BEFORE THE HON'BLE CENTRAL ELECTRICITY REGULATORY COMMISSION

AT 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 Dulanga 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

INDEX

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.)

9	**Annexure A/2** – Copy of Directive of MNRE (No.:318/17/2024) for "Saturation of Government Buildings with Rooftop Solar under PM-Surya Ghar: Muft Bijli Yojana	471-484
10	**Form-1**	485-487

Filed By

(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

AT 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 Dulanga mine for the period from 01.04.2024 to 31.03.2029.**

AND
IN THE MATTER OF

MEMO of Parties

Petitioner: : NTPC Ltd.
NTPC Bhawan
Core-7, Scope Complex
7, Institutional Area, Lodhi Road
New Delhi-110 003.

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

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.)

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. Gujarat Urja Vikas Nigam limited (GUVNL)
Vidhyut Bhawan, Race Course,
Vadodara – 390 007

MOST RESPECTFULLY SHOWETH:

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

(In compliance with CERC notice dated 07.06.2024)

The major highlights of the Dulanga 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 Dulanga mine for the period from 01.04.2024 to 31.03.2029

2. Dulanga is an integrated mine (captive type) located at District Sundergarh, Odisha. Dulanga started commercial operation (COD) on 01.10.2020. In terms of the allotment order, coal supplied from Dulanga is being used in the end use generating station i.e. Darlipalli STPS (2X800 MW). The power generated from the end use generating station is being supplied to the respondents herein.

3. The input price of Dulanga for the period from 01.10.2020 (COD) to 31.03.2024 is yet to be determined by the Hon'ble Commission in Petition No. 245/MP/2021 (The petition is under consideration of the Hon'ble Commission). The capital cost claimed for determination of input price in petition no 245/MP/2021 included the actual additional capital expenditure up to 31.03.2024.

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

4. The closing capital cost as on 31.03.2024 as per the above-mentioned 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 Dulanga Coal Mine project, the Hon'ble Commission may please approve the input price of coal supplied from Dulanga Coal mine for the tariff period 2024-29 as per provision of Regulation 9 read with Chapter-9 of the CERC Tariff Regulations, 2024.

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.)

BEFORE THE HON'BLE CENTRAL ELECTRICITY REGULATORY COMMISSION

AT 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 Dulanga mine for the period from 01.04.2024 to 31.03.2029.**
AND IN THE MATTER OF	:	

NTPC Ltd. .....Petitioner

Versus

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

पवन देव जामटा/PAWAN DEV JAMTA
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Deputy General Manager (Commercial)
एन टी पी सी लिमिटेड/NTPC LIMITED
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. Dulanga coal mine (hereinafter referred to as '**Dulanga**') is one such coal mine (captive type) which has been allocated to NTPC Ltd as a linked mine for Darlipalli STPS (2X800 MW). Dulanga coal mine is located in Sundergarh district of Odisha State. The power generated from the end use station generating station i.e. Darlipalli STPS is being supplied to the respondents herein above.

4) It is submitted that the revised mining plan (1st Revision) for Dulanga Coal mine was approved by Ministry of Coal (MoC), GoI in August 2012. Copy of the mining plan dated 14.08.2012 is attached as **Annexure- A.**

5) 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.

6) 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."

7) 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:

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

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 Dulanga mine for the period from 01.04.2024 to 31.03.2029 as per the Tariff Regulations, 2024.

8) It is submitted that amended Petition No. 245/MP/2021 was filed by the Petitioner before the Hon'ble Commission for determination and approval of input price of coal supplied from Dulanga coal mine based on the actual capital cost as on COD of Dulanga (i.e. 01.10.2020) and actual additional capital expenditure for the period from 01.10.2020 to 31.03.2024.

9) The said petition is under active consideration of the Hon'ble Commission and the order for approval of input price of coal for Dulanga for the period from 01.04.2019 to 31.03.2024 is yet to be issued by the CERC in Petition No. 245/MP/2021.

10) It is submitted that the actual closing capital cost as on 31.03.2024 has been worked out in the aforesaid petition as Rs. 1002.87 Crs 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 1002.87 Crs. in the instant petition. The Hon'ble Commission may be pleased to adopt this capital cost as on 31.03.2024 and determine the input price in the present petition for the period 2024-29.

11) 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:

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.)

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 have 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. Further, GST @ 5% will be applicable along with GST Cess @ Rs. 400/- per Ton, if the coal is supplied to a station having different GST number.

G. **Fixed Reserve Price:** Fixed reserve price claimed for the period from FY 2024-25 to 2028-29 is based on the actual fixed reserve price applicable for the financial year 2024-25 as per office order of Nominated Authority, Ministry of Coal, GoI.

H. **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.

I. **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

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

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.

J. **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.

K. **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.

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

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.

12) 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.

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

RE: FILING FEE

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.)

14) 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.

15) 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.

16) 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 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.

17) 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.

18) 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.

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.)

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 Dulanga 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)

Noida

Date: 27.11.2024

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.)

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 (4) of Central Electricity Regulatory Commission (Terms and Conditions of Tariff), 2024 for determination of input price of coal from Dulanga Coal 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 & 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 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.)

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 (वाणिज्यिक)
Deputy General Manager (Commercial)
एन टी पी सी लिमिटेड/NTPC LIMITED
EOC, 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 (वाणिज्यिक)
Deputy General Manager (Commercial)
एन टी पी सी लिमिटेड/NTPC LIMITED
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

NOTARY
YOGENDRA SINGH
ADVOCATE
G.B. NAGAR
GOVT. OF INDIA

ATTESTED
OGENDRA SINGH
NOTARY NOIDA
G B NAGAR (U.P.) INDIA
27 NOV 2024

APPENDIX-I

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.)

Petition No : .....

TARIFF FILING FORMS (INTEGRATED MINE)

FOR DETERMINATION OF INPUT PRICE

FOR

DULANGA COAL MINE

(FOR THE PERIOD 01.04.2024 TO 31.03.2029)

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

PART-IV List of Supporting Forms / documents for tariff filing for Integrated Mine		
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 Woks 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

List of supporting documents for tariff filing for Integrated Mine		
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.

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

Summary of Input Price

PART-IV
FORM- 1

Name of the Petitioner: NTPC Ltd

Name of the Integrated Mine: Dulanga

Place (Region/District/State): ER/ Sundargarh/ Odisha

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	1166.79	1209.35	1251.07	1295.61	1342.20	1391.73
1.2	Additional Charges/Surface Transportation Charges#	Rs/Tonne	-	-	-	-	-	-
	Input Price	Rs/Tonne	1166.79	1209.35	1251.07	1295.61	1342.20	1391.73
1.3	Statutory Charges	Rs/Tonne	268.87	274.80	280.50	286.49	292.79	299.43
1.4	Total input price		1435.66	1484.16	1531.56	1582.10	1634.99	1691.16
1.5	GST @ 5%							
	Total input price	**Rs/Tonne**	**1435.66**	**1484.16**	**1531.56**	**1582.10**	**1634.99**	**1691.16**

(Petitioner)

Note: GST @5% and GST Compensation cess @Rs 400 per Ton shall be applicable in case coal is transferred to station having different GSTN.

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: Dulanga
Place (Region/District/State): ER/ Sundergarh/ Odisha

Amount in Rs Lakhs

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	4,428.06	4,440.05	4,447.94	4,469.86	4,464.64	4,466.96
1.2	Interest on Loan	Rs Lakh	4,126.99	3,889.53	3,568.17	3,253.83	2,937.52	2,638.48
1.3	Return on Equity	Rs Lakh	5,033.67	5,105.20	5,112.97	5,128.23	5,138.41	5,148.96
1.4	Interest on Working Capital	Rs Lakh	422.09	448.20	466.87	486.59	506.60	529.21
1.5	O&M Expenses excluding mining charge	Rs Lakh	7,223.34	7,602.57	8,001.70	8,421.79	8,863.93	9,329.29
1.6	Mine closure expense	Rs Lakh	441.44	315.41	333.15	351.75	371.23	391.82
1.0	**Total Annual Extraction Cost (Sum of above 1.1 to 1.6)**	Rs Lakh	**21,678.40**	**21,800.95**	**21,930.78**	**22,112.84**	**22,282.34**	**22,496.72**
2.0	Annual Target Quantity (ATQ)	Tonne	70,00,000	70,00,000	70,00,000	70,00,000	70,00,000	70,00,000
3.0	Annual Extraction cost per tonne (1.0 in Rs/2.0)	Rs/Tonne	309.69	311.44	313.30	315.89	318.32	321.38
4.0	Mining charge#	Rs/Tonne	721.37	759.24	799.10	841.05	885.21	931.68
5.0	Fixed Reserve Price	Rs/Tonne	133.73	138.67	138.67	138.67	138.67	138.67
6.0	ROM cost (3.0+4.0)	Rs/Tonne	1,166.79	1,209.35	1,251.07	1,295.61	1,342.20	1,391.73

(Petitioner)

Mining Charge 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 महाप्रबंधक (वाणिज्यिक)
Dep.y General Manager (Commercial)
एनटीपीसी लिमिटेड / NTPC LIMITED
ECC, 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: Dulanga

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	1,00,286.97	1,00,341.97	1,00,591.97	1,00,941.97	1,00,991.97
2	Add: Addition during the year/period	55.00	250.00	350.00	50.00	50.00
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)**	1,00,341.97	1,00,591.97	1,00,941.97	1,00,991.97	1,01,041.97
6	**Average Capital Cost**	1,00,314.47	1,00,466.97	1,00,766.97	1,00,966.97	1,01,016.97

(Petitioner)

पवन देव जामटा/PAWAN DEV JAMTA
उप महाप्रबन्धक (वाणिज्यिक)
Dep.Ty 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: Dulanga

Amount in Rs Lakhs

Sr	Particulars	2024-25	2025-26	2026-27	2027-28	2028-29
1	2	3	4	5	6	7
A)	**Return on Equity**					
1	Opening Equity	30,086.09	30,102.59	30,177.59	30,282.59	30,297.59
2	Add: Increase in equity due to addition during the year / period	16.50	75.00	105.00	15.00	15.00
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)	30,102.59	30,177.59	30,282.59	30,297.59	30,312.59
6	Average Equity	30,094.34	30,140.09	30,230.09	30,290.09	30,305.09
7	Rate of ROE (Pre Tax)	16.964	16.964	16.964	16.964	16.964
8	Total ROE	5,105.20	5,112.97	5,128.23	5,138.41	5,140.96

(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.)

Statement showing claimed O&M cost

PART-IV
FORM-2B

Name of the Petitioner: NTPC Ltd
Name of the Integrated Mine: Dulanga

Amount in Rs Lakhs

S. No.	Particulars	2024-25	2025-26	2026-27	2027-28	2028-29
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*	7,079.06	7,450.71	7,841.88	8,253.57	8,686.89
8	Annual Charge of Agency(ies) Other Than MDO#	523.50	550.99	579.91	610.36	642.40
9	Total Claimed O&M Expenses	7,602.57	8,001.70	8,421.79	8,863.93	9,329.29

(Petitioner)

*O&M expenses 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.

Annual Charges of Agency(ies) other than MDO claimed based on actual expenses for the year 2022-24 and the same has been escalated @ 5.25% per year for subsequent years.

पवन देव जामटा/PAWAN DEV JAMTA
उप महाप्रबंधक (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 dated (14/08/2012)		PART- IV FORM-3
Name of the Petitioner: NTPC Ltd		
Name of the Integrated Mine: Dulanga		
Sr No	**Parameters**	**Values**
1	Mining plan/Mine closure plan Revision number and date of revision, if any	No.13016/27/2012-CA-I dated 14.08.2012 of Moc, GoI
2	Peak rated Capacity	7 MTPA
3	Year in which proposed to be achieved	2022-23
4	Mineable reserves (Opencast)	152.05 Million Metric Tonnes
5	Mining area land - Acquired/ Leased	762.42 Ha
6	If Leased - Period and terms of lease	N.A
7	Mining Block Area	567.19 Ha
8	Type of Mining	Opencast
9	Method of Mining	Mechanised Opencast mining using Shovel dumper combination for OB removal and Surface Miner for coal extraction
10	Mine life in Years	24 years (Excluding construction period of two years)
11	Scheduled date of commercial operation as per Investment approval	N/A
12	Distance of Loading Point from mine end	about 1 Km
13	Gross Calorific value (GCV in Kcal/Kg) of coal as per Geological Report, Range ,Mean	2870 - 5330, 4008
14	Specific gravity of coal (Avg)*(Calculated from GR)*	1.58 Tonne/m3
15	Main Equipments	Shovel, Dumper, Surface Miner, Loader Dozer, Motor Grader, Coal Handling Equipments
16	Other Important Parameters as deemed necessary	Coal production started on 19.09.2018

CALENDER PRODUCTION PROGRAMME DURING THIS TARIFF PERIOD*

Production Year/s	Coal Production (Mt)	OB Removal (Mm^3)	Stripping Ratio (m^3/t)
2024-25	7.00	18.40	2.63
2025-26	7.00	18.40	2.63
2026-27	7.00	18.40	2.63
2027-28	7.00	18.40	2.63
2028-29	7.00	18.40	2.63

ACTUAL PRODUCTION ACHIEVED DURING THIS TARIFF PERIOD

Production Year/s	Coal Production (Mt)	OB Removal (Mm^3)	Stripping Ratio (m^3/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
उप 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: Dulanga

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	601.95	633.55	666.81	701.82	738.66	777.44
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
उप महाप्रबन्धक (वाणिज्य)
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

Part-IV
Form-8

Name of the Company		NTPC LTD			
Name of the Integrated Mine		Dulanga			
					(Rs. in Lakhs)
Particulars					
Source of Loan - Bonds Series	66	69	73	74	75
Currency	INR	INR	INR	INR	INR
Amount of Loan sanctioned (In Lakh)	3,92,500.00	4,30,000.00	2,50,000.00	3,99,600	3,00,000
Amount of Gross Loan drawn upto COD (In Lakh)	3,92,500.00	4,30,000.00	2,50,000.00	3,99,600	3,00,000
Interest Type	Fixed	Fixed	Fixed	Fixed	Fixed
Fixed Interest Rate, if applicable*	7.37%	7.32%	6.43%	6.87%	6.69%
Base Rate, if Floating Interest	N/A	N/A	N/A	N/A	N/A
Margin, if Floating Interest	N/A	N/A	N/A	N/A	N/A
Are there any Caps/Floor	No	No	No	No	No
If above is yes,specify caps/floor	N/A	N/A	N/A	N/A	N/A
Moratorium Period (In Years)	15	10	10	15 yrs 1 day	10
Moratorium effective from*	14-12-2016	17-07-2019	27-01-2021	20-04-2021	13-09-2021
Repayment Period	Bullet Repayment	Bullet Repayment	Bullet Repayment	Bullet Repayment	Bullet Repayment
Repayment effective from	14-12-2031	17-07-2029	27-01-2031	21-04-2036	13-09-2031
Repayment Frequency	Bullet Repayment	Bullet Repayment	Bullet Repayment	Bullet Repayment	Bullet Repayment
Repayment Instalment (In Lakh)	3,92,500.00	4,30,000.00	2,50,000.00	3,99,600	3,00,000
Base Exchange Rate	N/A	N/A	N/A	N/A	N/A
Door to Door Maturity (In Years)	15	10	10	15 yrs 1 day	10
Name of the Projects	**66**	**69**	**73**	**74**	**75**
Dulanga CMB	**25,400.00**	**5,000.00**	**2,700.00**	**3,400**	**4,100**
** Survillance fee @0.03%					
*Moratorium period has been taken as the period from Deemed Date of Allotment till the date of first Redemption.					

(Petitioner)

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

Name of the Company: NTPC LTD

Name of the Integrated Mine: Dulanga

Annex-I

Details of International Finance:

Particulars										
	1	2	3	4	5	6	7	8	9	10
Source of Loan	Euro Loan I	Euro Loan II	Euro Loan III	USD 750 Million Bond I	USD 750 Million Bond II	USD 750 Million Bond III	USD 750 Million Bond IV	USD 750 Million Bond V	USD 750 Million Bond VI	JPY Equ. 5400 Million Bond III
Bond										
Currency	EUR	EUR	EUR	USD	USD	USD	USD	USD	USD	JPY
Amount of loan sanctioned	4,89,31,039	8,42,38,902	8,43,12,994	10,50,00,000	10,00,00,000	25,00,00,000	10,00,00,000	10,00,00,000	10,00,00,000	14,77,60,00,000
Amount of Gross Loan drawn upto 31.03.2024	4,89,31,039	8,42,38,902	8,43,12,994	10,50,00,000	10,00,00,000	25,00,00,000	10,00,00,000	10,00,00,000	10,00,00,000	14,77,60,00,000
Interest Type	Floating	Floating	Floating	Floating	Floating	Floating	Floating	Floating	Floating	Floating
Fixed Interest Rate, if applicable	-	-	-	-	-	-	-	-	-	-
Base Rate, if Floating interest*	6 Month Euribor*	6 Month Euribor*	6 Month Euribor*	6 Month Term SOFR*	6 Month Term SOFR*	6 Month Term SOFR*	6 Month Term SOFR*	6 Month Term SOFR*	6 Month Term SOFR*	6 Month Compounded TONA*
Margin, if floating interest rate	0.95%	0.95%	0.95%	1.10000%	1.10000%	1.10000%	1.10000%	1.10000%	1.10000%	1.20000%
Any loan tenure, Caps / Floor	No	No	No	No	No	No	No	No	No	No
If above is Yes, specify Caps / Floor	-	-	-	-	-	-	-	-	-	-
Moratorium Period	7	7	7	4	4	4	4	4	4	4
Moratorium effective from	14-Sep-2021	14-Sep-2021	14-Sep-2021	05-Oct-2021	05-Oct-2021	05-Oct-2022	05-Oct-2023	05-Oct-2023	06-Oct-2023	31-Aug-2023
Repayment period	Bullet payment	Bullet payment	Bullet payment	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly	Yearly
Repayment effective from	14-Sep-2028	14-Sep-2028	14-Sep-2028	05-Oct-2028	05-Oct-2028	05-Oct-2028	05-Oct-2028	05-Oct-2028	06-Oct-2028	31-Aug-27
Repayment frequency	One Time	One Time	One Time	Seven times	Seven times	Seven times	Seven times	Seven times	Seven times	Seven times
Repayment installment	4,89,31,039	8,42,38,902	8,43,12,994	1,42,85,714	1,42,85,714	3,57,14,286	1,42,85,714	1,42,85,714	1,42,85,714	2,11,08,57,143
Date Exchange Rate - Cut off date of draw	80.19639	81.30807	80.44404	73.31208	76.87495	81.37603	82.46589	82.73603	82.44117	0.55819
Any foreign currency loan hedged	No	No	No	No	No	No	No	No	No	No
If above is Yes, specify details	-	-	-	-	-	-	-	-	-	-
Name of the Projects	%	%	%	%	%	%	%	%	%	%
Dulanga Coal Mine	0.7653%	1.3264%	1.3177%	0.0968%	3.1290%	0.5807%	0.2425%	0.8462%	0.2426%	0.6962%

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

NTPC Ltd.
Dulanga Integrated Mine
Details of RoI of International Finance:

2023-24

Euro Loan I- Drawl I

06-12-2023	117	4.8950%	5.72715	
01-04-2024			0	
	117		5.72715	**5.0700%**

Euro Loan I- Drawl II

06-12-2023	117	4.8950%	5.72715	
01-04-2024			0	
	117		5.72715	**5.0600%**

Euro Loan I- Drawl III

06-12-2023	117	4.8950%	5.72715	
01-04-2024			0	
	117		5.72715	**5.0600%**

USD 750 M Loan Drawl I-part A					
25-10-2023	159	6.81909%	10.5243531		
01-04-2024			0		
	159		10.5243531	**6.6372%**	0.866667
USD 750 M Loan Drawl I-part B					
25-10-2023	159	6.53909%	10.3971531		
01-04-2024					
			0		
	159		10.3971531	**6.9357%**	0.133333
			Part A	5.7522%	
			Part B	0.9248%	
				6.6770%	

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

USD 750 M Loan Drawl II-part A

25-10-2023	159	6.61909%	10.5243531		
01-04-2024			0		
	159		10.5243531	**6.6372%**	0.866667

USD 750 M Loan Drawl II-part B

25-10-2023	159	6.53909%	10.3971531		
01-04-2024					
			0		
	159		10.3971531	**6.9357%**	0.133333
			Part A	5.7522%	
			Part B	0.9248%	
				6.6770%	

USD 750 M Loan Drawl III-part A

25-10-2023	159	6.61909%	10.5243531		
01-04-2024			0		
	159		10.5243531	**6.6372%**	0.866667

USD 750 M Loan Drawl III-part B

25-10-2023	159	6.53909%	10.3971531		
01-04-2024					
			0		
	159		10.3971531	**6.9357%**	0.133333
			Part A	5.7522%	
			Part B	0.9248%	
				6.6770%	

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

USD 750 M Loan Drawl IV-part A

25-10-2023	159	6.61909%	10.5243531		
01-04-2024			0		
	159		10.5243531	**6.6372%**	0.866667

USD 750 M Loan Drawl IV-part B

25-10-2023	159	6.53909%	10.3971531		
01-04-2024			0		
	159		10.3971531	**6.9357%**	0.133333

	Part A	5.7522%
	Part B	0.9248%
		6.6770%

USD 750 M Loan Drawl V-part A

25-10-2023	159	6.61909%	10.5243531		
01-04-2024			0		
	159		10.5243531	**6.6372%**	0.866667

USD 750 M Loan Drawl V-part B

25-10-2023	159	6.53909%	10.3971531		
01-04-2024			0		
	159		10.3971531	**6.9357%**	0.133333

	Part A	5.7522%
	Part B	0.9248%
		6.6770%

पवन देव जामटा/PAWAN DEV JAMTA
उप महाप्रबन्धक (वित्तीय)
Dep... Gen... (Fin...)
EOC, A-6A, Sec... ED
...P.)

USD 750 M Loan Drawl VI-part A					
25-10-2023	159	6.61909%	10.5243531		
01-04-2024			0		
	159		10.5243531	**6.6372%**	0.866667
USD 750 M Loan Drawl VI-part B					
25-10-2023	159	6.53909%	10.3971531		
01-04-2024					
			0		
	159		10.3971531	**6.9357%**	0.133333
			Part A	5.7522%	
			Part B	0.9248%	
				6.6770%	

JPY Equ. $400 Million Drawl III

25-09-2023	189	1.20000%	2.268	
01-04-2024			0	
	189		2.268	**1.2000%**

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.)

Interest Rate Statement FY 2023-24

S.No.	Bank Loan	Interest Rate	Applicable from	Applicable upto	Number of Days	Product	Weighted Average Rate of Interest
	2023-24						
1	HDFC Bank Limited-IV	8.01%	01-Apr-23	31-May-23	61.00	4.89	
	HDFC Bank Limited-IV	7.95%	01-Jun-23	31-Mar-24	305.00	24.25	
					366.00	**29.13**	**7.96%**
2	HDFC Bank Limited-V	8.01%	01-Apr-23	31-May-23	61.00	4.89	
	HDFC Bank Limited-V	7.95%	01-Jun-23	31-Mar-24	305.00	24.25	
					366.00	**29.13**	**7.96%**
3	HDFC Bank Limited-VII	8.01%	01-Apr-23	31-May-23	61.00	4.89	
	HDFC Bank Limited-VII	7.95%	01-Jun-23	31-Mar-24	305.00	24.25	
					366.00	**29.13**	**7.96%**
4	ICICI Bank-VII	8.10%	01-Apr-23	02-Sep-23	155.00	12.56	
	ICICI Bank-VII	8.15%	03-Sep-23	12-Sep-23	10.00	0.82	
	ICICI Bank-VII	8.00%	13-Sep-23	31-Mar-24	201.00	16.08	
					366.00	**29.45**	**8.05%**
5	State Bank of India - IX	8.00%	01-Apr-23	13-May-23	43.00	3.44	
	State Bank of India - IX	8.10%	14-May-23	13-Aug-23	92.00	7.45	
	State Bank of India - IX	8.15%	14-Aug-23	13-Feb-24	184.00	15.00	
	State Bank of India - IX	8.20%	14-Feb-24	31-Mar-24	47.00	3.85	
					366.00	**29.74**	**8.13%**
6	State Bank of India - X	8.10%	01-Apr-23	24-Sep-23	177.00	14.34	
	State Bank of India - X	8.15%	25-Sep-23	24-Dec-23	91.00	7.42	
	State Bank of India - X	8.20%	25-Dec-23	31-Mar-24	98.00	8.04	
					366.00	**29.79**	**8.14%**
7	State Bank of India - XI	8.00%	01-Apr-23	10-Apr-23	10.00	0.80	
	State Bank of India - XI	8.10%	11-Apr-23	10-Oct-23	183.00	14.82	
	State Bank of India - XI	8.15%	11-Oct-23	10-Jan-24	92.00	7.50	
	State Bank of India - XI	8.20%	11-Jan-24	31-Mar-24	81.00	6.64	
					366.00	**29.76**	**8.13%**
8	State Bank of India - XII	8.00%	01-Apr-23	10-Apr-23	10.00	0.80	
	State Bank of India - XII	8.10%	11-Apr-23	10-Oct-23	183.00	14.82	
	State Bank of India - XII	8.15%	11-Oct-23	10-Jan-24	92.00	7.50	
	State Bank of India - XII	8.20%	11-Jan-24	31-Mar-24	81.00	6.64	
					366.00	**29.76**	**8.13%**
9	HDFC Bank Limited-XII	7.78%	01-Jan-24	12-Jan-24	12.00	0.93	
	HDFC Bank Limited-XII	7.70%	13-Jan-24	12-Feb-24	31.00	2.39	
	HDFC Bank Limited-XII	7.65%	13-Feb-24	12-Mar-24	29.00	2.22	
	HDFC Bank Limited-XII	7.60%	13-Mar-24	31-Mar-24	19.00	1.44	
					91.00	**6.98**	**7.67%**
10	HDFC-X	8.01%	01-Apr-23	31-May-23	61.00	4.89	
	HDFC-X	7.95%	01-Jun-23	31-Mar-24	305.00	24.25	
					366.00	**29.13**	**7.96%**
11	HDFC Bank Limited-XI	7.74%	01-Sep-23	10-Sep-23	10.00	0.77	
	HDFC Bank Limited-XI	7.80%	11-Sep-23	10-Oct-23	30.00	2.34	
	HDFC Bank Limited-XI	7.77%	11-Oct-23	10-Nov-23	31.00	2.41	
	HDFC Bank Limited-XI	7.92%	11-Nov-23	10-Dec-23	30.00	2.38	
	HDFC Bank Limited-XI	7.97%	11-Dec-23	10-Jan-24	31.00	2.47	
	HDFC Bank Limited-XI	7.89%	11-Jan-24	10-Feb-24	31.00	2.45	
	HDFC Bank Limited-XI	7.67%	11-Feb-24	10-Mar-24	29.00	2.22	
	HDFC Bank Limited-XI	7.84%	11-Mar-24	31-Mar-24	21.00	1.65	
					213.00	**16.69**	**7.83%**

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

Statement Giving Details of Project Financed through a Combination of loan

Form 8

TRANCHE NO

BP NO 5050000521 T00001 D00001

Unsecured Loan From HDFC Bank Ltd.-IV		
Source of Loan :	HDFC Bank Ltd.-IV	
Currency :	INR	
Amount of Loan :	20,00,00,00,000	
Total Drawn amount :	1,00,00,00,000	
Date of Drawal:	17.04.2017	
Interest Type :	Floating	
Fixed Interest Rate :		
Base Rate, If Floating Interest	7.90%	
Margin, If Floating Interest :		
Are there any Caps/ Floor :	Y/N	
Frequency of Intt. Payment	MONTHLY	
If Above is yes, specify Caps/ Floor :		
Moratorium Period :	3 Years	
Moratorium effective from :	17.04.2017	
Repayment Period (Inc Moratorium) :	12 Years	
Repayment Frequency :	9 Yearly Instalment	
Repayment Type :	AVG	
First Repayment Date :	17.04.2021	
Base Exchange Rate :	RUPEE	
Date of Base Exchange Rate :	N.A.	
Project Code	Project Name	Amount
	RIHAND-III	40,00,00,000.00
	DULANGA COAL MINE	9,00,00,000.00
	VINDHYACHAL-IV	41,00,00,000.00
	MOUDA-I	50,00,00,000.00
	ANANTPUR SOLAR PV	60,00,00,000
Total Allocated Amount		**1,00,00,00,000**

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 Giving Details of Project Financed through a Combination of loan

Form 8

TRANCHE NO

BP NO 5050000561 **T00001** **D00001**

Unsecured Loan From HDFC Bank Ltd. V		
Source of Loan :	**HDFC Bank Ltd. V**	
Currency :	INR	
Amount of Loan :	25,00,00,00,000	
Total Drawn amount :	5,00,00,00,000	
Date of drawl	25.09.2017	
Interest Type :	Floating	
Fixed Interest Rate :		
Base Rate, If Floating Interest	7.90%	
Margin, If Floating Interest :	NIL	
Are there any Caps/ Floor :	Y/N	
Frequency of Intt. Payment	MONTHLY	
If Above is yes, specify Caps/ Floor :		
Moratorium Period :	6 Years	
Moratorium effective from :	25.09.2017	
Repayment Period (Inc Moratorium) :	15 Years	
Repayment Frequency :	9 Yearly Instalment	
Repayment Type :	AVG	
First Repayment Date :	25.09.2024	
Base Exchange Rate :	RUPEE	
Date of Base Exchange Rate :	N.A.	
Project Code	Project Name	Amount
	TANDA-II	13,85,00,000
	RAMMAM	3,00,00,000
	KHARGONE	89,68,00,000
	TELANGANA	16,00,00,000
	MANDSAUR SOLAR PV	11,00,00,000
	BOJMAL WIND	21,00,00,000
	MOUDA-II	39,84,00,000
	KUDGI	2,76,97,00,000
	CHATTI BARIATU CMB	19,13,00,000
	DULANGA COAL MINE	6,00,00,000
	MOUDA-I	3,53,00,000
Total Allocated Amount		**5,00,00,00,000**

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 Giving Details of Project Financed through a Combination of loan

Form 8

TRANCHE NO

BP NO 5050000561 **T00001** **D00003**

Unsecured Loan From HDFC Bank Ltd. V		
Source of Loan :	**HDFC Bank Ltd. V**	
Currency :	INR	
Amount of Loan :	25,00,00,00,000	
Total Drawn amount :	2,00,00,00,000	
Date of drawl	13.11.2017	
Interest Type :	Floating	
Fixed Interest Rate :		
Base Rate, If Floating Interest	7.90%	
Margin, If Floating Interest :	NIL	
Are there any Caps/ Floor :	Y/N	
Frequency of Intt. Payment	MONTHLY	
If Above is yes, specify Caps/ Floor :		
Moratorium Period :	6 Years	
Moratorium effective from :	13.11.2017	
Repayment Period (Inc Moratorium) :	15 Years	
Repayment Frequency :	9 Yearly Instalment	
Repayment Type :	AVG	
First Repayment Date :	25.09.2024	
Base Exchange Rate :	RUPEE	
Date of Base Exchange Rate :	N.A.	
Project Code	Project Name	Amount
	SOLAPUR	77,00,00,000
	PAKRI BARWADIH COAL MINE	26,00,00,000
	BONGAIGAON	27,00,00,000
	TELANGANA	12,00,00,000
	BARH - II	10,00,00,000
	ROJMAL WIND	15,00,00,000
	LARA	10,00,00,000
	CHATTI BARIATU CMB	15,00,00,000
	DULANGA COAL MINE	8,00,00,000
Total Allocated Amount		**2,00,00,00,000**

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

Statement Giving Details of Project Financed through a Combination of loan

Form 8

TRANCHE NO

BP NO 5050000561 **T00001** **D0009**

Unsecured Loan From HDFC Bank Ltd. V		
Source of Loan :	**HDFC Bank Ltd. V**	
Currency :	INR	
Amount of Loan :	25,00,00,00,000	
Total Drawn amount :	2,20,00,00,000	
Date of drawl	02.07.2018	
Interest Type :	Floating	
Fixed Interest Rate :		
Base Rate, If Floating Interest	8.10%	
Margin, If Floating Interest :	NIL	
Are there any Caps/ Floor :	Y/N	
Frequency of Intt. Payment	MONTHLY	
If Above is yes, specify Caps/ Floor :		
Moratorium Period :	6 Years	
Moratorium effective from :	02.07.2018	
Repayment Period (Inc Moratorium) :	15 Years	
Repayment Frequency :	9 Yearly Instalment	
Repayment Type :	AVG	
First Repayment Date :	25.09.2024	
Base Exchange Rate :	RUPEE	
Date of Base Exchange Rate :	N.A.	
Project Code	Project Name	Amount
	LARA-I	50,00,00,000
	DULANGA COAL MINE	10,00,00,000
	TALAIPALI COAL MINE	10,00,00,000
	NORTH KARANPURA	75,00,00,000
	KHARGONE	75,00,00,000
Total Allocated Amount		**2,20,00,00,000**

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 Giving Details of Project Financed through a Combination of loan

Form 8

TRANCHE NO

BP NO 5050000791 **T00001** **D00001**

Unsecured Loan From HDFC Bank Ltd. VII		
Source of Loan :	HDFC Bank Ltd. VII	
Currency :	INR	
Amount of Loan :	25,00,00,00,000	
Total Drawn amount :	3,85,00,00,000	
Date of drawl	11.06.2019	
Interest Type :	Floating	
Fixed Interest Rate :		
Base Rate, If Floating Interest	8.40%	
Margin, If Floating Interest :	NIL	
Are there any Caps/ Floor :	Y/N	
Frequency of Intt. Payment	MONTHLY	
If Above is yes, specify Caps/ Floor :		
Moratorium Period :	6 Years	
Moratorium effective from :	11.06.2019	
Repayment Period (Inc Moratorium) :	15 Years	
Repayment Frequency :	9 Yearly Instalment	
Repayment Type :	AVQ	
First Repayment Date :	11.06.2026	
Base Exchange Rate :	RUPEE	
Date of Base Exchange Rate :	N.A	
Project Code	Project Name	Amount
	BONGAIGAON	1,21,00,00,000
	LARA	28,00,00,000
	TAPOVAN VISHNUGAD	15,00,00,000
	BARH-I	98,00,00,000
	GADARWARA	20,00,00,000
	CHATTI BARIATU CMB	18,00,00,000
	DARLIPALLI	20,00,00,000
	DULANGA CMB	35,00,00,000
	TALAIPALI CMB	30,00,00,000
Total Allocated Amount		**3,85,00,00,000**

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

Form 8

TRANCHE NO

BP NO 5050000791 **T00001** **D00005**

Unsecured Loan From HDFC Bank Ltd. VII	
Source of Loan :	HDFC Bank Ltd. VII
Currency :	INR
Amount of Loan :	25,00,00,00,000
Total Drawn amount :	1,00,00,00,000
Date of drawl	11.02.2020
Interest Type :	Floating
Fixed Interest Rate :	
Base Rate, If Floating Interest	7.50%
Margin, If Floating Interest :	NIL
Are there any Caps/ Floor :	Y/N
Frequency of Intt. Payment	MONTHLY
If Above is yes, specify Caps/ Floor :	
Moratorium Period :	6 Years
Moratorium effective from :	11.02.2020
Repayment Period (Inc Moratorium) :	15 Years
Repayment Frequency :	9 Yearly Instalment

Repayment Type :	AVG	
First Repayment Date :	11.06.2026	
Base Exchange Rate :	RUPEE	
Date of Base Exchange Rate :	N.A.	
Project Code	Project Name	Amount
	BARH-I	30,00,00,000
	TAPOVAN VISHNUGAD	20,00,00,000
	NORTH KARANPURA	20,00,00,000
	DARLIPALLI	35,00,00,000
	RAMMAM	20,00,00,000
	BARAUNI-II	1,30,00,00,000
	DULANGIA CMB	15,00,00,000
	TALAIPALI CMB	30,00,00,000
Total Allocated Amount		**3,00,00,00,000**

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

Statement Giving Details of Project Financed through a Combination of loan

Form 8

TRANCHE NO

BP NO 5050000551	T00001	D00009
	Unsecured Loan From SBI-X	
Source of Loan :	**SBI-X**	
Currency :	INR	
Amount of Loan :	40,00,00,00,000	
Total Drawn amount :	3,00,00,00,000	
Date of Drawal:	01.05.2018	
Interest Type :	Floating	
Fixed Interest Rate :	————	
Base Rate, If Floating Interest	7.85%	
Margin, If Floating Interest :	0.00%	
Are there any Caps/ Floor :	Y/N	
Frequency of Intt. Payment	Monthly	
If Above is yes, specify Caps/ Floor :		
Moratorium Period :	6 Years	
Moratorium effective from :	01.05.2018	
Repayment Period (Inc Moratorium) :	15 Years	
Repayment Frequency :	9 Yearly Installments	
Repayment Type :	AVG	
First Repayment Date :	01.10.2024	
Base Exchange Rate :	RUPEE	
Date of Base Exchange Rate :	N.A.	
Project Code	**Project Name**	**Amount**
	PAKRI BARWADIH CMB	70,00,00,000
	CHATTI BARIATU CMB	15,00,00,000
	DULANGA COAL MINE	25,00,00,000
	TALAIPALI COAL MINE	1,90,00,00,000
Total Allocated Amount		3,00,00,00,000.00

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.)

Statement Giving Details of Project Financed through a Combination of loan

Form 8

TRANCHE NO

BP NO 5050009741 **T00001** **D00001**

	Unsecured Loan From SBI-XII	
Source of Loan :	**SBI-XII**	
Currency :	INR	
Amount of Loan :	50,00,00,00,000	
Total Drawn amount :	7,50,00,00,000	
Date of Drawal:	11.02.2019	
Interest Type :	Floating	
Fixed Interest Rate :	————	
Base Rate, If Floating Interest	8.35%	
Margin, If Floating Interest :	NIL	
Are there any Caps/ Floor :	Y/N	
Frequency of Intt. Payment	Monthly	
If Above is yes, specify Caps/ Floor :		
Moratorium Period :	6 Years	
Moratorium effective from :	11.02.2019	
Repayment Period (Inc Moratorium) :	15 Years	
Repayment Frequency :	9 Yearly Installments	
Repayment Type :	AVG	
First Repayment Date :	31.03.2026	
Base Exchange Rate :	RUPEE	
Date of Base Exchange Rate :	N.A.	
Project Code	**Project Name**	**Amount**
	BARH-I	1,30,00,00,000.00
	TAPOVAN VISHNUGARH	15,00,00,000.00
	BONGAIGAON	65,00,00,000.00
	SOLAPUR	40,00,00,000.00
	GADARWARA	90,00,00,000.00
	DARLIPALLI	60,00,00,000.00
	TANDA-II	50,00,00,000.00
	KHARGONE	90,00,00,000.00
	TELANGANA	70,00,00,000.00
	CHATTI BARIATU	15,00,00,000.00
	DULANGA	20,00,00,000.00
	TALAIPALI	80,00,00,000.00
	NCPS-FGD	25,00,00,000.00
Total Allocated Amount		**7,50,00,00,000.00**

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.)

Statement Giving Details of Project Financed through a Combination of loan

Form 8

TRANCHE NO

BP NO 5050000741 **T00001** **D00003**

	Unsecured Loan From SBI-XII	
Source of Loan :	**SBI-XII**	
Currency :	INR	
Amount of Loan :	50,00,00,00,000	
Total Drawn amount :	5,00,00,00,000	
Date of Drawal :	26.03.2019	
Interest Type :	Floating	
Fixed Interest Rate :	----------	
Base Rate, If Floating Interest	8.35%	
Margin, If Floating Interest :	NIL	
Are there any Caps/ Floor :	Y/N	
Frequency of Intt. Payment	Monthly	
If Above is yes, specify Caps/ Floor :		
Moratorium Period :	6 Years	
Moratorium effective from :	26.03.2019	
Repayment Period (Inc Moratorium) :	15 Years	
Repayment Frequency :	9 Yearly Installments	
Repayment Type :	AVG	
First Repayment Date :	31.03.2026	
Base Exchange Rate :	RUPEE	
Date of Base Exchange Rate :	N.A.	
Project Code	**Project Name**	**Amount**
	BARH-I	40,00,00,000.00
	UNCHAHAR STPP IV	1,20,00,00,000.00
	LARA	30,00,00,000.00
	NORTH KARANPURA	30,00,00,000.00
	GADARWARA	60,00,00,000.00
	DARLIPALLI	41,00,00,000.00
	TANDA-II	30,00,00,000.00
	KHARGONE	60,00,00,000.00
	TELANGANA	60,00,00,000.00
	CHATTI BARIATU	5,00,00,000.00
	DULANGA	10,00,00,000.00
	TALAIPALI	10,00,00,000.00
	NCPS-FGD	4,00,00,000.00
Total Allocated Amount		**5,00,00,00,000.00**

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

Statement Giving Details of Project Financed through a Combination of loan

Form 8

TRANCHE NO

BP NO 5050000861 **T00001** **D00001**

	Unsecured Loan From SBI-XIII	
Source of Loan :	SBI-XIII	
Currency :	INR	
Amount of Loan :	50,00,00,00,000	
Total Drawn amount :	2,00,00,00,000	
Date of Drawal:	24.03.2020	
Interest Type :	Floating	
Fixed Interest Rate :	----------	
Base Rate, If Floating Interest	7.45%	
Margin, If Floating Interest :	NIL	
Are there any Caps/ Floor :	Y/N	
Frequency of Intt. Payment	Monthly	
If Above is yes, specify Caps/ Floor :		
Moratorium Period :	4 Years	
Moratorium effective from :	24.03.2020	
Repayment Period (Inc Moratorium) :	15 Years	
Repayment Frequency :	12 Yearly Installments	
Repayment Type :	AVG	
First Repayment Date :	24.03.2024	
Base Exchange Rate :	RUPEE	
Date of Base Exchange Rate :	N.A.	
Project Code	**Project Name**	**Amount**
	BILHAUR SOLAR 140MW	25,00,00,000.00
	BILHAUR SOLAR 85MW	4,00,00,000.00
	AURAIYA SOLAR 20MW	16,00,00,000.00
	JETSAR SOLAR	5,00,00,000.00
	DEVIKOT SOLAR	23,00,00,000.00
	SAMBHU KI BHURJ SOLAR	47,00,00,000.00
	KORBA R&M	5,00,00,000.00
	RAMAGUNDAM R&M	10,00,00,000.00
	VINDHYACHAL R&M	20,00,00,000.00
	CHATTI BARIATU CMB	20,00,00,000.00
	DULANGA COAL MINE	5,00,00,000.00
	TALAIPALI COAL MINE	20,00,00,000.00
Total Allocated Amount		**2,00,00,00,000.00**

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.)

Statement Giving Details of Project Financed through a Combination of loan

Form 8

TRANCHE NO

BP NO 50500001042 T00001 D00002

	Unsecured Loan From ICICI-VII	
Source of Loan :	ICICI-VII	
Currency :	INR	
Amount of Loan :	30,00,00,00,000	
Total Drawn amount :	9,77,21,00,000	
Date of Drawal	30.12.2020	
Interest Type :	Floating	
Fixed Interest Rate :		
Base Rate, If Floating Interest	6.00%	
Margin, If Floating Interest :	NIL	
Are there any Caps/ Floor :	Y/N	
Frequency of Intt. Payment	MONTHLY	
If Above is yes, specify Caps/ Floor :		
Moratorium Period :	3 Years	
Moratorium effective from :	30.12.2020	
Repayment Period (Inc Moratorium) :	15 years	
Repayment Frequency :	12 Yearly Instalment	
Repayment Type :	AVG	
First Repayment Date :	30.12.2024	
Base Exchange Rate :	RUPEE	
Date of Base Exchange Rate :	N.A.	
Project Code	**Project Name**	**Amount**
	THDC	5,06,81,00,000.00
	NEEPCO	2,70,40,00,000.00
	BILHAUR SOLAR 140MW	25,00,00,000.00
	BILHAUR SOLAR 85MW	4,00,00,000.00
	AURAIYA SOLAR 20MW	16,00,00,000.00
	JETSAR SOLAR	5,00,00,000.00
	DEVIKOT SOLAR	23,00,00,000.00
	SAMBHU KI BHURJ	47,00,00,000.00
	KORBA-R&M	5,00,00,000.00
	RAMAGUNDAM-R&M	10,00,00,000.00
	VSTPS R&M	20,00,00,000.00
	CHATTI BARIATU	20,00,00,000.00
	DULANGA CMB	5,00,00,000.00
	TALAIPALI	20,00,00,000.00
Total Allocated Amount		**9,77,21,00,000.00**

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.)

Form 8

TRANCHE NO

BP NO 5050001151	T00001	D00002
Unsecured Loan From HDFC Bank Ltd. X		
Source of Loan :	**HDFC Bank Ltd. X**	
Currency :	INR	
Amount of Loan :	30,00,00,00,000	
Total Drawn amount :	5,00,00,00,000	
Date of drawl	24.11.2021	
Interest Type :	Floating	
Fixed Interest Rate :		
Base Rate, If Floating Interest	5.83%	
Margin, If Floating Interest :	NIL	
Are there any Caps/ Floor :	Y/N	
Frequency of Intt. Payment	MONTHLY	
If Above is yes, specify Caps/ Floor :		
Moratorium Period :	3 Years	
Moratorium effective from :	24.11.2021	
Repayment Period (Inc Moratorium) :	15 Years	
Repayment Frequency :	12 Yearly Instalment	
Repayment Type :	AVG	
First Repayment Date :	24.11.2025	
Base Exchange Rate :	RUPEE	
Date of Base Exchange Rate :	N.A.	
Project Code	Project Name	Amount
	NORTH KARANPURA	24,00,00,000.00
	RAMMAM	3,00,00,000.00
	TELANGANA	23,00,00,000.00
	LARA	50,00,00,000.00
	GADARWARA	50,00,00,000.00
	DARLIPALLI	77,00,00,000.00
	TANDA-II	65,00,00,000.00
	BARAUNI-II	20,00,00,000.00
	SINGRAULI R&M	15,00,00,000.00
	KORBA R&M	25,00,00,000.00
	RAMAGUNDAM I & II R&M	40,00,00,000.00
	VINDHYACHAL R&M	7,00,00,000.00
	FARAKKA R&M	10,00,00,000.00
	UNCHAHAR R&M	4,00,00,000.00
	RIHAND R&M	15,00,00,000.00
	KAHALGAON R&M	3,00,00,000.00
	CHATTI BARIATU CMB	5,00,00,000.00
	DULANGA COAL MINE	26,00,00,000.00
	TALAIPALI COAL MINE	36,00,00,000.00
	KHEENDARI	3,00,00,000.00
	BARH-II FGD	2,50,00,000.00
	MOUDA-II FGD	6,50,00,000.00
Total Allocated Amount		**5,00,00,00,000**

पवन देव जामटा/PAWAN DEV JAMTA
उप महाप्रबंधक (कॉर्पोरेट वित्त)
Dy. General Manager (Corporate Finance)
एन टी पी सी लिमिटेड/NTPC LIMITED
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

Form 8

TRANCHE NO

BP NO 5050001586 T00001 D00003

Unsecured Loan From HDFC Bank Ltd. XI		
Source of Loan :	HDFC Bank Ltd. XI	
Currency :	INR	
Amount of Loan :	30,00,00,00,000	
Total Drawn amount :	10,00,00,00,000	
Date of drawl	01.09.2023	
Interest Type :	Floating	
Fixed Interest Rate :		
Base Rate, If Floating Interest	7.74%	
Margin, If Floating Interest :	NIL	
Are there any Caps/ Floor :	Y/N	
Frequency of Intt. Payment	MONTHLY	
If Above is yes, specify Caps/ Floor :		
Moratorium Period :	3 Years	
Moratorium effective from :	14.07.2023	
Repayment Period (Inc Moratorium) :	15 Years	
Repayment Frequency :	12 Yearly Instalment	
Repayment Type :	AVG	
First Repayment Date :	14.07.2027	
Base Exchange Rate :	RUPEE	
Date of Base Exchange Rate :	N.A.	
Project Code	Project Name	Amount
	BARH-I	5,02,14,00,000.00
	PAKRI BARWADIH CMB	1,70,00,00,000.00
	NOKH SOLAR PLOT-III (245M	39,00,00,000.00
	SINGRAULI-I & II FGD	36,73,00,000.00
	KERANDARI	25,00,00,000.00
	NOKH SOLAR PLOT-II (345MW	22,00,00,000.00
	RAMAGUNDAM-I & II FGD	20,06,00,000.00
	TALAIPALI COAL MINE	20,00,00,000.00
	TSTPS STAGE-II & I FGD	17,83,00,000.00
	FARAKKA-I, II & III FGD	16,76,00,000.00
	VINDHYACHAL-I &II FGD	15,73,00,000.00
	TTPS III (2X660MW)	10,00,00,000.00
	DULANGA COAL MINE	10,00,00,000.00
	KAHALGAON-I & II FGD	9,88,00,000.00
	NOKH SOLAR PLOT-I (245MW)	9,00,00,000.00
	UNCHAHAR -I, II & III-FGD	8,56,00,000.00
	VINDHYACHAL-III &IV FGD	8,05,00,000.00
	SIMHADRI-II & I FGD	7,48,00,000.00
	RIHAND- II & III FGD	5,39,00,000.00
	KHARGONE FGD	5,36,00,000.00
	KORBA-I, II & III FGD	5,14,00,000.00
	SIPAT-I FGD	5,07,00,000.00
	KUDGI-FGD	4,74,00,000.00
	DARLIPALLI FGD	4,50,00,000.00
	LARA FGD	3,92,00,000.00
	MOUDA-II FGD	3,14,00,000.00
	GADARWARA FGD	3,08,00,000.00
	NORTH KARANPURA FGD	2,42,00,000.00
	MOUDA-I FGD	2,30,00,000.00
	BARH-II FGD	2,19,00,000.00
	SOLAPUR-FGD	2,17,00,000.00
	TANDA II FGD	2,05,00,000.00
	RAMAGUNDAM-III FGD	31,00,000.00
Total Allocated Amount		10,00,00,00,000.00

पवन देव जामटा/PAWAN DEV JAMTA
उप महाप्रबंधक/Deputy General Manager
एच डी एफ सी बैंक लि./HDFC Bank Ltd.
EOC, A-8A, Sector-24, Noida-201301

Form 8

TRANCHE NO

BP NO 9050001441 T00001 D00004

Unsecured Loan From HDFC Bank Ltd. XII		
Source of Loan :	HDFC Bank Ltd. XII	
Currency :	INR	
Amount of Loan :	50,00,00,00,000	
Total Drawn amount :	16,00,00,000	
Date of drawl	01-Jan-24	
Interest Type :	Floating	
Fixed Interest Rate :		
Base Rate, If Floating Interest	7.65%	
Margin, If Floating Interest :	NIL	
Are there any Caps/ Floor :	Y/N	
Frequency of Intt. Payment	MONTHLY	
If Above is yes, specify Caps/ Floor :		
Moratorium Period :	3 Years	
Moratorium effective from :	13.10.2023	
Repayment Period (Inc Moratorium) :	15 Years	
Repayment Frequency :	12 Yearly Instalment	
Repayment Type :	AVG	
First Repayment Date :	13.10.2027	
Base Exchange Rate :	RUPEE	
Date of Base Exchange Rate :	N.A.	
Project Code	Project Name	Amount
	BARH-I (3X 660MW)	2,40,00,00,000.00
	TAPOVAN VISHNUGARH (4X13	32,00,00,000.00
	NORTH KARANPURA (3X660)	1,47,00,00,000.00
	RAMMAM (3X40MW)	3,00,00,000.00
	TELANGANA (2X800MW)	40,00,00,000.00
	GANDHAR 20MW	1,00,00,000.00
	RIHAND SOLAR (20MW)	1,00,00,000.00
	ANTA SOLAR (90MW)	2,00,00,000.00
	NOKH SOLAR PLOT-II (245MW	22,00,00,000.00
	NOKH SOLAR PLOT-III (245M	36,00,00,000.00
	LARA	32,00,00,000.00
	GADARWARA	9,00,00,000.00
	DARLIPALLI	25,00,00,000.00
	TANDA-II	20,00,00,000.00
	BARAUNI-II (2X250MW)	9,00,00,000.00
	NABINAGAR	9,00,00,000.00
	CHATTI BARIATU CMB	9,50,00,000.00
	TALAIPALI COAL MINE	20,00,00,000.00
	KERANDARI	3,50,00,000.00
	PAKRI BARWADIH CMB	40,00,00,000.00
	DULANGA COAL MINE	3,00,00,000.00
	RIHAND- I FGD	11,50,00,000.00
	RIHAND- II & III FGD	1,00,00,000.00
	VINDHYACHAL-I &II FGD	3,00,00,000.00
	VINDHYACHAL-III &IV FGD	1,00,00,000.00
	SIPAT-I (3X660 MW) FGD	1,00,00,000.00
	SIPAT-II FGD	6,50,00,000.00
	KORBA-I,II,III FGD	26,50,00,000.00
	BARH-II FGD	1,00,00,000.00
	RAMAGUNDAM-I & II FGD	16,00,00,000.00
	RAMAGUNDAM-III FGD	3,50,00,000.00
	SOLAPUR-FGD	35,00,00,000.00
	KUDGI-FGD	4,00,00,000.00
	SINGRAULI-I & II FGD	6,00,00,000.00
	FARAKKA-I , II & III FGD	15,50,00,000.00
	KAHALGAON-I & II FGD	18,00,00,000.00
	TSTPS STAGE-II & I FGD	21,50,00,000.00
Total Allocated Amount		8,75,00,00,000.00

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.)

Statement Giving Details of Project Financed through a Combination of loan

Form 8

TRANCHE NO

BP NO 8050005681	T00001	D00002
	Unsecured Loan From SBI-XI	
Source of Loan :	SBI-XI	
Currency :	INR	
Amount of Loan :	50,00,00,00,000	
Total Drawn amount :	5,00,00,00,000	
Date of Drawal :	16.10.2018	
Interest Type :	Floating	
Fixed Interest Rate :	----------	
Base Rate, If Floating Interest :	8.35%	
Margin, If Floating Interest :	0.00%	
Are there any Caps/ Floor :	Y/N	
Frequency of Intt. Payment :	Monthly	
If Above is yes, specify Caps/ Floor :		
Moratorium Period :	3 Years	
Moratorium effective from :	16.10.2018	
Repayment Period (Inc Moratorium) :	12 Years	
Repayment Frequency :	9 Yearly Installments	
Repayment Type :	AVG	
First Repayment Date :	01.10.2022	
Base Exchange Rate :	RUPEE	
Date of Base Exchange Rate :	N.A.	
Project Code	Project Name	Amount
	NORTH KARANPURA	85,00,00,000
	DARLIPALLI	1,00,00,00,000
	KHARGONE	1,20,00,00,000
	TELANGANA	90,00,00,000
	DULANGA COAL MINE	25,00,00,000
	TALAIPALI COAL MINE	70,00,00,000
Total Allocated Amount		5,00,00,00,000.00

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 Capitalisation after date of Commercial operation up to/beyond achieving Peak rated Capacity

Part-IV
Form-9

Name of the Petitioner :NTPC Ltd
Name of the Integrated Mine: Dulanga
Date of Commercial Operation: 01.10.2020

Financial Year 2024-25

Amount in Rs Lakhs

S. No.	Head of Work / Equipment	ACE Claimed (Projected)				Regulations under which claimed	Justification	Admitted Cost by the Commission, if any
		Accrual basis	Un-discharged Liability included in column 3	Cash basis	IDC included in col. 3			
1	2	3	4	(5 = 3 - 4)	6	7	8	9
1	Construction of Roads & Drains	35.00	-	35.00	-	42(2)(a)	Expenditure is towards construction of approach roads to enable sustained operation of mine as per the mine plan. Strengthening of access road is mentioned at chapter VIII cl. no. 8.4 (point no. 8) of Mining plan. Diversion of approach road for Khamjhar/a village (Project affected village). (Copy of Mining Plan attached as Annexure - A to the Petition)	
2	Rain Water Harvesting System	20.00	-	20.00	-	42(3)(b)	Installation of Rain water harvesting System in compliance to NOC issued by Central Ground Water Authority(CGWA) (point no 13 of General conditions of NOC) (Copy attached as Annexure- A/1)	
	Total	55.00	-	55.00	-			

(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.)

Year wise Statement of Additional Capitalisation after date of Commercial operation up to/beyond achieving Peak rated Capacity

Part-IV
Form-9

Name of the Petitioner: NTPC Ltd
Name of the Integrated Mine: Dulanga
Date of Commercial Operation: 01.10.2020

Financial Year 2025-26

Amount in Rs Lakhs

S. No.	Head of Work / Equipment	ACE Claimed (Projected)				Regulations under which claimed	Justification	Admitted Cost by the Commission, if any
		Accrual basis	Un-discharged Liability included in column 3	Cash basis	IDC included in col. 3			
1	2	3	4	(5 = 3 - 4)	6	7	8	9
1	Construction of Buildings & Structures	150.00	-	150.00	-	42(2)(a)	Expenditure towards construction of Control Room under Disaster Management cell & associated buildings, equipment installed etc. as envisaged in Mine Plan of Dulanga CMP Point no 8.3.7 in Mining Plan under Chapter VIII (Copy of Mining Plan attached as Annexure - A to the Petition).	
2	Construction of Roads & Drains	30.00	-	30.00	-	42(2)(a)	Expenditure is towards construction of approach roads to enable sustained operation of mine as per the mine plan. Strengthening of access road is mentioned at chapter VIII cl. no. 8.4 (point no. 8) of Mining plan Diversion of approach road for Khuntijharia village (Project affected village). (Copy of Mining Plan attached as Annexure - A to the Petition)	
3	Electrical installations works	30.00	-	30.00	-	42(2)(a)	Power Supply (33 Kv/0.415Kv) to Site Office etc. Expenditure as per requirements of the Mining plan mentioned at chapter-III cl no 3.3 (Copy of Mining Plan attached as Annexure - A to the Petition).	
4	Installation of Roof Top Solar	40.00	-	40.00	-	42(2)(b)	Installation of Roof Top Solar in compliance with the directive of MNRE (No.:318/17/2024) for "Saturation of Government Buildings with Rooftop Solar under PM-Surya Ghar: Muft Bijli Yojana" (Copy attached as Annexure - A/2)	
	Total	250.00	-	250.00	-			

(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.)

Year wise Statement of Additional Capitalization after date of Commercial operation up to/beyond achieving Peak rated Capacity

Part-IV
Form-9

Name of the Petitioner: NTPC Ltd
Name of the Integrated Mine: Dulanga
Date of Commercial Operation: 01.10.2020

Financial Year 2026-27

Amount in Rs Lakhs

S. No.	Head of Work / Equipment	ACE Claimed (Projected)				Regulations under which claimed	Justification	Admitted Cost by the Commission, if any
		Accrual basis	Un-discharged Liability included in column 3	Cash basis	IDC included in col. 3			
1	2	3	4	(5 = 3 - 4)	6	7	8	9
1	Construction of Buildings & Structures	250.00	-	250.00	-	42(2)(i)	Expenditure towards construction of Control Room under Disaster Management cell & associated buildings, equipment installed etc. as envisaged in Mine Plan of Dulanga CMP Point no 8.3.7 in Mining Plan under Chapter VIII (Copy of Mining Plan attached as Annexure - A to the Petition).	
2	Electrical Installation Works	100.00	-	100.00	-	42(2)(i)	Power Supply (33 Kv/0.415Kv) to Site Office etc. Expenditure as per requirements of the Mining plan mentioned at chapter-III cl no 3.3 (Copy of Mining Plan attached as Annexure - A to the Petition)	
Total		350.00	-	350.00	-			

(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.)

Year wise Statement of Additional Capitalisation after date of Commercial operation up to/beyond achieving Peak rated Capacity | **Part-IV Form-5**

Name of the Petitioner: NTPC Ltd
Name of the Integrated Mine: Dulanga
Date of Commercial Operation: 01.10.2020

Financial Year 2027-28

Amount in Rs Lakhs

S. No.	Head of Work / Equipment	ACE Claimed (Projected)				Regulations under which claimed	Justification	Admitted Cost by the Commission, if any
		Accrual basis	Un-discharged Liability included in column 3	Cash basis	IDC included in col. 3			
1	2	3.00	4.00	(5 = 3 - 4)	6	7	8	9
1	Construction of Roads & Drains	50.00	-	50.00	-	42(2)(i)	Expenditure is towards construction of approach roads to enable sustained operation of mine as per the mine plan. Strengthening of access road is mentioned at chapter VIII sl. no. E.4 (point no. 8) of Mining plan. Diversion of approach road for Khuntjharia village (Project affected village). (Copy of Mining Plan attached as Annexure - A to the Petition)	
Total		50.00	-	50.00	-			

(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.)

Year wise Statement of Additional Capitalisation after date of Commercial operation up to/beyond achieving Peak rated Capacity | **Part-IV Form-9**

Name of the Petitioner: NTPC Ltd
Name of the Integrated Mine: Dulanga
Date of Commercial Operation: 01.10.2020

Financial Year 2028-29

Amount in Rs Lakhs

S. No.	Head of Work / Equipment	ACE Claimed (Projected)				Regulations under which claimed	Justification	Admitted Cost by the Commission, if any
		Accrual basis	Un-discharged Liability included in column 3	Cash basis	IDC included in col. 3			
1		3	4	(5 = 3 - 4)	6	7	8	9
1	Construction of Roads & Drains	50.00	-	50.00	-	42(2)(a)	Expenditure is towards construction of approach roads to enable sustained operation of mine as per the mine plan. Strengthening of access road is mentioned at chapter VIII cl. no. 8.4 (point no. 8) of Mining plan. Diversion of approach road for Khanjhara village (Project affected village) (Copy of Mining Plan attached as Annexure - A to the Petition).	
Total		50.00	-	50.00	-			

(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.)

PART- IV
FORM- 10

Financing of Additional Capitalization

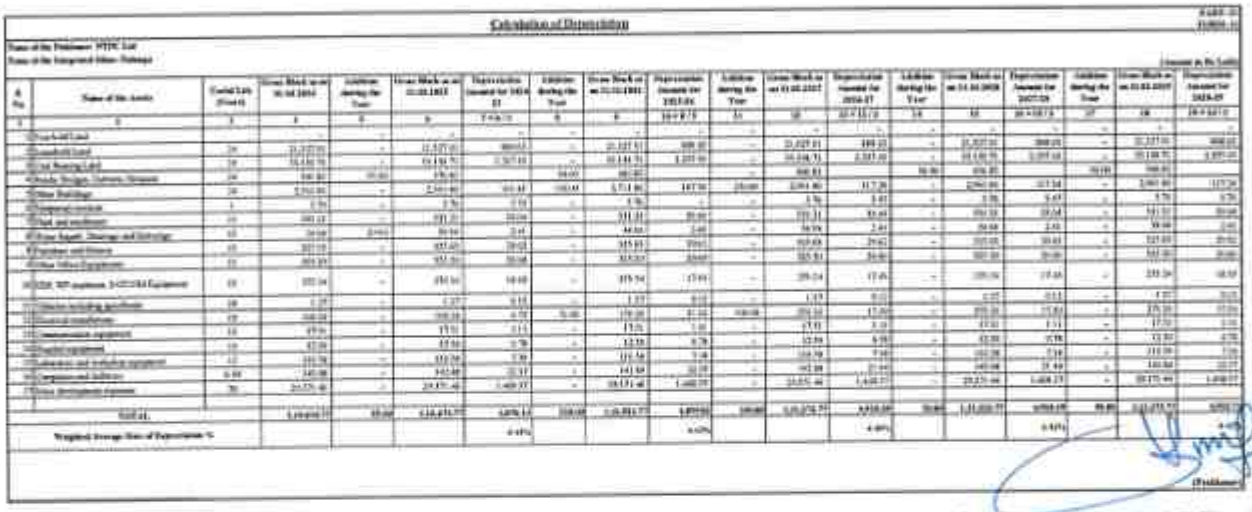
Name of the Petitioner: NTPC Ltd.
Name of the Integrated Mine: Dulanga
Date of Commercial Operation: 01.10.2020

(Amount in Rs Lakh)

	Actual					Admitted				
Financial Year (Starting from COD)'	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
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 Depreciation

पवन देव जोमटा/PAWAN DEV JOMTA
उप महाप्रबन्धक (सिविल)
Deputy General Manager (Civil)
एन टी पी सी लिमिटेड/NTPC LTD
EOC, A-8A, Sector-24, Noida-201301

Statement of Depreciation

PART- IV
FORM- 12

Name of the Petitioner: NTPC Ltd

Name of the Integrated Mine: Dulanga

(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	97530.77	1,00,286.97	1,00,341.97	1,00,591.97	1,00,941.97	1,00,991.97
2.	Closing Capital Cost	100286.97	1,00,341.97	1,00,591.97	1,00,941.97	1,00,991.97	1,01,041.97
3.	**Average Capital Cost**	98908.87	1,00,314.47	1,00,466.97	1,00,766.97	1,00,966.97	1,01,016.97
4.	Freehold land	-	-	-	-	-	-
4A	Assets having zero salvage value	93093.67	93,093.67	93,093.67	93,093.67	93,093.67	93,093.67
5.	Rate of depreciation	4.47%	4.43%	4.43%	4.44%	4.42%	4.42%
6.	Depreciable value	98618.11	99,953.43	1,00,098.31	1,00,383.31	1,00,573.31	1,00,620.81
7.	Balance useful life at the beginning of the period	21.50	20.50	19.50	18.50	17.50	16.50
8.	Remaining depreciable value	88995.44	85,910.79	81,615.62	77,452.68	73,172.82	68,755.68
9.	**Depreciation (for the period)**	4420.06	4,440.05	4,447.94	4,469.86	4,464.64	4,466.96
10.	**Depreciation (annualized)**	4420.06	4,440.05	4,447.94	4,469.86	4,464.64	4,466.96
11.	Cumulative depreciation at the end of the period	14042.73	4,440.05	22,930.63	27,400.49	31,865.13	36,332.09
12.	Less: Cumulative depreciation adjustment on account of de-capitalization	0.09	-	-	-	-	-
13.	Net Cumulative depreciation at the end of the period	14042.64	18,482.69	22,930.63	27,400.49	31,865.13	36,332.09

(Petitioner)

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

Calculation of Weighted Average Rate of Interest on Actual Loans **PART- IV**
FORM- 13

Name of the Petitioner: NTPC Ltd

Name of the Integrated Mine: Dulanga

(Amount in Rs. Lakh)

S.No.	Particulars	2024-25	2025-26	2026-27	2027-28	2028-29
1	**Bonds Series - 66**					
	Gross Loan - Opening	25,400.00	25,400.00	25,400.00	25,400.00	25,400.00
	Cumulative Repayments of Loans upto Previous Period	-	-	-	-	-
	Net Loan - Opening	25,400.00	25,400.00	25,400.00	25,400.00	25,400.00
	Increase / Decrease due to FERV	-	-	-	-	-
	Increase / Decrease due to ACE / Drawl during the period	-	-	-	-	-
	Total	25,400.00	25,400.00	25,400.00	25,400.00	25,400.00
	Repayments of Loans during the Period	-	-	-	-	-
	Net Loan - Closing	25,400.00	25,400.00	25,400.00	25,400.00	25,400.00
	Average Net Loan	**25,400.00**	**25,400.00**	**25,400.00**	**25,400.00**	**25,400.00**
	Rate of Interest on Loan	7.4000%	7.4000%	7.4000%	7.4000%	7.4000%
	Interest on Loan	**1879.60**	**1879.60**	**1879.60**	**1879.60**	**1879.60**
2	**Bonds Series - 69**					
	Gross Loan - Opening	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00
	Cumulative Repayments of Loans upto Previous Period	-	-	-	-	-
	Net Loan - Opening	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00
	Increase / Decrease due to FERV	-	-	-	-	-
	Increase / Decrease due to ACE / Drawl during the period	-	-	-	-	-
	Total	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00
	Repayments of Loans during the Period	-	-	-	-	-
	Net Loan - Closing	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00
	Average Net Loan	**5,000.00**	**5,000.00**	**5,000.00**	**5,000.00**	**5,000.00**
	Rate of Interest on Loan	7.3500%	7.3500%	7.3500%	7.3500%	7.3500%
	Interest on Loan	**367.50**	**367.50**	**367.50**	**367.50**	**367.50**

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 Weighted Average Rate of Interest on Actual Loans **PART- IV**
FORM- 13

Name of the Petitioner: NTPC Ltd

Name of the Integrated Mine: Dulanga

(Amount in Rs. Lakh)

S.No.	Particulars	2024-25	2025-26	2026-27	2027-28	2028-29
3	**Bonds Series - 73**					
	Gross Loan - Opening	2,700.00	2,700.00	2,700.00	2,700.00	2,700.00
	Cumulative Repayments of Loans upto Previous Period	-	-	-	-	-
	Net Loan - Opening	2,700.00	2,700.00	2,700.00	2,700.00	2,700.00
	Increase / Decrease due to FERV	-	-	-	-	-
	Increase / Decrease due to ACE / Drawl during the period	-	-	-	-	-
	Total	2,700.00	2,700.00	2,700.00	2,700.00	2,700.00
	Repayments of Loans during the Period	-	-	-	-	-
	Net Loan - Closing	2,700.00	2,700.00	2,700.00	2,700.00	2,700.00
	Average Net Loan	**2,700.00**	**2,700.00**	**2,700.00**	**2,700.00**	**2,700.00**
	Rate of Interest on Loan	6.4600%	6.4600%	6.4600%	6.4600%	6.4600%
	Interest on Loan	**174.42**	**174.42**	**174.42**	**174.42**	**174.42**
4	**Bonds Series - 74**					
	Gross Loan - Opening	3,400.00	3,400.00	3,400.00	3,400.00	3,400.00
	Cumulative Repayments of Loans upto Previous Period	-	-	-	-	-
	Net Loan - Opening	3,400.00	3,400.00	3,400.00	3,400.00	3,400.00
	Increase / Decrease due to FERV	-	-	-	-	-
	Increase / Decrease due to ACE / Drawl during the period	-	-	-	-	-
	Total	3,400.00	3,400.00	3,400.00	3,400.00	3,400.00
	Repayments of Loans during the Period	-	-	-	-	-
	Net Loan - Closing	3,400.00	3,400.00	3,400.00	3,400.00	3,400.00
	Average Net Loan	**3,400.00**	**3,400.00**	**3,400.00**	**3,400.00**	**3,400.00**
	Rate of Interest on Loan	6.9000%	6.9000%	6.9000%	6.9000%	6.9000%
	Interest on Loan	**234.60**	**234.60**	**234.60**	**234.60**	**234.60**

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 Weighted Average Rate of Interest on Actual Loans **PART- IV**
FORM- 13

Name of the Petitioner: NTPC Ltd

Name of the Integrated Mine: Dulanga

(Amount in Rs. Lakh)

S.No.	Particulars	2024-25	2025-26	2026-27	2027-28	2028-29
5	**Bonds Series - 75**					
	Gross Loan - Opening	4,100.00	4,100.00	4,100.00	4,100.00	4,100.00
	Cumulative Repayments of Loans upto Previous Period	-	-	-	-	-
	Net Loan - Opening	4,100.00	4,100.00	4,100.00	4,100.00	4,100.00
	Increase / Decrease due to FERV	-	-	-	-	-
	Increase / Decrease due to ACE / Drawl during the period	-	-	-	-	-
	Total	4,100.00	4,100.00	4,100.00	4,100.00	4,100.00
	Repayments of Loans during the Period	-	-	-	-	-
	Net Loan - Closing	4,100.00	4,100.00	4,100.00	4,100.00	4,100.00
	Average Net Loan	**4,100.00**	**4,100.00**	**4,100.00**	**4,100.00**	**4,100.00**
	Rate of Interest on Loan	6.7200%	6.7200%	6.7200%	6.7200%	6.7200%
	Interest on Loan	**275.52**	**275.52**	**275.52**	**275.52**	**275.52**
6	HDFC Bank Limited-IV					
	Gross Loan - Opening	900.00	900.00	900.00	900.00	900.00
	Cumulative Repayments of Loans upto Previous Period	300.00	400.00	500.00	600.00	700.00
	Net Loan - Opening	600.00	500.00	400.00	300.00	200.00
	Increase / Decrease due to FERV	-	-	-	-	-
	Increase / Decrease due to ACE / Drawl during the period	-	-	-	-	-
	Total	600.00	500.00	400.00	300.00	200.00
	Repayments of Loans during the Period	100.00	100.00	100.00	100.00	100.00
	Net Loan - Closing	500.00	400.00	300.00	200.00	100.00
	Average Net Loan	**550.00**	**450.00**	**350.00**	**250.00**	**150.00**
	Rate of Interest on Loan	7.9500%	7.9500%	7.9500%	7.9500%	7.9500%
	Interest on Loan	**43.73**	**35.78**	**27.83**	**19.88**	**11.93**

पवन देव जामवाल/PAWAN DEV JAMWAL
उप महाप्रबंधक (परियोजना)
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 **PART- IV**
FORM- 13

Name of the Petitioner: NTPC Ltd

Name of the Integrated Mine: Dulanga

(Amount in Rs. Lakh)

S.No.	Particulars	2024-25	2025-26	2026-27	2027-28	2028-29
7	HDFC Bank Limited-V					
	Gross Loan - Opening	2,400.00	2,400.00	2,400.00	2,400.00	2,400.00
	Cumulative Repayments of Loans upto Previous Period	-	266.67	533.33	800.00	1,066.67
	Net Loan - Opening	2,400.00	2,133.33	1,866.67	1,600.00	1,333.33
	Increase / Decrease due to FERV	-	-	-	-	-
	Increase / Decrease due to ACE / Drawl during the period	-	-	-	-	-
	Total	2,400.00	2,133.33	1,866.67	1,600.00	1,333.33
	Repayments of Loans during the Period	266.67	266.67	266.67	266.67	266.67
	Net Loan - Closing	2,133.33	1,866.67	1,600.00	1,333.33	1,066.67
	Average Net Loan	**2,266.67**	**2,000.00**	**1,733.33**	**1,466.67**	**1,200.00**
	Rate of Interest on Loan	7.9500%	7.9500%	7.9500%	7.9500%	7.9500%
	Interest on Loan	**180.20**	**159.00**	**137.80**	**116.60**	**95.40**
8	State Bank of India - X					
	Gross Loan - Opening	2,500.00	2,500.00	2,500.00	2,500.00	2,500.00
	Cumulative Repayments of Loans upto Previous Period	-	277.78	555.56	833.33	1,111.11
	Net Loan - Opening	2,500.00	2,222.22	1,944.44	1,666.67	1,388.89
	Increase / Decrease due to FERV	-	-	-	-	-
	Increase / Decrease due to ACE / Drawl during the period	-	-	-	-	-
	Total	2,500.00	2,222.22	1,944.44	1,666.67	1,388.89
	Repayments of Loans during the Period	277.78	277.78	277.78	277.78	277.78
	Net Loan - Closing	2,222.22	1,944.44	1,666.67	1,388.89	1,111.11
	Average Net Loan	**2,361.11**	**2,083.33**	**1,805.56**	**1,527.78**	**1,250.00**
	Rate of Interest on Loan	8.2000%	8.2000%	8.2000%	8.2000%	8.2000%
	Interest on Loan	**193.61**	**170.83**	**148.06**	**125.28**	**102.50**

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 Weighted Average Rate of Interest on Actual Loans **PART- IV**
FORM- 13

Name of the Petitioner: NTPC Ltd

Name of the Integrated Mine: Dulanga

(Amount in Rs. Lakh)

S.No.	Particulars	2024-25	2025-26	2026-27	2027-28	2028-29
9	State Bank of India - XI					
	Gross Loan - Opening	2,500.00	2,500.00	2,500.00	2,500.00	2,500.00
	Cumulative Repayments of Loans upto Previous Period	555.55	833.33	1,111.10	1,388.88	1,666.65
	Net Loan - Opening	1,944.45	1,666.68	1,388.90	1,111.13	833.35
	Increase / Decrease due to FERV	-	-	-	-	-
	Increase / Decrease due to ACE / Drawl during the period	-	-	-	-	-
	Total	1,944.45	1,666.68	1,388.90	1,111.13	833.35
	Repayments of Loans during the Period	277.78	277.78	277.78	277.78	277.78
	Net Loan - Closing	1,666.68	1,388.90	1,111.13	833.35	555.58
	Average Net Loan	**1,805.56**	**1,527.79**	**1,250.01**	**972.24**	**694.46**
	Rate of Interest on Loan	8.2000%	8.2000%	8.2000%	8.2000%	8.2000%
	Interest on Loan	**148.06**	**125.28**	**102.50**	**79.72**	**56.95**
10	State Bank of India - XII					
	Gross Loan - Opening	3,000.00	3,000.00	3,000.00	3,000.00	3,000.00
	Cumulative Repayments of Loans upto Previous Period	-	-	333.33	666.67	1,000.00
	Net Loan - Opening	3,000.00	3,000.00	2,666.67	2,333.33	2,000.00
	Increase / Decrease due to FERV	-	-	-	-	-
	Increase / Decrease due to ACE / Drawl during the period	-	-	-	-	-
	Total	3,000.00	3,000.00	2,666.67	2,333.33	2,000.00
	Repayments of Loans during the Period	-	333.33	333.33	333.33	333.33
	Net Loan - Closing	3,000.00	2,666.67	2,333.33	2,000.00	1,666.67
	Average Net Loan	**3,000.00**	**2,833.33**	**2,500.00**	**2,166.67**	**1,833.33**
	Rate of Interest on Loan	8.2000%	8.2000%	8.2000%	8.2000%	8.2000%
	Interest on Loan	**246.00**	**232.33**	**205.00**	**177.67**	**150.33**

पवन देव जानदा/PAWAN DEV JANDA
उप महाप्रबन्धक (कार्यरत)
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 **PART- IV**
FORM- 13

Name of the Petitioner: NTPC Ltd

Name of the Integrated Mine: Dulanga

(Amount in Rs. Lakh)

S.No.	Particulars	2024-25	2025-26	2026-27	2027-28	2028-29
11	ICICI Bank-VII					
	Gross Loan - Opening	500.00	500.00	500.00	500.00	500.00
	Cumulative Repayments of Loans upto Previous Period	-	41.67	83.33	125.00	166.67
	Net Loan - Opening	500.00	458.33	416.67	375.00	333.33
	Increase / Decrease due to FERV	-	-	-	-	-
	Increase / Decrease due to ACE / Drawl during the period	-	-	-	-	-
	Total	500.00	458.33	416.67	375.00	333.33
	Repayments of Loans during the Period	41.67	41.67	41.67	41.67	41.67
	Net Loan - Closing	458.33	416.67	375.00	333.33	291.67
	Average Net Loan	**479.17**	**437.50**	**395.83**	**354.17**	**312.50**
	Rate of Interest on Loan	8.0000%	8.0000%	8.0000%	8.0000%	8.0000%
	Interest on Loan	**38.33**	**35.00**	**31.67**	**28.33**	**25.00**
12	HDFC Bank Limited-X					
	Gross Loan - Opening	2,600.00	2,600.00	2,600.00	2,600.00	2,600.00
	Cumulative Repayments of Loans upto Previous Period	-	-	216.67	433.33	650.00
	Net Loan - Opening	2,600.00	2,600.00	2,383.33	2,166.67	1,950.00
	Increase / Decrease due to FERV	-	-	-	-	-
	Increase / Decrease due to ACE / Drawl during the period	-	-	-	-	-
	Total	2,600.00	2,600.00	2,383.33	2,166.67	1,950.00
	Repayments of Loans during the Period	-	216.67	216.67	216.67	216.67
	Net Loan - Closing	2,600.00	2,383.33	2,166.67	1,950.00	1,733.33
	Average Net Loan	**2,600.00**	**2,491.67**	**2,275.00**	**2,058.33**	**1,841.67**
	Rate of Interest on Loan	7.9500%	7.9500%	7.9500%	7.9500%	7.9500%
	Interest on Loan	**206.70**	**198.09**	**180.86**	**163.64**	**146.41**

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

Calculation of Weighted Average Rate of Interest on Actual Loans **PART- IV FORM- 13**

Name of the Petitioner: NTPC Ltd

Name of the Integrated Mine: Dulanga

(Amount in Rs. Lakh)

S.No.	Particulars	2024-25	2025-26	2026-27	2027-28	2028-29
13	HDFC Bank Limited-XI					
	Gross Loan - Opening	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
	Cumulative Repayments of Loans upto Previous Period	-	-	-	-	83.33
	Net Loan - Opening	1,000.00	1,000.00	1,000.00	1,000.00	916.67
	Increase / Decrease due to FERV	-	-	-	-	-
	Increase / Decrease due to ACE / Drawl during the period	-	-	-	-	-
	Total	1,000.00	1,000.00	1,000.00	1,000.00	916.67
	Repayments of Loans during the Period	-	-	-	83.33	83.33
	Net Loan - Closing	1,000.00	1,000.00	1,000.00	916.67	833.33
	Average Net Loan	**1,000.00**	**1,000.00**	**1,000.00**	**958.33**	**875.00**
	Rate of Interest on Loan	7.8400%	7.8400%	7.8400%	7.8400%	7.8400%
	Interest on Loan	**78.40**	**78.40**	**78.40**	**75.13**	**68.60**
14	HDFC Bank Limited-XII					
	Gross Loan - Opening	300.00	300.00	300.00	300.00	300.00
	Cumulative Repayments of Loans upto Previous Period	-	-	-	-	25.00
	Net Loan - Opening	300.00	300.00	300.00	300.00	275.00
	Increase / Decrease due to FERV	-	-	-	-	-
	Increase / Decrease due to ACE / Drawl during the period	-	-	-	-	-
	Total	300.00	300.00	300.00	300.00	275.00
	Repayments of Loans during the Period	-	-	-	25.00	25.00
	Net Loan - Closing	300.00	300.00	300.00	275.00	250.00
	Average Net Loan	**300.00**	**300.00**	**300.00**	**287.50**	**262.50**
	Rate of Interest on Loan	7.6000%	7.6000%	7.6000%	7.6000%	7.6000%
	Interest on Loan	**22.80**	**22.80**	**22.80**	**21.85**	**19.95**

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 Weighted Average Rate of Interest on Actual Loans — **PART- IV, FORM- 13**

Name of the Petitioner: NTPC Ltd

Name of the Integrated Mine: Dulanga

(Amount in Rs. Lakh)

S.No.	Particulars	2024-25	2025-26	2026-27	2027-28	2028-29
15	Euro Loan I					
	Gross Loan - Opening	760.00	760.00	760.00	760.00	760.00
	Cumulative Repayments of Loans upto Previous Period	-	-	-	-	-
	Net Loan - Opening	760.00	760.00	760.00	760.00	760.00
	Increase / Decrease due to FERV	-	-	-	-	-
	Increase / Decrease due to ACE / Drawl during the period					
	Total	760.00	760.00	760.00	760.00	760.00
	Repayments of Loans during the Period	-	-	-	-	760.00
	Net Loan - Closing	760.00	760.00	760.00	760.00	-
	Average Net Loan	**760.00**	**760.00**	**760.00**	**760.00**	**380.00**
	Rate of Interest on Loan	5.0700%	5.0700%	5.0700%	5.0700%	5.0700%
	Interest on Loan	**38.53**	**38.53**	**38.53**	**38.53**	**19.27**
16	Euro Loan II					
	Gross Loan - Opening	1,130.00	1,130.00	1,130.00	1,130.00	1,130.00
	Cumulative Repayments of Loans upto Previous Period	-	-	-	-	-
	Net Loan - Opening	1,130.00	1,130.00	1,130.00	1,130.00	1,130.00
	Increase / Decrease due to FERV	-	-	-	-	-
	Increase / Decrease due to ACE / Drawl during the period					
	Total	1,130.00	1,130.00	1,130.00	1,130.00	1,130.00
	Repayments of Loans during the Period	-	-	-	-	1,130.00
	Net Loan - Closing	1,130.00	1,130.00	1,130.00	1,130.00	-
	Average Net Loan	**1,130.00**	**1,130.00**	**1,130.00**	**1,130.00**	**565.00**
	Rate of Interest on Loan	5.0600%	5.0600%	5.0600%	5.0600%	5.0600%
	Interest on Loan	**57.18**	**57.18**	**57.18**	**57.18**	**28.59**

पवन देव जामटा/PAWAN DEV JAMTA
उप महाप्रबन्धक (वाणिज्यिक)
Deputy General Manager (Com
एन टी पी सी लिमिटेड/NTPC LIMITED
EOC, A-8A, Sector-24, Noida-201

Calculation of Weighted Average Rate of Interest on Actual Loans — **PART- IV, FORM- 13**

Name of the Petitioner: NTPC Ltd

Name of the Integrated Mine: Dulanga

(Amount in Rs. Lakh)

S.No.	Particulars	2024-25	2025-26	2026-27	2027-28	2028-29
17	Euro Loan III					
	Gross Loan - Opening	1,350.00	1,350.00	1,350.00	1,350.00	1,350.00
	Cumulative Repayments of Loans upto Previous Period	-	-	-	-	-
	Net Loan - Opening	1,350.00	1,350.00	1,350.00	1,350.00	1,350.00
	Increase / Decrease due to FERV	-	-	-	-	-
	Increase / Decrease due to ACE / Drawl during the period					
	Total	1,350.00	1,350.00	1,350.00	1,350.00	1,350.00
	Repayments of Loans during the Period	-	-	-	-	1,350.00
	Net Loan - Closing	1,350.00	1,350.00	1,350.00	1,350.00	-
	Average Net Loan	**1,350.00**	**1,350.00**	**1,350.00**	**1,350.00**	**675.00**
	Rate of Interest on Loan	5.0600%	5.0600%	5.0600%	5.0600%	5.0600%
	Interest on Loan	**68.31**	**68.31**	**68.31**	**68.31**	**34.15**
18	USD 750 Million Drawl I					
	Gross Loan - Opening	450.00	450.00	450.00	450.00	450.00
	Cumulative Repayments of Loans upto Previous Period	-	-	-	64.29	128.57
	Net Loan - Opening	450.00	450.00	450.00	385.71	321.43
	Increase / Decrease due to FERV	-	-	-	-	-
	Increase / Decrease due to ACE / Drawl during the period					
	Total	450.00	450.00	450.00	385.71	321.43
	Repayments of Loans during the Period	-	-	64.29	64.29	64.29
	Net Loan - Closing	450.00	450.00	385.71	321.43	257.14
	Average Net Loan	**450.00**	**450.00**	**417.86**	**353.57**	**289.29**
	Rate of Interest on Loan	6.6770%	6.6770%	6.6770%	6.6770%	6.6770%
	Interest on Loan	**30.05**	**30.05**	**27.90**	**23.61**	**19.32**

पवन देव जामटा/PAWAN DEV JAMTA
उप महाप्रबन्धक (वित्त)
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 **PART- IV**
FORM- 13

Name of the Petitioner: NTPC Ltd

Name of the Integrated Mine: Dulanga

(Amount in Rs. Lakh)

S.No.	Particulars	2024-25	2025-26	2026-27	2027-28	2028-29
19	USD 750 Million Drawl II					
	Gross Loan - Opening	1,700.00	1,700.00	1,700.00	1,700.00	1,700.00
	Cumulative Repayments of Loans upto Previous Period	-	-	-	242.86	485.71
	Net Loan - Opening	1,700.00	1,700.00	1,700.00	1,457.14	1,214.29
	Increase / Decrease due to FERV	-	-	-	-	-
	Increase / Decrease due to ACE / Drawl during the period					
	Total	1,700.00	1,700.00	1,700.00	1,457.14	1,214.29
	Repayments of Loans during the Period	-	-	242.86	242.86	242.86
	Net Loan - Closing	1,700.00	1,700.00	1,457.14	1,214.29	971.43
	Average Net Loan	**1,700.00**	**1,700.00**	**1,578.57**	**1,335.71**	**1,092.86**
	Rate of Interest on Loan	6.6770%	6.6770%	6.6770%	6.6770%	6.6770%
	Interest on Loan	**113.51**	**113.51**	**105.40**	**89.19**	**72.97**
20	USD 750 Million Drawl III					
	Gross Loan - Opening	2,000.00	2,000.00	2,000.00	2,000.00	2,000.00
	Cumulative Repayments of Loans upto Previous Period	-	-	-	285.71	571.43
	Net Loan - Opening	2,000.00	2,000.00	2,000.00	1,714.29	1,428.57
	Increase / Decrease due to FERV	-	-	-	-	-
	Increase / Decrease due to ACE / Drawl during the period					
	Total	2,000.00	2,000.00	2,000.00	1,714.29	1,428.57
	Repayments of Loans during the Period	-	-	285.71	285.71	285.71
	Net Loan - Closing	2,000.00	2,000.00	1,714.29	1,428.57	1,142.86
	Average Net Loan	**2,000.00**	**2,000.00**	**1,857.14**	**1,571.43**	**1,285.71**
	Rate of Interest on Loan	6.6770%	6.6770%	6.6770%	6.6770%	6.6770%
	Interest on Loan	**133.54**	**133.54**	**124.00**	**104.92**	**85.85**

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 Weighted Average Rate of Interest on Actual Loans **PART- IV**
FORM- 13

Name of the Petitioner: NTPC Ltd

Name of the Integrated Mine: Dulanga

(Amount in Rs. Lakh)

S.No.	Particulars	2024-25	2025-26	2026-27	2027-28	2028-29
21	USD 750 Million Drawl IV					
	Gross Loan - Opening	200.00	200.00	200.00	200.00	200.00
	Cumulative Repayments of Loans upto Previous Period	-	-	-	28.57	57.14
	Net Loan - Opening	200.00	200.00	200.00	171.43	142.86
	Increase / Decrease due to FERV	-	-	-	-	-
	Increase / Decrease due to ACE / Drawl during the period					
	Total	200.00	200.00	200.00	171.43	142.86
	Repayments of Loans during the Period	-	-	28.57	28.57	28.57
	Net Loan - Closing	200.00	200.00	171.43	142.86	114.29
	Average Net Loan	**200.00**	**200.00**	**185.71**	**157.14**	**128.57**
	Rate of Interest on Loan	6.6770%	6.6770%	6.6770%	6.6770%	6.6770%
	Interest on Loan	**13.35**	**13.35**	**12.40**	**10.49**	**8.58**
22	USD 750 Million Drawl V					
	Gross Loan - Opening	700.00	700.00	700.00	700.00	700.00
	Cumulative Repayments of Loans upto Previous Period	-	-	-	100.00	200.00
	Net Loan - Opening	700.00	700.00	700.00	600.00	500.00
	Increase / Decrease due to FERV	-	-	-	-	-
	Increase / Decrease due to ACE / Drawl during the period					
	Total	700.00	700.00	700.00	600.00	500.00
	Repayments of Loans during the Period	-	-	100.00	100.00	100.00
	Net Loan - Closing	700.00	700.00	600.00	500.00	400.00
	Average Net Loan	**700.00**	**700.00**	**650.00**	**550.00**	**450.00**
	Rate of Interest on Loan	6.6770%	6.6770%	6.6770%	6.6770%	6.6770%
	Interest on Loan	**46.74**	**46.74**	**43.40**	**36.72**	**30.05**

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 Weighted Average Rate of Interest on Actual Loans **PART- IV**
FORM- 13

Name of the Petitioner: NTPC Ltd

Name of the Integrated Mine: Dulanga

(Amount in Rs. Lakh)

S.No.	Particulars	2024-25	2025-26	2026-27	2027-28	2028-29
23	USD 750 Million Drawl VI					
	Gross Loan - Opening	200.00	200.00	200.00	200.00	200.00
	Cumulative Repayments of Loans upto Previous Period	-	-	-	28.57	57.14
	Net Loan - Opening	200.00	200.00	200.00	171.43	142.86
	Increase / Decrease due to FERV	-	-	-	-	-
	Increase / Decrease due to ACE / Drawl during the period					
	Total	200.00	200.00	200.00	171.43	142.86
	Repayments of Loans during the Period	-	-	28.57	28.57	28.57
	Net Loan - Closing	200.00	200.00	171.43	142.86	114.29
	Average Net Loan	**200.00**	**200.00**	**185.71**	**157.14**	**128.57**
	Rate of Interest on Loan	6.6770%	6.6770%	6.6770%	6.6770%	6.6770%
	Interest on Loan	**13.35**	**13.35**	**12.40**	**10.49**	**8.58**
24	JPY Equ. $400 Million Drawl III					
	Gross Loan - Opening	500.00	500.00	500.00	500.00	500.00
	Cumulative Repayments of Loans upto Previous Period	-	-	-	-	71.43
	Net Loan - Opening	500.00	500.00	500.00	500.00	428.57
	Increase / Decrease due to FERV	-	-	-	-	-
	Increase / Decrease due to ACE / Drawl during the period	-	-	-	-	-
	Total	500.00	500.00	500.00	500.00	428.57
	Repayments of Loans during the Period	-	-	-	71.43	71.43
	Net Loan - Closing	500.00	500.00	500.00	428.57	357.14
	Average Net Loan	**500.00**	**500.00**	**500.00**	**464.29**	**392.86**
	Rate of Interest on Loan	1.2000%	1.2000%	1.2000%	1.2000%	1.2000%
	Interest on Loan	**6.00**	**6.00**	**6.00**	**5.57**	**4.71**

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 Weighted Average Rate of Interest on Actual Loans **PART- IV**
FORM- 13

Name of the Petitioner: NTPC Ltd

Name of the Integrated Mine: Dulanga

(Amount in Rs. Lakh)

S.No.	Particulars	2024-25	2025-26	2026-27	2027-28	2028-29
	Total Loan					
	Gross Loan - Opening	65,290.00	65,290.00	65,290.00	65,290.00	65,290.00
	Cumulative Repayments of Loans upto Previous Period	855.55	1,819.44	3,333.32	5,597.21	8,040.86
	Net Loan - Opening	64,434.45	63,470.56	61,956.68	59,692.79	57,249.14
	Increase / Decrease due to FERV	-	-	-	-	-
	Increase / Decrease due to ACE / Drawl during the period	-	-	-	-	-
	Total	64,434.45	63,470.56	61,956.68	59,692.79	57,249.14
	Repayments of Loans during the Period	963.89	1,513.89	2,263.89	2,443.65	5,683.65
	Net Loan - Closing	63,470.56	61,956.68	59,692.79	57,249.14	51,565.50
	Average Net Loan	63,952.51	62,713.62	60,824.73	58,470.97	54,407.32
	Rate of Interest on Loan	**7.2085%**	**7.1910%**	**7.1715%**	**7.1570%**	**7.2063%**
	Interest on Loan	4,610.03	4,509.71	4,362.07	4,184.75	3,920.78

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.)

Non-Tariff Income

PART- IV
FORM- 15

Name of the Petitioner: NTPC Ltd
Name of the Integrated Mine: Dulanga

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 जाम्टा/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.)

PART- IV
FORM- 16

Details of Applicable Statutory Charges

Name of the Petitioner: NTPC Ltd

Name of the Integrated Mine: Dulanga

Particulars	Applicable Rate	Quantity	Amount (2024-25)	Amount (2025-26)	Amount (2026-27)	Amount (2027-28)	Amount (2028-29)
Royalty	% of CIL Price	14%	106.12	106.12	106.12	106.12	106.12
GST under Reverse Charge Mechanism	% of Royalty	18%	19.10	19.10	19.10	19.10	19.10
District Mineral Foundation (DMF)	% of Royalty	10%	10.61	10.61	10.61	10.61	10.61
GST under Reverse Charge Mechanism	% of DMF	18%	1.91	1.91	1.91	1.91	1.91
National Mineral Exploration Trust (NMET)	% of Royalty	2%	2.12	2.12	2.12	2.12	2.12
GST under Reverse Charge Mechanism	% NMET	18%	0.38	0.38	0.38	0.38	0.38
Users Fee	Rs per tonne	1.00	1.00	1.00	1.00	1.00	1.00
GST under Reverse Charge Mechanism	% Users Fee	18%	0.18	0.18	0.18	0.18	0.18
GST Compensation Cess*	Rs per tonne	-	-	-	-	-	-
GST on reserve price under Reverse Charge Mechanism	% Reserve Price	18%	24.96	24.96	24.96	24.96	24.96
GST on MDO price	% of Mining Charges	18%	108.41	114.11	120.10	126.40	133.04
Total			**274.80**	**280.50**	**286.49**	**292.79**	**299.43**

(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.)

* GST Compensation cess @Rs 400 per Ton shall be applicable in case coal is transferred to entities having different GSTN

PART-IV
FORM- 17

Details of Mine Closure Expenses

Name of the Petitioner: NTPC Ltd

Name of the Integrated Mine: Dulanga

Amount in Rs Lakhs

1. Amount Deposited in Escrow Account prior to date of Commercial Operation (Rs)	PV	907
2. Life of Mine over which amount is to be recovered (Yrs)	n	24
3. Borrowing Rate per year (%)	r	7.3061
4. Amount recoverable per Year (Rs)	P = PV x r / [1-(1+r)-n]	81.22

5. Deposit after the date of Commercial operation - when mine closure is in scope of Generating Company itself

Production Year No. (1)	Amount of Deposit in Escrow account (2)	Date of Deposit in Escrow account (3)	Interest Earned/Accrued in Escrow account (4)	Amount received from Escrow account towards Mine closure (5)	Admissible Mine closure expense (6)
7	212.57	28.03.2024			212.57
8	223.19				223.19
9	234.35				234.35
10	246.07				246.07
11	258.37				258.37

6. Deposit after the date of Commercial operation - when mine closure is in scope of Mine Developer & Operator (MDO)

Production Year No. (1)	Amount of Deposit in Escrow account (2)	Date of Deposit in Escrow account (3)	Borrowing cost at weighted average rate of interest of actual loan (4)	Interest Earned/Accrued in Escrow account (5)	Amount received from Escrow account towards Mine closure (6)	Adjustment to be made in Input price as a part of Mine closure expense (7)
7	212.57	28.03.2024	80.21	58.59		21.62
8	223.19		96.26	67.52		28.75
9	234.35		113.07	76.89		36.18
10	246.07		130.68	86.73		43.95
11	258.37		149.30	97.07		52.23

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 truing up.

(ii) Rate of interest in escrow account has been provisionally taken as 4% and the actual interest shall be submitted at the time of truing up.

(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.)

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

(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.)

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: Dulanga

(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	1,20,262.21					
2	Less: Ind-AS Adjustments	10,112.27					
3	Closing Gross Block as per I GAAP	1,10,149.94					
4	Opening Gross Block as per IND AS	1,19,346.65					
5	Add/Less: Adjustments	10,112.27					
6	Opening Gross Block as per I GAAP	1,09,234.38					
7	**Total Additions as per books (G = 3 - 6)**	915.56					
8	Less: Additions pertaining to other Mines (give Mine wise breakup)	-	Shall be submitted at the time of truing up.				
9	**Net Additions pertaining to instant Mine**	915.56					
10	Less: Exclusions (items not allowable / not claimed)	-					
11	**Net Additional Capital Expenditure Claimed (on accrual basis) (I GAAP)**	915.56					
12	**Less: Un-discharged Liabilities**	172.64					
13	**Add: Discharges of un-discharged liabilities.**	2,013.28					
14	**Net Additional Capital Expenditure Claimed (on cash basis)**	2,756.20					

(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.)

PART- IV
FORM- G

Statement of Capital cost
(To be given for relevant dates and year wise)

Name of the Petitioner: NTPC Ltd
Name of the Integrated Mine: Dulanga

(Amount in Rs. Lakh)

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 Gross Block Amount as per books (Indian GAAP)	1,10,618.78	14,848.15	95,770.63					
	b) Amount of IDC in A(a) above	9,555.42	-	9,555.42					
	c) Amount of FC in A(a) above	-	-	-					
	d) Amount of FERV in A(a) above	-	-	-					
	e) Amount of Hedging Cost in A(a) above	-	-	-					
	f) Amount of IEDC in A(a) above	11,441.12	-	11,441.12					
B	a) Addition in Gross Block Amount during the period (Direct purchases) (Indian GAAP)	Shall be submitted at the time of truing up.			Shall be submitted at the time of truing up.				
	b) Amount of IDC in B(a) above								
	c) Amount of FC in B(a) above								
	d) Amount of FERV in B(a) above								
	e) Amount of Hedging Cost in B(a) above								
	f) Amount of IEDC in B(a) above								
C	a) Addition in Gross Block Amount during the period (Transferred from CWIP) (Indian GAAP)								
	b) Amount of IDC in C(a) above								
	c) Amount of FC in C(a) above								
	d) Amount of FERV in C(a) above								
	e) Amount of Hedging Cost in C(a) above								
	f) Amount of IEDC in C(a) above								
D	a) Deletion in Gross Block Amount during the period (Indian GAAP)								
	b) Amount of IDC in D(a) above								
	c) Amount of FC in D(a) above								
	d) Amount of FERV in D(a) above								
	e) Amount of Hedging Cost in D(a) above								
	f) Amount of IEDC in D(a) above								
E	a) Closing Gross Block Amount as per books (Indian GAAP)								
	b) Amount of IDC in E(a) above								
	c) Amount of FC in E(a) above								
	d) Amount of FERV in E(a) above								
	e) Amount of Hedging Cost in E(a) above								
	f) Amount of IEDC in E(a) 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.)

