration has indicated total area as 485</td></tr></table>	Particulars	Approved Mining Plan	Revised Mining Plan	+/- (Ha)	Reason	Block Area excluding Area 'A'	3943	3943		No Change	Area 'A'	384	485	101	Detailed survey of Area 'A' at the time of detailed exploration has indicated total area as 485
Particulars	Approved Mining Plan	Revised Mining Plan	+/- (Ha)	Reason														
Block Area excluding Area 'A'	3943	3943		No Change														
Area 'A'	384	485	101	Detailed survey of Area 'A' at the time of detailed exploration has indicated total area as 485														

SANJIV KUMAR SINGH  
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Ministry of Coal, Govt. of India

सहायक निदेशक, कोयला  
राज्य कोयला निदेशक  
राज्य कोयला निदेशक  
राज्य कोयला निदेशक  
राज्य कोयला निदेशक

प्राप्त हो जायगा/PAWAN DEV JAIN  
Dep. General Manager (Mining)  
EOC, A&A, Sector-24, Noida-201301 (U.P.)



Pointwise Compliance to MoC's observation issued vide letter no. 34011/05/2015/CPAM(Pt) dated 28<sup>th</sup> December 2015 on Revised Mining Plan & Mine Closure Plan – 1st Revision of Pakri Barwadih Coal Block

Sl. No	Ref Para	Observations	Compliance to the Observations			
			Outside Block area (For OB Dumps and Infrastructure)	299	267	ha. Same has been notified under Section 7(i) of CBA.
			Total	4526	4595	Difference of 69 Ha is due to above two reasons.
<p>The difference of 69 ha between the areas shown in the Approved Mining Plan and present Revised Mining Plan and Mine Closure Plan(1st Revision) is attributed due to increase of 101 ha in Area 'A' after demarcation &amp; measurement, and reduction by 32 ha of the area taken for external dumping and infrastructure.</p> <ul style="list-style-type: none"> <li>The revised area of PB-NW (Sector 'A') has been certified by CMPDI (enclosed as Annexure -XIX).</li> <li>The above details have been now incorporated in the reference para and Chapter IX (Land Requirement) of the Revised Mining Plan and Mine Closure Plan(1st Revision).</li> </ul>						
7	Sum 3 (f)	Reason for deviation from lease boundary / required boundary from the boundary demarcated by CMPDI/ SCCL/ NLC needs to be clarified	The block boundary considered for mining is the same as provided by the CMPDI. However additional land has been envisaged and acquired for external dump and infrastructure such as Cross Country Conveyor, Railway Siding etc. outside the block boundary.			
8	Sum 4(i) & 4(m)	The Grade of Coal indicated at Para 4.4.2 at Table 4.12/4.13 and other relevant pages area on obsolete system of grading of Coal. The GCV based grading of coal	<p>GCV is calculated based on following formula:</p> <p>Gross Calorific Value = <math>(UHV + 3645 - 75.4 \times M) / 1.466</math></p> <p>Accordingly GCV based grading is now provided at Table 4.12/4.13 and incorporated at all relevant pages of the Revised Mining Plan and Mine Closure Plan (1st Revision).</p>			

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Ministry of Coal, Govt. of India

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प्रमाणित किया गया  
Date: 28/12/2015  
By:   
For:   
Sanjiv Kumar Singh  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)





Pointwise Compliance to MoC's observation issued vide letter no. 34011/05/2015/CPAM(Pt) dated 28<sup>th</sup> December 2015 on Revised Mining Plan & Mine Closure Plan – 1st Revision of Pakri Barwadih Coal Block

Sl. No	Ref Para	Observations	Compliance to the Observations									
			Seam	Net Reserve	Barrier Loss	Batter Loss	Mineable Reserves	Mining Loss	Extractable Reserve	% Extraction		
			V Top	22.29	0.72	1.57	19.99	0.59	19.40	87.08		
			V Bottom	15.56	0.51	1.10	13.96	0.41	13.55	87.06		
			V Combined	11.57	0.21	0.49	10.87	0.44	10.43	90.16		
			Seam - V	49.42	1.44	3.16	44.82	1.44	43.38	87.78		
			IV Top	19.82	0.64	2.23	16.95	0.50	16.46	83.01		
			IV Bottom	9.92	0.32	1.12	8.48	0.25	8.23	83.01		
			IV Combined	52.32	3.15	10.68	78.49	2.43	76.06	82.39		
			Seam - IV	122.06	4.10	14.03	103.93	3.18	100.75	82.54		
			III Top	27.45	1.21	2.04	24.20	0.70	23.49	85.59		
			III Bottom	9.83	0.43	0.73	8.66	0.25	8.41	85.59		
			III Combined	4.80	0.21	0.35	4.23	0.12	4.11	85.59		
			Seam - III	42.08	1.85	3.13	37.10	1.08	36.02	85.59		
			II Top	59.98	4.66	5.21	49.11	1.89	47.22	78.72		
			II Middle	139.75	11.83	11.24	116.68	3.83	112.86	80.75		
			II TM	76.09	7.28	5.63	63.18	1.77	61.40	80.70		
			II Bottom	116.05	10.76	9.90	95.39	2.89	92.50	79.71		
			II MB	17.90	1.71	1.32	14.86	0.42	14.44	80.70		
			II Combined	7.35	0.70	0.54	6.11	0.17	5.94	80.70		

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Recognised Qualified Person  
No. 34011/15/2009-CPAM  
Ministry of Coal, Govt. of India

Page 5 of 35

अधिकारी के नाम पर (P) NAME  
अधिकारी के पद पर (P) Designation  
अधिकारी के पद पर (P) Designation

परीक्षा के अध्यक्ष (P) IN-CHARGE  
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Pointwise Compliance to MoC's observation issued vide letter no. 34011/05/2015/CPAM(Pt) dated 28<sup>th</sup> December 2015 on Revised Mining Plan & Mine Closure Plan – 1st Revision of Pakri Barwadih Coal Block

Sl. No	Ref Para	Observations	Compliance to the Observations												
			Seam- II	417.13	36.95	34.85	345.33	10.97	334.36	80.16					
			I Top	36.93	2.72	9.39	24.81	0.77	24.05	65.11					
			I Middle	72.97	5.27	18.20	49.49	1.66	47.84	65.56					
			I TM	2.51	0.23	0.79	1.49	0.04	1.45	57.80					
			I Bottom	35.60	2.52	8.69	24.39	0.52	23.87	67.06					
			I MB	14.85	1.35	4.67	8.83	0.24	8.58	57.80					
			I Combined	3.58	0.33	1.13	2.13	0.06	2.07	57.80					
			Seam- I	156.44	12.42	42.88	111.14	3.28	107.86	64.81					
			LL	2.60	0.10	0.35	2.15	0.11	2.04	78.62					
			K5	0.13	0.01	0.06	0.06	0.01	0.05	36.32					
			K4	4.21	0.13	1.11	2.97	0.11	2.86	67.83					
			K3	3.34	0.22	0.86	2.26	0.06	2.20	65.95					
			K2	5.38	0.27	1.14	3.97	0.07	3.90	72.40					
			K1	15.24	1.25	4.65	9.34	0.41	8.93	58.62					
			Seam- Local	30.90	1.98	8.17	20.75	0.77	19.98	64.66					
			Total	828.03	58.74	106.22	663.07	20.72	642.35	77.58					

\*Additional 20Mt of proved reserve had not been considered in the above table as the same is considered to be mined by u/g.

Percentage of extraction is 78% and the same has been now incorporated at para 4(i) of Summarised Data and Table-5.6 of Chapter-5.

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10 Sum 4(i) The percentage of extraction needs to be checked.

EOC, A-BA, Sector-24, Huda-201-19 (U.P.)



Compliance to the Observations																								
Sl. No	Ref Para	Observations																						
11	Summary 5 (a)	The Schedule of starting of proposed underground mining at Para 1.6.2 is 20 year of start of mining operation, while at para 5.7 it is 10th year of start of mining operation,, while for assessment of amount to be deposited into escrow account has been envisaged from 9th year of mining operation, this needs to be reconciled.	<p>Schedule of start of underground mining operations has been envisaged from 10th year of mining operations (P10). Schedule of UG Operation is as follows.</p> <p><b>Schedule of Commencement PB (UG)</b></p> <table><tr><th>SI No.</th><th>Activity</th><th>Time schedule</th></tr><tr><td>1</td><td>Detailed exploration of the underground area</td><td>4 years</td></tr><tr><td>2</td><td>Preparation of G.R.</td><td>1 year</td></tr><tr><td>3</td><td>Various Studies and Clearances</td><td>3 year</td></tr><tr><td>4</td><td>Preparation and approval of Mining Plan from MOC</td><td>1 year</td></tr><tr><td>3</td><td>Commencement of mining operations</td><td>1 years</td></tr><tr><td></td><td><b>Total time</b></td><td><b>10 years</b></td></tr></table> <p>Accordingly it has been now reconciled at para 1.6.2 and para 5.4 and Table 5.22 of Chapter-5.</p>	SI No.	Activity	Time schedule	1	Detailed exploration of the underground area	4 years	2	Preparation of G.R.	1 year	3	Various Studies and Clearances	3 year	4	Preparation and approval of Mining Plan from MOC	1 year	3	Commencement of mining operations	1 years		<b>Total time</b>	<b>10 years</b>
SI No.	Activity	Time schedule																						
1	Detailed exploration of the underground area	4 years																						
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4	Preparation and approval of Mining Plan from MOC	1 year																						
3	Commencement of mining operations	1 years																						
	<b>Total time</b>	<b>10 years</b>																						
12	Sum 5(d) & 5(e)	Quantum of coal to be produced indicated at para 5(d) is 616.20 Mte. and extractable reserve indicated at para 4 (a) is 625.13	<p>Total revised Quantum of coal to be produced from the block is 642.34 Mt and the same has been reconciled at para 5(d). extractable reserves and at para 4 (a).</p>																					

Pointwise Compliance to MoC's observation issued vide letter no. 34011/05/2015/CPAM(Pt) dated 28<sup>th</sup> December 2015 on Revised Mining Plan & Mine Closure Plan – 1st Revision of Pakri Barwadih Coal Block

Sl. No.	Ref Para	Observations	Compliance to the Observations																																												
13	Sum 6(a)	<p>Mile, while production plan for only 609.19 mte has been envisaged. This needs to be reconciled.</p> <p>Calculation for Coal requirement for the company and % of coal likely to be met from this project is given below:</p> <table border="1"> <thead> <tr> <th>Sl. No.</th><th>Parameter</th><th>Unit</th><th>Value</th></tr> </thead> <tbody> <tr> <td>1</td><td>Thermal Power (Coal-Commercial) Capacity as on 06.01.2016</td><td>MW</td><td>34425.00</td></tr> <tr> <td>2</td><td>Heat Rate</td><td>kCal/kWh</td><td>2386.00</td></tr> <tr> <td>3</td><td>Average GCV of blended coal (Domestic + Imported)</td><td>kcal/kg</td><td>3367.80</td></tr> <tr> <td>4</td><td>Sp. Coal Consup. blended coal (Domestic+Imported)</td><td>kg/kWh</td><td>0.71</td></tr> <tr> <td>5</td><td>PLF</td><td>%</td><td>0.80</td></tr> <tr> <td>6</td><td>Coal Consup. (Domestic+Imported)</td><td>Million Tonnes</td><td>171.41</td></tr> <tr> <td>7</td><td>Coal Requirement (Domestic Coal) for 92% PLF</td><td>Million Tonnes</td><td>207.81</td></tr> <tr> <td>8</td><td>Coal availability from Pakri barwadih</td><td>MTPA</td><td>18.00</td></tr> <tr> <td>9</td><td>Other Blocks of NTPC</td><td>MTPA</td><td>0.00</td></tr> <tr> <td>10</td><td>Percentage of end use requirement to be met from Pakri Barwadih mine</td><td>%</td><td>9%</td></tr> </tbody> </table>	Sl. No.	Parameter	Unit	Value	1	Thermal Power (Coal-Commercial) Capacity as on 06.01.2016	MW	34425.00	2	Heat Rate	kCal/kWh	2386.00	3	Average GCV of blended coal (Domestic + Imported)	kcal/kg	3367.80	4	Sp. Coal Consup. blended coal (Domestic+Imported)	kg/kWh	0.71	5	PLF	%	0.80	6	Coal Consup. (Domestic+Imported)	Million Tonnes	171.41	7	Coal Requirement (Domestic Coal) for 92% PLF	Million Tonnes	207.81	8	Coal availability from Pakri barwadih	MTPA	18.00	9	Other Blocks of NTPC	MTPA	0.00	10	Percentage of end use requirement to be met from Pakri Barwadih mine	%	9%	<p>Calculation for Coal requirement for the company and % of coal likely to be met from this project is given below:</p>
Sl. No.	Parameter	Unit	Value																																												
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9	Other Blocks of NTPC	MTPA	0.00																																												
10	Percentage of end use requirement to be met from Pakri Barwadih mine	%	9%																																												

The same is also incorporated in Table-1.7 of Chapter-1.

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पवन देव जामटा/PAWAN DEV JAMTA  
Dep. General Manager (Coal) (Mining)  
एन टी सी रा. लिमिटेड, (NTPC Limited)  
EOG, A-8A, Sector-24, Noida-201301 (U.P.)





Pointwise Compliance to MoC's observation issued vide letter no. 34011/05/2015/CPAM(Pt) dated 28<sup>th</sup> December 2015 on Revised Mining Plan & Mine Closure Plan – 1st Revision of Pakri Barwadih Coal Block

Sl. No.	Ref Para	Observations	Compliance to the Observations															
23	15		15	3	18	66		66	6.2	74.2	4.46	2.73	4.12					
24	15		15	3	18	66		66	6.2	74.2	4.40	2.73	4.12					
25	11	4	15	3	18	31.2	31.85	63.05	6.2	71.25	4.30	2.73	3.95					
26	7	8	15	3	18	26	26.08	82.08	6.2	71.15	4.20	2.73	3.95					
27	1.21	13.79	15	3	18	19.5	46.5	66	6.2	74.2	4.40	2.73	4.12					
28	15	15	15	3	18		66	66	9.2	75.2	4.40	3.07	4.18					
29	15	15	15	3	18		66	66	11.4	77.4	4.40	3.86	4.30					
30	15	15	15	3	18		66	66	11.4	77.4	4.40	3.86	4.30					
31	15	15	15	3	18		66	66	11.4	77.4	4.40	3.86	4.30					
32	15	15	15	3	18		66	66	11.4	77.4	4.40	3.86	4.30					
33	15	15	15	3	18		66	66	11.4	77.4	4.40	3.86	4.30					
34	15	15	15	3	18		66	66	11.4	77.4	4.40	3.86	4.30					
35	15	15	15	3	18		66	66	11.4	77.4	4.40	3.86	4.30					
36	15	15	15	3	18		66	66	11.4	77.4	4.40	3.86	4.30					
37	15	15	15	3	18		66	66	11.4	77.4	4.40	3.86	4.30					
38	10	10	10	3	13		66	66	10.2	76.3	6.00	3.43	5.57					
39	3.99	3.99	3	6.99		12.98		12.98	10.04	33.03	3.35	3.35	3.35					
40				3	3				9.00	9		3.00	3.00					
41				3	3				9.00	9		3.00	3.00					
42				3	3				9.00	9		3.00	3.00					
43				3	3				9.00	9		3.00	3.00					
44				3	3				9.00	9		3.00	3.00					
45				3	3				9.00	9		3.00	3.00					
46				3	3				9.00	9		3.00	3.00					
47				3	3				9.00	9		3.00	3.00					
48				3	3				8.50	8.5		2.83	2.83					
49				3	3				7.00	7		2.33	2.33					
50				3	3				5.75	5.75		1.82	1.82					
51				2	2				3.50	3.5		1.75	1.75					
52				1.40	1.40				1.48	1.48		1.01	1.01					
Total	311.78	151.68	603.38	138.94	542.34	1238.43	888.28	2088.78	437.97	2436.75	4.17	3.15	3.95					

Sanjay Kumar Singh  
Joint Under Secretary  
General Manager, CPAM  
Ministry of Coal, Govt. of India

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Sanjay Kumar Singh  
Joint Under Secretary  
General Manager, CPAM  
Ministry of Coal, Govt. of India

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Sanjay Kumar Singh  
Joint Under Secretary  
General Manager, CPAM  
Ministry of Coal, Govt. of India

Page 10 of 35

Sanjay Kumar Singh  
Joint Under Secretary  
General Manager, CPAM  
Ministry of Coal, Govt. of India











Sl. No	Ref Para	Observations	Compliance to the Observations																																																																																																																																																																																																																																																																																																																																																							
20	Sum 7 (b) and Chapter XI Para 11.20	<p>The Land use pattern pre-mining, during mining, post mining and post closure should be furnished in a tabular form. Justification for Proposed area, UG entry etc should be envisaged.</p> <table><tr><th>Type</th><th>Ha</th><th>End of Life</th><th>Grading</th><th>Waste Body</th><th>Public Use</th><th>Unutilized Land</th><th>Total</th></tr><tr><td>Agricultural</td><td>2458.00</td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Township</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Grading</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Water Bodies</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Barren</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Commercial</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Industrial</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Forest</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Barren</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Water Body</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>UG Entry</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Settlement</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Agricultural Land</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Total</td><td>4455.30</td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> <p>The quantum of land likely to be damaged due to mining needs to be envisaged. Further post mining land likely to be restored and their future use needs to be elaborated.</p>	Type	Ha	End of Life	Grading	Waste Body	Public Use	Unutilized Land	Total	Agricultural	2458.00							Township								Grading								Water Bodies								Barren								Commercial								Industrial								Forest								Barren								Water Body								UG Entry								Settlement								Agricultural Land								Total	4455.30							<p>Pre mining land use, land use during mining, post mining land use and post closure land use pattern are presented in the following tables. Post mining land likely to be restored and their future use is elaborated in Chapter-9.</p> <table><tr><th colspan="2">Pre Mining Land Use "ha"</th><th colspan="6">Land Use "ha"</th><th colspan="4">Post Closure</th><th>Total</th></tr><tr><th>Type</th><th>Ha</th><th>End of Life</th><th>Grading</th><th>Waste Body</th><th>Public Use</th><th>Unutilized Land</th><th>Total</th><th>End of Life</th><th>Grading</th><th>Waste Body</th><th>Public Use</th><th>Unutilized Land</th><th>Total</th></tr><tr><td>Agricultural</td><td>2458.00</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Township</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Grading</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Water Bodies</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Barren</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Commercial</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Industrial</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Forest</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Barren</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Water Body</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>UG Entry</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Settlement</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Agricultural Land</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Total</td><td>4455.30</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>	Pre Mining Land Use "ha"		Land Use "ha"						Post Closure				Total	Type	Ha	End of Life	Grading	Waste Body	Public Use	Unutilized Land	Total	End of Life	Grading	Waste Body	Public Use	Unutilized Land	Total	Agricultural	2458.00													Township														Grading														Water Bodies														Barren														Commercial														Industrial														Forest														Barren														Water Body														UG Entry														Settlement														Agricultural Land														Total	4455.30												
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**SANJIV KUMAR SINGH**  
 Managing Director  
 No. 34011/05/2015/CPAM  
 Ministry of Coal, Govt. of India

  
**PAWAN DEV JAMBH**  
 General Manager (Corporation)  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)



**Pointwise Compliance to MoC's observation issued vide letter no. 34011/05/2015/CPAM(Pt) dated 28<sup>th</sup> December 2015 on Revised Mining Plan & Mine Closure Plan – 1st Revision of Pakri Barwadih Coal Block**

Sl. No	Ref Para	Observations	Compliance to the Observations							
			Year wise Closure Cost for Pakri Barwadih Mine							
			Closure Cost of PB Coal Block							
			Year	Average cost per annum on current cost (in Crores)			Year wise Expenditure with 5 % escalation (in Crores)		Cumulative amount deposited in the Escrow account excluding interest (Rs. Crore)	Maximum amount excluded interest to be released w.r.t. expenditure incurred (Rs. Crores)
				Openc ast	Undergro und	Total	Openc ast	Undergro und	Total	
			P1	5.67	0.00	5.67	5.67	0.00	5.67	5.67
			P2	5.67	0.00	5.67	5.96	0.00	5.96	11.63
			P3	5.67	0.00	5.67	6.25	0.00	6.25	17.89
			P4	5.67	0.00	5.67	6.57	0.00	6.57	24.45
			P5	5.67	0.00	5.67	6.90	0.00	6.90	31.36
			P6	5.67	0.00	5.67	7.24	0.00	7.24	38.59
			P7	5.67	0.00	5.67	7.60	0.00	7.60	46.19
			P8	5.67	0.00	5.67	7.98	0.00	7.98	54.18
			P9	5.67	0.00	5.67	8.38	0.00	8.38	62.56
			P10	5.67	0.78	6.46	8.80	0.78	9.59	72.14
			P11	5.67	0.78	6.46	9.24	0.82	10.07	82.21
			P12	5.67	0.78	6.46	9.70	0.86	10.57	92.78
			P13	5.67	0.78	6.46	10.19	0.91	11.10	103.87
			P14	5.67	0.78	6.46	10.70	0.96	11.66	115.53
			P15	5.67	0.78	6.46	11.23	1.00	12.23	127.76
			P16	5.67	0.78	6.46	11.79	1.05	12.85	140.61
			P17	5.67	0.78	6.46	12.36	1.10	13.48	154.09
			P18	5.67	0.78	6.46	13.00	1.16	14.16	168.26
			P19	5.67	0.78	6.46	13.65	1.22	14.87	183.13
			</							

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*Singh*  
SANJIV KUMAR SINGH  
Regular and Qualifying Person  
No. 34011/15/2008-CPAM  
Ministry of Coal, Govt. of India


  
 Director, EOC, A&S, Sector-24, Noida
   
 EOC, A&S, Sector-24, Noida



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**SANJIV KUMAR SINGH**  
Retired Qualified Person  
No. 34011/(15)/2009-CFAM  
Ministry of Coal, Govt. of India





Pointwise Compliance to MoC's observation issued vide letter no. 34011/05/2015/CPAM(Pt) dated 28<sup>th</sup> December 2015 on Revised Mining Plan & Mine Closure Plan – 1st Revision of Pakri Barwadih Coal Block

Sl. No	Ref Para	Observations	Compliance to the Observations																			
1.1		Plantation along the block boundary, embankment, approach road, CHP Cross country conveyor, Railway siding etc and around the mine infrastructure area																				
		Outsourced (under the																				
1.2		Physical reclamation of internal and external dump (Leveling, Spreading of top soil, low wall formation, drain etc.)																				
		Supervision of NTPC) Environment Engr-1, Engr-2, Surveyor-2, Chainman-4																				
1.3		Physical reclamation of land of better and haul road																				
1.4		Bio reclamation of above items																				
1.5		Making safe approach up to the water lagoon for future uses																				

पवन देव जामटा/PWAN DEV JAMTA  
 Deputy General Manager (Coal) NTPC Ltd.  
 एन टी सी लिमिटेड/ NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)

Sanjay  
 SANJIV KUMAR SINGH  
 Recognised Qualified Person  
 No. 34011/(15)/2009-CPAM  
 Ministry of Coal, Govt. of India



Pointwise Compliance to MoC's observation issued vide letter no. 34011/05/2015/CPAM(Pt) dated 28<sup>th</sup> December 2015 on Revised Mining Plan & Mine Closure Plan – 1st Revision of Pakri Barwadih Coal Block

Sl. No	Ref Para	Observations	Compliance to the Observations
2.5		Strengthening of embankment	
2.6		Quarterly sampling of water to know its quality status	Lab Assistant-1 Helper-1
2.7		Record keeping, monitoring and reporting	Surveyor-1 Chainman-3
3		Management of Infrastructure & Mining Machineries	
3.1		Decommissioning of structural & semi-permanent constructions	Job
3.2		Renovation of Mine/Project office, Canteen, Training Centre, Rest shelter etc.	Outsourced Civil Engineer-1 Supervisor-1 Surveyor-1 Chainman-2
3.3		Cleaning of land for vegetation over the area	

SANJIV KUMAR SINGH  
Recognised Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India

पवन देव जामटा/PAWAN DEV JAMTA  
Depy. General Manager (Mining)  
एन सी सी लिमिटेड / NCC LIMITED  
EOG, A&A, Sector-24, Noida-201301 (U.P.)

Pointwise Compliance to MoC's observation issued vide letter no. 34011/05/2015/CPAM(Pt) dated 28<sup>th</sup> December 2015 on Revised Mining Plan & Mine Closure Plan – 1st Revision of Pakri Barwadih Coal Block

Sl. No	Ref Para	Observations	Compliance to the Observations									
3.4		Dismantling of machineries										
4		Actions for safety & security of local community due to abandonment of the mine or part of the mine										
4.1		Regular inspection of the mined out area, O.B. dumps for assessing the closure job.	Supervisor 3-2 in each shift, Mining Engineer-1 in each shift									
4.2		Action, if required, for making safe, the drainage areas, for areas etc.										
4.3		Making 2 metre high pucca wall on the slope of internal dumps, along the estimated water level.	Supervisor-1 in each shift, Civil Engineer-1 in each shift									
4.4		Making 2 meter high pucca wall around the top edge of the mined out area, where immediate void exists at the quarry edge										
4.5												

  
**पवन देव जामटा/PAWAN DEV JANTA**  
 Dep-1, General Manager (Commercial)  
 एन टी पी सी लिमिटेड / NTPC LIMITED  
 EOC, A-8A, Sector 24, Noida-201301 (U.P.)

**Sanjiv Kumar Singh**  
 Rec-joined Qualified Person  
 No. 34011/15/2000-CPAM  
 Ministry of Coal, Govt. of India



Pointwise Compliance to MoC's observation issued vide letter no. 34011/05/2015/CPAM(Pt) dated 28<sup>th</sup> December 2015 on Revised Mining Plan & Mine Closure Plan – 1st Revision of Pakri Barwadih Coal Block

Sl. No	Ref Para	Observations	Compliance to the Observations																			
			Making 2 meter high pucca wall around the external OS Dump																			
			Closing with walling and gates in the haul road, to prevent adventant entry into water lagoon.																			
			Filling the haul road up to ground level, from surface up to sealing gate.																			
			Survey of the total project area for updating mine plans Under Coal Mine Regulation.																			
			Social & Economic Aspects																			
			C.S.R activities																			
			Execution & Supervisor																			

*Saniv*  
**SANIV KUMAR SINGH**  
 Registered Qualified Person  
 No. 34011/15/2009-CPAM  
 Ministry of Coal, Govt. of India

*[Signature]*  
**पवन देव जामटा/PAWAN DEV JAMTA**  
 Director General, Mines  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)

Pointwise Compliance to MoC's observation issued vide letter no. 34011/05/2015/CPAM(Pt) dated 28<sup>th</sup> December 2015 on Revised Mining Plan & Mine Closure Plan – 1st Revision of Pakri Barwadih Coal Block

Sl. No	Ref Para	Observations	Compliance to the Observations																			
			Purchasing/Hiring of equipment for closure activities etc.																			
			Execution & Supervision of the activities by mining personnel.	6.2																		
			Miscellaneous charges including power cost, deployment of security personnel, 3 years post closure environmental monitoring, supervision, power cost etc.	7																		
			Underground Mining	8																		
			Sealing of Mine entries for UG mine	8.1																		
			Isolation stopping, if required	8.2																		

SANJIV KUMAR SINGH  
Recognised Qualified Person  
No. 34011/(15)2009-CPAM  
Ministry of Coal, Govt. of India

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पवन देव जामट/PAWAN DEV JAMTA  
General Manager  
एन टी सी लिमिटेड/NTSIC LIMITED  
EOC, A-8A, Sector-24, Noida-201305 (U.P.)

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**प्रधान देव जामवाल / PRADHAN DEV JAMWAL**  
 Deputy General Manager (Non Industrial)  
 एन टी सी लिमिटेड / NTPC LIMITED  
 EGC-A&A, Sector-24, Noida-201301 (U.P.)

*Sanjiv*  
SANJIV KUMAR SINGH  
Ret.-In-aid Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India

Pointwise Compliance to MoC's observation issued vide letter no. 34011/05/2015/CPAM(Pt) dated 28<sup>th</sup> December 2015 on Revised Mining Plan & Mine Closure Plan – 1st Revision of Pakri Barwadih Coal Block

Sl. No	Ref Para	Observations	Compliance to the Observations
		escalation of amount to be deposited in Escrow account.	Escalation rate of Closure cost 1.37
			Rate of compounding of Annual Closure Cost 5.00%
			Amount to be deposited into Escrow Account after compounding @ of 5% "Rs. in Crs" 1373.200
			Particulars
			UG OC
			Base Rate of Closure Cost "Rs. Crs./Ha" 0.010 0.060
			Closure Cost "Rs. Crs./Ha" 0.014 0.082
			Lease Area 1106.96 3588.04
			Amount to be deposited into Escrow Account "Rs. in Crs" 52.120 1321.090
			Amount already deposited into Escrow Account "Rs. in Crs" 0.000 0.000
			Net Amount to be deposited into Escrow Account "Rs. in Crs" 52.120 1321.090
			Balance Life of the project "in Yrs" 30 52
			Annual Closure Cost 1.737 25.405

SANJIV KUMAR SINGH  
Recognised Qualified Person  
No. 34011/15/2009-CPAM  
Ministry of Coal, Govt. of India

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पवन देव जामटा/PAWAN DEV JAMTA  
General Manager (Coal Block)  
एन टी पी लिमिटेड / NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)



Pointwise Compliance to MoC's observation issued vide letter no. 34011/05/2015/CPAM(Pt) dated 28<sup>th</sup> December 2015 on Revised Mining Plan & Mine Closure Plan – 1st Revision of Pakri Barwadih Coal Block

Sl. No	Ref Para	Observations	Compliance to the Observations																																																																																																																													
25	Sum - 8 (a) & Chapter XI	The Mine closure activities required to be taken should be in coherence with the guidelines of the Mine Closure plan and also indicative cost with the basis of calculation of the cost of mine closure activities needs to be envisaged	The Mine closure activities are now as per the guidelines and have been accordingly elaborated Table No. 11.22 in the Chapter XI. The estimated total expenditure for Mine Closure Activities in Sum- 8 (a) has also been accordingly modified in view of the revised mine life. Tentative assessment of activitywise closure cost is given in following table. <div>Provision for Expenditure for Mine Closure of Pakri Barwadih Coal Mining Block</div> <div>Amount in Rs. Crores</div> <table><tr><th>Sl. No.</th><th>Activities to be undertaken</th><th>P-6</th><th>P-11</th><th>P-15</th><th>P-21</th><th>P-25</th><th>P-31</th><th>P-36</th><th>P-41</th><th>P-46</th><th>P-51</th><th>P-56</th><th>Cost</th></tr><tr><td>1</td><td>Mined Area &amp; Waste Management</td><td>14.33</td><td>10.20</td><td>8.24</td><td>12.34</td><td>8.43</td><td>12.17</td><td>12.59</td><td>34.89</td><td>25.36</td><td>51.45</td><td>48.27</td><td>228.05</td></tr><tr><td>1.1</td><td>Plantation along the block boundary, embankment, approach road, CRP Cross country conveyer, Railway siding etc and around the mine infrastructure area</td><td>14.33</td><td>10.20</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td><td>24.53</td></tr><tr><td>1.2</td><td>Physical reclamation of internal and external dump (Levelling, Spreading of top soil, top soil formation, drain etc.)</td><td>0.00</td><td>0.00</td><td>8.24</td><td>12.34</td><td>8.43</td><td>12.17</td><td>12.59</td><td>10.00</td><td>10.39</td><td>0.00</td><td>0.00</td><td>34.26</td></tr><tr><td>1.3</td><td>Physical reclamation of land of buffer and haul road</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.20</td><td>0.00</td><td>0.50</td><td>10.00</td><td>10.39</td><td>20.34</td><td>0.00</td><td>40.56</td></tr><tr><td>1.4</td><td>Soil reclamation of above dumps</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td><td>10.20</td><td>16.08</td><td>26.28</td></tr><tr><td>1.5</td><td>Making safe approach up to the water lagoon for future uses</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td><td>10.25</td><td>15.09</td><td>25.34</td></tr><tr><td>1.6</td><td>Barbed wire fencing as per requirement</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td><td>5.00</td><td>5.19</td><td>10.25</td><td>16.09</td><td>30.57</td></tr></table>														Sl. No.	Activities to be undertaken	P-6	P-11	P-15	P-21	P-25	P-31	P-36	P-41	P-46	P-51	P-56	Cost	1	Mined Area & Waste Management	14.33	10.20	8.24	12.34	8.43	12.17	12.59	34.89	25.36	51.45	48.27	228.05	1.1	Plantation along the block boundary, embankment, approach road, CRP Cross country conveyer, Railway siding etc and around the mine infrastructure area	14.33	10.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.53	1.2	Physical reclamation of internal and external dump (Levelling, Spreading of top soil, top soil formation, drain etc.)	0.00	0.00	8.24	12.34	8.43	12.17	12.59	10.00	10.39	0.00	0.00	34.26	1.3	Physical reclamation of land of buffer and haul road	0.00	0.00	0.00	0.00	0.20	0.00	0.50	10.00	10.39	20.34	0.00	40.56	1.4	Soil reclamation of above dumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.20	16.08	26.28	1.5	Making safe approach up to the water lagoon for future uses	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.25	15.09	25.34	1.6	Barbed wire fencing as per requirement	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	5.19	10.25	16.09	30.57
Sl. No.	Activities to be undertaken	P-6	P-11	P-15	P-21	P-25	P-31	P-36	P-41	P-46	P-51	P-56	Cost																																																																																																																			
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1.1	Plantation along the block boundary, embankment, approach road, CRP Cross country conveyer, Railway siding etc and around the mine infrastructure area	14.33	10.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.53																																																																																																																			
1.2	Physical reclamation of internal and external dump (Levelling, Spreading of top soil, top soil formation, drain etc.)	0.00	0.00	8.24	12.34	8.43	12.17	12.59	10.00	10.39	0.00	0.00	34.26																																																																																																																			
1.3	Physical reclamation of land of buffer and haul road	0.00	0.00	0.00	0.00	0.20	0.00	0.50	10.00	10.39	20.34	0.00	40.56																																																																																																																			
1.4	Soil reclamation of above dumps	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.20	16.08	26.28																																																																																																																			
1.5	Making safe approach up to the water lagoon for future uses	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.25	15.09	25.34																																																																																																																			
1.6	Barbed wire fencing as per requirement	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	5.19	10.25	16.09	30.57																																																																																																																			

SANJIV KUMAR SINGH  
Recognised Qualified Person  
No. 34011/15/2009-CPAM  
Ministry of Coal, Govt. of India

पवन देव जामटा/PAWAN DEV JAMTA  
General Manager (Commercial)  
एन टी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

Pointwise Compliance to MoC's observation issued vide letter no. 34011/05/2015/CPAM(Pt) dated 28<sup>th</sup> December 2015 on Revised Mining Plan & Mine Closure Plan – 1st Revision of Pakri Barwadih Coal Block

Sl. No	Ref Para	Observations	Compliance to the Observations													
2		Environmental Management (Air, Water, Waste, Noise etc.)	2.87	6.12	18.13	29.82	28.65	29.21	43.16	23.09	21.61	21.61	50.97	281.14		
2.1		Thorough inspection of external and stabilized internal dumps to find state of its stabilization & Bio-reclamation.	0.00	1.02	1.65	2.47	1.89	2.43	2.54	2.00	2.08	4.12	8.44	25.42		
2.2		Action to stabilize & vegetate uncovered patches, if any.	0.00	2.04	3.30	4.94	3.37	4.87	5.06	4.00	4.15	8.23	12.87	52.95		
2.3		Inspection of gulland drains & bunds around external dumps to prevent in-leakage water from entering natural water courses directly.	0.00	2.04	3.30	4.94	3.37	4.87	5.06	4.00	4.15	8.23	12.87	52.95		
2.4		Inspection of embankment to prevent entry of uncontrolled water to mine.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.5		Strengthening of embankment.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.6		Quarterly sampling of water to know its quality status.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.7		Record keeping, monitoring and reporting.	2.87	1.02	1.65	2.47	1.89	2.43	2.54	2.00	1.94	1.03	1.81	20.34		
3		Management of Infrastructure & Mining Machines	0.00	10.20	0.00	0.00	16.85	24.34	25.38	39.98	41.54	41.16	64.36	283.83		
3.1		Decommissioning of structures & semi-permanent constructions.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3.2		Renovation of Mine Project office, Canteen, Training Centre, Rest shelter etc.	0.00	5.10	0.00	0.00	8.43	0.00	0.00	10.80	0.00	0.00	0.00	0.00	0.00	0.00

SANJIV KUMAR SINGH

Recognised Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India

पवन देव जामना/PAWAN DEV JAMNA  
उप निरीक्षक (सहायक)  
Deputy General Manager (C&E)  
एन टी सी लिमिटेड, NTPC LIMITED  
EOC, A&A, Sector-24, Noida-201301 (U.P.)

Pointwise Compliance to MoC's observation issued vide letter no. 34011/05/2015/CPAM(Pt) dated 28<sup>th</sup> December 2015 on Revised Mining Plan & Mine Closure Plan – 1st Revision of Pakri Barwadih Coal Block

Sl. No	Ref Para	Observations	Compliance to the Observations													
3.3		Clearing of land for vegetation over the mine	0.00	8.10	0.00	0.00	8.43	0.00	0.00	0.00	10.00	8.00	0.00	0.00	8.00	23.52
3.4		Demarcation of boundaries	0.00	0.00	0.00	0.00	0.00	24.34	23.35	19.95	20.77	0.00	0.00	0.00	0.00	50.50
4		Actions for safety & security of local community due to abandonment of the mine or part of the mine	0.72	1.02	0.69	14.81	10.11	14.61	15.23	21.00	38.43	34.06	35.40	107.18		
4.1		Regular inspection of the mined out area, O.B. dumps for assessing the closure job	0.00	0.51	0.52	1.23	0.84	1.22	1.27	1.00	1.04	2.00	3.22	10.21		
4.2		Action, if required, for making safe the drainage areas, for access etc.	0.00	0.00	0.00	12.34	0.00	0.00	0.00	12.69	0.00	10.39	0.00	0.00	35.42	
4.3		Making 2 metre high pucca wall on the slope of mineral dumps, along the estimated water level	0.00	0.00	8.24	0.00	11.43	0.00	0.00	0.00	0.00	30.58	0.00	47.34		
4.4		Making 2 metre high pucca wall around the top edge of the mined out area, where immediate void exists at the quarry edge	0.00	0.00	0.00	0.00	0.00	12.17	0.00	0.00	10.39	0.00	0.00	22.56		
4.5		Making 2 metre high pucca wall around the external OB Dump	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	10.39	0.00	0.00	20.36		
4.6		Closing with walling and gates in the haul road, to prevent inadvertent entry into water lagoon	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.19	0.00	16.09	21.28		
4.7		Filling the haul road up to ground level, from surface up to sealing gate	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.29	16.09	20.36		

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प्रबल देव जामटा/PAWAN DEV JAMATA  
 डी.पी.जी. लिमिटेड (एन.पी.सी.)  
 एन.पी.सी. लिमिटेड / NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)

Sanjay  
 SANJIV KUMAR SINGH  
 Recognised Qualified Person  
 No. 34011/15/2009-CFAM  
 Ministry of Coal, Govt. of India



Pointwise Compliance to MoC's observation issued vide letter no. 34011/05/2015/CPAM(Pt) dated 28<sup>th</sup> December 2015 on Revised Mining Plan & Mine Closure Plan – 1st Revision of Pakri Barwadih Coal Block

Sl. No	Ref Para	Observations	Compliance to the Observations															
4.8		Survey of the total project area for updating mine plans Under Coal Mine Regulation	0.72	0.51	0.82	1.23	0.84	1.22	1.27	1.00	1.04	2.00	0.00	10.71				
5		Social & Economic Aspects	7.17	5.10	8.24	0.00	8.43	0.00	12.69	10.00	10.39	0.00	0.00	62.81				
5.1		C & R activities	7.17	5.10	8.24	0.00	8.43	0.00	12.69	10.00	10.39	0.00	0.00	62.07				
6		Execution & Supervisor	0.00	0.00	0.00	0.00	0.00	12.17	0.00	15.00	15.58	30.07	16.00	68.70				
6.1		Purchasing/Hiring of equipment for closure activities etc.	0.00	0.00	0.00	0.00	0.00	12.17	0.00	15.00	10.39	20.36	0.00	52.13				
6.2		Execution & Supervision of the activities by mining personnel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	5.19	10.29	10.00	36.13				
7		Miscellaneous Charges	0.00	0.00	0.00	0.00	0.00	0.00	2.54	2.00	2.08	4.12	6.44	17.167				
7.1		Miscellaneous charges including power cost, employment of security personnel, 3 years post closure, environmental monitoring, supervision, power cost etc.	0.00	0.00	0.00	0.00	0.00	0.00	2.54	2.00	2.08	4.12	6.44	17.17				
8		Underground Mining	0	0	0	0	0	0	0	0	0	0	0	0				
8.1		Grading of Mine entries for UG mine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	223.89				
8.2		Isolation stopping, if required	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.19	10.29	0.00	15.48				
8.3		Withdrawal of machinery etc	0.00	0.00	0.00	0.00	0.00	0.00	5.35	5.00	5.19	10.29	0.00	20.83				
8.4		Subsidence Management	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.19	10.29	0.00	11.48				

Sd/-  
**SANJIV KUMAR SINGH**  
 Recognised Qualified Person  
 No. 34011/15/2009-CPAM  
 Ministry of Coal, Govt. of India

श्री. पी. एम. ए. P. NAGPAL  
 ज्य. सचिव, ज्य. सचिव  
 ज्य. सचिव, ज्य. सचिव  
 ज्य. सचिव, ज्य. सचिव  
 ज्य. सचिव, ज्य. सचिव

पवन देव जामटा/PAWAN DEV JAMTA  
 ज्य. महाप्रबन्धक (सहायक)  
 ज्य. महाप्रबन्धक (सहायक)  
 ज्य. महाप्रबन्धक (सहायक)  
 ज्य. महाप्रबन्धक (सहायक)  
 ज्य. महाप्रबन्धक (सहायक)





Pointwise Compliance to MoC's observation issued vide letter no. 34011/05/2015/CPAM(Pt) dated 28<sup>th</sup> December 2015 on Revised Mining Plan & Mine Closure Plan – 1st Revision of Pakri Barwadih Coal Block

Sl. No.	Ref Para	Observations	Compliance to the Observations
		-8 needs to be incorporated in the Mining Closure portion of the mining plan.	
28		Before dumping over the dip side coal bearing area of the block the opencast production potential of that area should be re-examined.	As per the available information seams occur at a depth of more than 300m in the dip side area and can be mined out by U/G method. The opencast potential would however be re-examined.
29		As per the current guideline all projects of capacity more than 2.50 Mtpa should have integrated washery. This needs to be elaborated in the mining plan.	Coal washability study has not yet been carried out for Pakri Barwadih Coal. Coal quality parameters obtained from the proximate analysis of coal revealed that ash percentage in all probability is likely to remain 34% or below which does not call for commissioning of coal washery. However space provision is kept for providing a Coal Washery at mine end in future, if required.
30		Reserves locked below nala should be included in the extractable reserve and should be planned for mining.	Reserves below the nala have now been included in the mineable/extractable reserves and has been envisaged for mining. This has enhanced the mine life from 41 years to 52 years.
31		Annexure Most of the Annexures attached are not legible. Legible copies of the same should be attached.	Legible copies of Annexures are now enclosed.
32	Annexure - III	Annexure - III shown in the list of Annexure in missing in the mining plan document	Annexure - III (Copy of approved Mine Closure Plan) is now attached

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पवन देव जामटा/PAWAN DEV JAMTA  
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EOG, A-8A, Sector-24, Noida-201301 (U.P.)

Pointwise Compliance to MoC's observation issued vide letter no. 34011/05/2015/CPAM(Pt) dated 28<sup>th</sup> December 2015 on Revised Mining Plan & Mine Closure Plan – 1st Revision of Pakri Barwadih Coal Block

Sl. No	Ref Para	Observations	Compliance to the Observations
33		A certificate required as per the guideline, regarding confirmation from RQP that he has verified the block area with the relevant plans supplied by CMPDIL/ SCCL / NLC and area covered by the mining plan does not encroach on any other coal lignite block, needs to be attached. The lining of the certificate should be in line with the guideline.	Certificate is attached at Annexure – XVI-C.
34		A certificate required as per the guideline that the mine will be developed as per the approval of the mining plan from Ministry of coal and all other approvals, as required will be obtained from relevant authorities issued by the empowered representative of / or Block allottee / applicant should be attached. The lining of the certificate should be in line with the guideline.	Certificate is attached at Annexure – XVII.
35		The lining of the Annexure – XVI C & XVI D should be exactly the same as required in the guideline for formulation of Mining plan	The lining of the Annexure – XVI C & XVI D are now as per the guideline for formulation of Mining Plan.
36		Certificate of CMPDIL that the block boundary considered in the Mining Plan is in line with the Block	Certificate is attached at Annexure – XIX.



Pointwise Compliance to MoC's observation issued vide letter no. 34011/05/2015/CPAM(Pt) dated 28<sup>th</sup> December 2015 on Revised Mining Plan & Mine Closure Plan – 1st Revision of Pakri Barwadih Coal Block

Sl. No	Ref Para	Observations	Compliance to the Observations
37		allocated to the project proponent is to be attached.  On the basis of CMPDIL certificate, a certificate of RQP is to be attached certifying that the block boundary considered in the mining plan is exactly in line with the certificate issued by CMPDIL.	Certificate of RQP is attached at Annexure – XVI-C.
38		<b>Plates</b> Pre-Mining Land use plan should be enclosed showing distinctly Private land, Govt Land & Forest land	Pre-Mining Land use plan showing distinctly different types of land is shown as Plate No. 4.
39	Plate - 6	The plan indicates the lease boundary and block boundary. The Mine boundary in distinct colour should also be indicated in the plan	Plate No 6 is now Plate No. 7 and has been modified indicating the Lease Boundary and Block boundary with distinct colours.
40	Plate - 6	The Area to be explored prior to dumping and also for proving of reserve and also the block boundary should be demarcated in distinct colour.	Geological Plan (Plate No 6) is now Plate No. 7 has been modified indicating the Area to be explored prior to dumping and also for proving of reserve with distinct colour.
		Cadastral plan showing total lease Area and Mine Boundary	Cadastral plan (Plate No 3) showing total lease Area and Mine Boundary superimposed over mine boundary and marked with distinct colours is attached.

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संलग्न की जा रही है।  
अन्य संलग्न की जा रही है।  
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अन्य संलग्न की जा रही है।



Pointwise Compliance to MoC's observation issued vide letter no. 34011/05/2015/CPAM(Pt) dated 28<sup>th</sup> December 2015 on Revised Mining Plan & Mine Closure Plan – 1st Revision of Pakri Barwadih Coal Block

Sl. No	Ref Para	Observations	Compliance to the Observations
42		Conceptual plan showing infrastructure facilities including colony, boundary of mining area, mine entries, roads including road diversion, nala diversion, river diversion, nala diversion, river diversion alignment etc, should be attached.	Infrastructure facilities including colony, boundary of mining area, mine entries, roads including road diversion, nala diversion, river diversion alignment etc, have been shown in Surface Master Plan. The modified Surface Master Plan (Conceptual Plan) is attached.
43		A plan showing top soil management should be attached	Location of Top soil dumps have been shown in respective stage plans. The detail has been explained in Chapter – V at para 5.4.9 and 5.5.10.2 regarding generation, spreading and its management.
44		Post Mining land use plan should be attached	Post Mining land use plan has been attached as Plate No 32.
45	Plate – 36	It is apparent from the plan that the final void on the NW quarry will be left as water body, while in the mining chapter it is indicated that the lower seams will be taken by Underground method of mining. Development of water body is likely to sterilise the lower un-worked seam this needs to be reconciled.	All seams of PB-NW quarry shall be mined by open cast method and no underground mining has been envisaged.

  
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संजय कुमार सिंह  
संजय कुमार सिंह  
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1.	Location plan	NTS	1	7010-199-POM-J-001
2.	Key plan	NTS	2	7010-199-POM-J-002
3.	Cadastral plan showing total lease Area & Mine Boundary	1:20000	3	7010-199-POM-J-003
4.	Pre Mining Landuse plan	1:20000	4	7010-199-POM-J-004
5.	Surface Master plan (Conceptual Plan)	1:20000	5	7010-199-POM-J-005
6.	Topographical plan	1:20000	6	7010-199-POM-J-006
7.	Geological Map	1:20000	7	7010-199-POM-J-007
8.	Scheme showing Detail Exploration in Dip side Area	1:20000	7A	7010-199-POM-J-07A
9.	Geological cross sections along A-A' to D - D'	1:10000	8	7010-199-POM-J-008
10.	Geological cross sections along E-E' to H-H'	1:10000	9	7010-199-POM-J-009
11.	Geological cross sections along I-I' to M-M'	1:5000	10	7010-199-POM-J-0010
12.	Graphic Litholog BH No. CNPB - 1-12, 15,18, 21,23,47,CMKPB 01,12,13,14,16,30,33	NTS	11	7010-199-POM-J-011
13.	Seam extent plan - V	1:20000	12	7010-199-POM-J-012
14.	Seam extent plan - IV	1:20000	13	7010-199-POM-J-013
15.	Seam extent plan - III	1:20000	14	7010-199-POM-J-014
16.	Seam extent plan - II	1:20000	15	7010-199-POM-J-015
17.	Seam extent plan - I	1:20000	16	7010-199-POM-J-016
18.	Seam extent plan - K - 5	1:20000	17	7010-199-POM-J-017
19.	Seam extent plan - K - 4	1:20000	18	7010-199-POM-J-018
20.	Seam extent plan - K - 3	1:20000	19	7010-199-POM-J-019
21.	Seam extent plan - K - 2	1:20000	20	7010-199-POM-J-020
22.	Seam extent plan - K - 1	1:20000	21	7010-199-POM-J-021
23.	Final Stage Quarry Plan	1:20000	22	7010-199-POM-J-022
24.	Mining system	1:5000	23	7010-199-POM-J-023

List of Contents

RQP No. 34011/(15)/2009-CPAM dated 27.09.10

*Sanji*  
**SANJIV KUMAR SINGH**  
 Recognised Qualified Person  
 No. 34011/(15)/2009-CPAM  
 Ministry of Coal, Govt. of India

*Sanji*  
**PAWAN KUMAR JAIN**  
 Deputy General Manager  
 एन टी पी सी लिमिटेड / NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)





## LIST OF ANNEXURES

SL. NO.	PARTICULAR	ANNEXURE
1.	Copy of block allotment letter & MoC Letter dated 24 <sup>th</sup> August 2005	Annexure – I & Annexure-II
2.	Copy of Approved Mining Plan & MoC's letter approval of Mining Plan	Annexure –III & Annexure-III A
3.	Copy of letter for submission of Mining Plan for PB North-West (Sector-A)	Annexure –IV
4.	Copy of letter for submission of Mining Plan for PB East	Annexure - V
5.	Copy of MoC's letter for submission of Revised Mining Plan and Mine Closure Plan	Annexure - VI
6.	Copy of letter of submission of Revised Mining Plan (1 <sup>st</sup> Revision) to MoC	Annexure - VII
7.	Copy of letter for commencement of Mining from PB East	Annexure - VIII
8.	Copy of MoC's letter for submission of Revised Mining Plan incorporating the changes in sequence of mining operation	Annexure -IX
9.	Copy of MoC's letter granting recognition to RQP for preparation of Mining Plan.	Annexure -X
10.	Copy of letter from CMPDIL& MECL for procurement of GR	Annexure –XI& Annexure-XIA
11.	No dues certificate from CMPDIL regarding Exploration cost	Annexure -XII
12.	Copy of approval letter of Mine Closure Plan & Approved Mine Closure Plan(Jan' 2012)	Annexure –XIII & Annexure - XIII A
13.	Notification under Section 7 (1) of CBA (A&D) Act	Annexure - XIV
14.	Co-ordinates boreholes of Pakri Barwadih	Annexure - XV
15.	Letter of authorization by the Block Allottee to the RQP	Annexure – XVI
16.	Certificates by the RQP regarding observance of guidelines of Mining Plan	Annexure – XVI A

*Sanjiv*  
**SANJIV KUMAR SINGH**  
 Recognised Qualified Person  
 No. 34011/(15)/2009-CPAM  
 Ministry of Coal, Govt. of India

*ho*  
**List of Contents**

**RQP No. 34011/(15)/2009-CPAM dated 27.09.10**

*Sanjiv*  
**पवन देव जामता/PAWAN DEV JAMTA**  
 General Manager (Coal) (P)  
 एन सी सी लिमिटेड/NTS LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)





## LIST OF ABBREVIATIONS

Sl. No.	Abbreviation	Full Form
1.	AMSL	Above Mean Sea Level
2.	bgl	Below ground level
3.	BH	Bore hole
4.	CBA	Coal Bearing Area
5.	CMPDIL	Central Mine Planning Design Institute Limited
6.	CSM	Continuous Surface Miner
7.	Cum/Mil. cum.	Cubic metre/ Million cubic metre
8.	DGMS	Director General Mines Safety
9.	E&M	Electrical and Mechanical
10.	EIA	Environmental Impact Assessment
11.	EMP	Environmental Management Plan
12.	FC	Fixed Carbon
13.	FE Loader	Front End Loader
14.	GCV	Gross calorific value
15.	Gol	Government of India
16.	GR	Geological Report
17.	GSI	Geological Survey of India
18.	HEMM	Heavy Earth Moving Machinery
19.	HFL	High Flood Level
20.	IB	Inter burden
21.	I.E.	Indian Electricity
22.	IMD	India Meteorological Department
23.	K. Cal/kg	Kilo Calorie per Kilogram
24.	KL/KI	Kilo Litre
25.	L/l	Litre
26.	m/Km	Metre/Kilometre
27.	m <sup>3</sup> /Mm <sup>3</sup>	Cubic metre/Million cubic metre
28.	MBCM	Million Bank Cubic Metre
29.	MCP	Mine Closure Plan
30.	MECL	Mineral Exploration Corporation Limited
31.	ML	Mining Lease
32.	mlt	Million litre per day
33.	MoC	Ministry of Coal
34.	MoEF	Ministry of Environment and Forests
35.	Mt	Million Tonne
36.	Mtpa	Million Tonne Per Annum
37.	OB	Overburden
38.	OC	Opencast
39.	PA	Per Annum
40.	PB	Pakri Barwadih
41.	RH	Relative Humidity
42.	RPM	Respirable Particulate Matter
43.	RQP	Recognised Qualified Person
44.	RoM	Run of Mine
45.	SC	Scheduled Caste

*Sanjay Kumar Singh*  
 SANJAY KUMAR SINGH  
 Recognised Qualified Person  
 No. 34011/(15)/2009-CPAM  
 Ministry of Coal, Govt. of India

List of Contents

RQP No. 34011/(15)/2009-CPAM dated 27.09.10

*Pawan Dev Jaiswal*  
 Pawan Dev Jaiswal/PAWAN DEV JAINTA  
 Joint General Manager (Commercial)  
 Dep. - Joint General Manager (Commercial)  
 एन टी पी सी लिमिटेड - NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)

46.	SH	State Highway
47.	SPM	Suspended Particulate Matter
48.	ST	Scheduled Tribe
49.	T/t	Tonne
50.	TPD	Tonne Per Day
51.	TS	Topsoil
52.	UHV	Useful Heat Value
53.	UG	Underground
54.	VM	Volatile Matter

Sanjiv Kumar Singh  
Recognised Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India

Sanjiv  
SANJIV KUMAR SINGH  
Recognised Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India


List of Contents

RQP No. 34011/(15)/2009-CPAM dated 27.09.10

पवन देव जामटा/PAWAN DEV JAMTA  
Depy. General Manager (Commercial)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

# SUMMARISED DATA

  
**SANJIV KUMAR SINGH**  
Recognised Qualified Person  
No. 34C / (1-5)/2009-CPAM  
Ministry of Coal, Govt. of India

  
**पवन देव-जसल/PAWAN DESAI**  
General Manager (Coal) (NTPC)  
NTPC LIMITED  
EUC, A-SA, Sector-22, Gurgaon-122001 (U.P.)

  
 पवन देव जैन/PAWAN DEV JAIN  
 Deputy General Manager (Finance)  
 एन टी पी सी लिमिटेड / NTPC LIMITED  
 EOC, A-IIA, Sector-24, Noida-201301 (U.P.)



**Summarized Data**

**1. General**

a) Name and address of the Applicant Company	NTPC Ltd. (Govt. of India Enterprises) NTPC Bhavan, Core-7, Scope Complex, 7 Institutional Area, Lodhi Road New Delhi-110003 Tel No. 011-24387333/24387000 Fax No. 011-24361018
b) Name and address of block Allottee	As above
c) Relationship between Applicant and Allottee company	Both Applicant and allottee company are one and the same.
d) Status of the Applicant Company	Public Sector Undertaking (PSU)
e) Name of the Coal Block together with name of Coalfield & State where located	Block : Pakri Barwadih Coal Block Coalfield : North Karanpura Coalfield State : Jharkhand
f) Date of allotment	Date: 11.10.2004 Letter No.: 13016/29/2003-CA-I
g) End Use of Coal as per Approval	For generation of Power. A basket Linkage exists for this Block.
h) ROM quantity proposed to be produced as per Mining Plan	ROM Quantity: 503.38 Mt from West and East Quarry 138.96 Mt from NW Quarry Total = 642.34 Mt
i) Norms adopted for calculating ROM quantity requirement in case it differs from the quantity indicated in the Allotment Order	N.A (Basket Linkage)
j) Beneficiation required: Yes/No	No
k) Requirement of Beneficiated Coal & expected availability thereof	Not Applicable
l) Period for which Mining Lease has been granted for	Since land for mining area is being acquired by NTPC under CBA Act. Mining Lease Not Applicable
m) Date of expiry of earlier Mining Lease, if any	Since land for mining area is being acquired by NTPC under CBA Act. Mining Lease Not Applicable
n) RQP who has prepared the Mining Plan Name: Address:  Phone Nos: <i>12</i>	<b>Mr. Sanjiv Kumar Singh</b> 4th Floor, Core-5, NTPC Ltd, Scope Complex, 7 Institutional Area, Lodhi Road, New Delhi-110003  (+91) 011- 24387669 (O), 0120-2400372 (R)

140

**SANJIV KUMAR SINGH**  
Recognized Qualified Person  
No. 34011/(15) 2009-CPAM  
Ministry of Coal, Govt. of India  
*Sanjiv*  
**पवन देव जैन/PAWAN DEV JAIN**  
अध्यक्ष, नैनीताल (वि. वि.)  
अध्यक्ष, नैनीताल (वि. वि.)  
Gen. Mgr. (Commercial)  
एन. टी. पी. लिमिटेड, NTPC LIMITED  
EOG, A-8A, Sector-24, Noida-201301 (U.P.)

Revised Mining Plan (1<sup>st</sup> Revision) – Pakri Barwadih Coal Mining Block

Mobile:	(+91) 9650991396
Fax:	(+91) 011-24367089,
Email ID:	<a href="mailto:sanjivkumarsingh01@ntpc.co.in">sanjivkumarsingh01@ntpc.co.in</a>
Registration No of RQP:	34011/(15)/2009-CPAM
Date of grant of RQP status:	27.09.2010
Renewal of RQP Status:	10 years from the date of issue
Validity:	

**2. Information regarding earlier approved Mining Plan**

a) Approval Letter no. and Date	13016/29/2003-CA-I, Dated 25 <sup>th</sup> August 2006 (Refer Annexure-II)
b) Lease Area	4626 ha ( Project Area )
c) Date of grant of Lease	Since land for mining area is being acquired by NTPC under CBA Act. Mining Lease Not Applicable
d) Date of expiry of Lease	Since land for mining area is being acquired by NTPC under CBA Act. Mining Lease Not Applicable
e) Targeted Production	15Mtpa
f) Proposed year of start of Production	
g) Proposed year of achieving the targeted production level	12 <sup>th</sup> year of Mine Operation
h) Envisaged life of mine (in years)	41 Years (Including two years of construction period)
i) Date of actual commencement of Mining Operation, if operation is already started	Production not yet started
j) Likely date of Mining Operations, if operations not yet started & reasons for non-commencement of operations	Likely date of Mining Operation-
k) Planned production and actual levels achieved in last 3 years	N/A
l) Coal:- OB:-	Open cast: N/A OB: N/A
m) Reasons for difference between planned and actual production levels	Reasons for delay in starting of the project are as under: a) Delay in issuance of NoC on jungle jhari land by Distt Admininstration due to which Forest Clearance was delayed. b) Revision of evacuation corridor on advice of FAC, MoEF c) Delay in land acquisition: There was delay in physical verification & Certification of land records, disbursement of land compensation by Hazaribagh Distt. Administration took more time due to old /

*Sanjiv*  
**SANJIV KUMAR SINGH**  
 Recognised Qualified Person  
 No. 34011/(15)/2009-CPAM  
 Ministry of Coal, Govt. of India

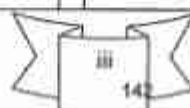


**PAWAN DEV JANTA**  
 Deputy General Manager (Coal) (C) (U.P.)  
 एन टी पी सी लिमिटेड / NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)

Revised Mining Plan (1<sup>st</sup> Revision) – Pakri Barwadih Coal Mining Block

	non availability of land records, inadequate State manpower at Dist/Block level, law & order problem etc.																													
	d) Non-performance by the earlier MDO. NTPC finally terminated the MDO contract wef 22.06.2014.																													
n) Reason for revision of Mining Plan	MoC directed to submit Revised Mining Plan (1 <sup>st</sup> Revision) including Mine Closure Plan as a whole instead of in parts, vide letter F.No.13016/29/2003-CA-1 (Part) dated 24.06.2015.																													
o) Details of changes in new Mining Plan compared to earlier approval	1. Comparison between Approved and Revised plan:																													
		<table><tr><th></th><th>Approved Plan</th><th>Revised Plan</th></tr><tr><td>Lease Area</td><td>4626 Ha</td><td>4695 Ha</td></tr><tr><td>Block boundary</td><td colspan="2">same</td></tr><tr><td>Production level</td><td>15Mtpa from 12<sup>th</sup> Year</td><td>18Mtpa from 12<sup>th</sup> Year</td></tr><tr><td rowspan="3">Reserves</td><td>West Quarry 311.71Mt</td><td>West Quarry 311.71 Mt</td></tr><tr><td>East Quarry 191.68 Mt</td><td>East Quarry 191.68 Mt</td></tr><tr><td></td><td>NW Quarry (Sector-A) 105.80 Mt</td></tr><tr><td>Mining Technology</td><td>Shovel Dumper combination with inclined slicing for coal and intervening parting and horizontal slicing method for top OB benches</td><td>Shovel Dumper combination with inclined slicing for coal and intervening parting and horizontal slicing method for top OB benches</td></tr><tr><td>Land use pattern</td><td>Forest: 1105.92 Ha</td><td>Forest: 1787.00Ha</td></tr><tr><td></td><td></td><td>Non-forest:</td></tr></table>		Approved Plan	Revised Plan	Lease Area	4626 Ha	4695 Ha	Block boundary	same		Production level	15Mtpa from 12 <sup>th</sup> Year	18Mtpa from 12 <sup>th</sup> Year	Reserves	West Quarry 311.71Mt	West Quarry 311.71 Mt	East Quarry 191.68 Mt	East Quarry 191.68 Mt		NW Quarry (Sector-A) 105.80 Mt	Mining Technology	Shovel Dumper combination with inclined slicing for coal and intervening parting and horizontal slicing method for top OB benches	Shovel Dumper combination with inclined slicing for coal and intervening parting and horizontal slicing method for top OB benches	Land use pattern	Forest: 1105.92 Ha	Forest: 1787.00Ha			Non-forest:
		Approved Plan	Revised Plan																											
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Land use pattern	Forest: 1105.92 Ha	Forest: 1787.00Ha																												
		Non-forest:																												

  
**RAKESH KUMAR SINGH**  
 Registered Qualified Person  
 No. 30111/15/2009-CPAM  
 Ministry of Coal, Govt. of India



पवन देव जामटा/PAWAN DEV JAMTA  
 जन महाप्रबन्धक (सह-निर्देशक)  
 Dep. General Manager (Commissioner)  
 एन टी सी लिमिटेड/NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)



Revised Mining Plan (1<sup>st</sup> Revision) – Pakri Barwadih Coal Mining Block

	Non-forest: 3519.92 Ha	2908.00 Ha
Coal Stockpile	Not provided	Stockpile which can cater to one week production of the West, East and NW Quarry is envisaged.

p. Reasons for change in Lease Area is given below:

	Approved Mining Plan	Revised Mining Plan	+/- (ha)	Reason
Block Area excluding Area 'A'	3943	3943		No Change.
Area 'A'	384	485	101	Detailed survey of Area 'A' at the time of detailed exploration has indicated total area as 485 ha. Same has been notified under Section 7(i) of CBA.
Outside Block area (For OB Dumps and infrastructure)	299	267	-32	Decrease in area as per direction of restrictions of MoEF.
<b>Total</b>	<b>4626</b>	<b>4695</b>	<b>69</b>	

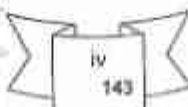
- The difference of 69 ha between the lease areas shown in the Approved Mining Plan and present Revised Mining Plan (Rev-1) is attributed to increase of 101 ha in Area 'A' after demarcation & measurement, and reduction by 32 ha of the area taken for external dumping and infrastructure.
- The revised area of PB-NW (Sector 'A') has been certified by CMPDI (enclosed as Annexure -XIX).

q. Reasons for change in Forest Area and Non-forest Area:

- Updation/Correction of forest records and land re-classification by State Govt./forest department.
- Increase in the area of sector -A (North-western part of Pakri Barwadih) which consists majority of forest land.

Details of forest/non forest along with variation with respect to Approved Mining Plan area as follows:

साईन द्या संशोधन, P. NAGPAL  
आयुक्त, राष्ट्रीय उद्योग विभाग  
कोयला, भारत सरकार, नई दिल्ली  
100001



*Sanjiv*  
**SANJIV KUMAR SINGH**  
Recognised Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India

**PAWAN DEV JAMTA**  
आयुक्त, राष्ट्रीय उद्योग विभाग  
कोयला, भारत सरकार, नई दिल्ली  
100001  
ECC, A-8A, Sector-24, Noida- 201301 (U)



Revised Mining Plan (1<sup>st</sup> Revision) – Pakri Barwadih Coal Mining Block

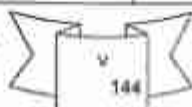
	Approved Mining Plan	Revised Mining Plan	Increase (ha)	Decrease (ha)
Forest Land	1126	1787	661	
Agricultural & Residential Land	2675	2520		155
Govt. Non-forest Land	825	388		437
Total	4626	4695	661	592

### 3. Location

a) Location of the block Taluka/Village/Khasra/Plot/Block Range etc.	North-Eastern part of North Karanpura CF, bounded by longitudes 85°9'19" to 85°15' 0"E and latitude 23°51'30" to 23°55'40" Taluka- Barkagaon etc. Village- Pakri Barwadih, Nagari, Arhara, Chepakalan, Jugra etc.
b) Name of the Coalfield	North Karanpura Coalfield
c) Particulars of adjacent blocks: North, South, East, West	North- Protected Forest South- Badmahi River & Barkagaon R.F. East- Barkagaon R.F. West- Kerendari 'C' Block
d) Area of the Allotted Block (hectares)	i) Geological Block Area: 4428.92 ha ii) Mining Block Area : 4428.92 ha
e) Reference no. of Plan of block boundary issued by CMPDI	Drawing, No: RI/III/6/5827 plate No. II March 2004 Refer Annexure - XII.
f) Whether the lease boundary is same as demarcated by CMPDI	Yes: The block boundary considered for mining is the same as provided by the CMPDI. However additional land has been envisaged and acquired for external dump and infrastructure such as Cross Country Conveyor, Railway Siding etc. outside the block boundary.
g) Existing mining Lease Area in case of existing mines	Not Applicable
h) Applied/required Lease Area as per the Mining Plan under consideration (hectares)	Lease is not applicable however required area is given below: Total Area = 4695 Ha Block Area = 4428.92 Ha Outside Block Area = 266.08 Ha
i) Whether the applied lease area falls within the allotted block	The area includes total allotted block area demarcated by CMPDI and an additional area of 266.08 Ha.
j) Area (hectares) which falls outside the block/sub-block delineated by CMPDI	266.08 Ha.
k) Details of outside area:	

*Samp*  
SANJIV KUMAR SINGH  
Reported Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India

पवन देव जैन  
General Manager (Mines)  
एन टी पी सी लिमिटेड, A-8A, Sector-24, Noida-201201 (U.P.)





	<table><tr><th colspan="5">Land use Post Closure</th></tr><tr><th>Sl. No.</th><th>Type</th><th>PB West &amp; East</th><th>PB NW</th><th>Total of PB</th></tr><tr><td>1</td><td>Water body</td><td>459.00</td><td>44.00</td><td>503.00</td></tr><tr><td>2</td><td>Plantation</td><td>2844.00</td><td>286.00</td><td>3130.00</td></tr><tr><td>3</td><td>Road</td><td>2.00</td><td>8.00</td><td>10.00</td></tr><tr><td>4</td><td>Grazing</td><td>223.00</td><td>24.00</td><td>247.00</td></tr><tr><td>5</td><td>Agricultural</td><td>524</td><td>76</td><td>600.00</td></tr><tr><td>6</td><td>Public Use</td><td>105</td><td>47</td><td>152.00</td></tr><tr><td>7</td><td>Barren</td><td>35</td><td>0</td><td>35.00</td></tr><tr><td>8</td><td>For UG Mine</td><td>18.00</td><td>0.00</td><td>18.00</td></tr><tr><td></td><td>Total</td><td>4210.00</td><td>485.00</td><td>4695.00</td></tr></table>	Land use Post Closure					Sl. No.	Type	PB West & East	PB NW	Total of PB	1	Water body	459.00	44.00	503.00	2	Plantation	2844.00	286.00	3130.00	3	Road	2.00	8.00	10.00	4	Grazing	223.00	24.00	247.00	5	Agricultural	524	76	600.00	6	Public Use	105	47	152.00	7	Barren	35	0	35.00	8	For UG Mine	18.00	0.00	18.00		Total	4210.00	485.00	4695.00
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	Total	4210.00	485.00	4695.00																																																				
<p>o) Proximity of public road/ railway line/ major water body if any and approximate distance</p>	<p>The entire block falls in the Hazaribagh district of Jharkhand State. The Hazaribagh – Khairi – Ranchi State highway passes through the eastern part of the block touching Barkagaon and Tandwa Villages. The nearest township is Hazaribagh located at a distance of around 25 kms from Barkagaon in the northern part of the block. The nearest rail stations are Ranchi Road of SE Railway around 70- 75 kms from the block.</p> <p>There are a number of seasonal streams/ nullah traversing the block and the prominent ones are Dumuhan, Hardara and Khora etc. flowing roughly north to south and carry huge load during rainy seasons. None of them are perennial in nature. They discharge their load into the Badmahi River flowing further south of the block which one of the important tributaries of the mighty Damodar River is flowing west to east in southern part of the North Karanpura Coalfield.</p>																																																							
<p>p) Toposheet No. with Latitude and Longitude</p>	<p>The block is covered by the Survey of India Toposheet No. 73 E/1 (RF 1:50,000) and special sheet no. 21, 23 &amp; 24 on R.F. 1:10000. It is bounded by longitude 85°09'19" to 85°15'00"E and latitude 23°51'30" to 23°55'40"N.</p>																																																							

#### 4. Geology and Exploration

a) Name of the Geological Block	Pakri-Barwadih Coal Block located in the north eastern part of North Karanpura coal field bounded by longitudes 85° 09' 19" to
---------------------------------	--

Block No. 146



SANJIV KUMAR SINGH  
Recognised Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India

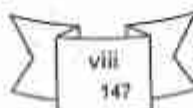
पवन देव जैन  
General Manager (Coal)  
ECC, A-5A, Sector-24, Noida-201301 (U.P.)



Revised Mining Plan (1<sup>st</sup> Revision) – Pakri Barwadih Coal Mining Block

and area in hectare	85°15'00" N and latitude 23° 51' 30" to 23° 55' 40" E covered by the Survey of India Toposheet no. 73E/1 (R.F 1: 50000) and special sheets no. 21, 23 & 24 on R.F. 1:10000 is located in the state of Jharkhand and is around 120-130 km from the state capital Ranchi.																
b) Name of the Geological Report (GR) with year of preparation	Two Geological Reports are available namely:  a. Geological Report on Coal Exploration Pakri-Barwadih Block (Non-CIL captive block) North Karanpura Coal Field, Dist. Hazaribagh, Jharkhand; prepared in March 2005.  b. Geological Report on Detailed Exploration for Coal Pakri Barwadih North West (Area - A Block), North Karanpura Coal Field, Dist. Hazaribagh, Jharkhand (State) October 2012.																
c) Name of the agency which conducted the exploration and prepared GR.	Two agencies were involved namely:  a. CMPDI for total PB Block except Area "A", North West part of Pakri Barwadih  b. MECL for Area "A", North West part of Pakri Barwadih																
d) Period of conducting exploration	Exploration by CMPDI was conducted in two phases:  1 <sup>st</sup> Phase- 1999-01  2 <sup>nd</sup> Phase- 2003-04  Exploration by MECL was conducted for PB "A" area:  2006-2012																
e) Details of drilling by all agencies (Coring and Non-coring)	<table border="1"> <thead> <tr> <th rowspan="2">Agency/ Type</th><th rowspan="2">Period of Drilling</th><th colspan="2">Drilling</th></tr> <tr> <th>No. of Boreholes</th><th>Meterage</th></tr> </thead> <tbody> <tr> <td>1. GSI / Regional</td><td>1961 to 1971</td><td>KB-1 to 26 (26 BHs)</td><td>8177.23</td></tr> <tr> <td>2. CMPDI a) Promotional (Semi-regional)</td><td>Dec. 1999 to April, 2001</td><td>CMKPB-1 to 38 (38 BHs)</td><td>10482.00</td></tr> </tbody> </table>			Agency/ Type	Period of Drilling	Drilling		No. of Boreholes	Meterage	1. GSI / Regional	1961 to 1971	KB-1 to 26 (26 BHs)	8177.23	2. CMPDI a) Promotional (Semi-regional)	Dec. 1999 to April, 2001	CMKPB-1 to 38 (38 BHs)	10482.00
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For the Director, NAGPAL  
Joint Field Office Secretary  
Joint Field Office, Coal  
Field, Hazaribagh, Jharkhand  
Vill. Pakri Barwadih, Dist. Hazaribagh



**SANJIV KUMAR SINGH**  
Recognised Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India

**पवन देव जामटा/PAWAN DEV JAMTA**  
उप महाप्रबन्धक (नॉन-सीलिंग)  
Deputy General Manager (Non-Sealing)  
एन टी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)



	<table border="1"> <tr> <td>b) Non-CIL (detail drilling)</td><td>Jan., 2003 to June 2004</td><td>CNPB- 1 to 135 (135 BHS)</td><td>24943.60</td></tr> <tr> <td><b>Sub -Total</b></td><td></td><td><b>199</b></td><td><b>43802.83</b></td></tr> <tr> <td>3. MECL for PB A</td><td>2006 to 2012</td><td>MNPB-1 to MNPB-1 (33 BHS)</td><td>4282.70</td></tr> <tr> <td><b>Total (1, 2 &amp; 3)</b></td><td></td><td><b>232</b></td><td><b>47885.53</b></td></tr> </table>	b) Non-CIL (detail drilling)	Jan., 2003 to June 2004	CNPB- 1 to 135 (135 BHS)	24943.60	<b>Sub -Total</b>		<b>199</b>	<b>43802.83</b>	3. MECL for PB A	2006 to 2012	MNPB-1 to MNPB-1 (33 BHS)	4282.70	<b>Total (1, 2 &amp; 3)</b>		<b>232</b>	<b>47885.53</b>				
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f) No. of Boreholes drilled within the block	196 BHs in PB 33 BHs in Area A (MECL) 03 BHs in Area A(CMPDIL) Total 232 BHs																				
g) Overall density within the block (no. /sq. km)	10 BHs/ sq. Km in Proved Reserve Area and 1 BHs/sq. km in Indicated Reserve area																				
h) Area covered by detailed exploration within the block (hectares)	<table border="1"> <tr> <th>Sl. No.</th><th>Area/Type</th><th>Area in Ha.</th></tr> <tr> <td>1</td><td>PB West and East (Explored)</td><td>1774.6</td></tr> <tr> <td>2</td><td>PB NW (Explored)</td><td>485.00</td></tr> <tr> <td>3</td><td>Regionally explored</td><td>2169.32</td></tr> <tr> <td>4</td><td>Outside Block Boundary</td><td>266.08</td></tr> <tr> <td></td><td><b>Total Area</b></td><td><b>4695.00</b></td></tr> </table>			Sl. No.	Area/Type	Area in Ha.	1	PB West and East (Explored)	1774.6	2	PB NW (Explored)	485.00	3	Regionally explored	2169.32	4	Outside Block Boundary	266.08		<b>Total Area</b>	<b>4695.00</b>
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	<b>Total Area</b>	<b>4695.00</b>																			
i) Area covered by detailed exploration outside the block (hectares)	N/A																				
ii) No. of boreholes drilled outside the block	5 Boreholes in the area PB- A																				
iii) Borehole density for outside area (no./sq. Km)	NA																				
j) Whether entire lease area is covered by 'detailed'	No																				

*Sanyu*  
SANYU KUMAR SINGH  
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पवन देव जामटा (PAWAN DEV JAMTA)  
 201301 (U.P.)

exploration

k) Further  
Exploration with  
timeframe  
(Tentative)

### A. Exploratory drilling for no coal zone proving

The infrastructure facilities and external waste dumping areas (Dump-A and B) as shown in Plate No. 4 have been selected beyond the incrop of Seam-I Bottom as indicated in the GR. CMPDIL drilled eight boreholes in this area. Karharbari seams are encountered in 7 boreholes however these seams are erratic and impersistent in nature and lacks opencast potentiality. No attempts were made to estimate the reserves however, If required negative probing boreholes will be drilled before starting of OB Dumping.

Period	No. of Bhs.	Location	Target
Pre-construction	30 (approx.)	Infrastructure sites and external waste dumps A & B	Negative proving of workable coal seams.

### B. Exploratory drilling for production support

In order to delineate the incrop of Seam-I & II and support the production requirement as per stage plan, phase-wise exploration through core drilling in different sectors of the block have been proposed below:

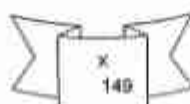
Period	No. of BH	Location	Estimated meterage
Development	15	Bet. F14& Seam-I Bottom incrop Bet F13 & F14 Bet F8 & F9	750
Production 1 <sup>st</sup> year	15	Bet F12 & F13 Bet F10 & F11 Bet F7 & F8	1500
Production 2 <sup>nd</sup> year	15	Bet F12 & F13 Bet F11 & F12 Bet F9 & F10	1500
Production 3 <sup>rd</sup> Year	12	Bet F8 & F10 Bet F7 & F8	1500

Dr. K. K. SINGH, I.P. NADPA,  
Joint Mining Under Secretary,  
State Intervention Unit,  
and District Mining  
Officer, Coal, Govt. of India

**K. K. SINGH**  
Authorized Qualified Person  
DIN/11/2009-CPAM  
Coal, Govt. of India

पवन देव जाम्टा/PAWAN DEV JAMTA  
अवर सचिव, उद्योग विभाग  
राज्य सरकार, कोयला विभाग  
राजधानी, रायपुर, छत्तीसगढ़

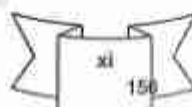
सचिव  
श्री कृष्ण सिंह  
अनुमोदित व्यक्ति  
2011/17(10)/2009-CPAM  
उद्योग विभाग, कोयला विभाग, भारत



पवन देव जाम्टा/PAWAN DEV JAMTA  
अवर सचिव, उद्योग विभाग  
राज्य सरकार, कोयला विभाग  
राजधानी, रायपुर, छत्तीसगढ़  
EOC, A-0A, Sector-24, New Raipur (U.P.)

	Production 4 <sup>th</sup> year	12	Bet F5 & F6 Bet F7 & F8	2200
	<p><b>C. Exploration for area beyond 300m depth line</b></p> <p>The southern portion of the Pakri-Barwadih Block covering around 12 sq. km. area has also not been explored in details and only "indicated" category reserves of the order of 733.2 Mt are provisionally assessed by CMPDI. Therefore a detailed exploration programme has been proposed to convert the indicated reserve into proved category and to develop underground mine plan. This is detailed below:</p> <ol style="list-style-type: none"> <li>Detailed exploration is to be carried out in this area, involving drilling of 55000-60000 m, as estimated by CMPDI.</li> <li>As per approved Mining Plan, 45000 m of drilling over 4 years in 12 sq. km area was indicated.</li> <li>Exploration in this area to be taken up in the 1<sup>st</sup> production year and completed in 4<sup>th</sup> Years.</li> </ol>			
i) i) No. of Coal horizons	Barakar : 5 persistent coaly horizons Karharbari: 5 thin coaly horizons Local : 1 coaly horizon			
ii) thickness range of coal seam	The five Barakar coal seams are splitted into several sections			
iii) mean thickness of total coal horizon	Maximum thickness of individual seam-28.67 m, Seam II Comb (CNPB 32). Minimum thickness of individual seam- 0.05 m, Seam K – 2 (CNPB 124).			
iii) Standard Deviation of the thickness	SD of individual coal seam thicknesses ranges from 0.35 - 10.2. Mean of thicknesses of total coal seams is >35 m			
Minimum and Maximum depth of intersection of roof of the coal seam	Maximum : 304.30m (Seam K - 3) Minimum : 11.50 m (Seam II Top)			

संकेत की जानकारी के अनुसार  
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*Sanjiv Kumar Singh*  
**SANJIV KUMAR SINGH**  
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 No. 34011/(15)/2009-CPAM  
 Ministry of Coal, Govt. of India

*Pawan Dev Sharma*  
**PAWAN DEV SHARMA**  
 Deputy General Manager (Construction)  
 एन टी पी सी लिमिटेड / NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)



<p>m) Gross Calorific Value (GCV in K Cal/ Kg) of Coal as per GR and Useful Heat Value (UHV in K. cal/ Kg), of coal as per GR:</p> <p>Range</p> <p>Mean</p>	<p>GCV: Ranges from 2491 (G-16) to 6280 (G-4)</p> <p>Mean: 4385.5 (G-10)</p> <p>UHV: Ranges from 1368 to 5657</p> <p>Mean: 3512.5</p>																																																																									
<p>n) Quality (Grade) of coal as per GR</p>	<p>The range of Grade varies from B to G. The proved reserve fall mostly in D-F grade. (As per GR prepared by CMPDI).As per the average GCV, the grade of</p> <p><b>West &amp; East Quarry- G-10</b></p> <p><b>North West Quarry- G-8.</b></p>																																																																									
<p>o) Total Geological Reserves in the block (as per GR)</p>	<p><b>Geological/Mineable Reserves of Pakri Barwadih</b></p> <p><i>million tonnes</i></p> <table><tr><th>S I N O.</th><th>Reserves*</th><th>PB-West &amp; East</th><th>PB-NW</th><th>Total</th></tr><tr><td>1</td><td>Net Geological</td><td>1436</td><td>137.6</td><td>1573.6</td></tr><tr><td>2</td><td>Amenable for Open Cast</td><td>707</td><td>121.03</td><td>828.03</td></tr><tr><td>3</td><td>Amenable for Underground</td><td>729</td><td>0</td><td>729</td></tr><tr><td>4</td><td>Mineable</td><td>503.39</td><td>138.98**</td><td>642.34</td></tr></table> <p>* Reserves up to 300m depth have been considered for opencast mining.</p> <p>**33.18 Mt of coal shall be mined as Barrier&amp; Batter Coal between PBW &amp; PB-NW.</p> <p><b>Net reserves and extractable reserves and losses</b></p> <p><i>(in Mt.)</i></p> <table><tr><th>Seam</th><th>Net Reserve</th><th>Barrier Loss</th><th>Batter Loss</th><th>Mineable Reserves</th><th>Mining Loss</th><th>Extractable Reserve</th><th>% Extraction</th></tr><tr><td>V Top</td><td>22.29</td><td>0.72</td><td>1.57</td><td>19.99</td><td>0.59</td><td>19.40</td><td>87.06</td></tr><tr><td>V Bottom</td><td>15.56</td><td>0.51</td><td>1.10</td><td>13.96</td><td>0.41</td><td>13.55</td><td>87.06</td></tr><tr><td>V Combined</td><td>11.57</td><td>0.21</td><td>0.49</td><td>10.87</td><td>0.44</td><td>10.43</td><td>90.16</td></tr><tr><td>Seam - V</td><td>49.42</td><td>1.44</td><td>3.16</td><td>44.82</td><td>1.44</td><td>43.38</td><td>87.78</td></tr><tr><td>IV Top</td><td>19.82</td><td>0.64</td><td>2.23</td><td>16.95</td><td>0.50</td><td>16.46</td><td>83.01</td></tr></table>	S I N O.	Reserves*	PB-West & East	PB-NW	Total	1	Net Geological	1436	137.6	1573.6	2	Amenable for Open Cast	707	121.03	828.03	3	Amenable for Underground	729	0	729	4	Mineable	503.39	138.98**	642.34	Seam	Net Reserve	Barrier Loss	Batter Loss	Mineable Reserves	Mining Loss	Extractable Reserve	% Extraction	V Top	22.29	0.72	1.57	19.99	0.59	19.40	87.06	V Bottom	15.56	0.51	1.10	13.96	0.41	13.55	87.06	V Combined	11.57	0.21	0.49	10.87	0.44	10.43	90.16	Seam - V	49.42	1.44	3.16	44.82	1.44	43.38	87.78	IV Top	19.82	0.64	2.23	16.95	0.50	16.46	83.01
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Sanjiv Kumar Singh  
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No. 34011/(19)2009-CPAM  
Ministry of Coal, Govt. of India

पवन देव जामुन/PANAN DEVI  
जय मेनकाश (सं. १५५५)  
Dep. General Manager (Geology)  
एन टी पी सी लिमिटेड / NTPC LIMITED  
EOC-A-8A, Sector-24, Noida-201305 (U.P.)



Revised Mining Plan (1<sup>st</sup> Revision) – Pakri Barwadih Coal Mining Block

<p>IV Bottom</p> <p>IV Combined</p> <p>Seam - IV</p> <p>III Top</p> <p>III Bottom</p> <p>III Combined</p> <p>Seam - III</p> <p>II Top</p> <p>II Middle</p> <p>II TM</p> <p>II Bottom</p> <p>II MB</p> <p>II Combined</p> <p>Seam - II</p> <p>I Top</p> <p>I Middle</p> <p>I TM</p> <p>I Bottom</p> <p>I MB</p> <p>I Combined</p> <p>Seam - I</p> <p>LL</p> <p>K5</p> <p>K4</p> <p>K3</p> <p>K2</p> <p>K1</p> <p>Seam-Local</p> <p>Total</p>	9.92	0.32	1.12	8.48	0.25	8.23	83.01
	92.32	3.15	10.68	78.49	2.43	76.06	82.39
	122.06	4.10	14.03	103.93	3.18	100.75	82.54
	27.45	1.21	2.04	24.20	0.70	23.49	85.59
	9.83	0.43	0.73	8.66	0.25	8.41	85.59
	4.80	0.21	0.36	4.23	0.12	4.11	85.59
	42.08	1.85	3.13	37.10	1.08	36.02	85.59
	59.98	4.66	6.21	49.11	1.89	47.22	78.72
	139.75	11.83	11.24	116.68	3.83	112.86	80.75
	76.09	7.28	5.63	63.18	1.77	61.40	80.70
	116.05	10.76	9.90	95.39	2.89	92.50	79.71
	17.90	1.71	1.32	14.86	0.42	14.44	80.70
	7.35	0.70	0.54	6.11	0.17	5.94	80.70
	417.13	36.95	34.85	345.33	10.97	334.36	80.16
	36.93	2.72	9.39	24.81	0.77	24.05	65.11
	72.97	5.27	18.20	49.49	1.66	47.84	65.56
	2.51	0.23	0.79	1.49	0.04	1.45	57.80
	35.60	2.52	8.69	24.39	0.52	23.87	67.06
	14.85	1.35	4.67	8.83	0.24	8.58	57.80
	3.58	0.33	1.13	2.13	0.06	2.07	57.80
	166.44	12.42	42.88	111.14	3.28	107.86	64.81
	2.60	0.10	0.35	2.15	0.11	2.04	78.62
	0.13	0.01	0.06	0.06	0.01	0.05	36.32
	4.24	0.13	1.11	2.97	0.11	2.86	67.83
	3.34	0.22	0.86	2.26	0.06	2.20	65.95
	5.38	0.27	1.14	3.97	0.07	3.90	72.40
	15.24	1.25	4.65	9.34	0.41	8.93	58.62
	30.90	1.98	8.17	20.75	0.77	19.98	64.66
	828.03	58.74	106.22	663.07	20.72	642.35	77.58
p) Depletion of reserves (in case of running mine)	Not applicable						
q) Additional Reserves (in case of running mine)	Not applicable						

SANJIV KUMAR SINGH  
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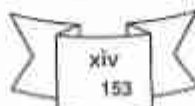
पवन शर्मा जयप्रकाश  
Dep.-2 General Manager (Coal) (P)  
एन टी पी सी लिमिटेड / NTPC लिमिटेड  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

r) Geological Reserves considered for mining	<p><b>PB West &amp; East:</b></p> <p>By opencast: 707.67 Mt (as per CMPDI GR). This is Net geological reserves from Seam-I to V and seam K-1 to K-5, including both proved and indicated reserves upto-300 m depth.</p> <p><b>PB North West:</b></p> <p>By opencast: 137.584Mt (as per MECL GR). This is Net geological reserves from Seam-I to V, including both proved and indicated reserves upto 300 m depth.</p>
s) Corresponding Extractable Reserve	<p><b>PB-East and West:</b></p> <p>Open cast mineable reserve 503.38 Mt</p> <p><b>PB-North West:</b></p> <p>Open cast mineable reserve 138.96 Mt</p> <p>Total <b>642.34 Mt.</b></p>
t) Percentage Recovery w.r.t geological reserves	<p><b>Percentage Recovery w.r.t proved geological reserves:</b></p> <p>Overall: 78%</p>

## 5. Mining

<p>a) Existing and Proposed method of mining</p> <p>Opencast</p> <p>Underground</p>	<p>Shovel dumper combination system with horizontal slicing pattern would be adopted in mining mass i.e. OB, coal and intervening parting.</p> <p>Bord and Pillar and Blasting gallery (which is a variation of Bord and Pillar) methods for this property.</p>
<p>b) The peak capacity as well in addition to targeted capacity in Mtpa when mine is fully developed and the year in which proposed to be achieved</p>	<p>Opencast: Targeted Capacity- 18Mtpa</p> <p>Year of Achieving: 12<sup>th</sup></p>
<p>c) Life of mine</p> <p>Overall</p>	<p>- 52 Years</p> <p>- 27 years for West Quarry</p> <p>- 15 years for East Quarry.</p> <p>- 39 years overall for PB</p>

  
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Revised Mining Plan (1<sup>st</sup> Revision) – Pakri Barwadih Coal Mining Block

Opencast workings					West and East (3 year overlapping period for East and West Quarries).  -52 years PB- A Quarry  All workings are Opencast	
d) Quantum of production and expected grade:					642.34 Mt, G-10	
e) Conceptual Calendar Program						
Yr	Opencast			ROM Coal (Mt)	Beneficiated Coal (Mt)	Washery rejects (Mt)
	Production Mt	OB (Mcum)	Stripping Ratio (Mcum/t)			
1	3.14	8.89	2.83	3.14	Not applicable	Not applicable
2	6.27	18.32	2.92	6.27		
12	18	52.20	2.90	18		
35	18	77.44	4.30	18		
52	1.46	1.48	1.01	1.46		
Conceptual	642.34	2536.75	3.95	642.34		
<p>Dump C has been planned over the area where the coal is beyond 300 m depth line and thus suitable for exploitation by underground means. As such no coal shall get sterilized due to Dump C.</p> <p>Dump D has been planned for PB East on non opencastable area where quarriable potential is not indicated in the GR.</p>						
<p>f) Whether negative proving for coal in the proposed site for OB dump/ infrastructure has been done.</p> <p><i>[Signature]</i></p> <p><i>[Stamp]</i></p> <p><b>SANJIV KUMAR SINGH</b> Recognised Qualified Person No. J4011/15/2009-CPMA Ministry of Coal, Govt. of India</p>				<p>The infrastructure facilities and external waste dumping area (A, B) has been selected beyond the incrop of Seam-I Bottom as indicated in GR. CMPDIL drilled eight boreholes in this area. Karharbari seams are encountered in 7 boreholes, however these seams are erratic and impersistent in nature and lacks opencast potentiality. No attempts were made to estimate the reserves however, If required negative probing boreholes will be drilled before starting of OB Dumping.</p> <p>Incase any quarriable patch is found, the same will be mined before starting waste dumping. If deeper seams (viz. Karharbari group seams K1 to K5) are found during the negative proving of this area, such seams will be extracted by underground mining.</p> <p><i>[Signature]</i></p> <p><b>PAWAN DEV JAMTA</b> Dep. General Manager (Commercial) एन.टी.पी.सी. लिमिटेड / NTPC LIMITED EOC, A-8A, Sector-24, Noida-201301 (U.P.)</p>		



g) Proposed configuration of HEMM for OC (Coal and OB)	PB-West & East Quarry		
	Equipment	Open cast	
		OB	Coal/Parting
	Shovel	20m <sup>3</sup>	8.3 m3
	Dumper	170/190T	100/120 T
	Drill	250 mm	160mm
	Dozer	410 HP	410 HP
	PB- NW Quarry		
	Equipment	Open cast	
		OB	Coal
	Shovel	10 m <sup>3</sup>	5.5 m3
	Dumper	100T	60 T
	Drill	250 mm	160mm
	Dozer	410 HP	410 HP
h) Mode of entry for Underground mines	Vertical Shaft		
i) Operations that are proposed to be outsourced	As on date, an entire operation of Pakri Barwadih Coal Project will be outsourced.		
j) Proposed coal evacuation facilities	Excavator and dumper system for extracting coal and dumping the same at ROM pad and after primary crushing transporting it to Stockpile by Conveyor belts		
Face to Surface			
Surface to end-use plants	By combination of Cross Country Conveyor and Railways for end-use plants.		

## 6. End-use of Coal

a) Capacity of the	Basket linkage
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*Revised Mining Plan (1<sup>st</sup> Revision) – Pakri Barwadih Coal Mining Block*

approved end use plants and b) Coal required for end-use plant with grade	
c) %age of end use requirement to be met from this mine	Basket Linkage
d) If washing/beneficiation of the coal is planned to be conducted on site or adjacent to the extraction area	Coal washability study has not yet been carried out for Pakri Barwadih Coal. Coal quality parameters obtained from the proximate analysis of coal revealed that ash percentage in all probability is likely to remain 34% or below which does not call for commissioning of coal washery. However to cater for more stringent future quality stipulations, space allocation is earmarked for commissioning of Coal Washery at mine end to facilitate transport of washed coal to the power plants as per qualitative requirements.
e) Proposed use of Rejects/Middling	Not applicable

**7. Environmental Management**

a) Land area indicating the area likely to be degraded due to mining, dumping, roads, workshop, washery, township etc.	Type	PB West & East	PB NW	Total of PB
	Mining Area	1600.00	382.00	1982.00
		0.00	0.00	0.00
	Barrier zone	8.97	1.03	10.00
	Proposed road on North side	12.55	1.45	14.00
	Area under Nala/ River	45.00	25.00	70.00
	External dump	825.76	14.45	840.21
	Top soil dump	40.00	7.14	47.14
	Settling pond	10.76	1.24	12.00
	Infrastructure area	273.50	4.85	278.35
	Rationalisation /Unutilized area	823.46	47.84	871.30
	Area for UG *	570.00	0.00	570.00
	<b>Total</b>	<b>4210.00</b>	<b>485.00</b>	<b>4695.00</b>

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Revised Mining Plan (1<sup>st</sup> Revision) – Pakri Barwadih Coal Mining Block

b) Existing land use pattern	Sl. No.	Class of land		Area in ha
	1	Forest		1787
	2	Non-forest	Govt.	388
			Private Land	2520
	Total			4695

c) Surface features over the block area	Refer to Plate No.-5																																																																																			
d) No. of villages/ houses to be shifted	<table><tr><th>S. No.</th><th>Name of Village</th><th>House Hold to be shifted (No's)</th></tr><tr><td>1</td><td>Arahara</td><td>242</td></tr><tr><td>2</td><td>Dadikalan</td><td>663</td></tr><tr><td>3</td><td>Chepakalan</td><td>460</td></tr><tr><td>4</td><td>Jugra</td><td>398</td></tr><tr><td>5</td><td>Lakura(P)</td><td>59</td></tr><tr><td>6</td><td>Itiz</td><td>125</td></tr><tr><td>7</td><td>Chirudih</td><td>10</td></tr><tr><td>8</td><td>Nagadi</td><td>261</td></tr><tr><td>9</td><td>Pakri-Barwadih</td><td>331</td></tr><tr><td>10</td><td>Urub</td><td>115</td></tr><tr><td>11</td><td>Deoria Khurd(P)</td><td>184</td></tr><tr><td>12</td><td>Churchu</td><td>254</td></tr><tr><td>13</td><td>Sonbarsa</td><td>242</td></tr><tr><td>14</td><td>Sinduari</td><td>228</td></tr><tr><td>15</td><td>Chepakhurd</td><td>278</td></tr><tr><td>16</td><td>Keri(P)</td><td>93</td></tr><tr><td>17</td><td>Langatu(P)</td><td>462</td></tr><tr><td>18</td><td>Barkagaon(P)</td><td>126</td></tr><tr><td>19</td><td>Deorikalan(P)</td><td>195</td></tr><tr><td>20</td><td>Sirna</td><td>17</td></tr><tr><td>21</td><td>Nawadih(P)</td><td>10</td></tr><tr><td>22</td><td>Basaria</td><td>22</td></tr><tr><td>23</td><td>Kandaber(P)</td><td>178</td></tr><tr><td>24</td><td>Jabra</td><td>8</td></tr><tr><td>25</td><td>Beltu(P)</td><td>6</td></tr><tr><td>26</td><td>Bariatu(P)</td><td>11</td></tr></table>			S. No.	Name of Village	House Hold to be shifted (No's)	1	Arahara	242	2	Dadikalan	663	3	Chepakalan	460	4	Jugra	398	5	Lakura(P)	59	6	Itiz	125	7	Chirudih	10	8	Nagadi	261	9	Pakri-Barwadih	331	10	Urub	115	11	Deoria Khurd(P)	184	12	Churchu	254	13	Sonbarsa	242	14	Sinduari	228	15	Chepakhurd	278	16	Keri(P)	93	17	Langatu(P)	462	18	Barkagaon(P)	126	19	Deorikalan(P)	195	20	Sirna	17	21	Nawadih(P)	10	22	Basaria	22	23	Kandaber(P)	178	24	Jabra	8	25	Beltu(P)	6	26	Bariatu(P)	11
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e) Population to be affected by the Project	8339 Nos.																																																																																			

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f) Year wise proposal for reclamation of land affected by mining

The table below shows the year wise proposal of reclamation of land:

**Yearly Details of reclamation of land  
(West Quarry , East Quarry & NW Quarry)**

Year	Dump Stabilization & Vegetation (Ha)
First Year Stage	-
3rd year Stage	19
5th year Stage	64
10th year Stage	177
20th year Stage	389
30th year Stage	557
40th year Stage	617
Final Stage	334

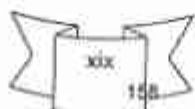
g) Monitoring schedules for different environmental components after the commencement of mining and other related activities

The full-time environmental staff will conduct routine field monitoring and reporting to provide a close supervision on the surrounding natural environment and provide early warnings of any adverse changes that may be related to some dimension of the mining and allied operations. The schedule, duration and parameters to be monitored are shown in the following table.

Sl. No	Description of Parameters	Schedule and Duration of Monitoring
1	Slope Failure	Bi-Weekly
2	Land Erosion	Weekly
3	Drainage	Daily
4	Blasting effect	As per mine workings and blasting
5	Re-vegetation and Green belt development	Yearly
6	Monitor Plantation Measures	Yearly
7	Surface Subsidence	Bi-Weekly

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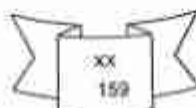
Revised Mining Plan (1<sup>st</sup> Revision) – Pakri Barwadih Coal Mining Block

	8	Water Quality Monitoring(Ground & Surface)	
		Water quality of Surface and ground water around the site (All parameters specified by JSPCB)	Monthly
	9	Emissions and Air Quality (RPM,SO <sub>2</sub> , NO <sub>x</sub> ,CO)	24 hourly samples with analysis carried out monthly all-round the year.
	10	Meteorological Station	Continuous
	11	Air Quality	Continuous
	12	Noise Quality	Continuous
	11	Occupational Health	Bi-Weekly

**8. Mine Closure Plan**

a) Estimated total capital expenditure for Mine closure activities	Rs. 318.55 Crores(current cost)	
b) Major closure Activities with proposed Capital Expenditure	Activities to be undertaken	Total (Rs.) in Cr
	Total closure cost for opencast mine (compounding @ 5% escalation)	1321.08
	Total closure cost for underground mine (compounding @ 5% escalation)	52.12
	Total closure cost for Pakri Barwadih Mine	1373.20

सं. १००/१९८१-१९८२  
२०११-१२ की वार्षिक योजना  
१.००० करोड़ रुपये की सीमा  
में प्रस्तावित है।  
२०११-१२ की वार्षिक योजना



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# CHAPTER I

## INTRODUCTION

  
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## CHAPTER I

### INTRODUCTION

#### 1.1 Overview

The Pakri Barwadih Coal Block is located in North Karanpura Coalfields in Hazaribagh district of Jharkhand state. The block has been allocated to NTPC Ltd., for captive mining for supply of coal to their super thermal power stations by Ministry of coal, Government of India vide letter no. 13016/29/2003-CA, New Delhi, dated 11<sup>th</sup> Oct 2004 & DO No.13016/29/2003-CA dated 24<sup>th</sup> August 2005 for a total area of 46.26 sq km. Copy of letter enclosed as Annexure-I and Annexure-II.

#### 1.2 Background of NTPC Ltd.

The company was incorporated on 7<sup>th</sup> November, 1975 under the Companies Act, essentially to promote power generation in the Country. Subsequently, the name of the Company was changed to its present name NTPC Limited and a fresh certificate of incorporation was issued on October 28, 2005. The name of the Company was changed to reflect the diversification of business operations beyond thermal power generation to include, among others, generation of power from hydro, nuclear and renewable energy and undertaking coal mining and oil exploration activities.

The Company is not operating under any injunction or restraining order.

#### 1.3 Installed Capacity of NTPC

Present installed capacity of NTPC is 45,548 MW (including 6,196 MW through JVs) comprising of 41 NTPC Stations (18 Coal based stations, 7 combined cycle gas/liquid fuel based stations, 1 Hydro based station), 7 Joint Venture stations (6 coal based and one gas based) and 8 renewable energy projects. Installed Capacity of NTPC is given in Table 1.1. Regional Spread of Generating Facilities is given in Table 1.2.

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TABLE 1.1

## Installed Capacity of NTPC

Sl.No.	NO. OF PLANTS	CAPACITY (MW)
<b>NTPC Owned</b>		
Coal	18	34,425
Gas/Liquid Fuel	7	4,017
Hydro	1	800
Renewable energy projects	8	110
<b>Total</b>	<b>34</b>	<b>38,602</b>
<b>Owned By JVs</b>		
Coal & Gas	7	6,196
<b>Total</b>	<b>41</b>	<b>45,548</b>

TABLE 1.2

## Regional Spread of Generating Facilities

REGION	COAL	GAS/Liquid	Renewable	TOTAL
Northern	9,515	2,344	35	11,894
Western	10,840	1,313	50	12,203
Southern	4,600	360	10	4,970
Eastern	9,470	-	10	9,480
Islands	-	-	5	5
Hydro	-	-	-	800
JVs	4,229	1,967	-	6,196
<b>Total</b>	<b>37,904</b>	<b>5,984</b>	<b>110</b>	<b>45,548</b>

Chapter - I Introduction  
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RQP No. 34011/(15)/2009-CPAM dated 27.09.10

DR. P. K. NAGPAL  
 Joint Mining Under Secretary  
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**1.3.1 Coal Based of end-use plants:**

With 18 coal based power stations, NTPC is the largest thermal power generating company in the country. The company has a coal based installed capacity of 34,425 MW. Table 1.3 shows the existing power plants of NTPC with location and capacity.

Location of coal based end-use plants with capacity along with the installed capacity and the Coal Based Joint Ventures of NTPC is given in Table 1.3 & 1.4 respectively.

**TABLE 1.3**  
**LOCATION OF END USE PLANTS**  
**(Coal Based and Under Commercial Operation)**

Sl. No.	COAL BASED STATION	STATE	COMMISSIONED CAPACITY(MW)
1	Singrauli	Uttar Pradesh	2,000
2	Korba	Chhattisgarh	2,600
3	Ramagundam	Telangana	2,600
4	Farakka	West Bengal	2,100
5	Vindhyachal	Madhya Pradesh	4,760
6	Rihand	Uttar Pradesh	3000
7	Kahalgao	Bihar	2,340
8	Dadri	Uttar Pradesh	1,820
9	Talcher Kaniha	Odisha	3,000
10	Feroze Gandhi, Unchahar	Uttar Pradesh	1,050
11	Talcher Thermal	Odisha	460
12	Simhadri	Andhra Pradesh	2,000
13	Tanda	Uttar Pradesh	440
14	Badarpur	Delhi	705
15	Sipat	Chhattisgarh	2,980
16	Mouda	Maharashtra	1000
17	Barh	Bihar	1320
18	Bongiagaon	Assam	250
	<b>Total Installed Capacity</b>		<b>34,425</b>

**TABLE 1.4**  
**COAL BASED JOINT VENTURES**

Chapter - I Introduction

RQP No. 34011/(15)/2009-CPAM dated 27.09.10.

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SL. NO	COAL BASED (Owned by JVs)	STATE	COMMISSIONED CAPACITY (MW)
1.	Durgapur	West Bengal	120
2.	Rourkela	Orissa	120
3.	Bhilai	Chhattisgarh	574
4.	Kanti	Bihar	415
5.	IGSTPP, Jhajjar	Haryana	1500
6.	Vallur	Tamil Nadu	1500
	Total		4,229

### 1.3.2 Projects Under Implementation and Future Capacity Addition:

NTPC, India's largest power company, was set up in 1975. Present installed capacity is 45048 MW and additional 23504 MW (capacity is under construction. To realise the vision of becoming a world class power major, NTPC has plans to become 128000 MW company by 2032. Projects under implementation is given in Table 1.5. Capacity addition path is given in Fig-1.1.

**TABLE 1.5**  
**PROJECTS UNDER IMPLEMENTATION (Coal Based Thermal)**

UNDER CONSTRUCTION	
COAL	
STAND ALONE	
BARH-I	1980
BONGAIGAON	500
VINDHYACHAL-V	500
KUDGI-I	2400
MAUDA-II	1320
SOLAPUR	1320
LARA-I	1600
GADARWARA	1600
UNCHAHAH-IV	500
DARLIPALI	1600
NORTH KARANPURA	1980
TANDA-II	1320
KHARGONE	1320
TOTAL	17940
SUBSIDIARY/JVs	
NABINAGAR (BRBCL)	1000

#### Chapter - I Introduction

**SANJIV KUMAR SINGH**  
Recognised Qualified Person  
No. 34C-1/(15)/2009-CPAM  
Ministry of Coal, Govt. of India

RQP No. 34011/(15)/2009-CPAM dated 27.09.10.

प्रा. पी. सी. लिमिटेड/ P. NTPC  
एन टी पी सी लिमिटेड/ NTPC  
एन टी पी सी लिमिटेड/ NTPC  
एन टी पी सी लिमिटेड/ NTPC

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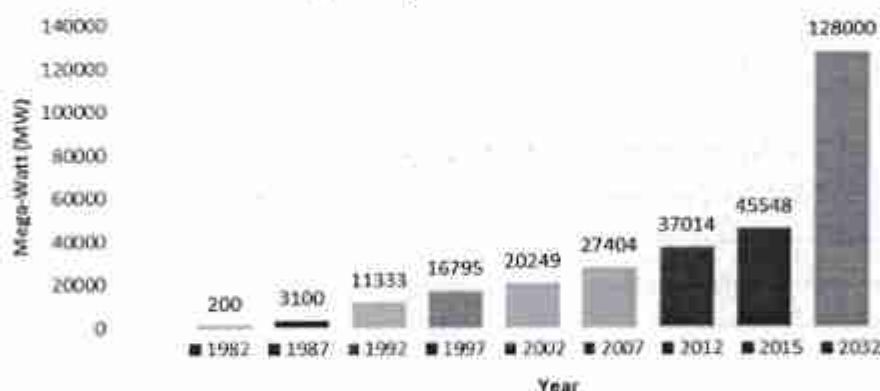
पवन देव जामटा/PAWAN DEV  
उप महाप्रबंधक (आ. वि.)  
Dep. General Manager (C. & A.)  
एन टी पी सी लिमिटेड/ NTPC  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)



Revised Mining Plan (1st Revision) – Pakri Barwadih Coal Block

KANTI-II (KBUNL)	195
MEJA (MUNPL)	1320
NABINAGAR (NPGCPL)	1980
TOTAL	4495
TOTAL COAL	22435
HYDRO	
TAPOVAN VISHNUGAD	520
LATA TAPOVAN	171
RAMMAM	120
TOTAL HYDRO	811
RENEWABLE	
SINGRAULI HYDRO	8
AP SOLAR PV	250
TOTAL RE	258
GROUP TOTAL	23504

### Capacity Addition Path



*leg*  
 Joint Secretary, NADPAL  
 Under Secretary  
 Ministry of Coal  
 Government of India  
 New Delhi-110021

Fig 1.1.

*Sanjiv*  
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#### 1.4 Coal Mining in Pakri Barwadih Block

Due to increase in plant load factor and future expansion program of NTPC, the gap between demand and supply of coal is continuously increasing. To elaborate it further, the existing power stations had been accorded with long-

term coal linkages on the then prevalent norms of Plant Load Factor (PLF), whereas as per Government norms these power stations are now required to perform at much higher level (>90%), as a result was foreseen that the gap between demand and availability of fuel would further increase. In addition to the above NTPC has ambitious plans for capacity augmentation as explained in **Table 1.5**. Considering the above, NTPC decided to diversify in the coal mining through backward integration. In this regard, Board of Director of NTPC modified its 'Memorandum of Association & Articles of Association' to accommodate the activities of Coal Mining from the fuel security point of view.

NTPC intends to work the entire property of allocated Pakri Barwadih block by mining of coal in scientific manner optimally with due regard to conservation, safety and environmental protection to enable NTPC to partly reduce the gap of demand and supply to NTPC power plants as indicated.

Geological/Mineable Reserves of Pakri Barwadih are given in Table: 1.6.

**TABLE 1.6**  
**Geological/Mineable Reserves of Pakri Barwadin**

Sl. No.	Reserves*	PB-West & East	PB-NW	Total
1	Net Geological	1436	137.6	1573.6
2	Amenable for Open Cast	707	121.03	828.03
3	Amenable for Underground	729	0	729
4	Mineable	503.39	138.98**	642.34

\* Reserves up to 300m depth have been considered for opencast mining

\*\*33.18 Mt of coal shall be mined as Barrier & Batter Coal between PBW & PB-NW.

### 1.5 Revision of Mining Plan

### 1.5.1 Mining Plan of Pakri Barwadih

Mining plan of Pakri Barwadih coal block which covered mining of Western and Eastern Area of the block, has been approved by MoC vide letter no.13016/29/2003/CA – I dated 26.08.2006 (**Copy enclosed as Annexure-III A**). North Western part (Sector – A) was not covered as it was unexplored. Copy of letter enclosed as

#### 1.5.2 Mining Plan of Pakri Barwadih North West Quarry (Sector-A)

## Chapter - I Introduction

**SANJIV KUMAR SINGH**  
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No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India

आदेश- श्री गणेशदास L.P. NAGPADA  
 उपायुक्त (अतिरिक्त) Under Secretary  
 RQP No. 34011/(151)/2009-CPAM dated 27.09.10.  
 राज्यीय खनिज Survey of India  
 भारत सरकार Ministry of India  
 नई दिल्ली New Delhi-110002

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पवन देव जामटा / PAVAN D  
इस तहसीलवाला (Jail) ...  
Deputy General Manager / NTPC  
एन टी पी सी लिमिटेड / NTPC  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

As already explained at that time of preparation of Mining Plan for the Pakri Barwadih Block the present area on the north western side of the block, now referred to as "Sector- A" was not explored. In the Approved Mining Plan NTPC had committed to carry out a detailed exploration of the area and submit a separate Mining Plan within six (6) months of the preparation of the GR. As per the commitment, detailed exploration was carried out and "Geological report (GR) of Sector- A was submitted by MECL in October 2012.

As per the commitment given by NTPC a separate Mining Plan of North West part (Sector-A) of capacity 3 MTPA was prepared and submitted to MoC on 02.07.2013. Geological reserves are 137.584 Mt, out of which Opencast mineable reserves were envisaged to be 106.688 Mt and the underground reserves are 30.896 Mt. Copy of letter enclosed as **Annexure-IV**.

### 1.5.3 Mining Plan of Pakri Barwadih-East

In order to augment the coal production from Pakri Barwadih block NTPC proposed to simultaneously commence production from Eastern Part of the block. Mining Plan of East Quarry of Pakri Barwadih with production potential of 7 MTPA was prepared and submitted to MoC on 27.08.2013 for consideration of Standing Committee. Copy of letter enclosed as **Annexure-V**.


### 1.5.4 Revision of Mining Plan


Ministry of Coal vide its letter No.13016/29/2003-CA-I(Part) dated 9<sup>th</sup> October 2014 advised NTPC to submit a Revised Mining Plan (1st Revision) including Mine Closure Plan as a whole instead of in parts. Copy of letter enclosed as **Annexure-VI**. NTPC vide letter no. CC: CM: ENGG: 7010: MP: 8 dated 03.04.2015 submitted Revised Mining Plan (1st Revision) to MoC for consideration. Copy of letter enclosed as **Annexure-VII**.

### 1.5.5 Present Revision of Mining Plan

To ward off the delay in commencement of mining operation NTPC decided to start up Eastern Quarry and run for a period of two years in the interim period till appointment of Mine Developer cum Operator (MDO) for commencement of mining operations from Western Quarry. NTPC informed its intentions to MoC vide letter No. CC:PEM:7010:MP:83 dated 22.05.2015 (Copy of letter enclosed as **Annexure-VIII**). Inter-alia acceptance of proposal MoC vide letter No.1306/29/2003-CA-I (Part) dated 24.06.2015 directed NTPC to submit a

#### Chapter - I Introduction

  
SANJIV KUMAR SINGH RQP No. 34011/(15)/2009-CPAM dated 27.09.10.  
Recognised Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India

  
पवन देव जासवाल/Pawan Dev Jaiswal  
एन टी सी लिमिटेड, नोडा  
नियंत्रण विभाग  
170/2003-CA-I (Part)  
170/2003-CA-I (Part)



### 1.6.1 Compliance

### 1.6.2 Salient Features of Present Mining Plan

- i. Present Mining Plan deals with exploitation of opencastable mineable reserves upto 300m depth only. Underground mining is envisaged from 10<sup>th</sup> years of Mining operations. A separate mining plan shall be submitted to MoC for consideration for the reserves amenable for underground mining, subsequent to completion of drilling/detailed exploration in the area proposed for underground mining.
- ii. Three distinct quarries have been carved out of Pakri Barwadih coal block namely
  - a. Pakri Barwadih West
  - b. Pakri Barwadih East
  - c. Pakri Barwadih North-West (Sector-A)

PB East and PB West shall commence simultaneously. PB North West quarry (Sector-A) shall commence on 4<sup>th</sup> year. Workings of PB East shall be stopped after two years of operations. PB West quarry and PB North West Quarry shall continue to work for their designated life. PB East shall be restarted after exhaustion of reserves of PB West. Sequence of operations in different quarries is given in Fig-2.