Statement of Capital Works in Progress
(To be given for relevant dates and year wise)

PART- IV
FORM- H

Name of the Petitioner: NTPC Ltd

Name of the Integrated Mine: Dulanga

(Amount in Rs. Lakh)

S. No.	Particulars	As on 01.04.2024			As on 01.04.2025		As on 01.04.2026
		Accrual Basis	Un-discharged Liabilities	Cash Basis			
A	a) Opening CWIP as per books (Indian GAAP)	8.94	-	8.94			
	b) Amount of IDC in A(a) above	-	-	-			
	c) Amount of FC in A(a) above	-	-	-			
	d) Amount of FERV in A(a) above	-	-	-			
	e) Amount of Hedging Cost in A(a) above	-	-	-			
	f) Amount of IEDC in A(a) above	-	-	-			
B	a) Addition in CWIP during the period(Indian GAAP)						
	b) Amount of IDC in B(a) above						
	c) Amount of FC in B(a) above						
	d) Amount of FERV in B(a) above						
	e) Amount of Hedging Cost in B(a) above						
	f) Amount of IEDC in B(a) above						
C	a) Transferred to Gross Block Amount during the period (Indian GAAP)						
	b) Amount of IDC in C(a) above						
	c) Amount of FC in C(a) above						
	d) Amount of FERV in C(a) above						
	e) Amount of Hedging Cost in C(a) above						
	f) Amount of IEDC in C(a) above						
D	a) Closing CWIP as per books (Indian GAAP)						
	b) Amount of IDC in E(a) above						
	c) Amount of FC in E(a) above						
	d) Amount of FERV in E(a) above						
	e) Amount of Hedging Cost in E(a) above						
	f) Amount of IEDC in E(a) above						

Shall be submitted at the time of truing up

Shall be submitted at the time of truing up

(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: Dulanga

(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	68,271.54	70,200.88	70,239.38	70,414.38	70,659.38	70,694.38
2	Cumulative repayment of Normative loan up to previous year	9,622.67	14,042.64	18,482.69	22,930.63	27,400.49	31,865.13
3	**Net Normative loan – Opening**	58,648.87	56,158.24	51,756.69	47,483.75	43,258.89	38,829.25
4	Add: Increase due to addition during the year	520.50	38.50	175.00	245.00	35.00	35.00
5	Less: Decrease due to de-capitalisation during the year	0.45		-	-	-	-
6	Add: Increase due to discharges during the year / period	1,409.30	-	-	-	-	-
6A	Less: repayment during the period	4,420.06	4,440.05	4,447.94	4,469.86	4,464.64	4,466.96
7	**Net Normative loan - Closing**	56,158.15	51,756.69	47,483.75	43,258.89	38,829.25	34,397.29
8	**Average Normative loan**	57,403.51	53,957.46	49,620.22	45,371.32	41,044.07	36,613.27
9	Weighted average rate of interest	7.19%	7.2085%	7.1910%	7.1715%	7.1570%	7.2063%
10	Interest on Loan	4,126.99	3,889.53	3,568.17	3,253.83	2,937.52	2,638.48

(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 Working Capital

PART- IV
FORM- J

Name of the Petitioner: NTPC Ltd

Name of the Integrated Mine: Dulanga

(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	Input Cost of Coal Stock for 7 days of Production corresponding to ATQ for the relevant year	1922.05	1992.43	2056.07	2123.91	2188.92	2270.33
2	Consumption of stores and spare including explosives, lubricants and fuels (@ 15%) of O&M expenses excluding mining charge of MDO or annual charge of any agency other than MDO	1083.50	1140.38	1200.26	1263.27	1329.59	1399.39
3	One Month O&M Expenses excluding mining charge of MDO or annual charge of any agency other than MDO	601.95	633.55	666.81	701.82	738.66	777.44
4	Total Working Capital	3607.50	3766.36	3923.13	4088.99	4257.17	4447.16
5	Rate of Interest	12.00	11.90	11.90	11.90	11.90	11.90
6	Interest on Working Capital	432.90	448.20	466.85	486.59	506.60	529.21

(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.)

Annexure - A

NTPC LIMITED

SCOPE Complex, 7 Institutional Area,
Lodhi Road, New Delhi-110003

DULANGA COAL BLOCK

IB VALLEY COALFIELD
DISTT. SUNDARGARH, ORISSA

OPENCAST- 7.00 MTPA

BLOCK AREA (PHASE I)	: 567.19 ha
BLOCK AREA (PHASE II)	: 86.92 ha
OUTSIDE BLOCK AREA	: 236.52 ha
TOTAL AREA	: 890.63 ha

REVISED MINING PLAN (1st REVISION)

VOLUME-I (TEXT)

APRIL 2012

पवन देव जामटा/PAWAN DEV JAM
उप महाप्रबन्धक (खनिज)
Deputy General Manager (Con
एन टी पी सी लिमिटेड/NTPC LIM
EOC, A-8A, Sector-24, Noida-201

PREPARED BY:
SANJIV KUMAR SINGH
RQP NO.: 34011/(15)/2009 - CPAM

PE-MP & D,5th FLOOR,NTPC ENGINEERING OFFICE COMPLEX, NTPC LTD.
PLOT NO.A-8A,SECTOR-24,NOIDA,PIN-201301
Tel: (91)0120-3318571,Mobile:9650991396,Fax:0120-2410136
Email:sanjivkumarsingh@ntpceoc.co.in

MoC OBSERVATIONS

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

No.34011/03/2012-CPAM
Government of India
Ministry of Coal

Shastri Bhavan,
New Delhi, the March, 2012

To

Shri A K Dash,
Asstt. General Manager,
5th Floor, Engineering Office Complex, Sector-24
NTPC Ltd., Noida-201301
FAX No. : 0120 2410137

Subject :	Presentation of Revised Mining Plan [1ST Revision] [October 2011] for Dulanga Coal Block submitted by M/s NTPC – Observations of Standing Committee – regarding.

Sir,

I am directed to inform that the Mining Plan presentation to the Technical Members of the Standing Committee constituted under MMDR Act, 1957 of the above mentioned project was held on 03-02-2012 at Ministry of Coal, Shastri Bhavan, New Delhi

The following observations were made.

1	Comparison between the Salient Features of Approved and the Revised Mining Plan should be furnished.
2	**Para 5.9 :** Extraction of Coal in Patch in consultation with Manoharpur should be explored.
3	**Para 7.1 :** Reason for adopting Push Pull arrangement instead of Loading Bulb should be explained.
4	**Para 9.5.1 :** Provision should be made for testing of Ash before decision is taken for dumping it in water body to reduce its depth from 25 mts.
5	Copy of Hydrogeological Report should be enclosed.
6	**Para 11.6 :** It has been proposed to retain all infrastructural facilities. Rationale for this decision may be explained.
7	**Para 11.9 :** A note on CSR activities should be incorporated.
8	Board's approval is not in order
9	Possibility of increasing production level should be examined
10	Possibility of converting some parts of Reclaimed area to agricultural land should be examined.

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

संदीप गुप्ता / SANDEEP GUPTA
अवर सचिव / Under Secretary
कोयला मंत्रालय / Ministry of Coal
भारत सरकार / Govt. of India
नई दिल्ली / New Delhi-110001

SANJIV KUMAR SINGH
Received Dt.
No. 34011/(16)/

81

Dulanga Coal Block

Part I:

The Cover Page should read Revised Mining Plan 1st Revision. On the Inside cover the name "Revised Draft Mining Plan" should be deleted.

Para 1.4.1: It should be clarified, if Pakri Barwadih Coal Block can be used at any Power Station of NTPC.

Para 1.4.3: it may be clarified, if a final decision about Coal Washing has been taken or not

Para 1.6: Names of Independent Directors have not been furnished.

Table 4.3 -It may be clarified if IB Seam is present in this area or not.

अवर सचिव / Under Secretary
कोयला मंत्रालय / Ministry of Coal
भारत सरकार / Govt. of India
नई दिल्ली / New Delhi-110001

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.)

Sanjiv

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2009-CPAM

REPLY TO MoC OBSERVATIONS

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.)

POINT WISE REPLY TO MoC OBSERVATION

1. **Observation: 1**

Comparison between the Salient Features of Approved Mining Plan and the Revised Mining Plan should be furnished.

Reply: 1

Comparison between the Salient Features of Approved Mining Plan and the Revised Mining Plan is furnished below:

Sl. No.	Particulars	Approved MP	Revised MP		Remarks
1	Block Area (ha)	657	654.11 (567.19 (Phase-I) + 87 (Phase-II))		1- Reduction of 2.89 ha as per Sec –9 2- Phase-1 - 567.19 ha - Revised MP. 3- Phase-II – 87 ha after 20th year.
2	Outside Area (ha)	373.66	236.52		Reduction in area due to: i. Realignment of coal evacuation system. ii. Relocation of Mine infra. & External Dump.
	Total Project Area (ha)	**1030.66**	**890.63**		**Total land requirement has been reduced.**
			Phase I	**Phase II**	
3	Mineable Reserves (Mt)	194.97	152.05*	47.95**	*1.81 Mt of mineable reserve reduced for boundary settlement. ** Geological Reserve
4	Overburden (Mm^3)	518	394	Will be submitted during submission of phase-II Mining Plan	
5	Top Soil (Mm^3)	3.75	3.65		
6	Stripping Ratio	2.66	2.59		
7	Mine Capacity (Mtpa)	7	7		
8	Mine life (Years)	31	26		
9	Coal Evacuation system	MGR-Bulb	Push Pull Arrangement		

संदीप गुप्ता / SANDEEP GUPTA
अवर सचिव / Under Secretary
कोयला मंत्रालय / Ministry of Coal
भारत सरकार / Govt. of India
नई दिल्ली / New Delhi-110001

पवन देव जामटे / PAWAN DEV
उप महाप्रबन्धक (खनि)
Dep. / General Manager (Co
एन.टी.पी.सी लिमिटेड / NTPC
E.O.C. A-8A, Sector-24, Noida

Sanjiv

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2009-CPAM

Sl. No.	Particulars	Approved MP	Revised MP	Remarks
10	Nala Diversion philosophy	Diversion of Baidhara Nala & Nala B planned for diversion in two stages	Diversion of Baidhara Nala & Nala B is planned for diversion in single stage.	
11	Location of External Dump & Area	On the North-Eastern side of the Coal Block (94 ha approx.)	On the South-Eastern side of the Coal Block (106 ha approx.)	

2. **Observation: 2**

Extraction of Coal in Batter in consultation with Manoharpur should be explored.

Reply: 2

A meeting was held between NTPC and OPGC to explore the possibility of exploitation of coal at the common batter and the following emerged:

After reviewing the stage plans of both the blocks, it emerged that it is possible to extract the coal blocked in the common batter in around 10th year of mining operation, by which time Manoharpur Block will reach the common boundary. At that time detail modalities for extraction of the blocked coal shall be carried out and submitted to MoC. DGMS will also be consulted and necessary approval will be sought accordingly.

MoM with OPGC is placed at Annexure- XVII

3. **Observation: 3**

Reasons for adopting Push-Pull arrangement instead of Loading Bulb should be explained

SANDEER GUPTA
Under Secretary
Ministry of Coal
Govt. of India
New Delhi-110001

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

Reply: 3

Loading bulb arrangement was envisaged during pre-FR stage, however during detail survey it was found that the alignment of bulb was cutting Satparlia Reserve Forest. As the available space outside of South Eastern side of the block boundary was not permitting placing of requisite diameter of the bulb, the coal evacuation arrangement was reviewed and changed to Push Pull arrangement.

This has reduced total land requirement.

4. **Observation: 4**

Provision should be made for testing of Ash before decision is taken for dumping it in water body to reduce its depth from 255m.

Reply: 4

Detail feasibility study and testing as per the statutory norms prevailing at that time shall be carried out before dumping of fly ash into the void. **Accordingly incorporated in Clause 9.5.1(3).**

5. **Observation: 5**

Copy of Hydro geological Report should be enclosed.

Reply: 5

Copy of Hydro geological Report is enclosed as **Annexure-XIX**.

पवन देव जामटा/PAWAN DEV J...
उप महाप्रबन्धक (खनिज)
Deputy General Manager (Co...
एन टी पी सी लिमिटेड/NTPC ...
E2/C, A-8A, Sector-24, Noida-201...

6. **Observation: 6**

It has been proposed to retain all infrastructural facilities. Rationale for this decision shall be furnished.

Reply: 6

The rationale to retain infrastructural facilities is based on the reutilization of facilities for extended duration for exploitation of coal in Phase-II mining of coal block.

As has already been explained in the Revised Mining Plan, the proposed plan is prepared keeping in view **Phase-I** operations only for 26 years.

However NTPC shall approach to MoEF at later date for mining out of 87 ha (approx.) hereinafter referred to as **Phase-II**. In the event of permission

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अवर सचिव / Under Secretary
कोयला मंत्रालय / Ministry of Coal
भारत सरकार / Govt. of India
नई दिल्ली / New Delhi-110001

Sampi

Competent Authority/Person
No. 34011/(15)/2009-CPAM

granted for the same, the existing infrastructural facilities will be utilized for Phase-II operations also.

7. **Observation: 7**

A note on CSR activities should be incorporated.

Reply: 7

Incorporated in Clause 10.7.6.

8. **Observation: 8**

Board's approval is not in order.

Reply: 8

Approval of Mine Closure Plan duly signed by Director (Technical) as per Board Resolution No. 370.2.10 dated 25.07.2011 is enclosed as **Annexure - XVIII.**

9. **Observation: 9**

Possibility of increasing production level should be examined.

Reply: 9

As per Revised Mining Plan; mine capacity is envisaged for 7Mtpa & life as 26 years for **Phase-I** operations.

Occurrence of seams and their disposition was once again studied in detail with a view to increase production level but enhancing the production beyond 7 Mtpa doesn't seem to be technically feasible at present, considering the geo-mining conditions of the mine in initial period up to 10th year of operation. The reason is explained below:

There are mainly three groups of seams:

i) Rampur Group-	Cumulative thickness	14 - 16m
ii) Lajkura Group-	Cumulative thickness	25 - 27m
iii) Parkhani Group-	Cumulative thickness	2 - 3m

Some of Rampur Group of seams in the North Eastern side is not fully developed and in some places have a mineable thickness of less than 1m. This constrains enhancement of production in the initial 10 years. After 10th year, Lajkura Group of seams are encountered which adds to the total coal thickness, and there is possibility of increasing the production level. But

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

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2009-CPAM

because of exclusion of the 'forest patch' on southern side, the strike length is reduced by 400m. This is restricting enhancement of production beyond 7 Mtpa.

However, NTPC will approach MoEF during 10th year of mining operation for obtaining permission for mining in the left out area of 87ha. In the event of being allowed for mining, detailed studies for increasing the rate of production shall be carried out and accordingly revised plan shall be submitted to MoC.

10. **Observation: 10**

Possibility of converting some parts of Reclaimed area to agricultural land should be examined.

Reply: 10

In the presentation made by NTPC for environmental clearance on 21.02.2012 EAC, MoEF inter-alia suggested to submit dumping & backfilling program including the reworked calendar plan of last 10 years after mine life to reduce the final pit void by re-handling the dumps.

Dump management as suggested by EAC was studied in detail considering the geo-mining conditions of the block and it was found that backfilling of the void can be done within five years of post mining operations (exhaustion of coal resources in the present block boundary) by re-handling the western and eastern internal dumps.

As per the EAC suggestions, NTPC submitted a Revised Final Stage Dump Plan **(Plate No. 53)** with void of area of 159 ha, but the depth of void will be reduced from 255m to 50m from surface by re-handling the internal dumps.

Apart from the above, efforts have been made to rework the post mining topography conforming to the surrounding surface level. Instead of planting trees NTPC may resort to spread the bio reclaimed soil over the internal dumps and convert some portion of land based on the practicability, into agricultural land.

संदीप गुप्ता / SANDEEP GUPTA
अवर सचिव / Under Secretary
कोयला मंत्रालय / Ministry of Coal
भारत सरकार / Govt. of India
नई दिल्ली / New Delhi-110001

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.)

Sanjit
Person
-2009-CPAM

In addition to the above the point wise reply to the observations made during presentation dated 08.02.2012 is furnished hereunder:

1. **Observation: 1**

   The cover page should read Revised Mining Plan 1st Revision. On the name "Revised Draft Mining Plan" should be deleted.

   Reply : 1

   Complied

2. **Observation: 2**

   It should be clarified, if Pakri Barwadih Coal Block can be used at any Power Station of NTPC.

   Reply: 2

   Pakri Barwadih Coal Mining Block was allotted to NTPC vide letter no 13016/29/2003-CA through Central Government Dispensation Route on 11.10.2004. It is also basket source whereby the coal from the block may be utilized depending upon the need in any power plant of NTPC.

   Coal from Dulanga Coal block shall be used exclusively for Darlipalli STPP (4000MW). The shortfall of coal will be met through other coal blocks and part of the requirement will be met through Pakri Barwadih Coal Mine.

3. **Observation: 3**

   It may be clarified, if a final decision about Coal Washing has been taken or not

   Reply: 3

   Based on the facts cited in Clause 1.4.3 of Revised Mining Plan Coal Washing shall not be resorted for Dulanga Coal. **Accordingly incorporated in Clause 1.4.3.**

   संदीप गुप्ता / SANDEEP GUPTA
   Under Secretary
   भारत सरकार / Ministry of Coal
   कोयला मंत्रालय / Govt. of India
   नई दिल्ली / New Delhi-110001

4. **Observation: 4**

   Names of Independent Directors have not been furnished

   Reply: 4

   Board of Directors is furnished below. Accordingly Names of Independent Directors **incorporated in Clause 1.6.**

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.)

Sanjay KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2009-CPAM

BOARD OF DIRECTORS

Sl. No	Name	Designation
1.	Mr. Arup Roy Choudhury	CMD
2.	Mr. A.K. Singhal	Director (Finance)
3.	Mr. I.J. Kapoor	Director (Commercial)
4.	Mr. B.P.Singh	Director (Project)
5.	Mr. D.K.Jain	Director (Technical)
6.	Mr. S.P.Singh	Director (HR)
7.	Mr. N.N.Mishra	Director (Operations)
8.	Mr. S. B. Ghosh Dastidar	Independent Director
9.	Mr. Rajib Sekhar Sahoo	Independent Director
10.	Dr. M. Govinda Rao	Independent Director
11.	Mr. I.C.P. Keshari	Independent Director
12.	Mr. Rakesh Jain	Independent Director
13.	Mr. Ajit M. Nimbalkar	Independent Director
14.	Mr. S.R. Upadhyay	Independent Director
15.	Ms. Homai A. Daruwalla	Independent Director
16.	Mr. Anol Nath Chatterji	Independent Director
17.	Mr. Sushil Khanna	Independent Director
18.	Mr. T. Venkatesh	Independent Director

5. **Observation: 5**

It may be clarified if IB seam is present in the area or not.

Reply: 5

As per the Interim Geological Reports submitted by Directorate of Geology Odisha & Final Geological Report submitted by MECL (Mineral Exploration Corporation Limited) IB seam in Dulanga Coal Block is not present. **Accordingly incorporated in Clause 4.3.4.7.**

संदीप गुप्ता/SANDEEP GUPTA
अवर सचिव/Under Secretary
कोयला मंत्रालय/Ministry of Coal
भारत सरकार/Govt. of India
नई दिल्ली/New Delhi-110001

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

SANJAY KUMAR SINGH
Recognised Qualified Person
RQP No. 34011/(15)/2009-CPAM

SUMMARISED DATA

पवन देव जामटा/PAWAN DEV JAMTA
उप महाप्रबन्धक (वाणिज्य)
Deputy General Manager (Commercial)
ईसी सी सी लिमिटेड / NTPC LIMITED
ECC, A-8A, Sector-24, Noida-201301 (U.P.)

Summarised Data

SL.NO	DESCRIPTION	
a)	Name and address of the Applicant Company	NTPC Limited, NTPC Bhavan, Core-7, SCOPE Complex-7,Institutional Area, Lodhi Road, New Delhi-110003
b)	Name and address of the Block Allottee	NTPC Limited, NTPC Bhavan, Core-7, SCOPE Complex-7,Institutional Area, Lodhi Road, New Delhi-110003
c)	Relationship between the applicant and allottee company	Same
d)	Status of the Applicant Company : Central /Public Sector Undertaking/State Government Undertaking/JV Company/ Pvt Company/Public Co/Others (Specify)	Public Sector Undertaking (PSU)
e)	Name of the Coal Block together with name of Coalfield & State where located	Block: Dulanga Coal Block, Coalfield: IB Valley Coalfields State: Orissa
f)	Date of allotment	Date: 25.01.2006 Letter No.: 13016/29/2003-CA-I
g)	End Use of Coal/Lignite as per Approval by the Competent Authority	For generation of Electric Power
h)	ROM Quantity proposed to be produced as per Mining Plan	Grade F & G
i)	Norms adopted for calculating ROM quantity requirement in case it differs from the quantity indicated in the Allotment Order.	As indicated in the Geological Report prepared by MECL
j)	Beneficiation required – Yes/No	No
k)	Requirement of Beneficiated Coal & expected availability thereof.	NIL
l)	Period for which Mining Lease has been granted/is to be renewed/ is to be applied for.	Not Applicable
m)	Date of Expiry of earlier Mining Lease, if any	Not Applicable
n)	RQP who has prepared the Mining Plan Name Address	**Mr. Sanjiv Kumar Singh** 5th Floor, Engineering Office Complex A-8A, Sector-24 NOIDA-201 301

संदीप गुप्ता / SANDEEP GUPTA
अवर सचिव / Under Secretary
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SANJIV KUMAR SINGH
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पवन देव जामवाल / PAWAN DEV JAMTA
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Deputy General Manager (Commercial)
एन टी पी सी लिमिटेड / NTPC LIMITED
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

	Phone Nos Mobile Fax Email ID Registration No of RQP Date of grant of RQP status Renewal of RQP Status Validity	(+91) 0120- 3318571 (O) , 2400372 (R) 9650991396 (+91) 0120-2410136,2410137 sanjivkumarsingh@ntpceoc.co.in 34011/(15)/2009-CPAM 27.09.2010 10 years from the date of issue

SL.NO	INFORMATION REGARDING EARLIER APPROVED MINING PLANS, IF ANY.	
a)	Approval Letter no. and Date	30.07.2009 vide their letter No. 13016/29/2003 CA-I (Vol-II).
b)	Lease Area	Block area: 657ha Outside Area: 373.66ha Total Area: 1030.66ha
c)	Date of grant of Lease	Not Applicable
d)	Date of Expiry of Lease	Not Applicable
e)	Target Production	7 Mtpa
f)	Proposed year of start of Production	March 2013.
g)	Proposed year of achieving the targeted production level	Fourth year from the commencement of coal production
h)	Envisaged life of the mine (in years)	31 years (Production period) Production not yet started
i)	Date of actual commencement of Mining Operations, if operations already started	Production not yet started
j)	Likely date of Mining Operations, if operations not yet started & reasons for non-commencement of operations	Production not yet started, Forest clearance not granted, land acquisition not done
k)	Planned production and actual levels achieved in last 3 years	Production not yet started
l)	Coal :- O/Cast OB	194.97 Mt 518.00 Mm^3
m)	Reasons for difference between the planned and actual production levels	Production not yet started
n)	Reason for revision of the Mining Plan	1. Change in block boundary 2. MoEF directive for exclusion

Summarised data

संदीप गुप्ता/SANDEEP GUPTA
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RQP No. 34011/(15)/2009-CPAM dated 27.09.10

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SANJIV KUMAR SINGH
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		3. of dense forest land (87ha). Change of location of external OB dump & infrastructure.

o) Details of changes in the new mining plan compared to earlier approval

Sl. No.	Particular	Approved	Revised
i)	Lease Area	1030.66 ha	890.63 ha
ii)	Block Boundary	657 ha	654.11 ha
iii)	Production level	7 Mtpa	7 Mtpa
iv)	Reserves	194.97 Mt	152.05 Mt
v)	Mining Technology (Additional sheets to be used, if required)	Shovel –Dumper, Surface Miner	Shovel –Dumper , Surface Miner

SL.NO	LOCATION	
a)	Location of the Block Taluk/ Village/ Khasra/ Plot / Block Range / etc. District / State	**Village:** Dulinga, Majhapara, Beldihi, Kathpali , Khuntirjharia, Khaprikachchar **Block Range:** Hemgir **District:** Sundargarh **State:** Orissa
b)	Name of the Coalfield/ Coal belt	IB Valley Coalfield, Son-Mahanadi Basin
c)	Particulars of adjacent blocks: North, South, East, West	Manoharpur coal block allotted to OPGC is located adjacent to Noth-west boundary of the Dulanga coal Block
d)	Area of the Allotted Block (hectares) i Geological block area ii Mining Block Area	654.11 ha 654.11 ha (Phase I+II)
e)	Reference no. of plan of block boundary issued by CMPDI/ SCCL/ NLC (A copy of the Plan also to be annexed)	No.1238/DULANGA/BLOCK boundary/TPA/08 dated 27.02.2006 (Issued by MECL) & Drg no. DG-IB-I/2009 issued by Directorate of Geology, Govt. of Orissa enclosed as Annexure XIII
f)	Whether the lease boundary/ required boundary is same as demarcated by CMPDI/ SCCL/ NLC for delineating block/sub-block	Yes

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g)	Existing mining Lease Area in case of existing mines (ha)	Not Applicable
h)	Applied/ required Lease Area as per the Mining Plan under consideration (ha)	890.63 ha
i)	Whether the applied lease area falls within the allotted block	654.11 ha falls within allotted block and 236.52 ha falls outside the allotted block.
j)	Area (hectares) of lease which falls outside the block/sub- block delineated by CMPDI/SCCL/NLC.	236.52 ha
k)	Details of outside area: - Whether forms part of any other coal block - Whether it contains any coal/lignite reserves - Purpose for which it is required, e.g. roads/ OB dumps/ service buildings/ colony/ safety zone/ others (specify)	 No No No External OB Dump, Mine Workshop, Coal evacuation system, Substation.
l)	Whether some part(s) of the allotted block has not been applied for mining lease. - Total area in ha of such part(s). - Total reserves in such part(s). - Brief reasoning for leaving such part(s).	Entire area will be applied for mining lease
m)	Type of Land involved in Hectares - Forest Land - Non Forest Land	 410.19 ha 480.44 ha
n)	Broad Land Use Pattern (Forest, Township, Industrial, Agricultural, Grazing, Barren etc.)	Outlined in Chapter-IX
o)	Proximity of public road / railway line/major water body if any and approximate distance	- 56 km away from Sundargarh township along Sundargarh-Garjanbahal-Himgir road - 10 km away from Garjanbahal. - 38 km away from Jharsuguda township - 25 km away Brajrajnagar
p)	Topo sheet No. with latitude and longitude	**Toposheet:** 64 O/9 and 64 O/13 **Latitude** N21°65'37" to

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		N21°56'43" **Longitude** 83°47'28"E to 83°49'05" E
SL.NO	**GEOLOGY AND EXPLORATION**	
a)	Name of the Geological Block and area in hectares	Dulanga Coal Block and 657 ha
b)	Name of the Geological Report (GR) with year of preparation	Geological Report on Detailed Exploration for Coal Dulanga Block, IB River Coal Field, Dist. Sundargarh, Orissa, March 2008
c)	Name of the agency which conducted exploration and prepared GR	Mineral Exploration Corporation Limited, Seminary Hills, Nagpur 440006
d)	Period of conducting exploration	Nov 95 to March 2002 (Directorate of Geology, Orissa) 23.11.2006 to 24.06.2007 (MECL)
e)	Details of drilling (by all agencies)	AGENCY / METERAGE / NO. OF BHs Directorate of Geology, Odisha — 7698 — 60 MECL — 3337.65 — 30 **Total — 11035.65 — 90**
f)	No. of boreholes drilled within the block	85 (5 outside the block boundary)
g)	Overall borehole density within the block (no./ sq. km)	13
h)	Area covered by 'detailed' exploration within the block (hectares)	657 Ha
i)	Area covered by 'detailed' exploration outside the block (hectares) - No. of boreholes drilled outside the block - Bore hole density for outside area (no./sq. km)	
j)	Whether entire lease area has been covered by 'detailed' exploration.	Yes
k)	Whether any further exploration is required or suggested and timeframe in which it is to be completed	No (Except for infill drilling during operation)
l)	Number of coal/lignite seams/horizons	15 coal seams (Parkhani to

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Summarised data

RQP No. 34011/(15)/2009-CPAM dated 27.09.19

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No. 34011/(15)/2009-CPAM

		Rampur IAI)
	- Thickness range of coal seams	Maximum - 12.09m (Laj T(I+II) Minimum - 0.07m (Rampur -IAI)
	- Mean Thickness of total coal horizon	22 m
	- Standard Deviation of thickness	11.27
	- Minimum & maximum depth of coal seams	Maximum-289.24m (Rampur IAI) Minium:4.52m (Lajkura Bot.-I)
m)	Gross Calorific Value (GCV in K Cal/kg) and Useful Heat Value (UHV in K.Cal/Kg). of coal as per GR : Range Mean	GCV (K Cal/kg): Range 2870 – 5330; Mean 4008 UHV (K Cal/kg): Range 675 – 5864; Mean 2731
n)	Quality (Grade) of coal as per GR : Range Mean	Range: UG – B Mean: F - G
o)	Total geological reserves in the block	245.143 Mt
p)	Depletion of reserves (in case of running mine)	-
q)	Additional reserves established (if any for running mine)	-
r)	Geological reserves considered for mining: by opencast by Underground	196.189 Mt
s)	Corresponding Extractable reserves: by opencast by Underground	152.05 Mt
t)	Percentage of recovery w.r.t geological reserves by opencast by Underground	78 %
SL.NO	MINING	
a)	Existing and proposed method of mining (Opencast for OB & coal separately with dragline/ shovel/ surface miners/ manual/ etc.)	Shovel-Dumper, SM (Surface Miner)

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	(Underground by longwall/ bord & pillar/ continuous miners/LHD/ SDL/ manual/ etc..)	
b)	Targeted capacity in Mtpa when the mine is fully developed and the year in which proposed to be achieved	7 Mtpa
	By opencast	7 Mtpa
	By Underground	0 Mtpa
	Total	7 Mtpa
c)	Life of the mine	
	Underground workings	0 Years
	Opencast workings	26 Years (including 2 years construction period)
	Overall	26 Years
d)	Indicate quantum of production and expected grade as in table below:-	

Year	UG Prodn. (Mt)	Opencast			ROM Coal/Lignite (Mt)	Saleable	Washery Rejects (Mt)
		Coal (Mt)	OB (Mm^3)	Stripping Ratio (m^3/t)			
1	0	1	4.50	4.50	1	1	0
2	0	2.5	10.50	4.29	2.5	2.5	0
3	0	4.5	15.50	3.81	4.5	4.5	0
4	0	7	16.00	3.23	7	7	0
Total for full lease period	0	152.05	394.01	2.59	152.05	152.05	0

e)	Furnish the detailed calendar programme of coal production year wise and seam wise along with OB removal in the relevant chapter	Enclosed in Chapter-V
f)	Whether the proposed external OB dump site is coal/ lignite bearing: - If so, whether coal/lignite below waste disposal area is extractable.	Proposed external OB dump site is non coal bearing.
g)	Whether negative proving for coal / lignite	In the Geological Report, 5

	in the proposed site for OB dump/ infrastructure has been done.	boreholes drilled outside the north eastern boundary of the block indicate presence of metamorphic rocks with no development of coal seams.
h)	Proposed configuration of HEMM for OC (Coal & OB) & Major Equipment for UG.	Equipment: Open cast – OB: Shovel 10 m³; Dumper 100/50T; Drill 250/160 mm; Dozer 850/350 HP; CSM -. Open cast – Coal: Shovel 8/4.5 m³; Dumper 50 T; Drill 160mm; Dozer 850/350 HP; CSM 2 (for 3 Mtpa). UG: Shovel -; Dumper -; Drill -; Dozer -; CSM -.
i)	Mode of entry for underground mines (shaft, incline, adit)	Not Applicable
j)	Operations that are proposed to be outsourced	Not yet finalised
k)	Proposed coal evacuation facilities - Face to Surface - Surface to end use plants	 Surface Transport of coal from mine to CHP WITHIN ML Area will be through 50 T dumpers. Processed coal will be transported from CHP to Darlipalli STPP through Push Pull arrangement.
SL.NO	END USE OF COAL/LIGNITE	
a)	Capacity of the approved end use plants	Darlipalli 3200 MW STPP
b)	Coal/ lignite requirement for end use plant with grade/quality	17.5 Mtpa
c)	%age of end use requirement to be met from this mine	40%
d)	If washing / beneficiation of the coal/ lignite is planned to be conducted on site or adjacent to the extraction area, briefly describe the nature of the beneficiation and recovery rate.	Not envisaged
e)	Proposed Use of Rejects/Middlings	Not Applicable.

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Deputy General Manager (Commercial)
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ECC, A-8A, Sector-24, Noida-201301 (U.P.)

SL.NO	ENVIRONMENTAL MANAGEMENT	
a)	Existing land use pattern	I. Mining lease / Area (ha) a) Private Land 186.91 b) Reserve Forest 108.95 c) Forest land 251.63 d) GM Land 106.62 Total 654.11 II. Outside mining lease / Area (ha) a) Private Land 124.07 b) Reserve Forest 0.70 c) Forest land 50.88 d) GM Land 40.87 III. Township area d) Private Land 20.00 Total 236.52 Grand Total 890.63
b)	Land area indicating the area likely to be degraded due to mining, dumping, roads, workshop, washery, township etc.	717.44 ha
c)	Surface features over the block area	Garia nala, Baidhara nala & Nala B are flowing inside the block boundary
d)	No. of villages/Houses to be shifted	4 (Dulinga, Majhapada, Beldihi, Kathpali)
e)	Population to be affected by	417 (New SES study is being conducted by XIMB Bhubaneswar, report is likely to be submitted by April 2011
f)	Year wise proposal for reclamation of land affected by mining activities	Year / Area Reclaimed (ha) 1st 17.93 2nd 9.45 3rd 17.72 4th 28.99 5th 71.85 Conceptual (24th) 466.46
g)	Monitoring schedules for different environmental components after the commencement of mining and other related activities.	For Air quality: 24 hours sampling basis for two days per week

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

		Water quality	Every year samples will be taken near mine & residential area
		Noise level	-do-
SL.NO	**PROGRESSIVE AND FINAL MINECLOSURE PLAN (A separate chapter is also to be incorporated)**		
a)	Estimated total capital expenditure for mine closure activities	₹.6106.59 lakhs	
b)	Major closure Activities with proposed Capital expenditure		
	i. Mined out area & waste management	₹.487.99 lakhs	
	ii. Environmental management (Air water waste noise etc.	₹.2175.02 lakhs	
	iii. Management of Infrastructure & mining	₹.405.32 lakhs	
	iv. Actions for safety and security of local community due to abandonment of mine or part thereof	₹.1312.90 lakhs	
	v. Social & economic aspects	₹.793.49 lakhs	
	vi. Execution & supervision	₹.556.51 lakhs	
	vii. Other Activities (Miscellaneous)	₹.375.36 lakhs	
	Total cost	₹.6106.59 lakhs	
SL.NO	**OTHERS**		
a)	Base date of Mining Plan	October 2011	
b)	Calendar year from which the production will start	Two years after approval of Mining Plan	
c)	Results of any investigation carried out for scientific mining, conservation of minerals and protection of environment, future proposals.	Not Applicable	
d)	Signature of RQP Date:09.04.2012 Place: NOIDA		

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Sanj.

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SUMAN SINGH
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LIST OF TABLES

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RQP No. 3401 [illegible] Dated 27.09.10

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RQP No. 3401(15)/2009-CPAM dated 27.09.10

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SINGH
Person

LIST OF PLATES

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14.	Floor contour plan – Lajkura Top-(I+II)	1:5000	14	7015-199-POM-B-014
15.	Floor contour plan – Local 3	1:5000	15	7015-199-POM-B-015
16.	Floor contour plan – Local 2	1:5000	16	7015-199-POM-B-016
17.	Floor contour plan – Lajkura Middle	1:5000	17	7015-199-POM-B-017
18.	Floor contour plan – Local 1	1:5000	18	7015-199-POM-B-018
19.	Floor contour plan – Lajkura Bottom-II	1:5000	19	7015-199-POM-B-019
20.	Floor contour plan – Lajkura Bottom-I	1:5000	20	7015-199-POM-B-020
21.	Floor contour plan – Rampur-IIIB	1:5000	21	7015-199-POM-B-021
22.	Floor contour plan – Rampur-IIIA	1:5000	22	7015-199-POM-B-022
23.	Floor contour plan – Rampur-II	1:5000	23	7015-199-POM-B-023
24.	Floor contour plan – Rampur-I	1:5000	24	7015-199-POM-B-024
25.	Floor contour plan – Rampur-IAII	1:5000	25	7015-199-POM-B-025
26.	Floor contour plan – Rampur-IAI	1:5000	26	7015-199-POM-B-026
27.	Seam folio plan – Parkhani	1:5000	27	7015-199-POM-B-027
28.	Seam folio plan – Lajkura Top-III	1:5000	28	7015-199-POM-B-028
29.	Seam folio plan – Lajkura Top-(I+II)	1:5000	29	7015-199-POM-B-029
30.	Seam folio plan – Local 3	1:5000	30	7015-199-POM-B-030
31.	Seam folio plan – Local 2	1:5000	31	7015-199-POM-B-031

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No. 34011/(15)/2009-CPAM

Sl. No.	Name of Drawing	Scale	Plates Nos.	Drawing Nos.
32.	Seam folio plan – Lajkura Middle	1:5000	32	7015-199-POM-B-032
33.	Seam folio plan – Local 1	1:5000	33	7015-199-POM-B-033
34.	Seam folio plan – Lajkura Bottom-II	1:5000	34	7015-199-POM-B-034
35.	Seam folio plan- Lajkura Bottom-I	1:5000	35	7015-199-POM-B-035
36.	Seam folio plan – Rampur-IIIB	1:5000	36	7015-199-POM-B-036
37.	Seam folio plan – Rampur-IIIA	1:5000	37	7015-199-POM-B-037
38.	Seam folio plan – Rampur-II	1:5000	38	7015-199-POM-B-038
39.	Seam folio plan – Rampur-I	1:5000	39	7015-199-POM-B-039
40.	Seam folio plan – Rampur-IAII	1:5000	40	7015-199-POM-B-040
41.	Seam folio plan – Rampur-IAI	1:5000	41	7015-199-POM-B-041
42.	First Year Stage Plan	1:5000	42	7015-199-POM-B-042
43.	Third Year Stage Plan	1:5000	43	7015-199-POM-B-043
44.	Fifth Year Stage Plan	1:5000	44	7015-199-POM-B-044
45.	10th Year Stage Plan	1:5000	45	7015-199-POM-B-045
46.	20th Year Stage Plan	1:5000	46	7015-199-POM-B-046
47.	Final stage Quarry Plan	1:5000	47	7015-199-POM-B-047
48.	Final stage dump plan	1:5000	48	7015-199-POM-B-048
49.	Reclamation Plan	1:5000	49	7015-199-POM-B-049
50.	Mining sections	1:2000	50	7015-199-POM-B-050
51.	Mine closure plan	1:5000	51	7015-199-POM-B-051
52.	Layout of Mine Infrastructure	NTS	52	7015-199-POM-B-052
53.	Revised Final Stage Dump Plan (MoEF Clearance)	1:5000	53	7015-199-POM-B-053

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LIST OF ANNEXURES

SL. NO.	PARTICULAR	ANNEXURE
1.	Copy of Allotment Order	Annexure-I
2.	Copy of MoC letter regarding change in block area	Annexure-II
3.	Copy of MoEF letter regarding Forest area in the block	Annexure-III
4.	Copy of MoEF letter regarding coal linked to NTPC	Annexure-IIIA
5.	Copy of earlier approval of Mining Plan	Annexure-IV
6.	Copy of MOC's letter granting recognition to RQP for preparation of Mining Plan	Annexure-V
7.	Letter of authorization by the Block Allottee to the RQP for preparing Mining Plan	Annexure-VI
8.	Certificates by the RQP regarding observance of guidelines of Revised Mining Plan	Annexure-VII-A
9.	Certificates by the RQP regarding coverage of block area	Annexure-VII-B
10.	Certificates by the RQP regarding block boundary as per MoC letter	Annexure-VII-C
11.	Certificates by the RQP regarding observance Mine Act 1952 & other applicable laws	Annexure-VII-D
12.	Certificates by the RQP regarding quarrying up to bottom most seam	Annexure-VII-E
13.	Certificates by the RQP regarding non coal bearing area outside the block boundary	Annexure-VII-F
14.	Certificate from the applicant	Annexure-VIII
15.	Consent letter from the applicant	Annexure-IX
16.	Copy of the document to establish that the Geological Report has been duly purchased from CMPDI/GSI/MECL.	Annexure-X
17.	CBA4(i) & Section 11 notification	Annexure-XI
18.	Proceedings of the meeting with CMD (IDCO)	Annexure-XII
19.	Finalised North western common boundary	Annexure-XIII
20.	Acquisition of private land at Beldihi	Annexure-XIV
21.	National Grid co-ordinates boreholes of Dulanga block	Annexure-XV
22.	MoEF observations on Mine closure Plan& NTPC's reply	Annexure-XVI
23.	MoM of NTPC and OPGC regarding extraction of coal	Annexure-XVII
24.	Approval of Director (Technical)	Annexure-XVIII
25.	Hydrogeological report	Annexure-XIX

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Sanjay

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LIST OF ABBREVIATIONS

Sl. No.	Abbreviation	Full Form
1.	EIA	Environmental Impact Assessment
2.	EMP	Environmental Management Plan
3.	RQP	Recognised Qualified Person
4.	ROM	Run of Mine
5.	IMD	India Meteorological Department
6.	OC	Opencast
7.	OB	Overburden
8.	TS	Topsoil
9.	IB	Interburden
10.	Cum	Cubic metre
11.	UHV	Useful Heat Value
12.	K. Cal/kg	Kilo Calorie per Kilogram
13.	MTPA	Million Tonne Per Annum
14.	MCPA	Million Cubic Metre Per Annum
15.	LTPA	Lakh Tonne Per Annum
16.	TPD	Tonne Per Day
17.	PA	Per Annum
18.	Mil. cum.	Million cubic metre
19.	MBCM	Million Bank Cubic Metre
20.	Mil. te.	Million Tonne
21.	ML	Mining Lease
22.	SH	State Highway
23.	GSI	Geological Survey of India
24.	RH	Relative Humidity
25.	VM	Volatile Matter
26.	FC	Fixed Carbon
27.	CSM	Continuous Surface Miner
28.	HEMM	Heavy Earth Moving Machinery
29.	FE Loader	Front End Loader
30.	HFL	High Flood Level
31.	E&M	Electrical and Mechanical
32.	RPM	Respirable Particulate Matter
33.	SPM	Suspended Particulate Matter
34.	m	Metre
35.	AMSL	Above Mean Sea Level
36.	bgl	Below ground level
37.	SC	Scheduled Cast
38.	ST	Scheduled Tribe

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पवन देव जामटा/PAWAN DEV JAMTA

CHAPTER I

INTRODUCTION

CHAPTER-1

INTRODUCTION

1.1 OVERVIEW

1.1.1 Background

The company was incorporated on November 7, 1975 under the Companies Act as a private limited company under the name "National Thermal Power Corporation Private Limited", and the word 'Private' was deleted on September 30, 1976 consequent upon the notification issued by the GoI exempting government companies from the use of word 'private' in their name. On September 30, 1985, NTPC was converted from a private limited company into a public limited company. 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.

1.1.2 Chronology

In July 1976, the registered office of the Company was changed from Shram Shakti Bhawan, New Delhi to Kailash Building, Kasturba Gandhi Marg, New Delhi. Subsequently, in May 1979 the registered office of the Company was shifted to NTPC Square, 62-63, Nehru Place, New Delhi and thereafter in October 1988 to its present location for administrative and operational efficiency.

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Major events in chronological order are detailed as under:

1975 - Incorporation of the Company

1978 - Takeover of management of the Badarpur project

1982 - Commissioning of the first 200MW unit at Singrauli, Center for education at Power Management Institute, Delhi, Established First direct

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foreign currency borrowing - a consortium of foreign banks led by Standard Chartered Merchant Bank extends a loan of GBP 298.41 million for the Rihand project 1984, The transmission line based on High Voltage Direct Current (HVDC) technology. Commissioned for power transmission from Rihand to Delhi Singrauli project received World Bank loan of US$ 150 million through GoI.

1986 - Synchronized first 500MW unit at Singrauli. The Company became one of the first PSUs to issue bonds in the debt market.

1987 - 5,000 MW installed capacity mark crossed.

1988 - First syndicated Japanese loan of 30 billion JPY raised 1989 - Consultancy division of the Company launched First unit (88 MW) of the Company's first gas based combined cycle power plant at Anta, Rajasthan commissioned

1990 - Total installed capacity of 10,000 MW reached

1992 - First acquisition by the Company of Feroze Gandhi Unchahar Thermal Power Station (2x210MW) from Uttar Pradesh Rajya Vidyut Utpadan Nigam of Uttar Pradesh The transmission systems owned by the Company were transferred to Power Grid Corporation of India Limited (PGCIL) pursuant to legislation by the Parliament of India

1993 - IBRD extended direct loan of US$400 million to the Company under time slice concept for its projects.

1994 - 15,000 MW of installed capacity achieved Maiden declaration of dividend of ₹. 650 million Jhanor-Gandhar (Gujarat) becomes the first thermal power station to have commissioned an integrated Liquid Waste Treatment Plant.

1997 - 'Navratna' status granted by the GoI for 100 billion units generation in one year achieved. A consortium of foreign banks led by Sumitomo Bank, Hong Kong extends foreign currency loan of 5 billion Japanese Yen for the first time without GoI guarantee.

1998 - Commissioned India's first Naphtha based plant at Kayamkulam with a capacity of 350

1999 - The Company's Dadri thermal power project, Uttar Pradesh adjudged the best in India with a PLF of 96.12% Dadri thermal power project, Uttar Pradesh certified with ISO 14001

2002 - Three wholly owned subsidiaries, viz., NTPC Electric Supply Company Limited, NTPC Hydro Limited and NTPC Vidyut Vyapar Nigam Limited incorporated ESP (Electrostatic precipitators) set up at Talcher power plant 20,000 MW installed capacity mark exceeded.

2003 - The Company undertook debt re-structuring. Raised funds through bonds (Series XIII and XIV) Construction of first hydro-electric power project of 800 MW capacity in Himachal Pradesh commenced after the investment approval.

2004 - The award of contract for the first Super Critical Thermal Power Plant at Sipat. Reached a total installed capacity of 22,249 MW with the Talcher Unit V getting synchronized on May 13, 2004 .The Company's Feroze Gandhi Unchahar Thermal station achieves a record PLF of 87.43% in current year up from 18.02% in February 92 when it was taken over by us LIC extends credit facility for ₹. 70 billion. ₹. 40 billion is in the form of unsecured loans and ₹. 30 billion is in the form of bonds The Company makes its debut issue of euro bonds amounting to USD 200 million in the international market. First captive coal block Pakri Barwadih allotted by MoC, GOI to undertake coal mining by NTPC for exclusive use of coal in its own power plant. Listing of the Equity Shares on the Stock Exchanges

2005 - The Company received the International Project Management Award 2005 for its Simhadri project at the International Project Management Association World Congress. Oil block allocated under NELP-V. The Company adopted core values 'BCOMIT' (Buisness Ethics, Customer Focus, Organisational Pride, Mutual Respect and Trust, Innovation and Speed and Total Quality for Excellence) The Company ranked as the Third Great Place to work for in India for second time in succession by a survey conducted by Grow Talent and Business World 2005.

2006 - Badarpur Thermal Power Station having an installed capacity of 705 MW transferred to the Company. Talaipalli Coal Block for meeting the coal requirement for the 4000MW of power generation capacity as part of Lara integrated coal mine-cum-power project, ,Kerandari, Chatti Bariatu in North

Karnapura coalfield in Jharkhand, Dulanga in Ib valley coalfield in Orissa for mining of coal for its power plants were allotted by MoC, GOI.

2007 - MoC, GoI granted in-principle approval for allocation of a new coal block, Chatti-Bariatu (South) to the Company subject to the conditions stipulated in the approval letter. The share of reserves is estimated to be 354 Million Tonnes.

2008 - The Company adjudged as the Star PSU - 2008 Board expanded by appointment of five independent Directors India Power Award conferred on Centre for Power Efficiency and Environmental Protection

2009 - Memorandum of understanding entered into with the Nuclear Power Corporation of India Limited ("NPCIL") for development of nuclear power in India 30,000 MW installed capacity mark crossed Long term fuel supply agreement signed with Coal India Limited for supply of coal to the power stations for a period of 20 years.

The Company acquired 44.6% of presently paid-up capital of Kerala and Transformers and Electricals Kerala Limited from Government of Kerala at a total consideration of Rs. 313.4 million, subject to final price to be based on the valuation of the assets of Kerala and Transformers and Electricals Kerala Limited. Kerala and Transformers and Electricals Kerala Limited is engaged in manufacturing and repair of heavy duty transformers International Gold Star Quality Award conferred on Centre for Power Efficiency and Environmental Protection.

NTPC enters MOU with Nuclear Power Corporation of India Ltd. (NPCIL) to work together for development of Nuclear Power in India and for this purpose to form a Joint Venture Company for setting up Nuclear Power Projects.

NTPC inks JV agreement with SAIL, RINL, Coal India and NMDC.

2010-Dulanga Coal Block listed by Ministry of Environment & Forest (MoEF) "No Go Area" category on the basis of GFC (Gross Forest Cover) & WFC (Weighted Forest Cover). The Company awarded Maharatna Status by GOI.

2011- Dulanga Coal Block re-categorised as "Go Area" by Ministry of Environment & Forest (MoEF) so that total installed capacity of the company reaches to 34,854 MW (including JVs). The Company updated core values

from 'BCOMIT' to 'BE COMMITTED' (Buisness Ethics, Environmentally & Economically Sustainable, Customer Focus, Organisational & Professional Pride, Mutual Respect and Trust, Innovation and Speed, Total Quality for Excellence, Transparent & Respected Organisation, Enterprising and Devoted)

1.1.3 **Locations of end-use plants:** Location of endues plants along with the capacity and the status of implementation is depicted in **Table-1.1**

TABLE-1.1
LOCATION OF END USE PLANTS

Sl. No.	COAL BASED (Owned by NTPC)	STATE	COMMISSIONED CAPACITY(MW)	EXISTING /PROPOSED
1	Singrauli	Uttar Pradesh	2,000	Existing
2	Korba	Chhattisgarh	2,600	Existing
3	Ramagundam	Andhra Pradesh	2,600	Existing
4	Farakka	West Bengal	2,100	Existing
5	Vindhyachal	Madhya Pradesh	3,260	Existing
6	Rihand	Uttar Pradesh	2,000	Existing
7	Kahalgaon	Bihar	2,340	Existing
8	NCTPP, Dadri	Uttar Pradesh	1,820	Existing
9	Talcher Kaniha	Odisha	3,000	Existing
10	Feroze Gandhi, Unchahar	Uttar Pradesh	1,050	Existing
11	Talcher Thermal	Odisha	460	Existing
12	Simhadri	Andhra Pradesh	1,500	Existing
13	Tanda	Uttar Pradesh	440	Existing
14	Badarpur	Delhi	705	Existing
15	Sipat	Chhattisgarh	1,980	Existing
16	Solapur-I,2X660MW	Maharashtra	1320	Proposed
17	Mouda-II,2X660MW	Madhya Pradesh	1320	Proposed
18	Nabinagar,3X660MW	Bihar	1980	Proposed
19	Meja-I,2X660MW	Uttar Pradesh	1320	Proposed
20	Kudgi-I,3X800MW	Karnataka	2400	Proposed
21	Gajmara-I,2X800MW	Odisha	1600	Proposed
22	Gidderbaha,4X660MW	Punjab	2640	Proposed
23	Barethi,6X660MW	Madhya Pradesh	3960	Proposed
24	Khargone,2X660MW	Madhya Pradesh	1320	Proposed
25	Gadarwara-I,2X660MW	Madhya Pradesh	1320	Proposed
26	Unchahar-IV,1X500MW	Uttar Pradesh	500	Proposed
27	Adra,2X660MW	West Bengal	1320	Proposed
28	Katwa,2X800MW	West Bengal	1600	Proposed

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Sl. No.	COAL BASED (Owned by NTPC)	STATE	COMMISSIONED CAPACITY(MW)	EXISTING /PROPOSED
29	Bilhaur,Kanpur,2X660MW	Uttar Pradesh	1320	Proposed
30	Dhuvaran,2X660MW	Gujarat	1320	Proposed
31	Lara-I,2X800MW	Chhattisgarh	1600	Proposed
32	Darlipalli-I,2X800MW	Odisha	1600	Proposed
33	Tanda-II,2X660MW	Bihar	1320	Proposed

1.1.4 Power generation

The total installed capacity of the company is 34,854 MW (including JVs) with 15 coal based and 7 gas based stations, located across the country. In addition under JVs, 5 stations are coal based & another station uses Naptha/LNG as fuel. The company has set a target to have an installed power generating capacity of 1,28,000 MW by the year 2032. The capacity will have a diversified fuel mix comprising 56% coal, 16% Gas, 11% Nuclear and 17% Renewable Energy (RES) including hydro. By 2032, non fossil fuel based generation capacity shall make up nearly 28% of NTPC's portfolio.

In October 2004, NTPC launched its Initial Public Offering (IPO) consisting of 5.25% as fresh issue and 5.25% as offer for sale by Government of India. NTPC thus became a listed company in November 2004 with the Government holding 89.5% of the equity share capital. In February 2010, the Shareholding of Government of India was reduced from 89.5% to 84.5% through Further Public Offer. The rest is held by Institutional Investors and the Public.

Growth of NTPC installed capacity & Generation is depicted in **Chart 1.1**.and contribution of NTPC in power generation is depicted in **Chart 1.2**.

NTPC has been awarded No.1, Best Workplace in India among large organizations and the best PSU for the year 2010, by the Great Places to Work Institute, India Chapter in collaboration with The Economic Times.

The concept of Corporate Social Responsibility is deeply ingrained in NTPC's culture. Through its expansive CSR initiatives, NTPC strives to develop mutual trust with the communities that surround its power stations.

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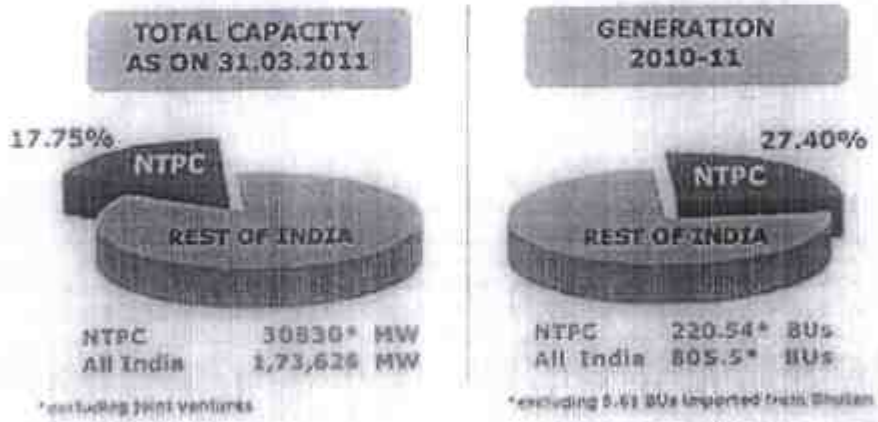
CHART 1.1.

Growth of NTPC Installed Capacity & Generation

*excluding joint ventures

CHART 1.2.

NTPC contributes more than one-fourth of India's total power generation with less than one-fifth capacity



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1.1.5 Coal Based Power Stations

With 15 coal based power stations, NTPC is the largest thermal power generating company in the country. The company has a coal based installed capacity of 27,535 MW. Mentioned below existing power plants of NTPC with location and capacity.

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1.1.6 Coal Based Joint Ventures:

TABLE-1.2
COAL BASED JOINT VENTURES

SL. NO	COAL BASED (Owned by JVs)	STATE	COMMISSIONED CAPACITY (MW)
1	Durgapur	West Bengal	120
2	Rourkela	Odisha	120
3	Bhilai	Chhattisgarh	574
4	Kanti	Bihar	110
5	IGSTPP, Jhajjar	Haryana	500
	Total		**1,424**

1.1.7 Regional Spread of Generating Facilities

TABLE-1.3
REGIONAL SPREAD OF GENERATING FACILITIES

REGION	COAL (MW)	GAS(MW)	TOTAL(MW)
Northern	8,015	2,312	10,327
Western	7,520	1,293	8,813
Southern	4,100	350	4,450
Eastern	7,900	-	7,900
JVs	1,424	1,940	3,364
Total	28,959	5,895	**34,854**

1.2 COAL DEMAND & LINKAGES

Coal Demand of NTPC up to 2017: Coal Demand for NTPC power plants arrived through SCC calculations. Existing stations PLF @ 92% and New stations PLF considered at 90%. Annual coal demand of NTPC and capacity addition is depicted in the Chart 1.3.

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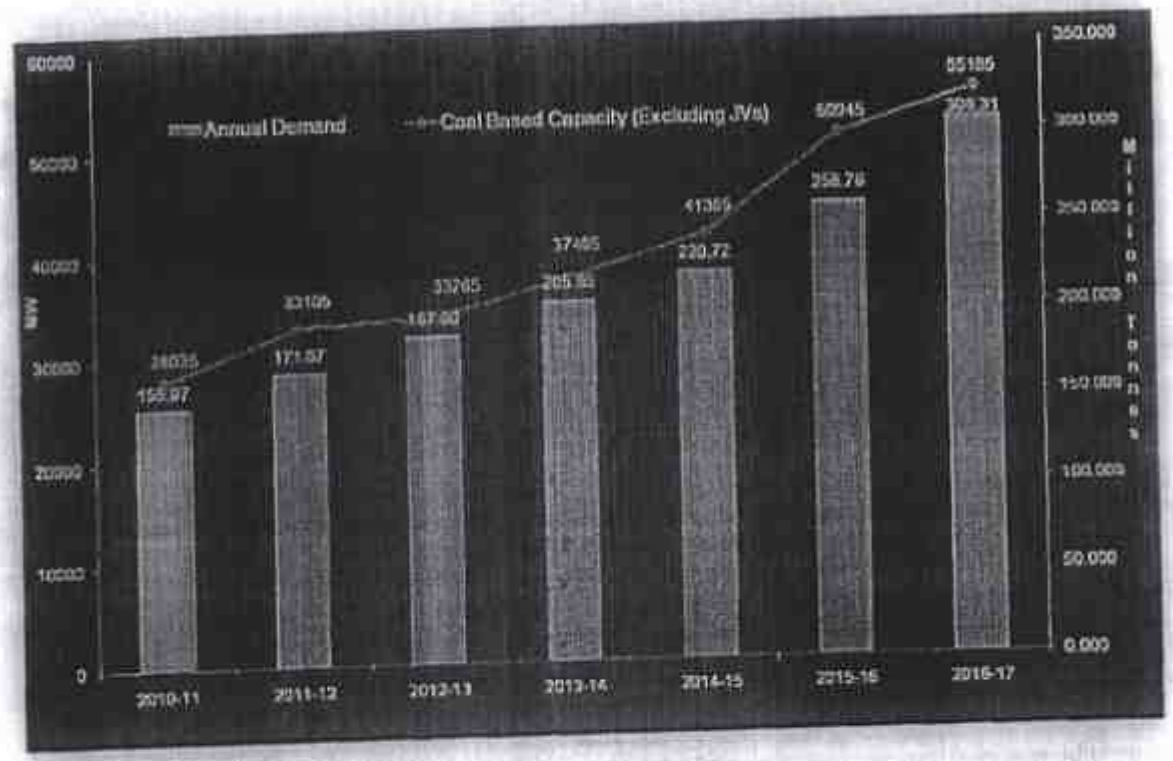
CHART 1.3.
COAL DEMAND OF NTPC



1.2.1 Plant wise Coal Linkage Details

TABLE-1.4
PLANTWISE COAL LINKAGE

Sl. No	Station	Capacity (MW)	Long Term Linkage (Mt)	Short term linkage for 2004-05 (Mt)
1	Singrauli	2000	7.2	9.41
2	Vindhyachal-I & II	2260	8.64	10.20
3	Rihand-I	1000	3.48	5.198#
4	Korba	2100	8.64	10.89
5	Ramagundam-I & II	2100	7.43	10.98@
6	Farakka	1600	5.64	10.014
7	Kahalgaon-I	840	2.97	5.55
8	Talcher Kaniha -I & II	3000	14.65	13.62
9	Talcher Thermal	460	1.33	2.40
10	Feroze Gandhi Unchahar	840	3.07	4.995
11	Dadri	840	3.6	5.085
12	Simhadri	1000	5.04 (Raw coal) 4.33 (Washed coal)	5.13
13	Badarpur*	705		4.53

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

संदीप गुप्ता / SANDEEP GUPTA
अवर सचिव / Under Secretary
कोयला मंत्रालय / Ministry of Coal
भारत सरकार / Govt. of India
नई दिल्ली / New Delhi-110001

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

Sanjiv Kumar Singh
Authorised Qualified Person
Regn. No. 31/07/2009-CPAM

Sl. No	Station	Capacity (MW)	Long Term Linkage (Mt)	Short term linkage for 2004-05 (Mt)
14	Rihand-II	1000	4.48	Included in Rihand I
15	Ramagundam-III	500	2.5	Included in Ramagundam I & II
16	Sipat-I	1980	10	Yet to be commissioned / taken up for implementation
17	Sipat-II	1000	5.04	
18	Barh	1980	10	
19	Kahalgaon -II	1500	8.82	
20	Vindhyachal-III	1000	4.41	
21	North Karanpura	1980	10.24	
22	Unchahar-III	210	2.56	
23	Nabinagar	1000	5	
24	Bhilai CPP (JV with SAIL)	500	2.5	

* Managed by NTPC
# Including 0.3 Million Tonnes (S T Linkage) for Rihand II for the period January-March 2005
@ Including 0.66 Million Tonnes (S T Linkage) for Ramagundam III for the period October 2004-March 2005

1.2.2 Long Term Coal Linkage XI Plan Projects

SLC (LT) has accorded approval for issuance of Letter of Assurance (LOA) for all the XIth plan projects (15580MW).Letter of Assurance (LOA) has been received for all the projects. Details of status are shown in **Table-1.5**.

TABLE-1.5
LONGTERM COAL LINKAGE DETAILS

Sl. No.	Project	Approval of issuance of LOA by SLC (in MW)	Letter of Assurance (LOA) received
1	NCPP Dadri-II(2X490MW)	980 MW	980 MW
2	IGSTPP Jhajjar(3X500MW)	1500 MW	1500 MW
3	Vallur Phase-I(2X500MW)	1000 MW	1000 MW
4	Vallur Stg-IPhII(1X500MW)	500 MW	500 MW
5	Simhadri Exp.(2x500MW)	1000 MW	1000 MW
6	Mauda STPS(2X500MW)	1000 MW	1000 MW
7	Rihand–III(2X500MW)	1000 MW	1000 MW
8	Korba—III(1X500MW)	500 MW	500 MW
9	Sipat-Stage-1(3x660MW)	1980 MW	1980 MW
10	Muzaffarpur TPP(2X195MW)	390 MW	390 MW
11	Bongaigaon (2X250MW)	500 MW	500 MW
12	Bongaigaon U#3(250MW)	250 MW	250 MW
13	Vindhyachal–IV(2X500MW)	1000 MW	1000 MW

संदीप गुप्ता / SANDEEP GUPTA
अवर सचिव / Under Secretary
भारत सरकार / Govt. of India
नई दिल्ली / New Delhi-110001

RQP No. 340 dated 27.09.10.

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

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 14011/(15)/2003-CPAM

Sl. No.	Project	Approval of issuance of LOA by SLC (in MW)	Letter of Assurance (LOA) received
14	Farakka–III(1X500MW)	500 MW	500 MW
15	Kahalgaon–II(Unit–III500MW)	500 MW	500 MW
16	Barh Stage-I(3X660MW)	1980 MW	1980 MW
17	Nabinagar(4X250MW)	1000 MW	1000MW
	Total	**15580 MW**	**15580 MW**

As on 21.06.2011

1.3 COAL REQUIREMENT FROM DULANGA COAL MINING PROJECT

Dulanga Coal Mining Block is linked to Darlipalli STPP which is proposed to be implemented in two stages. Stage–I of the project shall comprise of 3200MW and stage-II shall comprise of 400MW. Annual coal requirement of Stage-I shall be of the order of 17.5 Mtpa.

Coal supply from Dulanga project is not envisaged to replace any existing linkages.

1.4 BALANCE COAL REQUIREMENT, TRANSPORTATION & BENEFICIATION

1.4.1 Replenishment of Balance Coal Requirement

Pakri Barwadih Coal Mining Block allocated to NTPC located in Hazaribagh District of Jharkhand and having an annual capacity of 15 Mtpa is a basket linkage. Its coal can be used at any NTPC power stations. No washing of coal either at the mine end or at the plant end is envisaged for coal of Pakri Barwadih Coal mining Project.

1.4.2 Surface Transport of Coal for Dulanga Coal Mining Project

Surface transport of the coal from the mine to the CHP within Mine Lease area will be effected by 50T coal body dumpers/Trucks. The processed coal obtained from CHP at pit head will be transported directly to the Darlipalli STPP through Push Pull arrangement of railway system. A rapid loading system for fast loading of 7 Mtpa shall be installed near pit head.

1.4.3 Beneficiation of Coal

Washability characteristics of coal cores have been carried out by Department of Fuel and Mineral Engineering, Indian School of Mines University as Consultancy Project by MECL. As per the Test results, the report concluded

that all size fractions and the composite coal sample are very difficult to wash as the value of NGM for ash of clean coal is high.

The yield for clean coal at 34% ash is expected to be around 55%. Reject / sink will be 45% having ash in reject to the tune of 59 to 60%.In case clean coal is decided to be used at 34% ash, which may not be mandatory, simultaneous arrangement for using reject (60% ash) through FBC boilers will be necessity. If coal is decided to be used on a cut between 41 to 43% ash, the reject will be 10 to 15% having ash percentage in the reject between 72 to 75%. Such reject could be dumped along OB in Dump yards and as back fill in the quarry.

Coal Washing has not been envisaged at the mine end.

1.5 NAME OF APPLICANT WITH COMPLETE ADDRESS

TABLE-1.6
NAME OF APPLICANT WITH COMPLETE ADDRESS

Local Office	Registered Office
NTPC Limited C.R.Barik, DGM (I/C) Dulanga Coal Mining Project Plot No. 681/26 Mission Road, Sundargarh, Orissa-770001	NTPC Limited A.K.Dash, Group Head/ AGM (MP & D) 5th Floor, Engineering Office Complex, A-8A, Sector-24, NOIDA-201 301
Ph:06622-275501,9437043085	Ph:0120-2509856, 9650991057
Fax:06622-275178	Fax : 0120-2410136, 2410137
Email (i) crbarik62@gmail.com (ii) ntpcdcmp@gmail.com	Email : akdash@ntpceoc.co.in

1.6 BOARD OF DIRECTORS OF COMPANY

TABLE-1.7
BOARD OF DIRECTORS OF COMPANY

Sl. No.	Name	Designation
1.	Mr. Arup Roy Choudhury	CMD
2.	Mr. A.K. Singhal	Director (Finance)
3.	Mr. I.J. Kapoor	Director (Commercial)
4.	Mr. B.P.Singh	Director (Project)
5.	Mr. D.K.Jain	Director (Technical)

6.	Mr. S.P.Singh	Director (HR)
7.	Mr. N.N.Mishra	Director (Operations)
8.	Mr. S. B. Ghosh Dastidar	Independent Director
9.	Mr. Rajib Sekhar Sahoo	Independent Director
10.	Dr. M. Govinda Rao	Independent Director
11.	Mr. I.C.P. Keshari	Independent Director
12.	Mr. Rakesh Jain	Independent Director
13.	Mr. Ajit M. Nimbalkar	Independent Director
14.	Mr. S.R. Upadhyay	Independent Director
15.	Ms. Homai A. Daruwalla	Independent Director
16.	Mr. Anil Nath Chatterji	Independent Director
17.	Mr. Sushil Khanna	Independent Director
18.	Mr. T. Venkatesh	Independent Director

1.7 RECOGNISED QUALIFIED PERSON

TABLE-1.8
RECOGNISED QUALIFIED PERSON

Name		Mr. Sanjiv Kumar Singh
Address (i) Office	:	5th Floor, Engineering Office Complex A-8A, Sector-24 NOIDA-201 301
Fax	:	0120-2410138,2410137
E-mail	:	sanjivkumarsingh@ntpceoc.co.in
Registration Number	:	34011/(15)/2009-CPAM
Date of grant / renewal	:	27.09.2010
Phone	:	0120-2400372, 9650991396

संदीप गुप्ता/SANDEEP GUPTA
अवर सचिव / Under Secretary
कोयला मंत्रालय / Ministry of Coal
भारत सरकार / Govt. of India
नई दिल्ली / New Delhi-110001

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.)

CHAPTER II

DETAILS OF EARLIER APPROVED MINING PLAN

पवन देव जामटा/PAWAN DEV JAM...
उप महाप्रबन्धक (खनि...
Dep... General Manager (Cos...
एन टी पी सी लिमिटेड/NTPC ...
ECC, A-5A, Sector-24, Noida-201...

CHAPTER - II

DETAILS OF EARLIER APPROVED MINING PLAN

2.1. APPROVED MINING PLAN

Ministry of Coal, Government of India have approved Mining Plan of Dulanga Coal Block on 30.07.2009 vide their letter No.13016/29/2003 CA-I (Vol-II).

As per Approved Mining Plan the approval was obtained for entire area of the block. The details are as follows:

Block area	:	657 ha
Outside Area	:	373.66 ha
Total Area	:	1030.66 ha

Copy of Approved Mining Plan along with one set of drawings is enclosed.

2.2. A COPY OF THE APPROVAL LETTER AND DEFICIENCIES, IF ANY, THAT EXISTED IN THE APPROVED MINING PLAN AND THEIR RECTIFICATION PROPOSALS.

The copy of approval letter is enclosed as **Annexure-IV**. As per the approval letter, no deficiencies were observed by MoC therefore, no rectification was effected in the Approved Mining Plan.

संदीप गुप्ता / SANDEEP GUPTA
अवर सचिव / Under Secretary
कोयला मंत्रालय / Ministry of Coal
भारत सरकार / Govt. of India
नई दिल्ली / New Delhi-110001

2.3. COMPLIANCE OF CONDITION

On approval MoC have imposed conditions accordingly, NTPC complied with the conditions. The conditions imposed by MoC and the present status of compliance are detailed in **Table-2.1.**

TABLE-2.1
MOC CONDITIONS AND STATUS OF COMPLIANCE

SL. NO.	CONDITIONS IMPOSED BY MOC	STATUS OF COMPLIANCE
i.	The mining company shall take all necessary precautions regarding safety of mining workings, persons deployed therein.	NTPC shall abide by the condition and shall take all necessary precautions regarding safety of mining workings.

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

Sanjay KUMAR SINGH
Qualified Person
34011/(15)/2009-CPAM

SL. NO.	CONDITIONS IMPOSED BY MOC	STATUS OF COMPLIANCE
		persons deployed therein.
ii.	Mining Lease to be acquired shall not encroach into any other coal block.	No encroachment to any other block shall be made.
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 approval of mining plan.
iv.	Two copies of the approved Mining Plan duly signed by the competent authority are returned herewith 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.

2.4. SALIENT FEATURES OF THE APPROVED MINING

TABLE-2.2
SALIENT FEATURES OF APPROVED MINING PLAN

Sl. No	Particulars	
1	Name of Project	Dulanga Coal Block
2	Location	IB Valley Coalfield, District: Sundargarh , Orissa
3	Company	NTPC Ltd
4	Block Allotment Reference No.	Block allotted vide ref no 13016/29/2003-CA-I dated 25.01.2006
5	Block Area Area For external Dump Total area	657 ha 373.66 ha 1030.66 ha
6	Approach	- 65 km away from Sundargarh township along Sundargarh-Garjanbahal-Himgir road - 10 km away from Garjanbahal, - 38 km away from Jharsuguda township - 25 km away Brajrajnagar
a	Nearest Township	Jharsuguda

Sl. No	Particulars			
b	Nearest Railway Station	Hemgir		
c	Nearest Airport	Raipur		
7	No. of Workable Seam	15		
8	Seam Gradient	$5^0 - 10^0$		
9	No. of faults	3		
10	Total Geological Reserves	Approved		
		245.14 Mt		
11	Reserves, Overburden & SR	Mineable Reserves (Mt)	Vol. Of OB (Mm^3)	Av. S.R (m^3/t)
		194.97	518.00	2.66
12	Target Output (MTPA)	7.00		
13	Quality of coal	Grade F-G		
14	Specific gravity of coal (Avg.)	1.68 t/m^3		
15	Method of Mining	Opencast (Shovel-Dumper combination) and Continuous Surface Miner (CSM)		
16	Main Customer	Darlipalli Super Thermal Power Plant of NTPC		
17	Life of the Mine Construction period Production period	32 Years 1 year 31 years		
18	Main Equipment	**Equipment**	**Size**	**Nos.**
		Overburden		
		Electric Rope Shovels	10 m^3	4
		Electric hydraulic back-hoes	10 m^3	3
		Equipment	**Size**	**Nos.**
		Diesel hyd. Shovel back hoes	4.5/5.5 m^3	3
		Rear Dumper	100T	30
		Rear Dumper	50T	12
		Elec. Drill	250 mm	6
		Diesel Drill	160 mm	2
		Dozer with ripper	850 HP	1
		Dozer with ripper	450 HP	1
		Dozer	450HP	5
		Wheel Dozer	350HP	2

Sl. No	Particulars			
		Coal		
		Continuous Surface Miners	Medium size	2
		Diesel hyd. Shovel backhoes	4.5/5.5 m³	2
		Rear Dumper(Coal Body)	50 T	14
		Diesel Drill	110/160 mm	2
		Dozers (one with ripper)	850 HP	1+1
		Dozer	450 HP	1
		Wheel Dozer	350 HP	2
		Front End Loaders	3.5/4.5 m3	3
		Exploratory Drill Rig	Medium	1
19	Mine Parameters			
a	Maximum Depth (m)	255		
b	Maximum strike length (m)			
	Along surface	2634		
	Along Mine floor	2396		
c	Maximum width (m)			
	On surface along Dip	2103		
	On floor along Dip	2016		

2.5. REASONS FOR REVISION OF MINING PLAN

Following reasons have necessitated the revision in Mining Plan:

1. **Revision in Mine Boundary**

Mine Boundary has been revised due to following reasons

(i) **Boundary Adjustment with Manoharpur Block of OPGC**

As per approved Mining Plan, the lease hold area of Dulanga Block was 657 ha. However during Section 4 notification under CBA, OPGC raised objection, stating that certain area along the north western boundary, proposed to be notified, is interfering with Manoharpur block. The issue was finally settled after due deliberations among NTPC, MECL, CMPDIL, GSI and OPGC and a common boundary mutually acceptable to all was drawn on the ground. Vide letter No. CC/MCBA/101/04/06/Policy/Vol.II, dated 15th March 2010 Ministry of Coal has issued NOC for 654.11ha of block area for Section 9(1). As a result the block area reduced from 657 ha

to 654.11ha. Copy placed at **Annexure-II**. The coal resources in the reduced area (2.89 ha) have been estimated as 2.027 Mt, the same will be added to the reserves of Manoharpur Coal Mining Project belonging to OPGC, and hence nation is not loosing any coal.

This adjustment of block boundary has not only reduced the mineable reserve but the alignment of Garia Nala diversion.

(ii) **Reduction in mine area duo MoEF Stipulations**

Dulanga Coal block was placed under "No Go Area" by MoEF for exceeding the norms for GFC (Gross Forest Cover) and WFC (Weighted Forest Cover). After representation from NTPC and prolonged inter-ministerial deliberation, MoEF acceded to the contention of NTPC and recategorised the same in "Go Area" on 29.06.2011 subject to reduction in forest area within block boundary so that the block conforms to GFC and WFC norms. The letter from MoEF is enclosed as **Annexure-III** which inter-alia states that;

NTPC will reduce tree felling from 67500 to 37500.

Saving of forest cover will be about 26%.

Based on the presentation made by NTPC to MoEF in this regard, an area of approx 87 ha which comprised of 13% of block area has been left out from mine boundary (as per approved Mining Plan) and south eastern mine boundary has been redrawn. The said area is likely to conform to stipulation of MoEF; however the number of reduction of tree felling is purely empirical which will be confirmed after final tree enumeration. Due to this the block area considered for mining in this mining plan is now reduced to 567.11 ha. vide letter no F.No. 11-225/2011-FC dated 19th July 2011 MoEF further confirmed the Go Area issue placed at **Annexure-IIIA.**

It is pertinent to mention here that the complete relinquishment of the said area (87 ha) is not envisaged and around 20th year of mining operation, NTPC will propose to MoEF for permitting the mining of the left out area in **Phase –II**.

2. **Revised alignment of nala diversion**

Nala diversion was envisaged along the south east boundary in the approved mining plan. Due to realignment of south eastern boundary this diversion route appears impractical.

NTPC now proposes to divert the course of two nalas i.e. Baidhara nala and Nala-B along the northern extremity of the block instead of southern fringe.

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

This diversion route is advantageous in obviating one more potential diversion in the event of MoEF agreeing to NTPC proposal of mining of left out area.

Realignment of nala diversion does not have any impact on mineable reserve.

3. **Change in location & area for infrastructure and external OB dump**

The area identified by NTPC for external OB dump in its Approved Mining Plan has been notified under LA Act in favour of OPGC for Manoharpur block. It is pertinent to mention here that use of the said area was not envisaged for any purpose by OPGC in its surface master plan as per its approved Mining Plan.

However responding to NTPC representation on this issue, Chairman IDCO in a meeting held on dated 16.05.11 has advised NTPC to look for alternate land for external OB dump. Copy placed at **Annexure-XII**.

Accordingly NTPC has identified land in Khapurikachar village on south eastern side of the block for placing external OB, thereby changing the location of external OB dump area as per the Approved Mining Plan. Revised Surface Master Plan is shown in **Plate No.4.**

4. **Acquisition of Private Land at Beldihi Village (66.33 acres)**

Collector and District Magistrate (Sundargarh) vide letter dated 31st July 2010 has recommended to NTPC for acquisition of private land to an extent of 66.33 acres (26ha) in the Beldihi Village adjacent to Dulanga Coal Mining Project. This recommendation was made in view of demand of the villagers citing that the balance land will be of no use to them after establishment of the Coal Mining Project. Copy of the letter enclosed as **Annexure-XIV**.

Prima facie in the light of disposition of the seams it appears that the said private land is over coal bearing area, therefore NTPC shall acquire the same under LA Act and utilized for the purpose of construction of temporary security barracks or for compensatory afforestation. In the event of the Dip Side block carved out in future and allotted to the party other than NTPC the same will be transferred to the concerned at cost. On the other hand if the same is allotted to NTPC, the area will be mined out. The private land as explained above has not been considered for preparation of Revised Mining Plan.

SANDEEP GUPTA
Under Secretary
Ministry of Coal
Govt. of India
New Delhi-110001

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CHAPTER III

LOCATION, TOPOGRAPHY AND COMMUNICATION

CHAPTER-III

LOCATION, TOPOGRAPHY & COMMUNICATION

3.1 LOCATION

3.1.1 Dulanga Block is located in Ib Valley Coalfields lying in the south-eastern extremity of NW-SE trending master basin belt of Son-Mahanadi Valley in Sundargarh district, Orissa state. The study area is situated in the northwestern part of Orissa and is covered in the Survey of India Toposheet No. 64 O/9 and 64 O/13. It is bound by Latitude 21°55'37" to 21°56'43" N and Longitude 83°47'28" to 83°49'05" E. (Refer Location map, **Plate No. 1**)

3.2 ACCESSIBILTY

3.2.1 **Rail Link:** The nearest railway station is Hemgir, which is about 28 km away from Dulanga block lying on the Mumbai – Howrah main lines of SE railway.

3.2.2 **Road Link:** The Block is located about 55 km South-West of Sundargarh, the district headquarters along Sundargarh-Garjanbahal-Hemgir road and about 10 km North-west of Jharsuguda, another district headquarters. The block is approachable throughout the year by Tar Road joining Hemgir-Jharsuguda road, which passes through the eastern part of the study area.

3.2.3 **Air Link:** The nearest airport is at Rourkela and an airstrip is also available at Jharsuguda.

3.3 POWER SUPPLY

3.3.1 The project will receive power at 33 kV through double circuit over head line. It is proposed to construct one 132/33kV, 16MVA substation within the project area which will receive power from NTPC proposed Darlipalli Substation through 132kV Double Circuit Line around 10 km from the mine site. Initially this line shall be charged at 33 kV to meet the power requirement of mining during early stages.

3.3.2 During the initial stage, when the power arrangement from Proposed Darlipalli STPP is under progress and the mine is not running in full capacity, interim power supply arrangement will be made from local existing substation in the nearby 11 kV substation.2 no. of DG set of 3 MVA each will be installed at suitable location to cater to the power requirement of construction stage, which will also serve as power back up for essential activities like pumping

CHAPTER-III

LOCATION, TOPOGRAPHY & COMMUNICATION

3.1 LOCATION

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पवन देव जांगिड / PAWAN DEV JANGID
Dep.. General Manager (CA)
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EDC, A-8A, Sector-24, Noida-201301 (U.P.)

SUSHIL KUMAR SINGH
Authorised Officer (Coal)
No. 34011/(15)/2009-CPAM

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illumination, colony lighting etc. in the event of power failures from regular source.

3.3.3 Construction of 10Km (distance of Dulanga Coal mining Project to Darlipalli STPP) of 132 kV Double Circuit line, 02 Nos. of 132 kV Bays and 02 Nos. of 33 kV bays shall be done by agency identified by NTPC for the purpose.

3.4 WATER RESOURCES

3.4.1 The sources of surface water are mainly Nalas and Ponds. The drainage system of the study area is dendritic to sub-dendritic type and well developed. The western, central and south-eastern parts of the study area are occupied by the hills, and hence most of the drainages originate from there, and the drainages are flowing towards East and southeast directions.

3.4.2 Major sources of surface water in the study area are Garia, Bichna, Bagmora, Brahmani, Bhesrakharu, Lilari and Tangramounda Jhar Nala. Garia nala, flows along the central part of the exploration block and more or less bisect the block into two sub-blocks and finally it confluences with Basundhra nala in the eastern part of the study area near village Chuabahal. The network of streamlets feeds the Garia Nala. All the streams originate in the western, southern and northern parts of the study area and flow easterly & south-easterly and merge into IB River.

3.4.3 Hydro-geologically the district is mainly confined to Precambrian crystalline ground water and Gondwana ground water province. 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 pediplain areas. Mostly the rainwater gets run-off in this area and hence the percentage of recharge of ground water is very less.

3.4.4 The water table over the lease area lies at a depth between 6 & 7 m below ground level. In general, over the larger portions of the study area, the depth to water level ranges between 4 & 6 m below ground. The ground recharge in these areas is very high. The major source of drinking water is dug well and hand pump, which is available in almost all the villages in the study area.

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3.5 TOPOGRAPHY

3.5.1 The topography of the block is highly undulating and rugged in nature. The central and southern parts of the area are marked by higher elevation exhibiting hillocks and ridges. The eastern side is more or less flat in nature. The maximum and minimum elevations above mean sea level are 336m and 232 m respectively (**Plate No. 5**).

3.5.2 The topography is largely controlled by lithology. Sandstone with quartz rich being resistant to weathering and erosion form the hillocks whereas the shales and carbonaceous horizons which are comparatively soft form the eastern plain land. The regional slope of land is towards south-east.

3.6 CLIMATE

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 1461 mm and maximum temperature is 42 °C in summer and minimum temp. is 2 °C in winter season. It has three distinguishable seasons :

i) The summer season starts from about the festival of Holi in March, but the mercury rises to its peak in May (42°C) and first part of June with the mean daily maximum temperature of 33°C and the mean daily minimum temperature of 21°C.

ii) The rainy season starts from the mid June to September with an average annual mean rainfall of 1461mm with the total number of rainy days being 68.

iii) Winter season commences from the last week of November to February. The intervening period October is the post monsoon or retreating monsoon period.

3.6.2 **Relative Humidity:** Since the climate is dry & hot, the relative humidity is generally moderate. The annual mean daily humidity is 68% in morning hours and 52% in evening hours. The monthly mean daily humidity varies from 46% (April) to 86% (Aug) in morning hours and from 25% (April) to 81% (Aug) in evening hours.

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3.6.3 **Rainfall:** The rainfall does not show any cyclic occurrences and shows wide and erratic variations. The average annual rainfall for the year 1999 to 2008 was 1517.2 mm. The monsoon season is spread over the months from June to September. The annual rainfall for the consecutive years is given in **Table 3.1.**

TABLE 3.1
ANNUAL RAINFALL RECORDED AT IMD STATION, JHARSUGUDA (1999 – 2008)

YEAR	RAINFALL (mm)
1999	1426.6
2000	732.2
2001	1718.0
2002	1182.9
2003	1851.5
2004	1593.6
2005	1709.7
2006	1249.7
2007	1738.6
2008	1969.2
AVERAGE	**1517.2**

3.7 LAND DETAILS

3.7.1 The total land requirement for this mining project (Phase I & II) has been estimated to the extent of 880.63 ha. Out of the total project area, 654.11 ha area falls under the allotted block. Area to the extent of 236.52 ha falls outside the block boundary which includes 20 ha of colony area which will be utilized for setting up infrastructure and siting of external OB dump. There is 360.58 ha forest area within the mining area. The land belongs to six villages viz. Dulanga, Manoharpar, Kathapali, Beldihi, Kuntijhana, Majhapada, Khaprikachara. The land use of the mine area is given in **Table 3.2.**

TABLE 3.2
LAND USE DETAILS OF MINE AREA (AS PER REVENUE RECORDS)

Particulars		Area (ha)
I. Mining area		
a)	Private Land	186.91
b)	Reserve Forest	108.95
c)	Forest land	251.63
d)	GM Land	106.62

Total	654.11
II. Outside mining area	
a) Private Land	124.07
b) Reserve Forest	0.70
c) Forest land	50.88
d) GM Land	40.87
III. Township area	
d) Private Land	20.00
Total	236.52
Grand Total	890.63

3.8 DRAINAGE & NALA DIVERSION

The existing drainage pattern constituting Garia Nala, Baidhara Nala and Nala-B along with their streamlets within the proposed mine lease area needs to be diverted as this has an important bearing over the proposed activities of excavation, dumping and placement of facilities thereby carrying out unabated and safe mining activities in the life of the mine.

3.8.1 Surface Drainage

3.8.1.1. Existing Drainage Pattern

i. Garia nala flowing through the middle of the property almost along the strikes line of seams. It is a tributary to Basundhara River which finally joins IB River on which mighty Hirakud Reservoir is built further southward.

ii. Existing width of Garia Nala in approximately 29 meters at its high bank which more or less resembles a river, contrary to the above Nala –B is virtually non existence as the images indicate agricultural activities are carried on its course. Baidhara nala is seasonal in nature the measured span is approximately 15m.

iii. These nalas together constitute various purposes like recharging of ground water providing drinking water and facilitates life sustenance for the local population apart from ecological advantages.

iii. Subsidiary nalas Baidhara & nala B entering the property in the south-western boundary of the property which also joins Garia nala inside the block. Diversion of Garia nala prompts diversion of other two nalas also.

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3.8.1.2. Proposed Drainage Pattern

i. For mining, the property safely and uninterruptedly these nalas need to be diverted.

ii. Garia nala is planned to be diverted away from the N.E. Boundary and along the NE boundary (formed after acquisition of additional land out side the block) of the block in this regard consultation with the Manoharpur block belonging to OPGC on the upstream side of Garia Nala has already been done. This diverted channel will be meeting its own main course at SE corner of the block.

Diversion activities for Garia nala will begin in the first year of operation and expected to finish at the end of 4th year.

iii. The planned extraction operation however may continue unabated till 5th year of operation without diversion. But as a precautionary option it is planned to finish the diversion operation in the 4th year itself. OPGC (Orissa Power Generating Corporation) has also proposed the Diversion of Garia Nala. The proposed route of diversion is finalized based on the joint decision taken after discussions & deliberation. Schedule of diversion of nala by NTPC is matching with OPGC. Suitable protective measure shall be taken at the joining point of diversion.

iv. Baidhara Nala & Nala B are planned to be diverted through the channel dug along the S-W & N-W boundary (adjoining Manoharpur Block of OPGC) of the block necessary pre-stripping will be done if needed. The proposed diversion will remain same till the end of life of the mine.

v. Diversion activities for Baidhara Nala & Nala-B shall commence in the beginning of 2nd year of operation and expected to match the diversion schedule of Garia Nala Diversion completion activities.

vi. These two nalas shall discharge their load in the NW boundary of the block with Garia Nala. The diversion channel of Garia Nala is designed to carry additional load of Baidhara nala & nala B.

3.8.2 Changes w.r.t. Approved Mining Plan:

i. The proposed diversion is same as suggested in the Approved Mining Plan for Garia Nala but the diversion of other two nalas are in variance. As per the Approved Mining Plan the proposed two nalas were diverted all along the SW & SE boundary by pre-stripping in the hillock region and taking recourse of valley like formation in between the hillocks.

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ii. Although Nala diversion studies have already been carried out by NTPC for earlier proposal (as per Approved Mining Plan), prima facie taking into account the topography and drainage pattern of the area proposed diversion route in the revised plan seems feasible. Nevertheless a separate Nala diversion study will be carried out for new diversion route of Baidhara Nala and Nala B.

iii. The coal reserves sterilized beneath the revised diverted channel is approximately same as that in earlier diversion hence the impact on mineable reserves will not be felt by alignment by new route.

3.8.1 Brief of Design

i. Width of diverted Garia Nala will be kept 30m and the depth will be decided on the magnitude of load to be carried by the channel. Bund shall be built at both side of channel. On mine side to prevent apprehended inrush of water a bund of 3 m high, sloping at 1 in 1.5 shall be created while on the other side the bund will be sloping at 1in 1.

ii. Each bund shall be adequately compacted and stone pitched to prevent leaching away of building material.

iii. On the Nala side the slope of the bund shall be pitched to strengthen.

iv. Free float of 1m height shall be maintained to prevent any untoward happening.

v. An inspection pathway of width 2m in mine side shall be provided and regular inspection for development of cracks of failure shall be ensured.

vi. Width of diverted Baidhara Nala & Nala-B shall be kept 20m and the depth will be decided on the magnitude of load to be carried by the channel. Bund shall be built at both side of flow. On mine side to prevent apprehended inrush of water a bund of 3 m high, sloping at 1 in 1.5 shall be created while on the other side the bund will be sloping at 1in 1.

3.8.4 Mine water drainage

i The proposed mine is located in an area with heavy rainfall. The ground water table within the area from surface in pre monsoon and post monsoon is varying between 5-20 m as noted during exploration. During 1st year of mining, 35-40m excavation depth will be achieved. Hence, the ground water table will be encountered even during the 1st year of mining. The

mine sump water will accumulate from precipitation and from mine seepage.

ii During the course of mining the water will be pumped out from mine sump moving along the eastern side and will be stored in a surface settling tank of 2.14 ha area located near the northern corner within the Block. The dimensions of reservoir are based on the quantity of sump water pumped out. After settling, the overflow, if any, water will be drained out into the Garia nala which is proposed to be diverted and the diversion will pass nearby the settling pond.

iii The max rainfall within 24 hour recorded ever is 257.8 mm recorded at Jharsuguda. The largest void area being 140.69 ha in 5th year and about 155 ha in the conceptual stage, the water collection as a result of above mentioned rainfall will be 0.181 Mm^3 and 0.335 Mm^3 respectively. Adding 10% for the seepage contribution (assumed), the volume will become 0.2 Mm^3 and 0.37 Mm^3. For evacuating (pumping) this water in 3 days time, the pumping capacity required comes to 0.07 Mm^3 and 0.12 Mm^3/day respectively. A settling tank of about 10.0 ha area with 4 m depth (partially dug out upto hard surface) has been provided having capacity to give adequate settling time under highest rainfall conditions.

iv Adequate measures to protect the mine workings from surface water flow during the rains will be taken by way of providing garland drains around the mine excavations and also providing suitable drainage gradients for mine benches. Sumps of adequate capacity will be provided on the quarry floor. The coal excavation and transport machinery are organised to be sited over the coal bench top and will not be affected by water accumulation from rains or strata seepage.

v Requirement of water for service buildings & Dust Suppression: The requirement of water for dust suppression, plantation, dump trucks washing workshop etc. is estimated to be about 1247 m^3/day and will be met from the mine water which will be duly treated in a limited manner for this purpose, additionally, the treated water from colony and canteen will be re-circulated and used for plantation and green belt to the tune of 435 m^3cum/day. The requirement of potable water for other site services i.e. canteen, Rest shelter, Offices including colony (653 m^3/day) will be met by mine sump and the same will be treated before use if required.

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3.8.5 Miscellaneous

i The diverted channels will be permanent source of water for nearby population notwithstanding persons directly affected by such diversion will be rehabilitated in the separate colony at suitable location as per the R&R policy and other prevailing statute.

ii During envisaged initial two years of construction phase of the mine requirement of potable and drinking water will be met through boreholes drilled for the purpose. Necessary approval from ground water authorities including Ground Water Board shall be obtained.

iii Water requirement at operation stage will be exclusively met through sump water. Drinking water and potable water requirement will be met through the mine water which will be made usable after treatment as per the prevailing norms.

iv Industrial water requirement for sprinkling HEMM washing, sanitary purposes etc. will be met through sump water only henceforth no groundwater will be used at the later stage of mining.

v The interest of the local villagers to be suitable addressed in the event of diversion.

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CHAPTER IV

EXPLORATION, GEOLOGY, SEAM SEQUENCE, COAL QUALITY AND RESERVES

CHAPTER - 4
EXPLORATION, GEOLOGY, SEAM SEQUENCE, COAL QUALITY AND RESERVES

4.1 EXPLORATION

4.1.1 INTRODUCTION

4.1.1.1 A Memorandum of Understanding (MoU) was signed between NTPC Ltd and Mineral Exploration Corporation Ltd (MECL) on 12.6.2006 to conduct detailed exploration for coal by MECL on behalf of NTPC Ltd in Dulanga block in IB River Coalfield allotted to NTPC Ltd for coal mining. The exploration work was awarded to MECL as per Letter of Award (LOA) No. CS-7014-708-9-CY-LOA-4711 dated 14.07.2006.

4.1.1.2 An envisaged drilling programme is to convert the indicated category coal reserves to proved category and MECL was approached to conduct the drilling and associated works for establishing proved coal reserves and documentation of old and new borehole data with Ore body Modelling.

4.1.1.3 Dulanga Coal Mining Block is connected with the national Grid. Coordinates of boreholes are enclosed as **Annexure-XV**.

4.1.2 EXPLORATORY DRILLING

4.1.2.1 The detailed exploration in Dulanga block was carried out with the following objectives :-

1. To prove the lay & disposition of coal seams, by drilling infilling boreholes, in the demarked block boundary of Dulanga block.
2. To determine the quality of coal seams and to assess thickness-wise, depth-wise, C:OB ratio-wise and grade-wise proved opencast coal reserves in the block.
3. Geological report in digital format & Ore Body Modelling.

4.1.2.2 Dulanga block falls in the southern end of Himgir Belt which was explored earlier by Directorate of Geology, Orissa, at the instance of CMPDIL in two phases. The Phase-I were involving 5090.25m drilling in 41 boreholes during the period from Nov. 1995 to June 1997 & Phase-II, drilling of 2607.75m. in 19 boreholes during Dec. 2000 to March 2002. Thus, 7698m drilling was done in 60 boreholes in all, in an area of 6.57 Sq.km which is entirely Coal bearing. The Directorate of Geology, Orissa established in Dulanga block indicated coal

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reserves of 259.57 million tonnes with the overall grade of G to F within C:OB vertical cut-off ratio of 1:1 to 1:6.

4.1.2.3 MECL commenced exploration work in Dulanga block on 23.11.06 and the exploration activity in the block was completed with the closure of MNID-28 on 24.06.2007 by drilling 30 MNID series boreholes involving 3337.65m of drilling. The year wise breakup of meterage drilled in the block is as follows.

Year 2006 – 07	-	2202.35 m
Year 2007 – 08	-	1135.30 m
Total	-	**3337.65 m in 30 boreholes**

4.1.2.4 Overall, 90 boreholes drilled over an area of 6.57 Km^2 at borehole density of 13 bore hole/Sq.Km. The break up details is as follows.

OIBD Series	(60 boreholes)	-	7698 m
MNID Series	(30 boreholes)	-	3337.65 m
Total	**(90 boreholes)**	-	**11035.65 m**

4.1.3 BLOCK BOUNDARY

4.1.3.1 Block boundary is taken as demarcated in Phase-I exploration of the block by Directorate of Geology Orissa is considered as such without modification by MECL in consultation with NTPC Ltd. It can be defined as follows:

North East	-	Incrop of Coal Seams
South East	-	Arbitrary line along boreholes OIBD 18 & 23
South West	-	Arbitrary line along boreholes OIBD-28 & 17
North West	-	As per GR arbitrary line, along boreholes OIBD-19, 1 & 8/ SW limit of Manoharpur block boundary.

However during the right of resolution of dispute settled by Coal Controller on 15.03.2010 and agreed by NTPC & OPGC hereinafter defined as the NW boundary final boundary. The drawing is enclosed at* ***Annexure-XIII.*

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4.1.4 GEOLOGICAL MAPPING

4.1.4.1 The entire area of Dulanga block is more or less covered with soil. The geology of the block is therefore, interpreted based on the subsurface data obtained from the boreholes. The geological information i.e. strike and dip of the strata, exposures wherever available in the block have been mapped and a geological plan showing the incrop of coal seams, faults and other surface geological features have been prepared and depicted in **Plate No. 6**. Six geological cross sections are prepared along NE- SW direction to depict the sub surface features and shown in **Plate No. 7 & Plate No. 8.**

4.1.5 SURVEYING

4.1.5.1 The survey work at Dulanga block has been carried out for the entire area of 6.57sq.km by closed traverse for control survey by using Electronic Total Station. The intermittent closed traverses have been run for connecting the boreholes and for contouring by using E.D.M and Theodolite.

4.1.5.2 The baseline has been laid at traverse stations T1 and T2. The distance between T1 and T2 was observed with Total Station is 173.863 m.

4.1.5.3 The geophysical co-ordinates of stations nos. T1 & T37 are observed with hand held G.P.S. The observed geographical co-ordinates were converted to rectangular co-ordinates. Then the local co-ordinates of all the boreholes and traverse stations were converted to Rectangular co-ordinates and geographical co-ordinates, after applying the scale factor and the necessary correction by using the in house software.

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4.1.6 LITHOLOGICAL LOGGING

4.1.6.1 The drill cores of both coal and non coal strata obtained from boreholes were systematically logged visually, with detailed description of litho-units like grain size, colour, mineral constituent etc. The structural details such as bedding, slickensides, fractures, core dip etc. were also recorded. The lithological and structural details are furnished in the GR. The representative graphic lithologs and correlation chart are shown in **Plate No. 9, Plate No.10 & Plate No. 11**

4.1.7 GEOPHYSICAL LOGGING

4.1.7.1 A total of 1122.00m in 6, out of 30 boreholes drilled in the block have been geophysical logged using multi parameter probes, the details of which have been given separately in Chapter-VII of GR

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4.1.8 SAMPLING AND ANALYSIS

4.1.8.1 The carbonaceous horizons (coal, shaly coal and carbonaceous shale) of all correlatable coal seams as well as persistent bands of significant thickness from the boreholes drilled by MECL in this block were sent for band by band analysis to chemical laboratory, MECL, Nagpur.

4.1.8.2 A total of 603.12 m of coal sampling in 26 boreholes have been carried out. All the samples have been sent for conducting band by band analysis. After obtaining the results of band by band analysis, the seam overall analysis at 60% RH & 40 °C for workable coal seams for 284 samples from 26 boreholes was carried out.

4.1.8.3 In addition to the seam overall analysis, special tests such as Ultimate analysis, AFT, Ash analysis, Total Sulphur & Sulphur Distribution, phosphorous content, Swelling Index and GKLT Coke type and HGI of coal seams have also been carried out as per the stipulated norms.