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**Fig-2**

### Sequence of Operation for Pakri Barwadih Coal Mining Block (18 MTPA)

[illegible]**Note:**

1. PE West shall continue mining operations till the end of 27 years.
2. PE east shall stop after two years of mining operations and shall restart on 25th years.
3. There will be overlapping period of 3 years i.e. from 25th to 27 th years
4. PB (NW) shall continue upto 41 years of mining operations
5. Total peak production from the block is 18 mtpa.

*Sampat*  
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Chapter - 1 Introduction

Prof. Dr. J. P. NAGPAL  
Under Secretary  
Ministry of Coal  
Government of India  
New Delhi-110001

RQP No. 34011/(15)/2009-CPAM dated 27.09.10.

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Chapter - I  
पावन देव जगटा/PAWAN DEV JAGTA  
उप महाप्रबन्ध (मार्गदर्शक)  
Dop. General Manager (Consultancy)  
एन टी पी सी लिमिटेड /NTPC LIMITED  
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RQP No. 34011/(15)/2009-CPAM dated 27.09.10.



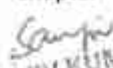
- vii. Separate set of HEMM is proposed for all three quarries. On cessation of PB West Quarry all the HEMM shall be deployed in PB East quarry except for the period of initial two years for which separate set of HEMM are proposed. Shovel dumpers are proposed for excavation, loading and in pit transportation. Primary and secondary crushers are proposed for crushing of coal to desired size. Cross country conveyor are proposed to transport the coal from mine end to Benadag siding. Coal shall be loaded in the railway wagon by Rapid Loading system from where coal shall be transported to designated power plants.
- viii. Coal washability study has not yet been carried out for Pakri Barwadih Coal. Coal quality parameters obtained from the proximate analysis of coal revealed that ash percentage in all probability is likely to remain 34% or below which does not call for commissioning of coal washery. However to cater for more stringent future quality stipulations, space allocation is earmarked for commissioning of Coal Washery at mine end to facilitate transport of washed coal to the power plants as per qualitative requirements.
- ix. Detailed exploration of the area earmarked for extraction by underground mining below proposed Dump-C shall be carried out, much in advance so as not to jeopardise the reserves.
- x. Provision has been kept for Effluent Treatment Plant, Sewerage Treatment Plant, wet drilling, dust suppression & Fire Fighting arrangement in crushers and CHP arrangement etc. in line with stipulation of Environmental Clearances.
- xi. Environment Clearance (EC) and Forest Clearance (FC) have been accorded for PB West & PB East Quarry and Coal Conveyor Corridor. In the present Mining Plan NW Quarry along with its dedicated conveyor corridor is integrated for which EC and FC is not available. It is expected the above clearances may be obtained in 3-4 years' time frame, accordingly commencement of PB NW Quarry is deferred by three years.

## 1.7 PROSPECTING AGENCIES

Following agencies have carried out exploration for Pakri Barwadih Coal Block:

- Geological Survey of India, Kolkata
- Central Mine Planning & Design Institute Ltd, Gondwana Place, Kanke Road, Ranchi-834008

### Chapter - I Introduction

  
**SANJIV KUMAR SINGH**  
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RQP No. 34011/(15)/2009-CPAM dated 27.09.10.

  
Page 1-11  
**पवन देव जासवाल/PWAN DEV JAISWAL**  
उप महाप्रबन्धक (जी.एम.डी.)  
Deputy General Manager (G.M.D.)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

- Mineral Exploration Corporation Limited, Dr.Babasaheb Ambedkar Bhavan, Seminary Hills, Nagpur

#### 1.8 PERIOD OF WHICH MINING LEASE ACQUIRED

Being Public Sector Organization NTPC is acquiring land under CBA (A&D) Act, 1957 within the Coal block area and for area outside the block boundary the area is acquired under "The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013", LARR-2013/LA Act 1894, hence obtaining lease from the State Government is Not Applicable.

#### 1.9 COAL SUPPLY FROM PAKRIBARWADIH COAL MINING PROJECT

Pakri Barwadih Coal Mine is having basket linkage and will make up for the shortfall in supply for coal in the existing and/or upcoming power projects of NTPC. Coal supply from PB block is not envisaged to replace any existing linkages. Calculation for Coal requirement for the company and % of coal likely to be met from this project is given in Table-1.7.

Table-1.7,  
Coal Requirement and Meeting Coal Requirement

Sl. No.	Parameter	Unit	Value
1	Thermal Power (Coal-Commercial) Capacity as on 31-Mar'15	MW	34425.00
2	Heat Rate	kCal/kWh	2386.00
3	Average GCV of blended coal (Domestic + Imported)	kcal/kg	3367.80
4	Sp. Coal Consp. blended coal (Domestic+Imported)	kg/kWh	0.71
5	PLF	%	0.80
6	Coal Consp. (Domestic+Imported)	Million Tonnes	171.41
7	Coal Requirement (Domestic Coal) for 92% PLF	Million Tonnes	207.81
8	Coal availability from Pakri barwadih	MTPA	18.00
9	Other Blocks of NTPC	MTPA	0.00
10	Percentage of end use requirement to be met from Pakri Barwadih mine	%	9%



**1.10 DESPATCH OF COAL**

ROM coal shall be crushed in two stages to final product size of (-50) mm. From the mine end (-50) mm shall be transported through cross country conveyor system up to the loading silos. Independent coal evacuation system by cross country coal conveyor system is envisaged for PB West quarry and PB North West Quarry. Coal produced from PB East shall be transported from the cross country conveyor envisaged for PB West quarry. NTPC shall construct Railway Siding at Banadag where the loading silos are located. From the silo, coal shall be transported through the Indian Railways network to the identified endues power stations of NTPC. Road transport is being envisaged till the completion of the proposed Cross Country Conveyor.

**1.11 NAME OF APPLICANT WITH COMPLETE ADDRESS**

**TABLE 1.8**  
**NAME OF APPLICANT WITH COMPLETE ADDRESS**

LOCAL OFFICE	REGISTERED OFFICE
NTPC Limited Sh R.S.Rathee, ED (PB/CB/KD) Pakri Barwadih Coal Mining Project Ujjwal Complex, Pugmil Road, Hazaribagh, Jharkhand – 825301 Ph:06546 - 270622, 9470575777 Fax:06546 – 270744 Email: <a href="mailto:rsrathee@ntpc.co.in">rsrathee@ntpc.co.in</a>	NTPC Limited Sh Sharad Anand, Regional Executive Director, Coal Mining, 6 <sup>th</sup> Floor, Core 6, NTPC Ltd, Scope Complex , Institutional Area, Lodhi Road , NewDelhi-110003 Ph:011-24362871 Fax : 011-24367089 Email : <a href="mailto:sharadanand@ntpc.co.in">sharadanand@ntpc.co.in</a>

**1.12 BOARD OF DIRECTORS OF COMPANY**

**TABLE 1.9**  
**BOARD OF DIRECTORS OF COMPANY**

SL. NO.	NAME	DESIGNATION
1.	Mr. A.K.Jha	CMD cum Director (Technical)
2.	Mr. U.P.Pani	Director (HR)
3.	Mr. S C Pandey	Director ( Projects )
4.	Mr. Kualmani Biswal	Director (Finance)
5.	Mr. K.K.Sharma	Director (Operations)
6.	Dr. Pradeep Kumar	Govt. Nominee

Chapter - I, Introduction

RQP No. 34011/(15)/2009-CPAM dated 27.09.10.

**SANJIV KUMAR SINGH**  
Recognised Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India

Page 1 of 13  
पवन देव जामटी/PAVN DEV JAMTA  
उप महाप्रबन्धक (सांख्यिक)  
General Manager (C&A)  
एन टी सी लिमिटेड / NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

*Revised Mining Plan (1st Revision) – Pakri Barwadih Coal Block*

SL. NO.	NAME	DESIGNATION
7.	Mr.Prashant Mehta	Independent Director
8.	Mr. Rajesh Jain	Independent Director
9.	Dr. Gauri Trivedi	Independent Director

### 1.13 RECOGNISED QUALIFIED PERSON

MoC has accorded grant of recognition to Sh. Sanjiv Kumar Singh of NTPC as competent person to prepare Mining Plan for Coal Block/Lignite of NTPC only. Particulars of RQP are given in **Table-1.10**. Copy of letter enclosed as **Annexure-X**.

**TABLE 1.10**  
**RECOGNISED QUALIFIED PERSON**

<b>Name</b>	<b>Mr. Sanjiv Kumar Singh</b>
<b>Address (i) Office</b>	: 4 <sup>th</sup> Floor, Core 5, NTPC Bhawan, SCOPE Complex, 7 Institutional Area, Lodhi Road, New Delhi- 110 003
<b>Fax</b>	: 011-24377089
<b>E-mail</b>	: sanjivkumarsingh01@ntpc.co.in
<b>Registration Number</b>	: 34011/(15)/2009-CPAM
<b>Date of grant / renewal</b>	: 27.09.2010
<b>Phone</b>	: 011-24387669, 9650991396

संकेत को सहायक डी. नाटपल  
अवर सचिव/Under Secretary  
जोधा विभाग, विभाग, कोयला  
एन टी पी लिमिटेड

*Sanjiv*  
**SANJIV KUMAR SINGH**  
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**Chapter - I Introduction**

**RQP No. 34011/(15)/2009-CPAM dated 27.09.10.**

Page 1 - 14  
पवन देव जगन्नाथ (कोयला)  
उप महाप्रबन्धक (कोयला)  
Dep. General Manager (Coal)  
एन टी पी लिमिटेड / NTPC LIMITED  
EOG, A-8A, Sector-24, Noida-201305 (U.P.)

# CHAPTER II

## DETAILS OF EARLIER APPROVED MINING PLAN

  
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**SANJIV KUMAR SINGH**  
Recognized Coalfield Person  
No. 34C / (15/2009-CPAM  
Ministry of Coal, Govt. of India

  
**PAWAN DEV**  
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EDG, A-5A, Sector-24, Noida-201301 (U.P.)

  
पवन देव जामटा/PAWAN DEW  
उप महाप्रबन्धक (वार्ड-24)  
Deputy General Manager (Ward-24)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)



## CHAPTER II

### EARLIER APPROVED MINING PLAN

#### 2.1. EARLIER APPROVED MINING PLAN

Mining Plan for the Pakri Barwadih Coal Project was approved by Ministry of Coal vide letter number 13016/29/2003-CA-I dated 25<sup>th</sup> August, 2006. A copy of the Approved Mining Plan along with Approval Letter is enclosed as Annexure-III and Annexure-III A.

Salient features of Approved Mining Plan is given in Table 2.1.

Table-2.1  
Salient features of the Approved Mining Plan

Sl. No.	Heads	Particulars		
	Name of Project	Pakri Barwadih Coal Block		
	Location	North Karanpura Coalfield, District: Hazaribagh , Jharkhand.		
	Company	NTPC Ltd		
	Block Allotment Reference No.	Block allotted vide ref no 13016/29/2003-CA, New Delhi dated 11th October 2004 and DO no 13016/29/2003-CA dated 24.8.2005		
	Block Area	4626 Ha		
	Nearest Township	Hazaribagh		
	Nearest Railway Station	Ranchi Road and Chitarpur		
	Nearest Airport	Ranchi		
	No. of Workable Seam	12 workable splits in 5 seams		
	Seam Gradient	10 <sup>0</sup> – 20 <sup>0</sup>		
	No. of faults	19		
	Total Geological Reserves within the block	1436 Mt		
	Proved	702.70 Mt		
	Indicated	733.20 Mt		
		Mineable Reserves (Mt)	Vol. Of OB (M cum)	Av. S. R. (cum/t)

#### Chapter II - Details of Earlier Approved Mining Plan

*Sanjiv*  
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Recognised Qualified Person  
No. 34C (15)/2009-CPAM  
Ministry of Coal, Govt. of India

RQP No. 34011/(15)/2009-CPAM dated 27.09.10

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पवन देव जामटा/PAWAN DEV JAMTA  
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EOC, A-8A, Sector-24, Noida-201301 (U.P.)

*Revised Mining Plan ( 1<sup>st</sup> Revision) – Pakri Barwadih Coal Block*

Reserves & Overburden	503.39	2098.78	4.16
Target Output (Mtpa)	15		
Quality of coal	Grade D – E ( Avg. E)		
Specific gravity of coal (Avg.)	1.68 t/cum		
Method of Mining	Opencast (Shovel-Dumper combination)		
Main Customer	All power plants of NTPC Ltd		
Life of the Mine including Construction Period	39 Years		

Main Equipment	Equipment	Size	No
	Overburden		
	Electric Rope Shovel	20 Cum	7
	Electric Rope Shovel	10 Cum	5
	Electric hydraulic shovel	8.3 Cum	14
	Rear Dumper	170-190T	78
	Rear Dumper	120-150T	152
	RBH Drill	250 mm	24
	RBH Drill	160 mm	10
	Track Dozer	310 kW	30
	Coal		
	Electric hydraulic	4.5 Cum	9
	Rear Dumper	50 T	77
	RBH Drill	160 mm	15
	Track Dozer	310 kW	15
	Wagon drill	100 mm	3
	<b>Mine Parameters</b>	<b>West Quarry</b>	<b>East Quarry</b>
	Maximum Depth (m)	300	300
	Maximum strike length (Km)	5.5	3.8
	Maximum width (Km)	1.66	1.71

**2.2. Compliance of Conditions imposed if any with approval of the mining plan**

**Chapter II - Details of Earlier Approved Mining Plan**

*Sanjiv Kumar Singh*  
**SANJIV KUMAR SINGH**  
 Recognised Qualified Person  
 No. 34C/(15)/2009-CPAM  
 Ministry of Coal, Govt. of India

**RQP No. 34011/(15)/2009-CPAM dated 27.09.10**

**पवन देव जामटा / PAWAN DEV JAMTA**  
 उप महाप्रबन्धक (वाणिज्यिक)  
 Deputy General Manager (Commercial)  
 एन टी पी सी लिमिटेड / NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201305 (U.P.)

Sl. No	Compliance of Condition(s) imposed	Action
1(i)	The Mining Company shall achieve the 15 Mtpa production level from the opencast by 12 <sup>th</sup> year.	The built up of production level for PB West has been kept the same as mentioned in the approved Mining Plan. PB East is planned to commence with PB West. Operations of PB East shall cease after 2 years and will restart again from 25 <sup>th</sup> year of Mining operation. NTPC shall achieve 15 Mtpa production level from the opencast by 12 <sup>th</sup> year.
1(ii)	As regards of coal block that has also been allotted to ONGC for Coal Bed Methane extractions, the conditions laid down in the allotment letter shall be fully complied.	Will be complied during operation stages.
1(iii)	The approval of the Mining Plan is without prejudice to the requirement of approvals from competent/prescribed authority under the relevant rules/regulations etc.	All necessary approval under relevant rules/regulations shall be obtained without prejudice to the requirement of approvals from competent/prescribed authority.
2	Two copies of the Approved Mining Plan duly signed by the competent authority are returned herewith with the request that a copy of the Approved Mining Plan may be submitted to the concerned state government for necessary action and also a photocopy of the Approved Mining Plan may be sent to the Coal Controller for monitoring of the block.	Complied

### 2.3. Status of Mining Plan submitted to MoC

Detailed in Clause No. 1.5 of Chapter-I

### 2.4. Revision of Mining Plan

#### Chapter II - Details of Earlier Approved Mining Plan

RQP No. 34011/(15)/2009-CPAM dated 27.09.10

*Sanjiv*  
SANJIV KUMAR SINGH  
Recognised Qualified Person  
No. 345 (15)/2009-CPAM  
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*Pawan*  
Page II - 3  
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## 2.5. Present Mining Plan

## 2.6. Reasons for revision of Mining Plan

**2.6.2** OB removal and Coal production has been planned from a patch of PB East Quarry (Eastern Pit 1) for two years as Interim Arrangement. The Plans showing the proposed stage of working by the end of First Year and Second Year are given in respective Stage Plan. Proposed area for mining has been mainly selected due to the availability of land for mining as well as ease of approach from the State Highway.

**2.6.4** PB NW Quarry which was unexplored at the time of approval of mining plan is now integrated with the present Revised Mining Plan (1<sup>st</sup> Revision). Resultant coal evacuation facilities from road and coal handling plant and additional volumes of OB/coal mining shall change the calendar programme and Land Use Pattern.

## 2.7. Changes in Revised Mining Plan with respect to Approved Mining Plan.

The proposed quarry area is part of PB East Quarry as per approved Mining Plan and is located in its North-Eastern part and is named Eastern Pit-1 (EP-1). The proposed quarry namely EP-1 is at a distance of approximately 850 m in North-West direction from the Tandwa-Barkagaon-Hazaribagh State Highway and is accessible by road connecting to Arhara village from the State Highway. However in variance with the approved Mining Plan, Eastern Quarry



is now planned to be started in 1<sup>st</sup> year of Mining Operations instead of 25<sup>th</sup> year. In the approved Mining Plan PB East Quarry was to start in 25<sup>th</sup> year of Mining operation.

### 2.7.2 External Dump Area

The land for external dumps as per approved Mining Plan Dump A, B, C is presently not available. Accordingly, to start mining operations, External Dump has been envisaged in the available land in the north side of this quarry area. This area lies partly in the area earlier identified for coal evacuation facilities. The area has been shown in Surface Master Plan). Forest diversion of this external dump area has been obtained and change of land use of this area has been taken up with MoEF.

### 2.7.3 Variation in Coal Transportation Arrangement

As per earlier approved Mining Plan coal is planned to be transported through belt conveyor to Banadag Railway siding which are under construction. It is proposed that coal shall be transported to Banadag Siding by Road till the construction of cross country conveyor.

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# CHAPTER III

## LOCATION, TOPOGRAPHY AND COMMUNICATION

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### CHAPTER III

#### LOCATION, TOPOGRAPHY, DRAINAGE & COMMUNICATION

##### 3.1. General

It is to mention that two separate Geological reports are prepared for Pakri Barwadih Block. The former is Geological Report for Pakri Barwadih and the later is Geological Report for Pakri Barwadih A. In the present Mining Plan i.e. Revised Mining Plan of Pakri Barwadih (Rev-1), reference to Pakri Barwadih Mine/Block/Project includes Pakri Barwadih-A (PB-NW), Pakri Barwadih West and Pakri Barwadih East.

##### 3.2. Location of Block

Pakri-Barwadih coal block is located in Hazaribagh district of Jharkhand State. The block is located in the north-eastern part of North-Karanpura Coalfield, bounded by:

- a. Longitudes 85°09'19"E to 85°15'00"E
- b. Latitude 23°51'30"N to 23°55'40" N

It is covered by the Survey of India Toposheet no. 73E/1 (R.F 1: 50000) and special sheets no. 21, 23 & 24 on R.F. 1:10000.

The entire block falls in the Hazaribagh district of Jharkhand State. The Hazaribagh – Khelari metal Road passes through the eastern part of the block touching Barkagaon and Tandwa Villages. The nearest township is Hazaribagh, located at a distance of about 24 kms from Barkagaon which is in the southern part of the block. Location is given at Fig-3.1.

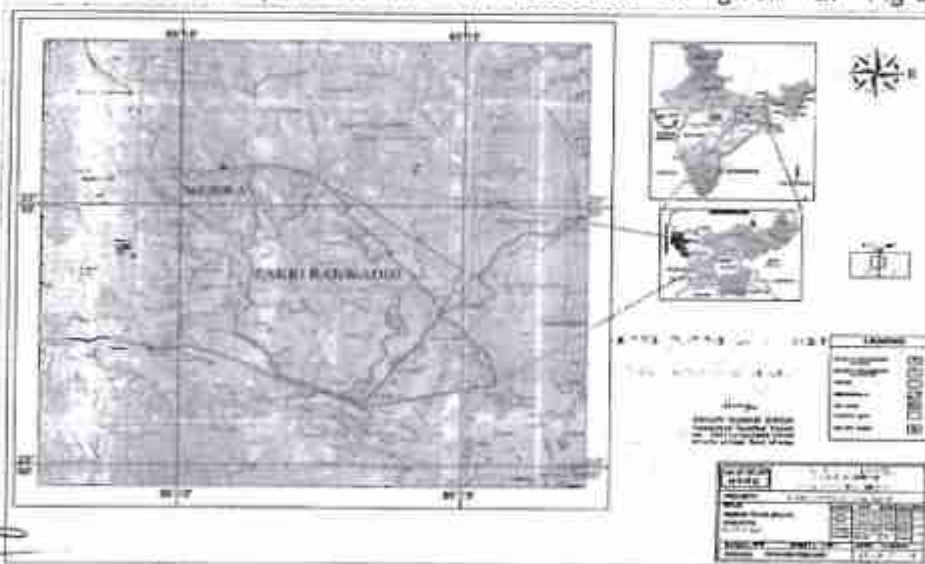


Fig-3.1.

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Under Secretary  
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Chapter-III Location, Topography, Drainage & Communication

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Page 11  
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### 3.3. Communication

The block is well connected to nearest town city and state capital through all-weather road. Brief description on the accessibility of the block is given below:

- i **Rail Link:** The nearest rail stations are Ranchi Road and Chitarpur on the Gomoh Barkakana – Dehri-on-Sone loop lines of SE Railway both around 70- 75 km from the block.
- ii **Road Link:** The Block is well connected to the district headquarter Hazaribagh via Barkagaon at a distance of 40 km by all-weather road. The block is located at a distance of 10 km from Barkagaon Township. The Hazaribagh - Khelari State Highway passes 5 Km south of the block via Barkagaon and Tandwa village. The area is also connected to Patratu Township by all-weather road via Urimari.
  - a A PWD Road exists between Hazaribagh & Barkagaon, Tandwa – Khelari. Our approach will be take-off from this road and will go from eastern to western part of the property. The total approach will be about 10 km from take-off point to mine entry point.
  - b This PWD road passes through the east quarry of the quarriable block, which shall be shifted to other route only after exhaustion of West Quarry but before mining operation of East quarry, is started.

iii **Air Link:** Nearest Airport is at Ranchi which is about 130 km from the block.

### 3.4. North Karnapura Coalfields

Pakri Barwadih Coal Block falls in the North Karnapura Coalfield under CCL command area of CIL. The North Karnapura Coalfield (1230 km<sup>2</sup>) as the name implies forms the northern part of the main Karnapura basin. It is separated from the South Karnapura CF by a east west elongated metamorphic patch. However, they are interconnected near Bachra and Hindegir village by a narrow strip of Talcher formation. It is bounded by Latitude 23039' and 23060' (N) and 840 46' and 850 24' (E) longitude spreads over to Hazaribagh, Ranchi, Chatra and Palamau districts with Pakri-Barwadih block located in ,as mentioned above , Hazaribagh district.

The North-Karnapura coalfield lies close to Hazaribagh town, the head quarter of the district bearing the same name. Barkagaon, an important locality in the north-eastern part of the coalfield is also located on the southern fringe of the Pakri-Barwadih Block under review. This locality is connected from Hazaribagh by an all-weather 24 Km metalled road which has been extended along the northern & western part of the coalfield touching Kerendari and Tandwa. This can serve as a useful road link from Pakri-Barwadih to Tandwa where proposed STPS of NTPC is located. This metalled road passes through the East sector of Pakri-Barwadih and divides the sector into two parts. The



Ranchi- Chandwa – Chatra – Barhi highway passess close to the western margin of the Coalfield. Several places in the western and southern parts of the field are connected with Ranchi- Lohardaga and Ranchi – Daltanganj State Highway. The eastern Railway Branch Line from Dhanbad to Gomoh and Dehri-on-Sone runs along the southern part of the coalfield. This railway line also passes through Chandrapur, Bokaro & Patratu Thermal Power Stations. However the western, northern and eastern part of the coalfield is presently devoid of railway lines. The coalfield is likely to be connected by a new railway network under initial phases of execution from Gomoh Daltanganj railway line of SE Rly.

The location plan of the area have been shown in drg no 7010-199-POM-J-001 and area covering buffer zone of 10 km radius all around the allocated block is presented at key plan in drg no. 7010-199-POM-J-002

### 3.5. Block area

Total area of the Parkri Barwadih Coal Block is 46.95 Sq. Km. Subsequently to the allocation of the block NTPC has applied for acquisition of land u/s 4(i) of CBA Act (1957) for mining of above mentioned coal bearing area together with an additional area of 2.99 sq km on the north- eastern side of allocated block for accommodating infrastructure facilities. Breakup of Mine Area is given in Table 3.1.

**Table 3.1**  
**Breakup of Mine Area**

Sl. No.	Particulars of Area	Area in (Sq. Km.)
1.	Explored (PB E & PB W)	39.43
2.	Explored (PB N W)	4.85
3.	Coal bearing area (1+2)	44.28
4.	Additional Acquisition for OB Dump	2.66
	<b>Total (3+4)</b>	<b>46.95</b>

### 3.6. Climate & Rainfall

#### 3.6.1 Temperature:

The area experiences a subtropical climate with very hot and dry in summer and well-distributed rainfall in the southwest monsoon season. Annual mean rainfall recorded at IMD's Observatory, Hazaribagh is 1277.90 mm and maximum temperature is 43 °C in summer and minimum temperature is 3 °C in winter season. It has three distinguishable seasons:

- The summer season starts from mid - March to mid – June. The temperatures varies from 16.5°C to 41.1°C

- ii) The rainy season starts from the mid June to September with an average annual mean rainfall of 1277.90 mm with the total number of rainy days being 67.
- iii) Winter season commences from the November to February. The temperature varies from 4°C to 31°C.

### 3.6.2 Relative Humidity:

Since the climate is dry & hot, the relative humidity is generally moderate. The annual mean daily humidity is 61%.

### 3.6.3 Rainfall:

Pakri-Barwadih block being a virgin block has no rain gauging station. The nearest station is at Barkagaon Block office where daily rainfall is recorded. The records available in the block office from year 1979 to 2004 shows that the maximum annual rainfall of 2037.50 mm was recorded in the year 1994 and minimum was 656.20 mm in the year 2002. The average annual rainfall is about 1182 mm. The rainfall does not show any cyclic occurrences and shows wide and erratic variations. The average annual rainfall recorded at Barkagaon office for the year 1979 to 2004 ranged between 656.2 to 2037.50mm (Mean is 1181.5mm). The monsoon season is spread over the months from June to September. Rainfall records at IMD Hazaribagh is given at Table 3.2.

Table 3.2  
Rainfall records at IMD Hazaribagh.

Month	Monthly total (mm)	No. of rainy days	Maximum Rainfall in 24 hrs.(in mm) with date	
January	2.5	1.7	68.1	6-1945
February	16.2	1.4	63.5	23-1927
March	18.4	1.7	44.2	20-1946
April	17.0	1.4	60.5	22-1925
May	43.4	2.9	84.1	27-1887
June	177.1	9.2	249.2	24-1911
July	310.0	16.2	221.7	6-1953

Chapter- III Location, Topography, Drainage & Communication

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**Revised Mining Plan (1st Revision) – Pakri Barwadih Coal Block**

August	320.1	16.2	180.1	17-1988
September	260.9	11.6	167.4	28-1963
October	80.6	4.1	149.4	24-1963
November	5.5	0.4	95.0	8-1924
December	5.2	0.4	39.4	13-1885
No of years data	29			

### 3.6.4 Vegetation:

At one time, the area, especially the hills and plateaus were covered with dense forest comprising mainly Sal, Mahua etc. With progressive increase of population and felling of trees, the forest areas have now reduced to isolated patches mostly occupying the upper parts of the hill. Other trees that grow in the area are Palash, Khair, Bair, Amla, Simul, Sisiu, Karanj etc.

About 50% of area of the north west part of the block is covered by forest. The plantation of orchards of mango, mahua, kaju and other common trees are found scattered in the block. However, forest comprising mainly of Sal, Assan and Kusum trees occupies the southern, north-eastern to eastern part of the block. The important wild lives found are bear fox, Jackal, Hyena, Monkey and rabbits.


### 3.7. Topography

Topographically the area is rather hilly and undulating in northern and north-west part of the block. The central and eastern part of the block is characterized by more or less flat terrain with gentle undulations. The ground in general slopes towards south. In western part the maximum elevation of 501 m is noticed in northern part near borehole CNPB- 109 and minimum elevation of 402 m in southern part near borehole CMKPB -32. In the central part the maximum elevation of 459 m is noticed in the northern part near borehole CMKP -30 and the minimum elevation of 396 m near borehole CMKP-30 in south-eastern part. In eastern part the maximum elevation of 480 m is noticed in north-eastern part near borehole CNPB -55 and minimum elevation of 405 m near borehole CMKPB -12 in southern part.

The north western part of the block exhibits undulating topography with general slope towards south. Due to presence of numerous ravines in the eastern half of the block, the topography is highly rugged, rendering the area unapproachable. In general the elevation of ground varies from 430m to 460m above mean sea level.

Chapter III Location, Topography, Drainage & Communication

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 मन्त्रालय, कोयला, भारत सरकार  
 Dep. Secy, General Manager (I)  
 एन टी सी (I) (15)/2009-CPAM  
 EOC, A-BA, Sector-24, Noida-201301 (U.P.)

### 3.8. Drainage

The drainage of the block is controlled by Sunrah river, which finally joins to Badmahi river, which is one of the major tributary of Damodar river flowing in south central part of coalfield. Three major nallahs flowing north to south are Khora, Dumuhani and Hardara (Pakawa). Besides these nallahs of the block, there are many small streams & stream lets, which discharge their load into these major nallahs. All the nallahs of the block are seasonal and become dry during summer.

The shape of north western part of the block is triangular. On two sides, block boundary is defined by tributaries of Khora Nala, which discharges its load Lathorwa Nala. The drainage of the block is controlled by Khora Nala, which flows into Lathorwa/Khora Nala which in-turn joins to Haharo Nadi, which is one of the major tributary of Damodar River flowing in south central part of coalfield. Besides, Khora nala of the block, there are many small Streams & streamlet, which discharge their load into this major nala. All the nalas of the block are seasonal and become dry during summers. (Plate No.5).

None of the nalas/tributaries were planned for diversion except straightening of Khora Nala – B at NW part of the block. During mining, adequate clearance from high bank of nala are left on the active pit side, to prevent seepage/flooding of water to mine. Embankments are also planned to prevent inrush of water during rainy season or otherwise.

### 3.9. Population

The entire coal-field is low to moderately populated except Barkagaon, Kerendari & Tandwa, which are the most populated villages in the northern & Western part of the coal-field.

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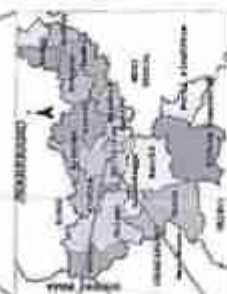
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Chapter- III Location, Topography, Drainage & Communication

RQP No. 34011/ (15)/2009-CPAM dated 27.09.10.

Page III - 6  
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**Support At Home**—Up close



CERTIFIED THAT THE PLAN IS CORRECT

RANJIV KUMAR SINGH (R.Q.P.)

*Sampat*

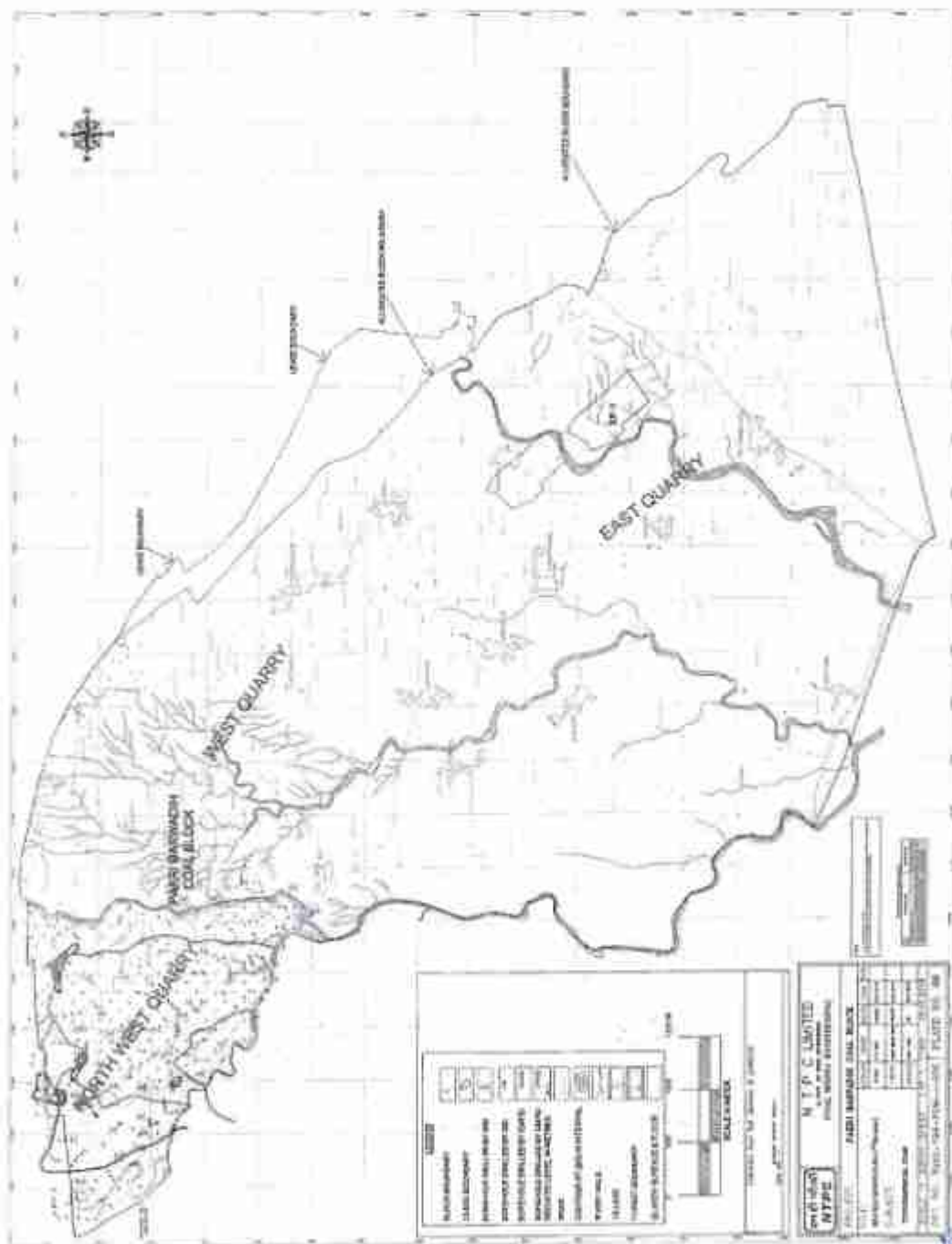
### LEGEND

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 <b>NTPC LIMITED</b> A Public Limited Company (HSE BOARD ENGINEERING)	
<b>PROJECT:</b> PAPER BACKHAUL CABLE BLOCK	
<b>TITLE:</b>	SCHEMATIC NAME: [Blank] SCALE: [Blank]
<b>SUBJECT:</b>	PROJECT NO.: [Blank] DRAWING NO.: [Blank]
<b>LOCATION:</b>	PROJECT NAME: [Blank] PROJECT ADDRESS: [Blank]
<b>SCALE:</b>	SHEET NO.: [Blank] OF [Blank]
<b>DWG NO:</b>	DRAWING NO.: [Blank]



Dr. Jyoti Pawan Desai  
General Manager  
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For the purpose of the map, the area is divided into blocks and the boundaries are shown. The map is prepared by the Survey of India, New Delhi.

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पर प्रशास्त्र (नॉन-एग्ज) **NTPC**  
Deputy General Manager (Non-Exg)  
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by \_\_\_\_\_

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उप महासचिव (एन सी सी) /  
Deputy General Secretary (N.S.S.)  
एन सी सी सो लिमिटेड / N.S.S. Ltd.  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)



## CHAPTER-IV

### GEOLOGY

#### 4.1 General

4.1.1 Pakri Barwadih (PB) coal block is located in the north eastern part of North Karanpura Coal Field bounded by Longitudes  $85^{\circ} 09'19''$  to  $85^{\circ} 15' 00''$  E and Latitude  $23^{\circ} 51' 30''$  to  $23^{\circ} 55' 40''$  N and covered by the Survey of India Topo sheet No73 E/1 (RF 1:50000) and special Sheets No 21,23 & 24 (RF 1:10000). The Block is located in the state of Jharkhand and is around 120-130 km from the state Capital Ranchi.

4.1.2 As per the Guidelines issued by MoC for preparation of Mining Plan for the coal blocks issued vide Letter No. 34011/(48)/2009-CPAM dated 15.07.2015, MoC directed to enclose additional item:

**"Certificate from CMPDI that the Geological Coordinates (Longitude and Latitude) used in preparation of Mining Plan in accordance with the Vesting Order and Geological Coordinates covered by the Mining Plan do not encroach into any other/adjacent coal block"**

Pakri Barwadih coal mining block was allocated to NTPC through Government Dispensation route in the year 2004. The block was retained with NTPC since Honourable Supreme Court had not de-allocated the same. Hence certificate from CMPDI is not applicable in this context. However boundary certified by CMPDI for notification under CBA Act is attached as **Annexure-XIX**.

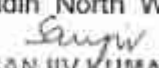
#### 4.2 Geological Report

Two Geological Report were prepared for this Block. NTPC has procured Geological Report (GR) of the block from CMPDI vide letter No DG/693(A)/095-96 dated 04/05/2005 (Copy of letter enclosed as **Annexure-XI**). It pertains to the exploration of Western and Eastern part of the block. In compliance to the commitment to MoC, Geological Report of PB North West (Sector-A) was prepared by NTPC through MECL, which pertains to the exploration of North Western part of the block. The brief is as following:

A Memorandum of Understanding (MoU) was signed between Mineral Exploration Corporation Limited (MECL) and NTPC Ltd, on 12.06.2006 for conducting detailed exploration for coal in Pakri Barwadih North West

Chapter- IV Geology

RQP No. 34011/ (15)/2009-CPAM dated 27.09.10.

  
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(Sector-A) Coal Block. The exploration work was awarded to MECL as per Letter of Award (LOA) No.CS-7010-708-9CY-LOA dated 14.07.2006.

MECL has carried out a detailed exploration for coal and allied geological activities including sampling and chemical analysis etc. in the said block based on the relevant standards.

Exploratory work carried out by MECL intermittently rather than continuous due to local problems. Villagers nearby hindered the work which contributed delay in completion of exploration work. Geological report was submitted to NTPC on 30.10.2012. (Copy of letter enclosed as Annexure-XIA)

The above two Geological Reports have been considered for preparation of present Mining Plan "Revised Mining Plan (1<sup>st</sup> Revision) Pakri Barwadih Coal Block".

#### 4.2.1. Connection with National Grid

Pakri Barwadih Coal Block is connected with the national grid.

#### 4.2.2. Payments of Exploration Cost vis a vis cost of Geological Report

NTPC has paid full amount for the cost of the above mentioned Exploration/Geological Report raised by GSI, CMPDIL and MECL.

MoC vide letter No. 13016/29/2003/CA-I (Part) dated 18.08.2015 confirmed that no additional amount is due with NTPC. (Copy of letters enclosed as Annexure-XII)

### 4.3 Details of exploration

#### 4.3.1 Core / Non-Core drilling

Drilling activity is carried out in two different phases for Pakri Barwadih west, east and Pakri Barwadih North West (Sector-A) block. A total of 196 boreholes have been drilled by GSI & CMPDI in Pakri Barwadih Block whereas in Pakri Barwadih North West MECL has drilled 33 boreholes and CMPDIL has drilled 3 borehole. In total 232 boreholes have been drilled in the whole block. The boreholes drilled during different phases in Pakri Barwadih Block as per break up given in Table 4.1. The seam wise borehole intersections and density is given in Table 4.2. The Location Plan of these boreholes have been shown Plate No.7.

संजिव कुमार सिंह  
उप सचिव  
असिस्टेंट सचिव

Chapter- IV/Geology

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RQP No. 34011/ (15)/2009-CPAM dated 27.09.10.



**Table 4.1**  
**Phase wise Agency wise exploration status**

Agency/ Type	Period of Drilling	Drilling	
		No. of Boreholes	Meterage
1. GSI / Regional	1961 to 1971	KB-1 to 26 (26 BHs)	8177.23
2. CMPDI			
a) Promotional (Semi-regional)	Dec. '1999 to April, 2001	*CMKPB-1 to 38 (38 BHs)	10482.00
b) Non-CIL (detail drilling)	Jan., 2003 to June 2004	CNPB- 1 to 135 (135 BHS)	24943.60
<b>Sub-Total (1 &amp; 2)</b>		<b>199</b>	<b>43602.83</b>
3. MECL for PB North West (Sector-A)	2006 to 2012	MNPB-1 to MNPB-1 (33 BHs)	4282.70
<b>Total (1, 2 &amp; 3)</b>		<b>232</b>	<b>47885.53</b>

\*CMKPB 24,25 & 38 are falling in PB (NW) quarry

#### 4.3.2 Seam wise borehole intersections and density

**Table-4.2**  
**Seam wise borehole intersections and density**

Seam/Parting	No. of Boreholes considered	Seam/Parting	No. of Boreholes considered
Seam-V Top	55	Seam-II MB	12
Seam-V Bottom	58	Seam-II Comb.	3+1
Seam-V Comb.	29	Seam-I Top	100
Seam-IV A	47	Seam-I Middle	97
Seam-IV Top	26	Seam-I TM	6
Seam-IV Bottom	26	Seam-I Bottom	72
Seam-IV Comb.	63	Seam-I MB	20
Seam-III Top	56	Seam-I Comb.	3+10

#### Chapter- IV Geology

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Seam-III Bottom	56	Local	90
Seam-III Comb.	31	Seam-K5	57+1
Seam-II Top	70	Seam-K4	58+1
Seam-II Middle	62	Seam-K3	56
Seam-II TM	46+10	Seam-K2	60
Seam-II Bottom	96+11	Seam-K1	75

#### 4.3.3 Requirement of Further Exploration with time frame

##### 4.3.3.1. Exploratory drilling for no coal zone proving

The infrastructure facilities and external waste dumping areas Dump-A, B and D) as shown in **Surface Master Plan (Plate No-5)** have been selected beyond the incrop of Seam-I Bottom. However, there is no specific mention of no-coal zone in the area. Therefore, before start of OB Dumping if required or insisted by Standing Committee the drilling for negative proving shall be carried out.

Period	No. of BH (Tentative)	Location	Estimated meterage	Target
Pre-construction (before start of OB dumping if required)	30	Infrastructure sites and external waste dump A & B	3000	Negative proving of workable coal seams
Pre-construction	10	Infrastructure sites and external waste dump D	1000	Negative proving of workable coal seams

##### 4.3.3.2. Exploratory drilling for production support

In order to delineate the in-crop of seam I & II and to support the production requirement as per stage plan, phase-wise exploration through core drilling in different sectors of the block have been proposed **Table 4.3**

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संज्ञा के समर्थन पर नाग्राल  
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**Table 4.3**  
**Production support boreholes**

Period	No. of BH	Location	Estimated meterage	Target
Pre-construction (2 years)	15	Bet. F14 & Seam IB incrop Bet. F13 & F14 Bet. F8 & F9	750	To delineate incrop of seam IB & IIB To support 1 <sup>st</sup> & 2 <sup>nd</sup> year production
1 <sup>st</sup> year	15	Bet. F12 & F13 Bet. F10 & F11 Bet. F7 & F8	500	To support 2 <sup>nd</sup> & 3 <sup>rd</sup> year production
2 <sup>nd</sup> year	15	Bet. F12 & F13 Bet. F11 & F12 Bet. F9 & F10	500	To support 3 <sup>rd</sup> & 4 <sup>th</sup> year production
3 <sup>rd</sup> year	12	Bet. F8 & F10 Bet. F7 & F8	500	To support 4 <sup>th</sup> & 5 <sup>th</sup> year production
4 <sup>th</sup> year	12	Bet. F5 & F6 Bet. F7 & F8	200	To support 5 <sup>th</sup> to 6 <sup>th</sup> year production

#### 4.3.3.3. Exploration for area beyond 300m depth line

The southern portion of the Pakri Barwadih Block covering around 12 sq. km. area has also not been explored in details and only "indicated" category reserves of the order of 733.199 Mt are provisionally assessed by CMPDI. Therefore a phase wise exploration programme has been proposed to convert the indicated reserved into proved category and to develop underground mine plan. Phasewise exploration program is given in Table 4.3 A.

**Table-4.3 A**  
**Phase wise exploration program**

Period	No. of BH	Location	Estimated meterage	Target
1 <sup>st</sup> year	25	Area beyond 300 m depth line	14000	To convert the indicated reserves into proved category and to develop underground mine plan
2 <sup>nd</sup> year	25		14000	
3 <sup>rd</sup> year	25		14500	
4 <sup>th</sup> year	25		14500	
<b>Total</b>			<b>55000-60000</b>	

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#### 4.4 Regional Geological set up of the area

The North Karanpura Coalfield forms a prominent east-west trending valley between Hazaribagh plateau in the north and Ranchi plateau in the south. The Aswa Pahar in the south-east separates the North and South Karanpura Coalfields by east west elongated metamorphic patch. However, they are interconnected near Bachra and Hindegir village by a narrow tongue of Talcher outcrops. On the eastern side, North Karanpura Coalfield is separated from the West Bokaro Coalfield by a narrow stretch of metamorphic rocks having several outliers of Talcher formation. In the west, it is separated by a stretch of about 20 Km wide metamorphic belt from Auranga Coalfield.

The generalized Stratigraphic Sequence of North Karanpura is given at Table 4.4.

Table 4.4  
Geological Succession of North Karanpura Coalfield

Period	Group	Sub-group	Formation	Lithology
Recent	-	-	Alluvium	Detrital and alluvial soil and sub soil
Jurassic	-	Equivalent to Rajmahal Trap	Igneous Intrusive	Dolerite and Mica Peridotite
Triassic	Upper Gondwana		Mahadeva	Massive coarse to conglomeratic feldspathic ferruginous sandstone with shale intercalation
Upper Permian to Lower	Lower Gondwana		Panchet	Yellowish to white coarse grained sandstone, red, chocolate colour clastic clays.

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Triassic				In the upper part, yellowish friable sandstone whereas lower part is greenish yellow
Upper Permian		Damuda	Raniganj	Fine to medium grained quartzo-feldspathic and quartzitic sandstone often micaceous and matured, interbanded shale and sandstone, carbonaceous shale and thin coal seam.
			Barren Measures	Dark Shale, sandy micaceous shale with sideritic interbanded shale and sandstones
			Barakar	Conglomerate, sandstone, shale, intercalation siltstone and shale, carbonaceous shale, fireclay, coal seams.
			Karharbari	Dark mottled sandstone occasional shale bands, fireclay, chocolate coloured clays and coal seams
Permo-Carboniferous			Talchir	Rikba plants beds, boulders, conglomerate, varvites, sandstone, tilloids and tillites.
-----Unconformity-----				
Pre-Cambrian			Metamorphics	Granite, gneiss, pegmatite, phyllites, micashist and limestone, chromite bearing rocks, amphibolites and quartzite.

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Out of 1230 sq. Km area of North Karanpura coalfield the coal bearing formations viz; Karharbari, Barakar and Raniganj crop-out over an area of about 500 sq. Km. The Karharbari formation is well developed in south-central and eastern part of the coalfield. It contains only one coal seam which occurs often in two to three sections. It comprises of very coarse grained gritty sandstone and at times has silicified sandstone, hard strata difficult to negotiate during drilling operation. The Barakar formation contains a number of coal seams and contributes the major bulk of reserves in this coalfield. Five persistent coal seams have been established in the coalfield. The total coal column is more or less around 30 to 40 meter in the major part of coalfield. Raniganj formation contains three or four impersistent coal seams which are generally shaly in nature.

#### 4.4.1 Local Geology

a. PB Block (East and West):

The Pakri-Barwadih block comprises of Talchir, Karharbari, Barakar, Barren Measures and Raniganj Formations belonging to Damudas, a Sub-Group of Lower Gondwana. Talchir Formation rest directly over the Pre-Cambrians. The Karharbaris and Barkars are the main coal bearing formations in the block. Stratigraphic succession of the formations in the block is given in Table 4.5.

**Table 4.5**  
**Stratigraphic Sequence of Pakri-Barwadih Block**

Period	Group	Sub-group	Formation	Thickness Range	Lithology
Recent	Lower Gondwana	Damuda	Alluvium	3.50 – 25.85	Detrital and Alluvial soil & subsoil
Upper Permian			Raniganj	1.50 – 324.50	Fine to medium grained micaceous sandstone, interbanded shale and sandstone,

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					Carbonaceous shale & thin uneconomic Coal seams.
Upper Permian			Barren Measures	5.14 – 353.00	Dark shale, sandy shale & interbanded shale & sandstone.
			Barakar	12.50 - 268.85	Fine to coarse grained sandstone, Shale, Conglomerate, Carbonaceous shale & Coal seams.
			Karharbari	10.00 – 81.60	Medium to coarse grained sandstone, Shale, silicified quartzite rock & thin coal seams.
Permo Carboniferous	--	--	Talcher	0.80 – 13.50	Green coloured shale, Boulder & Conglomerate
-----Unconformity-----					
Pre-Cambrian	--	--	Metamorphics	--	Granite, Gneisses & Quartzites

There are a few small outliers of Barakar/ Karharbari/ Talchir Formations occurring over the Pre-Cambrian Basements immediately north of the Pakri-Barwadih Block.

**b. PB Block (North West):**

However, in PB North West (sector-A) area small exposures of sand stone and coal seam are found near the bank of Khora Nala in the western margin of the block. At places Karharbari Formation also rest directly over metamorphic. The geological

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succession established in the PB North West area (sector-A) of the block from sub-surface exploration data is given in Table 4.6.

**TABLE 4.6**  
**STRATIGRAPHIC SUCCESSION OF PB NW (SECTOR-A) AREA OF**  
**COAL BLOCK**

Period	Group	Sub-Group	Formation (Thickness)	Lithology
Recent & Sub-Recent			Alluvium (3.00 to 23.00m)	Soil & Sub-soil
-----Unconformity-----				
Middle Permian			Barren Measure (44.00 – 138.70m)	Predominantly shale with intercalation of sandstone and shale and arenaceous shale
Lower Permian	Lower Gondwana	amuda	Barakar (19.07m – 137.10m)	Fine to coarse grained sandstones, shale, carbonaceous shale and coal seams.
			Karharbari (5.14m to 91.52m)	Fine to coarse grained sandstone with bands of shale and coal seams
Permo - Carboniferous			Talchir 0.65m to 4.64m )	Green coloured shale, boulders and conglomerates
-----Unconformity-----				
Precambrian			Metamorphics (2.80-11.00m)	Gniesses, granites and quartzites

#### 4.4.2 Structure

##### a. Structure of PB (East and West)

Structurally the North Karanpura coalfield is a major broad syncline with its axis trending east to west and plunging towards east. The Pakri-Barwadih is Located in the NE part of northern limb. The northern boundary of the block

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appears to have normal contacts with Talcher and basement metamorphics. The southern boundary of the Eastern sector is marked by a major fault of about 250m throw towards south. This has resulted in bringing the Barakar formations including coal seams in juxtaposition with Raniganj formation.

The block is generally traversed by NW-SE/SE-EW trending faults with northerly throw causing step like configuration. The strike of the strata is generally NW-SE and the dip of the strata varies from  $10^{\circ}$  to  $20^{\circ}$  (1 in 3 to 1 in 5.5) but generally  $10^{\circ}$  to  $15^{\circ}$  towards south-west.

Nineteen faults with throw ranging up to 170m have been deciphered based on exploration carried out in the block. The throw of most of the faults ranges from 10-40m.

It may be mentioned here that the geological structure of the block is primarily based on CMPDI GR in general and in particular in the north and north central part of West Quarry i.e. north of fault F10 –F10, giving due cognizance to the long field association of CMPDI during exploration.

The fault F5 which is of distinctive nature has been considered as the boundary for division of the block into West & East Quarry. The details of faults are given in Table 4.7.

Table 4.7  
Fault Details of PB West & East Block

Fault	Trend	Dip	Throw	Remarks
F1 -F1	East- West	Northerly	20-60m	Omission of (i)Seam-II in KB-16 (ii) Seam-II Top to Seam-IV in CMKPB 29 (iii) Reduction in parting between Seam-II MT & Middle in CMKPB-12

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F2 -F2	NW-SE	North-easterly	10-100m	Omission of (i) Seam-I in CMKPB 10 (ii) Seam-II Bottom & V in CMKPB 35 (iii) Seam-III Top & Bottom in CMKPB-12
F3 -F3	NW-SE& Curvilinear fault trending NW-SE and gradually swerving to N-S	Northerly	80-170 m	Intersected in (i) CNPB – 107 (Omission of Seam-I Bottom to Seam-V Top). (ii) Based on Stratum Contours.
F4 -F4	NW-SE dies out near borehole CNPB- 52	North-East	0 -20m	Omission of (i) Seam-I Bottom to Seam-II Bottom in CNPB – 49, (ii) Seam-IVA & IV in CNPB- 15 (iii) Seam-II Top & (iv) Seam-III in CNPB-21& Seam-IV in CNPB –64.
F5 -F5	NW-SE to swerving to E-W	North-Easterly/ Northerly	40-140 m	Omission of (i) Seam-I & II in CNPB-92, (ii) Seam-III Bottom in CNPB-93, (iii) Seam-III in CNPB-95, (iv) Seam-III Bottom to V top in KB-11 (v) Seam –II to V top in CNPB-16 (vi) Based on Stratum contour.
F6 -F6	NW-SE abuts against fault F5-F5 near BHs CNPB- 93.	North Easterly	10 – 40 m	(i) CNPB-39 Omission of Seam-II Top, Middle & Bottom), (ii) CNPB- 29 Omission of Seam-I Top to I Bottom (iii) Based on Stratum contour.
F7 -F7	Almost E-W Abuts against fault F6-F6 near BH CNPB-28	Northerly	20-80 m	(i) Omission of Seam-III in boreholes CNPB-28, 20& 68. (ii) CNPB – 61 Omission of Seam-II Top to Seam-I Bottom (iii) CNPB-25 Omission of seam floor of Seam-II MB to Seam-I Bottom (iv) CNPB – 29 Omission of Seam-I Top to Seam-I Bottom.
F8 -F8	NW-SE	North Easterly	10-20m	(i) Reduction in parting between Seam II Top & III in CNPB-

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FN-16	WNW-ESE	NEN	20M	1) Redelineation of incrop of seam 1 2) Cross Section 3. Revision of Floor contours of seam 1
FN-17	NW-SE tion in the East Sector within the quarriable zone.	NE	5M	1 & 2 same as above 3. Revision of Floor Continuer plan 4. Geological Cross Section additional.
FN-18	NW-SE Location in the Central sector	NE	Amount of throw could not be establis hed	Geological Cross Section
FN-19	WNW-ESE	NNE		Geological Cross Section

#### b. Structure of PB (North West)

Pakri Barwadih North West (Sector-A) area of the Block, the general strike of the formation in the block is almost east-west. The local swing in the strike at places is due to rolling dip. The strata are dipping at 10° to 12° southerly.

The block is traversed by 8 numbers of faults. Among these, 3 faults are varying from 0 m to 50 m. Fault F1 is the major fault varying in through from 160m to 180m. This fault runs approximately along southern to western boundary of the block. The trend of the fault is NW-SE and except faults F7 & F8, all are extending in metamorphic terrain. The description of faults is presented in the Table 4.8.

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Table 4.8

## DESCRIPTION OF FAULTS INTERPRETED IN PB NW (Sector-A)

FAULT NO.	LOCATION	NATURE	TREND & THROW (m)	BH. NO.	DEPTH (m.)	EVIDENCES
F <sub>1</sub> – F <sub>1</sub>	Located near southern boundary	Oblique fault	NW-SE & 160 – 180m	MNPB - 25	274.50	<ul style="list-style-type: none"> <li>Seam K-1 to K-5 &amp; Local-L – faulted in borehole MNPB-25</li> <li>Interpreted based on level difference of seam on either side of fault</li> <li>Metamorphics has come in juxtaposition of Gondwana in north western part of the block</li> <li>Equivalent to fault F<sub>3</sub> of western section of Pakri-Barwadih block</li> </ul>
F <sub>2</sub> – F <sub>2</sub>	Located in Central part of the block	Oblique fault	NW-SE & 0 – 40	MNPB-4	170.00	<ul style="list-style-type: none"> <li>Seam K-1 &amp; K-2 faulted in MNPB-4</li> <li>Interpreted based on level difference of seam on either side of fault</li> </ul>
F <sub>3</sub> – F <sub>3</sub>	Located in Central part of the block	Oblique fault	NW-SE & 30 – 55	MNPB-7 MNPB-26	29.00 316.60	<ul style="list-style-type: none"> <li>Seam K2 faulted in MNPB-7</li> <li>Seam K-1 and contact of Karharbari and metamorphic faulted in borehole MNPB-26</li> <li>Interpreted based on level difference of seam on either side of fault</li> <li>Equivalent to F<sub>5</sub></li> </ul>

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FAULT NO.	LOCATION	NATURE	TREND & THROW (m)	BH. NO.	DEPTH (m.)	EVIDENCES
						of western sector of Pakri-Barwadih
F <sub>4</sub> – F <sub>4</sub>	Located in north-eastern part of the block	Oblique fault	NW-SE & 10 – 50	MNPB-11	87.00	<ul style="list-style-type: none"> <li>Seam K-1 to K-4 faulted in Borehole MNPB-11</li> <li>Interpreted based on</li> <li>level difference of seam</li> <li>on either side of fault</li> <li>Equivalent to F<sub>10</sub> of western sector of Pakri Barwadih</li> </ul>
F <sub>5</sub> – F <sub>5</sub>	Located in north-eastern corner of the block	Oblique fault	NW-SE & 10	-	-	Extending from western sector of Pakri-Barwadih (equivalent to fault F <sub>14</sub> )
F <sub>7</sub> – F <sub>7</sub>	Located in the eastern part of the block	Oblique fault	NW-SE & 0 – 10	MNPB-24	205	Seam K-3 faulted in borehole MNPB-24 equivalent to fault F <sub>8</sub> of Pakri-Barwadih Block
F <sub>8</sub> – F <sub>8</sub>	Located in the eastern part of the block	Oblique fault	NW-SE & 0 – 5	MNPB-5 MNPB-10	100 28	<ul style="list-style-type: none"> <li>Seam K-2 faulted</li> <li>Seam K-5 faulted</li> </ul>

## 4.4.3 Stratigraphic Sequences

## Stratigraphic Sequences of PB West &amp; East

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The Barakar formation contains five persistent coal seams numbered Seam-I to Seam-V in ascending order. Out of these, Seam-I & Seam-II have splitted into 3 sections, whereas Seam-III, Seam-IV and Seam-V splitted in two sections each. The split sections are designated as top, middle & bottom. The split sections of the seams merge to form composite seams designated for example as II TM for II Top & Middle combined and MB for Middle and Bottom combined.

The Karharbari formations underlies the Barakar formation and contain 5 thin non-workable coal seams namely Seam-K1 to Seam-K5. The average thickness of these coal seams is less than 1 m.

The summarized sequence and details of coal seams in the block are given in Table 4.9 and seams have been shown in geological plan (Plate No. 7)

Table 4.9  
Sequence & details of coal seams

Seam/Parting	Thickness range (m)		General thickness (m)	No of BH considered
	Minimum	Maximum		
Seam-V Top	0.39 (CNPB – 34)	3.91 (CMKPB 13)	1.50	55
Parting	0.80 (CNPB – 32)	12.41 (CMKPB 13)		
Seam -V Bottom	0.18 (CNPB –113)	2.20 (CMKPB 29)	1.00	58
Seam-V Comb	0.73 (CMKPB 37)	6.00 (CMKPB 11)	1.50	19
Parting	2.16 (CNPB– 95)	29.11 (CNPB – 64)		
Seam-IV A	0.20 (CNPB – 95)	3.13 (CNPB –105)	1.25	47
Parting	0.64	12.37		

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**Revised Mining Plan (1st Revision) – Pakri Barwadih Coal Block**

Seam/Parting	Thickness range (m)		General	No of BH
	(CMKPB –4)	(CMKPB – 30)		
Seam-IV Top	0.90 (CNPB – 26)	7.88 (CNPB – 68)	3.00	26
Parting	0.90 (CNPB – 105)	17.59 (CNPB – 53)		
Seam-IV Bottom	0.65 (CNPB – 86)	7.64 (CNPB –134)	2.50	26
Seam-IV Comb	2.10 (CNPB – 131)	14.61 (CNPB – 144)	8.00	53
Parting	0.98 (MNPB – 25)	44.31 (CMKPB 37)		
Seam-III Top	0.46 (CMKPB 12)	3.75 (CMKPB 10)	1.50	56
Parting	0.94 (CMKPB 15)	28.88 (CMKPB 10)		
Seam-III Bottom	0.16 (CNPB – 85)	3.10 (CNPB – 22)	1.25	56
Seam-III Comb	0.46 (CNPB – 7)	3.74 (CNPB – 37)	1.50	31
Parting	1.97 (CNPB – 48)	45.97 (CNPB-91)		
Seam-II Top	0.25 (CMKPB –4)	15.46 (CMKPB 10)	8.00	60
Parting	Nil	31.93 (CNPB-31)		
Seam-II Middle	2.98 (CMKPB 30)	20.04 (CNPB – 34)	8.00	56
Seam-II TM	10.28	20.26	12.00	39

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Seam/Parting	Thickness range (m)		General	No of BH
	(CNPB-17)	(MNPB-22)		
Parting	0.77 (CNPB-131)	10.75 (CNPB-72)		
Seam-II Bottom	1.40 (CNPB-38)	14.56 (CMKPB-10)	7.00	80
Seam-II MB	13.85 (CMKPB-29)	22.51 (CNPB-30)	16.00	12
Seam-II Comb	17.70 (CMKPB-8)	28.67 (CNPB-32)		3
Seam-I Top	0.21 (CMKPB-12)	11.36 (CNPB-124)	2.50	81
Parting	1.00 (CNPB-110)	18.77 (CNPB-91)		
Seam-I Middle	0.42 (CNPB-106)	10.13 (CNPB-110)	2.50	90
Seam-I TM	3.85 (CNPB-90)	11.95 (CNPB-125)		6
Parting	0.85 (CNPB-44)	23.62 (CNPB-72)		
Seam-I Bottom	0.20 (CNPB-108)	8.10 (CNPB-134)	2.00	64
Seam-I MB	4.70 (MNPB-11)	11.88 (CMKPB-25)		6
Seam-I Comb	7.96 (CNPB-78)	13.76 (CMKPB-35)		3
Parting	1.80 (CNPB-72)	35.75 (CNPB-73)		
Local	0.06	5.56	1.50	72

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Seam/Parting	Thickness range (m)		General	No of BH
	(MNPB – 38)	(CMKPB-5)		
Parting	4.72 (CNPB – 69)	78.89 (CNPB-88)		
Seam-K5	0.08 (MNPB –38)	2.22 (CNPB-79)	0.75	39
Parting	2.27 (CNPB – 80)	81.25 (CNPB-124)		
Seam-K4	0.09 (CNPB –124)	3.04 (CNPB-90)	0.75	34
Parting	1.20 (CNPB –106)	29.75 (CMKPB-36)		
Seam-K3	0.08 (CNPB – 90)	2.46 (CNPB-116)	1.25	33
Parting	0.50 (CNPB –110)	33.40 (CMKPB-20)		
Seam-K2	0.05 (CNPB –124)	4.80 (CNPB-123)	1.25	36
Parting	1.04 (CNPB –101)	48.00 (CNPB-128)		
Seam –K1	0.10 (CNPB – 52)	6.45 (CNPB-105)	1.50	50

Note: (i) TM stands for Top & Middle Merged.  
(ii) MB stands for Middle & Bottom Merged.

The details of the thickness of different coal seams, partings and OB is given in Table 4.10 & Table 4.11.

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Table 4.10  
Thickness of Coal Seams & Partings in PB (West East)

Particulars	West Quarry		East Quarry	
	Max	Min	Max	Min
Over Burden	251.55	10.39	266.81	6
Seam-V Top	3.24	0.36	3.91	0.84
Parting	7.19	0.8	4.89	0.82
Seam-V Bottom	3	0.29	2.04	0.21
Parting	24.97	2.16	19.95	5.88
Seam-IV Top	7.88	0.9	6.57	2.34
Parting	6.76	0.9	17.59	16.38
Seam-IV Bottom	7.64	0.65	6.56	0.87
Parting	44.31	5.1	22.93	5.31
Seam-III Top	3.75	0.23	3.22	0.49
Parting	24.75	1.1	16.94	0.94
Seam-III Bottom	3.1	0.16	2.41	0.21
Parting	45.97	3.39	33.72	1.97
Seam-II Top	12.7	0.74	11.22	0.25
Parting	31.93	1.2	28.12	1.34
Seam-II Middle	20.04	1.75	10.98	3.5
Parting	6.28	0	5.8	0.97
Seam-II Bottom	11.4	1.4	14.02	1.99
Parting	30.43	6.21	27.94	4.74
Seam-I Top	11.36	0.45	4.95	0.42
Parting	18.77	1	14.73	1.6
Seam-I Middle	10.13	0.42	6.71	0.87
Parting	16.35	0.95	18.7	0.85
Seam-I Bottom	8.1	0.2	4.8	0.25

Table 4.11  
Thickness of Coal Seams & Partings in PB (North West)

Sl. No.	Seam /Parting	Min.	Max.
1	V COMB	3.24	5.9
2	Parting	3.72	27.16
3	IV COMB	5.15	10.04
4	Parting	0.98	30.55

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Sl. No.	Seam /Parting	Min.	Max.
5	II TOP	6.96	10.61
6	Parting	1.09	5.12
7	II MID	7.17	11.68
8	Parting	0	0
9	II T+M	15.97	20.26
10	Parting	1.4	24.22
11	II BOT	2.85	6.3
12	Parting	5.89	15
13	I TOP	0.42	3.79
14	Parting	0.52	4.51
15	I MID	1.15	8.73
16	Parting	0.17	4.19
17	I BOT	1.01	4.17
18	Parting	0	0
19	I M+B	4.7	11.88
20	Parting	16.8	27.68
21	LOCAL(L)	0.06	2.35
22	Parting	16.39	29.67
23	K-5	0.08	1.32
24	Parting	4.74	12.65
25	K-4	0.28	1.74
26	Parting	4.4	9.85
27	K-3	0.45	1.96
28	Parting	8.45	19.58
29	K-2	0.06	2.99
30	Parting	1.95	13.84
31	K-1	1.19	4.68

#### 4.4.3.1 General characteristics of Lithological units (coal seams/ parting/ overburden)

- The Seam-II and its splits are the most potential seams in the block both from resource and grade of coal but seam II Top & Middle is found as coalesced seam in the eastern part of the block i.e. PB North-West(sector-A) area.
- Seam-I is highly discontinuous and occur mostly in patches. Seam I Bottom and I Middle is found as combined seam in the eastern part of the block.

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- (iii) In Pakri Barwadih block all Barakar seams of the block are highly inter-banded and inferior in nature except Krahbari seams. Where as Krahbari formation are well developed in the PB North West (sector-A) area except in few small patches. The Barakar coal seams (seam I to V) are medium to high ash, non-coking bituminous type. The moisture and ash of these coals normally ranges between 3% to 5% and 25% to 45% respectively on inclusion of all dirt bands less than 1m in thickness.
- (iv) Overall proximate analysis on 60% RH and 40°C has been carried out for selected boreholes to determine Moisture, Ash and Volatile Matter (VM) on samples excluding carbonaceous shale & all other dirt bands (BCS) and including dirt bands up to 30 cm (I<sub>30</sub>) and including dirt bands up to 1m (I<sub>100</sub>) thickness. However all non-combustibles dirt bands such as Grey Shale, Arenaceous Shale, Sandstone samples more than 5 cm have been excluded for estimations of quality and reserves in all cases.
- (v) In the boreholes where seam overall proximate analysis has not been determined, Ash & Moisture have been calculated by weighted average method from band by band data. Useful Heat Value (UHV) of coal has been calculated by using the formula  $8900 - 138 \times (A\% + M\%)$  for determination of grade as per present standard of commercial coal grading system.
- (vi) The other special test such as Ultimate Analysis, Ash Analysis, Ash Fusion Range, Petrographic Analysis, Mineralogical Study and Selective Reactivity test have been carried out to ascertain different industrial properties of coal in case of selected seams/sample.
- (vii) The Partings of the coal seams are comprises of sandstone, alternate shale & sandstone, shale, carbonaceous shale, etc. The bulk of the OB rocks comprise of sandstones and shale and their intermediate varieties. The soil and weathered rock varies 6 to 24 m thick but generally varies from 6 - 18m.

#### 4.5 Seam wise Quality Parameters of PB Block

The generalized range of quality of coal including dirt bands is given in Table-4.12.

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Table 4.12  
Range of Quality details of Coal seams, PB (West East)

Seam	M%	ASH%	VM%	UHV (K.Ca l/Kg.)	Grade (Base d on UHV)	CV (K.Cal/ Kg.)	Grade (Based on GCV)	CV (Dmmf) (K.Cal/ Kg.)
Seam-V Top	3.5-6.8	22.4- 52.2	17.8- 22.3	1144- 4880	D-G (E-F)	3040- 5466	G7-G15	6932- 7765
Seam - V Bottom	3.9-7.3	15.7- 48.7	20.1- 21.9	1648- 6015	B-G (E-F)	3409- 6321	G4-G13	7012- 8361
Seam-V Comb	3.4-7.1	17.9- 51.8	18.5- 24.70	1236- 5472	C-Ungr (E-F)	3136- 5858	G5-G14	7054- 7794
Seam- IV A	3.4-5.2	25.2- 49.9	18.5- 19.6	1510- 4750	D-G (E-F)	3329- 5475	G7-G14	7167- 7830
Seam- IV Top	3.1-5.8	31.3- 43.6	20.4- 23.7	2255- 3969	E-G (E-F)	3788- 4999	G8-G12	7306- 7778
Seam- IV Bottom	3.7-5.3	21.6- 50.2	18.2- 23.8	1626- 5225	C-G (D-F)	3438- 6070	G5-G13	7307- 8191
Seam- IV Comb	2.6-6.7	31.2- 48.2	17.9- 27.1	1641- 3863	E-G (E-F)	3000- 4832	G9-G15	5714- 7825

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Seam	M%	ASH% ↓	VM%	UHV (K.Cal /Kg.)	Grade (Base d on UHV)	CV (K.Cal/ Kg.)	Grade (Based on GCV)	CV (Dmmf) (K.Cal/ Kg.)
Seam- III Top	2.6-5.5	17.2- 51.2	18.7- 25.7	1365- 5767	B-G (C-E)	3200- 6136	G4-G14	7048- 8672
Seam- III Bottom	2.8-5.7	16.6- 50.0	22.7- 27.1	1616- 5818	B-G (D-E)	3447- 6160	G4-G13	7299- 7924
Seam- III Comb	3.4-5.8	25.9- 37.9	-	3021- 5055	D-F (E)	4037- 5529	G6-G11	7264- 7919
Seam-II Top	2.7-6.7	23.3- 52.7	18.0- 25.3	1158- 5059	C-G (D-F)	3130- 5724	G6-G14	7129- 7931
Seam-II Middle	2.0-6.9	23.1- 43.2	20.7- 28.5	2621- 5132	C-F (D-F)	4520- 5789	G6-G10	7635- 8107
Seam-II TM	2.6-5.8	27.2- 45.9	21.9- 26.2	2206- 4650	D-E	3854- 5550	G6-G12	7485- 8809
Seam-II Bottom	1.6-5.6	26.9- 47.2	21.2- 26.3	2082- 5183	C-G(D- F)	3736- 5578	G6-G12	7223- 8142
Seam-II MB	2.3-4.0	29.7- 35.3	23.3- 24.0	3711- 4178	D-E	4820- 5214	G7-G9	7652- 7661

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**Revised Mining Plan (1st Revision) – Pakri Barwadih Coal Block**

Seam	M%	ASH%	VM%	UHV (K.Ca l/Kg.)	Grade (Base d on UHV)	CV (K.Cal/ Kg.)	Grade (Based on GCV)	CV (Dmmf) (K.Cal/ Kg.)
Seam-II Comb	3.8-4.6	28.9- 36.6	22.9- 23.0	3324- 4398	D-F (E-F)	4620- 5292	G7-G9	7751- 8057
Seam-I Top	1.5-5.7	18.7- 51.1	20.8- 29.6	1368- 5657	B-G (D-F)	3525- 6280	G4-G13	7435- 8209
Seam-I Middle	1.8-5.3	18.6- 50.8	18.0- 27.7	1599- 5602	C-G (D-F)	3400- 5459	G7-G13	7365- 7977
Seam-I TM	2.9-4.3	27.2- 46.0	20.5	2151- 4544	D-G (E-F)	3903- 5363	G7-G12	7440- 7836
Seam-I Bottom	1.5-4.1	20.1- 53.9	18.3- 27.6	1172- 5208	C-Ungr (E-F)	2491- 6071	G5-G17	7217- 8006
Seam-I MB	2.8-5.2	33.5- 43.8	-	2459- 3642	E-F	4016- 4716	G9-G11	7531- 7727
Seam-I Comb	2.9-3.6	30.9- 49.4	20.1	1682- 4128	E-G (F-G)	3484- 5114	G8-G13	7303- 7818
Local	2.3-5.7	15.7- 52.8	17.6- 26.5	1213- 5984	B-G (E-G)	2867- 6286	G4-G15	6945- 7970
Seam- K5	2.5-5.8	8.0- 49.9	-	1677- 7603	A-G (C-E)	3502- 6753	G2-G13	7301- 8090

**Chapter- IV Geology**

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Seam	M%	ASH%	VM%	UHV (K.Ca l/Kg.)	Grade (Base d on UHV)	CV (K.Cal/ Kg.)	Grade (Based on GCV)	CV (Dmmf) (K.Cal/ Kg.)
Seam- K4	2.8-6.2	6.4 - 45.9	-	2116- 7492	A-G (B-D)	3761- 6963	G2-G12	7397- 8117
Seam- K3	2.3-6.1	7.1- 48.7	15.1- 31.40	1820- 7244	A-G (B-D)	3400- 7145	G1-G13	6981- 8154
Seam- K2	2.3-5.6	6.5- 47.4	22.4	1996- 7299	A-G (B-D)	3712- 7056	G1-G12	7428- 8128
Seam- K1	1.0-5.1	8.4- 49.8	19.3- 28.7	1773- 7230	A-G (B-D)	3603- 7213	G1-G13	7515- 8254

Note: (i) TM Stands for Top & Middle Merged.  
(ii) MB stands for Middle & Bottom Merged.

An exercise has been carried out to assess the coal reserves under D&E grade which together may give an overall ash of nearly 34% and that of F grade & inferior coals with higher ash content. It will be observed that the grade of coal seams generally range between D to G with average of E grade. The reserves in grade D & E constitute over 85% and grade F to G coal accounts for the balance 15% of the total quarriable reserves up to 100 m depth. The corresponding data for total reserves in grade D and E are nearly 70% in the depth range 100 to 300m. From the quality details as available, the reserves available in the block are suitable for power generation.

#### 4.6 RESERVE ESTIMATION:

##### 4.6.1 Reserve Estimation for Pakri Barwadih (West & East)

##### 4.6.1.1 Methodology of Reserve Estimation

#### Chapter- IV Geology

अनुसंधान एवं विकास

अनुसंधान एवं विकास

अनुसंधान एवं विकास

अनुसंधान एवं विकास

अनुसंधान एवं विकास

अनुसंधान एवं विकास

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Reserves for all the potential coal seams of Barakar formation i.e. Seams I bottom – Seam V top except IV-A & Local Seams have been estimated by utilizing isochore of individual coal seams. In this isochore method, the areas between successive isochores were determined with the help of digital planimeter which has been multiplied with the average thickness of successive isochores to arrive at volume of chore. The specific gravity of  $1.28 + 1\%$  of ash% has been considered for estimation of tonnage of different coal seams.

#### 4.6.1.2 Seam-wise Grade-wise Geological Reserve:

Grade-wise reserves were also computed by measuring area between iso-grad (UHV contours).

#### 4.6.1.3 Category wise Net geological reserves

The reserves so estimated have been categorized as Proved and Indicated reserves based on density of boreholes. The reserves of Southern and South-Western part of the block have been placed under Indicated category, whereas the entire reserve of north – eastern part of the block is placed under Proved category. Further these reserves are also classified under UNFC guidelines considering the economic, feasibility and geological axis.

Summarized details of coal reserves are furnished in Table 4.13 and Summary of Coal Reserve in Million tonnes is given in Table 4.14

Table 4.13  
Seam-wise Grade-wise Geological Reserve

Seam-wise Grade-wise Geological Reserve										
Seam Name	Area Sq. Km.	Grades								
		B	C	D	E	F	G	Ungr.	Total	
PROVED RESERVES										
Area less than 100m Depth										
EASTERN SECTOR										
Seam-V Top	0.128	0.128				0.004	0.328			
Seam-V Bot	0.214	0.214				0.465				
Seam-	0.841	0.841				4.883	2.386	0.077		

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Seam Name	Area Sq. Km.	Grades							
		B	C	D	E	F	G	Ungr.	Total
IV Comb									
Seam-III Top	0.438	0.438			0.874	0.423	0.052		
Seam-III Comb	0.067	0.067				0.192			
Seam-II Top	1.644	1.644			0.549	2.340	3.468		
Seam-II Mid	1.580	1.580			9.877	6.295			
Seam-II Bot	1.642	1.642			0.388	10.443	1.603		
Seam-II MB	0.063	0.063				1.415			
Seam-I Top	1.771	1.771		2.253	1.400	0.019			
Seam-I Mid	2.551	2.551				1.502	2.964	5.290	
Seam-I Bot	0.782	0.782			0.613	1.227	0.877	1.380	
<b>Total</b>				<b>2.253</b>	<b>13.701</b>	<b>29.208</b>	<b>11.678</b>	<b>6.747</b>	
<b>Area Between 100m &amp; 300m Depth</b>									
Seam-V Top	1.575			0.044	0.047	5.304	0.206		5.601
Seam-V Bot	1.497				2.534	0.746			3.280
Seam-V Comb	0.170				0.579				0.579
Seam-IV Comb	1.590				6.095	6.332	0.276		12.703
Seam-III Top	1.687		1.091	3.632	0.529	0.131			5.383
Seam-III Bot	0.171					0.312			0.312
Seam-III Comb	0.097				0.419				0.419
Seam-II Top	1.256		0.337	0.588	1.801	3.408	0.143		6.277

**Chapter- IV Geology**

*Sanjiv*  
**SANJIV KUMAR SINGH** RQP No. 34011/ (15)/2009-CPAM dated 27.09.10.  
 Recognised Qualified Person  
 No. 34011/ (15)/2009-CPAM  
 Ministry of Coal, Govt. of India

Page No. 26  
 पवन देव जामटा/PANDEV JAMTA  
 General Manager (Geology)  
 एन टी सी लिमिटेड/NTSCL LTD  
 EOC, A-5A, Sector-24, Noida-201301 (U.P.)



**Revised Mining Plan (1st Revision) – Pakri Barwadih Coal Block**

Seam Name	Area Sq. Km.	Grades							
		B	C	D	E	F	G	Ungr.	Total
Seam-II Mid	1.642			16.65 9	3.020		-		19.679
Seam-II Bot	1.558			0.392	11.64 3	0.080			12.115
Seam-II MB	0.015				0.336				0.336
Seam-I Top	1.465	0.103	0.595	1.773	0.537	0.079			3.087
Seam-I Mid	1.726					2.732	3.927		6.659
Seam-I Bot	1.130					1.151	2.067		3.218
Total		0.103	2.023	23.08 8	27.54 0	20.27 5	6.619		79.648
Total for EASTERN SECTOR		0.103	4.276	36.78 9	56.74 8	31.95 3	13.36 6		143.23 5
CENTRAL SECTOR									
Area less than 100m Depth									
Seam-V Top	0.013					0.038	0.012		0.050
Seam-IV Top	0.172					0.776			0.776
Seam-IV Bot	0.178			0.234	0.270				0.504
Seam-IV Comb	0.069				0.565				0.565
Seam-III Top	0.382			0.080	0.376	0.236			0.692
Seam-III Bot	0.441			0.592	0.502				1.094
Seam-II Top	0.860			1.720	1.529				3.249
Seam-II Mid	0.900			2.249	10.93 9				13.188
Seam-IITM	0.761			5.227	5.379				10.606
Seam-II Bot	1.615			0.487	6.953	3.094	0.159		10.693
Seam-II MB	0.240				5.738				5.738

**Chapter- IV Geology**

**SANJIV KUMAR SINGH**  
Recognised Qualified Person  
No. 340 - I(15)/2009-CPAM  
Ministry of Coal, Govt. of India

**RQP No. 34011/ (15)/2009-CPAM dated 27.09.10.**



**Revised Mining Plan (1st Revision) – Pakri Barwadih Coal Block**

Seam Name	Area Sq. Km.	Grades							Total
		B	C	D	E	F	G	Ungr.	
Seam-II MB	0.240				5.738				5.738
Seam-I Top	1.053			0.339	0.776	0.588	0.691		2.394
Seam-I Mid	1.746			0.013	0.320	1.200	4.010		5.543
Seam-I TM	0.149					0.287	2.154		2.441
Seam-I Bot	0.552			0.071	0.267	0.611	0.373		1.322
Seam-I Comb	0.024						0.038		0.038
<b>Total</b>				<b>11.012</b>	<b>33.614</b>	<b>6.830</b>	<b>7.437</b>		<b>58.893</b>
<b>Area Between 100m &amp; 300m Depth</b>									
Seam-V Top	2.056			0.443	1.023	3.187	1.939		6.592
Seam-V Bot	2.092			0.074	0.153	3.036	1.664		4.927
Seam-V Comb	0.995		0.209	0.271	0.605	0.783	0.591		2.459
Seam-IV Top	0.639				0.706	1.914	0.154		2.774
Seam-IV Bot	0.784			0.254	0.334	0.538	0.334		1.460
Seam-IV Comb	3.199				1.233	26.630	1.723		29.586
Seam-III Top	3.090		0.350	2.127	2.859	0.190			5.526
Seam-III Bot	1.180		0.550	1.070	0.869				2.489
Seam-III Comb	0.240			0.168		0.675			0.843
Seam-II Top	3.070		0.071	2.574	4.221	1.203	0.292		8.361
Seam-II Mid	3.927		1.475	43.298	6.393				51.166
Seam-IITM	0.941			12.451	5.465				17.916
Seam-II	3.592			1.210	21.87	6.638	0.164		29.885

**Chapter- IV Geology**

*Sanjiv*  
**SANJIV KUMAR SINGH** RQP No. 34011/ (15)/2009-CPAM dated 27.09.10.  
 Recognised Qualified Person  
 No. 34C / (15)/2009-CPAM  
 Ministry of Coal, Govt. of India

  
 Page No. 31  
 General Manager, NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)

**Revised Mining Plan (1st Revision) – Pakri Barwadih Coal Block**

Seam Name	Area Sq. Km.	Grades							
		B	C	D	E	F	G	Ungr.	Total
Bot					3				
Seam-II MB	0.487				11.580				11.580
Seam-II Comb	0.199				5.551				5.551
Seam-I Top	2.649			0.595	1.350	2.236	1.174		5.355

Seam-I Mid	3.378				0.095	3.796	3.726		7.617
Seam-I TM	0.004						0.066		0.066
Seam-I Bot	1.157					1.436	2.108		3.544
Seam-I Comb	0.231						2.675		2.675
<b>Total</b>			2.655	64.535	64.310	52.262	16.610		200.372

**Area beyond 300m Depth**

Seam-V Top	0.519					1.483	0.608		2.091
Seam-V Bot	0.648				0.125	2.085			2.210
Seam-V Comb	0.445		0.221	0.266	0.285	0.275			1.047
Seam-IV Top	0.222					0.580			0.580
Seam-IV Bot	0.222					0.623			0.623
Seam-IV Comb	1.587					16.216	0.594		16.810
Seam-III Top	1.053			0.149	1.357	0.271	0.137		1.914
Seam-III Bot	0.051			0.081	0.018				0.099
Seam-II Top	1.485			0.592	1.836	1.229	1.151	0.254	5.062
Seam-II Mid	1.490			10.994	9.362				20.356
Seam-II Bot	1.482			0.216	4.545	5.434			10.195

**Chapter- IV Geology**

*Samp*  
**SANJIV KUMAR SINGH**  
 Recognised Qualified Person  
 No. 340 / (15)/2009-CPAM  
 Ministry of Coal, Govt. of India

**RQP No. 34011/ (15)/2009-CPAM dated 27.09.10.**

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**पवन देव जमरत/PAWAN DEV JAMRAT**  
 Director General Manager  
 एन टी पी सी लिमिटेड / NTPC Ltd.  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)

**Revised Mining Plan (1st Revision) – Pakri Barwadih Coal Block**

Seam-II Comb	0.045			1.256				1.256
Seam-I Top	0.688		0.022	0.079	0.843	0.634		1.578
Seam-I Mid	0.808				1.339	0.862		2.201
Seam-I Bot	0.572				0.893	0.428		1.321
<b>Total</b>		<b>0.221</b>	<b>12.320</b>	<b>18.863</b>	<b>31.271</b>	<b>4.414</b>	<b>0.254</b>	<b>67.343</b>
<b>Total For CENTRAL SECTOR</b>		<b>3.876</b>	<b>88.867</b>	<b>117.787</b>	<b>91.363</b>	<b>29.461</b>	<b>1.254</b>	<b>327.608</b>

<b>WESTERN SECTOR</b>								
<b>Area less than 100m Depth</b>								
Seam-III Top	0.507					1.068		1.068
Seam-III Bot	0.377			0.574	0.189			0.763
Seam-IITM	1.470		6.063	17.010				23.073
Seam-II Bot	1.661		0.374	4.048	3.912			8.334
Seam-I Top	1.710	0.485	1.192	1.023	1.775	0.669		5.144
Seam-I Mid	2.217		2.511	3.804	2.744	0.394		9.453
Seam-I Bot	1.242			0.714	2.235	1.965		4.914
Seam-I MB	1.018			7.782				7.782
<b>Total</b>		<b>0.485</b>	<b>3.703</b>	<b>11.978</b>	<b>36.168</b>	<b>7.129</b>	<b>1.068</b>	<b>60.531</b>
<b>Area Between 100m &amp; 300m Depth</b>								
Seam-V Top	0.902			0.139	1.145	1.868		3.152
Seam-V Bot	0.387				0.939			0.939
Seam-V Comb	0.469			0.722	0.896			1.618
Seam-IV Top	1.195			0.685	7.551			8.236

**Chapter- IV Geology**

**SANJIV KUMAR SINGH**  
Recognised Qualified Person  
No. 34C / (15)/2009-CPAM  
Ministry of Coal, Govt. of India

**RQP No. 34011/ (15)/2009-CPAM dated 27.09.10.**

**PAWAN DEB JANTA**  
Dep. General Manager (NTPC Limited)  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)



Revised Mining Plan (1st Revision) – Pakri Barwadih Coal Block

Seam-IV Bot	1.192			0.570	2.516	0.968	0.348		4.402
Seam-IV Comb	1.061				0.643	12.158	0.219		13.020
Seam-III Top	1.107		0.524	0.759	0.632	0.563	0.412		2.890
Seam-III Bot	0.188				0.409				0.409
Seam-III Comb	0.502			0.605	0.964				1.569
Seam-II Top	0.583			1.791	0.909				2.700
Seam-II Mid	0.901		0.224	8.190	2.801				11.215
Seam-IITM	1.906			4.047	25.424				29.471
Seam-II Bot	2.421			4.350	12.278	3.185	0.078		19.891
Seam-II Comb	0.098			2.285					2.285
Seam-I Top	2.034			0.970	1.881	2.226	0.428		5.505
Seam-I Mid	2.563			0.399	3.546	6.382			10.327
Seam-I Bot	1.802				0.666	3.732	0.903		5.301
Seam-I MB	0.623					7.076			7.076
Seam-I Comb	0.069					0.871			0.871
<b>Total</b>			0.748	23.966	54.215	47.692	4.256		130.877
<b>Area beyond 300m Depth</b>									
Seam-V Top	0.334			0.409	0.348	0.397			1.154
Seam-V Bot	0.229					0.465			0.465
Seam-V Comb	0.121				0.432				0.432
Seam-IV Top	0.465					3.392			3.392
Seam-IV Bot	0.465				0.967	0.815	0.216		1.998

Chapter- IV Geology

*Sanjiv*  
**SANJIV KUMAR SINGH**  
 Recognised Qualified Person  
 No. 34C / (15)/2009-CPAM  
 Ministry of Coal, Govt. of India

RQP No. 34011/ (15)/2009-CPAM dated 27.09.10.

*Sanjiv*  
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**पवन देव जामटा / PAVAN DEV JAMTA**  
 General Manager (C.A. & M.)  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)



**Revised Mining Plan (1st Revision) – Pakri Barwadih Coal Block**

Seam-IV Comb	0.472				0.326	3.567			3.893
Seam-III Top	1.016		0.359	0.632	1.224	1.077	0.197		3.489
Seam-III Comb	0.581			1.281	0.275				1.556
Seam-II Top	0.030			0.138					0.138
Seam-II Mid	0.540			0.464	0.770				1.234
Seam-IITM	0.565			11.388	0.972				12.360
Seam-II Bot	0.474			0.660	3.429	0.299			4.388
Seam-I Top	0.436			0.025	0.416	0.828	0.214		1.483
Seam-I Mid	0.559				0.926	1.896			2.822
Seam-ITM	0.081				1.277				1.277
Seam-I Bot	0.457					1.158	0.210		1.368
<b>Total</b>			<b>0.359</b>	<b>14.588</b>	<b>11.014</b>	<b>13.497</b>	<b>0.837</b>		<b>41.449</b>
<b>Total for WESTERN SECTOR</b>	<b>0.485</b>		<b>4.810</b>	<b>50.532</b>	<b>101.397</b>	<b>68.318</b>	<b>6.161</b>		<b>232.857</b>

<b>INDICATED SECTOR</b>									
<b>EASTERN SECTOR</b>									
<b>Area Between 100m &amp; 300m Depth</b>									
Seam-V Top	0.704					2.661			2.661
Seam-V Bot	0.679			0.193	0.980	1.672			2.845
Seam-IV Top	0.240				1.913				1.913
Seam-IV Bot	0.300		1.682						1.682
Seam-IV Comb	0.748				5.183	2.638			7.776
Seam-III Top	0.752			0.972	0.551	0.079			1.602
Seam-III Bot	0.073					0.161			0.161

**Chapter- IV Geology**  
**Sanjiv KUMAR SINGH**  
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 No. 345 / (15)/2009-CPAM  
 Ministry of Coal, Govt. of India

**RQP No. 34011/ (15)/2009-CPAM dated 27.09.10.**

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 DEPT. OF COAL, GOVT. OF INDIA  
 General Manager, Coal India Ltd.  
 EOC-A-8A, Sector-24, Noida-201301 (U.P.)

Revised Mining Plan (1st Revision) – Pakri Barwadih Coal Block

Seam-III Comb	0.11 8				0.499				0.499
Seam-II Top	1.11 6			0.554	4.438	0.103			5.095
Seam-II Bot	1.27 0				10.347	0.484		-	10.831
Seam-I Top	0.52 7		0.095	0.708	0.314				1.117
Seam-I Mid	0.72 7				0.118	2.252	0.408		2.778
Seam-I Bot	0.61 0					1.600	0.166		1.766
<b>Total</b>			<b>1.777</b>	<b>2.427</b>	<b>24.298</b>	<b>11.650</b>	<b>0.574</b>		<b>40.726</b>
<b>Area beyond 300m Depth</b>									
Seam-V Top	1.88 8					2.863	2.868		5.731
Seam-V Bot	2.21 3			0.716	2.126	2.254			5.096
Seam-IV Top	1.06 0				8.448				8.448
Seam-IV Bot	2.06 0		8.857						8.857
Seam-IV Comb	0.33 9				0.825	2.385			3.210
Seam-III Top	1.54 6			0.052	2.511	0.842			3.405
Seam-III Bot	0.82 3					2.080			2.080
Seam-II Top	3.69 4				10.653				10.653
Seam-II Mid	2.68 1			18.973	1.387				20.360
Seam-II Bot	2.68 5				15.257				15.257
Seam-I Top	1.38 7	0.221	1.363	1.281					2.865
Seam-I Mid	1.78 1					2.547	4.327		6.874
Seam-I Bot	1.29 0			0.013	0.116	1.751			1.880
<b>Total</b>		<b>0.221</b>	<b>10.220</b>	<b>21.035</b>	<b>41.323</b>	<b>14.722</b>	<b>7.195</b>		<b>94.716</b>
<b>Total for EASTERN SECTOR</b>		<b>0.221</b>	<b>11.997</b>	<b>23.462</b>	<b>65.621</b>	<b>26.372</b>	<b>7.769</b>		<b>135.442</b>
<b>CENTRAL SECTOR</b>									
<b>Area Between 100m &amp; 300m Depth</b>									

Chapter- IV Geology

RQP No. 34011/ (15)/2009-CPAM dated 27.09.10.

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**SANJIV KUMAR SINGH**  
Recognised Qualified Person  
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*Sanjiv*  
**Page IV - 36**  
Dep. General Manager  
एन टी सी लिमिटेड / NTPC लि.  
EOC, A-3A, Sector-24, Noida-201301 (U.P.)

**Revised Mining Plan (1st Revision) – Pakri Barwadih Coal Block**

Seam-V Top	0.258					0.575	0.167		0.742
Seam-V Bot	0.541					0.769	0.467		1.236
Seam-IV Top	0.317					2.605			2.605
Seam-IV Bot	0.317			0.084	0.568				0.652
IV Comb	1.495				9.410	6.147			15.557
III Top	0.326		0.105	0.172	0.461				0.738
Seam-III Bot	0.763				1.593				1.593
Seam-II Top	1.189				6.136	0.521	0.588		7.245
Seam-II Mid	0.632			7.401	0.670	0.075			8.146
Seam-II Bot	0.740			0.608	0.914	4.448			5.970
Seam-I Top	1.163			0.249	0.105	1.103	1.202		2.659
Seam-I Mid	1.462				0.834	1.899	0.360		3.093
Seam-I Bot	1.126						1.723	0.881	2.604
<b>Total</b>			<b>0.105</b>	<b>8.514</b>	<b>20.691</b>	<b>18.142</b>	<b>4.507</b>	<b>0.881</b>	<b>52.840</b>
<b>Area beyond 300m Depth</b>									
Seam-V Top	4.240					1.895	12.577	0.716	15.188
Seam-V Bot	4.670				3.262	5.778	0.196		9.236
Seam-IV Top	1.814				4.235	10.657			14.892
Seam-IV Bot	1.814			0.560	1.269	4.376			6.205
Seam-IV Comb	2.488				1.887	8.281			10.168
Seam-III Top	2.985		0.090	0.935	3.767	1.574			6.276
Seam-III Bot	1.991			0.746	2.502	0.948			4.196
Seam-II Top	3.876			3.266	19.307	0.757	0.540		23.870
Seam-II Mid	4.230			10.874	12.771	0.243			23.888
Seam-II Bot	4.212			0.196	31.639	1.695			33.530

**Chapter- IV Geology**

RQP No. 34011/(15)/2009-CPAM dated 27.09.10.

**SANJIV KUMAR SINGH**  
Recognised Qualified Person  
No. 34C / (15)/2009-CPAM  
Ministry of Coal, Govt. of India

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**PAWAN DEV JAMTA**  
General Manager (Coal) (C&I)  
NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)



**Revised Mining Plan (1st Revision) – Pakri Barwadih Coal Block**

Seam-I Top	4.201			3.053	2.780	2.909	0.505		9.247
Seam-I Mid	4.390			1.620	3.541	4.853	1.474		6.327
Seam-I Bot	2.255					3.350	1.870		5.220
<b>Total</b>			<b>0.090</b>	<b>21.25 0</b>	<b>86.96 0</b>	<b>45.42 1</b>	<b>4.585</b>		<b>173.494</b>
<b>Total for CENTRAL SECTOR</b>			<b>0.195</b>	<b>29.76 4</b>	<b>107.6 51</b>	<b>65.28 6</b>	<b>8.250</b>		<b>226.334</b>

<b>WESTERN SECTOR</b>									
<b>Area Between 100m &amp; 300m Depth</b>									
Seam-V Top	0.21 2					0.481			0.481
Seam-V Comb	0.02 5					0.067			0.067
Seam-IV Top	0.54 6					5.277			5.277
Seam-IV Bot	0.59 6			0.245	0.920	0.933			2.098
Seam-IV Comb	0.10 5					1.184			1.184
Seam-III Top	0.24 3				0.880				0.880
Seam-III Bot	0.19 1			0.386					0.000
Seam-II Top	0.34 8				2.483				2.483
Seam-II Mid	0.35 3		0.448	1.190	1.640				3.278
Seam-II Bot	0.09 5				0.599				0.599
Seam-I Top	0.36 8			0.261	0.690				0.951
Seam-I Mid	0.33 1					1.616			1.616
Seam-I Bot	0.28 5					0.559	0.095		0.654
<b>Total</b>			<b>0.448</b>	<b>2.082</b>	<b>7.212</b>	<b>10.11 7</b>	<b>0.095</b>		<b>19.95 4</b>
<b>Area beyond 300m Depth</b>									
Seam-V Top	8.27 1					5.151	15.53 4		20.68 5

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## Revised Mining Plan (1st Revision) – Pakri Barwadih Coal Block

Total for WESTERN SECTOR		0.448	31.059	165.89 2	153.17 0	20.857		371.42 3
Total Proved	0.588	11.962	175.18 8	274.93 2	190.63 4	47.988	0.254	702.70 0
Total Indicated	0.221	12.640	84.285	339.16 4	244.82 5	36.876		733.19 9

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**Table 4.14**  
**Summary of Coal Reserve in Million tonnes**

	Up to 300m depth	Beyond 300m depth	Total
Proved	594	109	703
Indicated	113	620	733
Total	707	729	1436

As per United Nations Framework Classification (UNFC) the reserves of Pakri-Barwadih can be classified as given in Table 4.15:

**Table 4.15**  
**Summary of Coal Reserve in Million tonnes**  
Million tonnes

UNFC Code	Type	Net Coal Reserves
111	Proved Reserves	703
211	Feasibility Mineral Reserves	636
222	Indicated Mineral Reserves	733
Total(111+222)		1436

#### 4.6.2 RESERVES of PB North West Area

##### 4.6.2.1 GENERAL

- The procedure adopted for estimation of reserves of coal in Pakri Barwadih North West (sector-A) Coal Block is fundamentally based on the specific geological factors which determine the extent to which correlation, interpolation of data can be projected for building up a stratigraphic and structural model of the lay and disposition of the coal seams.
- The structural model is depicted in various plates illustrating vertical cross sections and floor contour plans. The dimensional model with quality overalls are presented in the individual seam folio plans.
- Detailed exploration in Pakri – Barwadih - A Coal Block, District Hazaribagh, Jharkhand has established the presence of 10 Nos. of seams, 5 each coal bearing horizons belonging to Barakar formations and Karharbari formation respectively. In ascending order these are seam K-1, K-2, K-3, K-4, K-5 in Karharbari Formation and Local(L), I, II, IV & V in

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Barakar Formation. Seam I splits into 3 sections viz. I Top, I Middle & I Bottom at places. Seam I Bottom and I Middle combined and form single seam namely I Bottom + Middle. Similarly Seam II also splits into 3 sections viz. II Top, II Middle and II Bottom. Seam II Top and II Middle coalesce to form single seam as II Top + II Middle in eastern part. In Pakri Barwadih North West (Sector-A) Coal Block Seam V & IV occur as a combined seam.

- d. The dimensional and quality aspects of the seams viewed in the spatial framework with reference to the ground surface have indicated the potentiality for mining of Seams. Seam I - Bottom, I - Bottom + I - Middle, I - Middle, I-Top, II-Bottom, II Middle, II Top, II Top + Middle, IV Combined & V Combined together as the opencast proposition, while Seam-Local (L) & K-1 to K-5 can be mined by underground method. The entire quarriable area considering seam-I as base seam occurs in less than 300 m depth.
- e. In borehole MNPB-13 located outside northern boundary, Seam K1 & K2 of Karharbari Formation are intersected at shallower depth. Besides, as per structure evolved, coal seams (K1 to K5) of Karharbari are likely to extend outside the northern boundary of the block in the northeastern area.

#### 4.6.2.2 BASIC ASSUMPTIONS AND NORMS FOLLOWED

The following basic assumptions and norms have been taken into account for reserves calculation:

- i) The isochores, isograde and the floor contours have been drawn by using MINEX software. It is assumed that the variation between any two points of observation is uniform and gradual.
- ii) The underground reserves for the seams have been estimated based on 1-30 thickness and quality of the seam. The 1-30 thickness has been delineated including carbonaceous shale bands upto 0.30m and non-combustible bands upto 0.05m thickness. However, all non-combustible bands (NCB) of >0.05m thickness and carbonaceous bands of > 0.30 m have been excluded. The quarriable reserves have been estimated on the basis of 1-100 thickness where the carbonaceous bands up to 1m thickness have been included in the seam and dirt bands more than 1 m. in thickness & obvious bands more than 0.05m in thickness have been excluded.
- iii) The minimum workable thickness for the estimation of open cast and underground reserves of the seam has been considered as 1.00 m and 0.90m/1.20m respectively.

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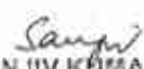
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- iv) In open cast reserves have been estimated at 1.00 m. thickness interval while in underground reserves have been estimated at 0.90m to 1.20m, 1.20m to 1.50m, 1.50m to 1.80m, 1.80m to 2.00m, 2.00m to 2.50m, 2.50m to 3.00m, 3.00m to 3.50m, 3.50m to 5.00m, 5.00m to 10.00m thickness ranges and above 10.00m interval
- v) The seams having UHV less than 1300 K/Cal/Kg have been considered as ungraded coal and have been marked in seam folio of respective seam. Ungraded coal zones have been included in over burden.
- vi) Areas have been identified where the seams are not developed at all. The limits of these zones of non-development have been marked by taking half of the influence of the boreholes with positive seam intersection. These limits have also been considered to be the line of zero seam thickness and the workable limits were delineated accordingly. The areas falling within < 1.00 m thickness zone have not been considered for estimation of opencast reserves in case of underground reserves areas <0.90 m. / 1.20 m. have not been taken in account for reserves estimation.
- vii) Line of split has been considered as 1.00m parting between two sections. Though in few cases the parting between two consecutive seams is less than 1m, seam is considered split as it occurs in small patches. Likewise if the seam is found coalesced in a small patch has been considered split.
- viii) 40m barrier have been drawn from Khora Nala, its tributary and road.
- ix) No barrier has been drawn along the kucha roads which connect the different parts of the block and small nalas.
- x) The reserves have been estimated upto the trace of the floor of the incropping coal seams within the block.
- xi) In incrop. region while estimating the reserves, average of thickness has been considered.
- xii) An overall deduction of 10% is applied to the gross tonnage from each seam to arrive at the net-in-situ reserves of coal to account for data gaps, wash out zones, abrupt change in seam thickness and the reserves have been rounded off to the nearest multiple of 1000 tonnes.
- xiii) Heave zone of respective seam has excluded while estimating reserves.
- xiv) All volumes of coal are estimated by isochore method.

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#### 4.6.2.3 ISOCHORE METHOD OF RESERVES ESTIMATION

- In order to estimate the underground reserves the isochores of seam thickness excluding all dirt bands having thickness > 0.30 m and all non-combustible bands having thickness > 0.05m have been drawn while for estimation of open cast reserves the isochores have been drawn by excluding dirt band of more than 1 m. thickness and obvious bands of >0.05m thickness. Isograde for different grades have been drawn. The intersections of all these lines have generated large number of small areas each with a specific combination of seam parameters and imposed limitations.
- The reserves of the seam have been calculated by using MINEX Software.
- The standard formula which is universally accepted has been used for calculating the gross reserves :

$$R = A \times Th \times Sp. Gr.$$

Where,

R = Gross Reserves in thousand tones

A = Area in Sq.m.

Th = Thickness in metre

Sp. Gr. = Specific Gravity of coal for a specific grade

#### 4.6.2.4 OVERBURDEN

- Nature of overburden:** Overburden consists predominantly sandstone with minor amount of shale, carbonaceous shale, ungraded coal and thin coal bands (< 1m in thickness). Besides, the overburden also includes soil, weathered rocks, obvious bands of any thickness and dirt bands of >1m thickness.
- Calculation of Overburden:** Overburden plan, total iso-pachytes plan, coal to overburden plan and iso-excavation plan on floor of Seam I Bottom and I Middle + Bottom have been prepared by using MINEX Software Programme. Total Volume has been calculated by software.
- The volume of overburden has been calculated by applying the formula:

$$V = A \times Th.$$

Where,

V = Volume of overburden in cubic meter.

A = Area in sq. m.

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Th = Average thickness of iso-pachytes of overburden in m / Iso-pachytes of parting.

#### 4.6.2.5 COAL TO OVERBUREN RATIO

The coal packet from Seam-I Bottom to V Combined together forms the opencast potentiality. Near the incrop of Seam-I Bottom, coal to overburden ratio is more than 1:5. But after the inclusion of younger seams the ratio improves to 1:1. With the increase of quarry depth, ratio decreases to 1:4. In the major part of the block coal to overburden ration varies from 1:1 to 1:4.

#### 4.6.2.6 STRIPPING RATIO

Stripping ratio is obtained after dividing total volume of overburden by tonnage of coal available in the same area. Volume of overburden and stripping ratio-wise and depth-wise reserves are given in Table 4.16.

TABLE 4.16  
SECTOR WISE, DEPTH WISE RESERVES, OVERBURDEN AND STRIPPING RATIO

SECTOR	DEPTH (m)	RATIO	AREA (m <sup>2</sup> )	REERVE ('000 TONNES)	VOLUME ('000 m <sup>3</sup> )	STRIPPING RATIO (m <sup>3</sup> /t)
I	0 - 50	<1:1	3700	95	53.599	0.564
		1:1 - 1:2	6800	87	137.412	1.579
		1:2 - 1:3	6600	99	156.579	1.582
	Depth Total		17100	281	347.590	1.237
	50 - 100	<1:1	41400	1887	1194.583	0.633
		1:1 - 1:2	13600	835	675.558	0.809
		Depth Total	55000	281	1870.141	0.687
	100 - 150	1:1 - 1:2	18000	1162	1116.640	0.961
	Depth Total		18000	1162	1116.640	0.961
	Sector Total		90100	4165	3334.371	0.801
	0 - 50	<1:1	2600	38	16.072	0.423
		1:1 - 1:2	22400	348	505.270	1.452

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SECTOR	DEPTH (m)	RATIO	AREA (m <sup>2</sup> )	REERVE ('000 TONNES)	VOLUME ('000 m <sup>3</sup> )	STRIPPING RATIO (m <sup>3</sup> /t)
II		1:2 – 1:3	116800	1565	2962.689	1.893
		1:3 – 1:4	68300	870	1962.472	2.256
		1:4 – 1:5	15300	177	451.181	2.549
		>1:5	60800	319	1431.425	4.487
	Depth Total		286200	3317	7329.109	2.210
	50 - 100	<1:1	7700	239	208.826	0.874
		1:1 – 1:2	384300	17512	17461.220	0.997
		1:2 – 1:3	11500	382	433.705	1.135
		1:3 – 1:4	1300	62	51.524	0.831
	Depth Total		404800	18195	18155.280	0.998
	100 - 150	1:1 – 1:2	106400	5984	7723.825	1.291
		1:2 – 1:3	135700	7633	12041.560	1.578
	Depth Total		242100	13617	19765.380	1.452
	150 - 200	1:2 – 1:3	118800	7754	14392.920	1.856
		1:3 – 1:4	122600	7619	17445.210	2.290
	Depth Total		241400	15373	31838.130	2.071
	200 - 250	1:2 – 1:3	100	7	14.998	2.143
		1:3 – 1:4	80800	5755	13679.360	2.377
		1:4 – 1:5	9900	778	1897.294	2.439
	Depth Total		90800	6540	15591.650	2.384
	250 - 300	1:4 – 1:5	700	53	143.101	2.700
	Depth Total		700	53	143.101	2.700
	Sector Total		1266000	57095	92822.650	1.626
	0 - 50	1:1 –	400	2	5.370	2.685

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SECTOR	DEPTH (m)	RATIO	AREA (m <sup>2</sup> )	REERVE ('000 TONNES)	VOLUME ('000 m <sup>3</sup> )	STRIPPING RATIO (m <sup>3</sup> /t)
III		1:2				
		1:2 – 1:3	21600	259	547.525	2.114
		1:3 – 1:4	28000	317	799.808	2.523
		1:4 – 1:5	17400	184	568.847	3.092
		>1:5	3900	27	113.712	4.212
		Depth Total	71300	789	2035.262	2.580
	50 - 100	<1:1	1100	69	30.245	0.438
		1:1 – 1:2	97700	3906	4805.997	1.230
		1:2 – 1:3	63600	2550	4001.816	1.569
		1:3 – 1:4	22900	569	1015.282	1.784
		1:4 – 1:5	14500	376	754.994	2.008
		>1:5	100	1	4.316	4.316
		Depth Total	199900	7471	10612.650	1.421
	100 - 150	1:1 – 1:2	18900	1096	1298.116	1.184
		1:2 – 1:3	174800	9133	15262.440	1.671
		1:3 – 1:4	22900	1122	2483.796	2.214
		Depth Total	216600	11351	19044.360	1.678
	150 - 200	1:2 – 1:3	3100	251	351.135	1.399
		1:3 – 1:4	145800	8342	19787.450	2.372
		1:4 – 1:5	200	11	32.013	2.910
		Depth Total	149100	8604	20170.600	2.344
	200 - 250	1:3 – 1:4	30700	2115	5093.640	2.408
		1:4 – 1:5	11400	743	1945.827	2.619

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SECTOR	DEPTH (m)	RATIO	AREA (m <sup>2</sup> )	REERVE ('000 TONNES)	VOLUME ('000 m <sup>3</sup> )	STRIPPING RATIO (m <sup>3</sup> /t)
	Depth Total		42100	2858	7039.467	2.463
	Sector Total		679000	31073	58902.340	1.896
IV	0 - 50	<1:1	100	69	2.100	0.030
		1:2 - 1:3	18100	293	559.562	1.910
		1:3 - 1:4	40400	579	1181.780	2.041
		1:4 - 1:5	14800	133	400.486	3.011
		>1:5	5900	67	140.887	2.103
	Depth Total		79300	1141	2284.815	2.002
	50 - 100	<1:1	7200	224	201.456	0.899
		1:1 - 1:2	82100	3353	3386.862	1.010
		1:2 - 1:3	28300	1193	1725.109	1.446
		1:3 - 1:4	20300	577	842.583	1.460
	Depth Total		137900	5347	6156.010	1.151
	100 - 150	1:1 - 1:2	100	5	6.663	1.333
	Depth Total		100	5	6.663	1.333
	Sector Total		217300	6493	8447.488	1.301
V	0 - 50	1:1 - 1:2	100	30	2.573	0.086
		1:2 - 1:3	5200	80	156.494	1.956
		1:3 - 1:4	32400	516	1013.048	1.963
		1:4 - 1:5	34500	356	1064.945	2.991
		>1:5	26500	213	805.907	3.784
	Depth Total		98700	1195	3042.967	2.546
	50 - 100	<1:1	400	12	11.901	0.992
		1:1 - 1:2	82300	3146	3736.673	1.188
		1:2 - 1:3	18800	806	1164.137	1.444

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यह प्रमाणित किया जाता है कि  
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यह प्रमाणित किया जाता है कि

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SECTOR	DEPTH (m)	RATIO	AREA (m <sup>2</sup> )	REERVE ('000 TONNES)	VOLUME ('000 m <sup>3</sup> )	STRIPPING RATIO (m <sup>3</sup> /t)
		1:3 – 1:4	16900	436	753.228	1.728
		1:4 – 1:5	19000	493	929.143	1.885
		>1:5	2200	140	100.593	0.719
	Depth Total		139600	5033	6695.675	1.330
	100 - 150	1:2 – 1:3	1200	54	83.737	1.551
		>1:5	1000	51	88.450	1.734
	Depth Total		2200	105	172.187	1.640
	Sector Total		240500	6333	9910.828	1.565
GRAND TOTAL		<1:1	64200	2633	1718.782	0.653
		1:1 – 1:2	833100	37466	40862.180	1.091
		1:2 – 1:3	724200	32059	53854.410	1.680
		1:3 – 1:4	633300	28879	66109.180	2.289
		1:4 – 1:5	137700	3304	8187.831	2.478
		>1:5	100400	818	2685.290	3.283
	TOTAL		2492900	105159	173417.700	1.649

## 4.6.2.7 SECTORS FOR RESERVE ESTIMATION

Based on structural set up, the block has been divided into 6 sectors. Descriptions of sectors are given in Table 4.17. Category wise Geological Reserve of PB North West Quarry are given in Table 4.18. Seamwise and Gradewise reserves are given in Table 4.19.

TABLE 4.17  
DESCRIPTION OF SECTORS

SECTOR	DESCRIPTION
Sector I	Located in the southern part of the block bounded by southern, western and eastern boundary of the block and up thrown trace of fault F <sub>1</sub> -F <sub>1</sub>

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Sector II	Located to the north of Sector-I, bounded by down thrown trace of fault F <sub>1</sub> -F <sub>1</sub> in the south, upthrown trace of fault F <sub>3</sub> -F <sub>3</sub> in north and by block boundary
Sector III	Located in the central part bounded by down thrown trace of Fault F <sub>3</sub> -F <sub>3</sub> , upthrown trace of fault F <sub>4</sub> -F <sub>4</sub> , in the north and by block boundary
Sector IV	Located in the north eastern part of the block, bounded by down thrown trace of fault F <sub>4</sub> -F <sub>4</sub> , in the south and up thrown trace of fault F <sub>6</sub> -F <sub>6</sub> in the north and block boundary.
Sector V	Located in the north eastern part of the block bounded by block boundary, up thrown trace of fault F <sub>5</sub> -F <sub>5</sub> in the north, block boundary in the east and down thrown trace of fault F <sub>6</sub> -F <sub>6</sub> in the south and west
Sector VI	A small triangular patch located in the extreme north-eastern part, bounded by block boundary in north & east, and down thrown trace of fault F <sub>5</sub> -F <sub>5</sub> in the south and west

A total of 137.584 million tonnes of coal reserves varying in grade from 'G' to 'A' has been established in Pakri Barwadih North West (Sector-A) Coal Block, out of which 134.470 m.t falls in proved category and 3.114 m.t in 'Indicated Category'.

Table 4.18

Category wise Geological Reserve of PB North West Quarry

Property	Reserves in Million Tonnes		
	Category		Total
	Proved	Indicated	Total
Opencast	106.263	0.425	106.688
Underground	28.207	2.689	30.896
Total	134.470	3.114	137.584

Table 4.19

SEAM WISE AND GRADE WISE GEOLOGICAL RESERVES

(In '000 Tonnes)

SEAM/ GRADE	A	B	C	D	E	F	G	TOTAL
V COMB	0	0	0	0	175	6010	0	6185
IV COMB	0	0	0	0	3547	8174	0	11721

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SEAM/ GRADE	A	B	C	D	E	F	G	TOTAL
II TOP	0	0	0	699	9683	0	0	10372
II MID	0	0	0	9623	2610	0	0	12233
II T+M	0	0	0	8459	12825	1347	0	22631
II BOT	0	0	0	1481	9913	703	1	12098
I TOP	0	0	277	2829	3188	805	0	7099
I MID	0	0	402	984	2593	435	0	4414
I BOT	0	0	416	499	484	389	85	1873
I M+B	0	0	0	0	7256	10806	0	18062
LOCAL	0	0	59	1414	733	391	0	2597
K - 5	97	0	4	0	1	26	0	128
K - 4	1958	1044	723	486	0	0	0	4211
K - 3	1159	947	988	249	0	0	0	3343
K - 2	3841	534	390	403	207	0	0	5375
K - 1	6301	4870	2142	1197	606	126	0	15242
TOTAL	13356	7395	5401	28323	53821	29212	86	137594

Seam wise and Depthwise Geological Reserve of PB North West Quarry are given in Table 4.20. Seamwise and Depthwise Underground reserves are given in Table 4.21.