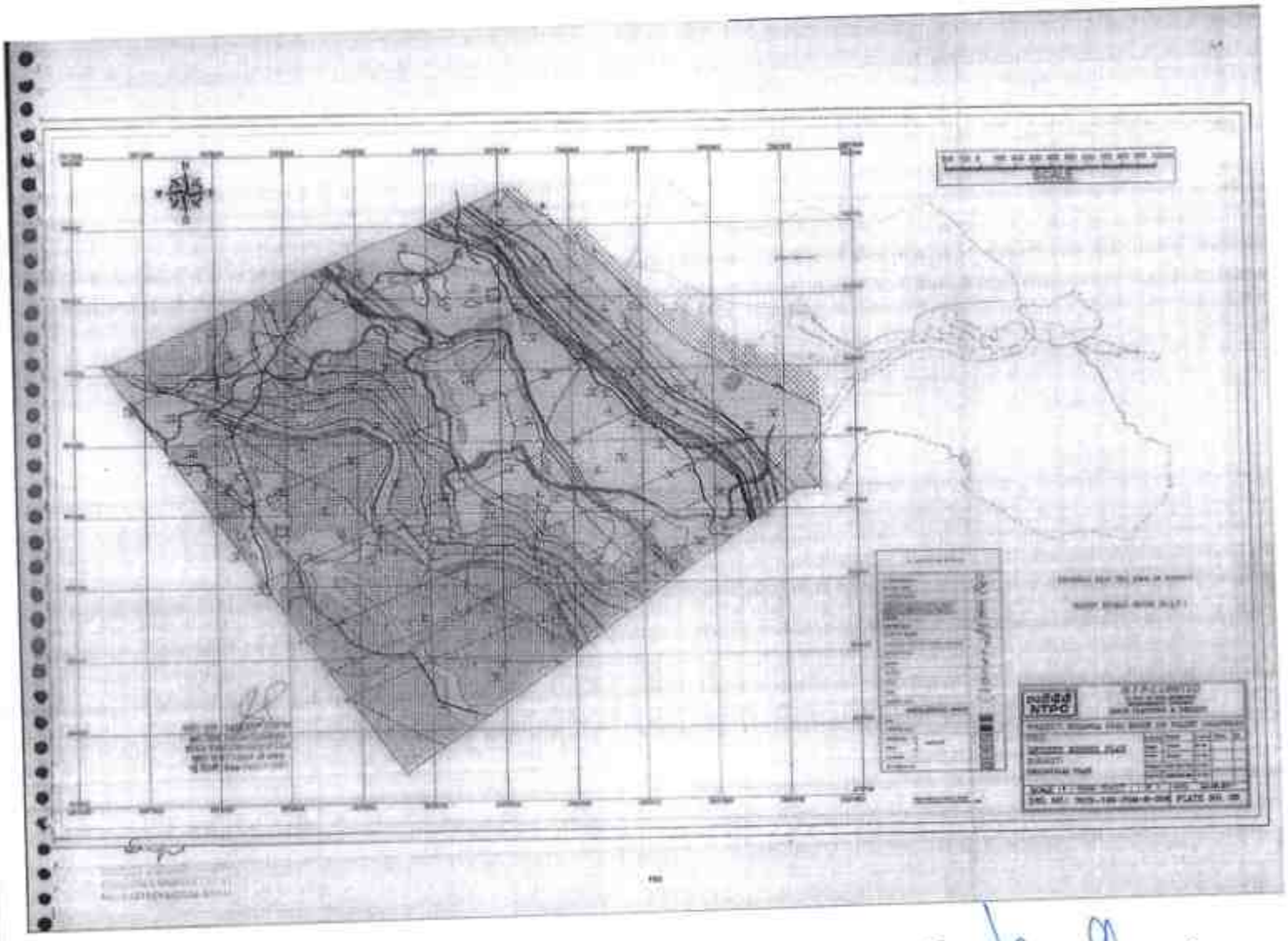
4.2 GEOLOGY

4.2.1 REGIONAL GEOLOGY OF IB RIVER COALFIELD

4.2.1.1 The Ib River Coalfield lies in the south-eastern extremity of NW-SE trending master basin belt in Son-Mahanadi Valley. The Ib River Coalfield displays the complete sequence of Lower Gondwana rocks from Talchir to Kamthi. The geological succession of the coalfield as established from surface and sub-surface data is given in **Table 4.1**

TABLE 4.1
STRATIGRAPHIC SEQUENCE OF IB RIVER COALFIELD (AFTER GSI)

FORMATION	LITHOLOGY
Recent and Sub-recent	Alluvium Laterite & recent gravel and conglomerate
Lower Gondwana	**Kamthi (Upper)**: Pebbly sandstone, ferruginous sandstone, red shale **Kamthi (Middle)**: Fine grained to coarse grained sandstone, siltstone, coal seams. = Raniganj **Kamthi (Lower)**: Grey and carbonaceous shales, sandstone, clay, = Barren Measures iron-stone nodule.



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FORMATION	LITHOLOGY
	Barakar : Sandstone, grey and carbonaceous shales, siltstones, Coal seams, fire-clay.
	Karharbari : Black carbonaceous sandstone, pebble bed with thin impersistent coal seams.
	Talchir : Diamictite, greenish sandstone, olive and chocolate shales, rhythmites.
----------	---------- Unconformity ----------
Pre-cambrian	Granite, gneisses, schists etc.

4.2.1.2 Precambrian: The basement rock on which the Gondwana strata have been deposited is exposed to the north-east and north central parts of the coalfield. It comprises granite, gneises and schists which are often traversed by vein quartz, pegmatite and basic rock.

4.2.1.3 Talchir Formation: The Talchir Formation is found to have deposited as discontinuous lens shaped bodies over the uneven basement. The outcrop of this formation is scanty and located only in the north western part. The Talchir Formation is represented by diamictite, medium to coarse grained greenish sandstone with dispersed clasts and rhythmites.

4.2.1.4 Karharbari Formation: The strata belonging to this formation overlies the Talchir Formation with a gradational contact. It comprises black carbonaceous sandstone with fresh feldspar laths, of white, very coarse grained to pebbly sandstone and contains thin laminae of coal.

4.2.1.5 Barakar Formation: Overlying the Karharbari Formation the thick pile of sediments of Barakar Formation constitute major portion of the coalfield. Barakar sequence commences with coarse grained sub arkosic sandstone with lenses and bands of conglomerate. The arenaceous basal Barakar contains Ib seam and grades upward into more argillaceous facies.

Barakar strata overlying the Ib seam comprise of white medium to coarse grained, occasionally granular, moderately sorted sub arkosic micaceous sandstone with calcareous and ferruginous cement with bands of grey micaceous shale, carbonaceous shale and fireclay. This sequence is overlain by Rampur Coal Horizon.

Overlying the Rampur Coal Horizon the sequence becomes more argillaceous comprising fine grained to coarse grained to medium grained arkosic sandstone with bands of grey micaceous shale, carbonaceous shale, siltstone and contains Lajkura Coal Horizon. The litho units of Barakar Formation become

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arenaceous again from the roof of Lajkura Coal Horizon up to the base of Barren Measure Formation.

4.2.1.6 **Barren Measure Formation:** The rocks of this Formation occupy the southern part of the coalfield. The strata of Barren Measure Formation occupy valley as well as the higher contours of the hill. It is composed mostly of grey to dark grey shale, carbonaceous shale, sandstone, clay ironstone nodules and is generally devoid of coal. The clay ironstone beds are lensoid bodies.

4.2.1.7 **Kamthi Formation:** Recent systematic geological studies in Ib River Coalfield have established a threefold sub-division of the Kamthi Formation. The lowermost unit is mainly argillaceous, composed of thick unit of shales with ironstone nodules, sandstones and is generally devoid of coal and is correlated with the Barren Measure Formation of Damodar Valley.

This is overlain by fine grained sandstones and occasional argillite bands and contains coal seams forming the middle member of the hitherto Kamthi Formation and is correlated as Raniganj Formation. The occurrence of coal in this Formation, which was unknown earlier, has enhanced the potentiality of coal in this coalfield.

The uppermost member of the unit, which generally occurs on the flat topped hills and plateau, comprises pebbly sandstones, ferruginous sandstones and red shales and is correlated as Kamthi (upper) Formation. Kamthi formations are reported to be occurring by GSI in the south central part of the Ib river Coalfield.

4.2.1.8 **Laterite and Recent Gravel:** Laterite occurs as patches on the sub-surface covering. Irregular pebbles and recent gravels and conglomerates generally occur on the high ground.

4.2.2 STRUCTURAL SET-UP OF THE COALFIELD

4.2.2.1 The Gondwana sediment of this coalfield were deposited in a large synclinal basin trending NW-SE. The northern and eastern boundary is an erosional remnant of the edge of the earlier basin. The southern and south western limit of the coalfield is defined by a well marked boundary fault while the north and north-eastern boundary terminating with the Archaean is a normal one. The Gondwana rests on a basement of Archaean rocks with a marked unconformity. The coalfield has been traversed by two important faults. One of them can be traced to the west of the Ib River extending from Gondghora to Rampur in a north-south direction while the other Kirarama fault is located further west. Besides, the strata have been subjected to minor folding and faulting.

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4.2.3 GEOLOGY OF DULANGA BLOCK

4.2.3.1 Dulanga Block is located in the northwestern part of northern limb of Ib River Coal Field. The geology of the block is in conformity with the regional set up. Almost the entire area of Dulanga block is covered by the rocks of Barakar Formations. In the northeastern side of the block beyond the block boundary gritty and pebbly sandstones of Karaharbari Formation, Talchir boulders and the basement rock comprising of Metamorphics are also exposed. In the Garianala exposures of sandstones, grey shale, carbonaceous shales, Coal horizons are found. Ferruginous red shales and sandstones of Kamthi formation are also noticed towards the extreme south of the block.

4.2.3.2 The Geological succession evolved on the basis of exploration data generated in the block is given in the **Table 4.2** while calculating the thickness of different stratigraphic formations, the data generated by MNID series boreholes only have been considered as the formation details in OIBD series boreholes drilled by Directorate of Geology, Orissa have not been clearly demarcated on the lithologs.

TABLE 4.2
GEOLOGICAL SUCCESSION IN DULANGA BLOCK

AGE	FORMATION	THICKNESS (M)	LITHOLOGY
Recent/ Sub Recent		0.00 - 4.50	Soil, alluvium
Lower Permian	Barakar	0.00 - 292.00	Fine, medium and coarse grained felspathic, grey sandstone, micaceous and laminated at places. Grey shale, fire clay and carbonaceous shales with thick coal seams
	Karharbari	27.50 - 98.16	Coarse to gritty and pebbly sandstones with unde-composed feldspar carbonaceous sandstone and thin carbonaceous shales and coal bands
Upper carboniferous	Talchir	3.50 - 11.53	Khaki green, brownish sandstone with impregnated fragments of Quartz, Quartz-mica schist, granite gneiss, boulders & green shales
----------Unconformity----------			

Precambrian	Older metamorphics	3.50 - 5.00	Granite, gneiss, chlorite schist, mica schist, quartzite etc.

4.2.4 DESCRIPTION OF FORMATION

4.2.4.1 Older Metamorphics: Precambrian metamorphic rocks constitute the basement of the basin. The older metamorphic rocks which are exposed on the eastern and northern parts beyond the block boundary are composed of quartzite, quartz mica schist, granite gneiss and at places intruded by pegmatites and vein quartz. The metamorphics have intersected in MNID-26 & MNID-27 at 30.00m & 26.50m depth respectively.

4.2.4.2 Talchir Formation: The rocks of Talchir Formation are not exposed within the block boundary. However, few exposures of Talchir comprising greenish, fine to medium sandstone with conglomerates are noticed along the Garia nala. It is also encountered in borehole MNID-24 at the depth of 116.97m.

4.2.4.3 Karharbari Formation: The Karharbari Formation is noticed towards the east of village Dulanga. However, in most of the boreholes Karharbari formation is encountered. 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.

4.2.4.4 Barakar Formation: The entire block is covered with Barakar formation. This formation constitutes fine to coarse grained, white to grey feldspatic, micaceous sandstone, shale, fire clay and carbonaceous shale with economic coal horizons. A total no. of 15 coal seams has been encountered in this formation besides a few local seams.

4.2.4.5 The block is free from any igneous intrusives. Major part of the block is covered by thin layer of soil and alluvium. The weathering has affected all the strata below soil to a varying extent. The thickness of soil cover ranges from 0.20m (OIBD-8 & 23, MNID-7) to 6.65m (OIBD-15). The depth of weathered zone varies from 3.20m (OIBD-3) to 16.10m (OIBD-39).

4.2.5 STRUCTURE OF DULANGA BLOCK

4.2.5.1 The Dulanga block is mostly covered with soil; hence the structural interpretation is mainly based on the sub-surface data obtained during the course of exploratory drilling.

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4.2.5.2 The general foliation of older metamorphic is N70°W-S70°E with southerly 60° dip. There are two sets of prominent joints trending N15°E-S15°W & N68°W-S68°E with easterly and northeasterly dip of 85°.

4.2.5.3 The general strike of the bed varies from N20°W-S20°E to N40°W-S40°E with southwesterly 5°to 10° dip.

4.2.5.4 The block is free from major tectonic disturbances but a strike fault namely F1 - F1 has been deciphered from the subsurface data which divides the block into two unequal parts. Besides two more faults of F2 - F2 & F3 – F3 of very small magnitude have been deciphered.

4.2.5.5 The F1-F1, fault located on the southern part of the block trends in a NW-SE direction. The throw of the fault varies from 20m towards south in the eastern side to 60m in the western side. The fault has intersected in MNID-20, OIBD-31 & MNID-28 and omitted a no. of seams as detailed below. The fault also continues towards both ends beyond the block boundary.

MNID-20 - Lajkura Bot-II seam

OIBD-31 - All the seams of Rampur group

MNID-28 - Rampur IA I seam and part of Rampur IA II seam

4.2.5.6 Two minor faults F2-F2 & F3-F3 have also been deciphered from the subsurface data. The F2-F2 fault is located in the southern corner of the block on the southeastern boundary near borehole No.MNID-21 and trends almost E-W direction. Due to the intersection of the fault the Laj Bot.I & Bot.II seam have been omitted in MNID-21. The fault is having a southerly throw of 10m in the east which reduced to 5m in the west and ultimately dies out within the block in the north of borehole No MNID-22. The fault continues beyond the southeastern block boundary. The F3-F3 fault which is located in the eastern corner of the block around MNID-17 trends almost N-S direction with a westerly throw of 5 m. The fault dies out in the north within the block and continues towards south beyond the southeastern block boundary.

4.2.5.7 Besides the above, some minor slips are also observed within the block due to which the Lajkura Bot.-II, Lajkura-Middle and part of Rampur-I seam were omitted in the boreholes OIBD-48, MNID-28 and OIBD-4 respectively. Possibility of increase of throw of the minor slips towards west cannot be ruled out.

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4.2.5.8 Floor contour plan for all seams are showing irregularity near borehole no. OIBD-52 is because the exact location of the borehole No. OIBD-51 drilled by Directorate of Geology, Orissa is doubtful.

4.3 COAL SEAMS

4.3.1 GENERAL

4.3.1.1 Detail exploration in Dulanga Block has revealed the presence of coal bearing horizons belonging to Karharbari & Barakar Formations. However, major part of the economic coal resources is confined to Barakar only. Three major coal seams occur in this block under report viz. Parkhani, Lajkura & Rampur, in descending order in Barakar Formation. In Karharbari Formation very thin coal bands are seen with no economic potentiality in the block.

4.3.1.2 The Parkhani seam which is the top most seams in the block developed persistently in the southern part of the block in a limited area.

4.3.1.3 Lajkura seam underlies the Parkhani seam and is the thickest coal horizon in the block. It has splitted into 6 major coal sections as Lajkura Bottom-I, Lajkura Bottom-II, Lajkura Middle, Lajkura Top-(I+II), Lajkura Top-III in ascending order.

4.3.1.4 Rampur seam underlies the Lajkura seam and extensively developed throughout the area is a thick seam and has splitted into 6 coal sections as Rampur IAI, Rampur IAII, Rampur-I, Rampur-II, Rampur-IIIA & Rampur IIIB in ascending order.

4.3.1.5 Besides the above major coal seams, three local seams are found to be persistent and occur in the southern part of the block. These coal seams have been correlated as L1, L2 & L3 in ascending order. The L1 seam occur in between Lajkura Bottom II seam and Lajkura middle seam where as the L2 and L3 seam occur in between Lajkura middle and Lajkura Top (I+II) seam in ascending order.

4.3.1.6 All the 15 seams are mainly composed of coal, shaly coal, carbonaceous shale and shale. The coal is dull in appearance high in moisture and is of non-coking type. The coal seams in this block are not affected by any igneous intrusions.

4.3.2 CORRELATION OF COAL SEAMS

4.3.2.1 Seam correlation adopted by Directorate of Geology, Orissa in the interim geological repot on Dulanga block (August 2000) has been considered as the basis of correlation.

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4.3.2.2 To delineate the seam precisely detailed studies have been carried out taking into consideration the thickness, stratigraphic position of seams, nature and thickness of dirt bands and quality etc.

4.3.2.3 The seams have been delineated on the basis of chemical analysis received from chemical laboratory MECL, Nagpur. In case of seams where the chemical analysis is not available such as samples sent for washability test and physico-mechanical test, the seam delineation has been done on visual basis and for determination of quality of these boreholes were not considered.

4.3.2.4 The norms established for non-coking coal have been followed for delineation of coal seams.

Coal	:	Ash+moisture upto 40%
Shaly coal	:	Ash+moisture >40% to 55%
Carbonaceous shale	:	Ash+moisture >55% to 75%
Obvious bands	:	Ash + Moisture >75%

4.3.2.5 Coal and shaly coal are grouped together to form coal seam. Thus, while demarcating the coal seam shaly coal occurring at roof and floor has been included in the coal seam.

4.3.2.6 Carbonaceous shale band has been considered as combustible dirt band while shale with its facies and sandstone have been treated as obvious bands

4.3.2.7 While delineating the roof and floor of the seam combustible and obvious bands, dirt bands occurring near roof and floor have been included in seam, if the thickness of bands is less than that of coal / shaly coal bands overlying and underlying it. The representative graphic seam correlation chart is shown in **Plate No.11.**

4.3.2.8 While computing effective thickness of the seam, all the carbonaceous shale bands and obvious bands as well as contiguous dirt bands have been excluded as detailed below.

BCS: Excluding all carb shale & obvious bands irrespective of thickness
I 30: Excluding all carb shale & obvious bands of more than 0.30m thickness
I100: Excluding all carb shale & obvious bands of more than 1.00m thickness
Ip : Including all carb shale and obvious bands irrespective of Thickness

4.3.3 SEQUENCE OF COAL SEAMS

4.3.3.1 The variation in thickness of coal seams and their intervening partings intersected in boreholes drilled by MECL & Directorate of Geology, Orissa

within the block has been given in **Table 4.3.** Part thickness of seam/intervening; parting due to fault/sub crop have not been considered in preparing this table.

TABLE NO. 4.3
SEQUENCE OF COAL SEAM AND PARTING, DULANGA BLOCK

Coal Seams	Thickness of coal seams (m)		Thickness of parting (m)	
	Minimum	Maximum	Minimum	Maximum
Parkhani	0.61 (MNID-22)	2.11 (OIBD-17)		
Parting			60.40 (OIBD-17)	68.16 (MNID-22)
Lajkura Top-III	1.10 (OIBD-50)	7.77 (MNID-25)		
Parting			0.41 (OIBD-31)	2.64 (MNID-23)
Lajkura Top(I+II)	3.33 (OIBD-8)	12.09 (OIBD-31)		
Parting			5.74 (OIBD-37)	17.18 (OIBD-7)
L3	0.31 (OIBD-51)	4.03 (MNID-12)		
Parting			3.25 (MNID-22)	36.67 (MNID-28)
L2	0.08 (MNID-25)	4.69 (MNID-22)		
Parting			8.37 (OIBD-10)	21.52 (MNID-25)
Lajkura Middle	2.28 (MNID-18)	7.05 (OIBD-47)		
Parting			14.09 (MNID-23)	39.11 (OIBD-28)
L1	0.11 (OIBD-23)	3.39 (OIBD-28)		
Parting			3.60 (MNID-25)	13.16 (OIBD-21)
Lajkura Bottom-II	0.44 (MNID-22)	11.05 (MNID-25)		
Parting			0.78 (OIBD-28)	17.72 (MNID-22)
Lajkura Bottom-I	0.31 (OIBD-33)	4.86 (MNID-2)		
Parting			30.87 (OIBD-25)	59.13 (OIBD-52)
Rampur-IIIB	0.10 (OIBD-43)	3.37 (OIBD-6)		

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Coal Seams	Thickness of coal seams (m)		Thickness of parting (m)	
	Minimum	Maximum	Minimum	Maximum
Parting			0.47 (MNID-28)	5.87 (MNID-22)
Rampur-IIIA	0.15 (OIBD-50)	3.34 (OIBD-28)		
Parting			0.46 (OIBD-2)	3.54 (OIBD-50)
Rampur-II	0.19 (MNID-18)	3.28 (OIBD-57)		
Parting			0.19 (OIBD-38	2.40 (OIBD-58)
Rampur-I	1.61 (OIBD-4)	11.74 (OIBD-48)		
Parting			1.52 (OIBD-40)	12.35 (MNID-22)
Rampur-IAII	0.25 (MNID - 28)	4.15 (MNID-25)		
Parting			1.21 (OIBD-52)	8.68 (MNID-21)
Rampur-I AI	0.07 (OIBD-39)	5.82 (OIBD-8)		

4.3.4 BEHAVIOUR OF COAL SEAM

4.3.4.1 Rampur seam with 6 splits except Rampur-I has gradually reducing trend in thickness towards northeast. Rampur-I is the thickest seam amongst them. The rest of Rampur sections are thin in nature. The dirt band occurring between the split sections of Rampur seam (in seam parting) between Rampur & Lajkura seam is gradually increasing towards the southeastern part of the block.

4.3.4.2 Lajkura seam with three major splits i.e. Lajkura Bottom, Lajkura Middle and Lajkura Top are composite horizons having average thickness of 10-12m, 4-5m and 16-18m respectively. In view of the high interbanding nature of the seams, it was decided to remove some highly interbanded portion and consider the coal seams in splits so that the quality of the coal seam improves

4.3.4.3 It is observed from borehole intersections of Lajkura Top seam except some boreholes, the parting between Lajkura Top-I & Lajkura Top-II is less than 1m and if these two seams are combined, the average grade is not affected adversely. Hence, these two seams have been taken up combinely for all practical purpose as Lajkura Top (I+II) seam.

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4.3.4.4 In both Rampur and Lajkura group of seams, coal seams at places are separated by parting of less than 1m. In most of the boreholes the parting between Rampur-I and Rampur-II seams is less than 1m. But, if these two seams are combined including their parting (as it is less than 1m) it is observed that in most of the cases the quality of the entire seam is becoming ungraded. Therefore, to improve the quality of the coal, the above two splits are considered separately. Similarly, in few cases the parting between Rampur-IIIB and Rampur-IIIA, Rampur-IIIA and Rampur-II, Lajkura Bottom II and Lajkura Bottom-I and Lajkura Top-III and Lajkura Top(I+II) are less than 1m.Hence, in view of improvement in quality and for the sake of consistency, the coal sections in the above cases have been treated separately.

4.3.4.5 The L1 seam is found developed in the southern half of the block and attains a thickness of >1.00 m in two patches in southern & western part of the block. The seam is thicker in the southern part as compared to the western portion. The L2 seam is developed only in the southern corner of the block in a limited area. The development of L3 seam is also confined to the southern part of the block. The thickness of the seam moreover increases towards the southern corner.

4.3.4.6 Besides the above three persistence local coal seams, there are a number of thin and impersistent coal bands occurring in localized patches are found within the block.

4.3.4.7 IB Seam is non-existent in the block as per the Geological Reports submitted by Directorate of Geology, Odisha & MECL. There are 12 correlatable horizons consisting of Rampur, Lajkura, Parkhani & local group of seams

4.3.5 QUALITY OF COAL SEAMS

4.3.5.1 To assess the quality of coal seams, coal core samples are sent to analytical laboratories for band-by-band analysis for their ash and moisture contents. After receiving the results, the coal samples have further been subjected to overall analysis at 60% RH and 40°C.

4.3.5.2 The seam overall analysis of all seams of all most all samples have been determined at 60% RH and 40°C except in few cases. In such cases the quality assessment of boreholes has been calculated from band-by-band analytical results by weighted average method. The calculated values obtained from band-by-band data on air dried basis have been converted to equilibrated basis (60% RH and 40°C) by using M100 formula.

4.3.5.3 The UHV for the respective coal seam for all the boreholes were determined using the formula.

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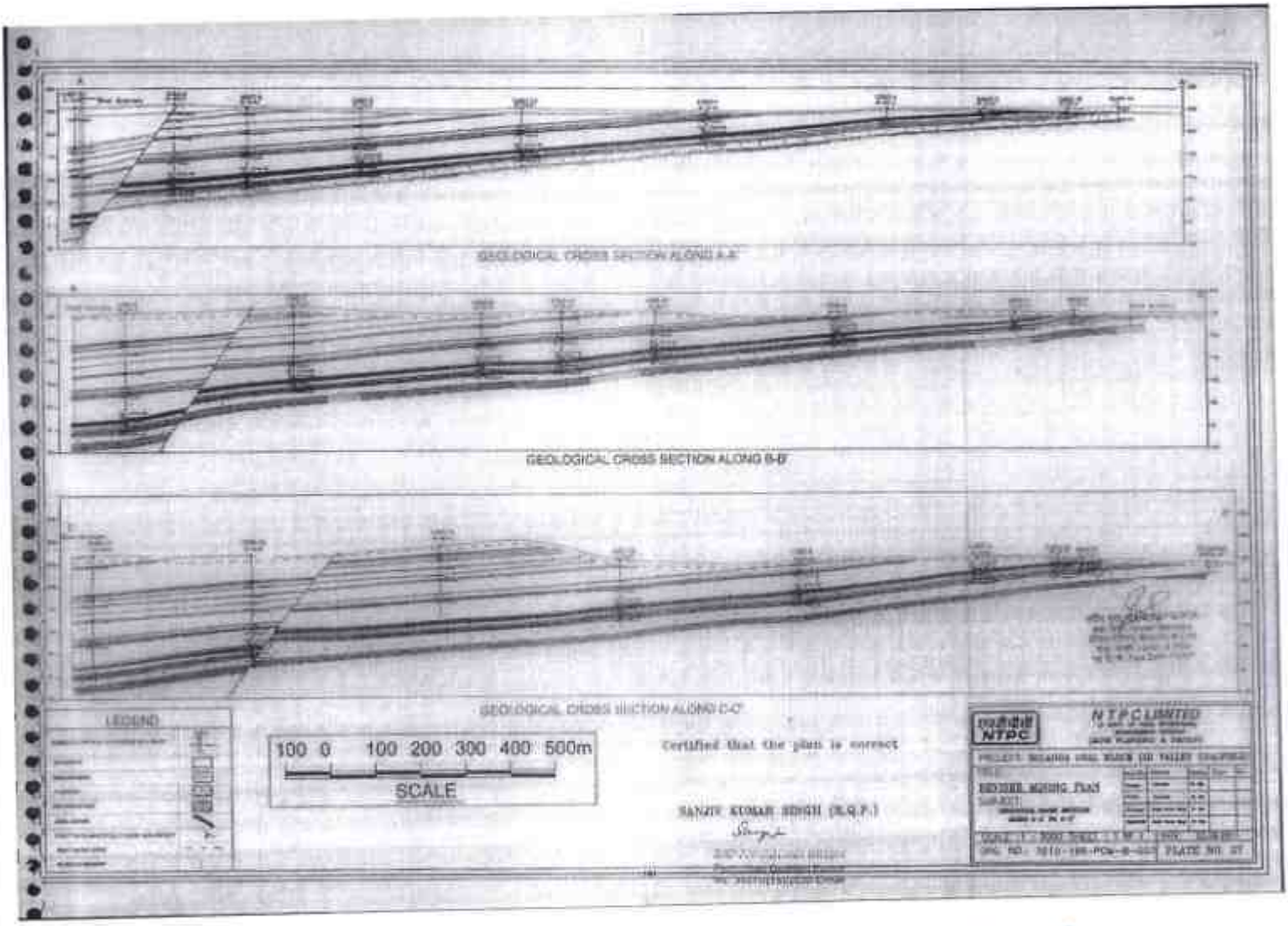

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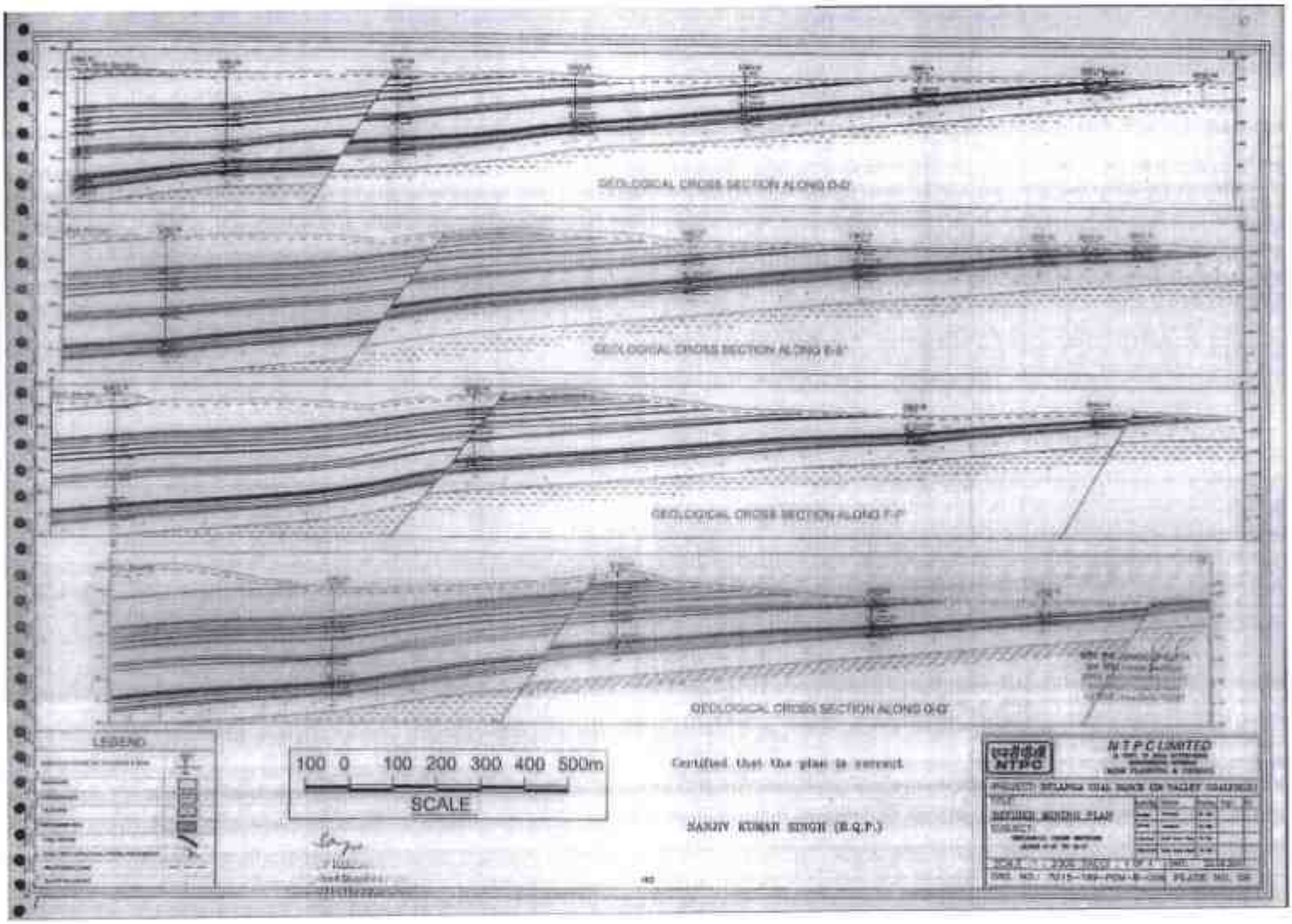

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UHV=8900-138(A%+ M%) K. Cal/Kg

4.3.5.4 Based on the UHV values the grade of the coal seam was determined as per the following standards.

UHV K.Cal/Kg	Ash%+Moisture %	Grade
6200 and above	19.56	A
6200-5600	19.56-23.91	B
5600-4940	23.91-28.69	C
4940-4200	28.69-34.05	D
4200-3360	34.05-40.14	E
3360-2400	40.14-47.10	F
2400-1300	47.10-55.07	G

It has been observed that in some cases, the Moisture% and Ash% of dirt bands have not been determined by analytical methods. In such cases, the determined value has taken for the respective litho types to calculate the seam overall data. Average Moisture% and Ash% of grey shale, sandy shale and sandstone have been taken as 1% and 80%, 1% & 85% and 0.5% and 90% respectively.

4.3.5.5 For detail assessment of quality of coal seams some of the boreholes have been subjected to special test analysis such as Ultimate analysis, Ash analysis Total sulphur and Sulphur distribution, Ash Fusion Temperature, Phosphorous content, HGI, Swelling Index and Coke type.

4.3.5.6 The structure of coal seams has been drawn (RF 1:50) based on the analysis received from laboratory. The litho column of 3m on the roof and 1m below the floor has also been drawn on the seam structure plates based on visual logs.

4.3.6 DESCRIPTION OF COAL SEAMS

4.3.6.1 The seams have been described in descending order.

i) A total of three major coal seams viz. Parkhani, Lajkura & Rampur are developed in Dulanga Block. Rampur seam with splits of 6 Nos. and Lajkura with splits of 5 Nos. occur within the block while Parkhani seam has got no split. Besides the three major coal seams, three more local seams are found to occur in the block. Due to their local development they have been correlated as L1, L2 & L3 in ascending order. All the above splits including the local ones have been concluded and considered as separate seam for description highlighting their

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stratigraphic position, incrop, thickness, nature of parting, immediate roof and floor, dirt bands, quality and reserve. Some local seams which are thin, impersistent and occur in localized patches have not been incorporated in this report.

ii) While describing the number of intersections and tabulating various parameters of seams, 60 boreholes of OIBD series drilled by D.M.G (O) and 26 boreholes of MNID series drilled by MECL have been considered. Out of the total 90 boreholes drilled in the block, 4 MNID series boreholes (MNID-26, 27, 29 & 30) have not intersected any coal seam as they are falling beyond incrop of Rampur IAI seam. A total no. of 6 OIBD series boreholes (OIBD-10, 17, 19, 51, 53 & 60) and 3 MNID series (MNID-3, 4 & 16) are not drilled deeper and in 4 no. of boreholes (OIBD-31, MNID-20, 21 & 28) one or more seams are found faulted. In a total of 33 boreholes (OIBD series 23 No. of bhs. & MNID series 10 No. of bhs.), one or more seams are not developed. Thus, all the coal seams including all sections have been encountered only in 4 boreholes (MNID-2, 19, 22 & 25) drilled in the block.

iii) The partings have been described with respect to the underlying seam. The description of lithology of partings between seams and roof & floor of seams indicate the dominant lithounits.

iv) The part thickness of sections either due to faulting or subcrop has not been considered for drawing isochore, isograde etc.

v) In describing roof characteristics of seam the immediate roof as well as the three metre column above coal seam has been considered. Similarly, the description of floor includes the immediate floor and one metre column below the coal seam. If three metre column above seam and one metre column below the seam is not persisting the parting with the overlying and underlying seam respectively has been taken into consideration for this purpose.

vi) In case of all the boreholes quality has been described on the basis of overall analysis determined on 60% RH and 40°C (Annexure-IV) , and the boreholes for which overall analysis have not been determined, the quality of seam has been calculated on the basis of equilibration (M100) basis except for boreholes sent for washability study (MNID-7,8,10,11,13,14,15,16 & 17) and physico-mechanical study (MNID-22). In such cases the seam thickness/ I-100 thickness has been considered for the preparation of seam folio plan and floor contour plan. For quality determination of seams these boreholes are not considered.

4.3.7 SEAM PARKHANI

4.3.7.1 Occurrence: Seam Parkhani, the youngest seam in the block occurring in Barakar formation overlies the Lajkura Top-III seam.

4.3.7.2 Incrop: The seam incrops in the southern part of the block. The incrop of the seam measuring 2.384 Km can be traced from the southeastern to southwestern boundary and is located to the south of borehole No.OIBD-5,48,25,28 & 37. No borehole has been drilled along the incrop of the seam. So the incrop zone of the seam has been tentatively drawn basing on the data of the boreholes drilled along the down dip side of the incrop.

4.3.7.3 Borehole intersections: The seam is fully intersected in 7 boreholes. The maximum and minimum depth of the floor of the seam is 7.79m (MNID-22) and 29.90m (MNID-19) respectively. In all the 7 boreholes the seam has been intersected within 100 m depth. The floor contour plan is shown in **Plate No. 12.**

4.3.7.4 Parting: The parting with the underlying Lajkura Top-III seam varies from 59.45m (OIBD-53) to 68.16 (MNID-22) only.

4.3.7.5 Thickness: The thickness of the seam varies from 0.61m (MNID-22) to 2.11m (OIBD-17). The seam is unworkable only in one borehole (MNID-22) where the seam thickness is less than 1.00m. The seam folio plan is shown in **Plate No. 27.**

4.3.7.6 Dirt Bands : The dirt bands upto 1.00m thickness varying in number 1 to 3 are noticed in 4 boreholes varying in thickness from 0.10m (MNID-25) to 0.58 (OIBD-17).

4.3.7.7 Roof & Floor: The immediate roof of the seam comprises mostly of carb shale and the 3.00m roof column is dominated by sandstone. The immediate floor of the seam is characterized by shale. The 1.0 m floor column is also characterized by shale but with subordinate sandstone.

4.3.7.8 Quality: The moisture and ash content of Parkhani seam varies from 4.60% (MNID-19) to 8.10% (MNID-2) and 36.60% (MNID-2) to 50.20% (OIBD-17) respectively. UHV varies from 1324 (OIBD-17) to 2731 K.Cal/Kg (MNID-2) and the grade varies from G to F. The grade of the seam over the major part is G, which improves to F in localized patches around MNID-2 & MNID-25. The summarized statement of quality is given in **Table 4.4**

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TABLE 4.4
RANGE OF QUALITY PARAMETERS (ON 60% RH & 40°C) FOR SEAM PARKHANI

PARAMETER	MINIMUM	MAXIMUM
Moisture%	4.60 (MNID-19)	8.10 (MNID-2)
Ash%	36.60 (MNID-2)	50.20 (OIBD-17)
VM%	23.60 (MNID-19)	25.30 (MNID-25)
FC%	27.90 (MNID-19)	31.30 (MNID-2)
UHV (K.Cal/Kg)	1324 (OIBD-17)	2731 (MNID-2)
Grade	G (OIBD-17)	F(MNID-2)
GCV (K.cal/Kg)	3520 (MNID-25)	3700 (MNID-2)

A. Ultimate analysis: The Ultimate analysis of seam Parkhani has been determined in 2 boreholes viz. MNID-19 & MNID-25 and the range of the same is presented below.

Range of Ultimate analysis of Seam Parkhani

Range	Carbon%	Hydrogen%	Nitrogen%	Sulphur%	Oxygen%
Minimum	37.75	2.62	0.32	0.53	5.84
Maximum	45.36	3.12	0.36	0.74	8.46

B. Sulphur distribution: The total sulphur for seam Parkhani has been determined in 3 boreholes viz. MNID-2, 19 & 25. The sulphur distribution has been carried out for one borehole viz.MNID-25 and is given below.

Distribution of Sulphur for Seam Parkhani

Range	Total Sulphur	Inorganic Sulphur	Organic Sulphur	Pyritic Sulphur
Minimum	0.50	5.4	51.38	43.24
Maximum	0.74	5.4	51.38	43.24

C. Ash analysis: The ash analysis has been determined for seam Parkhani in 2 boreholes viz.MNID-19 & 25 and the range of results are presented below.

Range of Ash Analysis for Seam Parkhani

Constituent	Range	
	Minimum	Maximum
SiO_2	61.48	62.46
Al_2O_3	24.68	25.90
Fe_2O_3	6.80	6.90
TiO_2	1.60	1.72
CaO	0.79	0.83
MgO	0.97	1.21
Na_2O	0.38	0.45
K_2O	0.20	0.23
SO_3	0.68	0.72
P_2O_5	0.26	0.28

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D. Ash Fusion Temperature (AFT): Ash Fusion Temperature range of Parkhani seam has been determined in 2 boreholes viz.MNID-19 & 25 and the results are given below.

Range of Ash Fusion Temperature for Seam Parkhani

Range	IT	ST	HT	FT
Minimum	1293	>1450	>1450	>1450
Maximum	1297	>1450	>1450	>1450

E. Phosphorous Content: The Phosphorous content of seam has been determined for 2 boreholes viz.MNID-19 & 25 and the range of results are given below:

Range of Phosphorous content for Seam Parkhani

Range	Phosphorous %	BH. No.
Minimum	0.14	MNID-19
Maximum	0.15	MNID-25

F. Swelling Index and Coke Type: The swelling index and coke type has been determined in 2 boreholes viz.MNID-19 & 25. The swelling index and coke type of the seam is 0 & A respectively.

4.3.7.9 Reserve: A total 0.60 Million Tonnes of opencast reserves has been assessed.

4.3.8 SEAM LAJKURA TOP-III

4.3.8.1 Occurrence: Seam Lajkura Top-III is the top most split of Lajkura seam occurring in Barakar formation. It underlies the Parkhani seam.

4.3.8.2 Incrop: The seam incrops in the southern part of the block. The incrop of the seam is located to the south of borehole No.OIBD-7 & 51, MNID-18 & OIBD-20. The length of the incrop is 2.587 Km and can be traced from the southeastern boundary of the block. The configuration of the incrop comprises multiple crest and tough due to surface topography. No borehole has been drilled along the incrop zone of the seam. Only one borehole (OIBD-50) has been drilled on the incrop zone of the seam. However, the incrop zone of the seam has been delineated tentatively based on the data of the boreholes drilled along the downdip side of the incrop.

4.3.8.3 Borehole intersections: The seam is fully intersected in 21 boreholes and partly in one borehole. In all the boreholes the seam has been intersected within 100.00m depth. The minimum and maximum depth of intersection of floor of the seam is 5.00m (OIBD-50) and 98.25m (MNID-19) respectively. The floor contour plan is shown in **Plate No. 13.**

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4.3.8.4 Parting: Lajkura Top-III seam is underlain by Lajkura Top (I+II) seam with a parting varying from 0.41m (OIBD-31) to 2.64m (MNID-23) and overlain by Parkhani seam with 58.35m (OIBD-17) to 68.16m (MNID-22).

4.3.8.5 Thickness: The thickness of the seam varies from 2.74m (OIBD-57) to 7.77m (MNID-25). The average thickness of the seam is 4.21m only. The seam folio plan is shown in **Plate No. 28.**

4.3.8.6 Dirt Bands: The dirt bands upto 1.00m thickness varying in number 1 to 4 are noticed in 14 boreholes varying in thickness from 0.11m (OIBD-10) to 1.19m (MNID-25). The seam does not contain any band more than 1.00m thickness. The dirt bands constituting upto 15% is observed in borehole No.MNID-25.

4.3.8.7 Roof & Floor: The immediate roof of the seam comprises mostly of sandstone with subordinate shale. The 3.00m roof column is dominated by sandstone with subordinate clay. The immediate floor of the seam comprises of shale with subordinate carb shale and the 1.00m floor column is also dominated by shale with subordinate carb shale.

4.3.8.8 Quality: The moisture & ash content of Lajkura Top-III seam varies from 2.90% (MNID-25) to 8.30% (OIBD-57) and 32.80% (OIBD-17) to 51.70% (MNID-25) respectively. The UHV varies from 1365 (MNID-25) to 3490 K.Cal/Kg (OIBD-17). The grade ranges from G to E. The grade of the seam over the major part is F which improves to E in localised patches around borehole OIBD-37, 10, 16 & 5. Whereas MNID-25 the grade of the seam deteriorates to G. The summarized statement of quality is given in **Table 4.5.**

TABLE 4.5
RANGE OF QUALITY PARAMETERS (ON 60% RH & 40°C) FOR SEAM LAJKURA-TOP III

PARAMETER	MINIMUM	MAXIMUM
Moisture%	2.90 (MNID-25)	8.30 (OIBD-57)
Ash%	32.80 (OIBD-17)	51.70 (MNID-25)
VM%	22.00 (MNID-25)	26.00 (MNID-23)
FC%	23.40 (MNID-25)	32.90 (MNID-21)
UHV (K.Cal/Kg)	1365 (MNID-25)	3490 (OIBD-17)
Grade	G (MNID-25)	E(OIBD-17)
GCV (K.cal/Kg)	3920 (MNID-21)	4130 (MNID-20)

A. Ultimate analysis: The Ultimate analysis of seam Lajkura Top-III has been determined in 4 boreholes viz. MNID-12, 20, 21 & 25 and the range of the same is presented below.

Range of ultimate analysis of Seam Lajkura Top-III

Range	Carbon%	Hydrogen%	Nitrogen%	Sulphur%	Oxygen%
Minimum	37.55	2.77	0.25	0.51	4.91
Maximum	43.47	4.58	0.30	0.83	8.19

B. Sulphur Distribution: The total sulphur content for seam Lajkura Top-III has been determined in 5 boreholes viz. MNID-2, 12, 20, 21 & 25 where as the sulphur distribution has been carried out in 4 boreholes viz.MNID-12, 20, 21 & 25 and the range is given below.

Distribution of Sulphur for Seam Lajkura Top-III

Range	Total Sulphur	Inorganic Sulphur	Organic Sulphur	Pyritic Sulphur
Minimum	0.51	4.76	48.19	38.46
Maximum	0.92	10.25	51.29	46.99

C. Ash analysis: The ash analysis has been determined for Lajkura Top-III in 4 boreholes viz.MNID-12, 20, 21 & 25 and the range of results are presented below.

Range of Ash Analysis for Seam Lajkura Top-III

Constituent	Range	
	Minimum	Maximum
SiO_2	61.00	63.34
Al_2O_3	25.19	28.42
Fe_2O_3	4.09	7.86
TiO_2	1.35	1.70
CaO	0.42	0.92
MgO	0.38	0.58
Na_2O	0.11	0.15
K_2O	0.10	0.13
SO_3	0.08	2.73
P_2O_5	0.24	0.56

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D. Ash Fusion Temperature (AFT): Ash Fusion Temperature range of Lajkura Top-III seam has been determined in 4 boreholes viz.MNID-12, 20, 21 & 25 and the results are given below.

Range of Ash Fusion Temperature for Seam Lajkura Top-III

Range	IT	ST	HT	FT
Minimum	>1450	>1450	>1450	>1450
Maximum	>1450	>1450	>1450	>1450

E. Phosphorous Content: The Phosphorous content of seam Lajkura Top-III has been determined for 4 boreholes viz.MNID-12, 20, 21 & 25 and the range of results are given below:

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Range of Phosphorous content for Seam Lajkura Top-III

Range	Phosphorous %	BH. No.
Minimum	0.06	MNID-25
Maximum	0.18	MNID-21

F. Swelling Index and Coke Type: The swelling index and coke type has been determined in 3 boreholes viz.MNID-12, 21 & 25. The swelling index and coke type of the seam is 0 & A respectively.

G. Hardgrove Grindability Index (HGI): The HGI has been determined for seam Lajkura Top-III in 2 boreholes viz.MNID-12 & 21 and the values observed as 66 and 72 respectively.

4.3.8.9 Reserve: A total 12.383 Million Tonnes of opencast reserves has been assessed.

4.3.9 SEAM LAJKURA TOP (I+II)

4.3.9.1 Occurrence: Lajkura Top (I+II) seam overlies Seam L3 and underlies the Lajkura Top-III seam. The seam occurs within 100m depth in 20 boreholes, more than 100m to 200m depth in 5 boreholes.

4.3.9.2 Incrop: The seam incrops in the southern part of the block and is located to the south of borehole No.MNID-6, OIBD-51 & MNID-18. The strike length of the incrop is 3.316 Km. The incrop of the seam can be traced from the south eastern boundary of the block. The incrop of the seam has been proved by one borehole only. So the incrop zone of this seam has been tentatively drawn basing on the data of the boreholes drilled along the down dip side of the incrop. The disposition of the incrop is found to be wavy due to be surface topography comprising hillocks and valleys.

4.3.9.3 Borehole intersections: The seam is fully intersected in 25 boreholes. The minimum and maximum depths of floor of the seam are 14.55m (OIBD-50) and 109.23 m (MNID-19) respectively. The floor contour plan is shown in **Plate No. 14.**

4.3.9.4 Parting: The parting between Lajkura Top (I+II) & underlying L3 Seam varies from 5.74m (OIBD-37) to 17.18m (OIBD-7) and overlying Lajkura Top (III) seam varies from 0.41m (OIBD-3) to 2.64m (MNID-23).

4.3.9.5 Thickness: The thickness of the seam varies from 3.33m (OIBD-8) to 12.09m (OIBD-31) and fully intersected in 25 boreholes. The seam is well developed in an area of 2.325 Sq.Km within the block with an average thickness of 9.55m. The seam folio plan is shown in **Plate No. 29.**

4.3.9.6 **Dirt bands:** Dirt band upto 1m thickness varying in number from 1 to 8 is noticed in 25 boreholes varying in thickness from 0.65m (OIBD-8) to 3.00m (MNIID-2). Contiguous bands of >1.00m thickness is observed in 11 boreholes varying in thickness from 1.01m (OIBD-7) to 1.30m (MNID-28). The dirt bands constituting up to 30% of total thickness of the seam is observed in borehole No.MNID-22.

4.3.9.7 **Roof & Floor:** The immediate roof of the coal seam comprises mostly of carb shale with subordinate shale. The 3m roof column is dominated by coal with subordinate carb shale. The immediate floor of the seam comprises mostly of shale with occasional carb shale. The 1.00m floor column is dominated by intercalation of shale & sandstone with subordinate sandstone.

4.3.9.8 **Quality:** The Moisture & Ash content of the seam varies from 3.20% (OIBD-48) to 8.00% (OIBD-10) and 23.60% (OIBD -10) to 45.30% (MNID -28) respectively. UHV varies from 1945 (OIBD-33) to 4539 K.Cal/Kg (OIBD-10) and the grade varies from G to D. The grade of the seam over the major part is F to G which improves to D near the incrop around borehole No.OIBD-10. The summarized statement of quality is given in **Table 4.6.**

TABLE 4.6
RANGE OF QUALITY PARAMETERS (ON 60% RH & 40°C) FOR SEAM LAJKURA TOP (I+II)

PARAMETER	MINIMUM	MAXIMUM
Moisture%	3.20 (OIBD-48)	8.00 (OIBD-10)
Ash%	23.60 (OIBD-10)	45.30 (MNID-28)
VM%	23.20 (MNID-12)	25.70 (MNID-23)
FC%	27.60 (MNID-28)	31.60 (MNID-21)
UHV (K.Cal/Kg)	1945 (OIBD-33)	4539 (OIBD-10)
Grade	G (OIBD-33)	D(OIBD-10)
GCV (K.cal/Kg)	3590 (MNID-12)	3970 (MNID-2)

A. **Ultimate analysis:** The Ultimate analysis of seam Lajkura Top (I+II) has been determined in 4 boreholes viz. MNID-12, 20, 21 & 25 and the range of the same is presented below.

Range of ultimate analysis of Seam Lajkura Top (I+II)

Range	Carbon%	Hydrogen%	Nitrogen%	Sulphur%	Oxygen%
Minimum	41.88	2.78	0.22	0.57	7.14
Maximum	45.89	3.43	0.32	0.65	7.63

B. **Sulphur Distribution :** The total sulphur content for seam Lajkura Top (I+II) has been determined in 5 boreholes viz. MNID-2, 12, 20, 21 & 25 where as the sulphur distribution for Lajkura Top (I+II) seam has been carried out for 4 boreholes viz. .MNID-12, 20, 21 & 25 and the range is given below.

Distribution of Sulphur for Seam Lajkura Top (I+II)

Range	Total Sulphur	Inorganic Sulphur	Organic Sulphur	Pyritic Sulphur
Minimum	0.43	3.39	49.23	40.32
Maximum	0.77	7.09	52.59	46.15

C. Ash analysis: The ash analysis has been determined for Lajkura Top (I+II) seam in 4 boreholes viz.MNID-12, 20, 21 & 25 and the range of results are presented below.

Range of Ash Analysis for Seam Lajkura Top (I+II)

Constituent	Range	
	Minimum	Maximum
SiO_2	51.26	64.84
Al_2O_3	24.33	30.51
Fe_2O_3	4.59	16.49
TiO_2	1.63	1.87
CaO	0.50	1.69
MgO	0.41	0.58
Na_2O	0.13	0.19
K_2O	0.10	0.17
SO_3	0.41	1.23
P_2O_5	0.35	1.13

D. Ash Fusion Temperature (AFT): Ash Fusion Temperature range of Lajkura Top (I+II) seam has been determined in 4 boreholes viz.MNID-12, 20, 21 & 25and the results are given below.

Range of Ash Fusion Temperature for Seam Lajkura Top (I+II)

Range	IT	ST	HT	FT
Minimum	>1450	>1450	>1450	>1450
Maximum	>1450	>1450	>1450	>1450

E. Phosphorous Content: The Phosphorous content of seam Lajkura Top (I+II) has been determined for 4 boreholes viz.MNID-12, 20, 21 & 25 and the range of results are given below:

Range of Phosphorous content for Seam Lajkura Top (I+II)

Range	Phosphorous %	BH. No.
Minimum	0.04	MNID-25
Maximum	0.19	MNID-21

F. Swelling Index and Coke Type: The swelling index and coke type has been determined in 3 boreholes viz.MNID-12, 21 & 25. The swelling index varies from 0 to ½ and coke type from A to B.

G. Hardgrove Grindability Index (HGI): The HGI has been determined for seam Lajkura Top (I+II) in 2 boreholes viz.MNID-12 & 21 and the values observed as 71 for both the boreholes.

4.3.9.9 Reserve: A total 30.673 Million Tonnes of opencast reserves has been assessed.

4.3.10 SEAM L3

4.3.10.1 Occurrence: L3 seam overlies L2 seam and underlies Lajkura Top (I+II) seam. The seam occurs within 100m depth in 22 boreholes and more than 100m to 200m depth in 6 boreholes.

4.3.10.2 Incrop: The seam incrops in the southern part of the block and is located to the south of borehole No.OIBD-2, OIBD-52, MNID-18 & OIBD-23. The seam is mostly not developed in incrop side. No borehole has been drilled on the incrop zone of the seam. So the incrop of the seam has been tentatively drawn basing on the data of the boreholes drilled along the down dip side of the incrop. The disposition of the incrop is found to be wavy due to surface topography comprising hillocks & valleys.

4.3.10.3 Borehole intersections: The seam is fully intersected in 28 boreholes. The minimum and maximum depths of floor of the seam are 15.81m (MNID-6) and 120.14m (MNID-19) respectively. The floor contour plan is shown in **Plate No. 15.**

4.3.10.4 Parting: The parting between L3 & overlying Lajkura Top (I+II) varies from 5.74m (OIBD-37) to 17.18m (OIBD-7) and underlying L2 seam from 3.25m (MNID-22) to 36.67m (MNID-28) only.

4.3.10.5 Thickness: The thickness of the seam varies from 0.31m (OIBD-51) to 4.03m (MNID-12). The seam is well developed in the southern corner of the block with an average thickness of 1.34m only. In the western corner of the block the seam is reduced to less than 1.00m thickness except around borehole No. MNID-6 & MNID-28 where the thickness increases marginally. The seam folio plan is shown in **Plate No. 30.**

4.3.10.6 Dirt bands: Dirt bands upto 1.00m thickness varying in number from 1 to 2 are noticed only in 3 boreholes out of the 28 intersections. The thickness of the dirt bands varies from 0.41m (OIBD-37) to 0.90m (MNID-12) only. The contiguous bands of more than 1.00m thickness are not observed in any of the boreholes. The dirt bands constituting upto 22% of total thickness of the seam is observed in borehole No.MNID-12.

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4.3.10.7 Roof & Floor: The immediate roof of the seam comprises mostly of carb. shale with subordinate sandstone. The 3m roof column is dominated by sandstone with subordinate Intercalation of shale & sandstone. The immediate floor of the seam comprises mostly of shale with occasional carb. shale. The 1m floor column is dominated by shale with subordinate sandstone.

4.3.10.8 Quality: The Moisture and Ash Content of the seam varies from 3.70% (OBID-37) to 8.2% (MNID-2) and 15.4% (MNID-23) to 48.9% (OBID-37) respectively. UHV varies from 1614 (OHV-37) to 5864 (MNID-23) and the grade varies from G to B. The summarised statement of quality is given in **Table 4.7**

TABLE 4.7
RANGE OF QUALITY PARAMETERS (ON 60% RH 40°C) FOR SEAM L3

PARAMETER	MINIMUM	MAXIMUM
Moisture%	3.7 (OIBD-37)	8.2 (MNID-2)
Ash%	15.4 (MNID-23)	48.9 (OIBD-37)
VM%	25.9 (MNID-12)	33.4 (MNID-20)
FC%	33.1 (MNID-12)	44.1 (MNID-21)
UHV (K.Cal/Kg)	1641 (OIBD-37)	5864 (MNID-23)
Grade	G (OIBD-37)	B (MNID-23)
GCV (K.cal/Kg)	4310 (MNID-12)	5330 (MNID-21)

A. Ultimate analysis: The Ultimate analysis of seam L3 has been determined in 2 boreholes viz MNID-12 & MNID-21 and the range of the same is presented below.

Range of ultimate analysis for Seam L3

Range	Carbon%	Hydrogen%	Nitrogen%	Sulphur%	Oxygen%
Minimum	46.30	3.54	0.27	0.61	6.98
Maximum	58.02	4.21	0.32	0.68	9.37

B. Sulphur Distribution : The total sulphur content for seam L3 has been determined in 2 boreholes viz MNID-2 & 12 where as the sulphur distribution has been carried out in one borehole i.e. MNID-12 only and the range is given below.

Distribution of Sulphur for Seam L3

Range	Total Sulphur %	Inorganic Sulphur %	Organic Sulphur %	Pyritic Sulphur %
Minimum	0.61	4.92	50.82	44.26
Maximum	0.84	4.92	50.82	44.26

C. Ash analysis: The ash analysis has been determined for L3 seam in 2 boreholes viz.MNID-12 & 21 and the range of results are presented below.

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Range of Ash Analysis for Seam L3

Constituent	Range	
	Minimum	Maximum
SiO_2	58.86	60.25
Al_2O_3	26.75	28.24
Fe_2O_3	7.87	8.92
TiO_2	1.80	1.83
CaO	0.25	0.39
MgO	0.38	0.42
Na_2O	0.11	0.16
K_2O	0.12	0.15
SO_3	0.10	0.93
P_2O_5	0.31	0.34

D. Ash Fusion Temperature (AFT): Ash Fusion Temperature range for seam L3 has been determined in 2 boreholes viz.MNID-12 & 21 and the results are given below.

Range of Ash Fusion Temperature for Seam L3

Range	IT	ST	HT	FT
Minimum	>1450	>1450	>1450	>1450
Maximum	>1450	>1450	>1450	>1450

E. Phosphorous Content: The Phosphorous content of seam L3 has been determined for 2 boreholes viz.MNID-12 & 21 and the range of results are given below:

Range of Phosphorous content for Seam L3

Range	Phosphorous %	BH. No.
Minimum	0.04	MNID-12
Maximum	0.19	MNID-21

F. Swelling Index and Coke Type: The swelling index and coke type has been determined in 2 boreholes viz.MNID-12 & 21. The swelling index of the seam varies from 0 to ½ and the coke type from A to B.

4.3.10.9 Reserve: A total 4.690 Million Tonnes of open cost reserves has been assessed.

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4.3.11 SEAM L2

4.3.11.1 Occurrence: L2 seam overlies Lajkura middle and underlies L3 seam. The seam occurs within 100m depth in 14 boreholes, and more than 100m to 200m depth in 12 boreholes.

4.3.11.2 Incrop: The seam incrops in the southern part of the block and is located to the south of borehole No.OIBD-6, 26 & 59. The seam is mostly not developed in the incrop side. As no borehole has been drilled on the incrop zone of the

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seam, the incrop has been tentatively drawn basing on the data of the boreholes drilled along the down dip side of the incrop.

4.3.11.3 Borehole intersections: The seam is fully intersected in 26 boreholes. The minimum and maximum depths of floor of the seam are 13.45m (OIBD-22) and 137.39m (OIBD-53) respectively. The floor contour plan is shown in **Plate No. 16.**

4.3.11.4 Parting: The parting between seam L2 & underlying Lajkura middle seam varies from 8.37m (OIBD-10) to 21.52m (MNID-25) and overlying L3 seam varies from 3.25m (MNID-22) to 36.67m (MNID-28).

4.3.11.5 Thickness: The thickness of the seam varies from 0.08m (MNID-25) to 4.69m (MNID-22) and fully intersected in 26 boreholes. The seam is developed in the southern part of the block, with an average thickness of 1.13m. The seam folio plan is shown in **Plate No. 31.**

4.3.11.6 Dirt bands: Dirt bands upto 1m thickness varying in number from 1 to 4 is noticed in 8 boreholes varying in thickness from 0.09m (OIBD-28) to 0.92m (MNID-22). The dirt bands constituting upto 33% of total thickness of the seam is observed in borehole No. MNID-23.

4.3.11.7 Roof & Floor: The immediate roof of the coal seam comprises mostly of shale with subordinate sandstone. The 3.00m roof column is dominated by sandstone only. The immediate floor of the seam comprises mostly of shale with subordinate carb shale. The 1.00m floor column is dominated by argillaceous sandstone with subordinate shale.

4.3.11.8 Quality: The Moisture and Ash content of the seam varies from 3.1 (MNID-21) to 5.0 (OIBD-37) and 30.7 (OIBD-37) to 48.1 (MNID-2) respectively. UHV varies from 1586 K.Cal/kg (MNID-2) to 3973 K.Cal/kg (OIBD-37) and the grade from G to E. The summarised statement of quality are given in **Table 4.8**

TABLE 4.8
RANGE OF QUALITY PARAMETERS (ON 60% & RH 40°C) FOR SEAM L2

PARAMETER	MINIMUM	MAXIMUM
Moisture%	3.1 (MNID-21)	5.0 (OIBD-37)
Ash%	30.7 (OIBD-37)	48.1 (MNID-2)
VM%	21.9 (MNID-2)	25.6 (MNID-20)
FC%	25.1 (MNID-2)	29.7 (MNID-12)
UHV (K.Cal/Kg)	1586 (MNID-2)	3973 (OIBD-
Grade	G (MNID-2)	E(OIBD-37)
GCV (K.cal/Kg)	3250 (MNID-2)	3990 (MNID-

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A. Ultimate analysis: The Ultimate analysis of seam L 2 has been determined in 1 borehole viz. MNID-21 which is presented below.

Range of ultimate analysis for Seam L2

Carbon%	Hydrogen%	Nitrogen%	Sulphur%	Oxygen%
42.51	3.10	0.29	0.60	7.20

B. Sulphur Distribution: The total sulphur content for seam L2 has been determined in 2 boreholes viz. MNID-2 & 21 where as the sulphur distribution has been carried out in one borehole (MNID-2) only.

Distribution of Sulphur for Seam L 2

Range	Total Sulphur%	Inorganic Sulphur%	Organic Sulphur%	Pyritic Sulphur%
Minimum	0.49	5.00	48.33	46.67
Maximum	0.60	5.00	48.33	46.67

C. Ash analysis: The ash analysis has been determined from seam L2 in 1 borehole viz. MNID-21 and the results are presented below.

Result of Ash Analysis for Seam L 2

Constituent	%
SiO_2	59.02
Al_2O_3	31.07
Fe_2O_3	6.38
TiO_2	1.73
CaO	0.21
MgO	0.30
Na_2O	0.13
K_2O	0.15
SO_3	0.10
P_2O_5	0.25

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D. Ash Fusion Temperature (AFT): Ash Fusion Temperature range for seam L3 has been determined in 1 borehole viz.MNID-21 and the results are given below.

Result of Ash Fusion Temperature for Seam L 2

IT	ST	HT	FT
>1450	>1450	>1450	>1450

E. Phosphorous Content: The Phosphorous content of seam L2 has been determined for 1 borehole viz.MNID-21 is 0.04% only.

F. Swelling Index and Coke Type: The swelling index and coke type has been determined in 1 borehole viz.MNID-21. The swelling index of the seam is 0 where as the coke type is A.

4.3.11.9 Reserve: A total 4.590 Million Tonnes of opencast reserves has been assessed.

4.3.12 SEAM LAJKURA-MIDDLE

4.3.12.1 Occurrence: Lajkura-Middle seam is underlain by L1 seam and overlain by L2 seam. The seam occurs within 100m depth in 20 boreholes, more than 100m to 200m depth in 17 boreholes.

4.3.12.2 Incrop: The seam incrops in the central part of the block and is located to the south of borehole No.OIBD-44, 42, 27, 20, 59 & 23. The strike length of the incrop is 2.898 Km. The incrop of the seam can be traced from south eastern to northwestern boundary of the block. No borehole has been drilled along the incrop of the seam. The incrop zone of this seam has been tentatively drawn basing on the data of the boreholes drilled along the down dip side of the incrop.

4.3.12.3 Borehole intersections: The seam is fully intersected in 37 boreholes. The minimum and maximum depths of floor of the seam are 9.89m (OIBD-55) and 153.88 m (OIBD-53) respectively. The floor contour plan is shown in **Plate No. 17.**

4.3.12.4 Parting: The parting between Lajkura-Middle & underlying L1 seam varies from 14.09 m (MNID-23) to 39.11m (OIBD-28) and overlying L2 seam varies from 8.37m (OBID-10) to 21.52m (MNID-25).

4.3.12.5 Thickness: The thickness of the seam varies from 2.28m (MNID-18) to 7.05m (OIBD-47) and fully intersected in 37 boreholes. The seam is well developed throughout the block with an average thickness of 4.08m. The seam folio plan is shown in **Plate No. 32.**

4.3.12.6 Dirt bands: Dirt band upto 1m thickness varying in number from 1 to 5 is noticed in 33 boreholes varying in thickness from 0.10m (MNID-21) to 1.26m (OIBD-36). The seam contains a band of more than 1m thickness i.e. 1.20m only in one borehole (OIBD-47). The dirt bands constituting upto 28% of total thickness of the seam is observed in one borehole (OIBD-36).

4.3.12.7 Roof & Floor: The immediate roof of the coal seam comprises mostly of sandstone with subordinate shale. The 3m roof column is dominated by sandstone with subordinate intercalation of shale & sandstone. The immediate floor of the seam comprises mostly of shale with occasional carb. shale. The 1m floor column is dominated by intercalation of shale & sandstone with subordinate shale.

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4.3.12.8 Quality: The Moisture & Ash content of the seam varies from 2.80% (OIBD-48) to 7.40% (MNID-2) and 28.10% (MNID-2) to 47.10% (OIBD-36) respectively. UHV varies from 1752 (OIBD-36) to 4001 K.Cal/Kg (MNID-2) and the grade varies from G to E. The grade of the seam over the major part is F which improves to E in patches around borehole No.MNID-12, 18, 2, OIBD-17 & 8 and deteriorates towards the incrop. The summarized statement of quality is given in **Table 4.9**

TABLE 4.9
RANGE OF QUALITY PARAMETERS (ON 60% RH & 40°C) FOR SEAM LAJKURA MIDDLE

PARAMETER	MINIMUM	MAXIMUM
Moisture%	2.80 (OIBD-48)	7.40 (MNID-2)
Ash%	28.10 (MNID-2)	47.10 (OIBD-36)
VM%	22.90 (MNID-18)	27.70 (MNID-2)
FC%	26.60 (OIBD-2)	39.70 (MNID-18)
UHV (K.Cal/Kg)	1752 (OIBD-36)	4001 (MNID-2)
Grade	G (OIBD-36)	E(MNID-2)
GCV (K.cal/Kg)	3840 (MNID-6)	4750 (MNID-2)

A. Ultimate analysis: The Ultimate analysis of seam Lajkura Middle has been determined in 4 boreholes viz. MNID-6, 12, 20 &21 and the range of the same is presented below.

Range of ultimate analysis for Seam Lajkura Middle

Range	Carbon%	Hydrogen%	Nitrogen%	Sulphur%	Oxygen%
Minimum	43.22	2.94	0.22	0.63	7.21
Maximum	46.72	3.91	0.32	0.78	8.04

B. Sulphur Distribution: The total sulphur content for seam Lajkura Middle has been determined in 5 boreholes viz. MNID-2, 6, 12, 20 & 21 where as the sulphur distribution has been carried out for 4 boreholes viz.MNID-6, 12, 20 & 21 and the range is given below.

Distribution of Sulphur for Seam Lajkura Middle

Range	Total Sulphur	Inorganic Sulphur	Organic Sulphur	Pyritic Sulphur
Minimum	0.63	4.35	49.27	30.16
Maximum	0.97	6.35	63.49	46.38

C.Ash analysis: The ash analysis has been determined for Lajkura Middle seam in 4 boreholes viz.MNID-6, 12, 20 & 21 and the range of results are presented below.

Range of Ash Analysis for Seam Lajkura Middle

Constituent	Range	
	Minimum	Maximum
SiO_2	57.16	64.50
Al_2O_3	26.68	29.80
Fe_2O_3	4.69	8.06
TiO_2	1.60	1.94
CaO	0.18	0.49
MgO	0.32	0.53
Na_2O	0.09	0.20
K_2O	0.10	0.18
SO_3	0.10	1.10
P_2O_5	0.21	0.45

D. Ash Fusion Temperature (AFT): Ash Fusion Temperature range of Lajkura Middle seam has been determined in 4 boreholes viz.MNID-6, 12, 20 & 21 and the results are given below.

Range of Ash Fusion Temperature for Seam Lajkura Middle

Range	IT	ST	HT	FT
Minimum	>1450	>1450	>1450	>1450
Maximum	>1450	>1450	>1450	>1450

E. Phosphorous Content: The Phosphorous content of seam Lajkura Middle has been determined for 4 boreholes viz.MNID-6, 12, 20 & 21 and the range of results are given below:

Range of Phosphorous content for Seam Lajkura Middle

Range	Phosphorous %	BH. No.
Minimum	0.05	MNID-12
Maximum	0.15	MNID-21

F. Swelling Index and Coke Type: The swelling index and coke type has been determined in 3 boreholes viz MNID-6, 12 & 21. The swelling index of the seam varies from 0 to ½ and the coke type of the seam is A to B.

G. Hardgrove Grindability Index (HGI): The HGI has been determined for seam Lajkura Middle in 2 boreholes viz. MNID- 6 & 12 and the values observed as 79 and 12 respectively.

4.3.12.9 Reserve: A total 20.199 Million Tonnes of opencast reserves has been assessed.

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4.3.13 SEAM L1

4.3.13.1 Occurrence: L1 seam overlies Lajkura Middle seam and underlies Lajkura bottom-II seam. The seam occurs within 100m depth in 26 boreholes and more than 100m to 200m depth in 18 boreholes.

4.3.13.2 Incrop: The seam incrops in the Central part of the block and is located to the south of borehole No.OIBID-4, 9, 16 and 18. The seam is not developed in the incrop side. No borehole has been drilled along the incrop of the seam. The incrop zone of this seam has been tentatively drawn basing on the data of the boreholes drilled along the down dip side of the incrop.

4.3.13.3 Borehole intersections: The seam is fully intersected in 44 boreholes. The minimum and maximum depths of floor of the seam are 7.40m (OIBD-23) and 184.43m (OIBD-17) respectively. The floor contour plan is shown in **Plate No. 18.**

4.3.13.4 Parting: The parting between Seam L1 and underlying Lajkura Bottom-11. Seam varies from 3.60m (MNID-25) to 13.16m (OIBD-21) and overlying Lajkura Middle varies from 14.09m (MNID-23) to 39.11m (OIBD-28) only.

4.3.13.5 Thickness: The thickness of the seam varies from 0.11m (OIBD-23) to 3.39m (OIBD-28) and fully intersected in 44 boreholes. The seam is developed in Southern and Western part of the block and is mineable in patches. The seam folio plan is shown in **Plate No. 33.**

4.3.13.6 Dirt bands: Dirt band upto 1m thickness varying in number from 1 to 4 is noticed in 10 boreholes varying in thickness from 0.10m (OIBD-22) to 1.07m (OIBD-28). The dirt bands constituting upto 32% of total thickness of the seam is observed in two boreholes (OIBD-20 & 23) drilled in the block.

4.3.13.7 Roof & Floor: The immediate roof of the coal seam comprises mostly of carb shale with subordinate shale. The 3.00m roof column is dominated by sandstone. The immediate floor of the seam comprises mostly of carb shale with subordinate shale. The 1.00m floor column is dominantly of areanaceous shale with subordinate argillaceous sandstone.

4.3.13.8 Quality: The Moisture & Ash content of the seam varies from 1.8% (MNID-12) to 4.8% (OIBD-7) and 21.9% (OIBD-7) to 53.4% (MNID-12) respectively. UHV & grade varies from 1530 K.Cal/Kg (OIBD-9) to 5215 K.Cal/Kg (OIBD-7) and the grade varies from G to C. The summarized statement of quality is given in Table **4.10**

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TABLE 4.10
RANGE OF QUALITY PARAMETERS (ON 60% RH 40°C) FOR SEAM L1

PARAMETER	MINIMUM	MAXIMUM
Moisture%	1.8 (MNID-12)	4.8 (OIBD-7)
Ash%	21.9 (OIBD-7)	53.4 (MNID-12)
VM%	23.1 (MNID-12, 26)	26.3 (MNID-6)
FC%	20.5 (MNID-2)	29.90 (MNID-6)
UHV (K.Cal/Kg)	1530 (OIBD-9)	5215 (OIBD-7)
Grade	G (OIBD-9)	C(OIBD-7)
GCV (K.cal/Kg)	-	-

A. Swelling Index and Coke Type: The selling index and coke type has been determined in 1 borehole viz. MNID-12. The swelling index of the seam is 0 and the coke type of the seam is A.

4.3.13.9 Reserve: A total 4.214 Million Tonnes of opencast reserves has been assessed.

4.3.14 SEAM LAJKURA BOTTOM-II

4.3.14.1 Occurrence: Lajkura Bottom-II seam is underlain by Lajkura Bottom-I seam. The seam occurs within 100m depth in 27 boreholes, more than 100m to 200m depth in 22 boreholes.

4.3.14.2 Incrop: The seam incrops in the northern part of the block and is located to the south of borehole No.OIBD-46, 3, 14 & 35. The strike length of the incrop is 2.905 Km. The incrop of the seam can be traced from southeastern to northwestern boundary of the block. The incrop of the seam has been proved by one borehole (OIBD-16) only. However, the incrop zone of this seam has been tentatively drawn based on the data of the boreholes drilled along the down dip side of the incrop.

4.3.14.3 Borehole intersections: The seam is fully intersected in 49 boreholes. The minimum and maximum depths of floor of the seam are 6.50m (OIBD-16) and 194.22 m (OIBD-17) respectively. The seam is faulted in two boreholes (MNID-20 & 21). In another borehole (OIBD-48), the seam could not be intersected due to minor slip. The floor contour plan is shown in **Plate No. 19.**

4.3.14.4 Parting: The parting between Lajkura Bottom-II & underlying Lajkura Bottom-I varies from 0.78m (OIBD-23) to 17.72m (MNID-22) and overlying L1 seam varies from 3.60m (MNID-25) to 13.16m (OIBD-21).

4.3.14.5 Thickness: The thickness of the seam varies from 0.44m (MNID-22) to 11.05m (MNID-25) and fully intersected in 49 boreholes. The seam is well developed throughout the block with an average thickness of 3.60m.

However, in the southern part of the block, the seam is reduced to less than 1.00m around borehole No.MNID-22 & 23 and OIBD-60. The seam folio plan is shown in **Plate No. 34.**

4.3.14.6 **Dirt bands:** Dirt bands upto 1m thickness varying in number from 1 to 10 is noticed in 43 boreholes varying in thickness from 0.11m (OIBD-10 & 58) to 4.08m (MNID-18) to 4.08m. Contiguous bands of > 1.00m have been observed in 3 boreholes ranging in thickness from 1.00m (MNID-18) to 1.63m (MNID-28). The dirt bands constituting upto 50% of total thickness of the seam is observed in borehole No.OIBD-9.

4.3.14.7 **Roof & Floor:** The immediate roof of the coal seam comprises mostly of carb shale with subordinate shale. The 3.00m roof column is dominated by sandstone with subordinate argillaceous sandstone. The immediate floor of the seam comprises mostly of shale with occasional carb shale. The 1.00m floor column is dominated by shale with subordinate carb shale.

4.3.14.8 **Quality:** The Moisture & Ash content of the seam varies from 2.30% (OIBD-33) to 5.80% (OIBD-10 & 20) and 33.70% (OIBD-10) to 54.40% (OIBD-32) respectively. UHV varies from 882 (OIBD-32) to 3449 K.Cal/Kg (OIBD-10) and the grade varies from UG to E. The grade of the seam over the major part is G which improves to F in patches in the central and southern part of the block and E in two boreholes (OIBD-10 & 20) only. The grade of the seam deteriorates to UG near the incrop zone around borehole No.OIBD-32. The summarized statement of quality is given in **Table 4.11.**

TABLE 4.11
RANGE OF QUALITY PARAMETERS (ON 60% RH & 40°C) FOR SEAM LAJKURA BOTTOM-II

PARAMETER	MINIMUM	MAXIMUM
Moisture%	2.30 (OIBD-33)	5.80 (OIBD-10 & 20)
Ash%	33.70 (OIBD-10)	54.40 (OIBD-32)
VM%	21.00 (MNID-28)	27.00 (MNID-6)
FC%	23.50 (MNID-18)	32.10 (MNID-12)
UHV (K.Cal/Kg)	882 (OIBD-32)	3449 (OIBD-10)
Grade	UG (OIBD-32)	E(OIBD-10)
GCV (K.cal/Kg)	3690 (MNID-6)	4160 (MNID-12)

A. Ultimate analysis: The Ultimate analysis of seam Lajkura Bottom-II has been determined in 2 borehole viz. MNID-6 &12 and the range of the same is presented below.

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Range of ultimate analysis of Seam Lajkura Bottom-II

Range	Carbon%	Hydrogen%	Nitrogen%	Sulphur%	Oxygen%
Minimum	43.81	3.07	0.19	0.46	6.26
Maximum	45.60	3.15	0.32	0.67	7.97

B. Sulphur Distribution: The total sulphur content for Lajkura Bot-II seam has been determined in 3 boreholes viz. MNID-2, 6 & 12 where as the sulphur distribution has been determined in 2 boreholes viz. MNID-6 & 12 and the range is given below.

Distribution of Sulphur for Seam Lajkura Bottom-II

Range	Total Sulphur	Inorganic Sulphur	Organic Sulphur	Pyritic Sulphur
Minimum	0.46	4.35	50.74	34.78
Maximum	0.67	4.48	60.87	44.78

C. Ash analysis: The ash analysis has been determined for Lajkura Bottom-II in 2 boreholes viz.MNID-6 & 12 and the range of results are presented below.

Range of Ash Analysis for Seam Lajkura Bottom-II

Constituent	Range	
	Minimum	Maximum
SiO_2	57.26	66.88
Al_2O_3	22.21	28.56
Fe_2O_3	5.99	7.93
TiO_2	1.75	1.87
CaO	0.36	0.96
MgO	0.45	0.63
Na_2O	0.16	0.16
K_2O	0.13	0.17
SO_3	0.96	1.13
P_2O_5	0.21	0.68

D Ash Fusion Temperature (AFT): Ash Fusion Temperature range of Lajkura Bottom-II seam has been determined in 2 boreholes viz.MNID-6 & 12 and the results are given below.

Range of Ash Fusion Temperature for Seam Lajkura Bottom-II

Range	IT	ST	HT	FT
Minimum	>1450	>1450	>1450	>1450
Maximum	>1450	>1450	>1450	>1450

E. Phosphorous Content: The Phosphorous content of seam Lajkura Bottom-II has been determined for 2 boreholes viz.MNID-6 & 12 and the range of results are given below:

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Range of Phosphorous content for Seam Lajkura Bottom-II

Range	Phosphorous %	BH. No.
Minimum	0.11	MNID-6
Maximum	0.13	MNID-12

F. Swelling Index and Coke Type: The swelling index and coke type has been determined in 2 boreholes viz.MNID-6 & 12. The swelling index of the seam is 0 and A respectively.

G. Hardgrove Grindability Index (HGI): The HGI has been determined for seam Lajkura Bottom-II in 2 boreholes viz. MNID- 6 & 12 and the values observed as 70 and 59 respectively.

4.3.14.9 Reserve: A total 21.749 Million Tonnes of opencast reserves has been assessed.

4.3.15 SEAM LAJKURA BOTTOM-I

4.3.15.1 Occurrence: Lajkura Bottom-I seam is underlain by Rampur IIIB seam. The seam occurs within 100m depth in 27 boreholes, more than 100m to 200m depth in 23 boreholes and above 200m depth in 1 borehole only.

4.3.15.2 Incrop: The seam incrops in the northern part of the block and is located to the south of borehole No.OIBD-46, 40, 12, 14 & 35. The strike length of the incrop is 2.851 Km. The incrop of the seam can be traced from southeastern to northwestern boundary of the block. No borehole has been drilled along the incrop of the seam. The incrop zone of this seam has been tentatively drawn basing on the data of the boreholes drilled along the down dip side of the incrop.

4.3.15.3 Borehole intersections: The seam is fully intersected in 51 boreholes. The minimum and maximum depths of floor of the seam are 4.52m (OIBD-3) and 200.36 m (OIBD-17) respectively. The seam is faulted in MNID-21 and in OIBD-48 the seam is not developed. The floor contour plan is shown in **Plate No. 20.**

4.3.15.4 Parting: The parting between Lajkura Bottom-I & underlying Rampur IIIB seam varies from 30.87m (OIBD-25) to 59.13m (OIBD-52) and overlying Lajkura Bottom-II seam varies from 0.78m (OIBD-23) to 17.72m (MNID-22).

4.3.15.5 Thickness: The thickness of the seam varies from 0.31m (OIBD-33) to 4.86m (MNID-2) and fully intersected in 51 boreholes. The average thickness of the seam is around 1.59m. The thickness of the seam is reduced to < 1.00m in the southeastern part of the block and also in patches near the southwestern boundary of the block. The seam folio plan is shown in **Plate No. 35.**

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एन टी पी सी लिमिटेड/NTPC LIMITED
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

4.3.15.6 Dirt bands: Dirt band upto 1m thickness varying in number from 1 to 4 is noticed in 33 boreholes varying in thickness from 0.14m (OIBD-37) to 1.62m (MNID-2). The seam does not contain any band more than 1m thickness. The dirt bands constituting upto 40% of total thickness of the seam is observed in borehole No.OIBD-24.

4.3.15.7 Roof & Floor: The immediate roof of the coal seam comprises mostly of carb shale with subordinate shale. The 3.00m roof column is dominated by intercalation of shale and sandstone with subordinate shale. The immediate floor of the seam comprises mostly of shale with occasional carb shale. The 1.00m floor column is dominated by sandstone with subordinate shale.

4.3.15.8 Quality: The Moisture & Ash content of the seam varies from 2.60% (MNID-18) to 6.20% (OIBD-32) and 27.70% (OIBD-32) to 53.80% (OIBD-52) respectively. UHV varies from 965 (OIBD-52) to 4305 K.Cal/Kg (MNID-25 & 28) and the grade varies from UG to D. The grade of the seam over the major part is G which improves to D. In one borehole (OIBD-52), the seam is found as ungraded. The summarized statement of quality is given in **Table 4.12**

TABLE 4.12
RANGE OF QUALITY PARAMETERS (ON 60% RH & 40°C) FOR SEAM LAJKURA BOTTOM-I

PARAMETER	MINIMUM	MAXIMUM
Moisture%	2.60 (MNID-18)	6.20 (OIBD-32)
Ash%	27.70 (OIBD-32)	53.80 (OIBD-52)
VM%	22.50 (OIBD-43)	32.50 (OIBD-57)
FC%	19.50 (OIBD-50)	67.20 (MNID-6)
UHV (K.Cal/Kg)	965 (OIBD-52)	4305(MNID-25 & 28)
Grade	UG (OIBD-52)	D(MNID-25 & 28)
GCV (K.cal/Kg)	3800 (MNID-2)	4610(MNID-12)

A. Ultimate analysis: The Ultimate analysis of seam Lajkura Bottom-I has been determined in 2 boreholes viz. MNID-6 & 12 and the range of the same is presented below.

Range of ultimate analysis of Seam Lajkura Bottom-I

Range	Carbon%	Hydrogen%	Nitrogen%	Sulphur%	Oxygen%
Minimum	46.75	3.33	0.22	0.42	7.14
Maximum	48.45	3.89	0.30	0.45	7.75

B. Sulphur Distribution : The total sulphur content for Lajkura Bot-I seam has been determined in 3 boreholes viz. MNID-2,6 & 12 where as the sulphur distribution has been carried out in 2 boreholes viz. MNID-6 & 12 and the range is given below.

Distribution of Sulphur for Seam Lajkura Bottom-I

Range	Total Sulphur	Inorganic Sulphur	Organic Sulphur	Pyritic Sulphur
Minimum	0.40	4.44	53.34	32.56
Maximum	0.57	4.65	62.79	42.22

C. Ash analysis: The ash analysis has been determined for Lajkura Bottom-I in 2 boreholes viz.MNID-6 & 12 and the range of results are presented below.

Range of Ash Analysis for Seam Lajkura Bottom-I

Constituent	Range	
	Minimum	Maximum
SiO_2	52.01	65.50
Al_2O_3	24.41	24.77
Fe_2O_3	5.22	18.15
TiO_2	1.45	1.52
CaO	0.36	0.57
MgO	0.43	0.68
Na_2O	0.14	0.16
K_2O	0.11	0.20
SO_3	1.12	1.27
P_2O_5	0.28	0.52

D. Ash Fusion Temperature (AFT): Ash Fusion Temperature range of Lajkura Bottom-I seam has been determined in 2 boreholes viz.MNID-6 & 12 and the results are given below.

Range of Ash Fusion Temperature for Seam Lajkura Bottom-I

Range	IT	ST	HT	FT
Minimum	>1450	>1450	>1450	>1450
Maximum	>1450	>1450	>1450	>1450

E. Phosphorous Content: The Phosphorous content of seam Lajkura Bottom-I has been determined for 2 boreholes viz.MNID-6 & 12 and the range of results are given below

Range of Phosphorous content for Seam Lajkura Bottom-I

Range	Phosphorous %	BH. No.
Minimum	0.07	MNID-12
Maximum	0.08	MNID-6

F. Swelling Index and Coke Type: The swelling index and coke type has been determined in 2 boreholes viz.MNID-6 & 12. The swelling index of the seam varies from 0 to ½ where as the coke type varies from A to B.

G. Hardgroove Grindability Index (HGI): The HGI has been determined for seam Lajkura Bottom-I in 1 borehole viz. MNID- 6 and the value observed as 58.

4.3.15.9 Reserve: A total 9.176 Million Tonnes of opencast reserves has been assessed.

4.3.16 RAMPUR-IIIB

4.3.16.1 Occurrence: Rampur IIIB seam is underlain by Lajkura Bottom-I seam. The seam occurs within 100m depth in 34 boreholes, more than 100m to 200m depth in 18 boreholes and above 200m depth in 10 boreholes.

4.3.16.2 Incrop: The seam incrops in the northern part of the block and is located to the south of borehole No.MNID-1, 4, 7, 8 & 9. The strike length of the incrop is 2.654 Km. The incrop of the seam can be traced from southeastern boundary of the block. No borehole has been drilled along the incrop of the seam. The incrop zone of this seam has been tentatively drawn basing on the data of the boreholes drilled along the down dip side of the incrop.

4.3.16.3 Borehole intersections: The seam is fully intersected in 62 boreholes. The minimum and maximum depths of floor of the seam are 9.23m (MNID-17) and 256.60 m (MNID-19) respectively. The seam is faulted in one borehole (OIBD-31) In 9 boreholes the seam is not developed. The floor contour plan is shown in **Plate No. 21.**

4.3.16.4 Parting : The parting between Rampur IIIB & underlying Rampur IIIA seam varies from 0.47m (MNID-28) to 5.87m (MNID-22) and overlying Lajkura Bottom-I seam varies from 30.87m (OIBD-25) to 59.13m (OIBD-22).

4.3.16.5 Thickness: The thickness of the seam varies from 0.10m (OIBD-43) to 3.37m (OIBD-6) and fully intersected in 62 boreholes. The thickness of the seam is reduced to less than 1.00m towards the northern, eastern and also southern part of the block. The seam folio plan is shown in **Plate No. 36.**

4.3.16.6 Dirt bands: Dirt band upto 1m thickness varying in number from 1 to 3 is noticed in 36 boreholes varying in thickness from 0.11m (OIBD-9 & 56) to 0.71m (OIBD-6). The seam does not contain any band more than 1m thickness. The dirt bands constituting upto 38% of total thickness of the seam is observed in borehole No.OIBD-20.

4.3.16.7 Roof & Floor: The immediate roof of the coal seam comprises mostly of carb shale with subordinate shale. The 3.00m roof column is dominated by sandstone with subordinate argillaceous sandstone. The immediate floor of the seam comprises mostly of shale with occasional carb shale. The 1.00m floor column is dominated by shale with subordinate Intercalation of shale and sandstone

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4.3.16.8 Quality: The Moisture & Ash content of the seam varies from 2.90% (OIB-48) to 6.50% (OIBD-18) and 17.90% (OIBD-18) to 48.90% (OIBD-29) respectively. UHV varies from 1641 (OIBD-29) to 5533 K.Cal/Kg (OIBD-18) and the grade varies from G to C. The grade of the seam over the major part is F, which improves to E in the central, western and southern corner of the block in patches. In only borehole (OIBD-37) the grade improves to D. The grade also improves to C in OIBD-18 where the sea m thickness falls below 1.00m. The summarized statement of quality is given in **Table 4.13.**

TABLE 4.13
RANGE OF QUALITY PARAMETERS (ON 60% RH & 40°C) FOR SEAM RAMPUR - IIIB

PARAMETER	MINIMUM	MAXIMUM
Moisture%	2.90 (OIBD-48)	6.50 (OIBD-18)
Ash%	17.90 (OIBD-18)	48.90 (OIBD-29)
VM%	21.30 (OIBD-6)	25.60 (OIBD-47, MNID-28)
FC%	29.10 (OIBD-2)	39.90 (MNID-28)
UHV (K.Cal/Kg)	1641 (OIBD-29)	5533 (OIBD-18)
Grade	G (OIBD-29)	C(OIBD-18)
GCV (K.cal/Kg)	4270 (MNID-6)	4600 (MNID-21)

A. Ultimate analysis: The Ultimate analysis of seam Rampur- IIIB has been determined in 4 boreholes viz. MNID-6, 12, 20 & 21 and the range of the same is presented below.

Range of ultimate analysis of Seam Rampur-IIIB

Range	Carbon%	Hydrogen%	Nitrogen%	Sulphur%	Oxygen%
Minimum	49.16	2.84	0.27	0.34	6.40
Maximum	52.23	3.83	0.32	0.47	7.07

B. Sulphur Distribution : The total sulphur content for seam Rampur -IIIB has been determined in 5 boreholes viz MNID-2,6,12,20 & 21 where as the sulphur distribution has been carried out for 4 boreholes viz. MNID-6,12,20 & 21 and the range is given below.

Distribution of Sulphur for Seam Rampur- IIIB

Range	Total Sulphur	Inorganic Sulphur	Organic Sulphur	Pyritic Sulphur
Minimum	0.34	4.34	50.00	44.12
Maximum	0.58	5.88	50.01	45.65

C. Ash analysis: The ash analysis has been determined for seam Rampur - IIIB in 4 boreholes viz.MNID-6, 12, 20 & 21 and the range of results are presented below.

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Deputy General Manager (Commercial)
एन टी पी सी लिमिटेड / NTPC LIMITED
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SANJEEV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2009-CPAM

Range of Ash Analysis for Seam Rampur -IIIB

Constituent	Range	
	Minimum	Maximum
SiO_2	60.26	65.06
Al_2O_3	22.07	26.09
Fe_2O_3	7.08	13.74
TiO_2	1.45	1.84
CaO	0.30	0.71
MgO	0.40	0.54
Na_2O	0.14	0.19
K_2O	0.14	0.16
SO_3	0.21	1.00
P_2O_5	0.21	0.51

D. Ash Fusion Temperature (AFT) : Ash Fusion Temperature range of Rampur -IIIB seam has been determined in 4 boreholes viz.MNID-6, 12,20 & 21 and the results are given below.

Range of Ash Fusion Temperature for Seam Rampur -IIIB

Range	IT	ST	HT	FT
Minimum	>1450	>1450	>1450	>1450
Maximum	>1450	>1450	>1450	>1450

E. Phosphorous Content: The Phosphorous content of seam Rampur -IIIB has been determined for 4 boreholes viz.MNID-6, 12, 20 & 21 and the range of results are given below :

Range of Phosphorous content for Seam Rampur -IIIB

Range	Phosphorous %	BH. No.
Minimum	0.06	MNID-12
Maximum	0.19	MNID-21

F. Swelling Index and Coke Type: The swelling index and coke type has been determined in 3 boreholes viz. MNID-6, 12 & 21. The swelling index of the seam varies from 0 to ½ where as the coke type varies from A to B.

G. Hardgrove Grindability Index (HGI): The HGI has been determined for seam Rampur-IIIB in 1 borehole viz. MNID- 6 and the value observed as 73.

4.3.16.9 Reserve: A total 10.374 Million Tonnes of opencast reserves has been assessed.

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कोयला मंत्रालय/Ministry of Coal
भारत सरकार/Govt. of India
नई दिल्ली/New Delhi-110001

पवन देव जामटा/PAWAN DEV JAMTA
उप महाप्रबंधक/Deputy General Manager
एन.टी.पी.सी. लि./NTPC Ltd.
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RQP No. 34011/(15)/2009-CPAM dated 27.09.10.

4.3.17 SEAM RAMPUR- IIIA

4.3.17.1 Occurrence: Rampur IIIA seam is underlain by Rampur IIIB seam. The seam occurs within 100m depth in 41 boreholes, more than 100m to 200m depth in 15 boreholes and above 200m depth in 11 boreholes.

4.3.17.2 Incrop: The seam incrops in the northern part of the block and is located to the south of borehole No.MNID-1, 4, 5, 9 & OIBD-19. The strike length of the incrop is 2.633 Km. The incrop of the seam can be traced from southeastern to northwestern boundary of the block. No borehole has been drilled along the incrop of the seam. The incrop zone of this seam has been tentatively drawn basing on the data of the boreholes drilled along the down dip side of the incrop.

4.3.17.3 Borehole intersections: The seam is fully intersected in 67 boreholes. The minimum and maximum depths of floor of the seam are 6.62m (MNID-9) and 259.11 m (MNID-19) respectively. The seam is faulted in one borehole (OIBD-31) In 7 boreholes the seam is not developed. The floor contour plan is shown in **Plate No. 22.**

4.3.17.4 Parting: The parting between Rampur IIIA and underlying Rampur II seam varies from 0.46m (OIBD-2) to 3.54m (OIBD-50) and overlying Rampur-IIIB seam varies from 0.47m (MNID-28) to 5.87m (MNID-22).

4.3.17.5 Thickness: The thickness of the seam varies from 0.15m (OIBD-50) to 3.34m (OIBD-28) and fully intersected in 67 boreholes. The average thickness of the seam is 1.76m. In the southern and western part of the block, the seam is found unworkable where the thickness is reduced to less than 1.00m. The seam folio plan is shown in **Plate No. 37.**

4.3.17.6 Dirt bands: Dirt band upto 1m thickness varying in number from 1 to 6 is noticed in 46 boreholes varying in thickness from 0.19m (OIBD-21) to 1.01m (OIBD-28). The seam does not contain any band more than 1m thickness. The dirt bands constituting upto 33% of total thickness of the seam is observed in borehole No.OIBD-15.

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4.3.17.7 Roof & Floor: The immediate roof of the coal seam comprises mostly of shale with subordinate carb shale. The 3.00m roof column is dominated by arenaceous shale with subordinate clay. The immediate floor of the seam comprises mostly of shale with occasional carb shale. The 1.00m floor column is dominated by shale with subordinate arenaceous shale.

4.3.17.8 Quality: The moisture & Ash content of the seam varies from 2.60% (OIBD-47) to 5.60% (OIBD-11 & 23) and 23.30% (OIBD-11) to 51.30% (OIBD-15)

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respectively. UHV varies from 1365 (OIBD-15) to 4912 K.Cal/Kg (OIBD-11) and the grade varies from G to D. The grade of the seam over the major part is F which improves to E in the western, southern and northern corner of the block. In the eastern corner, the seam deteriorates to grade G. The seam improves to grade D around borehole No.OIBD-23, 58 and 11 as patches. The summarized statement of quality is given in **Table 4.14**

TABLE 4.14
RANGE OF QUALITY PARAMETERS (ON 60% RH & 40°C) FOR SEAM RAMPUR IIIA

PARAMETER	MINIMUM	MAXIMUM
Moisture%	2.60 (OIBD-47)	5.60 (OIBD-11&23)
Ash%	23.30 (OIBD-11)	51.30 (OIBD-15)
VM%	20.40 (MNID-25)	27.90 (OIBD-58)
FC%	27.70 (OIBD-43)	41.30 (MNID-12)
UHV (K.Cal/Kg)	1365(OIBD-15)	4912 (OIBD-11)
Grade	G (OIBD-15)	D(OIBD-11)
GCV (K.cal/Kg)	3800 (MNID-3)	5180 (MNID-12)

A. Ultimate analysis: The Ultimate analysis of seam Rampur-IIIA has been determined in 2 boreholes viz. MNID-3 & 12 and the range of the same is presented below.

Range of ultimate analysis of Seam Rampur- IIIA

Range	Carbon%	Hydrogen%	Nitrogen%	Sulphur%	Oxygen%
Minimum	50.08	2.23	0.26	0.31	3.87
Maximum	53.70	3.94	0.31	0.46	6.24

B. Sulphur Distribution : The total sulphur content for seam Rampur -IIIA has been determined in 4 boreholes viz MNID-2,3,6 & 12 where as the sulphur distribution has been carried out for 3 boreholes viz. MNID-3,6 & 12 and the range is given below.

Distribution of Sulphur for Seam Rampur- IIIA

Range	Total Sulphur	Inorganic Sulphur	Organic Sulphur	Pyritic Sulphur
Minimum	0.30	4.35	33.34	34.28
Maximum	0.46	13.33	60.00	53.33

C. Ash analysis: The ash analysis has been determined for Rampur-IIIA IN 2 boreholes viz. MNID-3 & 12 and the range of results are presented below.

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RQP No. 34011/[15]/2009-CPAM dated 27.09.10.

Range of Ash Analysis for Seam Rampur -IIIA

Constituent	Range	
	Minimum	Maximum
SiO_2	63.16	64.26
Al_2O_3	26.97	28.15
Fe_2O_3	2.51	4.15
TiO_2	1.86	1.87
CaO	0.39	1.09
MgO	0.51	0.57
Na_2O	0.17	0.28
K_2O	0.14	0.16
SO_3	0.36	0.95
P_2O_5	0.17	0.72

D. Ash Fusion Temperature (AFT): Ash Fusion Temperature range of Rampur-IIIA seam has been determined in 2 boreholes viz.MNID-3 & 12 and the results are given below.

Range of Ash Fusion Temperature for Seam Rampur- IIIA

Range	IT	ST	HT	FT
Minimum	>1450	>1450	>1450	>1450
Maximum	>1450	>1450	>1450	>1450

E. Phosphorous Content: The Phosphorous content of seam Rampur -IIIA has been determined for 3 boreholes viz.MNID-3, 6 &12 and the range of results are given below:

Range of Phosphorous content for Seam Rampur- IIIA

Range	Phosphorous %	BH. No.
Minimum	0.03	MNID-3
Maximum	0.10	MNID-12

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F. Swelling Index and Coke Type: The swelling index and coke type has been determined in 3 boreholes viz. MNID-3, 6 & 12. The swelling index of the seam varies from 0 to ½ where as the coke type varies from A to B.

G. Hardgroove Grindability Index (HGI): The HGI has been determined for seam Rampur-IIIA in 1 borehole viz. MNID- 6 and the value observed as 64.

4.3.17.9 Reserve: A total 13.586 Million Tonnes of opencast reserves has been assessed.

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4.3.18 SEAM RAMPUR-II

4.3.18.1 Occurrence: Rampur II seam is underlain by Rampur IIIIA seam and overlain by Rampur-I seam. The seam occurs within 100m depth in 44 boreholes, more than 100m to 200m depth in 19 boreholes and above 200m depth in 13 boreholes.

4.3.18.2 Incrop: The seam incrops in the northern part of the block and is located to the south of borehole No.OIBD-19, MNID-4, 5, 27, 30 & 24. The strike length of the incrop is 2.587 Km. The incrop of the seam can be traced from southeast to northwest boundary of the block. No borehole has been drilled along the incrop of the seam. The incrop zone of this seam has been tentatively drawn basing on the data of the boreholes drilled along the down dip side of the incrop.

4.3.18.3 Borehole intersections: The seam is fully intersected in 76 boreholes. The minimum and maximum depths of floor of the seam are 9.14m (MNID-9) and 261.84 m (MNID-19) respectively. The seam is faulted in one borehole (OIBD-31) due to intersection of F1-F1 fault in the southern part of the block. The floor contour plan is shown in **Plate No. 23.**

4.3.18.4 Parting: The parting between Rampur-II & underlying Rampur I seam varies from 0.19m (OIBD-38) to 2.40m (OIBD-58) and overlying Rampur-IIIA seam varies from 0.46m (OIBD-46) to 3.54m (0BID-50).

4.3.18.5 Thickness: The thickness of the seam varies from 0.19m (MNID-18) to 3.28m (0BID-57) and fully intersected in 76 boreholes. The seam is very thin as compared to other seams with an average thickness to 1.23m. The seam is unworkable in 23 boreholes where the seam thickness in less than 1m. The seam follo plan is shown in **Plate No. 38.**

4.3.18.6 Dirt bands: Dirt band upto 1m thickness varying in number from 1 to 3 is noticed in 23 boreholes varying in thickness from 0.09m (MNID-6) to 0.88m (MNID-28). A band of more than 1.00m has been observed in one borehole (OIBD-57) with thickness of 1.01m. The dirt bands constituting upto 38% of total thickness of the seam is observed in borehole No.OIBD-58.

4.3.18.7 Roof & Floor: The immediate roof of the coal seam comprises mostly of shale with subordinate carb shale. The 3.00 m roof column is dominated by coal with subordinate shale. The immediate floor of the seam comprises mostly of shale with occasional carb shale. The 1m floor column is also dominated by shale with subordinate carb shale.

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4.3.18.8 **Quality:** The Moisture & Ash content of the seam varies from 2.30% (MNID-21) to 6.80% (OIBD-36) and 18.40% (OIBD-36) to 49.60% (OIBD-58%) respectively. UHV varies from 1614 (OIBD-58) to 5422 K.Cal/Kg (OIBD-36) and the grade varies from G to D. The grade of the seam over the major part is F, which improves to E towards the eastern, western and southern corner of the block. The summarized statement of quality is given in **Table 4.15**.

TABLE 4.15
RANGE OF QUALITY PARAMETERS (ON 60% RH & 40°C) FOR SEAM RAMPUR-II

PARAMETER	MINIMUM	MAXIMUM
Moisture%	2.3 (MNID-21)	6.80 (OIBD-36)
Ash%	18.40 (OIBD-36)	49.60 (OIBD-58)
VM%	21.60 (OIBD-58)	31.90 (MNID-19)
FC%	25.10 (MNID-3)	40.80 (OIBD-55)
UHV (K.Cal/Kg)	1614 (OIBD-58)	5422(OIBD-36)
Grade	G (OIBD-58)	C(OIBD-36)
GCV (K.cal/Kg)	3710 (MNID-9)	4300 (MNID-20)

A. Ultimate analysis: The Ultimate analysis of seam Rampur-II has been determined in 5 boreholes viz. MNID-6, 9, 12, 20 &21 and the range of the same is presented below.

Range of ultimate analysis for Seam Rampur-II

Range	Carbon%	Hydrogen%	Nitrogen%	Sulphur%	Oxygen%
Minimum	41.86	2.80	0.22	0.31	4.67
Maximum	53.52	3.51	0.36	0.52	7.62

B. Sulphur Distribution : The total sulphur content for seam Rampur-II has been determined in 5 boreholes viz. MNID-2,6,9,12 & 21 where as the sulphur distribution has been carried out for 4 boreholes viz. MNID-6, 9,12 & 21 and the range is given below.

Distribution of Sulphur for Seam Rampur -II

Range	Total Sulphur	Inorganic Sulphur	Organic Sulphur	Pyritic Sulphur
Minimum	0.31	3.12	50.00	35.48
Maximum	0.52	6.45	58.07	46.87

C. Ash analysis: The ash analysis has been determined for Rampur II seam in 5 boreholes viz.MNID-3, 6, 9, 12 & 21 and the range of results are presented below.

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SANJAY KUMAR SINGH
Qualified Person
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Range of Ash Analysis for Seam Rampur -II

Constituent	Range	
	Minimum	Maximum
SiO_2	59.18	64.90
Al_2O_3	22.80	27.36
Fe_2O_3	4.94	13.30
TiO_2	1.41	1.86
CaO	0.32	0.65
MgO	0.40	0.82
Na_2O	0.17	0.29
K_2O	0.12	0.24
SO_3	0.14	1.10
P_2O_5	0.17	0.36

D. Ash Fusion Temperature (AFT): Ash Fusion Temperature range of Rampur-II seam has been determined in 5 boreholes viz.MNID-3,6,9, 12 & 21 and the results are given below.

Range of Ash Fusion Temperature for Seam Rampur-II

Range	IT	ST	HT	FT
Minimum	>1450	>1450	>1450	>1450
Maximum	>1450	>1450	>1450	>1450

E. Phosphorous Content: The Phosphorous content for seam Rampur -II has been determined in 4 boreholes viz.MNID-6,9,12 & 21 and the range of results are given below :

Range of Phosphorous content for Seam Rampur -II

Range	Phosphorous %	BH.No.
Minimum	0.05	MNID-9
Maximum	0.19	MNID-21

F. Swelling Index and Coke Type: The swelling index and coke type has been determined in 4 boreholes viz. MNID-6, 9, 12 & 21. The swelling index of the seam varies from 0 to ½ where as the coke type varies from A to B.

G. Hardgrove Grindability Index (HGI): The HGI has been determined for seam Rampur-II in 3 boreholes viz. MNID- 6, 9 & 12 and the value observed as 72, 73 and 65 respectively.

4.3.18.9 Reserve: A total of 9.346 Tonnes of opencast reserves has been assessed.

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कोयला मंत्रालय / Ministry of Coal
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4.3.19 SEAM RAMPUR-I

4.3.19.1 Occurrence: Rampur I seam is underlain by Rampur IAII Seam and overlain by Rampur-II Seam. Out of 78 boreholes the seam has been intersected within 100m in 42 boreholes with in 100m to 200m depth in 22 boreholes and above 200m depth in 14 boreholes.

4.3.19.2 Incrop: The seam incrop in the northern part of the block. The incrop is located to the south of borehole No.MNID-26, 27 & 30. The strike length of the incrop is 2.554Km. The incrop of the seam can be traced from southeast to northwest boundary of the block. No borehole has been drilled along the incrop zone of the seam. However, the incrop zone of the seam has been delineated basing on the data of boreholes drilled along the down dip side of the incrop.

4.3.19.3 Borehole intersections: The seam is fully intersected in 78 boreholes. The minimum and maximum depth of floor of the seam is 13.50m (OIBD-19) and 272.00 (MNID-19) respectively. The seam is found faulted in one borehole (OIBD-31) only. The floor contour plan is shown in **Plate No. 24.**

4.3.19.4 Parting : Rampur-I seam is underlain by Rampur IAII seam with a parting varying from 1.52m (OIBD-40) to 12.35m (MNID-22) and overlain by Rampur-II seam with a parting varying from 0.19m (OIBD-38) and 2.40m (OIBD-58).

4.3.19.5 Thickness: The seam is well developed in the block. Thickness of the seam varies from 1.61m (OIBD-4) to 11.74m (OIBD-48). The seam has got an average thickness of 7.77m which is more or less uniform throughout the block. The seam follo plan is shown in **Plate No. 39.**

4.3.19.6 Dirt Bands: The dirt bands upto 1m thickness varying in number from 1 to 9 are noticed in 70 boreholes varying in thickness from 0.23m (OIBD-30) to 2.99m (MNID-23). The seam also contains bands of > 1m thickness varying from 1.03m (MNID-23) to 2.17m (MNID-5). As a whole a total number of 12 boreholes has intersected > 1m contiguous bands in Rampur-I seam.

4.3.19.7 Roof and Floor: The immediate roof of the seam comprises mostly of carb shale with subordinate shale and the 3.00m roof column is dominated by coal with subordinate shale. The immediate floor of the seam is characterized by dominantly of shale with subordinate carb shale and the 1.00m floor column is dominantly of Intercalation.

4.3.19.8 Quality: The Moisture and the Ash content of Rampur-I seam varies from 2.10% (MNID-28) to 4.80% (OIBD-15) and 36.60% (OIBD-15) to 54.50% (OIBD-19) respectively. The UHV varies from 841 (OIBD-19) to 3283

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K.Cal/Kg (OIBD-7). The grade ranges from UG to F. The grade of the seam over major part of the area is G which improves to F in localized patches throughout the block. The grade of seam deteriorated to UG in OIBD-19 in northern corner of the block near the incrop. The summarized statement of quality is given in **Table 4.16.**

TABLE 4.16
RANGE OF QUALITY PARAMETERS (ON 60% RH & 40°C) FOR SEAM RAMPUR-I

PARAMETER	MINIMUM	MAXIMUM
Moisture%	2.10(MNID-28)	4.80 (OIBD-15)
Ash%	36.60(OIBD-15)	54.50 (OIBD-19)
VM%	18.40 (OIBD-19)	23.00 (MNID-12)
FC%	23.20 (OIBD-19)	35.20(MNID-12)
UHV (K.Cal/Kg)	841 (OIBD-19)	3283(OIBD-7)
Grade	UG (OIBD-19)	F(OIBD-7)
GCV (K.cal/Kg)	3060(MNID-1)	3790 (MNID-21)

A. Ultimate analysis: The Ultimate analysis of seam Rampur-I has been determined in 6 boreholes viz. MNID-1, 4, 6, 9, 12, 20 & 21 and the range of the same is presented below.

Range of ultimate analysis for Seam Rampur-I

Range	Carbon%	Hydrogen%	Nitrogen%	Sulphur%	Oxygen%
Minimum	42.27	1.71	0.25	0.24	3.77
Maximum	46.76	3.14	0.32	0.46	5.46

B.Sulphur Distribution : The total sulphur content for seam Rampur-I has been determined in 6 boreholes viz. MNID-1,2,4,6,12 & 21 where as the sulphur distribution has been carried out for 5 boreholes viz. MNID-1, 4, 6,12 & 21 and the range is given below.

Distribution of Sulphur for Seam Rampur-I

Range	Total Sulphur	Inorganic Sulphur	Organic Sulphur	Pyritic Sulphur
Minimum	0.13	4.88	33.34	31.25
Maximum	0.41	8.33	62.50	58.33

C. Ash analysis: The ash analysis has been determined for Rampur- I seam in 5 boreholes viz.MNID-1, 3, 4, 12 & 21 and the range of results are presented below.

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Range of Ash Analysis for Seam Rampur-I

Constituent	Range	
	Minimum	Maximum
SiO_2	63.92	65.96
Al_2O_3	23.02	26.10
Fe_2O_3	5.73	12.68
TiO_2	1.41	1.83
CaO	0.39	0.65
MgO	0.52	0.70
Na_2O	0.15	0.26
K_2O	0.11	0.18
SO_3	0.13	1.18
P_2O_5	0.17	0.48

D. Ash Fusion Temperature (AFT): Ash Fusion Temperature range of Rampur-I seam has been determined in 6 boreholes viz.MNID-1, 3, 4, 12, 20 & 21 and the results are given below.

Range of Ash Fusion Temperature for Seam Rampur-I

Range	IT	ST	HT	FT
Minimum	>1450	>1450	>1450	>1450
Maximum	>1450	>1450	>1450	>1450

E. Phosphorous Content: The Phosphorous content of seam Rampur -I has been determined in 5 boreholes viz.MNID-1,4,6,12 & 21 and the range of results are given below:

Range of Phosphorous content for Seam Rampur-I

Range	Phosphorous %	BH.No.
Minimum	0.03	MNID-1&4
Maximum	0.16	MNID-12

F. Swelling Index and Coke Type: The swelling index and coke type has been determined in 5 boreholes viz. MNID-1, 4, 6, 12 & 21. The swelling index of the seam varies from 0 to ½ where as the coke type varies from A to B.

G. Hardgrove Grindability Index (HGI): The HGI has been determined for seam Rampur-I in 4 boreholes viz. MNID- 5, 6, 9 & 12 and the value observed as 82, 73 and 71 & 67 respectively.

4.3.19.9 Reserve: A total 73.437 Million Tonnes of opencast reserves has been assessed.

4.3.20 SEAM RAMPUR-IAII

4.3.20.1 Occurrence: Rampur IAII seam is underlain by Rampur IAI seam. The seam occurs within 100m depth in 36 boreholes, more than 100m to 200m depth in 22 boreholes and above 200m depth in 13 boreholes.

4.3.20.2 Incrop: The seam in crops in the northern part of the block and is located to the south of borehole No.MNID-26, 27 & 30. The strike length of the incrop is 2.558 Km. The incrop of the seam can be traced from southeastern to northwestern boundary of the block. No borehole has been drilled along the incrop of the seam. The incrop zone of this seam has been tentatively drawn basing on the data of the boreholes drilled along the down dip side of the incrop.

4.3.20.3 Borehole intersections: The seam is fully intersected in 70 boreholes. The minimum and maximum depths of floor of the seam are 8.50m (MNID-24) and 283.18 m (MNID-19) respectively. The seam is faulted in (OIBD-31) and part faulted in MNID-28. In 8 boreholes the seam is not developed. The floor contour plan is shown in **Plate No. 25.**

4.3.20.4 Parting : The parting between Rampur IAII & underlying Rampur IAI seam varies from 1.21m (OIBD-52) to 8.68m (MNID-21) and overlying Rampur-I seam varies from 1.52m (OIBD-40) to 12.35m (MNID-22).

4.3.20.5 Thickness: The thickness of the seam varies from 0.25m (MNID-28) to 4.15m (MNID-25) and fully intersected in 71 boreholes. The seam is well developed throughout the block with an average thickness to 2.23m. However, the seam is unworkable only in 19 boreholes where the seam thickness is less than 1m. in patches throughout the block. The seam follo plan is shown in **Plate No. 40.**

4.3.20.6 Dirt bands: Dirt band upto 1m thickness varying in number from 1 to 3 is noticed in 43 boreholes varying in thickness from 0.09m (MNID-5) to 1.02m (OIBD-25). The seam does not contain any band more than 1m thickness. The dirt bands constituting upto 45% of total thickness of the seam is observed in borehole No.OIBD-43

4.3.20.7 Roof & Floor: The immediate roof of the coal seam comprises mostly of carb shale with subordinate shale. The 30m column is dominated by shale with subordinate sandstone. The immediate floor of the seam comprises mostly of shale with occasional carb shale. The 1m floor column is dominated by shale with subordinate clay.

4.3.20.8 Quality: The Moisture & Ash content of the seam varies from 2.20% (MNID-21 & OIBD-43) to 5.50% (OIBD-52) and 34.30% (OIBD-52) to 51.80% (MNID-5).

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respectively. UHV varies from 1351 (MNID-5) to 3587 K.Cal/Kg (MNID-25) and the grade varies from G to E. The grade of the seam over the major part is G, which improves to E in localized patches. The summarized statement of quality is given in **Table 4.17**

TABLE 4.17
RANGE OF QUALITY PARAMETERS (ON 60% RH & 40°C) FOR SEAM RAMPUR-IAII

PARAMETER	MINIMUM	MAXIMUM
Moisture%	2.20(MNID-21 & OIBD-43)	5.50 (OIBD-52)
Ash%	34.30 (OIBD-52)	51.60 (MNID-5)
VM%	17.20(MNID-5)	27.70 (OIBD-48)
FC%	27.10 (OIBD-58)	37.50 (MNID-6)
UHV (K.Cal/Kg)	1351 (MNID-5)	3587(MNID-25)
Grade	G (MNID-5)	E(MNID-25)
GCV (K.cal/Kg)	3220 (MNID-5)	4350 (MNID-12)

A. Ultimate analysis: The Ultimate analysis of seam Rampur-IAII has been determined in 6 boreholes viz. MNID-5, 6, 9, 12, 20 &21 and the range of the same is presented below.

Range of ultimate analysis for Seam Rampur-IAII

Range	Carbon%	Hydrogen%	Nitrogen%	Sulphur%	Oxygen%
Minimum	33.21	1.87	0.22	0.29	2.78
Maximum	48.46	3.33	0.39	0.38	5.46

B. Sulphur Distribution : The total sulphur content for seam Rampur-IAII has been carried out in 6 boreholes viz. MNID-2,5,6,9,12 & 21 where as the sulphur distribution has been carried out for 5 boreholes viz. MNID-5,6,9,12 & 21 and the range is given below.

Distribution of Sulphur for Seam Rampur –IAII

Range	Total Sulphur	Inorganic Sulphur	Organic Sulphur	Pyritic Sulphur
Minimum	0.29	5.26	51.43	33.33
Maximum	0.38	6.90	60.00	42.86

C. Ash analysis: The ash analysis has been determined for Rampur IAII in 5 boreholes viz. MNID-5, 6, 9, 12 & 21 and the range of results are presented below.

Range of Ash Analysis for Seam Rampur -IAII

Constituent	Range	
	Minimum	Maximum
SiO_2	57.84	65.52
Al_2O_3	22.26	28.56
Fe_2O_3	6.24	10.05

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Constituent	Range	
	Minimum	Maximum
TiO_2	1.72	2.01
CaO	0.28	0.83
MgO	0.50	0.78
Na_2O	0.16	0.21
K_2O	0.12	0.18
SO_3	0.38	1.10
P_2O_5	0.17	0.56

D. **Ash Fusion Temperature (AFT) :** Ash Fusion Temperature range of Rampur-IAII seam has been determined in 6 boreholes viz.MNID-5,6,9, 12,20 & 21 and the results are given below.

Range of Ash Fusion Temperature for Seam Rampur-IAII

Range	IT	ST	HT	FT
Minimum	>1450	>1450	>1450	>1450
Maximum	>1450	>1450	>1450	>1450

E. **Phosphorous Content:** The Phosphorous content of seam Rampur -IAII has been determined for 5 boreholes viz.MNID-5,6,9,12 & 21 and the range of results are given below :

Range of Phosphorous content for Seam Rampur -IAII

Range	Phosphorous %	BH.No.
Minimum	0.06	MNID-6 & 9
Maximum	0.17	MNID-12 & 21

F. **Swelling Index and Coke Type:** The swelling index and coke type has been determined in 5 boreholes viz. MNID-5, 6, 9, 12 & 21. The swelling index of the seam varies from 0 to ½ where as the coke type varies from A to B.

G. **Hardgroove Grindability Index (HGI):** The HGI has been determined for seam Rampur-IAII in 4 boreholes viz. MNID- 5, 6, 9 &12 and the value observed as 90, 67, 67 and 55 respectively.

4.3.20.9 **Reserve:** A total of 19.620 Million Tonnes of opencast reserves has been assessed.

4.3.21 SEAM RAMPUR-IAI

4.3.21.1 **Occurrence**: Rampur IAI seam is the bottom most seam occurring within Barakar formation. The seam occurs within 100 m depth in 22 boreholes, more than 100 m to 200 m depth in 20 boreholes and >200 m in 12 boreholes.

4.3.21.2 **Incrop:** The seam incrops in the northern part of the block and is located to the south of borehole No.MNID-26, 27, 30 & 24. The strike length of the incrop is 2.558 Km. The incrop of the seam can be traced from southeastern to northwestern boundary of the block. The subcrop of the seam defines the block boundary as it occupies the maximum area of the block. No borehole has been drilled along the incrop of the seam. However, the incrop position of the seam has been delineated on the basis of boreholes drilled at the down dip side of the incrop.

4.3.21.3 **Borehole intersection:** The seam is fully intersected in 54 boreholes. The minimum & maximum depths of floor of the seam are 29.31m (MNID-5) and 289.24m (MNID-19) respectively. The seam is faulted in two boreholes (OIBD-31 & MNID-28). In 21 boreholes the seam is not developed. The floor contour plan is shown in **Plate No. 26.**

4.3.21.4 **Parting:** Rampur IAI seam is the bottom most seam of the Barakar formation in the block. The Karharbari seams in the block are not developed or thinly developed, impersistent and occur in localized patches. So seams/bands of Karharbari formation are not correlated in the block. Thus, the parting between Rampur IAI Seam & Karharbari seam is not incorporated in this report. The parting of Rampur IAI seam with the overlying Rampur IAII seam varies from 1.21m (OIBD-52) to 8.68m (MNID-21).

4.3.21.5 **Thickness:** The thickness of the seam varies from 0.07m (OIBD-39) to 5.82m (OIBD-8) and fully intersected in 54 boreholes. The I-100 thickness of the seam varies from 0.07m (OIBD-39) to 4.69 (MNID-25). The seam is unworkable in major part of the block. The seam folio plan is shown in **Plate No. 41.**

4.3.21.6 **Dirt bands:** The dirt bands upto 1m thickness varying in number from 1 to 6 are noticed in 24 boreholes varying in thickness from 0.09m (MNID-12) to 1.09m (OIBD-9). Dirt bands of more than 1m thickness has been intersected in one borehole (OIBD-8) only with the thickness of 1.51m constituting 26% of the total thickness of the seam.

4.3.21.7 **Roof and Floor:** The immediate roof of the coal seam comprises mostly of shale with subordinate carbonaceous shale. The 3m roof column of the seam is dominated by shale with subordinate sandstone. The immediate floor of the seam comprises mostly of shale with subordinate carbonaceous shale. The 1.00m floor column is dominated by argillaceous sandstone with subordinate shale.

4.3.21.8 **Quality:** The Moisture and Ash content of the seam varies from 2.50% (MNID-21) to 4.40% (OIBD-7) and 32.00% (MNID-21) to 50.60% (OIBD-21)

respectively. The UHV varies from 1576 (OIBD-21) to 4139 K.Cal/Kg (MNID-21) and the grade varies from G to F. The grade of the seam over the major part is F and deteriorates in localized patches. The summarized statement of quality are given in **Table 4.18**

TABLE 4.18
RANGE OF QUALITY PARAMETERS (ON 60% RH & 40°C) FOR SEAM RAMPUR-IAI

PARAMETER	MINIMUM	MAXIMUM
Moisture%	2.50(MNID-21)	4.40 (OIBD-7)
Ash%	32.00(MNID-21)	50.60 (OIBD-21)
VM%	17.20(OIBD-42)	25.40 (MNID-21)
FC%	28.60 (OIBD-52)	40.10 (MNID-21)
UHV (K.Cal/Kg)	1476(OIBD-21)	4139(MNID-21)
Grade	G (OIBD-21)	E(MNID-21)
GCV (K.cal/Kg)	3250 (MNID-6)	4790 (MNID-21)

A. Ultimate analysis: The Ultimate analysis of seam Rampur-IAI has been determined in 4 boreholes viz. MNID-6, 12, 20 &21 and the range of the same is presented below.

Range of ultimate analysis for Seam Rampur-IAI

Range	Carbon%	Hydrogen%	Nitrogen%	Sulphur%	Oxygen%
Minimum	43.64	2.73	0.29	0.38	4.09
Maximum	54.46	3.58	0.36	0.60	5.78

B. Sulphur Distribution : The total sulphur content for seam Rampur-IAI has been carried out 5 boreholes viz. MNID-2,6,12,20 & 21 where as the sulphur distribution has been determined for 4 boreholes viz. MNID-6,12,20 & 21 and the range is given below.

Distribution of Sulphur for Seam Rampur –IAI

Range	Total Sulphur	Inorganic Sulphur	Organic Sulphur	Pyritic Sulphur
Minimum	0.25	3.33	50.01	42.10
Maximum	0.60	5.26	52.64	45.45

C. Ash analysis: The ash analysis has been determined for Rampur IAI in 3 boreholes viz.MNID-6, 12 & 21 and the range of results are presented below.

Range of Ash Analysis for Seam Rampur -II

Constituent	Range	
	Minimum	Maximum
SiO_2	62.36	64.80
Al_2O_3	23.30	27.44
Fe_2O_3	4.40	9.04

Constituent	Range	
	Minimum	Maximum
TiO_2	1.58	1.85
CaO	0.43	0.50
MgO	0.45	0.81
Na_2O	0.11	0.17
K_2O	0.10	0.14
SO_3	0.27	1.23
P_2O_5	0.21	0.26

D. Ash Fusion Temperature (AFT): Ash Fusion Temperature range of Rampur-IAI seam has been determined in 3 boreholes viz.MNID-6, 12, & 21 and the results are given below.

Range of Ash Fusion Temperature for Seam Rampur-IAI

Range	IT	ST	HT	FT
Minimum	>1450	>1450	>1450	>1450
Maximum	>1450	>1450	>1450	>1450

E. Phosphorous Content: The Phosphorous content of seam Rampur -IAI has been determined for 3 boreholes viz.MNID-6, 12 & 21 and the range of results are given below:

Range of Phosphorous content for Seam Rampur -IAI

Range	Phosphorous %	BH.No.
Minimum	0.08	MNID-6
Maximum	0.23	MNID- 21

F. Swelling Index and Coke Type: The swelling index and coke type has been determined in 3 boreholes viz. MNID-6, 12 & 21. The swelling index of the seam varies from 0 to ½ where as the coke type varies from A to B.

G. Hardgrove Grindability Index (HGI): The HGI has been determined for seam Rampur-IAI in 2 boreholes viz. MNID- 6 &12 and the value observed as 75 and 69 respectively.

4.3.21.9 Reserve: A total 10.506 Million Tonnes of opencast reserves has been assessed.

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4.4 RESERVES

4.4.1 GENERAL

4.4.1.1 The procedure adopted for estimation of reserves of coal in Dulanga Block is fundamentally based on the specific geological factors which determine the

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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 and this concept applied to generate various plans to estimate coal reserves through Minex Software.

4.4.1.2 From the structural 3-D model, various plans viz. vertical cross sections and floor contour plans have been generated. Similarly from the model quality overalls are presented in the individual seam folio plans by taking in Minex software. Hence all the plans have been generated by the sophisticated Minex model.

4.4.1.3 The Barakar Formation in the block contains 15 coal seams viz. Parkhani, Lajkura Top-III, Lajkura Top (I+II), L3, L2, Lajkura Middle, L1, Lajkura- Bott-II, Lajkura Bott-I, Rampur-III B, Rampur –III A, Rampur II, Rampur-I, Rampur-IA-II and Rampur IAI from top to bottom. Besides, there are a few local bands which have not been taken into cognizance for reserve estimation.

4.4.1.4 The quarry depth is considered for seams-Parkhani to Rampur-I, as Rampur-I seam is having stable floor.

4.4.1.5 The two bottom most seams Rampur-IAII & IAI are thin seams & have unstable floor. These 2 seams occurrence especially Rampur IAI, is patchy (Ref: seam folio plans) as at many patches they are not developed. Hence reserves assessments of these 2 seams are done separately, though on I_{100} norms, as for other seams.

4.4.2 BASIC ASSUMPTIONS AND NORMS FOLLOWED

4.4.2.1 The following norms have been taken into account for reserves calculation:

i) The isochores, isograde and the floor contours, Iso-OB, Iso depth lines have been generated by Minex Software.

ii) The reserves have been estimated on the basis of I-100 thickness for all the 15 seams, where all the carbonaceous bands and obvious bands individually or collectively upto 1m thickness have been included in the seam & >1m bands excluded.

iii) Reserves are not estimated for Bcs, I_{30} & IP seam thicknesses.

iv) The reserves are estimated for 1 m and above seam thickness & at 1 m thickness interval.

v) Iso-overburden & Iso-quarry lines are generated through model for Rampur-I seam floor. The Iso overburden lines are compared with combined coal thickness to generated C: OB lines, sub sector wise.

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vi) A 60 m nala barrier zone is left for Garia nala. However for the Kuchha roads barriers are not left.

vii) All volumes of coal are estimated by Minex Software Model and reserves are estimated as :

Gross Reserves	=	Area	X Thickness	X Sp. Gravity of Coal
(Thousand Tonnes)	=	(Sq.m)	(m)	(Grade wise)

viii) A 10% deduction has been made from the gross reserves to arrive at the net-in-situ reserves available in the block.

4.4.3 OVERBURDEN

4.4.3.1 **Nature of overburden**: Overburden consists of predominantly sandstone with minor amount of shale, carbonaceous shale and thin coal bands. Besides, the overburden also includes sandy soil, weathered rocks and dirt bands >1m thickness. While computing inseam burden, dirt-bands of >1m have been excluded to arrive at the effective thickness of the seam.

4.4.3.2 **Calculation of Overburden:** The volume of overburden has been generated by Minex Software Model, as:

Volume of overburden (Cu.m)	= Area (Sq.m)	X Overburden Thickness (Ratiowise) (m)	

4.4.4 COAL : OVERBURDEN RATIO

4.4.4.1 The top ten seams namely Parkhani, Lajkura Top III, Lajkura(I+II), Lajkura Middle, Lajkura Bott II, Lajkura Bott I, Rampur IIIB , Rampur IIIA, Rampur II & Rampur I seams are considered for quarry depth considering Rampur I seam as base seam.

4.4.4.2 The seams Rampur IAII & IAI are assessed separately without C: OB ratio lines. Locally these 2 seams are not developed, however in the area of their development they can be mined by deepening the quarry further and the parting between Rampur I and these 2 seams is around 5 to 10m only.

4.4.5 STRIPPING RATIO

4.4.5.1 Stripping ratio is obtained after dividing total volume of overburden by tonnage of coal available in the same area (C: OB ratiowise). Volume of overburden and stripping ratio for different coal to overburden ratio and depth range is given in **Table 4.22**

4.4.6 CALCULATION OF SPECIFIC GRAVITY

4.4.6.1 The specific gravity has been calculated seam-wise for each grade by the procedure outlined below :

i) The mean of ash percentage is assessed found for each grade and for each seam.

ii) From this mean ash percentage, average specific gravity was calculated by the formula :

Specific Gravity = 1.28 + 0.01 x Ash

4.4.6.2 The grade-wise specific gravity considered for all the coal seams are given below.

GRADE-WISE AVERAGE SPECIFIC GRAVITY OF COAL SEAMS

GRADE	SPECIFIC GRAVITY
B	1.42
C	1.47
D	1.52
E	1.58
F	1.67
G	1.75

4.4.7 METHOD OF GRADE ESTIMATION

4.4.7.1 The proximate analyses on 60% R.H. & at 40o C of the seams form the basis for grade estimation. Wherever such analyses are not available, the same have been calculated on M-100 basis.

4.4.7.2 The non-coking coals have been classified into seven grades on the basis of the useful heat value (U.H.V.) in K.Cal./Kg. as per the Govt. of India Notification No. 28012/80/CA dated 13.02.1981. The grades of the coal are given below.

GRADES OF NON-COKING COAL BASED ON U.H.V.

Grade	Ash%+Moisture % (on 60% RH & 40°C	Useful heat value (UHV) (In K.cal/Kg)
A	< 19.6	> 6200
B	19.6 - 23.9	>5600 - 6200
C	24.0 - 28.6	>4940 - 5600
D	28.7 - 34.0	>4200 - 4940
E	34.1 - 40.1	>3360 - 4200
F	40.2 - 47.1	>2400 - 3360
G	47.2 - 55.0	>1300 - 2400

4.4.8 CATEGORISATION OF RESERVES

4.4.8.1 The entire reserves of all the coal seams are grouped under "Proved" category.

4.4.9 AREA CONSIDERED FOR RESERVES ESTIMATION

4.4.9.1 For all the seams the updip limit is floor of seam incrop of respective seam, the down dip limit and the lateral limit for the purpose of reserve calculation have been defined by the block boundary.

4.4.10 SECTORS FOR RESERVE ESTIMATION

4.4.10.1 The reserves of the coal seam have been estimated sector-wise. For this purpose, the block has been divided into two sectors on the basis of fault F1 F1.

Sector-A : Located to the north (up thrown) of fault F1.
Sector-B : Located to the south (down thrown) of fault F1.

4.4.10.2 For the purpose of calculating seam wise reserves sector A & B are further subdivided to sub sectors as :

Sector	Sub Sector	Area Between Seam / Fault/Boundary	
		From	To
A	A1	Seams Rampur I, II, IIIA & IIIB	Seam Lajkura Bott-I
	A2	Seams Lajkura Bot. (I + II) & L1	Seam Lajkura Mid.
	A3	Seam Lajkura Middle, L3 & L2	Seams Lajkura Top (I+II)
	A4	Seams Lajkjura Mid.(I+II) & III	Fault F1
B	B1	Fault 1	Seam Parkhani
	B2	Seam Parkhani	Southern Block limit

4.4.10.3 The Reserves are given in table 4.19 to 4.28.

TABLE 4.19
SUMMARY OF SEAM-WISE NET IN-SITU PROVED OPENCAST RESERVES

Seam	In Crop Zone		Beyond in Crop Zone		Total		Seam wise Percentage Reserves (%)
	Area (Sq.m)	Reserves ('000 Tonnes)	Area (Sq.m)	Reserves ('000 Tonnes)	Area (Sq.m)	Reserves ('000 Tonnes)	
PARKHANI	33000	37	289600	563	322600	600	0.24
LAJ TOP(III)	52800	142	1990500	12241	2043300	12383	5.05
LAJ TOP(I+II)	158300	988	2101400	29685	2259700	30673	12.51
LOCAL-3	6000	8	1986100	4682	1992100	4690	1.91
LOCAL-2	2900	4	1492300	4586	1495200	4590	1.87

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Seam	In Crop Zone		Beyond in Crop Zone		Total		Seam wise Percentage Reserves (%)
	Area (Sq.m)	Reserves ('000 Tonnes)	Area (Sq.m)	Reserves ('000 Tonnes)	Area (Sq.m)	Reserves ('000 Tonnes)	
LAJ MIDDLE	110300	407	3290200	19792	3400500	20199	8.24
LOCAL-1	0	0	1831300	4214	1831300	4214	1.72
LAJ BOT-II	75300	197	4041600	21552	4116900	21749	8.87
LAJ BOT-I	31100	47	3512500	9129	3543600	9176	3.74
RAMPUR-IIIB	9000	10	3604100	10364	3613100	10374	4.23
RAMPUR-IIIA	31500	45	4947300	13541	4978800	13586	5.54
RAMPUR-II	18800	21	4670800	9325	4689600	9346	3.81
RAMPUR-I	145100	741	5991500	72696	6136600	73437	29.96
Sub Total (Upto Rampur-I)		**2647**		**212370**		**215017**	
RAMPUR-IAII	35000	53	5456900	19567	5491900	19620	8.00
RAMPUR-IAI	0	0	3458700	10506	3458700	10506	4.29
Sub Total (Rampur-IAII & IAI)		**53**		**30073**		**30126**	
Grand Total		2700		242443		245143	
Reserves (Million Tonnes)		**2.70**		**242.443**		**245.143**	

TABLE 4.20
SUMMARY OF DEPTH-WISE NET IN-SITU PROVED OPENCAST RESERVES

Depth Range	Area (Sq.km)	Reserves ('000 Tonnes)	Percent Reserves
0-50	10182300	49852	20.34
50-100	14122100	73911	30.15
100-150	9685600	46158	18.83
150-200	8464500	41681	17.00
200-250	5276100	23917	9.76
250-300	1418500	8129	3.32
>300	224800	1495	0.61
Grand Total		**245143 (245.143 M.T.)**	

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TABLE 4.21
SUMMARY OF GRADE-WISE NET IN-SITU PROVED OPENCAST RESERVES

Grade	Area (Sq.km)	Reserves ('000 Tonnes)	Percent Reserves
B	202000	336	0.14
C	430000	734	0.30
D	1407600	3623	1.48
E	2823300	7204	2.94
F	26792200	128381	52.37
G	17586100	104269	42.53
UG	132700	596	0.24
Grand Total		245143 (245.143 M.T.)	

TABLE 4.22
SUB-SECTOR-WISE, RATIO-WISE RESERVES, VOLUME OF OVERBURDEN & STRIPPING RATIO

Sub-Sector	Ratio Line	Reserves ('000 Tonnes)	Volume ('000 m^3)	Stripping Ratio
A1	<1:1	1276	2261	1.77
	1:1-1:2	3565	4036	1.13
	1:2-1:3	6231	8269	1.33
	1:3-1:4	4986	9977	2.00
	1:4-1:5	3400	8703	2.56
	1:5-1:6	1144	3142	2.75
	1:6-1:7	213	757	3.55
	1:7-1:8	43	177	4.12
Sub-Sector Total		20858	37322	1.79
A2	1:2-1:3	2995	7060	2.36
	1:3-1:4	9893	22097	2.23
	1:4-1:5	11627	33171	2.85
	1:5-1:6	3821	12133	3.18
	1:6-1:7	1003	3292	3.28
Sub-Sector Total		29339	77753	2.65
A3	1:3-1:4	3533	11347	3.21
	1:4-1:5	25068	66576	2.59
	1:5-1:6	10611	37207	3.51
	1:6-1:7	1104	3579	3.24
Sub-Sector Total		40916	118709	2.90
A4	1:3-1:4	16482	50113	3.04
	1:4-1:5	21840	58980	2.70
	1:5-1:6	207	518	2.50
Sub-Sector Total		38529	109611	2.84
B1	1:4-1:5	22542	59452	2.64
	1:5-1:6	26351	78465	2.98
	1:6-1:7	1717	6390	3.72
Sub-Sector Total		50610	144307	2.85

Sub-Sector	Ratio Line	Reserves ('000 Tonnes)	Volume ('000 m^3)	Stripping Ratio
B2	1:3-1:4	254	848	3.34
	1:4-1:5	3816	12096	3.17
	1:5-1:6	12156	40884	3.36
	1:6-1:7	6802	27029	3.97
	1:7-1:8	4117	15464	3.76
	1:8-1:9	3900	15851	4.06
	1:9-1:10	1296	5234	4.04
Sub-Sector Total		**32341**	**117406**	**3.63**
Grand Total		**212593**	**605108**	**2.85**

As per individual seam total Reserves (Parkhani to Rampur-I) = 215.017 Million Tonnes
As per cumulative seam thickness Reserves (Parkhani to Rampur-I) = 212.593 Million Tonnes
Difference in Reserves (99% Agreement) = 2.424 Million Tonnes

TABLE 4.23
SEAM WISE AND SECTOR WISE INSITU PROVED RESERVES

(RESERVES IN'000 TONNES)

SEAM	SECTOR		TOTAL
	A	B	
PARKHANI	0	600	600
LAJ TOP(III)	1618	10765	12383
LAJ TOP(I+II)	6362	24311	30673
LOCAL-3	875	3815	4690
LOCAL-2	692	3898	4590
LAJ MIDDLE	11757	8442	20199
LOCAL-1	1891	2323	4214
LAJ BOT-II	15611	6138	21749
LAJ BOT-I	7073	2103	9176
RAMPUR-IIIB	6643	3731	10374
RAMPUR-IIIA	10742	2844	13586
RAMPUR-II	6887	2459	9346
RAMPUR-I	54832	18605	73437
RAMPUR-IAII	15492	4128	19620
RAMPUR-IAI	8174	2332	10506
TOTAL	**157796**	**87347**	**245143**

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TABLE 4.24
SEAM WISE AND BARRIER WISE INSITU PROVED RESERVES

(RESERVES IN'000 TONNES)

SEAM	BARRIER		TOTAL
	INSIDE NALA	OUTSIDE NALA	
PARKHANI	53	547	600
LAJ TOP(III)	976	11407	12383
LAJ TOP(I+II)	2629	28044	30673
LOCAL-3	399	4291	4690
LOCAL-2	257	4333	4590
LAJ MIDDLE	2424	17775	20199
LOCAL-1	570	3644	4214
LAJ BOT-II	4789	16960	21749
LAJ BOT-I	1910	7266	9176
RAMPUR-IIIB	1592	8782	10374
RAMPUR-IIIA	2552	11034	13586
RAMPUR-II	1587	7759	9346
RAMPUR-I	12462	60975	73437
RAMPUR-IAII	3482	16138	19620
RAMPUR-IAI	1896	8610	10506
TOTAL	**37578**	**207565**	**245143**

TABLE 4.25
SEAM WISE AND INCROP-WISE INSITU PROVED RESERVES

(RESERVES IN'000 TONNES)

SEAM	INCROP		TOTAL
	INCROP	OUTSIDE	
PARKHANI	37	563	600
LAJ TOP(III)	142	12241	12383
LAJ TOP(I+II)	988	29685	30673
LOCAL-3	8	4682	4690
LOCAL-2	4	4586	4590
LAJ MIDDLE	407	19792	20199
LOCAL-1	0	4214	4214
LAJ BOT-II	197	21552	21749
LAJ BOT-I	47	9129	9176
RAMPUR-IIIB	10	10364	10374
RAMPUR-IIIA	45	13541	13586
RAMPUR-II	21	9325	9346
RAMPUR-I	741	72696	73437
RAMPUR-IAII	53	19567	19620
RAMPUR-IAI	0	10506	10506
TOTAL	2700	242443	**245143**

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TABLE 4.26
SEAM WISE AND DEPTH-WISE INSITU PROVED RESERVES

(RESERVES IN'000 TONNES)

SEAM	DEPTH							TOTAL
	0-50	50-100	100-150	150-200	200-250	250-300	>300	
PARKHANI	589	11	0	0	0	0	0	600
LAJ TOP(III)	3839	7411	976	157	0	0	0	12383
LAJ TOP(I+II)	8901	17976	2922	874	0	0	0	30673
LOCAL-3	737	2598	1163	192	0	0	0	4690
LOCAL-2	422	1637	1827	704	0	0	0	4590
LAJ MIDDLE	5947	6917	6568	720	47	0	0	20199
LOCAL-1	318	1269	693	1664	270	0	0	4214
LAJ BOT-II	5840	6023	4648	5152	86	0	0	21749
LAJ BOT-I	2577	2563	2062	1827	137	10	0	9176
RAMPUR-IIIB	216	1410	2820	3008	2390	466	64	10374
RAMPUR-IIIA	3515	3535	2268	1578	2400	262	28	13586
RAMPUR-II	1634	2186	1523	1950	1786	236	31	9346
RAMPUR-I	12497	14231	12998	16659	11276	4567	1209	73437
RAMPUR-IAII	2508	4333	3776	4225	3001	1614	163	19620
RAMPUR-IAI	312	1811	1914	2971	2524	974	0	10506
TOTAL	**49852**	**73911**	**46158**	**41681**	**23917**	**8129**	**1495**	**245143**

TABLE 4.27
SEAM WISE AND THICKNESS-WISE INSITU PROVED RESERVES

(RESERVES IN'000 TONNES)

SEAM	THICKNESS												TOTAL
	Upto 1.0	1.0-2.0	2.0-3.0	3.0-4.0	4.0-5.0	5.0-6.0	6.0-7.0	7.0-8.0	8.0-9.0	9.0-10.0	10.0-11.0	11.0-12.0	12.0-13.0	
PARKHANI	8	553	39	0	0	0	0	0	0	0	0	0	0	600
LAJ TOP(III)	0	83	249	3422	8188	140	170	131	0	0	0	0	0	12383
LAJ TOP(I+II)	0	0	0	6	15	45	220	1899	8350	14409	4245	1260	24	30673
LOCAL-3	31	3158	729	787	5	0	0	0	0	0	0	0	0	4690
LOCAL-2	28	2077	647	826	1012	0	0	0	0	0	0	0	0	4590
LAJ MIDDLE	0	0	1939	6690	9123	2166	281	0	0	0	0	0	0	20199
LOCAL-1	13	3104	582	455	0	0	0	0	0	0	0	0	0	4214
LAJ BOT-II	14	2334	3315	4487	7466	1678	966	662	581	234	0	0	0	21749
LAJ BOT-I	72	6236	2570	225	74	0	0	0	0	0	0	0	0	9176
RAMPUR-IIIB	34	5205	4736	397	0	0	0	0	0	0	0	0	0	10374
RAMPUR-IIIA	41	8608	4617	320	0	0	0	0	0	0	0	0	0	13586
RAMPUR-II	116	6759	471	0	0	0	0	0	0	0	0	0	0	9346
RAMPUR-I	0	14	74	142	885	3530	10421	21714	17795	15308	2688	926	0	73437
RAMPUR-IAII	30	5018	8909	5619	44	0	0	0	0	0	0	0	0	19620
RAMPUR-IAI	58	4967	1885	2032	1564	0	0	0	0	0	0	0	0	10506
TOTAL	**503**	**50115**	**30904**	**25190**	**28376**	**7589**	**12050**	**24396**	**26886**	**29951**	**6933**	**2186**	**24**	**245143**

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पवन देव जामटा/PAWAN DEV JAMTA

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TABLE 4.28
SEAM WISE AND GRADE-WISE INSITU PROVED RESERVES
(RESERVES IN'000 TONNES)

SEAM	GRADE							TOTAL
	B	C	D	E	F	G	UG	
PARKHANI	0	0	0	0	118	482	0	600
LAJ TOP(III)	0	0	0	0	11988	395	0	12383
LAJ TOP(I+II)	0	0	996	578	19674	9425	0	30673
LOCAL-3	336	711	1616	664	1090	273	0	4690
LOCAL-2	0	0	0	422	2236	1932	0	4590
LAJ MIDDLE	0	0	0	218	16528	3453	0	20199
LOCAL-1	0	0	0	131	1130	2953	0	4214
LAJ BOT-II	0	0	0	0	2138	19224	387	21749
LAJ BOT-I	0	0	0	125	3559	5414	78	9176
RAMPUR-IIIB	0	0	15	1706	8527	126	0	10374
RAMPUR-IIIA	0	0	319	1266	10027	1974	0	13586
RAMPUR-II	0	23	575	1750	6526	472	0	9346
RAMPUR-I	0	0	0	0	29621	43685	131	73437
RAMPUR-IAII	0	0	0	0	9291	10329	0	19620
RAMPUR-IAI	0	0	102	344	5928	4132	0	10506
TOTAL	**336**	**734**	**3623**	**7204**	**128381**	**104269**	**596**	**245143**

4.4.11 REVISED RESERVES ESTIMATION

4.4.11.1 The block area is reduced by 2.89 Ha in the north western boundary due to the realignment of adjacent boundary between Dulanga and Manoharpur (OPGC) blocks. This leads to loss of 2.027 MT of coal reserves in the block. The details of reserves lost are given in **table 4.29** and revised seam wise geological reserves in **table 4.30**.

TABLE 4.29
DETAILS OF LOSS OF RESERVES

SL. NO	SEAM	RESERVES (Mt)
1	LAJ TOP (I+II)	0.035
2	LAJ MIDDLE	0.186
3	LAJ BOT-II	0.290
4	LAJ BOT-I	0.127
5	RAMPUR-IIIB	0.053
6	RAMPUR-IIIA	0.196
7	RAMPUR-II	0.050
8	RAMPUR-I	0.886
9	RAMPUR-IAII	0.129
10	RAMPUR-IAI	0.074
	TOTAL	**2.027**

TABLE 4.30
REVISED SEAM WISE INSITU PROVED RESERVES

SL.NO	SEAM	RESERVES (Mt)
1	PARKHANI	0.6000
2	LAJ TOP(III)	12.3830
3	LAJ TOP(I+II)	30.638
4	LOCAL-3	4.6900
5	LOCAL-2	4.5900
6	LAJ MIDDLE	20.013
7	LOCAL-1	4.2140
8	LAJ BOT-II	21.459
9	LAJ BOT-I	9.049
10	RAMPUR-IIIB	10.321
11	RAMPUR-IIIA	13.390
12	RAMPUR-II	9.296
13	RAMPUR-I	72.551
14	RAMPUR-IAII	19.491
15	RAMPUR-IAI	10.432
	TOTAL	243.116

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CHAPTER V

MINING

CHAPTER- V

MINING

5.1 CHOICE OF MINING METHOD AND JUSTIFICATION FOR OPTIMISATION OF TARGETED CAPACITY

5.1.1 Detail exploration in Dulanga Block has revealed the presence of coal bearing horizons belonging to Karharbari & Barakar Formations. However, major part of the economic coal resources is confined to Barakar only.

a. Three major coal seams occur in this block under report viz. Parkhani, Lajkura & Rampur, in descending order in Barakar Formation. In Karharbari Formation very thin coal bands are seen.

b. The Rampur seam underlies the Lajkura seam and extensively developed throughout the area is a thick seam and has splitted into 6 coal sections as Rampur IAI, Rampur IAII, Rampur-I, Rampur-II, Rampur-IIIA & Rampur IIIB in ascending order.

Besides the above major coal seams, three local seams are found to be persistent and occur in the southern part of the block. These coal seams have been correlated as L1, L2 & L3 in ascending order.

In the GR, it was suggested that the seams of upper group mentioned under para "a)" above should be worked by opencast method only upto a OB: coal ratio of 5:1 (m^3: T), while the rest coal of these seams be extracted by underground method along with the seams of lower group mentioned at para "b)" above due to economic viability prevailing at that time.

In the present Mining Plan, it is planned to extract all the coal of all the seams by OC method which will last for over 24 years for the planned boundary and excluding the area of 87 ha on the south corner of the block. No UG mining is envisaged. Accordingly OC mining has been described below.

5.1.2 **Opencast Mining:** Opencast mining method has been adopted due to following reasons :

a. The coal seams are incropping at a shallow depth;
b. The OB : Coal ratio is favourable (2.59 : 1) for opencast mining.

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c. The mining by opencast method will be economical against underground method; and
d. The opencast mining operations are comparatively safer and ensure higher recovery of coal resource.(Final Stage Quarry Plan is enclosed as **Plate No.-47**)

5.1.3 Selection of mining technology

Following types of equipment systems available for opencast mining:

a) Bucket wheel mining
b) Dragline mining
c) Continuous surface miner (CSM)
d) 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 Dulanga 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 cue 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 will be uneconomic in this alternative.

iii. Requirement of precision selective mining which will not be possible by bucket wheels especially for thin seams and partings.

(b) Dragline

Dragline has not been recommended due to following reasons:

i. Multiplicity of seams and that the lower most seam is very 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 will be available from the overlying OB layer for direct casting.

ii. The availability of adequate material from single seam or OB layer is not there and dragline being a high capacity machine will become under utilised.

iii. Multi seam mining will also require utilisation of other types of equipment system like shovel-dumper combination which will require dependence of one system upon the other leading to efficiency deterioration.

(c) Continuous Surface Miner (CSM)

CSM has been recommended for two seams only due to following reasons:

i. Continuous Surface Miners (CSM) is known for their precision cuttings, they're by improving the quality of mined coal especially in seams having dirt bands.

ii. There will be more than 25 benches in the mine having 255 m depth (max) in which these machines cannot be deployed exclusively due to limitation of mobility /flexibility. Hence only two seams in Rampur horizons were chosen for deployment.

iii. These machines also require wider benches which will require comparatively higher volumes of OB to be removed in the initial stages leading to higher cost of production and imbalance in equipment utilisation due to subsequently decreasing OB: coal ratio. Therefore only top benches requiring lesser volume of OB handling was chosen as the place of deployment of CSM.

iv. Over and above, marginal grade improvement will be of much use in this specific case as washery is not proposed at the pit head for the purpose.

(d) Shovel & Dumper

i. Keeping in mind that there are 15 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.

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iii. Further more, to tackle about 18 Mm^3 OB and over 7.00 Mt of coal from several locations in the mine, comparatively medium and higher size shovels of upto 10 m^3 bucket capacity have been envisaged along with matching capacity of rear dumpers.

iv. Flexibility in operation will be available due to such equipment system.

5.1.4 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-sterilising the remaining potential reserves for future mining.

As already mentioned, there are fifteen seams including their splits (Parkhani, Lajkura Top-III, Lajkura Top (I+II), L3, L2, Lajkura Middle, L1, Lajkura- Bot-II, Lajkura Bot-I, Rampur-III B, Rampur –III A, Rampur II, Rampur-I, Rampur-IA-II and Rampur IAI from top to bottom).

The Geological Report indicated that the coal reserves down upto Rampur-I coal seam are 212.6 Mt with an OB: Coal ratio of 2.85, the lower seams Rampur-IA-II and Rampur IAI were not considered for OC mining in GR.

In the present Mining Plan, the lower seams also have been considered for OC mining due to two reasons:

i. The parting over these seams is about 5m which will not give possibility of mining them safely by UG method.

ii. The OB: coal ratio for the workable area (>1m) of these seams comes lower than the ratio for the upper seams, thereby giving the advantage of lowering the overall ratio for all the seams combined together.

The equipment selection and operating methods have been designed considering the volume and nature of overburden and disposition of coal seams.

5.2 ASSUMPTIONS MADE

a. All the coal upto I100 will be mined out below this thickness coal will be mined along with overburden. Coal will be mined upto bottom most seam of the allocated block.

b. Coal sterilization to be minimised

c. Maximum depth of the mine shall not exceed 255 meters from the ground profile.

d. Coal in the left out area of 87Ha is excluded from this mining plan however 4 years before exhaustion of the existing resources envisaged in the mining plan, NTPC will propose to MoC/MoEF for mining of this area also.

e. Mining of initial 10 years shall be as per approved mining plan

5.3 SEQUENCE OF MINING

The mine development during various stages is explained below:

Year 1

The initial mine entry will be made in the Seam Rampur-IAII in the incrop in central part of the NE side boundary of the block as the lower most seam Rampur-IAI is not occurring here in workable thickness. The entry mouth will be at 244m RL near BH No. MNID- 27 (on its NW side) and aligned from NE to SW. The initial mine entry (haul road) will touch the floor of Seam Rampur-1AII at incrop at floor contour of 235m RL by following a gradient of 1:16. After this it will be driven towards western direction and in the course it will pass through an area of potential thickness of the lower seam i.e. Rampur-IAI and therefore will be driven to meet its floor at 225m RL. By the end of this year OB/waste generation is 4.50 Mm^3 (including 2.00 Mm^3 from nala diversion activity- Garia and the other two nalas) with a coal production of 1.0 MT from seams Rampur-III B, Rampur –III A, Rampur II, Rampur-I, Rampur-IA-II and Rampur IAI.

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The depth of pit will be 35m to 40m which will be worked in 5 to 7 benches. There will be no backfilling activities in this year.

There will be another activity of diverting the two nalas (Baidhara Nala & Nala B), which are presently entering from south west direction and passing

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through the block to discharge their load in Garia Nala at middle of the block. The Garia nala which enters the block from Manoharpur block will be diverted by the Manoharpur block allottees and left at a point on Dulanga Coal Block common boundary. From where Dulanga block allottees will have to divert it further beyond the NE boundary as shown in the stage plans. The road diversion will also start as shown in the stage plans. **Plate-42** shows the mine pit configuration at the end of 1st year.

Year 2

By the end of this year OB/waste generation is 10.50 Mm^3,2.00 Mm^3 from nala diversion activity- Garia and the other two nalas, with a coal production of 2.5 Mt from seams Rampur-III B, Rampur –III A, Rampur II, Rampur-I, Rampur-IAII and Rampur IAI. The depth of pit will be up to about 50m which will be worked in 6 to 8 benches and the operation will mostly advance towards NW direction. No backfilling is envisaged in this year, entire overburden measuring 10.50 Mm^3 shall be dumped in the external dump.

The activity of diverting the two nalas (Baidhara Nala & Nala B) will continue. Similar will be the case with Garia nala. The road diversion will also continue as shown in the stage plans.

Year 3

By the end of this year OB/waste generation is 15.50 Mm^3 with a coal production of 4.5 Mt from seams Rampur-III B, Rampur –III A, Rampur II, Rampur-I, Rampur-IAII and Rampur IAI. The depth of pit will be up to about 50m which will be worked in 6 to 8 benches. Only 2.5 Mm^3 OB can be backfilled in this year, the rest has to be disposed off into the surface dump. The excavation benches will be spread along strike to the full width of the block.

The activity of diversion of two nalas (Baidhara Nala & Nala B) and Garia nala will be continuing this year also. The road diversion will also continue as shown in the stage plans. **Plate-43** shows the mine pit configuration at the end of 3rd year. Settling pond will also be dug in this year and necessary arrangements shall be made to prevent water vanishing through cracks.

Year 4

By the end of this year OB/waste generation is 18.00 Mm^3 with a coal production of 7.0 Mt (Ultimate capacity of the mine) from seams Rampur-III B, Rampur –III A, Rampur II, Rampur-I, Rampur-IAII and Rampur IAI. Two

additional seams, Lajkura Bot I and Lajkura Bot II, will also be encountered and contribute to the coal production.

The depth of pit will be up to about 70m which will be worked in 7 to 9 benches. Out of total OB generated this year 10.50 Mm^3 shall be dumped in the external dump and 7.50 Mm^3 will be backfilled. The excavation benches spread along strike to the full width of the block will be advance towards the dip. Diversion activities of nalas will be complete by the end of 4th year. Necessary connections with the mainstream will be established so that nallas will start flowing in regular basis. The diverted roads will be thrown open for the public usage.

Year 5

By the end of this year OB/waste generation is 18.00 Mm^3 with a coal production of 7.0 Mt from seams Rampur-III B, Rampur–III A, Rampur-II, Rampur-I, Rampur-IAII and Rampur IAI. Two additional seams, Lajkura Bot I and Lajkura Bot II will similarly contribute to the coal production. The depth of pit will be up to about 80m which will be worked in 8 to 10 benches. All the OB generated will be backfilled in this year.

The excavation benches spread along strike to the full width of the block will be advanced towards the dip. About 40-60 m width on the floor of quarry form the advancing face will be kept intact for the purpose of movement of HEMM in the lowest bench and safety of man & machinery. **Plate-44** shows the mine pit configuration at the end of 5th year.

Year 6-10

During these five years, total OB/waste generation is 92.00 Mm^3 @18.4 Mm^3 per year along with total coal production of 35.0 Mt @7.0 Mt per year from seams Rampur-III B, Rampur–III A, Rampur-II, Rampur-I, Rampur-IAII, Rampur IAI, Lajkura Middle, Local-1, Lajkura Bot I and Lajkura Bot II.

At the end of 10th year, the depth of pit will vary from 120m (275 mRL- 155 mRL) to 160m (295 mRL-135 mRL) which will be worked in 14 to 16 benches. All the OB generated will be backfilled in these years. The excavation benches spread along strike to the full width of the block will be advanced towards the dip direction. About 40-60 m width on the floor of quarry form the advancing face will be kept intact for the purpose of movement of HEMM in the lowest bench and safety of man & machinery. **Plate-45** shows the mine pit at the

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configuration at the end of 10th year. Upto 10th year of mining operation the stages are same as per earlier approved mining plan.

Year 11-15

During these five years, total OB/waste generation is 92.00 Mm^3 @ 18.4 Mm^3 per year along with total coal production of 35.0 Mt @ 7.0 Mt per year from seams Rampur-III B, Rampur–III A, Rampur-II, Rampur-I, Rampur-IA-II, Rampur IAI, Lajkura Middle, Local-1, Lajkura Bot I and Lajkura Bot II. Four additional seams Lajkura Top-III, Lajkura Top-I+II, Local-3 and Local-2 will contribute to the coal production during these years. At the end of 15th year, the depth of pit will vary from 134m (274m RL-140m RL) to 170m (265m RL-95m RL) which will be worked in 18 to 20 benches.

All the OB generated will be backfilled in these years. The excavation benches spread along strike but limited to the demarcated boundary of Phase-II operation and be advanced towards the dip direction. About 40-60 m width on the floor of quarry form the advancing face will be kept intact for the purpose of movement of HEMM in the lowest bench and safety of man & machinery.

Year 16-20

During these five years, total OB/waste generation is 92.00 Mm^3 @ 18.4 Mm^3 per year along with total coal production of 35.0 Mt @ 7.0 Mt per year from seams Rampur-IIIB, Rampur–IIIA, Rampur-II, Rampur-I, Rampur-IAII, Rampur IAI, Lajkura Middle, Local-1, Lajkura Bot I and Lajkura Bot II, Lajkura Top-III, Lajkura Top-I+II, Local-3 and Local-2. At the end of 20th year, the depth of pit will vary from 140m (265m RL-125m RL) to 235m (270m RL- 35m RL) which will be worked in 18 to 20 benches. All the OB generated will be backfilled in these years. The excavation benches spread along strike to two-third width of the block will be advanced towards the dip direction. About 40-60 m width on the floor of quarry form the advancing face will be kept intact for the purpose of movement of HEMM in the lowest bench and safety of man & machinery. **Plate- 46** shows the mine pit configuration at the end of 20th year.

At the end of 20th year of mining operations NTPC may seek approval for mining of **Phase-II** area. In the event of obtaining permission the benches restricted otherwise will be extended further towards south eastern extremities to assume entire strike of the mine, the production continue unabated upto exhaustion of the coal. On the contrary the said area will not be disturbed.

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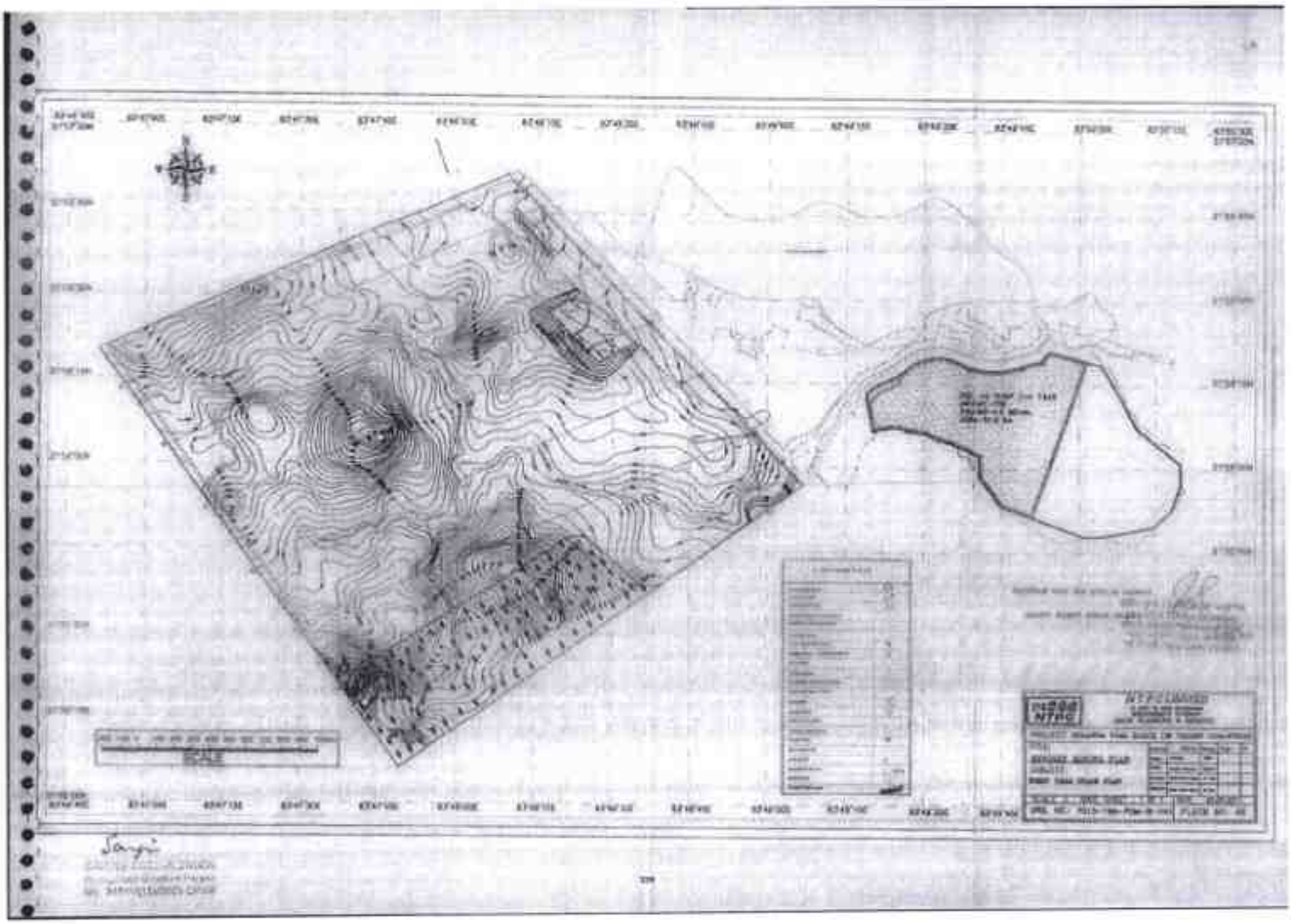

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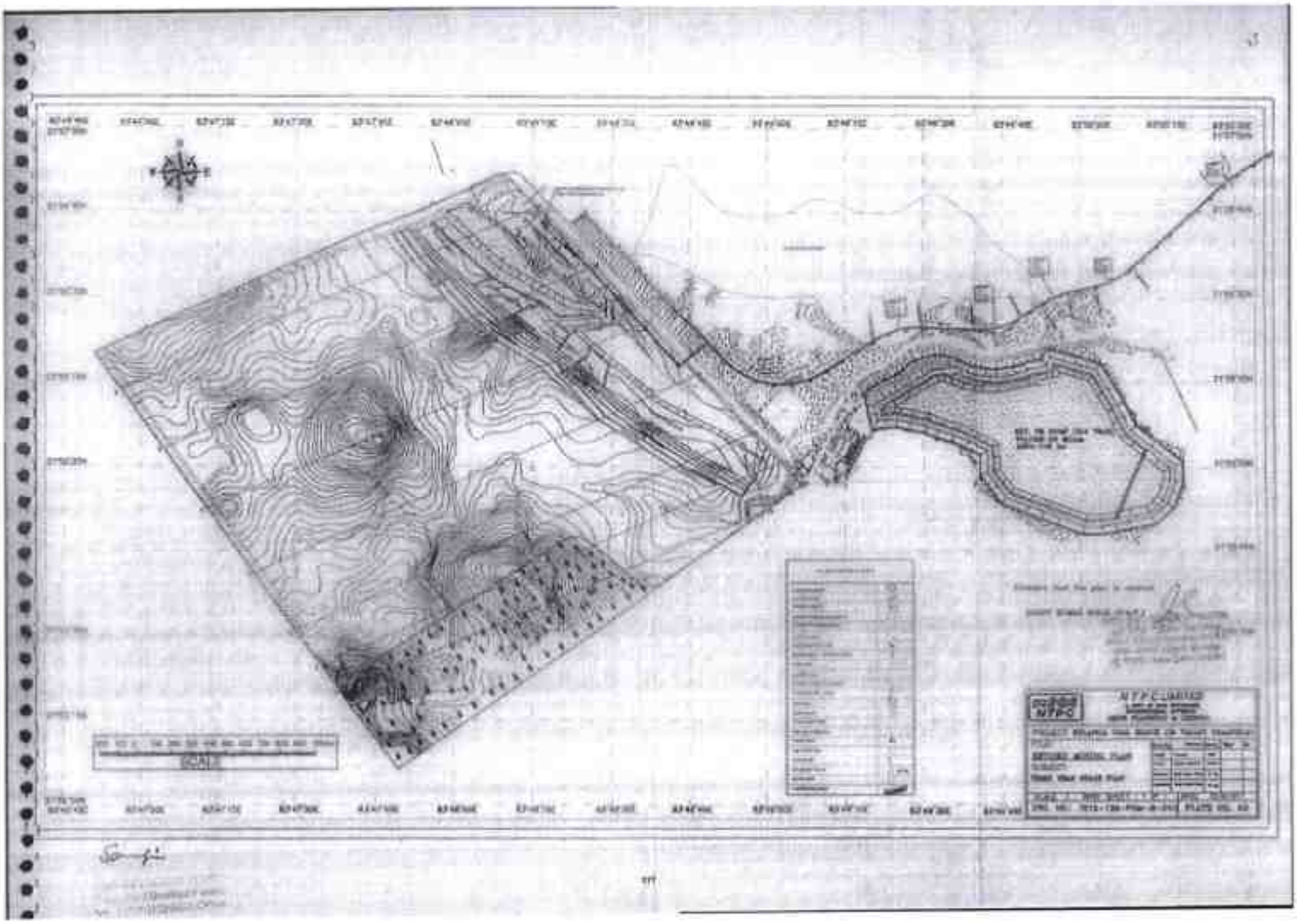

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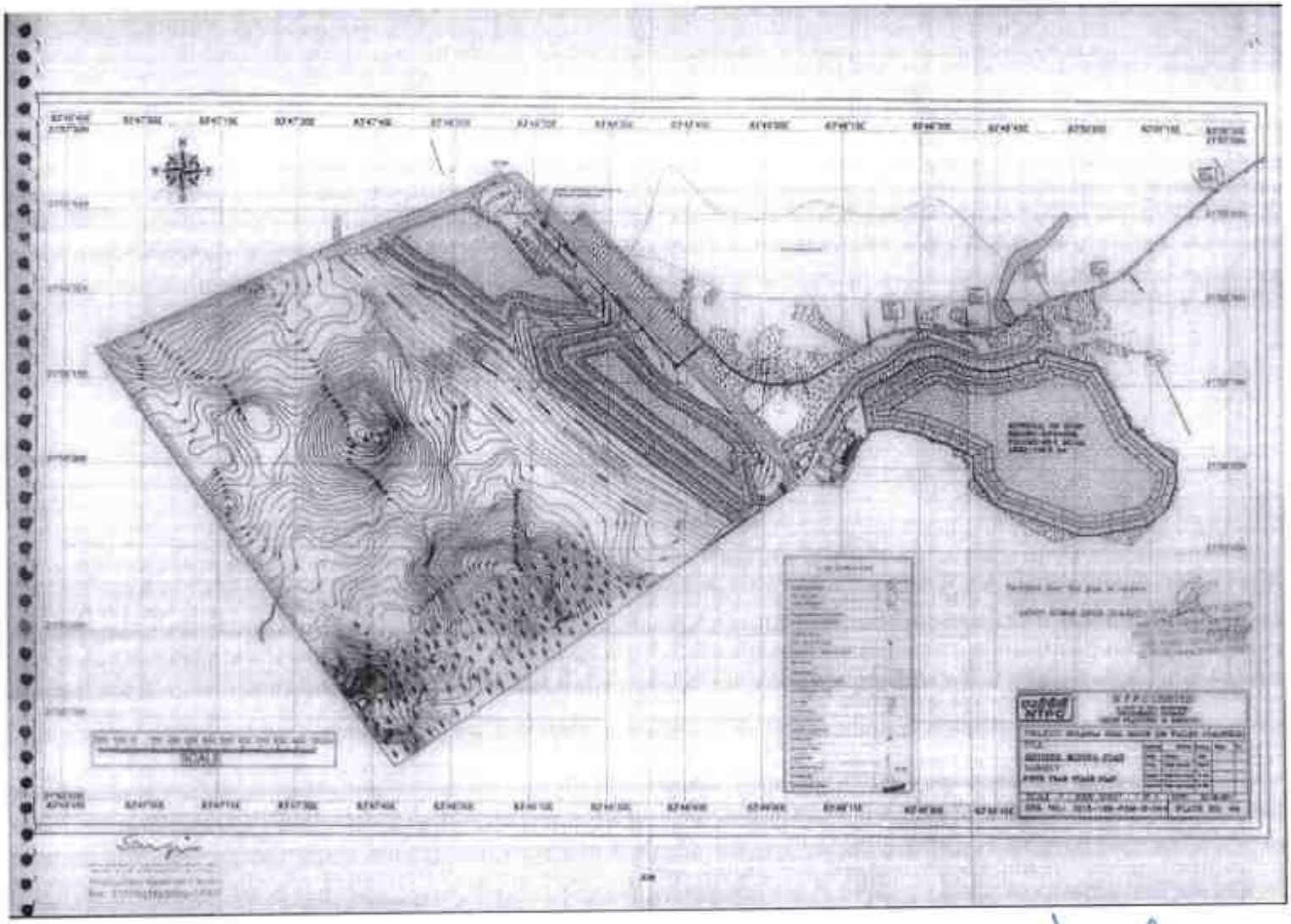

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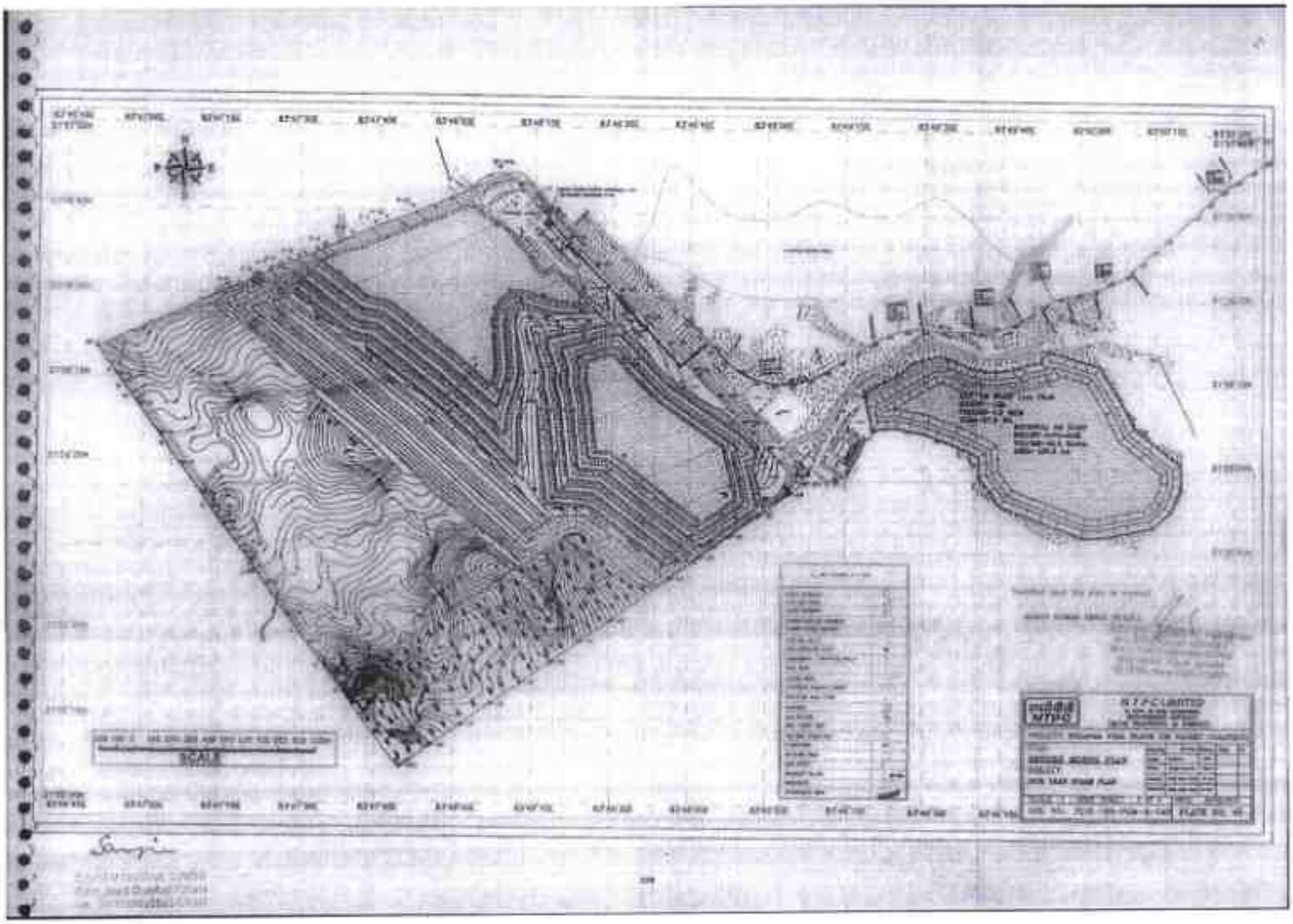

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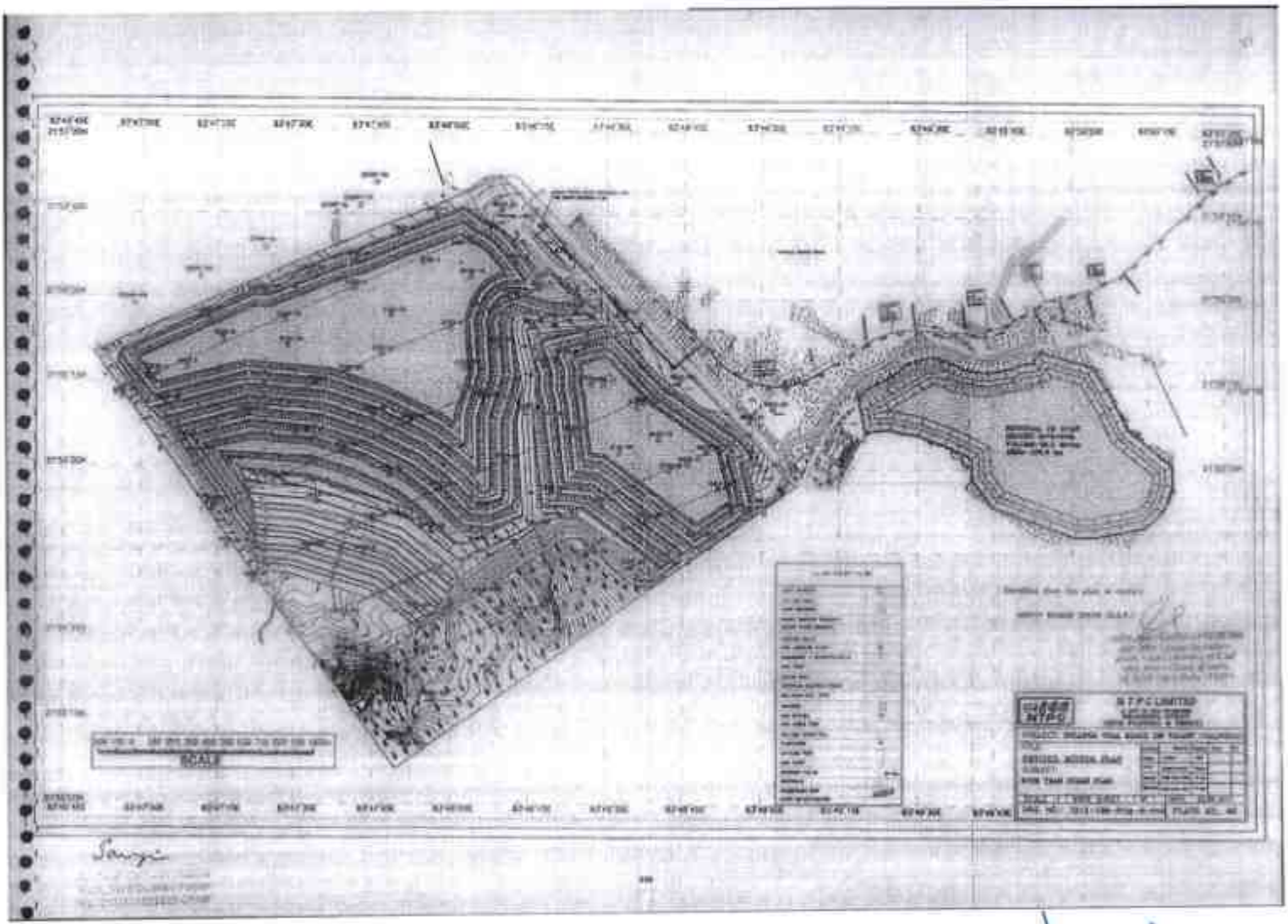

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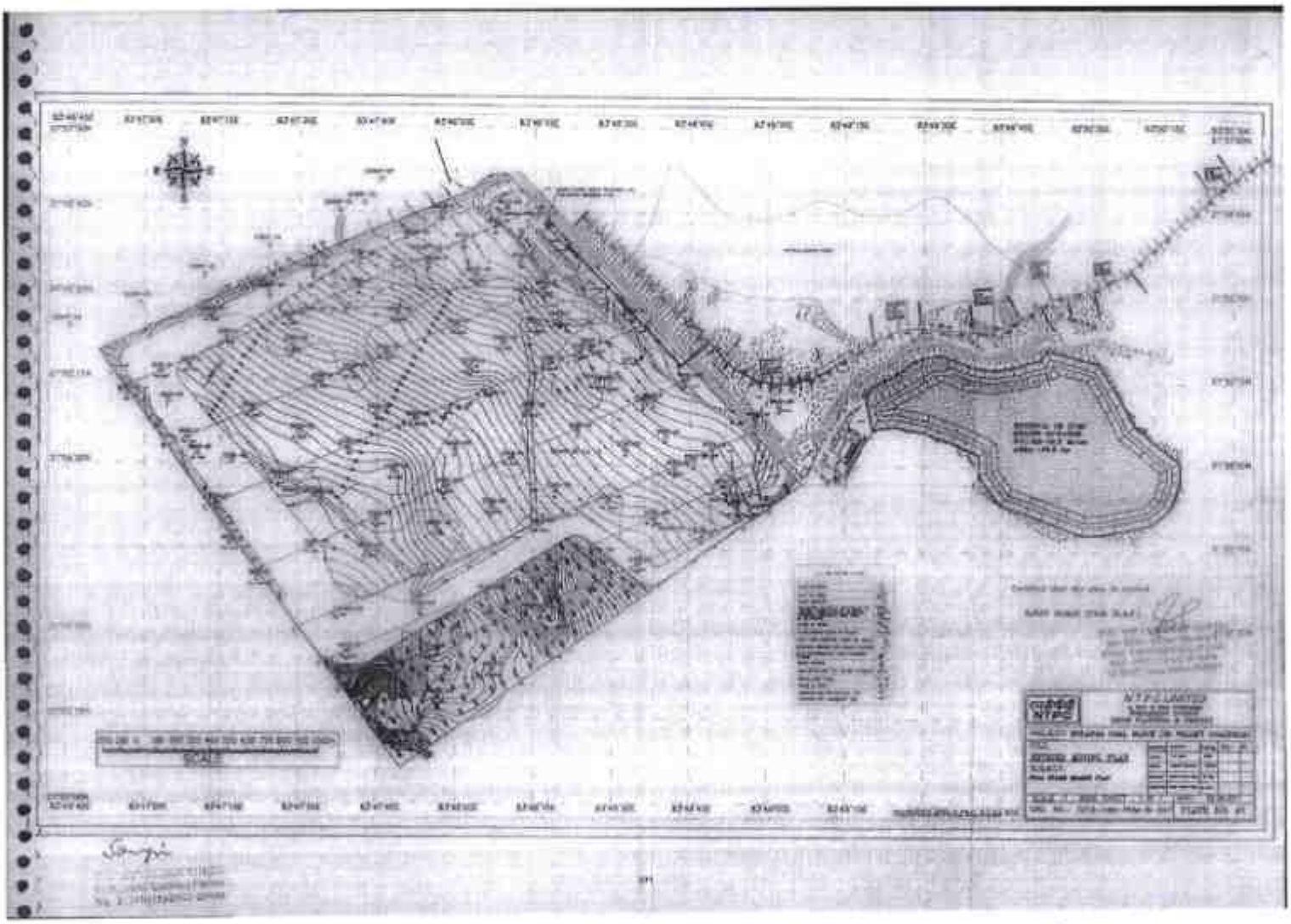

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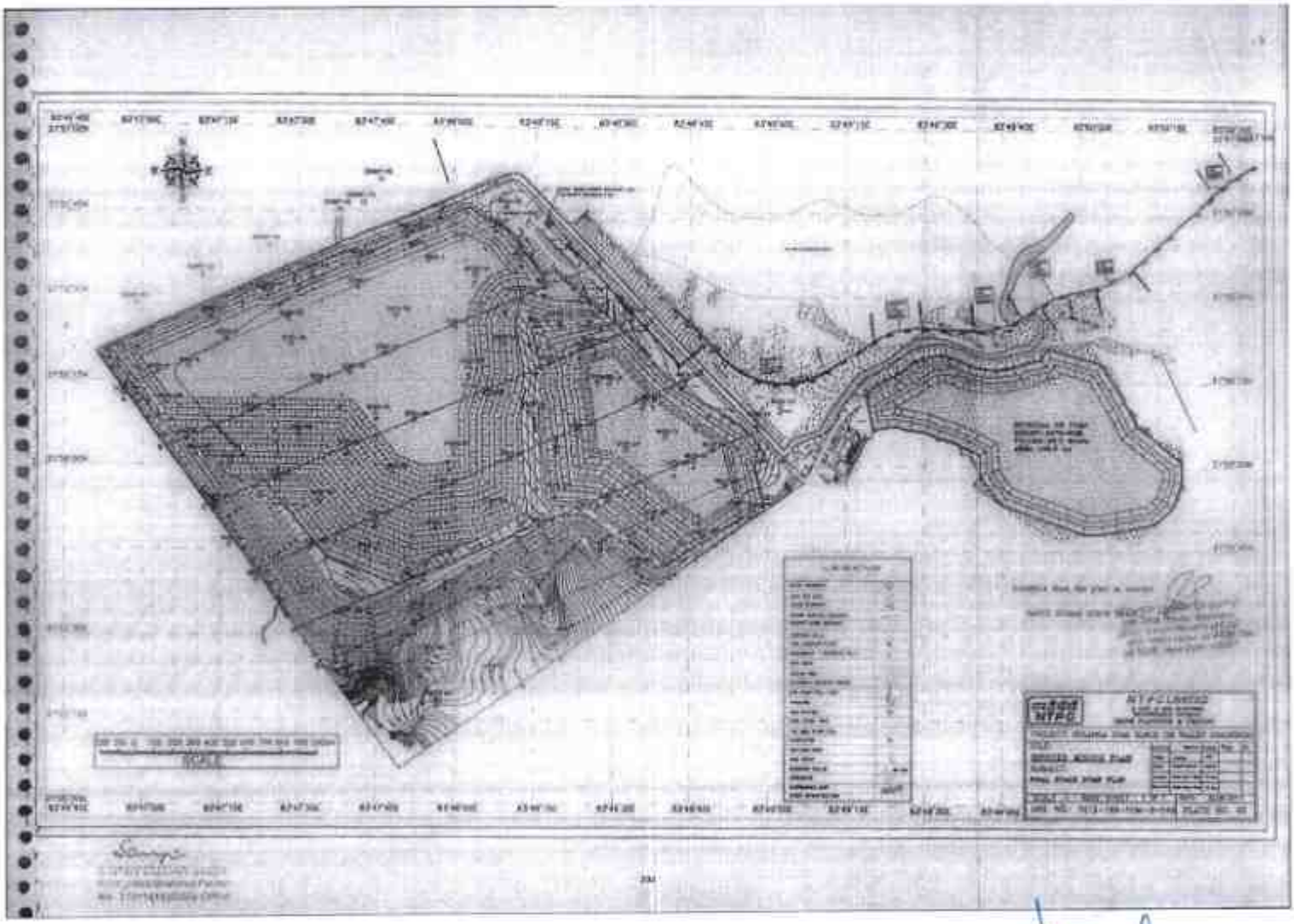

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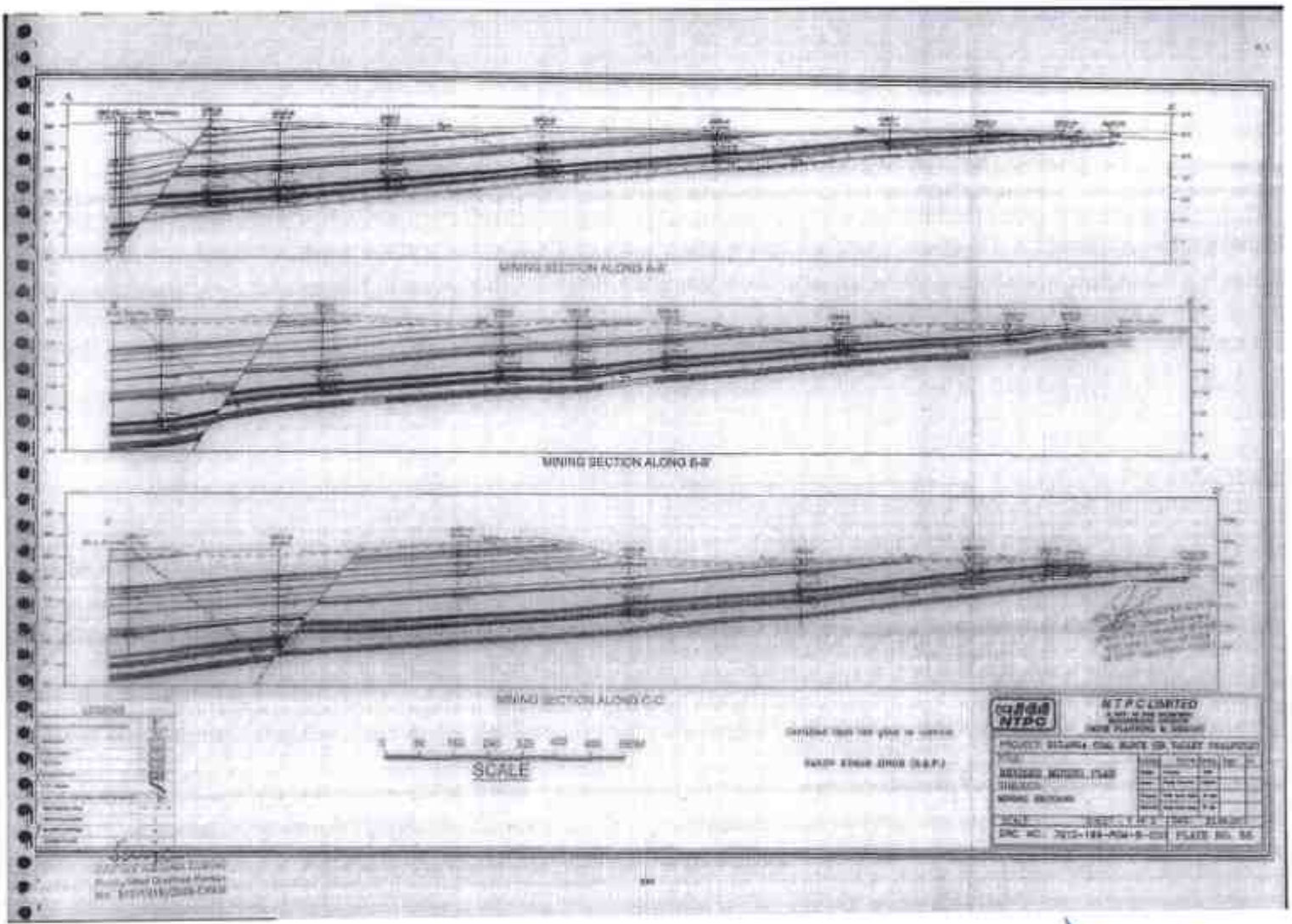

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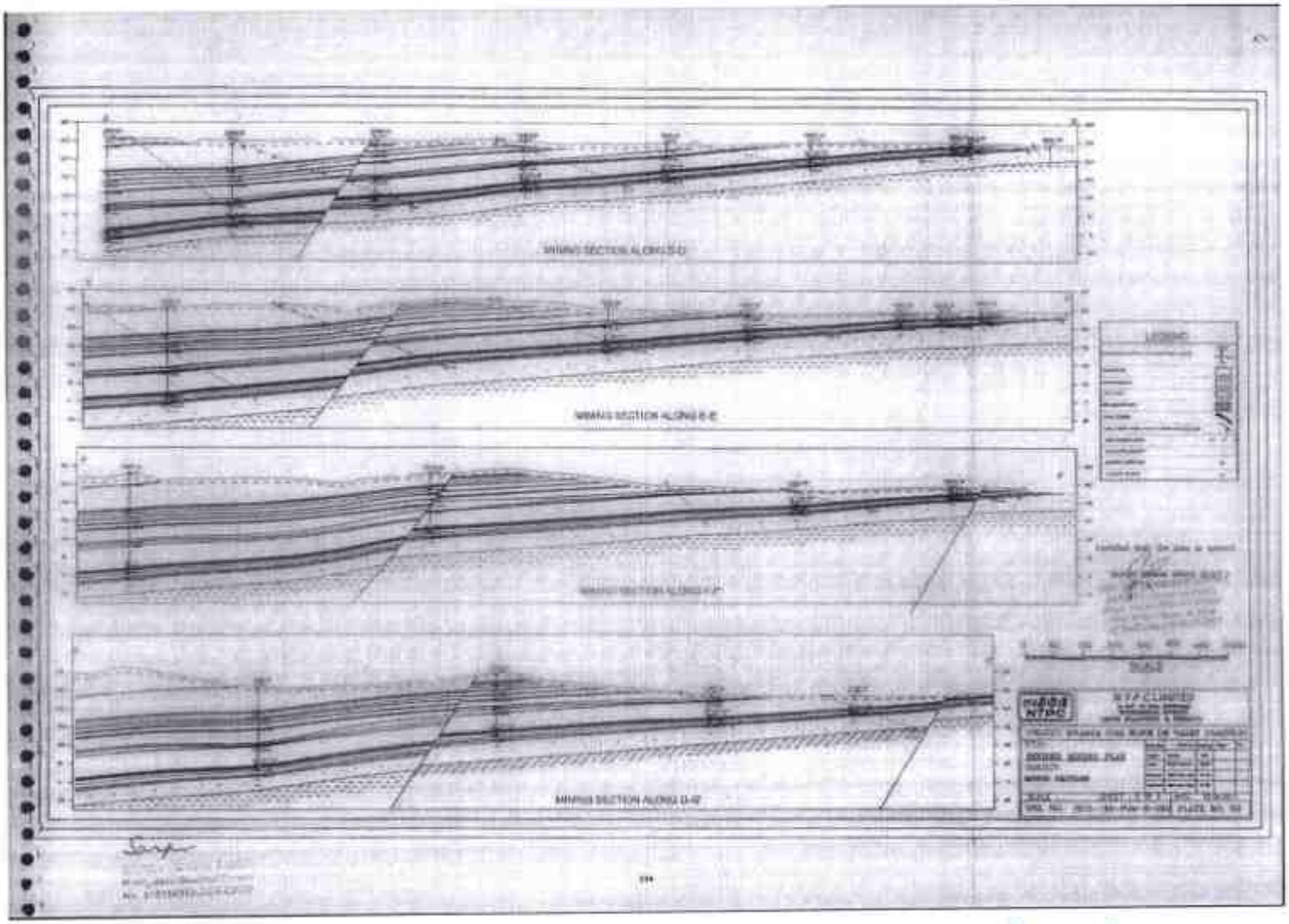

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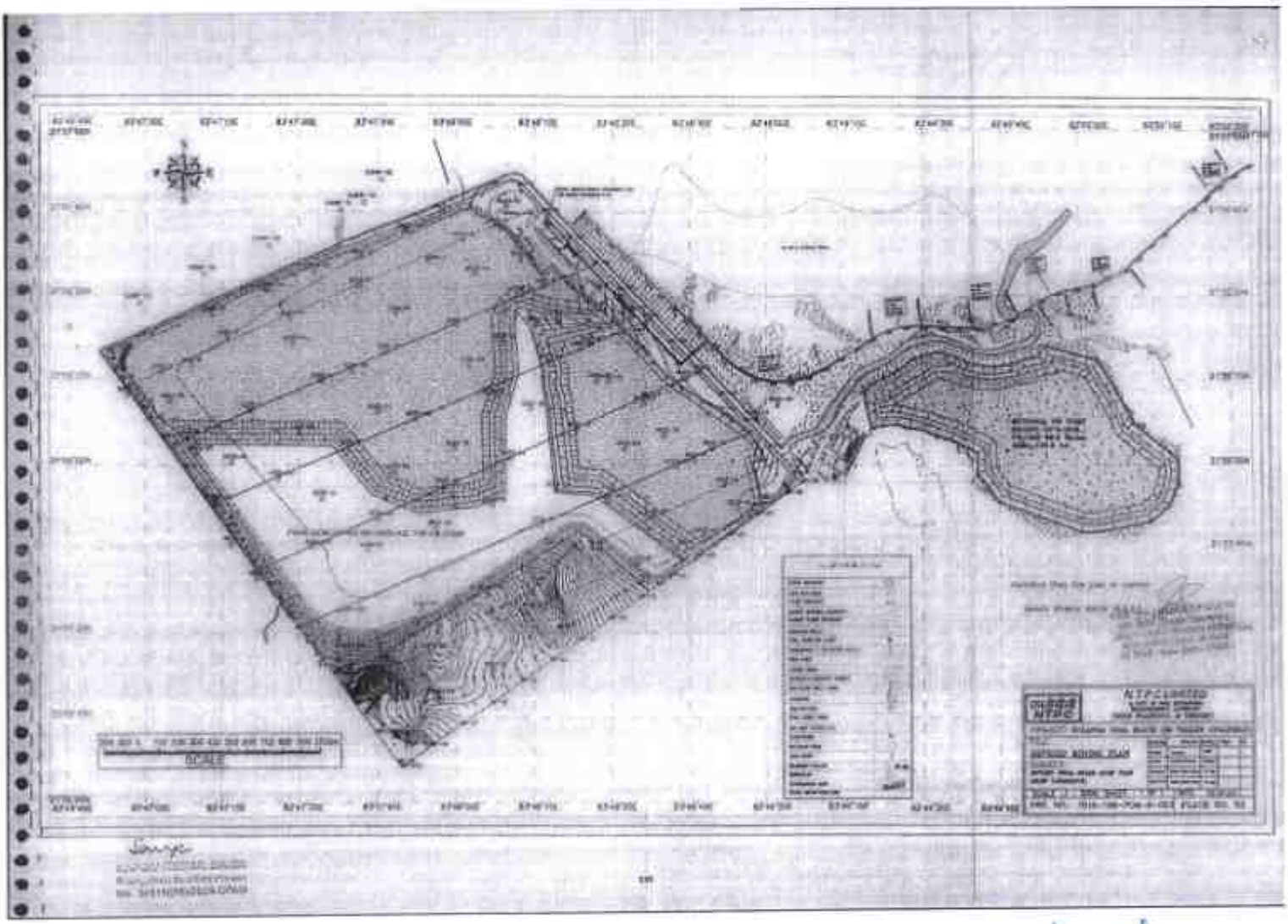
EOC, A-8A, Sector-24, Noida-201301 (U.P.)



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.)

Year 21-24

During these four years, total OB/waste generation is 51.5 Mm^3 @ 18.4 Mm^3 for the year 21st & 22nd year 10 Mm^3 will be produced in 23rd and 4.7 Mm^3 will be produced in 24th year of mining operation. Coal production of 25 Mt @ 7.0 Mt 21st & 22nd year 6 Mt will be produced in 23rd and 5 Mt will be produced in 24th year of mining operation. This production will comprise from seams Rampur-IIIB, Rampur–IIIA, Rampur-II, Rampur-I, Rampur-IAII, Rampur-IAI, Lajkura Middle, Local-1, Lajkura Bot I and Lajkura Bot II, Lajkura Top-III, Lajkura Top-I+II, Local-3 and Local-2. One additional seam Parkhani will also contribute to the coal production. At the end of 24th year, the depth of pit will vary from 190m (260m RL -70m RL) to 240m (260m RL-20m RL) which will be worked in 22 to 25 benches.

All the OB generated will be backfilled in these years. The excavation benches spread along strike to two third width of the block and advanced towards the dip most extremity of the block. **Plate-47** shows the mine pit configuration at the end of 24th year.

5.4 IMPLEMENTATION

On the basis of broad planning provided on five years horizon, it will be necessary to draw annual operational plan by the planning wing of the execution authority in detail. Such planning process allocates OB and coal removal, bench and seam wise, on the basis of planned deployment of shovels as per requirement and capacity. Considering loads for shovels, matching numbers of dumpers will be provided. On the basis of such annual work plan drawn, monthly task bench wise and seam wise will be worked out and workload on different shovels will be examined and properly balanced. It will be necessary to assign the workload on shovels/surface miners on weekly basis and monitor the same to ensure planned results.

5.5 PRODUCTION SCHEDULING

Year wise production for **Phase-I** is given in **Table 5.1.**

संदीप गुप्ता/SANDEEP GUPTA
अवर सचिव/Under Secretary
भारत सरकार/Govt. of India
नई दिल्ली/New Delhi-110001

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

SANJAY KUMAR SINGH
Empanelled Qualified Person
No. 34011/(15)/2009-CPAM

5.6 EQUIPMENT CONFIGURATION

HEMM, ancillary equipment and other equipment are broadly given in **Table-5.2.** These equipments will be procured phase wise up to 4th year till the mine reaches to peak capacity of 7Mtpa. The broad list of equipment is tentatively worked out however the capacity and number may vary during detailing.