Table 4.20

**SEAM WISE AND DEPTH WISE OPENCAST RESERVES**  
(In '000 Tonnes)

SEAM/DEPTH	0 - 50	50 - 100	100 - 150	150 - 200	200 - 250	250 - 300	TOTAL
V COMB	26	891	2150	2312	803	3	6185
IV COMB	32	2657	4106	3430	1485	11	11721
II TOP	35	3611	2897	2592	1226	11	10372
II MID	220	4297	3190	2999	1514	13	12233
II T+M	389	10758	5631	4660	1193	0	22631



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SEAM/DEPTH	0 - 50	50 - 100	100 - 150	150 - 200	200 - 250	250 - 300	TOTAL
II BOT	695	5011	2630	2639	1117	6	12098
I TOP	1081	2927	1355	1240	496	0	7099
I MID	1485	1670	1039	216	2	2	4414
I BOT	862	629	276	104	1	1	1873
I M+B	2366	6632	3407	4115	1537	5	18062
TOTAL	7191	39083	26681	24307	9374	52	106688

**Table 4.21**

**SEAM WISE AND DEPTH WISE UNDERGROUND RESERVES PB (NW)**  
(in '000 Tonnes)

SEAM/DEPTH	<300	>300	TOTAL
LOCAL	0	2597	2597
K - 5	128	0	128
K - 4	4209	2	4211
K - 3	3334	9	3343
K - 2	5355	20	5375
K - 1	15023	219	15242
TOTAL	28049	2847	30896

**4.7 Total Reserves**

Total reserves of Pakri Barwadih Coal Block is given in Table 4.22.

**Table No 4.22**

**Total Reserve in Pakri Barwadih Block**

Sl. No.	Reserve Category	PB West & East	PB NW	Total(Reserve in Million Tones)
1	Proved	703	134.470	837.470
2	Indicated	733	3.114	736.114
	Total	1436	137.584	1573.584

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**Chapter- IV Geology**

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# CHAPTER V

## MINING

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## CHAPTER V MINING

### 5.1. GENERAL

- 5.1.1. Pakri Barwadih coal mining block covers an area of 46.95 Sq km and located in North Karanpura Coalfield. Present Mining Plan covers entire area of the block including an area of 2.66 sq km falling outside block between Barakar seams and metamorphic on the rise side for OB dumps, proposed mine infrastructure, evacuation corridor and railway siding. Underground Mining is also proposed for which separate mining plan shall be submitted on 9<sup>th</sup> year from the commencement of Opencast Mining operations. Details of area is given in Table 5.1.

Table 5.1  
Area of the Block

Sl. No.	Particulars	Area in Sq. Km
1	Pakri Barwadih West and East	39.43
2	Pakri Barwadih North West	4.85
3	Additional area for OB dump, Infra, Evacuation	2.66
	<b>Total</b>	<b>46.95</b>

- 5.1.2. Total 27 number of villages are located in the coal block. Villages namely Itiz, Chirudih, Nagadi, Dadi Kalan, Chepa Kalan, Arahara, Pakri Barwadih, Sinduari, Sonbersa, Churchu, Jugra, Chepa Khurd, Keri, Langatu, Deoria Khurd, Urub, Barkagaon, Bariatu, Beltu, Kandaber, Nawadih, Sirma, Basariya and Jabra. Sirma, Basariya and Nawadih are located in the northern part of the block. Jabra village is towards Southwest of the block.

Cumulative population of approximately 8339 Project Affected Persons (PAPs) were estimated for the block. These PAPs shall be relocated at Rehabilitation and Resettlement Colony which shall be constructed near Denga Village on the South Eastern part of the Block.

### 5.2. MINE DESIGN STRATEGY

- 5.2.1. Out of 44.28 sq Km block area of Pakri Barwadih Block, 29.28 Sq Km is fully explored and rest 15 sq km is regionally explored. 266.08 Ha of land falls outside of the block boundary. Two nos. of Geological Reports have been prepared, the first GR which was prepared by CMPDI covered West and East part of the block while the other GR prepared by MECL covered North West sector. Total area of the block is 46.95 Sq. Km. Estimated coal reserves are

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COAL MINING PLAN

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1573 million tonnes. Data from both the GRs have been used for preparation of Present Mining Plan.

5.2.2. Pakri Barwadih Block is designed to produce 18 MTPA (Peak Capacity) of coal for captive usage of NTPC Power Plants located at different parts of country. As block area is virgin/Greenfield and no coal evacuation infrastructure is available at present, requisite infrastructure is also planned.

5.2.3. In the present Mining Plan, coal from Pakri Barwadih blocks is envisaged for extraction of coal by Open Cast method of mining. Coal shall be extracted up to 300 meter depth line only by mixed slicing method through deployment of Shovel-Dumper combination. Horizontal slicing method shall be adopted to extract coal from PB North West and East quarry while combination of inclined and horizontal slicing method shall be adopted to extract coal from PB West quarry.

Underground Mining is proposed for which separate mining plan shall be submitted on 9<sup>th</sup> year from the commencement of opencast mining operations.

5.2.4. Initially two box cuts namely Box cut-West & Box cut – East shall be simultaneously driven for Pakri Barwadih West, Pakri Barwadih East respectively. PB East quarry shall be worked for two years initially. On 4<sup>th</sup> year to facilitate augmentation of coal extraction one more box cut in the quarry PB North West shall be driven. During 25<sup>th</sup> year when the PB-West quarry ceases to operate, previously driven (Box Cut-East) shall be restarted and continued for extraction of coal from PB East quarry in the remaining life of PB East mine.

5.2.5. Mining Operations shall be carried out in three quarries namely PB West, PB East and PB North West. PB West quarry shall commence production on 1<sup>st</sup> operating year shall produce peak production of 15 MTPA in 12<sup>th</sup> operating year. PB East quarry shall also commence on the 1<sup>st</sup> operating year and shall produce peak production 1.1 MTPA for initial two years only. However, while PB West Quarry shall still be operational PB East quarry shall be restarted after 25<sup>th</sup> year. Throughout the period of 37 operational years PB West Quarry and PB East together shall be producing 15 MTPA of Peak production.

PB North West quarry shall commence production on 4<sup>th</sup> operating year and produce peak production of 3 MTPA up to 50<sup>th</sup> year.

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The combined peak production of Pakri Barwadih shall be 18 MTPA from 12th to 37th operational year. Total life of Pakri barwadih coal mine is 52 years.

- 5.2.6. For optimisation of internal dumping in PB West quarry, 4 pits shall be created namely WP-1, WP-2 WP-3 and WP-4 to progressively all these pits shall be worked and filled by in pit dumping in succession. For operation of PB East only one pit shall be created. PB North West quarry shall be worked by making two pits namely PIT-1, PIT-2 and in later years PIT-1 shall be filled by in pit dumping.
- 5.2.7. Scrapping of Top soil, face preparation, marking of holes, drilling, charging of holes blasting, loading through excavators, transportation of OB & coal to the destination, observance of safety requirements, dust-suppression, deployment of statutory personnel, haul roads preparation, grading, environment management, wildlife preservation etc. shall be routine operations observed during extraction of mineral.
- 5.2.8. Useful Top soil shall be scrapped and stacked separately before preparation of OB for reclamation purposes. Drilling and Blasting shall be performed by deployment of large diameter drilling machines and SMS/emulsion explosives. Excavated OB shall be loaded by High capacity Excavators in High capacity Dumpers. This OB shall be dumped either in allocated external dumps or designated in pit dumps.
- 5.2.9. In initial years OB shall have to be exclusively dumped in the external dump. Dump A, B & C are earmarked to dump Overburden produced from PB West quarry. Dump D is earmarked to dump Overburden produced from PB East quarry for two years only. During the course of mining in the Western Quarry, in pit dumping shall also be carried out when sufficient de-coaled area is available. In the later years i.e after 25 years entire Overburden of PB East quarry shall be dumped in the void created by workings of PB West quarry. Here also intermittent in pit dumping shall be performed. Therefore no re-handling of OB shall take place for PB-West and PB East quarry. It is not proposed to re handle external dumps created by PB West & PB East Quarry.
- 5.2.10. For PB-NW quarry three external dumping location have been identified name A, B and C. External dump A shall be re-handled to facilitate extraction from PIT-2. Dump-C shall be re-handled and filled in the void of PB-West quarry to facilitate extraction of coal locked beneath it. Dump heights varying from 60m-90m shall be maintained.

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- 5.2.11. Nallahs namely Khora, Dumuha, Pakwa Nalla, Hardara are traversing through the block.

It is proposed to construct a catchment canal from the northern periphery of the block as per the diversion study report prepared by CWPRS, Pune. The above drain shall also serve the purpose of catchment canal for rainwater and runoff from northern hills.

Lathorva nalla which flows from western side of PB NW quarry shall not be diverted but realigned/straightened if necessary emboldened to carry additional load of diverted Khora Nalla.

Before restart of exploitation of East Quarry reserves Hardara Nalla shall be diverted in the periphery of PB East Quarry which shall meet its own course further downstream within the block boundary.

General slope for diverted channel shall be kept as 1 in 500-1000, side slopes shall be kept limited to 2H to 1V and free board shall be maintained to 1.5m.

It is amply clear from the above that all nallas flowing through the blocks and interfering with the production regime shall be diverted preferably to the northern fringe of the block to free up the locked reserves so as to ensure minimum or no sterilization of coal.

- 5.2.12. There shall not be any barrier between PB NW, PB West, PB East quarries hence no coal shall be sterilized. Reserves are blocked only in the barrier left against the adjacent mines and batters which shall be governed by prevailing design standards.

- 5.2.13. Detailed exploration of regionally explored area below planned Dump-C where underground mining is proposed shall be carried out and finished before commencement of actual dumping operations in such a manner not to jeopardise the underground mining operations.

- 5.2.14. ROM coal transportation shall be effected by dumper brought up to receiving hopper of primary Crusher. Coal shall be reduced up to (-) 50mm size by the deployment of Primary and Secondary crushing units. Crushed coal from West and East Quarry shall be fed by mine end conveyor system either to stock yard having stacking & reclaiming system or directly to 14 km Cross Country conveyor transporting coal from mine to Silo at Bandag railway siding.. Within mining lease (-) 50 mm coal shall be transported from PB NW to stacking and reclaiming system by trucks.

- 5.2.15. Loading silos of concrete construction, shall load the coal in the Railway 60T/other specification wagons through Rapid Loading System, weighment arrangement of coal at conveyors and in motion weigh bridges shall be provided

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pre & post loading points. Through Indian Railway system coal shall be transported to its destination.

- 5.2.16. Coal washability study has not yet been carried out for Pakri Barwadih Coal. Coal quality parameters obtained from the proximate analysis of coal revealed that ash percentage in all probability is likely to remain 34% or below which does not call for commissioning of coal washery. However to cater for more stringent future quality stipulations, space allocation is earmarked for commissioning of Coal Washery at mine end to facilitate transport of washed coal to the power plants as per qualitative requirements.
- 5.2.17. Permanent source of electrical power is identified as Patratu Thermal Power station transmission lines shall be drawn at 220KV. The 220/33/11KV main receiving station is being envisaged by NTPC for providing power for mining operations. Two nos. of 33KV independent feeders are provided from 33KV switchgear for each quarry i.e for PB West, PB East and PB North West quarry. Further power distribution to infrastructure and other facilities for both the quarries shall through 33KV transmission Lines. High capacity DG sets have been envisaged for backup power.
- 5.2.18. Hazaribagh-Tandwa Road which passes through eastern part of the block is identified as approach road to connect the mine from State Highway. Nearly 10 km road upto Mine entry shall be constructed/strengthened for transportation of HEMM during commissioning. Existing Hazaribagh- Tandwa Road shall be diverted at the periphery of PB East quarry during 18<sup>th</sup> year of mining operation to facilitate extraction coal from East quarry.
- 5.2.19. Requisite infrastructure is planned for PB West & East quarry and NW quarry. Infrastructure proposed for PB West such as CHP, Sub Station, Workshop, administrative buildings etc. shall be utilised also for PB East quarry. Some infrastructure/facilities such as haul roads, culverts drainage system etc. shall be made separately for eastern quarry. Certain facilities such as coal sampling lab, environmental cell, vocational training centre, magazine etc. shall be common for both the quarries.
- 5.2.20. Environment clearance, forest clearance, nalla diversion study, SES study have been completed for PB West and PB East quarry. However, Environment clearance, Forest clearance, Nalla diversion study, SES study shall be carried out separately for PB NW quarry. Slope stability and wash ability study (if required) shall be carried out for entire block.
- 5.2.21. During mine closure there shall be two voids. The first in the order shall be in the North West side while the second shall be on the eastern side of the block. Re-handling of internal & external dump overburden for reduction of void is not



envisaged in the present mining plan. The voids so left shall serve for the purpose of water storage reservoir for use society and shall also facilitate groundwater recharge. Overburden dumps shall be planted, as far as possible the other area shall be levelled and planted and handed over the state government. Dangerous infrastructures shall be dismantled, manpower shall be shifted to other operating mine of NTPC. Roads and buildings shall be handed over to the state government for public use.

### 5.3. MINING

As already explained extraction of reserves shall be carried out from three distinct quarries of Pakri Barwadih Coal Block. The mining system is explained under following different heads.

- i) Characteristics of Deposit
- ii) Quarry boundary
- iii) Opening up of Deposit
- iv) Quarry Design Strategy
- v) Mineable Reserves and Stripping Ratio
- vi) Mining Method and Choice of Technology
- vii) System Parameters
- viii) Drilling and Blasting
- ix) Disposal of Waste
- x) Projected Production Plan/Calendar Program
- xi) Equipment Requirement
- xii) Annual Capacity and Life of Quarry
- xiii) Quarry Drainage

#### 5.3.1. Characteristics of Deposit

##### PB West & East

The geological & mining characteristics of the PB West & East depicts total 12 workable splits contained in 5 seams i.e. Seam-I to V is considered for open cast mining. Seam I occurrence is not reported in most of the boreholes, as a result mining shall be carried out in patches. In general, the coal seams are dipping at 1 in 3 to 1 in 5 towards south. As per Geological Report prepared by CMPDI, the Karharbari formations contain five thin non workable seams namely K1 – K5. The average thickness of these seams are less than 1m. GR indicated four coal seams (Seam-II to V with 9 distinct splits) amenable for opencast mining. On critical analysis taking mineral conservation as top priority, patches of seam I is also considered in the planning. Advance drilling shall be carried out to prove the extent of Seam-I for opencast mining. The seam can be taken with the same Haul Road in pockets.

##### PB (North West)

The geological & mining characteristics of PB North West depicts a basinal structure particularly in the area north and west which are Precambrian inlier.





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	Part bet IB & IM	m	2.29 - 3.62	0.95 - 10.56	1.13 - 16.35	0.95 - 11.96	0.85 - 18.7
	Part bet IM & IT	m	1.0 - 2.60	1.66 - 3.71	1.01 - 15.8	1.02 - 18.77	1.6 - 14.73
	Part bet IT & IIB	m		7.43 - 25.5	11.21 - 30.05	6.21 - 30.43	4.74 - 27.94
	Part bet IIB & IIM	m		1.6 - 6.28	0 - 2.85	0.85 - 4.65	0.97 - 5.8
	Part bet IIM & IIT	m		10.46 - 10.46	19.04 - 29.42	1.2 - 31.93	1.34 - 28.12
	Part bet IIT & IIIB	m		10.16 - 20.39	10.24 - 33.87	3.39 - 45.97	1.97 - 33.72
	Part bet IIIB & IIIT	m		4.38 - 24.75	2.48 - 17.29	1.1 - 20.2	0.94 - 16.94
	Part bet IIIT & IVB	m			8.58 - 29.23	5.1 - 44.31	5.31 - 22.93
	Part bet IVB & IVT	m			1.23 - 6.54	0.9 - 6.76	16.38 - 17.59
	Part bet IVT & VB	m			23.08	2.16 - 24.97	5.88 - 19.95
	Part bet VB & VT	m				0.8 - 7.19	0.82 - 4.89
IV	Quarry parameters						
	Dip of Seams		1 in 4 to 1 in 5	1 in 4 to 1 in 5.5	1 in 4	1 in 4	1 in 3
	Surface Strike Length	m	1800	2200	1600	5500	3800
	Surface width	m	400	800	400	1800	1400
	Maximum depth	m	100	150	125	300	300
	Area of excavation *	Ha	59.98	140.7	113.6	605.29	662.85

**Table 5.2 B**

**Mining and Geological Characteristics of PB NW Quarriable Block**

Sl.no	Particulars	Units	PIT 1	PIT 2
*	Seam /Parting			
1	V COMB	m	3.24-5.9	3.24-5.9
2	IV COMB	m	5.15-10.04	5.15-10.04
3	II TOP	m	6.96-10.61	6.96-10.61
4	II MID	m	7.17-11.68	7.17-11.68
5	II T+M	m	15.97-20.26	15.97-20.26
6	II BOT	m	2.85-6.3	2.85-6.3
7	I TOP	m	0.42-3.79	0.42-3.79
8	I MID	m	1.15-8.73	1.15-8.73
9	I BOT	m	1.01-4.17	1.01-4.17
10	I M+B	m	4.7-11.88	4.7-11.88
11	LOCAL(L)	m	0.06-2.35	0.06-2.35
12	K-5	m	0.08-1.32	0.08-1.32
13	K-4	m	0.28-1.74	0.28-1.74
14	K-3	m	0.45-1.96	0.45-1.96
15	K-2	m	0.06-2.99	0.06-2.99
16	K-1	m	1.19-4.68	1.19-4.68
	Top OB (Avg.)		Average thickness overburden	
		m	25	45

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**Revised Mining Plan (1st Revision) – Pakri Barwadih Coal Block**

Parting				
1	Par bet V COMB & IV COMB	m	3.72	27.16
2	Par bet IV COMB & II TOP	m	0.98	30.55
3	Par bet II TOP & II MID	m	1.09	5.12
4	Par bet II MID & II T+M	m	0	0
5	Par bet II T+M & II BOT	m	1.4	24.22
6	Par bet II BOT & I TOP	m	5.89	15
7	Par bet I TOP & I MID	m	0.52	4.51
8	Par bet I MID & I BOT	m	0.17	4.19
9	Par bet I BOT & I M+B	m	0	0
10	Par bet I M+B & LOCAL(L)	m	16.8	27.68
11	Par bet LOCAL(L) & K-5	m	16.39	29.67
12	Par bet K-5 & K-4	m	4.74	12.65
13	Par bet K-4 & K-3	m	4.4	9.85
14	Par bet K-3 & K-2	m	8.45	19.58
15	Par bet K-2 & K-1	m	1.95	13.84
<b>Quarry parameters</b>				
1	Quarry floor area	ha	167	158
2	Quarry surface area	ha	267	175
3	No. of seams	no.	14	14
4	Life in years	no.	24	28
5	Gradient		10° to 12°	10° to 12°
6	Strike length (along floor)			
	a) Maximum	m	1180	1060
	b) Minimum	m	565	270
7	Strike length (along surface)			
	a) Maximum	m	1410	1050
	b) Minimum	m	1060	290
	Depth		280	280

**Note:**  
 \*Total quarriable area for all the pits=1982 ha (919.2 (West quarry) + 662.85 (East quarry) = 1582 ha.  
 Out of 1582ha, 42 ha is common because of excavation to be done in phases. Hence net quarriable area for West & East quarries is 1540 ha).

### 5.3.2. Mine/Quarry boundary

The boundaries of PB West and PB East Quarry are delineated and given in Table-5.3.

**Table 5.3**  
**Boundaries up to 300 m depth line**

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Particulars	WEST QUARRY				EAST QUARRY	NORTH WEST QUARRY	
	WP-1	WP-2	WP-3	WP-4		PIT-1	PIT-2
North-West Boundary	Incrop of seam I	F <sub>14</sub> and Incrop of seam I	Incrop of seam I	Incrop of seam I	Incrop of seam I	In-crop of K - 1 seam Quarry surface has been projected at 45° on the surface, with respect to the quarry floor.	In-crop of K - 1 seam Quarry surface has been projected at 45° on the surface, with respect to the quarry floor.
West Boundary	Khora nala and Incrop of seam I	Khora nala and Incrop of seam I	Arbitrary line	Khora nala	F <sub>8</sub> F <sub>3</sub>	22 m from the Khora - B Nala.	20 m from the Khora - B Nala.
East Boundary	F <sub>14</sub> & Incrop of seam I	F <sub>14</sub> - F <sub>15</sub>	F <sub>8</sub>	F <sub>3</sub>	F <sub>1</sub> F <sub>2</sub> F <sub>3</sub> F <sub>4</sub>	60 m from the Khora - A Nala.	60 m from the Khora - A Nala.
South-East Boundary	F <sub>15</sub>	F <sub>10</sub> & F <sub>13</sub>	F <sub>3</sub> and FRL of 300 Seam 4	300 m depth line/ FRL of 120 m of Seam 2	300 m depth & FRL of 120 m of Seam 2	Quarry surface has been projected at 45° on the surface as well as on the confluence of Khora Nala - A & B.	Quarry surface has been projected at 45° on the surface as well as on the confluence of Khora Nala - A & B.

Note: 7.5m space width is left from the outer boundary of PB NW quarry

### 5.3.3. Opening up of Deposit

Advance action activities would be implemented before starting Box-Cut operation in WP-1, WP-2 and WP-3 and EP in 1st year of quarry operation. These activities include

- Land acquisition and possession.
- Construction of canal on the rise side of the proposed West Quarry to control inflow of surface water of the area on the rise side. This canal joins Hardara (Pakwa) nala in the east and Khora nala in turn Lathorva Nalla in the west.
- Bringing power line to the project and construction of electrical sub-station.
- Construction of the workshop for commissioning of HEMM and other necessary civil constructions.
- Construction of essential Residential Buildings.
- Railway siding and coal loading arrangement for coal dispatch.

Details are shown in Surface Master Plan (SMP).

NW-Pit 1 shall be opened first by opening a box cut near the borehole MNPB - 7 in the incrop of Seam K - 1 at a gradient of 6% to touch the seam floor. The bottom seams are workable in this area. Initially the quarry shall be advanced towards southern block boundary in south and NW-Pit 2 commences from an arbitrary line adjoining Pit - 1 in north. During later years the mine shall be advanced towards south in the dip side. Coal production shall start in P-4. During P - 6 of mining operations shall be shifted further west ward to accommodate the overburden in-pit dumping and the earlier mine opening



shall cease to operate. At the P-28, OB and Coal shall be transported to and from Pit – 2 through western most corner of the block. Temporary pit workshop shall cease to operate and permanent workshop shall be used for various purposes.

#### 5.3.4. Quarry Design Strategy

##### PB-West and PB East

- i) The rated capacity shall be achieved at the end of 12<sup>th</sup> year by increasing the production in gradual manner in order to create the space for internal dumping.
- ii) A total of 9 workable splits contained in four seams i.e. Seam –II to V is considered for open cast mining excluding three distinct splits of Seam – I which is having three distinct splits has also been considered for mining in patches. Wherever required, advance drilling (if required) shall be carried out to prove the extent seam 1.
- iii) It has been envisaged that quarry operation shall be started by creating three separate pits viz WP-1, WP-2 & WP-3 simultaneously in west quarry area to create the internal dump space along the area bounded by up throw faults.
- iv) Due to the small size of pits, in the initial period, mine production shall be limited and gradually start producing 10 Mt by 5th year of production after about 3 km strike length in pit WP-4 gets developed.
- v) The mine production shall again start increasing from 11th year of operation gradually when the WP-2, WP – 3 and WP – 4 shall merge leading to longer strike length of more than 5 km.
- vi) The western quarry shall achieve a rated capacity of 15 Mt/yr from 12th year of operation and shall continue till 24th year (Stage Plans are enclosed). Further capacity enhancement is not possible due to the following reasons:
  - Property is intervened by 19 Nos. of strike faults resulting into reduced strike length as well as dislocation of Seam II.
  - Steep gradient of coal seams needs adoption of modified inclined slicing method of working in mining mass.
  - Problem of internal dump stability at the floor gradient of 1 in 3 to 1 in 5.
  - Large volume of overburden handling (Avg. SR 1: 4.16)
  - Limited dump space available outside the mining mass where maximum dump height of 90 m has been considered.
  - Most of the coal seams are thin with thickness ranging between 1 m to 4 m except seam II B & II M which are 6 to 9 m.
  - Highly splitted seams with variable parting.

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- Congestion of mining equipment at overburden benches. As the maximum possible per day dumping just matches with the dumping requirement at 15 MTPA.
- Considerably high rate of face advancement of the order of 60 m and 103 m in West and East quarry respectively in down dip direction to achieve 15 MTPA.

The above is depicted in Final Stage Quarry Plan.

- vii) The magnitude of OB dumping can be judged from the fact that about 2098.78 million cubic meter of OB shall have to be excavated and dumped suitably for mining 503.40 Mt of coal from the total mine block upto a depth of 300 m.
- viii) The total dumping outside the quarry shall be accommodated in dumps A and B on the northern side in non-forest area Dump C on southern side of the open-cast limit line and Dump D on northern side of PB East limit line. The ratio of external dumping on the surface as compared to total quantity shall be about 31% for the whole opencastable mine block.
- ix) Attempt has been made to reduce external dumping by raising the height of back-filled dumps in WP-1, WP-2 & WP-3 and merging these with surface dumps A & B on the northern side so as to maximise total dump capacity. Details are shown in Final Stage Dump Plan.
- x) The PB West quarry has been planned to achieve a rated capacity of 15 MTPA from 12th year onwards. The production from PB West quarry shall taper from 25th year and opencastable reserves of West quarry shall be completely exhausted by the end of 27<sup>th</sup> year. The production from PB North West quarry shall commence from 4<sup>th</sup> year onwards of production plan of Pakri Barwadih Block. PB East Quarry shall restart producing from 25<sup>th</sup> year with an overlap of 3 years so as to reach the full capacity before the exhaustion of PB West Quarry and maintain the rated capacity of 15 Mt/yr till its exhaustion. The de-coaled space of West quarry shall be utilised to accommodate remaining quantity of OB/waste to be generated in PB East quarry internally.
- xi) The quarriable block for West and East Part of Pakri Barwadih have total 12 workable splits contained in 5 seams i.e Seam – I to V is considered for open cast mining. Seam I occurrence is not reported in most of the boreholes, as a result mining shall be carried out in patches. In general, the coal seams are dipping at 1 in 3 to 1 in 5 towards south.
- xii) Before restart of PB East quarry, Hardara (Pakwa) nallah on the eastern side shall be diverted towards dump filled area. The main road linking Hazaribagh and Barkagaon shall also be diverted along the diverted course of above mentioned nallah (South-eastern boundary of block). This shall enable release of blocked coal underneath the Hardara (Pakwa) nallah & the existing road.

- xiii) A canal has been planned along the north-eastern boundary of the block to catch the rain water & small streamlets ahead of the quarriable area for smooth operation of mine during rainy season. !

#### PB-North West

- i) Availability of numerous seams/splits (14nos.) at amenable depth (280m) and also reasonable coal overburden ratio (3.15 m<sup>3</sup>/t) presents a favourable situation to develop a mechanised opencast mine in the coal block under reference.
- ii) The entire property is envisaged to mine by opencast method from the view of conservation of and exploitation of high grade coal.
- iii) To the east of PB North West quarry adjoins PB Western Quarry which has an important bearing on design of PB North West Quarry mine. Road passing through northern fringe of the PB shall serve as approach road for PB North west. This road shall meet with Hazaribagh - Tandwa State Highway.
- iv) Khora nala defines two sides of block boundary. Meandering part of Lathorva Nala - B at the western side of the block approximately 1 km in length is planned for straightening. Khora Nallah shall be diverted along the northern fringe of PB-NW part which shall discharge its load on Lathorva Nalla. Study of such diversion shall be carried out before commencement of PB-NW quarry. An embankment suitably sloped on both sides shall be constructed to prevent in-rush during rainy season and flash flood. A road of 5m wide shall run all alongside the embankment.
- v) Initial Mine entry shall be made near borehole No. MNID - 13. Floor of seam K - 1 shall be mine floor. Entire coal of the block in envisaged for extraction. Due to paucity of land for OB dumping the mine is divided into two Pits namely Pit - 1 & Pit - 2. Fault F5 - F5 (throw 150m), shall serve as a natural arbitrary line of division of two pits. Pit - 2 is planned as an extension of Pit-1 in 28th year of mining operation.
- vi) As land outside the block is unavailable all generated waste shall be dumped inside the coal block boundary in three locations namely Dump - A, Dump - B & Dump - C. Dump - A shall not be re-handled while Dump B and Dump C shall be temporary and progressively re-handled at later years of mine life. Rehandling shall facilitate release of additional area for excavation of coal from Pit-2 and from Barrier between PB-NW and PB-West (Total 33.18 Mt, 10.95Mt of PB West & 22.23Mt of PB North west), Plate No.4.
- vii) Coal from the mine shall be brought to the surface by 60T coal body dumpers. ROM coal shall be reduced through primary and secondary crushing to (-) 50mm size. Crushed coal shall be transported by road upto a coal stock pile near TP-1 from where it shall be brought to NTPC's



Benadag Yard by conveyors and shall be loaded on railway wagons by fast loading silo and dispatched to end use plants through Indian Railway.

- viii) Taking into account the extraction of coal in the barrier between PB-NW and PB-West envisaged life of PB-NW quarry is 52 years including 3 years of construction period.
- ix) Environmental clearance (EC) has already been obtained for PB block (West & East Quarries) vide MoEF letter no.J-11015/692/2007-IA\_II(M) dated 19.05.2009 for rated production of 15Mtpa. At present, base line data generated previously are used to address environment management chapter. However, fresh EIA/EMP shall be carried out for this block and MoEF clearance shall be obtained.
- x) The area is sparsely populated as revealed during site visit, approximately 150 PAP's have been considered for preparation of Mining Plan. Site is conducting SES study based on which Rehabilitation and Resettlement Plan shall be drawn for PAPs as per NPRR and other relevant policies.

### 5.3.5. Mineable Reserves, OB and Stripping Ratio

The total mineable reserve of PB West and East Quarry is estimated as 503.39 Mts up to the 300m depth line i.e. FRL of 120 m of seam II bottom and mineable coal reserves of seam I, which is found suitable for mining by the open cast method, especially in the western part of PB West Quarry and PB East Quarry. The corresponding OB removal estimated as 2098.78 Mm<sup>3</sup> at an average stripping ratio of 4.16 m<sup>3</sup>/t. Percentage extraction with respect to net geological reserves for seam II to V is also given in the same table. Due to the discontinuous nature of Seam I it has been planned that mining shall be done in patches.

Total geological coal reserve of PB NW Quarry as per GR is estimated to be about 137.584 Mt. It is estimated that 105.78 Mt of mineable coal would be available against overburden of 348.24 Mm<sup>3</sup> within the mine boundaries. However additional reserves of barrier 33.18 Mt. and additional QB of 90 Mm<sup>3</sup> shall also be excavated is kept at present in Pit-2 account. The average stripping ratio works out to 3.30m<sup>3</sup>/t. Extractable reserves of PB West & East is given in **Table-5.4**. The detailed break-up of quarry wise and sub-quarry wise mineable reserves is given in **Table 5.5**.

श्री श्री गणेशाय नमः  
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**Table 5.4**  
**Extractable Reserves**

Total geological reserve up to 300 m depth line		
Sl No.	Description	Reserves (Mt)
1	Seam I to V Net geological reserves as per (CMPDI GR):	707.67
2	Seam I to V Net geological reserves as per geological model based on Bore Hole data	696.78
3	Difference	1.5 %
As per GR, seam I has not been considered opencastable		
4	Net geological reserves Seam II to Seam V (upto 300 m depth line) amenable to opencast mining	540 *
5	Additional coal reserves available beyond 300m depth line on high wall side as considered in Mining plan	15.45
6	Total reserves arrived for proposed quarry upto pit depth(4+5)	555.45
7	Less : Reserves transferred to UG property due to (a) Enclosed between Nailah and fault F-3 (b) Coal falling South of fault F-5	48.05
8	Less : Coal Reserves in crushed zones between faults F1 & F2 having very steep gradient, narrow patch and cannot be worked hence kept outside pit boundary	16.50
9	Net opencastable Reserves Seam II to seam V (9 -10-11)	490.90
10	To be extracted from Eastern & Western Quarry	437.01
11	Barrier against Khora Nailah to be opencasted later along with North-West patch "A".	10.95
12	Net Extractable reserve (seam II to seam V)	447.96
13	Percentage extraction (seam II to seam V)	91.25 %
Reserve balance of seam I, a part of which has been considered for opencast mining in the present mining plan		
14	As per GR, Total reserve of seam I up to 300 m depth line	135
15	Reserves transferred to UG property	17.24
16	Coal Reserves in crushed zones between fault F1 & F2	2
17	Net opencastable Reserves of Seam I (14 -15-16)	115.76
18	To be extracted from Eastern & Western Quarry as per calendar plan	66.39
19	Barrier against Khora Nailah to be opencasted later along with North-West patch "A".	5
20	Net extractable reserve of seam I as per mining plan (18+19)	71.39
21	Balance reserve( Part of which may be extracted later after proving by production support drilling)	39.37
22	Total extractable reserve for West & East Quarries	503.37
23	Total Extractable reserve for NW Quarry	138.96
23	Total extractable reserve for PB Block (22+23)	642.35

\* As per table 5.4.1 (pg. 169) of GR indicating sectorwise and depthwise volume of total excavation recasted at table 04.09 of mining plan the assessed volume of coal up to 300 m depth line of seam II

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bottom is 329 Mm<sup>3</sup> which compares favorably with volume estimates through geological model i.e. 327.27 Mm<sup>3</sup> (equivalent to 540 Mt considering average sp. gravity of 1.65)

**Table 5.5**  
**Mineable Coal Reserves, Volume of OBR, Stripping ratio**

Quarry	Extractable reserves in Mt	OB including Access trench in Mm <sup>3</sup>	Strip ratio cum/t
<b>WEST QUARRY (Seam I-V)</b>			
WP -I	6.65	25.9	3.89
WP -II	28.47	82.57	3.01
WP -III	18.51	62.57	3.38
WP -IV	258.09	1067.44	4.14
<b>Subtotal (West Quarry )</b>	<b>311.71</b>	<b>1238.49</b>	<b>3.97</b>
<b>EAST QUARRY (EP-1)(Seam I-V)</b>	<b>191.68</b>	<b>860.29</b>	<b>4.49</b>
<b>Subtotal (East Quarry )</b>	<b>191.68</b>	<b>860.29</b>	<b>4.49</b>
<b>*Subtotal (West and East Quarry)</b>	<b>503.39</b>	<b>2098.78</b>	<b>4.17</b>
<b>NORTH WEST QUARRY (All Seam)</b>			
PIT 1	68.6	201	2.94
PIT 2	70.36	237.24	3.96
<b>**Subtotal (NW Quarry )</b>	<b>138.96</b>	<b>438.24</b>	<b>3.15</b>
<b>TOTAL (block)</b>	<b>642.34</b>	<b>2537.02</b>	<b>3.95</b>

**Remarks:**

\*Up to 300 m depth line, OB estimated as per GR = 1441 Mm<sup>3</sup>. In the GR, the OB estimation is based on considering vertical wall along 300 m depth line.

i In the Mining-Plan, the final stage-working plan envisages. Inclined pit slope due to benching and for stability. Hence the total OB in quarriable area works out to 2098 Mm<sup>3</sup> considering pit slope for both Western & Eastern quarries combined and extraction of Seam-I in certain patches.

ii In the Mining-Plan certain patches of Seam-I is planned to be extracted by opencast. For this additional overburden, parting between Seam-I top to FRL of Seam-II B is required to be evacuated for extracting Seam-I. Total quantity 186 Million m<sup>3</sup> – II to I.

iii Additional excavation done along high wall to provide for inclined pit-slope providing stability to the high wall as well as for batter roads 471 Million m<sup>3</sup> (This 471 Million m<sup>3</sup> constitutes 22.45 % of total excavation i.e. 2098 Million m<sup>3</sup>)

Hence additional excavation required to be done on account of above two reasons is 186 Million m<sup>3</sup> + 471 Million m<sup>3</sup> = 657 Million m<sup>3</sup>.

Thus total OBR removal/ excavation required to be done = 1441 Million m<sup>3</sup> + 657 Million m<sup>3</sup> = 2098 Million m<sup>3</sup>

\*\*The Geological Report indicated that the coal reserves down upto Seam - I are 106,688 Mt with an OB: Coal ratio of 1.649.

In the present Mining Plan, the lower seams also have been considered for OC mining due to two reasons: first Good quality of coal in Karharabari seams and the second the stripping ratio for the workable area (>1m) of these seams comes around 3.5-4 m<sup>3</sup>/t for all the seams combined together.



Revised Mining Plan (1st Revision) - Pakri Barwadih Coal Block

i. The equipment selection and operating methods have been designed considering the volume and nature of overburden and disposition of coal seams.

ii. Additional reserves of 33.18 Mt. from barrier & batter, and additional OB of 90 mm<sup>3</sup> shall also be excavated is kept at present in Pit-2 account

**Extractable Reserves:**

Net opencastable reserves of Pakri Barwadih is 808.23 Mt, barrier loss and batter loss worked out as 58.74 Mt and 106.22 Mt. Taking into account of mining losses of 20.72 Mt extractable reserves worked out as 642.35 Mt. Percentage of extraction by opencast mine is 78%. Net reserves and extractable reserves alongwith losses are given in Table -5.6.

**Table -5.6**  
**Net reserves and extractable reserves and losses**

(in Mt.)

Seam	Net Reserve	Barrier Loss	Batter Loss	Mineable Reserves	Mining Loss	Extractable Reserve	% Extraction
V Top	22.29	0.72	1.57	19.99	0.59	19.40	87.06
V Bottom	15.56	0.51	1.10	13.96	0.41	13.55	87.06
V Combined	11.57	0.21	0.49	10.87	0.44	10.43	90.16
Seam - V	49.42	1.44	3.16	44.82	1.44	43.38	87.78
IV Top	19.82	0.64	2.23	16.95	0.50	16.46	83.01
IV Bottom	9.92	0.32	1.12	8.48	0.25	8.23	83.01
IV Combined	92.32	3.15	10.68	78.49	2.43	76.06	82.39
Seam - IV	122.06	4.10	14.03	103.93	3.18	100.75	82.54
III Top	27.45	1.21	2.04	24.20	0.70	23.49	85.59
III Bottom	9.83	0.43	0.73	8.66	0.25	8.41	85.59
III Combined	4.80	0.21	0.36	4.23	0.12	4.11	85.59
Seam - III	42.08	1.85	3.13	37.10	1.08	36.02	85.59
II Top	59.98	4.66	6.21	49.11	1.89	47.22	78.72
II Middle	139.75	11.83	11.24	116.68	3.83	112.86	80.75
II TM	76.09	7.28	5.63	63.18	1.77	61.40	80.70
II Bottom	116.05	10.76	9.90	95.39	2.89	92.50	79.71
II MB	17.90	1.71	1.32	14.86	0.42	14.44	80.70
II Combined	7.35	0.70	0.54	6.11	0.17	5.94	80.70
Seam- II	417.13	36.95	34.85	345.33	10.97	334.36	80.16
I Top	36.93	2.72	9.39	24.81	0.77	24.05	65.11
I Middle	72.97	5.27	18.20	49.49	1.66	47.84	65.56
I TM	2.51	0.23	0.79	1.49	0.04	1.45	57.80
I Bottom	35.60	2.52	8.69	24.39	0.52	23.87	67.06
I MB	14.85	1.35	4.67	8.83	0.24	8.58	57.80

Chapter V - Mining

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Seam	Net Reserve	Barrier Loss	Batter Loss	Mineable Reserves	Mining Loss	Extractable Reserve	% Extraction
I Combined	3.58	0.33	1.13	2.13	0.06	2.07	57.80
Seam- I	166.44	12.42	42.88	111.14	3.28	107.86	64.81
LL	2.60	0.10	0.35	2.15	0.11	2.04	78.62
K5	0.13	0.01	0.06	0.06	0.01	0.05	36.32
K4	4.21	0.13	1.11	2.97	0.11	2.86	67.83
K3	3.34	0.22	0.86	2.26	0.06	2.20	65.95
K2	5.38	0.27	1.14	3.97	0.07	3.90	72.40
K1	15.24	1.25	4.65	9.34	0.41	8.93	58.62
Seam- Local	30.90	1.98	8.17	20.75	0.77	19.98	64.66
Total	*828.03	58.74	106.22	663.07	20.72	642.34	77.58

\*Additional 20Mt of proved reserve had not been considered in the above table as the same is considered to be mined by u/g

### 5.3.6. Mining Method and Choice of Technology

#### Opencast Mining

Opencast mining method for the targeted reserves has been adopted due to following reasons

- The coal seams are in cropping at a shallow depth;
- The OB : Coal ratio is favorable (3.15 : 1) for opencast mining;
- Higher percentage of recovery as compared to underground system.
- The mining by opencast method shall be economical against underground method
- The opencast mining operations are comparatively safer and ensure higher recovery of coal resource.(Final Stage Quarry Plan is enclosed)

#### Selection of mining technology

Following types of equipment systems available for opencast mining:

- Bucket wheel mining
- Dragline mining
- Continuous surface miner (CSM)
- Shovel dumper combination

Technical feasibility for deployment of each of the above technology has been studied in details, based upon the prevalent conditions existing therein in North-Western Coal Mining Project, shovel dumper combination owing to its flexibility recommended as most favourable method of mining. Brief of each of the system is explained:

**(a) Bucket Wheel Excavator**

Bucket Wheel Excavator (BWE) alternative has not been considered due to following reasons

- i. The strata below the upper most weathered mantle are hard and strong requiring blasting hence bucket wheel is not viable.
- ii. Presence of large number of seams and interburden layers of mostly of small thickness, which shall be uneconomic in this alternative.
- iii. Requirement of precision selective mining which shall not be possible by bucket wheels especially for thin seams and partings.

**In view of the above this option is not recommended.**

**(b) Dragline**

Dragline has not been recommended due to following reasons:

- i. Steep gradient of seams
- ii. Multiplicity of seams and that the lower most seam is thin and the OB parting lying over is also thin due to which neither the advantage of long reach can be taken nor adequate OB material shall be available from the overlying OB layer for direct casting.

**In view of the above this option is not recommended.**

**(c) Continuous Surface Miner (CSM)**

CSM has not been recommended due to following reasons:

- i. Depth of mine is 300m depth (approx.) and seams are dipping at 1 in 3 to 1 in 5, these machines cannot be deployed exclusively due to limitation of mobility /flexibility.
- ii. These machines also require wider benches which shall require comparatively higher volumes of OB to be removed in the initial stages leading to higher cost of production and imbalance in equipment utilization due to subsequently decreasing OB: coal ratio.
- iii. Over and above, marginal grade improvement shall be of much use in this specific case.

**In view of the above this option is not recommended.**

**(d) Shovel & Dumper**

Shovel & dumper combination is recommended due to following reasons:

- i. In view of multiple seams and equal nos. of inter burden layers to be tackled, an equipment system which is capable of dealing many layers



at a time (flexibility) of operations with the help of smaller units has been recommended as shovel dumper combination.

- ii. The quality problem can be handled with the help of hydraulic excavators, which have three-dimensional movement of bucket. They are capable of carrying out selective mining.
- iii. Furthermore, to tackle about 15 Mty coal & 66 Mcum of OB from West & East Quarry and 3 Mty and 12 Mm<sup>3</sup> OB from several locations in the mine, comparatively medium and higher size shovels of upto 20 m<sup>3</sup> bucket capacity have been envisaged along with matching capacity of rear dumpers.
- iv. Flexibility in operation shall be available due to such equipment system.

In view of the above this option is recommended.

(e) The main objectives of mine development have been

- i. To design an economical production of required coal quality;
- ii. To minimise transportation distance for coal and waste;
- iii. To minimise adverse effects on environment; and
- iv. Non - sterilizing the remaining potential reserves for future mining.

### 5.3.7. System Parameters

Some major system parameters are given in Table-5.7:

Table-5.7

Sl. No.	Particulars	PB-West & East	PB -NW
1.	Maximum Bench Height		
	Top OB	15m	15m
	Coal and Intervening parting	5 - 15m	5 - 15m
2.	Proposed minimum Bench Width		
	Working Bench *	50m	40m
	Non-Working Bench Width	25m	25m
3.	Width of the permanent haul road	30m	25m
4.	Width of the temporary transport ramp	10m	10m
5.	Usual height of the spoil dump bench (1Tier)	30m	30m
6.	Width of the active dump bench	30m	30m
7.	Bench Slope		



OB Bench	70°	70°
Coal Bench		70°
Dump bench	37°	37°
Overall (Ultimate) pit slope	37° (300 m depth)	43° (155m depth)

### 5.3.8. Drilling and Blasting

For PB West and East Quarry Drilling & Blasting shall be required both in OB and Coal benches before excavation by shovels. Top OB benches shall be developed in horizontal/inclined slicing method. 20 m<sup>3</sup> rope shovel along with 170-190 T class of dumpers shall be deployed. A part workload of Top OB shall also be handled by 8.3 cum Hydraulic shovels with 120-150T class of dumpers

Partings and coal seams shall also be worked in horizontal slices using a combination of hydraulic front end and backhoes machines to minimise intermixing of waste with coal with intermediate benches of 5m.

Thin seams (Seam V T and V B, Seam III T and III B, thin partings between Seam V T and V B, between IV T and IV B, II M and II B shall be ripped, dozed and piled by 850 hp/510kW dozers. The piled material shall be taken by 5 cum wheel loaders, loading onto 120-150T trucks.

Based on the workload of the above sections, it is expected that about 5% of the OB workload and about 10% of the coal workload shall be ripped. The balance material shall have to be blasted.

For PB NW Quarry Drilling & Blasting shall be required both in OB and Coal benches before excavation by shovels. Top OB benches shall be developed in horizontal slicing method. 10 m<sup>3</sup> shovel along with 100 T class of dumpers shall be deployed. A part workload of Top OB shall also be handled by 5.5 cum Hydraulic shovels with 60 T class of dumpers

Partings and coal seams shall also be worked in horizontal slices using a combination of hydraulic front end and backhoes machines to minimise intermixing of waste with coal with intermediate benches of 5m.

Thin seams (Seam V T and V B, Seam III T and III B, thin partings between Seam V T and V B, between IV T and IV B, II M and II B shall be ripped, dozed and piled by 410 hp dozers. The piled material shall be taken by 8-10 cum wheel loaders, loading onto 100 T trucks.

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Based on the workload of the above sections, it is expected that about 5% of the OB workload and about 10% of the coal workload shall be ripped. The balance material shall have to be blasted.

#### 5.3.8.1. Drilling & Blasting in Overburden

For PB West and East Quarry top O.B benches shall be of 15 m height where 250 mm Blast hole drill shall be used for drilling blast holes. For thin partings & thick wedges, 160 mm Blast hole drill shall be used.

Blasting pattern depends upon the nature and hardness of rock and varies from mine to mine. Expert agency shall be engaged to design and optimize the blast patterns after field trials.

For PB NW Quarry Top O.B benches shall be of 15 m height where 250 mm Blast hole drill shall be used for drilling blast holes. For thin partings & thick wedges, 160 mm Blast hole drill shall be used.

Blasting pattern depends upon the nature and hardness of rock and varies from mine to mine. Expert agency shall be engaged to design and optimize the blast patterns after field trials.

Suggested pattern is given below in Table-5.8

Table-5.8  
Pattern of Drilling in Overburden

Sl. No.	Particular	1MTY	3 MTY	10 MTY	15 MTY
1	Average Annual OB including top and parting (mm <sup>3</sup> )	6	18	40	66
2	Weekly OB Removal (000 mm <sup>3</sup> )	120	350	700	1270
3	Weekly Explosive Required (tonnes)	50	150	300	500
4	Blast Hole Spacing (meters)	8 to 10	8 to 10	8 to 10	8 to 10
5	Blast Hole Burden (meters)	7 to 8	7 to 8	7 to 8	7 to 8
6	Powder Factor assumed (m <sup>3</sup> /Kg of explosives)	2.5	2.5	2.5	2.5
7	Type of Explosives	Bulk Explosives slurry/emulsion			

Blast holes shall be suitably drilled to provide sufficient OB to each shovel unit for one week's work load.

#### 5.3.8.2. Drilling & Blasting in Coal

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For PB West and East Quarry Coal benches planned are of 10m or less in height. 160 mm drill shall be used for drilling blast holes in Coal benches. Blasting shall be done once in 3 days in Coal benches. Field trials shall be required by expert agency for designing best suited pattern in coal.

For PB NW Quarry Coal benches are planned for 10 m or to the thickness of seams, whichever is less. 160 mm drill shall be used for drilling blast holes in Coal benches. Field trials shall be required by expert agency for designing best suited pattern in coal.

Suggested pattern for blasting in coal is given below in Table-5.9

Pattern of Drilling in Coal

Table-5.9

Sl. No.	Particular	1MTY	3 MTY	10 MTY	15 MTY
1	Annual Coal Production (Mt)	1	3	10	15
2	Three days Coal Production considering 330 days a year (000 T)	10	30	100	150
3	Explosives required for 3 days coal production (tones)	1.7	6	17	25
4	Blast Hole Spacing (meters)	6	6	6	6
5	Blast Hole Burden (meters)	5	5	5	5
6	Powder Factor assumed (m <sup>3</sup> /Kg of explosives)	6t/kg of explosive	6t/kg of explosive	6t/kg of explosive	6t/kg of explosive
7	Type of Explosives	Bulk Explosives slurry/emulsion			

Effort shall be made to suitably distribute drilling in all coal benches to provide 3 days work load to each shovel.

Powder factor of 0.3 kg/cum for OB and 0.2 kg/cum for coal has been assumed for Explosive consumption.

### 5.3.8.3. Control of ground vibrations due to blasting

Ground vibration due to blasting shall be controlled by following:

- Reducing the explosive charged per delay
- Reducing the spacing and burden per blast



- Reducing the amount of explosive charged per blast
- Proper controlled rock movement during blast by using suitable initiating sequence and delay.

#### 5.3.8.4.Storage of explosive

It is envisaged that the blasting operation shall be carried out by Emulsion/SMS (Site Mix Slurry) and shall be transported to the mine site by the explosive agency located centrally for the North Karanpura coalfield.

**For PB-West & East Quarry** A cluster of 3T magazines, 3 in nos. (total capacity 9T) is provided for storing detonating fuses, detonators etc. and other explosives for secondary blasting if necessary.

**For PB-NW Quarry** A 3T magazines, 1 in nos. (Total capacity 3T) is provided for storing detonating fuses, detonators etc. and other explosives for secondary blasting if necessary.

Magazines shall be located as shown in the Surface Master Plan at place generally not interfered with public or employees.

If required additional Magazines capacity shall be provide to improve operational efficiency

#### 5.3.9. Disposal of Waste

##### 5.3.9.1.Overburden Management

**For PB West and East Quarry** Proposed quarries namely PB West and East are to be opened in Barakar formations, which consist of alluvium soil, sandstone and shale. The thickness of soil/weathered mantle generally varies from 6-18 m. It is commonly dirty-white to reddish-brown in colour and carbonaceous shale generally constitutes bulk of inseam burden.

The overburden / Waste stripping operation shall start first with top soil removal which shall be stacked separately for reclamation purposes from both the quarries. The top soil dump has been planned over the non-coal bearing areas of eastern quarry. The external dumps "A", "B" for PB West Quarry and external dump "D" for PB East have been planned on non-opencastable coal area where quarriable potential is not indicated in the GR.

The OB from WP-1, WP-2 & WP-3 would be dumped externally up to 5th year of quarry operation in external dumps A & B. Whereas the OB from EP1 would

be dumped externally up to 2nd year of quarry operation in external dump D. The assessed OBR (solid) capacities are 10.3 Mm<sup>3</sup> (Dump A), 67 Mm<sup>3</sup> (Dump B) and 6 Mm<sup>3</sup> (Dump D) respectively which corresponds to loose capacities of 12 Mm<sup>3</sup>, 80 Mm<sup>3</sup> and 7.2 Mm<sup>3</sup> respectively for dump A, B & D. About 21 Mm<sup>3</sup> of OB shall be transported to the area earmarked for dump 'C' in the 4<sup>th</sup> year of operation. The WP-1, after de-coaling in 7th year, shall accommodate internal dumping. Subsequently, WP-2 and WP-3 shall also be ready to accommodate internal dumping after its de-coaling i.e. 8th year and 10th year respectively. After two years of mining operation in PB (East) quarry no dumping shall be resorted to external dump D.

From 7th to 11th year, OB shall be accommodated in the de-coaled area of WP-1, WP-2 and WP-3. As soon as de-coaled area is created in the floor of Seam-II within WP-4, internal dump shall be formed after leaving a safety distance of 100-150m from advancing lower most coal bench of high wall side of the OCP. This safety distance shall be reduced if step up fault is met while advancing. The high wall face, because of step up fault, shall act as a retaining wall for holding the slope of dump. However, a scientific study shall be undertaken before going for implementation. In addition to it, a safety distance of 100-150 m shall be kept against the haul road to accommodate conveyor system for transporting coal also.

After accommodating OB in the floor of WP-4 (Internal Dumping), balance OB from 12th year onwards shall be accommodated in Dump 'C'. Afterwards the OB shall be accommodated in maximum possible space available within WP-4 but major share of OB shall still have to be accommodated in dump 'C'. The capacity of dump 'C' has been assessed as 563 Mm<sup>3</sup>. Dump C has been planned over the area where the coal is beyond 300m depth line and thus suitable for exploitation by underground means only for which tentative scheme for mining has been envisaged and included in the Approved Mining Plan. Reserves beyond 300 m depth line are under "Indicated" category and shall be subjected to detailed exploration. As such no coal shall thus get sterilized due to dump 'C'.

ONGC/IOC programme of CBM exploration/exploitation shall be taken care of while dumping in dump "C". A corridor of about 40-50m width shall be marked from WP-4 upto the dump 'C' location in consultation with ONGC/IOC and a haul road shall be developed to connect with dump C.



After exhaustion of WP-4 quarry, East Quarry shall be restarted. Entire remaining OB of East Quarry shall be dumped into voids of West Quarry.

Final stage dump plan, as well as other stage plans also show the location of external/internal dumps in respective stage plans including height as well as volume of dump.

The total non-forest land available in south side of the quarriable block is 15 sq. km in which 7.7 sq. km is available for Dump 'C', balance 7.3 Sq.km covers, safety distance of 300m against the high wall side of the OCP, two different locations of pair shafts for approaching coal seams lying at depth, two villages which are densely populated and area kept for further advancing of high wall side of the OCP in future, if need arises. This shall be decided at a later date for extending the quarry beyond 300 m depth line if feasible.

Small area of non-forest land falling on north side of the quarriable block has been proposed to be utilized for infrastructure of the OCP, leaving forest area in which only a magazine is proposed to be located. Most of the forest area is having hilly terrain hence dump formation over the hilly terrain is not feasible.

**PB North West quarry** is dotted with hillocks on its north, on the west & south side, the block is surrounded by Kerandari 'C' coal block. Above constraints restricts the availability of land outside the block. No space outside the block is envisaged for dumping of overburden. Entire overburden generated during the life of the mine shall be dumped inside the block boundary.

OB generated shall be dumped at the three locations viz. Dump 'A', Dump 'B' and Dump 'C'.

#### External Dump A'

It is located on the north western side on non-coal bearing area. From 1<sup>st</sup> to 3<sup>rd</sup> year of mining operation, OB shall be dumped in 3 benches of 30m each. The OB shall be rehandled at the closing stages of the mine life for reclamation purposes. Total volume accommodated in this dump is 11.00Mm<sup>3</sup> and the area of the dump is 16.23 Ha.

#### External Dump B':

It is located on the western side of coal bearing zone i.e. Pit – 2. From 6<sup>th</sup> to 28<sup>th</sup> year of mining operation, OB shall be dumped in two benches of 30m each. This OB shall be rehandled from 28<sup>th</sup> year onwards and dumped in the void of Pit-1 and void created by PB west pit. This arrangement shall facilitate release of coal progressively for simultaneous excavation. Entire OB shall be



rehandled for concurrent reclamation. Total volume accommodated at peak in this dump is 49.75Mm<sup>3</sup> and the area of the dump is 123 Ha.

#### External Dump C':

It is located on the south side of the coal bearing zone at the confluence of Khora Nala A & B. From 16<sup>th</sup> to 19<sup>th</sup> year of mining operation i.e. for 4 years, OB shall be dumped in three benches of 30m, 20m, and 10m height respectively. The OB shall be re-handled during 40<sup>th</sup> year to free up the blocked reserves beneath it. Coal below this dump shall be taken along with the locked coal of barrier between PB West and this quarry. Total volume accommodated at peak in this dump is 3.50Mm<sup>3</sup> and the area of the dump is 10 Ha.

#### In Pit Dumping:

Above three dumps together accommodate 73.44 Mm<sup>3</sup> out of 438 Mm<sup>3</sup> generated during the life of the mine. About 9.19Mm<sup>3</sup> of OB is utilized for creation of embankment along nala which is accounted in Dump A and remaining 364.79 Mm<sup>3</sup> of OB shall be accommodate in in-pit dumping during different stages of mine.

OB removal and its phasing from Pakri Barwadih is given in Table- 5.10 & Table 5.11 respectively. Percentage dumping of overburden in internal and External dumps are given in Table 5.12.

Table 5.10

Year wise proposed OB Removal from PB (Mm<sup>3</sup>)

Prod. Year	OBR (West Quarry)	Cum OBR (West Quarry)	OBR (East Quarry)	Cum OBR (West Quarry)	Total OBR (West & East)	OBR (NW Quarry)	Cum OBR (NW Quarry)	Total OBR (PB Block)
1	5.94	5.94	2.95	2.95	8.89		0	8.89
2	15.27	21.21	3.05	6	18.32		0	18.32
3	21.12	42.33		6	21.12		0	21.12
4	26.11	68.44		6	26.11	4.08	4.08	30.19
5	25.03	93.47		6	25.03	8.15	12.23	33.18
6	35.51	128.98		6	35.51	11.69	23.92	47.2
7	41.44	170.42		6	41.44	12.03	35.95	53.47
8	41.52	211.94		6	41.52	12.03	47.98	53.55
9	41.5	253.44		6	41.5	12.03	60.01	53.53
10	41.5	294.94		6	41.5	8.22	68.23	49.72

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Prod. Year	OBR (West Quarry)	Cum OBR (West Quarry)	OBR (East Quarry)	Cum OBR (West Quarry)	Total OBR (West & East)	OBR (NW Quarry)	Cum OBR (NW Quarry)	Total OBR (PB Block)
11	44	338.94		6	44	8.22	76.45	52.22
12	44	382.94		6	44	8.22	84.67	52.22
13	52.76	435.7		6	52.76	8.22	92.89	60.98
14	66.04	501.74		6	66.04	8.22	101.11	74.26
15	66	567.74		6	66	8.22	109.33	74.22
16	66	633.74		6	66	8.22	117.55	74.22
17	66	699.74		6	66	8.21	125.76	74.21
18	66.01	765.75		6	66.01	8.21	133.97	74.22
19	66.01	831.76		6	66.01	8.21	142.18	74.22
20	66.01	897.77		6	66.01	8.21	150.39	74.22
21	66.01	963.78		6	66.01	8.21	158.6	74.22
22	66.01	1029.79		6	66.01	8.21	166.81	74.22
23	66	1095.79		6	66	8.22	175.03	74.22
24	66	1161.79		6	66	8.23	183.26	74.23
25	31.2	1192.99	31.85	37.85	63.05	8.23	191.49	71.28
26	26	1218.99	36.95	74.8	62.95	8.23	199.72	71.18
27	19.5	1238.49	46.5	121.3	66	8.23	207.95	74.23
28		1238.49	66	187.3	66	9.17	217.12	75.17
29		1238.49	66	253.3	66	11.36	228.48	77.36
30		1238.49	66	319.3	66	11.36	239.84	77.36
31		1238.49	66	385.3	66	11.36	251.2	77.36
32		1238.49	66	451.3	66	11.36	262.56	77.36
33		1238.49	66	517.3	66	11.37	273.93	77.37
34		1238.49	66	583.3	66	11.43	285.36	77.43
35		1238.49	66	649.3	66	11.43	296.79	77.43
36		1238.49	66	715.3	66	11.43	308.22	77.43
37		1238.49	66	781.3	66	11.43	319.65	77.43
38		1238.49	66	847.3	66	10.32	329.97	76.32
39		1238.49	12.99	860.29	12.99	10.04	340.01	23.03
40						9.00	349.01	9
41						9.00	358.01	9
42						9.00	367.01	9
43						9.00	376.01	9
44						9.00	385.01	9
45						9.00	394.01	9
46						9.00	403.01	9
47						9.00	412.01	9
48						8.50	420.51	8.5
49						7.00	427.51	7

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 2. उच्च न्यायालय  
 3. अधीनस्थ न्यायालय  
 4. महान्यायालय  
 5. न्यायाधीश  
 6. न्यायाधीश  
 7. न्यायाधीश  
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**Table 5.11**  
**Phased overburden dumping /waste disposal and capacity of dumps**

Particulars	PB WEST AND EAST										PB NW				(In Mm <sup>3</sup> )	
	External Dump (Solid)					Internal Dump (Solid)					External				Internal	
	A	B	C	D	SUB TOTAL	A (Extn)	B (Extn)	WP-4	SUB TOTAL	Total (West&East)	DUM P 'A'	DUM P 'B'	DUM P 'C'	Sub Total	WP-4	Sub Total
1-5 yrs																
WP1	10.33	6.55			16.88					16.88						16.88
WP2		40.00			40.00					40						40.00
WP3		6.23	21.00		27.23					29.23						29.23
WP4		7.36			7.36					7.36						7.36
EP1				6.00	6.00				6							6.00
PIT-1										9.08	9.08			9.08	3.15	12.23
PIT-2																
6-10 yrs																
WP1									9.36	9.36						9.36
WP2		4.86			4.86				38.38	43.24						43.24
WP3									33.15	33.15						33.15
WP4									115.71	115.71						115.71
PIT-1										6.61	4.00			10.6	45.39	56
PIT-2																56.00

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Particulars		PB WEST AND EAST										PB NW										(in Mm <sup>2</sup> )	
		External Dump (Solid)					Internal Dump (Solid)					External					Internal						
		A	B	C	D	SUB TOTAL L	A (Extn )	B (Extn )	WP-4	SUB TOTAL L	Total (West&East )	DUM P'A'	DUM P'B'	DUM P'C'	Sub Total L	DUM P'A' Extn.	WP-4	Sub Total	TOTAL L (NW)	(Solid)			
11 - 15 yrs																							
WP 4			169.00		169.00		130.80		130.80	299.8											299.80		
PIT-1											3.00	11.00				27.10		27.1	41.1	41.10			
PIT-2																							
16 - 20 yrs																							
WP 4			208.00		208.00	37.00	2.00	79.00	118	324						10.93		10.93	10.93	10.93			
PIT-1											1.50	13.00	2.00		16.5	13.63		13.63	30.13	30.13			
PIT-2																					324.00		
21 - 25 yrs																							
WP 4 + East Quarry			167.00		167.00			163.05	163.05	330.05											330.05		
PIT-1												12.00	1.50		13.5	27.60		27.6	41.1	41.10			
PIT-2																							
26 - 30 yrs																							
PIT-1												8.75			8.75	12.46	27.14	39.6	48.35	48.35			
PIT-2																							

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PB WEST AND EAST																			PB NW				(in Mm <sup>3</sup> )	
Particula rs	External Dump (Solid)						Internal Dump (Solid)						External				Internal				GRA ND TOT AL			
	A	B	C	D	SUB TOT L	A (Extn )	B (Extn )	WP-4	SUB TOT L	Total (West&Eas )	DUM P 'A'	DUM P 'B'	DUM P 'C'	Sub Tota l	DUM P 'A' Extn.	WP-4	Sub Total	TOTA L (NW)						
WP 4 + East Quarry								330.00	330	330									330.00					
31-35 yrs East Quarry								330.00	330	330									330.00					
PIT-1																								
PIT-2																								
36 - 39 yrs East Quarry								184.00	184	184		1.00		1	21.72	34.23	55.95	56.95	56.95					
PIT-1																			184.00					
PIT-2																								
40 - 52 yrs																								
PIT-1																								
PIT-2																								
								</																

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Table 5.12  
Percentage Overburden Dumping

	PB West & East (Mm <sup>3</sup> )	PB NW(Mm <sup>3</sup> )	PB (Mm <sup>3</sup> )	PB West an East (%)	PB NW (%)	PB (%)
External Dump	619.00	73.44	692.44	29.49%	16.76%	27.29%
Internal Dump	1479.83	364.79	1844.62	70.51%	83.24%	72.71%
Total	2098.83	438.23	2537.06	100.00%	100.00%	100.00%

### 5.3.9.2. Top Soil Management

For PB-WEST & EAST Quarry during Operating life of mine 5.81 Mm<sup>3</sup> of top soil shall be generated. This figure is arrived at by considering 1 m (approx.) thickness of top soil, as because unlike PB-NW Quarry considerable deposition has not taken place in the block.

For the initial 5 years of Mining operation, top soil shall be stacked at a designated location over coal bearing area, as shown in **Surface Master Plan**. Estimated land requirement for stacking is 1 Ha. The requirement of land shall cease to operate from 10<sup>th</sup> year onwards as because scrapped top soil shall be spread over the dump for land reclamation.

Stacking of top soil shall be achieved in two tiers. The bottom tier shall be of 3m in height while top tier shall be of 2m or shall below height not exceeding the limit as per prescribed norms.

Stack of top soil shall be grassed to retain fertility if required. Besides this, top soil stack them shall be made use of concurrent filling without bringing the scrapped top soil to the stack.

For PB-NW Quarry during Operating life of mine 5.81 Mm<sup>3</sup> of top soil shall be generated. This figure is arrived at by considering 1.5m (approx.) thickness of top soil, as because presence of ravines and surrounding nalas considerable deposition has taken place in the block.

For the initial 5 years of Mining operation, top soil shall be stacked at a designated location over Pit - 2, as shown in Plate No.5. Estimated land requirement for stacking is 1 Ha. The requirement of land shall cease to operate from 10<sup>th</sup> year onwards as because scrapped top soil shall be spread over the dump for land reclamation.

Stacking of top soil shall be achieved in two tiers. The bottom tier shall be of 3m in height while top tier shall be of 2m or shall below height not exceeding the limit as per prescribed norms.

**Top soil scrapping:** Scrappers shall be deployed to scrap the top soil off the surface. With the help of front end loader, top soil shall be loaded on the tripper of 10T capacity and transported to top soil stock yard. In the event of non-stacking system, top soil shall be transported directly to the desired location.

**Top soil spreading:** Front end loader shall load on to the trippers and transported to desired location and spread with the help of dozer/graders.

Stack of top soil shall be grassed to retain fertility if required. Besides this, top soil stack them shall be made use of concurrent filling without bringing the scrapped top soil to the stack. Year wise quantity schedule of management of top soil excavated and spread is given in Table 5.13 and Summerised data for Top Soil Management is given in Table 5.14.

Table 5.13

Management of top soil

Year	PB West and East				PB-NW			
	Area of TS removal (Ha)	Prog. Top Soil (Mm <sup>3</sup> )	Prog. Spread (Ha)	prog. Spread (Mm <sup>3</sup> )	Area of TS removal (Ha)	Prog. Top Soil (Mm <sup>3</sup> )	Prog. Spread (Ha)	Prog. Spread (Mm <sup>3</sup> )
P-1	70.88	0.57	0.00	0.00	0.00	0.00	0.00	0.00
P-2	88.60	0.71	0.00	0.00	0.00	0.00	0.00	0.00
P-3	106.32	0.85	0.00	0.00	0.00	0.00	0.00	0.00
P-4	124.04	0.99	0.00	0.00	15.48	0.23	0.00	0.00
P-5	141.76	1.13	0.00	0.00	19.35	0.29	0.00	0.00
P-6	159.48	1.28	5.32	0.07	23.22	0.35	0.00	0.00
P-7	177.20	1.42	5.32	0.07	27.09	0.41	0.00	0.00
P-8	35.44	0.28	5.32	0.07	30.96	0.46	0.00	0.00
P-9	35.44	0.28	5.32	0.07	34.83	0.52	1.00	0.03
P-10	35.44	0.28	5.32	0.07	38.70	0.58	1.00	0.03

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Deputy General Manager (Custodian)  
एन टी पी सी लिमिटेड / NTPC LIMITED  
POC, A-8A, Sector-24, Noida-201301 (U.P.)



Year	PB West and East				PB-NW			
	Area of TS removal (Ha)	Prog. Top Soil (Mm <sup>3</sup> )	Prog. Spread (Ha)	prog. Spread (Mm <sup>3</sup> )	Area of TS removal (Ha)	Prog. Top Soil (Mm <sup>3</sup> )	Prog. Spread (Ha)	Prog. Spread (Mm <sup>3</sup> )
P-11	35.44	0.28	5.32	0.07	7.74	0.12	1.00	0.03
P-12	35.44	0.28	10.63	0.14	7.74	0.12	1.00	0.03
P-13	35.44	0.28	10.63	0.14	7.74	0.12	1.00	0.03
P-14	35.44	0.28	10.63	0.14	7.74	0.12	1.00	0.03
P-15	35.44	0.28	10.63	0.14	7.74	0.12	1.00	0.03
P-16	35.44	0.28	10.63	0.14	7.74	0.12	1.00	0.03
P-17	35.44	0.28	15.95	0.21	7.74	0.12	1.00	0.03
P-18	35.44	0.28	15.95	0.21	7.74	0.12	2.00	0.06
P-19	35.44	0.28	15.95	0.21	7.74	0.12	2.00	0.06
P-20	35.44	0.28	15.95	0.21	7.74	0.12	3.00	0.09
P-21	35.44	0.28	15.95	0.21	7.74	0.12	3.00	0.09
P-22	35.44	0.28	15.95	0.21	7.74	0.12	3.00	0.09
P-23	35.44	0.28	15.95	0.21	7.74	0.12	3.00	0.09
P-24	35.44	0.28	21.26	0.28	7.74	0.12	3.00	0.09
P-25	35.44	0.28	21.26	0.28	7.74	0.12	3.00	0.09
P-26	35.44	0.28	31.90	0.43	7.74	0.12	3.00	0.09
P-27	26.58	0.21	31.90	0.43	7.74	0.12	4.00	0.12
P-28	26.58	0.21	31.90	0.43	7.74	0.12	4.00	0.12
P-29	26.58	0.21	31.90	0.43	7.74	0.12	4.00	0.12
P-30	26.58	0.21	31.90	0.43	5.81	0.09	4.00	0.12
P-31	26.58	0.21	31.90	0.43	5.81	0.09	4.00	0.12
P-32	17.72	0.14	53.16	0.71	5.81	0.09	4.00	0.12
P-33	17.72	0.14	53.16	0.71	5.81	0.09	4.00	0.12
P-34	17.72	0.14	53.16	0.71	5.81	0.09	4.00	0.12
P-35	8.86	0.07	74.42	0.99	3.87	0.06	4.00	0.12
P-36	8.86	0.07	74.42	0.99	3.87	0.06	4.00	0.12
P-37	8.86	0.07	74.42	0.99	3.87	0.06	4.00	0.12
P-38	8.86	0.07	74.42	0.99	1.94	0.03	6.00	0.17
P-39	8.86	0.07	74.42	0.99	1.94	0.03	6.00	0.17
P-40	0.00	0.00	53.16	0.71	1.94	0.03	6.00	0.17
P-41	0.00	0.00	21.26	0.28	1.94	0.03	6.00	0.17
P-42	0.00	0.00	26.58	0.35	1.94	0.03	6.00	0.17
P-43	0.00	0.00	0.00	0.00	0.00	0.00	6.00	0.17
P-44	0.00	0.00	0.00	0.00	0.00	0.00	6.00	0.17

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Year	PB West and East				PB-NW			
	Area of TS removal (Ha)	Prog. Top Soil (Mm <sup>3</sup> )	Prog. Spread (Ha)	prog. Spread (Mm <sup>3</sup> )	Area of TS removal (Ha)	Prog. Top Soil (Mm <sup>3</sup> )	Prog. Spread (Ha)	Prog. Spread (Mm <sup>3</sup> )
P-45	0.00	0.00	0.00	0.00	0.00	0.00	6.00	0.17
P-46	0.00	0.00	0.00	0.00	0.00	0.00	8.00	0.23
P-47	0.00	0.00	0.00	0.00	0.00	0.00	8.00	0.23
P-48	0.00	0.00	0.00	0.00	0.00	0.00	8.00	0.23
P-49	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.29
P-50	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.29
P-51	0.00	0.00	0.00	0.00	0.00	0.00	10.00	0.29
P-52	0.00	0.00	0.00	0.00	0.00	0.00	8.00	0.23
P-53	0.00	0.00	0.00	0.00	0.00	0.00	8.00	0.23
P-54	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.06
P-55	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.06
<b>TOTAL</b>	<b>1772</b>	<b>14.176</b>	<b>1063.2</b>	<b>14.176</b>	<b>387.02</b>	<b>5.8053</b>	<b>200</b>	<b>5.81</b>

Table 5.14  
Summerised data for Top Soil Management is given in

Sl. No.	Particular	PB West & East	PB -NW
1	Total Area disturbed (Ha)	1772	387.02
2	Thickness of Top Soil Cover (m)	0.8	1.5
3	Volume of Top Soil (Mm <sup>3</sup> )	14.176	5.8053
4	Commencement of T/Soil Removal	P-1	P-4
5	Storage period in Years	5	5
6	Reclaimed area through Spread (Ha)	1063.2	200
7	Thickness of Top Soil in Reclaimed Area (m)	1.33	2.90

### 5.3.10. Projected Production Plan/Calendar Program

The Pit-Wise planned production programme from PB West quarry, PB East Quarry and PB North-West, is given in Table 5.15. Calander Programme is given in Table-5.16

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**Table 5.15**  
**Pit-Wise production programme (Coal in Mt)**

Year	PB West Quarry					PB East Quarry		PB NW			Total
	WP-1	WP-2	WP-3	WP-4	Sub Total PB-West	EP1	Sub Total PB-East	PIT-1	PIT-2	Sub Total PB-NW	
1 <sup>st</sup> Yr	0.4	1.2	0.74		2.34	0.8	0.8				3.14
2 <sup>nd</sup> Yr	0.8	2.4	1.97		5.17	1.1	1.1				6.27
3 <sup>rd</sup> Yr	1.2	3.6	2.98	0.7	8.48		0				8.48
4 <sup>th</sup> Yr	1.2	3.6	3.5	1.2	9.5		0	0.5		0.5	10
5 <sup>th</sup> Yr	1.2	3.6	2.5	2.7	10		0	1		1	11
6 <sup>th</sup> Yr	1	4.8	1.5	2.7	10		0	2		2	12
7 <sup>th</sup> Yr	0.85	4.79	1.5	2.86	10		0	3		3	13
8 <sup>th</sup> Yr		4.48	1.5	4.03	10.01		0	3		3	13.01
9 <sup>th</sup> Yr			1.5	8.5	10		0	3		3	13
10 <sup>th</sup> Yr			0.82	8.18	9		0	3		3	12
11 <sup>th</sup> Yr				12	12		0	3		3	15
12 <sup>th</sup> Yr to 24 <sup>th</sup> Yr.				15	15		0	3		3	18
25 <sup>th</sup> Yr				11	11	4	4	3		3	18
26 <sup>th</sup> Yr				7	7	8	8	3		3	18
27 <sup>th</sup> Yr				1.21	1.21	13.79	13.79	3		3	18
28 <sup>th</sup> Yr						15	15	2.1	0.9	3	18
29 <sup>th</sup> Yr to 37 <sup>th</sup> Yr						15	15		3	3	18
38 <sup>th</sup> Yr						10	10		3	3	13
39 <sup>th</sup> Yr						3.99	3.99		3	3	6.99
40 <sup>th</sup> Yr to 50 <sup>th</sup> Yr							0		3	3	3
51 <sup>st</sup> Yr									2	1.28	1.28
52 <sup>nd</sup> Yr									1.46	1.28	1.28

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Table 5.16  
Calendar Program of Pakri Barwadh

Production in Years	Coal Production (Mt)				OB Removal (Mm3)				Strip Ratio (m3/t)		
	West Quarry	East Quarry	PB West & East	NW Quarry	Total from PB	West Quarry	East Quarry	PB West & East	NW Quarry	West & East Quarry	PB
1	2.34	0.8	3.14		3.14	5.94	2.95	8.89		2.83	2.83
2	5.17	1.1	6.27		6.27	15.27	3.05	18.32		2.92	2.92
3	8.48		8.48		8.48	21.12		21.12		2.49	2.49
4	9.5		9.5	0.5	10	26.11		26.11	4.1	2.75	8.20
5	10		10	1	11	25.03		25.03	8.2	2.50	8.20
6	10		10	2	12	35.51		35.51	11.7	3.55	5.85
7	10		10	3	13	41.44		41.44	12	4.14	4.00
8	10		10	3	13	41.52		41.52	12	4.15	4.00
9	10		10	3	13	41.5		41.5	12	4.15	4.00
10	10		10	3	13	41.5		41.5	8.2	4.15	2.73
11	12		12	3	15	44		44	8.2	3.67	2.73
12	15		15	3	18	44		44	8.2	2.93	2.73
13	15		15	3	18	52.76		52.76	8.2	3.52	2.73
14	15		15	3	18	66.04		66.04	8.2	4.40	2.73
15	15		15	3	18	66		66	8.2	4.40	2.73
16	15		15	3	18	66		66	8.2	4.40	2.73
17	15		15	3	18	66		66	8.2	4.40	2.73
18	15		15	3	18	66.01		66.01	8.2	4.40	2.73
19	15		15	3	18	66.01		66.01	8.2	4.40	2.73
20	15		15	3	18	66.01		66.01	8.2	4.40	2.73
21	15		15	3	18	66.01		66.01	8.2	4.40	2.73
22	15		15	3	18	66.01		66.01	8.2	4.40	2.73
23	15		15	3	18	66		66	8.2	4.40	2.73
24	15		15	3	18	66		66	8.2	4.40	2.73

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Production Years	Coal Production (Mt)				OB Removal (Mm3)				Strip Ratio (m3/t)				
	West Quarry	East Quarry	PB, West & East	NW Quarry	Total from PB	West Quarry	East Quarry	PB, West & East	NW Quarry	Total PB Mm3	West & East Quarry	NW Quarry	PB
25	11	4	15	3	18	31.2	31.85	63.05	8.2	71.25	4.20	2.73	3.96
26	7	8	15	3	18	26	36.95	62.95	8.2	71.15	4.20	2.73	3.95
27	1.21	13.79	15	3	18	19.5	46.5	66	8.2	74.2	4.40	2.73	4.12
28		15	15	3	18		66	66	9.2	75.2	4.40	3.07	4.18
29		15	15	3	18		66	66	11.4	77.4	4.40	3.80	4.30
30		15	15	3	18		66	66	11.4	77.4	4.40	3.80	4.30
31		15	15	3	18		66	66	11.4	77.4	4.40	3.80	4.30
32		15	15	3	18		66	66	11.4	77.4	4.40	3.80	4.30
33		15	15	3	18		66	66	11.4	77.4	4.40	3.80	4.30
34		15	15	3	18		66	66	11.4	77.4	4.40	3.80	4.30
35		15	15	3	18		66	66	11.4	77.4	4.40	3.80	4.30
36		15	15	3	18		66	66	11.4	77.4	4.40	3.80	4.30
37		15	15	3	18		66	66	11.4	77.4	4.40	3.80	4.30
38		10	10	3	13		66	66	10.3	76.3	6.60	3.43	5.87
39		3.99	3.99	3	6.99		12.98	12.99	10.04	23.03	3.26	3.35	3.29
40				3	3				9.00	9		3.00	3.00
41				3	3				9.00	9		3.00	3.00
42				3	3				9.00	9		3.00	3.00
43				3	3				9.00	9		3.00	3.00
44				3	3				9.00	9		3.00	3.00
45				3	3				9.00	9		3.00	3.00
46				3	3				9.00	9		3.00	3.00
47				3	3				9.00	9		3.00	3.00
48				3	3				8.50	8.5		2.83	2.83
49				3	3				7.00	7		2.33	2.33
50				3	3				5.75	5.75		1.92	1.92

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EOG, A-8A, Sector-24, Noida-201301 (U.P.)

Revised Mining Plan (1st Revision) - Pakri Barwadhi Coal Block

Production n Years	Coal Production (Mt)				QB Removal (Mm3)				Strip Ratio (m3/t)		
	West Quarry	East Quarry	PB West & East	Total from PB	West Quarry	East Quarry	PB West & East	Total PB Mm3	West & East Quarry	NW Quarry	PB
51				2				3.50		1.75	1.75
52				1.46				1.48		1.01	1.01
Total	311.70	191.68	503.38	642.34	1238.49	860.29	2098.78	437.97	4.17	3.15	3.95

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### 5.3.11. Equipment Requirement

#### 5.3.11.1 Design criteria

The design criteria adopted is as follows:

- Number of annual working days : 330
- Number of shifts /day : 3
- Duration of shift hours : 8

The number of equipment has been calculated on the basis of availability and utilization norms adopted for coal mines by CMPDI and is presented below in Table No 5.17 for shovels and dumpers.

Table 5.17  
Norms of Equipment Availability and Utilization

Sl. No.	Equipment	Availability	Utilization
1	Shovels	80%	58%-61%
2	Dumpers	67%-72%	50%-54%

#### 5.3.11.2 CATEGORY OF EXCAVATION

Following categories of excavation have been assumed.

- i) Top soil : Cat. I
- ii) Overburden : 50% Cat. III + 50% Cat. IV
- iii) Coal : Cat. III

#### 5.3.11.3 PRODUCTIVITY OF EXCAVATORS

Productivity of excavators is presented in Table-5.18. Productivity of dumpers is presented in Table-5.19

Table 5.18  
Productivity of excavators

Sl. No.	Description	Productivity (Mm3)
A	OVERBURDEN	
1	5.5m <sup>3</sup> Hydraulic shovel with 60T rear dumper	1.5

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Sl. No.	Description	Productivity (Mm3)
2	10m3 Hydraulic shovel with 100T rear dumper	2.6
3	20 m3 rope shovel + RD 170 T	4.015
4	10 m3 rope shovel + RD 120 T	2.08
5	8.3 m3 hyd shovel + RD 120 T	2.18
B	COAL	
1	8.3 m3 hyd. shovel + RD 120 T	2.2
2	4.5 m3 hyd. shovel + RD 50 T	1.18
3	5.5m3 Hydraulic shovel with 60T rear dumper	1.65

Table-5.19  
Productivity of dumpers for Lead

Different Combination	1 Km	1.5 Km	2 Km	2.5 Km	3 Km	3.5 Km	4 Km	4.5 Km
RD 170 T + 20 m3 shovel	0.7584	0.6398	0.5671	0.5181	0.4696	0.4322	0.4252	0.3852
RD 120+ 10m3 rope shovel	.5018	.4288	.3835	.3524	.3214	.2972	.275	.262
RD 120 T+ 8.3 m3 hyd. shovel	.566	.4845	.433	.398	.363	.336	.311	.296
RD 50 T + 4.5 m3 shovel	0.2128	0.1801	0.1603	0.1471	0.1335	0.1232	0.120	0.112
5.5m3 Hydraulic shovel with 60T rear dumper	0.2312	0.1971	0.1762	0.1623	0.1477	0.1365	0.143	
10m3 Hydraulic shovel with 100T rear dumper	0.4456	0.3758	0.3341	0.3062	0.2777	0.2559	0.2386	

The requirement of dumpers has been worked based on the annual workload, deployment of equipment, lead assessed from the stage plan of pit operations for 1st to 5th yr, 10th yr, , 20th yr, 30th yr, 40<sup>th</sup> yr and final stage along with dumping plan

It is suggested that the dumpers deployed in coal and OB to a have suitable dump bodies for optimum utilisation of the dumper payload.

#### 5.3.11.4 Equipment selection for PB West and PB East Quarries.

The geo-mining conditions warrant that the equipment deployed in partings and coal to alternate between the coal seam and partings. Thus, in the

process of selection of mining equipment, two major equipment combinations have been proposed. One for Top OB and the other for the coal seams and the partings.

20 cum Electric Rope Shovels operating with 170T-190T class of dumpers shall be deployed in Top OB and 10 cum Electric/Diesel Hydraulic shovel/backhoe operating with 100-120T class of dumpers in partings and Coal. The size has been decided to meet the twin objective of effective deployment, optimal utilization of the equipment and at the same time keeping the fleet size to manageable levels. This equipment size shall also offer a choice from a variety of vendors during the procurement and facilitate better inventory management.

In the initial years, the mine shall be opened by 10 cum hydraulic shovel/backhoe working with 100-120 T rear dumpers. This is proposed, as this combination shall have much smaller lead time for deployment. Deployment of 20 cum Electric rope shovels shall start as soon as the load for top OB increases.

A part of the Top OB workload is also proposed to be handled by 10 cum hydraulic shovel/backhoe operating with 100-120T rear dumpers. This has been done in years where there isn't enough consistent workload for a deployment of a new 20 cum rope shovel. This gives flexibility to the operations and also ensures better equipment utilization.

It is also proposed to work out the thin seams/partings with the help of high capacity ripper dozers (510hp).

#### **5.3.11.5 Equipment selection for PB NW Quarries.**

The geo-mining conditions warrant that the equipment deployed in partings and coal to alternate between the coal seam and partings. Thus, in the process of selection of mining equipment, two major equipment combinations have been proposed. One for Top OB and the other for the coal seams and the partings.

10 cum Electric Rope Shovels operating with 100T class of dumpers shall be deployed in Top OB and 5.5 cum Electric/Diesel Hydraulic shovel/backhoe operating with 60 T class of dumpers in partings and Coal. The size has been decided to meet the twin objective of effective deployment, optimal utilization of the equipment and at the same time keeping the fleet size to manageable levels. This equipment size shall also offer a choice from a variety of vendors during the procurement and facilitate better inventory management.

In the initial years, the mine shall be opened by 5.5 cum hydraulic shovel/backhoe working with 60 T rear dumpers. This is proposed, as this

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combination shall have much smaller lead time for deployment. Deployment of 10 cum Electric rope shovels shall start as soon as the load for top OB increases.

A part of the Top OB workload is also proposed to be handled by 5.5 cum hydraulic shovel/backhoe operating with 60T rear dumpers. This has been done in years where there isn't enough consistent workload for a deployment of a new 10 cum hydraulic shovel. This gives flexibility to the operations and also ensures better equipment utilization.

It is also proposed to work out the thin seams/partings with the help of high capacity ripper dozers (410hp). These machines shall rip the material, doze to form a heap to be handled by 10 cum front end loaders with 100 T class dumpers. Proposed.

### 5.3.11.6 Proposed HEMM

Size of HEMM are minimum and may vary in size as per requirement of site conditions. Proposed list of HEMM is given in Table 5.20.

Table 5.20  
Proposed list of HEMM FOR PB WEST AND PB EAST

PB WEST AND EAST				PB-NW			
Sl. No.	Equipment	Size /capacity	Nos.	Sl. No.	Equipment	Size /capacity	Nos.
COAL							
1	Elec. Hydraulic shovel	4.5 m <sup>3</sup>	9	1	Diesel Hydraulic Shovel with Backhoe attachment	5.5 m <sup>3</sup>	2
2	Rear Dumper	40-60 T	77	2	Rear Dumper	60 T	18
3	RBH Drill	160 mm	15	3	RBH Drill (Electric)	160 mm	2
4	Track Dozer	310 kW	15	4	Dozer with Ripper attachments	410 HP	2
5	Back hoe hyd shovel	2.8m <sup>3</sup>	6	5	Wheel Dozer	410 HP	1
6	Wagon drill	100mm	3	6	Coal Tippers (Coal Body)	20T	25
TOP OB/PATING/INTERBURDEN							
1	Elec. Rope Shovel	20 m <sup>3</sup>	7	1	Hydraulic Shovel	5.5 m <sup>3</sup>	3
2	Elec. Rope Shovel	10 m <sup>3</sup>	5	2	Hydraulic Shovel	10.0 m <sup>3</sup>	3
3	Elec. Hydraulic shovel	8.3 m <sup>3</sup>	14	3	Rear Dumper	60 T	20

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Revised Mining Plan (1st Revision) - Pakri Barwadih Coal Block

PB WEST AND EAST				PB-NW			
Sl. No.	Equipment	Size /capacity	Nos.	Sl. No.	Equipment	Size /capacity	Nos.
5	Rear Dumper	170-190 T	78	4	Rear Dumper	100 T	18
6	Rear Dumper	120-150 T	152	5	RBH Drill (Electric)	250 mm	3
7	RBH Drill	250 mm	24	6	Dozer with ripper attachments	410 HP	4
8	RBH Drill	160mm	10	7	Dozer with ripper attachments	850HP	4
9	Track Dozer	310 kw	30				
COMMON /AUXILIARY EQUIPMENT							
1	Dozer with Ripper	510 kW	5	1	Water Sprinkler (wide spray system)	70 KL	3
2	Motor Grader	205 kW	14	2	Truck Mounted DTH Drill	100-120mm	1
3	Wheel Loader	5 m <sup>3</sup>	4	3	Mobile Rough Terrain Crane	70T	1
4	Diesel crane	75 T	2	4	R. T. Crane	30T	1
5	Hyd. Rough terrain crane	30 T	5	5	R. T. Crane	8T	
6	Hyd. Rough terrain crane	12 T	6	6	F.E.Loader	10 Cum	1
7	Diesel Hyd. Pickup Crane	8 T	8	7	Hydraulic shovel with Backhoe (Diesel)	1.2-2.2 m <sup>3</sup>	1
8	Wheel Dozer	280 kW	6	8	Wagon drill	100-120mm	1
9	Water Sprinkler	28 kL	14	9	Diesel Browser	16KL	1
10	Tyre Handler		4	10	Rock Breaker		1
				11	Fire Tender		1
				12	Cable Handler		1
				13	Tyre Handler		1
				14	Tipping trucks	10 T	6
				15	Maintenance Van		1
				16	Heavy Duty Tosing truck		1
Haul Road Equipment							
				1	Grader	280 HP	2
				2	Vibratory Compactor	30TH	1
				3	Wheel Dozer	460 HP	1
Reclamation							
				1	F E Loader	10 m <sup>3</sup>	1
				2	Water Sprinkler (wide spray system)	28 KL	2

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PB WEST AND EAST				PB-NW			
Sl. No.	Equipment	Size /capacity	Nos.	Sl. No.	Equipment	Size /capacity	Nos.
				3	Rear Dumper	60T	3
				4	Dozer (With ripper Attachment)	410 HP	1
				5	Farm Track/tractor with trolley		1

In the initial two years of mining operation of PB East quarry, separate set of smaller equipment are proposed. After completion of the said period these equipment shall be disposed of suitably. The proposed list of major equipment are mentioned in Table 5.21.

#### Proposed list of HEMM FOR PB EAST FOR INITIAL TWO YEARS

Table 5.21

Sl No	Equipment Type	Size/Cap	Population
1	Shovel	4.5 Cum	3
2	Dumper	35 T	30
3	Dozer	320 Hp	3
4	Drill Machine	160 mm	3
5	Grader	145 Hp	1
6	Water sprinkler	28 Kl	1

The size and the equipment indicated above may vary depending upon their market availability and technology upgradation.

#### 5.3.12. Annual Capacity and Life of Quarry

The life of the PB OCP is estimated as 52 years. No construction period is considered. PB-NW quarry shall commence mining operation on 4th year. After 39 year peak capacity of mine shall be 3 MTPA and shall be limited to extraction of coal of barrier.

Annual peak capacity and life quarrywise and for PB mine is given in Table 5.22.

Table 5.22  
Annual Capacity and Life of Quarry

Sl. No.	Quarry	From	To	Life	Capacity (MTPA)
1	PB-West	P-1	P-27	27	15
2	PB-East initial	P-1	P-2	2	1

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3	PB-East Later	P-25	P-39	15	15
4	PB-NW	P-4	P52	48	3
	PB Min	P-1	P-52	52	18

### 5.3.13. Quarry Drainage

#### 5.3.13.1 Quarry Dewatering

Sufficient numbers of inpit sumps as required PB West and East Quarry and all necessary in pit drainage channels to facilitate pit dewatering to comply with the Water Management Plan. A suitable number of large mining pumps (some mounted on pontoons) shall ensure adequate capacity to pump water from the mine during and after the "monsoon" season. The mine shall be so designed that it allows all water falling on the working areas to be directed to major sumps located strategically at the bottom of each pit. During very high rainfall periods production focus shall be on the drier upper benches.

Sufficient temporary and permanent inpit and expit pipework and drainage channels shall be provided for to ensure adequate dewatering can take place both during and after the monsoon period. Annual planning shall ensure that mining from lower benches is minimised during the monsoon so that disruptions to production due to flooded lower areas of the pit can be minimised also. Time to dewater the lower areas of the pit during and after the monsoon season is allowed for in the mine plan. Lower areas of the mine shall be mined during the dryer months.

#### 5.3.13.2 Water Management Plan

The main areas of water management in the Quarry shall be:-

- Surface water flow around the mine through Garland Drains
- In pit accumulation caused by intense rainfall during the monsoon season and plans for managing this rainfall by utilising sumps, diversion ditches and pumps.
- Groundwater flow into the pit and the construction, maintenance and operation of mine dewatering plant to handle this groundwater.
- Non potable water required for construction and mining services around the mine site including fire protection.
- Potable water required for drinking purposes at both the mine site and the colony.
- Discharge of decanted water into the seasonal streams which traverse the mining lease.

#### 5.3.13.3 Surface Water Flow

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NTPC had appointed Central Water and Power Research Station (CWPRS), Pune for conducting an area-drainage study. As recommended by CWPRS, the central nallah flowing across PB block, shall be tapped at the northern boundary of the block to transfer the flow to the eastern and western nallas through diversion canals.

Water flow from this canal is directed towards both the Lathorva Nallah and Hardara (Pakwa) Nallah. Additionally collector and diversion drains shall be constructed around the outside of the pit, predominantly along the base of the waste dumps to intercept over land flow and water shed from the waste dumps. This captured water shall be diverted via the drains and sediment ponds to existing nallahs to take the water away from the mine. All collection and diversion drains shall be bunded to increase drain capacity. The alignment of the proposed canal and layout of these drains and sediment ponds are shown in the "Surface Master Plan".

Garland drains all around the periphery of the excavation zone shall be dug with the help of low capacity backhoe. This garland drain shall be connected to nearest natural nala. Such garland drains and their inter-connection shall be ever shifting and unlined. Preferably, 2m wide and 1m deep cross section is presumed to carry rain water to the nearest natural drainage.

Adequate sump capacity to cater to the ground water seepage and direct rainfall water during rainy season shall be created at all point of time in the mine life. Additional water shall be dewatered with the help of pump installed near sump at elevated location. Pipe ranges shall discharge water to the settling tank on the surface. In the settling tank/pond clear water shall be pumped to nearest natural nala.

For keeping the working face and benches during monsoon season, benches shall be mildly sloped toward sump side/dip side to allow water to percolate at the bottom most coal benches and finally lead to sump. Diesel operate face sump and slurry pumps shall be installed for occasional running for drying up faces.

Pump out water from the mine shall be brought to the settling pond located by the north of Khora/Lathorva Nala (A). Furrows suitable to arrest the siltation if any before finally pumping the clean water to nala. Settling pond shall be 2m (approx.) deep and around which bund shall be erected. Settling pond measuring approx 1 Ha shall be sloped southward to facilitate natural flow of water.

Drained mine water as explained above shall be carried to Lathorwa nala which finally meets Ghagra river on south side of the block.

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#### 5.3.13.4 In pit Storm water from Monsoon rainfall

In pit storm water runoff shall be intercepted at various levels within the pits to minimise the amount of water reaching the base of the pit. This shall involve the following system:

- Bund walls at specified levels within the pit to create a multilevel series of small holding dams
- Corresponding bench drains for interception of surface and ground water flow and its subsequent diversion to holding dams
- High volume discharge pumps at each holding dam level to discharge collected storm water. These shall be on an automatic start float system.

#### 5.3.13.5 Groundwater Flows

Groundwater shall be controlled by the installation of dewatering wells along the perimeter of the pit which shall intercept groundwater flow and reduce the risk of excessive flows into the pit. The dewatering system shall be progressive and shall be brought on in stages as the mine develops. The system shall utilise 100 mm diameter submersible pumps in 150 mm diameter PVC well screens and casing and the wells shall be at approximately 150 m centres.

The details of the groundwater dewatering system shall be refined on the basis of data collected from specialised pump tests to be conducted along the northern pit limit of the West Quarry (between the proposed canal and the pit limit). In addition, groundwater monitoring boreholes shall be established at 500 m centres to collect data on a continuous basis, which shall be used along with geotechnical monitoring systems to assess slope stability parameters on a continual basis.

#### 5.3.13.6 Non Potable Water Requirements

Water from the dewatering wells shall be piped to a water storage facility. From here the water shall be piped to various locations around the mine site for use in construction, dust suppression at the mine and coal handling plant, sewerage system at the mine infrastructure and Colony, green belt irrigation, fire protection and for miscellaneous washing purposes.

#### 5.3.13.7 Potable Water Requirements

Water from the storage facility shall be piped to a water treatment plant to produce potable water. This water shall then be piped around the mine site infrastructure and to the Colony. Borewell shall also be drilled to meet

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requirement of drinking water and water requirement during construction stage.

### 5.3.13.8 Discharged Water

Excess water from the mine shall be discharged into the existing nallahs via Sediment Ponds. The ponds shall be 300m x 300m with a depth of 1.5 to 2.0 metres and internal bunding to control flow movement.

### 5.3.13.9 Pumping of Mine Water

The pumping system has been planned separately for each pit considering simultaneous working. Mine has been planned in such a way that working faces and haul road shall remain dry as far as possible. Layout of quarry provides suitable gradient along quarry floor and benches to facilitate self-drainage of water to lowest level of quarry.

Proper drains shall be dug along both sides of haul road to keep the haul roads dry. Main sump at the lowest-point of quarry shall have sufficient capacity to accommodate entire make of water.

Water accumulated in the sump shall be pumped out of the mine at suitable point so that it drains away to canal and to Main River. Suitable sedimentation tank shall be made where quarry water shall be discharged and then after proper sedimentation, water shall flow to the nallahs. Pumping requirement has been assessed on the basis of,

- (i) Meteorological data from nearby area concerning maximum rainfall.
- (ii) Catchment area and depth of quarry.

Assuming 20 hours of pumping and six days to pump out the total water, the required pumping rate shall be 7726 cum/hr. selecting 540m<sup>3</sup>/hr pumps, the requirement is as given below. Initially 60 m head pumps shall be used for pumping out water from main Sump. As the quarries advance on dip side lower head pumps shall be replaced by higher head pumps.

- a) Main Pumps [160 lps x 60 to 300 m head]: Complete with 6.6 KV 365KW electricals and starters. 4% Pump sets with electricals to be kept as standby for emergency.

- b) Diesel operating Pumps:

- 80 lps X 60 m head
- 35 lps X 60 m head

संज्ञा के माध्यम से निम्नलिखित  
अनुसूची के अन्तर्गत कार्य  
आवश्यक है।  
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- c) Face pumps 11 lps X 30 m head
- d) Pipes: Sufficient length of pipes of dia. 406 mm, 300 mm, 219 mm and 100 mm have been envisaged for above pumps depending upon capacity of pumps.

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#### 5.4. CONCEPTUAL UNDERGROUND MINING

5.4.1 Pakri-Barwadih (PB) Block has been divided into two portions, one for opencast upto a depth of 300 meters for deepest Seam, Seam-I and the other for underground mining. No underground mining shall be carried out in the PB-NW and PB-East as all the seams are extracted by opencast working. Thickness of mining block between floors of bottom most seam to roof of top most seam varies from about 120 m to about 170 m, average being about 140 m. The maximum depth of the Pakri-Barwadih block is about 600 m. Thus, the mining depth of proposed underground mining shall vary from about 160 m to 600 m. Such a property is ideally approached by an incline for coal raising and two shafts for ventilation and man and material transport. However, an incline through quarry bottom is not possible as this shall prevent or at least greatly limit back filling of over-burden in the worked out quarry and hence underground mines shall be developed through shafts only.

As per Geological data available, the underground area of the Pakri-Barwadih block contains about 728 millions tones (Mt) of coal reserves out of which only 109 Mt are 'Proved' and balance are 'indicated'. This calls for detailed exploration and formulation of geological report before action oriented Project is prepared. The detailed exploration programme for this area has already been discussed elsewhere in the document. Detailed exploration shall be completed before start of actual dumping operations over underground area. The time frame for exploration and exploitation of underground area and submission of mining plan for the same is given below.

Zero date of Commencement of exploration work for the area - from the commencement of opencast mining operations. Commencement of mining operations shall be reckoned from commencement of shaft sinking. Schedule of commencement is given in Table 5.23.

Table 5.23  
Schedule of Commencement PB (UG)

Sl No.	Activity	Time schedule
1	Detailed exploration of the underground area	4 years
2	Preparation of G.R.	1 year
3	Various Studies and Clearances	3 year
4	Preparation and approval of Mining Plan from MOC	1 year
3	Commencement of mining operations	1 years

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Total time	10 years
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This chapter, therefore, deals with only a conceptual approach for exploitation of the deposit through underground mining. It may, however, be mentioned here that exploration and detailed mine planning activity are so timed and executed that it should be possible to start underground mine development activity at the earliest. This is necessary because underground mine development work, namely shaft sinking pit-bottom, winding arrangements, pump house and sump, horizon development and finally development of production panels take a long time.

#### 5.4.2 Tentative Calendar Program:

Considering the production from area beyond 300 m depth line i.e. reserve amenable to underground mining a projected production plan is summarised in Table 5.24.

Table 5.24  
Projected production plan

Year	UG mining (Projected) (Mt)	Cumulative (Mt)
	0.5	0.5
10 <sup>th</sup> Yr	1	1.5
11 <sup>th</sup> Yr	3.6	5.1
13 <sup>th</sup> Yr	3.6	8.7
14 <sup>th</sup> Yr	3.6	12.3
15 <sup>th</sup> Yr	3.6	30.3
20 <sup>th</sup> Yr	3.6	48.3
25 <sup>th</sup> Yr	3.6	66.3
30 <sup>th</sup> Yr	3.6	84.3
35 <sup>th</sup> Yr	3.6	102.3
40 <sup>th</sup> Yr	3.6	120.3
45 <sup>th</sup> Yr	3.6	138.3
50 <sup>th</sup> Yr	3.6	141.9
51 <sup>st</sup> Yr	3.6	145.5
52 <sup>nd</sup> Yr		

#### 5.4.3 Mine development

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The underground mining area shall be developed through two pairs of shafts, one pair for the Western sector and the other for the Central sector of the Block (there being practically no area in the Eastern sector for coal of depth of more than 300 Mining from surface for development of a separate underground mine). These shafts shall be at least 400 m away from overburden dumps to ensure that infrastructure created near the shaft is not affected by any accidental slide of dumps. Shafts shall be sunk up-to a depth of about 430 m with landing arrangements at about 400 meter from surface.

From each shaft, two level cross-measure roadways (in fact marginally rising for drainage of water to shaft) shall be driven to touch initially the top-most seam but later on to all seams as need arises. There shall thus be two main intakes and two main returns. Thereafter, all development shall be in coal. At shaft bottom, the following facilities shall be developed in stone and shall serve all the seams throughout the life of the mine:

1. Pump house and Sump
2. Sub-station both at downcast (DC) shaft
3. Skip loading arrangements at upcast (UC) shaft.
4. 150-200 t coal surge bunker before skip loading arrangements.

The upcast shaft shall be suitably covered to prevent short-circuiting of air. This shaft shall be connected to main mine exhaust fans (two in number-one working, one stand-by) through a fan-drift.

The upcast shaft shall be equipped with 15-tonne skip winding system with automatic loading of coal at shaft-bottom and automatic unloading of coal at shaft-top. The winding cycle shall be of about two minutes capable of giving 30 cycles per hour. Arrangements shall be made for man-winding in skip shaft in case of emergency.

The downcast shall be equipped with cages for man and material winding.

Both winding systems shall be operated through ground mounted Koepe winders. Shafts shall be equipped with rigid guides for smooth winding of skips and cages. Both shafts shall be of 6.5 m dia. finished and shall be about 60 m apart.

For initial development both shafts shall have temporary headgears and winders equipped with cage and mine car systems. Once facilities in rock are developed, permanent-winding facilities shall be installed as mentioned above.

Up-cast and down-cast shafts shall be connected only through one gallery in stone to restrict short circuiting of mine air. Development faces shall mainly be ventilated by auxiliary fans and tubing.

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EOC, A-8A, Sector-24, Noida-201301 (U.P.)

For stone work, compressed air shall be supplied from compressors installed on surface supplying compressed air to working forces through pipes and houses. Side discharge loaders of about 2 m<sup>3</sup> bucket capacity, shall be used for loading blasted rock in mine cars. On surface, these cars shall be taken to a tippler from where a conveyor shall take the muck or the mined rock to a bunker for loading dump trucks, for dumping the mined rock in overburden dump of the opencast mine.

All workings in rock shall be rock-bolted and gunited. Arches or wall-girder support shall be provided only where found necessary.

No underground working shall be permitted within 60 m of worked out opencast mine, thus maintaining minimum 60 m solid barrier between underground and opencast as this is necessary on safety consideration.

#### 5.4.4 Development in coal

Once the four cross-measure roadways of 400 m horizon touch a coal seam, rest of the mine development shall be in coal. Seams shall be developed and extracted top downwards. Two main intakes and two main return air roadways shall be developed on both sides of cross-measure roadways. Thus, there shall be a set of four main roadways for each seam or each group of seams. From these roadways, panels shall be developed on rise and dip-side. Scheme of development is shown in fig. 1 & 2. Solid barrier shall be left between a panel and main trunk roadways. Return and intake roadways shall be connected at as few places as possible to reduce the number of stoppings and to prevent leakage. Development shall be done with the help of side-discharge loaders and conveyors, which shall initially load mine cars but later on skip loading conveyor. 2.5 t capacity mine cars shall be used for development before all conveyor system is established.

Main trunk roadways shall be 4.8 m wide, roof-bolted. Centre to centre distance between roadways shall 48 m. Panel development emanating from these trunk roadways shall be according to the final method of coal extraction. Height of trunk roadways shall be equal to seam thickness or a maximum of 3 m. There shall be only one set of trunk roadways for each group of seams. If any seam has top, middle and bottom sections, trunk roadways for them shall only be one set in located a suitable horizon. Similarly if any two seams have less than 9 m parting between them, trunk roadways shall only be in one of them only.

Main trunk return air and intake air roadways shall have as few connections as possible. When not in use, these inter-connections shall be cut off by stoppings. One intake-airway shall be used for conveyors and travelling the other for material supply rail track equipped with endless haulage.



Each seam shall have its own small sump and pumping station which shall pump water to main sump of the mine.

#### 5.4.5 Mine development includes:

1. Working in stone as shown in the area bound by dotted line.
2. Shafts 4 nos. of cross-measure drifts, sub-station, Pump house, sump, skip drift, bunker, skip loading arrangements are in stone and for all seams. All other development is in coal seam.
3. Seams are extracted top downwards.
4. Coal transport is through belt in intake except from main intake to skip loading station which is in return.
5. Seams are touched by cross-measure drifts 4 nos. – 2 intake 2 returns.
6. Initial development shall be through cages, mine-cars and haulages.

#### 5.4.6 Method of coal extraction

There are basically three methods of underground coal extractions:-

1. Board and pillar,
2. Room and Pillar, and
3. Longwall.

Normally for such deep mines as in this case Powered support Longwall is the appropriate method of coal extraction provided the deposit is near uniform and roof is not hard to cave. If the seam thickness varies considerably, more than one set of powered support are needed to cover the entire property. Even for one panel, double telescopic powered supports may be required to cover the entire seam thickness variation. Such supports are very costly. The geological data available indicated that each seam has considerable thickness variation.

Coming to geological structure in the underground area, the same is yet to be confirmed by detailed exploration as the area mostly contains "Indicated reserves". There are a large number of faults in the opencast area and if similar structure is considered for dip-side underground area, formation of long panels (an essential requirement of powered support longwall) for 150 to 200 m long face shall not be possible.

Further, geological information has revealed that roof rocks are very hard in nature and to cave them properly heavy duty and costly supports shall be needed and yet caving may not be proper and regular without blasting in goaf.

For the reasons mentioned above longwall – Technology is ruled out for coal extraction,

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Coming to Room and Pillar system of mining seam gradient is a bottle neck here. Gradient of seams is indicated as 1 in 3 to 1 in 5 (100 to 150). This rules out use of shuttle cars with continuous miners. Use of continuous haulage with continuous miner is a possibility but this technology has not yet been tried in India and is not widely practiced even in those countries, which extensively use Room and Pillar system of mining. Further this system cannot effectively extract coal from seams that are more than 4.5m thick. As per geological information available out of over (12) twelve mineable coal seams and twenty (20) coal sections these (including top, middle, bottom top and middle, middle and bottom, and total combined sections etc.), as many as 15 have coal thickness more than 5 m in different areas. Such a deposit cannot be efficiently worked by Room and Pillar technology.

We thus have no alternative but to adopt Board and Pillar and Gallery Blasting (which is a variation of Board and Pillar) methods for this property. However deep properties like the area in question, require high output and high productivity. This can be achieved by using higher capacity side discharge loaders, universal drilling machines (both for roof bolting and to obtain longer pull per blast by long hole drilling and by mechanization of support system in pillar extraction.

Sequence of extraction shall be as follows:-

- a) If two seams have a parting of less than 3m between them the thicker seams shall be worked and the thinner shall be left in-site unused.
- b) If parting between two seams is 3 to 6 m both seams shall be developed and extracted simultaneously.
- c) If parting between two seams is more than 6 m upper seams shall first be extracted.  
All seams shall be extracted by caving.  
Thickness less than 1.5m shall not be worked.  
Seams of thickness 1.5 to 4.0 shall be extracted by Slice and Rib (SR) method and of thickness more than 4 m by Blasting Gallery (BG) method.

#### 5.4.7 Panel Size

Since the depth of opencast mine shall be 300m from surface for the lower most seams, in the underground mine the upper-seams in some area shall have depth less than 300m depth. For area of depth less than 240m panels shall have 9 level galleries and 8 pillars of size 30.5 x 30.5m centre to centre with 4.2m wide galleries. Panel shall as long as possible. For long panels system of sub-panelling shall be adopted, if required. For during extraction stage,

For depths between 240 and 360 m a panel shall be of 7 level and 6 pillars of size of 39.5 x 39.5 centre to centre.

For depths beyond 360 m a panel shall have 6 level and 5 pillars of size 45m x 45m m centre to centre.

The above is as per requirements of Coal Mines Regulation, 99. However it is proposed to approach Directorate General of Mines Safety to permit pillars of Factor of safety 2.5 as it has been scientifically established that pillar of Factor of safety 2 and more have long term stability. If the proposal is accepted by DGMS, pillar size can be much smaller than presently required under Law. With smaller pillars there shall be more number of faces and depillaring shall also be facilitated.

Each panel shall be equipped with 3 side-discharge loaders (SDLs) 2m<sup>3</sup> bucket capacity, 3 universal drilling Machines (UDMs) and at least 3 face conveyors, 2 gathering conveyors and one gate conveyor.

In order to improve percentage of extraction and to reduce number of stopping, this solid barrier shall be left between panels. Thickness of such barrier shall be scientifically determined.

#### 5.4.8 Mine Output

On an average a panel with 3 SDLs (2m<sup>3</sup> bucket capacity) shall give a production of 600 tonnes per day. Such ten panels shall be worked at a time, six in upper seams and 4 in the lower seams. Where BG method shall be worked, SDLs shall have remote controlled facility. The projected mine output is thus 6000 tonnes per day.

#### 5.4.9 Total Output

With working of two underground mines, each producing 6000 tonnes per day the total annual output works out to 3.6 million tonnes a year considering 300 working days in a year.

#### 5.4.10 Coal Disposal

Initially, skips of a mine shall unload coal to a small bunker which shall load a conveyor. This conveyor shall carry coal to 200 T capacity overhead bunkers for truck transport of coal to railway siding of the opencast mine. Later on, a conveyor shall be installed on surface to take coal from 200 T bunker to a 1000 T bunker at a point central to both underground mines. Similar facilities shall be created for the second underground mine. From two close by 1000 T bunkers a conveyor, which shall be laid on the leveled of over-bunker of western sector opencast mine, shall carry coal to main bunker of opencast mine for rail movement of coal.

#### 5.4.11 Environment protection

In a multi-seam mining situation two factors need special attention. They are

1. Risk of underground fire, and



2. Heavy subsidence on surface.

These problems shall be tackled in following manner.

**A. Underground Fire**

Solid coal barriers shall be left between panels so that problem of one panel is contained within the same. Wherever required (due to incubation period considerations) sub-paneling shall be done.

Working panels shall have minimum connections with trunk roadways so that they can be isolated quickly in case of fire.

Automatic monitoring system shall be installed at strategic points underground to give audio-visual alarm in control room on surface for abnormal rise in values of CO, CH<sub>4</sub> and temperature.

**B. Damage to surface**

Since the underground mine area is yet to be covered by detailed exploration, panel layouts, exact thickness of coal extraction and subsidence due to such extraction cannot be projected at this stage.

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Chapter V - Mining

RQP No. 34011/(15)/2009-CPAM dated 27.09.10

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Dep. General Manager (Commercial)  
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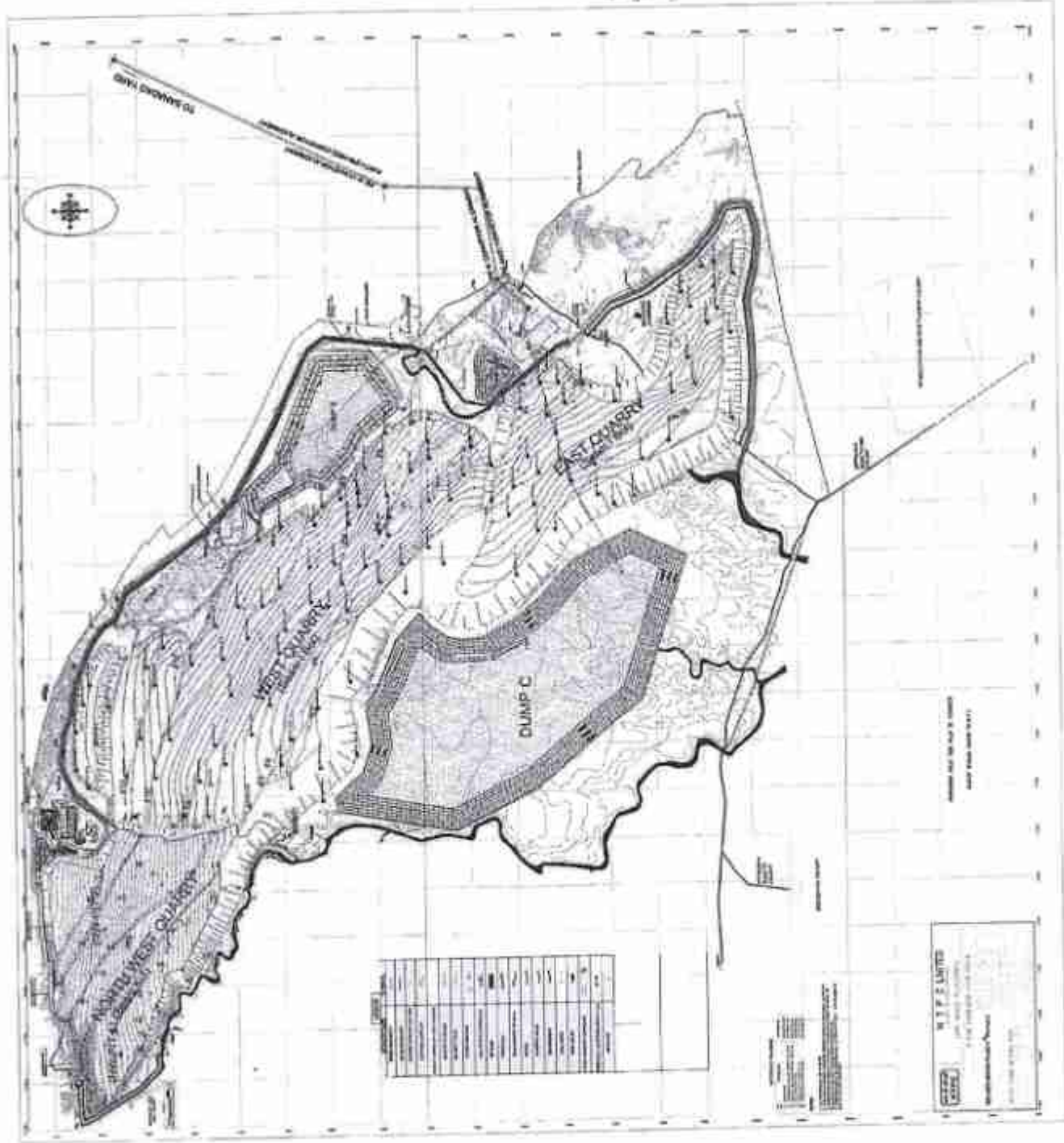


पवन देव जोषा/PWAN DEVJOTA  
उप महाप्रबन्धक (एनटीपीसी)  
Deputy General Manager (NTPC Limited)  
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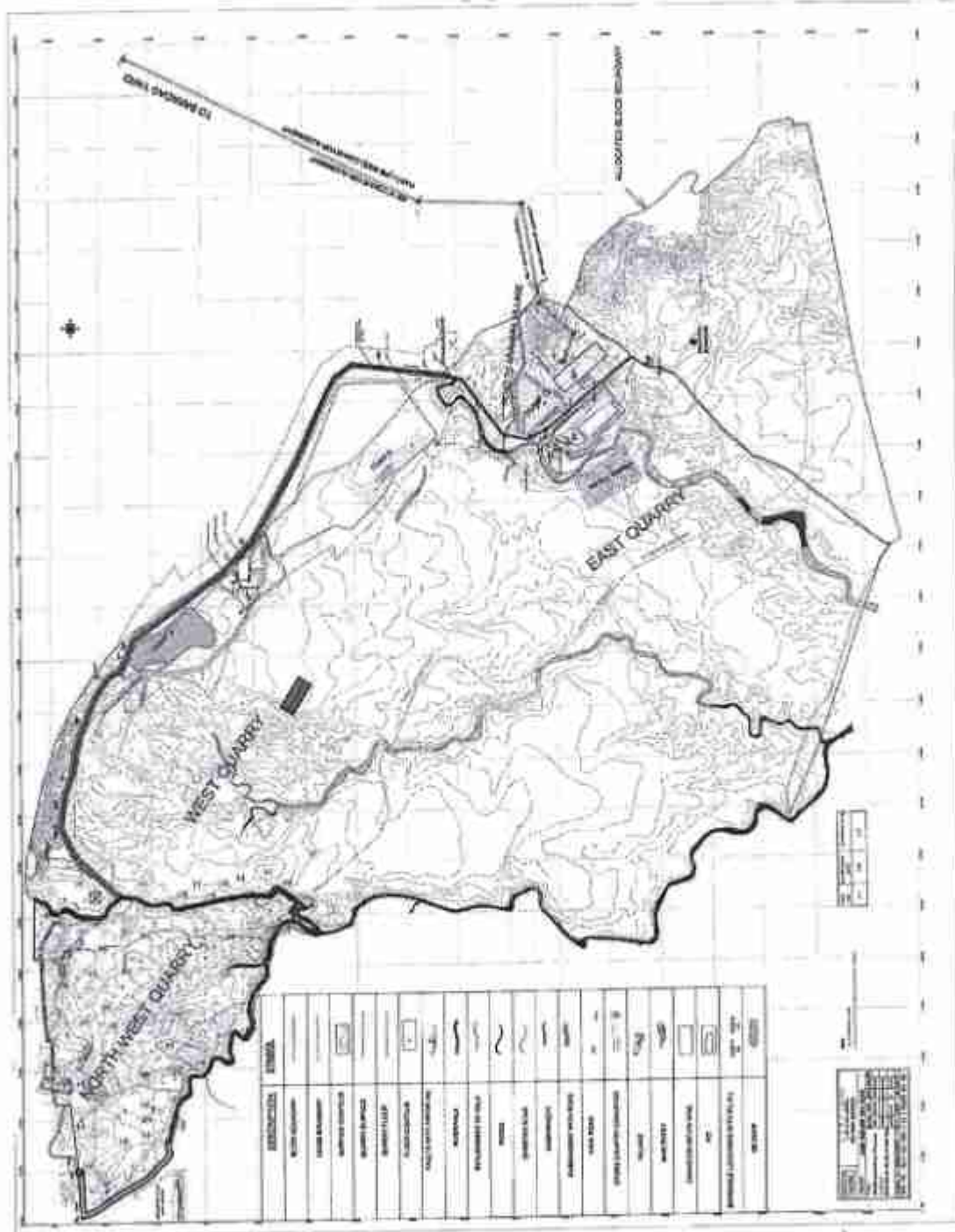
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*Pawan Dev Janta*  
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1. The project is being  
 implemented by the  
 Government of India  
 through the Ministry of  
 Coal, Government of India  
 and the Ministry of  
 Environment and Forests,  
 Government of India

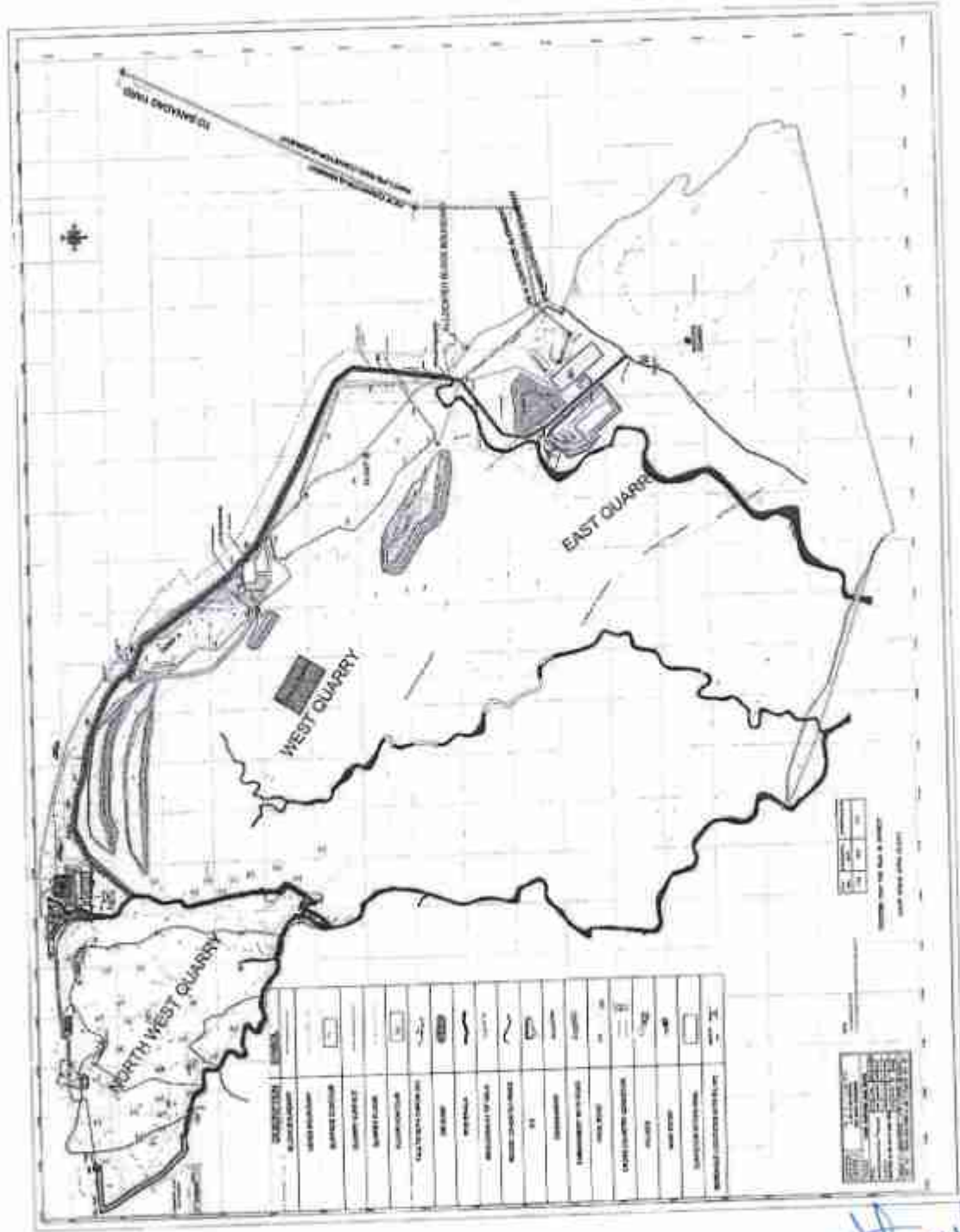
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1. The map is prepared by NTPC Ltd. for the purpose of showing the location of the project area. It is not a cadastral map and should not be used for any other purpose.

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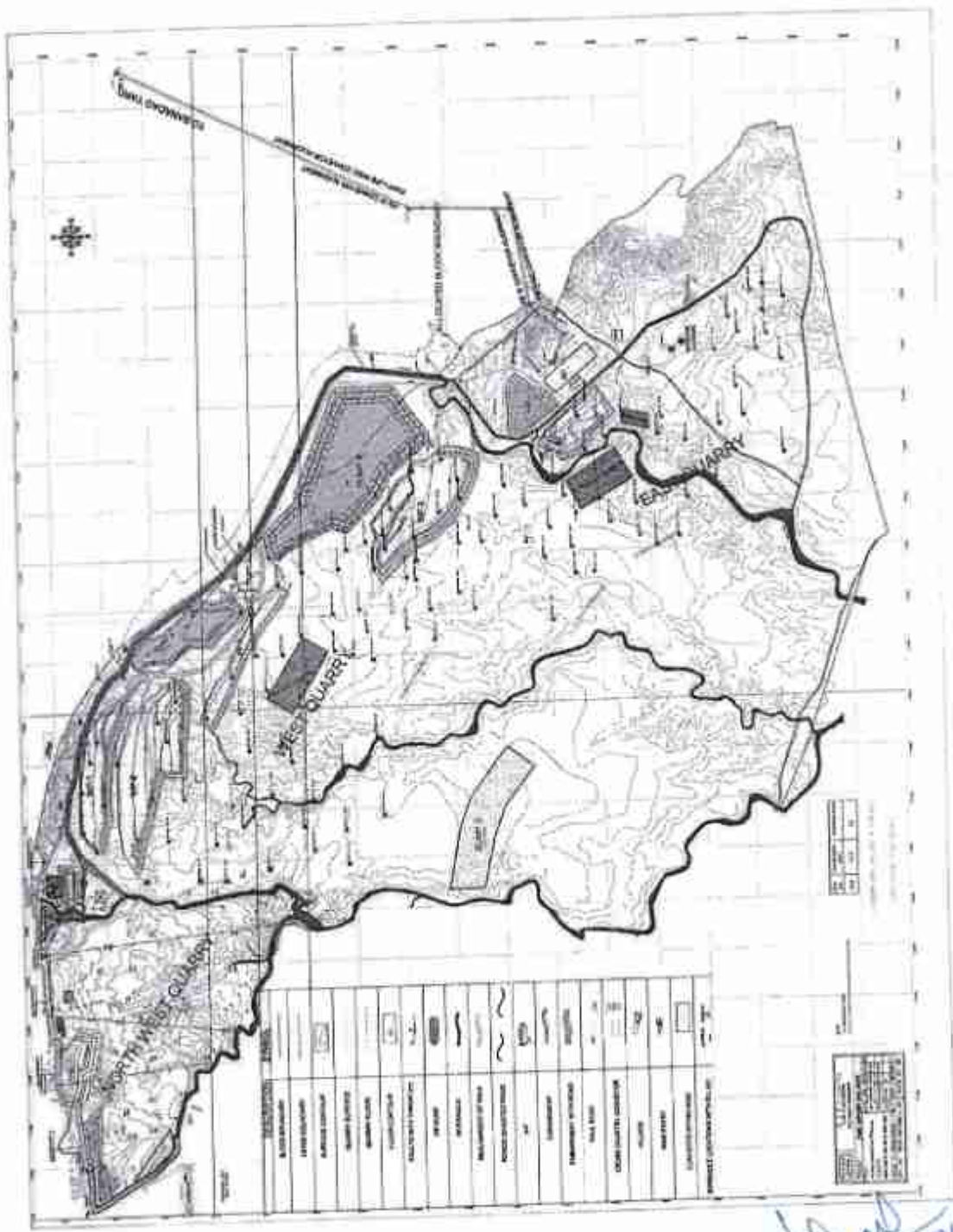


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वे  
 1. The attached map shows the location of the proposed project area in the vicinity of the existing project area. The map is for reference only and does not constitute a guarantee of the accuracy of the information contained therein. The Government of India is not responsible for any loss or damage arising out of the use of the map.

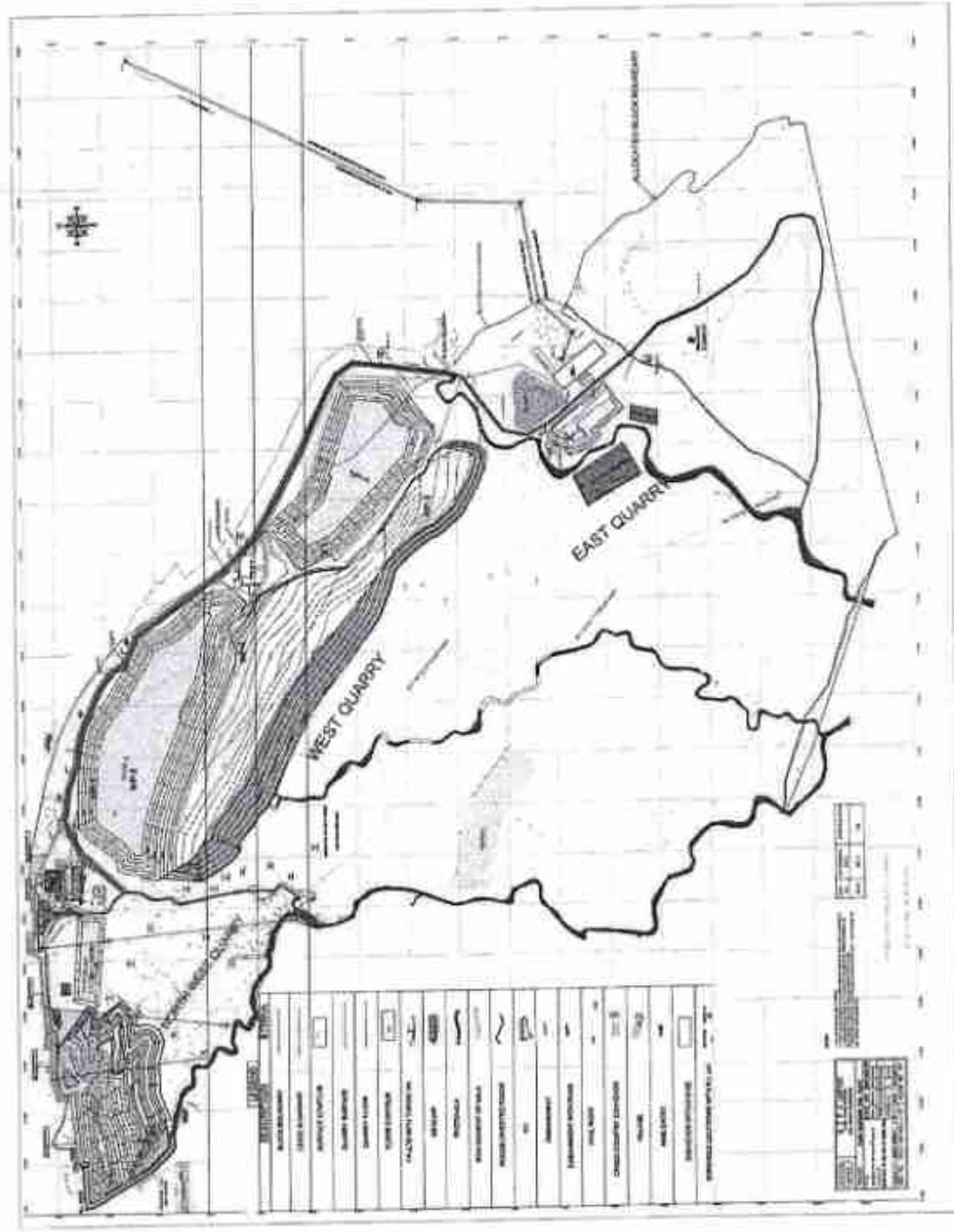
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 with the various maps and plans  
 and other documents of the  
 project, the following details  
 are furnished for the  
 purpose of the project.

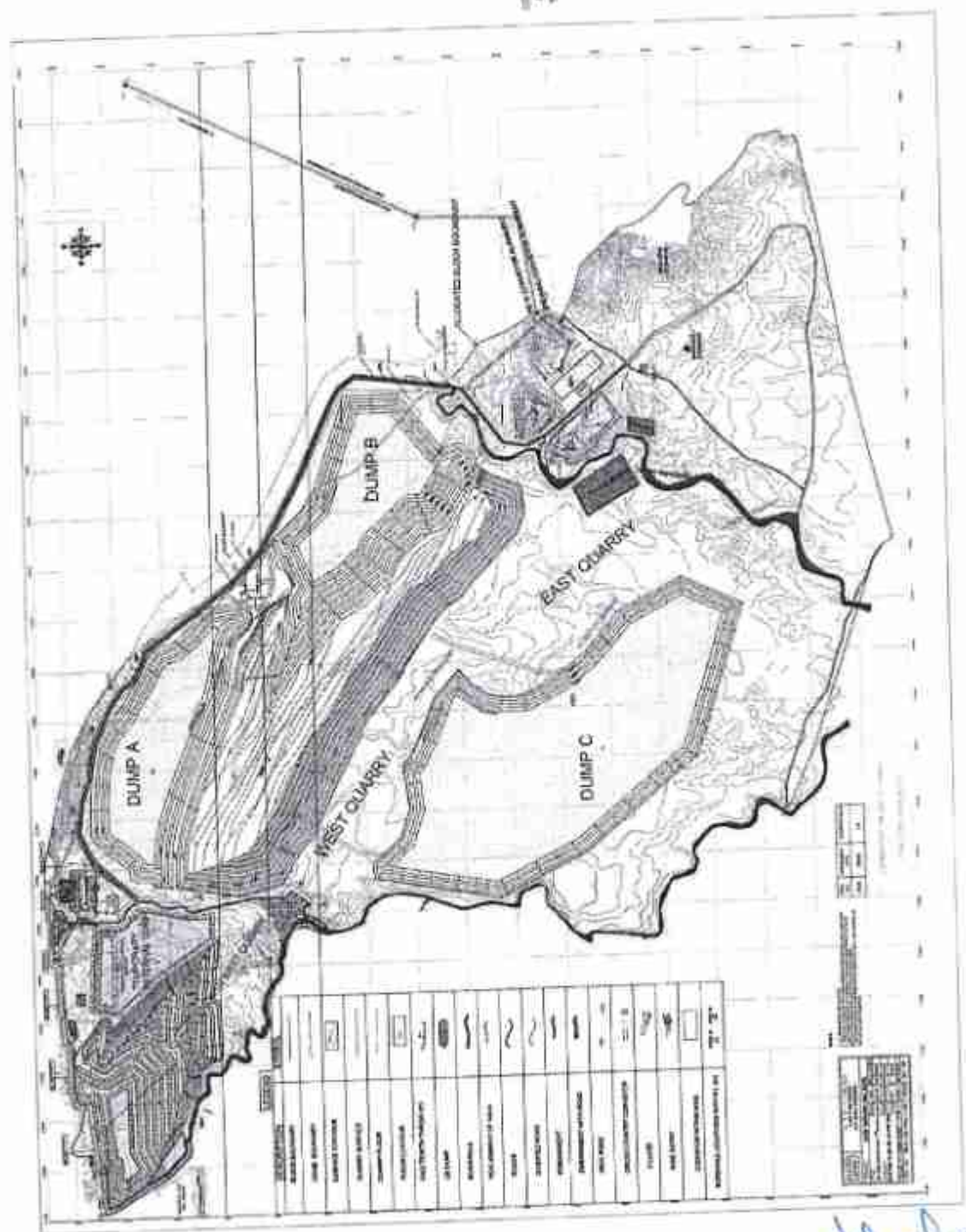
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The above map is submitted for the purpose of showing the location of the proposed quarry and dump sites in the area of the proposed project. The map is not to be used for any other purpose without the written consent of the Government of India.

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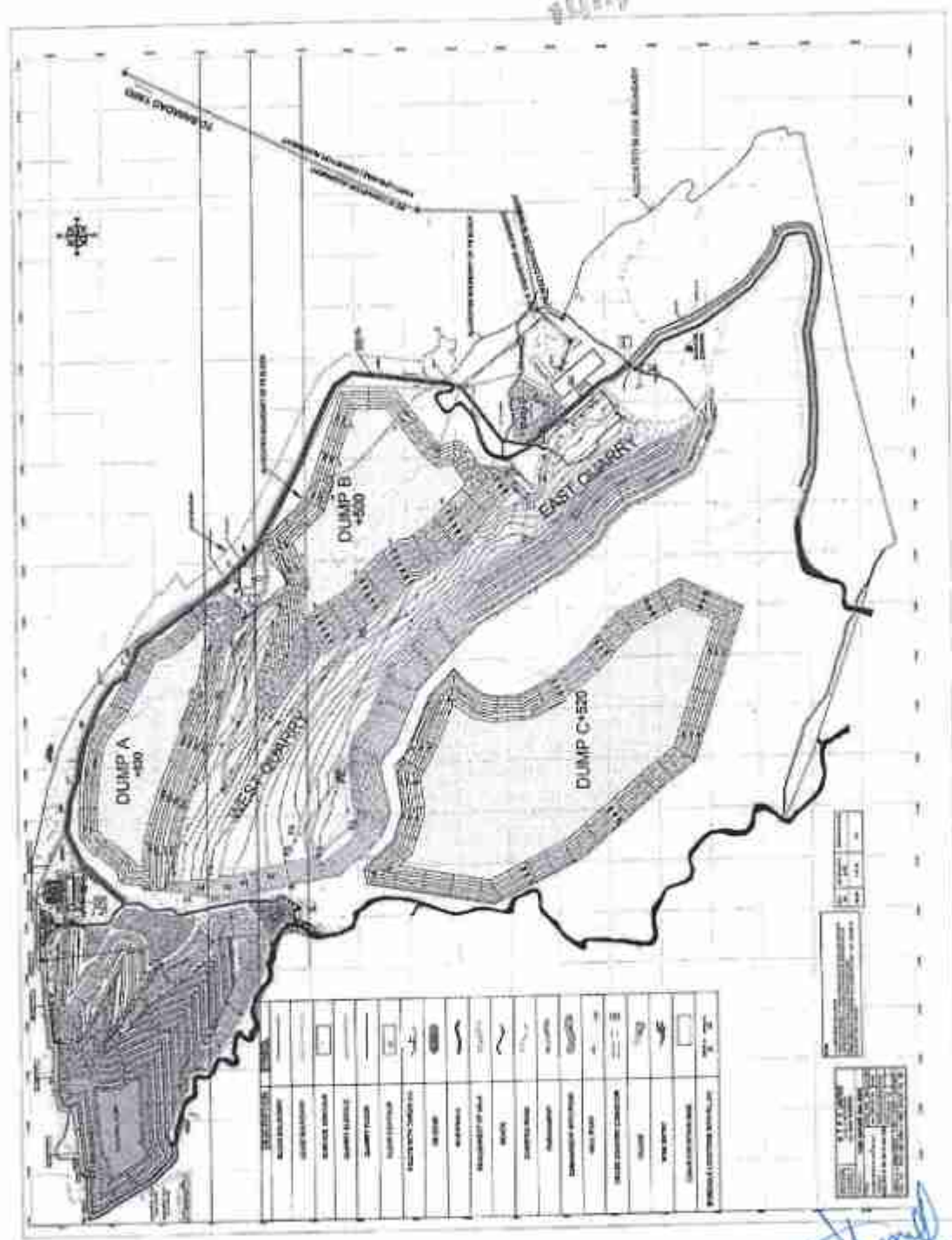
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# CHAPTER VI

## MANPOWER, SAFETY AND SUPERVISION

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## CHAPTER VI

### MANPOWER, SAFETY AND SUPERVISION

#### 6.1 INTRODUCTION

6.1.1 Life of the mine shall be approximately 52 years as per the calendar programme. Besides maintaining large fleet of HEMM and ancillary equipment, there is need to employ sufficient manpower to improve overall availability/utilization of the mining equipment, extraction transportation & despatch of coal, administration & welfare of the personnel employed, for safe and economic exploitation of mineral. The manpower has been provided to achieve the above objective.

6.1.2 Requisite manpower is provided for PB West and PB NW quarry. Manpower proposed for PB North West quarry shall be utilized for managing the affairs of PB North West quarry exclusively. As already explained in Chapter-5 PB East quarry shall be operated in two distinct phases the first phase shall last for initial two years while the second phase shall commence from 25<sup>th</sup> year till end of life of quarry.

In the second phase of PB East Quarry manpower proposed for PB West Quarry shall be utilized for managing the affairs of PB East Quarry progressively, commensurate with the fall & rise of production from West Quarry and East Quarry respectively. In the first phase of PB East Quarry separate set of manpower is proposed for managing the affairs of PB East Quarry. At the conclusion of first phase of PB East Quarry the proposed manpower shall be suitably deployed by NTPC in its establishments.

For the common Infrastructure and ancillary facilities (Explained in Chapter-VIII) separate fleet of manpower shall be provided which shall serve the purpose of managing common affairs of quarries.

6.1.3 Manpower planning and scheduling has been done in compliance with Mine Act 1952, Mine Rules 1955, Coal Mine Regulation 1957, Mine Vocational Training Rules 1966 and all other rules and regulations applied to Indian Coal Mines, apart from compliance to the directives/circulars issued by DGMS (Directorate General of Mine Safety) issued time to time.

6.1.4 Abiding by the aforementioned statutes organisation chart for the mine shall be drawn. The positions of statutory manpower such as Mine Manager, Assistant Mine Manager, Safety Officer, Labour Officer, Welfare Officer, V.T. Manager, mine officials, workman inspectors, Supervisors, set of competent persons etc., have been clearly identified and shall be deployed in consultation with DGMS. Qualifying requirement shall be drawn up and

Chapter - VI Manpower, Safety & Supervision

RQP No. 34011/(15)/2009-CPAM dated 27.09.10.

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suitably qualified and experienced persons wherever warranted shall be deployed in the post to ensure adequate management, control and supervision.

6.1.5 Potential of local/regional personnel shall be explored preferably land losers who shall be recruited in unskilled, semi-skilled, office assistant or similar categories. These personnel will need training and orientation before project starts. Besides some I.T.I qualified young people from the region can be recruited for operation and maintenance job of plant and machineries after proper training. The employment of local people in primary and secondary sectors of project shall upgrade the prosperity of the region. Skilled and highly skilled personnel shall also be required who shall be recruited as per NTPC appointment and recruitment norms.

6.1.6 The required manpower is categorised broadly in four different categories,

- a) Supervision
- b) Operation
- c) Maintenance
- d) Other services

Following are the different categories of Supervisory manpower:

- a) Management
- b) Operations
- c) Human Resource
- d) Fixed Plant
- e) Finance and Procurement
- f) Technical Services

Additional statutory manpower will be inducted wherever required by DGMS.

6.1.7 As per the prevailing industrial practices, the Positions mandated by DGMS are given in Table 6.1.

Chapter - VI Manpower, Safety & Supervision

RQP No. 34011/ (15)/2009-CPAM dated 27.09.10.

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**TABLE 6.1**  
**Statutory Persons**

Head	Category	Statutory (DGMS)
Management	General Manager	Agent
Management	Manager - Mine Operation	Mine Manager
Management	Manager - Maintenance	Colliery Engineer
Operations	Deputy Manager - Safety	Safety Officer
HR & Admin	IR Officer	Welfare Officer
HR & Admin	Training and Development Manager	Training Officer
Fixed Plant	Fixed Plant Manager -CHP	Colliery Engineer CHP

## 6.2 Requirement of Man Power

6.2.1 Requirement of Departmental Manpower is given in Table-6.2

**TABLE 6.2**  
**MAN POWER REQUIREMENT FOR PAKRI BARWADIH PROJECT**

Sl.No	Category	PB West & East Quarry	PB NW	Total
1	OB Direct	345	267	612
2	Coal			
	Coal Direct	479	211	690
	CHP	138	42	178
	Loading & Despatch	12	4	16
		627	257	884
3	Common Services			
	Excv Supervision	108	13	121
	E&M Supervision	42	13	55
	Excv P&M maintenance	242	220	462
	E&M Maintenance	91	20	111
	Support Equipment/Other Operations	114	45	159
	Safety, Production & Quality Control	72	17	89
	CGM Office / Project Office cum Planning Division	51	10	61

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**Revised Mining Plan (1st Revision) –Pakri Barwadih Coal Block**

	Training Centre	5	5	10
	Communication	17	12	29
	Finance & Accounts	16	11	27
	Personnel & Welfare	9	7	16
	Stores	24	10	34
	Civil & Town Administration	11	22	33
	Medical & Sanitation	24	17	41
	Survey	12	9	21
	Transport	22	33	55
	Watch & Ward	1	1	2
	<b>Sub-Total</b>	<b>861</b>	<b>465</b>	<b>1326</b>
<b>5</b>	<b>Reclamation &amp; Environment</b>	<b>22</b>	<b>19</b>	<b>41</b>
	<b>Total</b>	<b>1855</b>	<b>1008</b>	<b>2863</b>

### 6.2.2 Requirement of outsourced Manpower

In Addition to the Manpower cited as above, the requirement of following category of manpower will be met through Outsourcing. The approximate number of such manpower shall be approximately 120 however details shall be worked out during project implementation stage preparation.

- a Security, Watch & Ward
- b Canteen
- c Rest House/Guest House
- d Water Supply
- e Coal Laboratory
- f Environment Laboratory
- g Water Supply
- h Vehicles for Transport
- i Cleaning & Sanitation.

### 6.2.3 Requirement of Manpower for PB East Quarry in the Initial Phase (2 Years

In Addition to the Manpower cited at clause no. 6.2.1 above, the requirement of following category of manpower is estimated for the period of two years only for operation of PB East Quarry. Requirement of Manpower for PB East Quarry in the initial years is given in Table 6.3.

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No. 34011/(15)/2009-CPAM  
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### Chapter - VI Manpower, Safety & Supervision

RQP No. 34011/ (15)/2009-CPAM dated 27.09.10.

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**TABLE 6.3**  
**MAN POWER REQUIREMENT FOR PB EAST PROJECT**

Sl.No	Category	Number
1	OB Direct	120
2	Coal	
	Coal Direct	65
	CHP	27
	Loading & Despatch	4
		96
3	Common Services	
	Excav Supervision	22
	E&M Supervision	9
	Excav P&M maintenance	49
	E&M Maintenance	19
	Support Equipment/Other Operations	23
	Safety, Production & Quality Control	15
	Training Centre	
	Finance & Accounts	3
	Survey	3
	Transport	4
	Sub-Total	147
5	Reclamation & Env. Mgmt.	4
	Total	367

### 6.3 SAFETY ASPECTS

#### 6.3.1 GENERAL

6.3.1.1. Designated Owner in person by name of the mine has to be notified by the Board Secretary on advice of the Board of Directors of company. The designated Owner shall notify Agent of the mine. The Agent shall notify employment of the Manager of the mine. Company will appoint Under Manager, Asst. Manager, Safety Officer, V.T Officer, Welfare Officer, Surveyor, all excavation and E & M Engineers including Chief Excavation Engineer and Chief E & M Engineer, Overmen, Mining Sirdars, attendance Clerks, electrical supervisors and mechanical foremen. The Mine will be inspected daily, as far as practicable, and also in odd hours by the Manager and the Agent and deficiencies in safety noted during inspection are to be rectified on priority basis. Under the above broad administrative setup,

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arrangements shall be discussed with DGMS and modification suggested by DGMS, if any, shall be incorporated.

6.3.1.2. Under the above set-up, all safety precautions during the mining operation, posting of sufficient number of officials and persons, maintenance of all records/registers as per statute, disaster management framing of bye-laws and code of practices shall be undertaken. Manager shall have the authority to order withdrawal of persons/ suspension of operation in case of any emergency like fire/inundation and he shall issue such order, if found fit, in consultation with the Agent and it is subject to the provision of CMR, 1957. Mining is a hazardous industry and hence, necessary measures shall be taken to prevent accident due to following anticipated hazardous/risk prone activities:

- Slope failure
- Handling of explosives
- Fly-rocks during heavy blasting
- Movement of HEMM
- Inundation due to surface water
- Dust hazards
- Fire hazards due to spontaneous heating of coal
- Hazards associated with use of electricity
- Flooding of lower benches

### 6.3.2 STATUTORY RULES

6.3.2.1. Deployment of HEMM in any mine for excavation of coal/ OB needs planning of various activities in conformation with the prevailing statutory provisions, as per Mines Act 1952, CMR 1957, various DGMS circulars & bye-laws.

6.3.2.2. All applicable statutory rules, regulations, bye-laws etc and statutory requirement related to Govt. licenses, workers compensation, insurance, etc, including Minimum Wage Act for workers employed by the outside agency shall have to be adhered to. Any other rule imposed by local/State/Central authorities shall also be complied with by user of HEMM/equipment and then shall have to supply various protective equipment viz. helmets, shoes, safety gear for welding, working at height, electrical apparatus handling, etc. to the workmen at their cost.

6.3.2.3. It is recommended that code of practice as part out in Cl.6.2.1.2 to be prepared by Company will be based on following.



1. ILO code of Safety and Health in opencast Mines (1991)
2. Coal Mines Regulation 1957
3. Mines Act 1952
4. Mines Rules 1966
5. Vocational Training Rules 1966
6. Indian Electricity Rules 1956
7. DGMS circulars from 1948 upto date
8. Factories Act 1948 (as applicable to mines)
9. Conditions attached to statutory permissions and exemptions granted by DGMS.
10. Recommendations of National Safety Conferences, Tripartite Safety Review Committees.
11. Special guide lines issued by DGMS following accident enquiries etc.
12. Any prevailing directive of Central or State government in their region.

### **6.3.3 SAFETY FOR HEMM/EQUIPMENT AND WORKERS**

**6.3.3.1.** Special precaution shall be taken while deploying the HEMM and workers in the mine. Some of the major safety aspects before deploying of workers & HEMM to the mine are enumerated as follows:

#### **(A) For workers**

- No worker shall be deployed unless he is skilled enough to take up the designated assignment and trained at VTC.
- Records in Form- B and Form- D shall be maintained.
- Records of Vocational training Certificate and driving license of operators shall be kept by owner.
- No persons shall be employed unless person holds VTC certificate. A record of it shall be maintained.
- Adequate supervision shall be maintained by qualified competent persons.
- Safety guidelines and safety instruction will be followed.
- All drivers shall obey traffic rules prepared by the management.
- Before deploying workers, they must be trained and briefed about safety aspects in opencast mine.

However during course of execution of the work, if any accident occurs, whether major or minor, the matter shall have to be immediately informed to the mine management i.e. Colliery Manager/Agent/GM of Area so that Notices of accidents in a accordance with (Reg.9 of CMR 1957) and Section

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23 of Mines Act 1952 may be given and other necessary steps may be taken in accordance with the Mines Act 1952.

**(B) For machineries as recommended by DGMS Cir. (Tech.) 1 of 1999:**

- All machineries to be deployed in mines shall be checked before deployment by the relevant Chief Engineer (mine) of the MDO.
- Regular checking of machines deployed by outside agency shall be done. No unfit machine shall be deployed before the defect is rectified.
- A proper record of repair and maintenance along with inspection done by manager and defect pointed out shall be maintained and signed by authorized person.
- The HEMM shall be provided with Audio visual alarms, proper light for use at night and during period when natural light is not sufficient. Also audio-visual alarms for reversing of HEMM shall be provided.
- RTO certificate photo copies of all vehicles shall be submitted to manager.
- Regular inspection of HEMM shall be done by the agency's mechanic as directed by the manager.
- Machine manufacturers shall be asked to give risk analysis details in respect machines deployed.
- Suitable fire extinguishers shall be provided in every machine.
- Risk Management Plan of HEMM shall be made and implemented.
- Transport system will be deployed in such a way so as to minimize pollution in the mine and keep the environmental status as recommended under the approved EMP.

**6.3.4 STABILITY OF BENCHES, QUARRY HIGH WALLS AND SPOIL DUMPS**

6.3.4.1. During quarry operations, it is necessary to adopt suggested mining parameters for the stability of benches, high-walls and spoil dumps. It is also mandatory to examine systematically the fencing of mine working, land slides and cracks between benches. It is required to maintain well graded and wide roads on benches keeping the width of working areas sufficient for spreading of blasted rock and movement of the mining and transport equipment.

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6.3.4.2. During actual mining operation, systematic observations and regular monitoring of the condition of benches, high-wall slopes and spoil dumps shall be carried out and the dimensions shall be modified if necessary, to suit the local conditions. Recommended bench geometry for different HEMM has been found suitable in existing opencast mines in the country.

6.3.4.3. Following slopes have been recommended in this report considering the practices in the other mines.

Overall (Ultimate) pit slope	-	37°
OB Bench	-	70°
Coal Bench	-	70°
Dump bench	-	37°

6.3.4.4. Company should get studies of physico-mechanical properties of rocks done at IITs/ISM/CMRI/CMPDI or other institutes so that further stability study can be performed by expert.

### **6.3.5 PRECAUTIONS AGAINST DANGER OF INUNDATION FROM SURFACE WATER**

6.3.5.1. A careful assessment is to be made against the danger from surface water before the onset of rainy season. The necessary precautions shall be clearly laid down and implemented. A garland drain needs to be provided to drain away the surface rain water from coming into the mine. Garland drain shall be provided around OB dumps and working mines to course the rain water to main streams.

6.3.5.2. Inspections for any accumulation of rain water, obstruction in normal drainage

6.3.5.3. Standing order for withdrawal of working persons in case of apprehended danger.

6.3.5.4. During heavy rain inspection of vulnerable points is essential. In case of any danger persons are to be withdrawn to safer places.

6.3.5.5. The nearest nala is Khora nala A & B and already discussed are flowing either side of the Block. There may be possibility of inrush of rain water from flooding of nalas into the opencast mine pit. However any such possibility is eliminated as all the nalas are planned to be straightened systematically.

6.3.5.6. Any excavation under such circumstances would inundate the mine if nala is not straightened. Hence, straightening of nala has been proposed before 3<sup>rd</sup> year of mining operation. So there is no risk of flooding from these water streams.

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6.3.5.7. Moreover in order to control the in-rush of water into the quarry in rainy season from the surface or through seepage from the strata, sufficient garland drains will be made around the opencast excavation as proposed. Besides, pumps of required capacity and HP will be installed to pump out the seepage and rain-water continuously. A stand by diesel generator will be provided for un-interrupted supply of power to the pumps in the event of failure of power.

### 6.3.6 PREVENTION OF FLOODING OF EQUIPMENT DEPLOYED AT BOTTOM HORIZONS

6.3.6.1. During the heavy monsoon period, the mining operation in the lower-most benches may have to be stopped. Adequate pumping capacity on the basis of historical data of maximum rainfall and distribution of rainfall has been designed. But in case of unprecedented rainfall, machineries may have to be withdrawn from lower benches temporarily and redeployed after dewatering in the lower benches again. Meanwhile they will be gainfully employed in the upper benches.

6.3.6.2. For ensuring safety of the equipment while working out bottom horizons with no access to surface profile, the following measures shall be taken:

1. Drivage of initial trenches and coal cutting on bottom benches shall be done during the dry season of the year.
2. Ramps shall be made for quick shifting of equipment from bottom horizons, liable to be flooded during monsoon period to the top horizons.

### 6.3.7 PREVENTION OF ELECTRIC SHOCKS

6.3.7.1. During mining operations, all the statutory provisions of the Indian Electricity Rules 1956, and Indian Standards for installation and maintenance of electrical equipment etc. shall be observed.

- For protection from electric shocks to persons, from electrical equipment with voltage up to 1000V Earth Leakage Relay shall be provided which will automatically disconnect electrical circuits.
- Closed mobile substations and switchgears shall be mechanically interlocked which exclude the possibility of opening the door when oil switch and air circuit breakers are in operation.
- All metal parts of electrical equipment shall be properly earthed to avoid failure of insulation.



- All H.T. lines and cables located within the blasting zones shall be disconnected during blasting operations.

### 6.3.8 DUST SUPPRESSION & DILUTION OF EXHAUST FUMES

6.3.8.1. The following measures shall be adopted for dust suppression at all quarry working places, dump, haul roads, CHP and near other auxiliary mining operations.

- Water sprinklers shall be deployed in haul road. Additionally, chemical additives are recommended to form consolidated crust. This can be first tried on certain length and then extended for the entire length, if found suitable.
- Spraying with water on all working faces by special spraying machines.
- While drilling holes, it is necessary to use dust extraction devices.
- Installation of local dust suppression and air conditioning devices in cabins of excavators and drilling rigs will be considered.
- Levelling of spoil dump surface.
- Separate dust suppression arrangement shall be provided for CHP.
- To prevent collection of harmful mixtures in the atmosphere, from the different sections of quarry working, it is recommended.
- Maintaining the engine and exhaust conditioners properly, so as to keep emission gasses within limits and regular checking of exhaust and recording the same.

### 6.3.9 FIRE FIGHTING AND FIRE PREVENTION

6.3.9.1. In addition to statutory provisions, the measures for fire fighting and prevention of fires are as follows:

- Efforts are to be made not to lose any coal in O.B benches, and specially ledges of coal in inclined slicing system.
- Organization of special cell for systematic observation to examine and prevent fire.
- Removal of spillage of coal on benches and cleaning of coal horizons to prevent cases of coal heating.
- Storage of lubricants and cotton waste in enclosed fire proof containers in working places
- Provision of fire extinguishers and fire tenders.

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- Delivery range of pump should have nozzles, strategically located, to tap water in case of emergency. Emergency organization shall be formed to deal with emergency during fire. The organization shall have names of responsible person along with their telephone numbers. Their duties shall be clearly specified and the persons shall be properly trained. Mock – rehearsals shall be held. A disaster management plan shall be prepared by the management and a CMG (Crisis Management Group) consisting of highly skilled & decision making persons shall be identified within the organization to tackle with such extreme situations.

### **6.3.10 MEASURES DURING DRILLING AND BLASTING**

**6.3.10.1.** Following measures shall be taken while drilling and blasting operations in the quarry:

- 1) Drilling and Blasting in quarry shall be done in accordance with the provisions of Mines Act, rules and regulations.
- 2) Adequate safety measures have to be taken during blasting operations in the quarry so that men/machines are not affected.
- 3) Ground vibration due to blasting will be controlled by following:
  - Reducing the explosive charge per delay. 2-5 millisecond of delay interval per meter of burden has been recommended.
  - Spacing and burden are to be optimized by the blasting engineer.
  - Reducing the amount of explosive charged per blast
  - Proper controlled rock movement during blast by using suitable initiating sequence and delay.
  - Pit blasting engineer will optimize powder factor, watch out for quantity of oversize and secondary blasting, improve utilization of Shovel and reduce damage of bucket teeth.
- 4) Sub-drill depth may be 0.2 times the distance between adjacent holes stemming depth will be 0.7 to 1.0 times the burden. It should be recommended that if burden is less, there will be venting of explosive gases with loss of efficiency and generation of fly rock. More burden results in back break and poor fragmentation. Too close spacing causes crushing and crater forming between holes, boulder in burden area and excessive toes. Too wide spacing results in inadequate fracturing between hole accompanied by bumps on the face and toe problem between the holes.



## 6.4 RISK ASSESSMENT

### 6.4.1 INTRODUCTION

6.4.1.1. Mining activities are associated with several potential hazards both to the employees and the public at large. A worker in a mine should be able to work under conditions that are adequately safe and healthy. At the same time the environmental conditions should be such as not to impair his working efficiency. The various safeguards will be taken to ensure the safety of the mine and that of employees are provided in the Mines Act, 1952.

### 6.4.2 IDENTIFICATION OF HAZARDS

6.4.2.1. There are various factors, which can cause disaster in the mines. These hazards are as follows:

- i. Drilling
- ii. Blasting
- iii. Overburden handling
- iv. Heavy Machinery and
- v. Explosives storage.

### 6.4.3 DRILLING AND BLASTING

6.4.3.1. Most of the accidents from blasting occur due to the projectiles, as they may some times go even beyond the danger zone, mainly due to over charging of the shot holes as a result of certain special features of the local ground. Flying rocks are encountered during initial and final blasting operations. Vibrations also lead to displacement of adjoining areas. Dust and noise are also problems commonly encountered during blasting operations.


### 6.4.4 OVERBURDEN HANDLING

6.4.4.1. The overburden dumps may cause landslides. High overburden dumps created at the quarry edge may cause sliding of the overburden dump or may cause failure of the pit slope due to excessive loading, thereby causing loss of life and property. Siltation of surface water may also cause run-off from overburden dumps.


### 6.4.5 HEAVY MACHINERY

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**6.4.5.1.** Most of the accidents during transport of dumpers, trucks, poclains, ripper dozers and other heavy vehicles are often attributable to mechanical failures and human errors.

#### **6.4.6 EXPLOSIVE STORAGE**

**6.4.6.1.** Most of the accidents occur during, transportation, storage, handling and use. Accidents often attributed to failure of workman to observe safety rules and regulations.

#### **6.5 DISASTER MANAGEMENT**

##### **6.5.1 MEASURES SUGGESTED TO AVOID ACCIDENTS DUE TO BLASTING HAZARDS**

- Shots shall not be fired except during the hours of day light or until adequate provision is made for artificial lighting and the holes charged on a particular day shall be fired on the same day;
- Shots, if fired after hours of daylight, should be muffled so that the flying fragments from the blasting material do not project beyond a distance of 10 m from the place of blasting;
- Adequate shelters or other protective structures shall be provided to the workers at all times;
- The shot fired shall give sufficient warning by effective signal over the entire area falling within a radius of 500m.
- Where any permanent building or structure is damaged within the danger zone, the aggregate maximum charge in all the holes fired at any particular time shall not exceed 2 kg.
- If a single shot exploder is used or if blasting is done with ordinary detonator, the shot-firer shall not fire more than fifty shots in one shift, but if multi-shot exploder is used, the number can go up to eighty;
- During the approach and progress of an electrical storm, adequate precaution shall be taken;
- No-shot hole shall be drilled in the overburden above the underground galleries.

##### **6.5.2 MEASURES TO PREVENT THE DANGER OF OVERBURDEN**

- A stone wall should be built around the toe of each active dump at a distance of about 50m from the toe;
- To prevent the failure of overburden slopes, especially during the rainy

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season, the following precautions shall be taken:

- Proper terracing of the dump slopes, with a maximum dump height of 10 m should be maintained;
- In flat areas where the dumping operations have come to an end, the slope angle should be flattened by about 5° lower than the angle of repose, which varies from site to site but not less than 25°;
- Planting vegetation as early as possible over the overburden dump slopes;
- Provide drainage channels along the overburden dump toe for additional protection, in such a way that a distance of 15m should be maintained left between the overburden dump and the bench; and
- If a mine is abandoned, the bench and overburden dump should be separated from each other by digging a trench of 6 to 10 m width.

#### 6.5.3 MEASURES TO PREVENT ACCIDENTS DUE TO TRUCKS AND DUMPERS

- All transportation within the main working area should be carried out under the direct supervision and control of the management;
- The vehicles must be maintained in good repairs and checked thoroughly at least once a week by a competent person authorized for this purpose by the management;
- Broad signs should be provided at each and every turning point, specially for the guidance of the drivers at night;
- To avoid dangers while reversing the trackless vehicles, especially at the embankment and tripping points, all areas for reversing of lorries should, as far as possible, be made man free, and there should be a light and sound device to indicate reversing of trucks; and
- A statutory provision of the fence, constant education, training etc will go a long way in reducing the incidence of such accidents.

#### 6.5.4 STORAGE OF FUELS AND EXPLOSIVE MATERIALS

- The explosives will be stored in a magazine of 4T capacity.

Based on the study of accidents in chemical industry in India over a few decades, a specific legislation was enacted and enforced by the Government of India (GOI) in 1989 in conjunction with Environment

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Protection Act, 1986, referred to as "GOI rules 1989". These rules are for the purpose of identifying major hazardous installations applying certain criteria on toxic, flammable and explosive properties of chemicals.

- Besides, the criteria list of hazardous substances with their threshold quantities is provided in part II of schedule I of the rules.
- Schedule-II of the rules sets out the threshold quantities for isolated storage units.
- Schedule-III gives a list of hazardous chemicals with their threshold quantities. In this schedule different chemicals are classified into different sub group viz. Group 1 - Toxic substances, Group 2 - Toxic substances, Group 3 - Highly reactive substances, Group 4 - Explosive substances and Group 5 - Flammable substances.
- Schedule-IV of the rules indicates various operations, which are hazardous during production, processing or treatment of organic and inorganic chemicals.
- The of storage of flammable and explosive materials used in mines to determine the Threshold quantities as notified GoI Rules 1989 and the applicable rules are identified. The results are summarized in Table 6.4. The major hazardous materials stored and used in the mines are Diesel, Ammonium nitrate and Nitroglycerine.

TABLE 6.4  
APPLICABILITY OF GOI RULES TO HAZARDOUS MATERIALS STORAGE

Sl. No.	Chemical	Annual Requirement/storage	Listed in Schedule No.	Threshold Qty as per GOI Rules (application of rules)
1	Diesel	40 KL (10 KL storage)	1(2)	(5, 7-9, 13 - 15) 10 - 12 25 MT 200 MT
2	Ammonium Nitrate	540 T (25 T Magazine)	1(2)	(4, 5 7-9 10 - 15) 350 T 2500 T

Since the storages of all hazardous materials in Pakri Barwadih - A Mines are much less, when compared with threshold storage quantities, the mine management advised to follow the Indian Explosive Act and Rules 1983 for handling of explosives.

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## 6.6 RECOMMENDATIONS

- i. It is recommended to carry out slope stability study before/during mining operation warranting storage of Overburden dump and stability of benches.
- ii. It is recommended the Blasting Pattern shall be designed in consultation with CMPDI or a contemporary agency before conducting any blasting for the purpose of winning coal.
- iii. Prevailing statute at the time of commencement of mining operation shall be observed regarding storage of hazardous material within the mining lease area.
- iv. Area Drainage Study/Nalla Diversion Study for PB North West (Sector A) had not been carried out. Straightening of nalla for a distance of 1km is proposed in this mining plan. However in the favour of safety it is recommended to carry out study and its approval before commencement of mining operations to prevent potential inundation hazard.
- v. In the present Mining Plan diversion/alignment of Khora Nala-A is envisaged to be explored during 25th year of mining operation over the back filled area of PB west to enable extraction of additional 33.18 Mt (10.95 of PB West & 22.23 of PB North West) coal blocked under barrier between the two quarries (PB & PB NW) & coal blocked under Dump C after 38th year of mining operation. It is recommended to carryout separate study for said diversion at appropriate time.
- vi. Forest clearance of PB North West (Sector A) had not been obtained. As approximately 65% of land of this sector falls in forest land category it is recommended to obtain clearance from MoEF&CC before commencement of mining operations.
- vii. EIA/EMP clearance PB North West (Sector-A) had not been obtained. As more than 65% of land of this sector is forest land approximately it is recommended to carry out EIA/EMP study and obtain its approval from MoEF &CC before commencement of mining operations.

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# CHAPTER VII

## COAL HANDLING, WASHING & MODE OF DISPATCH

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## CHAPTER VII

### COAL HANDLING, WASHING & DISPATCH OF COAL

#### 7.1. Use of Mineral

Pakri Barwadih block has been allocated to NTPC to undertake coal mining for exclusive use of coal for its power plants. Coal linkages already in place shall not be disturbed and NTPC shall continue to honour its commitments towards long-term linkages from nationalised companies to its thermal power plants.

All coal mined from the block, shall be used in NTPC power plants and no coal shall be disposed of in any other manner, whatsoever, without prior permission, in writing, of the Govt. of India.

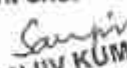
NTPC has presently planned Open Cast, Underground mining shall also be planned to extract the reserves below 300 meters at later date. This project is planned for produce 18 million tonnes of coal out of which 15 million tonnes shall be produced by PB West & East Quarry while 3 million tonnes shall be produced by PB NW Quarry. The produced ROM coal shall be D-E grade/ (G-8) from PB North West while D-F grade / (G-8) from PB West & East. Coal produced from all the three quarries shall be power grade coal.

#### 7.2. Mineral Processing


NTPC power plants have been designed to accept F grade coal. The entire coal production from the mine has been basket linked to different power houses. Rom coal directly received from the mine is expected to have 1000-1200 mm size, ROM coal shall be screened and oversize coal shall be reduced to -50mm. The ROM coal shall be crushed in two stages, at initial stage (Primary Crushing) size shall be reduced from 1000-1200 mm to 200-250 mm and in the subsequent stage (Secondary Crushing), size shall be reduced from 200-250 mm to (-) 50mm. If necessary suitable de-shaling/dry de-shaling arrangement will be provided, as may be required from time to time.

The above processing arrangement shall be installed at the pit head of the mine. Further processing if necessary shall take place at the power plant end.

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### 7.3. Surface Transport of Coal

ROM Coal shall be transported from active faces of all three quarries namely PB West, PB East and PB NW, in coal body dumpers (60T) to their respective pit head Coal Handling Plant (CHP) hoppers. CHP of PB West shall be dismantled at the exhaustion of coal from the same. Each of CHP hoppers are designed to cater to the requirement of volume of production of respective quarries and provided with enough space for unloading of two dumpers.

The processed coal shall be fed to the Cross country conveyors which in turn convey the coal to Benadag Yard being constructed by NTPC. Benadag Yard is located at approx. 14 km from the project boundary.

Indian Railway wagons shall be loaded by rapid loading system provided in loading silos. Onward transportation of coal shall be through Indian Railway to identified power plants of NTPC.

Cross Country Conveyor System from the mine to Benadag Siding is presently under construction. Till the completion of the conveyor system coal shall be transported to the nearest Railway siding (Benadag) by road.

### 7.4. Coal Handling Plant for Western & Eastern Quarry

As per this Mining Plan built up period for western quarry is 12 years, CHP shall be commissioned phase wise to handle 15 million tonnes of coal initially for western quarry. During period of full production this CHP shall be handling entire coal production from western quarry. During the overlapping period of 3 years separate CHP shall be installed to handle the coal from Eastern quarry. As coal production from western quarry diminishes, and coal production from PB East quarry surges the CHP of Western quarry shall be dismantled and simultaneously installed for Eastern quarry in phases. Brief of working philosophy of CHP of PB West and PB East is described below:

#### 7.4.1. GENERAL

The coal handling plant has been designed to crush the ROM (-) 1000-1200mm feed from different pits to produce (-) 50 mm sized coal. The major process facilities of proposed CHP will comprise of the following:

- In-pit Skid mounted crusher/ Crusher equipped with apron feeder and hopper
- Long distance belt conveyor
- Secondary crushing
- Product stockpiling & reclaiming
- Cross country conveyor from Reclaimer to Railway Loading point.
- Loading & dispatch

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The coal from different benches will be transported by dumpers and will be fed to the in-pit crushers / Crushers through apron feeders, placed at suitable locations in different pits to generate (-) 250 mm product. The crushed coal will be brought to long distance belt conveyor through conveyors. The long distance belt conveyor running along the north-eastern periphery of the pits will transport the crushed coal to secondary crushers/ Crushers to further reduce the product size to (-) 50 mm. The sized coal will be further conveyed to product stockpile, where it will be stacked and reclaimed through stacker reclaimer unit, or will be directly discharged into the cross country conveyor. The cross country conveyor shall transport the sized coal and directly load into the railway wagon through silos. The CHP has been planned to handle ultimate total capacity of 15 Mty of coal. Initially, all the 3 skid mounted primary Crushers will be installed along with one circuit of long distance belt conveyor, 1 set of stacker reclaimer, 2 circuits of cross country conveyor and 1 no. silo has been envisaged to be commissioned in the first phase. Subsequently, the 2nd circuit of LDBC will be ready by 4th year of production, second set of stacker reclaimer, cross country conveyor and second silo will be commissioned by 10/11th year to meet the rated capacity of 15 Mty.

#### 7.4.2. DESIGN PARAMETERS

##### a. BASIC DATA

• Production capacity in MTY	15.0
• No. of working days / annum	330
• No. of working shifts / day	3
• Duration of each shift (hours)	8
• Feed size of R.O.M coal (mm)	(-) 1000-1200
• Product size in mm	(-) 50

##### b. CHP WORKING SCHEDULE

Crushing, storage and loading will be done in three shifts per day and seven days a week.

##### c. SYSTEM CAPACITY

The handling capacity of the CHP has been decided to match with the production capacity of the mine. In order to meet the fluctuations of coal output from the mine due to irregularities of despatch / transport system

and seasonal fluctuations, the design capacity of the CHP has been fixed accordingly.

#### 7.4.3. SALIENT FEATURES

The proposed CHP consist of the following units:

- Three no. of Skid mounted Crushing station equipped with apron feeder and receiving hopper. Apron feeders will feed coal into primary Crusher.
- 3 nos. of Crushers (Primary) of 1600 TPH at receiving hopper to crush coal from 1200 mm to 250 mm size.
- Two streams of 1800mm wide Conveyor systems upto the secondary crushing station.
- 4 nos. of Crushers (Secondary) of 1200 TPH each with vibro feeders at Secondary crushing house to crush coal from 250 mm to 50 mm size.
- Conveyor systems of 1800 mm width and 2200 tph from secondary crushing station upto the stockyard.
- Two numbers of Stacker Reclaimer of 2500 tonnes per hour capacity each.
- Three circuits of 1800mm wide belt conveyors of 2500 TPH each capacity upto loading point.
- Two nos. of 4000 te capacity Silo each containing 2sets of 5500 TPH capacity Rapid loading system with 2x72te capacity pre-weight hoppers.
- One numbers of magnetic separators in each flow.
- One numbers of metal detectors in each flow.
- One numbers of belt weighers to weigh the coal in each flow after secondary crushing.
- Miscellaneous facilities like dust control system, firefighting and ventilation system. Plant cleaning and Infrastructure for preventive maintenance are also envisaged. Necessary Electrical, interlocking, signalling and communication facilities.

#### 7.4.4. IN-PIT SKID MOUNTED SEMI - MOBILE CRUSHING STATION

Coal receiving unit will be of 200 te capacity, semi-mobile, skid mounted consisting of Apron/Chain feeder of 1600 TPH capacity with matching suitable electric drive motor. Adequate height skirt plates will be installed on the apron/ chain feeder in

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such a way that the assembly acts as a receiving hopper to receive coal from tipping trucks. The apron/ chain feeder will be of robust construction, heavy duty type and suitable for round the clock continuous operation. It will be suitable for use in adverse environmental conditions and dusty surroundings. The feeder will be capable of absorbing the impact of falling lumps of maximum lump size. It must be capable of receiving the direct impact of coal from tippers.

The R.O.M. coal brought from the quarry by tippers will discharge into the said sizing plant. The unit will be complete in all respect, could be easily dismantled, shifted and installed at new location. Major components of the unit are as under.

Low height roll Crusher (preferably double roll) has been envisaged to size the coal to (-) 250 mm size with matching suitable electric motor drive. The sizing roll will be fitted with replaceable sizing teeth which shall slide over the slots provided in the shaft with picks (heavy duty). The Crusher design will be such that it be able to have round the clock continuous operation. It will be suitable for dusty condition. It will be able to start at full load conditions and robust enough.

Suitable lifting devices will be provided for ease in installation, dismantling and taking out components for maintenance. The components/ parts will also be provided with lifting lugs.

Unit will be designed to provide suitable maintenance platform for inspection, maintenance etc. It will also have an operator's cabin installed at a suitable location for the operator of the machine. Operator should be able to view the crushing operation.

Suitable dust suppression system will be provided to suppress dust particles during discharge of coal by tipping trucks etc and also at transfer points. Portable type fire extinguishers of different type will be provided in the Crushing unit to prevent fire hazards.

The electrical system of the semi-mobile sizing units consist of the A.C drives and (related Motor Control Centre for Apron / Chain feeder, Crushers etc. Along with this the power supply arrangement should also cater for dust suppression system, electrical hoists, illumination (Plant & Peripheral) and other sub system. Power at 3.3/6.6 kV will be made available up to the sizing units

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#### 7.4.5. SPECIFICATION OF SECONDARY CRUSHER

• Nos. :	04 (Four)
• Material to be handled:	Coal
• Feed size of ROM. coal (in mm):	(-) 250
• Product size (in mm):	(-) 50
• Average HGI of coal:	45 (max.)
• Bulk density of coal:	1000 kg/m <sup>3</sup>
• Crushing capacity:	Rated-1600tph
• Designed:	1850 tph
• Moisture content:	upto 10%
• Ambient temperature:	50 deg C
• Duty:	Continuous,
Hrs/day:	20
Per Year:	350
• Power Supply:	3.3kV, 3phase, 50Hz,

#### 7.4.6. CRUSHER LOCATION

Considering the gradual increase of production from 2.34 Mt to 10 Mt in the first 5 years, the required nos. of Crushers will be added at different pits starting from the second year of construction period as indicated in the table showing phasing of CHP. These Crushers will be located at the mouth of the different pits viz WP-1, WP-2, WP-3 & WP-4 in the initial period. Further enhancement of capacity from 10 Mt to 15 Mt. will start in the 11th year of production from WP-IV pit. Two no. of Crushers from pit WP-I, WP-2 and WP-3 will be shifted to pit WP-4 in the 8th year and 10th year respectively.

On advancement of faces at WP-4 pit, the Crushers will be shifted and located at suitable places to keep the dumper lead minimum.

#### 7.4.7. CONVEYING ARRANGEMENTS

The sized coal will be discharged to collecting-cum-elevating conveyor which in turn will discharge it to the long distance belt conveyor having length of about 5 km. The entire product will be conveyed to the secondary crushing station where coal will be crushed to (-) 50mm. Finally coal will be reclaimed through 2 no. of 1800mm wide belt conveyors and conveyed to the product stockpile. Two circuits of long

distance belt conveyor (LDBC) with each having 2500 TPH capacity has been envisaged up to the product stockpile. Stacker & Reclaimers have been proposed for stacking the coal on the ground and loading on the cross country conveyors. Stacker and Reclaimer shall be installed at the terminal point of the long distance belt conveyor and starting point of cross country conveyor for carrying coal to Silo for fast loading into the rakes. These (-)50 mm coal will be transported to the Silos located at loading point through two circuits of cross country belt conveyors having a length of about 14 km of above mentioned specification.

#### 7.4.8. Product Stockpile

Open air product stockpile of 800m x 400m dimension has been proposed with facility of stacking and reclaiming through rail mounted Stackers & Reclaimers with capacity of 2500 tph each. There will be a bypass arrangement at product stock pile wherein the sized coal can be directly fed to the cross country conveyor, without stacking, for loading into the wagons through silos. The product stockpile can accommodate 4 lakh tons of coal i.e. about 10 day production of the mine at rated capacity.

#### 7.4.9. BROAD TECHNICAL PARAMETERS OF STACKER-RECLAIMER

The main characteristics of the Stacker-Reclaimer shall be as follows.

- Type: Rail mounted, self-propelled, luffable, slewable, Boom type Stacker cum Bucket wheel Reclaimer.
- Nos. : 02 (Two)
- Material to be handled: Coal
- Duty: Continuous, 20 hrs. /day, 350 days a year.
- Capacity, tph: Stacking  
Rated: 2500, Designed: 2875  
Reclaiming  
Rated: 2500, Designed: 2875
- Power Supply:  
3.3kV, 3phase, 50Hz, through Flexible Cables and Cable Reeling Drums.
- Boom length, m: To suit the stock-pile width
- Track centres: 6.0 m
- Length of travel: 750m

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- Travel speed: Forward 0-20 m/ min stepless
- Hoisting speed: 2 m/min (approx.)
- Luffing Range to suit the stock-pile width/ length  
(With respect to discharge pulley)
- Cross section of the stock pile: Triangular
- Bottom width of stock pile: 25 m
- Height of stock: 10-15 m Pile w.r.t. to rail level.

#### 7.4.10. WAGON LOADING SYSTEM

Fast loading Silo having 4000 T capacity suitable for flood loading of Indian Railway Rakes 58 Box 'N' or long 116 Box 'N' has been proposed. Silo shall be of RCC construction each fitted with two nos. pre-weight bins and telescopic swing chutes suitable for loading at the rate of 5000 TPH.

The brief specification of silos is as follows.

i) Capacity selected	4000 T
ii) Diameter (apprx.)	20 m
iii) Height (apprx.)	55 – 60 m

#### 7.5. Coal Handling Plant for PB North-West (NW) Quarry

##### 7.5.1. Introduction

The rated coal production of 3.0 Crusher from PB North West (Sector-A) Coal Block is required to be fully processed through separate Coal Handling Plant (CHP) to ensure consistent size and continuous supply of coal to thermal power station (TPS).

Coal from the Quarry NW shall be transported upto the receiving hopper, in the CHP ROM coal shall be reduced to -50mm size and stored in the truck loading hoppers. 20-40 tonner trucks shall be loaded through truck loading system and transported upto surge bunker located near PB East & West surge bunker. Reclaim conveyor shall load the coal in the cross country conveyor. Through a separate stream of conveyor, coal shall be conveyed upto loading silo located at Benadag Yard. Rapid loading system installed in the Loading Silo shall load the coal in the Railway wagons from where the coal shall be despatched to the identified power plant of NTPC.

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However, detail feasibility study is recommended to finalise the following:

- Coal evacuation system for PB (NW) Quarry adjacent to cross country conveyor of PB(West & East)
- Location and capacity of Rapid Loading System for PB (NW) Quarry

#### 7.5.2. General

The coal handling plant has been designed to crush the ROM (-) 1000-1200mm feed from different pits to produce (-) 50 mm sized coal. The major process facilities of proposed CHP will comprise of the following:

- Receiving hopper
- Primary / Crusher equipped with apron feeder and hopper
- Long distance belt conveyor
- Secondary crushing
- Product stockpiling & Reclaiming
- Cross country conveyor from reclaiming to Railway Loading point
- Loading & dispatch

The coal from active faces/different benches will be transported by 60T dumpers and fed to the s / Crushers through apron feeders, placed at suitable locations in the surface to generate (-)250 mm product. The belt conveyor will transport the crushed coal to secondary s/ Crushers to further reduce the product size to (-) 50 mm. The CHP has been planned to handle ultimate total capacity of 3 Mty of coal.

#### 7.5.3. DESIGN PARAMETERS

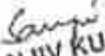
##### 7.5.3.1 BASIC DATA

- |                                  |   |        |
|----------------------------------|---|--------|
| • Production capacity in MTY     | - | 3.0    |
| • No. of working days / annum    | - | 330    |
| • No. of working shifts / day    | - | 3      |
| • Duration of each shift (hours) | - | 8      |
| • Feed size of R.O.M coal (mm)-  | - | 1200   |
| • Product size in mm             | - | (-) 50 |

##### 7.5.3.2 CHP WORKING SCHEDULE

Crushing, storage and loading will be done in three shifts per day and seven days a week.

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### 7.5.3.3 SYSTEM CAPACITY

The handling capacity of the CHP has been decided to match with the production capacity of the mine. In order to meet the fluctuations of coal output from the mine due to irregularities of despatch / transport system and seasonal fluctuations, the design capacity of the CHP has been fixed accordingly.

### 7.5.4. SALIENT FEATURES

The proposed PB-NW Quarry CHP consist of the following units:

- Two no. of Primary Crushing station equipped with apron feeder and receiving hopper. Apron feeders will feed coal into primary Crusher.
- 4 nos. of Crushers (Secondary) of 300 TPH each with vibro feeders at Secondary crushing house to crush coal from 250 mm to 50 mm size.
- Conveyor systems of 800 mm width and 300 tph
- Two numbers of Stacker Reclaimer of 600 tonnes per hour capacity each.
- One no. of 2000 te capacity Silo each containing one sets of 3500 TPH capacity Rapid loading system with 2x72 te capacity pre-weigh hoppers.
- One numbers of magnetic separators in each flow.
- One numbers of metal detectors in each flow.
- One numbers of belt weighers to weigh the coal in each flow after secondary crushing.
- Miscellaneous facilities like dust control system, firefighting and ventilation system. Plant cleaning and Infrastructure for preventive maintenance are also envisaged. Necessary Electrical, interlocking, signalling and communication facilities.

### 7.5.5. COAL RECEIPT AND PRIMARY CRUSHING

Run of Mine (RoM), 1000-1200 mm coal from the mine shall be transported by 60 T dumpers to crushing arrangement located at pit head. The RoM coal shall be reduced to (-) 200-250mm size through primary crushing arrangement located at the pit head.

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### SPECIFICATION OF PRIMARY CRUSHER

Nos.	02
Material to be handled:	Coal
Feed size of ROM. coal (in mm)	1200
Product size (in mm)	(-) 250
Average HGI of coal	45 (max.)
Bulk density of coal	1000 kg/m <sup>3</sup>
Crushing capacity	Rated-300tph
Designed	350 tph
Moisture content	upto 10%
Ambient temperature	50 deg C
Duty	Continuous,
Hrs. /day	20
Days a year	350
Power Supply:	3.3kV, 3phase, 50Hz,

### 7.5.6. SECONDARY CRUSHING

Crushed Coal of (-) 200-250 mm size from primary shall be fed directly onto the secondary crushing arrangement for further sizing of coal to (-) 50mm. The crushed coal shall be transported to surface hoppers through conveyor system.

### SPECIFICATION OF SECONDARY CRUSHER

Nos.	04 (Four)
Material to be handled	Coal
Feed size of ROM. coal (in mm)	(-) 250
Product size (in mm)	(-) 50
Average HGI of coal	45 (max.)
Bulk density of coal	1000 kg/m <sup>3</sup>
Crushing capacity	Rated-300tph
Designed	350 tph

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• Moisture content	upto 10%
• Ambient temperature	50 deg C
• Duty	Continuous,
Hrs. /day	20
Days a year	350
• Power Supply:	3.3kV, 3phase, 50Hz,

#### 7.5.7. Product stockpile

Open air product stockpile of 400m x 200m dimension has been proposed with facility of stacking and reclaiming through rail mounted stackers & reclaimers with capacity of 600 tph each. There will be a bypass arrangement at product stock pile wherein the sized coal can be directly fed to the cross country conveyor, without stacking, for loading into the wagons through silos. The product stockpile can accommodate 1 lakh tons of coal ie. about 10 day production of the mine at rated capacity.

#### BROAD TECHNICAL PARAMETERS OF STACKER-RECLAIMER

The main characteristics of the Stacker-Reclaimer shall be as follows.

- 1) Type : Rail mounted, self propelled, luffable, slewable, Boom type Stacker cum Bucket wheel Reclaimer.
- 2) Nos. : 02 (Two)
- 3) Material to be handled: Coal
- 4) Duty: Continuous, 20 hrs/day, 350 days a year.
- 5) Capacity, tph: Stacking  
Rated: 600, Designed: 650  
Reclaiming  
Rated: 600, Designed: 650
- 6) Power Supply:  
3.3kV, 3phase, 50Hz, through Flexible Cables and Cable Reeling Drums.
- 7) Boom length: To suit the stock-pile width
- 8) Track centres: 6.0 m

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- 9) Length of travel: 250m
- 10) Travel speed: Forward 0-20 m/ min stepless
- 11) Hoisting speed: 2 m/min (approx)  
/Luffing Range to suit the stock-pile width/ length  
(With respect to discharge pulley)
- 12) Cross section of the stock pile: Triangular
- 13) Bottom width of stock pile: 25 m
- 14) Height of stock: 10-15 m Pile w.r.t. to rail level.

#### 7.5.8. Wagon loading system

Fast loading Silo having 2000 T capacity suitable for flood loading of Indian Railway Rakes 58 Box 'N' or long 116 Box 'N' has been proposed. Silo shall be of RCC construction each fitted with two nos. pre-weigh bins and telescopic swing chutes suitable for loading at the rate of 3500 TPH.

The brief specification of silos is as follows.

i) Capacity selected	2000 T
ii) Diameter (apprx.)	18 m
iii) Height (apprx.)	25 – 30 m

#### 7.6. DUST CONTROL SYSTEM

The objective of this system is to eliminate the air born coal dust or suppress the dust at its source. The system involves confinement of the dust within the dust producing area by a curtain of moisture and wetting the coal dust by direct contact between the particles and droplet of water. Adequate number of precision anti-clog nozzles will be installed at suitable locations for suppressing dust by spraying water mixed with suppressant. Suitable control for dust suppression shall be provided and the system shall be so inter-locked that it functions only when the conveyor system is operating or the loading operation is on. Fog type dust suppression system will be provided wherever possible.

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#### 7.7. NOISE CONTROL

Noise pollution causes fatigue to operating personals. Provision will therefore be made to keep down the noise level to the extent possible. All machine mountings will have in their foundations anti-vibration pads/sheets for reducing the vibration and thereby noise. All transfer chutes and hoppers, silo shall have wear resistant rubber or ultra-high molecular weight plastic / synthetic liners of various thickness as per design requirement and their suitability.

#### 7.8. FIRE FIGHTING SYSTEM

Necessary firefighting system has also envisaged for the plant, which includes fire hydrant tees at strategic locations at equal spacing of 25 to 35 meters with suitable water supply pipe lines. Also portable type fire extinguishers to deal with electrical / oil / ordinary fires shall be provided at all strategic locations in the plant.

#### 7.9. PLANT CLEANING SYSTEM

To facilitate cleaning at strategic locations ample number of high pressure water servicing points have been envisaged. These service points will be so located that with a 15/20 m long hose any working area in the plant or equipment working place can be reached. These service points will be provided with quick connecting hose couplings for easy fixing and dismantling of hoses.

#### 7.10. PLANT PREVENTIVE MAINTENANCE

For effective maintenance of all the equipment, there will be sufficient working space around the equipment/machinery. All the equipment and conveyor discharge drums/transfer points, etc shall have covered and well ventilated housing complete with access stair ways, hand rails, platforms, cross-over ladders, etc as required.

Necessary mono-rails electric hoists and chain pulley blocks at suitable points of adequate capacity will also be provided on respective floors for operational Control.

A control desk cum mimic panel will be provided in the control room from where the entire plant from crushing to ground stacking will be controlled. However for loading operation from silo, separate control desk cum panel shall be provided in the control room at rapid loading station. At the time of start, an alarm through



hooter will be blown to warn the working personnel.

#### 7.11. ELECTRICALS

The main switching station for the coal handling plant shall be suitably located and will receive power from the Project substation.

The electrical system shall comprise:

- Power reception and distribution system
- Centralized sequence control-cum-interlocking, automation, signaling and instrumentation system
- Illumination of plant and adjacent area Illumination shall be provided as per Indian Electricity Rules.
- Centralized welding circuit
- Earthing arrangement for the plant shall be provided as per Indian Electricity Rules.

#### 7.12. COAL SAMPLING

It is proposed to install automatic sampling system in the CHP. Coal from conveyors shall be collected by the sampler at pre-determined intervals to assess the quality of the coal being dispatched. The coal samplers shall be suitably located. The samples collected shall be sent to the laboratory for further analysis.

#### 7.13. CIVIL & STRUCTURALS

The civil and structural work shall cover all aspects of civil and structural design based on detailed survey, soil and hydrological investigations, seismic data, etc.

#### 7.14. MODE OF DESPATCH

##### RAILWAY SIDING

Considering the topography of the area, site near Banka Village, located at a distance of about 14 km from the block has been selected for the Railway Siding. Benadag Railway siding shall be constructed by NTPC This Railway siding is under construction which shall be connected with Hazaribagh Railway Station at approx. 9 km from Benadag Siding.

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Three no. of Loading silos shall be constructed on the over the tracks out of which two silos of 4000T each capacity shall cater to the PB West & East Quarry the third shall be of 2000T capacity which will cater to the requirement of PB-NW Quarry.

## ROAD TRANSPORTATION

Cross Country Conveyor System from the mine to Benadag Siding is presently under construction. Till the completion of the conveyor system coal shall be transported to the nearest Railway siding (Benadag) by road.

### 7.15. WASHING

Coal Block was explored during the period 2003-04 and no washability studies were conducted. As per the Geological Report average grade of the coal is G-10 (Grade -E) with a calculated GCV of about 4300 Kcal/kg. Based on the Geological Report the range of ash percentage varies from 16-51% in PB West & East Quarry and 7-50% in North West Quarry. The average ash for the mined out coal is estimated to be about 34%, hence no provision for coal washery has been made as of now.

It is proposed to dispatch the ROM sized coal (-50mm) by conveyor followed by rail to the End Use Plants (EUPs).

### 7.16. COAL QUALITY MONITORING LABORATORY

For quality assurance and control, it is proposed to establish a Coal Laboratory with all the necessary equipment for daily analysis of the coal quality at Mine end.

### 7.17. DRAWINGS

A Coal flow diagram for proposed CHP has been given in the drawing.

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COAL HANDLING ARRANGEMENT  
FOR QUARRY-WEST

COAL HANDLING ARRANGEMENT  
FOR QUARRY-EAST

COAL HANDLING ARRANGEMENT  
FOR QUARRY-EAST&WEST

COAL LOADING ARRANGEMENT AT  
BENJADAG YARD

COAL HANDLING ARRANGEMENT  
FOR QUARRY-NW

For approval of the  
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No. 340111/152008-CPAM  
Ministry of Coal, Govt. of India

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NTPC LIMITED	
PROJECT	FAIRBANKS COAL FIELD
NO.	340111/152008-CPAM
SUBJECT	COAL HANDLING ARRANGEMENT FOR QUARRY-WEST
DATE	15.03.2011
BY	Sanjiv Kumar Singh
FOR	Sanjiv Kumar Singh
SCALE	1:1000
PLATE NO.	1519-159-POM-J-42
PLATE NO.	42



For approval of the Ministry of Coal, Govt. of India  
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# CHAPTER VIII

## INFRASTRUCTURE FACILITIES PROPOSED AND THEIR LOCATION

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## CHAPTER-VIII

## MINING INFRASTRUCTURE &amp; FACILITIES

## 8.1 Introduction

Pakri Barwadih mine is planned to produce 18 Mt of coal per annum by Open Cast method of mining. Life of the mine shall be approximately 52 years as per the calendar programme. Besides maintaining large fleet of HEMM and ancillary equipment, it will employ approximately 2863 manpower including 367 manpower for operation of PB East in the initial two years. To improve overall availability/utilization of the mining equipment there is a need for flawless extraction of coal and OB, transportation and despatch of coal to the end use plant. Further to ensure proper administration and welfare of the personnel employed, there is a need to construct the infrastructure for safe and economic exploitation of coal. The layout has been designed to achieve the above objectives. All necessary facilities have been provided in the workshop to cater the need of the project.

Mostly separate infrastructure is planned for PB West quarry and PB NW Quarry. Infrastructure proposed for PB West quarry such as CHP, substation, workshop, administrative buildings etc. shall be utilised progressively for PB East quarry on restart after 25<sup>th</sup> years of Mining Operation and proportionate to the production. But the infrastructure/facilities which could not be shared with PB West quarry shall be constructed separately for initial two year as well as after the restart of PB East quarry (haul roads, culverts drainage system etc.). Certain facilities such as coal sampling lab, environmental cell, vocational training centre etc. shall be common for all quarries.

The target capacity & water requirements for each quarry are given in Table 8.1.

Table 8.1

Sl. No.	Quarry Name	Target Capacity in MTPA	Water Demand in MGD
1.	PB West & East Quarry	15	0.91
2.	PB North-West Quarry	3	0.2
	Total for PB Mine	18	1.11

As explained above separate infrastructure is proposed for PB-West & East quarry and PB- NW, details are as following:

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## 8.2 Infrastructure and facilities for PB West & East Quarry

### 8.2.1 Infrastructure facilities proposed

The area for the infrastructure facilities will be secured by a boundary fence and a soil bund on the edge of the mine. The proposed major buildings within and precincts of the mine boundary are as follows:

1. Heavy Earth Moving Machinery (HEMM) Workshop
  - a. Welding Shop
  - b. Tool Store
  - c. Electrical Shop
  - d. Office space for workshop management
  - e. Shift in change room
  - f. Washing facilities and toilets
2. Light Vehicle (LV) Workshop
3. Tyre Workshop & Tyre Storage Bay (open area)
4. Equipment Washing Facility
5. Office Building
6. Worker's Bathhouse and Canteen
7. Dispensary
8. Store
9. Engineering Section
10. Security Office
11. Fuel Depot
12. Coal Evacuation System and Coal Handling Plant
13. Electrical Power supply
14. Mobile Service Van
15. Approach Roads
16. Other roads and culverts
17. Domestic and Industrial water supply & sewerage
  - a. Sources of water
  - b. Industrial water supply
  - c. Effluent Treatment Plant
  - d. Industrial Sewerage
  - e. Sewage Treatment Plant
18. Temporary Workshop

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### 1. Heavy Earth Moving Machinery (HEMM) Workshop (Maintenance Workshop)

The Maintenance Workshop shall have a concrete grade slab that is designed to support the loads by the next larger size of the heaviest unloaded vehicle in the quarry's fleet. It shall have minimum of six vehicle maintenance bays to handle the next larger size of the largest vehicle in the quarry equipment fleet. At least four of the six bays shall be "drive through" to allow the trucks to be serviced.

The Maintenance Workshop shall also provide separate space, of adequate size for the equipment being maintained.

A minimum of two bays shall be provided with rails embedded in the concrete grade slab. These rails shall be spaced to support all of the tracked equipment off of the concrete and the supporting rebar mat membrane shall be design to distribute this load without the concrete cracking.

The facilities shall include overhead crane(s) sized for the largest of the largest component load of the next largest size of the largest truck or the currently planned truck. The crane(s) shall service all of the maintenance bays and run the length of bays as required for positioning components for the vehicles being maintained.

The Maintenance Workshop shall primarily be an open frame steel structure without walls and with a roof height sufficient for truck/overhead crane clearance. Work areas which are sequestered from the main area (for reasons of safety, security etc.) shall be partitioned from the main areas with masonry walls. The facility shall have walls as required to frame in the crane and to provide a complete roof above the truck maintenance level. The roof shall include Control of rain runoff away from main access areas.

The ground level maintenance bays shall be an open structure except where access limitations have been described. A full building skin shall be provided at a level sufficient for truck clearance of the next largest of the largest truck in the mine fleet.

#### a. Welding Shop

Welding shop for repair of shovels, buckets, equipment etc. will be part of the HEMM Workshop.

#### b. Tool Store

Tool store will be provided in the HEMM Workshop to store the tools.

#### c. Electrical shop

Electrical shop will be provided as part of the HEMM Workshop for repairing



of electrical parts.

Apart from the above, office space for the workshop management, shift change room, washing facilities and toilets shall also be provided. In addition to the Main Workshop, a temporary workshop has also been envisaged to cater to daily maintenance and routine checking of HEMM deployed in the mine.

**d. Office space for workshop management**

Office space in the separate building equipped with computers, communication facilities stationary and furniture shall be provided for workshop management. Office climate control shall also be provided based on the prevailing ergonomics.

**e. Shift in change room**

A separate shift in-charge room along with the office of Mine Time Keeper shall be provided. This room shall be equipped with computers, communication facilities stationary and furniture for manpower management during the shift operations. Office climate control shall also be provided based on the prevailing ergonomics.

**f. Washing facilities and toilets**

Washing facilities and toilets shall be provided as per requirement.

**2. Light Vehicle Workshops**

A separate maintenance workshop for highway vehicles shall consist of a minimum of six bays with a separate office and a secure storage room for parts and tools. This facility shall include a concrete grade slab, and primarily framed from steel with reinforced masonry walls. No garage doors are required but the facility shall have walls on two sides and shall have a complete roof. The roof shall include control of rain runoff away from main access areas.

**3. Tyre Workshop**

This facility shall consist of a heavy floor slab sufficient to support the haul track and the forces induced from a floor jack or lift as required to change wheels tyres on the haul truck. This facility shall also include a complete roof to control rain runoff away from main access areas. The facility shall also incorporate a secure tool storage room locker with benches to allow workmen to change from their work clothing, a toilet and an office.

**4. Equipment Washing Facility**

This facility shall include a large concrete grade slab with rail embedded to protect the slab from tracked equipment. The slab shall be sloped to direct water to the settlement basins. This facility shall include the washing



equipment, including water cannon; access platforms; settling tanks; oil traps and oil collecting tanks. The settling tanks shall be designed to allow a small pay loader to drive in to the tank to collect large deposits of silt or other materials deposited from washing the vehicles.

#### 5. Office Building with Medical Clinic

A single-story Office Building shall be provided to serve mine support functions such as; engineering; mine supervisors and managers; the canteen; document storage; Information Technologies (IT) and computer backup; mine administration; secret ration; secretarial and other support staff. The building shall also provide a minimum of four meeting rooms and have a waiting room. This office building will also include First Aid Medical clinic.

#### 6. Worker's Bathhouse and Canteen

A separate canteen for the hourly staff shall be provided. It shall have showers, changing areas, toilets, kitchen, a canteen serving area and an area for recreation. For employee morale, plans for this facility shall include features that make this a facility that the workers enjoy.

#### 7. Medical unit (Dispensary)

This facility shall comprise of containers for first aid and handling medical emergencies, offices for doctors & nursing staff, emergency ward, ward for patients, toilets, kitchen, medicine room, ambulance van etc. It shall be equipped for treating the medical emergencies.

#### 8. Ware house and warehouse building (Store)

The ware house shall be an open two-story facility with extensive fenced storage yard adjacent to the facility. Access to the fenced storage and the main equipment storage entry shall be controlled through a gate. A tool shop, the main switchboard, radio room, offices, toilets and meeting rooms shall be provided within this facility. Office space shall be provided to supplement the main office building.

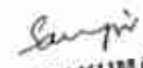
#### 9. Engineering Section

This is broadly divided in to five sub-sections

- i. Machine shop
- ii. Electrical repair shop
- iii. Welding & structural shop

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- iv. CHP & Mechanical repair shop
- v. Repair shop for Pumps and Pipes

The Engineering section is also equipped with a small workshop substation, scrap yard etc. A common 10/5 t capacity EOT has been envisaged to serve all the above mentioned shops of Engineering section to facilitate inter-shop equipment movement smoothly.

#### 10. Security Office

Security offices shall be provided where access to the mine is required to be controlled. Suitable monitoring, recording and secure access controls shall be provided as appropriate where items stored are dangerous or easily removed

#### 11. Fuel Depot

A fuel storage facility shall be provided to ensure that the mine can operate for a period of about one month during an interruption of fuel delivery.

The facilities shall include containment walls of sufficient height to assure if any one tank is compromised any fuel stored shall that may be spilled shall be contained. The facility shall also include perimeter collection concrete culverts that drain to an oil interceptor which shall be design to collect localize spills that occur during normal fuelling. The trucks are to be fuelled on a concrete grade slab which is surrounded by the concrete culverts. Continuous grating shall be installed over the culverts which shall support any vehicle in the mine fleet.

#### 12. Coal Evacuation System and Coal Handling Plant

Proposed coal evacuation system and coal handling plant has been elaborated in Chapter VII.

#### 13. Electrical Power Supply

##### 13.1 Construction Power Supply

It is proposed to arrange construction power at 11 kV from JSEB, Langatu substation located at about approx. 4 km from the project site before establishment of permanent power supply arrangement.

The 11 kV switchgear will be envisaged at main receiving substation for receiving construction power at 11 kV. The power supply for all construction activities, mine office and other amenity buildings can be fed at 11 kV. Provision of DG sets has also been made in the report to meet the construction power requirement at the time of power failure.

#### Chapter -VIII Mine Infrastructure & Facilities

संलग्नक-8 (अ) पाकि बारवाडीह कोयला ब्लॉक में खनन के लिए आवश्यक बुनियादी ढांचा और सुविधाएँ।  
अनुसंधान और विकास विभाग, कोयला विभाग, भारत सरकार।  
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### 13.2 Intermediate Power Supply

It is anticipated that construction of 220 KV line from Patratu Thermal Power Station of JSEB may get delayed due to administrative & statutory requirements and therefore a provision has been kept for intermediate power supply by drawing power at 33kV from Langatu sub-station of JSEB to charge 33KV switchgear of Main Receiving Sub-station. This will support the requirement of 5 MVA power during initial period of mine operation.

### 13.3 Permanent Power Supply Arrangement, Main Substations and Power Distribution:

The maximum power demand estimated for the mine including CHP will be 32 MVA. The source of power will be made available is from JSEB, Patratu at 220 KV. Main receiving Substation of 220/33/11 KV will be constructed at Pakri Barwadih Coal Block.

Other substations like Coal Substation, OB Substation, Colony Substation and CHP substations are also being proposed for further distribution of power inside mine block. All the 33kV substations will receive power at 33kV from the double circuit power line originated from the 33KV switchgear of Main Receiving substation.

Layout of the proposed Sub-stations and power supply system broadly covers the following:

1. Power reception & distribution system.
2. Illumination of workshop and adjacent area.
3. Earthing

The power for workshop shall be made available from project sub-station.

Quarry area is proposed to be illuminated by "HIGH-MAST-TOWERS" located along quarry periphery with Sodium Vapour Lamps on each tower haul Road and inside quarry shall be illuminated by Mobile Towers with Metal-Halide lamps. Proper earthing has been envisaged for Electrical System. All electrical System will have protection from lightening and high voltage surges

### 14. Mobile Service Van

Provision of a mobile service van has been envisaged to cater the need of repair of heavy equipment at site itself. Following equipment will be required to be installed:

- Welding Transformer, Gas cutting complete set
- Air compressor two stage displacement, Tyre Inflation gauge

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- Water container for drinking water
- Work table, Bench vice to be fitted on work table (1 no.)
- Lighting, Mechanical crane lifting device capacity 1 t
- Hand lamp 100 watts with 25 meters long wire
- Generator set complete with Engine Alternator coupling etc.
- 12/24 Volts D.C. Generator, Distribution board
- Hand operated pneumatic Grinder, Hand operated pneumatic drill
- Fire Extinguisher, First aid box

#### 15. Approach Road

Hazaribagh -Tandwa road passes through eastern part of the block and this road shall be used as main approach road for the block. During operation of Quarry east this road shall be diverted to the easternmost periphery of the block. Approximate distance of road for connecting to quarry west is 10-km.

#### 16. Other Roads & Culverts

##### 16.1 Haul Road

For both the technological options, the length of double lane haul road has been estimated as 10.25 Km for plying of largest dumpers. Another haul road to the dump site having an estimated length of 4km has also been envisaged.

##### 16.2 Heavy duty Road

The dumpers deployed in the benches will also go to the workshop for maintenance. Hence a provision of heavy duty road of 0.25Km has been envisaged in the present report.

##### 16.3 Approach road to the Township

Approximately 10km long, 7.5m wide black top road connecting to the Residential colony has been envisaged.

##### 16.4 Approach road to Magazine

The proposed magazine building has been envisaged to be located at a suitable location keeping in view safety and security requirements. Provision for 1.0Km magazine road has been envisaged in the present report.

##### 16.5 Road along CCT conveyor

A 14 km long, 3.75m wide black top road from block to Banadag yard has been envisaged as road along CCT conveyor.

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Additionally, Strengthening of 4 nos. of bridges / culverts on Hazaribagh PKB Highway has also been envisaged.

#### 17. Water Supply & Sewerage

The Water demand assessed for PB West and PB East Quarry is indicated in Table 8.2.

**Table 8.2.**  
**The Water demand**

Potable Water Demand in MGD for OCP	Industrial Water Demand in MGD for OCP	Total Water Demand in MGD
0.31	0.60	0.91

Separate sewerage system for domestic & industrial sewage has been envisaged for the Project.

#### 17.1 Source of water

Three sources of groundwater have been identified.

- i. Surface water such as existing ponds, reservoir, nalla or river
- ii. Borewells
- iii. Mine sump water

During construction years, there is actually no excavation taking place for extraction of coal, but water will be required for building of infrastructure, drinking & service purposes. During first year of operation sump water is not available as mine shall not intersect the aquifer due to lesser depth of the mine. For above period bore wells shall be drilled exclusively to draw water for meeting the water requirement of mine & residential colony. As the mine goes deeper & wider during later year of mining operation the sump water availability vis a vis water requirement of mine shall increase and the water requirement in these operational years shall be met by both sump water & ground water (Bore well water). From this period & beyond when the mine shall be producing 15 MTPA and water requirement expected to reach approx. 4000 m<sup>3</sup>/day, entire water requirement shall be met with the sump water. Sump water shall also be treated for drinking water purposes and bore well water shall be ceased to use.

As Permission/clearance for drawl and use of groundwater is in place revised Permission/clearance for drawl and use of groundwater shall be obtained from Central Ground Water Board. If necessary Hydrogeological study shall be carried out to assess availability of ground water.

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## 17.2 Industrial water supply

For both the options, ground water in the construction period and mine water has been envisaged as source of water for the project. For the initial years, ground water shall be drawn from bore wells. Afterwards, mine water shall be used. Raw water shall be stored in a bulk water reservoir from which water shall be treated and stored in a separate reservoir. From this reservoir, water will be taken to individual overhead tanks for consumption through pipe network at different points through gravity flow.

For firefighting purposes in the industrial areas like workshops, stores and quarry area, separate distribution networks have been proposed from the ground reservoir. Provision towards requirement of water for public utilities like garden, afforestation etc. has been made in this report. It has been envisaged that the distribution network for firefighting purposes shall also be utilized for these purposes.

## 17.3 Effluent Treatment Plant (ETP)

Effluent treatment Plant (ETP) of requisite capacity for treatment of industrial sewerage shall be installed.

## 17.4 Industrial sewerage

It has been considered that the industrial waste from workshop and other industrial establishments would be led through oil & grease traps. The effluent coming out of the industrial premises is proposed to be treated and led to the settling tank and to be recycled for various industrial uses of this project. The domestic sewage generated in the industrial premise has been considered to be dealt through sewerage disposal system.

Furthermore, to divert run off water for the northern side catchment area, a nallah along the northern boundary has been envisaged.

## 17.5 Sewerage Treatment Plant (STP)

Sewerage treatment Plant (STP) of requisite capacity for treatment of industrial sewerage shall be installed.

## 18. Temporary Workshop

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Chapter-VIII Mine Infrastructure & Facilities

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In addition to the Main Workshop, a field workshop has been envisaged to cater to daily maintenance and routine checking of HEMM deployed in the mine. This workshop shall be shifting as the mine advances and preferably kept in the near proximity to the access of quarry. This workshop shall constitute bays of Daily Maintenance shop occupying requisite area. The shop area is enough to deal with 4 to 5 dumpers at a time, which will meet the requirement of total number of dumpers to be dealt in each shift.

Dumpers after being washed at the washing station shall enter these sheds and daily maintenance requirement like checking nuts & bolts, tyre pressure checking, inspection of hydraulic systems for any leakages and their rectification, electrical system general check-up, battery check-up shall be carried out. Similarly dumpers after complete washing / cleaning will move to the Daily Schedule Maintenance where they will have oil levels checked, lubrication points greased, air cleaner, dust pans cleaned, water level and / or anti-freeze checked. The air, oil and fuel filters will be changed if required as per the maintenance schedule and tyres inflated if necessary.

Besides providing Parking space for HEMM specific jobs to be performed in the Temporary Workshop are as follows:

- i. Daily maintenance & washing of HEMM.
- ii. Scheduled maintenance, lubrication & inspection of equipment.
- iii. Fuelling of dumpers and dozers etc.
- iv. Air system check
- v. Hydraulic system check
- vi. Electrical check
- vii. Mechanical check

If on inspection, repair of any component / assembly is required, and then the machine will be sent to Dumper repair shed in the main workshop.

### 8.3 Infrastructure and facilities for PB North West Quarry

#### 8.3.1 Infrastructure facilities proposed

In line with the infrastructure facilities for PB West & East Quarry the area for the infrastructure facilities will be secured by a boundary fence and a soil bund on the edge of the mine. Distance between PB-West quarry is approximately 3 Km. from the viewpoint of ensuring better management, control and ease of access some of the facilities have been planned separate for PB-NW Quarry. The broad specifications shall be in line with the specifications adopted for PB-

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West & East Quarry. Proposed infrastructure within and precincts of the mine boundary are as follows:

1. Heavy Earth Moving Machinery (HEMM) Workshop

- a Welding Shop
- b Tool Store
- c Electrical Shop
- d Office space for workshop management
- e Shift change room
- f Washing facilities and toilets

2. Light Vehicle (LV) Workshop

3. Tyre Workshop & Tyre Storage Bay (open area)

4. Equipment Washing Facility

5. Office Building

6. Worker's Bathhouse and Canteen

7. Dispensary

8. Store

9. Engineering Section

10. Security Office

11. Fuel Depot

12. Coal Evacuation System and Coal Handling Plant

13. Electrical Power supply

14. Mobile Van

15. Approach Road

16. Other roads and culverts

17. Water Supply and Sewerage

- a Source of Water
- b Industrial water supply
- c Effluent Treatment Plant
- d Industrial sewerage
- e Sewage Treatment Plant

18. Temporary Workshop

1. Heavy Earth Moving Machinery (HEMM) Workshop (Maintenance Workshop)

In line with the Maintenance Workshop proposed for PB West & East Quarry, separate Maintenance Workshop shall be provided for NW quarry also.

2. Light Vehicle Workshops

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In line with the Light Vehicle Workshop proposed for PB West & East Quarry, separate Light Vehicle Workshop shall be provided for NW quarry also.

**3. Tyre Workshop**

In line with the Tyre Workshop proposed for PB West & East Quarry, separate Tyre Workshop shall be provided for NW quarry also.

**4. Equipment Washing Facility**

In line with the Equipment Washing Facility proposed for PB West & East Quarry, separate Equipment Washing Facility shall be provided for NW quarry also.

**5. Office Building with Medical Clinic**

In line with the Office Building with Medical Clinic Facility proposed for PB West & East Quarry, separate Office Building with Medical Clinic Facility shall be provided for NW quarry also.

**6. Worker's Bathhouse and Canteen**

In line with the Office Building with Worker's Bathhouse and Canteen Facility proposed for PB West & East Quarry, separate Worker's Bathhouse and Canteen Facility shall be provided for NW quarry also.

**7. Medical unit (Dispensary)**

In line with the Dispensary proposed for PB West & East Quarry, separate Dispensary shall be provided for NW quarry also.

**8. Ware house and warehouse building (Stores)**

In line with the ware house and warehouse building proposed for PB West & East Quarry, separate ware house and warehouse building shall be provided for NW quarry also.

**9. Engineering Section**

In line with the Engineering Section proposed for PB West & PB East Quarry, separate Engineering Section shall be provided for NW quarry also.

**10. Security Office**

In line with the Security office proposed for PB West & PB East Quarry, separate Security office shall be provided for NW quarry also.

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### 11. Fuel Depot

In line with the Fuel Depot proposed for PB West & PB East Quarry, separate Fuel Depot depending upon the magnitude of consumption of oil & lubricants shall be provided for NW quarry also.

### 12. Coal Evacuation System and Coal Handling Plant

Proposed coal evacuation system and coal handling plant has been elaborated in Chapter VII.

### 13. Electrical Power Supply

The maximum power demand for mine including CHP shall be 15MVA.

Electrical Power Supply system shall broadly cover the following:

1. Power reception & distribution system.
2. Illumination of workshop and adjacent area.
3. Earthing.

In line with the Electrical Power Supply system proposed for PB West & East Quarry, separate Electrical Power Supply system depending upon the magnitude of consumption of electrical power shall be provided for NW quarry also. The identified source of construction Power, Intermediate power and permanent power proposed for PB West & PB East Quarry, shall remain same for NW quarry also.

The power for workshop, HEMM, buildings, facilities, illumination etc. shall be made available from PB-NW project sub-station. Power shall be drawn from 33KV switchgear of PB west main receiving substation through O/H lines running on the northern periphery of PB West Quarry.

### 14. Mobile Service Van

In line with the Mobile Service Van proposed for PB West & East Quarry, separate Mobile Service Van shall be provided for NW quarry also to cater the need of repair of heavy equipment at site itself.

### 15. Approach Road

The approach road for PB West Quarry will be used to access PB-NW Quarry. The proposed approach road for PB West Quarry shall be extended upto PB NW (sector-A) quarry from northern periphery of PB West Quarry.

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**16. Other Roads & Culverts**

In line with the other roads such as haul roads, heavy duty roads, culvers on such roads and bridges proposed for PB West & East Quarry, separate other roads such as haul roads, heavy duty roads, culvers on such roads and bridges shall be provided for NW quarry also for transportation of coal/OB/topsoil/other purposes.

**Road along CCT conveyor**

In addition to the 14 km long, 3.75m wide black top road from block to Banadag yard proposed for PB West & PB East Quarry CCT a separate 14 km long, 3.75m wide black top road along with culverts/bridges as required from block to Banadag yard shall be provided for NW quarry also.

**17. Water Supply & Sewerage**

The Water demand assessed for the NW Quarry is indicated in the following Table. 8.2.

**Table. 8.2**  
**Water Demand for the NW Quarry**

Potable Water Demand in MLD	Industrial Water Demand in MGD	Total Water Demand in MLD
0.55	1.5	2.05

In line with the sewerage system for industrial sewage proposed for PB West & East Quarry, separate sewerage system for industrial sewage shall be provided for NW quarry also.

**a Source of water**

Three sources of groundwater have been identified.

- Surface water such as existing ponds, reservoir, nalla or river
- Borewells
- Mine sump water

During construction years, there is actually no excavation taking place for extraction of coal, but water will be required for building of infrastructure, drinking & service purposes. During first year of operation sump water is not



available as mine shall not intersect the aquifer due to lesser depth of the mine. For above period bore wells shall be drilled exclusively to draw water for meeting the water requirement of mine & residential colony. As the mine goes deeper & wider during later year of mining operation the sump water availability vis a vis water requirement of mine shall increase and the water requirement in these operational years shall be met by both sump water & ground water (Bore well water). From this period & beyond when the mine shall be producing 3 MTPA and water requirement expected to reach approx. 2000 m<sup>3</sup>/day, entire water requirement shall be met with the sump water. Sump water shall also be treated for drinking water purposes and bore well water shall be ceased to use.

As Permission/clearance for drawl and use of groundwater is in place revised Permission/clearance for drawl and use of groundwater shall be obtained from Central Ground Water Board. If necessary Hydrogeological study shall be carried out to assess availability of ground water.

**b Industrial water supply**

In line with the industrial water supply system proposed for PB West & PB East Quarry, separate industrial water supply system for industrial sewage shall be provided for NW quarry also.

**c Effluent Treatment Plant (ETP)**

Effluent treatment Plant (ETP) of requisite capacity for treatment of industrial sewerage shall be installed.

**d Industrial sewerage**

In line with the industrial sewerage system proposed for PB West & East Quarry, separate industrial sewerage system shall be provided for NW quarry also.

**e Sewerage Treatment Plant(STP)**

In line with the industrial sewerage system proposed for PB West & East Quarry, Sewerage treatment Plant (STP) of requisite capacity for treatment of industrial sewerage shall be installed.

**18. Temporary Workshop**

In line with the Temporary Workshop proposed for PB West & East Quarry, separate industrial sewerage system shall be provided for NW quarry also.

**8.4 Common Infrastructure and facilities**

The area for the common infrastructure facilities will be secured by a boundary fence and a soil bund on the edge of the mine. The proposed major buildings intended for common usage within and outside the precincts of the mine boundary are as follows:

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1. Residential Colony
2. Magazine
3. Core Shed
4. Coal Laboratory
5. Disaster Management Cell
6. Environmental Laboratory
7. Vocational Training Centre
8. Community Buildings
9. Communication System
10. Rehabilitation & Resettlement Colony
11. Coal Washery

## 1. Residential colony

### a General Connectivity

The block is connected by Hazaribagh – Khelari metal Road. The nearest railway stations are Ranchi Road and Chatarpur on the Gomoh Barkakana – Dehri-on-Sone loop lines of SE Railway and are about 70- 75 kms from the block. Ranchi, which is the state capital of Jharkhand, is about 125 kms from the block.

The nearest township is Hazaribagh, located at a distance of about 24 kms from Barkagaon located in the southern part of the block. It has been envisaged that the proposed colony shall come at Village Sikri near Barkagaon on the Tandwa road.

A residential colony suitable for living condition with proper ventilation, drainage shall be provided to officers, staff and workman employed in the mine as per prevailing statute. The colony shall be an integrated residential facility with PB block which shall be situated within 5 km from the block.

As this colony has been proposed to be located near Barkagaon Town on Tandwa Road thereby enabling the residents to avail the facilities of the Town as well as making it easy for them to reach the project site. The proposed project has been envisaged as highly mechanised mine needing skilled manpower. This manpower is required to be housed near the project site for smooth and continuous operation of the mine. With this background, 55% housing satisfaction has been considered for the project.

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## Chapter-VIII Mine Infrastructure & Facilities

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Residential colony has been considered for 1561 persons. Separate provisions have been made for colony and industrial water. It has been envisaged that there will be separate bulk reservoirs, water treatment plants and treated water reservoirs. From these treated water reservoirs, water shall be taken to the colony and for industrial purposes.

Relevant Standard Specifications shall be adopted for the construction of residential and service buildings. Requirement of residential units are given in Table 8.3.

**Table 8.3**  
**Requirement of residential units**

Manpower for OC Project	Total No. of residential units
2863	1575 including 36 Unit Hostel

Hostel accommodation has been proposed as 20% of type -A quarters, and reduction in proposed type – A quarters has been made accordingly.

The buildings have been envisaged as RCC-cum-brick masonry structures.

**b Colony water supply**

Ground water has been envisaged as source of water for the colony. This water shall be stored in a bulk water reservoir, would be treated through treatment plant and stored in ground reservoir. From these ground reservoirs, water would be pumped to overhead reservoir from which water will be distributed to the points of consumption through gravity flow.

**c Colony sewerage**

Colony sewage has been proposed to be dealt through sewerage disposal system. Sewerage treatment Plant (STP) of requisite capacity for treatment of colony sewerage shall be installed.

**d Colony Roads**

The 3.75 m wide trunk and 10m wide gate roads of length as per requirement shall be provided for residential colony. Provisions have also been made towards culverts/bridges, tree guards and drains along these roads.



## 2. Magazine

A magazine having storage capacity of 12 tonnes of explosive will be provided for this coal block. This shall be constructed as per the design approved by Chief Controller of Explosive and shall at all times be kept in state of good repair (or maintained in good condition). Magazine shall be constructed at ground level only and it will be a single storey building. Safety distance shall be kept as per prescribed norms. It shall be made of heavy construction, i.e. steel, reinforced concrete, brick, stone or preformed concrete blocks. Maximum security is attainable only with steel or reinforced concrete structures. The internal dimensions of the magazine shall be such that there is ready access to all explosives. Suitable traverse or mound i.e. a solid mass of earth, sand, concrete or a brick work around the magazine shall be erected to prevent protection against effects of explosion. A distance of 15 metres surrounding the magazine shall be kept clear of dried grass or bush or flammable materials.

Magazine shall have attached thereto one or more efficient lightning conductors designed and erected in accordance with specification laid down by Bureau of Indian Standards. A cemented trough at least fifteen centimetres deep shall be provided near each entrance of magazine and shall be kept filled with clean water. Magazine shall be provided with a shelter for the security guard(s) on duty near the magazine at a suitable location not less than thirty metres away from the magazine. The magazine shall be kept securely closed or locked at all times except when goods are being placed in or taken from it or when it must be kept open for some other purpose in connection with the management of such premises.

Magazine shall be used only for keeping explosives specified in the licence and of receptacles, tools or implements for work connected with the keeping of such explosives. At the end of every month a return in Form RE-6 shall be submitted to the District Magistrate, Superintendent or Commissioner of Police in whose jurisdiction the magazine is situated in the proforma prescribed from time to time so as to reach the above authorities by 10th day of the succeeding month.

## 3. Core shed

The Core shed shall be a minimal facility used to store and prepare coal samples.

All facilities shall include lighting via windows and light fixtures, bollards, electrical connections and shall be design to all in the purpose the facility is designated to be used for.

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#### 4. Coal Laboratory

The Coal Laboratory shall include two offices, toilet with extensive washing facilities and a separate testing room. The testing room shall have independent ventilation equipment. One of the offices shall be for the chief technician and the other shall to house all other technical staff.

#### 5. Disaster Management Cell

A Control Room shall be set up within mining lease, which shall work round the clock. The control Room shall be provided with manpower, communication system and other equipment so as to deal with any disaster and provide necessary help affected persons.

The Control room shall also be provided with communication system to call for help from other Govt. or private organisation at the time of major disaster.

#### 6. Environmental Laboratory

A fully equipped laboratory to carry out testing and analysis as per the prescribed norm for quality of water, soil, air and other mandatory environmental parameters will be provided as common facility of all the quarries. The testing room apart from state of the art equipment's shall have independent ventilation equipment.

#### 7. Vocational Training centre

Training facility for the employees shall be provided comprising of training rooms, workstations, offices for training personnel, toilets, kitchen etc. This facility shall house safety and include a mobile equipment simulator if needed. This building shall be constructed from reinforced masonry.

#### 8. Community Buildings

Facilities required to have a healthy living for the employees have been envisaged and shall be provided as common facility for all the quarries.

#### 9. Communication System

For effective management of different production, service units and for ensuring safety, the following communication facilities have been envisaged:

- Voice Communication
- Data Communication System

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• Truck Despatching System

a) EXTERNAL COMMUNICATION SYSTEM (ECS)

Twenty telephone lines have been provided for BSNL communication and access to public communication grid. These telephone sets would be located in the residences and offices of key personnel of the project, sub-station, railway siding, CHP, workshop, etc. Besides fixed line BSNL telephones, 20 nos. of BSNL cell one Mobile connection with sets may also be provided to important personnel of the project.

b) PLANT COMMUNICATION SYSTEM (PCS)

A 25-point Plant Communication System is proposed for voice communication in the CHP. Loud speaking facility for broadcasting of messages/instructions shall be available in the PCS. The Plant Communication System shall have the facility of private communication between any two handset stations, handset to central station, in addition to the loud speaking facility.

c) MOBILE COMMUNICATION SYSTEM (MCS)

Instead of simplex type mobile sets, the TETRA-based system is proposed for mobile communication in the entire operational area of the Project including all important locations. The TETRA-based system has facility to incorporate GPS based Automatic Vehicle Location System (AVLS) and is very advantageous compared to the presently used VHF walkie-talkie sets. The system based on TETRA (Terrestrial Trunk Radio) is cost-effective, reliable, extremely spectrum efficient and has higher quality reception for voice, data and multimedia.

d) TRUCK DESPATCH SYSTEM (TDS)

To achieve optimum utilisation of the HEMM in O/C mines, there is a need to provide an efficient means of data acquisition & control system. With the advancement in the TDS, the use of GPS for determining the points of different moving vehicles & automatic data transmission system for efficient control of vehicles has been found quite efficient & viable in Opencast mines.

10. REHABILITATION AND RESETTLEMENT COLONY

The resettlement colony shall be considered where the PAPs are those HSOs who have not opted for self-resettlement. The land for Rehabilitation Colony

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shall be made available by NTPC free of any encumbrances preferably at one place Government land for RC is preferable. The cost in that case will also be borne by NTPC. Location of the RC could be decided in consultation of the project and could be slightly away but in the vicinity of the project. Basic infrastructure facilities for CD works will be provided in RCs.

The infrastructure facilities and basic minimum amenities shall be augmented in the RCs, the project affected villages and in the vicinity of the project to ensure that the displaced population (HSOs) in the resettlement colony or the village may secure for themselves a reasonable standard of community life.

The facilities/ amenities will vary depending upon local requirements. The focus areas would be Connectivity, Drinking Water, Sanitation apart from Education and Health related infrastructure. These may include the following:

- a. Internal and the approach roads with proper drainage, with preference for concrete roads
- b. One or more sources of safe drinking water like hand pump, borewells with water outlet platforms etc., as per need and requirement
- c. Tree plantation including fruit trees
- d. Community halls/ Panchayat Ghar
- e. Primary educational facilities
- f. Primary health facilities
- g. Street lighting in the Resettlement Colonies
- h. Public cremation ground/ burial ground
- i. Common grazing land/ small distributaries for irrigation
- j. Drainage
- k. Sanitation
- l. Drinking water for cattle
- m. Community Ponds
- n. Children playground

## 11. COAL WASHERY

Coal washability study has not yet been carried out for Pakri Barwadih Coal. Coal quality parameters obtained from the proximate analysis of coal revealed that ash percentage in all probability is likely to remain 34% or below which does not call for commissioning of coal washery. However space provision is kept for providing a Coal Washery at mine end in future, if required.

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# CHAPTER IX

## LAND REQUIREMENT

4

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## CHAPTER IX

## LAND REQUIREMENT

## 9.1 Village wise land

4695 Ha of land is proposed for the Open cast project, which would be utilized for different purposes to carry out extraction of coal. There are 27 villages identified in the core zone of Pakri Barwadih coal block. The list of the villages along with area (ha) in the core zone are given in the Table-9.1.

Table 9.1  
Village wise Land in the Core Zone

Sl. No.	Name of Village	Total Area within core zone (ha)
1	Deoria Kalan	87.00
2	Dewria Khurd	56.00
3	Urub	321.00
4	Itij	49.00
5	Chirudih	234.00
6	Nagri	218.00
7	Darikalan	282.00
8	Chepa-Khurd	100.00
9	Jugra	170.00
10	Arahara	296.00
11	Pakri-Barwadih	625.00
12	Barkagaon	166.00
13	Langatu	389.00
14	Sonbarsa	197.00
15	Sinduari	109.00
16	Churchu	145.00
17	Keri	197.00
18	Lakura	214.54
19	Chepa- Kalan	316.00
20	Bariatu	212.09
21	Basaria	48.13
22	Beltu	16.57
23	Jabra	12.85
24	Kandaber	65.18
25	Nawadih	43.42
26	Sirma	45.37
27	Urub	41.38
28	Other	38.46
Total		4695.00

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No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India

Chapter - IX Land Requirement

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PAWAN DEV JAMTA  
Depository General (Coal) Limited  
EOC, A-SA, Sector-24, Noida-201301 (U.P.)

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### 9.2 Category wise existing land use pattern

Out of total project area of 4895 ha, 38.06% is designated as forest land. Tenancy land and Government non forest land for which breakup is not presently available constitutes 2713 ha which constitutes 61.93%. Category wise pre mining (existing) land use pattern is given in Table 9.2.

**Table 9.2**  
**Pre Mining Land Use Pattern**

Sl. No.	Type		PB West & East (including u/g)	PB NW	Total of PB
1	Tenancy	Agricultural	2731.48	176.52	2908.00
		Habitation			
		Grazing			
		Barren			
2	Govt Forest Non	Agricultural	1478.52	308.48	1787.00
		Habitation			
		Grazing			
		Barren			
3	Forest	Forest	4210.00	485.00	4695.00
	<b>Total</b>				

### 9.3 Land Use during mining and Post Mining:

#### Land Use During Mining

Actual excavation shall take place over 1982 ha which is 42% of total area of the project. 29% of total project area shall be unutilized due to various reasons such as presence of hills and rationalization etc. Top soil dump is planned in flatter land over an area of 47 ha.

#### Post Mining (End of Life) Land Use Pattern

Mining operations has an impact on the land use pattern. In the proposed project, the impact on the land is due to:

- Overburden removal and extraction of coal
- Dumping of overburden as well as Coal
- Construction of infrastructure and facilities such as, workshop, office, road etc. coal handling plant within and outside project area.

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**Revised Mining Plan (1<sup>st</sup> Revision) – Pakri Barwadih Coal Block**

Post mining the land use pattern shall be very different from pre mining land use pattern. Due to Mining, dumping, diversion of nallas/rivers and water filled reservoirs, aesthetic appearance of landform shall be changed.