TABLE 5.2
LIKELY LIST OF HEMM & OTHER EQUIPMENT

Sl. No.	Equipment	Size	Population
I	**OB**		
1	Electric Rope Shovels	10 M³	4
2	Electric hydraulic back-hoes	10 M³	3
3	Diesel hyd. Shovel back hoes	4.5/5.5 M³	3
4	Rear Dumper	100T	36
5	Rear Dumper	50T	12
6	Elec. Drill	250 mm	6
7	Diesel Drill	160 mm	2
8	Dozer with ripper	850 HP	1
9	Dozer with ripper	450 HP	1
10	Dozer	450HP	5
11	Wheel Dozer	350HP	2
II	**Coal**		
1	Diesel hydraulic Shovel (Coal bucket)	8 M³	1
2	Diesel hyd. Shovel backhoes	4.5/5.5 M³	2
3	Rear Dumper(Coal Body)	50 T	14
4	Diesel Drill	160 mm	2
5	Dozer with ripper	850 HP	1
6	Dozer	450 HP	1
7	Wheel Dozer	350 HP	2
8	Continuous Surface Miner (CSM)	2200mm	2
III	**Common Service**		
1	Grader	280 HP	3
2	Crane	100 T	1
3	Crane	30 T	1
4	Crane	8 T	1
5	Crane	5 T	1
6	Diesel B'hoe	1.5 M³	1
7	FE Loader	3.5/4.5 M³	2
8	FE Loader	1-2 M³	1

After shot holes are drilled into the horizontal bench cut by the shovel, the faces are blasted using explosives and detonators. Coal is also extracted after blasting off the coal faces.

Drilling & Blasting would be required both in OB and Coal benches before excavation by shovel. Except for coal benched which will be mined by CSMs. Heavy ANFO type /Slurry Emulsion is proposed to be used based on the daily requirement. However, flexibility may have to be provided for usage of suitable alternative/available explosives as per the requirement.

5.7.3 Transport

The OB will be transported by 50T and 100 T R.D trucks to external dumps and later on, as soon as de-coaled area is available suitable for backfilling, to the site of back-filling.

The coal will be transported by 50 T R.D. trucks to the pit headstock yard from where the coal will be transported to the Coal Handling Plant. The processed coal in the size range of -50mm through the network of conveyor belts transported up to Loading Silo. Empty railway wagons will be loaded through a rapid Loading System and the Push-Pull Rail System will transport the coal up to Darlipalli Power Plant. The railway line will be extended up to the pit head.

A coal stockyard facility has been provided for accommodating one week's production to provide for incidental failure/repair/overhaul /maintenance of Coal Handling Plant.

संदीप गुप्ता/SANDEEP GUPTA
अवर सचिव/Under Secretary
कोयला मंत्रालय/Ministry of Coal
भारत सरकार/Govt. of India
नई दिल्ली/New Delhi-110001

5.7.4 Overburden Removal and Disposal

The waste generated during 1st & 2nd year will be exclusively disposed in external surface dump located at south eastern side of ML (Block) area, lying outside the allotted block boundaries. In the 3rd and 4th year, disposal of waste will be partly in surface dump and partly in backfilling. From the start of 5th year and onward full scale backfilling will start. The external OB dump will expand over an area of 106.5 ha and designed to accommodate 38.5 Mm^3.

The ultimate backfilled level will be upto 50 m higher than the surface level in conceptual stage. Backfilling will be done in benches each of 30 & 20m height from the level of the surface. The crown dump will start from 5th year. Final Stage Dump Plan is given in **Plate No.-48**

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.)

Qualified Person
No. 34011/(15)/2009-CPAM

Year 21-24

During these four years, total OB/waste generation is 51.5 Mm^3 @ 18.4 Mm^3 for the year 21st & 22nd year 10 Mm^3 will be produced in 23rd and 4.7 Mm^3 will be produced in 24th year of mining operation. Coal production of 25 Mt @ 7.0 Mt 21st & 22nd year 6 Mt will be produced in 23rd and 5 Mt will be produced in 24th year of mining operation. This production will comprise from seams Rampur-IIIB, Rampur–IIIA, Rampur-II, Rampur-I, Rampur-IAII, Rampur-IAI, Lajkura Middle, Local-1, Lajkura Bot I and Lajkura Bot II, Lajkura Top-III, Lajkura Top-I+II, Local-3 and Local-2. One additional seam Parkhani will also contribute to the coal production. At the end of 24th year, the depth of pit will vary from 190m (260m RL -70m RL) to 240m (260m RL-20m RL) which will be worked in 22 to 25 benches.

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5.4 IMPLEMENTATION

On the basis of broad planning provided on five years horizon, it will be necessary to draw annual operational plan by the planning wing of the execution authority in detail. Such planning process allocates OB and coal removal, bench and seam wise, on the basis of planned deployment of shovels as per requirement and capacity. Considering loads for shovels, matching numbers of dumpers will be provided. On the basis of such annual work plan drawn, monthly task bench wise and seam wise will be worked out and workload on different shovels will be examined and properly balanced. It will be necessary to assign the workload on shovels/surface miners on weekly basis and monitor the same to ensure planned results.

5.5 PRODUCTION SCHEDULING

Year wise production for **Phase-I** is given in **Table 5.1.**

SANDEEP GUPTA
Director / Under Secretary
Coal Wing / Ministry of Coal
Govt. of India
New Delhi-110001

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

TABLE 5.1
CALENDER PROGRAMME OF EXCAVATION

Year	Coal Progressive (Mt)	Coal Cumulative (Mt)	Total waste (OB) (Mm^3) prog.	Total waste (OB) (Mm^3) Cumulative	Stripping ratio (m^3/t) prog.	Stripping ratio (m^3/t) Cumulative
1	1	1	4.50	4.50	4.50	4.50
2	2.5	3.5	10.50	15.00	4.20	4.29
3	4.5	8	15.50	30.50	3.44	3.81
4	7	15	18.00	48.50	2.57	3.23
5	7	22	18.00	66.50	2.57	3.02
6	7	29	18.4	84.90	2.63	2.93
7	7	36	18.4	103.30	2.63	2.87
8	7	43	18.4	121.70	2.63	2.83
9	7	50	18.4	140.10	2.63	2.80
10	7	57	18.4	158.50	2.63	2.78
11	7	64	18.4	176.90	2.63	2.76
12	7	71	18.4	195.30	2.63	2.75
13	7	78	18.4	213.70	2.63	2.74
14	7	85	18.4	232.10	2.63	2.73
15	7	92	18.4	250.50	2.63	2.72
16	7	99	18.4	268.90	2.63	2.72
17	7	106	18.4	287.30	2.63	2.71
18	7	113	18.4	305.70	2.63	2.71
19	7	120	18.4	324.10	2.63	2.70
20	7	127	18.4	342.50	2.63	2.70
21	7	134	18.4	360.90	2.63	2.69
22	7	141	18.4	379.30	2.63	2.69
23	6	147	10.00	389.30	1.67	2.65
24	5	152	4.70	394.00	0.94	2.59
Total	**152.00**		**394.00**			**2.59**

संदीप गुप्ता / SANDEEP GUPTA
अवर सचिव / Under Secretary
कोयला मंत्रालय / Ministry of Coal
भारत सरकार / Govt. of India
नई दिल्ली / New Delhi-110001

पवन देव जोशटा/PAWAN DEV
उप महाप्रबन्धक (खनन)
Dep.., General Manager (
एन टी पी सी लिमिटेड/NTPC
EOC, A-8A, Sector-24, Noida-201

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2009-CPAM

5.6 EQUIPMENT CONFIGURATION

HEMM, ancillary equipment and other equipment are broadly given in **Table-5.2.** These equipments will be procured phase wise up to 4th year till the mine reaches to peak capacity of 7Mtpa. The broad list of equipment is tentatively worked out however the capacity and number may vary during detailing.

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8	Dozer with ripper	850 HP	1
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संदीप गुप्ता/SANDEEP GUPTA
अवर सचिव/Under Secretary
कोयला मंत्रालय/Ministry of Coal
भारत सरकार/Govt. of India
नई दिल्ली/New Delhi-110001

पवन देव जामटा/PAWAN DEV JAMTA
उप महाप्रबंधक (सी)
Dep. General Manager (C)
एन टी पी सी लिमिटेड/NTPC Limited
EOC, A-8, Sector-24, Noida

Sanjeev Kumar Singh
Recognised Qualified Person
RQP No. 3401/(15)/2009-CPAM

Sl. No.	Equipment	Size	Population
9	Diesel Drill	100 mm	1
10	Dozer	450 HP	1
11	Wheel Dozer	350 HP	1
12	Diesel browser		3
13	Fire tender		1
14	Boom truck		1
15	Heavy duty toe truck		1
16	Fork lift truck		1
17	Line Truck		1
18	Tipping Trucks	10 T	3
19	Vibratory compactor	25 T	1
20	Tyre handler		2
21	Mobile maintenance Van		2
22	Water sprinkler	28kl	3
23	Material supply Trucks	10 T	6
24	Ambulance Van		1
25	Jeeps and Cars		18
IV	**Reclamation**		
1	Grader	280 HP	1
2	Dozer	450 HP	1
3	Water sprinkler	28kl	1
4	Farm Truck		1

Note: All the operations will be carried out by the use of machines.

5.7 BRIEF DESCRIPTION OF ALL OPERATION

5.7.1 Extent of mechanization

All mining activities such as face preparation, drilling, charging, blasting, muck removal, coal loading, processing, transport & despatch of coal and OB will be mechanized. Brief of operations are outlined below.

5.7.2 Drilling & Blasting

Crawler-mounted pneumatically operated down the hole drilling rigs with hole diameter of about 250 mm and those rigs are capable to meet the future requirement of 8 m/hr will be deployed for OB. R.B.H drills will be used for drilling about 160mm dia. holes in coal.

संजीव गुप्ता / SANJIV GUPTA
अवर सचिव / Under Secretary
कोयला मंत्रालय / Ministry of Coal
भारत सरकार / Govt. of India
नई दिल्ली-110001 / New Delhi-110001

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.)

After shot holes are drilled into the horizontal bench cut by the shovel, the faces are blasted using explosives and detonators. Coal is also extracted after blasting off the coal faces.

Drilling & Blasting would be required both in OB and Coal benches before excavation by shovel. Except for coal benched which will be mined by CSMs. Heavy ANFO type /Slurry Emulsion is proposed to be used based on the daily requirement. However, flexibility may have to be provided for usage of suitable alternative/available explosives as per the requirement.

5.7.3 Transport

The OB will be transported by 50T and 100 T R.D trucks to external dumps and later on, as soon as de-coaled area is available suitable for backfilling, to the site of back-filling.

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A coal stockyard facility has been provided for accommodating one week's production to provide for incidental failure/repair/overhaul /maintenance of Coal Handling Plant.

संदीप गुप्ता / SANDEEP GUPTA
अवर सचिव / Under Secretary
कोयला मंत्रालय / Ministry of Coal
भारत सरकार / Govt. of India
नई दिल्ली / New Delhi-110001

5.7.4 Overburden Removal and Disposal

The waste generated during 1st & 2nd year will be exclusively disposed in external surface dump located at south eastern side of ML (Block) area, lying outside the allotted block boundaries. In the 3rd and 4th year, disposal of waste will be partly in surface dump and partly in backfilling. From the start of 5th year and onward full scale backfilling will start. The external OB dump will expand over an area of 106.5 ha and designed to accommodate 38.5 Mm^3

The ultimate backfilled level will be upto 50 m higher than the surface level in conceptual stage. Backfilling will be done in benches each of 30 & 20m height from the level of the surface. The crown dump will start from 5th year. Final Stage Dump Plan is given in **Plate No.-48**

पवन देव जामटा/PAWAN DEV JAMWAL
उप महाप्रबंधक (सी)
Deputy General Manager (Co...)
एन टी पी सी लिमिटेड / NTPC ...
EOC, A-8A, Sector-24, Noida-201...

With the advance of mining operations from north to south (towards dip side), the internal backfill quantities will progressively increase and full-scale backfilling will be achieved in the 5th year of project operation.

TABLE- 5.3
DUMP DESIGN PARAMETERS

Sl. No.	Parameter	Value
1	Dump bench height	30 m
2	Natural angle of repose of individual bench	37°
3	Ramp gradient	6% (1 in 16)
4	Maximum dump height	60 m
5	Overall average final dump slope	27°-28°

5.7.4.1. **Surface Dump and crown dump:** The height of the dump will be about 60m and it will be constructed in 2 lifts of 30 m height each. A proper retaining wall will be constructed at the toe of the dump to prevent not only uncontrolled rolling of stones/lumps but also to prevent slippage of the dump during precipitation. A garland drain of adequate size will be constructed outside the toe wall to drain the dump properly and water lead to settling ponds for stagnation. The benches will be planted as soon as they reach the final desired position. The ultimate slope of dumps will be kept below 28°.

5.7.4.2. **Backfill:** Berm of adequate width after every 30 m lift will be kept so that the ultimate slope does not exceed 28°. The water will be channelized in a controlled manner by garland drains and benches and paved chutes will be provided wherever necessary for controlled descent of water. As soon as the bench or any area takes final shape, it will be planted with grass and local trees, bushes after laying a layer of topsoil preserved for the purpose.

As mentioned above, there would be one surface dump in the south eastern direction of the ML area in Khaprikachhar village. Dumping schedule is given in **Table-5.4**

SANDEEP GUPTA

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

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2009-CPAM

TABLE- 5.4
OVERBURDEN DUMPING SCHEDULE

Year	External Dump OB (Mm^3)	External Dump OB Cumulative (Mm^3)	Internal Dump OB (Mm^3)	Internal Dump OB Cumulative (Mm^3)	Total OB (Mm^3)	Cumulative OB (Mm^3)
C1	0	0	0	0	0	0
C2	0	0	0	0	0	0
1	4.50	4.50	0	00	4.50	4.50
2	10.50	15.00	0	0	10.50	15.00
3	13.00	28.00	2.50	2.50	15.50	30.50
4	10.50	38.50	7.50	10.00	18.00	48.50
5	0	38.50	18.00	28.00	18.00	66.50
6	0	38.50	18.40	46.40	18.40	84.90
7	0	38.50	18.40	64.80	18.40	103.30
8	0	38.50	18.40	83.20	18.40	121.70
9	0	38.50	18.40	101.60	18.40	140.10
10	0	38.50	18.40	120.00	18.40	158.50
11	0	38.50	18.40	138.40	18.40	176.90
12	0	38.50	18.40	156.80	18.40	195.30
13	0	38.50	18.40	175.20	18.40	213.70
14	0	38.50	18.40	193.60	18.40	232.10
15	0	38.50	18.40	212.00	18.40	250.50
16	0	38.50	18.40	230.40	18.40	268.90
17	0	38.50	18.40	248.80	18.40	287.30
18	0	38.50	18.40	267.20	18.40	305.70
19	0	38.50	18.40	285.60	18.40	324.10
20	0	38.50	18.40	304.00	18.40	342.50
21	0	38.50	18.40	322.40	18.40	360.90
22	0	38.50	18.40	340.80	18.40	379.30
23	0	38.50	10.00	350.80	10.00	389.30
24	0	38.50	4.70	355.50	4.70	394.00
TOTAL	38.50		355.50		394.00	

Proper attention will be given to the stability of the backfilled dump, crown dump and the external surface dump from failures and leaching out.

संदीप गुप्ता / SANDEEP GUPTA
अवर सचिव / Under Secretary
कोयला मंत्रालय / Ministry of Coal
भारत सरकार / Govt. of India
नई दिल्ली / New Delhi-110001

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

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

Authorised Qualified Person
No. 34011/(15)/2009-CPAM

5.7.5 Topsoil Removal and Disposal

The total top soil generated (3.65 Mm^3) during the development of mine will be stacked separately in a soil stack pile located within the block area along the western boundary at south eastern corner of the block and will be stacked over an area of 3.84 ha. This location is good enough for the first five years. If necessary the location of the top soil dump will change with the advancing mine operations either over the unexcavated area or over the backfilled area. The stacked soil will be re handled and spread to the required location before its fertility vanishes. It will be used for plantation development of green belt along the fringes of the site roads and reclamation of surface dump and backfilled area.

The top soil stockpiles will be low height not exceeding as per the prescribed norms. This will be grassed to retain fertility if required. Besides this topsoil stack, there would be temporary stacks over the area to be reclaimed which will be made use of for concurrent filling without bringing the topsoil to the soil stack near the OB dump. The year wise quantity schedule of top soil generated and spread is given in **Table-5.5.**

TABLE-5.5
TOP SOIL EXCAVATION & SPREAD

Year	Excavated (Mm^3)	Excavated Cumm.(Mm^3)	Spread (Mm^3)	Spread cumm. (Mm^3)
C1	0.00	0.00	0.00	0.00
C2	0.00	0.00	0.00	0.00
1	0.17	0.17	0.00	0.00
2	0.17	0.35	0.00	0.00
3	0.17	0.52	0.00	0.00
4	0.17	0.70	0.17	0.17
5	0.17	0.87	0.17	0.35
6	0.17	1.04	0.17	0.52
7	0.17	1.22	0.17	0.70
8	0.17	1.39	0.17	0.87
9	0.17	1.57	0.17	1.04
10	0.17	1.74	0.17	1.22
11	0.17	1.91	0.17	1.39
12	0.17	2.09	0.17	1.57
13	0.17	2.26	0.17	1.74
14	0.17	2.43	0.17	1.91

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.)

SANJIV KUMAR SINGH
Recognised Qualified Person-I
No. 34011/(15)/2009-CPAM

Year	Excavated (Mm^3)	Excavated Cumm.(Mm^3)	Spread (Mm^3)	Spread cumm. (Mm^3)
15	0.17	2.61	0.17	2.09
16	0.17	2.78	0.17	2.26
17	0.17	2.96	0.17	2.43
18	0.17	3.13	0.17	2.61
19	0.17	3.30	0.17	2.78
20	0.17	3.48	0.17	2.96
21	0.17	3.65	0.17	3.13
22	0	3.65	0.17	3.30
23	0	3.65	0.17	3.48
24	0	3.65	0.17	3.65
Total	3.65		3.65	

5.8 LIFE OF THE MINE (WITH ASSUMPTIONS)

5.8.1 Following assumption are made:

- Coal will be extracted upto bottommost occurring seam
- All coal will be mined with opencast method
- The capacity of Mining Machinery remains same by and large
- Mine is worked with Shovel-Dumper combination and CSM is deployed for excavation of two seams
- Approximately 87 ha of coal bearing dense forest land is reduced from mining point of view

5.8.2 In view of the above assumptions and with the rated output of 7Mtpa the life of mine computed as 24 years, in addition to this there will be construction period of two years before commencement of actual production from the mine.

5.9 GEOLOGICAL RESERVES CONSIDERED FOR MINING VIS-A-VIS EXTRACTABLE RESERVES

The philosophy of calculation coal reserves is based on the premise that total coal effectively brought to the surface will constitute the extractable reserves. In a bid to work out the details reserves blocked in the Phase-II of mining, reserved blocked in the barrier and batter and mining losses have been deducted from the In situ Geological reserves. Details of extractable reserves is given in **Table-5.6**

TABLE 5.6
GEOLOGICAL RESERVES CONSIDERED FOR MINING VIS-À-VIS EXTRACTABLE RESERVES

Seam	Geological Reserves as per GR (Mt)	Geological Reserves w.r.t Adjusted Boundary (Mt)	Geological Reserves blocked in Phase-II area (Mt)	Geological Reserves excluding blocked reserves (Mt)	Reserves lost in barrier (Mt)	Reserves lost in batter (Mt)	Mineable Reserves (Mt)	Mining Losses (Mt)	Extractable reserves (Mt)
PARKHANI	0.60	0.6	0.1	0.5	0.21	0.09	0.2	0.01	0.19
LAJ TOP(III)	12.38	12.383	4.13	8.253	0.1	2.02	6.12	0.18	5.94
LAJ TOP(I+II)	30.67	30.638	10.51	20.128	0.25	5.116	14.24	0.43	13.81
LOCAL-3	4.69	4.59	2.3	2.29	0.03	0.08	2.29	0.07	2.22
LOCAL-2	4.59	4.59	1.86	2.73	0.03	0.78	1.92	0.06	1.86
LAJ MIDDLE	20.75	20.013	4.65	15.363	0.19	2.68	12.68	0.38	12.3
LOCAL-1	4.21	4.214	0.56	3.654	0.05	1.1	2.51	0.08	2.43
LAJ BOT-II	21.73	21.459	3.64	17.819	0.23	2.98	14.92	0.45	14.47
LAJ BOT-I	9.18	9.049	1.61	7.439	0.09	0.48	7	0.21	6.79
RAMPUR-IIIB	10.37	10.32	1.41	8.91	0.11	2.73	6.12	0.18	5.94
RAMPUR-IIIA	13.59	13.39	1.47	11.92	0.15	2.35	9.62	0.29	9.33
RAMPUR-II	9.35	9.296	1.09	8.206	0.09	0.7	7.46	0.22	7.24
RAMPUR-I	73.44	72.551	12.03	60.521	0.77	7.61	52.03	1.56	50.47
RAMPUR-IAII	19.62	19.491	2.09	17.401	0.22	3.6	13.71	0.41	13.3
RAMPUR-IAI	10.51	10.432	0.5	9.932	0.13	3.44	5.94	0.18	5.76
Reserves (Mt)	245.143	243.116	47.95	195.166	2.65	35.756	156.75	4.71	152.05

5.9.1 Average stripping ratio

Entire coal resources within the block are envisaged to be mine out corresponding to average strip ratio of 2.59 m^3/t.

5.10 DETAILED BREAK UP OF BLOCKED RESERVES

Detailed break-up of seam wise blocked reserves in the 87ha area, which NTPC has envisaged to mine out during Phase-II subject to the permission granted by MoEF and MoC is given in **Table 5.7**

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पवन देव जामटा/PAWAN DEV JA
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Dep... General Manager (Com...
एन टी पी सी लिमिटेड/NTPC LI...
EOC, A-8A, Sector-24, Noida-2013...

TABLE-5.7
GEOLOGICAL RESERVES IN PHASE II

Sl. No.	Seam	Geological Reserves blocked in Phase-II area (Mt)
1.	PARKHANI	0.10
2.	LAJ TOP(III)	4.13
3.	LAJ TOP(I+II)	10.53
4.	LOCAL-3	2.30
5.	LOCAL-2	1.86
6.	LAJ MIDDLE	4.65
7.	LOCAL-1	0.56
8.	LAJ BOT-II	3.64
9.	LAJ BOT-I	1.61
10.	RAMPUR-IIIB	1.41
11.	RAMPUR-IIIA	1.47
12.	RAMPUR-II	1.09
13.	RAMPUR-I	12.03
14.	RAMPUR-IAII	2.09
15.	RAMPUR-IAI	0.50
	TOTAL	47.95

5.11 LOCATION OF ACCESS TRENCH & REASON FOR SELECTION OF SITE

As already explained in Clause -5.3, the block is virgin and there is no active portion, hence, opening up of deposit of the mine will be done from the surface in the north-eastern limb of the block near borehole No. MNID- 27(on its NW side). This initial box cut will be made in the Seam Rampur-IAII after making an entry at 244m RL and aligned from NE to SW as the incrop is available here at shallow depth of about 10 m. However, some variation in the location may take place after detailed survey.

Rampur seam with 6 splits except Rampur-I has gradually reducing trend in thickness towards northeast. Rampur-I is the thickest seam amongst them. The rest of Rampur sections are thin in nature. The dirt band occurring between the split sections of Rampur seam (in seam parting) between Rampur & Lajkura seam is gradually increasing towards the south-eastern

part of the block. The occurrence of the coal in the north east limb of the mine is at its minium of the order of 10m from the surface, this enables the best location of making of access trench, upto bottommost level of occuring seam at its incropping zone. Further the same will enable working benches or cuts to be driven easily.

5.11.1 Factors Contributing Location of Access Trench

1. **Shape and size of the opencast mine :** More or less the shape of the mine is rhombus and size is medium large.

2. **The angle of dip** : The angle of dip in this case is taken as the dipping of the seams which shows general trend of sloping at 6° to 11°. Slope of access trench is also kept conforming to the trending of coal seams.

3. **The local topography :** The topography of the block is highly undulating and rugged in nature. The central and southern parts of the area are marked by higher elevation exhibiting hillocks and ridges. The maximum and minimum elevations above mean sea level are 336m and 232 m respectively. The eastern side is more or less flat in nature enabling to minimisation of pre-stripping and early hitting of coal deposit.

4. **The physical and mechanical property of the rock** : Almost the entire area of Dulanga block is covered by the rocks of Barakar Formations. In the north eastern side of the block beyond the block boundary gritty and pebbly Sandstone of Karaharbari Formation, Talchir boulders and the basement rock comprising of Metamorphics are also exposed. The robust base of metamorphic base will enable the stability of access trench.

5. **The hydrogeological conditions** are such that will allow minimum of seepage from the side, this will help maintaining the access trench dry in all seasons.

6. **The type of transport facility** - As has already explained type of transportation will be effected by 50T to 100T rear dump haul trucks. The width of haul road in the access trench is kept at 25m to allow easy and safe operation.

7. **The disposition of surface structures :** Except a few hutments which will be removed during execution of the mine there is no surface structures to pose hindrances.

8. **The system of opencast mining :** Shovel dumper combination, CSM proposed for two Rampur horizon seams.

5.12 MINE PARAMETERS

TABLE-5.8
MINE PARAMETERS

SL. NO.	PARAMETERS	VALUE
1.	Area of project (ha) (Phase I + II)	890.63
	a. Within block (ha)	654.11
	b. Outside the block (ha)	236.52
2.	Maximum Depth (m)	255
	Minimum Depth (m)	10
3.	Maximum strike length a) along surface (m) b) along mine floor (m)	 2815 2400
4.	Minimum strike length a) along surface (m) b) along mine floor (m)	 1980 1551
5.	Maximum width of quarry- a) On surface along dip (m) b) On floor along dip (m)	 2103 2016
6.	Area to be excavated for quarry – a) At surface (ha) b) At floor (ha)	 510.77 394.02
7.	Area under surface dump (ha)	106.62
8.	Height of surface dump (m)	60.00
9.	Dump bench height (m)	30
10.	Overall angle of dumping slope	28°
11.	Backfilled area (ha)	413.07
12.	Height of crown dump (m)	60.00
13.	Area of ultimate void* (ha)	159
14.	Manpower	1278 nos
15.	Total Power requirement (approx.)	8.40 MW
16.	Total plantation area (ha)	466.46

* The area of ultimate void will be reduced further by taking recourse of filling ash generated from STPP place wise based on the decision taken.

5.12.1 Geometry Bench Parameters

Separate benches will be developed for coal and OB. The thickness of benches for thin seams will be determined by the thickness of coal seams. Thicker benches will be developed in two or more benches as per the requirement. All efforts will be made to mine out available coal were there are

constraints offered owing to thin seam will be mined out with OB and disposed with OB. Bench height is designed in such a manner which will provide stability and ease of maintainability. Bench parameters are given in **Table-5.9.**

TABLE-5.9
BENCH PARAMETERS

Sl. No.	Particulars	Remarks
1.	Bench height OB Coal	Upto 10m or equal to parting thickness. Upto 10m or equal to coal seam thickness.
2.	Bench width	20 - 40 m
3.	Slope of OB bench or coal bench	70°
4.	Slope of backfill or surface dump bench	37°
5.	Overall slope of surface dump or backfill	26°
6.	Gradient of haul road	1 in 16
7.	Gradient of ramps	Usually 1:16, sometimes upto 1:10

5.12.2 Thickness range of each seam and parting: The data have been taken from the Geological Report, thickness range of each seam along with their depth from the surface is given in the **Table-5.10**

TABLE- 5.10
THICKNESS RANGE OF EACH SEAM AND PARTING

Coal Seams	Depth of coal seams (m)		Thickness of coal seams (m)		Thickness of parting (m)	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
Parkhani	7.79 (MNID-22)	29.9 (MNID-19)	0.61 (MNID-22)	2.11 (OIBD-17)		
Parting					60.40 (OIBD-17)	68.16 (MNID-22)
Lakura Top (I)	5.00 (OIBD-50)	98.25 (MNID-19)	1.10 (OIBD-50)	7.77 (MNID-25)		
Parting					0.41 (OIBD-31)	2.64 (MNID-23)
Lakura Top(II)	14.55 (OIBD-56)	109.23 (MNID-19)	3.35 (OIBD-5)	12.09 (OIBD-31)		
Parting					5.74 (OIBD-37)	17.18 (OIBD-7)
L3	15.61 (MNID-06)	120.14 (MNID-19)	0.31 (OIBD-51)	4.02 (MNID-12)		
Parting					3.25 (MNID-22)	38.67 (MNID-28)
L2	13.45 (OIBD-22)	137.39 (OIBD-56)	0.38 (MNID-25)	4.59 (MNID-22)		
Parting					8.37 (OIBD-10)	21.52 (MNID-26)

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SANJIV KUMAR SINGH
Recognised Qualified Person
RQP No. 34011/(15)/2009-CPAM

पवन देव जामटा/PAWAN DEV JAMTA
उप महाप्रबन्धक (खनिज)
Deputy General Manager (Co...)
एन टी पी सी लि./NTPC Ltd.
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

Coal Seams	Depth of coal seams (m)		Thickness of coal seams (m)		Thickness of parting (m)	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
Lajkura Middle	9.89 (OIBD-56)	153.86 (OIBD-53)	2.28 (MNID-18)	7.05 (OIBD-47)		
Parting					14.09 (MNID-23)	39.11 (OIBD-28)
L1	7.40 (OIBD-23)	184.43 (OIBD-17)	0.11 (OIBD-23)	3.39 (OIBD-28		
Parting					3.60 (MNID-25)	13.16 (OIBD-21)
Lajkura Bottom-II	6.50 (OIBD-16)	194.22 (OIBD-17)	0.44 (MNID-22)	11.05 (MNID-25)		
Parting					6.78 (OIBD-23)	17.72 (MNID-22)
Lajkura Bottom-I	4.52 (OIBD-3)	200.36 (OIBD-17)	0.31 (OIBD-33)	4.65 (MNID-2)		
Parting					30.87 (OIBD-25)	59.13 (OIBD-52)
Rampur-IIIB	9.23 (MNID-17)	256.60 (MNID-19)	0.10 (OIBD-43)	3.37 (OIBD-6)		
Parting					0.47 (MNID-28)	5.87 (MNID-22)
Rampur-IIIA	6.62 (MNID-9)	259.11 (MNID-19)	0.15 (OIBD-50)	3.34 (OIBD-28)		
Parting					0.46 (OIBD-2)	3.54 (OIBD-50)
Rampur-II	9.14 (MNID-9)	261.84 (MNID-19)	0.17 (OIBD-26	3.28 (OIBD-57)		
Parting					0.19 (OIBD-38	2.40 (OIBD-58)
Rampur-I	13.50 (OIBD-19)	272.00(MNID-19)	1.16 (OIBD-4	11.74 (OIBD-48)		
Parting					1.52 (OIBD-40)	12.35 (MNID-22)
Rampur-IA	8.50 (MNID-24)	283.18 (MNID-19)	0.30 (OIBD-54)	4.15 (MNID-25)		
Parting					1.21 (OIBD-52)	8.68 (MNID-21)
Rampur-I A	29.31 (MNID-05)	289.74 (MNID-19)	0.07 (OIBD-39)	5.62 (OIBD-8)		

5.13 STAGE WISE EXTRACTABLE COAL & OB

5.13.1 Stage-wise, seam-wise extractable coal and OB is given in Table-5.11

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Deputy General Manager
एन टी पी सी लिमिटेड / NTPC
EOC, HQ, Sector-24, Noida-2

TABLE- 5.11
STAGE WISE EXTRACTABLE COAL, OB & STRIP RATIO

Year	Succession of Seam (Top downward)	Extractable Coal (Mt)	OB (Mm^3)	Strip Ratio (m^3/t) = OB /Coal
End of 1st Year	**Top OB**		3.27	
	RAMPUR-IIIB	0		
			0.10	
	RAMPUR-IIIA	0.04		5.48
			0.08	
	RAMPUR-II	0.06		1.26
			0.07	
	RAMPUR-I	0.51		0.13
			0.51	
	RAMPUR-IAII	0.30		1.69
			0.47	
	RAMPUR-IAI	0.08		5.81
	Total	**1.01**	**4.50**	**4.48**
End of 2nd Year	**Top OB**		9.32	
	RAMPUR-IIIB	0		
			0.19	
	RAMPUR-IIIA	0.22		10.19
			0.13	
	RAMPUR-II	0.13		0.97
			0.13	
	RAMPUR-I	1.41		0.09
			0.71	
	RAMPUR-IAII	0.57		1.25
			0.03	
	RAMPUR-IAI	0.17		0.18
	Total	**2.50**	**10.50**	**4.19**
End of 3rd Year	**Top OB**		14.42	
	RAMPUR-IIIB	0		
			0.23	
	RAMPUR-IIIA	0.46		14.91
			0.27	
	RAMPUR-II	0.64		0.43
			0.20	
	RAMPUR-I	2.91		0.07
			0.37	
	RAMPUR-IAII	0.28		1.29
			0.02	
	RAMPUR-IAI	0.22		0.09
	Total	**4.50**	**15.50**	**3.44**
End of 4th Year	**Top OB**		11.74	
	LAJ BOT-II	0.47		25.09
			0.09	
	LAJ BOT-I	0.30		0.30

Year	Succession of Seam (Top downward)	Extractable Coal (Mt)	OB (Mm^3)	Strip Ratio (m^3/t) = OB /Coal
			3.31	
	RAMPUR-IIIB	0		
			0.84	
	RAMPUR-IIIA	0.93		4.21
			0.50	
	RAMPUR-II	0.43		1.17
			0.37	
	RAMPUR-I	3.77		0.10
			0.99	
	RAMPUR-IAII	0.86		1.15
			0.17	
	RAMPUR-IAI	0.25		0.68
	Total	7.00	18.00	2.57
End of 5th Year	**Top OB**		11.65	
	LAJ BOT-II	0.43		26.97
			0.77	
	LAJ BOT-I	0.32		2.43
			2.56	
	RAMPUR-IIIB	0.16		15.66
			0.69	
	RAMPUR-IIIA	0.84		0.82
			0.49	
	RAMPUR-II	0.43		1.14
			0.30	
	RAMPUR-I	3.69		0.08
			1.15	
	RAMPUR-IAII	0.85		1.34
			0.39	
	RAMPUR-IAI	0.28		1.40
	Total	7.00	18.00	2.57
From 5th to 15th Year	**Top OB**		77.56	
	LAJ TOP-III	0.73		106.82
			0.10	
	LAJ TOP-I+II	2.20		0.04
			1	
	LOCAL-III	0.23		4.41
			1.00	
	LOCAL-II	0.35		2.89
			0.43	
	LAJ MIDDLE	0.76		0.56
			10	
	LOCAL-I	1.18		8.48
			14.14	
	LAJ BOT-II	9.16		1.54
			4.49	
	LAJ BOT-I	4.62		0.97
			59.47	

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Year	Succession of Seam (Top downward)	Extractable Coal (Mt)	OB (Mm^3)	Strip Ratio (m^3/t) = OB /Coal
	RAMPUR-IIIB	2.64		22.53
			3.00	
	RAMPUR-IIIA	4.44		0.67
			1.90	
	RAMPUR-II	3.58		0.53
			1.64	
	RAMPUR-I	24.85		0.07
			6.67	
	RAMPUR-IAII	7.02		0.95
			2.51	
	RAMPUR-IAI	2.25		1.11
	Total	**70.01**	**184.00**	**2.63**
From 16th to 24th Year (UPTO END OF MINE LIFE)	**Top OB**		28.93	
	PARKHANI	0.19		149.36
			4.64	
	LAJ TOP-III	5.21		0.89
			0.98	
	LAJ TOP-I+II	11.81		0.08
			8.20	
	LOCAL-III	1.99		4.11
			8.20	
	LOCAL-II	1.52		5.41
			8.20	
	LAJ MIDDLE	5.53		1.48
			15.45	
	LOCAL-I	1.25		12.41
			15.45	
	LAJ BOT-II	4.41		3.51
			4.28	
	LAJ BOT-I	1.56		2.75
			38.17	
	RAMPUR-IIIB	3.13		12.18
			1.59	
	RAMPUR-IIIA	2.40		0.66
			1.60	
	RAMPUR-II	1.97		0.81
			0.87	
	RAMPUR-I	13.33		0.07
			3.77	
	RAMPUR-IAII	3.41		1.11
			3.14	
	RAMPUR-IAI	2.51		1.25
	Total	**80.01**	**143.50**	**2.39**
	Grand Total	**152.03**	**394.01**	**2.59**

5.13.2 Year wise quality of extractable coal reserves is given in **Table 5.12.**

TABLE- 5.12
YEARWISE QUALITY OF EXTRACTABLE COAL RESERVES

Year	Coal Seam Name	PARKHANI	LAJ TOP - III	LAJ TOP - II	LOCAL - 3	LOCAL - 2	LAJ MIDDLE	LOCAL - 1	LAJ BOT - II	LAJ BOT - I	RAMPUR - IIIB	RAMPUR - IIIA	RAMPUR - II	RAMPUR - I	RAMPUR - IAII	RAMPUR - IAI	weighted average
1st Year	M(%)											4.2	4.2	2.7	3.0	3.9	3.0
	Ash((%)											37.3	33.6	47.7	47.1	50.5	46.9
	UHV											3173.5	3686.7	1945.6	1978.4	1389.2	2018.5
2nd year	M(%)											3.6	4.2	2.6	3.0	3.8	2.9
	Ash((%)											32.5	34.0	45.9	47.1	49.1	44.9
	UHV											3907.2	3825.8	2199.6	1976.7	1597.4	2304.7
3rd year	M(%)										7.7	4.4	4.8	2.6	3.1	3.7	3.0
	Ash((%)										47.6	39.7	38.4	45.6	47.7	47.4	45.0
	UHV										1269.1	2810.3	2945.8	2241.3	1899.9	1841.9	2272.7
4th year	M(%)								3.3		7.3	4.2	4.5	2.6	2.9	3.5	3.1
	Ash((%)								47.8		45.2	37.9	35.7	44.6	45.2	45.9	43.3
	UHV								1846.5		1654.0	3092.5	3351.4	2392.1	2284.1	2071.8	2502.4
5th year	M(%)								3.3	3.3	5.6	4.0	4.5	2.5	2.8	3.5	3.0
	Ash((%)								48.3	35.2	34.8	35.5	35.7	44.0	44.3	45.3	42.5
	UHV								1781.3	3582.2	3323.5	3455.6	3390.2	2475.8	2388.9	2164.0	2632.7
6th year	M(%)								3.3	3.8	5.6	4.0	4.4	2.5	2.8	3.5	3.1
	Ash((%)								48.9	40.9	34.5	35.4	35.1	43.8	43.3	45.4	42.3
	UHV								1658.3	2723.3	3366.1	3468.1	3450.6	2505.4	2539.4	2148.6	2647.8
7th Year	M(%)								3.3	3.9	5.7	4.0	4.3	2.5	2.8	3.5	3.1

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

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

Year	Coal Seam Name	PARKHANI	LAJ TOP - III	LAJ TOP - II	LOCAL - 3	LOCAL - 2	LAJ MIDDLE	LOCAL - 1	LAJ BOT - II	LAJ BOT-I	RAMPUR – IIIB	RAMPUR - IIIA	RAMPUR – II	RAMPUR - I	RAMPUR - IAII	RAMPUR – IAI	weighted average
	Ash((%)								47.7	41.6	35.2	35.4	34.6	43.5	43.0	44.9	42.2
	UHV								1873.4	2616.1	3247.7	3462.5	3522.6	2651.0	2578.1	2224.6	2645.8
8th Year	M(%)							3.1	3.9	5.7	4.0	4.4	2.5	2.8	3.5	3.2	3.5
	Ash((%)							46.1	41.7	35.3	35.4	35.1	43.6	43.9	44.4	42.3	41.7
	UHV							2100.8	2607.9	3240.6	3463.9	3448.1	2633.8	2455.4	2295.4	2624.8	2662.7
9th Year	M(%)							3.8	3.1	3.9	5.7	4.0	4.4	2.6	2.9	3.4	3.2
	Ash((%)							46.7	45.2	41.4	35.4	35.5	35.8	44.0	44.6	43.9	42.4
	UHV							1932.0	2242.4	2863.6	3227.4	3449.6	3378.3	2479.3	2347.2	2369.8	2610.1
10th Year	M(%)						3.8	3.7	3.0	3.8	5.8	4.0	4.4	2.5	2.9	3.4	3.2
	Ash((%)						38.1	45.6	44.5	41.0	34.8	36.0	34.9	44.3	44.5	43.0	42.3
	UHV						3117.4	2087.6	2336.4	2715.3	3352.0	3380.6	3474.8	2431.4	2359.9	2506.4	2623.4
11th Year	M(%)					3.9	3.7	3.0	3.8	5.5	4.1	4.3	2.5	2.6	3.3	3.3	3.5
	Ash((%)					39.3	45.0	43.7	40.9	34.2	36.3	34.1	44.4	44.1	42.2	41.9	41.4
	UHV					2934.9	2184.4	2459.9	2725.8	3417.6	3324.4	3509.9	2422.8	2417.1	2624.6	2671.6	2712.5
12th Year	M(%)				5.2		4.0	3.7	3.0	3.9	5.6	4.1	4.3	2.6	2.8	3.3	3.3
	Ash((%)				21.6		40.5	44.9	43.6	41.2	34.3	36.3	34.0	44.5	43.6	42.1	41.9
	UHV				5201.3		2752.2	2198.4	2474.5	2679.1	3388.1	3325.5	3618.6	2412.7	2503.1	2641.7	2656.8
13th Year	M(%)			5.0	5.2	4.8	4.0	3.7	3.0	3.9	5.5	4.0	4.3	2.6	2.7	3.3	3.4
	Ash((%)			35.7	21.5	47.1	40.5	44.6	43.4	41.3	34.1	36.2	34.2	44.5	42.6	42.2	41.6
	UHV			3158.2	5212.2	1740.3	2748.1	2242.4	2508.8	2659.3	3429.8	3347.7	3592.8	2412.1	2640.3	2620.9	2693.9
14th Year	M(%)		3.2	5.0	4.7	4.7	4.0	3.7	2.9	3.9	5.5	4.0	4.3	2.6	2.7	3.3	3.4
	Ash((%)		36.6	37.0	19.4	46.9	40.3	44.8	43.2	41.4	33.9	35.9	34.4	44.5	41.7	42.5	41.2

Year	Coal Seam Name	PARKHANI	LAJ TOP - III	LAJ TOP - II	LOCAL - 3	LOCAL - 2	LAJ MIDDLE	LOCAL - 1	LAJ BOT - II	LAJ BOT - I	RAMPUR - IIIB	RAMPUR - IIIA	RAMPUR - II	RAMPUR - I	RAMPUR - IAII	RAMPUR – IAI	weighted average
	UHV		3406.6	3107.2	5563.2	1773.6	2765.9	2210.3	2535.6	2648.4	3469.7	3389.0	3559.3	2408.4	2763.4	2578.2	**2745.9**
15th Year	M(%)		3.3	5.1	4.5	4.8	4.0	3.7	3.0	3.9	5.5	4.0	4.3	2.6	2.7	3.3	**3.5**
	Ash((%)		36.8	37.4	18.9	47.4	39.9	45.6	43.3	41.4	33.7	35.9	34.2	44.5	41.4	42.4	**40.8**
	UHV		3366.1	3048.0	5660.6	1702.2	2845.5	2094.2	2519.7	2650.7	3502.6	3399.0	3592.5	2401.6	2822.3	2585.5	**2782.1**
16th Year	M(%)		3.3	5.2	4.4	4.8	3.9	3.6	3.0	3.8	5.4	4.0	4.1	2.6	2.7	3.2	**3.5**
	Ash((%)		37.3	38.3	18.4	47.5	39.5	44.3	43.3	40.1	33.6	36.1	32.8	44.5	41.6	41.4	**40.7**
	UHV		3301.6	2891.0	5746.6	1688.4	2903.4	2287.2	2515.7	2643.7	3528.3	3363.8	3612.5	2413.7	2788.3	2742.6	**2809.0**
17th Year	M(%)		3.4	5.3	4.8	4.8	3.8	3.5	3.0	3.7	5.4	4.0	4.1	2.5	2.7	3.2	**3.5**
	Ash((%)		38.3	39.5	19.9	47.1	38.6	43.2	43.4	39.4	33.4	35.7	32.5	44.3	41.5	40.5	**40.4**
	UHV		3150.7	2795.9	5500.9	1736.7	3030.7	2449.9	2506.3	2958.5	3550.2	3422.0	3652.7	2436.3	2807.6	2672.2	**2847.9**
18th Year	M(%)		3.4	5.4	5.9		3.7	3.3	2.9	3.6	5.4	3.9	4.2	2.5	2.6	3.1	**3.5**
	Ash((%)		38.3	39.7	24.8		37.3	40.3	42.0	36.0	33.3	34.3	33.3	43.3	40.5	39.5	**39.5**
	UHV		3140.8	2675.8	4651.6		3235.6	2875.2	2713.5	3181.1	3562.9	3636.0	3757.0	2587.7	2956.4	3023.1	**2959.0**
19th Year	M(%)		3.6	5.7	5.9	5.9	3.7	3.4	2.9	3.4	5.4	3.6	4.4	2.4	2.6	3.0	**3.6**
	Ash((%)		40.7	41.9	24.8	58.5	36.7	40.9	42.8	36.7	33.5	32.4	35.2	42.2	40.0	38.3	**39.7**
	UHV		2792.5	2522.4	4984.2		3332.1	2797.8	2587.7	3359.8	3534.4	3927.8	3434.8	2735.7	3025.8	3195.1	**2930.7**
20th Year	M(%)		5.0	3.8	3.5		3.8	4.1	3.6	2.4	3.3	5.1	4.2	5.0	2.3	2.4	**4.0**
	Ash((%)		40.1	43.4	25.9		37.6	40.8	44.1	35.7	34.9	31.6	37.4	39.8	39.9	37.0	**40.0**
	UHV		2668.9	2386.5	4840.0		3158.4	2707.2	2319.5	3630.5	3628.5	3834.0	3167.2	2727.5	3079.0	3460.5	**2830.7**
21st Year	M(%)	4.2	3.8	4.9	6.3	5.6	3.7	3.9	3.3	3.3	4.3	4.7	4.2	3.4	2.5	2.8	**4.2**
	Ash((%)	46.7	38.2	41.1	31.2	36.7	37.4	44.7	44.8	38.6	31.5	36.5	34.5	43.0	40.8	37.7	**39.5**
	UHV	1872.2	2801.1	2536.8	4026.6	2802.9	3173.8	2212.7	2273.5	2928.0	3660.0	3139.3	3644.0	2519.8	2971.1	3276.9	**2932.6**

पवनदेव जामटा/PAWAN DEV JAMTA
उप महाप्रबंधक (वाणिज्यिक)
Deputy General Manager (Commercial)
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EDC, A-8A, Sector-24, Noida-201301 (U.P.)

Chapter-V Mining

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

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Year	Coal Seam Name	PARKHANI	LAJ TOP - III	LAJ TOP - I+II	LOCAL - 3	LOCAL - 2	LAJ MIDDLE	LOCAL - 1	LAJ BOT - II	LAJ BOT - I	RAMPUR – IIIB	RAMPUR - IIIA	RAMPUR – II	RAMPUR - I	RAMPUR - IAII	RAMPUR – IAI	weighted average
22nd Year	M(%)	4.3	4.0	4.7	6.0	6.1	3.7	4.0	3.3	3.2	4.1	4.9	4.1	3.7	2.5	2.7	4.3
	Ash((%)	46.2	38.0	41.3	31.6	38.2	37.4	44.5	44.7	38.6	31.6	36.3	34.7	42.6	40.8	37.3	39.5
	UHV	1942.7	2983.7	2543.0	3904.0	2804.4	3184.0	2227.3	2274.9	2980.6	3742.8	3168.4	3524.1	2520.9	2967.5	3343.1	2924.8
23rd Year	M(%)	4.3	3.9	4.6	6.3	5.7	3.7	3.9	3.3	3.3	4.2	4.7	4.1	3.5	2.5	2.7	4.3
	Ash((%)	46.3	39.1	41.2	31.6	38.3	37.4	44.5	44.8	38.7	31.3	36.5	34.5	42.8	40.8	37.6	39.5
	UHV	1917.8	3011.0	2541.2	3882.1	2828.5	3184.2	2231.6	2264.6	2982.3	3799.6	3183.5	3557.5	2517.9	2962.4	3306.4	2913.1
24th Year	M(%)	4.3	4.0	4.7	6.0	6.2	3.8	4.0	3.4	3.2	4.1	4.9	4.1	3.8	2.5	2.7	4.3
	Ash((%)	46.1	37.9	41.5	32.2	37.8	37.5	44.7	44.9	39.2	31.6	36.4	34.3	42.6	40.9	38.3	39.6
	UHV	1950.3	3036.1	2527.6	3790.4	2847.6	3176.2	2183.5	2242.5	2836.0	3826.4	3148.7	3595.2	2508.0	2939.5	3207.9	2891.0

Note: *Moisture M(%)* *Ash Ash((%)* *Useful Heat Value* *UHV(Kcal/Kg.))*

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

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2009-CPAM

CHAPTER VI

MANPOWER, SAFETY AND SUPERVISION

CHAPTER- VI

MANPOWER, SAFETY AND SUPERVISION

6.1 MANPOWER AND SUPERVISION REQUIREMENT

6.1.1 INTRODUCTION:

Every step has been taken to comply fully with Mine Act 1952, Mine Rules 1955, Coal Mine Regulation 1957, Mine Vocational Training Rules 1966 and all other rules and regulations applied in Indian Coal Mines, and the directives/circulars issued by DGMS (Directorate General of Mine Safety) issued time to time.

Abiding by the aforementioned rules organisation chart for the mine has been set up. The positions of Mine Manager Assistant Mine Managers, Safety Officer, Labour Officer, Welfare Officer, Foreman, V.T. Manager etc., have been clearly identified. Suitable and qualified persons with relevant experience shall be deployed in the post to ensure adequate supervision.

Number of local personnel including land losers could be mostly recruited in unskilled, semi skilled office assistant categories etc. 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. Several skilled and highly skilled personnel will be required to be brought from outside. The employment potential for the proposed mine is given in **Table 6.1.**

TABLE 6.1
MAN POWER REQUIREMENT FOR DULANGA PROJECT

Sl. No.	Operators	Capacity	Total Persons
OVERBURDEN HEMM OPERATORS (Direct)			
1	Elect. Rope Shovel	10m³	14
2	Elect. Hyd Backhoe	8 m³	11
3	Diesel Hyd Backhoe	4.3 m³	11
4	Rear Dumper	100T	126
5	Rear Dumper	50T	42

Sl. No.	Operators	Capacity	Total Persons
6	Electric Drill	250mm	21
7	RBH Drill	160mm	7
8	Dozer(With Ripper)	850 HP	4
9	Dozer(With Ripper)	410 HP	4
10	Dozer	410HP	16
11	Wheel Dozer	360HP	7
	Total		265
	COAL HEMM OPERATORS (Direct)		
1	Surface Miner	-	7
2	Diesel Hyd Backhoe	4.3 m^3	7
3	F.E. Loader	3.5-4.5 m^3	10
4	Rear Dumper (Coal body)	50T	49
5	Diesel Drill	115 MM	7
6	Dozer(with Ripper)	850 HP	3
7	Dozer	410 HP	3
8	Exploratory drill	-	3
9	Wheel Dozer	350HP	7
	Total		96
	COMMON HEMM OPERATORS (direct)		
1	Hydraulic Mobile Crane	100T	2
2	Hydr. Crane	30 T	2
3	Hydr. Crane	8T	2
4	Crane	5 T	2
5	Hydraulic Back Hoe	1.5 m^3	2
6	Dozer	410 HP	4
7	Wheel Dozer	360 HP	4
8	Grader	260 HP	7
9	Front end Loader	1-2 m^3	4
10	Front end Loader	3.5/4.5 m^3	7
11	Diesel Bowser	-	11
12	Tipping Truck	10 T	11
13	Mobile Maintenance Van	10T	7
14	Tyre Handler	-	5
15	Vibratory Compactor	-	2
16	Material Supply Truck	25T	14
17	Line Truck	-	4
18	Fork Lift Truck	-	2
19	Heavy Duty Toe Truck	-	2
20	Boom Truck	-	2
21	Diesel Drill	100MM	4
22	Fire Tender	-	4
23	Hydraulic Stone breaker	-	5
	Total		109
	MAINTENANCE (SHIFT+GENERAL)		

Sl. No.	Operators	Capacity	Total Persons
1	Mechanic		24
2	Fitter - Grade I		24
3	Fitter - Grade II		24
4	Fitter - Grade III		48
5	Electrician - Grade I		8
6	Electrician - Grade II		16
7	Electrician - Grade III		24
8	Welder-Grade I		4
9	Welder-Grade II		4
10	Welder-Grade III		4
11	Turner - Grade I		2
12	Turner - Grade II		2
13	Turner - Grade III		2
14	Machinist - Grade I		2
15	Machinist - Grade II		2
16	Machinist - Grade III		2
17	Black smith		3
18	Hammerman		3
19	Carpenter		1
20	EOT Crane operator		2
21	Fork Lift operator		1
22	Wash m/c operator		4
23	Helper/Greaser		56
24	Mazdoor		55
	Total Maintenance		**317**
	COAL HANDLING PLANT		
1	DGM (E&M)		1
2	Manager (E&M)		1
3	ENGINEER		2
4	Feeder Breaker attendant		8
5	Chute Operator		32
6	Vibro Feeder /R&P gate operator		4
7	Secondary crusher operator		4
8	Conveyor System Attendant		20
9	Vibrating screen operator		4
10	MCC Room Attendant		4
11	Plough feeder operator		4
12	Tripper operator		4
13	Silo operator		4
14	Mazdoor / Cleaner		4
15	Sub Station Attendant		4
16	PEON		1
	Total of Coal Handling Plant		**101**

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 3401I/(15)/2009-CPAM

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उप महाप्रबंधक (वाणिज्यिक)
Deputy General Manager (Commercial)
एन टी पी सी लिमिटेड/NTPC LIMITED
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

Sl. No.	Operators	Capacity	Total Persons
	COMMON SERVICES		
	EXCAVATION SUPERVISION		
1	DGM (EXCV)		1
2	Sr. Manager (Excv)		4
3	Manager (Excv)		8
4	Sr. Engineer (EXCV)		8
5	ENGINEER (EXCV)		12
6	FOREMAN INCHARGE		12
7	FOREMAN		12
8	P.A.		2
9	LDC		2
10	ASST STORE KEEPER		2
11	PEON		2
	Sub-total of EXCV. SUPERVISION		**65**
	E&M SUPERVISON		
1	DGM (E&M)		1
2	Manager (E&M)		2
3	Sr. Engineer (E&M)		4
4	FOREMAN - INCHARGE		2
5	FOREMAN		4
6	SR.PA./PA.		1
7	ASST STORE KEEPER		1
8	PEON		1
	Sub-total of E&M SUPERVISON		**16**
	E&M MAINT. ,QUARRY, WORKSHOP, COLONY		
1	MECH. FITTER - Grade I		3
2	MECH. FITTER - Grade II		6
3	ELECTRICIAN - Grade-I		6
4	ELECTRICIAN - Grade-II		12
5	E&M HELPER		24
6	FILTER M/C ATTENDANT		1
7	WELDER		1
8	BLACKSMITH		1
9	CARPENTER		1
10	HAMMERMAN		1
11	TURNER		1
12	MACHINIST		1
13	TYNDAL		6
14	MAZDOOR		6
	Sub-total of E&M SUPERVISON		**72**
	PUMPING OPERATIONS		
1	PUMP KHALASI		7
2	MAZDOOR		7

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एन टी पी सी लिमिटेड/NTPC LIMITED
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

SANJIV [illegible]
Recognised Qualified Person

Sl. No.	Operators	Capacity	Total Persons
	Sub-total of PUMPING OPERATIONS		**14**
	PLANNING OFFICE		
1	Sr. Manager (PLANNING)		1
2	Sr. Engineer		2
3	SR.P.A		1
4	LDC/TYPIST		1
5	PEON		1
	Sub-total PLANNING OFFICE		**6**
	TRANSPORT		
1	ENGINEER		1
2	FOREMAN		2
3	DRIVER		8
4	DRIVER		8
5	MOTOR MECHANIC		3
6	AUTO ELECTRICIAN		2
7	HELPER/CLEANER		4
	Sub-total TRANSPORT		**28**
1	AGM		1
2	DGM		2
3	Sr. MANAGER/Manager		4
4	Dy. MANAGER		8
5	Engineer (Fire fighting officer)		1
6	GENERAL OVERMAN		3
7	BLASTING OVERMAN		2
8	SR. OVERMAN		3
9	OVERMAN		6
10	MINING SIRDAR		3
11	MINING SIRDAR		6
12	P.A.		1
13	LDC/TYPIST		1
14	REGISTER KEEPER		5
15	PEON		1
	Sub-total		**48**
	TRAINING CENTRE		
1	Manager (Training)		1
2	ENGINEER (EXCV/E&M)		1
3	INSTRUCTOR		1
4	LDC/TYPIST		1
5	PEON		1
	Sub-total TRAINING CENTRE		**5**
	GM OFFICE		
1	GM		1

Sl. No.	Operators	Capacity	Total Persons
2	DGM		1
3	OS		1
4	SR. CLERK		1
5	LDC/TYPIST		2
6	SR. CASHIER		1
7	CASHIER		1
8	PEON		3
	Sub-total GM OFFICE		11
	FINANCE & ACCOUNTS		
1	DGM(Finance)		1
2	SR. ACCOUNT OFFICER		1
3	ACCOUNT OFFICER		1
4	ACCOUNTANT		2
5	JR. ACCOUNTANT		2
6	JR. STENO		1
7	ACCOUNTS CLERK		3
8	LDC/TYPIST		1
	Sub-total FINANCE & ACCOUNTS		12
	WATCH & WARD		
1	SECURITY OFFICER		1
2	WATCH & WARD INSPECTOR		1
3	Watchman		8
4	Arm Guard		4
	Sub-total WATCH & WARD		14
	PERSONNEL & WELFARE		
1	Sr. MANAGER (HR)		1
2	Dy. Manager (HR)		1
3	WELFARE OFFICER		1
4	JR. STENO		1
5	LDC/TYPIST		2
6	RECREATION CLUB ATTENDANT		1
	Sub-total PERSONNEL & WELFARE		7
	STORES		
1	MANAGER (Stores)		1
2	DY. MANAGER		1
3	Sr. Engineer		2
4	SR. STORE KEEPER		2
5	STORE KEEPER		8
6	ASSTT. STORE KEEPER		2
7	LDC/TYPIST		1
8	PEON		1
9	TYNDAL		4
10	CARPENTAR/PACKER		1

Sl. No.	Operators	Capacity	Total Persons
11	FORK LIFT TRUCK OPERATOR		1
	Sub-total STORES		18
	CIVIL & TOWN ADMN		
1	Sr. Manager (CIVIL)		1
2	Manager (CIVIL)		1
3	Dy. Manager (CIVIL)		1
4	ENGINEER (CIVIL)		1
5	ENGG. ASSTT.		2
6	DIVISIONAL ACCOUNTANT		1
7	WORK SUPERVISOR		4
8	OVERSEER		2
9	ESTIMATOR		1
10	LDC/TYPIST		1
	Sub-total CIVIL & TOWN ADMN		15
	MEDICAL & SANITATION		
1	CMO		1
2	MEDICAL OFFICER		2
3	LADY MEDICAL OFFICER		1
4	COMPOUNDER		2
5	DRESSER		2
6	NURSE		2
7	SANITARY INSPECTOR		1
8	STORE KEEPER (MEDICAL)		1
9	LDC		1
10	PEON		1
	Sub-total MEDICAL & SANITATION		14
	WATER SUPPLY		
1	PUMP KHALASI		3
2	PLUMBER/VALVEMAN		3
3	MAZDOORS		2
	Sub-total WATER SUPPLY		8
	SURVEY		
1	SR. SURVEY OFFICER		1
2	HEAD SURVEYOR		1
3	SURVEYOR (MINES)		2
4	DRAFTSMAN		2
5	CHAINMAN		2
6	FERRO PRINTER		1
7	SURVEY MAZDOORS		2
	Sub-total SURVEY		11
	COMMUNICATION		
1	Sr.Engineer (COMMUNICATION)		1

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Sl. No.	Operators	Capacity	Total Persons
2	FOREMAN		1
3	RADIO MECHANIC		1
4	EXCHANGE MECH CUM OPER		2
5	LINEMAN		2
6	LINEMAN HELPER		2
	Sub-total COMMUNICATION		9
	TOTAL (COMMON SERVICES)		373
	ENVIRONMENT		
1	Sr. Engineer (Reclamation)		1
2	Environment assistant		1
3	Water sprayer (Mobile) operator		8
4	Front End Loader (3.5 cum) operator		1
5	10 T Truck operator		2
6	Grader (BEML, BG 825, 280 HP) operator		1
7	Dozer (410 HP) operator		1
8	DRIVER		2
	Sub-total ENVIRONMENT		17
	GRAND TOTAL		1278

6.2 SAFETY ASPECTS

6.2.1 GENERAL

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 AGM/GM of the colliery /group of collieries as Agent of the mine. The Agent shall notify employment of the Manager of the mine. Company will appoint Under Manager, Asst. Manager, Safety Officer, ST 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, the arrangements shall be discussed with DGMS and modification suggested by DGMS, if any, shall be incorporated.

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 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. 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

6.2.2 STATUTORY RULES

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.
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.

It is recommended that code of practice to be prepared by Company will be based on following.

1. ILO code of Safety and Health and 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)

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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.

6.2.3 SAFETY FOR HEMM/EQUIPMENT AND WORKERS

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 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.

6.2.4 STABILITY OF BENCHES, QUARRY HIGH WALLS AND SPOIL DUMPS

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.

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.

Following slopes have been recommended in this report considering the practices in the other mines.

Overall (Ultimate) pit slope	-	37^0
OB Bench	-	70^0
Coal Bench	-	70^0
Dump bench	-	37^0

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.

6.2.5 PRECAUTIONS AGAINST DANGER OF INUNDATION FROM SURFACE WATER

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.
2. Inspections for any accumulation of rain water, obstruction in normal drainage
3. Standing order for withdrawal of working persons in case of apprehended danger.
4. During heavy rain inspection of vulnerable points is essential. In case of any danger persons are to be withdrawn to safer places.
5. The nearest nala is Garia nala and two more nalas (Nala B and Gaidhara Nala) already discussed are flowing through the Block. There may be possibility of inrush of rain water from flobding of nalas into the opencast mine pit. However any such possibility is eliminated as all the nalas are planned to be diverted systematically.
6. Any excavation under such circumstances would inundate the mine if nala is not diverted. Hence nala diversion has been proposed before 3rd year of mining operation. So there is no risk of flooding from these water streams.

6.2.5.1 The nearest nala is Garia nala and two more nalas (Nala B and Baidhara Nala) already discussed are flowing through 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 diverted systematically.

Any excavation under such circumstances would inundate the mine if nala is not diverted. Hence nala diversion has been proposed at he end of 4th year of mining operation. So there is no risk of flooding from these water streams.

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.

6.2.6 PREVENTION OF FLOODING OF EQUIPMENT DEPLOYED AT BOTTOM HORIZONS

6.2.6.1 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.

6.2.6.2 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.

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6.2.7 PREVENTION OF ELECTRIC SHOCKS

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.

6.2.8 DUST SUPPRESSION & DILUTION OF EXHAUST FUMES

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.

6.2.9 FIRE FIGHTING AND FIRE PREVENTION

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.
- 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.

6.2.10 MEASURES DURING DRILLING AND BLASTING

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.

6.3 RISK ASSESSMENT AND DISASTER MANAGEMENT PLAN

6.3.1 INTRODUCTION

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.

6.3.2 IDENTIFICATION OF HAZARDS

There are various factors, which can cause disaster in the mines. These hazards are as follows:

i. Drilling
ii. Blasting
iii. Overburden handlinges
iv. Heavy Machinery and
v. Explosives storage.

6.3.3 DRILLING AND BLASTING

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.

6.3.4 OVERBURDEN HANDLING

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.

6.3.5 HEAVY MACHINERY

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.

6.3.6 EXPLOSIVE STORAGE

Most of the accidents occur during, transportation, storage, handling and use. Accidents often attributed to failure of workman to observe safety rules and regulations.

6.4 DISASTER MANAGEMENT

6.4.1. 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 rock 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 change 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.

6.4.2. 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 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.

6.4.3. 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.

6.4.4. 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 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 groups viz. Group 1 - Toxic substances, Group 2 - Toxic substances, Group 3 - Highly reactive substances, Group 4 - Explosive substances and Group 5 - Flammable substances.

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- 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-6.1. The major hazardous materials stored and used in the mines are Diesel, Ammonium nitrate and Nitroglycerine.

TABLE-6.2
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* 25 MT	*10 - 12)* 200 MT
2	Ammonium Nitrate	540 T (25 T Magazine)	1(2)	*(4,5 7-9* 350 T	*10 - 15)* 2500 T

Since the storages of all hazardous materials in Dulanga 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.

6.5 RECOMMENDATIONS

i. It is recommended to carry out slope stability study before commencement of mining operation warranting storage of Overburden dump and stability of benches.

ii. It is recommended the blast design 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.

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CHAPTER VII

COAL HANDLING, WASHING & MODE OF DISPATCH

CHAPTER- VII

COAL HANDLING, WASHING & MODE OF DESPATCH

7.1 INTRODUCTION

The planned coal production from Dulanga Coal Block is required to be fully processed through CHP (Coal Handling Plant) units to ensure that consistent quality and size of coal is supplied to thermal power station (TPS) to enable the plant to work at the highest possible efficiency. Washability characteristics of coal does not warrant for installation of washery units.

The coal handling plant of the Dulanga OCP is planned to handle the ultimate mine output of 7.0 Mtpa of ROM coal; out of which 3 Mtpa shall be obtained by blast free technique whereas 4 Mtpa by conventional technique i.e.; drill blasting technique. The coal from the mine will be brought to the coal receipt hoppers located at pit head by 50 T dumpers.

Processed coal of size (-50mm) will be loaded on the railway wagons through Rapid Loading system and transported through Railways.

Push pull arrangement of transportation of coal from pit head to STTP will be installed to cater to need of despatch of entire 7Mtpa coal from the mine to Darlipalli STTP located at a distance of approximately 10km, from the mine. Coal production from this block will partially fulfil the requirement of 3200 MW.

7.2 WASHING & MINERAL PROCESSING

Washability characteristics of coal cores have been carried out by Department of Fuel and Mineral Engineering, Indian School of Mines University as Consultancy Project by MECL.

As per the Test results, the report concluded that all size fractions and the composite coal sample are very difficult to wash as the value of NGM for ash of clean coal is high.

The yield for clean coal at 34 % ash is expected to be around 55%. Reject / sink will be 45% having ash in reject to the tune of 59 to 60%.

In case clean coal is decided to be used at 34% ash, which may not be mandatory, simultaneous arrangement for using reject (60% ash) through FBC boilers will be necessity.

If coal is decided to be used on a cut between 41 to 43% ash, the reject will be 10 to 15% having ash percentage in the reject between 72 to 75%. Such reject could be dumped along OB in Dump yards and as back fill in the quarry.

In view of the above washing of coal is not envisaged in the Revised Mining Plan.

7.3 COAL HANDLING PLANT (BRIEF OF SYSTEM DESCRIPTION)

7.3.1 COAL RECIEPT AND PRIMARY CRUSHING:

The ROM coal is expected to have lump size up to 1000mm by conventional technique (4 Mty) and up to (-) 100 mm by blast free technique (3 Mty). The entire coal from the mine will be brought to the coal receipt hoppers located at pit head by dumpers. Five nos. of coal receipt hoppers of capacity 100t have been envisaged with fixed grizzly. (-) 200mm coal shall be separated and collected in the 100t capacity hopper underneath the grizzly (+) 200mm coal shall be directed to the hopper of the feeder breaker. The ROM coal thus discharged by dumpers into the hoppers over feeder breakers shall be crushed to (-) 200mm size and discharged on to the belt conveyor C1 of 1200mm width from all the feeder breakers. Out of five nos. of feeder breaker circuits required for handling of 4 Mty of ROM coal, four shall be working and one is envisaged as stand by. (Plate-43)

7.3.2 SECONDARY CRUSHING:

Coal more than 50 mm size shall be fed directly into the secondary crushing envisaged by the side of the vibrating screen where as (-) 50mm size coal would be bypassed to the bunker 4 nos. of secondary crushers of capacity 500 TPH have been proposed which include 2 nos. as standby.

7.3.3 BELT CONVEYOR SYSTEM:

Coal from the mine will be brought to the coal receipt hoppers located at pit head by tipping trucks / dumpers. It shall be discharged onto the conveyors by feeder breakers as well as coal receipt hoppers respectively. Coal from the main bunker shall be reclaimed by plough feeders and shall be loaded on to

elevating conveyors which in turn shall load into the silo through bridge conveyors for onward transportation to end utilization point.

7.3.4 STORAGE & RECLAIM:

A semi ground bunker has been envisaged in the proposed system. Stacking of the coal in the bunker will be by travelling trippers installed on conveyors. The proposed bunker shall be of self flowing type & slit type openings beneath it. There will be plough feeders for slits.

7.3.5 RAPID LOADING SYSTEM:

Coal carried by the conveyors will be discharged onto the Silo. There will be two outlets at the bottom of each silo. These outlets / pockets at the silo bottom are fitted with pre weigh hoppers. The loading from the silo into wagons will be through pre weigh hoppers. The silos shall be of R.C.C. construction and designed to take all the loads as expected in the system. Arch breakers, necessary silo discharge and maintenance gates, load cells, pre-weigh hoppers, swing chutes, shear and crushing sections, hydraulic power pack, accumulator, cooling system, air compressors, hydraulic cylinders and valves, control desk with computer and color monitors to operate the RLS through PLC and all other miscellaneous items for the operation of pre-weigh hopper system of loading, freight cum passenger lift, staircases, etc. will form part of the silo loading system. In addition to the above, calibrating test weight blocks, level sensors, air blasters etc are also envisaged.

7.3.6 WEIGHMENT:

Pre-weigh hoppers shall be fitted underneath the silo for accurate weighment of the wagons loaded. These shall load coal of pre-determined quantities into any one or two number of wagons of the rakes placed on parallel railway tracks. The weighment of the wagons will also be carried out twice, before and after loading with the help of in motion electronic rail weigh bridges.

7.3.7 COAL SAMPLING:

It is proposed to install semi automatic sampling system in the CHP. Coal from conveyors will be collected by the sampler at pre- determined intervals by cutter type samplers to assess the quality of the coal being dispatched. The coal samplers will be installed at suitable location in the ground level. The samples collected will be sent to the laboratory for analysis purposes.

7.3.8 OTHER ASSOCIATED MECHENICAL SYSTEMS:

Dust suppression system, noise control measures, fire fighting system and plant cleaning system shall be put in place for smooth operation of CHP.

7.3.9 ELECTRONIC METAL DETECTORS:

Metal detector shall be installed on conveyors at a suitable location. This shall be electronic type suitable to be installed over belt conveyor. The conveyor will be stopped for its removal as and when required and the metallic pieces shall be removed manually and stored at a suitable location over a platform for further disposal.

7.3.10 TRAMP METAL REMOVAL:

Metal detector and one no. of tramp iron magnet will be installed on conveyors to dispatch clean coal without any non ferrous/ferrous metals. Ferrous materials shall be attracted out from the coal stream by heavy duty suspended magnets which shall be subsequently disposed off. Similarly metal detectors shall give a signal whenever non magnetic materials are passing with the coal stream over the conveyor and the system shall be stopped temporarily to pick the non ferrous metals.

7.3.11 ELECTRICAL:

The main switching station for the coal handling plant will be located near ground bunker and will receive power at 6.6 from the Project substation. There will be two more switching stations namely to be installed near feeder breaker complex and silo loading station respectively.

7.3.12 ILLUMINATION:

Illumination shall be provided as per I.E. Rules.

7.3.13 EARTHING & LIGHTING PROTECTION:

Proper earthing arrangement for the plant has to be provided as per I.E. Rules.

7.3.14 CONTROL & MONITORING EQUIPMENTS:

The conveyors and equipment should be able to trip on occurrence of the following conditions:

- Under speed (for conveyors only)

- Belt sway operated with the arrangement to bye pass belt sway switches at the time of the starting of the plant and also during normal running if found necessary (for conveyors only)
- Pull chord switch operated (for conveyors only)
- Single phasing of the power supply
- Motor winding and bearing overheating (HT motors only)
- Bearing temperature of mechanical equipment like gear box (HT drives)
- Operation of safety and protection device
- Motor overload
- Any other fault if found necessary during detailed engineering stage by the Customer

7.3.15 CIVIL & STRUCTURALS:

The civil and structural work shall cover all aspects of civil works including soil and hydrological investigations, collection of rainfall data, seismic data, detailed survey, and fire fighting purposes besides water supply to various buildings and structures for dust suppression and plant cleaning as per system requirement and land development.

7.4 MODE OF DISPATCH

The processed coal obtained from CHP at pit head will be transported directly to the Darlipalli STPP through Push Pull arrangement of railway system. A rapid loading system for fast loading of 7Mtpa shall be installed near pit head.

CHAPTER VIII

INFRASTRUCTURE FACILITIES PROPOSED AND THEIR LOCATION

CHAPTER- VIII

INFRASTRUCTURE FACILITIES PROPOSED AND THEIR LOCATION

8.1 INTRODUCTION

Dulanga OC mine project envisages 7 Mt of production per annum. The life of the mine is 24 years excluding 2 years of construction period as per the calendar programme of the mine. Besides maintaining fairly large fleet of HEMM and ancillary equipment, it will employ 1278 odd fleet of manpower. To improve overall availability/utilization of the mining equipment there is an urgent need for flawless extraction, transportation and despatch of coal to the STTP. Further to ensure proper administration and welfare of the personnel employed herein there is an urgent need to construct the infrastructure for safe and economic exploitation of coal. The layout has been designed to achieve this very objective. All necessary facilities have been provided in the workshop to cater to the needs of the entire project.

8.2 GENERAL LAYOUT OF INFRASTRUCTURE FACILITIES

The proposed site layout is shown in the **Plate No. 52**. Based on the proposed layout, the area requirement will be worked out during detailing. The area will secured by a boundary fence and a soil bund on the edge of the mine as shown in the drawing. A minimum clearance will be maintained from the edge of the mine boundary. The proposed major buildings within the proposed lease area are:

1. Heavy Earth Moving Machinery (HEMM) Workshop & Open Apron
2. Light Vehicle (LV) Workshop
3. Welding Shop
4. Tool Store
5. Electrical Shop
6. Tyre Workshop & Tyre Storage Bay (open area)
7. Wash Pad for trucks
8. Tank Farm
9. Ready Line
10. Main Office Building and Car park

11. Training Centre
12. Workers Canteen
13. Medical Unit
14. Warehouse
15. Support Operation Store
16. Security Offices & Fencing
17. Hardstand (open area)
18. LV Parking Area (open area)
19. Lubricants and Oil Storage Facility
20. Environmental Laboratory
21. Core Storage Shed

8.2.1 Heavy Earth Moving Machinery (HEMM) Workshop & Open Apron

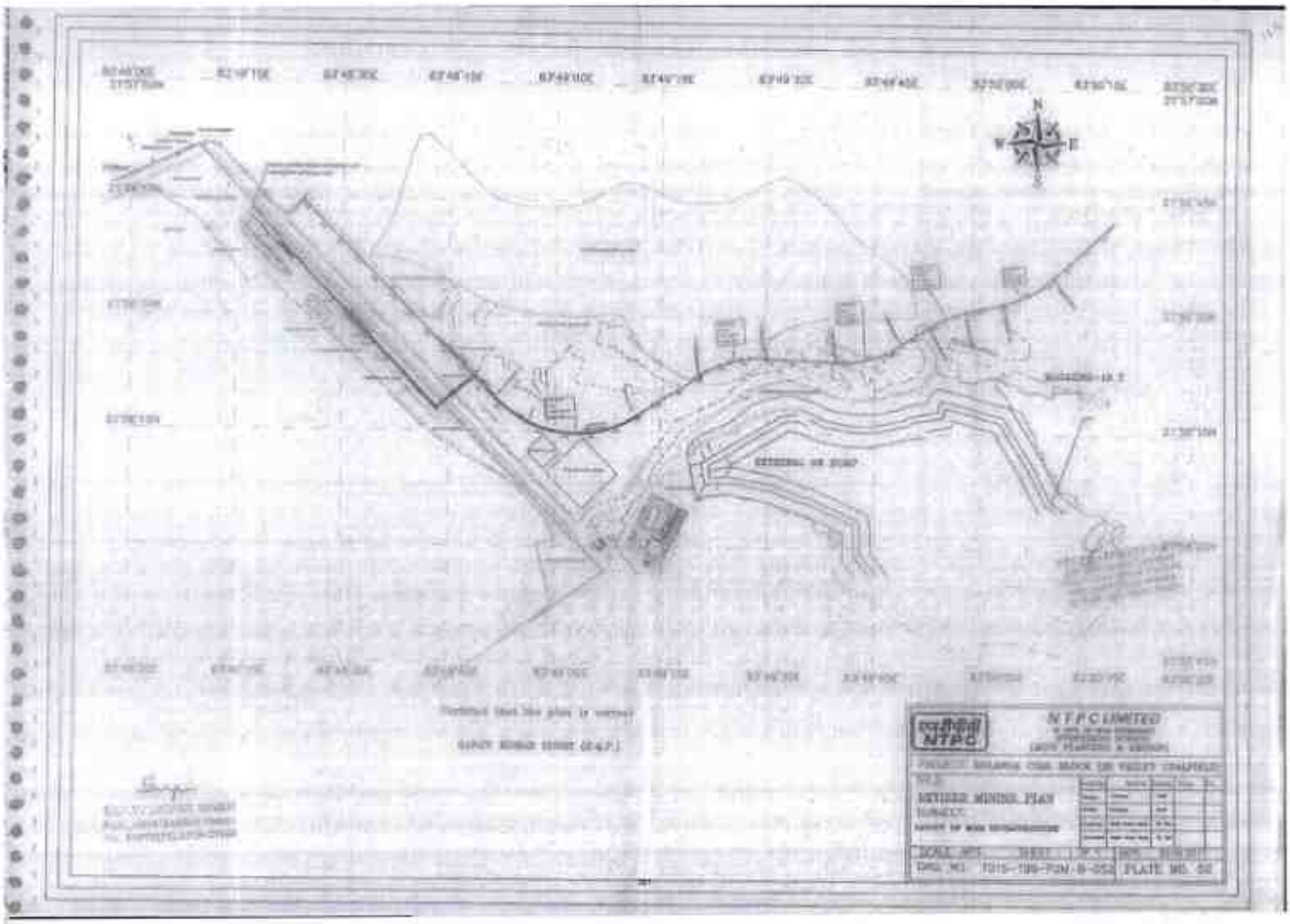
To facilitate quickly addressing the recurrent problem a temporary workshop in addition to main workshops is planned.

8.2.1.1. Main Work Shop

This workshop will cater to Preventive maintenance of HEMM & allied equipment, incidental minor repair/replacement of components & assemblies of motor transport equipment, rebuilding & machining of small worn-out components, incidental minor repairs of assemblies and sub-assemblies of mining, mechanical and electrical equipment, scheduling of major repair works with original equipment manufacturers.

8.2.1.2. Temporary Workshop

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. Dumpers after being washed at the washing station shall enter these sheds and daily maintenance requirement. 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.



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8.2.2 Light Vehicle (LV) Workshop

Layout and configuration for the proposed LV Workshop shed is shown in the Plate No. 52. Proposed plinth area will be as per requirement The LV will have service bays, office and a store. The apron will be RC grade & shed will be a steel framed structure with corrugated GI roof. Roof and cladding will be designed to ensure all weather operability of the LV workshop.

8.2.3 Welding Shop

Welding shop for repair of shovels, buckets, equipment etc will be part of the HEMM Workshop as shown in **Plate No. 52**.Total area of the proposed welding shop will be estimated during detailing.

8.2.4 Tool Store

Two tool stores will be provided in the HEMM Workshop and form part of the structures. The tool stores will be secured as shown in **Plate No. 52**. Proposed total area of the tool stores is 252 m^2.

8.2.5 Electrical shop

Electrical shop will be provided as part of the HEMM Workshop as shown in the **Plate No. 52**.Total area of the proposed electrical shop is 108 m^2. The shop will be separated from the service bays for safety purposes. The floor will have antistatic, fire resistant coating.

8.2.6 Tyre workshop & tyre storage bay (open area)

The proposed Tyre Workshop is shown in **Plate No. 52**. It will be suitable for attending two vehicles simultaneously. The workshop will have a tool store, locker and change room and an office. The apron will be RC grade slab on prepared base. The shed will be a steel framed structure with corrugated GI roof. The clear height will be 10 m inside the shed.

8.2.7 Wash pad

The proposed Wash Pad for dumpers & dozers is shown in **Plate No. 52**. The wash pad will be suitable for all types of vehicles including track mounted machineries. Provision for another wash bay is kept. The spent water from the wash pad will be discharged in a silt pit. The settled water from the silt pit will overflow into a settling tank. The spent oil will be collected into an oil tank. Spent oil and grease will be periodically collected from the oil tank and stored in the spent oil tanks before final disposal. The silt pit, settling tank and the oil tank are designed to cater for wash water

from two wash pads.

8.2.8 Tank farm

The tank farm will consist of a bulk storage area and a fuel pad as shown in **Plate No. 52**.Tanks will be designed as per the estimated capacity is. Two tanks have been envisaged initially with provision for one more tank as production builds up. The total capacity is based on 7 days supply. A masonry wall will be provided along the bulk storage area to contain any spillage. Perimeter drains will be provided for draining of storm water. An oil interceptor will be provided at the drain outlet.

8.2.9 Ready line

HEMM machineries will be parked at designated locations inside the pit during shift change. Parking is also envisaged near the site facility area.

8.2.10 Main office building and car park

Layout and configuration of the Main Office is shown in **Plate No. 52**.The number of offices and staff workstations (cubicles) has been matched with the manning schedule. Officers' canteen and a kitchen will also be provided.

Site Office will be one storied steel framed structure with outer masonry walls. The base slab will be RCC over prepared sub-base. Flexible joints shall be provided in the base slab. Roof will be covered by corrugated GI sheet. False ceiling with suitable heat insulation will be provided for all rooms.

All walls should be distempered and the floors shall be terrazzo tiled. Toilet floors and walls will be covered with glazed tiles. Façade will be architectural finish.

The car park area will be sufficient to accommodate 40 cars and 2 buses.

The office will be under centralized security system comprising of a CCTV network with cameras installed at key locations. The office shall have adequate fire fighting facilities and smoke detectors.

8.2.11 Training centre (Vocational)

Layout of the proposed training canteen is shown in **Plate No. 52**. The proposed area is 1300 m^2. The training centre will contain 4 class rooms, an office area for trainees and staff and a practical training shed containing a truck and excavator Simulator for operator training. The building will be steel framed structure on RCC grade slab. Masonry walls will be painted and plastered. Roof cover will be corrugated GI. Office area and class

rooms will have false ceiling suspended from the main structure.

8.2.12 Workers canteen

Layout of the proposed workers canteen is shown in **Plate No. 52**. The building will contain lockers and change area for workers. Kitchen and preparation space will be provided inside the building. The building will be steel framed structure on RCC grade slab. Masonry walls will be painted and plastered. Roof cover will be corrugated GI and skylight sheet.

8.2.13 Medical unit (Dispensary)

Layout of the proposed training canteen is shown in **Plate No. 52**. The proposed area is 630m^2. Two 20 feet containers will be provided for first aid and handling medical emergencies. The medical unit will be located close to the HEMM workshop as shown in the site layout drawing. A fully equipped ambulance will be provided for carrying patients to the nearest hospital.

8.2.14 Warehouse

The layout and configuration of the proposed warehouse is shown in **Plate No. 52**. The open storage area will be fenced. The warehouse will be attached to the HEMM workshop and the office through a 3m wide corridor as shown in the drawing. The warehouse will have an office for supervisory staff. Corridor and circulation areas provided will be suitable for movement of light loading vehicles like forklifts. The clear height of the warehouse will be kept as per the requirement.

The building will be steel framed structure on RCC grade slab. Roof cover will be corrugated GI and skylight sheet. The floor will be finished with an antistatic, skid and fire resistant coating. Flexible joints will be provided in the grade slab at suitable locations.

8.2.15 Support operation store

Support operation store will be used to store items like building materials, small equipments etc. At this time an area of 600 m^2 has been tentatively allotted to the store as shown in the layout drawing. The area will be fenced. The requirement of a secured covered shed will be determined later.

8.2.16 Security offices & fencing

Security offices will be provided at the main gate, near ROM pad and crusher plant and other suitable locations. The central security control will be inside the main office.

A boundary fence will be provided as shown in the site layout drawing. The fencing will be about 2 – 2.5 m high, fixed with 1.0 m barbed wire on top of it. The fence will be steel structure with fencing mesh.

8.2.17 Hardstand (open area)

The hardstand is provided for parking of HEMMs, which will need to be serviced / repaired. The location of the proposed hardstand is shown in the site layout drawing.

8.2.18 LV parking area (open area)

LV parking area is allotted for parking of LVs. The location of the proposed LV parking area is shown in the site layout drawing.

8.2.19 Lubricants & oil storage facility

A lubricants and oil storage facility will be provided as shown in the layout drawing. The facility will have an adjacent filling pad as shown in **Plate No. 52.** A masonry wall will be provided along the storage area to contain any spillage. A geotextile membrane will be provided under the grade slab to avoid contamination of the soil. Capacities shown in the drawing are indicative only.

Spent oil will also be stored in this facility. Spent oil collected at the oil interceptors will be pumped into the tanks for storage. The waste oil will be periodically cleared and taken offsite by subcontractors.

Perimeter drains will be provided along the facility for draining of storm water. An oil interceptor will be provided at the drain outlet.

8.2.20 Environmental Laboratory

A fully equipped laboratory to carry out testing and analysis will be provided as shown on the layout drawings.

8.2.21 Core Shed

A core shed for storage of cores will be constructed as per the requirement.

8.3 OTHER IMPORTANT INFRASTRUCTURE

1. Coal evacuation system
2. Coal handling plant
3. Sub stations(power supply)

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4. Common Equipment
5. Mobile Service Van
6. Quality Lab
7. Disaster Management Cell
8. Residential Colony

8.3.1 Coal evacuation system

Layout of the proposed coal evacuation system is shown in **Plate No.52**. The proposed area is 70800m^2. A push pull type of coal evacuation system shall be constructed for transportation of coal from mine end to Darlipalli STTP. Total length of the alignment will be approximately 10km. Connectivity with the Indian Railway shall also be established with suitable Y connection.

Necessary liaison with the Railway authorities will be made for ensuring connections. The entire work of engineering, procurement, construction of Railway track, procurement of moving stock, and operation shall be done by NTPC for the proposed track. NTPC shall abide by the prevailing law and other statute for construction of Railway. The said push pull arrangement shall cater to the requirement of 7 Mtpa capacity of the mine.

8.3.2 Coal handling plant

Layout of the proposed CHP is shown in **Plate No. 52**. The proposed area is 3300 m^2.Detail of CHP is covered in Chapter -7.

8.3.3 Sub stations (Power Supply)

Layout of the proposed Sub-stations is shown in **Plate No. 52**. The proposed cumulative area is 53400 m^2.The system referred above 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 through 6.6kV double circuit overhead line. Stepped down to 440V through one no. 6.6/0.440kV, 315kVA transformer. The transformer will feed power to a 440V which will feed power to various PDBs and LDBs installed at different shops. The PDBs and LDBs, in turn, will feed power to various distribution boards which will serve as primary control of equipments/ drives and for lighting in and around workshop. The workshop sub-station will be indoor

type .The sub-station room shall be adequately pressurized from inside to prevent dust entry and the Inlet air shall be conditioned to prevent condensation.

8.3.4 Common Equipment

Common equipment for work shop & stores has been envisaged to meet the requirement of inter shop material handing, listed as under:

- Fork lift truck of 5t capacity with drum handling attachment.
- Truck mounted mobile articulated crane 8 te cap

8.3.5 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
- 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

8.3.6 Quality Lab

Layout of the proposed Quality Lab is shown in **Plate No. 52.** The proposed area is 355m^2.A fully equipped quality laboratory to carry out testing and analysis coal will be provided as shown on the layout drawings.

8.3.7 Disaster Management Cell

A Control Room will be set up nearby and within mining lease, which will works round the clock. The control Room is provided with manpower, communication system and other equipments so as to deal with any disaster by immediately attending the site of disaster, organise help of Fire Brigade for

rescue operation, clear the site debris 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 time of major disaster. The onus of liaison with Disaster Management Authorities at appropriate authorities will lie over this cell. Necessary guidelines issued by Govt. time to time will be observed by the mine management.

8.3.8 Residential colony

Layout of the proposed colony is not shown. The proposed area is 200000 m^2. A residential colony suitable for modern day living condition with proper ventilation drainage shall be provided to impart accommodation to officers, staff and workman employed in the mine as per Coal mining Regulations 1957 or as per prevailing statute. Overall housing satisfaction will be of the order of 65% of total employment wherein 100% accommodation will be provided to officials of the mine.

8.4 CONSTRUCTION PERIOD

As has already explained in the calendar program of the mine in Chapter-5, life of mine will be 24 years excluding 2 years of construction period. During this period all preparatory activities including development of majority of mining infrastructure shall be completed to ensure hassle free commencement of coal production. It is envisaged, commencing the coal production in the 3rd quarter of 2013. Broadly outlined below are the activities to be undertaken in the construction period.

1. Land acquisition under CBA & LA Act.
2. Detail survey and demarcation of locations of various infrastructures.
3. Obtaining various statutory clearances, permissions approvals from local/state/central level government authorities as applicable including government approval for construction.
4. Preparation of operational plan both short term and long term
5. Design & detailed engineering in general
6. Procurement of temporary power arrangement & construction of overhead lines & main receiving station, sub station etc. for permanent power.
7. Site work , ground surface contouring & levelling work

8. Strengthening of access road, construction of site roads, storm water drainage system, water supply & sewerage system etc.

9. Construction installation, testing and commissioning of utility services.

10. Procurement, mobilization and erection of mining equipments

11. Construction of HEMM workshop, warehouse and other mining facilities like colony, rest shelters, fuel pumps offices etc.

12. Construction of magazine and obtaining licences for procurement, storage and use of explosives

13. Completion of first Phase of construction of colony, CHP & coal evacuation system

14. Commencement of Nala diversion activities at the end of construction phase.

15. Preparation of various, standing orders, code of conduct, safe work practices and framing of byelaw for related activities.

16. Staffing suitably skilled manpower for aforesaid activities initialization of production commencement activities.

17. Arrangement for safety & security of man, material and machinery liaison with local/state administration, fencing of lease area for prevention of unauthorised entry.

18. Construction of temporary makeshift residential arrangement along with communication, lighting etc. facilities.

8.5 SCHEDULE OF IMPLEMENTATION

All the activities as explained above will be implemented phase wise the chart No. 8.1.

CHART NO. 8.1
CHART OF IMPLEMENTATION

Sl.No	Year →	YEAR 2011-12				YEAR 2012-13				YEAR 2013-14				YEAR 2014-15			
	Quarter →	QR-1	QR-2	QR-3	QR-4	QR-1	QR-2	QR-3	QR-4	QR-1	QR-2	QR-3	QR-4	QR-1	QR-2	QR-3	QR-4
	Activities	apr-jun	jul-sept	oct-dec	jan-mar	apr-jun	jul-sept	oct-dec	jan-mar	apr-jun	jul-sept	oct-dec	jan-mar	apr-jun	jul-sept	oct-dec	jan-mar
1	Approval of Revised Mining Plan																
2	Land acquisition under CBA Act																
3	Diversion of Forest																
4	Land Acquisition under LA Act																
5	Rehabilitation and resettlement																
6	Diversion of Nalla																
7	Diversion of Road																
8	Strengthening of access road																
9	Construction of CHP																
10	Construction of Loading Silo																
11	Construction of Rail Line																
12	Procurement of HEMM																
13	Commencement of Mining operation																

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RAJNEESH GUPTA
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CHAPTER IX
LAND REQUIREMENT

CHAPTER-IX

LAND REQUIREMENT

9.1 INTRODUCTION

Revised Block Boundary: In view of disputed boundary issue on the North Western side of common boundary, DG (O) as third party conducted the survey for demarcating common boundary in May 2009. Subsequently, representatives of both NTPC and OPGC conducted joint ground verification and agreed to follow the revised boundary. Allotted Block boundary of Dulanga coal mining block was revised on 15.03.2010. As per the revised mine boundary the area of Dulanga Coal Block reduced from 657 ha to 654.11 ha. The same was communicated by COAL CONTROLLER, GOI to Ministry of Coal on 15.03.2010. A copy of the letter is enclosed as **Annexure-II**. Finalised North western common boundary is enclosed as **Annexure-XIII**.

Revised Mineable Boundary: Vide letter dated 29.06. 2011, MoEF (Ministry of Environment & Forest) re-categorized Dulanga Coal Block in Go Area but subject to the condition as follows:

NTPC will reduce tree felling from 67,500 to 37,500.
Saving of forest cover will about 26%.

Based on the presentation and as per the directive of MoEF; dense forest area falling in the South East & South Western corner of the block and measuring approximately 87 ha has not been considered for mining in present mining plan. The letter of Ministry of Environment & Forest is enclosed as **Annexure-III**.

It is to mention here that as per earlier approved mining plan of Dulanga block area was 657 ha approx.

Phasing of Coal Extraction: In view of the above the present and future land use plan have been worked out based on two scenarios, hereinafter referred to as **Phase-I** and **Phase-II**.

Phase-I: In the first phase forest area measuring approx. 87 ha and falling in the South East & South Western corner of the block has been excluded from block area for extraction purposes.

Phase-II: During second phase NTPC shall approach to the MoEF and MoC with the proposal to seek permission for mining of 87 ha area (excluded in

phase-I for extraction purposes) also. The present mining plan is prepared taking into account the availability of land during **Phase-I** only.

Without prejudice to the above NTPC shall carry out other studies for whole block however refrains from mining of the 87 ha land during Phase-I.

9.2 PRESENT LAND USE

9.2.1. Phase-I

Total requirement of land is 803.71 ha out of which 567.19 ha is within the allotted block boundary while 236.52 ha are outside the block area. Area within the block boundary does not include 87 ha of forest land. Area outside the block boundary includes 20ha land for project colony but has not been demarcated in the Surface Master Plan. The land belongs to six villages viz. Dulanga, Manoharpar, Kathapali, Beldehi, Kuntijharia, Majhapada and Khaprikachara.

Land schedule is given in **Table 9.1 to Table 9.5**

TABLE 9.1
LAND DETAILS (PHASE –I)

Particulars	Area (ha)
Lease area (Block area)	567.19
Additional area for facilities	236.52
Total	803.71

9.2.1.1 Within Block Boundary

TABLE 9.2
PRESENT LAND USE WITHIN BLOCK BOUNDARY (PHASE – I)

Thana - Hemgir District - Sundargarh

Village	Patwari Circle	Private Land (A) (ha)	Forest Land (B) (ha)	GM Land (C) (ha)	Total Govt. Land (D) = (B+C) (ha)	Total Land E= (A+D) (ha)	Remark
Dulinga	105	58.57	24.21	40.05	64.26	122.83	Part
Majhapada	112	75.15	6.47	25.49	31.96	107.11	Part
Beldihi	111	32.49	153.39	26.69	180.08	212.57	Part
Kathpalli	108	3.26	48.89	6.07	54.96	58.21	Part
Khuntijharia	113	16.90	12.60	8.30	20.90	37.80	Part

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Manoharpur	106	0.54	6.06	0.00	6.06	6.60	Part
Dhanwardihi RF	-	0.00	12.96	0.00	12.96	12.96	Part
Giripahad RF	-	0.00	9.1	0.00	9.1	9.1	Part
TOTAL		186.91	273.68	106.60	380.28	567.19	

9.2.1.2 Outside Block Boundary

TABLE 9.3
PRESENT LAND USE OUTSIDE BLOCK BOUNDARY (PHASE – I)

Thana-Hemgir District-Sundergarh

Village	Patwari Circle	Private Land (A) (ha)	Forest Land (B) (ha)	GM Land (C) (ha)	Total Govt. Land (D) = (B+C) (ha)	Total Land E= (A+D) (ha)	Remark
Dulinga	105	5.81	2.52	0.36	2.89	8.70	Part
Majhapada	111	32.99	13.77	9.74	23.52	56.51	Part
Khapurikachara	-	85.28	34.58	30.76	65.34	150.62	Part
Sathparlia RF	-	0.00	0.70	0.00	0.70	0.70	Part
TOTAL	-	124.07	51.58	40.87	92.45	216.52	Part

9.2.1.3 Colony Area

TABLE 9.4
PRESENT LAND USE COLONY AREA (PHASE – I)

Village	Private Land (A) (ha)	Forest Land (B) (ha)	GM Land (C) (ha)	Total Govt. Land (D) = (B+C) (ha)	Total Land E= (A+D) (ha)	Remark
	20	0	0	0	20	Part

9.2.1.4 GRAND SUMMARY

TABLE 9.5
SUMMARY OF LAND DETAILS OF THE PROJECT (PHASE –I)

Particulars	Area (ha)
I. Mining lease	
a) Private Land	186.91
b) Reserve Forest	22.03
c) Forest land	251.63
d) GM Land	106.62
Total	**567.19**
II. Outside mining lease	
a) Private Land	124.07

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Particulars	Area (ha)
b) Reserve Forest	0.70
c) Forest land	50.88
d) GM Land	40.87
III. Township area	
d) Private Land	20.00
Total	**236.52**
Grand Total	803.71

9.2.2. Phase-II

Total requirement of land is 890.63 ha out of which 654.11ha is within the allotted block boundary while 236.52 ha are outside the block area. Area within the block boundary includes 87 ha of forest land. Area outside the block boundary includes 20ha land for project colony but has not been demarcated in the Surface Master Plan. The land belongs to six villages viz. Dulanga, Manoharpar, Kathapali, Beldehi, Kuntijharia, Majhapada and khaprikachara.

Land schedule is given in Table 9.6 to Table 9.10

TABLE 9.6
LAND DETAILS (PHASE –II)

Particulars	Area (ha)
Lease area (Block area)	654.11
Additional area for facilities	236.52
Total	890.63

9.2.2.1 Within Block Boundary

TABLE 9.7
PRESENT LAND USE WITHIN BLOCK BOUNDARY (PHASE – II)
Thana-Hemgir District-Sundergarh

Village	Patwari Circle	Private Land (A) (ha)	Forest Land (B) (ha)	GM Land (C) (ha)	Total Govt. Land (D) = (B+C) (ha)	Total Land E= (A+D) (ha)	Remark
Dulinga	105	58.57	24.21	40.05	64.26	122.83	Part
Majhapada	112	75.15	6.47	25.49	31.96	107.11	Part
Beldihi	111	32.49	153.39	26.69	180.08	212.57	Part
Kathpalli	108	3.26	48.89	6.07	54.96	58.21	Part

Khuntijharia	113	16.90	12.60	8.30	20.90	37.80	Part
Manoharpur	106	0.54	6.06	0.00	6.06	6.60	Part
Dhanwardihi RF		0.00	12.96	0.00	12.96	12.96	Part
Giripahad RF		0.00	96.02	0.00	96.02	96.02	Part
TOTAL		186.91	360.60	106.60	467.20	654.11	

9.2.2.2 Outside Block Boundary

TABLE 9.8
PRESENT LAND USE OUTSIDE BLOCK BOUNDARY (PHASE – II)

Thana-Hemgir District-Sundergarh

Village	Patwari Circle	Private Land (A) (ha)	Forest Land (B) (ha)	GM Land (C) (ha)	Total Govt. Land (D) = (B+C) (ha)	Total Land E= (A+D) (ha)	Remark
Dulinga	105	5.81	2.52	0.38	2.89	8.70	Part
Majhapada	111	32.99	13.77	9.74	23.52	56.51	Part
Khapurikachara	-	85.28	34.58	30.76	65.34	150.62	Part
Sathpartia RF	-	0.00	0.70	0.00	0.70	0.70	Part
TOTAL		124.07	51.58	40.87	92.45	216.52	Part

9.2.2.3 Colony Area

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TABLE 9.9
PRESENT LAND USE COLONY AREA (PHASE – II)

Village	Private Land (A) (ha)	Forest Land (B) (ha)	GM Land (C) (ha)	Total Govt. Land (D) = (B+C) (ha)	Total Land E= (A+D) (ha)	Remark
	20	0	0	0	20	Part

9.2.2.4 GRAND SUMMARY

TABLE 9.10
SUMMARY OF LAND DETAILS OF THE PROJECT (PHASE –II)

Particulars		Area (ha)
I. Mining lease		
a)	Private Land	186.91
b)	Reserve Forest	108.95
c)	Forest land	251.63
d)	GM Land	106.62
Total		**654.11**
II. Outside mining lease		

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Particulars	Area (ha)
a) Private Land	124.07
b) Reserve Forest	0.70
c) Forest land	50.88
d) GM Land	40.87
III. Township area	
d) Private Land	20.00
Total	236.52
Grand Total	890.63

9.3 FUTURE LAND USE

9.3.1. **Block Area:** Mainly the land within the block boundary will be used for coal excavation activities. Some non coal bearing area existing beyond in crop zone will be utilized for siting of temporary workshop, setting tank and part of coal handling plant.