Even after maximization of in pit dumping void shall remain over 668 ha and backfilled area consisting of hillocks shall be over 1294 ha of area. Various buildings, coal handling plants, sub stations & other statutory facilities shall be occupying around 291 ha land.

#### 9.4 Post Closure Land Use Pattern

Although progressive mine closure activities shall be carried out during various stages of mining operations. Final mine closure activities shall commence from 52<sup>nd</sup> year of mining operations and shall continue upto 55<sup>th</sup> year. Mine shall be closed as per Mine Closure Plan. Overall land use Pattern is given in Table 9.3.

**Table 9.3**  
**Overall land use Pattern**

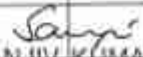
*Area in Ha*

Pre Mining Land Use "Ha"			Land Use "Ha"								
Type	Ha		Type	During Mining	End of Life	Post Closure					
						Agricultural	Plantation	Water Body	Public Use	Forest Land (Returned)	Undisturbed
Tenancy	2638.00	Agricultural	Excavation Area	1982.00							
		Township	Backfilled Area	1294.00	1294.00	713.00	581.00				1294.00
		Grazing	Excavated Void	668.00	668.00			668.00			668.00
		Water Bodies	Top Soil Dump	47*							
		Road	External Dump	885.00	885.00		885.00				885.00
		Community	Safety Zone	10.00	10.00		10.00				10.00
		Inhabited	Haul Road between quarries								
		Barren	Road Diversion	18.00	18.00				18.00		18.00
Govt Non Forest	270.00	Agricultural	Diversion/Below River/Nalla	58.00	58.00				58.00		58.00
		Township	Settling Pond	12.00	12.00			12.00			12.00
		Grazing	Road & Infrastructure Area	291.00	291.00		258.00		33.00		291.00
		Barren	Rationalization Area								
Forest	1787.00		Garland Drains	10.00							

**Chapter - IX Land Requirement**

सं. 34011/(15)/2009-CPAM  
मंत्रालय, नई दिल्ली  
प्रमाणित व्यक्ति  
पवन देव जामरा/PAWAN DEV JAM

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 सं. 34011/(15)/2009-CPAM  
 Deputy, EOC, A-8A, Sector-24, Noida-201301 (U.P.)  
**Page IX-3**  
 एन टी पी सी लिमिटेड/NT-PO LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)



**Revised Mining Plan (1<sup>st</sup> Revision) – Pakri Barwadih Coal Block**

			Embankment	20.00	20.00		20.00				20.00
			Green Belt	18.00	18.00		18.00				18.00
			Water Reservoir Near Pit								
			UG Entry	18.00	18.00					18.00	18.00
			Undisturbed/Mining Right for UG	1383.00	1383.00					1383.00	1383.00
			Resettlement								
Free Hold			Agricultural Land								
Total		4695.00		4695.00	4695.00	713.00	1772.00	700.00	109.00	1401.00	4695.00

\* Within Excavation area

### 9.5 Land Restoration

Efforts will be made to restore the land to the original land use to the extent possible. Post closure land use will serve following purposes:

1. Voids shall be made safer by erection of fencing and development of Ghats. This shall also be a source of water for nearby locality and a picnic spots for use of general public.
2. Water from the voids shall be used for irrigation, watering the forest at early stage which is expected to attract avifauna.
3. As per present plan the depth of the void is 280 m (approx.). As per the direction of MoEF, if necessary, post mining, depth of the void shall be reduced to the recommended level.
4. Industrial, residential and other buildings used for the purpose of project will be handed over to the state government.
5. The civil or mechanical installations prejudicial to the safety of the general public will be dismantled or suitably disposed or transferred to other locations as deemed fit by NTPC.
6. Roads will be thrown open for public use under the observation of state/local government.
7. Agricultural land shall be developed over 713 ha land and handed over to the state/local government at their disposal.
8. Substantially thick plantations will be developed in the identified areas to improve aesthetic look of the surroundings.

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SANJIV KUMAR SINGH  
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Ministry of Coal, Govt. of India

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PAWAN DEV JAIN  
Manager (Coal Marketing)  
NTPC Ltd.  
Noida-201301 (U.P.)


9. Overburden dump both external & internal will be planted and afforested with the local varieties of trees in consultation with Forest Department, Government. Backfill Percentage = 65.28% Plantation Area = 1772 ha

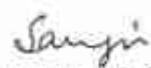
Year wise land restoration Plan is given in Table -9.4.

**Table -9.4**  
**Year wise land restoration Plan**

**Area in Ha**

Stage	Cumulative area(Ha)							Cumulative Plantation area(Ha)				Agricuilt ure/ Grazing land	Total
	Excavat ion	Backfilli ng	Void	Topsoil dump	Ext. dump	Others	Total	Backfill	Dump	Green area	Infrastruct ure		
Y1	57.18	0.00	57.18	26.25	84.30	4527.27	4695.00	0.00	0.00				0.00
Y3	142.98	0.00	142.98	36.00	193.23	4322.79	4695.00	0.00	19.00				19.00
Y5	292.69	0.00	292.69	47.12	261.67	4093.52	4695.00	0.00	83.00	10.00			83.00
Y10	750.14	289.76	460.38	25.18	316.61	3603.07	4695.00	0.00	260.00	10.00			260.00
Y20	1025.34	512.34	513.00	25.18	911.07	2733.41	4695.00	67.00	456.00	15.00			523.00
Y30	1541.81	608.39	933.42	0.00	913.54	2239.65	4695.00	311.00	669.00	20.00			980.00
Y40	1935.00	1192.00	743.00	0.00	885.00	1875.00	4695.00	524.00	885.00	38.00	124.00	665.00	2074.00
Y52	1982.00	1294.00	688.00	0.00	885.00	1828.00	4695.00	581.00	885.00	48.00	258.00	48.00	2485.00

  
 J.P. Nagpal  
 Joint Under Secretary  
 Ministry of Coal,  
 Govt. of India  
 New Delhi-110001

  
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# CHAPTER X

## ENVIRONMENT MANAGEMENT PLAN

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*Sanjay Kumar Singh*  
SANJAY KUMAR SINGH  
Recognised Qualified Person  
No. 34C (15)/2009-CPAM  
Ministry of Coal, Govt. of India

*Pawan Dev Janta*  
पवन देव जामल/PAWAN DEV JANTA  
General Manager  
(नि. टी. सी. लिमिटेड/NTL)  
EOC, A-8A, Sector-24, Rohtak-201301 (H.P.)

  
 पवन देव जामटा/PAWANDEV JAMTA  
 डी.जी.एम. (एन.पी.सी.)  
 Deputy General Manager (N.P.C.)  
 एन.पी.सी. लिमिटेड/NTPC LIMITED  
 EOC, A-2A, Sector-24, Noida-201301 (U.P.)

## CHAPTER X ENVIRONMENTAL MANAGEMENT PLAN

### 10.1 General

Pakri Barwadih Mine is designed to produce 18 MTPA of coal for the estimated life of 52 years which may have potential to release harmful substances into the soil, air, and water. The environmental impact of Pakri Barwadih mining includes erosion, formation of sinkholes, loss of biodiversity, and contamination of soil, groundwater, surface water by chemicals from mining processes. Besides creating environmental damage, the contamination resulting from leakage of chemicals may also affect the health of the local population. NTPC is required to follow environmental conditions mandated by EC and rehabilitation and resettlement standards as per R&R plan.

Erosion of exposed hillsides, mine dumps, tailings dams and resultant siltation of drainages, creeks and rivers can significantly impact the surrounding areas. It may also cause destruction and disturbance of ecosystems and habitats, and in areas of farming it may disturb or destroy productive grazing and croplands. It may also may produce noise pollution, dust pollution and visual pollution.

To maintain ecological balance and to check / mitigate harmful effects due to mining and allied activities at Pakri-Barwadih Mine, environmental control measures have been integrated into the process of mine planning. Many of the areas of environmental management planning require multidisciplinary approach.

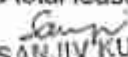
The changes warranted as per site specific conditions are to be accounted for, during actual implementation. Further, in the light of experience likely to be gained during the initial years of operation, proposed schemes shall be periodically modified/ updated. Physical, chemical, biological and socio-economic control measures shall be taken in various areas to implement most effective environment control throughout the life of mining operation.

### 10.2 Environmental Clearance


Ministry of Environment, Forest and Climate Change, vide letter no. No.J-11015/692/2007-IA.II(M), dated 19<sup>th</sup> May 2009 accorded EC for Pakri Barwadih Coal Mine Project for a production capacity of 15 MTPA in a total lease area of

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पवन देव जासवाल/PAWAN DEV JAISWAL  
अधीक्षक (पर्यावरण)  
Dy. General Manager (Environment)  
एन टी सी लिमिटेड, NTPC LIMITED  
ECC, A-8A, Sector-24, Noida-201301 (U.P.)



3319.42 ha, which consists of Phase-I of 39 years of operation and comprises of opencast operations only. Copy of EC is placed at Annexure-XII.

The present mining plan is envisaged for rated production of 18 MTPA for the life of 52 years and includes PB NW quarry additional area also. Thus present mining plan is at a variance with the EC.

It is recommended to seek EC for PB NW Quarry for rated production of 3 MTPA.

Further Baseline Environmental Data have not yet generated for PB NW area, the available Baseline Environmental Data as per study of PB West and PB East Quarry, shall be used to assess the environmental impacts for PB NW Quarry and accordingly checks/mitigative environmental measures are suggested.

### 10.3 Baseline status of Environment

Different element of environment namely land, water, air and ambient noise status of the area was studied in winter, 2005-06 (supplemented with data from June, 2006). All attempts have been made to gather the available data on the present environment in the study area which is the area within 10 km radius of the proposed mine site.

#### 10.3.1 Existing Land Use pattern

Existing (pre-mining) land use in lease area is given in Chapter-9 "Land Requirement" is reproduced below.

		Forest	Non-Forest		Total
			Govt.	Private	
1.0	Within the block				
1.1	Opencast Area				
1.1.1	Excavation & Dump Area				2866.0
1.1.2	Infrastructure & undisturbed				635.0
	<b>Sub-total(1.1)</b>	1252.44	275.24	1973.31	3501.0
1.2	Underground	89.88	81.54	399.38	570.8
1.3	Unutilized Area	357.08			357.08
	<b>Sub-total(1.0)</b>	1699.4	356.78	2372.69	4428.9
2.0	Outside Block (External Dump, Coal Evacuation)	87.6	31.02	147.46	266.08

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1.0	Within the block	Forest	Non-Forest		Total
			Govt.	Private	
	Corridor, Railway Siding, Mine Infra)				
Grand-total		1787	388	2520	4695

### 10.3.2 Soil Quality

To assess the quality of soil in and around the mining area, soil samples were collected from eight locations during June, 2005 (before the onset of monsoons) as well as during November, 2005 for physicochemical analysis. Table 10.1 lists the soil sampling locations.

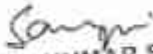
Table 10.1

List of Soil Sampling Locations

Sample No.	Location	Type of Land
S1	Village Pakri-Barwadih	Forest Land
S2	Village Chiradhi	Forest Land
S3	Village Chepakhurd	Agricultural Land
S4	Horam	Agricultural Land
S5	Barkagaon	Fallow Land
S6	Kanrtari	Sediment From Haharo river
S7	Mahugain Khurd	Fallow Land
S8	Kandaber	Agricultural land

The results of analysis are given in Tables 10.1, 10.2, 10.3, 10.4, 10.5, 10.6, 10.7, 10.8, 10.9, 10.10, and 10.11.

  
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 पवन देव जामटा (Pawan Dev Janta)  
 General Manager (Commercial)  
 एन सी सी लिमिटेड / NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)

**Table 10.2**  
**Physical Properties of Soil in June, 2005**

Sample No.	Texture Analysis*			Type of Soil
S1	Sand: 6	Silt: 18	Clay: 76	Clay Loam
S2	Sand: 8.5	Silt: 12.8	Clay: 78.7	Clay Loam
S3	Sand: 12.5	Silt: 62.5	Clay: 25	Silt Loam
S4	Sand: 9.4	Silt: 37.5	Clay: 53.1	Clay Loam
S5	Sand: 3.9	Silt: 21.6	Clay: 74.5	Clay Loam
S6	Sand: 6.1	Silt: 20.4	Clay: 73.5	Clay Loam
S7	Sand: 13.6	Silt: 17.6	Clay: 68.6	Clay Loam
S8	Sand: 6.2	Silt: 8.8	Clay: 75	Clay Loam
* All values in %				

**Table 10.3**  
**Physical Properties of Soil in November, 2005**

Sample No.	Texture Analysis*			Type of Soil
S1	Sand: 7.9	Silt: 13.1	Clay: 79	Clay Loam
S2	Sand: 8.5	Silt: 14	Clay: 74	Clay Loam
S3	Sand: 15	Silt: 15	Clay: 70	Silt Loam
S4	Sand: 16.7	Silt: 14.6	Clay: 68.7	Silty Clay Loam
S5	Sand: 14	Silt: 8	Clay: 78	Loamy Sand
S6	Sand: 16.3	Silt: 6.1	Clay: 77.6	Silt Loam
S7	Sand: 8.9	Silt: 31.3	Clay: 60	Sand
S8	Sand: 14.3	Silt: 9.5	Clay: 76.2	Sandy Loam
* All values in %				



Table 10.4

## Chemical Properties of Soil during June, 2005

Parameters	S1	S2	S3	S4	S5	S6	S7	S8
pH (1:5) at 25° C	6.85	6.86	6.84	6.52	6.85	7.8	6.3	7.01
Electrical Conductivity (1:5) in (μs/cm) at 25 ° C	89.06	79.95	70.71	97.78	342	132.7	182	158

Table 10.5

## Chemical Properties of Soil during November, 2005

Parameters	S1	S2	S3	S4	S5	S6	S7	S8
pH (1:5) at 25 ° C	6.94	6.74	6.9	6.31	7.09	7.56	6.46	7.09
Electrical Conductivity (1:5) in (μs/cm) at 25 ° C	138	141	149	93	103	147	167	119

Soil pH plays an important role in the availability of nutrients. Soil microbial activity is also dependent on pH. In the study area the soil pH is slightly acidic to slightly alkaline ( $6.30 < \text{pH} < 7.80$  in summer;  $6.31 < \text{pH} < 7.56$  in winter).

Electrical conductivity (EC) is a measure of the soluble salts and ionic activity in the soil. In the collected soil samples the conductivity ranged from 70.7 to 158.01 μs/cm in summer and from 93 to 167 μs/cm in winter.

Table 10.6

## Available NPK Contents in Soil in June, 2005

Parameters	S1	S2	S3	S4	S5	S6	S7	S8
Organic Carbon in % & Rating	0.21	0.33	0.33	0.76	0.7	1.11	1.08	0.17
	Low	Low	Low	High	Medium	High	High	Low
	245.86	215.13	282.74	384.16	357.5	276.6	461.78	208.98

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Parameters	S1	S2	S3	S4	S5	S6	S7	S8
Available Nitrogen in g/ha & rating	Low	Low	Medium	Medium	Medium	Low	Medium	Low
Available Potassium in kg/ha & Rating	370.72 High	164.64 Medium	179.2 Medium	163.52 Medium	265.08 Medium	306.88 High	222.62 Medium	448 High
Available Phosphorous in kg/ha & rating	1.43 Low	2.09 Low	1.98 Low	1.65 Low	41.34 High	1.87 Low	41.88 High	1.1 Low

Rating based on:			
Available Nitrogen	<280 - Low	280- 560 -Medium	>560 - High
Organic carbon	<0.50- Low	0.5-0.75 - Medium	> 0.75 - High
Available Phosphorus	<10 - Low	10 – 25 - Medium	>25 - High
Available Potassium	<120 - Low	120 - 280 -Medium	>280 – High

**Table 10.7**

**Available NPK Contents in Soil in November, 2005**

Parameters	S1	S2	S3	S4	S5	S6	S7	S8
Organic Carbon in % & Rating	0.35 Low	0.25 Low	0.46 Low	0.63 Medium	0.75 Medium	0.96 High	0.24 Low	0.38 Low
Available Nitrogen in g/ha & rating	175.18 Low	212.06 Low	371.86 Medium	304.25 Medium	248.94 Low	227.42 Low	221.28 Low	239.72 Low
Available Potassium in kg/ha & Rating	285.60 High	239.68 Low	691.60 High	143.81 Low	360.08 High	234.08 Medium	274.40 Medium	228.48 Medium
Available Phosphorous in kg/ha & rating	6.74 Low	6.06 Low	4.97 Low	3.96 Low	10.11 Medium	33.85 High	7.59 Low	1.09 Low

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*Pawan*  
**पवन देव जामटा/PAWAN DEVI**  
उप महाप्रबन्धक (परिचालन)  
Dep. General Manager (Commercial)  
एन टी सी लिमिटेड / NTPC LIMITED  
EOC, A-6A, Sector-24, Noida-201301 (U.P.)

Rating based on:			
Available Nitrogen	<280 - Low	280- 560 -Medium	>560 - High
Organic carbon	<0.50- Low	0.5-0.75 - Medium	> 0.75 - High
Available Phosphorus	<10 - Low	10 – 25 - Medium	>25 - High
Available Potassium	<120 - Low	120 - 280 -Medium	>280 – High

Phosphorus and Nitrogen are limiting nutrients, especially phosphorus. During June, 2005, in the tested soil samples, availability of phosphorus is low except in S5 and S7, where it is high; available Nitrogen is low to medium; organic carbon content is low to high while potassium content is low to high. During November, 2005 except in S5 and S6 availability of phosphorus is low; available Nitrogen is low to medium; organic carbon content is low to high while potassium content is low to high.

Table 10.8

Exchangeable Soil Cations in June, 2005

Parameters	S1	S2	S3	S4	S5	S6	S7	S8
Calcium (meq/100gm)	20.91 (74.7)	22.81 (74)	64.64 (68.4)	18.24 (61.7)	18.24 (70.5)	45.62 (67.5)	9.6 (67.5)	26.61 (67.5)
Magnesium (meq/100gm)	11.48 (23.5)	11.48 (21.7)	47.86 (28.2)	51.69 (33.3)	6.77 (26.6)	36.37 (29)	9.67 (29)	19.15 (29)
Sodium (meq/100gm)	0.23 (1.3)	0.34 (2.2)	0.8 (2.5)	0.34 (2.5)	2.04 (1.3)	1.38 (1.6)	1.7 (1.6)	0.8 (1.6)
Potassium (meq/100gm)	21.16 (0.5)	9.4 (2.1)	9.59 (0.9)	9.34 (2.5)	7.57 (1.6)	17.52 (1.9)	6.33 (1.9)	25.58 (1.9)
Figures in ( ) gives the % contribution of the respective ions to base saturation								



Table 10.9

## Exchangeable Soil Cations in November, 2005.

Parameters	S1	S2	S3	S4	S5	S6	S7	S8
Calcium (meq/100gm)	70.70 (56.1)	82.80 (56.8)	60.60 (56.3)	68.68 (49.8)	70.70 (52.1)	76.75 (52.3)	58.58 (55.2)	45.45 (55.7)
Magnesium (meq/100gm)	50.30 (39.9)	53.29 (36.5)	37.22 (34.6)	62.37 (45.2)	58.34 (43.0)	61.42 (41.9)	42.25 (39.8)	33.20 (40.7)
Sodium (meq/100gm)	0.81 (0.64)	0.97 (0.67)	0.91 (0.85)	0.81 (0.59)	0.91 (0.67)	0.86 (0.59)	0.70 (0.66)	0.70 (0.86)
Potassium (meq/100gm)	4.25 (3.4)	8.79 (6.0)	8.96 (8.3)	6.11 (4.4)	5.63 (4.15)	7.62 (5.2)	4.64 (4.37)	2.21 (2.7)

Figures in ( ) gives the % contribution of the respective ions to base saturation.

The above results show that the tested soil samples have high proportions of calcium and magnesium whereas proportions of exchangeable sodium and potassium were low.

Table 10.10

## Available Micronutrients in Soil in June, 2005

Parameters	S1	S2	S3	S4	S5	S6	S7	S8
Copper	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Zinc	0.041	0.060	0.042	0.032	<0.013	0.030	0.022	0.031
Iron	26	47.5	29.25	35.10	0.57	31.29	2.39	37.14

(Values in mg/kg).

Table 10.11

## Available Micronutrients in Soil in November, 2005

Parameters	S1	S2	S3	S4	S5	S6	S7	S8
Copper	1.8	2.22	3.14	1.96	2.24	2.08	1.14	1.24
Zinc	6.88	24.73	11.42	8.44	8.38	9.26	5.94	7.48
Iron	20.70	31.50	32.99	24.30	23.60	22.90	15.70	15

(Values in mg/kg).

Soil micro-nutrients also play an important role in plant growth and can act as limiting nutrients. Soil-micro-nutrient analysis can be employed as a diagnostic tool for predicting the possibility of deficiency of a nutrient and the profitability of its application. For this, it is essential to fix the critical limits. The critical limit of micro-nutrient in a soil is that content of extractable nutrient at or below which plantation practiced on it will produce a positive response to its application. The critical limits of copper, zinc and iron are 0.20-0.66 mg/kg, 0.50-0.65 mg/kg and 4.5-6.0 mg/kg respectively.


From the above Tables it can be seen that during June, 2005 in all the soil samples, micro-nutrient levels, other than that of iron, are very low; iron levels are very high. During November, 2005, availability of all the tested micro-nutrients was high in all the samples. Excessive micro-nutrients are detrimental to plant growth as excess of one more micro-nutrients adversely affects the uptake of other micro-nutrients. Excess of copper affects uptake of Molybdenum, another micro-nutrient. Excess of Zinc, Manganese and Copper affect iron uptake. Excess Iron, Copper and Zinc affect Manganese uptake. Thus due to the antagonistic effect of some micro-nutrients, uptake of other nutrients is adversely affected which hampers plant growth i.e. the fertility of soils in the study area are low.

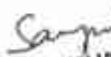
### 10.3.3 Quality of Air, Ambient Noise and Water

The existing quality of Air and Water are discussed in 11.4 and 11.3 respectively.

#### a. Ambient Noise Levels

In order to have an idea about the existing noise level of the study area, noise monitoring has been carried out at five locations listed in Table 10.12.

  
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Stn. No.	Location	Core Zone/ Buffer Zone	Distance & Direction (from Centre of proposed project)
N1	Pakri-Barwadih	Core	-
N2	Chepa Khurd	Core	-
N3	Pundaul	Buffer	.0 Km south-east of Core one
N4	Road, just outside lease area	Core	-
N5	Sirma	Core	-
N6	Kandaber	Buffer	.1 Km west of Core Zone
N7	Garrikalan	Buffer	.1 Km west of Core Zone
N8	Horam	Buffer	.0 Km south-east of Core one
N9	Sikri	Buffer	.0 Km south-west of Core one
N10	Kadmadih	Buffer	.1 Km south of Core zone

#### b. Noise Monitoring Frequency

Monitoring was carried out once during June, 2005. At each ambient noise monitoring station, Leq. Noise level has been recorded at hourly intervals for 24 hours continuously by operating the noise-recording instrument for fifteen (15) minutes during each hour. At work-zone noise monitoring stations, Leq. noise was recorded at hourly intervals for 8 hours continuously by operating the noise-recording instrument for fifteen (15) minutes during each hour.

### c. Results and Discussions

The summarised results of ambient noise monitoring in June, 2005 are given in **Tables 10.13**. The results have been compared with the standard specified in Noise 2000 Standards in Environmental Protection Rules given in **Table 10.14**.

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Table 10.13

## Summarised Results of Noise Monitoring During June 2005

Stn. No.	Location	Results					
		Day (0600-2200 hr.)			Night (2200-0600 hr.)		
		Max.	Min.	Mean.*	Max.	Min.	Mean.*
N1	Pakri-Barwadih	66	36	58.3	48	29	40.2
N2	Chepa Khurd	62	30	55.3	52	22	43.9
N3	Pundaul	67	35	59.8	45	26	37.3
N4	Road, just outside	69	40	62.9	44	28	39.1
N5	Sirma	52	30	49.7	28	24	27.9
N6	Kandaber	58	32	52.8	42	24	35.0
N7	Garrikalan	74	48	66.8	66	30	57.1
N8	Horam	68	41	60.8	46	30	40.8
N9	Sikri	54	37	50.8	38	23	31.4
N10	Kadmadih	58	34	54.2	44	25	36.0

\* Logarithmic Averages  
All Values in dB (A).

Table 10.14

## Ambient Air Quality norms in respect of Noise

(As Per Schedule III, Rule 3 of Environment Protection Rules)

Type of Area	Day (0600 - 2200 hrs.)	Night (2200 - 0600 hrs.)
Industrial Area	75	70
Commercial Area	65	55
Residential Area	55	45
Silence Zone	50	40

All Values in dB (A)

All the noise monitoring stations are "Residential Areas". (There are no areas of the other types in the study area). During day time, the noise levels were high in some locations due to movement of traffic and village activities. At

night, the noise levels were mostly within the norms, except at one location (N7 – Garrikalan) because of operation of a DG Set in the village.

#### **10.4 Environmental Impact Assessment**

An essential step in Environmental Impact Assessment (EIA) is to identify all potential environmental impacts (both beneficial and adverse). The identified impacts due to mining and associated activities have been studied in relation to the following areas:

##### **10.4.1 Impact on land use**

Existing (pre-mining) land use in lease area is given in "Land Requirement" Chapter-IX. Mining, dumping, road, built area etc. will change the existing land use pattern by degrading/utilizing forest and non-forest land. Plantation/utilization break-ups have been given in "Land Requirement" Chapter-IX.

##### **10.4.2 Impact on water quality**

Washing of coal has not been envisaged at present.

##### **10.4.3 Impact on noise levels**

The noise level in and around the mine may increase in future due to mechanized mining operation, blasting and operation of crusher. However, the noise levels in and around the area is expected to be below 75 dB (A).

##### **10.4.4 Impact on Air Environment**

Mining operations such as excavation, loading and unloading, movement of dumpers on haul roads, back filling, crushing screening and also drilling and blasting are expected to generate airborne fugitive dusts. Emission of pollutants like nitrous fumes (Nox), Sulphur oxides (SOx), carbon monoxide (CO) etc. from diesel operated equipment will also have little contribution.

The ambient air quality of the area shows that the pollutants like SPM, SOx, Nox CO and dust fall are well within the specified tolerance limits. As such the air environment of the mine is not likely to be adversely affected during the five years period.



#### 10.4.5 Vibration levels (due to blasting)

Blasting pattern has been designed to minimise the vibration levels. However, vibration levels will be studied once the blasting is done in the lease area.

#### 10.4.6 Impact on Water regime

The mining operation starting from western side of the coal block will affect Dumuhani Nallah and its tributary streams and streamlets joining it from northern part of the block. The Nallah flows in more or less NNE to SSW direction across the western part of the lease and finally joins the Haro Nadi outside the southern part of lease. Ground water level of the area varies from 25 to 35 m from the surface. The opencast mining below ground water level shall involve release of water in the order of 500 m<sup>3</sup>/hr through pumping which will be discharged to the proposed garland nallah along north eastern boundary of lease. The drawl of this quantity of water is expected to be recharged through rains during monsoon which is 200-800 mm in monsoon and 100 – 200 mm in post & pre monsoon season. In addition water requirement of 526 m<sup>3</sup> /day for the domestic purposes shall also be met through bore wells. Industrial water requirement for drilling, spraying over road, washing of machinery etc. shall be met through creating a small reservoir on Dumuhani nallah at eastern boundary of the lease and drawl through pumping.

The active mining activity for the five years period does not encounter any stream/ nallah. As such accumulation of surface water is not envisaged in any quarry even during rainy season. Suitable storm water drains will be made above the top bench to channelise the surface run-off during rainy season.

#### 10.4.7 Impact on Socio-economics

Displacement of human settlement will be involved due to the proposed mining activities. Adequate settlement and rehabilitation schemes will be implemented as per the guidelines of State/Central Govt. Mining activities will have a positive effect on the socio-economic condition of the people nearby, as it is a steady source of income for them. With the continuation of mining operation

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employment opportunities, communication, medical facilities, schooling etc will be improved further.

#### 10.4.8 Historical Monuments

There is no historical monument in and around the mining lease boundary other than a Megalith Structure at PB East Quarry. As directed by MoEF 500m radius is left for its preservation. No coal shall be mined beneath the influence zone.

#### 10.5 Environment Management

##### 10.5.1. Year-wise program for reclamation of affected land

As per the year wise excavation programme envisaged in the mining plan, the mine benches will remain active till the end of first five years of operation. Accordingly, the reclamation of mined out area will not be possible during first five years. However, the back filling of mined out area will start after 6<sup>th</sup> year of mine operation in western pit. Once the internal dumping in the mined out area starts, limited quantity will be dumped at the external dump. Mining benches will be filled upto 450 mRL in the western pit of the Block and subsequently raised to 540 mRL. Yearly coverage of reclamation areas are given below in Table 10.15.

Table 10.15

Yearly Details of reclamation of land

Stage	Reclamation Area (Ha)
1st year Stage	-
3rd year Stage	19
5th year Stage	64
10th year Stage	177
20th year Stage	389

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Stage	Reclamation Area (Ha)
30th year Stage	557
40th year Stage	617
Final Stage	334

#### 10.5.2. Afforestation Programme

During first four years period of mine planning a total of 487 Ha (in non-forest) of land will be broken in western part of the Block both for Mining and Dumping. To compensate for the above, plantation over 100 ha area will be undertaken during first 5 Years as per the following plantation schedule.

Table 10.16

Year	Area to be covered (ha)	Number of trees to be planted (@ 1250 saplings/ha), 75 % survival rate
First year	15	18750 (all around the lease boundary, along the access road, facilities)
Second year	20	25000 (Along the access road, outside the dump area and compensate the plant died)
Third year	20	25000 (On the external dump/mine periphery & along road)
Fourth Year	20	25000 (On the external dump/mine periphery & along road)
Fifth Year	25	31250 (On the external dump/mine periphery & along road)

#### 10.5.3. Stabilization, vegetation and management of dumps

The quantities of OB, Parting (Excluding of Topsoil) to be dumped during first five years for West & East Quarry have been estimated at 99.47 Mm<sup>3</sup>. The external waste dump will be stabilized by terracing the slopes. Plantation will be

carried out over the stabilized external dump to increase the stability of dump & also to make the surroundings more eco-friendly. Only local species will be planted under the guidance of state forest department.

A 1.5 m high barrier wall will be erected along the outer edge of external dump at a distance of 15 m from dump toe to arrest the rolling stones down the dump edge. A drainage channel will be dug inside the wall to channelize the rain water falling over the dump area. The channel will be cleaned periodically particularly before the onset of monsoon. Dozer has been envisaged for terracing of dump slopes as well as maintaining the drainage. The details of year wise stabilization and vegetation of dumps is given in Table 10.17.

**Table 10.17**  
**Yearly stabilization and vegetation of dump**

Year	Dump Stabilization & Vegetation (Ha)
First Year Stage	
3rd year Stage	19
5th year Stage	64
10th year Stage	177
20th year Stage	389
30th year Stage	557
40th year Stage	617
Final Stage	334

#### 10.5.4. Measures to control erosion/sedimentation of water courses

Continuous monitoring will be done to remove overburden material and loose sediments from the working mine benches and excavation zone to avoid rolling of the same into the water course and thereby prevent the erosion and sedimentation. Retention wall will be constructed around the dump to prevent rolling down of loose sediments. Settling pits will be constructed at appropriate



locations along the water channels to arrest sediments and clean water will be allowed to flow into natural water course.

#### 10.5.5. Treatment and disposal of water from mine

The water inside the mine pit is expected from the rain water during rainy season. Entire precipitation over the pit will be channelised systematically into natural drainage. In order to ensure the discharge of clean water into the natural drainage, sedimentation ponds will be made at suitable location to arrest the sludge. Accumulated sludge will be scraped off time to time to maintain the proper mine water discharge. In order to monitor and subsequent management of water quality, monitoring stations will be located near settling pit. Effluent treatment plant is envisaged for treatment of water discharge from workshop as well as domestic waste.

#### 10.5.6. Management of air quality

In the proposed lease area, the existing air quality is within the norms as specified by the National Ambient Air Quality Standards (NAAQS). Fugitive dust shall be generated in open cast mine due to drilling, blasting, handling of overburden & coal. To control dust from various operations following measures will be resorted to.

- Drilling area will be wetted prior to drilling
- Water will be sprayed during loading/unloading of OB and ore
- Periodical water spraying will be done on haul road, overburden dump & stacks of coal
- Trees will be planted on road side.
- Dumps will be stabilised by planting grass/trees

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It has been proposed that all mining and ore processing equipment will have dust extraction and separation attachment to minimise air pollution. In order to monitor and subsequent management of air quality, monitoring stations will be located near dust generating areas such as haul road, OB dump, coal handling plant etc.

#### 10.5.7. Protective measures for ground vibration/air blast caused by blasting

Loosening of rock mass will be done by the blasting of 10 to 15 m deep and 160/250 mm diameter blast holes. Burden and spacing have been proposed as 4.5 m and 5.0 m respectively. Milli-second delay detonators have been envisaged to minimise the ground vibration. Use of non-electric detonators will be used wherever required. Blast vibration studies will be conducted to optimise the burden & spacing and explosive requirement so as to minimise the vibration effect due to the blasting.

Blasting will be carried out in a periodical manner so as to minimize the impact on the local habitants and the faunal species.

#### 10.5.8. Measures for protecting historical monuments and for rehabilitation of human settlements

Historical monuments do not exist within 5 km radius of the proposed ML area. Adequate scheme for rehabilitation for human settlement within the leasehold area, will be implemented in line with the policies of Central/State Govt.

#### 10.5.9. Socio-economic benefits arising out of mining

The activities involved in mining and subsequent preparation of coal at proposed leasehold area will generate employment potential both directly or indirectly. As the proposed mining and transportation has been envisaged through contractual means, through Mine Developer & Operator (MDO), local



people will have employment opportunities as skilled, semi-skilled and unskilled labourers in mining, transportation and allied activities. Thus there will be overall improvement in the socio-economic status of the people of the surrounding areas. Mining activities will have a positive effect on the socio-economic condition of the people nearby, as it is a steady source of income for them. With the continuation of mining operation employment opportunities, communication, medical facilities, schooling etc will be improved further.

**10.5.10. Monitoring schedules for different environmental components right from the commencement of mining and other related activities**

The environmental staff will make and conduct routine field monitoring and inspections and interact closely with operations personnel. The necessary planning of environmental field activities such as topsoil removal, storage and replacement will be performed by the environmental staff.

Environmental monitoring and reporting will be conducted to provide a close supervision on the surrounding natural environment and provide early warnings of any adverse changes that may be related to some dimension of the mining and allied operations. The activity can be categorised into routine tasks.

In order to carry out routine tasks in a systematic manner, Environmental group will practice the following:

- Plan a site-based strategy to control pollution. The strategy should include formulation of code of actions for controlling air, water, noise, soil pollution, managing blasting effects, phase wise afforestation scheme and actions to be taken in respect of socio economic development. Frequency of monitoring/ sampling and inspection of various parameters / factors will also be planned.
- Oversee environmental control measures are implemented as per approved action plan.
- Plan conservation programmes in respect of water and energy.

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- Identify and record the constraints in respect of environmental planning and implementation.
- Systematically document all the field monitoring and laboratory analysis results. Analyse the monitoring results and inspection findings. The results can be compared with various standards/ Norms. Prepare periodic progress reports, which will include the analysis and inspection results. Environmental audit results and actions taken should also be systematically documented.

Monitoring and compliance shall be done as per Environmental, Forest and other statutory clearances accorded for the project. However, tentative monitoring schedules are provided in Table 10.18.

Table 10.18

Monitoring Schedule

Sl. No.	Description of Parameters	Schedule and Duration of Monitoring
1	Slope Failure	Bi-Weekly
2	Land Erosion	Weekly
3	Drainage	Daily
4	Blasting effect	As per mine workings and blasting
5	Re-vegetation and Green belt development	Yearly
6	Monitor Plantation Measures	Yearly
7	Surface Subsidence	Bi-Weekly
8	Water Quality Monitoring (Ground & Surface)	
	Water quality of Surface and ground water around the site (All parameters specified by JSPCB)	Monthly
9	Emissions and Air Quality (RPM, SO <sub>2</sub> , NO <sub>x</sub> , CO)	24 hourly samples with analysis carried out

Sl. No.	Description of Parameters	Schedule and Duration of Monitoring
		monthly all-round the year.
10	Meteorological Station	Continuous
11	Air Quality	Continuous
12	Noise Quality	Continuous
11	Occupational Health	Bi-Weekly

#### 10.6 ENVIRONMENT MANAGEMENT OF PAKRI BARWADIH NORTH WEST (SECTOR-A) QUARRY

Environmental Clearance for Pakri Barwadih Project (covering Western and Eastern Part of the Block) was accorded by MoEF on 19.05.2009 for rated production of 15 MTPA. At that time the North Western (Sector-A) part of this block was unexplored. Subsequent to detailed exploration, NTPC submitted Mining Plan which could not be presented to MoC. In compliance to the MoC letter no- 13013/29/2003- CA-I dated 09.10.2014 NTPC is submitting Mining Plan of Pakri Barwadih (Rev.1) for consideration of MoC. Base line environmental data is unavailable for this part of the block.

In the present Pakri Barwadih West & East and Pakri Barwadih NW are integrated as a result this mine shall be producing 18 MTPA. As the clearance is already obtained for 15 MTPA, NTPC shall conduct EIA/EMP for PB-NW part and submit proposal to MoEF & CC for consideration.

The environmental management plan shall include the evaluation of impacts of carrying out mining activities, mitigation of environmental pollution and monitoring of environmental parameters such as land, water, air etc.

Environmental mitigation measures and monitoring and control of environmental parameters shall be carried out in line with that proposed for Pakri Barwadih West and East Quarry.

Salient features of the PB NW Quarry (sector-A) for planning the study are briefly given in Table 10.19

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Table 10.19

Salient Features of PB NW (Sector-A) Quarry

a)	Applied Lease area	485 ha (Equal to Block area )
b)	Core Zone	485 ha Block area
c)	Nature of land	Habitated land, Agricultural land, waste land, Forest land and Water bodies
d)	Mineral to be mined	Coal
e)	Scale of operation	The capacity of proposed mine is 3.00 million tonnes per annum (Mtpa)
f)	Anticipated life of mine	38 years (excluding two years of construction period)
g)	Method of mining	Opencast
h)	Surface transport	By trucks and CHP within the ML, by combination of road, CHP and railways from pit head to the thermal power plant

10.6.1 SOCIO ECONOMIC STUDY

Socio Economic Survey Study is under process and the findings of the study will be incorporated after finalization of SES report.

10.6.2 EXISTING LAND USE PATTERN

Mining, dumping, road, built area etc. will change the existing land use pattern by degrading/utilizing forest and non-forest land. Post mining land use pattern is given in Chapter-IX.

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# CHAPTER XI

## PROGRESSIVE AND FINAL MINE CLOSURE PLAN

  
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## CHAPTER-XI MINE CLOSURE PLAN

### 11.1 Introduction on Mine Closure Plan

The present Mine Closure Plan is prepared for 4695 Ha, which includes PB West, PB East and PB North West Quarries. This Mine Closure Plan covers extraction area, external OB dump area, facilities, diversion/realignment of nallah & road, colony and coal evacuation through cross country conveyor.

Mine Closure Plan based on the Approved Mining Plan has already been approved by MoC as separate document vide letter No. 34011/09/2011-CPAM dated 20.04.2012 (Copy of approval letter is placed as Annexure-XIII).

The Mine Closure Plan is integrated with present Mining Plan of Pakri Barwadih Mining Plan (1<sup>st</sup> Revision). Mine Closure Plan consists of two parts namely "Progressive Mine Closure Plan" and "Final Mine Closure Plan". Final Mine Closure Plan shall be prepared five years before closure of mine. Present Progressive Mine Closure Plan is in line with the MoC guidelines issued in this regard includes all aspects covered in approved Mine Closure Plan.

#### 11.1.1 Reasons for Closure

Mine shall be closed either

- after exhaustion of coal reserves or,
- by any order of government or,
- by any violation of statutory obligation or,
- any other unforeseen reason.

#### 11.1.2 Statutory Obligations

All applicable statutory rules, regulations, bye-laws etc. and statutory requirement related to Government Licenses, workers' compensation, insurance, etc. including Minimum Wage Act for the workers employed by the outside agencies shall be adhered to. Following statutory rules, regulations, bye-laws etc. shall be adhered to:

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- a. Coal Mines Regulation 1957
- b. Mines Act 1952
- c. Mines Rules 1966
- d. Vocational Training Rules 1966
- e. Indian Electricity Rules 1956
- f. DGMS circulars from 1948 (up-to-date)
- g. Factories Act 1948 (as applicable to mines)
- h. Explosive Act and Rules
- i. Conditions attached to statutory permissions and exemptions granted by DGMS to Mines of CIL.
- j. Recommendations of National Safety Conferences, Tripartite Safety Review
- k. Special guidelines issued by DGMS following accident enquiries etc.
- l. ILO code of Safety and Health and in open cast Mines (1991).

Special conditions imposed while execution of lease deed, approval of Mining Plan, directive issued by the Ministry of Coal, conditions imposed by the MoEF, State Pollution Control Board or by any other statutory organizations shall be followed. All conditions stipulated in the Approved Mining Plan, Environmental clearance, Forest clearance and other future clearances shall be complied. List of clearance along with their status is given in Table 11.1

Table 11.1

**LIST OF CLEARANCES FOR PB EAST, WEST and NORTH WEST QUARRY**

Sl. No.	Clearances	Status for PB West & East Quarry	Status for NW Quarry
1.	Approval of Mining Plan by MoC	Approved	Not Approved
2.	Revised Mining Plan (1st Revision) and Mine Closure Plan	Under approval	Integrated with PB West and East as one mine mine

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Ministry of Coal  
Ministry of Environment & Forests  
Ministry of Water Resources  
Ministry of Labour & Employment  
Ministry of Panchayats

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3.	Public Hearing conducted by SPCB	Completed	Not done
4.	Environment clearance by MoEF	Obtained	Not Available
5.	Forest clearance by MOEF (Stage I and Stage II)	Obtained	In Process
6.	Permission for Diversion of Nalla passing through West Quarry of PB from Govt. of Jharkhand	Obtained	Not Available
7.	Permission for Withdrawal of Ground Water from CGWA	Obtained	In Process
8.	Land Acquisition / surface rights  - State Govt. /Govt. of India	In Process (Section 11 under CBA Act has been notified)	In Process
9.	Clearance for use of explosives and construction of magazine	In Process	Integrated with PB WE as one mine
10.	Permission for opening of coal mine from DGMS	Obtained	In Process

### 11.1.3 CLOSURE PLAN PREPARATION

Conceptual Final Mine Closure Plan has been prepared. However, Final

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Mine Closure plan shall be prepared 5 years before the likely cessation of mining operations shall continue for 3 years after likely cessation of mining operations and will have the approval of the Board of Directors.

## 11.2 MINE DESCRIPTION

The entire coal block has been considered for opencast mining in the interest of conservation of reserves and techno economic considerations.

The minimum workable in-band thickness of seam for opencast mining has been taken as 1.00 m. In case of opencast potentiality, a seam has been considered as splitted if the parting between the two sections has attained a thickness of more than 1.00 m and is persistent.

During the course of mining operations, Khora, Dumuhani and Hardara Nala will need to be diverted at different stages of mining operations to ensure safety of mine workings as also for releasing the coal reserves which otherwise would be lost in the safety barriers required to be left against this water channel. Care would also be necessary to provide suitable garland drains as well as embankment along diverted nala route to avoid any inundation of opencast mine workings.

### 11.2.1 Mine Boundaries

It is proposed to mine maximum area leaving a barrier of 7.5 m on surface from block boundary which is a statutory requirement. The boundaries of PB West & East Quarry PB-NW Quarry are delineated and given in Table-11.2.

Mine parameters for the delineated mine boundaries are shown below:

**Table 11.2**  
**Boundaries up to 300 m depth line**

Particulars	WEST QUARRY				EAST QUARRY	NORTH WEST QUARRY	
	WP -1	WP -2	WP -3	WP -4		PIT-1	PIT-2
North-West Boundary	in-crop of seam I	F <sub>14</sub> and in-crop of seam I	in-crop of seam I	in-crop of seam I	in-crop of seam I	in-crop of K -1 seam Quarry surface has been projected at 45° on the surface, with respect to the quarry floor.	in-crop of K -1 seam Quarry surface has been projected at 45° on the surface, with respect to the quarry floor.
West Boundary	Khora nala and in-crop of	Khora nala and in-crop of	Arbitrary line	Khora nala	F <sub>2</sub> F <sub>3</sub>	20 m from the Khora - B Nala.	20 m from the Khora - B Nala.

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	seam I	seam II					
East Boundary	$F_{10}$ & Incrop of seam I	$F_{10} - F_{11}$	$F_8$	$F_8$	$F_1, F_2, F_3$	60 m from the Khora - A Nala.	60 m from the Khora - A Nala.
South-East Boundary	$F_{10}$	$F_{10} & F_{11}$	$F_8$ and FRL of 300 Seam-II	300 m depth line/ FRL of 120 m Seam II	300 m depth & FRL of 120 m of Seam II	Quarry surface has been projected at 45° on the surface as well as on the confluence of Khora Nala - A & B.	Quarry surface has been projected at 45° on the surface as well as on the confluence of Khora Nala - A & B.

*Note: 7.5m-space width is left from the outer boundary of PB NW quarry*

Some major system parameters are given in Table 11.3.

**Table-11.3  
System Parameters**

Sl. No.	Particulars	PB-West & East	PB -NW
1.	Maximum Bench Height		
	Top OB	15m	15m
	Coal and Intervening parting	5 - 15m	5 - 15m
2.	Proposed minimum Bench Width		
	Working Bench	50m	40m
	Non-Working Bench Width	25m	25m
3.	Width of the permanent haul road	30m	25m
4.	Width of the temporary transport ramp	10m	10m
5.	Usual height of the spoil dump bench (1Tier)	30m	30m
6.	Width of the active dump bench	30m	30m
7.	Bench Slope		
	OB Bench	70°	70°
	Coal Bench		70°
	Dump bench	37°	37°
	Overall (Ultimate) pit slope	37° (300 m depth)	43° (155m depth)

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## 11.2.2 Geology

The Pakri-Barwadih block (East & West Quarry) comprises of Talchir, Karharbari, Barakar, Barren Measures and Raniganj Formations belonging to Damudas, a Sub-Group of Lower Gondwana. Talchir Formation rest directly over the Pre-Cambrians. The Karharbaris and Barkars are the main coal bearing formations in the block. Stratigraphic succession of the formations in the PB West & East and PB NW is given in the following Table-11.4 A.

Table-11.4 A  
Stratigraphic Sequence of Pakri-Barwadih Block

Period	Group	Sub-group	Formation	Thickness Range	Lithology
Recent	Lower Gondwana	Damuda	Alluvium	3.50 – 25.85	Detrital and Alluvial soil & subsoil
Upper Permian			Raniganj	1.50 – 324.50	Fine to medium grained micaceous sandstone, interbanded shale and sandstone, Carbonaceous shale & thin uneconomic Coal seams.
Upper Permian			Barren Measures	5.14 – 353.00	Dark shale, sandy shale & interbanded shale & sandstone.

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			Barakar	12.50 - 268.85	Fine to coarse grained sandstone, Shale, Conglomerate, Carbonaceous shale & Coal seams.
			Karharbari	10.00 - 81.60	Medium to coarse grained sandstone, Shale, silicified quartzite rock & thin coal seams.
Permo Carbonifero us	--	--	Talcher	0.80 - 13.50	Green coloured shale, Boulder & Conglomerate
-----Unconformity-----					
Pre- Cambrian	--	--	Metamorphics	--	Granite, Gneisses & Quartzites

There are a few small outliers of Barakar/ Kaharbari/ Talchir Formations occurring over the Pre-Cambrian Basements immediately north of the Pakri-Barwadih Block.

However, in PB North West (sector-A) area small exposures of sand stone and coal seam are found near the bank of Khora Nala in the western margin of the block. At places Karharbari Formation also rest directly over metamorphic. The geological succession established in the PB North West area (sector-A) of the block from sub-surface exploration data is given in Table 11.4 B.

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Table-11.4 B  
STRATIGRAPHIC SUCCESSION OF PB NW (SECTOR-A) AREA OF COAL BLOCK

Period	Group	Sub-Group	Formation (Thickness)	Lithology
Recent & Sub-Recent			Alluvium (3.00 to 23.00m)	Soil & Sub-soil
-----Unconformity-----				
Middle Permian			Barren Measure (44.00 – 138.70m)	Predominantly shale with intercalation of sandstone and shale and arenaceous shale
Lower Permian	Lower Gondwana	amuda	Barakar (19.07m – 137.10m)	Fine to coarse grained sandstones, shale, carbonaceous shale and coal seams.
			Karharbari (5.14m to 91.52m)	Fine to coarse grained sandstone with bands of shale and coal seams
Permo Carboniferous			Talchir 0.65m to 4.64m )	Green coloured shale, boulders and conglomerates
-----Unconformity-----				
Precambrian			Metamorphics (2.80-11.00m)	Gniesses, granites and quartzites

As per the geological report, no major, minor and trace elemental analysis of different rock types was available. The chemical analysis of coal indicates presence of nontoxic minerals. The sandstones of Barakar Formation constitute major part of area forms a principal aquifer. The chemical analysis of ground water shows the trace element like Cu, Mn, Hg, Cd, Se, As, Pb, Zn, Cr, Al and B are present below deduction limit.

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The ground water quality indirectly infers the source rocks characters hence, the rock of Pakri-Barwadih Coal block contains no toxic elements.

### 11.2.3 Reserves

As per United Nations Framework Classification (UNFC) the geological reserves of Pakri-Barwadih (East & West Quarry) can be classified as given in Table 11.5.

Table 11.5

#### Summary of Coal Reserve in Million tonnes

UNFC Code	Type	Net Coal Reserves
111	Proved Reserves	703
211	Feasibility Mineral Reserves	636
222	Indicated Mineral Reserves	733
Total(111+222)		1436

A total of 137.584 million tonnes of coal reserves has been established in Pakri Barwadih North West (Sector-A) Coal Block, out of which 134.470 m.t falls in proved category and 3.114 m.t in 'Indicated Category'. Category wise Geological Reserve of PB North West Quarry is given in Table 11.6.

Table 11.6

#### Category wise Geological Reserve of PB North West Quarry

Property	Reserves in Million Tonnes		
	Category		Total
	Proved	Indicated	Total
Opencast	106.263	0.425	106.688
Underground	28.207	2.689	30.896
Total	134.470	3.114	137.584

The seam wise, grade wise and depth wise geological reserves have been provided in Geology chapter.

Net opencastable reserves of Pakri Barwadih is 808.23 Mt, barrier loss and batter loss worked out as 58.74 Mt and 106.22 Mt. Taking into account of mining losses of 20.72 Mt extractable reserves worked out as 642.34 Mt. Percentage of extraction by opencast mine is 78%. Net reserves and extractable reserves along with losses are given in Table -11.7.

Table -11.7

Net reserves and extractable reserves and losses

Seam:	Net Reserve	Barrier Loss	Batter Loss	Mineable Reserves	Mining Loss	Extractable Reserve	% Extraction
	In Mt						
V Top	22.29	0.72	1.57	19.99	0.59	19.40	87.06
V Bottom	15.56	0.51	1.10	13.96	0.41	13.55	87.06
V Combined	11.57	0.21	0.49	10.87	0.44	10.43	90.16
Seam - V	49.42	1.44	3.16	44.82	1.44	43.38	87.78
IV Top	19.82	0.64	2.23	16.95	0.50	16.46	83.01
IV Bottom	9.92	0.32	1.12	8.48	0.25	8.23	83.01
IV Combined	92.32	3.15	10.68	78.49	2.43	76.06	82.39
Seam - IV	122.06	4.10	14.03	103.93	3.18	100.75	82.54
III Top	27.45	1.21	2.04	24.20	0.70	23.49	85.59
III Bottom	9.83	0.43	0.73	8.66	0.25	8.41	85.59
III Combined	4.80	0.21	0.36	4.23	0.12	4.11	85.59

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Seam	Net Reserve	Barrier Loss	Batter Loss	Mineable Reserves	Mining Loss	Extractable Reserve	% Extraction
	In Mt						
<b>Seam - III</b>	<b>42.08</b>	<b>1.85</b>	<b>3.13</b>	<b>37.10</b>	<b>1.08</b>	<b>36.02</b>	<b>85.59</b>
II Top	59.98	4.66	6.21	49.11	1.89	47.22	78.72
II Middle	139.75	11.83	11.24	116.68	3.83	112.86	80.75
II TM	76.09	7.28	5.63	63.18	1.77	61.40	80.70
II Bottom	116.05	10.76	9.90	95.39	2.89	92.50	79.71
II MB	17.90	1.71	1.32	14.86	0.42	14.44	80.70
II Combined	7.35	0.70	0.54	6.11	0.17	5.94	80.70
<b>Seam- II</b>	<b>417.13</b>	<b>36.95</b>	<b>34.85</b>	<b>345.33</b>	<b>10.97</b>	<b>334.36</b>	<b>80.16</b>
I Top	36.93	2.72	9.39	24.81	0.77	24.05	65.11
I Middle	72.97	5.27	18.20	49.49	1.66	47.84	65.56
ITM	2.51	0.23	0.79	1.49	0.04	1.45	57.80
I Bottom	35.60	2.52	8.69	24.39	0.52	23.87	67.06
I MB	14.85	1.35	4.67	8.83	0.24	8.58	57.80
I Combined	3.58	0.33	1.13	2.13	0.06	2.07	57.80
<b>Seam- I</b>	<b>166.44</b>	<b>12.42</b>	<b>42.88</b>	<b>111.14</b>	<b>3.28</b>	<b>107.86</b>	<b>64.81</b>
LL	2.60	0.10	0.35	2.15	0.11	2.04	78.62
K5	0.13	0.01	0.06	0.06	0.01	0.05	36.32
K4	4.21	0.13	1.11	2.97	0.11	2.86	67.83
K3	3.34	0.22	0.86	2.26	0.06	2.20	65.95
K2	5.38	0.27	1.14	3.97	0.07	3.90	72.40

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Seam	Net Reserve	Barrier Loss	Batter Loss	Mineable Reserves	Mining Loss	Extractable Reserve	% Extraction
	In Mt						
K1	15.24	1.25	4.65	9.34	0.41	8.93	58.62
Seam-Local	30.90	1.98	8.17	20.75	0.77	19.98	64.66
Total	828.03	58.74	106.22	663.07	20.72	642.34	77.58

#### 11.2.4 Mining Method

Opencast mining method for the targeted reserves has been adopted due to following reasons

- The coal seams are in cropping at a shallow depth;
- The OB : Coal ratio is favorable (3.15 : 1) for opencast mining;
- Higher percentage of recovery as compared to underground system.
- The mining by opencast method shall be economical against underground method
- The opencast mining operations are comparatively safer and ensure higher recovery of coal resource.

Shovel & dumper combination is recommended for this block to mine the coal due to following reasons:

- In view of multiple seams and equal nos. of inter burden layers to be tackled, an equipment system which is capable of dealing many layers at a time (flexibility) of operations with the help of smaller units has been recommended as shovel dumper combination.
- The quality problem can be handled with the help of hydraulic excavators, which have three-dimensional movement of bucket. They are capable of carrying out selective mining.
- Furthermore, to tackle about 15 Mty coal & 66 Mcum of OB from West & East Quarry and 3 Mty and 12 Mm<sup>3</sup> OB from several locations in the mine, comparatively medium and higher size shovels of upto 20 m<sup>3</sup> bucket capacity have been envisaged along with matching capacity of rear dumpers.

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iv. Flexibility in operation shall be available due to such equipment system.

#### 11.2.5 Equipment Selection

##### A. Equipment selection for PB West and PB East Quarries

The geo-mining conditions warrant that the equipment deployed in partings and coal to alternate between the coal seam and partings. Thus, in the process of selection of mining equipment, two major equipment combinations have been proposed. One for Top OB and the other for the coal seams and the partings.

20 cum Electric Rope Shovels operating with 170T-190T class of dumpers shall be deployed in Top OB and 10 cum Electric/Diesel Hydraulic shovel/ backhoe operating with 100-120T class of dumpers in partings and Coal. The size has been decided to meet the twin objective of effective deployment, optimal utilization of the equipment and at the same time keeping the fleet size to manageable levels. This equipment size shall also offer a choice from a variety of vendors during the procurement and facilitate better inventory management.

In the initial years, the mine shall be opened by 10 cum hydraulic shovel/backhoe working with 100-120 T rear dumpers. This is proposed, as this combination shall have much smaller lead time for deployment. Deployment of 20 cum Electric rope shovels shall start as soon as the load for top OB increases.

A part of the Top OB workload is also proposed to be handled by 10 cum hydraulic shovel/backhoe operating with 100-120T rear dumpers. This has been done in years where there isn't enough consistent workload for a deployment of a new 20 cum rope shovel. This gives flexibility to the operations and also ensures better equipment utilization.

It is also proposed to work out the thin seams/partings with the help of high capacity ripper dozers (510hp).

##### B. Equipment selection for PB NW Quarries.

The geo-mining conditions warrant that the equipment deployed in partings and coal to alternate between the coal seam and partings. Thus, in the process of selection of mining equipment, two major equipment combinations have been proposed. One for Top OB and the other for the coal seams and the partings.

10 cum Electric Rope Shovels operating with 100T class of dumpers shall be deployed in Top OB and 5.5 cum Electric/Diesel Hydraulic shovel/ backhoe operating with 60 T class of dumpers in partings and Coal. The size has been



decided to meet the twin objective of effective deployment, optimal utilization of the equipment and at the same time keeping the fleet size to manageable levels. This equipment size shall also offer a choice from a variety of vendors during the procurement and facilitate better inventory management.

In the initial years, the mine shall be opened by 5.5 cum hydraulic shovel/backhoe working with 60 T rear dumpers. This is proposed, as this combination shall have much smaller lead time for deployment. Deployment of 10 cum Electric rope shovels shall start as soon as the load for top OB increases.

A part of the Top OB workload is also proposed to be handled by 5.5 cum hydraulic shovel/backhoe operating with 60T rear dumpers. This has been done in years where there isn't enough consistent workload for a deployment of a new 10 cum hydraulic shovel. This gives flexibility to the operations and also ensures better equipment utilization.

It is also proposed to work out the thin seams/partings with the help of high capacity ripper dozers (410hp). These machines shall rip the material, doze to form a heap to be handled by 10 cum front end loaders with 100 T class dumpers.

Detailed list of HEMM deployment has been provided in Chapter-V "Mining".

#### 11.2.6 Mined - Out Land

The opening of a mine, irrespective of the method of mining, has impact on the land use pattern. In the proposed project, the impact on the land is expected due to following activities:-

- Extraction of Coal and Overburden removal.
- Dumping of overburden as well as Coal,
- Construction of infrastructural facilities such as, workshop, office, road etc. within the project area.
- Diversion of Nalla, stream etc.

Mining, dumping, road, built area etc. shall change the existing land use pattern by degrading/utilizing forest and non-forest land. Post mining land use pattern is given in Table 11.8.

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TABLE 11.8

## POST MINING LAND USE PATTERN

SL. NO.	TYPE OF LAND USE	AREA IN PB WEST & EAST QUARRY (Ha)	AREA IN PB NORTH WEST QUARRY (Ha)	TOTAL (Ha)
1	Plantation	2844	286	3130
2	Water Body	596	104	700
3	Public Use	105	47	152
4	Grazing	223	24	247
5	Agriculture and Greenbelt	442	24	466
6	Total	4210	485	4695

## 11.2.7 Water Quality Management

Water is an essential element for sustenance of life supporting system on the earth. It is an essential requirement for all human activities right from survival to the development. Therefore, quality and quantity of water are the utmost important factors for survival and sustainable development. Hydro-geologically, the district is mainly confined to Precambrian crystalline ground water and Gondwana ground water province.

## 11.2.7.1 Existing Surface and Groundwater bodies

## A. Surface Water Resources

The source of the surface water is mainly River, Nallahs and Ponds. The drainage system of the study area is dendrites' to sub-dendritic type and well developed. The drainage of the block is controlled by Sunrah River in the east, which finally joins to Badmahi River, which is one of the major tributary of Damodar River flowing in south central part of coalfield. Three major nallahs flows north to south of the area viz. Khora, Dumuhani and Hardara (Pakwah). Besides these major nallahs of the block, there are many small Streams & streamlet, which discharge their load into this major nallahs. All the nallahs of the block are seasonal and become dry during summers.



## B. Ground water sources

The groundwater in sedimentary formation occurs under confined conditions and is limited to the thickness of the formation. The Barakar formation acts as a good aquifer due to high porosity and permeability in the formation. Predominantly western part of the study area comprises of hills and rugged topography, the water level is at great depth as compared to the Padi plain areas. Mostly the rainwater gets run-off in this area and hence the percentage of recharge of ground water is very less. The water table of this area varies from 5m to 20m; in the valley-fill areas, the water table is at shallow depth. The ground recharge in these areas is very high. The major source of drinking water is dug wells and hand pumps, which are available in almost all the villages in the study area.

### 11.2.7.2 Existing Water Quality (Surface and Groundwater)

Water quality monitoring was carried out in order to collect baseline data on existing water quality, which can be used to predict the impacts due to the project on water regime. Samples were collected from fifteen (15) locations within the block area.

The results of analysis of surface water is given in Table 11.9. The results have been compared with the IS: 10500. It can be seen that at all seven monitoring stations, water from these sources can be used for drinking after conventional treatment and disinfection.

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**Table 11.9**  
**Results of Surface Water Analysis**

Sl. No	Parameters	Results						
		SW1	SW2	SW3	SW4	SW5	SW6	SW7
1	Colour, Hazen Units	30	>70	20	30	40	20	50
2	Odour	#	#	#	#	#	#	#
3	Turbidity, NTU	30	100	700	1400	1500	1000	340
4	pH at 30°C	7.1	7.25	7.7	7.68	7.34	7.34	7.33
5	Dissolved Oxygen, mg/l	2.06	3.29	5.36	5.05	5.56	5.25	0.3
6	Iron(as Fe), mg/l	5.8	4.48	21.48	13.64	105.89	53.96	12.57
7	Floating Matter (TSS) in mg/l	65	124	720	1480	1840	1140	380
8	Chloride(as Cl), mg/l	14.24	9.5	18.99	9.5	11.87	18.99	56.98
9	Fluoride (as F), mg/l	0.63	0.53	0.42	0.41	0.28	0.13	0.67
10	Total Dissolved Solids, mg/l	130	94	152	122	92	74	310
11	Copper (as Cu) in mg/l	<0.01	<0.01	<0.01	0.026	0.026	0.02	<0.01
12	Sulphate (as SO <sub>4</sub> ), mg/l	22.4	20	33.6	18.8	24.22	16	40
13	Nitrates (as NO <sub>3</sub> ), mg/l	0.39	1.65	0.71	2.38	0.56	0.66	0.27
14	BOD (3 days at 27°C), mg/l	40	44	22	28	24	46	54

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15	Phenolic Compound (as C <sub>6</sub> H <sub>5</sub> OH) in mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
16	Cadmium (as Cd) in mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
17	Selenium (as Se) in mg/l	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
18	Arsenic (as As) in mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
19	Lead (as Pb) in mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
20	Zinc (as Zn) in mg/l	<0.005	<0.005	0.03	0.077	0.026	0.03	0.156
21	Anionic Detergent (MBAS) in mg/l	0.11	0.16	0.49	0.6	0.62	0.46	0.25
22	Hexavalent Chromium (as Cr+6) in mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
23	Oil & Grease in mg/l	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
24	Total coliform org. MPN/100 ml	36	230	210	73	91	36	2400
#Unobjectionable								

The results of analysis of ground water are given as Tables 11.10 A, 11.10 B and 11.10 C. The results have been compared with the drinking Water Quality standards specified in IS 10500. From the results it transpires that the ground water quality parameters meet the prescribed norms.

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**RQP No. 34011/(15)/2009-CPAM dated 27.09.10.**

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**Table 11.10A**  
**Results of Ground Water Analysis**

SL No.	Parameter	Norms		Results			
		Desirable limits *	Permissible limits **	GW1	GW2	GW3	GW4
Essential Characteristics							
1	Colour	5	25	<5.0	<5.0	<5.0	<5.0
2	Taste	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3	Odour	#	#	#	#	#	#
4	Turbidity as NTU	5max.	10	<1.0	<1.0	2.9	<1.0
5	pH	6.5-8.5	6.5-8.5	7.52	7.41	7.67	7.32
6	Total Hardness (as CaCO3) in mg/l	300	600	233.12	297.92	219.52	246.96
7	Iron (as Fe) in mg/l	0.3	1	<0.1	<0.1	0.14	<0.1
8	Chlorides (as Cl) in mg/l	250	1000	33.11	85.53	17.47	47.82
9	Fluoride(as F) in mg/l	1	1.5	0.16	0.56	0.4	0.19
10	Residual Free Chlorine in mg/l	0.2		NIL	NIL	NIL	NIL
Desirable Characters							
11	Total Dissolved Solids in mg/l	500	2000	320	428	262	324
12	Calcium (as Ca) in mg/l	75	200	59.58	73.7	68.99	61.15
13	Magnesium (as Mg) in mg/l	30	100	21.64	27.28	11.29	22.58
14	Copper (as Cu) in mg/l	0.05	1.5	<0.01	<0.01	<0.01	<0.01
15	Manganese (as Mn) in mg/l	0.1	0.3	<0.01	<0.01	<0.01	<0.01
16	Sulphate (as SO4) in mg/l	200	400	6	30.8	2	21.2

  
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17	Nitrates (as NO <sub>3</sub> ) in mg/l	45	100	<0.1	<0.1	<0.1	<0.1
18	Phenolic Compound (as C <sub>6</sub> H <sub>5</sub> OH) in mg/l	0.001	0.002	<0.001	<0.001	<0.001	<0.001
19	Mercury (as Hg) in mg/l	0.001	0.001	<0.0005	<0.0005	<0.0005	<0.0005
20	Cadmium (as Cd) in mg/l	0.01	0.01	<0.005	<0.005	<0.005	<0.005
21	Selenium (as Se) in mg/l	0.01	0.01	<0.005	<0.005	<0.005	<0.005
22	Arsenic (as As) in mg/l	0.05	0.05	<0.03	<0.03	<0.03	<0.03
23	Lead (as Pb) in mg/l	0.05	0.05	<0.05	<0.05	<0.05	<0.05
24	Zinc (as Zn) in mg/l	5	15	<0.005	<0.005	<0.005	<0.005
25	Anionic Detergent (MBAS) in mg/l	0.2	1	NIL	NIL	NIL	NIL
26	Hexavalent Chromium (as Cr+6) in mg/l	0.05	0.05	<0.01	<0.01	<0.01	<0.01
27	M-Alkalinity (as CaCO <sub>3</sub> ) in mg/l	200	600	254.8	156.8	229.32	203.84
28	Aluminium (as Al) in mg/l	0.03	0.2	<0.01	<0.01	<0.01	<0.01
29	Boron (as B) in mg/l	1	5	0.26	0.86	2.84	3.73
30	Cyanide (as CN) in mg/l	0.05	0.05	<0.01	<0.01	<0.01	<0.01
31	Mineral Oil, mg/l	0.01	0.03	<0.01	<0.01	<0.01	<0.01

\*:Requirement(Desirable limits),#:Unobjectionable  
 \*\*:Permissible limits in the absence of alternate source

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Table 11.10 B  
Results of Ground Water Analysis

Sl. No	Parameter	Norms		Results			
		Desirable limits *	Permissible limits **	GW5	GW6	GW7	GW8
				10.06.0	10.06.0	12.06.0	12.06.0
				5	5	5	5
<b>Essential Characteristics</b>							
1	Colour	5	25	<5.0	<5.0	<5.0	<5.0
2	Taste	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3	Odour	#	#	#	#	#	#
4	Turbidity as NTU	5	25	1.7	<1.0	3.5	1.6
5	pH	6.5-8.5	6.5-8.5	7.37	7.47	7.27	7.52
6	Total Hardness (as CaCO <sub>3</sub> ) in mg/l	300	600	235.2	211.68	301.84	348.88
7	Iron (as Fe) in mg/l	0.3	1	<0.1	0.12	0.53	0.76
8	Chlorides (as Cl) in mg/l	250	100	68.05	20.23	44.14	93.81
9	Fluoride (as F) in mg/l	1	1.5	0.38	0.47	0.072	0.092
10	Residual Free Chlorine in mg/l	0.2		NIL	NIL	NIL	NIL
<b>Desirable Characters</b>							
11	Total Dissolved Solids in mg/l	50	200	235.2	211.68	301.84	348.88
12	Calcium (as Ca) in mg/l	75	200	61.15	65.86	98.78	106.62
13	Magnesium (as Mg) in mg/l	30	100	19.75	11.29	13.17	19.75

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14	Copper (as Cu) in mg/l	0.05	1.5	<0.01	<0.01	<0.01	<0.01
15	Manganese (as Mn) in mg/l	0.1	0.3	<0.01	<0.01	<0.01	<0.01
16	Sulphate (as SO <sub>4</sub> ) in mg/l	20	400	61.15	65.86	98.78	106.62
17	Nitrates (as NO <sub>3</sub> ) in mg/l	45	100	< 0.1	< 0.1	< 0.1	< 0.1
18	Phenolic Compound (as C <sub>6</sub> H <sub>5</sub> OH) in mg/l	0.00	0.00	<0.001	<0.001	<0.001	<0.001
19	Mercury (as Hg) in mg/l	0.00	0.00	<0.0005	<0.0005	<0.0005	<0.0005
20	Cadmium (as Cd) in mg/l	0.01	0.01	<0.05	<0.05	<0.05	<0.05
21	Selenium (as Se) in mg/l	0.01	0.01	<0.05	<0.05	<0.05	<0.05
22	Arsenic (as As) in mg/l	0.05	0.05	<0.03	<0.03	<0.03	<0.03
23	Lead (as Pb) in mg/l	0.05	0.05	<0.05	<0.05	<0.05	<0.05
24	Zinc (as Zn) in mg/l	5	15	<0.005	<0.005	<0.005	<0.005
25	Anionic Detergent (MBAS) in mg/l	0.2	1	NIL	NIL	NIL	NIL
26	Hexavalent Chromium (as Cr+6) in mg/l	0.05	0.05	<0.01	<0.01	<0.01	<0.01
27	M-Alkalinity (as CaCO <sub>3</sub> ) in mg/l	200	600	188.16	203.84	200.68	184.24
28	Aluminium (as Al) in mg/l	0.03	0.2	<0.01	<0.01	<0.01	<0.01
29	Boron (as B) in mg/l	1	5	3.77	1	1.42	1.29

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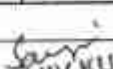
30	Cyanide (as CN) in mg/l	0.05	0.05	<0.01	<0.01	<0.01	<0.01
31	Mineral Oil mg/l	0.01	0.03	<0.01	<0.01	<0.01	<0.01
*:Requirement(Desirable limits),#:Unobjectionable							
**:Permissible limits in the absence of alternate source							


**Table 11.10 C  
Results of Ground Water Analysis**

Sl. No.	Parameter	Norms		Results		
		Desirable limits *	Permissible limits **	Sinduari	Pakri-Barwadih	Deworia-Khurd
				15.12.05	15.12.05	16.12.05
<b>Essential Characteristics</b>						
1	Colour	5	25	<5	<5	<5
2	Taste	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3	Odour	#	#	#	#	#
4	Turbidity as NTU	5 max.	10	<1	5.2	<1
5	pH	6.5-8.5	8.5 6.5-	7.97	7.73	7.99
6	Total Hardness (as CaCO <sub>3</sub> ) in mg/l	300	600	355.52	298.96	246.44
7	Iron (as Fe) in mg/l	0.3	1	0.37	0.25	BDL
8	Chlorides (as Cl) in mg/l	250	1000	81.29	79.15	38.5
9	Fluoride(as F) in mg/l	1	1.5	0.23	0.15	BDL
10	Residual Free Chlorine in mg/l	0.2	-	NIL	NIL	NIL
<b>Desirable Characters</b>						

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11	Total Dissolved Solids in mg/l	500	2000	390	3	248
12	Calcium (as Ca) in mg/l	75	200	87.26	64.64	72.72
13	Magnesium (as Mg) in mg/l	30	100	32.96	32.97	15.51
14	Copper (as Cu) in mg/l	0.05	1.5	BDL	BDL	BDL
15	Manganese (as Mn) in mg/l	0.1	0.3	BDL	BDL	BDL
16	Sulphate (as SO <sub>4</sub> ) in mg/l	200	400	22.88	7.49	3.74
17	Nitrates (as NO <sub>3</sub> ) in mg/l	45	100	16.38	6.05	5.19
18	Phenolic Compound (as C <sub>6</sub> H <sub>5</sub> OH) in mg/l	0.001	0.002	BDL	BDL	BDL
19	Mercury (as Hg) in mg/l	0.001	0.001	BDL	BDL	BDL
20	Cadmium (as Cd) in mg/l	0.01	0.01	BDL	BDL	BDL
21	Selenium (as Se) in mg/l	0.01	0.01	BDL	BDL	BDL
22	Arsenic (as As) in mg/l	0.05	0.05	BDL	BDL	BDL
23	Lead (as Pb) in mg/l	0.05	0.05	BDL	BDL	BDL
24	Zinc (as Zn) in mg/l	5	15	0.05	BDL	BDL
25	Anionic Detergent (MBAS) in mg/l	0.2	1	NIL	NIL	NIL
26	Hexavalent Chromium (as Cr+6) in mg/l	0.05	0.05	BDL	BDL	BDL
27	M-Alkalinity (as)	200	600	232	199.52	180.96

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**RQP No. 34011/(15)/2009-CPAM dated 27.09.10.**

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	CaCO <sub>3</sub> in mg/l					
28	Aluminium (as Al) in mg/l	0.03	0.2	BDL	BDL	BDL
29	Boron (as B) in mg/l	1	5	BDL	1.25	BDL
30	Cyanide (as CN) in mg/l	0.05	0.05	BDL	BDL	BDL
31	Mineral Oil, mg/l	0.01	0.03			NIL
*:Requirement(Desirable limits),#:Unobjectionable						
**:Permissible limits in the absence of alternate source						

### 11.2.7.3 Ground Water

Groundwater occurrence and storage in study area are mainly controlled by the geological set up of the area. The ability of geological formation to store and transmit water is dependent on its formation parameters, such as porosity and hydraulic conductivity.

Ground water in unconsolidated rocks circulated to a limited extent through the secondary openings represented by joints, cracks, fissures and such other planes of discontinuity. The weathered residuum of the hard rocks as well as the fractures, joints, fissures, faults and other zones of discontinuity are the principle repositories of groundwater in the area. Ground water in the weathered and fracture zones of hard rocks occur under unconfined condition. Depth of the water-table in the hard rock of the area generally ranges from 2.0 m to 15.0 m below ground level. The Gondwana sediments form the semi-consolidated formations and are better water potential zone. Gondwana sandstones are known to constitute good aquifers and ground water occurs at 7-14 m as observed in the dug wells. Depth of water level for pre-monsoon period varies from 5-7 mbgl around the block to some places it stretches to a deeper depth of 7-12 m.

Hydrogeological condition together with climate and topography influences the occurrence and movement of ground water in this region. The major source of the water in the region is south-west monsoon during summer and very small contribution from the north-east during the winter season.



In the study area ground water is withdrawn usually by means of open dug-wells and small diameter hand operated tube-wells. The tube-wells are most often deeper (18 m–58 m) than the dug wells and tap the fractures below the weathered mantle. During the wet monsoon seasons, the net evaporation is less than the precipitation, resulting in surplus water which loss through either surface runoff or being part of the subsurface storage.

In order to calculate the water potential and impact of proposed mining activity, the sub-watershed has been demarcated. The sub-watershed confining the contributing and receiving streams has been studied. Physical characteristics of the sub-water shed are given at Table 11.11.

Groundwater levels in the open wells of the villages surrounding the core zone were measured during June (Summer Season) and October (Post-Monsoon season), 2005. The measured water levels are given in Table 11.12.

Table 11.11  
Physical Characteristics Sub-Water Shed

Sl. No.	Characteristics	Value
1.	Area	176.46
2.	Drainage density	5.3
3.	Length of river/ stream in sub- watershed	Ghagra Nadi–
4.	Elevation variation	405–681

As per the order of the  
Ministry of Coal, Govt. of India  
No. 34011/(15)/2009-CPAM dated 27.09.10.

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Table 11.12

## Ground Water Levels in Open Wells

Sl. No.	Village	Pre-monsoon	Post-monsoon	Fluctuation
		(June' 2005) (m)	(Oct' 2005) (m)	(m)
1	Garri Kalan	8.23	2.44	5.79
2	Jamira (S)	6.71	3.35	3.36
3	Jamira (N)	15.25	6.71	8.54
4	Mataji	14.64	8.54	6.1
5	Khdabar	9.15	2.13	7.02
6	GarriKhurd	9.15	2.44	6.71
7	DeoriaKhurd	4.57	2.44	2.13
8	Darri Kalan	8.85	3.05	5.8
9	Karrigada	9.15	2.44	6.71
10	Changara	3.05	1.52	1.53
11	Sikri	6.41	3.05	3.36
12	Chandol	7.32	2.44	4.88
13	Pandual	10.67	3.05	7.62
14	Badam	5.79	2.13	3.66
15	Ambajit	8.23	2.13	6.1
16	Pipradih	5.79	2.44	3.35
17	Pakri	6.41	2.74	3.67
18	Chepa Khurd	7.62	2.44	5.18
19	Jugra	8.54	3.05	5.49
20	Chepa Kalan	6.71	1.83	4.88
21	Upardari	5.49	3.05	2.44
22	Barwadih	10.67	4.57	6.1
23	Nagribad	4.25	2.13	2.12
24	Sinduari	5.49	1.52	3.97
25	Sanbarsa	7.93	3.35	4.58
26	Rajhar	7.93	2.74	5.19
27	Palah	9.15	2.13	7.02
28	Horam	7.62	1.52	6.1
29	Harli	7.62	1.52	6.1
30	Bisrampur	6.1	2.13	3.97
31	Balta	11.89	4.88	7.01
32	Pahre	10.98	3.05	7.93
Average		8.04	2.9	5.14

Chapter -XI Mine Closure Plan

RQP No. 34011/(15)/2009-CPAM dated 27.09.10.

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#### 11.2.7.4 Impact on water quality due to Mining

Washing of coal has not been envisaged at present.

#### 11.2.7.5 Impact on Surface Water

The surface water quality is likely to be affected with higher load of suspended solids by the following:

- Wash off from dumps
- Soil erosion from mine and roads
- Pumping out mine water to surface water channels

The outside dump may contribute to the pollution of surface water in terms of suspended solids. Since dumping location proposed to be carried out at a safe distance from nallahs, it shall have negligible impact on water pollution.

The pumped out water during dewatering may carry higher levels of suspended solids. Other sources of pollution are by oil spillage at the pit head and at the facilities viz. Workshop, resulting in oil and grease contamination of surface water if appropriate control measures are not adopted.

Ground water pollution can take place only if dumps and stockpiles contain harmful chemical substances, which may get leached by precipitation of water and percolate to the ground water table, thus causing water pollution.

However, this is not the case with this mine, as neither the coal nor the OB, contains any harmful ingredients which may leach down to the water table and pollute it. Therefore, no adverse impact on ground water quality is anticipated considering this aspect. The leaching down of pollutants (oil, grease etc.) to the ground water may render the water non-potable and hence cannot be used by the local people. The percolation of sewage waste from the pit head as well as colony area shall also pollute the ground water if control measures are not adopted as envisaged in the management plan.



#### 11.2.7.6 Impact on water regime

The mining operation starting from western side of the coal block shall affect Dumuhani Nallah, Khora Nallah and distributary streams and streamlets joining it from northern part of the block. The nallah flows in more or less NNE to SSW direction across the western part of the lease and finally joins the Haharo-Nadi outside the southern part of lease. Groundwater level of the area varies from 25 to 35 m from the surface. The opencast mining below ground water level shall involve release of water in order of 500 m<sup>3</sup>/hr. through pumping, which shall be discharged to the proposed garland nallah along north-eastern boundary of lease. The drawl of this quantity of water is expected to be recharged through rains during monsoon which is 200-800 mm in monsoon and 100-200 mm in post & pre-monsoon season.

In addition, water requirement of 526 m<sup>3</sup>/ day for PB West Quarry and 553 m<sup>3</sup>/ day for PB North West Quarry for the domestic purposes shall also be met through bore wells. Industrial water requirement for drilling, spraying over road, washing of machinery etc. shall be met through creating a small reservoir on Dumuhani Nallah, at eastern boundary of the lease and drawl through pumping.

#### 11.2.7.7 Water Requirement

##### A. PB West and PB East Quarry:

The average daily demand of water for the proposed mine shall be 4576 m<sup>3</sup>/d whereas peak daily demand shall be 5256 m<sup>3</sup>/d. Of the 5256 m<sup>3</sup>/d of water (peak daily demand) to be consumed in the project, 4730 m<sup>3</sup>/d of industrial water requirement shall be met by utilizing treated mine discharge water (650 m<sup>3</sup>/d of water shall be the recycled second used water generated from pit head bath and equipment washing). Balance 526 m<sup>3</sup>/d of water required for drinking and for domestic purposes in the township, shall be drawn from bore-wells. The water requirement and source of water are given in Table 11.6 and Table 11.7 respectively.

##### B. PB North West Quarry:

The average daily demand of water for the proposed mine shall be 1089 m<sup>3</sup>/d. Of the 1089 m<sup>3</sup>/d of water to be consumed in the project, 537 m<sup>3</sup>/d of industrial water requirement shall be met by utilizing treated mine discharge water. Balance 553m<sup>3</sup>/d of water required for drinking and for

domestic purposes in the township, shall be drawn from bore-wells. The water requirement is given in Table 11.13A and Table 11.13B. Source of Water Supply for PB West & East Quarry is given in Table 11.14.

**Table 11.13 A**  
**Water Requirement ( $m^3/day$ ) for West & East Quarry**

Purpose	Avg. Demand	Peak Demand
<b>A. Mine site</b>		
1. Mine operation		
a) Drilling & Spraying	1200	1500
2. Land reclamation	Included in above	Included in above
3. Dust suppression	Included in above	Included in above
4. Drinking	526	5
5. Green Belt	1750	20
6. Beneficiation	Not Applicable	Not Applicable
7. Washery	Not Applicable	Not Applicable
8. Fire Service	Nil	1
9. Others		
a. Pit Head Bath	200	2
b. Equipment Washing	700	0
c. Misc.	200	0
<b>B. Township</b>		
1. Green Belt	Included under sl.4/5	Included under sl.4/5
2. Domestic	Included under sl.4	Included under

3. Other(specify)	Not Applicable	Not Applicable
<b>Total</b>	<b>4576</b>	<b>52</b>

**TABLE 11.13 B**  
**WATER REQUIREMENT FOR PB NORTH WEST QUARRY**

SL. NO.	PARTICULARS	m <sup>3</sup> /day (Avg.)
1	Drinking Water Demand	553
2	Non- Drinking Water Demand	537
	<b>Total water demand (1+2)</b>	<b>1090</b>

**Table 11.14**  
**Source of Water Supply for PB West & East Quarry**

Sl. No.	Source	m <sup>3</sup> /day (Avg.)
1	River (Specify)	
2	Ground water	526
3	Mine water (surp/ pit)	3400 Treated Mine Discharge Water + 650 Treated Effluents (2nd Use)
4	Other surface water bodies (specify)	Nil

#### 11.2.7.8 Water Balance Diagram

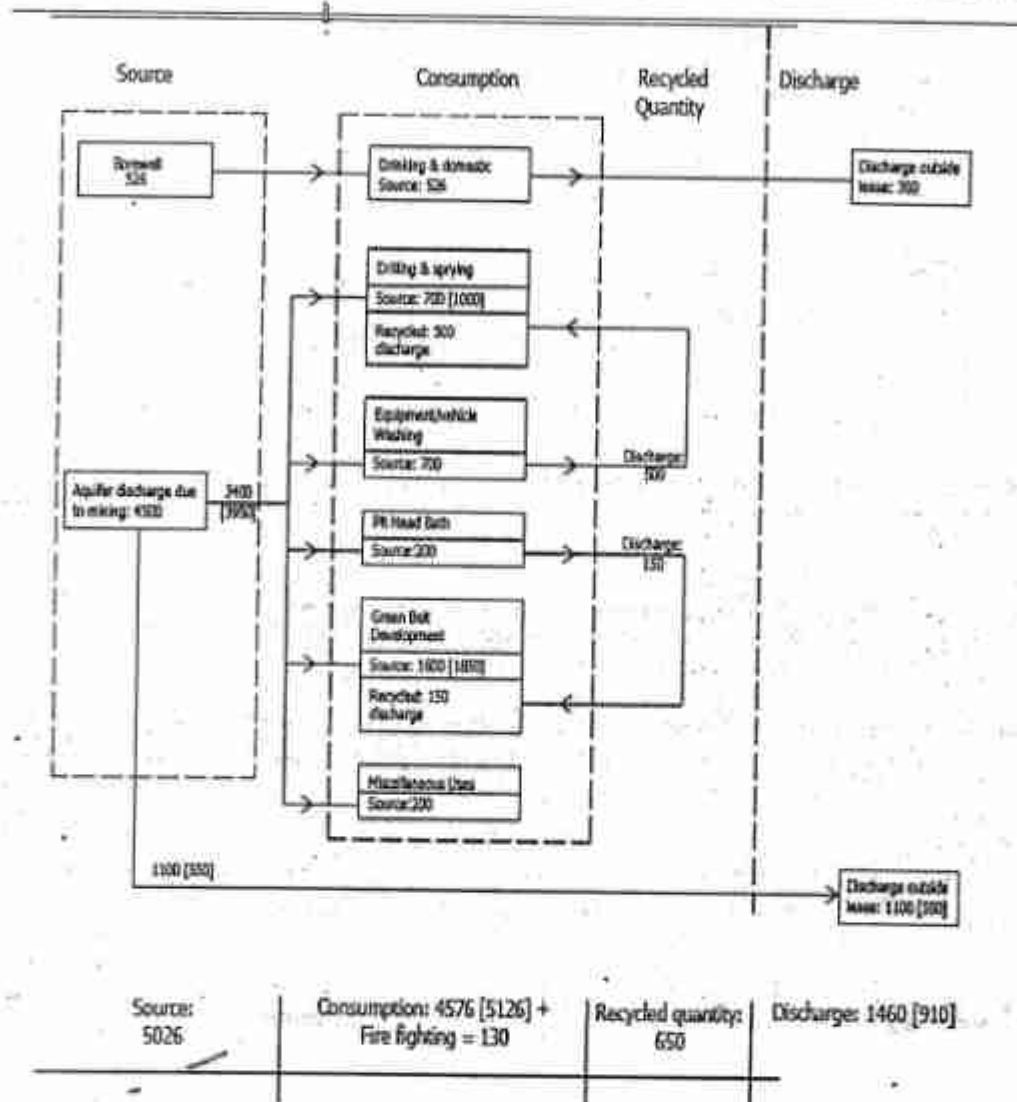
(a) Water Balance chart for PB West and East Quarry is Fig-11.1:

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- Figures are in m<sup>3</sup>/d
- Figures outside [ ] corresponds to average daily water demand.
- Figures within [ ] corresponds to daily demand in peak season. [ ] values are indicated only when peak demand is different than average demand; Otherwise daily demand in peak season and average daily demand should be taken as equal.

Fig-11.1

Water Balance chart for PB West and East Quarry

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(b) Water Balance chart for PB North West Quarry is given in Fig-11.2.

(b) Water Balance chart for North West Quarry.

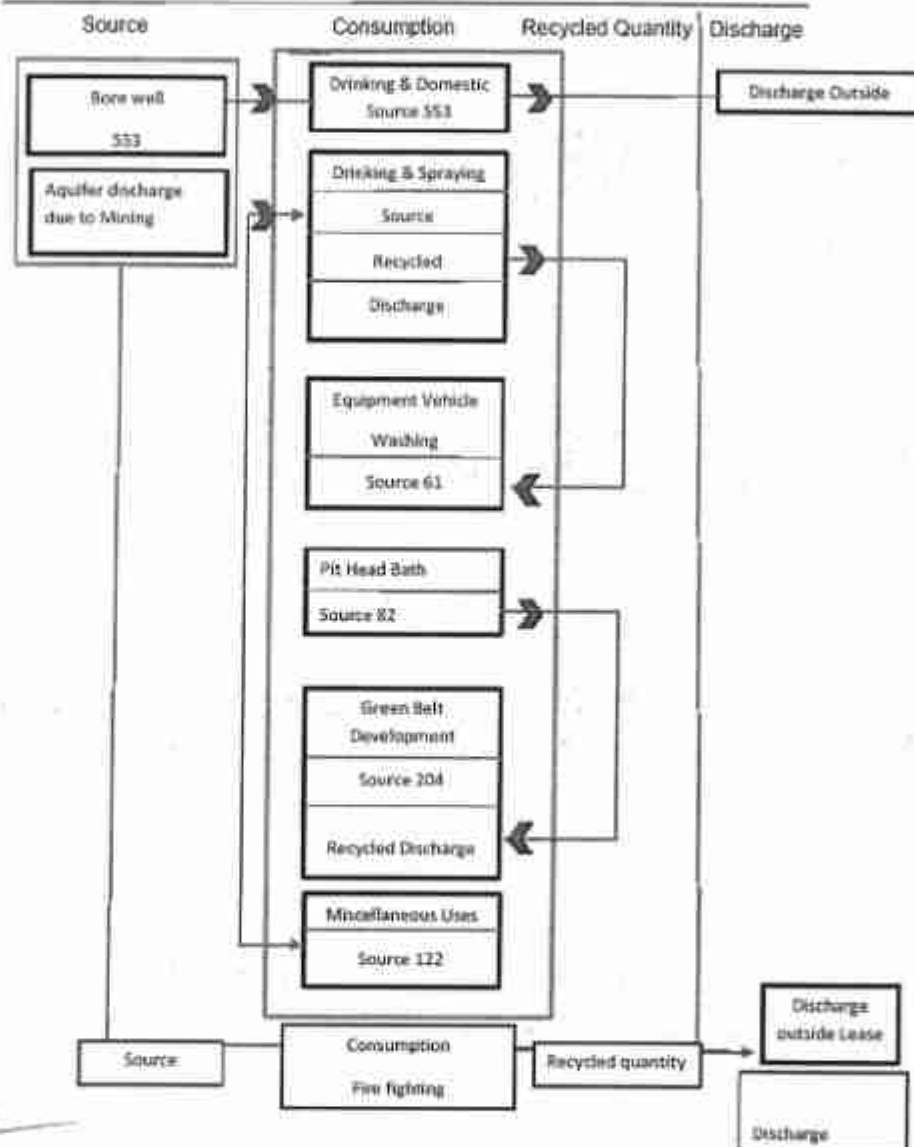


Fig-11.2

Water Balance chart for PB NW Quarry

#### 11.2.7.9 Water Pollution Control Measures

##### A. Measures to control erosion/sedimentation of water courses

Continuous monitoring shall be done to remove overburden material and loose sediments from the working mine benches and excavation zone to avoid rolling of the same into the water course and thereby prevent the erosion and sedimentation. Retention wall shall be constructed around the dump to prevent rolling down of loose sediments. Settling pits shall be constructed at appropriate locations along the water channels to arrest sediments and clean water shall be allowed to flow into natural water course.

##### B. Treatment and disposal of water from mine

The water inside the mine pit is expected from the rain water during rainy season. Entire precipitation over the pit shall be channelized systematically into natural drainage. In order to ensure the discharge of clean water into the natural drainage, sedimentation ponds shall be made at suitable location to arrest the sludge. Accumulated sludge shall be scraped off time to time to maintain the proper mine water discharge. In order to monitor and subsequent management of water quality, monitoring stations shall be located near settling pit. Effluent treatment plant is envisaged for treatment of water discharge from workshop as well as domestic waste.

Garland drains around the quarry with settling tanks shall arrest suspended solid matter. Effluents from the workshop and the CHP shall be collected and treated before discharge.

##### C. Measure to minimize adverse effects on water regime

During the process of mine rehabilitation and with the completion of backfilling, a water body shall be created in the mined out pit which shall act as water reservoir improving the ground water recharge, source of attraction for fauna and shall help in the maintenance of afforested areas. To enhance aesthetic appearance, parks and lawns shall be made around the water body.



Selected water quality parameters of ground and surface water resources within 10 km radius of the study area have been studied for assessing the water environment and evaluate anticipated impact of the proposed project. Secondary data shows that water quality in ground water sources is within permissible limits.

#### 11.2.7.10 Proposed Nallah Diversion / Construction of catchment canal

##### A. PB West and East Quarry:

The study area has dendritic pattern of drainage. Three different nallahs viz Khora/ Lathorwa (Western), Dumuhani (Central) and Pakwa (Eastern) Nallah traverse through the coal mining block. The Table 11.15 below gives the particulars of three nallahs.

**Table 11.15**  
**Details of Nallah**

Sl. No.	Name of the Nallah	Length of Nallah (km)	Catchment area (Sq. km)
1	Western	18.35	54.86
2	Central	-	25.64
3	Eastern	18.75	51.92

Central nallah originates at a small distance upstream of the northern boundary of the coal mining block and traverses towards south. The mining activity would be carried out in such a way that the catchment area of the central nallah shall go on reducing towards south. Water entering the central nallah from the upper catchment at the northern boundary of the coal mining block would be diverted through canals constructed along the boundary of the mining block to eastern and western nallah.

Precipitation falling within the mining block from the catchment area of central nallah would be pumped to the eastern and western nallah progressively. All the three nallahs rise in the hills on northern side of the coal mining block and flow towards south. The nallah pass through steep falls in the range of 5 to 10 m spread over a length of about 600 to 800 m.

Investigations for locating the check dam on eastern and western nallahs have been carried out and six sites each on Khora Nallah and Pakwa

Nallah have been identified. Attempts were made to ensure that there is no change in the alignment and location of all three nallahs in coal mining block.

It is proposed to tap the discharge of central nallah at the northern boundary of the coal mining block and transfer flows to eastern and western nallahs through diversion canals to be constructed near the outer boundary of the mining block. The alignment is more or less along 460 m contour. The eastern arm of diversion canal would continue to traverse a distance of about 5100 m before reaching the outfall point in Pakwa Nallah. Similarly, western arm would flow for a length of about 800 m up to outfall in Khora Nallah. A fall structure with height of fall equal to difference in elevation of canal bed and nallah bed is to be provided at the end of canal alignment.

Catchment area of central nallah up stream of diversion canal is 7.6 sq. Km and maximum flood discharge component from this area was derived as 57.44 m<sup>3</sup>/s. Out of this flow only 90% is proposed to be diverted to eastern nallah i.e. 51.7 m<sup>3</sup>/s and remaining would be diverted to western nallah. Component of discharge from the catchment of eastern nallah that would get blocked due to diversion canal was estimated as 1.81 m<sup>3</sup>/s. Thus total discharge in eastern canal would be 53.51 m<sup>3</sup>/s and the design discharge for the eastern part of the diversion canal was computed as 58.86 m<sup>3</sup>/s.

Component of discharge from the catchment of western nallah was estimated as 1.5 m<sup>3</sup>/s. Thus total discharge in western canal would be 7.24 m<sup>3</sup>/s and by adding 10% to account for safety, the design discharge for the western arm of the diversion canal was computed as 7.94m<sup>3</sup>/s.

The diversion canal is required to be designed for the maximum discharge derived above and aligned along the north-eastern boundary of the mining block. As the canal is proposed in are mostly hilly area near reserve forest and the bed material consisting of boulders; maintenance of the canal would be difficult. So, an unlined canal is suggested. The details of a typical section of eastern arm of diversion canal derived for two different bed slopes are in Table 11.16

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Table 11.16

## Details of Eastern Arm of Diversion Canal

Design discharge (m <sup>3</sup> /s)	60	60
Slope	1 in 1000	1 in 500
Bed width (m)	5	5
Side slope (m)	2 H to 1 V	2 H to 1 V
Depth off low (m)	3.24	2.74
Manning's (n)	0.03	0.03
Velocity (m/s)	1.62	2.09
Freeboard (m)	1.5	1.5

The dimensions of western arm of diversion nallah were also derived on the similar lines of eastern arm.

**B. PB North West Quarry:**

The study area has dendritic pattern of drainage. Two different nallahs viz Khora A & B on the western and eastern sides traverse through the coal mining block.

Both nallah originates at a small distance upstream of the northern boundary of the coal mining block and traverses towards south. The mining activity would be carried out in such a way that the catchment area of the nallah shall go on reducing towards south.

Meandering part of Khora Nala – B at the western side of the block approximately 1 km in length is planned for straightening. Except this re-alignment rest part of nala shall not be disturbed. An embankment suitably sloped both sides shall be constructed to prevent in-rush during rainy season and flash flood. A road of 5m wide shall run all alongside the embankment.

After 25th year of mine operation, Khora Nala – A is envisaged to be diverted on the back filled area of PB. A separate study for diversion shall be conducted at appropriate time and recommendation after approval



from relevant competent authority shall be implemented. This shall help in releasing approximately 32Mt of coal in the barrier and batter of PB – A and PB (west) mines.

#### 11.2.7.11 Impact on villagers due to Nala diversion

Three nalas viz. western nala (Khora/Lathorwa), central nala (Dumuhani) and eastern nala (Pakwa) traverse through Pakri Barwadih coal mining block and outfall into Haharo River one Km south of lease area, near Barkagaon village. The eastern and western nalas originate upstream of the coal mining boundary on north side. It is proposed to divert flow of the central nala outside the boundary through canals constructed along the boundary of the Western Quarry of the mining block to eastern and western nala. Since the water flow in the central nala shall outfall into Haharo River through canals at same point where it was joining that before diversion. Hence there shall be no effect of diversion downstream the lease area. The lease area shall also be evacuated for mining operations. Hence there shall also be no effect on villagers living in the lease area.

#### 11.2.8 Air Quality Management

There shall be constant monitoring of air quality to keep within the prescribed norms. Dust pollutants are generated during blasting and while operating diesel equipment and these shall be kept at minimum levels by ensuring good blast design and good equipment maintenance. Dust suppression system and dust extraction System shall be in operative. Plantation around the quarry and CHP shall put up a green belt for mitigating air pollution.

##### 11.2.8.1 Existing air quality status

To quantify the impact of the proposed mining and allied activities on the ambient air quality, it is necessary at first to evaluate the existing ambient air quality of the core and the buffer zones. The existing ambient air quality, in terms of Suspended Particulate Matter (SPM), Respirable Particulate Matter (RPM), Sulphur-dioxide (SO<sub>2</sub>), Oxides of Nitrogen (NO<sub>x</sub>), Carbon Monoxide (CO), Lead (Pb) and Dust fall has been measured through a planned field monitoring.

To assess the ambient air quality level, 15 (fifteen) monitoring stations (includes 4 from core zone) were set up to a maximum distance of 10.0 km from core zone limit (Buffer Zone). Table 11.17 gives summarised ambient air quality results.

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The results when compared with National Ambient Air Quality Standards (NAAQS) of Central Pollution Control Board (CPCB) for "Residential and Rural Areas" shows that the ambient air quality is within the stipulated limit except with respect to SPM at a number of stations. Dust blowing from the unpaved roads and dry agricultural fields account for the high SPM levels.

Dust fall rates were recorded as 30 days average during monitoring periods at twelve

(12) AAQ monitoring stations. The results are given in **Table 11.18**.

In absence of Indian Norms, the results have been compared with the German norm published in TA Luft, 1986 which is as follows:

98 percentile value :  $0.65 \text{ g/m}^2/\text{d}$

The above results indicate that the dust fall rates at all the stations, except at Pundaul and are within the compared German standards.

  
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Table 11.17 - Summarized Ambient Air Quality Results

Parameters		SP			RP			SO			NOx			CO			Lead			
Permissible AAQ standard(CPB)	Monitoring Location	Category	Min.	Max	Arth. Mea	Min.	Max	Arth. Mea	Min.	Max	Arth. Mea	Min.	Max	Arth. Mea	Min.	Max	Arth. Mea	Min.	Max	Arth. Mean
	Barkagaon	R	142	318	251.9	64	147	108.5	<10	10.6	<10	21.4	37.8	30.7	<0.00	0.051	<0.00	0.042	0.047	
	Sinduari	R	139	340	254.9	59	131	104	<10	11.2	<10	41.9	88.8	31.7	<0.00	0.013	<0.00	<0.003	0.007	
	Pundaal	R	146	349	260.6	63	139	104.8	<10	10.3	<10	20.6	38.2	30.2	<0.00	<0.00	<0.00	<0.003	<0.003	
	Sirma	R	175	184	179.3	62	85	79	<10	<10	<10	19.5	34.6	25.8	<0.00	<0.00	<0.00	<0.003	<0.003	
	Hesabar	R	104	201	252.5	45	78	61.5	<10	<10	<10	15.0	23.6	20.1	<0.00	<0.00	<0.00	<0.003	<0.003	
	Kandabar	R	155	387	281.4	62	172	119.4	<10	11.3	<10	16.0	38.5	23.5	<0.00	<0.00	<0.00	<0.003	<0.003	
	Rajhar	R	116	204	176.5	49	92	69.1	<10	<10	<10	14.3	27.3	21.5	<0.00	0.034	0.022	0.028		
	Garrikian	R	172	398	314.5	80	180	103.4	<10	12.8	<10	24.0	52.9	40.0	<0.00	<0.00	<0.003	<0.003		
	Sikri	R	114	314	224.9	45	129	89.8	<10	<10	<10	15.7	38.4	25.6	<0.00	<0.00	<0.003	<0.003		
	Kanrtari	R	152	373	271.5	70	155	112.3	<10	<10	<10	161.0	35.9	24.4	<0.00	<0.00	<0.003	<0.003		
	Bisampur	R	142	417	306.3	68	182	124.6	<10	13.4	<10	25.5	56.5	28.8	<0.00	<0.00	<0.003	<0.003		
	Badam	R	158	405	258.3	57	197	111.8	<10	<10	<10	18.1	32.7	27.4	<0.00	<0.00	<0.003	<0.003		
	Sukulhapi	R	112	314	200.5	50	124	84.3	<10	<10	<10	15.7	31.5	24.0	<0.00	<0.00	<0.003	<0.003		
	Deuriakhur	R	268	346	296.5	101	133	119.5	<10	<10	<10	21.5	27.7	24.9	<0.00	<0.00	<0.003	<0.003		
	Upardri	R	118	351	213.3	54	162	99.3	<10	<10	<10	17.6	32.5	24.6	<0.00	<0.00	<0.003	<0.003		

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**Table 11.18**  
**Measurement of Dust fall Rate**

Station Location	Station No.	Results(g/m <sup>2</sup> /d)
Barkagaon	A1	0.468
Sinduari	A2	0.599
Pundaul	A3	1.528
Sirma	A4	0.185
Kandabar	A5	0.576
Rajhar	A6	0.128
Garrikalan	A7	2.415
Sikri	A8	0.238
Kanrtari	A9	0.424
Bisrampur	A10	0.511
Badam	A11	0.382
Deuriakhurd	A12	0.476

#### 11.2.8.2 Impact on Air Quality due to Mining

##### A. Construction Phase

Impacts of construction activities on air quality are cause for concern mainly in the dry months due to dust particles. The main sources of emission during the construction period are the movement of equipment at site and dust emitted during the levelling, grading, earthworks, foundation works and other construction related activities. The dust emitted during the above mentioned activities depend upon the type of soil being excavated. The dust generated during the construction activities shall however, settle quickly. Therefore, the impact shall be for short duration and confined locally to the construction site. The composition of dust in this kind of operation is, however, mostly inorganic and non-toxic in nature.

Exhaust emissions from vehicles and equipment deployed during the construction phase is also likely to result in marginal increase in the levels of SO<sub>2</sub>, NO<sub>x</sub>, SPM, CO and unburnt hydrocarbons. It may, therefore, be deduced that construction activities may cause changes in the SPM levels locally. The impact shall, however, be reversible, marginal, and temporary in nature.

The impact of such activities would be temporary and restricted to the

construction phase. The impact shall be confined within the project boundary and is expected to be negligible outside the ML boundaries. Proper upkeep and maintenance of vehicles, sprinkling of water on roads and construction site, providing sufficient vegetation etc. are some of the measures that would greatly reduce the impacts during the construction phase.

## B. Operation Phase

The main activities, which generally contribute to air pollution in mining industry, are:

- Drilling and blasting
- Excavation and loading
- Transportation
- Crushing at CHP

The excavation / loading of the OB/coal shall be done by hydraulic shovels. The transportation of OB and coal shall be carried out in the same way as is generally done in OC mining i.e. by dumpers. Dust generation by this is anticipated. Coal crushing at CHP shall also generate dust.

The opencast mining operations are generally prone to generation of high levels of SPM and to a limited extent SO<sub>2</sub>, NO<sub>x</sub> and CO due to fossil fuel based vehicles, machines and blasting using explosive and fuel combustion etc. Air pollution due to SO<sub>2</sub>, NO<sub>x</sub> and SPM may result in irritation and inflammation of eyes and congestion of throat and oedema of lungs. Carbon monoxide can cause loss of hemoglobin in blood and subsequently stresses on those suffering from Cardio-Vascular and pulmonary diseases. High level of CO in the air is dangerous and may be fatal.

### 11.2.8.3 Air pollution mitigation measures

In the proposed lease area, the existing air quality is within the norms as specified by the National Ambient Air Quality Standards (NAAQS). Fugitive dust shall be generated in open cast mine due to drilling, blasting, handling of overburden & coal. To control dust from various operations following measures will be resorted to.

- Drilling area will be wetted prior to drilling
- Water will be sprayed during loading/unloading of OB and ore



- Periodical water spraying will be done on haul road, overburden dump & stacks of coal
- Trees will be planted on road side.
- Dumps will be stabilized by planting grass/trees

It has been proposed that all mining and ore processing equipment will have dust extraction and separation attachment to minimize air pollution. In order to monitor and subsequent management of air quality, monitoring stations will be located near dust generating areas such as haul road, OB dump, coal handling plant etc.

#### 11.2.8.4 Measures to control noise pollution

The following control measures shall be adopted to keep the ambient noise levels below permissible limits:

- i. Provision of protective devices like ear muffs/ear plugs to those workers who cannot be isolated from the source of noise.
- ii. Confining the noise by isolating the source of noise
- iii. Reducing the exposure time of workers to the higher noise levels

Precautions shall be taken as per conditions imposed by MoEF or other statutory bodies.

#### 11.2.8.5 Measures to reduce ground vibrations due to blasting and prevent fly rocks

The vibrations due to blasting shall be studied before the commencement of mining operations and the recommendations/suggestion given as per the result of the said study shall be strictly adhered to especially the charge per delay.

#### 11.2.9 Waste management

##### 11.2.9.1 Type of Rocks

The block is mostly covered with Barakar formation. This formation constitutes fine to coarse grained, white to grey feldspathic, micaceous sandstone, shale, fire clay and carbonaceous shale with economic coal horizons. The Karharbari formation is noticed towards the east of Pakri Barwadih Coal Block. The rocks are mostly coarse to gritty, carbonaceous sandstone pebbly at places with unaltered fresh pink feldspar and quartz pieces. Few very thin carbonaceous shale and coal bands are also intersected in some boreholes. The Barren Measures which is characterized by fine grained sandstone, shale and sandy



shale is noticed towards the north-west part of the block and Sector –A . The block is free from any igneous intrusions.

As per the geological report, no major, minor and trace elemental analysis of different rock types was available. The chemical analysis of coal indicates presence of nontoxic minerals. The sandstones of Barakar Formation constitute major part of area forms a principal aquifer. The chemical analysis of ground water shows the trace element like Cu, Mn, Hg, Cd, Se, As, Pb, Zn, Cr, Al and B are present below deduction limit.

The ground water quality indirectly infers the source rocks characters hence, the rock of Pakri-Barwadih Coal block contains no toxic elements.

### 11.2.9.2 Removal of Overburden

For PB West and East Quarry Proposed quarries namely PB West and PB East are to be opened in Barakar formations, which consist of alluvium soil, sandstone and shale. The thickness of soil/weathered mantle generally varies from 6-18 m. It is commonly dirty-white to reddish-brown in colour and carbonaceous shale generally constitutes bulk of in-seam burden.

OB removal and its phasing from Pakri Barwadih is detailed Chapter 5 "Mining". yearwise dumping schedule of overburden in internal and external dumps are given in Table-11.19.

Table-11.19  
Schedule of Overburden Dumping

Particulars	PB WEST AND EAST										PB NW										(in Mm <sup>3</sup> )
	External Dump (Solid)					Internal Dump (Solid)					External					Internal					GRAND TOTAL
	A	B	C	D	SUB TOT AL	A (Est N.)	B (Est N.)	WP-4	SUB TOT AL	Total (West& East)	DU MP 'A'	DU MP 'B'	DU MP 'C'	Sh & Tot al	DU MP 'A' Extr	WP-4	Sub Totals	TOT AL (NW)	(Solid)		
1-5 yrs																					
WP1	10.33	6.3			16.63					16.63											16.63
WP2		40.00			40.00					40.00											40.00
WP3		8.2	21.0		29.2					29.2											29.2
WP4		7.3			7.36					7.36											7.36
EP1				6.0	6.00					6											6.00
PST-1											11.08			9.0	3.15		3.15	13.2			12.23
PST-2																					
1-16 yrs																					
WP1						9.36			9.36	9.36											9.36
WP2		4.3			4.36	36.3			36.3	40.66											40.66
WP3						33.1			33.1	33.1											33.1

## Revised Mining Plan ( 1st Revision ) – Pakri Barwadih Coal Block

WFO#						115.71			115.71	115.71				10.6	40.3		40.3	36	115.71
PIT-1											6.61	4.00							56.00
PIT-2																			
11 - 15 yrs																			299.8
WFO-4			108.00		168.00		130.00		138.8	299.8									299.8
PIT-1											3.00	11.0		14	27.1		27.1	41.1	41.10
PIT-2																			
16 - 20 yrs																			324.0
WFO-4			208.00		206.00	37.0	2.00	79.00	118	324									324.0
PIT-1															10.9		10.9	10.9	79.30
PIT-2											1.50	13.0	2.00	16.5	13.8		13.8	30.1	38.13
21 - 25 yrs																			
WFO-4 + East Quarry			167.00		147.00			163.0	163.0	330.00									330.0
PIT-1																			
PIT-2												12.0	1.50	11.5	27.6		27.6	41.1	41.10
26 - 30 yrs																			
PIT-1																			
PIT-2											8.75			4.7	10.4	27.1	99.8	48.3	48.35
WFO-4 + East Quarry								330.0	330	330									330.0
31 - 35 yrs																			
East Quarry								300.0	330	330									330.0
PIT-1																			
PIT-2											1.00				11.1	34.2	55.8	98.9	98.95
36 - 39 yrs								184.0	184	184									184.0
East Quarry																			
PIT-1															22.8	20.3	41.2	41.2	43.22
PIT-2																			
40 - 52 yrs																			
PIT-1																			
PIT-2															0.00	58.2	58.2	58.2	58.22
Total	16.33	57.00	543.00	6.6	646.33	233.00	132.80	1096.05	1452.45	2098.78	28.1	49.7	3.50	73.44	184.84	179.86	364.75	418.23	2537.01

Final stage dump plan, as well as other stage plans also show the location of external/internal dumps in respective stage plans including height as well as volume of dump.

### 11.2.9.3 Types of Solid Waste

Four types of solid waste are likely to be generated through mining activities.

These are:

- Overburden (both topsoil and waste)
- Sludge from washing HEMM

## Chapter -XI Mine Closure Plan

ROP No. 34011/(15)/2009-CPAM dated 27.09.10.

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*Singh*  
SANJIV KUMAR SINGH  
Recognized Qualified Person  
No. 34011/(15)/2005-CFAM  
Ministry of Coal Govt. of India

34011/(15)/2004-05  
Ministry of Coal, Govt. of India  
पवन देव जामटा / PAWAN DEV JAMTA  
ज. सहप्रबन्धक (मार्केटिंग)  
District Manager (Marketing)  
एन ए सी लिमिटेड / NTPC LIMITED  
EUC, A-8A, Sector-24, Noida-201301 (U.P.)



- c) Sludge created by mine water in settling pond.
- d) Municipal solid waste

#### Protective measures

The dump shall be stabilized and afforested. The top soil shall be used for spreading over backfilled area and over OB dump for plantation. The area of top soil stock shall be afforested.

The area of ground disturbance shall be minimized by progressively rehabilitating disturbed land.

Reclamation of land shall be carried out by landscaping, re-vegetation etc. As far as possible the reclamation activities shall be taken up concurrently with the mining operations. For re-vegetation, the native plants and saplings suitable for the existing soils and site conditions shall be considered.

#### A. Steps to be taken to avoid Dump Slides

- Dumping of top soil shall be avoided at the bottom of the dump as it leads to instability. Dumping of soil and clayey material shall be done away from the working area that is on farther end of the dump so that formation of weak planes is avoided.
- Afforestation by planting trees shall helped a lot in improving stability of dumps by preventing erosion.
- Construction of retaining walls
- Construction of drains for drainage
- Provision of jute mesh for facilitating grass or vegetative growth on slopes
- Provision of good soil mixed with manure and subsequent irrigation for growth of grass for anchorage on slopes. Plantation mixed with indigenous and fast growing plant species.
- The degraded area shall be reclaimed and rehabilitated with local species of plantation in a phased manner.
- Plantation shall be carried out on waste dumps.
- A belt of trees with thick canopy shall be created along the mine boundary to intercept dust, gaseous pollutants and noise.

The void area of the excavated pit shall ultimately become a water reservoir. The depth of the void shall be reduced in the post mining stage by filling it with waste. This void area shall also be suitably sloped, bunded and fenced.



## B. Management of Sludge

### ➤ Management of Sludge from Oil/Water separator

Effluent from workshops, vehicle washing etc. shall be passed through impermeable drains and shall be treated in the oil/water separator. The treated effluent will be re-circulated in the workshop.

### ➤ Management of Sludge created by mine water in settling pond

Sludge from the mine water settling pond shall be removed periodically and shall be backfilled along with the OB.

### ➤ Sludge from domestic waste

Sludge from the domestic waste shall be utilized as manure for the plantation in the mine lease area and on dump.

### ➤ Management of Municipal solid waste

The municipal solid waste e.g. from canteen, etc. shall be composted and used as manure for plantation along with the domestic sludge.

## 11.2.9.4 Topsoil management

- A. For PB-WEST and EAST Quarry during Operating life of mine 5.81 Mm<sup>3</sup> of top soil shall be generated. This figure is arrived at by considering 1 m (approx.) thickness of top soil, as because unlike PB-NW Quarry considerable deposition has not taken place in the block.

For the initial 5 years of Mining operation, top soil shall be stacked at a designated location over coal bearing area, as shown in **Surface Master Plan**. Estimated land requirement for stacking is 1 Ha. The requirement of land shall cease to operate from 10<sup>th</sup> year onwards as because scrapped top soil shall be spread over the dump for land reclamation.

Stacking of top soil shall be achieved in two tiers. The bottom tier shall be of 3m in height while top tier shall be of 2m or shall below height not exceeding the limit as per prescribed norms.

Stack of top soil shall be grassed to retain fertility if required. Besides this, top soil stack them shall be made use of concurrent filling without bringing the scrapped top soil to the stack.

- B. For PB-NW Quarry during Operating life of mine 5.81 Mm<sup>3</sup> of top soil shall be

generated. This figure is arrived at by considering 1.5m (approx.) thickness of top soil, as because presence of ravines and surrounding nalas considerable deposition has taken place in the block.

For the initial 5 years of Mining operation, top soil shall be stacked at a designated location over Pit – 2, as shown in **Plate No.4**. Estimated land requirement for stacking is 1 Ha. The requirement of land shall cease to operate from 10<sup>th</sup> year onwards as because scrapped top soil shall be spread over the dump for land reclamation.

Stacking of top soil shall be achieved in two tiers. The bottom tier shall be of 3m in height while top tier shall be of 2m or shall below height not exceeding the limit as per prescribed norms.

**C. Top Soil Scrapping:** Scrappers shall be deployed to scrap the top soil off the surface. With the help of front end loader, top soil shall be loaded on the tripper of 10T capacity and transported to top soil stock yard. In the event of non-stacking system, top soil shall be transported directly to the desired location.

**D. Top Soil Spreading:** Front end loader shall load on to the trippers and transported to desired location and spread with the help of dozer/graders.

Stack of top soil shall be grassed to retain fertility if required. Besides this, top soil stack them shall be made use of concurrent filling without bringing the scrapped top soil to the stack. Year wise quantity schedule of management of top soil excavated and spread and summarised data for Top Soil Management is given in **Chapter 5 "Mining"**.

#### 11.2.10 Management of Coal rejects from Washery

Not applicable

#### 11.2.11 Decommissioning of Infrastructure

The infrastructure consists of substation, CHP, Workshops, Mine office, blasting shelters, rest shelters etc. The mine office & related infrastructure shall be handed over to state govt. for public use. The probable list of facilities which shall be dismantled and those which shall be retained has been furnished in **Table 11.20**

*[Faint stamp and signature]*

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**PAWAN DEV JAIN**  
General Manager (Coal)  
ECC, A-8A, Sector-24, Noida-201301

Table 11.20

List of facilities to be dismantled or retained at the end of Life of  
PB Coal Block

Sl.No.	Facilities	Remarks(Dismantled/Retained)
1	Service buildings/Infrastructure	
a	Project/Mine Office	To be retained.
b	Workshop	Dismantled
c	Store	Dismantled
d	Canteen	To be retained.
e	First aid center	To be retained.
f	Rest shelter	To be retained.
g	Training Centre	To be retained.
h	Firefighting station	To be retained.
i	Pit head bath	Dismantled
j	Magazines	Dismantled.
k	Environmental laboratory	To be retained.
l	Dispensary	To be retained.
2	Mining Machinery	i) Usable: - to be moved to any other units. ii) Non-usable:- auctioned.
3	Pumps used in mines	Dismantled.
4	Electrical/mechanical equipment used in workshop or other places	Dismantled.
5	CHP, conveyors and railway siding	Dismantled.
6	Sub-station	Dismantled
7	Furniture	To be retained.
8	Approach road and Culverts	To be retained.
9	Haul road and Culverts	Restricted Entry.
10	Water supply arrangement	To be retained.
11	Permanent Manpower	To be transferred to any other projects of NTPC or options for VRS or as per company's existing policy.
	Corpus fund for maintenance	Provision has been made in fund requirements as provided



#### 11.2.12 Disposal of Mining Machinery

Nearly all the mining machinery shall be moved to other units of the owner. Only the scraps and non-usable machines, if any, shall be auctioned.

#### 11.2.13 Safety & Security

##### a. Closure of Mine Entries

After closure of the mining activities, all the entries to the mine shall be effectively sealed off to avoid any accident and to prevent access to any unauthorized person. Underground worksites with surface openings, shall be effectively sealed. The area that is not reclaimed shall be properly fenced and/ sealed to prevent any unauthorized entry into the area.

Security Personnel shall be detained for a period of three years after mine closure for protecting new plantations in the reclamation area and look after the protective fence around the boundary of the mine to prevent any stray animal/man entering the area.

##### b. Disaster Management and Risk Assessment

Provisions under coal mines regulation and rules made there under and different circulars of DGMS shall be strictly followed. Safety training shall be imparted in the vocational training center to the workers for protection against landslide/fall, moving equipment and precautions during blasting, electrical shock protection and accidental fire.

##### c. Care and Maintenance during temporary discontinuation

During such period round the clock security guard shall be provided to prevent stray animal or persons entering mining area. Temporary fencing with proper signage about danger shall be erected.

#### 11.2.14 Economic Repercussions of Closure of Mine

The mine shall be one of the highly mechanized open cast mines and shall require services of highly skilled and semi-skilled work force.

As far as possible local population shall be given employment in semi-skilled and unskilled category.

In lieu of employment, an annuity of around Rs. 36,000 per acre per annum for 30 years for those losing one acre or more land which is to be escalated by Rs. 1000 every two years (limited to maximum for 5 acres) and those losing land less than 1 acre then annuity of around Rs. 30,000 per annum for 30 years which is

to be escalated by Rs. 750 every two years is proposed. This shall help the annuitants residing in the peripheral area of coal block to make them self-sustainable after the closure of the mine.

Persons engaged in satellite occupations connected to mining industry shall have access/ market in other industries of the mine owner. They shall be given preference or they shall have to opt for other related engagement similar to their occupation.

After closure of mining operations, local residents employed in the mine may be offered jobs elsewhere in the running projects of NTPC.

To mitigate any hardship, the following things are being done or shall be done

1. R&R plan pertaining to NTPC mining projects in Jharkhand has already been prepared in consultation and participation of stakeholders which is in line with the state R&R policy. This include among others provisions and activities pertaining to preference in employment subject to suitability and availability, vocational / self-employment opportunities, education, health, skill development and training programs for various focused groups.
2. In addition to the preference in direct and indirect gainful employment opportunities to affected families / locals through contracting agencies etc. and otherwise subject to suitability and availability, NTPC has committed to build a Greenfield ITI in the vicinity of these mining projects of Jharkhand for capacity building, skill development which shall also result in improving the employability of the affected families / locals.
3. Skill of the unskilled workers shall be developed through structured programme to the extent possible so that they can be absorbed in other units or they can follow some self-employment.
4. Employees who would be retrenched would get adequate compensation as per existing labour laws/ golden hand sack / VRS or any other scheme of the Company prevailing at the time of mine closure.

NTPC would endeavour for harmonious relations with PAPs, not only during mining operation but there after also. But it would be prudent to develop their own ability to sustain their present life standard after the closure of the mine by self-employment. NTPC would like continuance of the social welfare amenities created for the employees and PAPs and try to meet the expectation of the society under the given financial constraints. The persons shall be imparted lectures on the financial mechanism for its sustenance after the mine closure.



## 11.3 Time Scheduling for Abandonment

Tentative details of likely closing activities with manpower requirement as envisaged below has been estimated based on the present mine closure plan. Actual closing activities and manpower requirement may change during the preparation of Final Mine Closure Plan which shall be prepared 5 years before the likely cessation of mining operation. A time schedule for abandonment along with tentative manpower requirement has been shown in the bar chart given in Table 11.21.

Table 11.21

## Manpower Requirement for Closure Activities

Sl. No	Activities to be undertaken	Manpower of NTPC	P-5	P-11	P-15	P-21	P-25	P-31	P-35	P-41	P-45	P-51	P-52	P-53	P-54	P-55
1	<b>Mined Area &amp; Waste Management</b>															
1.1	Plantation along the block boundary, embankment, approach road, CHP Cross country conveyor, Railway siding etc and around the mine infrastructure area	Outsourced (under the														
1.2	Physical reclamation of internal and external dump (Leveling, Spreading of top soil, toe wall formation, drain etc.)	supervision of NTPC) Environment al Engr-1, Surveyor-2, Chainman-4														
1.3	Physical reclamation of land of batter and haul road															
1.4	Bio reclamation of above items															
1.5	Making safe approach up to															

Chapter -XI Mine Closure Plan

Stamp: Director, NTPC  
 Date: 27.09.2010  
 RQP No. 34011/(15)/2009-CPAM dated 27.09.2010

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Revised Mining Plan (1st Revision) – Pakri Barwadih Coal Block

Sl. No	Activities to be undertaken	Manpower of NTPC	P-6	P-11	P-16	P-21	P-26	P-31	P-36	P-41	P-46	P-51	P-52	P-53	P-54	P-55
	the water lagoon for future uses															
1.5	Barbed wire fencing as per requirement															
2	<b>Environmental Management (Air, Water, Waste, Noise etc.)</b>															
2.1	Thorough inspection of external and stabilized internal dumps to find state of its stabilization & Bio-reclamation.	Supervisors-2 in each shift, Environmental Engineer-1 in each shift														
2.2	Action to stabilize & vegetate uncovered patches, if any	Job Outsourced														
2.3	Inspection of garland drains & bunds around external dumps to prevent leachate water from entering natural water courses directly	Supervisors-2 in each shift, Mining Engineer-1 in each shift														
2.4	Inspection of embankment to prevent entry of uncontrolled water to mine	Supervisors-2 in each shift, Engineer-1 in each shift														
2.5	Strengthening of embankment															
2.6	Quarterly sampling of water to know its quality status	Lab Assistant-1, Helper-1														
2.7	Record keeping, monitoring and reporting	Surveyor-1, Chainman-3														
3	<b>Management of Infrastructure &amp; Mining Machineries</b>															

Chapter -XI Mine Closure Plan

Under Secretary,  
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RQP No. 34011/(15)/2009-CPAM dated 27.09.10

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Revised Mining Plan (1st Revision) – Pakri Barwadih Coal Block

Sl. No.	Activities to be undertaken	Manpower of NTPC	P. 6	P. 11	P. 16	P. 21	P. 26	P. 31	P. 36	P. 41	P. 46	P. 51	P. 52	P. 53	P. 54	P. 55
3.1	Decommissioning of structuralis & semi- permanent constructions	Job Outsourced Civil Engineer-1, Supervisor-1, Surveyor-1, Chainman-2														
3.2	Renovation of Mine/Project office, Canteen, Training Centre, Rest shelter etc.															
3.3	Cleaning of land for vegetation over the area															
3.4	Dismantling of machineries															
4	Actions for safety & security of local community due to abandonment of the mine or part of the mine															
4.1	Regular inspection of the mined out area, O.B. dumps for assessing the closure job.	Supervisors-2 in each shift, Mining Engineer-1 in each shift														
4.2	Action, if required, for making safe, the drainage areas, fire areas etc.															
4.3	Making 2 metre high pucca wall on the slope of internal dumps, along the estimated water level.	Supervisor-1 in each shift, Civil Engineer-1 in each shift														
4.4	Making 2 meter high pucca wall around the top edge of the mined out area, where immediate void exists at the quarry edge.															
4.5	Making 2 meter high pucca wall															

Chapter -XI Mine Closure Plan

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पवन शैव जामटा/PAWAN S4  
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EOC, A-8A, Sector-24, Noida-201301 (U.P.)





Revised Mining Plan (1st Revision) – Pakri Barwadih Coal Block

Sl. No	Activities to be undertaken	Manpower of NTPC	P. 6	P. 11	P. 16	P. 21	P. 26	P. 31	P. 36	P. 41	P. 46	P. 51	P. 52	P. 53	P. 54	P. 55
8.1	Sealing of Mine entries for UG mine															
8.2	Isolation stopping, if required															
8.3	Withdrawal of machinery etc															
8.4	Subsidence Management															
8.5	Post closure Subsidence Monitoring															
8.6	Miscellaneous charges including power cost, supervision etc.															

Other manpower shall be deployed or, outsourced as per actual requirement.

#### 11.4 Abandonment Cost

Tentative cost of likely closing activities as envisaged below has been estimated considering base date as December '2015 at current cost. Actual closing activities and activity wise costs may change during the preparation of Final Mine Closure Plan which shall be prepared before the likely cessation of mining operation. A time schedule for abandonment including post 3 years of likely cessation of mining operation along with tentative fund requirement has been shown in the bar chart given at Table 11.22.

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 Joint Secretary  
 Ministry of Coal  
 Government of India  
 New Delhi-110002

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#### Chapter -XI Mine Closure Plan

RQP No. 34011/(15)/2009-CPAM dated 27.09.10.

*[Signature]*  
 Deputy General Manager (CPAM)  
 EOC, A-2A, Sector-24, Noida-201301 (NTPC)

Table-11.22

## Provision for Expenditure for Mine Closure of Pakri Barwadih Coal Mining Block

Amount in Rs. Crores

Sl. No.	Activities to be undertaken	P-5	P-11	P-16	P-21	P-26	P-31	P-36	P-41	P-46	P-51	P-55	Cost
1	<b>Mined Area &amp; Waste Management</b>	14.33	10.20	8.24	12.34	8.43	12.17	12.69	24.99	25.96	51.45	48.27	229.00
1.1	Plantation along the block boundary, embankment, approach road, CHP Cross country conveyor, Railway siding etc and around the mine infrastructure area	14.33	10.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.53
1.2	Physical reclamation of internal and external dump (Leveling, Spreading of top soil, toe wall formation, drain etc.)	0.00	0.00	8.24	12.34	8.43	12.17	12.69	10.00	10.38	0.00	0.00	74.20
1.3	Physical reclamation of land of batter and haul road	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	10.38	20.58	0.00	40.96
1.4	Bio reclamation of above items	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.29	16.09	26.38
1.5	Making safe approach up to the water lagoon for future uses	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.29	16.09	26.38
1.6	Barbed wire fencing as per requirement	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.00	5.19	10.29	16.09	36.57

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**Revised Mining Plan (1st Revision) – Pakri Barwadih Coal Block**

2	<b>Environmental Management (Air, Water, Waste, Noise etc.)</b>	2.87	6.12	18.13	29.62	28.65	29.21	43.16	23.99	21.81	21.61	65.97	291.14
2.1	Thorough inspection of external and stabilized internal dumps to find state of its stabilization & Bio- reclamation.	0.00	1.02	1.65	2.47	1.60	2.43	2.54	2.00	2.08	4.72	6.44	26.42
2.2	Action to stabilize & vegetate uncovered patches, if any	0.00	2.04	3.30	4.94	3.37	4.87	5.08	4.00	4.15	8.23	12.87	52.85
2.3	Inspection of garland drains & bunds around external dumps to prevent leachate water from entering natural water courses directly	0.00	2.04	3.30	4.94	3.37	4.87	5.08	4.00	4.15	8.23	12.87	52.85
2.4	Inspection of embankment to prevent entry of uncontrolled water to mine	0.00	0.00	0.00	7.41	5.06	7.30	7.62	6.00	0.00	0.00	0.00	33.38
2.5	Strengthening of embankment	0.00	0.00	0.00	7.41	5.06	7.30	7.62	6.00	0.00	0.00	0.00	33.38
2.6	Quarterly sampling of water to know its quality status	0.00	0.00	8.24	0.00	8.43	0.00	12.69	0.00	10.39	0.00	32.18	71.33
2.7	Record keeping, monitoring and reporting	2.87	1.02	1.65	2.47	1.60	2.43	2.54	2.00	1.04	1.03	1.61	20.34
3	<b>Management of Infrastructure &amp; Mining Machineries</b>	0.00	19.20	0.00	0.00	16.85	24.34	25.38	26.99	41.54	41.16	64.36	263.83
3.1	Decommissioning of structurals & semi-permanent constructions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.77	41.16	64.36	126.29
3.2	Renovation of	0.00	6.10	0.00	0.00	6.43	0.00	0.00	10.00	0.00	0.00	0.00	23.52

**Chapter -XI Mine Closure Plan**

*Sanjiv*  
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**RQP No. 34011/(15)/2009-CPAM dated 27.09.10.**

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 EOC, A-8A, Sector-24, Noida-201301 (U.P.)



**Revised Mining Plan (1st Revision) – Pakri Barwadih Coal Block**

	Mine/Project office, Canteen, Training Centre, Rest shelter etc.												
3.3	Cleaning of land for vegetation over the area	0.00	5.10	0.00	0.00	8.42	0.00	0.00	10.00	0.00	0.00	0.00	23.52
3.4	Dismantling of machineries	0.00	0.00	0.00	0.00	0.00	24.34	25.39	18.99	20.77	0.00	0.00	90.59
4	<b>Actions for safety &amp; security of local community due to abandonment of the mine or part of the mine</b>	0.72	1.02	9.89	14.81	10.11	14.61	15.23	21.98	36.40	34.96	35.40	197.19
4.1	Regular inspection of the mined out area, O.B. dumps for assessing the closure job.	0.00	0.51	0.82	1.23	0.84	1.22	1.27	1.00	1.04	2.08	3.22	13.21
4.2	Action, if required, for making safe, the drainage areas, fire areas etc.	0.00	0.00	0.00	12.34	0.00	0.00	12.69	0.00	10.39	0.00	0.00	35.42
4.3	Making 2 metre high pucca wall on the slope of internal dumps, along the estimated water level.	0.00	0.00	8.24	0.00	8.43	0.00	0.00	10.00	0.00	20.58	0.00	47.24
4.4	Making 2 meter high pucca wall around the top edge of the mined out area, where immediate void exists at the quarry edge.	0.00	0.00	0.00	0.00	0.00	12.17	0.00	0.00	10.39	0.00	0.00	22.56
4.5	Making 2 meter high pucca wall around the external OB Dump	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.00	10.39	0.00	0.00	20.38

**Chapter -XI Mine Closure Plan**

**RQP No. 34011/(15)/2009-CPAM dated 27.09.10.**

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Dep. General Manager  
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**Revised Mining Plan (1st Revision) – Pakri Barwadih Coal Block**

4.0	Closing with walling and gates in the haul road, to prevent inadvertent entry into water lagoon.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.19	0.00	16.09	21.28
4.1	Filling the haul road up to ground level, from surface up to sealing gate.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.29	16.09	26.38
4.8	Survey of the total project area for updating mine plans Under Coal Mine Regulation.	0.72	0.51	0.62	1.23	0.84	1.22	1.27	1.00	1.04	2.06	0.00	10.71
5	<b>Social &amp; Economic Aspects</b>	7.17	5.10	8.24	0.00	8.43	0.00	12.69	10.00	10.39	0.00	0.00	62.01
5.1	C.S.R activities.	7.17	5.10	8.24	0.00	8.43	0.00	12.69	10.00	10.39	0.00	0.00	62.01
6	<b>Execution &amp; Supervisor</b>	0.00	0.00	0.00	0.00	0.00	12.17	0.00	15.00	15.58	30.87	16.09	89.70
6.1	Purchasing/Hiring of equipment for closure activities etc.	0.00	0.00	0.00	0.00	0.00	12.17	0.00	10.00	10.39	20.58	0.00	53.13
6.2	Execution & Supervision of the activities by mining personal.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	5.19	10.29	16.09	36.57
7	<b>Miscellaneous Charges</b>	0.00	0.00	0.00	0.00	0.00	0.00	2.54	2.00	2.06	4.12	6.44	17.17
7.1	Miscellaneous charges including power cost, deployment of security personal, 3 years post closure environmental monitoring, supervision ,	0.00	0.00	0.00	0.00	0.00	0.00	2.54	2.00	2.06	4.12	6.44	17.17

**Chapter -XI Mine Closure Plan**

SANJIV KUMAR SINGH RQP No. 34011/(15)/2009-CPAM dated 27.09.10.  
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**Revised Mining Plan (1st Revision) – Pakri Barwadih Coal Block**

	power cost etc.													
<b>8</b>	<b>Underground Mining</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>6.346</b>	<b>9.997</b>	<b>20.77</b>	<b>41.15</b>	<b>144.8</b>	<b>223.09</b>	
8.1	Sealing of Mine entries for UG mine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	96.54	96.54	
8.2	Isolation stopping, if required	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.19	10.29	0.00	15.48	
8.3	Withdrawal of machinery etc	0.00	0.00	0.00	0.00	0.00	0.00	6.35	5.00	5.19	10.29	0.00	26.83	
8.4	Subsidence Management	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.19	10.29	0.00	15.48	
8.5	Post closure Subsidence Monitoring	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	32.18	32.18	
8.6	Miscellaneous charges including power cost, supervision etc.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	5.19	10.29	16.09	36.57	
	<b>Total estimated expenditure incurred (In Rs Crore)</b>	<b>25.0</b>	<b>32.6</b>	<b>44.4</b>	<b>56.7</b>	<b>72.4</b>	<b>92.5</b>	<b>118.0</b>	<b>147.9</b>	<b>176.5</b>	<b>225.3</b>	<b>381.3</b>	<b>1373.2</b>	<b>1</b>

### 11.5 Annual Closure Cost

The annual closure cost has been calculated as per guidelines issued by MoC (vide letter no 55011-012009-CPAM dated 27/08/2009, 18.02.2011, 07.06.2011, 11.01.2012, & 07.01.13).

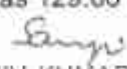
#### A. For Opencast

As per circulated guidelines of MoC the closure cost for an opencast mine is to be modified based on the Wholesale Price Index (WPI) as notified by Govt. of India.

The WPI for all commodities Issued from Office of Economic Advisor, Ministry of Commerce and Industry, Govt. of India (Base date: 2004-05) was 129.60 in

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पवन देव जैन/PAWAN DE  
 एन सी पी लिमिटेड (एन सी पी)  
 Deputy General Manager  
 एन सी पी लिमिटेड / NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)



Aug'09 and 177.60 in November '2015. The closure cost was Rs. 6.00 Lakhs per Ha in Aug'09. The current closure cost has been arrived by multiplying Rs. 6.00 Lakhs per Ha by the ratio of WPI in November '15 and WPI in Aug'09 which comes to be Rs. 8.22 Lakhs per Ha. The calculation methodology is given in Table 11.23.

Table-11.23

## Methodology of Calculation of Annual Closure Cost (Opencast)

A	Lease hold area for West Quarry (including area for Infrastructure outside the block boundary), Unutilised area	3103.04 Ha
B	Lease hold area for Eastern Quarry	
C	Lease hold area for Pakri Barwadih 'A'	485.00 Ha
D	Total lease hold area for opencast ( West Quarry, East Quarry, area for infrastructure outside the block boundary, Unutilised area and North West(Sector-A) considered for mine closure (A+B+C)	3588.04 Ha
E	Mine closure cost per Ha for opencast mine in Aug'09	6.00 Lakhs
F	Mine closure cost per Ha for opencast mine in November '15	8.22 Lakhs
G	Life of the mine	52 years
H	Annual base price $[(D \times F) / G]$ ( for 1 <sup>st</sup> year)	Rs. 567.34 Lakhs
I	Total closure cost for opencast mine (Compounding @ 5% annual escalation)	Rs. 1321.09 Cr.

## B. For Underground

As per calculated guidelines of MoC the closure cost for an underground mine is to be modified based on the Wholesale Price Index (WPI) as notified by Govt. of India.

The WPI for all commodities issued from Office of Economic Advisor, Ministry of Commerce and Industry, Govt. of India ( Base date: 2004-05) was 129.60 in Aug'09 and 177.60 in November '2015. The closure cost was 1.00 Lakhs per Ha

## Chapter -XI Mine Closure Plan

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in Aug'09. The current closure cost has been arrived by multiplying Rs. 1.00 Lakhs per Ha by the ratio of WPI in November '15 and WPI in August'09 which comes to be Rs. 1.37 Lakhs per Ha. The base cost has been escalated to arrive the mine closure cost of land for underground area in year P-10 @ 5% annually. The calculation methodology is given in Table 11.24:

Table-11.24

## Methodology of Calculation of Annual Closure Cost (Underground)

A	Total lease hold area considered for mine closure	1106.96 Ha
B	Mine closure cost per Ha for underground area in Aug'09	Rs. 1.00 Lakhs
C	Mine closure cost per Ha for underground area in November '2015	Rs. 1.37 Lakhs
D	Rate per Ha (1.37 Lakhs per ha ~ escalated up to P-10 <sup>th</sup> year @ 5% PA)	Rs. 2.13 Lakhs
E	Life of Mine (P-10 to P-39)	30 year
F	Annual base price $[(A \times D)/E]$ ( for 1 <sup>st</sup> year of underground operation .i.e. P-10)	Rs. 78.44 Lakhs
G	Total closure cost for underground mine (Compounding @ 5% annual escalation)	Rs. 52.12 Crores

The year wise closure cost for opencast and underground is tabulated in Table 11.25.

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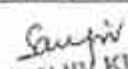
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**Table 11.25**  
**Year wise Closure Cost for Pakri Barwadih Mine**

Closure Cost of PB Coal Block								
Year	Average cost per annum on current cost (In Crores)			Year wise Expenditure with 5 % escalation(In Crores)			Cumulative amount deposited in the Escrow account excluding interest (Rs Crore)	Maximum amount excluding interest to be released w.r.t. expenditure incurred (Rs Crore)
	Opencast	Underground	Total	Opencast	Underground	Total		
P1	5.67	0.00	5.67	5.67	0.00	5.67	5.67	
P2	5.67	0.00	5.67	5.96	0.00	5.96	11.63	
P3	5.67	0.00	5.67	6.25	0.00	6.25	17.89	
P4	5.67	0.00	5.67	6.57	0.00	6.57	24.45	
P5	5.67	0.00	5.67	6.90	0.00	6.90	31.35	
P6	5.67	0.00	5.67	7.24	0.00	7.24	38.59	25.08
P7	5.67	0.00	5.67	7.60	0.00	7.60	46.19	
P8	5.67	0.00	5.67	7.98	0.00	7.98	54.18	
P9	5.67	0.00	5.67	8.38	0.00	8.38	62.56	
P10	5.67	0.78	6.46	8.80	0.78	9.59	72.14	
P11	5.67	0.78	6.46	9.24	0.82	10.07	82.21	32.64
P12	5.67	0.78	6.46	9.70	0.86	10.57	92.78	
P13	5.67	0.78	6.46	10.19	0.91	11.10	103.87	
P14	5.67	0.78	6.46	10.70	0.95	11.65	115.53	
P15	5.67	0.78	6.46	11.23	1.00	12.23	127.76	
P16	5.67	0.78	6.46	11.79	1.05	12.85	140.61	44.49
P17	5.67	0.78	6.46	12.38	1.10	13.49	154.09	
P18	5.67	0.78	6.46	13.00	1.16	14.16	168.26	
P19	5.67	0.78	6.46	13.65	1.22	14.87	183.13	
P20	5.67	0.78	6.46	14.34	1.28	15.61	198.74	
P21	5.67	0.78	6.46	15.05	1.34	16.39	215.14	56.78
P22	5.67	0.78	6.46	15.81	1.41	17.21	232.35	
P23	5.67	0.78	6.46	16.60	1.48	18.08	250.43	
P24	5.67	0.78	6.46	17.43	1.55	18.98	269.40	

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**Pawan**  
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**Revised Mining Plan (1st Revision) – Pakri Barwadih Coal Block**

P25	5.67	0.78	6.46	18.30	1.63	19.93	289.33	
P26	5.67	0.78	6.46	19.21	1.71	20.92	310.26	72.47
P27	5.67	0.78	6.46	20.17	1.80	21.97	332.23	
P28	5.67	0.78	6.46	21.18	1.89	23.07	355.30	
P29	5.67	0.78	6.46	22.24	1.98	24.22	379.52	
P30	5.67	0.78	6.46	23.35	2.08	25.43	404.95	
P31	5.67	0.78	6.46	24.52	2.19	26.71	431.66	92.50
P32	5.67	0.78	6.46	25.75	2.29	28.04	459.70	
P33	5.67	0.78	6.46	27.03	2.41	29.44	489.14	
P34	5.67	0.78	6.46	28.39	2.53	30.91	520.06	
P35	5.67	0.78	6.46	29.80	2.66	32.46	552.52	
P36	5.67	0.78	6.46	31.29	2.79	34.08	586.60	118.05
P37	5.67	0.78	6.46	32.86	2.93	35.79	622.39	
P38	5.67	0.78	6.46	34.50	3.08	37.58	659.97	
P39	5.67	0.78	6.46	36.23	3.23	39.46	699.42	
P40	5.67	0.00	5.67	38.04		38.04	737.46	
P41	5.67	0.00	5.67	39.94		39.94	777.40	147.96
P42	5.67	0.00	5.67	41.94		41.94	819.34	
P43	5.67	0.00	5.67	44.03		44.03	863.37	
P44	5.67	0.00	5.67	46.24		46.24	909.61	
P45	5.67	0.00	5.67	48.55		48.55	958.16	
P46	5.67	0.00	5.67	50.98		50.98	1009.13	176.56
P47	5.67	0.00	5.67	53.52		53.52	1062.66	
P48	5.67	0.00	5.67	56.20		56.20	1118.86	
P49	5.67	0.00	5.67	59.01		59.01	1177.87	
P50	5.67	0.00	5.67	61.96		61.96	1239.83	
P51	5.67	0.00	5.67	65.06		65.06	1304.89	225.34
P52	5.67	0.00	5.67	68.31		68.31	1373.20	
End of Mine Closure								381.34
Total Cost	295.02	23.53	318.55	1321.09	52.12	1373.20		1373.20

Note:

- The above estimated closure cost is based on WPI for "All commodities" as on November 2015. The WPI value for "All Commodities" as downloaded from website of "Office of Economic Advisor" is enclosed as **Annexure XX**.
- Escrow Account has already been opened for area of 4626 ha corresponding mine closure cost is Rs. 799.19 Crores. (Copy of Approval of Mine Closure Plan (MoC) is enclosed at **Annexure-XIII** and the copy of Approved Mine Closure Plan (Report) is enclosed at **Annexure XIII A**.

**Chapter -XI Mine Closure Plan**

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## 11.6 Financial Assurance

As per guidelines for Mine Closure Plan, NTPC shall take following actions for ensuring the financial assurance to complete the mine closure activities:

### 11.6.1 Opening of an Escrow Account

The proponent has already opened an escrow Account with the Scheduled Bank. The beneficiary of this account is Coal Controller Organization (on behalf of central Government). The proponent shall deposit the amount detailed in previous chapter, on yearly basis into this Escrow account.

### 11.6.2 Condition for operating the Escrow Account

An agreement, outlining detailed terms and conditions of operating the Escrow account, has been finalized and executed amongst the project owners, concerned Bank and the Coal Controller.

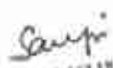
### 11.6.3 Release of Funds from Escrow Account

Mining shall be carried out in a phased manner initiating afforestation/ work in the mined out area of the first phase while commencing the mining in the second phase i.e. continuation of mining activities from one phase to other indicating the sequence of operations depending on the geo mining condition of the mine. Up to 80% of the total deposited amount including interest accrued in the escrow account shall be released after every five years in line with the periodic examination of the Closure Plan as per Clause 3.1 of the Annexure of the Guidelines.

The amount released shall be equal to the expenditure incurred in the Progressive Mine Closure in past five years or 80% whichever is less. The balance amount at the end of the Final Mine Closure shall be released to mine owner / lease holder on compliance of all provisions of closure plan duly signed by the lessee. It shall be certified that said closure of mine complied all statutory rules, regulations, orders made by the Central or State Govt, statutory organizations, court etc and duly certified by the Coal Controller.

## 11.7 Responsibilities of the owner

NTPC shall ensure that protective measures contained in the Mine Closure Plan including reclamation and rehabilitation works are carried out in accordance with the approved Mine Closure Plan and Final Mine Closure Plan.

  
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NTPC shall submit to the coal controller a yearly report before 1st July every year setting forth the extent of protective and rehabilitative works carried out as envisaged in the approved Mine Closure Plans. (Progressive and Final Closure Plans). Details of physical progress of the closure activities and expenses incurred shall be included in the yearly report.

#### 11.8 Provision for Mine Closure

NTPC shall obtain a mine closure certificate from Coal Controller to the effect that the protective, reclamation and rehabilitation works have been carried out in accordance with the Mine Closure Plan/Final Mine Closure Plan for surrendering the reclaimed land to the State Government concerned.

After the closure of the mine, the reclaimed leasehold area and any structure thereon, which is not to be utilized by NTPC, shall be surrendered to the state Govt. concerned following a laid down procedure as in vogue at that point of time.

The balance amount at the end of the final Mine Closure shall be released to NTPC on compliance of all provisions of Closure Plan duly signed by the mine owner to the effect that said closure of mine complied with all statutory rules, regulations, orders made by the Central or State Government, statutory organisations, court etc. and duly certified by the Coal Controller. This should also indicate the estimated extractable coal reserves and coal actually mined out.

If the Coal Controller has reasonable grounds for believing that the protective, reclamation and rehabilitation measures as envisaged in the approved mine closure plan in respect of which financial assurance was given has not been or will not be carried out in accordance with mine closure plan, either fully or partially, the Coal controller shall give the mine owner a written notice of his intention to issue the orders for forfeiting the sum assured at least thirty days prior to the date of the order to be issued after giving an opportunity to be heard.

  
SANJIV KUMAR SINGH  
Recognised Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India



  
पवन देव जामटा/PAWAN DEV JANTA  
उप महाप्रबन्धक (वाणिज्यिक)  
Deputy General Manager (Commercial)  
एन टी पी सी लिमिटेड / NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)



ke

*(Sample)*  
SARJIT K. SINGH  
Recognized Qualified Person  
No. 34C / (15)/2009-CPAM  
Ministry of Coal, Govt. of India

पवन हेड जमाना/PAWAN CHAN JAMANTA  
उप महासचिव  
जिला स्तर, मध्याह्न  
एन टी वी सी वि/ए/ए  
EOC, A.B.A. Sector-24, Mohali-201301 (U.P.)



  
 पवन देव जामला/PWAN DEV JAMLA  
 Deputy General Manager (Technical)  
 एन टी पी सी लिमिटेड / NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)

## LIST OF ANNEXURES

SL. NO.	PARTICULAR	ANNEXURE
1.	Copy of block allotment letter & MoC Letter dated 24 <sup>th</sup> August 2005	Annexure - I & Annexure-II
2.	Copy of Approved Mining Plan & MoC's letter approval of Mining Plan	Annexure -III & Annexure-III A
3.	Copy of letter for submission of Mining Plan for PB North-West (Sector-A)	Annexure -IV
4.	Copy of letter for submission of Mining Plan for PB East	Annexure - V
5.	Copy of MoC's letter for submission of Revised Mining Plan and Mine Closure Plan	Annexure - VI
6.	Copy of letter of submission of Revised Mining Plan (1st Revision) to MoC	Annexure - VII
7.	Copy of letter for commencement of Mining from PB East	Annexure - VIII
8.	Copy of MoC's letter for submission of Revised Mining Plan incorporating the changes in sequence of mining operation	Annexure -IX
9.	Copy of MoC's letter granting recognition to RQP for preparation of Mining Plan.	Annexure -X
10.	Copy of letter from CMPDIL & MECL for procurement of GR	Annexure -XI & Annexure-XI A
11.	No dues certificate from CMPDIL regarding Exploration cost	Annexure -XII
12.	Copy of approval letter of Mine Closure Plan & Approved Mine Closure Plan (Jan' 2012)	Annexure -XIII & Annexure - XIII A
13.	Notification under Section 7 (1) of CBA (A&D) Act	Annexure - XIV
14.	Co-ordinates boreholes of Pakri Barwadih	Annexure - XV
15.	Letter of authorization by the Block Allottee to the RQP	Annexure - XVI
16.	Certificates by the RQP regarding observance of guidelines of Mining Plan	Annexure - XVI A
17.	Certificates by the RQP regarding coverage of block area.	Annexure - XVI B
18.	Certificates by the RQP regarding block boundary as per MoC letter	Annexure - XVI C

List of Contents

RQP No. 34011/(15)/2009-CPAM dated 27.09.10

*Sanjiv*  
**SANJIV KUMAR SINGH**  
 Recognised Qualified Person  
 No. 34011/(15)/2009-CPAM  
 Ministry of Coal, Govt. of India

**पवन देव जामटा / PAWAN DEV JAMTA**  
 Deputy General Manager (Coal) (U.P. Coal)  
 एन टी पी सी लिमिटेड / NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)

  
 पवन देव जामटा/PAWAN DEV JAMTA  
 Dep. General Manager (Commercial)  
 एन टी पी लिमिटेड / NTPC LIMITED  
 EOC, A-5A, Sector-24, Noida-201301 (U.P.)



Revised Mining Plan (1<sup>st</sup> Revision) Pakri Barwadih Coal Block

19.	Certificates by the RQP regarding observance Mine Act 1952 & other applicable laws	Annexure – XVI D
20.	Certificates by the RQP regarding quarrying up to bottom most seam	Annexure – XVI E
21.	Certificate by the RQP regarding authorisation	Annexure – XVI F
22.	Certificate from the applicant	Annexure - XVII
23.	Letter of RED(Coal Mining) to MoC along with the Board Resolution	Annexure - XVIII
24.	Plan of block boundary issued by CMPDI	Annexure - XIX
25.	WPI value for "All Commodities" as downloaded from website of "Office of Economic Advisor"	Annexure-XX

*Sanjiv*  
**SANJIV KUMAR SINGH**  
 Recognised Qualified Person  
 No. 34011/(15)/2009-CPAM  
 Ministry of Coal, Govt. of India

*Up*  
 Under the supervision of  
 Joint Chief Engineer  
 District Coal Office, Pakri Barwadih

**List of Contents**

**RQP No. 34011/(15)/2009-CPAM dated 27.09.10**

*Pawan Dev*  
**PAWAN DEV JAMTA**  
 Joint General Manager (Commercial)  
 एन टी पी सी लिमिटेड / NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)

  
**पवन देव जामवाल/PAWAN DEV JAMTA**  
 General Manager (Commercial)  
 एन. टी. पी. लिमिटेड/NTPC LIMITED  
 EOC, Sector-24, Noida-201301 (U.P.)

ANNEXURE-I

No. 13016/29/2003-CA  
Government of India  
Ministry of Coal and Mines  
Department of Coal

New Delhi, the 11.10.2004

To  
The Chairman & Managing Director,  
National Thermal Power Corporation Ltd.,  
NTPC Bhawan, Scope Complex,  
7 Institutional Area, Lodhi Road,  
New Delhi.

Subject :- Allotment of Pakri Barwadih Coal block in favour of National Thermal Power Corporation Ltd. to undertake coal mining for exclusive use of coal in their power plants.

S

I am directed to refer to your letter No. 01/CMCW/MOC/067-623 dated 9.8.2004 on the subject mentioned above and hereby convey the 'in principle' consent of the Government of India to the working of Pakri Barwadih coal block by the National Thermal Power Corporation Limited within the provision of Central Government Company dispensation under Section 3(3)(a) (i) of the Coal Mines (Nationalisation) Act, 1973 subject to the following conditions :-

i) Coal mining shall be carried on by NTPC or a separate company to be created with NTPC's participation provided such separate company is a Central Government company with coal mining as an object in its Memorandum of Association. This condition is necessitated under S. 3(3)(a)(i) of the Coal Mines (Nationalisation) Act, 1973 which allows coal mining to a Central Government Company.

ii) Coal linkages from CIL/SCCL would not be disturbed in any way with coal mined from Pakri Barwadih block. NTPC shall continue to honor its commitment towards long term linkage from these nationalized coal companies to their thermal power stations through FSAs.

iii) All coal mined from the block, including any middlings or rejects etc, if washing is resorted to, shall be used in NTPC power plants. No coal will be disposed off in any other manner, whatsoever without prior permission, in writing, of the Department of Coal.

iv) NTPC would plan for both Open cast and underground mining in Pakri Barwadih coal block so as to exhaust the reserves below 300 meters as well as at a later date.

v) NTPC will do coal mining in accordance with the provisions of the Coal Mines (Nationalisation) Act 1973, the MMDR Act, 1957, the Contract Labour (Regulation & Abolition) Act, 1970 and in compliance with all other mineral, environmental and labour laws and regulations governing the Indian Coal Industry.

Sanjiv  
SANJIV KUMAR SINGH  
Recognized Coal Miner  
No. 340311/COALMINER/01  
Ministry of Coal, Govt. of India

पवन देव जामटा/PAWAN DEV JAMTA  
General Manager (Coal Mining)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)



vi) The mining lease will be executed in the name of the NTPC or such separate Government company which may be formed with equity participation by NTPC

vii) Violation of any of the conditions imposed above on the separate Government Company, in mining and disposing of Barwadih coal block will render the mining lease liable for cancellation

viii) NTPC may approach the CMPDL to obtain the geological payment of necessary exploration cost and obtain a mining lease per the provisions of the MM (D&R) Act, 1957.

Yours faithfully,

(S. K. Kakkar)  
Under Secretary

*Sanjiv*  
SANJIV KUMAR SINGH  
Recognised Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India

*Sanjiv*  
SANJIV KUMAR SINGH  
Recognised Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India

*Sanjiv*

संज्ञित व्यक्ति (R.Q.P.)  
संज्ञित व्यक्ति (R.Q.P.)  
संज्ञित व्यक्ति (R.Q.P.)  
संज्ञित व्यक्ति (R.Q.P.)  
संज्ञित व्यक्ति (R.Q.P.)  
संज्ञित व्यक्ति (R.Q.P.)

*Sanjiv*  
पवन देव जामटा/PAWAN DEV JAMTA  
DUP of General Manager  
एन. सी. ई. रा. लिमिटेड / NTPC Ltd.  
EOC, A.B.A. Sector-24, New Delhi-110029



**Sujit Gulati**  
Director  
Tn. 123456

GO. NO. 13019/22/2003-CA I  
Government of India  
Ministry of Coal  
Shashi Bhauni  
Secy

ANNEXURE-II

Date: 24<sup>th</sup> August 2005

Dear Shri Choudhary,

Kindly refer to your letter dated 23/24.5.2005. It has been decided in the Ministry that the block boundary to be indicated to NTPC should be the entire block of Pakri Barwadit including the CBM area as also the unexplored western portion marked as 'A' in the map supplied by you and annexed to this letter.

Since there is an overlap between CBM exploration areas given to ONGC/MOC and the coal block given to NTPC, this boundary will be communicated to NTPC with the condition that they shall render all necessary cooperation for proper exploration of CBM by the allottees of CBM blocks without any financial liability or other liabilities on the part of those who have CBM exploration licence.

Further, in order to have a harmonious and coordinated development of the area, both for coal mining as well as exploration/exploitation of CBM, this matter will be referred to the Joint Committee between the Ministry of Coal and Ministry of Petroleum and Natural Gas set up under the MOU of 1997 so that necessary information can be fed to the Joint Committee both by ONGC/MOC and NTPC about their plans so that proper coordinated planning can be done and issues, if any, sorted out in time. You may also inform NTPC accordingly.

With regards,

Yours sincerely,

(Sujit Gulati)

Shri S. Choudhary  
Chairman/Managing Director  
CMFOIT  
Kanke Road  
Ranchi

Copy to the Chairman, NTPC, SCOPE Complex, Lodhi road, New Delhi for information. The allocation of Pakri Barwadit coal block to NTPC shall be subject to their rendering all necessary assistance and cooperation in the allottees of the overlapping CBM block for exploration/exploitation without any financial liability on the allottees of the CBM block and to render all necessary information/cooperation to the Joint Committee for coordinated exploitation/exploitation of coal and CBM in the block of Pakri Barwadit.

(Sujit Gulati)  
Section Officer

**S. D. Sahai**  
Recognised Qualified Person  
CP No. 34011/16/2004-CPAM

**SANJIV KUMAR SH**  
Recognised Qualified Person  
CP No. 34011/16/2004-CPAM  
Ministry of Coal  
General Manager (Commercial)  
NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

  
 पवन देव जामरा/PAWAN DEV JAISWAL  
 जेनरल मैनेजर (एन टी सी सी)  
 Director General Manager (NTSCS)  
 एन टी सी सी लिमिटेड/NTSCS LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)



No. 13016/29/2003-CA-I  
Government of India  
Ministry of Coal

New Delhi, the 25<sup>th</sup> August, 2006.

To

The Chairman-cum-Managing Director,  
National Thermal Power Corporation Limited,  
NTPC Bhawan,  
SCOPE Complex, Lodhi Road,  
New Delhi - 110 003.

Subject : Approval of Mining Plan in respect of Pakri-Barwadih coal mining block  
(June, 2006) of NTPC Limited.

Sir,

I am directed to refer to your letter No. NTPC:CM:MP:2006:180106 dated 18.01.2006 submitting mining plan of Pakri-Barwadih coal mining block for approval of the Central Government and to state that the mining plan of Pakri-Barwadih coal mining block has been considered and the approval of the Central Government thereon is hereby conveyed under Section 5 (2) (b) of the Mines & Minerals (Development & Regulation) Act, 1957 subject to the following conditions :-

- i) The Mining Company shall achieve the 15 Mtp production level from the opencast operation by 12<sup>th</sup> year.
- ii) As regards part of coal block that has also been allotted to ONGC for Coal Bed Methane extractions, the conditions laid down in the allotment letter shall be fully complied with.
- iii) The approval of the mining plan is without prejudice to the requirement of approvals from competent/prescribed authority under the relevant rules/regulations etc.

2. Two copies of the approved mining plans duly signed by the competent authority are returned herewith with the request that a copy of the approved mining plan may be submitted to the concerned State Government for necessary action and also a photocopy of the approved mining plan may be sent to the Coal Controller for monitoring of the block.

Yours faithfully,

  
(V.S. Sharma)

Under Secretary to the Govt. of India.

Encls. As above





SANJIV KUMAR SINGH  
Recognised Qualified Person  
No. 34011/(15)/2003-CPAM  
Ministry of Coal, Govt. of India

  
पवन देव जैसवाल/PWAN DEV JAISWAL  
उप महाप्रबन्धक (मिनींग)  
Dep. General Manager (Mining)  
एन टी पी सी लिमिटेड / NTPC LIMITED  
EOC, A-3A, Sector-24, Noida-201301 (U.P.)

  
पवन देव जस्ता/PWAN DEV JANTA  
उप महाप्रबन्धक (नवविभाग)  
Deputy General Manager (Construction)  
एन टी पी सी लिमिटेड / NTPC (LTM) लि.  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)



एन टी पी सी लिमिटेड

एन टी पी सी लिमिटेड  
NTPC Limited  
A SECTOR OF INDIA CORPORATION  
(Formerly National Thermal Power Corporation Ltd.)  
INDIA - Ministry, Corporate Centre, Noida

Ref: NTPC: PE-MP&D: 7010

Date: 02/07/2013

To,  
The Section Officer (CA-I),  
Ministry of Coal,  
Shastri Bhawan,  
New Delhi

Sub: Submission of Mining Plan and Mine Closure Plan of Pakri Barwadih 'A' which is a part of Pakri Barwadih Coal Block of NTPC Ltd. for Approval of MoC

Dear Sir,

NTPC Ltd was allotted Pakri Barwadih Coal Block in North Karanpura Coalfield in the State of Jharkhand vide MoC letter No. 13016/29/2003-CA-I dated 11<sup>th</sup> oct'2004, New Delhi. Mining Plan for the Block has been approved by MoC vide letter no. 13016/29/2003 CA-I dated 25<sup>th</sup> Aug'2005. As Area 'A' of the Block was not explored at that time, NTPC has given commitment to carry out detailed exploration of the area and to submit a separate Mining Plan for this.

Detailed exploration of the area has been now been carried out and a separate Mining Plan and Mine Closure Plan for this has been prepared as per MMDR Act'1957 and Rule 22 (4) of Mineral Concession Rules, 1960 and enclosed in two volumes i.e

Volume I : Text  
Volume II : Drawings

Four copies of Mining Plan and Mine Closure Plan are enclosed for kind perusal and according necessary approval Please.

Thanking You,

Yours Sincerely,

A. K. Dash  
Addl. GM (PE-Mine Planning & Design)  
5<sup>th</sup> Floor, Engineering Office Complex, Sector-24  
NTPC Ltd., NOIDA-201301  
Tel no. 0120-2410102  
Email: akdash@ntpcplc.co.in

Encl: Four Copies of Mining Plan in two volumes (Text & Drawings).

Copy for kind information: GM(PE-MP&D)/ GM(PE-Mech)/ GM(Coal Mining)/ GM(PP&M) / ED (Engg)/ ED(FT)/ STA to D (T)



Sanjiv  
SANJIV KUMAR SINGH  
Recognised Qualified Person  
No. 34011/(15)/2009-CPA  
Ministry of Coal, Govt. of India

पवन देव जामठा / PAVAN DEV JAMTA  
General Manager (PE-MP&D)  
एन टी पी सी लिमिटेड, NTPC LIMITED  
EOC, A-24, Sector-24, Noida-201301 (U.P.)



  
 पवन केव जैसिया/PWAN KEV JAISIA  
 Dep. General Manager (Operations)  
 एन टी सी लिमिटेड/NTSC Limited  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)

ANNEXURE-V

**एन टी पी सी लिमिटेड**  
**NTPC Limited**  
 A Govt. of India Enterprise  
 (Formerly, National Thermal Power Corporation Ltd.)  
 Delhi, Kolkata, Chandigarh, Chennai, Mumbai

Ref NTPC PE-MPD: 7010.37

Date: 27/08/2013

To  
 The Section Officer (CA-I),  
 Ministry of Coal,  
 Shastri Bhawan,  
 New Delhi

Sub: Submission of Mining Plan and Mine Closure Plan of Pakri Barwadih- 'East Quarry' which is a part of Pakri Barwadih Coal Block of NTPC Ltd. for Approval of MoC

Dear Sir,

NTPC Ltd was allotted Pakri Barwadih Coal Block in North Karanpura Coalfield in the State of Jharkhand vide MoC letter No. 13016/29/2003-CA-I dated 11<sup>th</sup> Oct 2004, New Delhi. Mining Plan for the Block has been approved by MoC vide letter no. 13016/29/2003 CA-I dated 25<sup>th</sup> Aug 2006 which envisages mining of Pakri Barwadih Block dividing it into West Quarry & East Quarry. East Quarry of the Block was earlier planned for mining after exhaustion of West Quarry reserve. But to increase coal production, feasibility of simultaneous mining of both West Quarry & East Quarry has now been studied. The present Mining Plan of Pakri Barwadih East Quarry envisages for Mining of East Quarry simultaneously with West Quarry.

Accordingly separate Mining Plan and Mine Closure Plan for Pakri Barwadih 'East Quarry' has been prepared as per MMOR Act 1957 and Rule 22 (4) of Mineral Concession Rules, 1980 and enclosed in two volumes i.e

Volume I : Text & Annexures  
 Volume II : Drawings

Eight copies of Mining Plan and Mine Closure Plan are enclosed for kind perusal and according necessary approval Please.

Thanking You,

Yours Sincerely,

A. K. Singh,  
 Addl. GM (PE-Mine Planning & Design)  
 5<sup>th</sup> Floor, Engineering Office Complex, Sector-24  
 NTPC Ltd. NOIDA-201301  
 Tel.no. 0120-2410102  
 Email : [ajay@nptcl.com](mailto:ajay@nptcl.com)

Encl: Eight Copies of Mining Plan in two volumes (Text & Drawings).

**एन टी पी सी लिमिटेड**  
**NTPC LIMITED**  
 EOC, A-5A, Sector-24, Noida-201301 (U.P.)  
 Dev. by: **PAWAN DTV JANTA**  
 General Manager (Civil Engineering)



*Sanjiv*

**SANJIV KUMAR SINGH**  
 Recognised Qualified Person  
 No. 34011/(15)/2009-CPAM  
 Ministry of Coal, Govt. of India

  
पवन देव जामटा / PAWAN DEV JAMTA  
नए महाप्रबन्धक (पृष्ठ 2302)  
Deputy General Manager (Construction)  
एन टी पी सी लिमिटेड / NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)



SPEED POST

F. No.13016/29/2003-CA-1 (Part)  
Government of India  
Ministry of Coal

Shastri Bhawan, New Delhi  
Dated: the 20<sup>th</sup> October, 2014

To,

**Shri A.K. Dash,**  
Add. GM (PE Mine Planning & Design)  
5<sup>th</sup> Floor, Engineering Office Complex, Sector -24  
NTPC Ltd. NOIDA - 201 301  
(Tel No. 0120-2410102)

**Subject: Submission of Revised Mine plan and Mine Closure Plan of Pakri Barwadih coal Block of NTPC for approval of MoC.**

Sir,

I am directed to refer to your letter Nos. CC/PEM/7010/MP/23 dated 20.3.2012, No. NTPC/PE/MP&D/7010 dated 9.7.2013 and No. NTPC/PE/MP&D/7010/37 dated 27.8.2013 on the above subject and to say that following three Mine Plan and Mine Closure Plan have been submitted by your organization vide above mentioned letters:

- (i) Revised Mining Plan of Pakri Barwadih Coal Block (1<sup>st</sup> Revision) [Compliance to observations awaited].
- (ii) Mining Plan of Pakri Barwadih -A coal block (Part of Pakri Barwadih coal block).
- (iii) Mining Plan of Pakri Barwadih coal block (East Quarry) (Part of Pakri Barwadih coal block)

2. It has been observed that the first Mining Plan for Pakri Barwadih block was approved by MoC for the whole block (proposing two quarries i.e. West Quarry & East Quarry to be worked in sequence), therefore the Revised Mining Plan should also be prepared for the whole Block and not for part of the block.

3. You are, therefore, requested to submit the Revised Mining Plan (1<sup>st</sup> Revision) including Mine Closure Plan as a whole instead of in parts. Copies of the Mine Plan and Mine Closure plans as mentioned in para 1 above are returned herewith.

Yours faithfully,



[ A. SANJAY SAHAY ]

Under Secretary to the Government of India  
Tel. 23073936

Copy for information to : Director (Tech.), Ministry of Coal

*Sanjay*  
**SANJIV KUMAR SINGH**  
Recognised Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India

*Sanjay*  
पुनः विवेकानंद प्रमाणित  
Dep. Gen. Secy (PE) NTPC  
(एन टी सी) लिमिटेड, नोडा-201301 (उ.प्र.)  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)





ANNEXURE-VII

एन टी पी सी लिमिटेड  
(भारत सरकार का उपक्रम)**NTPC Limited**  
A Govt. of India Enterprise

इ-टी-ई कार्यालय, कॉर्पोरेट कॉम्प्लेक्स

Ref: CC: CM: ENGG: 7010: MP: 82

Date: 03.04.2015

To,

Under Secretary (CA-I)  
Ministry of Coal, Shastri Bhawan,  
New DelhiSub: Submission of Revised Mining Plan & Mine Closure Plan (1st Revision)  
of Pakri Barwadih- Coal Block of NTPC Ltd. for Approval of MoC

Sir,

NTPC Ltd was allotted Pakri Barwadih Coal Block (North Karanpura Coalfield) in the State of Jharkhand vide MoC letter No. 13016/29/2003-CA-I dated 11th Oct' 2004. Mining Plan of the block has been approved by MoC vide letter no. 13016/29/2003 CA-I dated 25th Aug' 2006. Consequent upon obtaining the Geological Report for sector A area of the block and due to operational reasons the following Mining Plans were submitted by NTPC as under:

- Mining Plan for a capacity of 15 Mtpa with faster ramp up submitted on 20.03.2012.
- Mining Plan for the Sector A of the block with a rated capacity of 3 Mtpa submitted on 02.07.2013.
- Mining Plan for Eastern Quarry with a capacity of 7 Mtpa submitted on 27.08.2013.

Subsequently Ministry of Coal vide letter no F.No. 13016/29/2003-CA- I (Part) dated 9<sup>th</sup> Oct' 2014 (Copy enclosed as **Annexure-I**) observed that the first Mining Plan for Pakri Barwadih block was approved by MoC for the whole block (proposing two quarries i.e. West Quarry & East Quarry to be worked in sequence), therefore the Revised Mining Plan should also be prepared for the whole block and not part of the block.

Accordingly, the Revised Mining Plan (1<sup>st</sup> Revision) including Mine Closure Plan as a whole has been prepared for the block in two volumes as per the statutory

*Sanjiv*  
**SANJIV KUMAR SINGH**  
Recognised Qualified Person  
No. 34011/(15)/2009-CPMR  
Ministry of Coal, Govt. of India

एन टी पी सी लिमिटेड, कॉर्पोरेट कॉम्प्लेक्स, 7, इन्स्टीट्यूशनल एरिया, लोधी रोड, नई दिल्ली-110003, टेलीफोन: 24380100, फैक्स: 011-24380101  
NTPC Bhawan, SCOPE Complx, 7, Institutional Area, Lodhi Road, New Delhi-110003, Tel: 24380100, Fax: 011-24380101

*Pawan*  
**पवन देव जामटा/PAWAN DEV JAMTA**  
उप महाप्रबन्धक (नवी-प्रायोजन)  
Deputy General Manager (New Projects)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)



requirement of MMDR Act 1957 amended from time to time and Rule 22 (4) of MCR, 1960 framed thereunder in two Volumes.

Volume I : Text

Volume II : Drawings

We are enclosing four copies of the Revised Mining Plan (1<sup>st</sup> Revision) of Pakri Barwadih Coal Block for kind perusal and according necessary approval.

Thanking You.

Yours Sincerely,

  
(SUNIL JUMDE)

GM (Coal Mining-Engg.)

1<sup>st</sup> Floor, CORE-7, SCOPE Complex,

NTPC Bhawan, Lodi Road, New Delhi-110 003

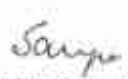
Tel.no: 011-24365709/ Fax: 011-24367089

e-mail: suniljunde@ntpc.co.in

Encl: 1) Four Copies of Revised Mining Plan in two volumes (Text & Drawings)

2) Four Copies of Approved Mining Plan

3) Four copies of Approved Mine Closure Plan

  
SANJIV KUMAR SINGH  
Recognised Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India



पवन देव शर्मा (Pawan Dev Sharma)  
उप महाप्रबन्धक (कोयला)  
एन टी पी सी लिमिटेड  
एन टी पी सी लिमिटेड, नोडा-201301 (उ.प्र.)

  
पवन देव शर्मा (Pawan Dev Sharma)  
उप महाप्रबन्धक (कोयला)  
Dep. General Manager (Coal)  
एन टी पी सी लिमिटेड / NTPC LIMITED  
EOO, A-8A, Sector-24, Noida-201301 (U.P.)



संस्थापक निदेशक, राष्ट्रीय कोयला निगम लि.

दिनांक: 27.08.2006

To  
The Section Officer (CPAM)  
Ministry of Coal  
Shastri Bhawan  
New Delhi- 110001

प्रति सं. प्रेषित अनुमत  
कोयला मंत्रालय, शास्त्री भवन  
नई दिल्ली-110001

**Sub: Deviations/Variations with respect to approved Mining Plan**

Relocation of initial Quarry (Pakri Barwadih Coal Mining Block-East Quarry)  
and Relocation of External Dump of Eastern Quarry w.r.t Approved Mining Plan  
of Pakri Barwadih Coal Mining Block

Ref: Approval of Mining Plan vide Letter no 13016/29/2003/CA-I dated  
26.08.2006

Dear Sir,

NTPC Ltd was allotted Pakri Barwadih Coal Block, located in North West Coalfields, Dist. Hazaribagh, Jharkhand for captive mining by Ministry of coal Government of India vide letter no. 13016/29/2003-CA, New Delhi, dated 11th Oct 2004 & DO No 13016/29/2003-CA dated 24th August 2005 (copy enclosed). The Mining plan of Pakri Barwadih Coal Block which covered mining of Western and Eastern Area of the block, was approved by MoC vide letter no 13016/29/2003/CA-I dated 26.08.2006 for targeted capacity of 15 Mtpa.

As per approved Mining Plan, West and East Quarry of Pakri Barwadih Coal Mining Project were envisaged be worked in sequence i.e. West Quarry followed by East Quarry. Western Quarry (Yr 1 to Yr 27) & Eastern Quarry (Yr 25 to Yr 39) Western Pit was envisaged to be opened at four places namely WP-1, WP-2, WP-3 and WP-4. External Dumps were planned to be placed at three designated places namely Dump 'A', 'B', 'C'. Entire dump of the Eastern Quarry was planned to be placed in the void of Western Quarry. A drawing showing the above quarries and external dumps is shown in the drawing placed at Annexure - I (Plate No. I).

To fulfill the commitment given to Government regarding start of Coal Production and also keeping in view the likely time taking process of award of MDQ for Western Pit and densely populated /hostile villages existing within Western Pit as well as connecting roads, NTPC has proposed to commence Mining Operations in the Eastern Pit area adjacent to main road where land is available, OB removal and Coal

**SANJIV KUMAR SINGH**  
Recognised Qualified Person  
No. 34011/(15)/2008-CPAM  
Ministry of Coal, Govt. of India

प्रबंधक, जाम्ना/PAWAN DEV JAMTA  
संस्थापक निदेशक (सं. नि. नि. नि.)  
Dep., General Manager (Commercial)  
एन टी पी सी लिमिटेड / NTPC LIMITED  
EOC, A-5A, Sector-24, Noida-201301 (U.P.)



एन टी पी सी लिमिटेड

(A Govt. of India Enterprise)

**NTPC Limited**

(Formerly National Thermal Power Corporation)

एन टी पी सी लिमिटेड

production has been planned from a patch of Eastern Quarry for two years as **Interim Arrangement**. The Plans showing the proposed stage of working by the end of First Year and Second Year are given in **Plate No. II and III (Annexure II)** respectively. Proposed area for mining has been mainly selected due to the availability of land for mining as well as ease of approach from the State Highway.

Due to the above mentioned interim arrangement, there are certain variations with respect to approved Mining Plan as mentioned below.

- i) **Change in mining sequence and External Dump Area:** The proposed quarry area is part of Eastern Pit as per approved Mining Plan in its North-Eastern part. The proposed quarry is at a distance of approximately 850 m in North-West direction from the Tandwa-Barkagaon-Hazaribagh State Highway and is accessible by road connecting to Arhara village from the State Highway. However in variance with the approved Mining Plan, Eastern Quarry is now planned to be started in 1<sup>st</sup> year of Mining Operations instead of 25<sup>th</sup> year.

The land for external dumps as per approved Mining Plan Dump A, B, C is presently not available. Accordingly, to start mining operations, **External Dump** has been planned in the available land in the north side of this quarry area. This area lies partly in the area earlier identified for coal evacuation facilities. This dump area mainly consists of demarcated and non-demarcated forest land. (The area has been shown in **Plate No. I**). Forest diversion of this external dump area has been obtained and change of land use of this area has been taken up with MoEF.

- ii) **Variation in Coal Transportation Arrangement:** As per earlier approved Mining Plan coal is planned to be transported through belt conveyor to Banadag Railway siding which are under construction. It is proposed that coal shall be transported to Banadag Siding by Road till the construction of cross country conveyor.

There is no change in calendar program and mining lease area with respect to the approved Mining Plan.

The stage plans duly signed by RQP is enclosed as Annexure II for your kind information please.

Thanking you

With kind regards

**Sanjiv Kumar Singh**  
Recognised Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India

**Sunil Junde**  
General Manager  
Coal Mining (Engg)  
Fax No. 011-24367089

**Pawan Dev Janda**  
General Manager  
Coal Mining (Engg)  
NTPC Limited  
EOC, A-8A, Sector-24, Noida-201304 (U.P.)



GOVERNMENT OF INDIA  
Ministry of Coal  
Department of Coal

New Delhi, the 11th April 2014

The Chairman & Managing Director  
National Thermal Power Corporation Ltd.  
NTPC Bhawan, Scope Complex,  
7 Institutional Area, Lodhi Road,  
New Delhi

Subject: **Agreement - Pakri Barwadih Coal Block** in favour of NTPC Limited, Government of India, undertake coal mining for dispatch for power generation plants

Sir,

I am directed to refer to your letter No. NTPC/067-673 dated 11.03.2014 on the subject mentioned above and hereby advise the in-principle consent of the Government of India in the working of Pakri Barwadih coal block by the National Thermal Power Corporation Limited within the provision of Central Government Company legislation under Section 1(3)(i) of the Coal Mines (Nationalisation) Act, 1973 subject to the following conditions:-

i) Coal mining shall be carried on by NTPC or a separate company to be created with NTPC's participation provided such separate company is a Central Government company with coal mining as an object in its Memorandum of Association. The condition is necessitated under Section 1(3)(i) of the Coal Mines (Nationalisation) Act, 1973 which allows coal mining to a Central Government Company.

ii) Coal linkage from IIL, DCCIL would not be disturbed in any way and coal mined from Pakri Barwadih block NTPC shall continue to supply to Government towards long-term linkage from these nationalised coal companies to their thermal power stations through PGCs.

iii) All coal mined from the block, including the residual coal reserves in the working of the block, shall be used in NTPC power plants. The coal will be disposed off in any other manner whatsoever without prior permission of writing of the Department of Coal.

iv) NTPC would plan for both open cast and underground mining in Pakri Barwadih coal block so as to extract the reserves below 100 meters as well as a long date.

v) NTPC will do coal mining in accordance with the provisions of the Coal Mines (Nationalisation) Act, 1973, the MMRB Act, 1987, the Central Labour (Regulation & Abolition) Act, 1970 and in compliance with all other national, international and State laws and regulations governing the coal, in India.

*Sanjiv*  
**SANJIV KUMAR SINGH**  
Recognised Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India

*Sanjiv*  
**पवन देव जगता/PWAN DEV JANTA**  
वर्ग महाप्रबन्धक (महोदय)  
Dep. General Manager (Commercial)  
एन टी पी सी लिमिटेड / NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)



एन टी पी सी लिमिटेड

(जोत संख्या ३३३३)

**NTPC Limited**

(A Govt. of India Enterprise)

(Formerly National Thermal Power Corporation)

मुख्य कार्यालय: Corporate Centre

Enclosure

1. Allocation letter vide letter no. 13016/29/2003-CA, New Delhi, dated 11th Oct 2004 & DO No. 13016/29/2003-CA dated 24th August 2005
2. Approval of Mining Plan Vide Letter no. 13016/29/2003/CA - I dated 26.08.2006
3. **Annexure - I:** A drawing showing the pits, external dumps as per approved Mining Plan and Proposed Quarry & Dump (Plate No. - I)
4. **Annexure - II:**  
Stage Plan at the end of First Year for the Proposed Quarry (Plate No. II)  
Stage Plan at the end of Second Year for the Proposed Quarry (Plate No. III)

1

*Sanjiv*

**SANJIV KUMAR SINGH**  
Recognised Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India

*Sanjiv*

Sanjiv Kumar Singh  
Recognised Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India

*Sanjiv*  
**PAWAN**  
Deputy General Manager  
एन टी पी सी लिमिटेड / NTPC LIMITED  
EOC, A-2A, Sector-24, Noida-201301 (U.P.)

The following table gives the values of  $\beta$  for  $\alpha = 0.05$  and  $\alpha = 0.01$  for various values of  $n$ .

10. The approach in the pricing plan is well designed, and the system of appeals is a very strong, rigorous, subject to review by the staff of the calculations.

Two samples of the application, drawing paper, were treated by the method described above, and the results were as follows: The sample treated by the procedure during the first 24 hours,  $\alpha$  and  $\beta$ -carotene levels were not significantly different from the control,  $\alpha$  and  $\beta$ -carotene levels were not significantly different from the control,  $\alpha$  and  $\beta$ -carotene levels were not significantly different from the control,  $\alpha$  and  $\beta$ -carotene levels were not significantly different from the control.

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**SANJIV KUMAR SINGH**  
Recognised Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India

पवन देव जाम्टा/PAWAN DEV JAMTA  
उप महाप्रबन्धक (आपूर्ति)  
Dor...  
एन सी सी लिमिटेड, नोडा-24  
EOC, A-BA, Sector-24, Noida-201301 (U.P.)



## AREA 'A'

NINE LIMITED

FARMER, MATHHEALTH, LLC, BELLINGHAM

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For a more detailed discussion of the literature on the effects of the 1996 welfare reform on the labor force participation of women, see the review by Duncan and Duncan (2005).

<b>NTPC LIMITED</b>	
PLANT MANAGER, COAL BLOCK	
State of Uttar Pradesh, Lucknow	
Date: 15/05/2015	
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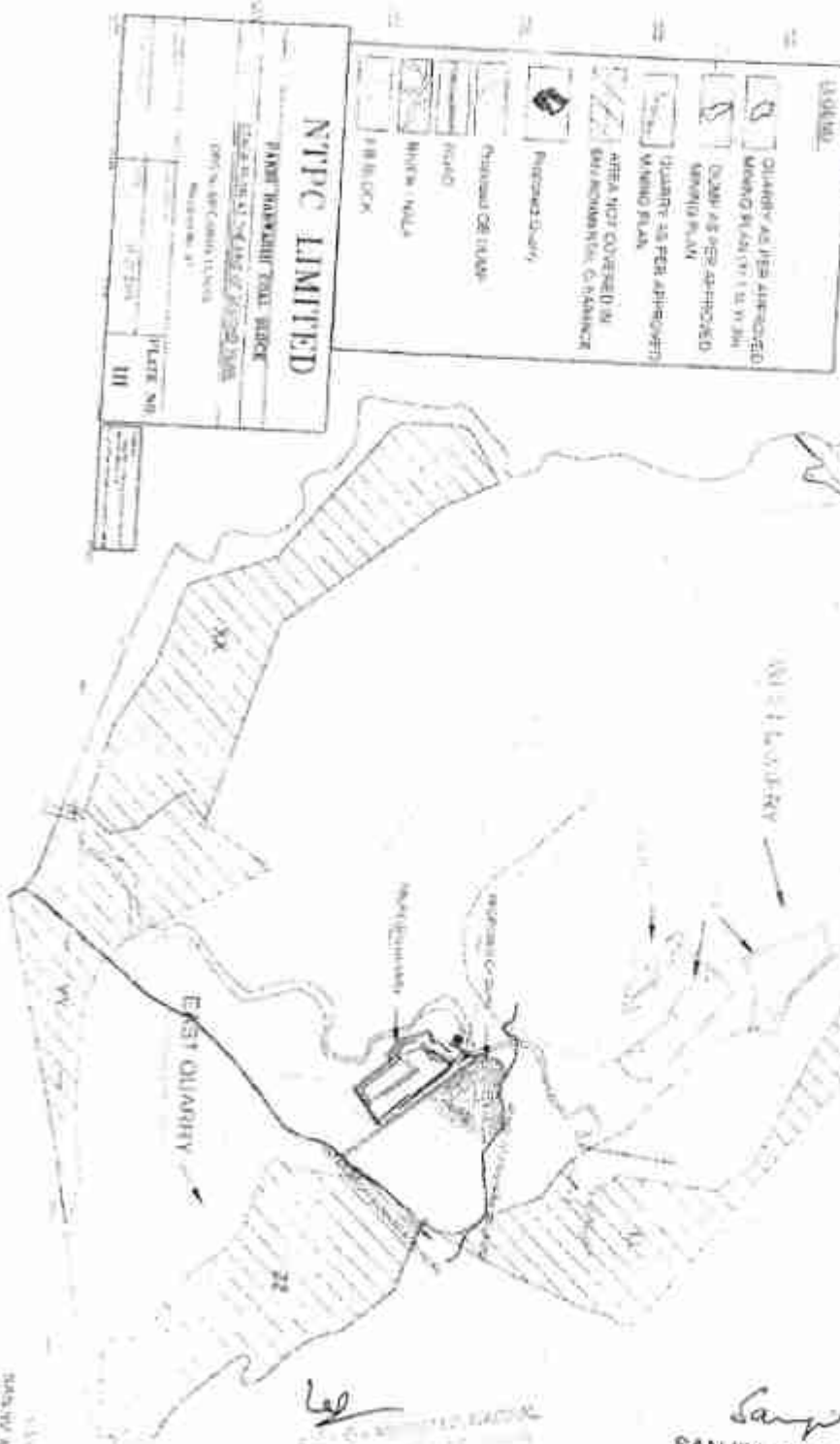
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*Sanjiv*  
**SANJIV KUMAR SINGH**  
 Recognised Qualified Person  
 No. 34011/(15)/2009-CPAM  
 Ministry of Coal, Govt. of India

*Pawan*  
**पवन देव जामुन/PWAN DEV JAMTA**  
 General Manager (Coal Block)  
 एन टी पी सी लिमिटेड / NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)

AREA 'A'



**NTPC LIMITED**  
**POWER HOUSING TREATMENT**  
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*Sanjiv*  
**SANJIV KUMAR SINGH**  
 Recognised Qualified Person  
 No. 34011/(15)/2009-CPAM  
 Ministry of Coal, Govt. of India

*Sanjiv*  
 Dup. General Manager  
 EOC, A-8A, Sector-24, Noida  
 201305



BY SPEED POST

F No. 13016/29/2003-CA-I (Part)  
Government of India  
Ministry of Coal

Shastri Bhawan, New Delhi  
Dated the 24<sup>th</sup> June, 2015

Shri Sanjay Gunde,  
General Manager, Coal Mining (Engg.),  
NTPC Ltd.,  
NTPC Bhawan, Scope Complex,  
7, Institutional Area, Lodhi Road,  
New Delhi-110003

Subject: Issue regarding change in Mining Sequence and External Dump Area  
(for 2 years as interim arrangement) for Pakri Barwadhi coal block.

The undersigned is directed to refer to NTPC's letter No CC PEM/010.MP-83 dated 22.05.2015 on the above-mentioned subject and to say that the Standing Committee, in its meeting held on 28.05.2015 under MMDR Act, 1957 had considered the above-captioned issue and after due deliberations, permitted NTPC to commence the Mining Operation at Eastern Quarry with the direction that NTPC will submit the Revised Mining Plan within three months after incorporating the changes in sequence of operation. Extracts of the minutes of the above meeting is enclosed herewith.

2 In view of the above, NTPC is requested to comply with the above-mentioned directions of Standing Committee.

Yours faithfully

FOR [A. SANJAY SAHAY]  
Under Secretary to the Government of India  
Tel: 23073939

Sanjiv  
SANJIV KUMAR SINGH  
Recognised Qualified Person  
No. 34011/(15)/2009-CPAL  
Ministry of Coal, Govt. of India

पवन देव जामरा/PAWAN DEV JAMARA  
उप महाप्रबन्धक (एन टी सी)  
Dep. General Manager (NTPC Limited)  
एन टी सी लिमिटेड, NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

No 34011/05-2015-CPAM  
Government of India  
Ministry of Coal

Shashi Bhasin, New Delhi  
Dated the 25-06-2015

OFFICE MEMORANDUM

Subject: Issue regarding change in Mining Sequence and External Dump Area (for 2 years as interim arrangement) for Pakri Barwadih Coal Block of M/s NTPC.

The undersigned is directed to refer to CA-I Section's Note No-13015/19/2003-CA-I (Part) dated 17-04-2015 forwarding therewith Revised Mining Plan and Mine Closure Plan (1<sup>st</sup> Revision) for Pakri Barwadih Coal Block for placing before the Standing Committee and to inform that after Submitting the 1<sup>st</sup> Revision of Mining Plan of Pakri Barwadih Coal Block, M/s NTPC submitted a representation (vide letter No-CC-REM 7010 MP 83 dated 22-05-2015) (copy enclosed) and sought permission from MoC regarding change in Mining Sequence and External Dump.

The Standing Committee meeting under MMDR Act, 1957 held on 28-05-2015 had considered the above said issue. After due deliberations the Standing Committee permits NTPC to commence the Mining Operation at Eastern Quarry with the direction that NTPC will submit the Revised Mining Plan within three months after incorporating the changes in sequence of operation (copy of minutes enclosed).

In view of above, the aforesaid plan is deleted from the Pendency list of CPAM Section.

CA-I Section is requested to take further necessary action at their end.

This issue has approval of Competent Authority

(I F Nagpal)  
Under Secretary (CPAM)

Encls: as above

Under Secretary  
CA-I Section  
Ministry of Coal

SANJIV KUMAR SINGH  
Recognised Qualified Person  
No. 34011/15/2009-CPAM  
Ministry of Coal, Govt.

पवन देव जामटा/PAWAN DEV JAMTA  
उप महाप्रबन्धक (वणिज्यिक)  
Deputy General Manager (Commercial)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

Approved by the Ministry of Coal, Government of India

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*[Signature]*  
Regional Controller of Mines  
Indian Bureau of Mines

*[Signature]*  
Prof. P.K. Benerjee  
Dept. of Mining Engineering,  
Indian School of Mines

*[Signature]*  
Regional Secretary  
Director (Technical),  
Ministry of Coal

*[Signature]*  
B. K. Chatterjee  
Director (TP&D),  
CMRD

*[Signature]*  
C. N. Prasad  
Director (Projects),  
Ministry of Coal

*[Signature]*  
R. P. Gupta  
Joint Secretary (CA-I),  
Ministry of Coal

*[Signature]*  
A. K. Singh  
Vice Chairman

*[Signature]*  
(And Swarn)  
Secretary, Ministry of Coal  
Chairman of the Standing Committee

*[Signature]*  
SANJIV KUMAR SINGH  
Recognised Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India

*[Signature]*  
Regional Controller of Mines  
Indian Bureau of Mines

*[Signature]*  
पवन देव जामरा/PAWAN DEVI  
उप महाप्रबन्धक (वाणिज्य)  
D. Deputy General Manager (Commercial)  
एन.टी.पी.सी. लिमिटेड / N.T.P.C. Limited  
EQC, Coal, Social & Environmental Affairs, New Delhi-110001



Sujit Gulati  
Director  
NTPC

U.O. No. 13016/2003-CA I  
Government of India  
Ministry of Coal  
Shashi Bhawan  
0240111

ANNEXURE - IA

Date: 24<sup>th</sup> August, 2005

Dear Shri Choudhary,

Kindly refer to your letter dated 23/24.5.2005. It has been decided in the Ministry that the block boundary to be allocated to NTPC should be the entire block of Pakri Barwadih, including the CBM area as also the unexplored western portion marked as 'A' in the map supplied by you and annexed to this letter.

Since, there is an overlap between CBM exploration areas given to ONGC/IOC and the coal block given to NTPC, this boundary will be communicated to NTPC with the condition that they shall render all necessary cooperation for proper exploration of CBM by the allottees of CBM blocks without any financial liability or other liabilities on the part of those who have CBM exploration licence.

Further, in order to have a harmonious and coordinated development of the area, both for coal mining as well as exploration/exploitation of CBM, this matter will be referred to the Joint Committee between the Ministry of Coal and Ministry of Petroleum and Natural Gas set up under the MOU of 1997 so that necessary information can be fed to the Joint Committee both by ONGC/IOC and NTPC about their plans so that proper coordinated planning can be done and issues, if any, sorted out in time. You may also inform NTPC accordingly.

With regards,

Yours sincerely,

(Sujit Gulati)

Shri S. Choudhary  
Chairman/Managing Director  
CMPDIL  
Narke Road  
Ranchi

Copy to the Chairman, NTPC, SCOPE Complex, Lodhi Road, New Delhi: for information. The allocation of Pakri Barwadih coal block to NTPC shall be subject to their rendering all necessary assistance and cooperation in the allotment of the overlapping CBM block for exploration/exploitation without any financial liability on the allottees of the CBM block and to render all necessary information/cooperation to the Joint Committee for coordinated exploration/exploitation of coal and CBM in the block of Pakri Barwadih.

(Signature)  
Senior Officer

(Signature)  
Sp. D. Sahai  
Recognised Qualified Person  
CP No. 34011/(15)/2004-CPAM

(Signature)  
SANJIV KUMAR SINGH  
Recognised Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India

(Signature)  
पवन देव जामटा/PAWAN DEV JAMTA  
उप महाप्रबन्धक (परिचालन)  
Deputy General Manager (Administration)  
एन टी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

vi) The mining lease will be awarded in the name of the NTPC or such separate Government company which may be formed with equity participation by NTPC.

vii) Violation of any of the conditions stipulated above on the part of NTPC or such separate Government Company in mining and disposing of coal from the Piku Barwadih coal block will render the mining lease liable for cancellation.

viii) NTPC may approach the CMPDIL to obtain the geological report of the block on payment of necessary exploration cost and obtain a mining lease to work the block as per the provisions of the MM (D&R) Act, 1957.

Yours faithfully,

(S. K. Kakkar)  
Under Secretary

*Sanjiv*

**SANJIV KUMAR SINGH**  
Recognised Qualified Person  
No. 347 12009-CPAM  
M...

SANJIV KUMAR SINGH  
Ran...  
No. 2...  
Ministry...

*W*  
...  
...  
...

*Pawan*  
**पवन देव जामटा/PAWAN DEV JAMTA**  
उप महाप्रबन्धक (वित्तिय) /  
Deputy General Manager (Commercial)  
एन टी पी सी लिमिटेड / NTPC Ltd.  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)



ANNEXURE-X

No. 14011/(15)2009-CPAM  
Government of India  
Ministry of Coal

Copy Date: 10/11/2015

227  
S. B. D. S. JAIN  
EXECUTIVE DIRECTOR (ENGL.)  
NTPC LIMITED,  
ENGINEERING OFFICE COMPLEX,  
PLOT NO. A-8A, SECTOR-24, POST BOX NO. 11,  
NOIDA-201301 (UTTAR PRADESH)

Subj: Grant of recognition as competent person to prepare Mining Plan for Coal/ Lignite Block

Sir,

I am directed to refer to your letter No. CC-PL/NTPC/ENGL/1000/11 dated 10/11/2015 on the above mentioned subject and to convey approval of the Central Government to the grant of recognition in favour of Shri Sanjiv Kumar Singh as competent person to prepare Mining Plan for Coal/Lignite block under Rule 22 of Mineral Concession Rule, 1961 for the assignment/works undertaken only by M/s. NTPC Limited up to 10 years from the date of issue of this order.


2. Your attention is also invited towards the decision of the Standing Committee that additional area beyond the block boundary may be considered in a mining plan subject to the condition that proper justification is given in the mining plan and that approved area does not coal bearing and does not infringe upon any already allotted or allotted coal/lignite blocks.

For the Director General  
Director General  
Ministry of Coal  
New Delhi

Yours faithfully,  
S. B. D. S. JAIN  
Executive Director (ENGL.)  
NTPC Limited

Sanjiv  
SANJIV KUMAR SINGH  
Recognised Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India

पवन देव जामटा/PAWAN DEV JAMTA  
उप महाप्रबन्धक (व्यापारिक)  
Deputy General Manager (Commercial)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

  
पवन देव जामटा/PAWAN DEV JAMTA  
उप महाप्रबन्धक (वाणिज्यिक)  
Dep. General Manager (Commercial)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EOC, A-5A, Sector-24, Noida-201301 (U.P.)



सेन्ट्रल माइन प्लानिंग एण्ड डिजाइन इंस्टीट्यूट लिमिटेड  
गोन्दवारा प्लेस, कान्के रोड, राँची - 834 008 (झारखण्ड) इन्डिया  
Central Mine Planning & Design Institute Limited  
Gondwana Place, Kanke Road, Ranchi - 834 008 (Jharkhand), INDIA



Ref. No. DG/693(A)/ 1095-96

Dt. 4<sup>th</sup> May '05


To  
Sri S.K. Gupta  
AGM(Uc-FM-CM)  
National Thermal Power Corpn. Ltd.  
Engineering Office Complex  
Plot No. A-8A, Sector-24,  
Post Box No. 13,  
NOIDA (U.P.)  
Pin-201301



Sub: **Geological Report of Pakri Barwadih Block**  
Ref: Your letter Nil dt. 2.5.05.

Dear Sir,

The copy of the Geological Report of Pakri Barwadih block is hereby being handed over to your representative. You are requested to kindly note that the above report may neither be reproduced in any form nor a copy of the same be handed over to any other person. However, you will be required to pay the full exploration cost once you hear from CMPDI in this regard.

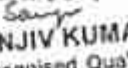
Yours faithfully,

  
(A. Mukherjee)  
Chief of Geology & Drilling


  
  
D.D. Sahai  
Recognised Qualified Person  
RQP No.-34011/(15)/2004-CPAM

☎ : (+91) 651 2230238, 2231852, 2231850, Fax : (+91) 651 2231851, 2231447, E-Mail : [cmpdihq@cmpdi.co.in](mailto:cmpdihq@cmpdi.co.in)  
Visit CMPDI Web page <http://www.cmpdi.co.in>

ANNEX-III/ 1/2  
526

  
SANJIV KUMAR SINGH  
Recognised Qualified Person  
No. 34011/(15)/2004-CPAM  
Ministry of Coal, Govt. of India  
उप महाप्रबन्धक (प्रादेशिक)  
Deputy General Manager (Regional)  
एन टी पी सी लिमिटेड / NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)



  
पवन देव जर्मटा/PAWAN DEV SAMANTA  
उप महाप्रबन्धक (व्यावसायिक)  
Deputy General Manager (Commercial)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

**ZONAL OFFICE  
EASTERN ZONE**

Ph. 0651-2290269, 2290399 (O)  
Fax 0651-2290269  
E-mail : zch\_madran@sanchamel.in



मिनरल एक्सप्लोरेशन कॉर्पोरेशन लि.  
(भारत सरकार का उद्यम)

**MINERAL EXPLORATION  
CORPORATION LIMITED**

(A Government of India Enterprise)  
Ancillary Chowk, Tupudana  
P.O. Hatia, District : Ranchi  
Jharkhand - 834 003

दिनांक: 30.10.2012

सं. 97/एम.ई.सी.एल./रांची/एनटीपीसी/2012-13/493  
सेवा में,  
श्री राजीव नंदन,  
अति. महाप्रबंधक (खनन)  
एन.टी.पी.सी. लिमिटेड  
पोस्ट-हजारीबाग- झारखंड-825301

Sub: Submission of Final Geological Report on Detailed Exploration  
for coal at Pakri Barwaridih-A Block, North Karanpura Coalfield,  
Distt. Hazaribagh, Jharkhand.

Sir,

Enclosed please find three sets in two volumes of "Final Geological Report on Detailed Exploration for Coal in Pakri Barwaridih-A Block, North Karanpura Coalfield, Distt. Hazaribagh, Jharkhand" for your kind perusal and further necessary action as per following details.

The Final Geological Report is in two volumes as under:

Volume-I Text & Annexures - Three Sets  
Volume-II Plates - Three Sets  
Kindly acknowledge the receipt.

Thanking you,

Encl. as above

भवदीय,

आंचलिक प्रबंधक  
पूर्वी अंचल, रांची


प्रतिलिपि:

1. श्री उपेंद्र राय, महाप्रबंधक (कोल माइनिंग), एन.टी.पी.सी., कॉर्पोरेट सेंटर, नोइडा (उ.प्र.), फेक्स नं. 0120-2410243/2410579।
2. महाप्रबंधक (गवेषण), एम.ई.सी.एल., नागपुर।
3. प्रभाग प्रमुख (टय.वि. एवं यो.), एम.ई.सी.एल., नागपुर।

**SANJIV KUMAR S.R.**  
Recognised Qualified Per  
No. 34011/(15)/2009-CP  
Ministry of Coal, Govt. of India

आंचलिक प्रबंधक  
पूर्वी अंचल, रांची

एन टी पी सी लिमिटेड  
General Manager (K. Sanchamel)  
एन टी पी सी लिमिटेड / NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

  
पवन देव जामटा/PAWAN DEV JAMTA  
उप महाप्रबन्धक (वाणिज्यिक)  
Deputy General Manager (Commercial)  
एन टी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)



09:18 HP LASERJET FAX  
001 2015 14 03 09:18 223631

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**cmpdi**

*A Min-Ratna Company*

सेन्ट्रल माईन्स प्लानिंग एण्ड डिजाइनिंग इन्स्टीट्यूट लिमिटेड  
(कोय इण्डिया लिमिटेड की अधुनस्थ कंपनी / भारत सरकार की एक सार्वजनिक  
उद्योगशास्त्र कंपनी, कार्गो रोड, राँची - 834 001, झारखंड (भारत))

Central Mine Planning & Design Institute Limited  
(A Subsidiary of Coal India Limited / Govt. of India Public Sector Undertaking)  
Gomohar Place, Kankar Road, Ranchi - 834 001, Jharkhand (INDIA)  
CORPORATE IDENTITY NUMBER - U14292JH1975501001223

पत्रांक संख्या: सीएमपीडीआई/सीजी/कंपटीक/139/1103

दिनांक 12.08.2015

सेवा में,

श्री मनीष उनीयाल,  
SO, CA-I,  
भारत सरकार,  
कोयला संचालन,  
शास्त्री भवन,  
नई दिल्ली - 110 115

Sub: Exploration cost of CMPDIL for Pakri Barwadih coal block - additional payment req.

महोदय,

With reference to your letter No.13016/29/2003-CA-I (Part) dated 16<sup>th</sup> July, 2015 on the above subject, it may be mentioned that CMPDI vide letter No.CMPDI/DG/Captive/139/752 dated 20.05.2016 addressed to Mr A.Sanjay Sahay, Under Secretary (Coal), MoC had communicated that Rs.1,50,80,373.00 is outstanding against NTPC on the basis of information available at that point of time. However, after receipt of the instant letter the matter was re-investigated and it was found that no additional payment is due with NTPC since the payment of Rs.15,82,75,462/- only has been deposited by NTPC before the datum line set by CMPDI vide its letter dated 14/15.02.2006. The matter may also be communicated to NTPC.

धन्यवाद,

भवदीय

*(Signature)*  
12.08.2015  
(अमिताभ दास)

महाप्रबन्धक (गवेषण)

COAL INDIA LIMITED  
Under Secretary  
Coal India Limited  
Gomohar Place, Kankar Road  
Ranchi - 834 001, Jharkhand  
(INDIA)

*(Signature)*  
SANJIV KUMAR SINHA  
Recognised Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India



फोन नम्बर / Phone No. +91 651 223631  
फैक्स नम्बर / Fax No. +91 651 2236875  
वेब साइट / Website Address: [www.cmpdi.co.in](http://www.cmpdi.co.in)

*(Signature)*  
पवन देव जामटा/PAWAN DEV JAMTA  
उप महाप्रबन्धक (वित्तियोग)  
Dep. General Manager (Finance)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201 301 (U.P.)

  
 पवन देव जगट/PAWAN DEV JAGAT  
 Deputy General Manager  
 एन टी पी सी लिमिटेड/NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)

No.34011/08/2011-CPAM  
Government of India  
Ministry of Coal

Shastri Bhavan,  
New Delhi, 20<sup>th</sup> April, 2012

To

Shri A K Dash  
Additional General Manager (PE-MPD)  
5<sup>th</sup> Floor, Engineering Office Complex, Sector-24,  
NTPC Limited, Noida -201301.  
**Fax No.0120-2410136, 37, Tele : 0120-2410102**

Subject :	Approval of Mine Closure Plan (January, 2012) for Pakri Barwadih Coal Block, District Hazaribagh, Jharkhand submitted by M/s NTPC Ltd.
-----------	--

Sir,

I am directed to refer to your letter No.CC:PEM:7010:MP:09 dated 31-01-2012 on the subject mentioned above and to say that the Mine Closure Plan (January 2012) to be read along with the party's letter dated 31-01-2012 has been considered by the Standing Committee and the approval of the Central Government is hereby conveyed under Section 5(2)(b) of the Mines & Minerals (Development & Regulation) Act, 1957 subject to the following conditions:

- (i) The mining company shall take all necessary precautions regarding safety of mine workings, persons deployed therein during the implementation of the Mine Closure Plan;
- (ii) Mining lease to be acquired shall not encroach into any other coal block.
- (iii) The approval of the mine closure plan is without prejudice to the requirement of approvals from competent/prescribed authority under the relevant rules/regulations, etc.


Two copies of the approved Mine Closure Plan duly signed by the competent authority are returned herewith with request that a copy of the approved Mine Closure Plan may be submitted to concerned State Government for necessary action and also a photocopy of the approved Mine Closure plan may be sent to the Coal Controller for the purpose of monitoring.

  
(V S Rana)  
Under Secretary (CPAM)  
Tele : 011 23073937  
Fax : 011 23073922  
Email : uscpam.mcc@nic.in

Encls : as above

Copy to : (i) The Under Secretary (CA-I). One copy of the approved Mine Closure Plan (January 2012) and company's letters dated 31-01-2012 are forwarded herewith.

(ii) The Director, Coal Controller, 1-Council House Street, Kolkata.

  
SANJIV KUMAR SINGH  
Recognised Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India



  
 पवन देव जामटा/PAWAN DEV JANTA  
 उपाय महाप्रबन्धक (वर्ग-2000)  
 Deputy General Manager (Class-2000)  
 एन टी पी सी लिमिटेड / NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)

REGD. NO. D. L. (N) 04/00/77/2003—05



प्राधिकार से प्रकाशित  
PUBLISHED BY AUTHORITY  
साप्ताहिक  
WEEKLY

भाग में चिन्न पुस्तक संख्या दी जाती है जिससे कि यह पुस्तक संकलन को रूप में रखा जा सके  
 Separate Paging is given to this Part in order that it may be filed as a separate compilation

PART II—Section 3—Sub-section (ii)

भारत सरकार के मंत्रालयों (रक्षा मंत्रालय को छोड़कर) द्वारा जारी किए गए राजपत्रिक आदेश और अधिसूचनाएं  
Statutory Orders and Notifications Issued by the Ministries of the Government of India  
(Other than the Ministry of Defence)

(1982)

**SANJIV KUMAR SINGH**  
Recognised Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India

पवन देव जामल/PAWAN DEV JAMTA  
उप महाप्रबंधक (निर्माण)  
Deputy General Manager (Construction)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

- B-C Line passes through eastern part of village Chhirpani, along partly common boundary of villages Bhamraha-Chhirpani, Bhamraha-Siguri, southern part of village Siguri, eastern part of village Amraha and meets at point 'C' on the common boundary of villages Amraha-Pathkhai.
- C-D Line passes through western part of village Pathkhai and meets at point 'D' on the common boundary of villages Pathkhai-Kelmaniya.
- D-A Line passes along partly common boundary of villages Kelmaniya-Pathkhai, western part of village Kelmaniya and meets at starting point 'A'.

(F. No. 430154/2012-PRW-1)

A. K. DAS, Under Secy

नई दिल्ली, 12 जून, 2012

✓ **आ.आ. 2096.**—केंद्रीय सरकार ने कोयला भूदक क्षेत्र (अर्जन और विकास) अधिनियम, 1957 (1957 का 20) (जिसे इसमें इसका संशोधन अधिनियम संख्या 7 का उपा-भाग (1) के अधीन जारी, भारत के राजपत्र, भाग-II, खंड 3, उपखंड (ii) में तारीख 26 अगस्त, 2011 में प्रकाशित भारत सरकार के कोयला मंत्रालय की अधिसूचना संख्या का.आ. 2267, तारीख 26 अगस्त, 2011 द्वारा इस अधिनियम में उपाखंड अनुसूची में विनिर्दिष्ट पश्चिमी की भूमि में, जिसका क्षेत्र 276.57 हेक्टेयर (लगभग) या 1904.17 एकड़ (लगभग) है, कोयले का खनन करने के अपने आदेश की सूचना दी थी ;

और, केंद्रीय सरकार का यह समाधान हो गया है, कि इस अधिसूचना में संलग्न अनुसूची में वर्णित जमीन भूमि के भाग में कोयला अधिनियम है।

आतः, अतः, केंद्रीय सरकार, कोयला भूदक क्षेत्र (अर्जन और विकास) अधिनियम, 1957 (1957 का 20) की धारा 7 की उपा-भाग (1) द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए, इससे संलग्न अनुसूची में वर्णित 697.98 हेक्टेयर (लगभग) या 1724.72 एकड़ (लगभग) जमीन की भूमि में सभी अधिकारों का अर्जन करने के अपने आदेश की सूचना देती है।

**टिप्पणी 1 :** इस अधिसूचना के अंतर्गत आने वाले क्षेत्र के रेखांक संख्या एनटीपीसी/सीएन/सीनएन :V/सीबीए/09/पीबी/051 तारीख 20 दिसम्बर, 2011 का प्रिंटिंग ड्राफ्ट, कालिका (सूचनाएं) के संशोधन में या कोयला विनियम, 1, काउंसिल ड्राफ्ट, कोलकाता-700001 के संशोधन में या कोयला विनियम, (डिप्टी सूरदा) एनटीपीसी डिप्टी, ब्रह्म उत्तर, आर एच डी भवन, फ्लोर-34, पोस्ट-201501 का उप महाप्रबंधक, एनटीपीसी लिमिटेड, एकरी कलकत्ता कोल कोर्टिंग प्रोसेस, उच्चतम सामग्री, पारितर्य, कालिका-825101 (डिप्टी) के कार्यालय में या मुख्य महाप्रबंधक (पर्यवेक्षण), सेंट्रल प्लान सर्विस ब्यूरो डिप्टी कलकत्ता, पौड्याना प्लान, कांके रीट रॉले का कोयला विनियम, 1, काउंसिल ड्राफ्ट, कोलकाता-700001 या कालिका-700001 और डिप्टी, कालिका-डिप्टी, ड्राफ्ट के संशोधन में किया जा सकता है।

**टिप्पणी 2 :** उक्त अधिनियम की धारा 8 के उपबंध की ओर ध्यान आकृष्ट किया जाता है जो निम्न उपबंध करता है :

**अर्जन के प्रति आदेश :-**

"(1) कोई व्यक्ति, जो किसी भूमि जिसकी सतह धारा 7 की उपा-भाग (1) के अधीन कोई अधिसूचना जारी की गई है, अधिसूचना जारी की जाने से दोष दिन के भीतर सम्पूर्ण भूमि या उसकी किसी भाग या ऐसी भूमि में या उस पर के किसी अधिकारों का अर्जन किए जाने के बाद से आदेश कर सकता है।

**स्पष्टीकरण :-**

(1) इस धारा के अंतर्गत यह आदेश नहीं मांग सकता कि कोई व्यक्ति किसी भूमि में कोयला उत्पादन के लिए स्वयं या अन्य व्यक्ति का काम करता है और ऐसी व्यक्ति कोयला उत्पादन या किसी अन्य कार्य को नहीं करने चाहिए।

(2) धारा 8 की उपा-भाग (1) के अधीन प्रत्येक आदेश, समस्त अधिकारों को लिखित रूप में किया जाएगा और समस्त अधिकारों, आवश्यकताओं को स्वयं सुने जाने का या लिखित रूप में सुने जाने का अवसर देगा और ऐसे सभी आदेशों को सुनने के पश्चात् और ऐसी अधिकारों और, यदि कोई हो, करने के पश्चात् जो वह आवश्यक समझता है, वह या तो धारा 7 की उपा-भाग (1) के अधीन अधिसूचित भूमि के या ऐसी भूमि में या उस पर के संबंध में एक रिपोर्ट या ऐसी भूमि के विभिन्न टुकड़ों या ऐसी भूमि में या उस पर के अधिकारों के संबंध में आदेशों या अपनी सिफारिशों और उसके द्वारा या गैर कार्यवाही के अधिलेख सहित लिखित रिपोर्ट कोयला सरकार को उसके विनिर्देश के लिए देगा।

(3) इस धारा के प्रयोग के लिए वह व्यक्ति किसी भूमि में लिखित समझ जाएगा जो अंतर्गत में दित का दावा करने का हकदार होता, या जो भूमि या किसी ऐसी भूमि में या उस पर के अधिकार इस अधिनियम के अधीन अधिनियम कर लिए जाते हैं।"

2012 के अनुसार 18 मार्च  
कोयला विनियम, 1957  
कोयला विनियम, 1957  
कोयला विनियम, 1957  
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EOC, A-8A, Sector-24, Noida-201301 (U.P.)



विषय 3 : संघीय सरकार ने कोयला नियंत्रण, 1, काठमांडू हाउस नं. 1, कोयला-700001 को उक्त अधिनियम की धारा 3 के अंतर्गत धारा 10 के तहत धारा-11, खंड 3, उपखंड (ii) तारीख 9 दिसम्बर, 2006 में प्रकाशित अधिसूचना में जो जो 3629, (वि) कोयला अधिनियम के तहत धारा-11, खंड (3), उपखंड (ii) में उल्लिखित का. नं. 2307 तारीख 15 अगस्त, 2007 द्वारा संशोधित किया गया था, द्वारा संशोधित अधिनियम के रूप में विस्तृत किया है।

अनुसूची

पकरी बरवाडी कोल बाहुनिय बर्लीक फेज-V

साथी बजरपुरा कोलफील्ड्स

जिला-हुजारीबाग, झारखंड

(रेखांक झंजटा-एनटीपीसी-चोरम/सेवरान IV /लेबीड/06/बीबी/051, तारीख 20 दिसम्बर, 2011)

साथी अधिकार :

(क) राजस्व भूमि :

क्रम नं.	राज्य का नाम	खंड नं.	खाना	जिला	क्षेत्रफल		रिप्लेस
					हेक्टेयर	एकर	
1.	केलु	32	कोरेडारी	हुजारीबाग	7.29	18.00	भाग
2.	बडाबोरा	33	कोरेडारी	हुजारीबाग	50.58	124.04	भाग
3.	बोरियालू	42	कोरेडारी	हुजारीबाग	12.82	31.68	भाग
4.	जमरा	43	कोरेडारी	हुजारीबाग	22.10	54.61	भाग
5.	बजरिया	44	कोरेडारी	हुजारीबाग	20.23	50.00	भाग
6.	बराडीह	45	कोरेडारी	हुजारीबाग	6.87	15.80	भाग
7.	बिराणा	46	कोरेडारी	हुजारीबाग	57.43	141.92	भाग
8.	पकरी बरवाडीह	56	बजरिया	हुजारीबाग	308.46	755.10	भाग
कुल (संग्रह)					384.96	951.10	

(ख) वन भूमि (अधिसूचित/गैर-अधिसूचित/जंगल-प्रणाली) :

क्रम नं.	राज्य का नाम	खंड नं.	खाना	जिला	क्षेत्रफल		रिप्लेस
					हेक्टेयर	एकर	
1.	केलु	32	कोरेडारी	हुजारीबाग	6.48	16.00	भाग
2.	बडाबोरा	33	कोरेडारी	हुजारीबाग	20.11	49.68	भाग
3.	बोरियालू	42	कोरेडारी	हुजारीबाग	202.28	500.40	भाग
4.	जमरा	43	कोरेडारी	हुजारीबाग	0.92	2.29	भाग
5.	बजरिया	44	कोरेडारी	हुजारीबाग	30.98	76.57	भाग
6.	बराडीह	45	कोरेडारी	हुजारीबाग	20.23	50.00	भाग
7.	बिराणा	46	कोरेडारी	हुजारीबाग	21.48	53.07	भाग
8.	पकरी बरवाडीह	56	बजरिया	हुजारीबाग	4.52	11.17	भाग
कुल (संग्रह)					243.00	600.12	

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EOG, A-5A, Sector-24, Noida-201301



- 484, 485, 486, 487, 488, 490, 491, 492, 493, 494, 495, 496, 498, 499, 500, से गुजरती हुई न्यायिक एवं के बिन्दु "ए" पर समाप्त होती है।
5. रेखा 48-49: रेखा बिन्दु "ए" न्यायिक एवं के उत्तर-पूर्व किनारे पर स्थित है और प्लॉट संख्या 13, 23, 42, 24, 25 से गुजरती हुई न्यायिक एवं के बिन्दु "ए" पर समाप्त होती है।
6. रेखा 49-50: रेखा बिन्दु "ए" न्यायिक एवं के उत्तर किनारे पर स्थित है और उत्तर-पूर्व की ओर प्लॉट संख्या 27, 6 और 27 से गुजरती हुई इसी एवं के बिन्दु "ए" पर समाप्त होती है।
7. रेखा 50-51: रेखा बिन्दु "ए" न्यायिक एवं के उत्तरी किनारे पर स्थित है और उत्तर-पूर्व की ओर प्लॉट संख्या 27 से गुजरती हुई इसी एवं के बिन्दु "ए" पर समाप्त होती है।
8. रेखा 51-52: रेखा बिन्दु "ए" न्यायिक एवं के उत्तरी-पूर्व किनारे पर स्थित है और एवं सिमा की उत्तर-पूर्व की ओर प्लॉट संख्या 38, 137, 139, 152, 153, 143 और 146 से गुजरती हुई सिमा एवं के बिन्दु "ए" पर समाप्त होती है।
9. रेखा 52-53: रेखा बिन्दु "ए" सिमा एवं के उत्तर किनारे पर स्थित है और एवं सिमा के उत्तर-पश्चिम की ओर प्लॉट संख्या 143, 149, 150, 141, 137 से गुजरती हुई इसी एवं के बिन्दु "ए" पर समाप्त होती है।
10. रेखा 53-54: रेखा बिन्दु "ए" सिमा एवं के उत्तर किनारे पर स्थित है और एवं की ओर प्लॉट संख्या 137, 113, 142, 144, 243 से गुजरती हुई इसी एवं के बिन्दु "ए" पर समाप्त होती है।
11. रेखा 54-55: रेखा बिन्दु "ए" सिमा एवं के पूर्वी किनारे पर स्थित है और दक्षिण-पूर्व की ओर प्लॉट संख्या 243 से गुजरती हुई इसी एवं के बिन्दु "ए" पर समाप्त होती है।
12. रेखा 55-56: रेखा बिन्दु "ए" सिमा एवं के दक्षिण-पूर्वी किनारे पर स्थित है और दक्षिण-पश्चिम की ओर प्लॉट संख्या 243, 247, 252, 253, 254, 255, 256, 257, 258, 259, 266, 295, 296 से गुजरती हुई इसी एवं के बिन्दु "ए" पर समाप्त होती है।
13. रेखा 56-57: रेखा बिन्दु "ए" सिमा एवं के दक्षिण-पूर्वी किनारे पर स्थित है और दक्षिण की ओर प्लॉट संख्या 1636 से गुजरती हुई इसी एवं के बिन्दु "ए" पर समाप्त होती है।
14. रेखा 57-58: रेखा बिन्दु "ए" दक्षिण एवं के उत्तर-पूर्वी किनारे पर स्थित है और दक्षिण-पूर्व की ओर प्लॉट संख्या 1636 और 1692 से गुजरती हुई इसी एवं के बिन्दु "ए" पर समाप्त होती है।
15. रेखा 58-59: रेखा बिन्दु "ए" दक्षिण एवं के उत्तर-पूर्वी किनारे पर स्थित है और दक्षिण की ओर प्लॉट संख्या 1636, 1691, 1699, 1698 से गुजरती हुई इसी एवं के बिन्दु "ए" पर समाप्त होती है।
16. रेखा 59-60: रेखा बिन्दु "ए" दक्षिण एवं के पूर्वी किनारे पर स्थित है और दक्षिण की ओर प्लॉट संख्या 1636 से गुजरती हुई इसी एवं के बिन्दु "ए" पर समाप्त होती है।
17. रेखा 60-61: रेखा बिन्दु "ए" दक्षिण एवं के दक्षिण-पूर्वी किनारे पर स्थित है और दक्षिण-पश्चिम की ओर प्लॉट संख्या 1636 और 1685 से गुजरती हुई इसी एवं के बिन्दु "ए" पर समाप्त होती है।
18. रेखा 61-62: रेखा बिन्दु "ए" दक्षिण एवं के दक्षिण-पूर्वी किनारे पर स्थित है और दक्षिण की ओर प्लॉट संख्या 1643 से गुजरती हुई इसी एवं के बिन्दु "ए" पर समाप्त होती है।
19. रेखा 62-63: रेखा बिन्दु "ए" दक्षिण एवं के दक्षिण-पूर्वी किनारे पर स्थित है और दक्षिण की ओर प्लॉट संख्या 1643 से गुजरती हुई इसी एवं के बिन्दु "ए" पर समाप्त होती है।
20. रेखा 63-64: रेखा बिन्दु "ए" दक्षिण एवं के दक्षिण-पूर्वी किनारे पर स्थित है और उत्तर की ओर दक्षिण एवं के प्लॉट संख्या 1643 और 1651 से गुजरती हुई इसी एवं के बिन्दु "ए" पर समाप्त होती है।
21. रेखा 64-65: रेखा बिन्दु "ए" दक्षिण एवं के दक्षिण किनारे पर स्थित है और दक्षिण-पश्चिम की ओर प्लॉट संख्या 152 से गुजरती हुई इसी एवं के बिन्दु "ए" पर समाप्त होती है।
22. रेखा 65-66: रेखा बिन्दु "ए" दक्षिण एवं के दक्षिण-पश्चिम किनारे पर स्थित है और उत्तर-पश्चिम की ओर प्लॉट संख्या 61 से गुजरती हुई इसी एवं के बिन्दु "ए" पर समाप्त होती है।
23. रेखा 66-67: रेखा बिन्दु "ए" दक्षिण एवं के दक्षिण-पश्चिम किनारे पर स्थित है और दक्षिण-पश्चिम की ओर प्लॉट संख्या 61 से गुजरती हुई इसी एवं के बिन्दु "ए" पर समाप्त होती है।

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एन टी पी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)



24. रेखा २२३-२२४:- रेखा बिन्दु "२२३" बरियामु गांव के दक्षिण-पश्चिम किनारे पर स्थित है और उत्तर-पश्चिम की ओर प्लॉट संख्या ८१ से गुजरती हुई इसी गांव के बिन्दु "२२४" पर समाप्त होती है ।
25. रेखा २२४-२२५:- रेखा बिन्दु "२२४" बरियामु गांव के पश्चिम किनारे पर स्थित है और जवरा गांव के दक्षिण-पश्चिम की ओर प्लॉट की संख्या 130, 113, 109, 108, 107, 98 से गुजरती हुई बरियामु गांव के बिन्दु "२२५" पर समाप्त होती है ।
26. रेखा २२५-२२६:- रेखा बिन्दु "२२५" ग्राम जवरा के दक्षिण-पश्चिम किनारे पर स्थित है और दक्षिण-पश्चिम की ओर कंदावा गांव के प्लॉट संख्या 682, 683, 684 से गुजरती हुई कंदावा गांव के बिन्दु "२२६" पर समाप्त होती है ।
27. रेखा २२६-२२७:- रेखा बिन्दु "२२६" ग्राम कंदावा के दक्षिण किनारे पर स्थित है और उत्तर-पश्चिम की ओर बेलतु गांव के प्लॉट संख्या 60, 1975, 62, 63, 64, 68, 69 और 66 से गुजरती हुई बेलतु गांव के बिन्दु "२२७" पर समाप्त होती है ।
28. रेखा २२७-२२८:- रेखा बिन्दु "२२७" ग्राम बेलतु के उत्तर-पश्चिम किनारे पर स्थित है और उत्तर-पश्चिम की ओर बंदावा गांव के प्लॉट संख्या 464, 510, 520, 521, 513, 515, 484 से गुजरती हुई इसी गांव के बिन्दु "२२८" पर समाप्त होती है ।
29. रेखा २२८-२२९:- रेखा बिन्दु "२२८" ग्राम बंदावा के पश्चिम किनारे पर स्थित है और उत्तर-पश्चिम की ओर बेलतु गांव के प्लॉट संख्या 60, 124, 84, 121, 120, 119, 105, 106, 107, 114, 110, 141 से गुजरती हुई इसी गांव के बिन्दु "२२९" पर समाप्त होती है ।
30. रेखा २२९-२३०:- रेखा बिन्दु "२२९" ग्राम बेलतु के उत्तर-पश्चिम किनारे पर स्थित है और उत्तर-पश्चिम की ओर कंदावा गांव के प्लॉट संख्या 484, 454, 456 से गुजरती हुई इसी गांव के बिन्दु "२३०" पर समाप्त होती है ।

"भाग-बो" का उचित वर्णन:

1. रेखा की सी1:- रेखा बिन्दु "सी 1" ग्राम पकरी बरखडोह के उत्तरी-पश्चिम किनारे पर स्थित है और इसी गांव के पूर्व की ओर प्लॉट संख्या 1950, 1913 से गुजरती हुई इसी गांव के बिन्दु "सी 2" पर समाप्त होती है ।
2. रेखा की सी2:- रेखा बिन्दु "सी 1" ग्राम पकरी बरखडोह के उत्तरी-पश्चिम किनारे पर स्थित है और इसी गांव के उत्तरी-पूर्व की ओर प्लॉट संख्या 1933, 1923, 1918 से गुजरती हुई इसी गांव के बिन्दु "सी 2" पर समाप्त होती है ।
3. रेखा की सी3:- रेखा बिन्दु "सी 2" ग्राम पकरी बरखडोह के उत्तरी-पश्चिम किनारे पर स्थित है और इसी गांव के दक्षिणी-पूर्व की ओर प्लॉट संख्या 1918, 1919, 1920 से गुजरती हुई इसी गांव के बिन्दु "सी 3" पर समाप्त होती है ।
4. रेखा की सी4:- रेखा बिन्दु "सी 3" ग्राम पकरी बरखडोह के उत्तरी-पश्चिम किनारे पर स्थित है और इसी गांव के दक्षिण की ओर प्लॉट संख्या 1920 से गुजरती हुई इसी गांव के बिन्दु "सी 4" पर समाप्त होती है ।
5. रेखा की सी5:- रेखा बिन्दु "सी 4" ग्राम पकरी बरखडोह के उत्तरी-पश्चिम किनारे पर स्थित है और इसी गांव के दक्षिणी-पूर्व की ओर प्लॉट संख्या 1920, 1921, 1922, 1937 से गुजरती हुई इसी गांव के बिन्दु "सी 5" पर समाप्त होती है ।
6. रेखा की सी6:- रेखा बिन्दु "सी 5" ग्राम पकरी बरखडोह के उत्तरी-पश्चिम किनारे पर स्थित है और इसी गांव के उत्तर की ओर प्लॉट संख्या 1937, 1939, 1940, 1943, 1944, 1945, 1946, 1947, 1948, 1949 से गुजरती हुई इसी गांव के बिन्दु "सी 6" पर समाप्त होती है ।
7. रेखा की सी7:- रेखा बिन्दु "सी 6" ग्राम पकरी बरखडोह के उत्तरी-पश्चिम किनारे पर स्थित है और इसी गांव के उत्तर की ओर प्लॉट संख्या 1949, 1950 से गुजरती हुई इसी गांव के बिन्दु "सी 7" पर समाप्त होती है ।
8. रेखा की सी8:- रेखा बिन्दु "सी 7" ग्राम पकरी बरखडोह के उत्तरी-पश्चिम किनारे पर स्थित है और इसी गांव के दक्षिणी-पूर्व की ओर प्लॉट संख्या 1949, 1950, 1951, 1952 से गुजरती हुई इसी गांव के बिन्दु "सी 8" पर समाप्त होती है ।
9. रेखा की सी9:- रेखा बिन्दु "सी 8" ग्राम पकरी बरखडोह के उत्तरी-पश्चिम किनारे पर स्थित है और इसी गांव के उत्तरी-पूर्व की ओर प्लॉट संख्या 1952, 1953, 1954, 1955 से गुजरती हुई इसी गांव के बिन्दु "सी 9" पर समाप्त होती है ।
10. रेखा की सी10:- रेखा बिन्दु "सी 9" ग्राम पकरी बरखडोह के उत्तरी-पश्चिम किनारे पर स्थित है और इसी गांव के दक्षिणी-पूर्व की ओर प्लॉट संख्या 1952, 1953 से गुजरती हुई इसी गांव के बिन्दु "सी 10" पर समाप्त होती है ।
11. रेखा की सी11:- रेखा बिन्दु "सी 10" ग्राम पकरी बरखडोह के उत्तरी-पश्चिम किनारे पर स्थित है और इसी गांव के दक्षिणी-पूर्व की ओर प्लॉट संख्या 1953, 1954, 1955, 1956 से गुजरती हुई इसी गांव के बिन्दु "सी 11" पर समाप्त होती है ।

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पवन देव जामटा PAVAN DEV JAMTA  
उप महाप्रबन्धक (कार्बोनाइड)  
Deputy General Manager (Coal)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EGC, A-8A, Sector-24, Noida-201301 (U.P.)