On the south western side of the available non coal bearing area will be utilized for stacking of excess coal and top soil. A 7.5 m wide barrier is left on three sides of the block were there is potential occurrence of coal beneath the surface.

The barrier herein left on the north western and south western side will be utilized for construction of diversion road. This road will act as connectivity to western & eastern side of villages.

An embankment of 3m high will be made on both side of diverted channel. The embankment as well as diverted channel will remain inside the block boundary on the south western and north eastern side of the block. Coal sterilization due to space occupied by diversion and construction of embankment will be incidental which is commensurate as detailed in the earlier approved mine plan of the block.

Apart from the land as explained above rest of the land will be mined out. The details of the area of future land use within the block boundary are detailed in **Table 9.11.**

TABLE-9.11
FUTURE LAND USE WITHIN THE BLOCK BOUNDARY

Sl. No.	Type of Land Use	Area (ha.)
1	Excavated area	510.78
2	Area planned for Phase-II	86.93

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Sl. No.	Type of Land Use	Area (ha.)
3	Barrier	2.61
4	Green Belt	10.84
5	Settling Pond	2.14
6	Coal stockpile	2.75
7	Topsoil stockpile	3.84
8	Nala diversion	14.06
9	Nala Embankment	6.58
10	Road	6.25
11	Temporary workshop	2.32
12	Coal handling plan	2.96
13	Loading Wall	2.04
	Total	654.11

9.3.2. **Outside Block Area:** While identifying land outside the block boundary, utmost care was exercised to include minimum of forest land of Dulanga, Majhapara, Khaprikachhar villages.

OB dump is located in the Khaprikachhar village characterised more or less by flat topography. Push pull arrangement of coal evacuation system is adopted which is running almost parallel to blocks north eastern flange to ensure minimum usage of land.

Mine workshop, Main office of project and other facilities have been sited so as to remain as close as possible to the block for the purpose of ease of monitoring & control.

Area which could not be effectively utilized for any of the aforesaid purposes should be systematically afforested. Green belt will be developed between the patch available between the eastern side road and railway track. Road diversion is made in such a manner which will obviate the passage of villagers on the haul roads earmarked for movement of HEMM.

The details of the area of future land use within the block boundary are detailed in **Table- 9.12.**

TABLE-9.12
LAND USE OUTSIDE THE BLOCK BOUNDARY

Sl. No.	Type of Land Use	Area (ha)
1	External OB Dump	106.50
2	Green Belt	72.80
3	Rail head	7.08
4	Coal handling plant	0.33
5	Road	6.94

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Sl. No.	Type of Land Use	Area (ha)
6	Nalla Diversion	6.42
7	Nalla Bund	3.44
8	Sub Station	5.34
9	Workshop	4.58
10	Erection Yard	1.05
11	Main Office	0.25
12	Mining Facilities	0.17
13	Vocational Training Centre	0.13
14	Shift setting office	0.03
15	Rescue Services	0.05
16	Dispensary	0.06
17	Quality lab	0.04
18	Magazine	1.05
19	Borewell facilities	0.25
20	Colony	20.00
	Total	**236.52**

9.4 STAGEWISE EXCAVATED AREA

The stage wise area excavated, area backfilled and planted area are given in **Table 9.13.**

TABLE 9.13
YEAR / STAGE WISE AREA EXCAVATED

YEAR	AREA MINED (ha)	TOTAL BACKFILLED (ha)	PLANTED BACKFILLED (ha)
1st	29.06	0.00	0.00
2nd	66.53	0.00	0.00
3rd	101.93	24.00	0.00
4th	157.94	51.86	0.00
6th	197.22	67.24	37.23
10th	326.00	222.00	101.23
20th	465.85	374.22	229.23
Conceptual (24th)	510.78	413.07	354.45

9.5 POST RECLAMATION LAND USE

The first step in a successful reclamation programme is to decide the post reclamation land use. The post mining land use with environment management is given in **Table 9.14.** NTPC envisages the area proposed for mining in the second phase may be allowed by MoC & MoEF subject to the conditions stipulated by both. In that case the phase –II mining will continue with interlocking with the Phase-I. The post mining land use with environment management as mentioned in Table-9.12 may vary accordingly.

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TABLE 9.14
POST MINING LAND USE WITH ENVIRONMENT MANAGEMENT

Sl. No.	Description of area	Land use (ha.)					
		Plantation	Water body	Bund	Public use	Undisturbed	Total
1	Top soil dump	3.84	0.00		0.00	0.00	3.84
2	Coal Stock yard	2.75				0.00	2.75
3	Surface dump	106.50	0.00		0.00	0.00	106.50
4	Excavation	351.23	159.55		0.00	0.00	510.78
5	Facilities, industrial & residential buildings	0.00	0.00		27.73	0.00	27.73
6	Roads				13.19		13.19
7	Surface water reservoir/settling pond	2.15	0.00		0.00	0.00	2.15
8	Bund along Garia nala			10.03			10.03
9	Diversion of Garia nala		20.48				20.48
10	Undisturbed area	0.00	0.00		0.00	86.25	86.25
11	Colony Area				20.00		20.00
12	Phase -II area					86.92	86.92
	Total	**466.46**	**180.03**	**10.03**	**60.92**	**173.18**	**890.63**

9.5.1 Post Mining Land Use:

Without prejudice to the above, it is considered appropriate to restore the lands to the original land use to the extent possible. Post mining land use will serve following purposes:

1. Whole of the excavated area is proposed to be developed into a picnic spot due to the formation of water body created as a result of the left out void.
2. The water body will be used for irrigation, watering the forest at earlier stages and it will also attract avifauna.
3. The depth of the void will be about 255 m (max) a decision will be taken to reduce the depth in post mining scenario by backfilling the ash from TPP etc in phased manner. Detailed feasibility study and testing as per the statutory norms prevailing at that time shall be carried out before dumping of fly ash into the void.

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4. Industrial residential buildings will be handed over to the state government for public usage.

5. The civil or mechanical installations prejudicial to the safety of the general public will be dismantled and suitably transported to other locations deemed fit by NTPC.

6. Roads will be thrown open for public use under the knowledge of local government authorities.

7. Substantially thick plantations will be developed in the other areas to improve aesthetic look of the surroundings. Overburden dump both external & internal will be planted and afforested with the local varieties of trees.

9.5.2. In compliance of suggestions made by MoEF, Western Internal dump would be brought to almost ground level by re-handling of internal dump during 5 years after end of mine life (EOL).The eastern dump after re-handling would be 30m above ground level.

After re-handling of the internal dumps, the depth of final void of 255m will get reduced to 50m from the surface. **(Plate No. 53).**

CHAPTER X

ENVIRONMENT MANAGEMENT PLAN

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CHAPTER-X

ENVIRONMENTAL MANAGEMENT PLAN

10.1 INTRODUCTION

The environmental management plan has been prepared for the proposed Dulanga open cast coal mine of NTPC in the administrative region of Hemgir tehsil of Sundargarh District of Orissa.

The mine with 7.00 Mtpa capacity of coal will be captive to Darlipalli Thermal Plant Plant of NTPC located at a distance of about 10 km.

The mine will be fed by power from Darlipalli STTP belonging to NTPC through 132/33 KV overhead line up to main receiving station of Mine. Length of overhead line will be located at a distance of 10 km approximately.

Surface mining to some extent is related to land, air, water and its inter-relationship with inhabitants and organic life in the immediate surroundings. The operations have also, a direct bearing on the socio-economic environment of the area. Therefore, as an essential part of the mining plan an environmental management plan has been incorporated this includes a study covering the following major aspects:

Adopting baseline information regarding relevant environmental aspects for assessment of prevailing environmental status from the study named "Environmental and land use studies in the area of detailed exploration for coal in Dulanga Block done on behalf of NTPC" prepared by MECL, Nagpur dt Sept., 2007). Further Rapid Environmental impact assessment and Environmental Management Plan prepared by M/S Minmec Consultancy Private Limited, New Delhi was also considered in this mining Plan. Together the EMP encapsulates:

- Assessment of the areas of environmental impact due to various mining operations.
- A management plan stipulating control measures to mitigate possible environmental hazards resulting from mining.

The environmental management plan includes the evaluation of total impacts after superimposing the predicted impacts over base line data. This helps in incorporating proper mitigation measures wherever necessary for preventing deterioration in environmental quality.

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The mining lease area constitutes the core area for the study and the area falling within 10 km radius of the leasehold area has been considered as the buffer zone for general information. The key map (**Plate II**) and location map (**Plate I**) depict the situation of the core area and location of the mine site with respect to the surrounding region. The salient features of the mine that have been taken into consideration while planning the study are briefly as under:

a)	Applied Lease area	654.11 ha (Equal to Block area)
b)	Core Zone	654.11ha Block area +236.52 ha outside area= 890.63 ha
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 7.00 million tonnes per annum (Mtpa)
f)	Anticipated life of mine	24 years(excluding two years of construction period)
g)	Method of mining	Opencast
h)	Surface transport	By trucks within the ML, by rail from pit head to the TPP

10.2 BASELINE STATUS OF ENVIRONMENT

The different elements of environment namely land, water, ecology, air, climate and socio-economic status of the area is taken from MECL study base on secondary data. No ambient air quality data and noise levels data was generated.

10.2.1 EXISTING LAND USE PATTERN

A) Core zone

The block area of 654.11 ha covering villages namely Dulinga, Manoharpur, Beldihi, Majhapara Kathphali is mostly in the form of agricultural land, Govt. waste land, forest land etc. The break-up of the present land use is as given in **Clause No. 9.2.2.1 of Chapter-9.** Revenue Plan is attached at **Plate III**.

The additional area 236.52 ha outside the block also comprises mostly agriculture land and some forest land. The break-up of the present land use

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is as given in Clause **No. 9.2.2.2 of Chapter-9**. Revenue Plan is attached at **Plate III**.

As per Socio Economic Survey Study conducted by Xavier Institute of Social Service Ranchi in May 2008 for the part area of lease hold there were About 417 Nos. of PAPs is located in the villages. A new study is being conducted by XIMB Bhubaneshwar on behalf of NTPC. The findings of the study may only be revealed by July 2012.

B) Buffer zone

The land use pattern in the buffer zone as per Census 2001 is summarised in **Table 10.1.**

TABLE 10.1
LAND USE PATTERN OF BUFFER ZONE (AS PER CENSUS 2001)
STATISTICS OF LAND USE / LAND COVER CLASSES BASED ON REMOTE SENSING STUDIES (10 KM RADIUS FROM THE CENTRE OF THE EXPLORATION BLOCK)

Sl. No.	Level-I			Level-II		
	Land use / Land cover Category	Area coverage (ha)	% of total area	Name of Class	Area coverage ha)	% of total Area
1	Built-up Area	567.657	1.81	Village Area/ Road/ Rail	567.657	1.81
2	Forest Land	21059.502	67.27	a)Dense Forest	10819.406	34.56
				b)Degraded Forest	8352.063	26.68
				c) Forest Blank	843.507	2.69
				d) Agriculture in Forest	1044.526	3.34
3	Agricultural Land	4133.37	13.20	a) Crop Land	1107.482	3.54
				b) Fallow Land	2959.894	9.45
				c) Plantation	65.994	0.21
4	Waste Land	5182.866	16.56	a) Scrub Land	5157.131	16.48
				b) Barren Land	25.735	0.08
5	Water bodies	363.491	1.16	Ponds/ Nalas/canal	363.491	1.16
	Total	**31306.886**	100%		**31306.886**	100%

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10.2.2 SOIL QUALITY

The data on soil quality is helpful in determining the suitability or other-wise of the soils promoting vegetation cover around the mining area so as to maintain environmental quality and ecological balance in the area. All the important physico-chemical properties like pH, grain size, distribution; available nutrients and engineering properties etc. play an important role in defining the soil quality.

The soil analysis (NBSS) of the type location of Gajmar Pahar village, Raigarh Tehsil of Mahanadi basin, which is having similar parent material and nearest to study area given below:

Depth (cm)	Organic Carbon (%)	$CaCO_3$ (%)	EC 1:2.5 water (dS/m)	pH 1:2.5 water	Sand (2.0-0.05 mm) (%)	Silt (0.05-0.002 mm) (%)	Clay (<0.002 mm) (%)	Coarse frag. (.2mm) Vol. (%) of whole soil
0 - 7	0.39	-	<0.2	6.3	39.5	23.61	36.9	38
> 7	Hard rock							

The soil analysis of the various villages of Sundargarh district is collected from Soil Testing Laboratory, Office of The Dy. Director Agriculture, Sundargarh. As per information gathered from laboratory the soil acidity varies from 54% to 64%, N - 1.24 to 1.3, P 1.58 to 1.82 and K - 2.08 to 2.32 based on 1998 data, acidity is more than 70% which shows rising tendency towards acidic in the soil, while Organic matter & P_2O_5 is low and K_2O in the medium range. Village wise soil analytical data of the study area is given in Table 10.2

TABLE 10.2
VILLAGE - WISE SOIL ANALYTICAL DATA THE STUDY AREA: DULANGA BLOCK DISTRICT: SUNDARGARH & JHARSUGUDA, ORISSA

Sl. No.	Village name	Organic Carbon	pH	P_2O_5	K_2O
P.S. HEMGIR, DISTT. SUNDARGARH					
1	KANIKA*	0.22 - 0.49	6.0 - 6.3	2.5 - 16.62	188 - 208
2	DURUBAGA*	0.05 - 0.57	6.0 - 6.5	2.50 - 15.0	130 - 280
3	DUDUKA*	0.02 - 0.51	5.8 - 6.4	4.75 - 14.0	120 - 282
4	LAIKERA*	0.12 - 0.54	6.0 - 6.5	5.0 - 20.0	130 - 280
5	TANGARDIHI*	0.05 - 0.57	6.0 - 6.5	5.0 - 16.87	120 - 280
6	KIRIPASHIRA**	0.14 - 0.49	6.0 - 6.4	2.5 - 7.5	170 - 180
7	DULANGA**	0.05 - 0.38	6.0 - 7.5	3.25 - 10.62	124- 210
8	BELDIHI**	0.12 - 0.59	6.1 - 6.4	6.25 - 7.50	128 - 210
9	TELIA**	0.19 - 0.59	5.8 - 6.1	3.25 - 9.12	156 - 290
P.S. LEPHRIPARA, DISTT. SUNDARGARH					
10	RAIDIHI*	0.22 - 0.59	6.0 - 6.5	3.25 - 19.12	110 - 280

* *Data collected from Soil Testing Laboratory, Office of The Dy. Director Agriculture, Sundargarh.*
** *Data collected from Block Development Office (Agriculture Division), Hemgir*

SOIL FERTILITY PARAMETERS			
Quality	Organic matter (%)	P_2O_5 (Kg/Hec.)	K_2O (Kg/Hec.)
LOW	<0.5	0-14	<118
MEDIUM	0.5-0.75	14-40	118-280
HIGH	>0.75	>40	>280
	pH		
ACIDIC	<6.5		
NEUTRAL	6.5-7.5		
ALKALINE	>7.5		

10.2.3 WATER REGIME, RESOURCES AND QUALITY

10.2.3.1 **General:** Water is an essential resource that sustains all 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

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development. This can be achieved by collecting information of existing water sources and of analytical parameters for the best-designated use. Since the pollutant in water has a direct impact on human being, it becomes important to know about the existing water pollutant, its nature and magnitude to save the life of human being and to work out water management programme.

Hydro geologically the district is mainly confined to Precambrian crystalline ground water and Gondwana ground water province.

10.2.3.2 **Surface Water Resources:** The source of the surface water is mainly River, Nalas and Ponds. The drainage system of the study area is dendritic to sub-dendritic type and well developed. The western, central and southeastern parts of the study area are occupied by the hills, and hence most of the drainages originate from there, and the drainages are flowing towards East and southeast directions.

A major source of surface water in the study area is Basundhra, Garia, Bichna, Bagmora, Brahmani, Bhesrakharu, Lilari and Tangramounda Jhar Nala. Garia nala, flows along the central part of the exploration block and more or less bisect the block into two sub-blocks and finally it confluences with Basundhra nala in the eastern part of the study area near village Chuabahal. The network of streamlets feeds the Garia Nala. All the streams originate in the western, southern and northern parts of the study area and flows easterly & southeasterly and merges into IB River.

10.2.3.3 **Ground water sources**: The groundwater in sedimentary formation occurs under confined conditions and is limited to the thickness of the formation. The Barakar formation act 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 pediplain 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 well and hand pump, which is available in almost all the villages in the study area.

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a. **Ground Water Quality:** The ground water becomes the main source of drinking water in the rural areas. The Government agencies like RWS&S Division engaged in installation of Hand pump for drinking water in rural areas. All the villages in the study area are having hand pumps as a source of drinking water facility.

The ground water quality in the study area is of acceptable quality for drinking purpose. In some of the villages high percentage of iron content has been reported, which is beyond acceptable limit (i.e. Desirable limit: 0.3 and Permissible limit: 1.0) for drinking water purpose (**Table 10.3**).

TABLE 10.3
WATER ANALYTICAL DATA FROM THE VILLAGES OF THE STUDY AREA

DISTRICT: SUNDARGARH & JHARSUGUDA, ORISSA, RWSS DIVISION OFFICE			
SL.NO.	VILLAGE NAME	LOCATION OF WATER SOURCE	Fe
	P.S. HEMGIR, DISTT. SUNDARGARH		
1	Kanika	Jhupudipara/Mahajit	0.20 - 1.50
2	Durubaga	Near School/Near Post Office	0.3 - 2.00
3	Duduka	Near Boy's Hostel/Road side	0.4 - 3.00
4	Garjanbahal	Bhaisalpara/U.P.School	0.3 - 8.00
5	Kirpashira	Basti/Harijanpada	0.1 - 8.00
6	Tithaitangara	School/Basti	0.03 - 0.6
7	Laikera	Gandapara/Harizanpara	0.2 - 4.00
8	Chuabahal	Mission (K.Para)	0.3
9	Kanakatora	Mundapara/Junadihi	0.1 - 1.5
10	Ratakhandi	Basti/School	0.02 - 0.5
11	Kalamegha	Alekhpara/Dharmunda	0.2 - 4.00
12	Dulanga	Basti/Basti	1-3
13	Manoharpur	Basti	1
14	Majhapada	Basti/School	0.1 - 0.8
15	Khuntijhaaria	School	1
16	Tangardihi	Manipur/Ghanachal	0.5 - 8.0
17	Telia	Basti	6.0
18	Singari Baghal	Basti	0.3

10.2.4 ECOLOGY

10.2.4.1 **General:** In general the biota includes naturally occurring flora and fauna of the study area. The study of biota of an area includes the information on the biological diversity of all forms of life, which plays an important role in maintaining the eco-system. The eco-system is determined by the local climatic conditions, soil types, water resources etc; wherein both the fauna & flora generally adopt particular set of conditions, which are prevailing in surrounding environment or eco-system. Any changes or disturbance induced by an intruder (mainly human interference) causes the direct impact on the biological composition or biota of the eco-systems. It is observed that any interference in the eco-system causes adverse impact on the biotic resources. Therefore, it is essential to have information on biotic resources as existing during exploration period or before the commencement of mining activity. Based on the existing status of biotic resources, a proper plan or corrective measures can be applied to minimize the expected adverse effect on biota before the commencement of any mining activity. The existing information on the biotic resources has been collected to know the status of biota and same are presented in the following paragraphs.

10.2.4.2 **Forests:** The data on the forests has been extracted from the S.O.I. toposheets, satellite data on land use/land cover and Census book. The forest of this area is of northern tropical dry deciduous type in nature, mainly containing Sal, Assan and Kurum, except of some species of damper plant, which occur in the moist and shady places along the perennial nalas and streams. The forests are located on all the geological formations i.e. Sedimentary, Metamorphics etc. The sedimentary represented only in Hemgir areas. The forest area is mostly studded with rich mineral deposits and also forest products like bamboo timber and Kendu-leaf, which are export oriented. In Hemgir areas bamboo is invading at a alarming rate due to ecological retrogression and a stage will come when probably bamboo will vanish as it have very little protection from soil.

Maximum area i.e. approximately >65% of the study area falls under forest. Protected / Reserve forest comes under the jurisdiction of forest department and Open Mixed Jungle/ Dense Sal Jungle/Plantation covers outside of the protected/ reserved forest area, comes under revenue land . The major Protected/ Reserve forests falls within the study area are

Barghumra R.F., Kantidungri P.F., Chhengapahar P.F., Teliya P.F., Kandarha P.F., Rajpura R.F., Giripahar R.F., Makarachata R.F., Hundrakhol R.F., Gariyapahar R.F., Hathikhol R.F., Balimoa R.F., Kalmegha R.F. and Salparliya R.F. etc.

10.2.4.3 **Flora:** The flora in Sundargarh & Jharsuguda districts, of which the study area is a part, is that of a dry tropical region and mostly dry type of forests occur in this area includes trees, shrubs and of wild grasses. The main varieties of trees providing timber fruits and medicines as extracted from working plan of forest are tabulated in **Table 10.4**

TABLE 10.4
GLOSSARY OF VERNACULAR AND BOTANICAL NAMES OF COMMON SPECIES MET WITH IN SUNDARGARH DIVISION

VERNACULAR NAME	BOTANICAL NAME
Amba	*Mangifera indica*
Anchi	*Morinda tinctoria*
Aonla	*Emblica officinalis*
Asan	*Terminalia tomentosa*
Arjun or kaha	*Terminalia arjuna*
Bahada	*Terminalia belarica*
Bandhan	*Oug nia dalbergioides*
Bans	*Dendrocalamus strictus*
Barenga	*Grewia elastica*
Baldia	*Erythrina suberosa*
Bel	*Aegle marmelos*
Benimani	*Caseria tomentosa*
Bero	*Zizyphus jujuba*
Bhelwa	*Semecarpus anacardium*
Bheru	*Chloroxylon swietenia*
Bija	*Pterocarpus marsupium*
Palas	*Butea parviflora*
Budel	*Butea superba*
Char	*Buchanania lanzan*
Dhaman	*Grewia tiliaefolia*
Dhaluk	*Woodfordia fruticose*

DEEPAK GUPTA
Under Secretary
Ministry of CoD
Govt. of India
New Delhi-110001

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VERNACULAR NAME	BOTANICAL NAME
Dhaura	*Anogeissus latifolia*
Dhobin	*Dalbergia paniculata*
Dhumar	*Ficus glomerata*
Dumkurdu	*Gardenia latifolia*
Dangi Bans	*C. phalostachyam pergracile*
Galgela	*Cochlospermum gossypium*
Ghonto	*Zizyphus xylopyra*
Girdi	*Indigofera pulchella*
Gila	*Entada scanders*
Gindola	*Sterculia urens*
Gora or Ganj	*Milletia auriculata*
Gambhar	*Gmelina arborea*
Halland	*Adina cordiforia*
Harida	*Terminelia chebula*
Harsingar	*Nyctanthus, arboretristic*
Jambo	*Syzygium jambolana*
Kekat	*Lanea – grandis*
Kendu	*Diospyros melanexyon*
Khair	*Acacia catechu*
Khais	*Bridelia retusa*
Kuchila	*Strychnos nox-vomica*
Kanteikuli	*Flacortia ramontchil*
Kumbhi	*Carea arborea*
Kargela	*Dellenia aurea*
Kurdu	*Gardenia gummifera*
Kure	*Holarrhena antidysendrica*
Kusum	*Schleichera trijuga*
Lata – palas	*Butea superba*
Ludho	*Symplocus racemosa*
Nadang	*Loranthus longifolius*
Makar kendu	*Dipspyrus Montana*
Mirgichara	*Grewia elastica*
Mohul	*Madhuca latifolia*
Mundi	*Mitragyna parviflora*
Muturilaha	*Smilax zey*
Panasi	*Eulaliopsis binata*

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VERNACULAR NAME	BOTANICAL NAME
Parhel	*Stereospermum suaveolens*
Palas	*Butea frondosa*
Randintum	*Flemingia chhappar*
Rohini	*Soymida febrifuga*
Sal	*Shorea robusta*
Salia	*Boswel'ia serrata*
Sealpoy	*Bauhinia vahlii*
Senha	*Lagerstoremia parviflors*
Sersuan	*Albizzia lebbek*
Semul	*Bombax ceiba*
Sissu	*Dalbergia latifolia*
Sunari	*Cassia fistula*
Telkoruan	*Ixora parviflora*
Thelko	*Randia uliginosa*
Thui	*Euphorbia nivulia*

10.2.4.4 **Fauna:** The thick forest in the area is an ideal abode for wild life. The common species found in the forest of the area are Bear, Fox, Jackal, Hyena, Monkeys, Common Languor and Rabbits etc. are among the mammals. Where as the common birds are Parrot, Woodpecker, Crow, Vulture, Sparrow, Wild hen etc. The list of wild life with their local name and scientific name are given below in **Table 10.5**

TABLE 10.5
LIST OF FAUNA IN THE STUDY AREA

SL. NO.	LOCAL NAME	SCIENTIFIC NAME
	I) WILD ANIMALS	
1	Bear	*Melursus ursinus*
2	Fox	*Vulpesm bengalensis*
3	Jackal	*Canis aqureus (linnacus)*
4	Hyena	*Hyena hyena*
5	Common Languor	*Persbytis entellus*
6	Nilgai	*Bosela phus*
7	Squirrel	*Faunambutus pennanli*
8	Field Rat	*Bandiota bengalensis*

SL. NO.	LOCAL NAME	SCIENTIFIC NAME
	II) BIRDS	
9	Parrot	*Psittacula kramerl*
10	Woodpecker	*Dinopium javanense*
11	Vulture	*Torgos calvus*
12	Crow	*Corvus macrothychos*
13	Wildhen	*Gallus gallus*
14	Sparrow	*Passer domesticus*
15	Koel	*Eudynamys scolopaccac*
16	Owl	*Bubo bubo*
	II) REPTILES	
17	Venomous viper	*Echis carinatus*
18	Squirrels	*Funambulus pennanti*
19	Krait	*Bungaris coeruleus*
20	Cobra	*Nala tripudians*

10.2.5 QUALITY OF AIR, AMBIENT NOISE

10.2.5.1 Air quality

LOCATION	RPM			SPM			SO_2			NO_x		
	Mi	Ma	98%il	Min	Max	98%il	Mi	Ma	98%il	Min	Max	98%il
Dulanga	34	44	44	98	127	127	7.6	9.7	9.7	9.2	12.8	12.7
Bendrichua	34	44	44	96	125	125	6.5	9.9	9.8	9.7	13.4	13.4
Rangalmund	36	46	46	102	131	130	8.7	10.	10.9	10.	14.3	13.9
Manoharpur	34	45	45	98	128	127	6.3	8.7	8.5	9.0	12.4	12.4
Kanika	36	47	47	108	135	135	8.0	11.	10.9	11	14.9	14.9
Khunt Jhana	36	45	45	103	128	128	7.3	9.6	9.6	10.	12.7	12.7
Lamihara	35	44	44	99	127	126	6.1	9.7	9.7	9.8	12.8	12.7

10.2.5.2 Ambient noise level

The noise monitoring has been conducted at ten locations. All the 10 locations are situated in rural and residential areas. The day time noise levels have been monitored during 6.00 am-10.00 pm and night time levels during 10.00 pm-6.00 am at all the locations covered in 10 Km radius of the study area.

Noise Levels in Core Zone:

Day	:	50.7 dB(A)
Night	:	44.8 dB(A)

Noise Levels in Buffer Zone:

Day:		53.6 – 45.5 dB(A)
Night	:	48.4 – 38.8 dB(A)

10.2.6 CLIMATIC CONDITIONS

The study area forms a part of Sundargarh & Jharsuguda districts situated in Northwestern part of Orissa. The area experiences a subtropical climate with very hot and dry in summer and well-distributed rainfall in the southwest monsoon season. It has three distinguishable seasons.

i) The summer season starts from about the festival of Holi in March but the mercury rises to its peak in May (42°C) and first part of June with the mean daily maximum temperature at 33°C, the mean daily minimum temperature at 21°C.

ii) The rainy season from the mid June to September with an average annual mean rainfall of 1461mm and the total number of rainy days is 68 and

iii) The winter season from last week of November to February. The intervening period October is the post monsoon or retreating monsoon period.

The meteorological observatory nearest to the study area is at Jharsuguda, which incidentally is the only standard observatory in the Jharsuguda district. The data of this station can be taken as representative of the study area.

A brief description of the long-term normal of various meteorological elements of Jharsuguda observatory, and salient features are described in the succeeding paragraphs. These data are drawn from the following publications of India Meteorological Department (IMD), Govt. of India (1) Climate of Orissa, 1988 and (2) Climatological Tables of Observatories in India (1951-80).

In these publications the data pertains to period 1951 to 1980 and has been considered as a long term data.

The short-term data of temperature for the period for 1991 from Census Atlas, Series-19, Orissa and rainfall data for the period from 1994 – 2006 has taken from the Block Development Offices at Hemgir of Sundargarh district and Jharsuguda of Jharsuguda District, Orissa (**Table 10.6 to 10.7**).

10.2.6.1 Seasons

The year may be divided into four seasons viz;

i) Winter season from November to February.
ii) Summer season from March to May.
iii) Monsoon season from June to September and
iv) Post-monsoon season during October.

During the southwest monsoon season the air is humid and the skies are heavily clouded to overcast while during the rest of the year the air is generally dry and the skies are clear or lightly clouded. Winds are generally light to moderate with some increase in force in the latter part of the summer season and the monsoon month. During the monsoon months, in associated with depression from the Bay of Bengal that more westward, the area experience wide spread heavy rains and stormy winds. Dust storm some time occurs in the summer season.

10.2.6.2 Temperature

The salient features of the long-term temperature data are;

a) Range of variation in mean daily temperature (°C)

   i) Maximum temperature: 27.6 (Dec) to 41.8 (May)

   ii) Minimum temperature: 12.0 (Jan) to 27.1 (May)

b) Extremes of daily temperature (°C)

   i) Maximum temperature: 48.0 (May 22, 1976)

   ii) Minimum temperature: 6.0 (Jan 10, 1976)

c) Annual mean daily temperature (°C)

   i) Maximum temperature: 33.1

ii) Minimum temperature: 20.5

10.2.6.3 Relative Humidity

Since the climate is dry & hot, the relative humidity is generally moderate. The annual mean daily humidity is around 65% in morning hours and about 50% in evening hours. The monthly mean daily humidity varies from 41% (April,) to 87% (Aug) in morning hours and from 21% (April) to 81% (Aug) in evening hours.

10.2.6.4 Wind Speed

The wind speed in and around the study area is generally moderate through out the year, but occasionally the wind speed are more for few days during the pre-monsoon and monsoon period. On an average wind speed on 305 days in a year are between 1-19 kms/hrs and only on 12 days, these exceed 20 km/hr while on 48 days the winds are calm in the morning hours.

10.2.6.5 Wind direction

The annual average of the percentage number of days of various wind directions.

The salient features of the wind direction are as follows:

i) The most prominent annual means of wind directions during morning hours are NE (24%) and N (17%) while those at evening hours are SW & W (16%) and S (14%). The wind is calm on 12% days in a year in morning hours and on 21% days during evening hours.

ii) During winters (Nov to February) the winds are mostly from N & NE direction or remain calm. During summers and the monsoons (April to Sept) the most prevalent wind direction is from SW or S. In post monsoon period (October to November) the winds are N & NE.

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10.2.6.6 Rainfall

The salient feature of the rainfall data at Jharsuguda observatory are:

i) The main rainy months are June to September when about 88.5% of the annual rainfall occurs. During the post monsoon period from October to November, about 4.7% of the annual rainfall occurs due to depressions over the Bay of Bengal.

ii) The average annual rainfall (1951 – 1980) is 1460.9 mm and the average number of rainy days in a year is 68.7.

iii) The variation of rainfall from year to year basis is very large. The highest annual rainfall amounting to 181.85 percent (2656.6 mm) of the normal was recorded in 1961. The lowest annual rainfall of 901.0 mm (61.67% of normal) was recorded in the year 1979.

iv) The heaviest rainfall in 24 hours amounting to 257.8 mm occurred on 20th August 1975.

v) The highest monthly rainfall (wettest month) amounting to 770.7 mm was recorded in the month of 08th July 1961.

vi) Season-wise rainfall distribution pattern is as below:

Season (month)	Mean R.F (mm)	%of Total R.F.	Mean Rainy days	%of Total Rainy days
Winter (Nov – Feb)	38.2	2.6	3.3	4.8
Pre-monsoon (March – May)	64.7	4.4	5.4	7.9
Monsoon (June –Sep)	1293.0	88.6	56.0	81.5
Post-monsoon (Oct)	65.0	4.4	4.0	5.8
Annual Total	1460.9	100.0	68.7	100.0

vii) The rainfall data in Jharsuguda district are available for fairly long period (1951 – 1980).

viii) The month-wise rainfall data (1994 – 2006) of Hemgir and Jharsuguda Block, which are the part of the study area, is given in **Table 10.8 & 10.9.**

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4. **To get a broader picture of the biodiversity impacts, it was decided to relook at the three projects together.** Another round of discussions commenced and the final meeting took place on June 27th, 2011. The picture that has emerged based on satellite imagery is as below.

	VDF	*MDF*	*ODF*	*Total*
		hectares		
UMPP				
Original	0	265	248	513
Revised	0	65	248	313
NTPC				
Original	2	272	37	311
Revised	0	195	35	230
OPGC				
Original	0	622	194	816
Revised	0	472	194	666

VDF-Very Dense Forest;
MDF-Medium Density Forest
ODF-Open, Degraded Forest

5. **Thus, it will be seen that a saving in forest area to be diverted of almost 40% in the case of the UMPP, 26% in the case of NTPC and 20% in the case of OPGC has materialised on account of the MoE&F's intervention and the cooperation received from the Ministry of Power, NTPC and OPGC.** The number of trees felled in the NTPC case falls from around 67,500 to 37,500 (a 44% reduction) and in the case of OPGC approximately 75,000 trees get saved. The numbers in regard to the UMPP have yet to be worked out but here too, the MoE&F will insist on a significant reduction.

SANDEEP GUPTA / Under Secretary / Ministry of Coal / Govt. of India / New Delhi-110001

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6. **It also bears mention that all the power units being put up with the coal mined in these six blocks will use supercritical technology.** This will result in a saving of around 5-8% in terms of carbon dioxide emissions from each of the generating units as compared to a comparable sub-critical 500 Mw unit.

7. **In view of the above two factors, all six blocks will now be considered by the FAC as "go" areas.** OPGC's proposal that is pending with the FAC will now be taken up by the FAC in its next meeting and the proposals relating to the UMPP and NTPC will be considered when they are received from the Odisha government. The **additional** condition that will be imposed over and above the usual conditions governing forest clearance (NPV, compensatory afforestation, wildlife management plans, etc) is that the **project proponents will bear the cost of regeneration of an area of open, degraded forest land equivalent to the amount of medium-density forest land being diverted.**

8. Finally, it should be pointed out that the UMPP and the NTPC power plants are both in Sundergarh district while the OPGC power plant in Jharsuguda district. Ash disposal and water availability need special focus by the Ministry of Power in Sundergarh district, a point reiterated to me by the state government as well.

Jairam Ramesh
MOS(I/C)E&F
June 29th, 2011

SANDEEP GUPTA
Joint Secretary

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ANNEXURE-I

LETTER OF MOS (I/C) E&F TO UNION MINISTER OF POWER DATED FEBRUARY 14TH, 2011

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

1-83

जयराम रमेश
JAIRAM RAMESH

राज्य मंत्री (स्वतंत्र प्रभार)
पर्यावरण एवं वन
भारत सरकार
नई दिल्ली-110003
MINISTER OF STATE (INDEPENDENT CHARGE)
ENVIRONMENT & FORESTS
GOVERNMENT OF INDIA
NEW DELHI - 110 003

14th February 2011

My dear Sushilkumarji -

I understand that you have given a statement today that the Orissa UMPP has been cleared by the MoE&F.

I hope that you have been informed of the conditions associated with this clearance:

1. Out of 265 hectares of good quality forest land, 200 hectares will be saved and not be subject to mining;
2. The Dulanga Coal block of NTPC which is close to this UMPP block will not be worked since this will involve loss of good quality forest cover;
3. The coal block of Orissa PGL close to the UMPP block will also be not opened up since this would also add to the loss of forest cover.

It is only after an assurance from the Ministry of Power that these three conditions will be met, will the approval for UMPP coal block be formally granted.

I have tried very hard to accommodate the Ministry of Power. Since you did not have any flexibility on the size of the UMPP (4000 MW), these conditions have become essential.

With regards,

Yours sincerely,

(Jairam Ramesh)

Shri Sushilkumar Shinde
Minister of Power
New Delhi

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ANNEXURE-II

LETTER FROM MINISTER OF ENERGY, GOVERNMENT OF ORISSA DATED 25th JUNE 2011

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ATANU SABYASACHI NAYAK
MINISTER OF STATE (Ind. Charge)
Energy, Orissa

Phone { Office : (0674) 2536642 Tel/Fax
EPABX : 2189
Res : (0674) 2570737

D.O. No. 1280 /MSE /B

BHUBANESWAR

Dated the 22.1

Respected Suman Ramakhsee,

Sub: Re-categorization of Manoharpur & Dip-side coal blocks of Orissa Power Generation Corporation from 'NO-GO' to 'GO' category & forest clearance thereof.

I take this opportunity to thank you for providing time to meet and discuss with you about the important state sector project namely Orissa Power Generation Corporation (OPGC), the only state PSU with foreign direct investment in power sector. As you already know, OPGC was allocated Manoharpur and Dip side coal blocks in Sundergarh district of Orissa in July 2007, however these blocks had been categorized in to 'NO-GO' category by Ministry of Environment & Forest in the year 2009 (retrospectively). This categorization of 'NO-GO' of these two coal blocks allocated to the state PSU seriously affects the expansion plan of the corporation and creates shortfall in meeting the power requirements of the state of Orissa.

OPGC, apart from having made significant progress in developing both the coal mine and the end use project, has also completed the Forest Diversion Proposal (FDP) at the state government level and the state government has already recommended the same to the Ministry of Environment and Forest, Government of India. Recently OPGC had engaged Orissa Space Applications Centre (ORSAC), a government agency to re-evaluate the Weighted Forest Coverage (WFC) and Gross Forest Coverage (GFC) based on the latest and high resolution data obtained from NRSC, Hyderabad. I am quite happy to let you know that the WFC & GFC percentage of Manoharpur coal block works out to be only 10.7% & 31.7% respectively (as against the earlier data of 23.5% & 34.4%). Considering the marginal difference with the stipulated norm of 10% & 30% MoEF, Government of India can easily consider this case and categorize this block in to 'GO' category. On a combined cluster concept also the Dip side can be considered favourably by Government of India and categorize in to 'GO' category.

Enclosed along with this is a brief self explanatory note prepared about these blocks and justifications on why and how these two blocks should be categorized in to 'GO' category without having to compromise on the preservation or regeneration of the forest cover.

Sanjiv

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Deputy General Manager (Proj.)
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EOC, A-8A, Sector-24, Noida-201301 (U.P.)

SANDEEP GUPTA
Under Secretary
Ministry of Coal
Govt. of India
New Delhi-110001

ATANU SABYASACHI NAYAK
MINISTER OF STATE (Ind. Charge)
Energy, Orissa

Phone { Office (0674) 2536942 Tele Fax
EPABX 2189
Res. (0674) 2570[illegible]

D.O. No. [illegible]

BHUBANESWAR

Dated the [illegible]

// 2 //

Given the changed circumstances with the latest calculated and certified results of ORSAC, I request you to personally look in to this matter, re-evaluate the issues and provide a favourable decision categorizing these blocks in to 'GO' category. This action will enable the state and the corporation to start the power plant construction immediately meeting the power needs of the state and the country within the twelfth plan period. I sincerely expect the Union Government to support the State Government's project keeping in mind the size of the project and the Rs.11,000 crores investment it will bring in to the western part of Orissa.

With Regards,

Yours sincerely,

Atanu 25/11

(Atanu Sabyasachi Nayak)

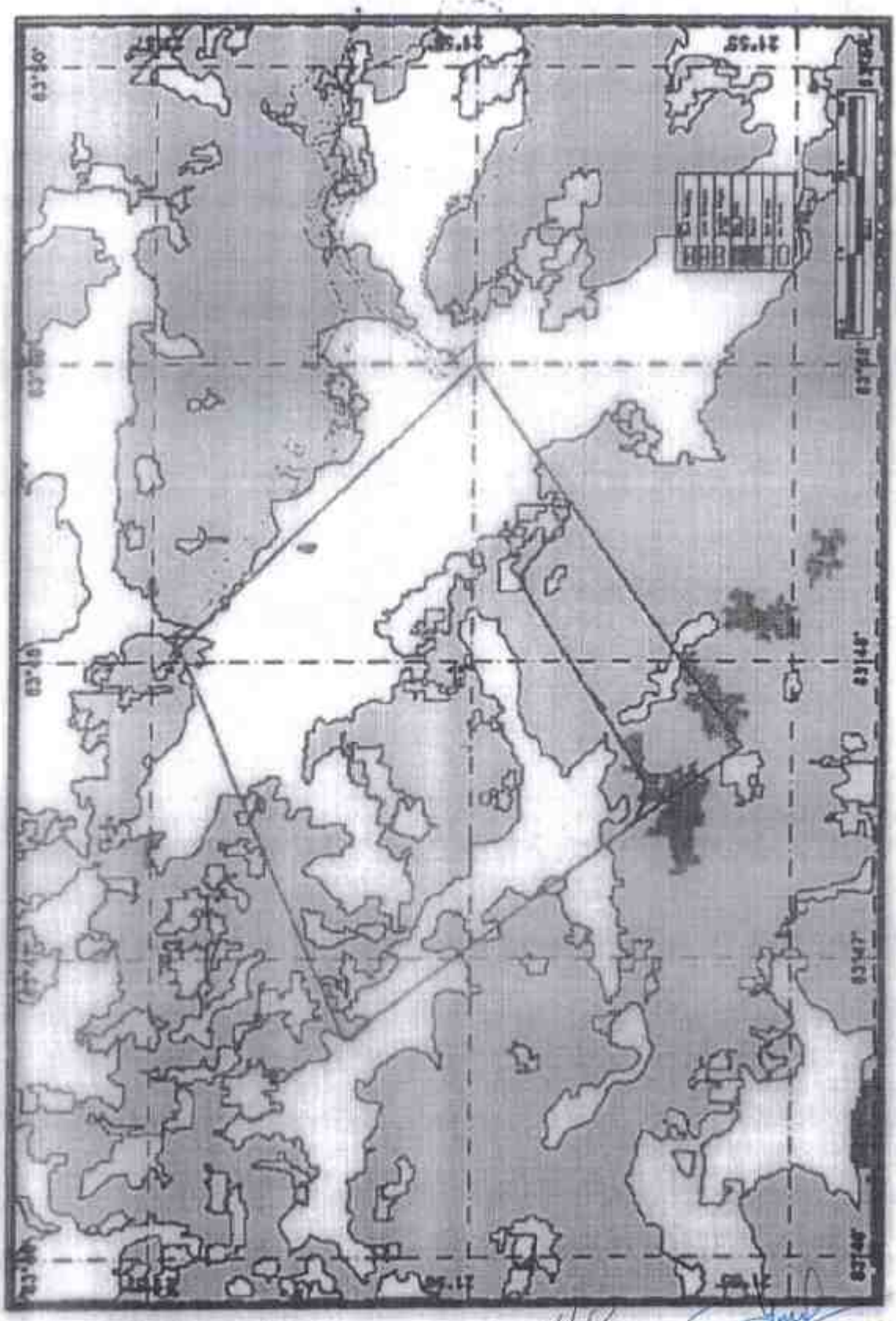
SHRI. JAIRAM RAMESH,
Hon'ble Minister of State (Independent Charge),
Ministry of Environment & Forests,
New Delhi.

संदीप गुप्ता/SANDEEP GUPTA
अवर सचिव / Under Secretary
भारत सरकार / Ministry of Coal
Govt. of India
नई दिल्ली / New Delhi-110001

Sanjiv

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2009-CPAM

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



SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2009-CPAM

संदीप गुप्ता / SANDEEP GUPTA
अवर सचिव / Under Secretary
कोयला मंत्रालय / Ministry of Coal
भारत सरकार / Govt. of India
नई दिल्ली / New Delhi-110001

पवन देव जामटा/PAWAN DEV JAMTA
उप महाप्रबंधक (अधिकार)
Dy. General Manager (Coordination)
एन टी पी सी लिमिटेड/NTPC LIMITED
EDC, A-8A, Sector-24, Noida-201301 (U.P.)

ANNEXURE IIIA

F No.F.J-1/2010-IPC(Vol II)
Government of India
Ministry of Power

New Delhi dated the 5th August, 2011

To

CMD,
NTPC Ltd
SCOPE Complex,
Lodhi Road New Delhi

Sub: Coal blocks linked to UMPP, NTPC and OPGC power plants in Odisha – reg

Sir,

I am directed to enclose herewith a copy of letter No.11-225/2011-FC dated 19th July, 2011 received from Ministry of Environment & Forests on the above subject for information and necessary action.

Yours faithfully

Encl: as above

संदीप गुप्ता/SANDEEP GUPTA
अवर सचिव/Under Secretary
कोयला मंत्रालय/Ministry of Coal
भारत सरकार/Govt. of India
नई दिल्ली/New Delhi-110001

(A Sengupta)
Section Officer

SANJAY KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2009-CPAM

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.)

ANNEXURE IV

No. 13016/29/2003 CA-I (Vol-II)
Government of India
Ministry of Coal

Dated the 30th July 2009

To
Shri Sunil Jumde
Group head (PE-Mine Planning and Design)
2nd Floor, NTPC Engineering Office Complex
A-8, Sector 24, Noida

Subject:- Approval of Mining Plan (February 2009) for Dulanga Coal block in District Sundergarh, Orrisa submitted by M/s NTPC Ltd.

Sir,

I am directed to refer to your letter No. NTPC : PE-MP&D: 7015 dated 22.10.2008 and letter No.CC: PEM: MP:MP&D:7015 dated 16.06.2009 submitting therewith mining plan (February 2009) for Dulanga Coal block in the IB Valley Coalfield, Dist. Sundergarh ,Orissa and to say that the Mining Plan 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 read along with company's letter dated 17.02.2009 and 16.06.2009 subject to the following conditions:-

(i) The mining company shall take all necessary precautions regarding safety of mine workings, persons deployed therein.
(ii) Mining Lease to be acquired shall not encroach into any other coal block.
(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 the block.

Yours faithfully

(V.S.Rawat)
Under Secretary to the Government of India

Encl. As above

Copy to:-
1. The Under Secretary, CPAM-Sction, Ministry of Coal for information and record.
2. The Director, Coal Controller Organization, 1- Council House Street, Kolkata

संदीप गुप्ता/SANDEEP GUPTA
अवर सचिव/Under Secretary
कोयला मंत्रालय/Ministry of Coal
भारत सरकार/Govt. of India
नई दिल्ली/New Delhi-110,001

Sanjiv
SANJIV KUMAR SINGH
Recognised Qualified Person
No. 3/211/(15)/2009-CPAM

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

ANNEXURE V

No. 34011(1)/12/2009-CPAM
Government of India
Ministry of Coal

New Delhi the 27th September, 2010

TO	SHRI D.K.JAIN, EXECUTIVE DIRECTOR (ENGG.), NTPC LIMITED, ENGINEERING OFFICE COMPLEX, PLOT NO.A-8A, SECTOR-24, POST BOX NO.13, NOIDA-201301 (UTTAR PRADESH).

Subject	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: PE-MP&D/MISC: 0009.01 dated 6.7.2010 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 (Coal/lignite block) under Rule 22A of Mineral Concession Rule, 1960 for the purpose of mining undertaken only by M/s NTPC Limited up to 31 years from the date of issue of this letter.

2. Your attention is also invited towards the decision of the Standing Committee that additional area beyond the block boundary may be considered to a mining plan subject to the condition that proper justification is given in the mining plan and that adjacent area is coal bearing and does not infringe upon any already allotted or identified coal/lignite block.

Yours faithfully,

(DEEPAK GUPTA)
Under Secretary to the Govt. of India
Ministry of Coal
Tel. No. 23384793

Sanjiv

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2009-CPAM

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.)

ANNEXURE VI

CONSENT LETTER FROM THE APPLICANT

1. I hereby authorize Sri. Sanjiv Kumar Singh, Registration No. 34011 (15) 2009 – CPAM, to prepare the Revised Mining Plan in respect of Dulanga Coal Block in the District of Sundargarh of Orissa.

2. I hereby undertake that all the conditions so made in the Revised Mining Plan 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.

Signature of the Applicant in full

(Authorized signatory)

ए. के. दास/A. K. DASH
Addl. General Manager
(PE-Mine Planning & Design)
एनटीपीसी लिमिटेड/NTPC Limited
A-8A, Sector-24, NOIDA-201301 (U.P.)

Name in full : Arun Kumar Dash

Address : PE – MP & D, 5th Floor, Front Block,
EOC, NTPC Limited, A - 8A, Sector 24,
Noida, Uttar Pradesh. Pin code – 201301
Tel 0120-3316521,9650991057
Fax:0120-2410136
E-mail: akdash@ntpceoc.co.in

Place: Noida
Date: 30.09.2011

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/-15)/2009-CPAM

संदीप गुप्ता/SANDEEP GUPTA
अवर सचिव/Under Secretary
कोयला मंत्रालय/Ministry of Coal
भारत सरकार/Govt. of India
नई दिल्ली/New Delhi-110001

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

ANNEXURE VII-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 for Dulanga 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 are true and correct to the best of my knowledge.

संदीप गुप्ता / SANDEEP GUPTA
अवर सचिव / Under Secretary
कोयला मंत्रालय / Ministry of Coal
भारत सरकार / Govt. of India
नई दिल्ली / New Delhi-110001

Sanjiv Kr. Singh

Sanjiv Kumar Singh
Recognized Qualified Person
RQP No. 34011 (15) 2009 – CPAM
PE – MP & D, 5th Floor, Front Block,
EOC, NTPC Limited, A - 8A, Sector 24,
Noida, Uttar Pradesh. Pin code – 201301
Tel: 0120-3318571,9650991396
Fax:0120-2410136
E-mail: sanjivkumarsingh@ntpceoc.co.in

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2009-CPAM

Sanjiv

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2009-CPAM

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

ANNEXURE VII -B

CERTIFICATE

It is to certify that the area of which this Revised Mining Plan has been prepared covers the coal block area allocated to M/s. NTPC Limited by the Government of India vide letter No.13016/29/2003-CA-1 dated 25th January, 2006.

SANDEEP GUPTA
Under Secretary
Ministry of Coal
Govt. of India
New Delhi-110001

Sanjiv Kr. Singh

Sanjiv Kumar Singh
Recognized Qualified Person
RQP No. 34011 (15) 2008- CPAM
PE – MP & D, 5th Floor, Front Block,
EOC, NTPC Limited, A - 8A, Sector 24,
Noida, Uttar Pradesh, Pin code – 201301
Tel: 0120-3318571,9650991396
Fax:0120-2410136
E-mail: sanjivkumarsingh@ntpceoc.co.in

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2008-CPAM

Sanjiv

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2009-CPAM

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

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ANNEXURE VII -C

CERTIFICATE

It is to certify that the Block Boundary shown in the Revised Mining Plan of Dulanga Coal Block is as per the MoC letter vide No.CC/MCBA/101/04/06/Policy/Vol.II dated 15th March 2010.

संदीप गुप्ता / SANDEEP GUPTA
अवर सचिव / Under Secretary
कोयला मंत्रालय / Ministry of Coal
भारत सरकार / Govt. of India
नई दिल्ली / New Delhi-110001

Sanjiv Kr. Singh

Sanjiv Kumar Singh
Recognized Qualified Person
RQP No. 34011 (15) 2009 – CPAM
PE – MP & D, 5th Floor, Front Block,
EOC, NTPC Limited, A - 8A, Sector 24,
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Tel: 0120-3318571,9650991398
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E-mail: sanjivkumarsingh@ntpceoc.co.in

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2009-CPAM

Sanjiv Kr. Singh

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2009-CPAM

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

ANNEXURE VII -D

CERTIFICATE

1. Certified that the Provisions of Mineral Conservation and Development Rules, 1998 and Mineral Concession Rules, 1960 have been observed in the preparation of Revised Mining Plan for Dulanga 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 Provisions of the Mines Act, 1952 and the Rules and Regulations made there under have been observed in the preparation of this Revised Mining Plan and that wherever specific permissions are required, the applicant will approach the Director General of Mines safety in the matter.

3. Certified that the information furnished in this Revised Mining Plan are true and correct to the best of my knowledge.

SANJEEV GUPTA
Director / Under Secretary
Ministry of Coal
Govt. of India
New Delhi-110001

Sanjiv Kumar Singh
SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2009-CPAM

Sanjiv Kumar Singh
Recognized Qualified Person
RQP No. 34011 (15) 2009 – CPAM
PE – MP & D, 5th Floor, Front Block,
EOC, NTPC Limited, A - 8A, Sector 24,
Noida, Uttar Pradesh. Pin code – 201301
Tel: 0120-3318571,9650991396
Fax:0120-2410136
E-mail: sanjivkumarsingh@ntpceoc.co.in

Sanjiv
SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2009-CPAM

पवन देव जामटा/PAWAN DEV JAMTA
उप महाप्रबंधक (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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ANNEXURE VII -E

CERTIFICATE

It is to certify that the total quarriable coal down to Seam Rampur IAI, the lowest workable seam in the allocated Coal Block at Dulanga, is planned for extraction in the Revised Mining Plan.

Sanjiv Kr. Singh

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2009-CPAM

Sanjiv Kumar Singh
Recognized Qualified Person
RQP No. 34011 (15) 2009 – CPAM
PE – MP & D, 5th Floor, Front Block,
EOC, NTPC Limited, A - 8A, Sector 24,
Noida, Uttar Pradesh. Pin code – 201301
Tel: 0120-3318571,9650991396
Fax:0120-2410136
E-mail: sanjivkumarsingh@ntpceoc.co.in

संदीप गुप्ता/SANDEEP GUPTA
अवर सचिव/Under Secretary
कोयला मंत्रालय/Ministry of Coal
भारत सरकार/Govt. of India
नई दिल्ली/New Delhi-110001

Sanjiv

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2009-CPAM

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

ANNEXURE VII -F

CERTIFICATE

It is to certify that the area required outside the boundary of Dulanga Coal Block of NTPC is not coal bearing which has been investigated on the basis of 5 boreholes of Geological Report, the details of which are given below:

BOREHOLE NUMBER	DEPTH OF BOREHOLE (IN M)	AREA OF PROJECT OVER WHICH THE BOREHOLE IS LOCATED	THE LOWEST STRATA INTERSECTED	WHETHER COAL INTERSECTED?
MNID - 24	128.50		Clay stone (Talchir Formation)	No
MNID - 26	35.00		Metamorphics	No
MNID - 27	30.00		Metamorphics	No
MNID - 29	38.50		Sandstone (Karharbari Formation)	No
MNID - 30	41.00		Sandstone (Karharbari Formation)	No

The Metamorphics and Talchirs intersected in the above boreholes indicate that there is no coal on the northern side of the block over which the various facilities including the surface dump is proposed to be located.

Sanjiv Kumar Singh
Recognized Qualified Person
RQP No. 34011 (15) 2009 – CPAM
PE – MP & D, 5th Floor, Front Block,
EOC, NTPC Limited, A - 8A, Sector 24,
Noida, Uttar Pradesh. Pin code – 201301
Tel: 0120-3318571,9650991396
Fax:0120-2410136
E-mail: sanjivkumarsingh@ntpceoc.co.in

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.)

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2009-CPAM

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ANNEXURE VIII

CERTIFICATE BY THE APPLICANT

Certified that the Revised Mining Plan of Dulanga Coal Block has been prepared by Sh. Sanjiv Kumar Singh, Registration No. 34011 (15) 2009 – CPAM of NTPC Limited, PE – MP & D, A - 8A, Sector 24, Noida – 201301 in full consulation with knowledge and consent of the undersigned.

SANDEEP GUPTA
Under Secretary
Ministry of Coal
Govt. of India
New Delhi-110001

Signature of the Applicant in full
Arun Kumar Dash (Authorised Signatory)
PE – MP & D, 5th Floor, Front Block,
EOC, NTPC Limited, A - 8A, Sector 24,
Noida, Uttar Pradesh. Pin code – 201301
Tel: 0120-3316521,9650991057
Fax:0120-2410136
E-mail: akdash@ntpceoc.co.in

ए. के. दास / A. K. DASH
Addl. General Manager
(PE-Mine Planning & Design)
एनटीपीसी लिमिटेड / NTPC Limited
A-8A, Sector-24, NOIDA-201301 (U.P.)

Place: Noida
Date: 30.09.2011

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2009-CPAM

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

ANNEXURE IX

CONSENT LETTER FROM THE APPLICANT

The Progressive Mine Closure Plan in respect of Dulanga Coal Block, over an area of 6.54 Sq.Km in the District of Sundargarh, State Orissa, has been prepared by Sh. Sanjiv Kumar Singh, Registration No. 34011 (15) 2009 – CPAM of NTPC Limited, PE – MP & D, A - 8A, Sector 24, Noida – 201301. Any further correspondence regarding Progressive Mine Closure Plan may please be made with the said recognised person at the following address

Name	: Sh. Sanjiv Kumar Singh
Address (Office)	: PE – MP & D, 5th Floor, Front Block, EOC, NTPC Limited, A - 8A, Sector 24, Noida, Uttar Pradesh. Pin code – 201301
Phone	: 0120-3318571,9650991396
Fax	: 0120-2410136
E-mail	: sanjivkumarsingh@ntpceoc.co.in
Registration No.	: 34011 (15) 2009 – CPAM
Date of grant/renewal	: 27th September 2010

I hereby undertake that all the conditions so made in the Progressive Mine Closure Plan by the recognised 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.

Signature of the Applicant in full

Name : Arun Kumar Dash (Authorised Signatory)

ए. के. दाश/A. K. DASH
Asst. General Manager
(PE-Mine Planning & Design)
एनटीपीसी लिमिटेड/NTPC Limited
A-8A, Sector-24, NOIDA-201301 (U.P.)

PE – MP & D, 5th Floor, Front Block,
EOC, NTPC Limited, A - 8A, Sector 24,
Noida, Uttar Pradesh. Pin code – 201301
Tel: 0120-3316521,9650991057
E-mail: akdash@ntpceoc.co.in

Date: 30.09.2011

Place: Noida

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2009-CPAM

संदीप गुप्ता / SANDEEP GUPTA
अवर सचिव / Under Secretary
कोयला मंत्रालय / Ministry of Coal
भारत सरकार / Govt. of India
नई दिल्ली / New Delhi-110001

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.)

ANNEXURE X

MINERAL EXPLORATION CORPORATION LIMITED
(A Government of India Enterprise)

Regd.Office : Dr. Babasaheb Ambedkar Bhawan, Highland Drive Road, Seminary Hills, Nagpur- 440 006.
Fax : 091-0712-2510133, 2510548, E-mail : mecl_ngp@Sancharnet.in website: www.meclindia.com

No. G-07/NTPC/07-08/ 1509 DATE : 20.03.08

Shri A.B. Haldar,
AGM (C.M.), NTPC Ltd.,
Coal Mining Division, West Wing,
1st Floor, PDIL Bhawan, A-14, Setor-1,
NOIDA-201 301 (U.P.)

FAX NO. 0120-2474091 / 2474066

Sub : Submission of final GR of Dulanga Coal Block.,
IB River Coalfield, Distt. Sundargarh, Orissa.

Ref : NTPC Ltd. LOA No. CS-7015-708-9-CY-LOA-4712 dtd. 14.7.2006

Sir,

Please find enclosed 2 sets of Final Geological Report entitled "Geological Report on Detailed Exploration for Coal, Dulanga Block, IB River Coalfield, Distt. Sundargarh, Orissa in three volumes as per details given below :

Volume – I	...	Text.
Volume – IIA Volume – IIB	...	Annexures
Volume – III	...	Plates

The Final Geological Report has been prepared incorporating comments sent by NTPC vide letter No. G/07/Dulanga/07-08/928 dt. 29.09.2007 and in line with your letter No. NTPC/CM/Expl-MECL/03 dt. 25/2/08.

The plates of exploration report are prepared from Minex Software and reserves are estimated as per UNFC OCP norms. The entire report is also being made available in soft copy, including ore body model.

Kindly acknowledge the receipt.

Yours faithfully,

(V.K.S. VISEN)
HOD (EXPLORATION)

Encls : As above

cc to:

1. Shri B.P.Singh, Executive Director, Coal Mining & Coal Washeries, NTPC Ltd., 1st Floor, PDIL Building, A-14,Sector-1, Noida,Pin-201301(U.P.) FAX: 0120-2474091 E-mail: bpsingh@ntpc.co.in
2. Shri B. Pradhan, DGM / Dulanga, Dulanga Coal Mining Project, Laxmi Bhawan, Main Road, Beheramal, Jharsuguda-768203 (Orissa). FAX : 06645-270438.

संदीप गुप्ता / SANDEEP GUPTA
अवर सचिव / Under Secretary
कोयला मंत्रालय / Ministry of Coal
भारत सरकार / Govt. of India
नई दिल्ली / New Delhi-110001

SANJAY KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2008-CPAM

पवन देव जामटा / PAWAN
उप महाप्रबन्धक (
Deputy General Manager
एन टी पी सी लिमिटेड / NTPC
EOC, A-8A, Sector-24, Noida-201301

MAHANADI COALFIELDS LIMITED

(A Subsidiary of Coal India Limi

Post JAGRUTI VIHAR, BURLA Dist SAMBALPUR

State ORISSA PIN: 768020 FAX: 0663-2542770

PHONE : 2542461 TO 2542469

92333,97

MONEY RECEIPT DEPARTMENT COPY

RECEIPT NO.:SMCL/2006/000862 CA NO. 000862 DATE 10 October 2006

https://172.19.0.10/reports/rwservlet?

RECEIVED WITH THANKS FROM M/s./Mrs./M/s. NTPC LTD.

SING NTPC, (DEPT OF GEOLOGICAL SURVEY)

RS. 24920568.00 Three Crore Forty Lakh Fifty Thousand Six Hundred Sixty-Eight Only

BY Cheque / Draft # 834169 DT. 29 SEP 2006 ON HDF.

THIS RECEIPT IS VALID SUBJECT TO CLEARANCE IN CASE OF CHEQUE(S)/DRAFT(S))

	A/C. CODE	Account Description	Debit (Rs)	Credit (Rs)
1	775020	TO HQ CENTRAL ACCOUNTS SING	0.00	24,050,568.00
		Total :	0.00	24,050,568.00

Party Code:- 3203307

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

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2000-CPAM

350

Mahanadi Coalfields Limited

(A Subsidiary of Coal India Limited)
OFFICE OF THE CHIEF GENERAL MANAGER(CP&P)
JAGRITI VIHAR, P.O. JAGRITI VIHAR, BURLA
Dist - SAMBALPUR - 768 020 (ORISSA)

Phone - (0663) 2542898 (O) / Fax - 2542767

Ref. No: MCL/SBP/CGM(CP&P)/06/ 1489 Dt. 31/10/06

To
Shri A.B. Haldar
DGM-CM, NTPC
Engineering Office Complex
Plot No-A-8A, Sector-24
Post Box No-13, Noida-201301
U.P

Sub: Exploration Cost of Geological Report of Dulunga Coal Block

Dear Sir,

This is to acknowledge receipt of DD No-834660 dated 29.09.2006 in favour of MCL for amount of Rs. 3,40,50,668.00 (Rupees Three Crores Forty Lakh Fifty Thousand Six Hundred Sixty Eight only) towards the cost of Geological Report of Dulunga Block.

A Money Receipt No FRCB/ 2006/00868 dated 10.10.2006 for the above amount is enclosed for your reference and record.

Yours faithfully,

(S.Sinha)
CGM(CP&P)

Copy:
1. CGM (Exploration), CMPDIL, Kanke Road, Ranchi- with a request to hand over the data of additional 19 boreholes drilled in Dulunga block to NTPC.
2. CGM (CP), CIL, 10-NS Road, Kolkata
3. G.M(F), MCL

Sanjay

SANJAY KUMAR SINGH
Recognised Qualified Person
No. 31011/(15)/2009-CPAM

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.)

Page No. 5906-07

रजिस्ट्री सं. डी. एल. (एन) 04/0007/2003—05

REGD. NO. D. L.-(N)04/0007/2003—05

ANNEXURE XI

भारत का राजपत्र
The Gazette of India

प्राधिकार से प्रकाशित

PUBLISHED BY AUTHORITY

साप्ताहिक

WEEKLY

सं. 34] नई दिल्ली, अगस्त 19—अगस्त 25, 2007, शनिवार/श्रावण 28 — भाद्र 3, 1929

No. 34] NEW DELHI, AUGUST 19—AUGUST 25, 2007, SATURDAY/SRAVANA 28—BHADRA 3, 1929

इस भाग में भिन्न पृष्ठ संख्या दी जाती है जिससे कि यह पृथक संकलन के रूप में रखा जा सके ।

Separate Paging is given to this Part in order that it may be filed as a separate compilation.

भाग II—खण्ड 3—उप-खण्ड (ii)
PART II—Section 3—Sub-section (ii)

भारत सरकार के मंत्रालयों (रक्षा मंत्रालय को छोड़कर) द्वारा जारी किए गए सांविधिक आदेश और अधिसूचनाएं
Statutory Orders and Notifications Issued by the Ministries of the Government of India
(Other than the Ministry of Defence)

कार्मिक, लोक शिकायत तथा पेंशन मंत्रालय

(कार्मिक और प्रशिक्षण विभाग)

नई दिल्ली, 17 अगस्त, 2007

का.आ. 2360.—केंद्रीय सरकार दिल्ली विशेष पुलिस स्थापना अधिनियम, 1946 (1946 का अधिनियम सं. 25) की धारा 6 द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए, दिल्ली विशेष पुलिस स्थापना (अपराधों का अन्वेषण) संशोधन अधिनियम, 2003 (2003 का अधिनियम सं. 2) की धारा 2 द्वारा यथा संशोधित उक्त अधिनियम की धारा 5 की उपधारा (1) द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए, केंद्रीय सरकार, मेघालय सरकार की सहमति से, दिल्ली विशेष पुलिस स्थापना के सदस्यों को पुलिस स्टेशन, शिलांग (मेघालय) में भारतीय दंड संहिता, 1860 (1860 का अधिनियम सं. 45) की धारा 302 के अधीन दर्ज मामला सं. 10(3)/2007 तथा उपरोक्त अपराध से उस मामले अथवा मामलों से संबंधित अथवा संसक्त प्रयत्नों, दुष्प्रेरणों और षड्यंत्रों तथा उसी संव्यवहार के अनुक्रम में किए गए अन्य किसी अपराध या अपराधों का अन्वेषण करने के लिए दिल्ली विशेष पुलिस स्थापना के सदस्यों की शक्तियों और अधिकारिता का विस्तार सम्पूर्ण मेघालय राज्य पर करती है ।

[सं. 228/21/2007-ए.वी.डी.II]

संदीप गुप्ता, अवर सचिव

MINISTRY OF PERSONNEL, PUBLIC GRIEVANCES AND PENSIONS

(Department of Personnel and Training)

New Delhi, the 17th August, 2007

S.O. 2360.—In exercise of the powers conferred by sub-section (1) of Section 5, read with Section 6 of the Delhi Special Police Establishment Act, 1946 (No. 25 of 1946), the Central Government with the consent of the Government of Meghalaya hereby extends the powers and jurisdiction of the members of the Delhi Special Police Establishment in the whole of the State of Meghalaya for investigation of Case No. 10(3)/2007 under Section 302 of the Indian Penal Code, 1860 (Act No. 45 of 1860) registered at Kynad Police Station, Shillong (Meghalaya) and attempts, abetments and conspiracies in relation to or in connection with one or more of the offences mentioned above and any other offences committed in the course of the same transaction arising out of the same facts.

[No. 228/21/2007-AVD.II]

CHANDRA PRAKASH, Under Secy.

3474 GI/07

(3987)

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2009-CPAM

संदीप गुप्ता/SANDEEP GUPTA
अवर सचिव/Under Secretary
कार्मिक, लोक शिकायत तथा पेंशन मंत्रालय/Ministry of Personnel, Public Grievances & Pensions
भारत सरकार/Govt. of India
नई दिल्ली/New Delhi-110001

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

कोयला मंत्रालय

नई दिल्ली, 21 अगस्त, 2007

का. आ. 2376.—केन्द्रीय सरकार को यह प्रतीत होता है कि इससे उपाबद्ध अनुसूची में उल्लिखित भूमि में कोयला अभिप्राप्त किये जाने की संभावना है।

अतः अब, केन्द्रीय सरकार, कोयला धारक क्षेत्र (अर्जन और विकास) अधिनियम 1957 (1957 का 20) (जिसे इसमें इसके पश्चात् उक्त अधिनियम कहा गया है) की धारा 4 की उपधारा (1) द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए, इसमें कोयले का पूर्वेक्षण करने के अपने आशय की सूचना देती है।

इस अधिसूचना के अंतर्गत आने वाले क्षेत्र का रेखा सं. 09/एन.टी.पी.सी./सेक्शन 4(1)/दुलंगा/07 दिनांक 15 मार्च, 2007 का निरीक्षण, महाप्रबंधक, कोल माइनिंग, एन.टी.पी.सी., प्रथम तल, पी डी ऑफिस एवं बिल्डिंग, मैकेटा-1, चोपन, उत्तरप्रदेश-231 301 या परियोजना प्रमुख का कार्यालय, एन.टी.पी.सी. लिमिटेड, लक्ष्मी भवन, मैन रोड, महागमल, जिला-झारसुगुडा, उड़ीसा पिन-768203 या मुख्य महाप्रबंधक (खोज प्रभाग), सेन्ट्रल माइन्स प्लानिंग एण्ड डिजाइन इंस्टीट्यूट, गोंडवाना प्लेस, कांके रोड, रांची या कोयला नियंत्रक, 1, काउंसिल हाउस स्ट्रीट कोलकाता अथवा जिला कलेक्टर और मजिस्ट्रेट, जिला सुन्दरगढ़, उड़ीसा के कार्यालय में किया जा सकता है;

इस अधिसूचना के अंतर्गत आने वाली भूमि में हितबद्ध सभी व्यक्ति, उक्त अधिनियम की धारा 13 की उपधारा (7) में निर्दिष्ट सभी नक्शों, चार्टों और अन्य दस्तावेजों को परियोजना प्रमुख, दुलंगा माइनिंग प्रोजेक्ट, एन.टी.पी.सी. लिमिटेड, लक्ष्मी भवन, मैन रोड, महागमल, जिला-झारसुगुडा, उड़ीसा पिन-768203 को इस अधिसूचना के राजपत्र में प्रकाशन की तारीख से चबबे दिन में भेजेंगे।

अनुसूची

दुलंगा कोल माइनिंग ब्लाक

जिला–सुन्दरगढ़ (उड़ीसा)

रेखांक सं. 09/एन.टी.पी.सी./सेक्शन 4(1)/दुलंगा/07 तारीख 15-03-2007

क्रम सं.	ग्राम का नाम	थाना	ग्राम सं.	जिला	क्षेत्रफल हेक्टेयर में (लगभग) हेक्टेयर	एकड़	टिप्पणी
1.	दुलंगा	हेमगिर	105	सुन्दरगढ़	97.75	241.54	भाग
2.	मगोहरपुर	हेमगिर	106	सुन्दरगढ़	8.25	20.39	भाग
3.	कनाबहली	हेमगिर	108	सुन्दरगढ़	48.81	120.61	भाग
4.	बेलाडीही	हेमगिर	111	सुन्दरगढ़	267.12	660.05	भाग
5.	सुन्दीझरिया	हेमगिर	113	सुन्दरगढ़	33.22	82.09	भाग
6.	सहापाड़ा	हेमगिर	112	सुन्दरगढ़	97.56	241.07	भाग
7.	संरक्षित वन	हेमगिर		सुन्दरगढ़	103.43	255.58	भाग
				कुल योग	656.14 (लगभग)	1621.32 (लगभग)	

सीमा वर्णन :

रेखा क-ख :– यह रेखा ग्राम कनाबहली (ग्राम सं. 108) की पूर्वी भाग के चरम बिन्दु "क" से आरंभ होकर उत्तर पूर्व दिशा में बढ़ती हुई उक्त ग्राम की उत्तरी सीमा को काटती हुई ग्राम मगोहरपुर (ग्राम सं. 106) से होती हुई ग्राम दुलंगा (ग्राम सं. 105) की पूर्वी सीमा से गुजरती है और ग्राम दुलंगा के उत्तरी भाग में स्थित बिन्दु "ख" पर समाप्त होती है।

रेखा ख-ग :– यह रेखा ग्राम दुलंगा के उत्तरी भाग के बिन्दु "ख" से आरंभ होकर दक्षिण-पूर्व दिशा में बढ़ती हुई ग्राम दुलंगा की पूर्वी सीमा को काटती हुई ग्राम सहापाड़ा (ग्राम सं. 112) से होते हुए उक्त ग्राम की उत्तरवर्ती सीमा को काटती है और ग्राम सुन्दीझरिया (ग्राम सं. 113) की उत्तरी पूर्वी भाग में स्थित बिन्दु "ग" पर समाप्त होती है।

रेखा ग-घ :– यह रेखा ग्राम सुन्दीझरिया (ग्राम सं. 113) की उत्तरी-पूर्वी भाग में स्थित बिन्दु "ग" से आरंभ होकर दक्षिण-पश्चिम दिशा में बढ़ती हुई ग्राम सुन्दीझरिया की दक्षिणी सीमा को काटती हुई गिरी पहाड़ (संरक्षित वन) से होते हुए ग्राम बेलाडीही (ग्राम सं. 111) में पूर्वी सीमा से प्रवेश करती है और उक्त ग्राम की पश्चिमी सीमा को काटती है तथा गिरी पहाड़ (सं. वन) में स्थित बिन्दु "घ" पर समाप्त होती है।

रेखा घ-क :– यह रेखा गिरी पहाड़ (सं. वन) स्थित बिन्दु "घ" से आरंभ होकर उत्तर-पश्चिम दिशा में बढ़ती हुई ग्राम बेलाडीही की दक्षिणी सीमा से गुजरती हुई इसके पश्चिमी सीमा को काटती है और अंततः ग्राम कनाबहली की दक्षिणी सीमा से पार ग्राम कनाबहली (ग्राम सं.108) के पूर्वी भाग के चरम में स्थित बिन्दु "क" पर समाप्त होती है।

[सिमिस सं. 43015/7/2006-पी.आर.आई.डब्ल्यू-I]

एच. शाहाबुद्दीन, अवर सचिव

MINISTRY OF COAL

New Delhi, the 21st August, 2007

S.O. 2376.—Whereas it appears to the Central Government that coal is likely to be obtained from the lands mentioned in the Schedule hereto annexed;

Now, therefore, in exercise of the powers conferred by sub-section (1) of Section 4 of the Coal Bearing Areas (Acquisition and Development) Act,1957 (20 of 1957), the Central Government hereby gives notice of its intention to prospect for coal therein;

The Plan bearing number 09/NTPC/SEC-4(1)/DULANGA/07 dated 15th March,2007 of the area covered by this notification can be inspected in the office of the General Manager, Coal Mining, NTPC Ltd., 1st Floor, PDIL Building, Sector-1, NOIDA-201 301 or at the office of the Project Head, Dulanga Coal Mining Project, NTPC Ltd. Laxmi Bhawan, Main Road, Behramal, District Jharsuguda, Orissa-768203; or at the office of Chief General Manager (Exploration Division), Central Mine Planning and Design Institute, Godwana Place, Kanke Road, Ranchi or at the office of the Coal Controller, 1 Council House Street, Kolkata or at the office of the Coal Controller, 1 Council House Street, Kolkata or at the place of the District Collector and Magistrate, Dist. Sundargarh, Orissa.

All persons interested in the lands covered by this notification shall deliver all maps, chart and other documents referred to in sub-section (7) of Section 13 of the said Act to the Project Head, Dulanga Coal Mining Project, NTPC Ltd. Laxmi Bhawan, Main Road, Behramal, District Jharsuguda, Orissa-768203 within ninety days from the date of publication of this notification in the Official Gazette.

SCHEDULE

Dulanga Coal Mining Block
Distt. Sundargarh, Orissa

Plan No. 09/NTPC/Sec 4(1)/Dulanga/07 dated 15-03-2007

Sl. No.	Village	Thana	Village number	District	Area (in hectares approximately)	Area (in acres approximately)	Remarks
1.	Dulanga	Hemgir	105	Sundergarh	97.75	241.54	Part
2.	Manoharpur	Hemgir	106	Sundergarh	8.25	20.39	Part
3.	Kathapali	Hemgir	108	Sundergarh	48.81	120.61	Part
4.	Beldihi	Hemgir	111	Sundergarh	267.12	660.05	Part
5.	Kantijharia	Hemgir	113	Sundergarh	33.22	82.09	Part
6.	Majhapada	Hemgir	112	Sundergarh	97.56	241.07	Part
7.	Reserve Forest	Hemgir		Sundergarh	103.43	255.58	Part
				Total area	656.14 (hectares approximately)	1621.32 (acres approximately)	

Boundary Description :

Line A-B : The line starts from point "A", near the eastern part of village Kathapali (village no. 108) and moving the north-east direction cuts the northern boundary of the said village passes through the village Manoharpur (village No. 106), the western boundary of village Dulanga (vill. No. 105) and ends at point "B" in the northern part of the village Dulanga.

Line B-C : The Line starts at point "B" in the northern part of village Dulanga and moving in the south-east direction cuts the eastern boundary of village Dulanga, passes through village Majhapada (Village No. 112), cuts the western boundary of the said village and ends at point "C" in the north-eastern part of village Kantijharia (Vill. No. 113).

Line C-D : The line starts at point "C" in the north-eastern part of village Kantijharia (village. 113), moves in the south-west direction cuts the southern boundary of the village Kantijharia, passes through the Giripahad (R.F.) enters the village Beldihi through its eastern boundary, cuts the western boundary of the said village and finally ends at the point "D" in the Giripahad (R.F.)

Line D-A : The line starts at "D" in the Giripahad (R.F.), moves in the north-west direction enters the southern boundary of village Beldihi cuts its northern boundary and finally ends at point "A" near the southern boundary of village Kathapali near the eastern part of village Kathapali (vill. No. 108).

[No. 43015/7/2006/PRIW-I]

M. SHAHABUDEEN, Under Secy.

Sanjiv

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2005-CPAM

संदीप गुप्ता/SANDEEP GUPTA
अवर सचिव/Under Secretary
कोयला मंत्रालय/Ministry of Coal
भारत सरकार/Govt. of India
नई दिल्ली/New Delhi-110001

पवन देव जामटा/PAWAN DEV JAMTA
उप महाप्रबंधक (खनिज)/Dy. General Manager (Comml.)
पीपीडी/PPDS/NTPC LIMITED
सेक्टर-24, Noida-201301 (U.P.)

Mr. I Dutta (AGM(C)/CS DNCMP

Notification u/s 11(1) CBA(Acq) Act DLCMP

कोयला मंत्रालय

आदेश

नई दिल्ली, 8 नवम्बर, 2010

का.आ. 2821.—कोयला धारक क्षेत्र (अर्जन और विकास) अधिनियम, 1957 (1957 का 20), (जिसे इसमें इसके पश्चात् उक्त अधिनियम कहा गया है) की धारा 9 की उप-धारा (1) के अधीन जारी भारत सरकार के कोयला मंत्रालय की अधिसूचना संख्यांक का.आ. 1892 तारीख 27 जुलाई, 2010 भारत के राजपत्र, भाग II, खंड 3, उपखंड (ii) तारीख 31 जुलाई, 2010 में प्रकाशित होने पर उक्त अधिसूचना से संलग्न अनुसूची में वर्णित भूमि और ऐसी भूमि में या उस पर के सभी अधिकार (जिसे इसमें इसके पश्चात् उक्त भूमि कहा गया है) उक्त अधिनियम की धारा 10 की उप-धारा (1) के अधीन सभी विल्लंगमों से मुक्त होकर, आत्यंतिक रूप में केन्द्रीय सरकार में निहित हो गई थी ;

और, केन्द्रीय सरकार का यह समाधान हो गया है, कि एनटीपीसी लिमिटेड, जो विद्युत मंत्रालय के अधीन पब्लिक सैक्टर उपक्रम है (जिसे इसमें इसके पश्चात् उक्त सरकारी कम्पनी कहा गया है), ऐसे निबंधनों और शर्तों का, जो केन्द्रीय सरकार इस निमित्त अधिरोपित करना उचित समझे, अनुपालन करने के लिए रजामन्द है ;

अतः, अब, केन्द्रीय सरकार कोयला धारक क्षेत्र (अर्जन और विकास) अधिनियम, 1957 की धारा 11 की उप-धारा (1) द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए यह निदेश देती है कि इस प्रकार निहित उक्त भूमि और उक्त भूमि में या उस पर के अधिकार, तारीख 11 जुलाई, 2010 से केन्द्रीय सरकार में इस प्रकार निहित बने रहने के बजाय, निम्नलिखित निबंधनों और शर्तों के अधीन रहते हुए, उक्त सरकारी कम्पनी में निहित हो जाएंगे, अर्थात् :

(1) उक्त सरकारी कम्पनी, उक्त अधिनियम के उपबन्धों के अधीन रहते हुए उचित प्राधिकार, भाड़ा, पुनर्वसनी और वैसी ही मदों के बाबत किए गए सभी संदत्तों को केन्द्रीय सरकार को प्रतिपूर्ति करेगी ;

(2) उक्त सरकारी कम्पनी द्वारा शर्त (1) के अधीन, केन्द्रीय सरकार को संदेय रकमों का अवधारण करने के प्रयोजन के लिए एक अधिकरण का गठन किया जाएगा तथा ऐसे किसी अधिकरण और ऐसे अधिकरण की सहायता के लिए नियुक्त व्यक्तियों के संबंध में उपगत सभी व्यय, उक्त कम्पनी वहन करेगी और इस प्रकार निहित उक्त भूमि में या उस पर के अधिकारों के लिए या उनके सम्बन्ध में सभी विधिक कार्यवाहियों, जैसी अपील आदि की बाबत उपगत सभी व्यय भी, उक्त सरकारी कम्पनी वहन करेगी ;

(3) उक्त सरकारी कम्पनी को केन्द्रीय सरकार या उसकी प्राधिकारी की, ऐसे किसी अन्य मामलात में, जो इस प्रकार निहित उक्त भूमि में या उस पर के अधिकारों के बारे में, केन्द्रीय सरकार या उसकी प्राधिकारी द्वारा या उनके विरुद्ध किसी कार्यवाहियों के सम्बन्ध में आवश्यक हो, क्षतिपूर्ति करेगी ;

(4) उक्त सरकारी कम्पनी को, केन्द्रीय सरकार के पूर्व अनुमोदन के बिना, उक्त भूमि अधिकार किसी अन्य व्यक्ति को अन्तरित करने की शक्ति नहीं होगी; और

(5) उक्त सरकारी कम्पनी, ऐसे निदेशों और शर्तों को, जो केन्द्रीय सरकार द्वारा, जब कभी आवश्यक हो, उक्त भूमि के विषय में लोक हित में या अधिसूचित किए जाएं, पालन करेगी ।

[फा.सं. 43015/7/2006-सीए.आई(इआर)-I (Part-II)]

एस. चक्रवर्ती, अवर सचिव

SANDEEP GUPTA
Secretary
Govt of India

MINISTRY OF COAL

ORDER

New Delhi, the 8th November, 2010

S.O. 2821.—Whereas, on publication of the notification of the Government of India, in the Ministry of Coal, number S.O. 1892 dated the 27th July, 2010 published in the Gazette of India, Part II, Section-3, sub-section (ii) dated 31 July, 2010 issued under sub-section (1) of Section 9 of the Coal Bearing Area (Acquisition and Development) Act, 1957 (20 of 1957) (hereinafter referred to as the said Act), the land and all rights in or over such land described in the Schedule appended to the said notification (hereinafter referred to as the said lands) vested absolutely in the Central Government free from all encumbrances under sub-section (1) of Section 10 of the said Act ;

And, whereas, the Central Government is satisfied that the NTPC Limited, a Public Sector undertaking under the Ministry of Power (herein referred to as the Government Company) is willing to comply with terms and conditions as the Central Government thinks fit to impose in this behalf ;

R. K. Acharya
AGM (Coal-civil)

SANJIV KUMAR SINGH
Recognised Officer
No. 43011/15/2009-CPAM

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

Now, therefore, in exercise of powers conferred by sub-section (1) of Section 11 of the Coal Bearing Area (Acquisition and Development) Act, 1957, the Central Government hereby directs that the said lands and all rights in or over the said lands, so vested, shall with effect from the 31st July, 2010 instead of continuing to so vest in the Central Government, vest in the Government Company, subject to the following terms and conditions, namely :—

1. The Government Company shall reimburse to the Central Government all payments made in respect of compensation, interest, damages and the like, as determined under the provisions of the said Act ;
2. A tribunal shall be constituted for the purpose of determining the amounts payable to the Central Government by the Government Company under condition (1) and all expenditure incurred in connection with any such tribunal and persons appointed to assist the tribunal, shall be borne by the Government Company and similarly, all expenditure incurred in respect of all legal proceedings like appeals, etc., for or in connection with the rights, in or over such lands, so vested, shall also be borne by the Government Company ;
3. The Government Company shall indemnify the Central Government or its officials against any other expenditure that may be necessary in connection with any proceedings by or against the Central Government or its officials, regarding the rights in or over the said lands, so vested ;
4. The Government Company shall have no power to transfer the said lands and the rights to any other person without the prior approval of the Central Government ; and
5. The Government Company shall abide by such direction and conditions as may be given or imposed by the Central Government for particular areas of the said lands, as and when necessary.

[F. No. 43015/7/2006/PRIW-I(Vol.II)]
M. SHAHABUDEEN, Under Secy.

पेट्रोलियम और प्राकृतिक गैस मंत्रालय

नई दिल्ली, 22 अक्तूबर, 2010

का.आ. 2822.—केन्द्रीय सरकार, पेट्रोलियम और खनिज पाइपलाइन (भूमि में उपयोग के अधिकार का अर्जन) अधिनियम, 1962 (1962 का 50) की धारा 2 के खण्ड (क) के अनुसरण में, भारत के राजपत्र में दिनांक 21 मार्च, 2009 को प्रकाशित पेट्रोलियम और प्राकृतिक गैस मंत्रालय की दिनांक 17 मार्च, 2009 की अधिसूचना संख्या का.आ. 711 और दिनांक 7 नवम्बर, 2009 को प्रकाशित दिनांक 4 नवम्बर, 2009 के का.आ. संख्या 3040 में निम्नलिखित संशोधन करती है :—

उक्त अधिसूचना में,

(i) "श्री नितिन कुमार गर्ग, उप प्रबंधक (प्रचालन), इंडियन ऑयल कॉर्पोरेशन लिमिटेड, मथुरा-जालंधर पाइपलाइन, बिजवासन," शब्दों के स्थान पर "श्री डी.के. सिंह, उप प्रबंधक (प्रचालन)," शब्द रखे जाएंगे ;

(ii) "श्री एस. के. गौतम, वरिष्ठ अनुरक्षण प्रबंधक, इंडियन ऑयल कॉर्पोरेशन लिमिटेड, उत्तरी क्षेत्र पाइपलाइन्स, पानीपत" शब्दों के स्थान पर "श्री रनु राम, वरिष्ठ प्रबंधक," शब्द रखे जाएंगे ।

[F. 3R-25011/9/2007-OR-I]
श्री के. दत्ता, अवर सचिव

MINISTRY OF PETROLEUM AND NATURAL GAS

New Delhi, the 22nd October, 2010

S.O. 2822. — In pursuance of clause (a) of Section 2 of the Petroleum and Minerals Pipelines (Acquisition of Right of User in Land) Act, 1962 (50 of 1962), the Central Government hereby makes the following amendments in the notification of the Government of India, Ministry of Petroleum and Natural Gas Number S.O. 711 dated 17th March, 2009, published in the Gazette of India on 21st March, 2009 and Number S.O. 3040 dated 4th November, 2009, published in the Gazette of India on 7th November, 2009, namely :—

In the said notification,

1. for the words "Shri Nitin Kumar Garg, Deputy Manager (Operations), Indian Oil Corporation Limited, Mathura Jalandhar Pipeline, Bijwasan" the words "Shri D. K. Singh, Deputy Manager (Operations)", shall be substituted.

2. for the words, "Shri S. K. Gautam, Senior Maintenance Manager, Indian Oil Corporation Limited, Northern Region Pipelines, Panipat" the words "Shri Ranu Ram, Senior Manager", shall be substituted.

[No. R-25011/9/2007-OR-I]
B. K. DATTA, Under Secy.

SANJAY KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2009-CPAM

पवन देव जामटा/PAWAN DEV JAMTA
उप महाप्रबंधक (वाणिज्यिक)
Deputy General Manager (Commercial)
इण्डियन ऑयल कॉर्पोरेशन लिमिटेड/INDIAN OIL CORPORATION LIMITED
ECC-I-5A, Sector-24, N... 201301 (U.P.)

ANNEXURE-XII

Proceeding of the meeting on the acquisition of land in the district of Sundargarh for NTPC & OPGC held on 16.05.2011

The meeting was chaired by Sri Priyabrata Patnaik, IAS, Chairman-Cum-Managing Director, IDCO. The representatives of NTPC & OPGC were also attended the meeting. The list of participants has been annexed.

The meeting was convened on the issue of overlapping of land required by both NTPC & OPGC for their Coal Mining Project at Dulanga and Manoharpur respectively. Since both the projects are procuring land through IDCO, It has been detected that in villages Dulanga, Sarbahal and Kalamegha there has been superimposition of land requisition by NTPC & OPGC. Detail village-wise overlapping area is mentioned below,

Sl.No.	Name of the village.	Govt. land	Pvt.land.	Filed for OPGC	To be filed for OPGC.
1	Dulinga	68.73	29.37	68.73 (Govt.) 5.42 (Pvt.)	23.95(pvt)
2	Sarbahal	0.20	1.43	1.43(Govt.) 0.20(Pvt.)	-
3	Kalamegha	3.58	2.01	3.58(Govt.) 2.01(Pvt.)	
	Total	72.51	32.81	81.37	23.95

Chairman-Cum-Managing Director, IDCO asked both the NTPC & OPGC representatives to put forth their stand on the above dispute.

NTPC people submitted that:

- Dulanga Coal Block was allotted to NTPC by Ministry of Coal on 25th January, 2006. NTPC has engaged consultant for preparation of Mining Plan and other studies like EIA/EMP study, Area drainage & Nallah diversion study, Socio economic survey etc.
- During preparation of Mining plan NTPC has consulted with OPGC who have been allotted with the neighboring Coal Block. They have taken into account the mining plan of OPGC which has been duly approved by Ministry of Coal. A combined surface plan has also been prepared by NTPC taken into account both the Coal Block.
- Initially NTPC has gone directly for acquisition of land. However, [illegible] in Steel & Mines Department [illegible] for resubmission of the [illegible] through IPICOL & IDCO.

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2009-CPAM

संदीप गुप्ता/SANDEEP GUPTA
अवर सचिव/Under Secretary
भारत सरकार/Govt. of India
नई दिल्ली/New Delhi-110001

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

- Accordingly NTPC applied to IPICOL for appraisal of total land being acquired by the project as approved by MoC. IPICOL vide letter No.SJ/NTPC-CAF-949/3254 dtd. 18.11.2010 and 10.05.2011 (copy placed at Flag-F) has appraised total land (under CBA Act 1621.32 acre & under LA Act 1038.59 acres).

- During above process it came to notice that substantial portion of land identified by NTPC in its approved mining plan has also been applied by OPGC for their coal block. In this context before publication of section-4 (I) of OPGC,s Manoharpur block during April -10, NTPC vide letters No.0100/DLCMP/LAO-OPGC/2010/404 & 0100/DLCMP/LAO-OPGC/2010/405 dated 13.02.2010 addressed to Land Acquisition Officer, Sundargarh and Tahasildar, Hemgir respectively has objected for the encroachment of OPGC in the NTPC,s OB dump area with the copy of the same was marked to all concerned department of Government of Orissa (Copy enclosed at Flag-I).

- The NTPC representatives complained that OPGC has not planned any OB Dumps in the areas for which they have now applied for acquisition. Further OPGC have revised their mining plan and changed the location of the mining [illegible] but the same has been approved by the Ministry of Coal. The revised OPGC plan is directly affecting the dump area, road, evacuation system, fly[illegible] area, Nalah diversion channel, besides including its coal bearing area for which the dispute has arisen. Finally they have requested for alternate OB Dump land for OPGC. NTPC people further mentioned here that OPGC has not conducted Public Hearing on Environment Studies till date for their Coal Ming Block and proposed revised Mining Plan has not yet been submitted to MOC for Approval.

OPGC authorities put forth their stand as mentioned b[illegible]

- OPGC has been allotted with 2(two) Coal Blocks namely Dipside Mannarmur in IB Valley Coalfields located in the district of Sundargarh adjacent to the NTPC Coal Block in July 2007

पवन देव जोमटा/PAWAN DEV JO[illegible]
उप महाप्रबंधक (वाणिज्यिक)
Deputy General Manager (Comm.)
एन टी पी सी लिमिटेड/NTPC Limited
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

- On the basis of allotment the OPGC authorities has submitted the detailed project proposal to IPICOL State Level Nodal Agency for assessment of land in Feb-2008. Accordingly IPICOL has also recommended Ac.1982 of land in favour of OPGC for the Coal Mining project in October - 2008.
- In March -2009 OPGC convened its objection from Ministry of Coal on the notification of Dulenga Coal Block indicating that the said notification has included 34 plots (13 in full & 21 in part) which are falling under Manharpur Coal Block.
- In April and May -2009 joint meetings have been held between OPGC, NTPC, Department of Geology - Government of Orissa & CMPDI to verify such overlapping. It was also accepted by NTPC that they have encroached into Manharpur Coal Block.
- In the meantime IDCO has taken up filing of acquisition/alienation proposal on behalf of OPGC with the recommendation of IPICOL and sought for administrative approval of Government in Department of Steel & Mines for processing of land acquisition. The filing of land acquisition/alienation has been taken up in phase for govt. land measuring Ac.1540.36 and pvt. land measuring Ac.897.46 with the concerned Revenue Authority. The land acquisition proposal has advanced a lot. 4(1) Notification has been issued for Ac.320.77 of pvt. land & 6(1) Declaration has been issued for Ac.776.69 of pvt. land. Further IPICOL has also recommended for acquisition of pvt. land measuring Ac.201.53 of pvt. land & measuring Ac.294.24 on the ground of un-economic holding and resettlement and rehabilitation as recommended by the RRDAC.

OPGC have revised the mining plan in accordance with the guidelines prescribed by Ministry of Coal. Taking into account the [illegible] and mining facilities OPGC have selected the new OB dump [illegible] into account quantity of OB burden to be handle by both [illegible] Mining projects. The total estimated over burden for [illegible] roughly 1843 Mq.m and same to the NTPC would be roughly [illegible] Mq.m. So OPGC require bigger area to handle this overburden.

संदीप गुप्ता/SANDEEP GUPTA
संयुक्त सचिव (Under Secretary)
भारत सरकार/Ministry of Coal
कोयला मंत्रालय/Govt. of India
नई दिल्ली/New Delhi-110001

पवन देव जामटा/PAWAN DEV JAMTA
उप महाप्रबंधक (कोर्डिनेशन)
Dep. General Manager (Coordination)
एनटीपीसी लि./NTPC LIMITED
ईओसी/EOC, Sector-24, Noida-201301 (U.P.)

After detailed deliberation by both the parties on the issue, the Chairman observed that :-

(a) M/s. OPGC have filed requisitioned with IDCO with the recommendation of IPICOL as early as in May -2009 when NTPC was not in picture. Government in Steel & Mines Department have also accorded necessary approval for acquisition of land in favour of OPGC. So the land acquisition proposal has progressed a long i.e. 6(1) Declaration has been issued for Ac.776.69.

(b) It may not be possible to take up acquisition/alienation of the said land for NTPC.

(c) Hence it is advisable NTPC to look for alternate land around their project i.e. available forest land for their OB Dump area. They may identify such land in consultation with the District Revenue Authorities and process for diversion proposal of the required forest land with Ministry of Environment & Forest (MOEF).

In this way both the Mining Project can co-exist without interfering with each other.

The meeting ended with vote of thanks to the Chair.

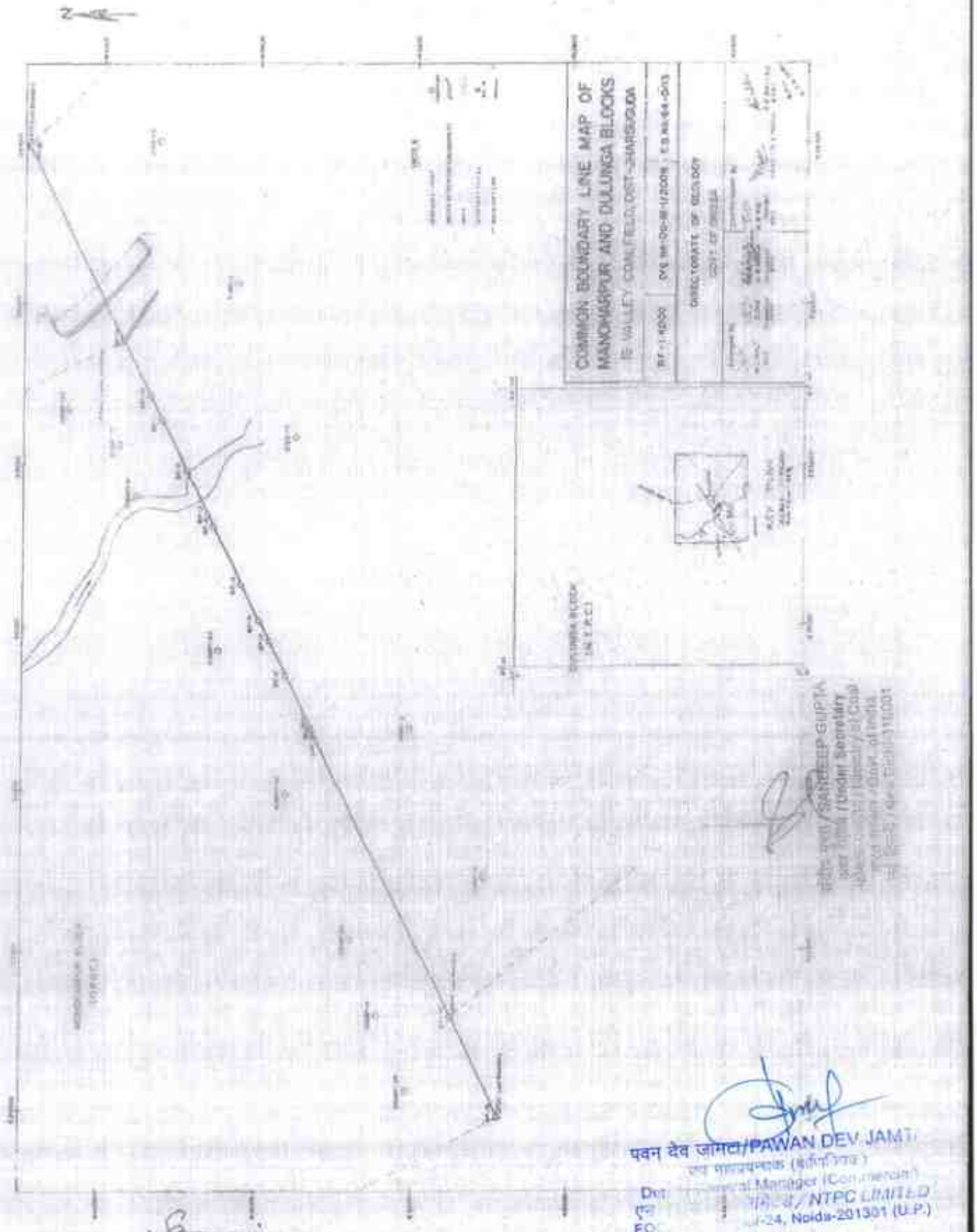
Sd/-
Chairman-Cum-Managing Director
IDCO

ASHUTOSH GUPTA
Scientist 'E'
Ministry of Coal
Govt. of India
New Delhi-110001

Sanjiv
SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2009-CPAM

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

ANNEXURE XIII



SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2009-CPAM

पवन देव जामटा/PAWAN DEV JAMTA
उप महाप्रबन्धक (वाणिज्यिक)
Deputy General Manager (Commercial)
एनटीपीसी/NTPC LIMITED
EC... ...-24, Noida-201301 (U.P.)