12. रेखा बी11-बी12:- रेखा बिन्दु "बी 11" ग्राम पकरी बरवाडीह के उत्तरी परिवर्धन किनारे पर स्थित है और इसी गांव के उत्तरी पूर्वी को और पश्चिम संख्या 2125, 2127, 2130, 1718, 1154 से गुजरती हुई इसी गांव के बिन्दु "बी 12" पर समाप्त होती है।
13. रेखा बी12-बी13:- रेखा बिन्दु "बी 12" ग्राम पकरी बरवाडीह के उत्तरी किनारे पर स्थित है और इसी गांव के पूर्वी को और पश्चिम संख्या 1154, 1137, 1136, 1134, 1133, 1132 से गुजरती हुई इसी गांव के बिन्दु "बी 13" पर समाप्त होती है।
14. रेखा बी13-बी14:- रेखा बिन्दु "बी 13" ग्राम पकरी बरवाडीह के उत्तरी किनारे पर स्थित है और इसी गांव के दक्षिणी पूर्वी को और पश्चिम संख्या 1132, 1128 से गुजरती हुई इसी गांव के बिन्दु "बी 14" पर समाप्त होती है।
15. रेखा बी14-बी15:- रेखा बिन्दु "बी 14" ग्राम पकरी बरवाडीह के उत्तरी-पूर्व किनारे पर स्थित है और इसी गांव के दक्षिणी-पूर्व को और पश्चिम संख्या 1128, 1041 से गुजरती हुई इसी गांव के बिन्दु "बी 15" पर समाप्त होती है।
16. रेखा बी15-बी16:- रेखा बिन्दु "बी 15" ग्राम पकरी बरवाडीह के पूर्व किनारे पर स्थित है और इसी गांव के दक्षिणी पूर्वी को और पश्चिम संख्या 1041 से गुजरती हुई इसी गांव के बिन्दु "बी 16" पर समाप्त होती है।
17. रेखा बी16-बी17:- रेखा बिन्दु "बी 16" ग्राम पकरी बरवाडीह के पूर्व किनारे पर स्थित है और इसी गांव के दक्षिणी पूर्वी को और पश्चिम संख्या 1041, 1432 से गुजरती हुई इसी गांव के बिन्दु "बी 17" पर समाप्त होती है।
18. रेखा बी17-बी18:- रेखा बिन्दु "बी 17" ग्राम पकरी बरवाडीह के पूर्व किनारे पर स्थित है इसी गांव के दक्षिणी पूर्वी को और पश्चिम संख्या 1432, 1449 से गुजरती हुई इसी गांव के बिन्दु "बी 18" पर समाप्त होती है।
19. रेखा बी18-बी19:- रेखा बिन्दु "बी 18" ग्राम पकरी बरवाडीह के पूर्व किनारे पर स्थित है और इसी गांव के दक्षिणी परिवर्धन की ओर पश्चिम संख्या 1449 से गुजरती हुई इसी गांव के बिन्दु "बी 19" पर समाप्त होती है।
20. रेखा बी19-बी20:- रेखा बिन्दु "बी 19" ग्राम पकरी बरवाडीह के दक्षिणी-पूर्व किनारे पर स्थित है और इसी गांव के दक्षिणी-परिवर्धन की ओर पश्चिम संख्या 1449 से गुजरती हुई इसी गांव के बिन्दु "बी 20" पर समाप्त होती है।
21. रेखा बी20-बी21:- रेखा बिन्दु "बी 20" ग्राम पकरी बरवाडीह के दक्षिणी पूर्व किनारे पर स्थित है और इसी गांव के दक्षिणी परिवर्धन की ओर पश्चिम संख्या 1449 से गुजरती हुई इसी गांव के बिन्दु "बी 21" पर समाप्त होती है।
22. रेखा बी21-बी22:- रेखा बिन्दु "बी 21" ग्राम पकरी बरवाडीह के दक्षिणी-पूर्व किनारे पर स्थित है और इसी गांव के दक्षिणी परिवर्धन की ओर पश्चिम संख्या 1449 से गुजरती हुई इसी गांव के बिन्दु "बी 22" पर समाप्त होती है।
23. रेखा बी22-बी23:- रेखा बिन्दु "बी 22" ग्राम पकरी बरवाडीह के दक्षिणी पूर्व किनारे पर स्थित है और इसी गांव के दक्षिणी पूर्वी को और पश्चिम संख्या 1449 से गुजरती हुई इसी गांव के बिन्दु "बी 23" पर समाप्त होती है।
24. रेखा बी23-बी24:- रेखा बिन्दु "बी 23" ग्राम पकरी बरवाडीह के दक्षिणी पूर्व किनारे पर स्थित है और इसी गांव के परिवर्धन की ओर पश्चिम संख्या 1449, 2464 से गुजरती हुई इसी गांव के बिन्दु "बी 24" पर समाप्त होती है।
25. रेखा बी24-बी25:- रेखा बिन्दु "बी 24" ग्राम पकरी बरवाडीह के दक्षिणी पूर्व किनारे पर स्थित है और इसी गांव के उत्तरी पूर्वी को और पश्चिम संख्या 2464 से गुजरती हुई इसी गांव के बिन्दु "बी 25" पर समाप्त होती है।
26. रेखा बी25-बी26:- रेखा बिन्दु "बी 25" ग्राम पकरी बरवाडीह के दक्षिणी पूर्व किनारे पर स्थित है और इसी गांव के उत्तरी-परिवर्धन की ओर पश्चिम संख्या 2464, 2438, 2436, 2379 से गुजरती हुई इसी गांव के बिन्दु "बी 26" पर समाप्त होती है।
27. रेखा बी26-बी27:- रेखा बिन्दु "बी 26" ग्राम पकरी बरवाडीह के दक्षिणी किनारे पर स्थित है और इसी गांव के दक्षिणी परिवर्धन की ओर पश्चिम संख्या 2379, 2375, 2468 से गुजरती हुई इसी गांव के बिन्दु "बी 27" पर समाप्त होती है।
28. रेखा बी27-बी28:- रेखा बिन्दु "बी 27" ग्राम पकरी बरवाडीह के दक्षिणी किनारे पर स्थित है और इसी गांव के परिवर्धन की ओर पश्चिम संख्या 2468, 2374, 2365 से गुजरती हुई इसी गांव के बिन्दु "बी 28" पर समाप्त होती है।
29. रेखा बी28-बी29:- रेखा बिन्दु "बी 28" ग्राम पकरी बरवाडीह के दक्षिणी किनारे पर स्थित है और इसी गांव के उत्तरी परिवर्धन की ओर पश्चिम संख्या 2365, 2362 से गुजरती हुई इसी गांव के बिन्दु "बी 29" पर समाप्त होती है।
30. रेखा बी29-बी30:- रेखा बिन्दु "बी 29" ग्राम पकरी बरवाडीह के दक्षिणी किनारे पर स्थित है और इसी गांव के उत्तरी परिवर्धन की ओर पश्चिम संख्या 2362, 2361, 2359, 2358, 2325, 1324 से गुजरती हुई इसी गांव के बिन्दु "बी 30" पर समाप्त होती है।

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*Pawan*  
**पवन देव जायसवाल/PWAN DEV JANTA**  
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31. रेखा बी30-बी31:- रेखा बिन्दु "बी 30" ग्राम एकरी बरसाही के दक्षिणी किनारे पर स्थित है और इसी गांव के उत्तरी पश्चिम की ओर फॉट संख्या 2324, 2323, 2276, 2275, 2274, 2273 से जुड़ा हुआ इसी गांव के बिन्दु "बी 31" पर समाप्त होती है ।
32. रेखा बी31-बी32: रेखा बिन्दु "बी 31" ग्राम एकरी बरसाही के दक्षिणी पश्चिम किनारे पर स्थित है और इसी गांव के उत्तरी पूर्व की ओर फॉट संख्या 2273, 2274 से जुड़ा हुआ इसी गांव के बिन्दु "बी 32" पर समाप्त होती है ।
33. रेखा बी31-बी 33:- रेखा बिन्दु "बी 32" ग्राम एकरी बरसाही के दक्षिणी पश्चिम किनारे पर स्थित है और इसी गांव के उत्तरी पश्चिम की ओर फॉट संख्या 2274, 2270, 2269 से जुड़ा हुआ इसी गांव के बिन्दु "बी 33" पर समाप्त होती है ।
34. रेखा बी31-बी 34:- रेखा बिन्दु "बी 33" ग्राम एकरी बरसाही के दक्षिणी पश्चिम किनारे पर स्थित है और इसी गांव के उत्तरी पूर्व की ओर फॉट संख्या 2269, 2268 से जुड़ा हुआ इसी गांव के बिन्दु "बी 34" पर समाप्त होती है ।
35. रेखा बी34-बी 35:- रेखा बिन्दु "बी 34" ग्राम एकरी बरसाही के दक्षिणी पश्चिम किनारे पर स्थित है और इसी गांव के उत्तरी पश्चिम की ओर फॉट संख्या 2268, 2251, 2250 से जुड़ा हुआ इसी गांव के बिन्दु "बी 35" पर समाप्त होती है ।
36. रेखा बी35-बी36:- रेखा बिन्दु "बी 35" ग्राम एकरी बरसाही के दक्षिणी पश्चिम किनारे पर स्थित है और इसी गांव के उत्तरी पश्चिम की ओर फॉट संख्या 2250, 2218, 2216, 2033, 2032, 2028, 2029 से जुड़ा हुआ इसी गांव के बिन्दु "बी 36" पर समाप्त होती है ।
37. रेखा बी36-बी 37: रेखा बिन्दु "बी 36" ग्राम एकरी बरसाही के दक्षिणी पश्चिम किनारे पर स्थित है और इसी गांव के दक्षिणी-पश्चिम की ओर फॉट संख्या 2029, 2025, 2023, 2022, 2021, 2020 से जुड़ा हुआ इसी गांव के बिन्दु "बी 37" पर समाप्त होती है ।
38. रेखा बी37-बी38: रेखा बिन्दु "बी 37" ग्राम एकरी बरसाही के दक्षिणी पश्चिम किनारे पर स्थित है और इसी गांव के उत्तरी पश्चिम की ओर फॉट संख्या 2023, 2019, 1950 से जुड़ा हुआ इसी गांव के बिन्दु "बी 38" पर समाप्त होती है ।
39. रेखा बी 38-बी39:- रेखा बिन्दु "बी 38" ग्राम एकरी बरसाही के दक्षिणी पश्चिम किनारे पर स्थित है और इसी गांव के उत्तरी पूर्व की ओर फॉट संख्या 1950 से जुड़ा हुआ इसी गांव के बिन्दु "बी 39" पर समाप्त होती है ।
40. रेखा बी39-बी:- रेखा बिन्दु "बी 39" ग्राम एकरी बरसाही के पश्चिमी किनारे पर स्थित है और इसी गांव के उत्तरी पश्चिम की ओर फॉट संख्या 1950 से जुड़ा हुआ इसी गांव के बिन्दु "बी" पर समाप्त होती है ।

[पत्र सं. 43015/2/2011 पीआरआई/एनए]

Dr. K. Rama, MD, PhD, FRCGS

New Delhi, the 12th June, 2012

S.O. 2096.— Whereas by the notification of the Government of India in the Ministry of Coal number S.O.2267, dated 26th August, 2011 issued under sub-Section (1) of Section 4 of the Coal Bearing Areas, (Acquisition and Development) Act, 1957 (26 of 1957) (hereinafter referred to as the said Act) and published in the Gazette of India, Part-II, Section-3, sub-section (ii), dated 27th August, 2011, the Central Government gave notice of its intention to prospect the coal in 774.57 hectares (approximately) or 1904.07 acres (approximately) of the land in the locality specified in the schedule annexed to this notification;

And, whereas the Central Government is satisfied that coal is exportable to a part of the said lands shown in the schedule appended to this notification,

Now, therefore, in exercise of the powers conferred by sub-section (1) of Section 7 of the Central Areas Acquisition & Development Act, 1957 (20 of 1957), the Central Government hereby gives the notice of its intention to acquire the land measuring 697.95 hectares (approximately) or 1724.72 acres (approximately) in all rights in the schedule appended hereto.

**Note 1:** The plan bearing number NEPC/CM/Sl-C IV/CB/A09/B051 dated the 26th December, 2014 of the area covered by this notification may be inspected at the office of the Deputy Commissioner, Hazratnagar, Bhadrakhol, District-1, Pukhri Haridwar Coal Mining Project, NEPC Limited, Upadhyay Complex, Dargah Road, Hazratnagar, K-253014 (Haridwar) or at the office of the Coal Controller, V, Council House Street, Kolkata - 700001 or at the office of the E&M (Min.) Pukhri Haridwar Coal Mining Project, NEPC Limited, Upadhyay Complex, Dargah Road, Hazratnagar, K-253014 (Haridwar) or at the office of the IED (Fuel Security) - NEPC Limited, Room-123, 6th Floor, E&M Building, Sector-24, Noida-201301 or at the office of the Chief General Manager (Exploration Division), Central Mine Planning & Design Institute, Gondwana Place, Kanke Road, Ranchi (Jharkhand) or at the office of the Coal Controller, V, Council House Street, Kolkata-700001 or at the office District Collector & Magistrate, District - Hazratnagar, Bhadrakhol.

**SANJIV KUMAR SINGH**  
Recognised Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India

**PAWAN DEVI JAIN**  
Dep. General Manager (Commercial)  
**NTPC LIMITED**  
EOC-A-8A Sector-24, Noida-201301 (U.P.)



**Note 2** Attention is hereby invited to the provision of Section 8 of the said Act which provides as follows:

**Objection to acquisition:**

"8. (1) Any person interested in any land in respect of which a notification under section 7(1) has been issued may, within thirty days of the issue of the notification, object to the acquisition of the whole or any part of the land or of any rights in or over such land.

**Explanation:-**

(1) It shall not be an objection within the meaning of the section for any person to say that he himself desires to undertake mining operation in the land for the production of the coal and those operations should not be undertaken by the Central Government or by any other person.

(2) Every objection under sub-section (1) shall be made to the Competent Authority in writing and the Competent Authority shall give the objector an opportunity of being heard either in person or by a legal practitioner and shall, after hearing all such objections and after making such further inquiry, if any, as he thinks necessary, either make a report in respect of the land which has been notified under sub-section (1) of Section 7 or of rights in or over such land, or make different reports in respect of different parcels of such lands or of rights in or over such land, to the Central Government, containing his recommendations on the objections together with the record of proceedings laid by him for the decision of the Government.

(3) For the purpose of this section, a person shall be deemed to be interested in land who would be entitled to claim an interest in compensation if the land or any rights in or over such land were acquired under this Act."

**Note 3:** The Coal Controller (Colonial House Street, Kolkata-700001), has been appointed by the Central Government as the Competent Authority under the Section 7 of the said Act vide notification number S.O. 3629, published in part-II Section(3), sub-section (ii) of the Gazette of India dated 9th September, 2006, which was subsequently amended vide number S.O. 2307, published in part-II Section(3), sub-section (ii) of the Gazette of India dated 18th August, 2007.

**SCHEDULE**

Patal Barwadih Coal Mining Block Phase- V  
North Karanpura Coalfields  
District: Hazaribagh, Jharkhand

(first hearing number MTPU/CUM/S/CTV/CTBA/09/13/031, dated the 20th December, 2011)

**All Rights:**

**(A) REVENUE LAND:**

Sl. No.	Village	Thana number	Thana	District	Area (approximately)		Remarks
					hectare	acres	
1	Bethi	32	Korodan	Hazaribagh	7.29	18.00	Part
2	Kandahar	33	Korodan	Hazaribagh	50.58	124.09	Part
3	Haryana	42	Korodan	Hazaribagh	12.82	31.68	Part
4	Jahra	43	Korodan	Hazaribagh	22.10	54.61	Part
5	Haryana	44	Korodan	Hazaribagh	20.23	50.00	Part
6	Narpatdi	45	Korodan	Hazaribagh	6.07	15.00	Part
7	Sarna	46	Korodan	Hazaribagh	52.43	129.95	Part
8	Patal Barwadih	46	Harkagan	Hazaribagh	208.46	515.10	Part
Total (approximately)					384.98	951.36	

**SANJIV KUMAR SINGH**  
Recognised Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India

## (D) FOREST LAND (Notified / On-Notified / Jungle - Jind)

Sl. No.	Village	Thana number	Thana	District	Area (approximately)		Remark
					hectare	acre	
1	Daha	32	Kerodari	Hazaribagh	6.48	16.00	Part
2	Kandaber	33	Kerodari	Hazaribagh	20.11	49.68	Part
3	Itrota	42	Kerodari	Hazaribagh	22.28	49.93	Part
4	Jabra	43	Kerodari	Hazaribagh	6.92	17.30	Part
5	Bauria	44	Kerodari	Hazaribagh	30.98	76.57	Part
6	Nawadli	45	Kerodari	Hazaribagh	20.23	50.00	Part
7	Sima	46	Kerodari	Hazaribagh	21.48	53.07	Part
8	Pakra Barwadli	56	Harkagan	Hazaribagh	4.32	11.17	Part
Total (approximately)					313.00	775.42	

## SUMMARY

(A) TOTAL REVENUE LAND: 316.98 hectares (approximately) or 951.30 acres (approximately)

(B) TOTAL FOREST LAND: 513.00 hectares (approximately) or 775.42 acres (approximately)

GRAND TOTAL, (A+B): 607.98 hectares (approximately) or 1726.72 acres (approximately)

## LIST OF REVENUE PLOTS TO BE ACQUIRED:

1. Village Dahan: 60P, 61, 64P, 65 to 67, 68P, 69P, 85, 86, 88 to 108, 110P, 107P, 108, 109, 110P, 111, 114P, 115P, 120P, 121P, 122, 123, 124P.
2. Village Kandaber: 185P, 188, 189, 190 to 196, 198 to 211, 213 to 239, 240P, 241 to 254, 255P, 410P, 410P, 451, 452P, 453P, 454P, 455P, 456 to 467, 468P, 471P, 472P, 473 to 483, 484P, 485 to 492, 494 to 512, 513P, 514, 515P, 519P, 520P, 521P, 522 to 526, 528 to 544, 546 to 624, 626 to 633, 635 to 639, 641 to 681, 682P, 684P.
3. Village Bauria: 5 to 20, 22 to 49, 51 to 62, 165P, 165P to 1658, 1685, 1687 to 1693.
4. Village Jabra: 1, 3 to 97, 98P, 99 to 107, 108P, 109P, 113 to 125.
5. Village Bauria: 0P, 13P, 14 to 22, 23P, 24P, 25P, 26, 28 to 31, 33.
6. Village Nawadli: 473P, 481P, 482, 483P, 484P, 485, 486P, 487P, 488P, 489, 490P, 491P, 492P, 493P, 494P, 495P, 496P, 497, 498P, 499P, 500, 501P, 502 to 504.
7. Village Sima: 113P, 137P, 141P, 142, 145P, 146P, 147, 148P, 149P, 150P, 151P, 152P, 157P, 158P to 192, 196 to 230, 241, 242, 243P, 244, 246, 248 to 290, 292 to 295.
8. Village Pakra Barwadli: 1041 to 1432, 1442 to 1446, 1448 to 1748, 1749 to 1753, 1918 to 1933, 1934 to 1938, 1952 to 2406, 2438 to 2463, 2499, 2516, 2518.

## LIST OF FOREST PLOTS TO BE ACQUIRED:

1. Village Dahan: 62P, 84P, 87, 143P, 1975P.
2. Village Kandaber: 197P, 212, 493, 529, 545, 625, 634, 646, 650P.
3. Village Bauria: 1 to 1, 21, 80, 63P, 232P, 1643P, 1686.
4. Village Jabra: 2, 110P.
5. Village Bauria: 1, 2P, 23P, 32, 34.
6. Village Nawadli: 422P, 505P.

*Sanjiv*  
**SANJIV KUMAR SINGH**  
 Recognized Qualified Person  
 No. 34011/(15)/2009-CPAM  
 Ministry of Coal, Govt. of India

*Pawan*  
**पवन देव जामदा/PAWAN DEV JAMDA**  
 उप महाप्रबन्धक (वाणिज्यिक)  
 Deputy General Manager (Commercial)  
 एन टी पी सी लिमिटेड/NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)

7. Village Sirma - 30P, 144R, 195, 240, 245, 247, 291, 296  
 8. Village Puri Nawadli - 1447, 2464

### Boundary Description of the area to be notified:

#### Boundary Description for "Part -A"

- (1) Line A-A1: The line starts at point 'A' located on North-West corner of plot no. 454 of village Kaudaber which moves towards North-East corner of the village Kaudaber passing through plot numbers 454, 455, 454, 453, 452, 448, 450, 447, 468, 471, 472, 255, 240, 188, 189, 185, 197, 199, 200 and ends at point 'A1' of the village Kaudaber.
- (2) Line A1-A2: The line starts at point 'A1' located on North corner of plot no. 209 of village Kaudaber which moves towards North-East of the village Nawadli passing through plot numbers 422 and 505 and ends at point 'A2' of the village Nawadli.
- (3) Line A2-A3: The line starts at point 'A2' located on North corner of village Nawadli which moves towards North-East of the village Nawadli passing through plot number 505 and ends at point 'A3' of the village Nawadli.
- (4) Line A3-A4: The line starts at point 'A3' located on North corner of village Nawadli which moves towards North-East of the village Nawadli passing through plot numbers 505, 473, 481, 483, 484, 485, 486, 487, 488, 490, 491, 492, 493, 494, 495, 496, 498, 499, 501 and ends at point 'A4' of the village Nawadli.
- (5) Line A4-A5: The line starts at point 'A4' located on North-East corner of village Nawadli which moves towards East of the village Basaria passing through plot numbers 11, 23, 12, 24, 25 and ends at point 'A5' of the village Basaria.
- (6) Line A5-A6: The line starts at point 'A5' located on North corner of village Basaria which moves towards North-East of the village Basaria passing through plot numbers 27, 6 and 27 and ends at point 'A6' of the village Basaria.
- (7) Line A6-A7: The line starts at point 'A6' located on North corner of village Basaria passing towards North-East of the village Basaria passing through plot number 27 and ends at point 'A7' of the village Basaria.
- (8) Line A7-A8: The line starts at point 'A7' located on North-East corner of village Basaria which moves towards North-East of the village Sirma passing through plot numbers 30, 157, 159, 152, 151, 145 and 146 and ends at point 'A8' of the village Sirma.
- (9) Line A8-A9: The line starts at point 'A8' located on North corner of village Sirma which moves towards North-West of the village Sirma passing through plot numbers 140, 149, 150, 141, 137 and ends at point 'A9' of the village Sirma.
- (10) Line A9-A10: The line starts at point 'A9' located on North corner of village Sirma which moves towards East of the village Sirma passing through plot numbers 137, 113, 143, 144, 243 and ends at point 'A10' of the village Sirma.
- (11) Line A10-A11: The line starts at point 'A10' located on North corner of village Sirma which moves towards South-East of the village Sirma passing through plot number 243 and ends at point 'A11' of the village Sirma.
- (12) Line A11-A12: The line starts at point 'A11' located on South-East corner of village Sirma which moves towards South-West of the village Sirma passing through plot numbers 243, 247, 252, 251, 254, 253, 256, 257, 258, 259, 286, 295, 296 and ends at point 'A12' of the village Sirma.
- (13) Line A12-A13: The line starts at point 'A12' located on South-East corner of village Sirma which moves towards South of the village Basaria passing through plot number 1686 and ends at point 'A13' of the village Basaria.
- (14) Line A13-A14: The line starts at point 'A13' located on North-East corner of village Basaria which moves towards South-East of the village Basaria passing through plot numbers 1693 and 1692 and ends at point 'A14' of the village Basaria.
- (15) Line A14-A15: The line starts at point 'A14' located on North-East corner of village Basaria which moves towards South of the village Basaria passing through plot numbers 1692, 1691, 1690, 1689, 1688 and ends at point 'A15' of the village Basaria.

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**SANJIV KUMAR SINGH**  
 Recognized Qualified Person  
 No. 34011/(15)/2009-CPAM  
 Ministry of Coal, Govt. of India

**पञ्च देव जामटा/PAWAN DEV JAMTA**  
 सहायक महाप्रबन्धक (वाणिज्यिक)  
 Deputy General Manager (Commercial)  
 एन टी सी लिमिटेड/NTS LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)



- (16) Line A15-A16: The line starts at point 'A 15' located on East corner of village Baratu which moves towards South of the village Baratu passing through plot number 1686 and ends at point 'A16' of the village Baratu.
- (17) Line A16-A17: The line starts at point 'A16' located on South-East corner of village Baratu which moves towards South-West of the village Baratu passing through plot numbers 1686 and 1685 and ends at point 'A 17' of the village Baratu.
- (18) Line A17-A18: The line starts at point 'A 17' located on South-East corner of village Baratu which moves towards South of the village Baratu passing through plot number 1643 and ends at point 'A 18' of the village Baratu.
- (19) Line A18-A19: The line starts at point 'A 18' located on South corner of village Baratu which moves towards West of the village Baratu passing through plot number 1643 and ends at point 'A 19' of the village Baratu.
- (20) Line A19-A20: The line starts at point 'A19' located on South corner of village Baratu which moves towards North of village Baratu passing through plot numbers 1643 and 1651 and ends at point 'A20' of the village Baratu.
- (21) Line A20-A21: The line starts at point 'A 20' located on South corner of village Baratu which moves towards South-West of the village Baratu passing through plot number 232 and ends at point 'A21' of the village Baratu.
- (22) Line A21-A22: The line starts at point 'A21' located on South-West corner of village Baratu which moves towards North-West passing through plot number 63 and ends at point 'A22' of the village Baratu.
- (23) Line A22-A23: The line starts at point 'A22' located on South-West corner of village Baratu which moves towards South-West of the village Baratu passing through plot number 63 and ends at point 'A23' of the village Baratu.
- (24) Line A23-A24: The line starts at point 'A23' located on South-West corner of village Baratu which moves towards North-West of the village Baratu passing through number 63 and ends at point 'A24' of the village Baratu.
- (25) Line A24-A25: The line starts at point 'A24' starting at the West side of village Baratu and passing in South-West direction through village Jabra passing through plot numbers 130, 123, 109, 108, 107, 98 and ends at point 'A25' of village Baratu.
- (26) Line A25-A26: The line starts at point 'A25' located on South-West corner of village Jabra which moves towards South-West of village Kandaber passing through plot numbers 682, 683, 684 and ends at point 'A26' of village Kandaber.
- (27) Line A26-A27: The line starts at point 'A26' located on South corner of village Kandaber which moves towards North-West of the village Belu passing through plot numbers 60, 1075, 62, 63, 64, 68, 69 and 60 and ends at point 'A27' of the village Belu.
- (28) Line A27-A28: The line starts at point 'A27' located on North-West corner of village Belu which moves towards North-West of the village Kandaber passing through plot numbers 484, 519, 520, 521, 513, 515, 485 and ends at point 'A28' of the village Kandaber.
- (29) Line A28-A29: The line starts at point 'A28' located on West corner of village Kandaber which moves towards North-West of the village Belu passing through plot numbers 60, 124, 84, 121, 120, 119, 105, 106, 107, 114, 110, 143 and ends at point 'A29' of the village Belu.
- (30) Line A29-A: The line starts at point 'A29' located on North-West corner of village Belu which moves towards North-West of the village Kandaber passing through plot numbers 454, 454, 456 and ends at point 'A' of the village Kandaber.

## Boundary Description for "Part - II"

- (1) Line H-B1: The line starts at point 'H' located on North-West of village Pakri Barwadhi which moves towards East corner of the village Pakri Barwadhi passing through plot numbers 1930, 1933 and ends at point 'B1' of the village Pakri Barwadhi.
- (2) Line H-B2: The line starts at point 'B1' located on North-West corner of village Pakri Barwadhi which moves towards North-East of the village Pakri Barwadhi passing through plot numbers 1933, 1933, 1938 and ends at point 'B2' of the village Pakri Barwadhi.

*Singh*  
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- (3) Line B2-B3: The line starts at point 'B2' located on North-West corner of village Pakri Barwadhi which moves towards South-East of the village Pakri Barwadhi passing through plot numbers 1918, 1919, 1920 and ends at point 'B3' of the village Pakri Barwadhi.
- (4) Line B3-B4: The line starts at point 'B3' located on North-West corner of village Pakri Barwadhi which moves towards South of the village Pakri Barwadhi passing through plot number 1920 and ends at point 'B4' of the village Pakri Barwadhi.
- (5) Line B4-B5: The line starts at point 'B4' located on North-West corner of village Pakri Barwadhi which moves towards South-East of the village Pakri Barwadhi through plot numbers 1920, 1921, 1922, 1923 and ends at point 'B5' of the village Pakri Barwadhi.
- (6) Line B5-B6: The line starts at point 'B5' located on North-West corner of village Pakri Barwadhi which moves towards North of the village Pakri Barwadhi passing through plot numbers 1932, 1939, 1940, 1943, 1944, 1945, 1946, 1947, 1948, 1949 and ends at point 'B6' of the village Pakri Barwadhi.
- (7) Line B6-B7: The line starts at point 'B6' located on North-West corner of village Pakri Barwadhi passing towards North of the village Pakri Barwadhi passing through plot numbers 1949, 1950 and ends at point 'B7' of the village Pakri Barwadhi.
- (8) Line B7-B8: The line starts at point 'B7' located on North-West corner of village Pakri Barwadhi which moves towards South-East of the village Pakri Barwadhi passing through plot numbers 1950, 1960, 1963, 1962 and ends at point 'B8' of the village Pakri Barwadhi.
- (9) Line B8-B9: The line starts at point 'B8' located on North-West corner of village Pakri Barwadhi which moves towards North-East of the village Pakri Barwadhi passing through plot numbers 1962, 1960, 1961, 1952 and ends at point 'B9' of the village Pakri Barwadhi.
- (10) Line B9-B10: The line starts at point 'B9' located on North-West corner of village Pakri Barwadhi which moves towards South-East of the village Pakri Barwadhi passing through plot numbers 1952, 1743 and ends at point 'B10' of the village Pakri Barwadhi.
- (11) Line B10-B11: The line starts at point 'B10' located on North-West corner of village Pakri Barwadhi which moves towards South-East of the village Pakri Barwadhi passing through plot numbers 1743, 1742, 1741, 2125 and ends at point 'B11' of the village Pakri Barwadhi.
- (12) Line B11-B12: The line starts at point 'B11' located on North-West corner of village Pakri Barwadhi which moves towards North-East of the village Pakri Barwadhi passing through plot numbers 2125, 2127, 2130, 1718, 1154 and ends at point 'B12' of the village Pakri Barwadhi.
- (13) Line B12-B13: The line starts at point 'B12' located on North corner of village Pakri Barwadhi which moves towards East of the village Pakri Barwadhi passing through plot numbers 1154, 1137, 1136, 1134, 1133, 1132 and ends at point 'B13' of the village Pakri Barwadhi.
- (14) Line B13-B14: The line starts at point 'B13' located on North corner of village Pakri Barwadhi which moves towards South-East of the village Pakri Barwadhi passing through plot numbers 1132 and 1428 and ends at point 'B14' of the village Pakri Barwadhi.
- (15) Line B14-B15: The line starts at point 'B14' located on North-East corner of village Pakri Barwadhi which moves towards South-East of the village Pakri Barwadhi passing through plot numbers 1128, 1041 and ends at point 'B15' of the village Pakri Barwadhi.
- (16) Line B15-B16: The line starts at point 'B15' located on East corner of village Pakri Barwadhi which moves towards South-East of the village Pakri Barwadhi passing through plot number 1041 and ends at point 'B16' of the village Pakri Barwadhi.
- (17) Line B16-B17: The line starts at point 'B16' located on East corner of village Pakri Barwadhi which moves towards South-East of the village Pakri Barwadhi passing through plot numbers 1041, 1432 and ends at point 'B17' of the village Pakri Barwadhi.
- (18) Line B17-B18: The line starts at point 'B17' located on East corner of village Pakri Barwadhi which moves towards South-East of the village Pakri Barwadhi passing through plot numbers 1432, 1419 and ends at point 'B18' of the village Pakri Barwadhi.

संज्ञा संख्या 18/1934  
मानक का समय  
जून 23, 2012

*Sanjiv*  
**SANJIV KUMAR SINGH**  
Recognised Qualified Person  
No. 34011/(16)/2009-CPAM  
Ministry of Coal, Govt. of India

**पवन देव जामटा/PWAN DEV JAMTA**  
मानक का समय  
जून 23, 2012  
Department of Coal, Govt. of India  
एन. सी. ई. सी. डिपार्टमेंट, न्यू दिल्ली-110002  
EOC, A-2A, Sector-24, New Delhi-110024 (U.P.)



- (19) Line B18-B19: The line starts at point 'B 18' located on East corner of village Pakri Barwadli which moves towards South-West of the village Pakri Barwadli passing through plot number 1449 and ends at point 'B 19' of the village Pakri Barwadli.
- (20) Line B 19-B20: The line starts at point 'B 19' located on South-East corner of village Pakri Barwadli which moves towards South-West of village Pakri Barwadli passing through plot number 1449 and ends at point 'B20' of village Pakri Barwadli.
- (21) Line B20-B21: The line starts at point 'B 20' located on South-East corner of village Pakri Barwadli which moves towards South-West of the village Pakri Barwadli passing through plot number 1449 and ends at point 'B21' of the village Pakri Barwadli.
- (22) Line B21-B22: The line starts at point 'B21' located on South-East corner of village Pakri Barwadli which moves towards North-West of the village Pakri Barwadli passing through plot number 1449 and ends at point 'B22' of the village Pakri Barwadli.
- (23) Line B22-B23: The line starts at point 'B 22' located on South-East corner of village Pakri Barwadli which moves towards South of the village Pakri Barwadli passing through plot number 1449 and ends at point 'B23' of the village Pakri Barwadli.
- (24) Line B23-B24: The line starts at point 'B23' located on South-East corner of village Pakri Barwadli which moves towards West of the village Pakri Barwadli passing through numbers 1449, 2464 and ends at point 'B24' of the village Pakri Barwadli.
- (25) Line B24-B25: The line starts at point 'B24' located at the South-East side of village Pakri Barwadli and passing in North-East direction through village Pakri Barwadli passing through plot number 2464 and ends at point 'B25' of village Pakri Barwadli.
- (26) Line B25-B26: The line starts at point 'B25' located on South-East corner of village Pakri Barwadli which moves towards North-West of village Pakri Barwadli passing through plot numbers 2464, 2438, 2436, 2379 and ends at point 'B26' of village Pakri Barwadli.
- (27) Line B26-B27: The line starts at point 'B26' located on South corner of village Pakri Barwadli which moves towards South-West of the village Pakri Barwadli passing through plot numbers 2379, 2375, 2468 and ends at point 'B27' of the village Pakri Barwadli.
- (28) Line B27-B28: The line starts at point 'B27' located on South corner of village Pakri Barwadli which moves towards West of the village Pakri Barwadli passing through plot numbers 2468, 2374, 2363 and ends at point 'B28' of the village Pakri Barwadli.
- (29) Line B28-B29: The line starts at point 'B28' located on South corner of village Pakri Barwadli which moves towards North-West of the village Pakri Barwadli passing through plot numbers 2363, 2362 and ends at point 'B29' of the village Pakri Barwadli.
- (30) Line B29-B30: The line starts at point 'B29' located on South corner of village Pakri Barwadli which moves towards North-West of the village Pakri Barwadli passing through plot numbers 2362, 2361, 2336, 2358, 2325, 2324 and ends at point 'A30' of the village Pakri Barwadli.
- (31) Line B30-B31: The line starts at point 'B30' located on South corner of village Pakri Barwadli which moves towards North-West of the village Pakri Barwadli passing through plot numbers 2324, 2323, 2276, 2273, 2274, 2273 and ends at point 'A31' of the village Pakri Barwadli.
- (32) Line B31-B32: The line starts at point 'B31' located on South-West corner of village Pakri Barwadli which moves towards North-East of the village Pakri Barwadli passing through plot numbers 2273, 2274 and ends at point 'A32' of the village Pakri Barwadli.
- (33) Line B32-B33: The line starts at point 'B32' located on South-West corner of village Pakri Barwadli which moves towards North-West of the village Pakri Barwadli passing through plot numbers 2274, 2270, 2269 and ends at point 'A33' of the village Pakri Barwadli.
- (34) Line B33-B34: The line starts at point 'B33' located on South-West corner of village Pakri Barwadli which moves towards North-East of the village Pakri Barwadli passing through plot numbers 2269, 2268 and ends at point 'A34' of the village Pakri Barwadli.

*Sany*  
**SANJIV KUMAR SINGH**  
 Recognised Qualified Person  
 No. 34011/(15)/2009-CPAM  
 Ministry of Coal, Govt. of India

*Pawan*  
**पवन देव जामदा/PAWAN DEVI JAMDA**  
 सन महारक्षक (वार्डन)  
 Dep-ny General Manager (C) NTPC LIMITED  
 एन टी सी लिमिटेड, NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)



- (35) Line B34-B35: The line starts at point 'B34' located on South-West corner of village Pakri Barwadli which moves towards North-West of the village Pakri Barwadli passing through plot numbers 2268, 2251, 2230 and ends at point 'A35' of the village Pakri Barwadli.
- (36) Line B35-B36: The line starts at point 'B35' located on South-West corner of village Pakri Barwadli which moves towards North-West of the village Pakri Barwadli passing through plot numbers 2230, 1718, 2216, 2013, 2037, 2028, 2029 and ends at point 'A36' of the village Pakri Barwadli.
- (37) Line B36-B37: The line starts at point 'B36' located on South-West corner of village Pakri Barwadli which moves towards South-West of the village Pakri Barwadli passing through plot numbers 2029, 2025, 2023, 2012, 2021, 2020 and ends at point 'A37' of the village Pakri Barwadli.
- (38) Line B37-B38: The line starts at point 'B37' located on South-West corner of village Pakri Barwadli which moves towards North-West of the village Pakri Barwadli passing through plot numbers 2020, 2019, 1950 and ends at point 'A38' of the village Pakri Barwadli.
- (39) Line B38-B39: The line starts at point 'B38' located on South-West corner of village Pakri Barwadli which moves towards North-East of the village Pakri Barwadli passing through plot number 1950 and ends at point 'A39' of the village Pakri Barwadli.
- (40) Line B39-B: The line starts at point 'B39' located on West corner of village Pakri Barwadli which moves towards North-West of the village Pakri Barwadli passing through plot numbers 1950 and ends at point 'B' of the village Pakri Barwadli.

(F. No. 43015/2011-PRW-B)

A. K. DAS, Under Secy.

## पेट्रोलियम और प्राकृतिक गैस विभाग

दरिद्रांश, 12 जून, 2012

क्रा. अ. 3097.—दे-बोम सरकार, पेट्रोलियम और खनिज विभाग (जूमि में उपयोग के अधिनियम का अर्थ) अधिनियम, 1992 को धारा 2 के तहत (क) के अनुसार यह, नीचे दी गई अनुसूची के तहत : में उल्लिखित व्यक्ति को, उक्त अनुसूची के खंड 2 में भी उल्लिखित व्यक्ति में उल्लिखित क्षेत्र के संबंध में उक्त अधिनियम के अधीन सख्त कार्यकारी के कृत्यों का निर्धारण करने के लिए प्राधिकृत किया है, अर्थात् :

## अनुसूची

प्रतिष्ठानों का नाम और पता	अधिकारिता का स्तर
(1)	(2)
श्रीमती बिजया चौधरी	आवास
ए. डी. एस. एडी. डिप्टी कमिशनर आर्वाली	
एन. डी. एस. चारुलाल पेट्रोलियम डिस्ट्रिक्ट	
सहय प्रबंधकारी कार्यालय	
इंडियन ऑयल कॉर्पोरेशन लिमिटेड (नॉन-कार्बन डिवाइज)	
ए. डी. एस. गुजराती परिवहन	
आर. डी. एस. गुजराती परिवहन	
सेक्टर-III, बुनरखी	
गुजराती 781030	
यह अधिनियम करने वाले को तारीख से लागू करने।	

1st Imp. 25/01/2012-अंश 11

मुख्य निदेश, अंश 11

Sanjiv  
SANJIV KUMAR SINGH  
Recognised Qualified Person  
No. 34011/(15)/2009-QP  
Ministry of Coal, Govt. of India

पवन देव जाण्टा/PAWAN DEV JANTA  
उप महाप्रबन्धक (वित्तियक)  
Deputy General Manager (Commercial)  
एन टी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

  
पवन देव जौमटा/PAWAN DEV JAISWAL  
उप महाप्रबन्धक (वाणिज्यिक)  
Deputy General Manager (Commercial)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201304 (U.P.)

## ANNEXURE-V

STATEMENT SHOWING LATITUDE, DEPARTURE, R.L., TOTAL DEPTH, DATE OF COMMENCEMENT &amp; CLOSURE OF BOREHOLES

DRILLED BY NECL

BLOCK: HAZRI-BARMACH			DISTRICT: HAZARINAGH		
COAL FIELD: NORTH KARANPURA			STATE: JHARKHAND		
BEL NO/BORHOLE NO.	R.L. (MTS.)	TOTAL DEPTH (M)	LATITUDE (N)	DEPARTURE (N)	DATE OF COMMENCEMENT/CLOSURE
1. M2B-1	442.61	59.00	1101042.056	1319068.309	09/12/06
2. M2B-2	436.27	89.50	1100238.217	3119341.299	19/12/06
3. M2B-3	451.79	175.00	1101338.766	3119258.150	26/12/06
4. M2B-4	435.81	179.00	1101235.416	3119613.398	19/01/07
5. M2B-5	447.63	125.00	1101594.532	3118944.193	23/01/07
6. M2B-6	450.82	37.00	1101480.165	3118406.431	10/02/07
7. M2B-7	468.46	65.00	1102216.914	3118869.827	11/02/10
8. M2B-8	453.47	74.00	1101977.554	3119166.093	18/02/10
9. M2B-9	464.19	22.00	1102222.826	3118446.285	03/03/10
10. M2B-10	459.34	71.00	1101950.949	3118536.183	04/03/10
11. M2B-11	456.95	101.00	1102179.013	3119494.074	08/03/10
12. M2B-12	458.03	106.00	1101377.564	3118254.587	12/03/10
13. M2B-13	468.97	47.00	1102566.941	3118920.159	19/03/10
14. M2B-14	452.16	32.00	1101379.010	3118706.598	20/03/10
15. M2B-15	453.02	96.00	1101983.228	3119633.113	27/03/10
16. M2B-16	483.53	27.00	1102147.138	3118058.096	28/03/10
17. M2B-17	453.76	126.00	1101507.611	3118688.559	03/04/10
18. M2B-18	450.52	140.00	1101688.066	3119483.134	04/04/10
19. M2B-19	435.27	26.00	1101342.293	3118160.619	12/04/10
20. M2B-20	460.46	77.00	1101804.602	3118290.582	17/04/10
21. M2B-21	451.67	122.00	1101804.632	3118451.056	18/04/10
22. M2B-22	481.29	300.40	1100922.994	3120705.914	29/04/10
23. M2B-23	425.68	217.00	1100959.622	3120592.153	09/05/10
24. M2B-24	434.80	230.40	1101194.691	3120709.353	06/06/10
25. M2B-25	436.51	276.50	1100173.584	3120813.744	29/06/10
26. M2B-26	439.31	319.00	1100636.176	3120866.544	22/07/10
27. M2B-27	456.71	115.00	1101559.907	3118512.392	09/10/10
28. M2B-28	446.52	781.00	1100372.190	3120221.200	12/01/12
29. M2B-29	439.16	280.00	1100730.430	3120298.110	10/03/12
30. M2B-30	455.10	175.00	1101993.270	3120198.530	16/03/12
31. M2B-31	451.19	127.30	1101754.550	3119973.460	14/04/12
32. M2B-32	454.59	159.60	1102094.460	3119963.820	17/04/12
33. M2B-33	453.74	21.00	1101874.480	3120462.260	06/05/12

Sanjiv  
**SANJIV KUMAR SINGH**  
 Recognised Qualified Person  
 No. 34011/(15)/2009-CPM  
 Ministry of Coal, Govt. of India

पवन देव जामटा/PAWAN DEV JAMTA  
 उप महाप्रबन्धक (माली/मिनी)  
 Dept. of General Management (Personnel)  
 एन ए पी सी लिमिटेड/NTPL LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)



**STATEMENT SHOWING THE CO-ORDINATES AND REDUCED LEVELS  
OF BOREHOLES, PAKRI-BARWADIH BLOCK, NORTH KARANPURA CF.**

Borehole No.	Latitude (m)	Departure (m)	R.L. (m)	Total Depth
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**EASTERN**

**BOREHOLES DRILLED BY G.S.I.**

KB01	3778.22	28073.35	423.07	177.89
KB02	4069.58	28742.98	435.30	105.00
KB03	3909.13	28451.29	430.31	120.42
KB04	3491.22	27701.48	417.92	219.28
KB05	3669.11	28016.33	420.15	235.04
KB06	2449.20	30322.00	421.81	155.60
KB07	2701.21	28235.84	422.48	169.65
KB08	1911.35	29098.47	415.24	445.80
KB09	1957.19	28442.34	408.30	376.44
KB10	3188.30	27341.32	407.76	435.40
KB16	2189.83	28701.55	411.37	297.00
KB19	1788.41	29431.50	422.32	527.05
KB22	5169.07	27622.67	396.25	184.18
KB23	2499.35	27145.27	411.50	531.55
KB25	2084.20	28668.35	406.30	164.15
KB26	2532.54	29852.22	424.84	230.30

**BOREHOLES DRILLED BY C.M.P.D.I.**

CMKPB01	28095.90	4490.83	426.58	185.50
CMKPB03	29006.62	5120.67	449.08	31.00
CMKPB12	27950.17	2224.48	408.93	351.00
CMKPB13	28211.11	2098.34	412.43	172.00
CMKPB14	28989.58	2697.87	414.22	194.00
CMKPB16	29117.02	3443.04	427.33	107.00
CMKPB30	26155.99	1958.50	402.31	543.00
CMKPB31	26759.65	1580.90	405.44	344.50
CNPB001	28380.67	4103.38	425.71	101.00
CNPB002	28501.25	4238.52	428.55	89.00
CNPB003	28240.23	4151.95	421.34	119.50
CNPB004	27971.41	4382.63	424.38	231.00
CNPB005	27831.94	3742.42	419.88	252.00
CNPB006	28280.19	3879.42	421.63	122.50
CNPB007	27968.18	4578.06	424.67	182.00
CNPB008	28248.97	3488.24	419.22	142.50
CNPB009	27768.70	3779.28	416.68	194.00
CNPB011	28583.22	3208.19	420.81	137.50
CNPB012	28755.34	2869.28	418.37	137.50
CNPB015	28585.96	2791.54	414.27	146.50
CNPB018	28471.40	2547.47	411.58	197.50
CNPB021	28735.25	2090.40	415.32	152.50
CNPB023	28908.50	3059.91	422.08	104.50

*Sanjiv*  
**SANJIV KUMAR SINGH**  
Recognised Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India

*Pawan*  
**पवन देव जामटा/PAWAN DEW**  
उप महाप्रबन्धक (सुरक्षा)  
Deputy General Manager (Safety)  
एन टी सी लिमिटेड / N.T.C.  
EOC, A-8A, Sector-24, Noida

Borehole No.	Latitude (m)	Departure (m)	R.L. (m)	Total Depth
CNPB045	28532.00	3532.34	433.14	160.50
CNPB047	28730.93	4060.07	433.10	110.50
CNPB048	28454.16	3748.18	429.84	153.50
CNPB049	27952.00	4128.81	407.43	224.50
CNPB050	27251.16	2550.88	410.43	329.00
CNPB052	27627.18	4510.17	415.54	242.50
CNPB054	27944.05	4873.16	424.48	140.50
CNPB055	28273.78	4843.12	433.89	110.50
CNPB056	27898.48	4790.56	418.74	104.00
CNPB057	28222.87	4685.42	430.73	118.50
CNPB058	28175.41	4245.85	424.22	107.00
CNPB059	28312.79	4400.76	424.78	131.00
CNPB060	28216.54	5475.87	428.46	113.00
CNPB062	28678.41	3808.58	438.17	121.00
CNPB063	28849.61	3330.88	437.10	146.00
CNPB064	27755.25	4311.79	406.73	247.00
CNPB065	29254.63	5158.04	423.46	141.00
CNPB066	27962.06	5648.47	416.54	146.50
CNPB067	29173.63	2844.95	422.26	182.00
CNPB069	28839.66	2968.85	436.90	110.00
CNPB070	29814.02	2637.93	422.93	176.00
CNPB072	27081.81	2379.87	424.83	221.00
CNPB074	27851.89	3160.76	414.82	258.00
CNPB075	29091.83	2515.15	417.45	188.50
CNPB111	29094.28	2058.36	407.63	179.00
CNPB112	27938.65	2929.58	413.10	167.00
CNPB116	26553.75	4727.14	432.49	59.50
CNPB118	30516.57	2549.62	425.36	102.50
CNPB127	30057.08	2693.35	426.71	125.50
CNPB131	28864.86	2274.63	412.12	217.50
CNPB132	27567.81	2535.39	410.71	239.00
CNPB133	27095.81	4005.55	408.95	32.00

#### CENTRAL

##### BOREHOLES DRILLED BY G.S.I.

KB11	5098.09	28731.92	417.35	327.85
KB12	2851.33	26283.90	410.70	471.20
KB13	8029.08	25778.17	427.91	491.30
KB14	3718.31	25972.26	416.12	448.00
KB15	4398.11	27431.86	410.54	300.00
KB16	6853.48	25050.17	431.31	358.00
KB20	5676.57	26841.96	425.28	271.50
KB21	4411.27	26422.30	413.98	514.00

##### BOREHOLES DRILLED BY C.M.P.D.I.

CMXPB04	24840.47	6641.12	420.30	386.00
CMXPB07	25080.51	7830.74	443.93	173.00

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**SANJIV KUMAR SINGH**  
Recognised Qualified Person  
No. 34011/(15)/2009-CP  
Ministry of Coal, Govt. of India

**PAWAN DEV JAMTA**  
उप महाप्रबन्धक (सांख्यिकी)  
Deputy General Manager (Accounts)  
एन टी पी सी लिमिटेड / NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)





Borehole No.	Latitude (m)	Departure (m)	R.L. (m)	Total Depth
CNPB073	27368.90	5792.91	421.70	203.50
CNPB078	25314.43	7727.39	442.35	221.00
CNPB080	25446.58	8482.13	455.93	175.00
CNPB081	25456.99	8077.35	447.77	205.00
CNPB083	25660.27	8306.65	446.95	142.00
CNPB085	25655.47	7508.67	440.51	197.00
CNPB086	25363.23	7595.98	451.09	132.00
CNPB087	25351.40	7504.03	446.24	187.00
CNPB089	25504.25	7004.09	436.50	200.00
CNPB089	25642.06	7561.89	446.01	136.50
CNPB090	25813.64	7108.28	439.43	95.00
CNPB116	26867.15	7303.42	443.22	143.00
CNPB117	27146.80	7235.24	439.18	69.00
CNPB120	27150.02	3497.51	407.94	305.00
CNPB122	27476.16	5607.13	431.46	88.00
CNPB123	27469.19	5241.55	427.80	209.00
CNPB124	27102.45	6468.38	432.22	211.00
CNPB126	26843.25	6545.20	434.19	206.00
CNPB129	26077.98	5639.85	422.15	299.00
CNPB130	26657.18	6920.45	435.72	172.00
CNPB135	25500.03	8243.17	450.17	125.00

#### WESTERN

##### BOREHOLES DRILLED BY G.S.I.


K917	8132.64	23778.07	436.92	300.00
K924	5471.78	23772.89	425.13	473.85

##### BOREHOLES DRILLED BY C.M.P.D.I.

CMKPB02	25710.51	4296.72	411.62	525.50
CMKPB05	25239.51	8837.54	455.00	186.50
CMKPB06	24234.26	7281.13	424.34	330.00
CMKPB08	23992.45	7984.09	426.78	259.00
CMKPB09	24729.48	7911.83	443.03	184.09
CMKPB10	23625.81	6517.58	432.56	305.00
CMKPB22	24252.02	8571.35	449.50	170.00
CMKPB23	24301.59	6155.45	428.25	431.00
CMKPB24	23014.54	7507.32	425.33	173.00
CMKPB25	22581.83	8121.94	430.72	182.00
CMKPB32	24985.52	4051.09	413.03	288.50
CMKPB33	25384.32	4823.21	417.80	451.09
CMKPB34	24148.79	4507.73	420.96	280.50
CMKPB35	24411.38	5249.51	423.88	419.00
CMKPB36	22952.75	8925.75	451.15	201.00
CNPB076	21087.76	8781.25	449.10	10.00
CNPB077	20742.28	9010.43	446.11	3.00
CNPB079	25055.54	8332.34	449.57	198.00
CNPB082	24788.02	7585.60	432.99	293.00
CNPB084	25035.71	8817.09	447.72	168.00

Sanjiv  
**SANJIV KUMAR SINGH**  
 Recognised Qualified Person  
 No. 34011/(15)/2009-CPA  
 Ministry of Coal, Govt. of India

V2 (Signature)  
**पवन देव जामटा/PAWAN DEV JAMTA**  
 Deputy General Manager (Coal) (P)  
 एन टी पी सी लिमिटेड, NHPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201305 (U.P.)

  
 पवन देव जोशी/PAWAN DEV JOshi  
 उप महाप्रबन्धक (वर्तमान)  
 Deputy General Manager (Current)  
 एन टी पी सी लिमिटेड/NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)

## ANNEXURE XVI

### CONSENT LETTER FROM THE APPLICANT

- 1 I hereby authorize Sri. Sanjiv Kumar Singh, RQP, Registration No. 34011 (15) 2009 – CPAM, to prepare the Revised Mining Plan and Mine Closure Plan (1<sup>st</sup> Revision) of Pakri Barwadih Coal Block located in the District of Hazaribagh of Jharkhand.
- 2 I hereby undertake that all the conditions so made in the Revised Mining Plan and Mine Closure Plan (1<sup>st</sup> Revision) by the recognized person be deemed to have been made with my knowledge and consent and shall be acceptable to me and binding on me in all respect.


  
21/01/16  
Signature of the Applicant in full


(Authorized signatory)

Name in full: Sunil Jumde  
Address: Coal Mining - Engg. 1<sup>st</sup> Floor, Core 7,  
NTPC Limited, Lodhi Road,  
New Delhi-110003  
Tel: 011-24365709, 9650991561  
Fax: 011-24367089  
E-mail: [suniljumde@ntpc.co.in](mailto:suniljumde@ntpc.co.in)

  
Sri. Sanjiv Kumar Singh, RQP,  
Registration No. 34011 (15) 2009 - CPAM,  
Ministry of Coal, Govt. of India

Place: New Delhi

  
SANJIV KUMAR SINGH  
Recognised Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India

  
पवन देव शर्मा / PAWAN DESAI  
उप महाप्रबन्धक (वर्ग-2009)  
Deputy General Manager (Commercial)  
एन टी पी सी लिमिटेड / NTPC LIMITED  
EOG, A-8A, Sector-24, Noida-201301 (U.P.)



  
 पवन देव जामटा/PAWAN DEV JAISWAL  
 ज्य. महाप्रबन्धक (वित्तियक)  
 Deputy General Manager (Commercial)  
 एन टी पी सी लिमिटेड / NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201305 (U.P.)

## ANNEXURE XVI- A

### CERTIFICATE

1. Certified that the guidelines issued by MoC vide letter no. 34011/(48)/2009-CPAM dated 04.04.2011 have been observed in the preparation of Revised Mining Plan and Mine Closure Plan (1<sup>st</sup> Revision) in respect of Pakri Barwadih Coal Block, which has been allocated to M/s NTPC Limited, and whenever specific permissions are required, the applicant will approach the concerned authorities.
2. Certified that the information furnished in this Revised Mining Plan and Mine Closure Plan (1<sup>st</sup> Revision) are true and correct to the best of my knowledge.

*Sanjiv K. Singh*

Sanjiv Kumar Singh

(Recognized Qualified Person)

RQP No. 34011 (15) 2009 – CPAM

Coal Mining Engg., 4<sup>th</sup> Floor, Core-5

NTPC Ltd, Scope Complex, 7

Institutional Area, Lodhi Road, New

Delhi-110003.

Tel: 011-24387669, 9650991396

Fax: 011-24367089

E-mail: [sanjivkumarsingh01@ntpc.co.in](mailto:sanjivkumarsingh01@ntpc.co.in)

*Sanjiv*  
Sanjiv Kumar Singh  
Recognized Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India

*Sanjiv*  
SANJIV KUMAR SINGH

Recognized Qualified Person

No. 34011/(15)/2009-CPAM

Ministry of Coal, Govt. of India

*Sanjiv*  
पवन देव शर्मा (Pawan Dev Sharma)

उप-सह-प्रबन्धक (प्रशासनिक)

Deputy General Manager (Administration)

एन टी पी सी लिमिटेड / NTPC लिमिटेड

EOC, A-8A, Sector-24, Noida-201301 (U.P.)

  
 पवन देव जाम्हा/PAWAN DEV JAMTA  
 उपायुक्त महाप्रबन्धक (वित्त/प्रशासन)  
 Deputy General Manager (Commercial)  
 एन टी पी सी लिमिटेड/NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)



## ANNEXURE XVI-B

### CERTIFICATE

It is to certify that the area for which this Revised Mining Plan and Mine Closure Plan (1st Revision) has been prepared covers the area allocated to M/s. NTPC Limited by the Government of India vide letter No.13016/29/2003-CA-I dated 11<sup>th</sup> October, 2004.

*Sanjiv K. Singh*

Sanjiv Kumar Singh  
(Recognized Qualified Person)  
RQP No. 34011 (15) 2009 – CPAM  
Coal Mining Engg., 4<sup>th</sup> Floor, Core-5  
NTPC Ltd, Scope Complex, 7  
Institutional Area, Lodhi Road, New  
Delhi-110003.  
Tel: 011-24387669, 9650991396  
Fax: 011-24367089  
E-mail: [sanjivkumarsingh01@ntpc.co.in](mailto:sanjivkumarsingh01@ntpc.co.in)

*Lee*

Sanjiv Kumar Singh  
Recognized Qualified Person  
No. 34011/(15)/2009-CP  
Ministry of Coal

*Sanjiv*

SANJIV KUMAR SINGH  
Recognised Qualified Person  
No. 34011/(15)/2009-CP  
Ministry of Coal

*Pawan Dev Jaiswal*

पवन देव जासवाल/PAWAN DEV JAISWAL  
उप महाप्रबन्धक (वणिज्यिक)  
Deputy General Manager (Commercial)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

  
 पवन देव जायसवाल/PAWAN DEV JAISWAL  
 उपाय महाप्रबन्धक (वित्त)  
 Deputy General Manager (Finance)  
 एन टी पी सी लिमिटेड/NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)

## ANNEXURE XVI-C

### CERTIFICATE

It is to certify that the Block area has been verified with the plan supplied by M/s CMPDIL and it is in line with the Plan issued by M/s CMPDI (Plan issued by M/s CMPDI is enclosed at Annexure XIX). The area covered in the Revised Mining Plan and Mine Closure Plan (1st Revision) does not encroach on any other Coal Block.

*Sanjiv K. Singh*

Sanjiv Kumar Singh

(Recognized Qualified Person)

RQP No. 34011 (15) 2009 – CPAM

Coal Mining Engg., 4<sup>th</sup> Floor, Core-5

NTPC Ltd, Scope Complex, 7

Institutional Area, Lodhi Road, New

Delhi-110003.

Tel: 011-24387669, 9650991396

Fax: 011-24367089


E-mail: [sanjivkumarsingh01@ntpc.co.in](mailto:sanjivkumarsingh01@ntpc.co.in)

*[Signature]*  
श्री श्री राजशेखर लाल शर्मा  
अध्यक्ष, कोयला विभाग  
राज्य शासक, कोयला विभाग  
कोयला विभाग, नई दिल्ली-110003

*[Signature]*  
SANJIV KUMAR SINGH  
Recognised Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India

*[Signature]*  
पवन देव जामटा/PAWAN DEV JAMTA  
उप महाप्रबन्धक (वाणिज्य)  
Deputy General Manager (Commercial)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)



  
 पवन देव जामटा/PAWAN DEV JAISWAL  
 उपायुक्त (आ.उ.वि.क.)  
 Deputy General Manager (Commercial)  
 एन टी पी सी लिमिटेड / NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)

ANNEXURE XVI-D

CERTIFICATE

It is to certify that the provisions of all relevant Rules and Regulations have been considered while preparing the Revised Mining Plan and Mine Closure Plan (1st Revision) of Pakri Barwadih Coal Block.

*Sanjiv Mr. Singh*

Sanjiv Kumar Singh

(Recognized Qualified Person)

RQP No. 34011 (15) 2009 – CPAM

Coal Mining Engg., 4<sup>th</sup> Floor, Core-5

NTPC Ltd, Scope Complex, 7

Institutional Area, Lodhi Road, New

Delhi-110003.

Tel: 011-24387669, 9650991396

Fax: 011-24367089

E-mail: [sanjivkumarsingh01@ntpc.co.in](mailto:sanjivkumarsingh01@ntpc.co.in)

*[Signature]*

Sanjiv Kumar Singh  
Recognized Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India

*Sanjiv*

SANJIV KUMAR SINGH

Recognised Qualified Person

No. 34011/(15)/2009-CPAM

Ministry of Coal, Govt. of India

*[Signature]*


पवन देव जामल/PAWAN DEV JAMAL

उप महाप्रबन्धक (प्राथमिक)

Deputy General Manager (Core Mining)

एन टी पी सी लिमिटेड/NTPC LIMITED

EOC, A-8A, Sector-24, Noida-201301 (U.P.)

  
 पवन देव जाम्भ/PAWAN DEV JAMBI  
 का महाप्रबन्धक (वाणिज्यिक)  
 Deputy General Manager (Commercial)  
 एन टी पी सी लिमिटेड / NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)



ANNEXURE XVI- E

CERTIFICATE

It is to certify that the total quarriable coal down to Seam K-1 / Seam I (whichever is applicable), the lowest workable seams in the allocated Coal Block at Pakri Barwadih, is planned for extraction in the Revised Mining Plan and Mine Closure Plan (1st Revision).

*Sanjiv K. Singh*

Sanjiv Kumar Singh  
(Recognized Qualified Person)  
RQP No. 34011 (15) 2009 – CPAM  
Coal Mining Engg., 4<sup>th</sup> Floor, Core-5  
NTPC Ltd, Scope Complex, 7  
Institutional Area, Lodhi Road, New  
Delhi-110003.  
Tel: 011-24387669,9650991396  
Fax:011-24367089  
E-mail: [sanjivkumarsingh01@ntpc.co.in](mailto:sanjivkumarsingh01@ntpc.co.in)

*Ly*  
सांजिव कुमार सिंह, NTPC  
कोल मीनिंग इंजिनियर

*Sanjiv*  
SANJIV KUMAR SINGH  
Recognised Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India

*mf*  
पवन देव (सांजिव) PAWAN DEV JALITA  
उप महाप्रबन्धक (खाना-निर्माण)  
Deputy General Manager (Coal Mining)  
एन टी पी सी लिमिटेड / NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

  
 पवन देव जर्मिटा/PAWAN D.  
 उपा महाप्रबन्धक (आ.प्र.)  
 Deputy General Manager (A.P.)  
 एन टी पी सी लिमिटेड/NTPC लि.  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)

ANNEXURE XVI- F

CERTIFICATE

This is to certify that I have been duly authorised by NTPC Ltd. to prepare this Revised Mining Plan and Mine Closure Plan (1st Revision) of Pakri Barwadih Coal Block. I have a valid recognition from MoC under MCR 1960 to prepare Mining Plan and Mine Closure Plan and the provisions of all relevant rules and regulations have been considered while preparing the Mining Plan.

*Sanjiv K. Singh*

Sanjiv Kumar Singh

(Recognized Qualified Person)

RQP No. 34011 (15) 2009 – CPAM

Coal Mining Engg., 4<sup>th</sup> Floor, Core-5

NTPC Ltd, Scope Complex, 7

Institutional Area, Lodhi Road, New

Delhi-110003.

Tel: 011-24387669, 9650991396

Fax: 011-24367089

E-mail: [sanjivkumarsingh01@ntpc.co.in](mailto:sanjivkumarsingh01@ntpc.co.in)

*Sanjiv*

SANJIV KUMAR SINGH

Recognised Qualified Person

No. 34011(15)/2009-CPAM

Ministry of Coal, Govt. of India

*Pawan Dev Jaiswal*  
पवन देव जैसवाल/PAWAN DEV JAISWAL  
उप महाप्रबन्धक (सी ई-२)  
Deputy General Manager (C.E.-2)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201305 (U.P.)



  
 पवन देव जमिता/PAWAN DEV JANITA  
 उप महाप्रबन्धक (महिला)  
 Deputy General Manager (Female)  
 एन टी पी सी लिमिटेड/NTPS LIMITED  
 EOC, A-BA, Sector-24, Noida-201301 (U.P.)

## ANNEXURE XVII

### CERTIFICATE BY THE APPLICANT

Certified that the Revised Mining Plan (1<sup>st</sup> Revision) of Pakri Barwadih Coal Block has been prepared by Sh. Sanjiv Kumar Singh, Registration No.34011 (15) 2009 – CPAM of NTPC Limited, Coal Mining-Engg, 4<sup>th</sup> Floor, Core-5, Scope Complex, Lodhi Road, New Delhi –110003 in full consultation with knowledge and consent of the undersigned.

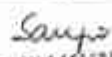
The mine will be developed as per the approval of the Revised Mining Plan and Mine Closure Plan (1<sup>st</sup> Revision) of Pakri Barwadih Coal Block from Ministry of Coal and all other approvals as required will be obtained from relevant authorities.

  
21/01/16  
Signature of the Applicant in full

(Authorized signatory)


Name in full: Sunil Jumde  
Address: Coal Mining Engg, 1<sup>st</sup> Floor, Core 7,  
NTPC Limited, Lodhi Road,  
New Delhi-110003  
Tel: 011-24365709, 9650991561  
Fax: 011-24367089  
E-mail: [suniljumde@ntpc.co.in](mailto:suniljumde@ntpc.co.in)

  
Sanjiv Kumar Singh  
Recognized Qualified Person

  
SANJIV KUMAR SINGH  
Recognized Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India

Place: New Delhi

  
पवन देव जामवाल/PAWAN DEV JAISWAL  
उप महाप्रबन्धक (सांख्यिकी)  
Deputy General Manager (C&A)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EOC, A-B, Sector-24, Noida-201301 (U.P.)

  
 पवन देव जासवाल/PAWAN D.E.  
 उपायुक्त महाप्रबन्धक (वॉरिंग)  
 Deputy General Manager (Waring)  
 एन टी सी लिमिटेड/NTSL  
 EOC, A-8A, Sector-24, Noida-201





एन टी पी सी लिमिटेड  
(भारत सरकार का उपक्रम)

**NTPC Limited**  
A Govt. of India Enterprise

केंद्रीय कार्यालय/Corporate Centre

Ref. No.: CC:CM:ENGG:7010:MP:96

Date: 21.01.2016

To

Advisor (Projects),  
Ministry of Coal,  
Shastri Bhawan,  
New Delhi- 110 001

**Sub: Approval of Revised Mining Plan & Mine Closure Plan  
(1<sup>st</sup> Revision) of Pakri Barwadih Coal Block.**

Sir,

With reference to letter Ref. No. 34011/05/2015/CPAM(Pt) dated 28.12.2015 from Ministry of Coal regarding submission of Revised Mining Plan and Mine Closure Plan (1<sup>st</sup> Revision) for Pakri Barwadih Coal Block incorporating clarifications to the observations of standing committee, the Revised Mining Plan (1<sup>st</sup> Revision) has been prepared and is enclosed herewith.

As per the guidelines regarding preparation of Mining Plan / Mine Closure Plan issued by MoC these plan(s) require approval of Board of Directors of the allottee company.

For this, Board of Directors of NTPC vide resolution Item no. 417.2.13, dated 25.02.2015 has authorized Regional Executive Director (Coal Mining) to approve the Mining Plans/Mine Closure Plans, associated documents pertaining to these plans for Coal Mining Projects and any subsequent revision/ updation thereof, to be submitted to Ministry of Coal or any statutory authority in connection with development of coal mining projects.

In line with the resolution Revised Mining Plan (1<sup>st</sup> Revision) and Mine Closure Plan of Pakri Barwadih Coal Block as prepared by RQP Shri Sanjiv Kumar Singh (RQP no. 34011/(15)/2009-CPAM) has been approved by the undersigned for submission to MoC for approval. This will be implemented as per approval and amendments/ modifications suggested by MoC from time to time.

Copy of Board Resolution is enclosed for your kind information please.


With Kind Regards,

Yours Sincerely

*Sharad*  
21.01.2016  
(Sharad Anand)  
RED(Coal Mining)

*Sanjiv*  
SANJIV KUMAR SINGH

एन टी पी सी लिमिटेड, केंद्रीय कार्यालय, शोभी रोड, नई दिल्ली-110003, टैल/टेल.: 24380100, फैक्स/फैक्स: 011-24381018  
NTPC Bhawan, SOCRS Complex, Institutional Area, Lodhi Road, New Delhi-110003, वेबसाइट/वेबसाइट: www.ntpc.co.in  
Ministry of Coal, Govt. of India

  
 प्रवर्तन देव जामन/PAWAN DE  
 Deputy General Manager  
 एन टी पी सी लिमिटेड/NTPC  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)

EXTRACTS FROM THE MINUTES OF 417<sup>th</sup> MEETING OF THE BOARD OF DIRECTORS HELD ON WEDNESDAY, 25<sup>th</sup> FEBRUARY 2015

Item No.417.2.13

Approval of Mining Plan & Mine Closure Plans of Coal Mining Projects of NTPC and nomination of "Owner" as per the Mines Act 1952 for Pakri-Barwadih and all other coal mining blocks allocated / to be re-allocated /to be formally allocated to NTPC

XX	XX	XX	XX	XX	XX
XX	XX	XX	XX	XX	XX

The Board, after discussions, passed the following resolution:

Resolved that Regional Executive Director (Coal Mining) be and is hereby authorised to approve the Mining Plans/Mine Closure Plans, associated documents pertaining to these plans for Coal Mining Projects and any subsequent revision/updation thereof, to be submitted to Ministry of Coal or any statutory authority in connection with development of coal mine projects.

Further resolved that Shri Sharad Anand, Regional Executive Director (Coal Mining) be nominated as "Owner" as per the Mines Act, 1952 for Pakri-Barwadih and for all other coal mining blocks already allocated / to be re-allocated /to be formally allocated to NTPC.

\*\*\*\*\*

CERTIFIED TRUE COPY


*Sanjiv*  
SANJIV KUMAR SINGH  
Recognised Qualified Person  
No. 34011/(15)/2008-CPAM  
Ministry of Coal, Govt. of India

*A.K. Rastogi*  
ए. के. रास्तेगी/A. K. RASTOGI  
Executive Director & Company Secretary  
एन टी पी सी लिमिटेड/NTPC Limited  
एन टी पी सी लिमिटेड, एन टी पी सी रोड, नोएडा-201301  
NTPC Limited, Noida Road, New Delhi-110019

एन टी पी सी लिमिटेड (P-3007794)  
एन टी पी सी लिमिटेड (P-3007794)  
एन टी पी सी लिमिटेड (P-3007794)

*Pawan Dev Jaiswal*  
पवन देव जागटा/PAWAN DEV JAISWAL  
उप महाप्रबन्धक (आर-पि-सी)  
Deputy General Manager (Corporate Affairs)  
एन टी पी सी लिमिटेड/NTPC Limited  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)



  
पवन देव जायदा/PAWAN DEV  
उप महाप्रबन्धक (वार्डन)  
Dep. General Manager (Cust.)  
एन टी पी सी लिमिटेड/NTPC लिमिटेड  
EOC/A-8A, Sector-24, Noida-201305 (U.P.)



19-09  
19.10.15  
**cmpdi**  
A Mini-Ratna Company

सेन्ट्रल माईन प्लानिंग एण्ड डिजाइन इन्स्टीट्यूट लिमिटेड  
(कोल इण्डिया लिमिटेड की अनुबंधी कंपनी / भारत सरकार का एक शीक उपकरण)  
गोन्दवाना प्लेस, कान्के रोड, राँची - 834 031, झारखंड (भारत)  
Central Mine Planning & Design Institute Limited  
(A Subsidiary of Coal India Limited / Govt. of India Public Sector Undertaking)  
Gondwana Place, Kanke Road, Ranchi - 834 031, Jharkhand (INDIA)

पत्रांक संख्या: सीएमपीडीआई/डीजी/Captive/139/ 1311

दिनांक: 16.10.2015

To,

Executive Director,  
PB,CB & KD CMP's,  
NTPC Limited,  
Ujjwal Complex,  
Pugnail Road,  
Hazaribagh-825301.

Sub : Certification of Block Boundary of Pakri Barwadih Coal Block of NTPC Ltd.,  
Hazaribagh

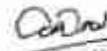
महोदय,

With reference to your letter No.7010/PBCMP/GM/14 dt. 03.04.2014 and subsequent discussions thereafter, please find enclosed herewith the certified block boundaries (3 copies) of Pakri Barwadih Coal Block.

धन्यवाद,

Enc : as above.

भवदीय,

  
16.10.2015


महाप्रबन्धक (गवेषण)



**SANJIV KUMAR SINGH**  
Recognised Qualified Person  
No. 34011/(15)/2009-CPAM  
Ministry of Coal, Govt. of India

  
पवन देव जैसवाल  
उप महाप्रबन्धक (वाणिज्यिक)  
एन टी पी सी लिमिटेड / NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

  
पवन देव जैसवाल/PAWAN DEV JAISWAL  
उप महाप्रबन्धक (वाणिज्यिक)  
Deputy General Manager (Commercial)  
एन टी पी सी लिमिटेड / NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

  
 पवन देव जामटा/PAWAN DESAI  
 Deputy General Manager (G)  
 एन टी पी सी लिमिटेड/NTPS  
 EOC, A-8A, Sector-24, Noida-201305



**MAP SHOWING THE AREA TO BE NOTIFIED UNDER SECTION 4(1) OF CBA (A&D) ACT, 1957 OF PAKRI BARWADIH COAL MINING PROJECT**



SL. NO.	Description	Symbol
1.	Block Boundary	—
2.	Area to be notified under Section 4(1)	—
3.	Wells Boundary	—
4.	Block Right Location	—
5.	Wells	—

**LEGEND**

NTPC LIMITED			
MAP SHOWING THE AREA TO BE NOTIFIED UNDER SECTION 4(1) OF CBA (A&D) ACT 1957			
SECTION	COAL MINE	PAKRI BARWADIH COAL BLOCK	
LOCATION	PAKRI BARWADIH	COALFIELD PLAN	
SHOWN BY			
Checked By			
Drawing No.			
SHEET			
SCALE 1:1000			
NO. OF SHEETS			

**SANJIV KUMAR SINGH**  
Recognised Qualified Person  
No. 340111/(15)/2009-CP  
Ministry of Coal, Govt. of India

**पवन देव जामरा/PAWAN DEW JAMARA**  
Deputy General Manager  
एन सी पी सी लिमिटेड, NTPC  
EOC, A-8A, Sector-24, Noida-201301

  
 पवन देव जामटा/PAWAN DEV JAISWAL  
 उपायुक्त महाप्रबन्धक (वाणिज्य)  
 Deputy General Manager (Commercial)  
 एन टी पी सी लिमिटेड/NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201305 (U.P.)

The WPI value for "All Commodities" as downloaded from website of "Office of Economic Advisor"

[illegible]


पवन देव जामल/PAWAN DEV JAMAL  
उप महाप्रबन्धक (परिचालन)  
Deputy General Manager (Operations)  
एन टी पी सी लिमिटेड/NTPC Limited  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

एन टी पी सी लिमिटेड / NTPC लिमिटेड  
Deputy General Manager (Corporation)  
एन टी पी सी लिमिटेड / NTPC लिमिटेड  
EOC, A-BA, Sector-24, Noida-201301 (U.P.)

Deputy General Manager (Civil)  
एन टी पी सी लिमिटेड, NTPC लिमिटेड  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

एन टी पी सी लिमिटेड / NTPC लिमिटेड  
EOG, A-8A, Sector-24, Noida-201301 (U.P.)



  
पवन देव जागद/PAWAN DEV JAGAD  
उप महाप्रबन्धक (वित्तिक) /  
Dep. General Manager (Finance)  
एन टी पी सी लिमिटेड / NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201309 (U.P.)



## Annexure - E



**MINING PLAN  
(INCLUDING MINE CLOSURE PLAN)  
(2ND REVISION)  
FOR**

**PAKRI BARWADIH COAL BLOCK**

Under Rule 22E of Mineral Concession Amendment Rules, 2020

North Karanpura Coalfield  
District-Hazaribagh, State- Jharkhand

Block Area : 4428.9 Ha  
Project Area : 4695 Ha  
Rated Capacity : 22 MTPA  
Peak Capacity : 27 MTPA  
(@150% of rated capacity)

**VOLUME -I  
(TEXT & ANNEXURE)**

**MINE PLAN PREPARING AGENCY (MPPA): MECON, RANCHI**

MPPA CERTIFICATE NO : NABET/APA-MPPA/IA/015

ISSUE DATE : 30<sup>th</sup> March, 2022

**NTPC LIMITED**

(A Public Sector Undertaking)

NTPC Bhawna, Core 7, Scope Complex  
Institutional Area, Lodhi Road  
New Delhi-110003, Ph: 011-24360071

SEPTEMBER 2023

  
पवन कुमार/PAWAN KUMAR  
उप महाप्रबन्धक (उप महाप्रबन्धक)  
Deputy General Manager (Deputy General Manager)  
एन टी पी सी लिमिटेड  
NTPC Ltd. Sector-24, Noida-201301 (U.P.)



**MINING PLAN (INCLUDING MINE CLOSURE PLAN)  
OF PAKRI-BARWADIH COAL MINE  
APPLICANT: NTPC**



**Index of Chapters**

Sl No.	Particulars	Page No
	Checklist	
1	Project Information	1-13
2	Exploration Geology, Seam sequence, Coal quality and Reserve	14-47
3	Mining	48-68
4	Safety Management	69-73
5	Infrastructure Facilities proposed and their location	74-79
6	Land Requirement	80-82
7	Environment Management	83
8	Progressive & Final Mine Closure Plan	84-95

  
पवन देव जैसवाल/PAWAN DEV Jaiswal  
उप महाप्रबन्धक (पर्वत) - २०१०  
Deputy General Manager (Pit) - 2010  
एन टी पी सी लिमिटेड/NTPC लि.  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)







**MINING PLAN (INCLUDING MINE CLOSURE PLAN)  
OF PAKRI-BARWADIH COAL MINE  
APPLICANT: NTPC**



**Index for List of Annexures**

Sl No.	Particulars	Details	Reference
1	Copy of allotment order/vesting order/Existing Mining lease	13016/29/2003-CA-I dated 11.10.2004	Annexure-I
2	Certificate of Qualified person(QP)/Accredited Mining Plan preparing agency(MPPA) if the project area is confined within the vested/allotted block boundary/existing mining lease area Where the project area extend beyond the block boundary, a certificate of Qualified person(QP)/Accredited Mining Plan preparing agency (MPPA) should be supported with a certificate of state Government mines and Geology department must be attached which should specify a) Intent of state government for grant of lease beyond the vested geological boundary b) Non-existence of Coal/ Lignite in the area beyond the vested/allotted geological block boundary/existing mining lease to rule out the issue of encroachment and use of coal bearing area(beyond the vested/allotted block boundary/existing mining lease) in the mining plan	Certificate of Accredited Mining Plan Preparing Agency (MPPA)	Annexure-II
3	Approval of the Company Board		Annexure-III
4	Copy of earlier approval of mining plan		Annexure-IV
5	Plan/chart showing schedule of implementation of Mine closure activities(Progressive and final closure) with duration of important activities		Annexure-V
6	Other documents		
6A	Slope Stability Report		Annexure-VI A
6B	Environmental Clearance		Annexure-VI B
6C	Forest Clearance		Annexure-VI C
6D	Hydrogeological Report		Annexure-VI D

पवन देव जामटा/PAWANA JAMTA  
उप महाप्रबन्धक (विकास)  
Dep. General Manager  
एन टी पी सी लिमिटेड/NTPL  
EOC, A-8A, Sector-24, Noida-201305





**MINING PLAN (INCLUDING MINE CLOSURE PLAN)  
OF PAKRI-BARWADIH COAL MINE  
APPLICANT: NTPC**



Sl No.	Particulars	Details	Reference
6E	QCI-NABET accreditation certificate for MECON, RANCHI as Mining Plan Preparation Agency (MPPA)		Annexure-VI E
6F	Cardinal Points of Block Boundary		Annexure-VI F
6G	Non-applicability of Mining Lease for the land acquired under CBA (Acquisition & Development) Act, 1957- Letter from Ministry of Coal to Jharkhand Govt.		Annexure-VI G

  
पवन देव जंगम/PAWAN DEV JANGA  
उप महाप्रबन्धक (सांख्यिक)  
Deputy General Manager (Commercial)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)



**MINING PLAN (INCLUDING MINE CLOSURE PLAN)  
OF PAKRI-BARWADIH COAL MINE  
APPLICANT: NTPC**



**Index for List of Plans/Drawings attached as Plates**

Sl No.	Details	Plate No
1	Location Plan	Plate-1
2	Plan certified by Qualified person(QP)/Accredited Mining Plan preparing agency(MPPA) if the project area is confined within the vested/allotted block boundary and Where the project area extends beyond the block boundary a plan certified by Qualified person(QP)/Accredited Mining Plan preparing agency(MPPA) should be supported with a plan with cardinal point coordinates duly certified by the state Government Mines and geology Department Plan in support of Annexure -II	Plate-2
3	KML file of the Proposed lease area, Project Area and geological block	Plate-3
4	Cadastral Plan showing approved Block boundary vis-à-vis proposed/existing mining lease and Mine boundary superimposed over it in distinct color, showing land use and infrastructure etc.	Plate-4
5	Geological Plan showing all the boreholes drilled and proposed to be drilled showing allotted block boundary and required lease area	Plate-5
6	Representative Graphic Lithologs	Plate-6
7	Surface plan showing drainage system	Plate-7
8	Conceptual plan showing infrastructure facilities including colony, boundary of mining area, mine entries, roads including road diversion alignment etc	Plate-8
9	Tentative land use plan showing land type (Govt, Forest and tenancy land) with its data source.	Plate-9
10	Floor Contour Plan, Seam Folio Plan, ISO-Grade Plan	

  
 पवन देव जायसवाल/PAWAN DEV JAISWAL  
 Deputy General Manager (Consolidation)  
 एन टी पी सी लिमिटेड/NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)







**MINING PLAN (INCLUDING MINE CLOSURE PLAN)  
OF PAKRI-BARWADIH COAL MINE  
APPLICANT: NTPC**



Sl No.	Details	Plate No												
11	Cross- section showing coal seams	Plate - 11												
12	Plan showing existing and proposed surface layout	Plate - 12												
	<b>Opencast Mines</b>													
13	Plan showing total thickness and overburden thickness and stripping ratio	Plate-13												
14	Final stage quarry plan showing haul road alignment	Plate-14												
	<b>Underground Mines</b>													
15	Plan showing mode and location of entries and surface layouts	Not applicable												
16	Layout of the panel for each system (like Longwall, Continuous Miner, Bord & Pillar, road header, etc.)	Not applicable												
17	Layout of pillar extraction	Not applicable												
18	Support system	Not applicable												
19	Haulage and transport system	Not applicable												
	<b>Closure Plan</b>													
20	Post mining land use plan	Plate-20												
21	Progressive Mine closer plan / Stage plan indicating stages	<table><tr><th>Year</th><th>Plate no.</th></tr><tr><td>1 st</td><td>21A</td></tr><tr><td>3 rd</td><td>21B</td></tr><tr><td>5 th</td><td>21C</td></tr><tr><td>PRC</td><td>21D</td></tr><tr><td>End Of life</td><td>21E</td></tr></table>	Year	Plate no.	1 st	21A	3 rd	21B	5 th	21C	PRC	21D	End Of life	21E
Year	Plate no.													
1 st	21A													
3 rd	21B													
5 th	21C													
PRC	21D													
End Of life	21E													
22	Reclamation Plan	Plate-22												

  
 पवन कुमार शर्मा / PAVAN K. SHARMA  
 का. नि. प्रबन्धक (का. नि. प्र.)  
 Dep. General Manager (Com.)  
 एन टी पी सी लिमिटेड / NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)





**MINING PLAN (INCLUDING MINE CLOSURE PLAN)  
OF PAKRI-BARWADIH COAL MINE  
APPLICANT: NTPC**



**List of Abbreviations**

LIST OF ABBREVIATION			
Abbrn.	Description	Abbrn.	Description
AMP	Approved Mining Plan	MCR	Mineral Concession Rule
BHs/bhs	Boreholes	mm	Millimeter
CHP	Coal Handling Plant	Mcum	Million Cubic Meter
CMR	Coal Mine Regulation	MECL	Mineral Exploration Corporation Limited
CPCB	Central Pollution Control Board	MoC	Ministry of Coal
CO	Carbon Monoxide	MGD	Million Gallon per Day
CMPDI	Central Mine Planning and Design Institute	MDO	Mine Developer cum Operator
dB/ dB(A)	Decibels	MSL	Mean Sea Level
DGMS	Directorate General of Mines safety	Mt	Million Tonne
EIA	Environmental Impact Assessment	Mtpa/MTPA	Million Tonnes per Annum
EMP	Environmental Management Plan	Mty	Million Tonnes per Year
E&M	Electrical & Mechanical	MVA	Mega Volt Ampere
e.o.t/E.O.T	Electric Overhead Travelling	OB	Overburden
Env.	Environment	PPM	Parts Per Million
GCV	Gross Calorific Value	RCC	Reinforced cement concrete
GPM	Gallons per minute	ROM	Run off Mine
GSI	Geological Survey of India	RPM	Respiratory Particulate Matter
Ha/ha	Hectare	MoEF CC &	Ministry of Environment and Forest for Climate Change
Hr	Hour	SPM	Suspended Particulate Matter
Hz	Hertz	s/Sec	Seconds
ISO	Indian Organisation Standard	Sq. km	Square kilometer
Kcal	Kilo Calorie	TPD	Tonnes per Day
Kg	Kilogram	Tph	Tonnes per hour
km	Kilometer	UHV	Useful Heat Value
Kv	Kilo Volt	V	Volts
LPS	Liters per second	VM	Volatile Matter
KWH	Kilo Watt Hour	VCB	Vacuum Circuit Breaker
m2	Square meter	WPI	Wholesale Price Index
m3/ cum	Cubic meter	°C	Centigrades

पवन देव जैन/PAWAN DEVI  
 General Manager (C)  
 एन टी सी लिमिटेड / NTPC  
 EOC, A-5A, Sector-24, Noida-201301 (U.P.)





**MINING PLAN (INCLUDING MINE CLOSURE PLAN)  
OF PAKRI-BARWADIH COAL MINE  
APPLICANT: NTPC**



**Checklist**

Details		(✓/X)
Text	Project Information	(✓)
Text	Exploration, Geology, Seam Sequence, Coal Quality and Reserve	(✓)
Text	Mining	(✓)
Text	Safety Management	(✓)
Text	Infrastructure Facilities proposed and their Location	(✓)
Text	Land Requirement	(✓)
Text	Environment Management	(✓)
Text	Progressive & Final Mine Closure Plan	(✓)
Annexure-I	Copy of allotment order /Vesting order.	(✓)
Annexure-II	Certificate of authorised person/agency if the project area is confined within the vested/allotted block boundary and Where the project area extends beyond the block boundary, a certificate of authorised person/agency should be supported with a certificate of State Government mines and Geology department must be attached, which should specify (a) intent of the state government for grant of lease beyond the vested geological boundary; (b) non-existence of Coal/ Lignite in the area beyond the vested/allotted geological block boundary to rule out the issue of encroachment and use of coal bearing area (beyond the vested/allotted block boundary) in the mining plan	(✓)
Annexure-III	Approval of the Company Board	(✓)
Annexure-IV	Copy of earlier approval of mining plan.	(✓)
Annexure-V	Plan / chart showing schedule of Implementation of Mine closure activities (progressive and final closure) with duration of important activities	(✓)
Annexure	Other document (if any)	(✓)
Annexure-VIA	Slope Stability Report	(✓)
Annexure-VIB	Environmental Clearance and Amendments	(✓)
Annexure-VIC	Forest Clearance and Amendments	(✓)
Annexure-VID	Hydrogeological Report	(✓)
Annexure-VIE	QCI-NABET accreditation certificate for MECON, RANCHI as Mining Plan Preparation Agency (MPPA)	(✓)
Annexure-VIF	Non-applicability of Mining Lease for the Land acquired under CBA (Acquisition & Development) Act, 1957- Letter from Ministry of Coal to Jharkhand Govt.	(✓)
Plates-01	Location plan	(✓)
Plates-02	Plan certified by authorised person/agency if the project area is confined within the vested/allotted block boundary and where the	(✓)



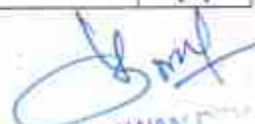




**MINING PLAN (INCLUDING MINE CLOSURE PLAN)  
OF PAKRI-BARWADIH COAL MINE  
APPLICANT: NTPC**



	project area extends beyond the block boundary, a Plan certified by authorised person/agency should be supported with a plan with geo-reference co-ordinates duly certified by the Mines and Geology Department of the concerned State Government. Plan in su ort of Annexure - II	
Plates-03	KML file of the proposed lease area, project area and geological block.	(✓)
Plates-04	Plan showing approved block boundary vis-à-vis proposed/ existing mining lease & Mine boundary superimposed over it in distinct colour.	(✓)
Plates-05	Geological plan showing all the boreholes drilled and proposed to be drilled showing allotted block boundary and required lease area	(✓)
Plates-06	Representative Graphic Litholog	(✓)
Plates-07	Surface Plan showing drainage system, Contour, preferably at 3 m interval, location of BH (borehole)	(✓)
Plates-08	Conceptual plan showing infrastructure facilities including colony, boundary of mining area, mine entries, roads including road diversion alignment etc.	(✓)
Plates-09	Tentative land use plan showing land type (Govt., forest and tenancy land) with its data source	(✓)
Plates-10	Floor contour plan and seam folio plan, iso-grade plan	(✓)
Plates-11	Cross-section showing coal/lignite seam(s)	(✓)
Plates-12	Plan showing existing and proposed surface layout(s)	(✓)
Plates-13	Plan showing total coal thickness and overburden thickness and stripping ratio (in case of opencast (OC) Mines)	(✓)
Plates-14	Final stage quarry plan showing haul road alignment (in case of OC Mines)	(✓)
Plates	Plan showing mode and location of entries and surface layouts (in case of underground (UG) Mines)	(X)
Plates	Layout of the panel for each system (like Longwall, Continuous Miner, Bord & Pillar, road header etc.) should be given (in case of UG Mines)	(X)
Plates	Layout of pillar extraction (in case of UG Mines)	(X)
Plates	Support system (in case of UG Mines)	(X)
Plates	Haulage and transport system (in case of UG Mines)	(X)
Plates-15	Post mining land use plan	(✓)
Plates-16	Progressive mine closure plan/ stage plans.	(✓)
Plates-17	Reclamation plan	(✓)

  
 पवन देव जागदा/PAWAN DEY  
 उप महाप्रबन्धक (वाणिज्य)  
 Deputy General Manager (Commercial)  
 एन टी पी सी लिमिटेड/NTPC लिमिटेड  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)





**MINING PLAN (INCLUDING MINE CLOSURE PLAN)  
OF PAKRI-BARWADIH COAL MINE  
APPLICANT: NTPC**



**Chapter - 1**

**PROJECT INFORMATION**

	Parameters	Details
<b>1.1</b>	<b>INTRODUCTION</b>	
1.1.1	Name of Coal / Lignite Block	Pakri Barwadih Coal Block
1.1.2	Name of the Coalfield/ Lignite Field	North Karanpura Coalfield
1.1.3	Base date of Mining Plan/ Mine Closure Plan	01.04.2023
1.1.4	Linked End Use Plant	All coal mined from the block, including any middlings or rejects etc, if washing is resorted to, shall be used in NTPC power plants.
1.1.5	Distance of End use plant from the pit head of the project in "km"	Various locations in India.
1.1.6	Mode of Coal Transport	Up to the loading point (south-eastern part of the block) by belt conveyor, from loading point to Banadag siding (13.5 km) by cross country belt conveyor (up to 15 MTPA) & by road (beyond 15 MTPA) and then dispatched to different power plants of NTPC by Indian Railway network.

<b>1.2</b>	<b>LOCATION, TOPOGRAPHY AND &amp; COMMUNICATION</b>	
1.2.1	Location of coal deposit (District and State)	Pakri Barwadih Coal Block is located on North-Eastern part of North Karanpura Coalfield in the Hazaribagh district of Jharkhand state.
1.2.2	Communication: PWD roads, railway lines, Air	<b>Road:</b> The block is well connected to the district headquarter Hazaribagh via Barkagaon at a distance of 40 km. by all-weather road. The block is located at a distance of 10 km. from Barkagaon. The Hazaribagh – Khelari State Highway passes 5 km. south of the block





**MINING PLAN (INCLUDING MINE CLOSURE PLAN)  
OF PAKRI-BARWADIH COAL MINE  
APPLICANT: NTPC**



		<p>via Barkagaon and Tandwa village. The area is also connected to Patratu by all-weather road via. Urimari.</p> <p><b>Railway:</b> The nearest rail station is Hazaribagh around 20 km from the block. It belongs to East Central Railway and lies on Koderma-Barkakana route.</p> <p><b>Air:</b> The nearest Birsa Munda Airport at Ranchi is situated at 130 Km south from the Pakri Barwadih Coal Block.</p>									
1.2.3	Availability of power supply, water etc.	<p>It is an Operating mine having adequate supply arrangement of water &amp; power supply.</p> <p>Presently, entire water requirement is being met through sump water and surface borewells.</p> <p>Power is being arranged from NTPC North Karanpura STPP (NKSTPP) to the main receiving sub-station (220/33/11 KV) of the Pakri Barwadih project. Provision of 6 (Six) nos. of 11 KV DG sets have also been made to cater to the power requirement at the time of power failure.</p> <table border="1"> <thead> <tr> <th align="center" colspan="3">Water Requirement</th></tr> <tr> <th align="center">West &amp; East (m3/day)</th><th align="center">NW (m3/day)</th><th align="center">Total (m3/day)</th></tr> </thead> <tbody> <tr> <td align="center">5,026</td><td align="center">745</td><td align="center">5,771</td></tr> </tbody> </table>	Water Requirement			West & East (m3/day)	NW (m3/day)	Total (m3/day)	5,026	745	5,771
Water Requirement											
West & East (m3/day)	NW (m3/day)	Total (m3/day)									
5,026	745	5,771									
1.2.4	Prominent physiographic features, drainage pattern, natural water courses, rainfall data, highest flood level	<p>Topographically the area is hilly and undulating in northern and north-west part of the block. The central and eastern part of the block is characterized by more or less flat terrain with gentle undulations. The ground has general slopes towards south.</p> <p>The HFL is 400 m. (Dip side of the block) – 450 m. (Hilly terrain in Northern portion). The original Surface contours vary from 430 m to 460 m. However, opencast mine, dumps and present civil construction activities changed the physiographic configuration varying from + 360m to + 520m from MSL within the area as per Survey of India Topo Sheets 73 E/1 (RF 1:50,000) due to quarry floor and dumps.</p>									

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		<p>There are a number of seasonal streams/nallah traversing the block and the prominent ones are western nala (lathorwa / khora), central nala (dumuhani), eastern nala (pakwa) flowing roughly north to south and carry huge load during rainy seasons. None of them are perennial in nature. They outfall into haharo nadi, near barkagaon village, flowing further south of the block which is one of the important tributaries of the mighty Damodar River flowing west to east in southern part of the North Karanpura Coalfield.</p> <p>The area experiences a subtropical climate with very hot and dry in summer and well distributed rainfall in the southwest monsoon season. Annual mean rainfall recorded at IMD's observatory, Hazaribagh is 1277.90 mm and maximum temperature is 43°C in summer and minimum temperature is 3°C in winter season.</p>
1.2.5	Important surface features within the project area and major diversion or shifting involved	<p><b>Habitation:</b></p> <p>The villages to be shifted are Arahara, Dadikalan, Chepakalan, Jugra, Lakura (P), Itiz, Chirudih, Nagadi, Pakri Barwadih, Urub, Deoria Khurd (P), Churchu, Sonbarsa, Sinduari, Chepakhard, Keri (P), Langatu (P), Barkagaon (P), Deorikalan (P), Sirma, Nawadih (P), Basaria, Kandaber (P), Jabra, Beltu (P), Bariatu (P)</p> <p><b>Nalas:</b></p> <p>There are a number of seasonal streams/nallah traversing the block and the prominent ones are western nala (lathorwa / khora), central nala (dumuhani), eastern nala (pakwa) flowing roughly north to south and carry huge load during rainy seasons. None of them are perennial in nature. They outfall into haharo nadi, near barkagaon village, flowing further south of the block which is one of the important tributaries of the mighty Damodar River flowing west to east in southern part of the North Karanpura Coalfield. It is proposed to construct a catchment canal from the northern periphery of the block as per the diversion study report prepared by CWPRS. This drain shall also</p>





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		<p>serve the purpose of catchment canal for rainwater and runoff from northern hills.</p> <p>Lathorva nala which flows from western side of PB- NW quarry shall not be diverted but realigned / straightened if necessary emboldened to carry additional load of diverted Khora nala.</p> <p>Before restart of exploitation of East Quarry, Pakwa nala shall be diverted in the periphery of PB East Quarry which shall meet its own course further downstream within the block boundary.</p> <p>All nalas (Khora, Dumuhani &amp; Pakwa) flowing through the block and interfering with the production regime shall be diverted preferable to the northern fringe of the block to free up the locked reserves so as to ensure minimum or no sterilization of coal.</p>
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1.3	DETAILS OF THE ALLOTTMENT AGREEMENT	
1.3.1	Name the Allottee	NTPC Ltd. (Govt. of India Enterprise)
1.3.2	Details of allotment/vesting order	Date: 11.10.2004 Letter No.: 13016/29/2003-CA-I
1.3.3	Name and address of the applicant	NTPC Ltd. (Govt. Of India Enterprise) NTPC Bhavan, Core-7 Scope Complex, 7 Institutional Area, Lodhi Road New Delhi 110003
1.3.4	Name of the Previous allottee of the Block	Not Applicable
1.3.5	Starting Date of the Mine as per CMDPA	Not Applicable
1.3.6	Rated Capacity as per CMDPA	18 MTPA (As per Approved Mining Plan)
1.3.7	Production Schedule as per opening permission (meeting provisions of CMDPA if any)	Not Applicable

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**MINING PLAN (INCLUDING MINE CLOSURE PLAN)  
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1.3.8	End Use of Coal/Lignite as per allotment order if any	For generation of power.
1.3.9	Cardinal points co-ordinates of the Block Boundary	Attached in Annexure VI F

<b>1.4</b>	<b>DETAILS OF THE PREVIOUS APPROVAL OF MINING PLAN</b>	
1.4.1	Date of Approval	07.03.2016
1.4.2	Conditions, if any	<p>1) The mining company shall take all necessary precaution regarding safety of mine workings, persons, deployed therein;</p> <p>2) Mining lease to be acquired shall not encroach into any other coal block;</p> <p>3) Mining company shall get the balance area explored in detail by getting the additional drilling done either by CMPDIL or under the supervision of CMPDIL within 4 years of the approval of mining plan and till then no overburden shall be dumped over the area.</p> <p>4) Mining company shall submit mining plan for underground mining for liquidation of beyond 300 m coal reserve of the block;</p> <p>5) The approval of mining plan is without prejudice to requirement of approvals under prescribed rules/regulations, etc.</p>
1.4.3	Scheduled year of start of production	2016
1.4.4	Proposed year of achieving the targeted production	2028
1.4.5	Date of actual commencement of mining operations, if operations already started	May 2016
1.4.6	Likely date of mining operations, if operations not yet started & reasons for non-commencement of operations	<p>Not applicable.</p> <p align="right">   <b>पवन देव जामटा/PAWAN DEV JAMTA</b>  उप महाप्रबन्धक (वाणिज्यिक)  Deputy General Manager (Commercial)  एन टी पी सी लिमिटेड/NTPC LIMITED  EOC, A-8A, Sector-24, Noida-201301 (U.P.) </p>







**MINING PLAN (INCLUDING MINE CLOSURE PLAN)  
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1.4.7	Planned production and actual levels achieved in last 3 years (Coal in Mte, OB in MM <sup>3</sup> , SR in M <sup>3</sup> /te)	<div>Planned production:</div> <table><tr><th>Year</th><th colspan="2">Coal in "Mt"</th><th>OB in M cum.</th><th>SR</th></tr><tr><td></td><th>UG</th><th>OC</th><td></td><td></td></tr><tr><td>2020-21</td><td></td><td>10.50</td><td>30.92</td><td>3.02</td></tr><tr><td>2021-22</td><td></td><td>11.50</td><td>44.25</td><td>3.93</td></tr><tr><td>2022-23</td><td></td><td>12.50</td><td>50.38</td><td>4.11</td></tr></table> <div>Actual production:</div> <table><tr><th>Year</th><th colspan="2">Coal in "Mt"</th><th>OB in M cum.</th><th>SR</th></tr><tr><td></td><th>UG</th><th>OC</th><td></td><td></td></tr><tr><td>2020-21</td><td></td><td>7.07</td><td>26.34</td><td>3.73</td></tr><tr><td>2021-22</td><td></td><td>8.32</td><td>21.98</td><td>2.63</td></tr><tr><td>2022-23</td><td></td><td>13.23</td><td>44.83</td><td>3.40</td></tr></table>	Year	Coal in "Mt"		OB in M cum.	SR		UG	OC			2020-21		10.50	30.92	3.02	2021-22		11.50	44.25	3.93	2022-23		12.50	50.38	4.11	Year	Coal in "Mt"		OB in M cum.	SR		UG	OC			2020-21		7.07	26.34	3.73	2021-22		8.32	21.98	2.63	2022-23		13.23	44.83	3.40
Year	Coal in "Mt"		OB in M cum.	SR																																																
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1.4.8	Statutory obligations vis-à-vis compliance status in a tabular form	<div>Statutory obligations vis-à-vis compliance status in a tabular form are given below –</div> <table><tr><th>Item</th><th>Date of Achievement</th><th>Compliance Status</th></tr><tr><td>Revised Mining Plan and Mine Closure Plan (1st Revision)</td><td>07.03.2016</td><td>Complied</td></tr><tr><td>Environmental Clearance</td><td>19.05.2009</td><td>Complied</td></tr><tr><td>Forest Clearance</td><td>Stage 1: 11.05.2010  Stage 2: 17.09.2010</td><td>Complied</td></tr><tr><td>Consent to Establish</td><td>18.12.2007</td><td>Complied</td></tr></table>	Item	Date of Achievement	Compliance Status	Revised Mining Plan and Mine Closure Plan (1st Revision)	07.03.2016	Complied	Environmental Clearance	19.05.2009	Complied	Forest Clearance	Stage 1: 11.05.2010  Stage 2: 17.09.2010	Complied	Consent to Establish	18.12.2007	Complied																																			
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**MINING PLAN (INCLUDING MINE CLOSURE PLAN)  
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		Consent to Operate	21.12.2016, 22.12.2018 (R1)	Complied
		Ground water clearance	02.07.2012	Complied
		Tripartite Escrow Agreement (Banker, CCO & NTPC)	12.11.2013	Complied
		DGMS Permission	25.06.2013	Complied
		Coal Controllers Permission	18.11.2013	Complied
1.4.9	Reasons for difference between the planned and actual production levels	<p>Reasons of difference:</p> <p>a) West Quarry:</p> <p><b>2020-21:</b> Less attendance of manpower, disturbance in supplies of spare parts of machinery, other inputs, etc. due to nationwide COVID-19 lockdown. Stoppage of operation for 94 days by the villagers</p> <p><b>2021-22:</b> 1654.1 mm of rainfall was received during 2021-22, which is 40% more than average.</p> <p>b) NW Quarry not started – EC and FC awaited.</p>		

1.5	PARAMETERS OF APPROVED MINING PLAN VIS-À-VIS PROPOSED MINING PLAN				
		Approved Mining Plan		Proposed Mining Plan	
1.5.1	Block Area in "Ha"	West & East	3943.76	West & East	3943.76
		NW	485.16	NW	485.16
		Total	4428.92	Total	4428.92
1.5.2	Block Area Projectised "Ha"	West & East	3943.76	West & East	3943.76
		NW	485.16	NW	485.16
		Total	4428.92	Total	4428.92

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**MINING PLAN (INCLUDING MINE CLOSURE PLAN)  
OF PAKRI-BARWADIH COAL MINE  
APPLICANT: NTPC**



1.5	PARAMETERS OF APPROVED MINING PLAN VIS-À-VIS PROPOSED MINING PLAN				
		Approved Mining Plan		Proposed Mining Plan	
1.5.3	Lease area "Ha"	Mining Lease is not applicable since mining area land is being acquired by NTPC under CBA Act.	Block Area		
			West & East	3943.76	
			NW	485.16	
			Mining Lease is not applicable for the land being acquired under CBA Act.		
1.5.4	Project Area "Ha"	Block Area		Block Area	
		West & East	3943.76	West & East	3943.76
		NW	485.16	NW	485.16
		Outside Block Area		Outside Block Area	
		West & East	266.08	West & East	266.08
		NW	0.00	NW	0.00
		Project Area		Project Area	
		West & East	4209.84	West & East	4209.84
		NW	485.16	NW	485.16
		Total	4695	Total	4695
		Out of 4695 Ha EC has been accorded for NW (485.16 Ha) and West & East (3319.42 Ha). Details of EC area has been attached at Annexure – VI B.			
1.5.5	Life of the Project "Yrs"	OC - 52 Years		OC - 51 Years (balance)	
1.5.6	Minimum and Maximum Depth of working "m"	Min – 30m. Max – 300 m.		Min -30 m. Max- 300 m.	
1.5.7	Net Geological Block "Ha"	West & East	3943.76	West & East	3943.76
		NW	485.16	NW	485.16
		Total	4428.92	Total	4428.92







**MINING PLAN (INCLUDING MINE CLOSURE PLAN)  
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APPLICANT: NTPC**



1.5		PARAMETERS OF APPROVED MINING PLAN VIS-À-VIS PROPOSED MINING PLAN			
		Approved Mining Plan		Proposed Mining Plan	
1.5.8	Production Target "MTPA"	18 MTPA		OC- 22 MTPA	
1.5.9	Seams Available "As per GR"	Multiple correlatable coal seams/splits viz: V Top, V Bottom, V combined, IV Top, IV Bottom, IV combined, III top, III Bottom, III combined, II Top, II middle, II TM, II Bottom, II MB, II combined, I Top, I middle, I TM, I Bottom, I MB, I combined, LL, K5, K4, K3, K2, K1		Multiple correlatable coal seams/splits viz: V Top, V Bottom, V combined, IV Top, IV Bottom, IV combined, III top, III Bottom, III combined, II Top, II middle, II TM, II Bottom, II MB, II combined, I Top, I middle, I TM, I Bottom, I MB, I combined, LL, K5, K4, K3, K2, K1	
1.5.10	Seams not considered for Mining with Reasons	<p><b>PB West &amp; East</b> – The geological &amp; mining characteristics depicts 12 workable splits contained in 5 seams of Barakar formations, i.e Seam I to V considered for opencast mining.</p> <p>The Karharbari formations contain 5 thin non workable seams ,K1 to K5. Avg. thickness of these seams is less than 1 m., hence not considered for opencast mining.</p> <p><b>PB North West</b>- The entire property is envisaged to be mined by opencast method.</p>		<p><b>PB West &amp; East</b> – The geological &amp; mining characteristics depicts 12 workable splits contained in 5 seams of Barakar formations, i.e Seam I to V considered for opencast mining.</p> <p>The Karharbari formations contain 5 thin non workable seams ,K1 to K5. Avg. thickness of these seams is less than 1 m., hence not considered for opencast mining.</p> <p><b>PB North West</b>- The entire property is envisaged to be mined by opencast method.</p>	
1.5.11	Gross Geological Reserve "Mt"	West & East	1595.64	West & East	1595.64
		NW	135.32	NW	135.32
		Total	1730.96	Total	1730.96

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**MINING PLAN (INCLUDING MINE CLOSURE PLAN)  
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APPLICANT: NTPC**



1.5	PARAMETERS OF APPROVED MINING PLAN VIS-À-VIS PROPOSED MINING PLAN				
		Approved Mining Plan		Proposed Mining Plan	
1.5.12	Net Geological Reserve "Mt"	West & East	1436.00	West & East	1436.00
		NW	137.58	NW	137.58
		Total	1573.58	Total	1573.58
1.5.13	Blocked Reserve "Mt"	West & East	187.66	West & East	187.66
		NW	15.43	NW	15.43
		Sub-Total	203.90	Sub-Total	203.90
		Extractable from barrier and batter coal between PB-West and PB-NW – Will be added to the reserves of PB-NW	38.13	Extractable from barrier and batter coal between PB-West and PB-NW – Will be added to the reserves of PB-NW	38.13
		Total	164.96	Total	164.96
1.5.14	Minalable Reserve "Mt"	West & East	519.34	West & East	519.34
		NW	143.73	NW	143.73
		Total	663.07	Total	663.07
1.5.15	Extractable Reserves "Mt"	West & East	503.38	West & East	503.38
		NW	138.96	NW	138.96
		Total	642.34	Total	642.34
1.5.16	% of Extraction/recovery	78%		78 %	
1.5.17	Reserve Depleted (till the base date) "Mt"	NA		West & East	47.753
				NW	-
				Total	47.753
1.5.18	Balance Extractable reserve "Mt"	NA		West & East	455.627
				NW	138.960
				Total	594.587





**MINING PLAN (INCLUDING MINE CLOSURE PLAN)  
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1.5	PARAMETERS OF APPROVED MINING PLAN VIS-À-VIS PROPOSED MINING PLAN					
		Approved Mining Plan		Proposed Mining Plan		
1.5.19	Average Grade	West & East Quarry- G10 NW Quarry – G8		West & East Quarry- G10 NW Quarry – G8		
1.5.20	OB in MM3	West & East	2098.78	OB removed till base date		
		NW	438.24	West & East	162.715	
		Total	2537.02	NW	-	
				OB Balance		
				West & East	1936.065	
				NW	438.24	
				Total	2374.305	
1.5.21	SR MM3/te	West & East	4.17	West & East	4.17	
		NW	3.15	NW	3.15	
		Overall	3.95	Overall	3.95	
1.5.22	Mining Technology	OC– Shovel Dumper combination system with horizontal slicing pattern would be adopted in mining mass, i.e, OB, Coal & intervening parting.  UG- Bord & Pillar and blasting gallery (which is a variation of Bord & Pillar) methods for this property.		OC– Shovel Dumper combination system with horizontal slicing pattern would be adopted in mining mass, i.e, OB, Coal & intervening parting.  UG- Bord & Pillar and blasting gallery (which is a variation of Bord & Pillar) methods for this property.		
1.5.23	Coal Beneficiation envisaged	Coal washability study has not been carried out for Pakri Barwadih coal. Coal Quality parameters obtained from the proximate analysis of coal revealed that ash percentage in all probability is likely to remain 34% or below which does not call for commissioning of coal washery.		Coal washability study has not been carried out for Pakri Barwadih coal. Coal Quality parameters obtained from the proximate analysis of coal revealed that ash percentage in all probability is likely to remain 34% or below which does not call for commissioning of coal washery. However to cater		





**MINING PLAN (INCLUDING MINE CLOSURE PLAN)  
OF PAKRI-BARWADIH COAL MINE  
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1.5	PARAMETERS OF APPROVED MINING PLAN VIS-À-VIS PROPOSED MINING PLAN						
		Approved Mining Plan			Proposed Mining Plan		
		washery. However to cater for more stringent future quality stipulations, space allocation is earmarked for commissioning of coal washery at mine end to facilitate transport of washed coal to the power plants as per qualitative requirements.			for more stringent future quality stipulations, space allocation is earmarked for commissioning of coal washery at mine end to facilitate transport of washed coal to the power plants as per qualitative requirements.		
1.5.24	Handling of Rejects	Not Applicable.			Not Applicable.		
1.5.25	Land use pattern " Ha"	West & East	NW	Total	West & East	NW	Total
1	Excavation Area	1600.00	382.00	1982.00	1600.00	382.00	1982.00
2	Top Soil Dump	40.00	7.14	47.14	40.00	7.14	47.14
3	External Dump	825.76	14.45	840.21	825.76	14.45	840.21
4	Safety Zone	8.97	1.03	10.00	8.97	1.03	10.00
5	Other Use	660.15	34.99	695.14	660.15	34.99	695.14
6	Infrastructure area	273.50	4.85	278.35	273.50	4.85	278.35
7	Green Belt	18.00	0.00	18.00	18.00	0.00	18.00
8	Undisturbed Area	823.46	47.84	871.30	823.46	47.84	871.30
9	Total	4209.84	485.16	4695.00	4209.84	485.16	4695.00
1.5.26	Reasons for revision	As a result of early start up of PB east Quarry, there is a variation in the calendar			To increase the production from West & East quarry from 15 MTPA to 19 MTPA		

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**MINING PLAN (INCLUDING MINE CLOSURE PLAN)  
OF PAKRI-BARWADIH COAL MINE  
APPLICANT: NTPC**



1.5	PARAMETERS OF APPROVED MINING PLAN VIS-À-VIS PROPOSED MINING PLAN		
		Approved Mining Plan	Proposed Mining Plan
		<p>program and the land use pattern of the mine.</p> <p>Besides that, PB NW Quarry was earlier unexplored during approval of Mining plan in 2006, is now integrated with the present revised Mining plan (1st revision). Resultant coal evacuation facilities from road and coal handling plant and additional volumes of coal/OB mining shall change the calendar program and land use pattern.</p>	<p>for the area in which EC has been accorded (Details of EC status has been attached in Annexure VI B)</p>

  
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**MINING PLAN (INCLUDING MINE CLOSURE PLAN)  
OF PAKRI-BARWADIH COAL MINE  
APPLICANT: NTPC**



**CHAPTER – 2**

**EXPLORATION, GEOLOGY, SEAM SEQUENCE, COAL QUALITY AND RESERVES**

	Parameters	Details			
<b>2.1</b>	<b>DETAILS OF THE BLOCK</b>				
2.1.1	Particulars of adjacent blocks: North, South, East, West	North- Protected Forest South-Badmahi River & Barkagaon R.F East- Barkagaon R.F West-Kerendari 'C' Block			
2.1.2	Location of the Block District / State	Pakri Barwadih Coal Block Coalfield: North Karanpura Coalfield District: Hazaribagh State: Jharkhand			
2.1.3	Area of the Block "Ha"		<b>West &amp; East</b>	<b>NW</b>	<b>Total</b>
		Geological Block Area	3943.76	485.16	4428.92
2.1.4	Area of the geological block projectized "in Ha" (Area of the geological block considered for liquidation of coal reserve)		<b>West &amp; East</b>	<b>NW</b>	<b>Total</b>
		Geological Block Area	3943.76	485.16	4428.92
		The block boundary considered for mining is the same as provided by the CMPDI. However additional land (266.08 Ha) has been acquired for external dump and infrastructure such as cross country conveyor, Railway siding etc. outside the block boundary.			
2.1.5	Balance area yet to be projectised "Ha"	NIL			
2.1.6	Likely Reserve in the area yet to be projectised "Mte"	NIL			

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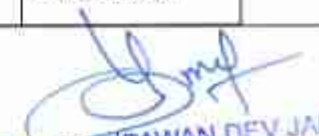


पवन देव जामट/PAWAN DEV JAM  
एन एम एन एल (कॉमर्सियल)  
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**MINING PLAN (INCLUDING MINE CLOSURE PLAN)  
OF PAKRI-BARWADIH COAL MINE  
APPLICANT: NTPC**



			1	311980.4692	2647159.772
			2	313129.5382	2647372.602
			3	313782.6419	2647447.134
			4	314631.8342	2647483.388
			5	316777.5563	2647174.964
			6	318153.6881	2645862.933
			7	319177.5792	2644674.552
			8	320097.6234	2643543.264
			9	320799.8789	2642052.087
			10	321695.6514	2641457.096
			11	322100.0657	2640720.801
			12	322551.6371	2639629.345
			13	320296.452	2639240.066
			14	318476.2464	2638828.291
			15	317223.5973	2639425.025
			16	315672.7493	2640074.623
			17	315691.0892	2640516.046
			18	314588.5174	2641542.285
			19	314597.4314	2642173.713
			20	314997.2703	2642858.353
			21	315111.5708	2644220.129
			22	314308.2927	2645267.842
			23	313498.8911	2645634.034
			24	312566.8643	2646262.31
2.1.8	Certificate of authorised person/agency if the project area is confined within the vested/allotte	Annexure-II	 <b>पवन देव जामटा/PAWAN DEV JAMTA</b> उप महाप्रबन्धक (वाणिज्यिक) Deputy General Manager (Commercial) एन टी पी सी लिमिटेड/NTPC LIMITED EOC, A-8A, Sector-24, Noida-201301 (U.P.)		





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<p>d block boundary and</p> <p>Where the project area extends beyond the block boundary, a certificate of authorised person/agency should be supported with a certificate of State Government mines and Geology department must be attached, which should specify (a) intent of the state government for grant of lease beyond the vested geological boundary; (b) non-existence of Coal/Lignite in the area beyond the vested/allotted geological block boundary to rule out the issue of</p>	<p>पवन देव जामटा/PAWAN DEV JAMTA उप महाप्रबन्धक (वणिज्यिक) Deputy General Manager (Commercial) एन टी पी सी लिमिटेड/NTPC LIMITED EOC, A-BA, Sector-24, Noida-201301 (U.P.)</p>
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**MINING PLAN (INCLUDING MINE CLOSURE PLAN)  
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	<p>encroachment and use of coal bearing area (beyond the vested/allotted block boundary) in the mining plan</p> <p>The Project area, Lease area and geological block area in "Ha" shall also be envisaged</p>	
2.1.9	KML file of the Proposed lease and geological block.	Complied. (Plate-3)
2.1.10	Whether the proposed project area is confined within the allotted block boundary, if not, the reason for deviation from allotted block boundary, may be given.	<p>The block boundary considered for mining is the same as provided by the CMPDI. However additional land (266.08 Ha) has been acquired for external dump and infrastructure such cross country conveyor, Railway siding etc. outside the block boundary.</p> <ul style="list-style-type: none"> <li>• OB dumps &amp; mine infrastructure: 193.85Ha</li> <li>• Evacuation corridor &amp; siding: 72.23 Ha</li> </ul>
2.1.11	If the project area extends outside the allotted block boundary,	North and eastern part of Block boundary of Pakri Barwadih forms the Northern Boundary of North Karanpura Coal Field as per Geological Map of North Karanpura Coal Field. Further, Geological Plan (vide drawing No. R-III/G/6206) of GR prepared by CMPDI reveals that the incrop of lowermost seam of Barakar Formation Seam-IB is within the block boundary and no mineable coal, extend



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	confirmation about non-occurrence of coal/lignite in the area under reference needs to be furnished	beyond that incrop line.															
2.1.12	Type of the Project (Operating / under Implementation) and year of Starting	Operating OC Mine & FY 2016-17															
2.2	EXPLORATION, GEOLOGY AND ASSESSMENT OF RESERVE																
2.2.1	Regional geological set up of the area, local geology, structure, stratigraphic sequence, characteristics of the lithological units (coal seams /partings/over burden).	<p>The North Karanpura Coalfield forms a prominent East-West trending valley between Hazaribagh plateau in the North and Ranchi plateau in the south. The Aswa pahar in the south-East separates the North and South Karanpura Coalfields by East West elongated metamorphic patch. However, they are interconnected near Bachra and Hindegir village by a narrow tongue of Talcher Outcrops. On the eastern side, North Karanpura Coalfield is separated from the West Bokaro Coalfield by a narrow stretch of metamorphic rocks having several outliers of Talcher formation. In the west, it is separated by a stretch of about 20 km wide metamorphic belt from Auranga Coalfield.</p> <table><tr><th>Period</th><th>Group</th><th>Subgroup</th><th>Formation</th><th>Lithology</th></tr><tr><td>Recent</td><td>-</td><td>-</td><td>Alluvium</td><td>Detrital and alluvial soil &amp; subsoil</td></tr><tr><td>Jurassic</td><td>-</td><td>Equivalent to Rajmahal</td><td>Igneous Intrusive</td><td>Dolerite and Mica peridotite</td></tr></table>	Period	Group	Subgroup	Formation	Lithology	Recent	-	-	Alluvium	Detrital and alluvial soil & subsoil	Jurassic	-	Equivalent to Rajmahal	Igneous Intrusive	Dolerite and Mica peridotite
Period	Group	Subgroup	Formation	Lithology													
Recent	-	-	Alluvium	Detrital and alluvial soil & subsoil													
Jurassic	-	Equivalent to Rajmahal	Igneous Intrusive	Dolerite and Mica peridotite													





**MINING PLAN (INCLUDING MINE CLOSURE PLAN)  
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			Trap		
		Triassic	Upper Gondwana	-	Mahadeva
					Massive coarse to conglomeratic feldspathic ferruginous sandstone with shale intercalation
		Upper Permian to Lower Triassic	Lower Gondwana		Panchet
					Yellowish to white coarse-grained sandstone, red, chocolate colour clastic clays.  In the upper part, yellowish friable sandstone whereas lower part is greenish yellow.
		Upper Permian		Damuda	Raniganj
					Fine to medium grained quartzo-feldspathic and quartzic sandstone often micaceous and matured, interbanded shale and sandstone, carbonaceous shale and sandstone, carbonaceous shale and thin coal seam.
					Barren
					Dark Shale,

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				Measures	sandy micaceous shale with sideritic interbanded shale and sandstones.
				Barakar	Conglomerate, sandstone, shale, intercalation siltstone and shale, carbonaceous shale, fireclay, chocolate-coloured clays and coal seams.
				Karharbari	Dark mottled sandstone occasional shale bands, fireclay, chocolate-coloured clays and coal seams.
				Talchir	Rikba plant beds, boulders, conglomerate, varvites, sandstone, tilloids and tillites.
-----Unconformity-----					
	Precambrian	-	-	Metamorphics	Granite, gneiss, pegmatite, phyllites, Micaschist and limestone, chromite

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					bearing rocks, Amphibolites and quartzite.
		<p>Out of the 1230 sq. Km area of the North Karanpura coalfield, the coal bearing formations viz Karharbari, Barakar &amp; Raniganj crop-out over an area of about 500 sq. Km. The Karharbari formation is well developed in the south-central and eastern part of the coalfield. It contains only one coal seam which occurs in two or three sections. It comprises of very coarse-grained gritty sandstone and at times has silicious sandstones, hard strata difficult to negotiate during drilling operations. The Barakar formation contains a number of coals seams and contributes the major bulk of reserves in this coalfield. The total coal column is more or less around 30 to 40 meter in the major part of the coalfield. Raniganj formation contains three or four impersistent coal seams which are generally shaly in nature.</p>			

  
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2.2.2

Local geology, Structure, Stratigraphic sequence, Characteristic s of the litho- logical units (coal seams / partings/overb urden).

A. PB Block (East and West)

The Pakri-barwadih block comprises of Talchir, Karharbari, Barakar, Barren measures and Raniganj formations belonging to Damudas, a Sub-group of Lower Gondwana. Talchir Formation rest directly over the Precambrian. The Karharbaris and Barakar are the main coal bearing formations in the block.

Period	Group	Sub-group	Forma- tion	Thick- ness Range	Lithology
Recent	Lower Gondw ana	Damud a	Alluviu m	3.5- 25.85	Detrital and Alluvial soil & subsoil
Upper Permian			Raniga nj	1.50- 324.50	Fine to medium grained micaceous sandstone, interbanded shale and sandstone Carbonaceous shale & thin uneconomic Coal seams.
Upper Permian			Barren- Measur es	5.14- 353.00	Dark shale, sandy shale & interbanded shale & sandstone
			Baraka r	12.50- 268.85	Fine to coarse grained sandstone, shale, conglomerate, carbonaceous shale & Coal seam
			Karhar bari	10.00- 81.60	Medium to coarse grained sandstone, shale, silicified

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					quartzite rock & thin coal seams
Permo-Carboniferous			Talchir	0.80-13.50	Green coloured shale, Boulder & Conglomerate
-----Unconformity-----					
Precambrian			Metamorphics		Granite, gneiss & quartzites

There are a few small outliers of Barakar/Karharbari/talker Formations occurring over the Precambrian basements immediately north of the Pakri-barwadih Block.

**B. PB Block (North West):**  
PB North west area small exposures of sandstone and coal seams are found near the bank of Khora Nala in the western margin of the block. At places Karharbari Formation also rest directly over metamorphic. The geological succession established in the PB North west area of the block from sub-surface exploration data is given below.

Period	Group	Sub-group	Formation (thickness)	Lithology
Recent and Sub-recent			Alluvium (3.00 to 23.00m)	Soil & Sub-soil
-----Unconformity-----				
Middle Permian			Barren Measures (44.00-138.70m)	Predominantly shale with intercalation of sandstone and shale arenaceous shale
Lower Permian	Lower Gondwana	Damuda	Barakar (19.07-137.10m)	Fine to coarse grained sandstone, shale, carbonaceous shale and coal

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				seams
			Karharbari (5.14-91.52m)	Fine to coarse grained sandstone with bands of shale and coal seams
Permo-Carboniferous			Talchir 0.65m-4.64m)	Green coloured shale, boulders and conglomerates
-----Unconformity-----				
Precambrian			Metamorphosis (2.80-11.00pm)	Gniesses, granite and quartzites

**Structure of PB (East and West)**

Structurally the North Karanpura coalfield is a major broad syncline with its axis trending east to west and plunging towards east. The Pakri-Barwadih is located in the NE part of the northern limb. The northern boundary of the block appears to have normal contracts with the Talcher and basement metamorphics. The southern boundary of the eastern sector is marked by a major fault of about 250m throw towards south. This has resulted in bringing the Barakar formations including coal seams in juxtaposition with Raniganj formation.

The block is generally traversed by NW-SE/SE-EW trending faults with northerly throw causing step like configuration. The strike of the strata is generally NW-SE and the dip of the strata varies from 10° to 15° towards south-west.

Nineteen faults with throw ranging up-to 170m have been deciphered based on exploration carried out in the block. The throw of most of the faults ranges from 10-40m.

It may be mentioned here that the geological structure of the block is primarily based on CMPDI GR in general and in particular in the north and north central part of West Quarry i.e., north of fault F10-F10, giving due cognizance to the long field association of CMPDI during exploration.

The fault F5 which is of distinctive nature has been considered as the boundary for division of the block into West & East Quarry. The





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details are given below.				
Fault	Trend	Dip	Throw	Remarks
F1-F1	East-West	Northerly	20-60m	Omission of (i) Seam-II in KB-16 (ii) Seam- II Top to Seam-IV in CMKPB 29 (iii) Reduction in parting between Seam-II MT & Middle in CMKPB-12
F2-F2	NW-SE	North-easterly	10-100m	Omission of (i)Seam- I in CMKPB 10 (ii)Seam-II Bottom & V in CMKPB 35 (iii)Seam- III Top& Bottom in CMKPB-12
F3-F3	NW-SE & Curvilinear near fault trending NW-SE and gradually swerving to N-S	Northerly	80-170m	Intersected in (i) CNPB-107 (Omission of Seam-I Bottom to Seam-V Top). (ii)Based on Stratum Contours.
F4-F4	NW-SE dies out near borehole	North-East	0-20m	Omission of (i)Seam-I Bottom to Seam-II Bottom in CNPB -49, (ii)Seam-IVA & IV in CNPB-15

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			CNPB-52			(iii)Seam-II Top & III in CNPB-21 (iv)Seam-III in CNPB-21 & Seam-IV in CNPB-64.
	F5-F5	NW-Se to swerving to E-W	North-Easterly/Northerly	40-140m		Omission of (i) Seam-I & II in CNPB-92, (ii)Seam-III Bottom in CNPB-93, (iii)Seam-III in CNPB-95, (iv)Seam-III Bottom to V top in KB-11 (v)Seam- II to V top in CNPB-16 (iv)Based on Stratum contour.
	F6-F6	NW-SE abducts against fault F5-F5 near BHs CNPB-93	North Easterly	10-40m		(i)CNPB-39 Omission of Seam-II Top, Middle& Bottom), (ii)CNPB-29 Omission of Seam-I Top- to I Bottom (iii)Based on Stratum contour.
	F7-F7	NW-SE to swerving to E-W	Northerly	20-80m		(i) Omission of Seam-III in boreholes CNPB-28, 20 & 68. (ii) CNPB - 61 Omission of Seam-II Top to Seam-I Bottom (iii) CNPB-25 Omission of seam floor of Seam-II MB to Seam-I Bottom





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					(iv) CNPB - 29 Omission of Seam-I Top to Seam-I Bottom.
F8- F8	NW- SE	North Easterly	10 – 20m	(i) Reduction in parting between Seam II Top & II CNPB-94 & KB- 17 (ii) Omission of Seam-IVA & Seam-IV in CNPB-40 (iii) Seam-III Top to Seam-IV A in CNPB-38 (iv) Seam-III Bottom in CNPB- 32 (v) Seam-II in CMKPB-11	
F9- F9	E-W, Abuts against fault F-8 near BH CNPB -30	Northerly	20-40m	Based on stratum contour plan	
F10 - F10	NW- SE curvili near fault trendin g almost E-W	Northerly	20-60m	(i) Seam-II Bottom to IVA in CNPB-78 (ii) Based on stratum contour.	
F11 - F11	Curvili near fault Trendi ng almost E-W	Northerly	20-60m	(i) Based on Stratum Contour plan (ii) Omission of Seam-I in boreholes CNPB - 83 & CNPB 135.	





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		F12 - F12	Curvilinear near fault Trending almost E-W	Northerly	20m	(i) Intersected in Borehole CNPB-80 where Seam-I Top & Middle is faulted (ii) Based on Stratum Contour Plan
		F13 - F13	E-W	Northerly	20 - 40 m	(i) Roof of Seam - I Top & Middle Combined is faulted in borehole CMKPB-5. (ii) Based on Stratum Contour Plan.
		F14 - F14	E-W	Northerly	40-60m	(i) Roof of Seam II Top & Middle combined is faulted in borehole CMKPB-5. (ii) Based on stratum contour plan;
		F15 - F15	Limits the boundary of Eastern-southern Sector of the block Major fault trending almost E-W.	Southerly	More than 200m throw	Raniganj and Barren Measure formations are in juxtaposition with Barakar
		<b>NEW FAULTS</b>				
		FN-16	WNW-ESE	NEN	20m	(i) Redelineation of incrop of seam 1 cross section (ii) Revision of Floor contours of seam-I





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FN-17	NW-SE ion in the East Sector within the quarria ble zone;	NE	5m	(i) Redelineation of incrop of seam 1 cross section (ii) Revision of Floor Continuer plan (iii) Geological Cross Section additional.
FN-18	NW-SE Locatio n in the Central sector	NE	Amount of throw could not be establis hed	Geological Cross Section
FN-19	WNW- ESE	NNE		Geological Cross Section

**Structure of PB (North West)**

Pakri Barwadih North West area of the Block, the general strike of the formation in the block is almost east-west. The local swing in the strike at places is due to rolling dip. The strata are dipping at 10° to 12° southerly.

The block is traversed by 8 numbers of faults. Among these, 3 faults are varying from 0. m to 50 m. Fault F1 is the major fault varying in through from 160111 to 180m. This fault runs approximately along southern to western boundary of the block. The trend of the fault is NW-SE and except faults F7 & F8, all are extending in metamorphic terrain.

**Description of Faults Interpreted in PB NW**

FA ULT NO.	LOCA TION	NAT URE	TRE ND & THR OW	BH. NO.	DEP TH (m)	EVIDENCE S
F1- F1	Located near souther n to Wester n bounda ry	Obliq ue fault	NW- SE & 160- 180m	MNP B -25	274.5 0	<ul style="list-style-type: none"> <li>Seam K-1 to K-5 &amp; Local-L faulted in borehole MNPB-25</li> <li>Interpreted based on" level</li> </ul>





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							difference of seam on either side of fault • Metamorphics has come in juxtaposition of Gondwana in north western part of the block • Equivalent to fault F3 Of western section of Pakri-Barwadih block
F2-F2	Located in Central the part-of the block	Oblique fault	NW-SE & 0- 40	MNP B-4	170.00		• Seam K-1 & K-2 faulted in MNPB-4 • Interpreted based on level difference of seam on either side of fault
F3-F3	Located in the Central part-of the block	Oblique fault	NW-SE & 30-55	MNP B-7 MNP B 26	29.00 316.60		• Seam K2 is faulted in MNPB-7 • Seam K-1 and contact of Karharbari and metamorphic faulted in borehole MNPB-26 • Interpreted based on level difference of seam on either side of fault • Equivalent to F5 of western sector of

*[Handwritten Signature]*

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						Pakri Barwadih
F4-F4	Located in the North-eastern part-of the block	Oblique fault	NW-SE & 10-50	MNP B-11	87.00	<ul style="list-style-type: none"> <li>Seam K-1 To K-4 faulted in Borehole MNPB-11</li> <li>Interpreted based on Level difference of seam on either side of fault</li> <li>Equivalent to F10 Of western sector of Pakri-Barwadih</li> </ul>
F5-F5	Located in the North-eastern part-of the block	Oblique fault	NW-SE & 10			Extending from western sector of Pakri-Barwadih (Equivalent to fault F14)
F7-F7	Located in the Eastern part-of the block	Oblique fault	NW-SE & 0-10	MNP B-24	205	Seam K-3 faulted in borehole MNPB-24 equivalent to fault F8 of Pakri-Barwadih Block
F8-F8	Located in the Eastern part-of the block	Oblique fault	NW-SE & 0-5	MNP B-5 MNP B-10	100 28	<ul style="list-style-type: none"> <li>Seam K-2 faulted</li> <li>Seam K-5 faulted</li> </ul>

**Stratigraphic Sequences**

Stratigraphic Sequences of PB west & East



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The Barakar Formation contains five persistent coal seams numbered Seam-I to Seam-V in ascending order. Out of these, Seam-I & Seam-II have split into 3 sections, whereas Seam-II, Seam-IV and Seam-V split in two sections each. The split sections are designated as top, middle and bottom. The split sections of the seams merge to form composite seams designated for example as II TM for II Top & Middle combined and MB for Middle & Bottom combined.

The Karharbari formations underlies the Barakar formations and contain 5 thin non-workable coal seams namely K-1 to K-5. The average thickness of these coal seams is less than 1m.

The summarized sequence and details of coal seams in the block are given below

**Sequence & details of Coal Seams**

Seam/Parting	Thickness range (m)		General thickness (m)	No of Boreholes considered
Seam-V Top	0.39 (CNPB-34)	3.91 (CMKPB 13)	1.5	55
Parting	0.80 (CNPB - 32)	12.41 (CMKPB 13)		
Seam - V Bottom	0.18 (CNPB - 113)	2.20 (CMKPB 29)	1.00	58
Seam - V Comb	0.73 (CMKPB 37)	6.00 (CMKPB 11)	1.50	19
Parting	2.16 (CNPB - 95)	29.11 (CMKPB - 64)		
Seam -IVA	0.20 (CNPB -	3.13 (CMKPB	1.25	47

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		95)	- 105)		
Parting	0.64 (CMKPB - 4)	12.37 (CMKPB - 30)			
Seam - IV Top	0.90 (CNPB- 26)	7.88 (CNPB- 68)	3.00	26	
Parting	0.90 (CNPB- 105)	17.59 (CNPB- 53)	-	-	
Seam - IV Bottom	0.65 (CNPB - 86)	7.64 (CNPB- 134)	2.50	26	
Seam -IV Comb	2.10 (CNPB- 131)	14.61 (CNPB- 144)	8.00	53	
Parting	0.98 (MNPB - 25)	44.31 (CMKPB - 37)	-	-	
Seam III Top	0.48 (CMKPB 12)	3.75 (CMKPB- 10)	1.50	56	
Parting	0.94 (CMKPB 15)	28.88 (CMKPB 10)			
Seam III Bottom	0.16 (CNPB - 85)	3.10 (CNPB - 22)	1.25	56	
Seam III Comb	0.46 (CNPB- 7)	3.74 (CNPB- 37)	1.50	31	
Parting	1.97 (CNPB -	45.97 (CNPB -			





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		48)	91)		
Seam – II Top	0.25 (CMKPB- 4)	15.46 (CMKPB – 10)	8.00	60	
Parting	Nil	31.93 (CNPB- 31)			
Seam – II Middle	2.98 (CMKPB- 30)	20.04 (CNPB – 34)	8.00	56	
Seam-II TM	10.28 (CNPB- 17)	20.26 (MNPB- 22)	12.00	39	
Parting	0.77 (CNPB- 131)	10.75 (CNPB 72)			
Seam-II Bottom	1.40 (CNPB- 29)	14.56 (CMKPB- 10)	7.00	80	
Seam – II MB	13.85 (CMKPB- 29)	22.51 (CNPB- 30)	16.00	12	
Seam-II Comb	17.70 (CMKPB- 8)	28.67 (CNPB- 32)		3	
Seam-I Top	0.21 (CMKPB- 12)	11.36 (CNPB- 124)	2.50	81	
Parting	1.00 (CNPB- 110)	18.77 (CNPB- 91)			
Seam-I Middle	0.42 (CNPB- (CNPB-	10.13 (CNPB-	2.50	90	





**MINING PLAN (INCLUDING MINE CLOSURE PLAN)  
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			106)	110)		
	Seam-I TM	3.85 (CNPB-90)	11.95 (CNPB-125)		6	
	Parting	0.85 (CNPB-44)	23.62 (CNPB-72)			
	Seam-I Bottom	0.20 (CNPB-108)	8.10 (CNPB-134)	2.00	64	
	Seam-I MB	4.70 (MNPB-11)	11.88 (CMKPB-25)		6	
	Seam – Comb	7.96 (CNPB - 78)	13.76 (CMKPB-35)		3	
	Parting	1.80 (CNPB-72)	35.75 (CNPB-73)			
	Local	0.06 (MNPB-38)	5.56 (CMKPB-5)	1.50	72	
	Parting	4.72 (CMPB-69)	78.89 (CNPB-88)			
	Seam – K5	0.08 (MNPB-38)	2.22 (CNPB-79)	0.75	39	
	Parting	2.27 (CNPB-80)	81.25 (CNPB-124)			
	Seam – K4	0.09 (CNPB-	3.04 (CNPB-	0.75	34	

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			124)	90)		
		Parting	1.20 (CNPB-106)	29.75 (CMKPB-36)		
		Seam – K3	0.08 (CNPB-90)	2.46 (CNPB-116)	1.25	33
		Parting	0.50 (CNPB-110)	33.40 (CMKPB-20)		
		Seam – K2	0.05 (CNPB-124)	4.80 (CNPB-123)	1.25	36
		Parting	1.04 (CNPB-101)	48.00 (CNPB-128)		
		Seam – K1	0.10 (CNPB-52)	6.45 (CNPB-105)	1.50	50
		Note : i) TM Stands for Top & Middle Merged ii) MB Stands for Middle & Bottom Merged				
2.2.3	Geological Block Area "Ha"	West & East		NW	Total	
		3943.76		485.16	4428.92	
2.2.4	Status of Exploration of the block	Phase wise & Agency wise exploration status				
	Agency/Type	Period of Drilling	Drilling			
			No. of B.H	Meterage		
	1. GSI/Regional	1961-1971	KB-1 to 26 (26 BHs)	8177.23		





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	2. CMPDI	Dec 1999 – April 2001	CMKPB-1 to 38 (38 BHs)	10482																		
	a. Promotional (Semi-regional)																					
	b. Non-CIL (detail drilling)	Jan 2003 to June 2004	CNPB-1 to 135 (135 BHs)	24943.60																		
	Sub-Total (1&2)		199	43602.83																		
	3. MECL for PB North West (Sector-A)	2006 to 2012	MNPB-1 to MNPB-38 (33 BHs)	4282.70																		
	4. CMPDI	2016-2020	62	31087.80																		
	Total (1,2, 3 & 4)		294	78973.33																		
2.2.5	Area covered by 'detailed' exploration within the block (sq. km)	<table><tr><td>Sl. No.</td><td>Area/Type</td><td>Area in sq. Km.</td></tr><tr><td>1</td><td>PB West &amp; East (Explored)</td><td>17.74</td></tr><tr><td>2</td><td>PB NW (Explored)</td><td>4.85</td></tr><tr><td>3</td><td>Regionally Explored</td><td>21.69</td></tr><tr><td>4</td><td>Outside Block Boundary</td><td>2.67</td></tr><tr><td></td><td>Total Area</td><td>46.95</td></tr></table>			Sl. No.	Area/Type	Area in sq. Km.	1	PB West & East (Explored)	17.74	2	PB NW (Explored)	4.85	3	Regionally Explored	21.69	4	Outside Block Boundary	2.67		Total Area	46.95
Sl. No.	Area/Type	Area in sq. Km.																				
1	PB West & East (Explored)	17.74																				
2	PB NW (Explored)	4.85																				
3	Regionally Explored	21.69																				
4	Outside Block Boundary	2.67																				
	Total Area	46.95																				
2.2.6	Whether entire lease area has been covered by 'detailed' exploration.	NO																				
2.2.7	No. of boreholes drilled within the block	<ul style="list-style-type: none"><li>• GSI : 26 BHs</li><li>• CMPDI : 234 BHs</li><li>• MECL : 33 BHs</li></ul>																				
2.2.8	Whether any further	The southern portion of the Pakri-Barwadih Block covering around 12 sq. km. area has also not been explored in detail.																				

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	exploration/study is required or suggested and time frame in which it is to be completed	A detailed exploration programme has been proposed to convert the indicated reserve into proved category and to develop underground mine plan.  Detailed exploration is being carried out in this area, involving drilling of 26000 m, as estimated by CMPDI. The same shall be completed by December 2025.			
2.2.9	Year wise future programme of exploration	A detailed drilling of 26000m is to be completed by CMPDI by December 2025.			
		Period	Meterage	Location	Target
		Aug 2023 to Dec 2025	26000 m.	Dip side of PB coal block and Dump A & B	Negative proving of Dump A & B and to convert the indicated reserve into proved category and to develop underground mine plan.
2.2.10	Overall borehole density within the block (no./sq. km) approx	10 BHs/Sq. Km. in proved Reserve Area and 1 Bhs/Sq. km. in indicated Reserve area.			
2.2.1 1	No of Seams available as per GR (Geological Report)	<ul style="list-style-type: none"><li>• Barakar: 5 persistent coaly horizons</li><li>• Karharbari: 5 thin coaly horizons</li><li>• Local: 1 coaly horizon</li></ul>			
2.2.1 2	Seams not considered for Mining with Reasons	<b>PB West &amp; East:</b> Karharbari (K1 to K5) & Local seams (L Seam) are not considered by opencast mining.			
2.2.1 3	Dip of the Seam	10° - 15°			
2.2.1 4	Seam wise thickness,	<b>Thickness of Coal Seams &amp; Partings in PB (West &amp; East)</b>			



**MINING PLAN (INCLUDING MINE CLOSURE PLAN)  
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depth and reserve	Particular	West Quarry		East Quarry	
		Max.	Min	Max.	Min.
	Overburden	251.55	10.39	266.81	6
	Seam-V Top	3.24	0.36	3.91	0.84
	Parting	7.19	0.8	4.89	0.82
	Seam-V Bottom	3	0.29	2.04	0.21
	Parting	24.97	2.16	19.95	5.88
	Seam-IV Top	7.88	0.9	6.57	2.34
	Parting	6.76	0.9	17.59	16.38
	Seam-IV Bottom	7.64	0.65	6.56	0.87
	Parting	44.31	5.1	22.93	5.31
	Seam-III Top	3.75	0.23	3.22	0.49
	Parting	24.75	1.1	16.94	0.94
	Seam-III Bottom	3.1	0.16	2.41	0.21
	Parting	45.97	3.39	33.72	1.97
	Seam-II Top	12.7	0.74	11.22	0.25
	Parting	31.93	1.2	28.12	1.34
	Seam-II Middle	20.04	1.75	10.98	3.5
	Parting	6.28	0	5.8	0.97
	Seam-II Bottom	11.4	1.4	14.02	1.99
	Parting	30.43	0.21	27.94	4.74
	Seam-I Top	11.36	0.45	4.95	0.42
	Parting	18.77	1	14.73	1.6






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Seam-I Middle	10.13	0.42	6.71	0.87
Parting	16.35	0.95	18.7	0.85
Seam-I Bottom	8.1	0.2	4.8	0.25

**Thickness of Coal Seams & Partings in PB (North West)**

Sl. No	Seam parting	Min	Max.
1	V COMB	3.24	5.9
2	Parting	3.72	27.16
3	M COMB	5.15	10.04
4	Parting	0.98	30.55
5	II Top	6.96	10.61
6	Parting	1.09	5.12
7	II MID	7.17	11.68
8	Parting	0	0
9	II T+M	15.97	20.26
10	Parting	1.4	24.22
11	II BOT	2.85	6.3
12	Parting	5.89	15
13	I TOP	0.42	3.79
14	Parting	0.52	4.51
15	I MID	1.15	8.73
16	Parting	0.17	4.19
17	I BOT	1.01	4.17
18	Parting	0	0
19	I M+B	4.7	11.88

  
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20	Parting	16.8	27.68
21	LOCAL (L)	0.06	2.35
22	Parting	16.39	29.67
23	K-5	0.08	1.32
24	Parting	4.74	12.65
25	K-4	0.28	1.74
26	Parting	4.4	9.85
27	K-3	0.45	1.96
28	Parting	8.45	19.58
29	K-2	0.06	2.99
30	Parting	1.95	13.84
31	K-1	1.19	4.68

**SEAM WISE AND DEPTH WISE OPENCAST RESERVES  
(In '000 Tonnes)**

Seam / Depth	0-50	50-100	100-150	150-200	200-250	250-300	Total
V COMB	26	891	2150	2312	803	3	6185
IV COMB	32	2657	4108	3430	1485	11	11721
II TOP	35	3611	2897	2592	1226	11	10372
II MID	220	4297	3190	2999	1514	13	12233
II T-M	389	10758	5631	4660	1193	0	22631
II BOT	695	5011	2630	2639	1117	6	12098
I TOP	1081	2927	1355	1240	496	0	7099
I MID	1485	1670	1039	216	2	2	4414
I BOT	862	629	276	104	1	1	1873
I M+B	2366	6632	3407	4115	1537	5	18062





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<b>TOTAL</b>	<b>7191</b>	<b>39083</b>	<b>26681</b>	<b>24307</b>	<b>9374</b>	<b>52</b>	<b>106688</b>
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**SEAM WISE AND DEPTH WISE UNDERGROUND RESERVES  
PB (NW)**

(in '000 Tonnes)

Seam/Depth	<300	>300	TOTAL
Local	0	2597	2597
K-5	128	0	128
K-4	4209	2	4211
K-3	3334	9	3343
K-2	5355	20	5375
K-1	15023	219	15242
<b>TOTAL</b>	<b>28049</b>	<b>2847</b>	<b>30896</b>

Summary of reserves of West & East Quarry (Million tonnes):

UNFC Code	Type	Reserves
111	Proved	703
211	Feasibility mineral reserves	636
222	Indicated mineral reserves	733
	<b>Total (111 + 222)</b>	<b>1436</b>

Summary of reserves of NW Quarry (Million tonnes):

UNFC Code	Type	Reserves
111	Proved	134.47
222	Indicated mineral reserves	3.114
	<b>Total (111 + 222)</b>	<b>137.584</b>

2.2.15 Methodology of reserves estimation (also mention if any software package has

Reserve Estimation for Pakri Barwadih (West & East)

Reserves for all the potential coal seams of Barakar formation i.e., Seams I bottom - Seam V top except IV-A & Local Seams have been estimated by utilizing isochore of individual coal seams. In this isochore method, the areas between successive isochores were determined with the help of ~ digital planimeter





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<p>been used).</p>	<p>which has been multiplied with the average thickness of successive isochores to arrive at volume of chore. The specific gravity of 1.28 + 1 % of ash% has been considered for estimation of tonnage of different coal seams.</p> <p><b>RESERVES of PB North West Area</b></p> <p>The procedure adopted for estimation of reserves of coal in Pakri Barwadih North West Coal Block is fundamentally based on the specific geological factors which determines the extent to which correlation, Interpolation of data can be projected for building up a stratigraphic and structural model of the lay and disposition of the coal seams.</p> <p>The structural model is depicted in various plates illustrating vertical cross sections and floor contour plans. The dimensional model with quality overalls are presented in the individual seam folio plans.</p> <p>Detailed exploration in Pakri - Barwadih - A Coal Block, District Hazaribagh, Jharkhand has established the presence of 10 Nos. of seams, 5 each coal bearing horizons belonging to Barakar formations and Karharbari formation respectively. In ascending order these are seam K-1, K-2, K-3, K-4, K-5 in Karharbari Formation and local(L), I, II, IV &amp; V In Barakar Formation. Seam I splits into 3 sections viz. I Top, I Middle &amp; I Bottom at places. Seam I Bottom and I Middle combined and form single seam namely I Bottom + Middle. Similarly, Seam II also splits into 3 sections viz. II Top, II Middle and II Bottom. Seam II Top and II Middle coalesce to form single seam as II Top + II Middle in eastern part. In Pakri Barwadih North West (Sector-A) Coal Block Seam V &amp; IV occur as a combined seam.</p> <p>The dimensional and quality aspects of the seams viewed in the spatial framework with reference to the ground surface have indicated the potentiality for mining of Seams. Seam I - Bottom, I - Bottom + I - Middle, I - Middle, I-Top, II-Bottom, II Middle, II Top, II Top+ Middle, IV Combined &amp; V Combined together as the opencast proposition, while Seam-Local (L) &amp; K-1 to K-5 can be mined by underground method. The entire quarriable area considering Seam-I as base seam occurs in less than 300 m depth.</p> <p>In borehole MNPB-13 located outside northern boundary, Seam K1 &amp; K2 of Karharbari Formation are intersected at shallower depth. Besides, as per structure evolved, coal seams (K1 to K5) of Karharbari are likely to extend outside the northern boundary of the block in the northeastern area.</p> <p>The isochores, isograde and the floor contours have been drawn</p>
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	<p>by using MINEX software. It is assumed that the variation between any two points of observation is uniform and gradual.</p> <p>The underground reserves for the seams have been estimated based on I- 30 thickness and quality of the seam. The I-30 thickness has been delineated including carbonaceous shale bands upto 0.30m and non-combustible bands upto 0.05m thickness. However, all non-combustible bands (NCB) of &gt;0.05m thickness and carbonaceous bands of &gt; 0.30 m have been excluded. The quarriable reserves have been estimated on the basis of I-100 thickness where the carbonaceous bands up to 1 m thickness have been included in the seam and dirt bands more than 1 m. in thickness &amp; obvious bands more than 0.05m in thickness have been excluded.</p> <p>The minimum workable thickness for the estimation of open cast and underground reserves of the seam has been considered as 1.00 m and 0.90m/1.20m respectively.</p> <p>In open cast, reserves have been estimated at 1.00 m. thickness interval while in underground, reserves have been estimated at 0.90m to 1.20m, 1.20m to 1.50m, 1.50m to 1.80m, 1.80m to 2.00m, 2.00m to 2.50m, 2.50m to 3.00m, 3.00m to 3.50m, 3.50m to 5.00m, 5.00m to 10.00m thickness ranges and above 10.00m interval.</p> <p>The seams having UHV less than 1300 K/Cal/Kg have been considered as ungraded coal and have been marked in seam folio of respective seam. Ungraded coal zones have been included in over burden.</p> <p>Areas have been identified where the seams are not developed at all. The limits of these zones of non-development have been marked by taking half of the influence of the boreholes with positive seam intersection. These limits have also been considered to be the line of zero seam thickness and the workable limits were delineated accordingly. The areas falling within &lt;1.00 m thickness zone have not been considered for estimation of opencast reserves in case of underground reserves areas &lt;0.90 m./ 1.20 m. have not been taken in account for reserves estimation.</p> <p>Line of split has been considered as 1.00m parting between two sections. Though in few cases the parting between two consecutive seams is less than 1 m, seam is considered split as it occurs in small patches. Likewise, if the seam is found coalesced in a small patch has been considered split.</p> <p>40m barrier have been drawn from. Khora Nala, its tributary and road.</p>
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		<p>No barrier has been drawn along the kucha roads which connect the different parts of the block and small nalas.</p> <p>The reserves have been estimated upto the trace of the floor of the incropping coal seams within the block.</p> <p>In incrop region while estimating the reserves, average of thickness has been considered.</p> <p>An overall deduction of 10% is applied to the gross tonnage from each seam to arrive at the net-in-situ reserves of coal to account for data gaps, wash out zones, abrupt change in seam thickness and the reserves have been rounded off to the nearest multiple of 1000 tonnes.</p> <p>Heave zone of respective seam has excluded while estimating reserves.</p> <p>All volumes of coal are estimated by isochore method.</p> <p>The reserves of the seam have been calculated by using MINEX Software.</p> <p>The standard formula which is universally accepted has been used for calculating the gross reserves:</p> $R = A \times Th \times Sp. Gr.$ <p>Where,</p> <p>R = Gross Reserves in thousand tonnes</p> <p>A = Area in Sq.m</p> <p>Th = Thickness in metre</p> <p>Sp. Gr. = Specific Gravity of coal for a specific grade</p>		
2.2.16	Average GCV	<p>West &amp; East Quarry: G-10</p> <p>North West Quarry: G-8</p>		
2.2.17	Gross Geological Reserve of the block "Mte"	West & East	NW	Total
		1595.64	135.32	1730.96
2.2.18	Net Geological Reserve of the	West & East	NW	Total
	Net Geological	1436.000	137.584	1573.584





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	block "Mte"	Net OC	707.000	121.030	828.030
2.2.19	Minable Reserve of the block "Mte"	West & East	NW	Total (for OC)	
		519.34	143.73	663.07	
2.2.20	Blocked Reserve "Mte"	West & East	NW	Total (for OC)	
		187.66	15.43	203.90	
		Extractable from barrier and batter coal between PB-West and PB-NW – 38.13			
		(Will be added to the reserves of PB-NW)			
		Total (for OC) – 164.96			
		(Barrier Loss: 58.74 Mt)			
2.2.21	Corresponding extractable reserve of the block "Mte"	West & East	NW	Total (for OC)	
		503.38	138.96	642.34	
2.2.22	Percentage of Extraction	77.58%			
2.2.23	Reserve already depleted (Base date of Mining Plan)	West & East	NW	Total (for OC)	
		47.753 Mt (2016-17 to 2022-23)	-	47.753	
2.2.24	Balance Reserve (as on Base Date)	West & East	NW	Total (for OC)	
		455.627	138.960	594.587	

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**CHAPTER – 3**

**MINING**

	Parameters	Details
3.1	MINING METHOD	
3.1.1	Existing method of mining if the mine is under operation	In the present Mining Plan, coal from PB blocks is envisaged for extraction of coal by opencast method of mining. Coal shall be extracted up to 300m. depth line only by mixed slicing method through deployment of shovel-dumper combination. Horizontal slicing method shall be adopted to extract coal from PB North West and East Quarry while combination of inclined and horizontal slicing method shall be adopted to extract coal from PB West Quarry.
3.1.2	Proposed method of mining with justification on suitability of method of mining	Given below.
<p><b>PROPOSED METHOD OF MINING FOR PB COAL BLOCK</b></p> <p>Considering the geo-mining characteristics of the block and for conservation of resource, it is proposed to extract the coal reserves up to up to a depth of 300m. using open cast mining Method because of following reasons –</p> <ol style="list-style-type: none"> <li>1. The coal seams are in cropping at a shallow depth.</li> <li>2. The OB: Coal ratio is favourable (3.95:1) for opencast mining.</li> <li>3. Higher percentage of recovery as compared to underground mining.</li> <li>4. The mining by opencast method shall be economical against underground method.</li> <li>5. The opencast mining operations are comparatively safer and ensure higher recovery of coal resource.</li> </ol> <p>Three distinct quarries have been carved out of Pakri Barwadih Coal block namely,</p> <ol style="list-style-type: none"> <li>a. Pakri Barwadih West</li> <li>b. Pakri Barwadih East</li> <li>c. Pakri Barwadih North-West</li> </ol> <p>Existing seams beyond 300 m. depth shall be considered for underground mining.</p>		

  
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at later stage, subsequent to completion of drilling/detailed exploration in the area. No underground mining shall be carried out in the PB-NW and PB-East as all the seams are extracted by opencast working.

**PB WEST & EAST**

The Geological & Mining characteristics of the PB West & East depicts total 12 workable splits contained in 5 seams i.e. seam-I to Seam V is considered for opencast mining. Seam I occurrence is not reported in most of the Boreholes, as a result mining shall be carried out in patches. In general, the coal seams are dipping at 1 in 3 to 1 in 5 towards south. As per Geological Report prepared by CMPDIL, the Karharbari formations contain five thin non workable seams namely K1 to K5. The average thickness of these seams is less than 1 m. The deposit has therefore been proposed for mining by opencast method up to the Seam I BOT Floor up to a depth of 300 m.

**WORKABLE SEAMS IN PB WEST & EAST QUARRY**

S.No.	Particulars	Thickness	West Quarry		East Quarry	
			Max	Min	Max	Min
1	Seam V Top	m.	3.24	0.36	3.91	0.84
2	Parting	m.	7.19	0.8	4.89	0.82
3	Seam V Bottom	m.	3	0.29	2.04	0.21
4	Parting	m.	24.97	2.16	19.95	5.88
5	Seam IV Top	m.	7.88	0.9	6.57	2.34
6	Parting	m.	6.76	0.9	17.59	16.38
7	Seam IV Bottom	m.	7.64	0.65	6.56	0.87
8	Parting	m.	44.31	5.1	22.93	5.31
9	Seam III Top	m.	3.75	0.23	3.22	0.49
10	Parting	m.	24.75	1.1	16.94	0.94
11	Seam III Bottom	m.	3.1	0.16	2.41	0.21
12	Parting	m.	45.97	3.39	33.72	1.97
13	Seam II Top	m.	12.7	0.74	11.22	0.25
14	Parting	m.	31.93	1.2	28.12	1.34





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15	Seam II Middle	m.	20.04	1.75	10.98	3.5
16	Parting	m.	6.28	0	5.8	0.97
17	Seam II Bottom	m.	11.4	1.4	14.02	1.99
18	Parting	m.	30.43	6.21	27.94	4.74
19	Seam I Top	m.	11.36	0.45	4.95	0.42
20	Parting	m.	18.77	1	14.73	1.6
21	Seam I Middle	m.	10.13	0.42	6.71	0.87
22	Parting	m.	16.35	0.95	18.7	0.85
23	Seam I Bottom	m.	8.1	0.2	4.8	0.25

**PB NORTH WEST**

The Geological & Mining characteristics of the PB North-West depicts total 10 nos. of coal seams, 5 each coal bearing horizons belonging to Barakar & Karharbari formation respectively. In ascending order these are seam K-1, K-2, K-3, K-4, K-5 in Karharbari formation and Local(L), I, II, IV & V in Barakar formation. Seam I splits into 3 sections viz. I Top, I Middle & I Bottom. At places Seam I Bottom & I Middle combined and form single seam namely I Bottom + Middle. Similarly, Seam II also splits into 3 sections viz. II Top, II Middle & II Bottom. Seam II Top & II Middle combined to form a single seam as II Top + II Middle in eastern part. Seam V & IV occur as a combined seam.

The block is traversed by 8 nos of faults. Among these, 3 faults are varying from 0 m. to 50 m. Fault F1 is the major fault varying in through from 160m to 180 m. this fault runs approximately along southern to western boundary of the block.

The general strike of the formation is almost east-west. The strata is dipping at 10° to 12° southerly.

**WORKABLE SEAMS IN PB NW QUARRY**

S.No.	Particulars	Unit	Thickness		Usual/Mean
			Max	Min	
1	Seam V comb	m.	5.9	3.24	1.50







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2	Parting	m.	27.16	3.72	
3	Seam IV comb	m.	10.04	5.15	8.00
4	Parting	m.	30.55	0.98	
5	II Top	m.	10.61	6.96	8.00
6	Parting	m.	5.12	1.09	
7	II Middle	m.	11.68	7.17	8.00
8	Parting	m.	0	0	
9	II T + M	m.	20.26	15.97	12.00
10	Parting	m.	24.22	1.4	
11	II Bot	m.	6.3	2.85	7.00
12	Parting	m.	15	5.89	
13	I Top	m.	3.79	0.42	2.50
14	Parting	m.	4.51	0.52	
15	I Mid	m.	8.73	1.15	2.50
16	Parting	m.	4.19	0.17	
17	I Bot	m.	4.17	1.01	2.00
18	Parting	m.	0	0	
19	I M + B	m.	11.88	4.7	
20	Parting	m.	27.68	16.8	
21	Local (L)	m.	2.35	0.06	1.50
22	Parting	m.	29.67	16.39	
23	K-5	m.	1.32	0.08	0.75
24	Parting	m.	12.65	4.74	
25	K-4	m.	1.74	0.28	0.75
26	Parting	m.	9.85	4.4	





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27	K-3	m.	1.96	0.45	1.25
28	Paring	m.	19.58	8.45	
29	K-2	m.	2.99	0.06	1.25
30	Parting	m.	13.84	1.95	
31	K-1	m.	4.68	1.19	1.50

### CHOICE OF TECHNOLOGY

The operational factors include

- Multi-Seam operation involving 12 workable splits contained in 5 seams i.e. seam-I to Seam V.
- Effective seam thickness varying from 1.00 to 12.00 m with majority of seams having less effective thickness varying from 1.00 to 2.50m.
- OB with varying parting thickness

Based on the above factors Shovel & Dumper combination is recommended due to the following reasons :

1. In view of multiple seams and equal nos. of inter burden layers to be tackled, an equipment system which is capable of dealing many layers at a time(flexibility) of operations with the help of smaller units has been recommended as shovel ,dumper combination.
2. The quality problem can be handled with the help of hydraulic excavators, which have three-dimensional movement of bucket. They are capable of carrying out selective mining.
3. Furthermore, to tackle about 19 MTPA coal & 75 MCum of OB from West & East Quarry, comparatively medium and higher size shovels of up to 10 Cum bucket capacity have been envisaged along with matching capacity of rear dumpers.
4. Flexibility of operation shall be available due to such equipment system.

### CONSTRAINTS ON MINE DEVELOPMENT

The following constraints in opencast working of the deposit have been envisaged:

- Property is intervened by total 19 nos. of strike faults resulting into reduced

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- strike length as well as dislocation of seam.
- Steep gradient (~1 in 4) of coal seams needs adoption of modified inclined slicing method of working in mining mass.
- Problem of internal dump stability at the floor gradient of 1 in 3 to 1 in 5 (towards south).
- Large volume of OB handling ( Avg SR 1:4.17)
- Limited dump space available outside the mining area where maximum dump height of 90m. has been considered.
- Most of the coal seams are thin with thickness ranging between 1m to 4 m. except seam IIB & II M which are 6 to 9 m.
- Highly splitted seams with variable parting.
- Congestion of mining equipment at OB & Coal benches.
- Considerably high rate of face advancement in the order of ~ 100m. (considering strike length of around 4.5 km. (avg.) and total seam thickness ~ 40m.(avg.))

**PIT FORMULAION STRATEGY:**

The mine boundary for the pit has been delineated taking into consideration block boundary, surface features, strip ratio and external dump space required for continuity of mining. UPL line or pit boundary shall start from in-crop of seam as Eastern and North western query boundary is defined up to in-crop of seam 1, no coal shall be left which can be mined safely and economically.

There shall not be any barrier between PB NW, PB West, PB East quarries, hence no coal shall be sterilized. Reserves are blocked only in the barrier left against the adjacent mines and batters shall be governed by prevailing design standards.

Considering the above, the pit is formulated with maximum possible external OB dump on the dip side within the block and internal dumping in the de-coaled area. Pit optimization has been done considering constraint on space availability for dumping of waste.

In the present Mining Plan, coal from Pakri Barwadih Blocks is envisaged for extraction of coal by open cast method of mining. Coal shall be extracted up to 300m. depth only by mixed slicing method through deployment of shovel-dumper combination. Horizontal slicing method shall be adopted to extract coal from PB North West and East Quarry while combination of inclined and horizontal slicing method shall be adopted to extract coal from PB West Quarry.

*[Signature]*  
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Deputy General Manager (Commercial)  
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Philosophy of Production as per present Mining Plan is as follows:

- The PB west Quarry has been planned to achieve a rated capacity of 19 MTPA from 10<sup>th</sup> year onwards. The production from PB west Quarry shall taper from 15<sup>th</sup> year and opencastable reserves of west quarry shall be completely exhausted by the end of 17th year.
- PB East Quarry shall restart producing from 15th year with an overlap of 3 years so as to reach the full capacity before the exhaustion of PB West Quarry and maintain the rated capacity of 15 MTPA till its exhaustion by the end of 29th year.
- The production from PB North-West Quarry shall commence from 3rd year onwards of production plan of Pakri Barwadih Block. PB North Quarry shall continue up to 51 years of mining operation at a rated capacity of 3 MTPA. Coal of Barrier & Batter locked between PB-NW & PB-West block shall be extracted from 40 years to 51 years.
- Total peak rated production from the block is 22 MTPA, which shall be achieved in 10th year and shall continue up to 15th year of mine life.

**RATED CAPACITY:**

Revised Mining Plan for Pakri Barwadih Coal Block has been prepared for a rated/peak capacity of 22.0 MTPA of Coal from Opencast mine. Out of which, 19 MTPA shall come from PB West & East Quarry and remaining 3 MTPA shall come from PB NW Quarry.

**BASIC PROJECT AND MINE PARAMETERS:**

The basic project parameters and mine parameters are given below:

Sl. No.	Parameters	Unit	Value
1	Net Geological Reserve	Mt	828.03
2	Extractable reserve by OC Method	Mt	642.34
3	OB Volume	M Cum	2537.02
4	Stripping Ratio	Cum/t	3.95



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5	Target Capacity	Mt/Year	22
6	Tentative Mine Life	Years	52
7	Maximum depth	m.	300

**SEQUENCE OF MINING:**

As per the Approved Mining Plan, PB west Quarry was envisaged to operate by starting three separate pits along the strike viz WP-1, WP-2, WP-3. Due to the small size of the pits, in the initial period, mine production was limited and gradually start producing 10 Mt by 5th year of production after about 3 km. strike length in Pit WP-4 gets developed. The mine production again start increasing from 11th year onwards gradually when the WP-2, WP-3 and WP-4 shall merge leading to longer strike length of more than 5 km. The Western Quarry was planned to achieve a rated capacity of 15 MTPA from the 12<sup>th</sup> year of operation and shall continue till 24<sup>th</sup> year (exhaustion of deposit).

Considering the creation of mine void for in-pit dumping by extraction of Seam I which has poor coal quality sequencing with other seams to maintain coal quality, and, progress direction of the mine varied from along the strike direction to towards dip (southern) side. We propose to advance the mine in the coming 5 years, towards south & south-east direction partially, till sufficient mine void is created for in-pit dumping.

Philosophy of Production as per present Mining Plan is as follows :

- The PB west Quarry has been planned to achieve a rated capacity of 19 MTPA from 10<sup>th</sup> year onwards. The production from PB west Quarry shall taper from 15<sup>th</sup> year and opencastable reserves of west quarry shall be completely exhausted by the end of 17th year.
- PB East Quarry shall restart producing from 15th year with an overlap of 3 years so as to reach the full capacity before the exhaustion of PB West Quarry and maintain the rated capacity of 15 MTPA till its exhaustion by the end of 29th year.
- The production from PB North-West Quarry shall commence from 3rd year onwards of production plan of Pakri Barwadih Block. PB North Quarry shall continue up to 51 years of mining operation at a rated capacity of 3 MTPA. Coal of Barrier & Batter locked between PB-NW & PB-West block shall be extracted from 40 years to 51 years.
- Total peak rated production from the block is 22 MTPA, which shall be



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achieved in 10th year and shall continue up to 15th year of mine life.

It is proposed to keep the strike length of around 4.5 km. and more in order to avoid the congestion of mining equipment at coal and OB benches.

Nallahs namely Khora, Dumuhani, Pakwa Nalla are traversing through the block. All the nallahs flowing through the blocks and interfering with the production regime shall be diverted preferably to the northern fringe of the block to free up the locked reserves so as to ensure minimum or no sterilization of coal.

Underground mining is proposed for depth beyond 300m., for which separate mining plan shall be submitted. Presently, detail exploration work is being carried out for preparation of Geological report for underground mining.

**MINING SYSTEM PARAMETERS :**

Elements of mining system have been determined in accordance with the parameters of excavation, transport equipment and parameters of drilling and blasting.

Sl. No.	Particulars	PB West & East	PB NW
1	Maximum Bench Height		
	Top OB	15 m.	15 m.
	Coal & Intervening parting	5-15 m.	5-15 m.
2	Proposed Maximum Bench Width		
	Working Bench	50 m.	40m.
	Non-working Bench width	25 m.	25 m.
3	Width of the Permanent Haul road	30 m.	25m.
4	Width of the temporary transport ramp	10 m.	10 m.
5	Usual height of the spoil dump bench ( 1 tier)	30 m.	30 m.
6	Bench Slope		
	OB Bench	70°	70°





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Coal Bench	70°	70°
Dump bench	37°	37°
Overall(ultimate) pit slope	37°	43°

**PIT SLOPE DESIGN**

Geo-Mining Conditions	Bench Parameters		
	Bench Height (m.)	Exposed Width (m.)	Angle (Degree)
Top soil/Sub Soil	6	9	70
Pit Benches in Coal & Sandstone	12	16	80
	OR		
	15	20	80

**INTERNAL DUMP DESIGN**

Geo-Mining Conditions	Bench Parameters		
	Bench Height (m.)	Exposed Width (m.)	Angle (Degree)
Internal Dump in drained condition	30	40	37
	Exposed bench width at 440 mRL (i.e. 90 m. from Top) should be 50m. width.		

**WASTE DISPOSAL STRATEGY :**

It was envisaged that, in initial years OB shall have to be exclusively dumped in the external dump. Dump A, B, C are earmarked to dump overburden produced from PB west Quarry. Dump D is earmarked to dump overburden produced from PB east Quarry for initial 2 years only. During the course of mining in the western Quarry, in pit dumping shall also be carried out when sufficient de-coaled area is available. In the later years, waste dump generated from PB East Quarry shall be dumped in the void created by workings of PB West Quarry. Here also intermittent in pit dumping shall be performed. Therefore no rehandling of external OB shall take place for PB West & PB East Quarry.

Presently, For PB West Quarry, OB is being accommodated in External Dump 'C' along with internal dumping at the Northern part of the Quarry in a proportion of





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60% and 40 % respectively. Since Dump 'A' is already matured, it is proposed that, OB generation volume during the coming 5 years also shall be accommodated in External Dump 'C' and In Pit Dumping through 60% and 40% ratio tentatively. In the later stage of mine, external dump % will reduce and internal dumping volume shall increase.

For, PB East Quarry no external dump as well as internal backfilling is envisaged as per earlier approved Mining plan. All the waste will be used for backfilling purpose at Western Quarry.

For, PB NW Quarry, all the excavated waste shall be stacked in external as well as internal dump as per earlier approved Mining plan.

The height of the external dump is proposed to be around 90m above ground level and final height of the internal dump is proposed to be 90m above ground level. This will ensure optimization of the life of the mine to extract maximum mineable coal.

Shovel-dumper spoil dumps will be formed in benches of 30m and slope of individual dump bench will be 37° (equal to angle of natural repose of OB material). The width of berm between two adjacent benches will be 30 m. Overall slope of dump works out to be 23° - 24°. Top soil wherever available will be stacked separately which will be used up for spreading over the completed OB dumps. For the formation of dumps and levelling of dumps, dozers will be used.

The waste disposal schedule is given below:

**PB West & East Quarry :**

Year	External dump (Mcum)		Internal dump (Mcum)		Total OB (Mcum)	
	Progressive	Cumulative	Progressive	Cumulative	Progressive	Cumulative
Up to Base year		151.45		11.2		162.65



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(31.03.23)						
2023 - 24	36.92	188.37	24.61	35.81	61.54	224.19
2024 - 25	36.92	225.29	24.61	60.43	61.54	285.72
2025 - 26	38.11	263.40	25.41	85.84	63.52	349.24
2026 - 27	31.76	295.16	31.76	117.60	63.52	412.76
2027 - 28	32.75	327.92	32.75	150.35	65.51	478.27
2028 - 29	26.20	354.12	39.30	189.65	65.51	543.77
2029 - 30	27.00	381.11	40.49	230.15	67.49	611.26
2030 - 31	20.25	401.36	47.24	277.39	67.49	678.75
2031 - 32	21.44	422.80	50.02	327.41	71.46	750.21
2032 - 33	22.63	445.43	52.80	380.21	75.43	825.64
2033 - 34	22.63	468.06	52.80	433.01	75.43	901.07
2034 - 35	22.63	490.69	52.80	485.81	75.43	976.50
2035 - 36	24.11	514.80	56.26	542.08	80.38	1056.88
2036 - 37	25.29	540.09	59.01	601.09	84.30	1141.18
2037 - 38	18.00	558.09	60.50	661.59	78.50	1219.68
2038 - 39			69.60	731.19	69.60	1289.28
2039 - 40			67.35	798.54	67.35	1356.63
2040 - 41			67.35	865.89	67.35	1423.98
2041 - 42			67.35	933.24	67.35	1491.33
2042 - 43			67.35	1000.59	67.35	1558.68
2043 - 44			67.35	1067.94	67.35	1626.03
2044 - 45			67.35	1135.29	67.35	1693.38
2045 - 46			67.35	1202.64	67.35	1760.73
2046 - 47			67.35	1269.99	67.35	1828.08
2047 - 48			67.35	1337.34	67.35	1895.43
2048 - 49			67.35	1404.69	67.35	1962.78
2049 - 50			68.08	1472.77	68.08	2030.86
2050 - 51			46.00	1518.77	46.00	2076.86
2051 - 52			21.85	1540.62	21.85	2098.71
<b>Total</b>	<b>406.64</b>	<b>558.09</b>	<b>1529.42</b>	<b>1540.62</b>	<b>1936.06</b>	<b>2098.71</b>

**PB NW Quarry :**

Year	External dump (Mcum)		Internal dump (Mcum)		Total OB (Mcum)	
	Progressive	Cumulative	Progressive	Cumulative	Progressive	Cumulative

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Up to Base year (31.03.23)		Nil		Nil		Nil
2025 - 26	3.04	3.04	1.07	1.07	4.11	4.11
2026 - 27	6.08	9.12	2.13	3.2	8.21	12.32
2027 - 28	2.22	11.34	9.48	12.68	11.7	24.02
2028 - 29	2.28	13.62	9.72	22.4	12	36.02
2029 - 30	2.28	15.9	9.72	32.12	12	48.02
2030 - 31	2.28	18.18	9.72	41.84	12	60.02
2031 - 32	1.56	19.74	6.64	48.48	8.2	68.22
2032 - 33	2.79	22.53	5.41	53.89	8.2	76.42
2033 - 34	2.79	25.32	5.41	59.3	8.2	84.62
2034 - 35	2.79	28.11	5.41	64.71	8.2	92.82
2035 - 36	2.79	30.9	5.41	70.12	8.2	101.02
2036 - 37	2.79	33.69	5.41	75.53	8.2	109.22
2037 - 38	3.28	36.97	4.92	80.45	8.2	117.42
2038 - 39	3.28	40.25	4.92	85.37	8.2	125.62
2039 - 40	3.28	43.53	4.92	90.29	8.2	133.82
2040 - 41	3.28	46.81	4.92	95.21	8.2	142.02
2041 - 42	3.28	50.09	4.92	100.13	8.2	150.22
2042 - 43	2.71	52.8	5.49	105.62	8.2	158.42
2043 - 44	2.71	55.51	5.49	111.11	8.2	166.62
2044 - 45	2.71	58.22	5.49	116.6	8.2	174.82
2045 - 46	2.71	60.93	5.49	122.09	8.2	183.02
2046 - 47	2.71	63.64	5.49	127.58	8.2	191.22
2047 - 48	1.39	65.03	6.81	134.39	8.2	199.42
2048 - 49	1.39	66.42	6.81	141.2	8.2	207.62
2049 - 50	1.56	67.98	7.64	148.84	9.2	216.82
2050 - 51	1.94	69.92	9.46	158.3	11.4	228.22
2051 - 52	1.94	71.86	9.46	167.76	11.4	239.62
2052 - 53	0.23	72.09	11.17	178.93	11.4	251.02
2053 - 54	0.23	72.32	11.17	190.1	11.4	262.42
2054 - 55	0.23	72.55	11.17	201.27	11.4	273.82
2055 - 56	0.23	72.78	11.17	212.44	11.4	285.22
2056 - 57	0.23	72.96	11.17	223.61	11.4	296.57
2057 - 58	0	72.96	11.4	235.01	11.4	307.97
2058 - 59	0	72.96	11.4	246.41	11.4	319.37
2059 - 60	0	72.96	10.3	256.71	10.3	329.67
2060 - 61	0	72.96	10.04	266.75	10.04	339.71



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	2061 - 62	0	72.96	9	275.75	9	348.71			
	2062 - 63	0	72.96	9	284.75	9	357.71			
	2063 - 64	0	72.96	9	293.75	9	366.71			
	2064 - 65	0	72.96	9	302.75	9	375.71			
	2065 - 66	0	72.96	9	311.75	9	384.71			
	2066 - 67	0	72.96	9	320.75	9	393.71			
	2067 - 68	0	72.96	9	329.75	9	402.71			
	2068 - 69	0	72.96	9	338.75	9	411.71			
	2069 - 70	0	72.96	8.5	347.25	8.5	420.21			
	2070 - 71	0	72.96	7	354.25	7	427.21			
	2071 - 72	0	72.96	5.75	360	5.75	432.96			
	2072 - 73	0	72.96	3.5	363.5	3.5	436.46			
	2073 - 74	0	72.96	1.75	365.28	1.75	438.24			
	Total	72.96	72.96	365.28	365.28	438.24	438.24			
3.1.3	Coal production capacity proposed "Mtpa"			22 Mtpa						
3.1.4	Justification for optimization Coal production capacity			Considering the geo-mining condition, cumulative thickness of coal seams (~40m) and strike length of 4.5 Km, the production capacity of 19 Mty is justified from PB West & East Quarry.  PB Northwest Quarry shall produce 3 Mtpa.						
3.1.5	Calendar year from which the production will start			Mine is already in Production						
3.1.6	Year of Achieving rated production			10 <sup>th</sup> Year (FY 2032-33)						
3.1.7	Coal production Plan "MT"			Year Wise production schedule is given below.						
	Year	PB -West		PB-East		PB-NW		PB Mine		
		Coal	OB	Coal	OB	Coal	OB	Total Coal	Total OB	S.R
	2023 - 24	15.5	61.54					15.5	61.54	3.97
	2024 - 25	15.5	61.54					15.5	61.54	3.97
	2025 - 26	16	63.52			0.5	4.1	16.5	67.62	4.10
	2026 - 27	16	63.52			1	8.2	17	71.72	4.22
	2027 - 28	16.5	65.51			2	11.7	18.5	77.21	4.17
	2028 - 29	16.5	65.51			3	12	19.5	77.51	3.97



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2029 - 30	17	67.49			3	12	20	79.49	3.97
2030 - 31	17	67.49			3	12	20	79.49	3.97
2031 - 32	18	71.46			3	8.2	21	79.66	3.79
2032 - 33	19	75.43			3	8.2	22	83.63	3.80
2033 - 34	19	75.43			3	8.2	22	83.63	3.80
2034 - 35	19	75.43			3	8.2	22	83.63	3.80
2035 - 36	19	80.38			3	8.2	22	88.58	4.03
2036 - 37	19	84.30			3	8.2	22	92.50	4.20
2037 - 38	15	60.00	4	18.5	3	8.2	22	86.70	3.94
2038 - 39	6	33.50	8	36.1	3	8.2	17	77.80	4.58
2039 - 40	1.83	8.22	13.17	59.133 3	3	8.2	18	75.55	4.20
2040 - 41			15	67.35	3	8.2	18	75.55	4.20
2041 - 42			15	67.35	3	8.2	18	75.55	4.20
2042 - 43			15	67.35	3	8.2	18	75.55	4.20
2043 - 44			15	67.35	3	8.2	18	75.55	4.20
2044 - 45			15	67.35	3	8.2	18	75.55	4.20
2045 - 46			15	67.35	3	8.2	18	75.55	4.20
2046 - 47			15	67.35	3	8.2	18	75.55	4.20
2047 - 48			15	67.35	3	8.2	18	75.55	4.20
2048 - 49			15	67.35	3	8.2	18	75.55	4.20
2049 - 50			15	68.08	3	9.2	18	77.28	4.29
2050 - 51			10	46	3	11.4	13	57.40	4.42
2051 - 52			4.63	21.85	3	11.4	7.63	33.25	4.36
2052 - 53					3	11.4	3	11.40	3.80
2053 - 54					3	11.4	3	11.40	3.80
2054 - 55					3	11.4	3	11.40	3.80
2055 - 56					3	11.4	3	11.40	3.80
2056 - 57					3	11.4	3	11.40	3.80
2057 - 58					3	11.4	3	11.40	3.80
2058 - 59					3	11.4	3	11.40	3.80
2059 - 60					3	10.3	3	10.30	3.43
2060 - 61					3	10.04	3	10.04	3.35
2061 - 62					3	9	3	9.00	3.00
2062 - 63					3	9	3	9.00	3.00
2063 - 64					3	9	3	9.00	3.00
2064 - 65					3	9	3	9.00	3.00
2065 - 66					3	9	3	9.00	3.00
2066 - 67					3	9	3	9.00	3.00
2067 - 68					3	9	3	9.00	3.00
2068 - 69					3	9	3	9.00	3.00
2069 - 70					3	8.5	3	8.50	2.83
2070 - 71					3	7	3	7.00	2.33





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	2071 - 72					3	5.75	3	5.75	1.92
	2072 - 73					2	3.5	2	3.50	1.75
	2073 - 74					1.46	1.48	1.46	1.48	1.01
3.1.8	Peak/Rated Capacity									
			By OC: 22 MTPA ( Year of achieving 10 <sup>th</sup> Year 2032-33)							
			By UG: Not decided yet.							
			Overall: 22 MTPA							
3.1.9	Life of the mine :									
	By OC		51 Years							
	By UG		Mining Plan for UG Mining shall be submitted, once the exploration work for dip side is completed.							
	Overall		West Quarry: 17 Years East Quarry: 15 Years (3 Years overlapping period) NW Quarry: 49 Years							
3.1.10	Whether the proposed external OB dump site is coal/ lignite bearing: If so, whether coal/lignite below waste disposal area is extractable.		<p>The total external dumping outside the Quarry shall be accommodated in dumps A,B, C &amp; D.</p> <p>External waste dumping area (A,B) has been selected on the northern side, beyond the in-crop of Seam – I Bottom as indicated in GR. CMPDIL drilled 8 nos. boreholes in this area. Karharbari seams are encountered in 7 boreholes. However these seams are erratic and impersistent in nature and lacks opencast potentiality. No attempts were made to estimate the reserves.</p> <p>Dump C has been planned on southern side over the area where the coal is beyond 300m depth line and thus suitable for exploitation by underground means. As such</p>							



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		no coal shall get sterilized due to Dump C.  Dump D has been planned on northern side of PB East quarry, over the non opencastable area where quarriable potential is not indicated in the GR.
3.1.11	Whether negative proving for coal / lignite in the proposed site for OB dump/ infrastructure has been done.	The infrastructure facilities and external waste dumping area (A, B) has been selected on the northern side, beyond the in-crop of Seam – I Bottom as indicated in GR. CMPDIL drilled 8 nos. boreholes in this area. Karharbari seams are encountered in 7 boreholes. However, these seams are erratic and impersistent in nature and lacks opencast potentiality. No attempts were made to estimate the reserves.
3.1.12	Results of any investigation carried out for scientific mining, conservation of minerals and protection of environment; future proposals.	Hydro Geological reports are attached in Annexure VI D.
3.1.13	Type of Equipment/ HEMM proposed	HEMM configuration are given below –

  
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**PROPOSED LIST OF HEMM FOR PB WEST AND PB EAST (19 MTPA)**

**COAL:**

Sl No.	Equipment	As per Proposed Mining Plan revision for 19 MTPA	
		Size/Capacity	Nos.
1	Excavator	5.5 Cum	9
2	Excavator	3.5 Cum	5
3	Rear Dumper	60 T	56
4	Rear Dumper	35 T	35
5	RBH Drill	160 mm	15
6	Track Dozer	310 KW	15
7	Wagon drill	100 mm	3

**TOP OB/PARTING/INTERBURDEN:**

Sl No.	Equipment	Size/Capacity	Nos.
2	Excavator	10 m3	23
3	Excavator	3.5 m3	28
4	Rear Dumper	100 T	157
5	Rear Dumper	35 T	193
6	RBH Drill	250 mm	29
7	RBH Drill	160 mm	12
8	Track Dozer	310 KW	36

**COMMON/AUXILIARY EQUIPMENT**

Sl No.	Equipment	Size/Capacity	Nos.
1	Dozer with Ripper	510 KW	7
2	Motor Grader	205 KW	16
3	Wheel Loader	5 cum	6





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4	Diesel Crane	75 T	3
5	Hyd. Rough terrain crane	30 T	6
6	Hyd. Rough terrain crane	12 T	7
7	Diesel Hyd. Pickup crane	8 T	9
8	Wheel Dozer	280 KW	8
9	Water Sprinkler	28 KL	16
10	Tyre Handler		5
11	Maintenance Van		3
12	Rock Breaker		3
13	Cable Handler		2
14	Heavy Duty Toeing Truck		2
15	Fire Tender		2

**RECLAMATION EQUIPMENT**

Sl No.	Equipment	Size/Capacity	Nos.
1	F E Loader	10 m3	1
2	Water Sprinkler	28 KL	2
3	Rear Dumper	60 T	3
4	Dozer (with ripper attachment)	410 HP	1
5	Farm Track/Tractor with trolley		1

**PROPOSED LIST OF HEMM FOR PB NW (3 MTPA)**

**COAL:**

Sl No.	Equipment	Size/Capacity	Nos.
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1	Excavator	5.5 m3	2
2	Rear Dumper	60 T	18
3	RBH Drill	160 mm.	2
4	Dozer with Ripper attachments	410 HP	2
5	Wheel Dozer	410 HP	1
6	Coal Tippers (Coal body)	20 T	25

**TOP OB/PARTING/INTERBURDEN:**

Sl No.	Equipment	Size/Capacity	Nos.
1	Excavator	5.5 m3	3
2	Excavator	10 m3	3
3	Rear Dumper	60 T	20
4	Rear Dumper	100 T	18
5	RBH Drill (elec.)	250 mm	3
6	Dozer with Ripper attachments	410 HP	4
7	Dozer with Ripper attachments	850 HP	4

**COMMON/AUXILIARY EQUIPMENT**

Sl No.	Equipment	Size/Capacity	Nos.
1	Water Sprinkler	70 KL	3
2	Truck mounted DTH drill	100-120 mm	1
3	Mobile Rough Terrain Crane	70 T	1
4	R.T Crane	30 T	1
5	R.T.Crane	8T	



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6	F.E Loader	10 Cum	1
7	Hyd Shovel with Backhoe (Diesel)	1.2 -2.2 Cum	1
8	Wagon drill	100-120 mm	1
9	Diesel Bowser	16 KL	1
10	Rock Breaker		1
11	Fire Tender		1
12	Cable Handler		1
13	Tyre Handler		1
14	Tipping Trucks	10T	6
15	Maintenance Van		1
16	Heavy Duty Toeing truck		1

**HAUL ROAD EQUIPMENT**

SI No.	Equipment	Size/Capacity	Nos.
1	Grader	280 HP	2
2	Vibratory compactor	30 TH	1
3	Wheel Dozer	460 HP	1


**RECLAMATION EQUIPMENT**

SI No.	Equipment	Size/Capacity	Nos.
1	F E Loader	10 m3	1
2	Water Sprinkler	28 KL	2
3	Rear Dumper	60 T	3
4	Dozer (with ripper attachment)	410 HP	1
5	Farm Track/Tractor with trolley		1

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	<b>MINING PLAN (INCLUDING MINE CLOSURE PLAN) OF PAKRI-BARWADIH COAL MINE APPLICANT: NTPC</b>	
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#### CHAPTER - 4

#### SAFETY MANAGEMENT

S. No	Parameters	Details	
4.1	Safety Management		
	Important safety Aspects		
4.1.1	Important Safety Aspects	Areas of concern	Remedial Measures
	<p>Major Risks and uncertainties to this project are anticipated as the followings :</p> <ul style="list-style-type: none"><li>• Slope failure</li><li>• Handling of explosives</li><li>• Fly-rocks during heavy blasting</li><li>• Movement of HEMM</li><li>• Inundation due to surface water</li><li>• Dust hazards</li><li>• Fire Hazards due to spontaneous heating of coal</li><li>• Hazards associated with use of electricity</li><li>• Flooding of lower benches</li></ul>	<p>Safety Management Plan</p>	<p>For complying with <b>Reg. 104</b> of CMR 2017, exercise shall be done to identify, assess and record the hazards of health and safety of the persons employed in the mine after consulting the Safety Committee and Internal Safety Organisation (ISO). Based on the above, Safety Management Plan (SMP) shall be formulated for overall management for developing and implementing the safety policy of the company.</p> <p>SMP shall contain, <i>inter alia</i>, plan to implement the policy, principal hazard management, standard operating procedure (SOP), monitor, evaluate and review the plan.</p>
		<p>Failure of OB/Coal Benches</p>	<p>Bench height of maximum 15.00 meters matching with the maximum reach of the digging and loading equipment has been</p>



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			<p>proposed. This reduces chances of accidents due to fall of loose materials.</p> <p>All DGMS guidelines and regulations shall be strictly adhered to.</p>
		Failure of Dump slopes	<p>The internal and external Dumps have been benched at 30 meters height. Overall slope has been proposed to 23-24 degrees leaving 30 meters wide berm between two successive benches. This will reduce the chances of OB dump slope failure and subsequent damages. The dumps once sterile should be stabilized by bio reclamation.</p> <p>The overall dump height shall be +90 m from the original ground level. A slope stability study as per DGMS guidelines has already been carried out and attached as Annexure.</p> <p>All DGMS guidelines and regulations shall be strictly adhered to.</p>
		Flooding of the mine.	<p>During the heavy monsoon period, the mining operation in the lower most benches may have to be stopped. Adequate pumping capacity on the basis of historical data of maximum rainfall and distribution of rainfall has been</p>





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			designed. But in the case of unprecedented rainfall, machineries may have to be withdrawn from lower benches temporarily and redeployed after dewatering in the lower benches again. Meanwhile they will be gainfully deployed in the upper benches.
		Precautions against danger of inundation from surface water	A careful assessment is to be made against the danger from surface water before the onset of rainy season. The necessary precautions shall be clearly laid down and implemented. A garland drain needs to be provided to drain away the surface rain water from coming into the mine. Garland drain shall be provided around OB dumps and working mines to course the rain water to main streams.
		Blasting in OB /Coal benches	Blasting shall be carried out under the direct supervision of statutory personnel and as per the permissions and regulations of DGMS.
		Fire in coal benches/stockyard	Spontaneous heating of coal will be controlled by continuous and regular movement of coal benches. In case any bench is idle it should be properly dressed and properly cleaned from coal dust at the time of stoppage.







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	Accidents due to lack of proper space of movement in Mine.	Workers around shovel, dozer, dumper, drill and cranes must be warned to keep out of blind area so that operator may be able to see them clearly. Audio visual alarms are used for pre warning of persons around this machine. To overcome shortage of space if any, strict discipline will have to be inculcated among workmen and supervisors. At any given point of time, multiple benches will be worked together which will distribute the major producing HEMM at safer distances.
	Dust suppression & dilution of exhaust fumes	Water sprinklers shall be deployed in haul road. Spraying with water on all working faces shall be carried out. While drilling holes, it is necessary to use wet drilling for proper dust suppression. Maintaining the engine and exhaust conditioners properly, so as to keep emission gases within limits and regular checking of exhaust and recording of the same.
	Prevention of electric shocks	During mining operations, all the statutory provisions of the CEAR 2010 or latest editions and Indian standards for installation and maintenance of electrical equipment etc. shall be followed strictly.

	<p align="center"><b>MINING PLAN (INCLUDING MINE CLOSURE PLAN) OF PAKRI-BARWADIH COAL MINE APPLICANT: NTPC</b></p>	
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		Disaster Management	The Mine will prepare a DMP (Disaster Management Plan) as per guideline. This plan is to be vetted by DGMS.
4.22	A commitment from the company Board that the entire mining operation will be carried out as per the statutory provisions given under mines Act 1952, Coal Mine Regulation 2017 and wherever specific permission will be required the company will approach the concerned Authorities	A commitment from the company Board has been provided in Annexure- III	



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**CHAPTER – 5**

**INFRASTRUCTURE FACILITIES**

Sl. No.	Parameters	Details
5.1	Mine infrastructure required e.g. Equipment maintenance planning, Office buildings, Workshop, Power supply arrangement, Water supply etc.	<p>Planning of Project Workshop and store has been done based on a comprehensive maintenance and repair program to achieve the high level of equipment availability, reliability and longer life. Maintenance and repair load of project workshop has been assessed on the basis of annual operating time, inter repair period, life of the equipment/ assemblies/ sub- assemblies, weight and size of the equipment/ assemblies/ sub-assemblies, man-hours required per repair/ maintenance, etc.</p> <p>Facility planning has been done for providing maintenance and repair facilities to all the major equipments deployed in the project, which include, heavy earth moving machineries (such as dumper, dozer, shovel, drill, etc.), light motor vehicles, coal handling plant machineries, mine pumps and power supply equipments. The proposed project workshop and project store will facilitate the maintenance and repair requirement of mining, mechanical, electrical, transport and other auxiliary equipment and storage of spare-parts, sub- assemblies and consumables.</p> <p>For maintenance and repair of equipment, the following facilities has been envisaged:</p> <p><b>HEMM WORKSHOP</b> : The maintenance workshop shall have concrete grade slab that is designed to support the heaviest unloaded vehicle in the quarry's fleet. It shall have minimum of six vehicle maintenance bays to handle the next larger size of the largest vehicle in the quarry equipment fleet.</p> <p>For maintenance and repair of equipment, the following facilities has been envisaged:</p> <ol style="list-style-type: none"> <li>Welding shop</li> <li>Tool store</li> <li>Electric shop</li> </ol>

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		<p>d. Office space for workshop management e. Shift in charge room f. Washing facilities &amp; toilets</p> <p><b>Light vehicle Workshop:</b> A separate maintenance workshop for highway vehicles shall consist of a minimum of six bays with separate office and secure storage room for parts and tools.</p> <p><b>Tyre Workshop:</b> This facility shall consist of a heavy floor slab sufficient to support the haul track and the forces induced from a floor jack or lift as required to change wheels tyres on the haul truck.</p> <p><b>Equipment washing facility:</b> This facility shall include a large concrete grade slab with rail embedded to protect the slab from tracked equipment. The slab shall be sloped to direct water to the settlement basins. This facility shall include the washing equipment, including water cannon, access platforms, settling tanks, oil traps and oil collecting tanks. The settling tanks shall be designed to allow a small pay loader to drive in to the tank to collect large deposits of silt or other materials deposited from washing the vehicles.</p>
5.2	Power supply & illumination.	<p><b>Main Sub-Station</b></p> <p>The maximum power demand estimated for the mine including CHP is 32 MVA. (West &amp; East – 23.5, NW – 8.5 MVA)</p> <p>Power is being arranged from NTPC North Karanpura STPP (NKSTPP) to the main receiving sub-station (220/33/11 KV) of the Pakri Barwadih project. Provision of 6 (Six) nos. of 11 KV DG sets have also been made to cater to the power requirement at the time of power failure.</p> <p>Other substations like coal colony and CHP substation are for further distribution of power.</p>





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		<p>inside mine. All the 33kv substations will receive power at 33kv from double circuit power line originated from 33 KV switchgear of Main receiving substation.</p> <p>Quarry area is proposed to be illuminated by high mast towers located along quarry periphery with sodium vapour lamps on each tower of haul road.</p> <p>For illumination of inside of the quarry shall be done by metal-halide lamps.</p> <p>Illumination will be maintained as per the DGMS standards.</p>									
5.3	<p>Drainage &amp; Pumping Assessment of Volume of Water for Pumping, Pumping Capacity and Pump Selection</p>	<p>Three sources of groundwater have been identified:</p> <ol style="list-style-type: none"> <li>1. Surface water such as existing ponds, reservoir, nala or rivers</li> <li>2. Borewells</li> <li>3. Mine sump water</li> </ol> <p>Presently, entire water requirement is being met through sump water and surface borewells.</p> <table border="1"> <thead> <tr> <th colspan="3">Water Requirement</th></tr> <tr> <th>West &amp; East (m3/day)</th><th>NW (m3/day)</th><th>Total (m3/day)</th></tr> </thead> <tbody> <tr> <td>5,026</td><td>745</td><td>5,771</td></tr> </tbody> </table> <p>Raw water is stored in a bulk water reservoir from which water is treated and stored in a separate reservoir.</p> <ul style="list-style-type: none"> <li>• The pumping system has been planned separately for each pit considering simultaneous working.</li> <li>• The planning of de-watering of the mine has been done in such a way that as far as possible the working faces and haul roads remain dry. The layout of the quarry provides suitable gradient along the quarry floors and the benches to facilitate self-drainage of water to the lowest level of the quarry.</li> <li>• Proper drains are dug along both sides of haul road to keep the haul roads dry. Main sump at the lowest point of quarry shall have sufficient capacity to accommodate entire make of water.</li> </ul> <p>Assuming 20 hours of pumping and six days to</p>	Water Requirement			West & East (m3/day)	NW (m3/day)	Total (m3/day)	5,026	745	5,771
Water Requirement											
West & East (m3/day)	NW (m3/day)	Total (m3/day)									
5,026	745	5,771									



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		<p>pump out the total water, the required pumping rate shall be 7726 cum/hr, selecting 540 cum/hr pumps, the requirement is as given below. Initially 60m. head pumps shall be used for pumping out water from main sump. As the quarries advance on dip side lower head pumps shall be replaced by higher head pumps.</p> <p>A. Main pumps (160 lps X 60 to 300 m. head): complete with 6.6 KV 365 KW electricals and starters. 4% pump sets with electricals to be kept as standby for emergency.</p> <p>B. Diesel operating Pumps:</p> <ol style="list-style-type: none"> <li>1. 80lps X 60 m head</li> <li>2. 35 lpsx 60 m head</li> </ol> <p>C. Face pumps 11 lps x 30 m. head.</p> <p>D. Pipes: sufficient length of pipes of dis. 406 mm, 300 mm, 219 mm and 100 mm have been envisaged for above pumps depending upon capacity of pumps.</p>
5.4	<p><b>Coal Handling Arrangement:</b></p> <p>Brief details of CHP / Mode of dispatch, Coal quality and coal staking and handling arrangement</p>	<p><b>CHP/Mode of Despatch:</b></p> <p>The ROM coal brought from the quarry by tippers will discharge into the sizing plant. The CHP has been designed for 330 working days in a year for 3 shifts in a day having 8 effective hours in each shift. CHP facilities consist of the following units :</p> <ul style="list-style-type: none"> <li>• 3 nos of primary crushers of 1125 TPH rated capacity to crush coal from 1200 mm to 250 mm size.</li> <li>• Individual streams of rated capacity 1125 TPH from each sizing station to secondary crushing stations to crush coal from 250 mm to 50mm size.</li> <li>• Conveyor of rated capacity 2250 TPH and belt width 1800 mm from Secondary sizing station 1 and 2 up to Transfer house TH-2.</li> <li>• Conveyor of rated capacity 1125 TPH and belt width 1400 mm from Secondary sizing station 3 up to Transfer house TH-2.</li> <li>• At TH-2, there is provision for conveying coal</li> </ul>

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		<p>to the stockyard or to the Fixed CHP or to the emergency stockyard.</p> <ul style="list-style-type: none"><li>• Conveying of coal till the stockyard is achieved through conveyors of rated capacity 3600 TPH. Stacking of coal in the stockyard is achieved through 2 nos. of stacking yard conveyors of rated capacity 1800 TPH each and 2 nos. of slewing stackers of rated capacity 1800 TPH each.</li><li>• Reclamation of coal from the stockyard is achieved through 2 nos. of bucket wheel reclaimers of rated capacity 2500 TPH each and 2 nos. of reclaiming yard conveyors of rated capacity 2500 TPH each.</li><li>• Coal reclaimed from the stockyard is conveyed to TH-2, through conveyors of rated capacity 2500 TPH, for further transportation by fixed CHP.</li><li>• The fixed CHP consist of series of double conveyors (1W+1S) of rated capacity 2500 TPH for conveying coal from the mine end to the ground bunker located near the Railway loading point.</li><li>• From the ground bunker, coal is transported through conveyors of rated capacity 4000 TPH to the rapid loading system consisting of two nos. of 400 tonnes capacity surge hoppers each containing 1 set of 4000 tph capacity rapid loading station with 1 x 110 Tonnes capacity pre-weigh hoppers.</li><li>• One number of magnetic separator in each flow.</li><li>• One number of metal detector in each flow.</li><li>• One number of belt weigher to weigh the coal in each flow after secondary crushing.</li><li>• Miscellaneous facilities like dust control system, firefighting and ventilation system, plant cleaning system etc.</li><li>• Presently, coal from Pakri Barwadih is being dispatched through Banadag Railway siding which has capacity of 15 MTPA. For dispatch beyond 15 MTPA of coal from Pakri Barwadih Coal Mine doubling of railway network from Banadag to Hazaribagh is</li></ul>
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		required. Also, the dispatch of coal from mine to Banadag siding beyond 15 MTPA will be done through road.
5.5	Coal washing and the proposed handling/ disposal of rejects.	Coal quality parameters obtain from the proximate analysis of coal revealed that ash percentage is 34% which does not require commissioning of coal washery.

  
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**CHAPTER – 6**

**LAND REQUIREMENT**

	Parameters	Details								
6.1	LAND REQUIREMENT									
6.1.1	Total Land requirement for the mine in "Ha"	Break up of pre-mining land type (indicative) and source of data.								
		SL	Type			West & East	NW	Total		
		1	Tenancy	Agricultural		2524.443	113.557	2638.000		
		2		Habitation						
		3		Grazing						
		4		Barren						
		5	Govt Non Forest	Agricultural		250.287	19.713	270.000		
		6		Habitation						
		7		Grazing						
		8		Barren						
	9	Forest	Forest		1435.110	351.890	1787.000			
		Total			4209.840	485.160	4695.000			
6.1.2	During mining Land use details:									
	Type	Land use(Proposed) (Ha)	LandUse(End of life)(Ha)	Land Use (Post Closure) (Ha)						
				Agricultural land	Plantation	Water Body	Public/ Company Use	Forest Land (Returned )	Undisturbed	Total
	Excavation Area	1982.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Backfilled Area	1294.00*	1294.00	713.00	581.00	0.00	0.00	0.00	0.00	1294.00
	Excavated Void (shallow abandoned quarry)	688.00*	688.00	0.00	0.00	688.00	0.00	0.00	0.00	688.00
	Without plantation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Top Soil Dump	47*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	External Dump (Old dump)	885.00	885.00	0.00	885.00	0.00	0.00	0.00	0.00	885.00
	Safety Zone	10.00	10.00	0.00	10.00	0.00	0.00	0.00	0.00	10.00
	Haul Road between Quarries	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Road diversion	18.00	18.00	0.00	0.00	0.00	18.00	0.00	0.00	18.00
	Diversion/ below River /Nala /Canal	38.00	58.00	0.00	0.00	0.00	58.00	0.00	0.00	58.00
	Settling pond	12.00	12.00	0.00	0.00	12.00	0.00	0.00	0.00	12.00
	Road & Infrastructure area	291.00	291.00	0.00	258.00	0.00	33.00	0.00	0.00	291.00
	Rationalisation area	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Garland drains	20.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Embankment	20.00	20.00	0.00	20.00	0.00	0.00	0.00	0.00	0.00
	Green Belt	18.00	18.00	0.00	18.00	0.00	0.00	0.00	0.00	18.00







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Parameters		Details														
	Water Reservoir near pit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
	UG entry	18.00	18.00	0.00	0.00	0.00	0.00	0.00	18.00	18.00						
	Undisturbed/ Mining right for UG	1383.00	1383.00	0.00	0.00	0.00	0.00	0.00	1383.00	1383.00						
	Resettlement	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
	Pit head power plant	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
	Water harvesting	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
	Agricultural land	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
	Total	4695.00	4695.00	713.00	1772.00	700.00	109.00	0.00	1401.00	4695.00						
*Within Excavation area																
6.1.3	Surface features over the block area	Existing surface features are, office buildings, crushing unit, coal evacuation system & Coal handling plant, Workshop, Transmission Lines, Telephone lines, water reservoir, Nallahs, roads, village basti , railway siding etc.														
6.1.4	No. of villages/Houses to be shifted	26 villages														
6.1.5	Population to be affected by the project	8339 nos.														
6.1.6	Proposed Rehabilitation programme	R&R shall be done as per policy of Govt of Jharkhand.														
6.2	DETAILS OF LEASE															
6.2.1	Status of Lease	Mining Lease is not applicable since mining area land is being acquired by NTPC under CBA Act.														
6.2.2	Existing Lease Area "Ha"	<table><tr><th colspan="2">Block Area</th></tr><tr><td>West &amp; East</td><td>3943.76</td></tr><tr><td>NW</td><td>485.16</td></tr></table> <p>Mining Lease is not applicable for the area being acquired under CBA Act.</p>									Block Area		West & East	3943.76	NW	485.16
Block Area																
West & East	3943.76															
NW	485.16															
6.2.3	Period for which Mining Lease has been granted/is to be renewed/ is to be applied for	Life of the Mine														
6.2.4	Date of expiry of earlier Mining Lease, if any	Not Applicable														
6.2.5	Whether the lease boundary/required boundary is same as mentioned in the allotment order	No <div>पवन देव-जैसवाल/PAWAN DEV JAISWAL उप महाप्रबन्धक (वाणिज्यिक) Deputy General Manager (Commercial) एन टी पी सी लिमिटेड/NTPC LIMITED EOC, A-8A, Sector-24, Noida-201301 (U.P.)</div>														
6.2.6	Lease Area (applied/	Block Area														






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Parameters		Details	
required) as per the Mining Plan under consideration (Ha)		West & East	3943.76
		NW	485.16
		Outside Block Area	
		West & East	266.08
		NW	0.00
		Project Area	
		West & East	4209.84
		NW	485.16
		Total	4695
		Out of 4695 Ha EC has been accorded for NW (485.16 Ha) and West & East (3319.42 Ha). Details of EC area has been attached at Annexure – VI B.	
6.2.7	Whether the applied lease area falls within the allotted block	No, 266.08 Ha falls outside the allotted block	
6.2.8	Area (Ha) of lease which falls outside the delineated block/sub-block	266.08 Ha falls outside the allotted block	
6.2.9	Details of outside area:		
	• Whether forms part of any other coal block	No	
	• Whether it contains any coal/lignite reserves	No	
	• Purpose for which it is required, e.g. roads/ OB dumps/ service buildings/ colony/ safety zone/ others (specify)	OB Dump, Infrastructure area, Evacuation corridor and siding	
6.2.10	Whether some part(s) of the allotted block has not been applied for mining lease.	No	
	• Total area in Ha of such part(s).	NA	
	• Total reserves in such art(s) (Mt)	NA	
	• Brief reasoning for leaving such part(s)	NA	



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CHAPTER – 7

ENVIRONMENTAL MANAGEMENT

	Parameters	Details
16	ENVIRONMENTAL MANAGEMENT	
a.	Commitment from the project proponent that the company will comply Environment and Forest Condition stipulated in the respective clearances	Annexure III.

  
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**Chapter - 8**

**PROGRESSIVE & FINAL MINE CLOSURE PLAN**

S No.	Parameter	Details							
8.1	Land degradation & restoration schedule								
8.1.1	Tentative Land degradation & technical reclamation (Cumulative Area "Ha")								
Year/ Stage (Life of the mine plus post closure period)		Land Degraded (Ha)				Technically reclaimed area (Ha)			
		Exc. Area for OC	Dump (External + top soil)	Infra/others	Total	Backfilling	Dump (External + top soil)	Infra/others	Total
Up to Base Year		436	363	2495	3294	55	24	0	79
Y - 1	2023-24	563	452	2279	3294	85	50	0	135
Y - 3	2025-26	701	584	2009	3294	158	100	0	258
Y - 5	2027-28	850	699	1745	3294	245	160	0	405
Y - 10	2032-33	1004	869	1421	3294	325	220	0	545
Y - 15	2037-38	1172	910	1212	3294	370	290	0	660
Y - 20	2042-43	1263	910	1121	3294	444	360	0	804
Y - 25	2047-48	1596	885	813	3294	518	450	200	1168
Y-30	2052-53	1819	885	590	3294	592	532	310	1434
Y-35	2057-58	1867	885	542	3294	666	600	420	1686
Y-40	2062-63	1897	885	512	3294	740	700	550	1990
Y-45	2067-68	1935	885	474	3294	814	780	850	2444
Y-50	2072-73	1982	885	427	3294	958	835	1050	2843
Y-51	2073-74	1982	885	427	3294	958	885	1100	2943
Post Closure									
Y-54	2076-77	1982	885	427	3294	1294	885	1115	3294



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8.1.2	Tentative Biological Reclamation (cumulative in "Ha")										
Year/Stage		Biologically Reclaimed Area (Ha)					Forest land (Return)	Un-disturbed/ To be left for public/ company use	Total		
		Agri-culture	Plantation	Water body	Public / Company Use	Total					
Up to Base year *		0.0	24.0		0.0	24.0	0.0	1401.0	1425.0		
Y-1	2023-24	0.0	40.0	0.0	0.0	40.0	0.0	1401.0	1441.0		
Y-3	2025-26	0.0	125.0	0.0	0.0	125.0	0.0	1401.0	1526.0		
Y-5	2027-28	0.0	186.0	12.0	0.0	198.0	0.0	1401.0	1599.0		
Y-7	2030-31	0.0	255.0	12.0	0.0	267.0	0.0	1401.0	1668.0		
Y-10	2032-33	0.0	424.0	12.0	40.0	476.0	0.0	1401.0	1877.0		
Y-15	2037-38	345.0	625.0	12.0	45.0	1027.0	0.0	1401.0	2428.0		
Y-20	2042-43	470.0	735.0	12.0	62.0	1279.0	0.0	1401.0	2680.0		
Y-25	2047-48	530.0	845.0	593.0	71.0	2039.0	0.0	1401.0	3440.0		
Y-30	2052-53	585.0	955.0	593.0	85.0	2218.0	0.0	1401.0	3619.0		
Y-35	2057-58	665.0	1100.0	593.0	91.0	2449.0	0.0	1401.0	3850.0		
Y-40	2062-63	665.0	1245.0	593.0	96.0	2599.0	0.0	1401.0	4000.0		
Y-45	2067-68	713.0	1420.0	593.0	99.0	2825.0	0.0	1401.0	4226.0		
Y-51	2073-74	713.0	1772.0	700.0	109.0	3294.0	0.0	1401.0	4695.0		
Post-closure											
Y-54	2076-77	713.0	1772.0	700.0	109.0	3294.0	0.0	1401.0	4695.0		
8.2	Post Closure Water Quality management			The proposed mining area is not dissecting any natural water stream. The storm water and ground water intersected during mining operations will be the source of water accumulation within the mining pit. Accumulated mine pit water during the active mining period will be pumped while post mining operation, there will be accumulated water in the left out voids. An area of about 688 ha of land will be converted to waterbody at the end of mine life. This area cannot be backfilled, however will technically reclaimed by							





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		<p>converting into water body.</p> <p>In post closure phase, Routine Environmental Monitoring (REM) of the water accumulated shall be fortnightly sampled and analyzed to monitor development of acidity or toxicity in the water at least for 3 years. As post mine period, most of the broken areas will be backfilled and left out water bodies will be much less, development of toxic water is not anticipated. The pH of the accumulated water is thus expected to be within a narrow range near the neutral value.</p> <p>The accumulated water will be utilized for the local community for agriculture and other uses. Regular monitoring of the water quality will be carried out as per the CPCB norms. Once the mine is closed, outside water shall be prevented to enter into the mined out pit which in turn will reduce the TDS and other solvents.</p> <p>The pit water will be utilized for agricultural use, supply as drinking water after treatment and for pisciculture. As such the area falls under arid climatic horizon and this water body will add life to the area by supplying water for agriculture and drinking.</p> <p>Effluent Treatment Plant (ETP) and Sewerage Treatment Plant (STP) should be maintained atleast for 3-5 years. Regular monitoring of the water quality will be carried out as per the CPCB norms.</p> <p>Water quality analysis shall be carried out as per CPCB Water Quality Monitoring 2017 guideline.</p>
8.3	Post Closure Air Quality management:	<p>The post closure activities will be restricted to limited operation only in the following areas:</p> <ol style="list-style-type: none"><li>1. Dismantling of temporary infrastructures.</li><li>2. Dismantling of electrical infrastructures.</li><li>3. Regular maintenance works in the dumping ground.</li><li>4. Post plantation care.</li><li>5. Maintenance of the main haul road.</li><li>6. Cleaning of suture drains and garland drains.</li></ol> <p>Most of the activities does not generate continuous dust generation, except the dismantling works which</p>







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will be restricted to the limited zones compared to the whole project area. Water sprinkling will be continued before the vehicle movement.

Routine Environmental Monitoring (REM) of the air quality shall be monitored as per latest CPCB guidelines atleast for 3-5 years.

Occasionally dust may be generated from the uncovered areas of the dumps. Regular sprinkling arrangements will be done till the areas are stabilised. Quarterly Air quality Monitoring will be done as per NAAQ standard (CPCB) guideline 2009)

**8.4 Waste Management (Figures in MM3) (Tentative)**

Year/ Stage	Year	OB Removal (Cumulative)			External Dump (Cumulative)			Internal Backfilling (Cumulative)		Embankment (Cumulative)	
		Top Soil	OB	Total	Top Soil	OB	Total	Top Soil	OB	Top Soil	OB
Up to Base year *		3.8	159.1	162.7	2.40	147.10	149.50	1.30	11.20	0.10	0.80
Y-1	2023-24	4.5	219.7	224.2	3.10	183.10	186.20	1.30	35.80	0.10	0.80
Y-2	2025-26	5.6	347.7	353.3	3.80	262.60	266.40	1.70	84.30	0.10	0.80
Y-3	2027-28	6.8	505.3	512.1	4.70	339.50	344.20	2.00	185.00	0.10	0.80
Y-7	2030-31	7.3	675.8	683.1	5.00	402.50	407.50	2.20	272.50	0.10	0.80
Y-10	2032-33	8	929.8	937.8	5.50	476.50	482.00	2.40	452.50	0.10	0.80
Y-15	2037-38	9.4	1352.4	1361.8	6.40	590.10	596.50	2.90	761.50	0.10	0.80
Y-20	2042-43	10.1	1747.9	1758	6.90	605.50	612.40	3.10	1141.60	0.10	0.80
Y-25	2047-48	11.8	2123.1	2135.9	8.70	615.90	624.60	4.00	1506.40	0.10	0.80
Y-30	2052-53	14.6	2317.4	2332	9.00	622.05	631.05	5.50	1694.55	0.10	0.80
Y-35	2057-58	15.6	2373.4	2389	9.50	621.75	631.25	6.20	1750.85	0.10	0.80
Y-40	2062-63	16.7	2419.7	2436.4	9.60	621.45	631.05	7.00	1797.45	0.10	0.80
Y-45	2067-68	17.8	2465.6	2483.4	9.80	621.25	631.05	7.90	1841.95	0.10	0.80
Y-50	2072-73	18.8	2495.8	2514.7	10.00	621.05	631.05	8.70	1876.05	0.10	0.80
Y-51	2073-74	19.98	2517.04	2537.02	10.18	620.87	631.05	8.70	1895.37	0.10	0.80
Post-closure											
Y-64	2076-77	19.98	2517.04	2537.02	10.18	620.87	631.05	8.70	1895.37	0.10	0.80





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**8.5 Top Soil Management– (Including Action plan for Top Soil management) (Tentative)**

Year/Stage	Year	Top Soil Removal Plan	Top Soil Used				
			Spreading over Embankment	Spreading over Backfill Area	Spreading over External OB Dump area	Used in Green Belt area	Total Utilised
Up to Base year *		3.5	0.1	0.0	2.4	0.5	3.0
Y - 1	2023-24	4.5	0.1	0.4	2.5	0.5	3.5
Y - 3	2025-26	5.6	0.1	0.8	3.1	0.5	4.5
Y - 5	2027-28	6.8	0.1	1.5	3.8	0.5	5.9
Y-7	2030-31	7.3	0.1	2.3	4.2	0.5	7.1
Y - 10	2032-33	8.0	0.1	2.5	4.6	0.5	7.7
Y - 15	2037-38	9.4	0.1	3.0	5.8	0.5	9.4
Y - 20	2042-43	10.1	0.1	3.2	6.3	0.5	10.1
Y - 25	2047-48	12.8	0.1	4.0	7.6	1.0	12.8
Y-30	2052-53	14.6	0.1	5.5	8.0	1.0	14.6
Y-35	2057-58	15.6	0.1	6.2	8.3	1.0	15.60
Y-40	2062-63	16.7	0.1	7.0	8.6	1.0	16.70
Y-45	2067-68	17.8	0.1	7.9	8.8	1.0	17.80
Y-50	2072-73	18.8	0.1	8.7	9.0	1.0	18.80
Y-51	2073-74	19.98	0.1	9.7	9.18	1.0	19.98
Post-closure							
Y-54	2076-77	19.98	0.1	9.7	9.18	1.0	19.98

**Top Soil Summary (M cum):**

West & East Quarry	NW Quarry	Total
14.176	5.8053	19.9813

<b>8.6 Management of Coal Rejects.</b>	Since the project does not envisaged any washery, generation of rejects are not associated.
<b>8.7 Restoration of Land used for Infrastructure</b>	Survey for 3 monsoon seasons should be done then carry out compaction of the land before any infrastructure to be built over it. All infrastructures will be dismantled excluding the office and Vocational Training center which will be handed over to the state government.





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8.8	Disposal of Mining Machinery	Mining machineries are to be deployed by Contracting agency. They will be taking out the machineries at the end of mine life and will utilize in their other projects. Scrapped machineries will be auctioned to the authorized agencies.																						
8.9	Safety & Security	<p>Thorough inspection of the mine and OB dump areas for assessing the left-over closure jobs of already reclaimed internal dump areas.</p> <ul style="list-style-type: none"><li><input type="checkbox"/> Inspection of infrastructure and water body area for their safe reclamation and abatement of any leftover dangers.</li><li><input type="checkbox"/> Action required making drainage and any fire areas safe for future period.</li><li><input type="checkbox"/> Making 2 meter high fencing wall against excavated void are to prevent inadvertent entry as per requirement (As per DGMS standard).</li><li><input type="checkbox"/> Making safe approach road from surface to left out pit bottom for future uses, as void becomes a water body.</li><li><input type="checkbox"/> Completing the survey of total reclaimed areas like mined areas, internal dump, mine faces, quarry fencing and other areas to complete and update the Mine plans under Coal mine Regulation</li></ul>																						
8.10	Abandonment Cost and Financial Assurance																							
8.10.1	Abandonment Cost: Cost of Activities to be taken up for closure of the mine																							
	<table><tr><th>Head</th><th>Activities</th><th>Units</th><th>Quantity</th><th>Rate Rs Lakh/unit</th><th>Total Amt. Rs. Lakh</th></tr><tr><td rowspan="3">Progressive Closure</td><td>Water Quality Management</td><td>LS</td><td></td><td></td><td>800.00</td></tr><tr><td>Air Quality Management</td><td>LS</td><td></td><td></td><td>800.00</td></tr><tr><td>Waste management</td><td>Mcum</td><td></td><td></td><td></td></tr></table>	Head	Activities	Units	Quantity	Rate Rs Lakh/unit	Total Amt. Rs. Lakh	Progressive Closure	Water Quality Management	LS			800.00	Air Quality Management	LS			800.00	Waste management	Mcum				
Head	Activities	Units	Quantity	Rate Rs Lakh/unit	Total Amt. Rs. Lakh																			
Progressive Closure	Water Quality Management	LS			800.00																			
	Air Quality Management	LS			800.00																			
	Waste management	Mcum																						








**MINING PLAN (INCLUDING MINE CLOSURE PLAN)  
OF PAKRI-BARWADIH COAL MINE  
APPLICANT: NTPC**



		Barbed Wire Fencing Around Dump	m			
		Barbed Wire Fencing Around Pit	m	80000	0.02	1600.00
		Filling up Voids and Rehandling of Dumps	MM3			
		Top Soil Management	MM3	19.98	430	8591.40
		Technical and Biological Reclamation of Mined out land & Dump	Ha	4695	3	14085.00
		Plantation over virgin area including green belt	Ha	1772	1.2	2126.40
		Manpower Cost and Supervision	Ls			3000.00
		Toe wall around dump	m	76923	0.065	5000.00
		Garland Drain	m	192308	0.0055	1058.00
		Garland drain around dump	m	56000	0.0055	308.00
		Subsidence monitoring	Ls			
		Masonry/ Concrete Wall	m			5000.00
		Other Activities	LS			15000.00
	Dismantling of Infrastructure & Disposal/ Rehabilitation of Mining Machinery	Dismantling of Workshop	LS			2500
		Rehabilitation of dismantled facilities	LS			800
		Dismantling of Pumps, Pipes/other facilities	LS			1200
		Dismantling Sand stowing Bunker/ Inlets, Provisioning of Pumps for borewell pumping Arrangement				
		Dismantling of UG Equipment				
		Rearranging water pipeline to dump top park/ Agricultural land	LS			2300
		Dismantling of Powerline & Electricals	LS			1800
		Dismantling of CHP	LS			2000
	Safety & Security	Barbed wire fencing around dump	Ls	30000	0.02	600
		Barbed wire fencing around the Pit	m.	25000	0.02	500
		Barbed wire fencing with masonry pillars	LS			3800
		Concrete wall with Masonry	Ls			4200

90

680

  
**प्रबल देव जामढा/PAWAN DEV JAM**  
 उप महाप्रबन्धक (वर्ग-1/अ) /  
 Deputy General Manager (Category-1/Asstt.)  
 एन टी पी सी लिमिटेड / NTPCL VILU  
 EOC, A-8A, Sector-24, Noida-201303 (U.P.)





**MINING PLAN (INCLUDING MINE CLOSURE PLAN)  
OF PAKRI-BARWADIH COAL MINE  
APPLICANT: NTPC**



		pillars around the pit				
		Securing shaft/ Fan Drift and installation of borewell pump	LS			
		Securing of Incline	LS			
		Concrete wall fencing around the water body	M.	5000	0.065	3250
		Boundary wall around the water body	LS			4500
		Stabilisation( viz benching, pitching etc) of side walls of the water body	LS			8500
		Toe Wall around the dump	LS			1000
		Garland drain	LS			
		Garland Drain around Dump	LS			7000
		Drainage Channel from main OB dump	LS			1500
		Underground Isolation Stopping	LS			18500
	Technical and Biological Reclamation of Mined out of land and OB Dump	Filling of Void	Ha			
		Top Soil management	LS			2200
		OB Rehandling for backfilling				
		Terracing, blanketing with soil and vegetation of External OB Dump	LS			1250
		Peripheral road, gates, view point, cemented steps on bank of Water body	LS			1500
		Expenditure on development of Agricultural land	LS			1200
		Landscaping and Plantation	Ha	4695	3	14085
		Rehandling of crown dump				
	Post Closure management and supervision	Power Cost	LS			2700
		Post Mining Water quality management	LS			2000
		Post Mining Air quality management	LS			2000
		Subsidence monitoring for 5 years	LS			
		Waste Management	LS			1000
		Manpower Cost and supervision	LS			1200

  
 पवन देव जामटा/PAWAN DEVI  
 उप महाप्रबन्धक (कार्मिक)  
 Deputy General Manager (Con)  
 एन टी पी सी लिमिटेड/NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)





**MINING PLAN (INCLUDING MINE CLOSURE PLAN)  
OF PAKRI-BARWADIH COAL MINE  
APPLICANT: NTPC**



Others	Enterprenuership development (vocational/skill development training for sustainable income of affected people	Ls			800
	Golden Handshake / Retrenchment benefits to 100 employees of OC	LS			300
	Golden Handshake / Retrenchment benefits to 200 employees of UG				
	Onetime financial grant to societies / institutions /organisations which is dependent upon the project	LS			300
	Provide jobs in other mines of the company				
	Continuation of other services like running of schools etc				1000
<b>Total</b>					<b>152853.795</b>
<b>8.10.2</b>	<b>Financial Assurance: Amount to be deposited in Escrow account as a security against the mine activities to be carried out for the closure of the mine</b>				

<b>ESCROW AMOUNT</b>	
<b>Mine Closure Cost Calculation for PB OC Project</b>	
<b>Project name</b>	<b>Pakri Barwadih</b>
Project Area (ha)	3588.04
Escrow Amount per Ha. For OC Project as on April, 2019 (lakhs/ Ha)	9
WPI as on April 2019	121.1
WPI as on August 2023	151.9
Escrow Amount per Ha. For OC Project as on August 2023 (lakhs/ Ha)	11.29
Current value of corpus as on August 2023 (Rs lakhs)	40505.45
Amount deposited (including interest) till date (Rs lakhs)	5220.09
Balance Corpus for which provision is to be made (Rs lakhs)	35285.36
Balance Life of mine (in years)	51
Annual corpus (Balance corpus / Balance life, in Rs. Lakh)	691.87







**MINING PLAN (INCLUDING MINE CLOSURE PLAN)  
OF PAKRI-BARWADIH COAL MINE  
APPLICANT: NTPC**



**Amount to be deposited in Escrow Account annually, Rs. Lakh**

Year	Fin. Year	OC ( In Lakh)	UG	Total ( In Lakh)
Y-1	2023 - 24	691.87		691.87
Y-2	2024 - 25	726.46		726.46
Y-3	2025 - 26	762.79		762.79
Y-4	2026 - 27	800.93		800.93
Y-5	2027 - 28	840.97		840.97
Y-6	2028 - 29	883.02		883.02
Y-7	2029 - 30	927.17		927.17
Y-8	2030 - 31	973.53		973.53
Y-9	2031 - 32	1022.21		1022.21
Y-10	2032 - 33	1073.32		1073.32
Y-11	2033 - 34	1126.98		1126.98
Y-12	2034 - 35	1183.33		1183.33
Y-13	2035 - 36	1242.50		1242.50
Y-14	2036 - 37	1304.62		1304.62
Y-15	2037 - 38	1369.85		1369.85
Y-16	2038 - 39	1438.35		1438.35
Y-17	2039 - 40	1510.26		1510.26
Y-18	2040 - 41	1585.78		1585.78
Y-19	2041 - 42	1665.07		1665.07
Y-20	2042 - 43	1748.32		1748.32

  
 पवन सिंह जायसवाल/PAWAN SINGH  
 उप महाप्रबन्धक (वार्डिंग)  
 Deputy General Manager (CUM)  
 एन टी पी सी लिमिटेड/NTPC लिमिटेड  
 EOC, A-8A, Sector-24, Noida-201301





**MINING PLAN (INCLUDING MINE CLOSURE PLAN)  
OF PAKRI-BARWADIH COAL MINE  
APPLICANT: NTPC**



Y-21	2043 - 44	1835.74		1835.74
Y-22	2044 - 45	1927.52		1927.52
Y-23	2045 - 46	2023.90		2023.90
Y-24	2046 - 47	2125.09		2125.09
Y-25	2047 - 48	2231.35		2231.35
Y-26	2048 - 49	2342.92		2342.92
Y-27	2049 - 50	2460.06		2460.06
Y-28	2050 - 51	2583.07		2583.07
Y-29	2051 - 52	2712.22		2712.22
Y-30	2052 - 53	2847.83		2847.83
Y-31	2053 - 54	2990.22		2990.22
Y-32	2054 - 55	3139.73		3139.73
Y-33	2055 - 56	3296.72		3296.72
Y-34	2056 - 57	3461.55		3461.55
Y-35	2057 - 58	3634.63		3634.63
Y-36	2058 - 59	3816.36		3816.36
Y-37	2059 - 60	4007.18		4007.18
Y-38	2060 - 61	4207.54		4207.54
Y-39	2061 - 62	4417.92		4417.92
Y-40	2062 - 63	4638.81		4638.81
Y-41	2063 - 64	4870.75		4870.75
Y-42	2064 - 65	5114.29		5114.29
Y-43	2065 - 66	5370.01		5370.01
Y-44	2066 - 67	5638.51		5638.51
Y-45	2067 - 68	5920.43		5920.43
Y-46	2068 - 69	6216.45		6216.45






**MINING PLAN (INCLUDING MINE CLOSURE PLAN)  
OF PAKRI-BARWADIH COAL MINE  
APPLICANT: NTPC**



Y-47	2069 - 70	6527.28		6527.28
Y-48	2070 - 71	6853.64		6853.64
Y-49	2071 - 72	7196.32		7196.32
Y-50	2072 - 73	7556.14		7556.14
Y-51	2073 - 74	7933.95		7933.95
<b>Total</b>		<b>152775.49</b>		<b>152775.49</b>

  
पवन देव जामटी/PAWAN DEV JAISWAL  
उप महाप्रबन्धक (वाणिज्यिक)  
Deputy General Manager (Commercial)  
एन टी पी सी लिमिटेड/NTPC LIMITED  
EOC, A-8A, Sector-24, Noida-201301 (U.P.)





## FORM-1

1.	Name of the Petitioner/Applicant	NTPC Limited
2.	Address of the Petitioner/Applicant	NTPC Bhawan, SCOPE Complex, Institutional Area, Lodhi Road, New Delhi- 110003.
3.	Subject Matter	Petition Under Section 62 and 79 (1) (a) of the Electricity Act, 2003 read with Chapter-III of the Central Electricity Regulatory Commission (Conduct of Business) Regulations, 2023 and Regulation-9 read with Chapter-9 of Central Electricity Regulatory Commission (Terms and Conditions of Tariff) Regulations, 2024 for approval of input price of coal supplied from Pakri Barwadih mine for the period from 01.04.2024 to 31.03.2029.
4.	Petition No., or Application No, if any	Petition No. _____/MP/2024
5.	Details of generation assets (a) Generating station/units (b) Capacity in MW (c) Date of commercial operation (d) Period for which fee paid (e) Amount of fee paid (f) Surcharge, if any	NA
6.	Details of transmission assets (a) Transmission line and sub-stations (b) Date of commercial operation (c) Period for which fee paid (d) Amount of fee paid (e) Surcharge, if any	NA
7.	Fee paid for Adoption of tariff for (a) Generation asset (b) Transmission asset	NA
8.	Application fee for licence (a) Trading licence (b) Transmission licence (c) Period for which paid (d) Amount of fee paid	NA
9.	Fees paid for Miscellaneous Petition	Rs. 3,00,000/-

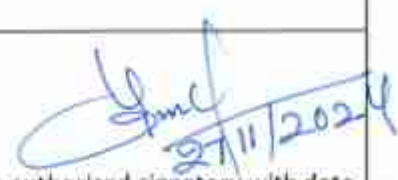
  
**पवन देव जामटा/PAWAN DEV JANTA**  
 Deputy General Manager (Commercial)  
 एन टी पी सी लिमिटेड/NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201201 (U.P.)

## FORM-1

10.	Fees paid for Interlocutory Application	NA
11.	Fees paid for Regulatory Compliance Petition	NA
12.	Fees paid for Review Application	NA
13.	Licence fees for inter-State Trading (a) Category (b) Period (c) Amount of fee paid (d) Surcharge, if any	NA
14.	Licence fees for inter-State Transmission (a) Expected/Actual transmission charge (b) Period (c) Amount of fee calculated as a percentage of transmission charge. (d) Surcharge, if any	NA
15.	Annual Registration Charge for Power Exchange/OTC Platform (a) Period (b) Amount of turnover (c) Fee paid (d) Surcharge, if any	NA
16.	Details of fee remitted (a) Transaction id, Reference No./ Payment id (b) Date of remittance (c) Amount remitted	92aff3be5e3c9c6c301e 19.11.2024 Rs. 3,00,000/-

Note: While Sl.No.1 to Sl. No.3 and Sl. No.16 are compulsory, the rest may be filled up as applicable

Signature of the authorized signatory with date

  
 पवन देव जांगरा/PAWAN DEV JANGRA  
 उप महाप्रबन्धक (वाणिज्यिक)  
 Deputy General Manager (Commercial)  
 एन टी पी सी लिमिटेड/NTPC LIMITED  
 EOC, A-8A, Sector-24, Noida-201301 (U.P.)

## Fee Acknowledgement

Counterfoil (Office Copy)

Reference No.:	1017/2024	Transaction Id.:	92aff3be5e3c9c6c301e
		Payment Gateway ID:	761891911240276518
		Status:	success
Received From :	NTPC Limited		
The Sum of Rs. :	300000		
Fee Type:	Petition Filing Fees	Dated :	Nov 19, 2024, 5:30 PM
Fee Mode:	Net Banking		
Fee Period:			
Petitioner/ Organisation Name:	NTPC Limited		

  
पवन देव जामरा/PAWAN DEV JAISWAL  
उप महाप्रबन्धक (वित्तियक)  
Deputy General Manager (Commercial)  
एन टी सी लिमिटेड/NTPC LIMITED  
EOC-A-BA, Sector-24, Noida-201301 (U.P.)

Nov 20, 2024, 1:31 AM