FAX NO.06645-27043

MINERAL EXPLORATION ORPORATION LIMITED
(A GOVERNMENT OF INDIA ENTERPRISE)

TILAIPALI 'A' PROJECT

POST : MUTRIMAL-496111
DISTT.: RAIGARH (C.G.)

NO.1038 /DULUNGA/BLOCK boundar/TPA/08 DATE : 27-03-2008

To
The G.G.M.
Dulunga Coal Mining Block,
N.T.P.C.
Post & Distt.-Jharsuguda
ORISSA

Sir,

As desired by you, the Co-ordinates of the block boundary Pillars of the Dulunga Block are enclosed for necessary action at your end.

Yours faithfully,

(BISWANATH DAS)
PROJECT MANAGER
TILAIPALI 'A' PROJECT

Encls :- As above.

(SANDEEP GUPTA)
Joint Secretary (Under Secretary of Coal
Govt. of India
New Delhi-110001

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 3401/(15)/2009-CPAM

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पवन देव जाम्टा/PAWAN DEV JAMTA
उप महाप्रबन्धक (तकनीकी)
Deputy General Manager (Technical)
एन टी पी सी लिमिटेड/NTPC LIMITED
ई ओ सी, ए-8ए, सैक्टर-24, नोएडा-201301 (यू.पी.)
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

BH.NO.	LOCAL CO-ORDINATES NORTHING	EASTING	RECTANGULAR CO-ORDINATES NORTHING	EASTING	GEOGRAPHICAL CO-ORDINATES LATITUDE (DMS)			LONGITUDE (DMS)		
BP-24	19500.159	22362.016	980790.7635	2980523.5486	21	55	39.8869	83	48	40.9569
BP-25	19618.509	22523.260	980905.3827	2980687.4452	21	55	43.6202	83	48	46.6668
BP-26	19736.861	22684.464	981020.0019	2980851.3418	21	55	47.3553	83	48	52.3752
BP-27	19855.212	22845.6879	981136.6211	2981015.2384	21	55	51.0906	83	48	58.0845
BP-28	19973.5629	23006.912	981249.2403	2981179.135	21	55	54.8255	83	49	3.7939
BP-29	20037.300	23094.000	981311.1616	2981267.6666	21	55	56.8433	83	49	6.8779
BP-30	20084.824	23045.784	981359.5792	2981220.5498	21	55	58.4163	83	49	5.2331
BP-31	20224.922	22903.052	981502.9150	2981081.0714	21	55	3.0732	83	49	.3637
BP-32	20363.020	22760.320	981646.2508	2980941.5929	21	55	7.7300	83	48	55.4943
BP-33	20505.118	22617.589	981789.5867	2980802.1145	21	55	12.3868	83	48	50.6248
BP-34	20645.218	22474.856	981932.9245	2980662.6361	21	55	17.0436	83	48	45.7552
BP-35	20785.3139	22332.124	982076.2583	2980523.1576	21	56	21.7002	83	48	40.9856
BP-36	20925.413	22189.392	982219.5941	2980383.6791	21	56	26.3569	83	48	36.0158
BP-37	21065.57	22046.66	982362.9899	2980244.202	21	56	31.0154	83	48	31.146
BP-38	21205.668	21903.829	982506.2680	2980104.6322	21	56	35.6701	83	48	26.2725
BP-39	21345.7059	21761.196	982649.6015	2979965.2498	21	56	40.3266	83	48	21.4059
BP-40	21485.804	21618.464	982792.9373	2979825.7653	21	56	44.9831	83	48	16.5357
BP-41	21625.9019	21475.732	982936.2731	2979686.2868	21	56	49.6395	83	48	11.6655
BP-42	21766.000	21333.000	983079.6089	2979546.9084	21	56	54.2959	83	48	6.7952
BP-43	21758.105	21317.435	983072.0733	2979531.0664	21	56	54.0501	83	48	6.2466
BP-44	21667.638	21139.065	982985.7240	2979350.5683	21	56	51.2333	83	47	59.9602
BP-45	21577.1705	20960.695	982899.3748	2979170.2703	21	56	48.4165	83	47	53.6739
BP-46	21486.704	20782.325	982813.0256	2978989.8722	21	56	45.5995	83	47	47.3877
BP-47	21396.237	20603.955	982726.6763	2978809.4741	21	56	42.7825	83	47	41.1015
BP-48	21305.770	20425.585	982640.3271	2978629.0760	21	56	39.9655	83	47	34.8154
BP-49	21215.303	20247.215	982553.9779	2978448.6780	21	56	37.1483	83	47	28.5294
BP-50	21124.836	20068.845	982467.6286	2978268.2799	21	56	34.3311	83	47	22.2435
BP-51	21034.369	19890.475	982381.2794	2978087.8818	21	56	31.5138	83	47	15.9576
BP-52	20943.9019	19712.105	982294.9302	2977907.4837	21	56	28.6965	83	47	9.6718
BP-53	20852.435	19533.735	982208.5808	2977727.0857	21	56	25.8791	83	47	3.3861
BP-54	20762.968	19355.365	982122.2317	2977546.6876	21	56	23.0616	83	46	57.1004

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/15/2009-CPAM

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पवन देव जामटा/PAWAN DEV
उप महाप्रबंधक (सी.एच.पी.)
Deputy General Manager (CHP)
एन टी पी सी लिमिटेड/NTPC Limited
EDC: A&A, Sector-24, Noida-201301 (U.P.)

SANJEEV GUPTA
Joint Secretary
Ministry of Coal
Govt. of India
New Delhi-110001

ANNEXURE -XIV

Shalini Pandit, I.A.S.
Collector & District Magistrate
Sundargarh

Ph. : 06622-272265 (O)
: 06622-272225 (R)
Fax : 06622-275171
E-mail : dmsng@ori.nic.in

No. 1106
Dated, the 31st July, 2010

To

The Executive Director (CM&CW),
NTPC Ltd., A-8A, Sector-24,
NOIDA-201301,
Uttar Pradesh

Sub: Acquisition of private land to an extent of 66.33 acres in village Beldihi for Dulinga Coal Mining Project of NTPC Limited.

Ref: Letter No.525 dated 12.04.2010 of the AGM, Dulinga Coal Mining Project.

Sir,

With reference to the subject cited above, I am to bring to your kind notice that on verification of record it is seen that out of the total area of village Beldihi i.e. Ac.145.51, an area of Ac.79.18 is under acquisition under CBA (A&D) Act, for the Coal Mining Project of NTPC leaving an area of Ac.66.33. By the process of acquisition of land, the entire village will be displaced and rehabilitated in the Rehabilitation & Resettlement Colony at Kalamegha which about 6 KMs away from the original village, Beldihi. The remaining Ac.66.33 related to agricultural land of the displaced families. Practically, it will not be possible for the displaced family to cultivate a very small chunk of land adjacent to the mining area at a distance of 6 KMs from their rehabilitated residence. After mining operation the balance land will also be un-approachable for cultivation by the villagers. The villagers of Beldihi area have repeatedly demanded for acquisition of the balance land which will be of no use for them after establishment of the Coal Mining Project. This demand of the villagers is justified on the above grounds. Due to this issue remaining unresolved, the villagers are obstructing various works like tree enumeration and structure valuation in adjoining areas.

In view of the above facts and circumstances, it is recommended that the proposal for acquisition of Ac.66.33 land in village Beldihi may be approved to give justice to the affected villagers and to avoid future complications.

Yours faithfully,

Collector, Sundargarh

SH. [illegible] GUPTA
Joint Secretary
Ministry of Coal
Govt. of India
Shastri Bhawan
New Delhi-110001

SAI Sanjeev SINGH
Recognised Qualified Person
No. 34011/(15)/2009-CPAM

पवन देव जामटा/PAWAN DEV JAMTA
उप महाप्रबंधक (पर्यावरण)/Dy. General Manager (Environment)
एनटीपीसी लि./NTPC Ltd.
ईओसी, ए-8ए, सेक्टर-24, नोएडा-201 301/EOC, A-8A, Sector-24, Noida-201 301

ANNEXURE XV

STATEMENT SHOWING RECTANGULAR CO-ORDINATES IN CONFORMAL CONIC PROJECTION AND GEODETIC-LATITUDE/LONGITUDE R.L.AND TOTAL DEPTH OF BOREHOLES DRILLED BY DIRECTORATE OF GEOLOGY,ORISSA

BLOCK: DULANGA — DISTRICT: SUNDARGARH
COAL FIELD: IB RIVER COAL FIELD — STATE : ORISSA

BH.NO.	REDUCED LEVEL(m)	DEPTH (m)	RECTANGULAR CO-ORDINATES NORTHING	EASTING	GEOGRAPHICAL CO-ORDINATES LATITUDE (DMS)			LONGITUDE (DMS)		
OIBD-1	255.16	47.00	882526.8033	2979197.355	21	56	36.2984	83	47	54.6362
OIBD-2	255.55	154.00	882103.9322	2978090.9237	21	56	22.4923	83	47	16.0777
OIBD-3	245.38	70.70	882165.9669	2979347.0136	21	56	24.5676	83	47	59.8718
OIBD-4	246.65	76.05	882384.0111	2978815.3127	21	56	31.6364	83	47	41.3218
OIBD-5	258.72	272.00	881557.1075	2977870.1747	21	56	4.6944	83	47	8.4085
OIBD-6	255.28	147.00	881963.6078	2978608.3976	21	56	14.6989	83	47	34.1327
OIBD-7	272.58	196.00	881703.5913	2978222.0789	21	56	9.47589	83	47	20.6708
OIBD-8	265.47	202.70	881916.5060	2977716.0949	21	56	16.3777	83	47	3.0178
OIBD-9	247.70	103.00	881817.7868	2979501.0728	21	56	13.2486	83	48	5.2600
OIBD-10	286.98	159.35	881501.6539	2978758.7178	21	56	2.9320	83	47	39.3916
OIBD-11	256.41	53.00	882343.8249	2979706.5839	21	56	30.3689	83	48	12.4010
OIBD-12	256.59	65.00	881968.743	2979863.6855	21	56	18.1748	83	48	17.8962
OIBD-13	248.79	37.00	881746.8372	2980383.9518	21	56	10.9789	83	48	36.0466
OIBD-14	247.73	72.00	881599.0316	2980018.8208	21	56	6.1553	83	48	23.3224
OIBD-15	242.15	47.35	881397.5855	2980559.3299	21	55	59.6255	83	48	42.1772
OIBD-16	242.80	110.00	881210.7834	2980185.6788	21	55	53.5333	83	48	29.1579
OIBD-17	268.53	247.10	881203.1035	2978037.9318	21	55	53.1871	83	47	14.2755
OIBD-18	233.86	58.00	881021.9787	2980712.8925	21	55	47.4139	83	48	47.5480
OIBD-19	256.76	21.00	882715.7063	2979558.9662	21	56	42.4592	83	48	7.2343
OIBD-20	251.74	126.00	881080.001	2979815.8512	21	55	49.2633	83	48	15.2697
OIBD-21	246.59	111.00	881444.1849	2979650.2153	21	56	1.1024	83	48	10.4777
OIBD-22	250.53	144.00	881292.1991	2979287.0099	21	55	56.1425	83	47	57.8213
OIBD-23	238.61	94.00	880868.0845	2980350.3305	21	55	42.3928	83	48	34.9141
OIBD-24	252.32	195.00	881113.333	2978920.7688	21	55	50.3078	83	47	45.0606
OIBD-25	250.61	242.00	880963.7111	2978556.5014	21	55	45.4242	83	47	32.3676
OIBD-26	253.80	150.00	881657.3443	2979126.8165	21	56	8.0130	83	47	52.2184
OIBD-27	260.37	122.00	882024.2169	2978965.0163	21	56	19.9396	83	47	46.5592

संदीप गुप्ता/SANDEEP GUPTA
अवर सचिव / Under Secretary
कोयला मंत्रालय / Ministry of Coal
भारत सरकार / Govt. of India
नई दिल्ली / New Delhi-110001

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

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2009-CPAM

BH.NO.	REDUCED LEVEL(m)	DEPTH (m)	RECTANGULAR CO-ORDINATES NORTHING	EASTING	GEOGRAPHICAL CO-ORDINATES LATITUDE (DMS)			LONGITUDE (DMS)		
OIBD-28	254.09	272.00	880613.3222	2978702.7288	21	55	34.0333	83	47	37.4831
OIBD-29	244.27	66.00	881496.9479	2980291.9828	21	56	2.8459	83	48	32.5026
OIBD-30	254.38	53.00	881867.6658	2980125.4442	21	56	14.8982	83	48	27.0277
OIBD-31	262.22	216.00	881224.3164	2978613.0516	21	55	53.9039	83	47	34.3264
OIBD-32	252.89	84.00	882078.8951	2979601.1588	21	56	21.7465	83	48	8.7373
OIBD-33	268.34	248.00	881332.8243	2978374.2268	21	55	57.4225	83	47	25.9955
OIBD-34	257.41	51.00	882039.0543	2980034.2269	21	56	20.4693	83	48	23.8394
OIBD-35	233.65	72.00	881122.7708	2980438.367	21	55	50.6811	83	48	37.9721
OIBD-36	253.07	139.00	882070.3750	2978455.2263	21	56	21.4177	83	47	28.7817
OIBD-37	258.87	259.00	880389.2437	2979205.3088	21	55	26.7671	83	47	55.0159
OIBD-38	247.32	90.00	881709.718	2979759.3822	21	56	9.7446	83	48	14.2715
OIBD-39	249.47	135.00	881184.0241	2979545.1498	21	55	52.6352	83	48	6.8267
OIBD-40	253.05	40.00	882451.9073	2979455.0455	21	56	33.8736	83	48	3.6251
OIBD-41	234.85	44.00	881175.0928	2980904.2856	21	55	52.4024	83	48	54.2143
OIBD-42	254.86	124.00	882206.3964	2978438.6147	21	56	25.8415	83	47	28.1958
OIBD-43	253.08	88.00	882465.6446	2978567.5294	21	56	34.2804	83	47	32.6780
OIBD-44	261.64	119.00	882360.1449	2978324.7988	21	56	30.8374	83	47	24.2196
OIBD-45	251.19	40.00	882684.3768	2979073.9114	21	56	41.4186	83	47	50.3243
OIBD-46	247.83	63.00	882543.5789	2978820.6881	21	56	36.8271	83	47	41.5015
OIBD-47	270.13	169.00	882228.7847	2978002.8023	21	56	26.5494	83	47	12.9987
OIBD-48	259.32	237.00	881423.75	2978117.6849	21	56	0.3682	83	47	17.0450
OIBD-49	261.01	145.00	881917.9937	2978778.1654	21	56	16.4758	83	47	40.0493
OIBD-50	266.79	190.00	881584.5864	2978432.9926	21	56	5.6175	83	47	30.1226
OIBD-51	261.53	77.00	881694.5547	2978917.3205	21	56	9.2140	83	47	44.9122
OIBD-52	269.88	192.00	881369.0574	2979010.7086	21	55	58.6302	83	47	48.1842
OIBD-53	259.09	187.00	881795.416	2977523.2905	21	56	12.3645	83	46	56.3016
OIBD-54	256.84	85.00	881949.5316	2979423.9914	21	56	17.5307	83	48	2.5661
OIBD-55	244.26	125.00	881495.1249	2979362.9893	21	56	2.7459	83	47	59.7599
OIBD-56	245.34	87.00	882232.754	2979021.7776	21	56	26.7255	83	47	48.5283
OIBD-57	254.52	285.00	880786.6522	2978258.0772	21	55	39.6309	83	47	21.9719
OIBD-58	245.14	95.00	881270.7987	2979898.2231	21	55	55.4732	83	48	19.1328
OIBD-59	247.13	105.00	880919.8868	2980136.7753	21	55	44.0688	83	48	27.4662
OIBD-60	264.69	193.75	880619.8266	2979160.1408	21	55	34.2656	83	47	53.4301

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2008-Co

पवन देव जामटा/PAWAN DEV
उप महाप्रबंधक (परियोजना)
Deputy General Manager (Cor
एन टी पी सी लिमिटेड/NTPC Limi
EOC, A-8A, Sector-24, Noida-201301 (U.

STATEMENT SHOWING RECTANGULAR CO-ORDINATES IN CONFORMAL CONIC PROJECTION AND GEODETIC-LATITUDE/LONGITUDE R.L.AND TOTAL DEPTH, DATE OF COMMENCEMENT & CLOSURE OF BOREHOLES DRILLED BY MECL

BLOCK: DULANGA
COAL FIELD: IB RIVER COAL FIELD

DISTRICT: SUNDARGARH
STATE : ORISSA

BH.NO.	REDUCED LEVEL(m)	DEPTH (m)	RECTANGULAR CO-ORDINATES NORTHING	EASTING	GEOGRAPHICAL CO-ORDINATES LATITUDE (DMS)			LONGITUDE (DMS)			DATE OF COMMENCEMENT	CLOSURE
MNID-1	256.17	33.60	882793.084	2979269.992	21	56	44.963	83	47	57.156	23/11/06	26/11/06
MNID-2	261.10	283.60	880977.512	2978112.875	21	55	45.852	83	47	16.899	29/11/06	04/01/07
MNID-3	257.37	31.65	882638.346	2979304.901	21	56	39.935	83	48	1.1704	09/12/06	13/12/06
MNID-4	258.68	26.00	882531.712	2979704.483	21	56	36.480	83	48	12.318	05/01/07	09/01/07
MNID-5	258.72	40.00	882385.260	2979835.404	21	56	31.722	83	48	16.890	09/01/07	14/01/07
MNID-6	258.99	188.00	881950.465	2977882.586	21	56	17.490	83	47	8.8211	11/01/07	27/01/07
MNID-7	254.25	38.50	882214.276	2979916.047	21	56	26.164	83	48	19.710	15/01/07	17/01/07
MNID-8	251.39	38.50	882067.599	2980086.243	21	56	21.400	83	48	25.651	18/01/07	20/01/07
MNID-9	247.58	32.50	881764.221	2980421.839	21	56	11.545	83	48	37.366	21/01/07	23/01/07
MNID-10	251.48	40.50	881860.929	2980190.619	21	56	14.681	83	48	29.300	24/01/07	28/01/07
MNID-11	257.19	55.50	882173.780	2979791.712	21	56	24.841	83	48	15.377	29/01/07	01/02/07
MNID-12	248.88	230.00	880940.131	2978870.429	21	55	44.671	83	47	43.313	31/01/07	14/02/07
MNID-13	245.98	38.50	881569.643	2980505.079	21	56	5.1842	83	48	40.278	02/02/07	05/02/07
MNID-14	242.55	40.50	881431.745	2980684.929	21	56	.7411	83	48	45.857	06/02/07	08/02/07
MNID-15	247.11	38.50	881495.977	2980765.619	21	56	2.8346	83	48	48.361	10/02/07	11/02/07
MNID-16	240.28	35.60	881296.799	2980831.724	21	55	56.358	83	48	51.679	13/02/07	15/02/07

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 3401/(15)/2006-CPAM
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पवन देव जाखड़/PAWAN DEV JAKH
उप महाप्रबंधक (भूविज्ञान)
Dep. General Manager (Geology)
एन टी पी सी लिमिटेड/NTPC LIMITED
ईओसी-ए-8ए, सेक्टर-24, नोएडा-201301 (यू.पी.)
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

SUNIL SANDEEP GUPTA

BH. NO.	REDUCED LEVEL(m)	DEPTH (m)	RECTANGULAR CO-ORDINATES NORTHING	EASTING	GEOGRAPHICAL CO-ORDINATES LATITUDE (DMS)			LONGITUDE (DMS)			DATE OF COMMENCEMENT	DATE OF CLOSURE
MNID-17	241.62	33.50	881172.728	2980978.358	21	55	52.328	83	48	56.797	16/02/07	19/02/07
MNID-18	245.79	179.00	881061.213	2979284.555	21	55	48.627	83	47	56.352	19/02/07	01/03/07
MNID-19	277.78	292.00	880388.737	2978759.262	21	55	26.730	83	47	39.465	23/02/07	23/04/07
MNID-20	276.13	176.50	880709.294	2979523.319	21	55	37.191	83	48	6.0879	24/02/07	20/03/07
MNID-21	270.32	238.80	880287.881	2979549.791	21	55	23.485	83	48	7.0307	05/03/07	22/03/07
MNID-22	265.54	261.00	880138.557	2979252.673	21	55	18.614	83	47	56.679	27/03/07	30/04/07
MNID-23	292.83	184.50	880609.272	2979820.306	21	55	33.951	83	48	16.446	30/03/07	22/04/07
MNID-24	239.80	128.50	881664.002	2981003.922	21	56	8.31	83	48	57.666	25/03/07	08/05/07
MNID-25	260.11	256.00	881470.533	2977924.489	21	56	1.8808	83	47	10.306	06/05/07	29/05/07
MNID-26	254.28	35.00	882010.982	2979624.930	21	56	45.821	83	48	9.5314	10/05/07	13/05/07
MNID-27	243.01	30.00	882234.670	2980318.237	21	56	26.844	83	48	33.733	17/05/07	19/05/07
MNID-28	257.02	242.00	881754.493	2977763.581	21	56	11.11	83	47	4.6818	19/05/07	25/06/07
MNID-29	238.67	38.50	881732.902	2981137.369	21	56	10.556	83	49	2.3167	21/05/07	26/05/07
MNID-30	239.74	41.00	881879.931	2980616.047	21	56	15.317	83	48	44.133	30/05/07	03/06/07

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 14011/13/98-IA.III

पवन देव जमदा/PAWAN DEV JAMDA
General Manager (Geology)
NTPC Limited
Plot No. 24, Noida-201301

No. 34011/08/2011-CPAM
Government of India
Ministry of Coal

ANNEXURE XVI

Shastri Bhawan,
New Delhi, 7th April, 2011

To

Shri A K Dash
Additional General Manager (PE-Mech-MPD)
5th Floor, Engineering Office Complex, Sector-24
NTPC Limited, Noida -201301
Fax No.0120-2410136, 37, Tele : 0120-2410102

Subject :	Presentation of Mine Closure Plan (October, 2010) for Dulanga Coal Block submitted by M/s NTPC - observations of Standing Committee

I am directed to inform that the Mining Plan presentation to the Technical Members of the Standing Committee constituted under MMDR Act, 1957 of the above mentioned project was held on 07-03-2011 at Ministry of Coal, Shastri Bhavan, New Delhi.

The following suggestions were made.

1. The approval of the Board of Directors of the Allottee company on the decision on mine closure should be furnished.
2. The name of the Mine Closure Plan should be as per allotment letter i.e. Dulanga Coal Block.
3. The word Final should be removed from the heading (cover page) of Mine Closure Plan.
4. The Index/List of Chapters, List of Plates, List of Tables, List of Annexure and Block allotment letter are not enclosed.
5. Authorization by the Allotee in favour of RQP for preparation of Mine Closure Plan, Copy of Grant of recognition as competent person to prepare Mining Plan by RQP issued by Ministry of Coal, a Certificate in regard to preparation of Mine Closure Plan by RQP and the contact details [Name, Address, Telephone No., Mobile, Email etc] of Mine Owner(s) and RQP are to be incorporated in the Mine Closure Plan.
6. The pre-mining land use pattern (like forest, Agricultural Land, Village, Barren Land, Water body, Roads, Habitation etc.), the proposed land use (quarry area, external dump, mine infrastructure, dyke, embankment, safety zone, etc.) and post closure land use pattern should be incorporated.
7. Salient features of approved Mining Plan are to be furnished.
8. Reason for mine closure should cover unforeseen reasons also.
9. List of the statutory obligations to be complied with as per clearances already received, should be furnished together with copies of clearance letters, status of compliance. List of other statutory clearances which are still to come, should also be furnished alongwith justification and the proposed

Sanjiv

SANJIV KUMAR SINGH
Recognised Qualified Person
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General Manager (PE-Mech-MPD)
NTPC LTD.
Engineering Office Complex, Sector-24, Noida-201301 (U.P.)

... thereof will be submitted with a clear satisfactory clearance ... be attached as Annexure.

... of the block should be delineated and whether the Block has been ... to National Grid or not, should be clarified.

... details regarding coal reserves seam wise/sector wise/quality ... category wise (proved & indicated) are to be furnished. Also, the ... which are not to be worked for various reasons like low thickness ... barrier, batter etc should be indicated reason wise & seam-wise.

... clearance of railway siding, mode of transport and dust control measures should be furnished.

... Details regarding different types of rocks available including toxic elements (if any) should be incorporated.

... The list of facilities which will be dismantled and those which will be retained should be furnished in a tabular form and provision for financial corpus fund for maintenance of these facilities should be made.

... It should be certified that Escrow amount will be modified based on Wholesale Price Index as notified by Government from time to time.

... Provision of stonewall fencing and precaution against drowning should be made.

... Land requirement for closure activities should be made in Bar chart.

... Possibilities of creation of employment/vocational opportunities for local people with education, skill development & training programme under CSR plan should be explored.

... Stage wise plans and sections showing land restoration/ reclamation details should be incorporated.

... Details of the land proposed to be used outside the block boundaries should be furnished.

... Map of diversion of Drain, Nala, Embankment, Canal & Nallah etc with water ... by local communities should be depicted.

... [illegible] ... should be submitted ... [illegible]

... It is suggested that Mining Plan / Scheme action suggestions should be ... to this Ministry in soft copy signed by RQP.

(Sandeep Gupta)
Under Secretary, CPAM
Tele: 011-23073614
Fax: 011-23073529

SANDEEP GUPTA / Under Secretary, Govt. of India, Ministry of Coal, Shastri Bhawan, New Delhi-110001

Sanjiv

SANJIV KUMAR SINGH
Recognised Qu...
No. 34011/(15)/2009-C...

पवन देव जांगल/PAWAN D...
Dep... General Manager
EQC, A-8A, Sector-24, Noida-201...

POINTWISE REPLY AND NTPC'S SUBMISSION TO MOC'S OBSERVATIONS ON PRESENTATION OF MINE CLOSURE PLAN OF DULANGA COAL BLOCK

1. The approval of the Board of Directors of the Allottee Company for mine closure plan should be furnished.

   Submission:

   Approval of Board of Directors is under process and will be submitted subsequently.

2. The name of the Mine Closure Plan should be same as per allotment letter i.e. Dulanga Coal Block.

   Submission:

   As Mining Plan has been revised, Mine Closure Plan has been included as part of Revised Mining Plan as per the guidelines. However, name of the block has been changed as per allotment letter ie Dulanga Coal Block.

3. The word Final should be removed from the heading (Cover Page) of Mine Closure Plan.

   Submission:

   As Mining Plan has been revised, Mine Closure Plan has been included as part of Revised Mining Plan as per the guidelines

4. The Index/ List of Chapters, List of Plates, List of Tables, List of Annexure and Block allotment letter are not enclosed.

   Submission: Complied.

   The index/ list of Chapters is placed at Page No. i-iii, List of Plates is placed at Page No. vii, List of Tables placed at on Page No. iv-vi, List of Annexure is placed at Page No. ix of the Revised Mining Plan.

   Block allotment letter is enclosed as Annexure-I of Revised Mining Plan.

5. Authorization by the Allottee in favour of RQP for preparation of Mine Closure Plan, Copy of Grant of recognition as Competent Person to prepare Mining Plan issued by Ministry of Coal, a Certificate in regard to preparation of Mine Closure Plan by RQP and the contact details, [Name, Address, Telephone No., Mobile, Email, etc] of Mine Owner(s) and RQP are to be incorporated in the Mine Closure Plan.

   Submission: Complied.

SANJIV KUMAR SINGH
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No. 34011/(15)/2009-CPAM

(i.) The Consent letter from the applicant is placed at Annexure VI of Revised Mining Plan.

Copy of Grant of recognition as RQP to prepare Mining Plan issued by Ministry of Coal is placed at Annexure-V.

(ii.) Certificate in regard to preparation of Mine Closure Plan by RQP is enclosed on Page No. VII(B) of Revised Mining Plan

(iii.) Contact details. [Name, Address. Telephone No., Mobile, Email etc] of Mine Owner(s) and RQP are mentioned in Table 1.8 of Chapter-1 of Revised Mining Plan.

6. The pre-mining land use pattern (like Forest, Agriculture Land, Villages, Barren land, Water Body, Roads, Habitation etc), the proposed land use (Quarry area, external dump, mine infrastructure, nalla, embankment, safety barrier etc) and post closure land use pattern should be incorporated.

Submission: Complied.

(i.) Pre-mining land use pattern, Proposed land pattern use & Post closure land use pattern are provided in chapter - IX

7. Salient features of approved Mining plan should be furnished.

Submission: Complied.

Salient features of the Approved Mining Plan has been furnished on Page Chapter II of Revised Mining Plan.

8. Reason for mine closure should cover unforeseen reasons also.

Submission: Compiled

Reason for mine closure due to unforeseen reasons is covered in Sub Section 11.1.1 of Chapter 1 of Revised Mining Plan.

9. List of statutory obligations to be compiled with as per clearances already received, should be furnished together with copies of clearance letters of Status of compliance. List of other statutory clearances which are still to come, should also be furnished with the confirmation that the obligations imposed therein will be complied with & copies of all statutory clearances should be attached as Annexure.

Submission: Compiled.

List of statutory obligations is covered in Sub-Section 11.1.2 and List of Clearances in Table 11.1 of Chapter 11 of Revised Mining Plan. List of other statutory clearances which are still to come are also be furnished with the

पवन देव जामटा/PAWAN DEV JAMWAL

confirmation that the obligations imposed therein will be complied with & copies of all statutory clearances are covered in table 11.1 of Chapter 11 of Revised Mining Plan.

10. Boundaries of the block should be described and whether the Block has been connected to National Grid or not should be clarified.

Submission: Complied.

The Block is connected with national grid and referred in Sub-section 4.1.1.3 of chapter 4 of Revised Mining Plan. Boundary description has is given at Sub-section 4.0 of Chapter 4 of Revised Mining Plan.

11. The details/table regarding coal reserves seam wise/ sector wise/quality wise/category wise (proved & indicated) are to be furnished. Also, the reserves which are not to be worked for various reasons like low thickness, left in barrier, batter etc should be indicated reason-wise & seam wise.

Submission: Complied.

(i.) The details of seam wise and grade wise net extractable reserves along with reserves left in Barrier and Batter is given in Table 5.6 of chapter 5 of Revised Mining Plan.

12. Distance of railway siding, mode of transport and dust control measures should be furnished.

Submission: Compiled.

i. The Mode of transport of coal is by Push-pull railway system of NTPC and it is explained in Chapter VII of Revised Mining Plan.

ii. The distance of the siding from mine end to Darlipalli STPP is 10 km (approx.).

iii. The dust control measures are detailed in Sub-Section 10.7.2, Chapter 10 of Revised Mining Plan.

13. Details regarding different types of rocks available including toxic elements (if any) should be incorporated.

Submission: Compiled.

The details regarding different types of rocks is given in Sub-Section 4.1.4, Chapter 4 of Revised Mining Plan.

14. The list of facilities which will be dismantled and those which will be retained should be furnished in a tabular form and provision for financial corpus fund for maintenance of these facilities should be made.

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Dep.Al General Manager (C...
एन टी पी सी लिमिटेड/NTPC LTD.
EOC, A-8A, Sector-24, Noida-201301 (U...

3

Submission: Complied.

The list of facilities to be dismantled /retained is given in Table 11.7, Chapter 11 of Revised Mining Plan.

15. It should be certified that Escrow amount will be modified based on Wholesale Price Index as notified by Government from time to time.

Submission: Complied.

Escrow amount will be modified based on Wholesale Price Index as notified by Government from time to time.

Refer Chapter 11 of Revised Mining Plan.

16. Provision for stonewall fencing and precaution against drowning should be made.

Submission: Compiled

Cost against the provision of stone wall fencing has been considered under table 11.9 of Chapter 11 of Revised Mining Plan.

17. Fund requirement for closure activities should be made in bar chart.

Submission: Complied.

A time schedule for abandonment along with tentative fund requirement made in bar chart has been furnished under table 11.9 of Chapter 11 of the Revised Mining Plan.

18. Possibilities of creation of employment/ vocational opportunities for local people with education, skill development & training programmes under CSR plan should be explored.

Submission: Complied

It is pertinent to mention that an R&R Plan of Dulanga Coal Mining Project in Sundargarh district is under preparation which is in line with Orissa State's R&R Policy. Adequate provisions will been kept in the proposed plan to cover activities which include among other provisions preference in employment subject to suitability and availability of vocational / self employment opportunities, education, health, skill development and training programs for various focused groups.

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, may build a Greenfield institutions in the vicinity of the mining project of Sundargarh for capacity

building, skill development which will also result in improving the employability of the affected families / locals.

Such activities would be continued even during operation stage for the entire life of the mining projects as part of NTPC's CSR activities in line with company policy. Creation of employment / vocational opportunities for local people shall be explored by NTPC.

19. Stage wise plans and sections showing land restoration / reclamation details should be incorporated.

Submission: Complied

Stage Plans as per requirement have been prepared and enclosed as plates.

20. Details of the land proposed to be used outside the block boundaries should be furnished.

Submission: Complied.

The outside mine lease area is given in Table 9.8, Chapter 9 of Revised Mining Plan.

21. Impact of diversion of Garia nala, Baidhara nala & Nala B on water availability for local community should be described.

Submission: Complied.

The Impact of diversion of Nalas and water availability for local community is detailed in Sub –Section 3.8, Chapter 3 of Revised Mining Plan.

22. Any reduction in mineable reserves and/or area (as cited during presentation) of approved Mining Plan should be clarified reason wise & reconciled with competent authority/MoC.

Submission: Complied.

The reason for change in reserve and area is detailed in subsection 2.5(1) of Chapter 2. Revised Mining Plan considers the changed reserve and area for approval is being sought for.

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2008-CPAM

पवन देव जामटा/PAWAN DEV JAMTA
उप महाप्रबंधक (खनिकर्म)
Deputy General Manager (Mining)
एन टी पी सी लिमिटेड/NTPC Ltd.
ECC, A-8A, Sector-24, Noida-201301

5

Minutes of Meeting held between NTPC and OPGC to explore the possibility of exploitation of coal at the common batter on 30.03.2012 at OPGC HQ, Bhubaneswar.

NTPC			OPGC		
1	Sri A.K. Dash	AGM(PE-MP&D)	1	Dr. Kshirod Brahma	GM(Mines)
2	Sri Sanjiv Kumar Singh	Sr. Manager (PE-MP&D) & (RQP)	2	Sri M B Mathur	RQP
3	Sri C R Barik	DGM(Incharge-Dulanga)	3	Sri Bhola Singh	VP(coal)
			4	Sri S K Kar	Sr. Manager
			5	Sri N R Satpathy	Sr. Manager

NTPC informed that the Mining Plan for Dulanga Coal Mining Project in Odisha has been revised and presented to the Technical Members of the Standing Committee of MOC on 08.02.2012. The observations of the committee were received on 14/03/2012. One of the observations of the Standing Committee is as follows:

Quote:

"Extraction of Coal in Batter in consultation with Manoharpur should be explored."

Unquote:

For this detailed discussions were held considering the revised mining Plan/Mining plan and stage plans of both the blocks and the following has emerged:

1. After detail discussion on mining plans of both the Projects it was agreed that technically it is possible to extract the coal blocked in the batter of the common boundary between the two projects. In discussion it has emerged that the extraction of the coal in batter will be possible after around 10th year of mining operation.
2. It was also felt that the DGMS should also be consulted and necessary approval may be sought after conducting further studies.
3. Both the parties will work out the modalities for mining of coal in batter at an appropriate time after due consideration of safety, conservation, technical and commercial aspects.

OPGC

NTPC

(A.K.DASH) 30/3/12 (C.R.BARIK)

30/3/2012 (Bhola Singh)

30/3/12 (Kshirod Brahma)

(M B Mathur)

(RQP) Sanjiv Kr. Singh 30/3/12

(S.K. Kar)

30/3/12 (N.R. Satpathy)

ANNEXURE XVIII

एनटीपीसी NTPC

डी. के. जैन
निदेशक (तकनीकी)
D. K. JAIN
Director (Technical)

एनटीपीसी लिमिटेड
भारत सरकार का उपक्रम
NTPC Limited
A Govt. of India Enterprise
(Formerly National Thermal Power Corporation Ltd.)
केन्द्रीय कार्यालय / Corporate Centre

Ref. No. 01/D(T):0000:999:
Dated : 19th January'2012

Sub. Approval of Mine Closure Plans of Pakri Barwadih, Chatti Bariatu, Kerendari 'A' and Dulanga coal blocks.

Dear Shri Perti,

This has reference to the observations of Standing Committee of MoC for approval of Mine Closure Plans by the Board of Directors of the company. For this, Board of Directors of the company, vide resolution No. 370.2.10, dated 25.07.2011 has severally authorised CMD and/or Director (Technical) for approval of Mine Closure Plans / Mining Plans for submission to MoC. In line with that resolution, Mine Closure Plans for the above coal blocks, as prepared by our RQP Shri Sanjiv Kumar Singh, have been approved by the undersigned for submission to MoC and these will be implemented as per approval and amendments/modifications suggested by MoC from time to time.

Copy of the Board resolution is enclosed for your kind information please.

With Kind regards

Yours Sincerely

(D K Jain)

To,

Shri Alok Perti,
The Secretary (Coal),
Ministry of Coal,
Shastri Bhavan,
New Delhi – 110001.

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2008-CPAM

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

NTPC LTD.

STATUS OF GROUND WATER STORAGE
FOR
DULANGA COAL BLOCK
DISTRICT SUNDARGARH, ORISSA

DECEMBER, 2009

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2009-CPAM

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

Prepared by:

MIN MEC CONSULTANCY PVT. LTD.
A-121, Paryavaran Complex, IGNOU Road, New Delhi – 110 030
Ph : 29534777, 29532236, 29535891 ; Fax: +91-11-29532568
Email :min_mec@vsnl.com; Web site : http://www.minmec.co.in
An ISO 9001:2000 approved company

SANJIV KUMAR SINGH
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No. 34011/(15)/2009-CPAM

STATUS OF GROUND WATER STORAGE DULANGA COAL BLOCK, SUNDERGARH, ORISSA

1.0 INTRODUCTION

NTPC Ltd. a leading public sector company of Govt. of India has been allotted Dulanga Coal Block in Ib valley coalfield Sundergarh district, Orissa. as captive coal block for their upcoming power plant at Darlipalli (3200 MW). NTPC has entrusted the EIA study to M/s Min Mec Consultancy Pvt. Ltd. New Delhi. The present hydrogeological study has been carried out by the consultancy group as a statuary requirement.

The period of lease for the coal block is 30 years and planned production of coal is 7 MTPA. The coal is of F&G grade. There are three major coal seams (Parkhani, Lajpura & Rampura) having a total reserve of 245 M.T. The entire coal mining shall be carried by opencast mining technique.

2.0 LOCATION

The coal block occupies Dulanga, Majhapara Beldihi & Kathpal village falling in Hemgir Tehsil of Sundergarh, district Orissa. The coal block is spread over 657 ha land. The study area covering 10 km radius of lease hold falls in survey of India toposheet 64 N/13, 64N/16, 64O/9 & 64O/13 (Fig 1). The study area lies between following geographical co-ordinate.

North Latitude	-	21°50'40" to 22°01'30"
East Longitude	-	83°42'06" to 83°53'43"

संदीप गुप्ता/SANDEEP GUPTA
अवर सचिव / Under Secretary
कोयला मंत्रालय / Ministry of Coal
भारत सरकार / Govt. of India
नई दिल्ली / New Delhi-110001

3.0 TOPOGRAPHY AND DRAINAGE

3.1 Topography

The topography of the block is highly undulating and rugged in nature. The central and southern parts of the area are marked by higher elevation exhibiting hillocks and ridges. The eastern side is more or less flat in nature. The maximum and minimum elevations above mean sea level are 336m and 232 m respectively. The regional slope of land is towards south-east. The nature and physical properties of litho units have strong bearing on the topographic feature. Resistant formations present generally form hillock while softer formations presents plain area (Fig 2).

3.2 Drainage pattern

The drainage pattern is mainly controlled by one major tributary of Basundhara nala i.e. Garia nala which flows along the central portion of the block and more or less bisects the block into two sub-blocks. A network of streamlets feeds the Garia nala. The general slope of the area is from west to east. The topography and drainage map is given in Fig 3.

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उप महाप्रबंधक (खनन)
Deputy General Manager (Conservation)
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E-OA, A-8A, Sector-24, Noida-201301 (U.P.)

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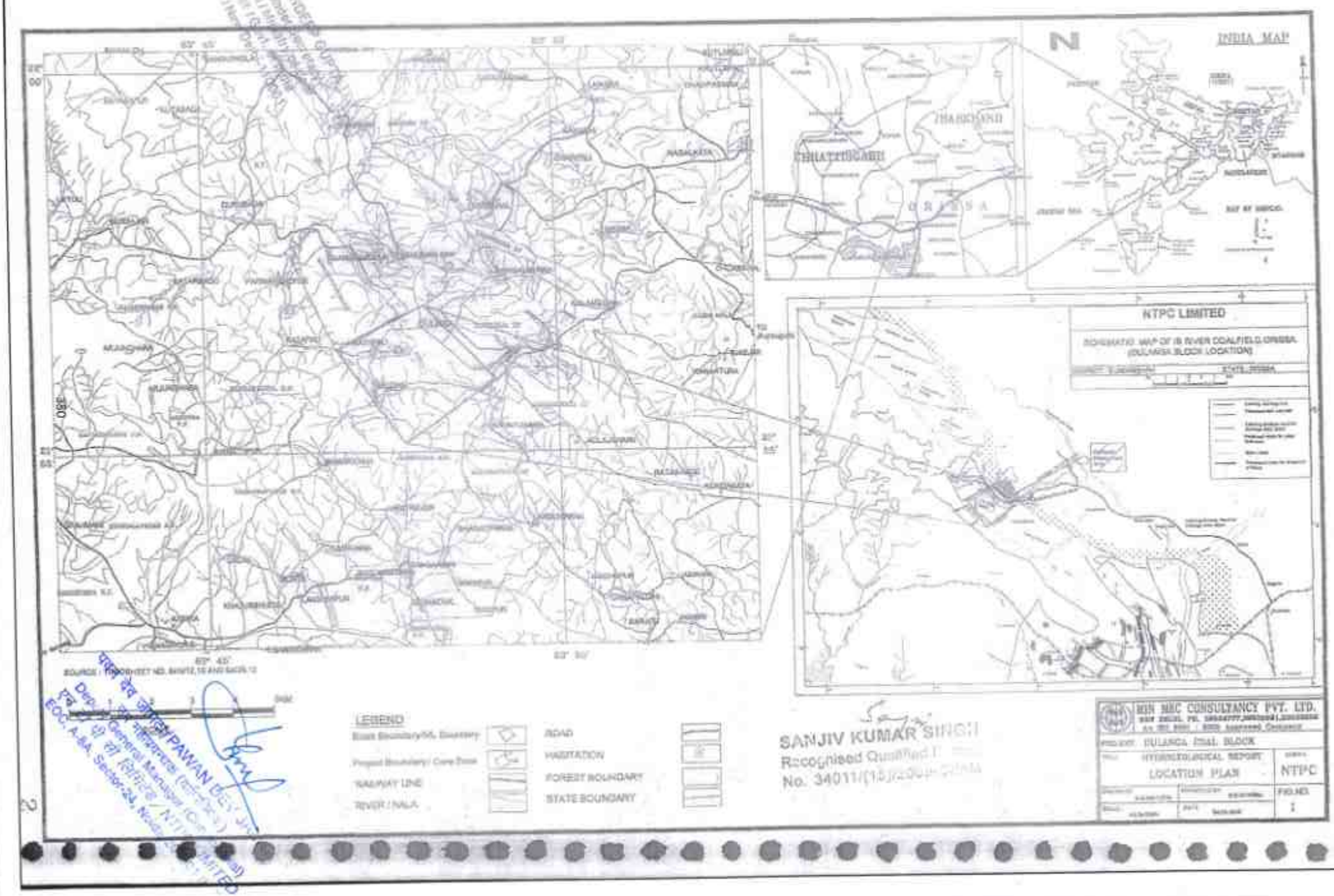
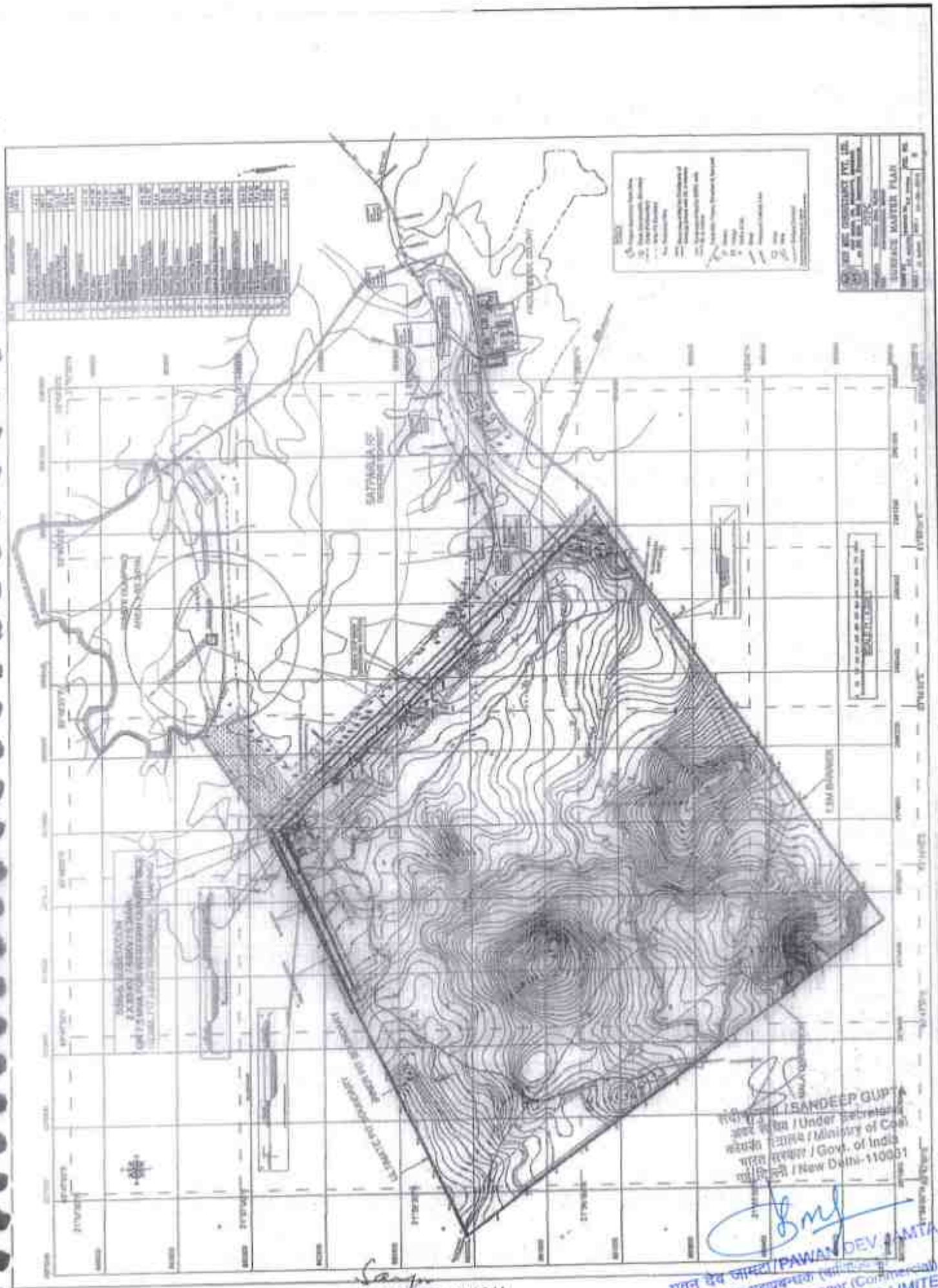

INDIA MAP
NTPC LIMITED
DULANGA BLOCK LOCATION
LEGEND
State Boundary/ML Boundary
Project Boundary/ Core Zone
RAILWAY LINE
RIVER / NALA
ROAD
HABITATION
FOREST BOUNDARY
STATE BOUNDARY
MIN MEC CONSULTANCY PVT. LTD.
DULANGA COAL BLOCK
HYDROGEOLOGICAL REPORT
LOCATION PLAN
NTPC
SANJIV KUMAR SINGH
Recognised Qualified
No. 34011/(15)/2009-EIA



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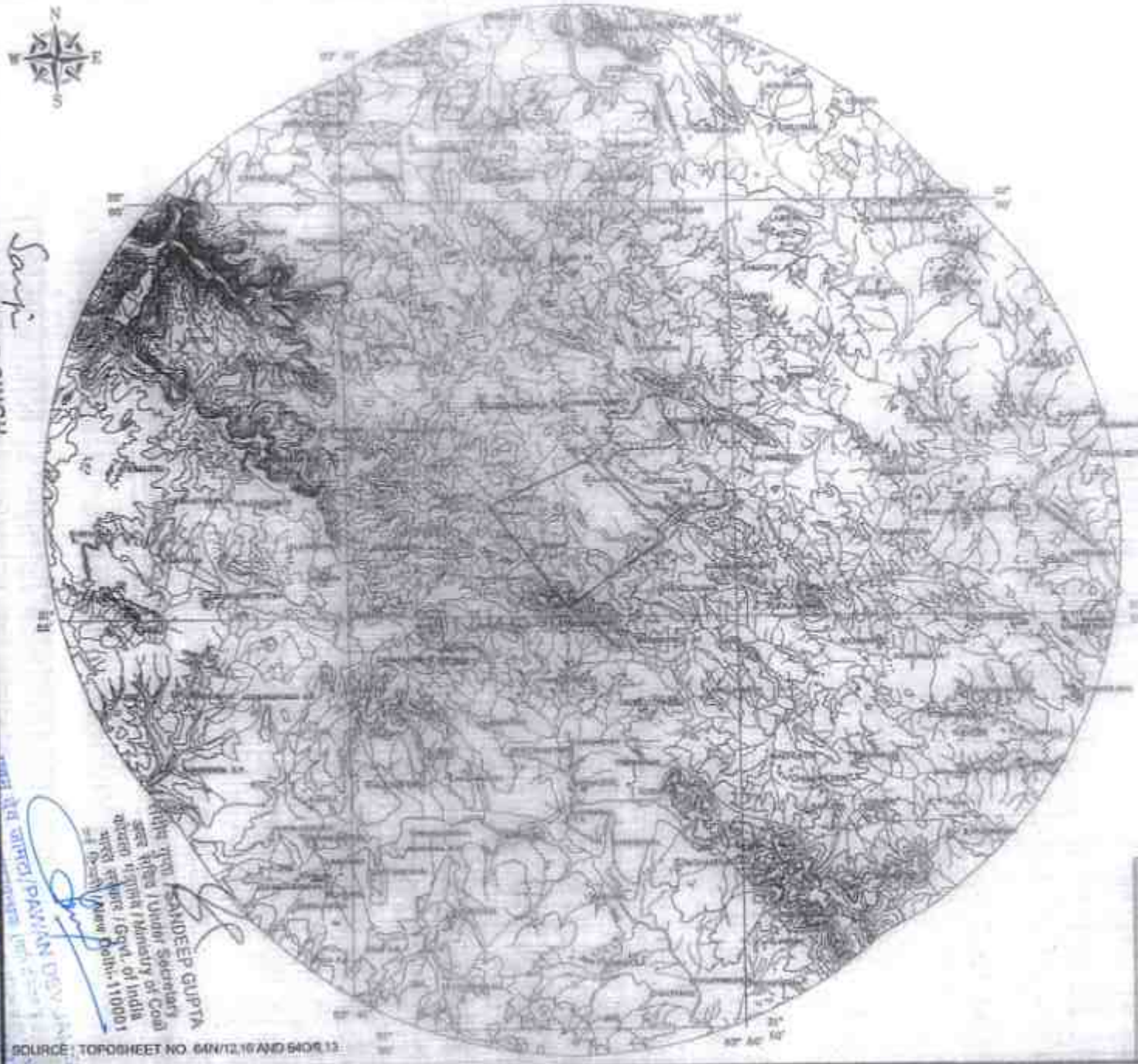
SANDEEP GUPTA
Under Secretary
Ministry of Coal
Govt. of India
New Delhi-110001

PAWAN DEV JAMTA
Deputy General Manager (Commercial)
NTPC LIMITED
EOC, A-8A, Sector-24, Noida-201301 (U.P.)



SOURCE : TOPOSHEET NO. 64N/12,16 AND 64O/9,13

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Under Secretary
Ministry of Coal
Govt. of India
New Delhi-110001

MIN MEC CONSULTANCY PVT. LTD.
NEW DELHI, PH. 26034777, 26035501
An ISO 9001 : 2000 Approved Company

CLIENT: NTPC
PROJECT: DULANGA COAL BLOCK
TITLE: HYDROGEOLOGICAL REPORT
TOPOGRAPHICAL AND DRAINAGE MAP
DRAWN BY: S.R. MATHUR
CHECKED BY: S.D. SHARMA
SCALE: AS SHOWN
DATE: 04-06-2010
FIG. NO. 3

SUNIL KUMAR SINGH
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4.0 REGIONAL GEOLOGY

The Ib valley Coalfield lies in the south-eastern extremity of NW-SE trending master basin belt in Son-Mahanadi Valley. The Coalfield displays the complete sequence of Lower Gondwana rocks from Talchir to Kamthi. The geological succession of the coalfield as established from surface and sub-surface data is given below in Table 1 and the regional geology is shown in Fig 4.

TABLE 1
STRATIGRAPHIC SEQUENCE OF IB VALLEY COALFIELD (AFTER GSI)

Formation	Lithology
Recent and Sub-recent	Alluvium Laterite /Recent gravel and conglomerate
Lower Gondwana	**Kamthi (Upper)** : Pebbly sandstone, ferruginous sandstone, red shale **Kamthi (Middle)** : Fine grained to coarse grained sandstone, siltstone, coal seams. = Raniganj **Kamthi (Lower):** Grey and carbonaceous shales, sandstone, clay, = Barren Measures iron-stone nodule. **Barakar:** Sandstone, grey and carbonaceous shales, siltstones, Coal seams, fire-clay. **Karharbari:** Black carbonaceous sandstone, pebble bed with thin impersistent coal seams. **Talchir:** Diamictite, greenish sandstone, olive and chocolate Shales, rhythmites.
----------	---------- Unconformity ----------
Pre-Cambrian	Granite, gneisses, schists etc.

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भारत सरकार / Govt. of India
नई दिल्ली / New Delhi-110001

Precambrian

The basement rock on which the Gondwana strata have been deposited is exposed to the north-east and north central parts of the coalfield. It comprises granite, gneises and schists which are often traversed by vein quartz, pegmatite and basic rock.

Talchir formation

The Talchir formation is found to have deposited as discontinuous lens shaped bodies over the uneven basement. The outcrop of this formation is scanty and located only in the north-western part. The Talchir formation is represented by diamictite, medium to coarse grained greenish sandstone with dispersed clasts and rhythmites.

Karharbari formation

The strata belonging to this formation overlies the Talchir formation with a gradational contact. It comprises black carbonaceous sandstone with fresh feldspar laths, of white, very coarse grained to pebbly sandstone and contains thin laminate of coal.

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Chief Manager (Con.-Surface)
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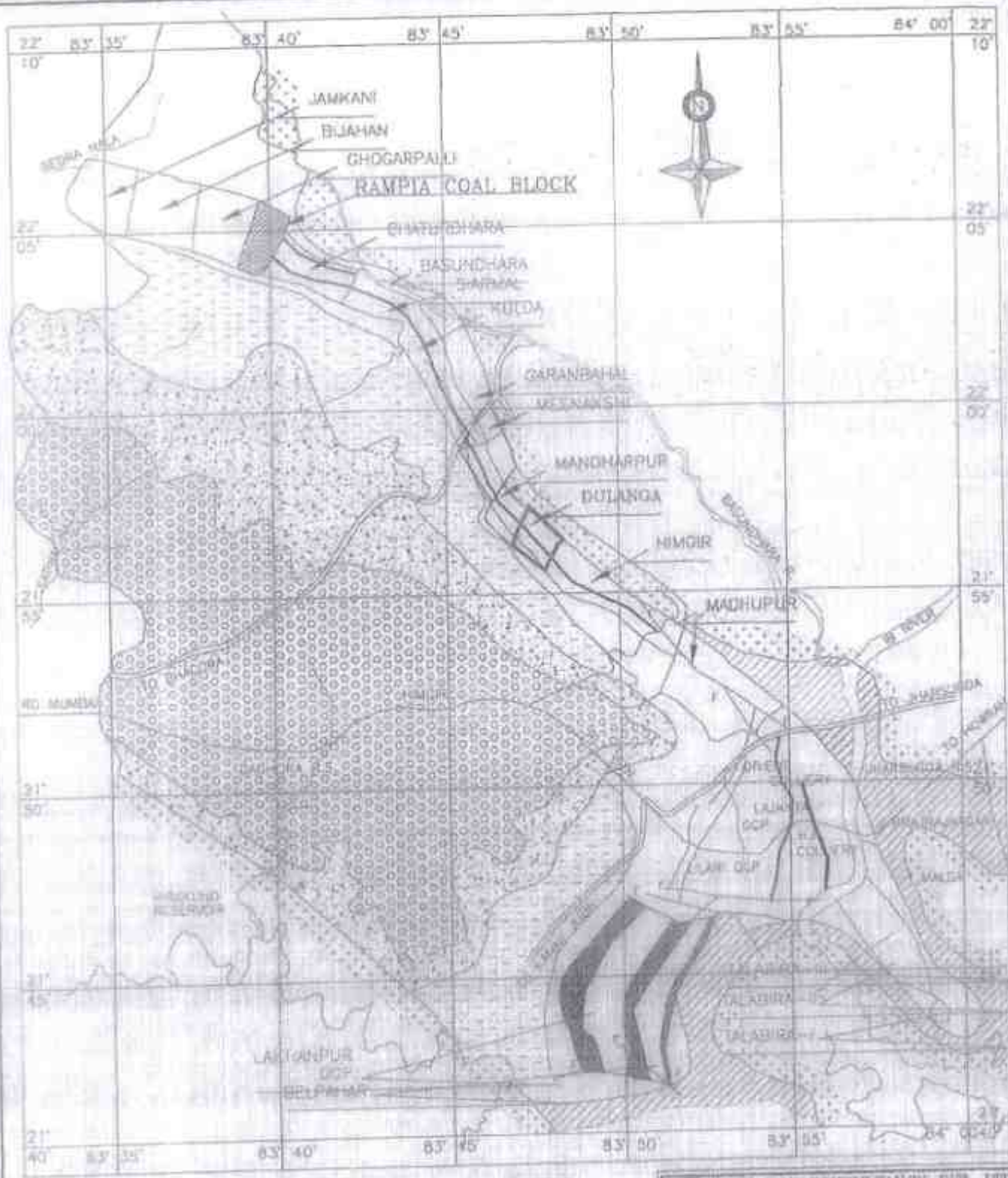

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SANJIV KUMAR
384
Recognised Qualifier
No. 34011/(15)/20

Deputy General Manager
EQC, A-8A, Sector-24, Noida-201301 (U.P.)

Barakar formation

Overlying the Karharbari formation the thick pile of coarse grained sub arkosic sandstone of Barakar formation cover major portion of the coalfield. The arenaceous basal Barakar contains Ib seam and grades upward into more argillaceous facies. This sequence is overlain by Rampur Coal Horizon, comprising fine grained to coarse grained to medium grained arkosic sandstone with bands of grey micaceous shale, carbonaceous shale, siltstone and contains Lajkura Coal Horizon. The litho units of Barakar formation become arenaceous again from the roof of Lajkura Coal Horizon up to the base of Barren Measure formation.

Kamti formation

Recent systematic geological studies in Ib valley Coalfield have established a three fold sub-division of the Kamthi formation. The lowermost unit is mainly argillaceous, composed of thick unit of shales with ironstone nodules, sandstones and is generally devoid of coal and is correlated with the Barren Measure formation of Damodar Valley. This is overlain by fine grained sandstones and occasional argillite bands and contains coal seams forming the middle member of the hitherto Kamthi formation and is correlated as Raniganj formation. The occurrence of coal in this formation, which was unknown earlier, has enhanced the potentiality of coal in this coalfield.

The uppermost member of the unit, which generally occurs on the flat topped hills and plateau, comprises pebbly sandstones, ferruginous sandstones and red shales and is correlated as Kamthi (upper) formation. Kamthi formations are reported to be occurring by GSI in the south central part of the Ib valley Coalfield.

Laterite and recent gravel

Laterite occurs as patches on the sub-surface covering. Irregular pebbles and recent gravels and conglomerates generally occur on the high ground.

5.0 LOCAL GEOLOGY

Dulanga Block is located in the north western part of northern limb of Ib valley Coalfield. The geology of the block is in conformity with the regional set up. Almost the entire area of Dulanga block is covered by the rocks of Barakar formations. In the north eastern side of the block beyond the block boundary gritty and pebbly sandstones of Karaharbari formation, Talchir boulders and the basement rock comprising of Metamorphics are also exposed. In the Garianala exposures of sandstones, grey shale, carbonaceous shales, coal horizons are found. Ferruginous red shales and sandstones of Kamthi formation are also noticed towards the extreme south of the block.

The Geological succession evolved on the basis of exploration data generated in the block is given in the Table 2 while calculating the thickness of different stratigraphic formations, the data generated by MNID series boreholes only have been considered as the formation details in OIBD series boreholes drilled by Directorate of Geology, Orissa have not been clearly demarcated on the litholog.

TABLE 2
GEOLOGICAL SUCCESSION IN DULANGA BLOCK

Age	Formation	Thickness(m)	Lithology
Recent/ Sub-recent		0.00 - 4.50	Soil, alluvium
Lower Permian	Barakar	0.00 - 292.00	Fine, medium and coarse grained felspathic, grey sandstone, micaceous and laminated at places, Grey shale, fire clay and carbonaceous shales with thick coal seams
	Karharbari	27.50 - 98.16	Coarse to gritty and pebbly sandstones with unde- composed feldspar carbonaceous sandstone and thin carbonaceous shales and coal bands
Upper carboniferous	Talchir	3.50 - 11.53	Khaki green, brownish sandstone with impregnated fragments of Quartz, Quartz-mica schist, granite gneiss, boulders & green shales
----------	----------	Unconformity	----------
Precambrian	Older meta morphics	3.50 - 5.00	Granite, gneiss, chlorite schist,mica schist, quartzite etc.

Structural set-up of the block

The Dulanga block is mostly covered with soil, hence the structural interpretation is mainly based on the sub-surface data obtained during the coarse of exploratory drilling.

The general foliation of older metamorphic is N70°W-S70°E with southerly 60° dip. There are two sets of prominent joints trending N15°E-S15°W & N68°W-S68°E with easterly and north easterly dip of 85°.

The general strike of the bed varies from N20°W-S20°E to N40°W-S40°E with south westerly 5° to 10° dip.

The block is free from major tectonic disturbances but a strike fault namely F1-F1 has been deciphered from the subsurface data which divides the block into two unequal parts. Besides two more faults of F2-F2 & F3 – F3 of very small magnitude have been deciphered (Fig 5). Minor slips causing omission of minor coal seams is as well observed in the coal block.

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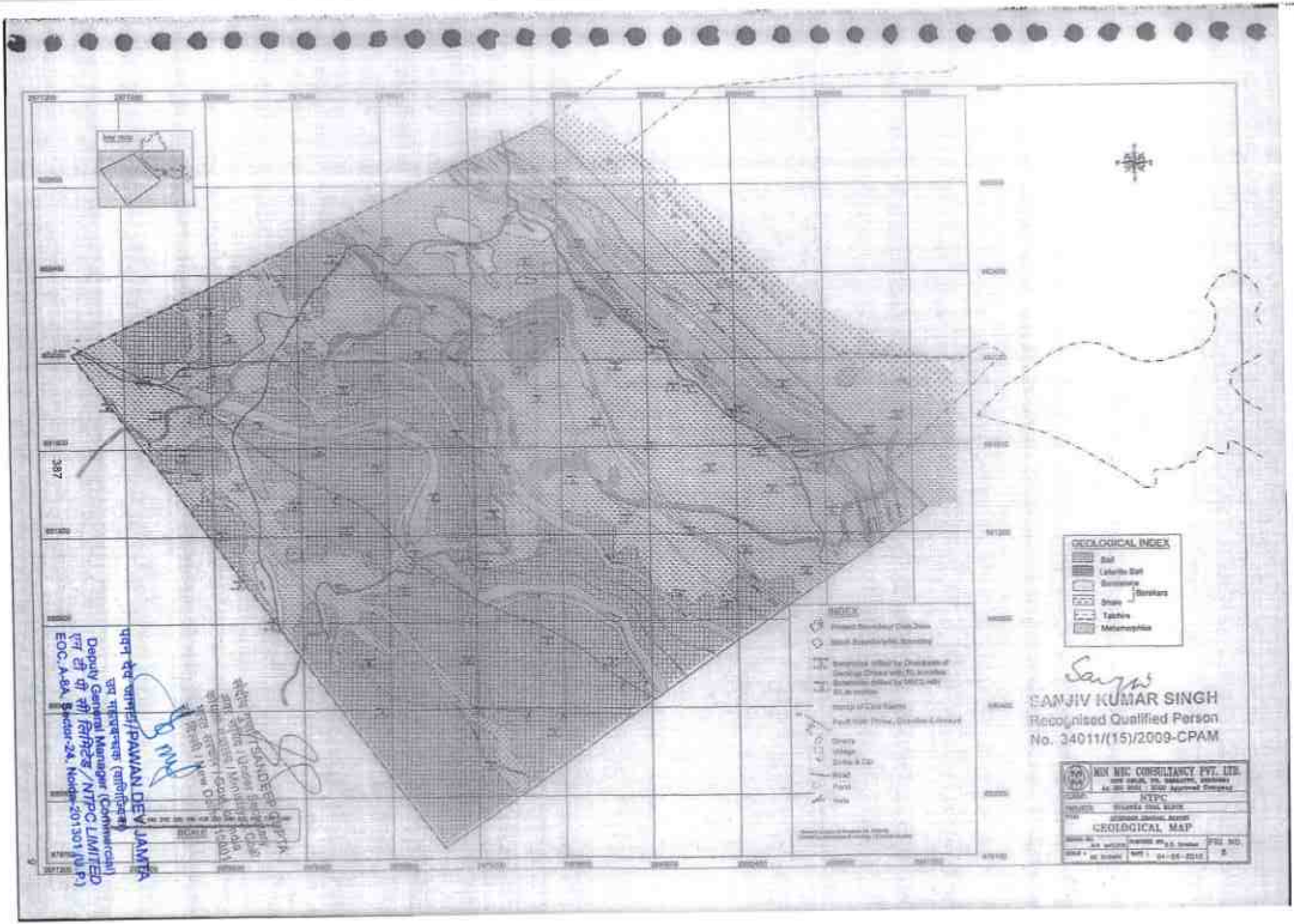

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Subsurface Geology

To decipher the subsurface conditions, geological cross section along the dip direction has been drawn using the exploratory borehole data (Fig 6). The review of this section indicate presence of three aquifer group in the coal block. The first shallow aquifer occurs with in 40 to 80 m below ground in the western sector of coal block. The groundwater in this aquifer is present in semi-confined to unconfined state. The second aquifer group occurs with in the depth range of 60 to 150 m depth below ground and the third one occurs below 220 m depth. The deeper aquifer pinches out in the eastern part of coal block and attain maximum thickness in the western sector only. No subsurface information beyond 300 m depth from the ground is available. The aquifer present in the area have limited extension.

6.0 CLIMATE & RAINFALL

The area experiences subtropical climate with hot & dry summer well distributed rainfall during monsoon period and cold winter season. The nearest meteorological observatory of IMD is located at Jharsuguda & second nearest is at Sundergarh and third station is at Raigarh. The available month wise rainfall data for these stations have been compiled (Table 3) and has been graphically represented (Fig 7).

TABLE 3
SUMMARISED MONTHLY RAINFALL (MM) DATA

Months	Jharsuguda (1969-2006)	Sundergarh (1979-2005)	Raigarh (1970-2006)
January	12.7	22.3	13.5
February	12.9	12.1	12
March	11.9	15.8	16.7
April	19.1	19	14
May	37.7	35.8	33.4
June	188.7	199.1	208.6
July	298.7	364.3	401.4
August	318.7	324.6	440.6
September	185.3	266.3	294.3
October	51.2	45.8	46.4
November	12.2	16	7.8
December	8.7	12.4	6.7
Total	**1157.8**	**1335.5**	**1435.4**

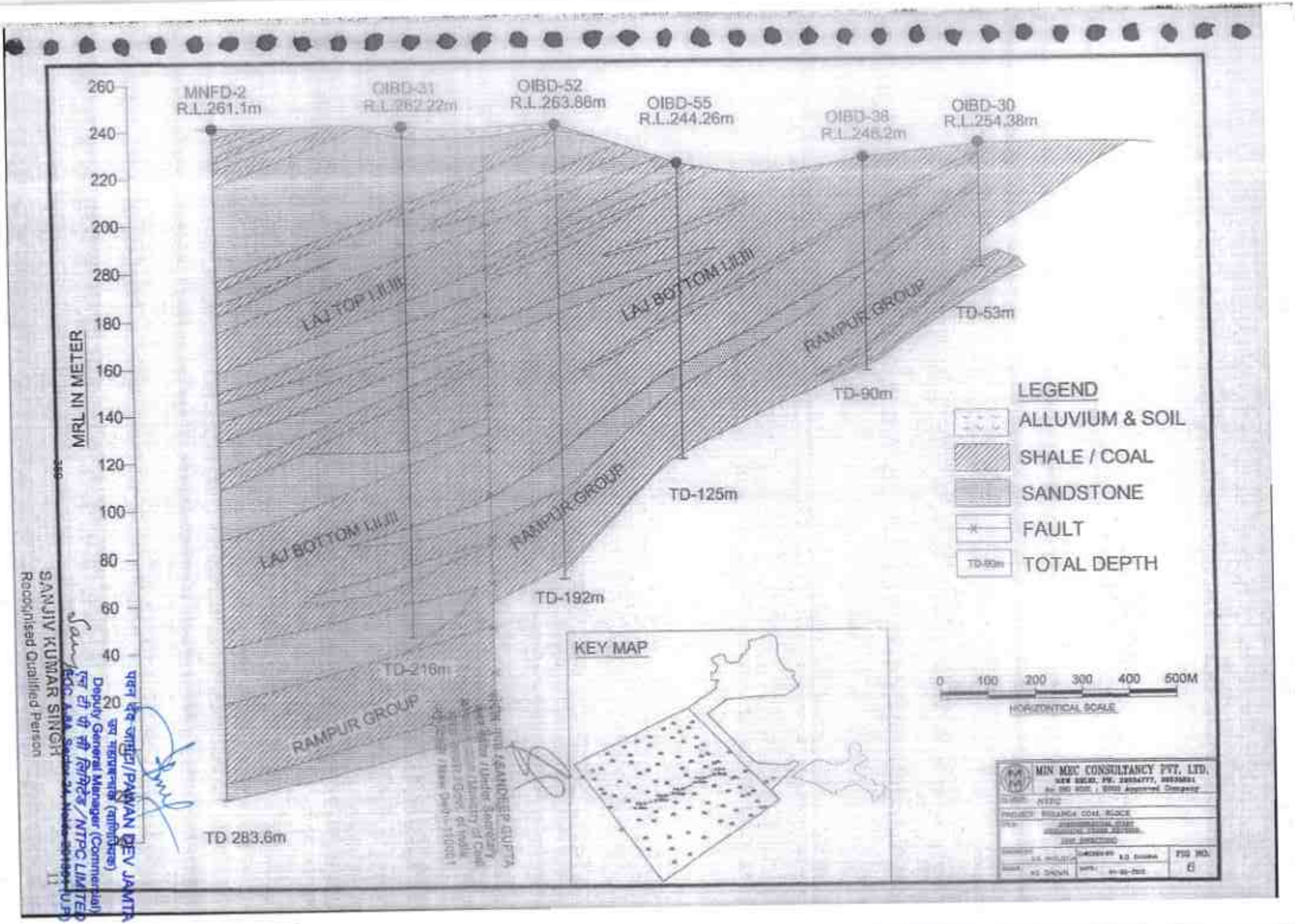

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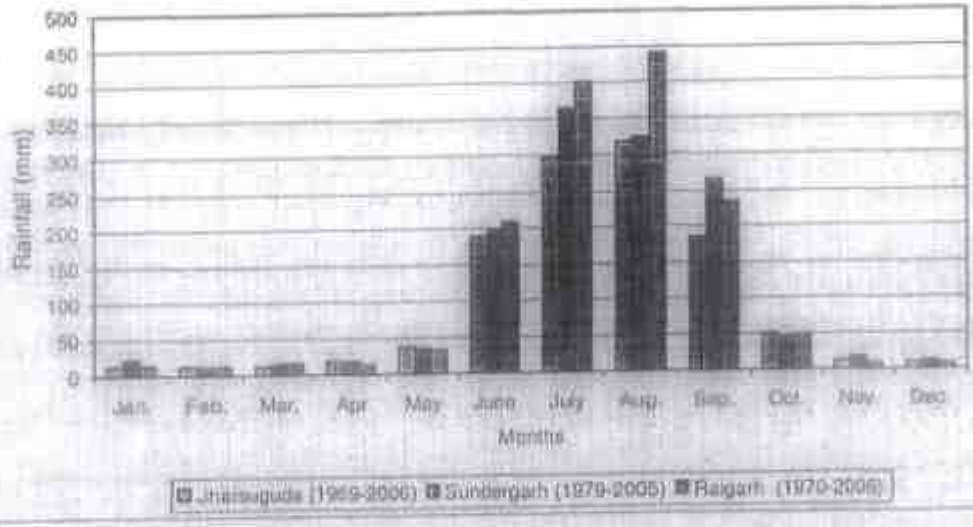
FIG 7 : MONTHLY AVERAGE RAINFALL (mm) IMD STATION, JHARSUGUDA, SUNDERGARH AND RAIGARH



From the above table it is observed that annual rainfall over the study area varies between 1157.8 mm to 1435.4. The rainfall at Jharsuguda and Sundergarh which are located closest to study area, is 1157.8 mm and 1335.5 mm respectively. The larger parts of annual rainfall (88%) occurs between June to September every year. The average monsoon rainfall for the study area works out as 1972.85 mm considering Jharsuguda.

7.0 HYDROGEOLOGY

The hydrogeological conditions of the study area varies with the nature of formation, geomorphology and hydrological characters of the formations present. There are three types of formations present in the area (1) Unconsolidated (2) Semi consolidated & (3) Consolidated formation. The hydrogeological conditions of three formations have been discussed subsequently.

Consolidated formation

Substantial area in the eastern sector is underlain by Pre-Cambrian metasediments of Sambalpur series comprising Granite, Quartzite and Granite Gneiss. These formations does not have any primary porosity. The ground water in these formation occurs in unconfined state with in the secondary porosity (Fractures & cracks). These formation have low yield prospects.

Semi consolidated formation

The shale & sandstones of Gondwana system forms the main aquifer over the lease hold and surrounding. These formations too does not hold primary porosity and the groundwater occurs with in the cracks & fractures of sandstone or partings of shale. The Barakar formations which is extensively

present in the area constitute principal aquifer. As such these formations have low yield character with low transmissivity. The ground water in these formation occurs in semi-confined to high confined conditions with high hydrostatic head.

Unconsolidated formation

Recent alluvium and weathered formations form the first shallow aquifer in the area in which the groundwater occurs in unconfined state with in the primary porosity of the formations present in the area. The lateritic formations form the most promising unconsolidated aquifer in the area. The thickness of unconsolidated formations present is limited. The yield prospects are moderate to low. The transmissivity of these formations is low.

Depth to water table

To evaluate the prevailing hydrological scenario of the area intensive well inventory has been carried out and the water levels were measured at selected locations. The observed water levels for the post-monsoon season have been compiled along with hydrological details (Table 4). The pre-monsoon water level has been estimated based on local information.

Using the observed water level, the depth to water table map for post monsoon season (Fig 8) has been prepared. The review of the map indicate that over the lease area the water table lies at a depth between 6 & 7 m below ground. In general over the larges portions of the study area the depth to water level range between 4 & 6 m below ground. Shallower water table less than 2.0 m occurs as isolated cases representing localized condition. Topography of the area has a strong bearing on the water table.

Ground water flow regime

To decipher the groundwater flow regime water table elevation contour map has been prepared based on observed water level during post-monsoon season of 2009 and the spot elevation estimated from the topographic map of the area (Fig 9). The review of the map indicated that regional flow of groundwater in the eastern sector of study area is towards south-east. The maximum elevation of water table is 280 mRL in the north-west of the study area of lowest is 220 mRL. The average slope of the water table over the lease area works out as 6 m/km. The study area is crossed by low hill range running in NW-SE direction dividing the total study area into several hydrological units. Over the south-western sector the ground water flow is towards south-west. Local variation in the flow regime is observed. It is thus evident that the topography has got strong control on groundwater flow in the area.

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TABLE 4

HYDROGEOLOGICAL DETAILS OF WELLS INVENTORIED IN AROUND NTPC'S DULANGA BLOCK, JHARSUGUDA, DIST. ORISSA

Sl. No.	Location	m.RL	Depth (m.b.g.l)	M.P. (m.a.g.l)	Dia (m)	Depth to Water Level m.b.g.l.	Reported Pre-monsoon Depth to Water Level (m.b.g.l.)	Fluctuation (m)	Remarks
1.	**CHANDLIMAL** - Inside the premises of Narayan Bank	220	6.47	0.38	2.87	2.53	5.62	3.09	D/W
2.	**MANOHARPUR-I** - Inside the premises of Jogeswar Oram	276	5.01	0.25	7.50	2.95	4.75	1.8	"
3.	**MANOHARPUR -II**, Inside U.P. School compound	270	8.74	0.56	2.30	4.27	7.04	2.77	"
4.	**KATARBAGA** – Inside the premises of Kshynanidhi Diswal	289	5.40	0.45	1.02	1.10	2.05	0.95	"
5.	**BURHAJHARIA** – Adjacent to Nala, on Durbaga – Hemagiri main road side	300	6.80	0.60	5.72	3.94	6.50	2.56	"
6.	**SUKHABAN (HEMAGIRI)** - Backside of inside Oil Petrol pump near by pass road junction	345	7.08	0.42	1.20	4.05	5.58	1.53	"
7.	**HEMAGIRI** – Near Forest Quarter Restshed	353	13.18	0.52	2.28	6.47	11.98	5.51	"
8.	**USTOLI** – Adjacent to house of Shri Dasaram Maitri Near Hanuman Temple	319	8.55	1.00	2.33	3.90	8.00	4.1	"
9.	**DURUBAGA** – Inside the premises of Basudev Rout	288	8.80	6.1	3.57	4.88	8.00	3.12	Irrigation well fitted with Tenda
10.	**DULANGA** – Adjacent to house of Shri Backran Sahoo, on the main road side	259	10.17	1.03	2.80	6.58	10.00	3.42	
11.	**MAJHAPADA** – Infront of U.P. School	248	8.50	0.80	2.75				

Sl. No.	Location	m.RL	Depth (m.b.g.l)	M.P. (m.a.g.l)	Dia (m)	Depth to Water Level m.b.g.l.	Reported Pre-monsoon Depth to Water Level (m.b.g.l.)	Fluctuation (m)	Remarks
12.	KALAMEGHA – Inside the land of Shri Anade Bhoi	239	8.10	6.1	4.50	3.24	7.50	4.26	Large dia irrigation well
13.	BIHAJOR – Infront of house of Sh. Tenu Dhurua Sarada Dhurua	225	7.10	0.80	3.17	2.12	6.20	4.08	D/W
14.	KANAKTURA – Adjacent to Binapani Club; Mousi Mandir	227	8.42	0.80	2.44	2.50	7.20	4.7	"
15.	CHICHINDA – Infront of house of Shri Managal Buda	216	6.43	0.70	3.42	3.37	5.30	1.93	"
16.	KHUNTPANI – Adjacent to club house on the main road leading to Kanaktura	218	6.58	0.46	2.16	3.26	6.54	3.28	"
17.	BURUBHAGA – Inside the house of Sh. Hrudananda Naik	230	9.21	0.56	3.50	2.50	6.44	3.94	"
18.	TAPARBA-I – Inside the house of Sh. Jaisankar Bhoe	240	8.80	6.1	3.42	3.01	8.00	4.99	"
19.	TAPARBA-II – Infront of house of Shri Harihar Bhoi	234	10.22	1.00	2.20	3.60	8.20	4.6	"
20.	RAIDIHI – Adjacent to house of Shri Subas Sah	240	10.44	0.46	2.80	1.74	6.54	4.8	"
21.	CHARPALLI – Infront of house of Benadhar Paule	245	7.92	0.68	2.76	2.66	6.38	3.72	"
22.	LAIKERA – Govt. T/Win front of Health Care Family Centre	251	60.00	0.50	200 mm	4.20	8.00	3.8	Govt. T/W
23.	DUDUKA – Inside the premises of Parameswar Naik on the main road side	249	7.00	0.90	1.53	2.15	5.10	2.95	
24.	KALOBAHAL – Govt. well infront of house of Dasarath Dhorua	254	8.60	0.92	2.13	3.78	7.08	3.3	
25.	BARPALLI – Infront of workshop Adj. to Siva temple	261	8.85	0.45	1.52				

Sl. No.	Location	m.RL	Depth (m.b.g.l)	M.P. (m.a.g.l)	Dia (m)	Depth to Water Level m.b.g.l	Reported Pre-monsoon Depth to Water Level (m.b.g.l.)	Fluctuation (m)	Remarks
26.	**BALINGA** – Near truckshed inside the land of Shri Pratilla Choudhary	282	9.20	1.30	4.75	2.69	8.00	5.31	
27.	**GARJAN BAHAL** – Infront of house of Shri Mahavir Agarwal, on the main road leading to Hemagiri	278	9.55	0.75	3.90	6.19	9.00	2.81	
28.	**KANIKA** – Adjacent to house of Md. Tayab	285	5.45	0.65	3.83	4.20	5.35	1.15	
29.	**LAKSHMIPUR** – On the roadside opp. to house of Bihari Raut	284	12.84	0.70	2.15	9.80	12.00	2.2	
30.	**BHELUATIKRA** – Adjacent to house of Samu Digi	263	13.90	0.90	3.00	10.20	12.00	1.8	
31.	**TANGARDIHI** – Infront of Navajyoti Yubak Sangha house	253	7.70	0.80	1.73	5.49	7.20	1.71	
32.	**BHUYAN BAHAL** – Inside the house of Upendra Bhaisal	274	7.00	6.1	2.80	3.90	6.00	2.1	
33.	**KAUDHARA** – Adjacent to house of Shri Somaru Bhoi	267	7.00	0.20	4.10	4.04	5.80	1.76	Irrigation large dia Dugwell
34.	**GIRINDOLA** – Inside the premises of Rahasa school	246	7.86	6.1	2.55	5.54	6.80	1.26	
35.	**CHAURIMAHUL** – Adjacent to house of Gobardhar Netty	235	7.88	0.62	2.00	5.33	7.38	2.05	
36.	**NAIKDIHI** – Inside the compound of Shyamsundar Kisan	226	7.23	0.73	4.30	4.17	5.28	1.11	
37.	**JALHARI** – Infront of house of Mahadev Dhurva	240	8.40	0.50	1.97	4.90	7.50	2.6	
38.	**BARJOB** – Adjacent to M.E. School on the road side	243	4.98	1.00	2.55	1.85	3.50	1.65	
39.	**MADHUPUR** – Inside the land of Cheitu Gauntia	244	5.40	0.25	7.00	2.70	3.60	0.9	Large dia irrigation well
40.	**NUAMUNDA** – Infront of Health Centre Near Entrance of village	238	10.67	0.36	2.30				

Sl. No.	Location	m.RL	Depth (m.b.g.l)	M.P. (m.a.g.l)	Dia (m)	Depth to Water Level m.b.g.l.	Reported Pre-monsoon Depth to Water Level (m.b.g.l.)	Fluctuation (m)	Remarks
41.	**CHELKUTHI** – Adjacent to house of Vijay Dilla	224	7.65	0.65	2.15	3.88	6.25	2.37	
42.	**JUNADIHI – RANKATA** – Inside the land of Lataben Dharua	222	8.05	6.1	4.35	4.20	6.00	1.8	Large dia irrigation well
43.	**GHUSRAMUNDA** – Infront of house of Sh. Ramesh Rout	222	7.06	0.69	3.42	2.06	5.50	3.44	
44.	**KONDAKUTA** – Infront of house of Shri Subhas Netty.	234	8.42	0.80	1.90	2.55	8.00	5.45	
45.	**AUNLAJHARAN** – Adj. to house of Shri Chandrasekhar petal	266	9.89	0.45	3.05	3.90	8.50	4.6	
46.	**KHUNTJHARIA** – Inside the house of Sankar Pradhan	246	7.55	0.60	2.72	4.73	6.40	1.67	D/W
47.	**GHUMRASAN** – Adj. to primary health sub centre & infront of C.P. office	267	60.00	6.1	200 mm	6.00	8.00	2	Govt. T/W
48.	**SARBAHAL** – Infront of house of Sh. Makund Mullia.	279	11.70	0.80	2.46	3.68	10.00	6.32	
49.	**KIRIPSIRA** – On telestorm side of Keripsira Garjanbahal road	274	4.60	6.1	4.00	1.30	2.00	0.7	Large dia irrigation well fitted with Tenda
50.	**BRAHMANI** – On Hemagiri – Kanika Road, infront of Dhoba	280	5.75	6.1	1.76	2.39	4.50	2.11	
51.	**BELDIHI** : Test well	268	146	0.7	200 mm	10.4	-	-	

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अवर सचिव / Under Secretary
कोयला मंत्रालय / Ministry of Coal
भारत सरकार / Govt. of India
नई दिल्ली / New Delhi-110001

Parameter	Limit		Observed Range	
	Desirable	Permissible	Ground water	Surface water
Chlorides (as Cl), mg/l	250	1000	12 – 103	12 – 18
Total Dissolved solids, mg/l	500	2000	85 – 554	82 – 96
Calcium (as Ca), mg/l	75	200	8.1 – 94.8	8.2 – 14.7
Sulphate (as SO_4), mg/l	200	400	0.15 – 43.03	0.9 – 4.14
Nitrate (as NO_3), mg/l	45	100	1 – 89	5 – 6
Fluoride (as F), mg/l	1.0	1.5	0.1 – 0.77	0.11 – 0.14
Alkalinity	200	600	48 – 182	42 – 52

From the above table it is evident that the groundwater of the shallow aquifer is nearly neutral with low alkalinity and mineralisation. The concentration of different elements present in groundwater of the area are well with in the desirable limit for human consumption.

11.0 MINE SEEPAGE

Utilising the proposed dimensions of the opencast mine the surface area of aquifer exposed in the mine pit has been worked out and the seepage from the mine face into the mine pit has been calculated using the Darcy's equation for laminar flow through porus media. The aquifer area has been taken entire formation exposed.

$$Q = T\,I\,L$$

Where

T =is transmissivity
I = Hydraulic Gradient
L = Length of aquifer

The transmissivity of the formation has been evaluated from the pump test data analysis and the hydraulic gradient has been evaluated from water table map (0.006). The stage was mine seepage estimates are presented (Table 7).

TABLE 7
YEAR WISE PROPOSED MINE DEVELOPMENT PLANS & MINE SEEPAGE

Year	Cumulative Excavated Area (ha)	Depth (m)	Cumulative Backfilled (ha)	Cumulative Void (ha)	Mine Pit Length (m)	Mine Pit Width (m)	Mine seepage (Cum/day)
3rd	119.79	22	-	119.79	2394	500	1740
5th	207.93	70	67.24	140.69	2578	870	2073
10th	354.55	123	148.86	205.69	2780	1495	2570
15th	443.27	160	183.62	259.65	2777	1818	2762
20th	486.84	190	211.62	275.22	2778	1940	2836

Year	Cumulative Excavated Area (ha)	Depth (m)	Cumulative Backfilled (ha)	Cumulative Void (ha)	Mine Pit Length (m)	Mine Pit Width (m)	Mine seepage (Cum/day)
25th	551.12	220	304.94	246.18	2057	2147	2527
30th	612.71	250	Nil	246.18	1503	2425	2361
Conceptual	624.31	260	364.74	259.57	1435	2425	2320

12.0 MAKE OF WATER

The source of water accumulation into the mine pit is rainfall and groundwater seepage. For uninterrupted mining activity the daily accumulation of water need to be cleared with in 72 hours adopting suitable mechanism of dewatering. To evaluate rainwater accumulation, probability analysis of daily rainfall data was carried out (Feasibility Report) and probable 24 hours rainfall has been estimated as 170 mm. To evaluate rainfall accumulation only void area has been considered. The make of water in different stage of mining has been given in Table 8.

TABLE 8
MAKE OF WATER IN MINE PIT

Year	24 hour* Rainwater	Mine Seepage Cum/day	Total water
3rd	203643	1740	205383
5th	239173	2073	241246
10th	349673	2570	352243
15th	441405	2762	444167
20th	467874	2836	470710
25th	418506	2527	421033
30th	418506	2361	420867
Conceptual	441269	2320	443589

** Void Area x Probable 24 hour Rainfall (170 mm)*

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WATER QUALITY TEST RESULTS

Date of sampling : 19.09.09

Parameters	Prescribed limits IS 10500	Bendrishura GW-1	Dulanga village GW-2	Kanakmura GW-3	Dudlia GW-4	Ghumrasan GW-5	Kiripeira GW-6	Parmanndpur GW-7	Lakdijharan GW- 8	Majhapara GW-9	Lalkera GW-10	Basundranala SW-1	Himagiri SW-2	Garianala SW-3
Color	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Taste	Agreeable	Agreeable			Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
Odour	Unobjec tionable	unobjectionable												
Turbidity, NTU	10	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
pH value	6.5to8.5	7.83	6.94	7.13	6.89	7.02	7.68	7.50	7.88	6.89	7.69	7.36	6.94	7.18
Total Dissolved solids, mg/l	2000	218	124	152	454	500	203	85	112	217	654	96	87	82
Total hardness (as $CaCO_3$) mg/l	600	144	90	68	280	292	124	60	80	148	284	64	44	44
Alkalinity, mg/l	600	103	48	67	143	158	135	51	70	102	162	52	42	48
Chlorides (as Cl) mg/l	1000	62	40	28	71	77	28	12	18	44	103	14	18	12
Iron (as Fe) mg/l	1.0	0.1	0.02	0.75	0.21	0.33	0.22	0.28	0.46	0.13	0.54	0.17	0.1	0.37
Fluoride (as F) mg/l	1.5	0.23	0.35	0.42	0.33	0.58	0.77	0.1	0.42	0.39	0.43	0.11	0.14	0.14
Sulphate (as SO_4) mg/l	400	1.35	1.04	0.15	33.42	28.54	5.03	0.15	1.04	12.27	43.03	4.14	0.9	1.92
Nitrate (as NO_3) mg/l	100	6	1	7	84	89	4	4	2	1	80	6	5	6
Calcium (as Ca), mg/l	200	32.0	21.0	19.6	65.4	60.5	32.7	8.1	16.3	37.6	94.8	8.2	11.4	14.7
Magnesium (as Mg)	100	15.5	8.2	9.7	29.16	34.0	10.69	9.72	9.72	13.61	12.64	10.69	3.89	1.94
Copper (as Cu) mg/l	1.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Manganese (as Mn) mg/l	0.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Mercury (as Hg) mg/l	0.001	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Cadmium (as Cd) mg/l	0.01	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Selenium (as Se), mg/l	0.01	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Arsenic (as As), mg/l	0.01	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Lead (as Pb), mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Zinc (as Zn) mg/l	15	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chromium (as Cr^{6+}), mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Aluminium (as Al)	0.2	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Boron	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

BDL (Below Detectible Level: As,Se,Cd,Cu,B,Cr,Mn,Zn,Al,Fe Concentrations < 0.01mg/L, Fe < 0.1mg/L an

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10.2.6.7 Clouds

During monsoon period i.e. June to September the skies are generally heavily clouded. Skies are generally clear or lightly clouded during the rest of the year.

10.2.6.8 Special Weather Features

Some of the monsoon depressions in July and August causes gusty winds and heavy rains. Dust storms or thunderstorms occur during March to June even in monsoon months.

10.2.6.9 Short-term meteorological data

The short-term data of temperature for the period for 1991 from Census Atlas, Series-19, Orissa and rainfall data for the period from 1994 – 2006 has been collected from the Block Development Offices at Hemgir of Sundargarh district and Jharsuguda of Jharsuguda District, Orissa (**Table 10.6 to 10.7**)

TABLE 10.6
MONTH WISE METEOROLOGICAL DATA (1991)
(Data from Census Atlas, Series-19, Orissa)

SL. NO.	MONTH	TEMPERATURE (°C)	
		SUNDARGARH DIST.	JHARSUGUDA DIST.
1.	January	17.45	19.95
2.	February	23.45	24.09
3.	March	27.04	28.02
4.	April	27.75	32.15
5.	May	33.05	35.85
6.	June	27.95	31.55
7.	July	26.04	29.00
8.	August	24.45	27.09
9.	September	26.65	28.02
10.	October	24.04	26.45
11.	November	23.02	22.25
12.	December	21.05	19.05
ANNUAL (Avg.)		25.00	27.17

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TABLE 10.7
MONTH WISE HIGHEST AND LOWEST TEMPERATURE (°C)
IN JHARSUGUDA DISTRICT, ORISSA

SL. NO.	MONTH	JHARSUGUDA CENTRE, ORISSA					
		1999		2000		2001	
		MAX.	MIN.	MAX.	MIN.	MAX.	MIN.
1	January	31.5	6.6	31.8	6.5	33.8	6.5
2	February	36.2	12.9	34.0	11.8	37.6	9.2
3	March	42.2	13.5	38.8	13.1	39.2	15.2
4	April	45.3	18.6	45.4	21.0	45.6	19.2
5	May	45.4	19.9	44.4	23.4	46.4	20.1
6	June	41.1	19.8	40.4	22.6	41.6	22.2
7	July	36.0	19.8	38.0	23.2	35.7	22.6
8	August	33.7	21.7	34.8	23.9	35.5	23.8
9	September	34.7	21.0	34.7	21.8	37.1	23.5
10	October	34.0	19.0	36.2	17.4	35.7	18.6
11	November	33.4	10.4	33.6	13.5	35.6	14.0
12	December	29.1	8.5	31.7	9.0	32.8	9.0

Source: DISTRICT STATISTICAL HANDBOOK, JHARSUGUDA, ORISSA.

TABLE 10.8
MONTHWISE RAINFALL (IN MM) DATA (1994- 2006)

(Data from meteorological station at Hemgir, Sundergarh, Orissa)

YEAR / MONTH	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Average
JAN	-	43.00	-	-	121.80	-	-	-	0.60	-	19.00	36.00	-	16.95
FEB	-	8.00	-	-	5.20	-	28.80	-	-	-	-	7.60	-	3.82
MAR	-	47.00	-	-	17.60	-	-	26.60	25.60	-	-	-	39.00	11.98
APR	-	6.08	-	41.00	-	-	-	-	11.20	-	54.20	5.00	47.40	12.68
MAY	5.00	38.00	13.08	11.40	17.00	208.80	91.60	11.00	53.00	-	-	33.00	71.00	42.53
JUNE	548.55	158.00	159.30	155.40	200.00	125.00	296.80	418.80	305.30	340.00	221.00	315.60	67.20	245.69
JULY	775.00	345.80	547.00	479.60	238.40	272.00	299.20	824.90	184.80	424.00	504.80	515.40	455.30	451.25
AUG	368.96	342.38	373.00	438.10	297.60	542.40	238.20	299.10	319.10	467.53	771.40	379.00	393.20	402.31
SEPT	245.80	205.06	139.20	233.00	455.20	228.80	133.40	86.10	178.40	457.20	100.00	279.80	161.00	223.38
OCT	16.00	38.00	23.30	-	86.00	0.40	-	104.00	-	211.40	72.80	100.40	35.00	52.87
NOV	0.20	61.00	-	25.00	33.00	-	-	-	-	10.20	-	-	1.80	10.09
DEC	-	-	-	104.60	-	-	-	-	-	11.00	-	0.40	-	8.94
TOTAL	1959.51	1293.32	1254.88	1488.30	1471.80	1377.40	1088.00	1770.50	1078.00	1921.33	1743.20	1672.20	1270.90	1482.49

Source: Block Development Office, Hemgir, Sundergarh, Orissa

TABLE 10.9
MONTHWISE RAINFALL (IN MM) DATA (1997- 2006)

(Data from meteorological station at Jharsuguda, Orissa)

YEAR	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Average
MONTH											
JANUARY	NA	118.00	-	-	-	32.00	-	11.00	44.00	-	*22.80*
FEBRUARY	NA	-	-	20.00	-	-	20.00	7.00	4.00	-	*5.70*
MARCH	NA	20.00	-	-	37.00	10.00	7.00	-	7.00	31.00	*12.40*
APRIL	NA	2.00	-	-	37.00	11.00	10.00	-	-	15.00	*8.30*
MAY	NA	51.00	52.00	84.00	19.00	27.00	10.00	9.00	18.00	70.00	*35.60*
JUNE	168.00	335.00	198.00	132.00	197.00	213.00	323.00	154.00	112.00	128.00	*196.00*
JULY	307.00	239.00	286.00	135.00	783.00	305.00	313.00	342.00	422.00	248.00	*338.20*
AUGUST	553.00	196.00	600.00	147.00	503.00	312.00	380.00	428.00	271.00	305.00	*369.50*
SEPT	435.00	521.00	278.00	170.00	141.00	184.00	368.00	54.00	161.00	53.00	*236.50*
OCT	-	44.00	14.00	11.00	79.00	78.00	224.00	100.00	64.00	12.00	*62.60*
NOV	52.00	37.00	-	-	-	-	-	0.03	2.00	2.00	*9.30*
DEC	126.00	-	-	-	-	-	21.00	-	53.00	-	*20.00*
TOTAL	1641.00	1563.00	1430.00	699.00	1796.00	1172.00	1676.00	1105.03	1158.00	864.00	*1316.90*

Source: Block Development Office, Jharsuguda, Jharsuguda, Orissa **NA: Not Available**

10.3 SOCIO-ECONOMICS

10.3.1 GENERAL

Socio-economics is defined as being related to or involving a combination of social and economic factors, which are required to be studied so as to create and maintain conditions under which man and nature can co-exist in productive harmony and fulfill the social, economic and other requirement of present and future generation. The objective of the socio-economical study is to ensure that the presently un-quantified environmental amenities and values may be given appropriate consideration in decision making along with economic consideration while formulating the development project.

Base line data on socio-economic attribute within the study area of Dulanga Coal Exploration Block has been collected from the Census Department, Govt. of India, to assess the existing status of socio-economic conditions of the people.

The village-wise Primary Census Abstract and Village Directory for the study area have been obtained from the Office of the Registrar General India, New Delhi. The village boundary map (Census Book-1991 of Sundargarh and Sambalpur Districts) has been obtained from the District Collector Office (Statistical Department) Districts Sundargarh and Jharsuguda, Orissa; as the village boundary maps of 2001 Census was not available. The new district of Jharsuguda carved out from Sambalpur came into existence in 1994.

The information collected on the socio-economic attributes of the study area is discussed in succeeding paragraphs with reference to:

1) Community structure
2) Employment patterns
3) Amenities and infrastructure
4) Social and cultural activities

10.3.2 COMMUNITY STRUCTURE

The study area is a part of Hemgir, Lephripara & Bhasma Police Stations of Sundargarh and Lakhanpur, Brajrajnagar & Belpahar Police stations of Jharsuguda Districts of Orissa. The villages, which are situated at the periphery and falling partly within the study area, are also considered for summarizing the demographic details. The study area covers a total of 68

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villages. The study area is entirely a rural area having very low infrastructure facilities.

The salient observations on the community structure are as under:

(A) **Uninhabitated Village**: All the villages are inhabitated.

(B) **Households:** The total numbers of household in the study area are 11074 and all the 11074 households are residential households. The average persons per residential household are 4.27.

(C) **Total Population and Population Density:** The total population of the study area is 47282 persons with an average population density of 132.84 persons / sq.kms.

Kanika village is the most densely populated (402.98 persons / sq/km.) village and Bheluatikira village has the lowest population density of 35.08 persons/sq.kms. in the study area.

The range wise distribution of populations of villages is as under

Population Range (Persons)	Number of villages
More than 5000	Nil
2001 to 5000	5
1001 to 2000	7
501 to 1000	15
Less than 500	41
Uninhabited	Nil
Total	**68**

(D) **Sex Ratio:** The male and female population in the study area is 23796 and 23486 persons respectively with an average sex ratio (i.e. female per thousand male) of 987. The highest sex ratio (1245) is of Bandhbahal village, where as the lowest sex ratio (787) is in Burta.

(E) **Child Population: (0-6 age group):** The child population in the study area as per 2001 census is 6080 i.e. 12.86% of the total population. The male and female child population in the study area is 3011 (6.37%) and 3069 (6.49%) respectively with an average sex ratio of about 1019. The population density of child population in the study area is about 17.08 child/sq.km.

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(F) **Schedule Castes:** The schedule Castes (SC) population within the study area is 7366 persons amounting to 15.58% of the total population. The sex ratio is 1003 with male and female population being 3678 and 3688 respectively. There are 11 villages in the study area having no SC population. Kuturajore has the highest proportion of SC population i.e. 42.71%.

(G) **Schedule Tribes:** The population of Schedule Tribes (ST) is 24400 persons i.e. 51.61% of the total population in study area. The sex ratio is about 995 with male and female ST population being 12231 and 12169 respectively. All the villages in the study area are having ST population with percentage ranging from 5.66 to 100.00%.

(H) **Literacy Rate:** A person who can both read and write with understanding in any language has been treated as literate in 2001 census. All children of the age of 6 years or less have been excluded from total population while calculating the literacy rate.

The average literacy rate of the study area is 63.21% of the total population. The male literacy rate is 75.41% of total male population and the female literacy rate is 50.79% of the total female population in the study area. The minimum female literacy rate of 10.64% is observed in village Bandhbahal village.

10.3.3 EMPLOYMENT PATTERN

The 2001 Census has assessed the employment pattern on the basis of the economic activities. The population has been classified into three main categories, viz. main workers, marginal workers and non-workers. The main workers include person employed in cultivation, agriculture labour and allied activities, construction, household industries, other than household industries, commerce & trade, transport storage, communication and other services. The marginal workers are those who are employed for some part of the year and remain unemployed during the remaining part of the year. The non-workers are unemployed persons. The village-wise detailed data on employment pattern with proportion of the main, marginal and non workers out of the total population are given below:

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A) **Employment Level:** The data on employment pattern reveals that the employment level in the study area is low with only 30.35% of the total population employed full time (main workers). The breakup of the data on the three categories of the workers is as under:

Category	Employment percentage of population				
	Male Employment		Female Employment		Total population
	Male population	Total population	Female population	Total population	
Main workers	45.97	23.14	14.52	7.21	30.35
Marginal workers	11.81	5.94	28.58	14.20	20.14
Non-workers	42.22	21.25	56.90	28.26	49.51

The employment level of male population is much higher than that of female population. In the study area 23.14% male of the total population (i.e. about 45.97% of male population) comes under main workers categories while only 7.21% female of the total population (i.e. about 14.52% of female population) are main workers.

B) **Categories of Main Workers:** The predominant categories of main workers are cultivators and agricultural labour.

10.3.4 AMENITIES

The data incorporated under various amenities have been taken from 2001 census. The salient features of the various amenities available in the study area are as depicted below:

The study area being entirely a rural area the **"educational amenities"** available to the population are poor and include only primary, middle and high school level education facilities. Out of 68 inhabitated villages in the study area 62 villages are having primary school facility. Only four villages are having more than one primary school. The middle schools and high school education facility is very low i.e. only 22 villages (32.35%) are having middle school facility, while high school facility is available in only eleven villages (i.e. 16.18%). College education facility is available in only three villages within the study area. There are no adult literacy centers in the study area. All the villages are having educational facilities.

The **"medical amenities"** in the study area are very poor: Only five primary health centers are available at village Duduka, Laikera, Kanika, Raidihi and Darlipali apart from these thirteen primary health sub centers are also available within study area. The study area is having lack of medical facilities like, Maternity Home, Maternity & Child Welfare Center and Nursing Home etc. Rest of the medical facility is available beyond 10 Km. of the study area.

Every village is having one or other source of **drinking water**: Main sources of "potable water" in the study area are Tap, Tank, Hand pump, Tube well & well. The data indicates that most of the villages are having more than one source of drinking water. Hand pump and well are the main source of water in the study area.

"Post and Telegraph" services in the study area are poor: The post office facility is available in only 13 villages and only Three villages have Post & Telegraph Office in the study area these villages are Hemgir, Kanika and Raidihi. Telephone facilities are available in thirty-six villages. The majority of the villages are having these facilities available within 5 km.

"The power supply": The power supply position is poor in the study area. Only twenty-seven villages are having power supply for domestic purpose. There are twenty-six villages in the study area, having power supply for all-purpose, while only one village i.e. Khuntijharia village having power supply for agriculture purpose.

The study area has a good approachability by road. All villages are connected to each other by Katcha road. Dulanga is approachable by Tar road joining Hemgir - Jharsuguda. The nearest railway station is Hemgir, which is about 28 Km away from Dulanga block and is falls within the study area.

10.3.5 SOCIAL AND CULTURAL ACTIVITIES

"Language": Oriya is the regional language of Orissa. The inhabitants of this area commonly read, write and speak in Hindi language and most of the villagers can understand and speak Hindi language. The tribal people have their own oral tribal languages and they do not know Oriya. The most important tribal languages are Mundari, Santali, Saora and Kui/Kuvi.

"Habits and Festivals": The people of Orissa largely rural keep to the traditional values and are very religious. The district is inhabited mainly by Scheduled Tribes and there is much difference between the inhabitants of Gangpur and Banei ethologically and economically. Until the establishment of the Raurkela Steel Plant, the district was relatively calm and quiet.

The cultural activities of the tribes are gradually changing due to their contact with cosmopolitan city of Raurkela and nearby town Jharsuguda. Jharsuguda district has a rich and developed cultural heritage. Various fairs and festivals are observed round the year for centuries by the different communities with complete harmony, notably Ranjta festival, Rath Jatra in Kukunjunga, Gokulastami Jatra in Rajpur and Makar Rathjatra in Belpahar. The main festival celebrated in the area is "Durga Puja & Deepawali".

10.4 PLACES OF RELIGIOUS / HISTORICAL AND ARCHEOLOGICAL IMPORTANCE AND TOURIST INTEREST

Sundargarh is about 55 km from the study area. Chatri hill located 60 km from Sundargarh (20-kms. on fair weather road branching off the main road connecting Sundargarh and Raurkela at a place called Bargaon) the unique features hill is that it is monolithic one totally barren of trees, bushes and pebbles. Some caves and some ancient palaeographic marks are also found on the hill. Junagarh is a fort of historical and archaeological importance with some ancient caves and having marks of Tantra worship is situated 4 kms. from Hemgir. Near Lakura village on the foot of Maheswar Pahad, there is a small village called Ulap where the ruins of the holy Ulapgarh fort and Ushakothi caves are situated 21km from Jharsuguda.

"Industries": Raurkela has come into prominence with the establishment in 1955 of the three public sector steel plants set up in India. It is one of the most modern steel plants deploying the latest technology in smelting steel. This is the biggest planned town in Orissa, which is spread over an area of about 45 Sq. Kms.

Basundhara Project near Balinga is the coalmine area of IB River Coalfield situated 18 Kms northwest of Dulanga. Similarly Brajrajnagar and Belpahar are also known coalmines area of IB Valley Coalfield in the southern part of the study area. The beautiful forest resources and agricultural products provide ample scope for the development of forest based and agro based industries.

10.4.1 **Does area (Partly or fully) fall under notified area under water (Prevention & control of Pollution) Act 1974.**

No.

10.5 PROJECT AFFECTED PEOPLE (PAPs)

There are 417 PAPs within the block, out of which 309 are resident PAPs and the rest 108 non-resident PAPs.

10.6 ENVIRONMENTAL IMPACT ASSESSMENT

Baseline information on various relevant environmental aspects generated and compiled for the project area, covering both core and buffer zones have been incorporated. These information provide an outline of the prevailing environmental scenario at the mining site and its surroundings. Mining, like any other development activity is bound to have some impact on the existing environment; both adverse and beneficial. The impacts on the physical, ecological and socio-economic environment of the area due to the proposed project are given in the following paragraphs.

10.6.1 Land environment

i) Land degradation and aesthetic environment

Year / stage wise area excavated is given in **Table 10.10**. The anticipated land use during mining operations within and outside block is tabulated in **Table 10.11. & Table 10.12**

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TABLE 10.10
YEAR / STAGE WISE AREA EXCAVATED

Year	Area excavated (ha)	
	Progressive	Cumulative
1st	29.06	29.06
2nd	37.47	66.53
3rd	35.40	101.93
4th	56.01	157.94
5th	39.28	197.22
10th	128.78	326.00
20th	159.85	485.85
Conceptual (24th)	24.93	510.78
Total	**510.78**	

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TABLE 10.11
LAND USE DURING MINING (INSIDE BLOCK)

Sl. No.	Type of Land Use	Area (ha)
1	Excavated area	510.78
2	Area planned for Phase-II	86.93
3	Barrier	2.61
4	Green Belt	10.84
5	Settling Pond	2.14
6	Coal stockpile	2.75
7	Topsoil stockpile	3.84
8	Nala diversion	14.06
9	Nala Embankment	6.58
10	Road	6.25
11	Temporary workshop	2.32
12	Coal handling plan	2.96
13	Loading Warf	2.04
	Total	**654.11**

TABLE 10.12
LAND USE DURING MINING (OUTSIDE BLOCK)

Sl. No.	Type of Land Use	Area (ha)
1	External OB Dump	106.50
2	Green Belt	72.80
3	Rail head	7.08
4	Coal handling plan	0.33
5	Road	6.94
6	Nala Diversion	6.42
7	Nala Bund	3.46
8	Sub Station	5.34
9	Workshop	4.58
10	Erection Yard	1.05
11	Main Office	0.25
12	Mining Facilities	0.17
13	Vocational Training Centre	0.13
14	Shift setting office	0.03

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Sl. No.	Type of Land Use	Area (ha)
15	Rescue Services	0.05
16	Dispensary	0.06
17	Quality lab	0.04
18	Magazine	1.05
19	Bore well facilities	0.25
20	Colony	20.00
	Total	236.52

ii) Impact due to solid waste

The solid waste dumping will lead to land degradation by occupying virgin area to an extent of about 73.84 ha before the end of 3rd year. It will also cause an impact on topography and visual asthetics due to its 60 m height. Additionally 10.00 ha land will required for storage of topsoil. Out of total 510.78 ha area excavated, 413.07 ha will be backfilled.

iii) Land profile

Presently, the core zone is virgin and topography is gently undulating with higher contours at NE side. The buffer zone is also in the form of gently undulating topography. The mining operations are not anticipated to cause any adverse impact on topography in reserved forest and outside the core zone. Irreparable damage to land can be caused by excavation and dumping, if appropriate control measures as suggested in the management plan are not adopted.

iv) Visual Intrusion

Due care has to be taken (from the conception stage of the project) for reducing the visual intrusion to a minimum. However, the movement of vehicles for transportation of coal from the mine to the plant may cause some intrusion. The other visual intrusion will be the outside dump (60m high) and the crown on the backfill (50m high) which will be visible from a distance. Appropriate measures such as green belt cover and concurrent reclamation will be needed to reduce visual intrusion from dumps, roads and facilities.

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10.6.2 IMPACT ON AIR QUALITY

The opencast mining operations are prone to generation of higher levels of SPM and to a limited extent of SO_2, NOx and CO due to blasting, fuel, oil combustion, burning of coals etc. However, there are no point source emissions. The coal transportation outside the ML area will be affected by rail; hence no adverse impact is anticipated.

10.6.3 IMPACT ON WATER QUALITY

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 nalas, it will 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 stock piles 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 unpotable and hence cannot be used by the local people. The percolation of sewage waste from the pit head as well as colony area will also pollute the ground water if control measures are not adopted as envisaged in the management plan.

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Meagre amount of sanitary waste, expected to be generated from various facilities will be treated properly through septic tanks and soak pits and is not anticipated to cause any water pollution.

10.6.4 IMPACT ON NOISE LEVEL

Noise is unwanted and unpleasant sound which causes distraction, disturbance and annoyance. Continuous exposure to high level of noise can impair human hearing power. The mining activities generate noise mainly on account of

- Operating mining machinery
- Use of explosives
- Moving road vehicles

The impact of these airborne noises will be more on the operating personnel and on the persons working nearby and not so much on the surroundings. The noises of activities also disturb animals/birds living in the surroundings forcing them to change their habitation. In the present case, the noise caused thereby has an impact to cause wild life migration.

The noise level at present may be well within the desired limit. But the future establishment Noise due the proposed project activity may pose some problem if project management will not adopt appropriate control measures.

10.6.5 EFFECT ON VIBRATION LEVEL (DUE TO BLASTING)

No ground vibration study has been conducted hence the impact of the proposed activity on ground vibration cannot be anticipated. It is proposed to conduct the study when the mining operations start.

10.6.6 IMPACT ON WATER REGIME

No impact on the surface water resources is envisaged as the water is not proposed to be drawn from surface or ground water resources. The water from the mine sump will be used for all purposes. However, in view of availability of ground water at shallow levels, the ground water level in the surrounding vicinity of the mine will be lowered causing drying of wells out to certain distance.

The Garia nala, Baidhara nala and nala "B" crossing the ML area are planned to be diverted but this will not cause any adverse impact as they will

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be joining at the pre determined place after the span of the block. The rehabilitation of the villages of the ML area in the initial stage itself will reduce any adverse impact.

10.6.7 IMPACT ON SOCIO-ECONOMIC ENVIRONMENT

a) Human settlement

As already mentioned earlier, 309 households out of 417 PAPs of Dulanga, Majhapara, Beldihi and Kathpal villages falling within the mine lease area depend upon agriculture. The land owners will be deprived of their land and the non land owners who depend upon agriculture will be deprived of their earnings.

On the other hand the mining and allied activities will provide job opportunities for eligible persons and many will find employment in service sector and marketing of day-to-day needs viz. poultry and other agricultural products The facilities and amenities like dispensary and communication, to be set up for the project will improve the basic infrastructure and these amenities can also be used by the people of the nearby villagers. The proposed long term activity will open up market and opportunities growth for self employed and cultivators. To this extent, the impact will be significantly beneficial since un-employment and under employment is the main socio-economic problem faced by the people in this area.

10.6.8 IMPACT ON HISTORICAL MONUMENT

There is no such monument within and outside the ML boundary in buffer zone. Hence question of impact on historical monument does not arise.

10.7 ENVIRONMENTAL MANAGEMENT PLAN

The environmental impact assessment made in the preceding section has identified the areas where certain control measures are called for to minimise the negative impacts. Subsequent paragraphs deal with effective measures proposed to be taken up with regard to the following aspects so that the proposed mining and allied activities can be continued in an environment-friendly manner:

i. Land use planning – Afforestation and landscape development

ii. Air pollution control

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iii. Blasting and Noise control

iv. Water pollution control

v. Socio-Economic aspects

10.7.1 LAND USE PLANNING

10.7.1.1 Land degradation control measures

Land degradation is one of the major adverse outcomes of opencast mining activities and any effort to control adverse impacts is considered incomplete when appropriate land reclamation strategy is not adopted. Since the land degradation in this mine is partly in the form of excavated void and partly in the form of external and internal dumps, the reclamation strategy must include a programme for the reclamation of the disturbed land.

a) Mined area reclamation

The lessee will have to take necessary steps to keep the area under disturbance at any stage of mining operation to a minimum. This can be achieved by carrying out the reclamation programme simultaneously with excavation. The gap can be reduced between degradation and the reclamation by this programme. The post mining land use of core zone shows that all the disturbed areas will be reclaimed before abandoning the mine excluding the void, garages, office, magazine and other facilities will be left as such to be used later as social infrastructure.

10.7.1.2 Top soil management

The total top soil generated (3.65 Mm^3) during the development of mine will be stacked separately in a soil stack pile located within the block area along the western boundary at south eastern corner of the block and will be stacked over an area of 3.84 ha. This location is good enough for the first five years. If necessary the location of the top soil dump will change with the advancing mine operations either over the unexcavated area or over the backfilled area. The stacked soil will be re handled and spread to the required location before its fertility vanishes. It will be used for plantation development of green belt along the fringes of the site roads and reclamation of surface dump and backfilled area.

The top soil stockpiles will be low height not exceeding as per the prescribed norms. This will be grassed to retain fertility if required. Besides this topsoil

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stack, there would be temporary stacks over the area to be reclaimed which will be made use of for concurrent filling without bringing the topsoil to the soil stack near the OB dump.

10.7.1.3 Post reclamation land use

The first step in a successful reclamation programme is to decide the post reclamation land use. The post mining land use with environment management is given in **Clause No. 9.5 of Chapter 9.**

In case of this mine, it would be appropriate to restore the lands to the original land use to the extent possible due to following reasons:

Whole of the excavated area is proposed to be developed into a picnic spot due to the formation of water body created as a result of the left out void. The water body will be used for irrigation, watering the forest at earlier stages and it will also attract avifauna. The depth of the void will be about 255 m (max) which may be reduced in post mining scenario by backfilling washery rejects etc. The plan showing the mine at the abandoned stage is given in **Plate - 49.**

10.7.1.4 Soil conservation measures

The following control measures to prevent soil erosion and wash off of fines from freshly excavated benches and dumps will be adopted:

i. Garland drains will be provided around the mine whenever required to arrest any soil from the mine area being carried away by the rain water.

ii. The bench levels will be provided with water gradient against the general pit slope to decrease the speed of storm water and prevent its uncontrolled descent.

iii. Special local stone paved chutes and channels will be provided wherever required, to allow controlled descent of water, especially from external dumps.

iv. Gullies formed, if any, on side of the benches shall be provided with check dams of local stone or sand filled bags.

v. The inactive dump slopes will be planned with bushes, grass, shrubs and trees to prevent soil erosion after applying top soil.

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vi. Retaining walls (with gabion, concrete or local stone) will be provided, wherever required, to support the benches or any loose material and also to arrest sliding of loose debris.

10.7.1.5 Afforestation

i) **Compensatory afforestation**

Compensatory plantation will be provided in line with the prevailing rules of Forest Department for the forest/reserve forest falling within the ML area.

ii) **Plantation during mining**

A plantation program over life of the mine has been planned in a phase wise manner. The plantation will be started from first year of mining along the EE boundary of the block and also around the southern boundary. The green belt development around the ML area will be completed within the 5 year. Plantation over backfilled area will be commenced from 4th year of mining.

A thick plantation is proposed to be provided and maintained around the mining area and along the roads. The yearly requirement of plants during the various years and stages of the mining project is as shown in the **Table 10.13.**

TABLE 10.13
REQUIREMENT OF PLANTS (YEAR/STAGE WISE AND LOCATION WISE)

Year	Requirement of plants for mine reclamation/afforestation			
	Planted Area (ha)			No. of Trees @ 2500/ha
	Inside Block Boundary	Outside Block Boundary	Total	
1st	0.00	17.93	17.93	44825
2nd	0.00	9.45	9.45	23625
3rd	0.00	17.72	17.72	44300
4th	0.00	28.99	28.99	72475
5th	37.23	34.62	71.85	179625
Conceptual (24th)	286.74	179.72	466.46	**1166150**

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To fulfill the requirements of nursery plants, a nursery will be established at the site. During peak requirements, additional plants will be transported from Govt./Forest nurseries, located around the area.

10.7.2 AIR AND DUST POLLUTION CONTROL MEASURES

The mining operations and related activities are anticipated to an increase the levels of SPM and gaseous pollutants to a limited extent. The control measures to be adopted are mentioned in the following paragraphs:

10.7.2.1 Controlling fugitive dust

Dust particles which are normally generated during various mining, crushing operation and transportation deteriorate the ambient air quality. Adequate control measures are, therefore, proposed to be taken during mining operations, transportation and crushing/loading operations. These control measures are discussed as follows:

i) **Mines**

a) Dust suppression systems (like water spraying) will be adopted at:

   i. Faces before and after blasting
   ii. Faces while loading

b) Dust extraction systems will be used in drill machines and crushing plant.

c) Dust generation will also be reduced by using sharp drill bits for drilling holes; drills with flushing system.

ii) **Haul roads and stock-piles**

a) Dust suppression system (like water spraying) would be adopted at roads which are used for transportation. Sprinklers (Whirling) have been proposed to be installed along the roads to suppress the dust.

b) Transport vehicles shall be maintained leak proof.

c) Suitable dust extraction or suppression systems such as mist sprays with or without chemical will be provided at appropriate places for preventing dust pollution during handling and stockpiling of coal.

d) Transfer points of coal will be provided with appropriate hoods/chutes to prevent fugitive dust emission.

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10.7.2.2 Preventing dispersal of air borne dust

In addition to the control measures proposed during mining and transportation operations, following steps will be taken to prevent air pollution due to airborne dust:

a) Dense tree belts will be planted around the mine and sites housing crushing and loading facilities.

b) Plantation over already mined out area will be done after backfilling as per schedule (with minimum gap between excavation and afforestation)

c) Dust masks will be provided as safety measure to the workers, engaged at dust generation points like drills, loading/unloading points, crushers etc.

10.7.2.3 Measures to mitigate CO levels

All heavy and light vehicles shall be tested for pollutants concentration in their exhausts regularly and well maintained. Strict vigil will be kept in and around the operational area for any fire which shall be immediately controlled.

10.7.2.4 Measures to mitigate NOx levels

The main reasons of production of NOx gases are:

a) Poor quality of explosive having large oxygen imbalance which can be due to following reasons:

- Manufacturing defect
- The use of expired explosives in which disintegration of ingredients has taken place

b) Incomplete detonation is caused mainly due to low primer column ratio.

To ensure that NOx levels do not increase during the proposed mining operations, the following control measures will be adopted:

a) Good quality explosives will be used for which the oxygen balance will be checked from time to time. The expired explosives will not be used for which a strict vigil will be kept on the date of manufacture. Even as a normal procedure, all explosives will be subjected to a

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visual inspection and if disintegrated ingredient are spotted, the explosives will not be used even if it is within expire date.

b) Primer: Column ratio will be rationalised. The ratio thus established, for producing minimum NOx, will be adhered to.

The mine ambient air quality will be regularly tested to detect the presence of any pollutants above prescribed limits and appropriate measures will be adopted.

10.7.3 NOISE AND BLASTING

10.7.3.1 Measures to control noise pollution

The following control measures will be adopted to keep the ambient noise levels below permissible limits 75 dB (A).

i. Provision and maintenance of thick tree belts to screen noise.
ii. Avenue plantation within the project area to dampen the noise
iii. Proper maintenance of noise generating machinery including the transport vehicles will be ensured.
iv. Provision of the air silencer to modulate the noise generated by the machines will be made wherever required.

To protect the workers from exposures to higher noise levels the following measures will be adopted.

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

10.7.3.2 Measures to reduce ground vibrations due to blasting and prevent fly rocks

The vibrations due to blasting will be studied before the commencement of mining operations and the recommendations/suggestion given as per the result of the said study will be strictly adhered to especially the charge per delay.

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10.7.3.3 General recommendations and suggestion

i. The peak particle velocity (PPV) of ground vibration will be kept below 50 mm/s by controlled blasting techniques which is substantially below the permissible limit of 70 mm/s.

ii. A low powder factor of 0.30 to 0.35 kg per BCM (bank cubic metre) will be adopted.

iii. Loading technique will be used with 200 kg at the bottom of the hole and remaining 165 at mid distance from the surface

iv. Drilling and charging pattern will be modified, if required, based on the vibration study to be carried out.

v. Short delay detonators will preferably be used in blasting rounds rather than detonating fuse as trunk line.

vi. To contain fly rocks, stemming column will not be less than burden of the hole and the blasting area will be muffed.

vii. Each blast will be carefully planned, checked, executed and observed. Blasting data will be recorded. During blasting a responsible officer will be supervising the whole operation.

viii. Covering the detonating fuse, in case it is used, at least with 150 mm thick cover of sand or drill cuttings.

ix. Blasting will be carried out at mid-day and never at night

x. Blasting will not be carried out when strong winds are blowing towards the inhabited areas.

Apart from the above, in order to ensure slope stabilisation, controlled production blasting will be adopted to avoid tension cracks and back breaks. Such cracks filled with water reduce stability of excavated slopes and angle of slopes. Good drainage system will be provided in and around the mine.

10.7.4 WATER POLLUTION CONTROL MEASURES

10.7.4.1 Effluent from mine

i. To prevent surface and ground water contamination by oil/grease and sewage waste, following control measures are proposed to be implemented.

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a) Leak proof containers will be used for storage and transportation of oil/grease. In the store also, the container containing oil/grease will be kept in empty safe open containers of higher volume than the containers to avoid oil/grease spillage. The area over which oil/grease is handled will be kept effectively impervious. Any wash off from the oil/grease handling area or workshop will be drained through impervious drains, collected in specially constructed pit and treated appropriately before releasing it into the natural drains.

b) The sewage waste generated will be drained by underground impervious drains, lead to appropriately designed septic tanks and soak pits to prevent any pollution of surface or ground water.

ii. The surface and ground water in and around the mine, loading plant and infrastructure will be regularly tested and appropriate control measures adopted in case of any pollutant is detected above the prescribed limit.

iii. All stacking and loading areas will be provided with proper garland drains equipped with baffles to prevent wash offs from reaching the downstream natural channels.

10.7.4.2 Storm water

Control measures to be adopted are briefly discussed below:

i. Check dams will be provided to prevent solids from wash off and screen if any from the mine related activities.

ii. Peripheral bunds will be erected on the outer edge of the abandoned benches before reclamation so that the soil is not carried away by storm water.

iii. A water gradient of about 1 in 100 will be kept at every bench towards inside of the bench to prevent formation of gullies in the bench slopes causing serious erosion.

iv. Chutes will be constructed by using local stone or masonry to guide the water in areas with loose soil to prevent erosion and uncontrolled descent of water wherever necessary.

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v. Construction of garland drains around freshly excavated and dumped areas so that flow of water with loose material is prevented. The mine water will be passed through specially constructed catch pits to arrest any loose material being carried away with water.

vi. Any areas with loose debris within the lease hold will be planted.

10.7.4.3 Measure to minimise adverse effects on water regime

During the process of mine rehabilitation and with the completion of backfilling, a water body will be created in the mined out pit which will act as water reservoir improving the ground water recharge, source of attraction for fauna and will help in the maintenance of afforested areas. To enhance aesthetic appearance, parks and lawns will be made around the water body.

10.7.5 SOCIO-ECONOMIC ASPECTS INCLUDING RESETTLEMENT AND BENEFITS

The 309 households to be rehabilitated from the four villages will be compensated for their land, building structures and amenities through direct negotiations or through Govt. Notification in line with state R & R policy hence, no major negative impact is anticipated. It may be noted that NTPC has its own R&R Policy also which is prepared in line with NPRR 2003 and NPRR 2007.R&R Compensation package will be in line with those suggested by Xavier Institute of Social Welfare in their "Socio Economic Survey for Dulanga Coal Mining Project" of May 2008. The development in the area which is predominantly backward, will largely benefit the local population. Preference will be given to the local people for gainful employment in the unskilled and semi-skilled categories as and when the need arises.

Due to development activity in the rural and backward area, traders and private enterprises will grow in the region which will provide indirect employment to the local people.

The company will arrange medical camps, sports competitions and awareness programmes for this benefit of the local people.

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10.7.6 CORPORATE SOCIAL RESPONSIBILITY (CSR) ACTIVITIES

10.7.6.1. General

a) R&R Plan would be finalized in consultation with stakeholders as per extant R&R policies of State Govt. of Odisha and GOI viz. NRRP-2007.

b) Rehabilitation & Peripheral Development Committee (RPDAC) already been constituted by State Govt. as per prevalent practice in Odisha and two meetings have already been held.

c) R&R Plan will cover individual R&R benefits as well as activities pertaining to Community and Peripheral development and is expected to be finalized within 6 months, copy of which would be submitted to MoEF after finalization.

d) Pending finalization of R&R Plan, Initial Community Development activities have already been initiated.

10.7.6.2. Tentative Resettlement Benefits For Homestead Oustees (As per Odisha R&R Policy 2006 as amended in 2008)

SL. NO.	DESCRIPTION	AMOUNT/ DETAILS
i)	House site in R&R colony	1/10th Acre of land
ii)	Assistance for self relocation	₹. 0.56 Lakh
iii)	Home building assistance	Constructed house or ₹.1.66 Lakh
iv)	Assistance for temporary Shed	₹.0.111 Lakh
v)	Transportation charges	₹.0.023 Lakh
vi)	Subsistence allowance (±)	₹. 2300/- per month for 1st year

10.7.6.3. Tentative Rehabilitation Benefits As Per Odisha R&R Policy-2006 (As amended in 2008)

SL. NO.	DESCRIPTION	AMOUNT (₹.LAKHS)
i)	Displaced family losing all land including homestead	5.52
ii)	Displaced Family losing more than 2/3rd of agricultural land and homestead land	3.31
iii)	Displaced family losing more than 1/3rd of agricultural land and homestead land	2.21

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SL. NO.	DESCRIPTION	AMOUNT (₹.LAKHS)
iv)	Displaced family losing only homestead land but not agricultural land	1.11
v)	Displaced family losing only agricultural land but not homestead land	1.11

10.7.6.4. **Tentative Community Development Plan**

Broad areas would include as under:

i. **Health**
   a. Mobile clinic in ambulance with testing and diagnostic facilities,
   b. Up-gradation of local PHC with equipments and infrastructure,
   c. Health camps in affected villages.

ii. **Education**
   a. Augmenation of infrastructure and equipments, furniture in schools,
   b. Scholarships to meritorious students,
   c. Partnerships in state sponsored education programmes.

iii. **Water**
   a. Provision of potable drinking water supply in affected villages,
   b. Awareness campaigns for water borne diseases, sanitation and hygiene.

iv. **Infrastructure**

   Construction of roads, drainage, community halls, school buildings, health centres, public utilities, sanitation facilities.

v. **Capacity Building**
   a. Setting up new ITI / Adoption of ITI with necessary infrastructure and machinery,
   b. Sponsorship of PAPs / wards for full / short term courses in vocational training,
   c. Specific programmes for ladies.

vi. **Vulnerable Persons**
   a. Pension to vulnerable (Elderly / Widows / Special Abilities)
   b. Creation / Adoption of old age homes etc.

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vii. **Sports and Culture**

a. Regular rural sports, facilitation / sponsorship to local talent etc.

However, specific activities would be finalized in consultation with the stakeholders including PAFs, Government of Odisha etc. through the Rehabilitation and Peripheral Development Advisory Committee (RPDAC) for Dulanga Project.

10.7.6.5. **CSR/ Initial Community Development Activities Undertaken at Dulanga Coal Mining Project**

Sl. No.	Budget Head	Description	Amount Spent in ICD Plan (₹.Lakh)
i	Health	Medical camp	5.50
		Ambulance	3.00
		Sports	1.00
ii	Education	Teacher	2.00
		Driving training	8.00
		Distribution of school bags	0.60
		Distribution of study kits	0.50
		Solar lantern	2.00
		School infrastructure	1.15
		Providing PCs & Soft copies of study materials	1.50
iii	Water	Distribution of drinking water	2.00
iv	Infrastructure	PIC rent	0.29
		Volunteer	2.30
		Making barbed wire fencing in school in Dulanga	0.60
		Solar street lamp	4.50
		WLL Phone	-
v	Need based	Guard	0.34
		Making pond in Kalamegha	3.00
		Making culvert in Katfali	3.00
		Distribution of blanket	0.75
		Nam yagya	2.00
Total			**44.03**

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10.8 MONITORING SCHEDULE OF EMP

i. In order to keep a watch on the environmental control measures discussed about air quality, water quality and noise level monitoring shall be done regularly every year by taking measurements near the mine and residential areas preferably close to some of the earlier stations so as to keep a comparative check with respect to the base line data. For air quality monitoring, continuous monitoring on 24 hours sampling basis would be done for two days per week and analytical checks made for SPM, SO_2, NOx and CO.

ii. For effective management of the environment, it is envisaged to have an organisational set-up under the administrative supervision of the Mines Management where responsibilities can be delegated to technical personnel like Mining Engineer, Geologist/Chemist and horticulturist with regard to specific aspects of environment management plan. The organisation for the purpose is as indicated in the chart given in Figure 10.1

10.9 CONCLUSION

1. The lease hold inhabitated area to be displaced and rehabilitated will be in line with state Govt. policy.
2. The forest area will be compensated and a fresh afforestation program will be considered as per the rules of Forest Department.
3. Agricultural land shall be converted to industrial or mining site
4. Major portion of the excavated waste will be backfilled simultaneously with mining.
5. After a minor change the mining will provide the opportunity to create a water storage reservoir and comparatively higher tree plantation and greenery will improve the general quality of the environment.
6. Meteorology and general air quality of the area will not suffer and the planned operations will not have any significant adverse impact on the hydrography and water quality in the area.

Only minor nature of air pollution is visualised for which more than adequate preventive measures have been contemplated

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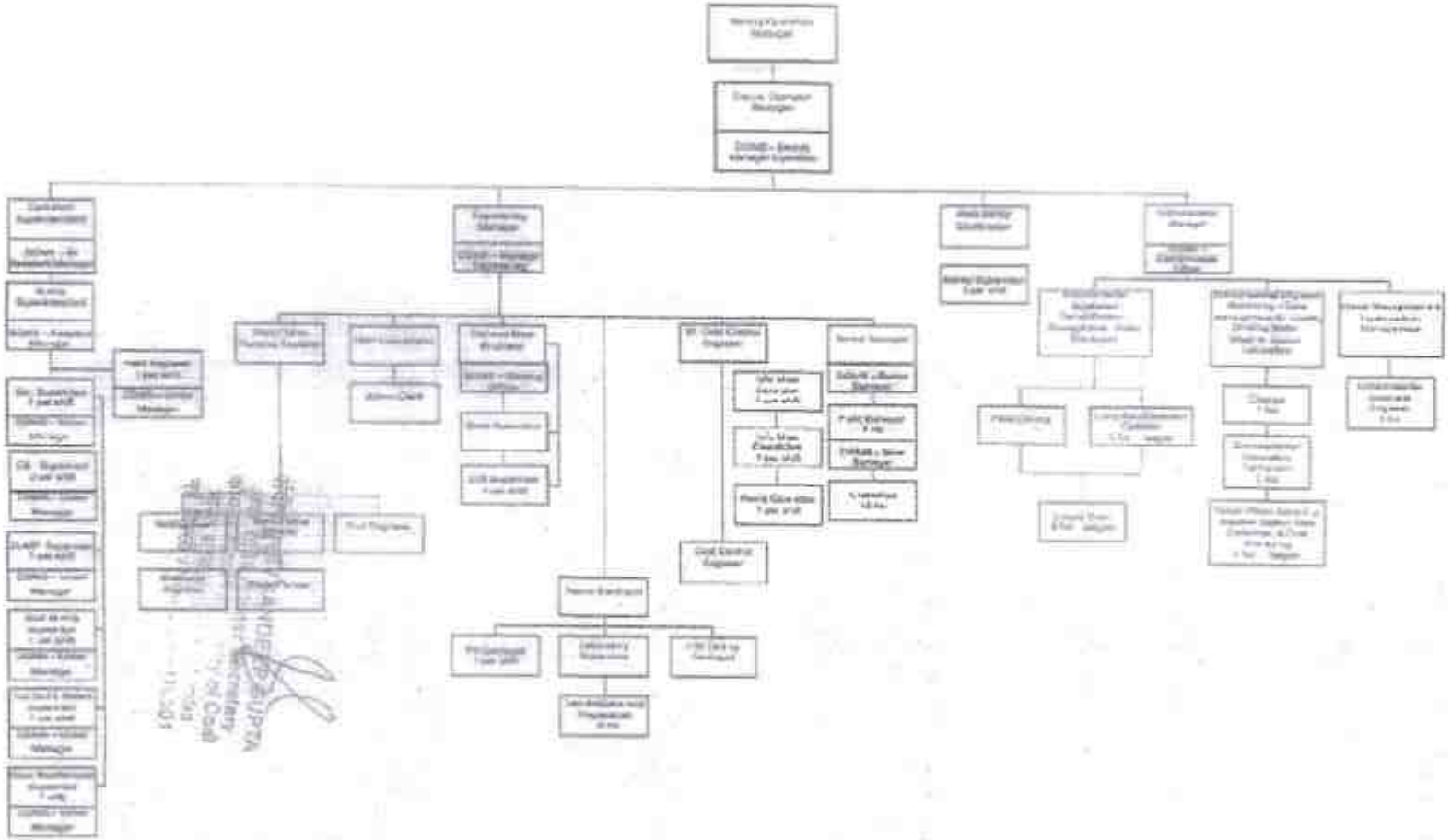
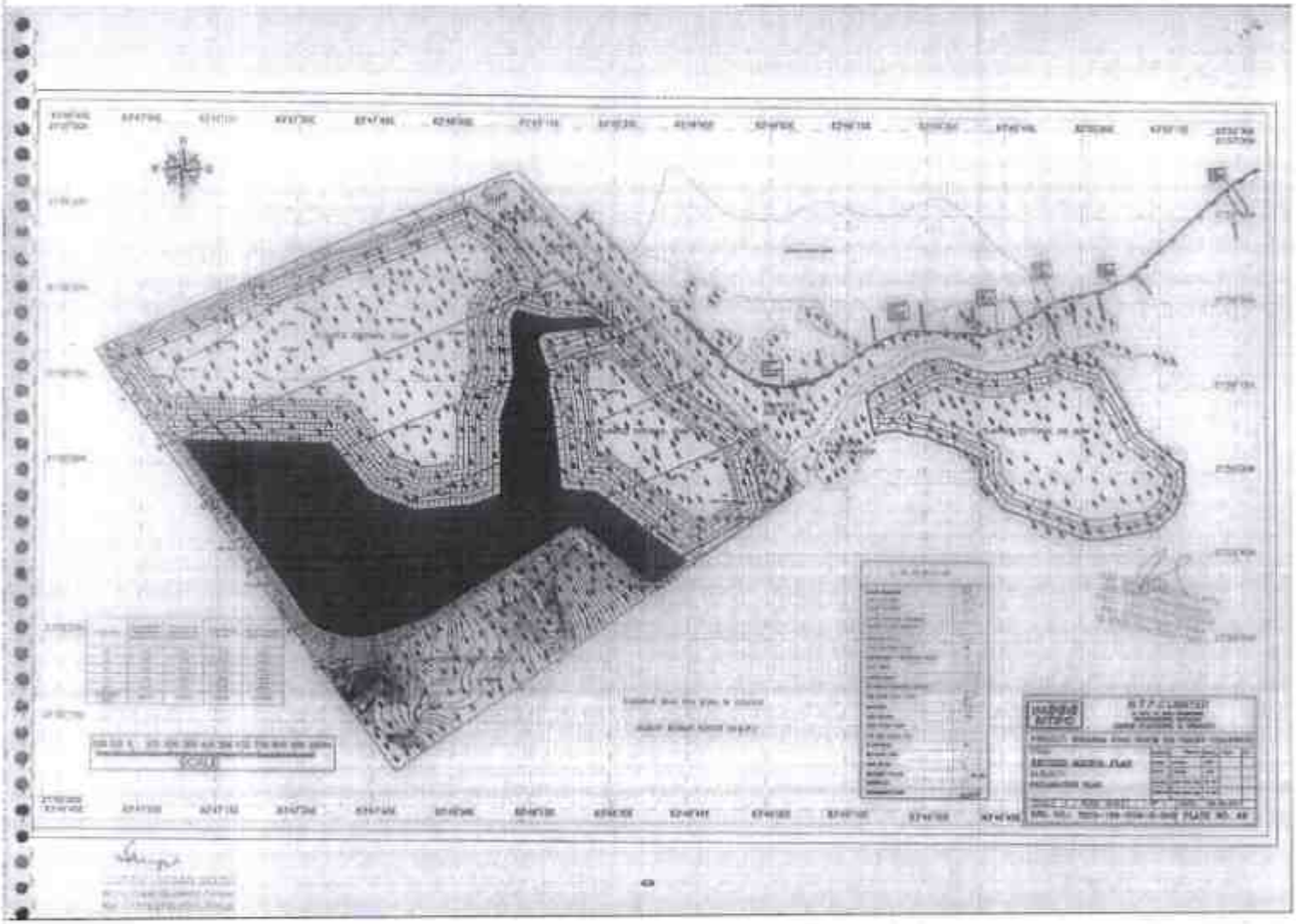
FIGURE-10.1
ORGANIZATION CHART





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CHAPTER XI

PROGRESSIVE AND FINAL MINE CLOSURE PLAN

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CHAPTER-XI

PROGRESSIVE AND FINAL MINE CLOSURE PLAN

11.1 INTRODUCTION

The present Mine Closure Plan is prepared for 890.63 ha, which includes block area, external OB dump area, facilities, diversion of nala & road, colony etc.

Earlier Mine Closure Plan based on the Approved Mining Plan has already been submitted to MoC on 04.11.2010 .The presentation to the standing committee was made on 07.03.2011. Observations from MoC received on 07.04.2011. The observations of MoC along with reply to the observations on the Earlier Mining Closure Plan are enclosed in **Annexure-XVI.**

In view of the reasons as explained in the Chapter-II, NTPC has prepared Revised Mining Plan based on which Progressive & Final Mine Closure Plan is also prepared which is in line with the MoC guidelines issued in this regard and covering all the aspects of Mine Closure Plan(already submitted to MoC). As per the Revised Mining Plan in Phase-I of mining operation the life of Mine is estimated as 26 years including 2 years of construction period.

NTPC has also envisaged approaching to MoEF during 20th year of mining operation for seeking permission of mining of 87 ha of forest land. If the permission is granted by the MoEF, life of mine will be enhanced by approximately 6 years and accordingly the mine closure activities will be applicable and implemented from the date of exhaustion of resources.

11.1.1 REASONS FOR CLOSURE

Mine will 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.

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11.1.2 STATUTORY OBLIGATIONS

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 will be adhered.

Following statutory rules, regulations, bye-laws etc will be adhered:

1. Coal Mines Regulation,1957
2. Mines Act, 1952
3. Mines Rules, 1966
4. Vocational Training Rules, 1966
5. Indian Electricity Rules, 1956
6. DGMS circulars
7. Factories Act,1948 (as applicable to mines)
8. Explosive Act and Rules,
9. Recommendations of National Safety Conferences, Tripartite Safety Review Committees.
10. Special guidelines issued by DGMS following accident's enquiries etc.
11. ILO code of Safety & Health in opencast Mines (1991)
12. 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 Government organization will be followed.

Mining Plan of this block has been approved. All conditions stipulated in approved Mining Plan, Environmental clearance and other statutory clearances which are still to come will be complied.

List of clearances along with their status is as elaborated in **Table No. 11.1.**

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TABLE NO. 11.1
LIST OF CLEARANCES

CLEARANCE/STUDY	STATUS	REMARKS
Approval of Mining Plan - MoC	Approved	All conditions as stipulated in received statutory clearances and other statutory clearances which are still to come will be complied.
Public Hearing SPCB	Completed	
Environment clearance – MOEF	In process	
Approval from the State govt. for Garia nala diversion	Awaited	
Forest clearance - MOEF	In process	
Land Acquisition / surface rights - State Govt/Govt. of India	In Process	
Clearance for use of explosives and construction of magazine – Chief Controller of Explosives.	In Process	
Permission for opening of coal mine from DGMS	In Process	
Rehabilitation & Resettlement of displaced families	In Process	

11.1.3 CLOSURE PLAN PREPARATION

A Final Mine Closure plan shall be prepared 5 years before the likely cessation of mining operations. However, conceptual Mine Closure Plan has been prepared by RQP and is being put up for approval by the competent authority.

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11.2 WATER QUALITY MANAGEMENT

Water is an essential resource that sustains all 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.

11.2.1 EXISTING SURFACE & GROUND WATER BODIES

11.2.1.1 Surface Water Resources

The source of the surface water is mainly River, Nalas and Ponds. The drainage system of the study area is dendrites' to sub-dendritic type and well developed. The drainages are flowing towards East and southeast directions. A major source of surface water in the study area is Basundhra, Garia, Bichna, Bagmora, Brahmani, Bhesrakharu, Lilari and Tangramounda Jhari

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Nala. Garia Nala, flows along the central part of the exploration block and more or less bisects the block into two sub-blocks.

11.2.1.2 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 pediplain 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.

11.2.2 EXISTING WATER QUALITY (SURFACE & GROUNDWATER)

The ground water becomes the main source of drinking water in the rural areas. The ground water quality in the study area is of acceptable quality for drinking purpose. In some of the villages high percentage of iron content has been reported, which is beyond acceptable limit (i.e. Desirable limit: 0.3 and Permissible limit: 1.0) for drinking water purpose. Summarised water quality results are shown in **Table 11.2** and Water analytical data from the villages of the study area is given in **Table 11.3**

TABLE 11.2
SUMMARISED WATER QUALITY RESULTS

PARAMETER	LIMIT		OBSERVED RANGE	
	Desirable	Permissible	Ground Water	Surface Water
pH	6.5 - 8.5	6.5 - 8.5	6.89 - 7.88	6.94 - 7.36
Total hardness (as $CaCO_3$),mg/l	300	600	60 - 292	44 - 64
Iron (as Fe),mg/l	0.3	1.0	0.02 - 0.75	0.1 - 0.37
Chlorides (as Cl),mg/l	250	1000	12 - 103	12 - 18
Total dissolved solids	500	2000	85 - 554	82 - 96
Calcium (as Ca), mg/l	75	200	8.1- 94.8	8.2 - 14.7
Sulphate (as SO4), mg/l	200	400	0.15 -	0.9 - 4.14
Nitrate (as NO3), mg/l	45	100	1 - 89	5 - 6
Fuoride (as F), mg/l	1.0	1.5	0.1 - 0.77	0.11 - 0.14
Alkalinity	200	600	48 - 162	42 - 52

TABLE 11.3
WATER ANALYTICAL DATA FROM THE VILLAGES OF THE STUDY AREA

DISTRICT: SUNDARGARH & JHARSUGUDA, ORISSA, RWSS DIVISION OFFICE			
SL. NO.	VILLAGE NAME	LOCATION OF WATER SOURCE	Fe
	P.S. HEMGIR, DISTT. SUNDARGARH		
1	Kanika	Jhupudipara/Mahajit	0.20 -1.50
2	Durubaga	Near School/Near Post Office	0.3 -2.00
3	Duduka	Near Boy's Hostel/Road side	0.4 -3.00
4	Garjanbahal	Bhaisalpara/U.P.School	0.3 -8.00
5	Kiripashira	Basti/Harijanpada	0.1 -8.00
6	Tithaitangara	School/Basti	0.03 -0.6
7	Laikera	Gandapara/Harizanpara	0.2 -4.00
8	Chuanahal	Mission (K.Para)	0.3
9	Kanakatora	Mundapara/Junadihi	0.1 -1.5
10	Ratakhandi	Basti/School	0.02 -0.5
11	Kalamegha	Alekhpara/Dhanmunda	0.2 -4.00
12	Dulanga	Basti/Basti	1--3
13	Manoharpur	Basty	1
14	Majhapada	Basti/School	0.1 -0.8
15	Khuntijhaaria	School	1
16	Tangardihi	Manipur/Ghanachal	0.5 -8.0
17	Telia	Basti	6.0
18	Singaribahal	Basti	0.3

11.2.3 IMPACT ON WATER QUALITY DUE TO MINING

11.2.3.1 IMPACT ON SURFACE WATER

The surface water quality is likely to be affected with higher level 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 nalas, it will 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 stock piles 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 unpotable and hence cannot be used by the local people. The percolation of sewage waste from the pit head as well as colony area will also pollute the ground water if control measures are not adopted as envisaged in the management plan.

11.2.3.2 IMPACT ON WATER REGIME

No impact on the surface water resources is envisaged as the water is not proposed to be drawn from surface or ground water resources. The water from the mine sump will be used for all purposes. However, in view of availability of ground water at shallow levels, the ground water level in the surrounding vicinity of the mine will be lowered causing drying of wells upto certain distance.

11.2.4 WATER REQUIREMENT

Industrial water required for HEMM washing, sprinkling on haul roads for dust suppression and for watering the mine site plantations, will be supplied from pumping installation at mine sump and surface reservoir (settling pond). The drinking water will be supplied from mine sump after proper treatment and stored in overhead tank near the facilities area and distributed through pipe lines to different facilities area for drinking and domestic purposes during operational stage. However, during construction stage (till adequate water in mine sump is not available), potable water will be drawn from bore wells.

Total requirement of fresh water for mining and allied activities is estimated as 1500 m /day besides the water which is reclaimed and reused for plantation from colony and canteen sewage effluent. The water requirements

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for various activities are given in **Table 11.4.**

Out of total fresh requirement of 1500 cum/day, 653 cum/day is potable and there 847cum/day is for industrial use from mine water. Additional requirement is met by reclaimed water from colony ETP, canteen etc (435 cum). Hydrogeological study has been carried out and the report is attached with the earlier Mine Closure Plan.

TABLE 11.4
WATER REQUIREMENTS

Sl. No	Particulars	Water (m^3/day)
1.	Sprinkling @ 68 m^3/Mt of annual coal production excluding CHP	480.00
2.	CHP excluding washery	160.00
3.	Plantation @ 15 m^3/ha for peak 40 ha in 3rd year = 600 m^3- recirculated from colony STP 408 m^3- 27 m^3 from canteen	165.00
4.	Vehicles washing @ 2 m^3/vehicle/day for 30 Vehicles = 60 m^3 - 48 m^3 recirculated	12.00
5.	Fire fighting water evaporation 10% of 45 m^3/Mt of annual coal production	30.00
	Sub - total (Industrial)	**847.00**
6.	Drinking at working place @ 45 lpd/head for about 1350 workers	60.00
7.	Colony for 945 employees (70% satisfaction) @ 135 lpd/head	510.00
8.	Canteen for 100 seater @ 68 lpd (500 persons)	34.00
9.	Others (LS)	49.00
	Sub-total (Potable)	653.00
	Total	1500.00

11.2.5 WATER POLLUTION CONTROL MEASURES

11.2.5.1 Effluent from Mine

To prevent surface and ground water contamination by oil/grease and sewage waste, following control measures are proposed to be implemented.

- Leak proof containers will be used for storage and transportation of oil/grease. In the store also, the container containing oil/grease will be kept in empty safe open containers of higher volume than the containers to avoid oil/grease spillage. The area over which oil/grease is handled will be kept effectively impervious. Any wash off from the oil/grease handling area or workshop will be drained through impervious drains.

collected in specially constructed pit and treated appropriately before releasing it into the natural drains.

- The sewage waste generated will be drained by underground impervious drains, lead to appropriately designed septic tanks and soak pits to prevent any pollution of surface or ground water.

11.2.5.2 The surface and ground water in and around the mine, loading plant and infrastructure will be regularly tested and appropriate control measures adopted in case of any pollutant is detected above the prescribed limit.

11.2.5.3 All stacking and loading areas will be provided with proper garland drains equipped with baffles to prevent wash offs from reaching the downstream natural channels.

11.2.6 CONTROL MEASURES FROM STORM WATER

Control measures to be adopted are briefly discussed below:

- Check dams will be provided to prevent solids from wash off and screen if any from the mine related activities.
- Peripheral bunds will be erected on the outer edge of the abandoned benches before reclamation so that the soil is not carried away by storm water.
- A water gradient of about 1 in 100 will be kept at every bench towards inside of the bench to prevent formation of gullies in the bench slopes causing serious erosion.
- Chutes will be constructed by using local stone or masonry to guide the water in areas with loose soil to prevent erosion and uncontrolled descent of water wherever necessary.
- Construction of garland drains around freshly excavated and dumped areas so that flow of water with loose material is prevented. The mine water will be passed through specially constructed catch pits to arrest any loose material being carried away with water.
- Any areas with loose debris within the lease hold will be planted.

11.2.7 MEASURE TO MINIMISE ADVERSE EFFECTS ON WATER REGIME

During the process of mine rehabilitation and with the completion of backfilling, a water body will be created in the mined out pit which will act as water reservoir improving the ground water recharge, source of attraction for

fauna and will help in the maintenance of afforested areas. To enhance aesthetic appearance, parks and lawns will 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

11.3 PROPOSED NALA DIVERSION

11.3.1 GARIA NALA

As explained in Chapter-III Clause 3.9

11.3.2 NALA A (BAIDHARA NALA) AND NALA B

As explained in Chapter-III Clause 3.9

11.3.3 IMPACT OF NALA DIVERSION ON LOCAL COMMUNITY

The project affected persons will be suitably rehabilitated in the R&R colony earmarked for them located nearby. The impact of diversion does not have any impact on water availability for the local community.

11.4 AIR QUALITY MANAGEMENT

There will 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 will be kept at minimum levels by ensuring good blast design and good equipment maintenance. Dust suppression system and dust extraction system will be in operative. Plantation around the quarry and CHP will put up a green belt for mitigating air pollution. External OB dump afforested

11.4.1 EXISTING AIR QUALITY STATUS

11.4.1.1 Construction Phase

The sources of air pollution in the region are vehicular traffic, dust arising from unmettalled village roads, domestic fuel burning and fugitive emissions. The ambient air quality test results are given in **Table 11.5.**

TABLE 11.5
AMBIENT AIR QUALITY TEST RESULTS (µg/m³) (Sep. To Nov.2009)

LOCATION	RPM			SPM			SO_2			NO_2		
	Mi	Ma	98%il	Min	Max	98%il	Mi	Ma	98%il	Min	Max	98%il
Dulanga	34	44	44	98	127	127	7.6	9.7	9.7	9.2	12.8	12.7
Bendrichua	34	44	44	96	125	125	6.5	9.9	9.8	9.7	13.4	13.4
Rangalmund	36	46	46	102	131	130	8.7	10.	10.9	10.	14.3	13.9
Manoharpur	34	45	45	98	128	127	6.3	8.7	8.5	9.0	12.4	12.4
Kanika	38	47	47	108	135	135	8.0	11.	10.9	11.	14.9	14.9
Khunt Jharia	36	45	45	103	128	128	7.3	9.6	9.6	10.	12.7	12.7
Lamihara	35	44	44	99	127	126	6.1	9.7	9.7	9.8	12.8	12.7

11.4.1.2 IMPACT ON AIR QUALITY DUE TO MINING

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 will be done by hydraulic shovels. The transportation of OB and coal will 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 will also generate dust.

The opencast mining operations are generally prone to generation of high levels of SPM and to a limited extent SO_2, NOx and CO due to fossil fuel based vehicles, machines and blasting using explosive and fuel combustion etc. Air pollution due to SO_2, NOx and SPM may result in irritation and inflammation of eyes and congestion of throat and oedema of lungs. Carbon monoxide can cause loss of haemoglobin 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.

11.4.2 AIR POLLUTION MITIGATION MEASURES

The mining operations and related activities are anticipated to increase the levels of SPM and gaseous pollutants to a limited extent. The control measures to be adopted are mentioned in the following paragraphs.

11.4.2.1 Controlling fugitive dust

Dust particles which are normally generated during various mining, crushing operation and transportation deteriorate the ambient air quality. Adequate control measures are, therefore, proposed to be taken during mining operations, transportation and crushing/loading operations. These control measures are discussed as follows:

11.4.2.2 Mines

a) Dust suppression systems (like water spraying) will be adopted at:
   - Faces before and after blasting
   - Faces while loading

b) Dust extraction systems will be used in drill machines and crushing plant.

c) Dust generation will also be reduced by using sharp drill bits for drilling holes; drills with flushing system.

11.4.2.3 Haul roads and stock-piles

- Dust suppression system (like water spraying) would be adopted at roads which are used for transportation. Sprinklers (Whirling) have been proposed to be installed along the roads to suppress the dust.

- Suitable dust extraction or suppression systems such as mist sprays with or without chemical will be provided at appropriate places for preventing dust pollution during handling and stockpiling of coal.

11.4.2.4 Preventing dispersal of air borne dust

In addition to the control measures proposed during mining and transportation operations, following steps will be taken to prevent air pollution due to airborne dust:

- Dense tree belts will be planted around the mine and sites housing crushing and loading facilities.

- Plantation over already mined out area will be done after backfilling as per schedule (with minimum gap between excavation and afforestation)

- Dust masks will be provided as safety measure to the workers, engaged at dust generation points like drills, loading/unloading points, crushers etc.

11.4.2.5 Measures to mitigate CO levels

All heavy and light vehicles shall be tested for pollutants concentration in their exhausts regularly and well maintained. Strict vigil will be kept in and around the operational area for any fire which shall be immediately controlled.

11.4.2.6 Measures to mitigate NOx levels

The main reasons of production of NOx gases are:

a. Poor quality of explosive having large oxygen imbalance which can be due to following reasons:
   - Manufacturing defect
   - The use of expired explosives in which disintegration of ingredients has taken place.

b. Incomplete detonation is caused mainly due to low primer: column ratio.

To ensure that NOx levels do not increase during the proposed mining operations, the following control measures will be adopted:

i) Good quality explosives will be used for which the oxygen balance will be checked from time to time. The expired explosives will not be used for which a strict vigil will be kept on the date of manufacture. Even as a normal procedure, all explosives will be subjected to a visual inspection and if disintegrated ingredient are spotted, the explosives will not be used even if it is within expire date.

ii) Primer: Column ratio will be rationalised. The ratio thus established, for producing minimum NOx, will be adhered to.

The mine ambient air quality will be regularly tested to detect the presence of any pollutants above prescribed limits and appropriate measures will be adopted.

11.4.2.7 Measures to control noise pollution

The following control measures will be adopted to keep the ambient noise levels below permissible limits 75 dB (A).

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i. Provision and maintenance of thick tree belts to screen noise.
ii. Avenue plantation within the project area to dampen the noise
iii. Proper maintenance of noise generating machinery including the transport vehicles will be ensured.
iv. Provision of the air silencer to modulate the noise generated by the machines will be made wherever required.

To protect the workers from exposures to higher noise levels the following measures will be adopted

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

11.4.2.8 Measures to reduce ground vibrations due to blasting and prevent fly rocks

The vibrations due to blasting will be studied before the commencement of mining operations and the recommendations/suggestion given as per the result of the said study will be strictly adhered to especially the charge per delay.

11.5 WASTE MANAGEMENT

11.5.1 TYPE OF ROCKS

The entire block is 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 village Dulanga. 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 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 non toxic 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 Dulanga block contains no toxic elements.

11.5.2 REMOVAL OF OVERBURDEN

As explained in Chapter-V, Clause No. 5.7.4

11.5.3 TYPES OF SOLID WASTE

Four types of solid waste are likely to be generated through mining activities.

These are:

a) Overburden (both topsoil and waste)
b) Sludge from washing HEMM
c) Sludge created by mine water in settling pond.
d) Municipal solid waste

The solid waste generated as mentioned above can have severe impacts on the health and surroundings of the area if proper management as suggested below is not done for handling these wastes. The solid waste dumping will lead to land degradation by occupying virgin area to an extent of about 73.84 Ha before the end of 3rd year. It will also cause an impact on topography and visual asthetics due to its 60 m height.

11.5.4 PROTECTIVE MEASURES AND MANAGEMENT OF SOLID WASTES

11.5.4.1 Management of Overburden

As explained in Chapter-V, Clause No. 5.7.4 & Clause 5.7.5. The generation and disposal of total waste quantities for the life of the mine are shown in Table 11.6.

TABLE 11.6
CUMULATIVE WASTE DISPOSAL (TOPSOIL & OB)

End of Year	Mined Area (ha)	Surface Dump (ha)	Backfilling (Mm^3)	Top Soil (Mm^3)	Total Waste (Mm^3)	Backfilling Area (ha)
1st	29.06	4.5	0	0.17	4.67	0
2nd	37.47	10.5	0	0.17	10.67	0
3rd	35.4	13	2.5	0.17	15.67	24
4th	56.01	10.5	7.5	0.17	18.17	28
5th	39.28	0	18	0.17	18.17	15
Conceptual (24th)	**510.78**	**38.50**	**355.50**	**3.65**	**359.15**	**413**

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11.5.4.2 Protective measures

- The dump will be stabilised and afforested. The top soil will be used for spreading over backfilled area and over OB dump for plantation. The area of top soil stack will be afforested.
- The area of ground disturbance will be minimized by progressively rehabilitating disturbed land.
- Reclamation of land will be carried out by landscaping, re-vegetation etc. As far as possible the reclamation activities will be taken up concurrently with the mining operations. For re-vegetation, the native plants and saplings suitable for the existing soils and site conditions will be considered.

11.5.4.3 Steps to be taken to avoid Dump Slides

- Dumping of top soil will be avoided at the bottom of the dump as it leads to instability. Dumping of soil and clayey material will 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 will helped a lot in improving stability of dumps by preventing erosion.
- Construction of retaining walls
- Construction of drains for drainage
- Provision of juta 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 will be reclaimed and rehabilitated with local species of plantation in a phased manner
- Plantation will be carried out on waste dumps
- A belt of trees with thick canopy will be created along the mine boundary to intercept dust, gaseous pollutants and noise.

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Part-XI

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The void area of the excavated pit will ultimately become a water reservoir. The depth of the void will be reduced in the post mining stage by filling it with waste. This void area will also be suitably sloped, bunded and fenced.

11.5.4.4 Management of Sludge from Oil/Water separator

Effluent from workshops, vehicle washing etc shall will be passed through impermeable drains and will be treated in the oil/water separator. The skimmed oil & grease collected from oil and grease separator shall be sold to the authorised recycling vendors.

11.5.4.5 Management of Sludge created by mine water in settling pond

Sludge from the mine water settling pond will be removed periodically and will be backfilled along with the OB.

11.5.4.6 Sludge from domestic waste

Sludge from the domestic waste will be utilized as manure for the plantation in the mine lease area and on dump.

11.5.4.7 Management of Municipal solid waste

The municipal solid waste e.g. from canteen, etc will be composted and used as manure for plantation along with the domestic sludge.

11.5.4.8 LAND DEGRADATION CONTROL MEASURES

Land degradation is one of the major adverse outcomes of opencast mining activities and any effort to control adverse impacts is considered incomplete when appropriate land reclamation strategy is not adopted. Since the land degradation in this mine is partly in the form of excavated void and partly in the form of external and internal dumps, the reclamation strategy must include a programme for the reclamation of the disturbed land.

11.5.5 TOPSOIL MANAGEMENT

As explained in Chapter-V, Clause 5.7.5

11.5.6 MANAGEMENT OF COAL REJECTS FROM WASHERY

Not Applicable.

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11.6 DECOMMISIONING OF INFRASTRUCTURE

The infrastructure consists of substation, CHP, Workshops, Mine office, blasting shelters, rest shelters etc. The surface master plan showing proposed Infrastructure is attached as **Plate IV**. The mine office & related infrastructure shall be handed over to state govt. for public use. The probable list of facilities which will be dismantled and those which will be retained has been furnished in **Table 11.7**

TABLE 11.7
LIST OF FACILITIES TO BE DISMANTLED OR RETAINED AT THE END OF LIFE OF DULANGA COAL BLOCK

Sl. No.	Facilities	Remarks (Dismantled/Retained)	Corpus fund for maintenance
1.	Service buildings/ Infrastructure		
a	Project/Mine Office	To be retained.	Provision has been made in fund requirements as provided in Table 11.9
b	Workshop	To be retained.	
c	Store	To be retained.	
d	Canteen	To be retained.	
e	First aid centre	To be retained.	
f	Rest shelter	To be retained.	
g	Training centre	To be retained.	
h	Fire fighting station	To be retained.	
i	Pit head bath	To be retained.	
j	Magazines	To be retained.	
k	Environmental laboratory	To be retained.	
l	Dispensary	To be retained.	
2.	Mining Machinery	To be retained.	
3.	Pumps used in mines	To be retained.	
4.	Electrical/mechanical equipments used in workshop or other places	To be retained.	
5.	CHP, conveyors and railway siding	To be retained.	
6.	Sub-station	To be retained	
7.	Furniture	To be retained.	
8.	Approach road and Culverts	To be retained.	
9.	Haul road and Culverts	To be retained.	
10.	Water supply arrangement	To be retained.	

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11.	Permanent Manpower	To be transferred to "Forest Area" in SE side or to any other projects of NTPC or VRS	

11.7 DISPOSAL OF MINING MACHINERY

Nearly all the mining machinery will be used for dip side/indicated area. Only the scraps and non-usable machines, if any, will be auctioned.

11.8 SAFETY & SECURITY

Security Personnel will be detailed for a period of two 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.

11.9 ECONOMIC REPERCUSSIONS OF CLOSURE OF MINE AND MANPOWER RETRENCHMENTS

The mine will be one of the highly mechanized open cast mine and will require services of highly skilled and semi skilled work force.

After closure of mining operations, local residents employed in the mine may be offered jobs elsewhere in the running projects of the Company. 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. In addition, parting employees can also utilize their savings accumulated during the period of employment for their own post- employment resettlement.

Number of persons engaged in the satellite occupations connected to the mining industry will be estimated during the preparation of Final Mine Closure Plan which will be prepared 5 years prior to likely cessation of mining operation. Those persons will be taken care of as per the Company's policy.

The Company 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.

The Company would like continuance of the social welfare amenities created for the employees and PAPs and try to meet the expectations of the society under the given financial constraints. The persons will be imparted lectures on the financial mechanism for its sustenance after the mine closure.

11.10 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 will 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 11.8.**

TABLE 11.8
TIME SCHEDULE FOR ABANDONMENT ALONG WITH MANPOWER REQUIREMENT FOR CLOSURE ACTIVITIES

Sl. No.	Activities to be undertaken		1st Year		2nd Year		3rd Year		4th Year	
			1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half
1.0	**Mined Out Area & Waste Management**	Manpower of NTPC								
1.1	Physical reclamation of internal and external dump (Levelling, Spreading of top soil, toe wall formation, drain etc.)	Outsourced (under the supervision of NTPC) Environmental Engr-1 Surveyor-2 Chainman-4								
1.2	Physical reclamation of land of batter and haul road									
1.3	Bio reclamation of item 1.1 & 1.2									
1.4	Making safe approach up to the water lagoon for future uses									
1.5	Barbed wire fencing									
2.0	**Environmental Management (Air, Water, Waste, Noise etc)**									
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								

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Sl. No.	Activities to be undertaken		1st Year		2nd Year		3rd Year		4th Year	
			1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half
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								
3.0	**Management of Infrastructure & Mining Machineries**	-								
3.1	Decommissioning of structurals & semi permanent constructions	Job Outsourced Civil Engineer-1, Supervisor-1, Surveydr-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									
4.0	**Actions for safety & security of local community due to abandonment of the mine or part of the mine**									

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Sl. No.	Activities to be undertaken		1st Year		2nd Year		3rd Year		4th Year	
			1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half
4.1	Thorough 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	Ad-on, 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 around the external OB Dump									
4.6	Closing with walling and gates in the haul road, to prevent advertant entry into water lagoon.	Supervisor-1 in each shift								
4.7	Filling the haul road up to ground level, from surface up to sealing gate.									
4.8	Survey of the total project area for updating mine plans Under Coal Mine Regulation.	Supervisors-2 in each shift Mining Engineer-1 in each shift								
5.0	**Social & Economic Aspects**									
5.1	Approval of one time grant as corpus fund for maintenance of some C.S.R activities.	Engineer-1 HR executive/staff -2								
	Sub-total									
6.0	**Execution & Supervisor**									

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Sl. No.	Activities to be undertaken		1st Year		2nd Year		3rd Year		4th Year	
			1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half
6.1	Execution & Supervision of the activities by mining personal.	Mining Engineer-1 HR executive/ staff-2								
7.0	**Miscellaneous charges including power cost, deployment of security personal, 3 years post closure environmental monitoring, supervision , power cost etc.**	Engineer-2 HR executive/ staff-3								

11.11 ABANDONMENT COST

11.11.1 TENTATIVE ABANDONMENT COST

Tentative cost of likely closing activities as envisaged below has been estimated considering base date as Feb '2011 at current cost. Actual closing activities and activity wise costs may change during the preparation of Final Mine Closure Plan which will be prepared 5 years before the likely cessation of mining operation. A time schedule for abandonment along with tentative fund requirement has been shown in the bar chart given below at **Table No 11.9**

TABLE 11.9
ESTIMATED FUND REQUIREMENT FOR CLOSURE ACTIVITIES (WITHOUT ESCALATION, BASE YEAR-FEB '2011)

Sl. No.	Activities to be undertaken	Fund Requirement	1st Year		2nd Year		3rd Year		4th Year	
			1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half	1st Half	2nd Half
1.0	Mined Out Area & Waste Management	Total (₹. Lakh)								
1.1	Physical reclamation of internal and external dump (Levelling, Spreading of top soil, toe wall formation, drain etc.)	79.65								
1.2	Physical reclamation of land of batter and haul road	52.62								

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1.3	Bio reclamation of item 1.1 & 1.2	64.69	
1.4	Making safe approach up to the water lagoon for future uses	120.37	
1.5	Barbed wire fencing	170.66	
	Sub-total	**487.99**	
2.0	**Environmental Management (Air, Water, Waste, Noise etc)**	0.00	
2.1	Thorough inspection of external and stabilized internal dumps to find state of its stabilization & Bio reclamation.	463.76	
2.2	Action to stabilize & vegetate uncovered patches, if any	69.56	
2.3	Inspection of garland drains & bunds around external dumps to prevent leachatte water from entering natural water courses directly	463.76	
2.4	Inspection of embankment to prevent entry of uncontrolled water to mine	463.76	
2.5	Strengthening of embankment	371.01	
2.6	Quarterly sampling of water to know its quality status	18.55	
2.7	Record keeping, monitoring and reporting	324.63	
	Sub-total	2175.02	
3.0	**Management of Infrastructure & Mining Machineries**	0.00	
3.1	Decommissioning of structurals & semi-permanent constructions	284.75	

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3.2	Renovation of Mine/ Project office, Canteen, Training centre, Rest shelter etc.	18.55	
3.3	Cleaning of land for vegetation over the area	9.28	
3.4	Dismantling of machineries	92.75	
	Sub-total	**405.32**	
4.0	**Actions for safety & security of local community due to abandonment of the mine or part of the mine**	0.00	
4.1	Thorough inspection of the mined out area, O.B. dumps for assessing the closure job.	324.63	
4.2	Action, if required, for making safe, the drainage areas, fire areas etc.	92.75	
4.3	Making 2 metre high pucca wall on the slope of internal dumps, along the estimated water level.	148.40	
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.	185.50	
4.5	Making 2 meter high pucca wall around the external OB Dump	92.75	
4.6	Closing with walling and gates in the haul road, to prevent advertant entry into water lagoon.	0.46	
4.7	Filling the haul road up to ground level, from surface up to sealing gate.	4.64	

SANDEEP GUPTA

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एन टी पी सी लिमिटेड/NTPC LIMITED
EOC, A-8A, Sector-24, Noida-201301 (U.P.)

4.8	Survey of the total project area for updating mine plans Under Coal Mine Regulation.	463.76	
	Sub-total	1312.90	
5.0	Social & Economic Aspects	0.00	
5.1	Approval of one time grant as corpus fund for maintenance of some C.S.R activities.	793.49	
	Sub-total	793.49	
6.0	Execution & Supervisor	0.00	
6.1	Purchasing / Hiring of equipment for closure activities etc.	92.75	
6.2	Execution & Supervision of the activities by mining personal.	463.76	
	Sub-total	556.51	
7.0	**Miscellaneous charges including power cost, deployment of security personal, 3 years post closure environmental monitoring, supervision , power cost etc.**	375.36	
	Total	6106.59	

11.11.2 ANNUAL CLOSURE COST

The annual closure cost has been calculated as per new guidelines issued by MoC (vide letter no 55011-01-2009-CPAM dated 27/08/2009 & 18.02.2011). 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 Aug'09 and 148.10 in Feb'11. The closure cost was ₹.6.00 Lakhs per ha in

Aug'09. The current closure cost has been arrived by multiplying ₹. 6.00 Lakhs per ha by the ratio of WPI in Feb'11 and WPI in Aug'09 which comes to be ₹. 6.86 Lakhs per ha. The calculation methodology is as follows:

Total lease hold area Considered for mine closure (A)	: 890.63 ha
Mine closure cost per Ha for opencast mine in Aug'09	: ₹. 6.00 Lakhs
Mine closure cost per Ha for opencast mine in Feb'11(B)*	: ₹. 6.86 Lakhs
Life of the mine (C) (Incl. 2 years of construction period)	: 26 years
Annual base price [(A X B)/C] (for 1st year)	: ₹. 2.35 Crores
Total closure cost for opencast mine	: ₹.120.05 Crores

(Compounding @ 5% annual escalation)

The year wise closure cost is tabulated in **Table 11.10**.

TABLE 11.10
YEAR WISE AMOUNT TO BE DEPOSITED IN ESCROW ACCOUNT

YEAR	AV. COST PER ANNUM (₹. CRORES)	YEAR WISE EXPENDITURE WITH 5 % ESCALATION (₹.CRORES)
C1	2.35	2.35
C2	2.35	2.47
P1	2.35	2.59
P2	2.35	2.72
P3	2.35	2.85
P4	2.35	3.00
P5	2.35	3.15
P6	2.35	3.31
P7	2.35	3.47
P8	2.35	3.64
P9	2.35	3.83
P10	2.35	4.02
P11	2.35	4.22

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2009-CPAM

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

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YEAR	AV. COST PER ANNUM (₹. CRORES)	YEAR WISE EXPENDITURE WITH 5 % ESCALATION (₹.CRORES)
P12	2.35	4.43
P13	2.35	4.65
P14	2.35	4.88
P15	2.35	5.13
P16	2.35	5.38
P17	2.35	5.65
P18	2.35	5.94
P19	2.35	6.23
P20	2.35	6.54
P21	2.35	6.87
P22	2.35	7.21
P23	2.35	7.57
P24	2.35	7.95
TOTAL	**61.07**	**120.05**

Total Estimated cost for completing the envisaged closure activities comes to **₹.120.05 Crores**. Estimated cost will be modified based on WPI as notified from Govt. of India from time to time.

संदीप गुप्ता/SANDEEP GUPTA
अवर सचिव / Under Secretary
भारत सरकार / Govt. of India
कोयला मंत्रालय / Ministry of Coal
नई दिल्ली / New Delhi-110001

11.12 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:

- **Opening of a Escrow Account**
  The proponent shall open an escrow Account with any Scheduled Bank. The beneficiary of this account shall be Coal Controller Organisation (on behalf of central Government). The proponent shall deposit the amount detailed in previous chapter, on yearly basis into this Escrow account.

  Estimated cost will be modified based on WPI as notified by Government of India from time to time.

- **Condition for operating the Escrow Account**
  An agreement, outlining detailed terms and conditions of operating the Escrow account, shall be finalized and executed amongst the project owners, concerned Bank and the Coal Controller. The agreement shall

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

be executed before the grant of permission by the coal controller to open the mine.

- **Release of Funds from Escrow Account**
  When implementation of the final mine closure activities get started 5 years before the scheduled closure of mining operations, the Coal Controller would permit release of funds from the Escrow Account four years before final mine closure date. The release of fund shall be based on quantum of closure activity executed. The withdrawn amount each year shall not exceed 20% of the total amount deposited in the account.

11.13 RESPONSIBILITY OF THE MINE OWNER

NTPC will ensure that protective measures contained in the Mine Closure Plan including reclamation and rehabilitation works have been carried out in accordance with the approved Mine Closure Plan and Final Mine Closure Plan.

NTPC shall submit 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. Details of physical progress of the closure activities and expenses incurred will be included in the yearly report.

11.14 PROVISION FOR MINE CLOSURE

The mine owner will obtain a mine closure certificate from coal controller to the effect that the protective, reclamation and rehabilitation works have been carried out by the mine owner in accordance with the mine closure plan/final mine closure plan for surrendering the reclaimed land to the State Government concerned.

Sanjiv
SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2009-CPAM

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

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ANNEXURES

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

No. 13016/29/2003-CA-I
Government of India
Ministry of Coal

ANNEXURE I

.....

New Delhi, dated the 25th January, 2006

To

The Chairman-cum-Managing Director,
National Thermal Power Corporation Limited,
NTPC Bhawan,
SCOPE Complex, Lodhi Road,
New Delhi – 110 003.

Subject : Allocation of Kerandari, Chatti Bariatu in North Karanpura coalfield in Jharkhand, Chhatrasal in Singrauli coalfield in Madhya Pradesh and Dulanga in Ib valley coalfield in Orissa for mining of coal for their Power Plants to M/s. National Thermal Power Corporation (NTPC).

Sir,

I am directed to refer to your letter No. 01/FM &MO/Coal Mining/006-623 dated 01.03.2005 and to state that the Central Government, after considering your request, has decided to allocate the four coal blocks viz., Kerandari (229 mt.), Chatti Bariatu (243 mt.) in North Karanpura coalfield in Jharkhand, Chhatrasal (150 mt.) in Singrauli coalfield in Madhya Pradesh and Dulanga (260 mt.) in Ib valley coalfield in Orissa for mining of coal for exclusive use in your specified proposed Power Plants (details of location, capacity, coal requirement and schedule for commissioning of each associated power plant to be provided by NTPC). This allocation is in pursuance of the provisions contained in Section 3(3)(a)(iii) of the Coal Mines (Nationalisation) Act, 1973. The allocation of these blocks is subject to the following conditions:

i) The allocation of the 4 blocks to M/s. NTPC has been made to meet the coal requirement of the following Power projects.

Coal Block	Power Project/location Name / Capacity	Coal requirement (mtpa)
Kerandari Chatti Bariatu Chhatrasal Dulanga	(Details to be provided by NTPC)	

M/s. NTPC shall provide the above details within 15 days of the date of issue of this letter.

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

ii) The coal produced from the block shall not replace any coal linkage given to M/s. NTPC by the Coal India Limited/ its subsidiary companies and/ or by the Singareni Collieries Company Limited.

iii) The block is meant for captive use in their own specified end use projects i.e. Power Generation.

iv) The company will use the middlings generated in the process of washing for power generation i.e.the useable middings/rejects generated during beneficiation shall be used captively by the allocattee. The modalities of disposal of surplus coal/ middlings/ rejects if any, would be as per the prevailing policy/ instructions of the Government at the relevant point in time and could also include handing over such surplus coal/ middlings/rejects to the local CIL subsidiary or to any person designated by it at a transfer price to be determined by the Government.

v) The coal production from the captive blocks shall commence within 36 months (42 months in case the area is in forest land) of the date of this letter in OC mine and in 48 months(54 months in case the area fall under forest land) from the date of this letter in UG mine. The power projects based on coal from these blocks shall commence generation latest by the end of the 11th Five Year Plan. The end use project schedule and the coal mine development schedule should be submitted to this Ministry within 3 months from the date of this letter. A copy of the indicative milestone chart is enclosed.

vi) The Company shall buy the Geological report from CMPDIL within six weeks of the date of this letter.

vii) The company shall submit a mining plan for approval by the competent authority under the Central Government within six months from the date of this letter.

viii) The progress of the mine will be monitored annually with respect to the approved mining plan, which will mention the zero date.

ix) No coal shall be sold, delivered, transferred or disposed of except for the stated captive mining purposes except with the previous approval of the Central Government.

x) Mining of Coal from the allocated captive coal block shall be carried out in accordance with the applicable Statutes/Rules/Orders/Directions governing the mining of coal in the country.

xi) The allocated coal blocks of Kerandari and Chatti Bariatu are overlapped by Coal Bed Methane (CBM) block given to the Oil and Natural Gas Commission (ONGC) for exploration. Process to exclude this captive coal block from the boundary of the CBM block has been initiated. In case the exclusion does not materialise, for

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

whatever reasons, then this allocation would be subject to the exploration rights accruing to the ONGC over the said CBM block. The allocatee of the captive coal block shall extend all reasonable co-operation, assistance and facility to the ONGC for carrying out the CBM exploration operations in the over-lap region without any additional cost to the ONGC.

xii) Those of the above conditions relevant at the time of grant of mining lease shall be included as additional conditions in the mining lease in addition to any further conditions imposed by or agreed to by the Central Govt.

xiii) The State Government at the time of seeking previous approval for the grant of mining lease shall submit a draft of the mining lease containing the above relevant conditions for vetting by the Central Govt. The final mining lease shall be as vetted/modified by the Central Govt. Any deviation from the vetted/modified draft shall render the mining lease deed *ab-initio* null and void and without effect.

2. Allocation / mining lease of the coal block may be cancelled, inter-alia, on the following grounds :-

(a) Unsatisfactory progress of implementation of their end use sponge iron plant / power plant.

b) Unsatisfactory progress in the development of coal mining project.

c) For breach of any of the conditions of allocation mentioned above.

The De-allocation/cancellation of mining lease shall be without any liability to the Government or its agencies, whatsoever. Any expenses incurred by the allocatee or any right or liability arising on the allocattee out of the measures taken by him shall solely be to his account and in no way be transferred to or borne by the Government or its agencies.

3. The company may approach CMPDIL for the geological report and contact the State Government authorities concerned for the necessary permissions/clearances etc. for attaining mining rights and related matters. The arrangement of transport of coal will have to be worked out by the company.

Yours faithfully,

(V.S. Rana)
Under Secretary to the Govt. of India

Encls. As above.

Sanjay

SANJAY KUMAR SINGH
Project Assisted Qualified Person
No. 34011(13)/2009-CPAM

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

Sno.	EVENT	TIME LIMIT in months from '0' date
1	Allocation	0
2	Purchase of GR	1.5
3	Bank Guarantee	3
4	Mining Lease Application	3
5	Mining Plan submission	6
6	Mining Plan approval	8
7	Previous approval application	11
8	Previous approval	11
9	Forest Clearance application	12
10	Forest Clearance	18
11	Environment Clearance Application	12
12	Environment Clearance	18
13	Mining Lease grant	24
14	Land acquisition begin	9, 19
15	Land Acquisition	30, 36
16	Opening permission application	34, 40 for OC 46, 52 for UG
17	Opening permission grant	35, 41 for OC 4753 for UG
18	Production	36, 42 for OC 48, 54 for UG

http://coal.nic.in/captimeC.htm

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Recognised Qualified Person
No. 34011/(15)/2009-CPAM

ANNEXURE II

Telegram: "COLCOMER"
Phone : 2248-9612 to 16
Fax : 2248-2459
E-mail : coalcont-wb@nic.co.in

No. CC/HCBA/101/04/06/Policy/Vol.II
GOVERNMENT OF INDIA
MINISTRY OF COAL
OFFICE OF THE COAL CONTROLLER
1, Council House Street, Kolkata-700 001

Dated, the 15th March, 2010

To
Sri M. Sahabuddin,
Under Secretary to Govt. Of India,
PRIW-I Section
M/o Coal

Sub:- Issuance of NOC for Section 9(1) for Dulunga coal block of NTPC Ltd.
Ref:- Letter No. 43015/7/2006-PRIW-I dated 16th Feb, 2010

Sir,

With reference to the above mentioned letter, I am directed to state that the boundary dispute between Dulunga and Manoharpur blocks, allotted to NTPC and OPGCL respectively, have been resolved amicably. Both parties have communicated their satisfaction to this office regarding common block boundary vide letters dated 22/02/2010 and 3/3/2010. The background details and present status of the dispute is mentioned below –

1. A total land area measuring 656.14 Ha have been notified u/s 7(1) for Dulunga Coal Block in sundergarh District of Orissa.Subsequent to the publication of notification u/s 7(1) in respect of Dulunga block, M/s OPGCL raised objection regarding common boundary dated 17.03.2009.

2. To resolve the common boundary problem, a meeting was held between OPGCL, NTPC, CMPDI and DG(O) on 28.04.2009 at CMPDI, Bhubaneswar. In line of the minutes of the meeting, DG(O) as third party conducted survey for demarcating common boundary in May, 2009. Subsequently, representatives of both NTPC and OPGCL conducted joint ground verification on 22.10.2009 and both parties mutually agreed to follow the revised boundary.

3. As per the joint ground verification report duly signed by both parties (copy enclosed), following observations was made regarding the plots coming along block boundary –

Full Plot Nos. given to OPGCL Coal Block			Village	Part Plot No coming under OPGCL coal block & NTPC coal block				
Plot No	Total Area (acres)	Area applied by NTPC (acres)		Plot No.	Total Area (acres)	Area applied by NTPC u/s 7(1) (acres)	Area to be given to OPGCL	
93	0.68	0.35	Dulunga	1078	46.07	6.33	0.01	Manoharpur
135	1.44	0.77		1081	46.48	5.76	0.01	
135	0.53	0.27		1080	7.69	4.76	0.03	
136	0.25	0.06		306	39.95	39.95	0.02	Kathapalli
				322	42.9	39.5	0.01	
138	0.34	0.3		95	5.05	1.6	0.1	Dulunga
				94	6.2	2.6	0.2	
141	0.69	0.18		123	0.32	0.32	0.04	
142	0.28	0.28		124	0.75	0.72	0.1	
143	0.33	0.33		126	0.27	0.27	0.02	
144	0.1	0.1		127	0.44	0.44	0.04	

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Full Plot Nos. gone to OPGCL Coal Block			Village	Part Plot No existing under OPGCL coal block & NTPC coal block				Villages
Plot No.	Total Area (acres)	Area applied by NTPC (acres)		Plot No.	Total Area (acres)	Area applied by NTPC u/s 7(1) (acres)	Area to be given to OPGCL	
217	0.87	0.22	Dulunga	128	0.05	0.05	0.02	Dulunga
219	1.65	1.14		855	0.05	0.05	0.02	
854	0.32	0.07		131	0.84	0.84	0.05	
856	0.04	0.04		134	0.56	0.56	0.02	
				862	0.7	0.7	0.1	
				225	0.93	0.93	0.04	
				224	0.56	0.56	0.03	
				223	0.68	0.68	0.04	
				222	0.33	0.33	0.03	
				221	1.82	1.82	0.02	
Total		4.06					0.95	

4. As per revised common boundary, Dulunga Coal Mining Block allotted to NTPC consists of –
   A. Total Revenue Land : 550.68 Ha (approx)
   B. Total Forest Land : 103.43 Ha(aprox)
   C. Grand Total: 654.11 Ha
   D. Total amount of land to be handed over to OPGCL = Full Plot (4.06 acres)
      Part plots (0.95 acres)
      Total (5.01 acres or 2.03 Ha)

Further, NTPC certified that this above mentioned 654.11 Ha land proposed to be notified u/s 9(1) is within the area notified u/s 7(1) for the same coal block.

Based on the above clarification NOC is being accorded to NTPC for Dulunga Block alongwith the above details.

Yours faithfully,

(N. J. Roy)
DD

Encl. As above

Copy to : Dulunga Block, NTPC

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Kind Attn - Sri R. K. Akhauri

DETAILS OF DISPUTED PLOTS OF NTPC & OPGC

VILLAGE-Dullinga (Full plots)

Plot no	Total area(acres)	Area applied by NTPC(acres)	Remarks
93	0.68	0.35	Full plot gone to OPGC
125	1.44	0.77	Full plot gone to OPGC
135	0.33	0.22	Full plot gone to OPGC
136	0.26	0.06	Full plot gone to OPGC
138	0.34	0.3	Full plot gone to OPGC
141	0.69	0.18	Full plot gone to OPGC
142	0.28	0.28	Full plot gone to OPGC
143	0.33	0.33	Full plot gone to OPGC
144	0.1	0.1	Full plot gone to OPGC
217	0.67	0.22	Full plot gone to OPGC
219	3.65	1.14	Full plot gone to OPGC
854	0.32	0.07	Full plot gone to OPGC
856	0.04	0.04	Full plot gone to OPGC
TOTAL AREA (I)		4.08	

संदीप गुप्ता / SANDEEP GUPTA
अवर सचिव / Under Secretary
कोयला मंत्रालय / Ministry of Coal
भारत सरकार / Govt. of India
नई दिल्ली / New Delhi-110001

P. Prabhakar 12/03/2010

पी. प्रभाकर
P. Prabhakar
भूवैज्ञानिक / Geologist
दुलंगा कोल माइनिंग प्रोजेक्ट
एन.टी.पी.सी. लिमिटेड / NTPC LIMITED

Sanjiv

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

Part plots shared between NTPC &OPGC

Plot no	Total area	Area applied in sec 7(1)	Area applied in sec 9(1)	Area to be given to OPGC
VILLAGE DULANGA				
96	5.05	1.8	1.5	0.1
97	6.2	2.6	2.4	0.2
123	0.32	0.32	0.28	0.04
124	0.75	0.72	0.62	0.1
126	0.27	0.27	0.25	0.02
127	0.44	0.44	0.4	0.04
128	0.05	0.05	0.03	0.02
855	0.05	0.05	0.03	0.02
131	0.84	0.84	0.79	0.05
134	0.58	0.58	0.54	0.02
862	0.7	0.7	0.6	0.1
225	0.93	0.93	0.89	0.04
224	0.56	0.56	0.53	0.03
223	0.68	0.68	0.64	0.04
222	0.33	0.33	0.3	0.03
221	1.82	1.82	1.8	0.02
Total				0.57
VILLAGE-Manoharpur				
1078	48.07	8.53	8.52	0.01
1081	15.46	5.78	5.77	0.01
1060	7.64	4.74	4.71	0.03
Total				0.05
VILLAGE-Kathfali				
308	39.95	39.95	39.93	0.02
327	42.9	39.5	39.49	0.01
Total				0.03
TOTAL AREA				0.65

SUS TOTAL
Full plots 4.98 acres
Part plots 0.65 acres
Total 5.01 acres
2.03 Hectares

SANDEEP GUPTA
Under Secretary
Ministry of Coal
Govt. of India
New Delhi-110001

P. Prabhakar
12/03/2013
पी. प्रभाकर
P. Prabhakar
अभियंता / Geologist
एन.टी.पी.सी. लिमिटेड / NTPC LIMITED

Sanjiv

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Ministry of Environment and Forests
GOVERNMENT OF INDIA

Subject: Coal-blocks linked to UMMP, NTPC and OPGC power plants in Odisha

I

1. 3 coal-blocks (Meenakshi-A, Meenakshi-B and Meenakshi Dipside) have been allocated to the 3960Mw/4000 Mw Ultra Mega Power Plant (UMPP) in Odisha that is an initiative of the Central government. 2 coal-blocks (Manoharpur and Manoharpur Dipside) have been allocated to the 1320 Mw power plant of the Orissa Power Generation Corporation (OPGC). 1 coal-block (Dulanga) has been allocated to NTPC's 1600 Mw power plant. **All the six coal-blocks are part of the Ib Valley coalfield and only one (Meenakshi-A) is presently in the "go" area, the other five being in "no go" areas.**

II

2. Since the UMPP had already advanced considerably and in response to persistent requests from it, discussions were held first with the Union Ministry of Power to see how the use of good quality forest land could be minimised in the UMPP-linked coal-blocks. Based on these discussions, I wrote to the Union Minister of Power on February 14th, 2011 saying that the Ministry of Power could consider the UMPP-linked coal blocks as having been approved but that this would mean the Ministry of Power giving up plans for the NTPC and OPGC power plants. This letter is at Annexure-I.

3. Subsequently, NTPC and OPGC also came forward and offered substantial changes in their mining plans. OPGC made the further argument that it was the only power plant of the three from which the state would get 100% power. OPGC also made a strong case for its coal-blocks on the grounds that this would be the first power plant to be set up by the OPGC, in which the state government now has a 51% stake, for almost two decades. The letter from Minister of Energy, Government of Orissa this regard is at Annexure-II

SANJIV KUMAR SINGH
Recognised Qualified Person
No. 34011/(15)/2009-CPAM

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.)

Annexure - A/1

भारत सरकार
जल शक्ति मंत्रालय
जल संसाधन, नदी विकास
और गंगा संरक्षण विभाग
केन्द्रीय भूमि जल प्राधिकरण
Government of India
Ministry of Jal Shakti
Department of Water Resources,
River Development & Ganga Rejuvenation
Central Ground Water Authority

(भूजल निकासी हेतु अनापत्ति प्रमाण पत्र)
NO OBJECTION CERTIFICATE (NOC) FOR GROUND WATER ABSTRACTION

Project Name:	M/s Ntpc Ltd.		
Project Address:	M/s Ntpc Ltd., Dulanga Coal Mining Project		
Village:	Dulinga	Block:	Hemgir
District:	Sundargarh	State:	Odisha
Pin Code:			
Communication Address:	M/s Ntpc Ltd, Dulanga Coal Mining Project, At- Khapurikachhar , P.o: Sanghumuda, Hemgir, Sundargarh, Odisha - 770013		
Address of CGWB Regional Office :	Central Ground Water Board South Eastern Region, Bhujal Bhawan, Khandagiri Square, Nh-5, Bhubaneshwar, Khordha, Odisha - 750001		

1.	**NOC No.:**	CGWA/NOC/MIN/REN/2/2022/7124			
2.	Application No.:	21-4/513/OR/MIN/2013	3.	Category: (GWRE 2020)	Safe
4.	Project Status:	Existing Ground Water	5.	NOC Type:	Renewal
6.	**Valid from:**	04/12/2021	7.	**Valid up to:**	03/12/2023

8. Ground Water Abstraction Permitted:

Fresh Water		Saline Water		Dewatering		Total	
m³/day	m³/year	m³/day	m³/year	m³/day	m³/year	m³/day	m³/year
91.00	33215.00			318.00	116070.00		

9. Details of ground water abstraction /Dewatering structures

	Total Existing No.:4						Total Proposed No.:2					
	DW	DCB	BW	TW	MP	MPu	DW	DCB	BW	TW	MP	MPu
Abstraction Structure*	0	0	3	0	0	0	0	0	2	0	0	0
Dewatering Structure*	0	0	0	0	1	0	0	0	0	0	0	1

*DW- Dug Well; DCB-Dug-cum-Bore Well; BW-Bore Well; TW-Tube Well; MP-Mine Pit;MPu-Mine Pumps

10. Ground Water Abstraction/Restoration Charges paid (Rs.): 304569.50

11. Number of Piezometers(Observation wells) to be constructed/ monitored & Monitoring mechanism.	No. of Piezometers	Monitoring Mechanism		
		Manual	DWLR**	DWLR With Telemetry
**DWLR - Digital Water Level Recorder	1	0	1	0

(Compliance Conditions given overleaf)

This is an auto generated document & need not to be signed.

18/11, जामनगर हाउस, मानसिंह रोड, नई दिल्ली - 110011 / 18/11, Jamnagar House, Mansingh Road, New Delhi-110011
Phone: (011) 23383561 Fax: 23382051, 23386743
Website: cgwa-noc.gov.in

पानी बचाये – जीवन बचाये
SAVE WATER - SAVE LIFE

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.)

Validity of this NOC shall be subject to compliance of the following conditions:

Mandatory conditions:

1) Installation of tamper proof digital water flow meter with telemetry on all the abstraction structure(s) shall be mandatory for all users seeking No Objection Certificate and intimation regarding their installation shall be communicated to the CGWA within 30 days of grant of No Objection Certificate.

2) Proponents shall mandatorily get water flow meter calibrated from an authorized agency once in a year.

3) Construction of purpose-built observation wells (piezometers) for ground water level monitoring shall be mandatory as per Section 14 of Guidelines. Water level data shall be made available to CGWA through web portal. Detailed guidelines for construction of piezometers are given in Annexure-II of the guidelines.

4) Proponents shall monitor quality of ground water from the abstraction structure(s) once in a year. Water samples from bore wells/ tube wells / dug wells shall be collected during April/May every year and analysed in NABL accredited laboratories for basic parameters (cations and anions), heavy metals, pesticides/ organic compounds etc. Water quality data shall be made available to CGWA through the web portal.

5) In case of mining projects, additional key wells shall be established in consultation with the Regional Director, CGWB for ground water level monitoring four (4) times a year (January, May, August and November) in core as well as buffer zones of the mine.

6) In case of mining project the firm shall submit water quality report of mine discharge/ seepage from Govt. approved/ NABL accredited lab.

7) The firm shall report compliance of the NOC conditions online in the website (www.cgwa-noc.gov.in) within one year from the date of issue of this NOC.

8) Industries abstracting ground water in excess of 100 m 3 /d shall undertake annual water audit through certified auditors and submit audit reports within three months of completion of the same to CGWA. All such industries shall be required to reduce their ground water use by at least 20% over the next three years through appropriate means.

9) Application for renewal can be submitted online from 90 days before the expiry of NOC. Ground water withdrawal, if any, after expiry of NOC shall be illegal & liable for legal action as per provisions of Environment (Protection) Act, 1986.

10) This NOC is subject to prevailing Central/State Government rules/laws/norms or Court orders related to construction of tube well/ground water abstraction structure / recharge or conservation structures/discharge of effluents or any such matter as applicable.

General conditions:

11) No additional ground water abstraction and/or de-watering structures shall be constructed for this purpose without prior approval of the Central Ground Water Authority (CGWA).

12) The proponent shall seek prior permission from CGWA for any increase in quantum of groundwater abstraction (more than that permitted in NOC for specific period).

13) Proponents shall install roof top rain water harvesting in the premise as per the existing building bye laws in the premise.

14) The project proponent shall take all necessary measures to prevent contamination of ground water in the premises failing which the firm shall be responsible for any consequences arising therefrom.

15) In case of industries that are likely to contaminate the ground water, no recharge measures shall be taken up by the firm inside the plant premises. The runoff generated from the rooftop shall be stored and put to beneficial use by the firm.

16) Wherever feasible, requirement of water for greenbelt (horticulture) shall be met from recycled / treated waste water.

17) Wherever the NOC is for abstraction of saline water and the existing wells (s) is /are yielding fresh water, the same shall be sealed and new tubewell(s) tapping saline water zone shall be constructed within 3 months of the issuance of NOC. The firm shall also ensure safe disposal of saline residue, if any.

18) Unexpected variations in inflow of ground water into the mine pit, if any, shall be reported to the concerned Regional Director, Central Ground Water Board.

19) In case of violation of any NOC conditions, the applicant shall be liable to pay the penalties as per Section 16 of Guidelines.

20) This NOC does not absolve the proponents of their obligation / requirement to obtain other statutory and administrative clearances from appropriate authorities.

21) The issue of this NOC does not imply that other statutory / administrative clearances shall be granted to the project by the concerned authorities. Such authorities would consider the project on merits and take decisions independently of the NOC.

22) In case of change of ownership, new owner of the industry will have to apply for incorporation of necessary changes in the No Objection Certificate with documentary proof within 60 days of taking over possession of the premises.

23) This NOC is being issued without any prejudice to the directions of the Hon'ble NGT/court orders in cases related to ground water or any other related matters.

24) Proponents, who have installed/constructed artificial recharge structures in compliance of the NOC granted to them previously and have availed rebate of upto 50% (fifty percent) in the ground water abstraction charges/ground water restoration charges, shall continue to regularly maintain artificial recharge structures.

25) Industries which are likely to cause ground water pollution e.g. Tanning, Slaughter Houses, Dye, Chemical/ Petrochemical, Coal washeries, pharmaceutical, other hazardous units etc. (as per CPCB list) need to undertake necessary well head protection measures to ensure prevention of ground water pollution as per Annexure III of the guidelines.

26) In case of new infrastructure projects having ground water abstraction of more than 20 m3/day, the firm/entity shall ensure implementation of dual water supply system in the projects.

27) In case of infrastructure projects, paved/parking area must be covered with interlocking/perforated tiles or other suitable measures to ensure groundwater infiltration/harvesting.

28) In case of coal and other base metal mining projects, the project proponent shall use the advance dewatering technology (by construction of series of dewatering abstraction structures) to avoid contamination of surface water.

29) The NOC issued is conditional subject to the conditions mentioned in the Public notice dated 27.01.2021 failing which penalty/EC/cancellation of NOC shall be imposed as the case may be.
30) This NOC is issued subject to the clearance of Expert Appraisal Committee (EAC) (if applicable).

(Non-compliance of the conditions mentioned above is likely to result in the cancellation of NOC and legal action against the proponent.)

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

Annexure - A/2

No.: 318/17/2024-Grid Connected Rooftop (Part-2)
Ministry of New and Renewable Energy
Government of India
***

Atal Akshay Urja Bhawan
Lodhi Road, New Delhi-110003
Dated: 03. 07.2024

Office Memorandum

Subject: Operational Guidelines for Saturation of Government Buildings with Rooftop Solar under PM-Surya Ghar: Muft Bijli Yojana.

This refers Ministry's order No. 318/17/2024-GCRT Division dated 16th March 2024 vide which sanction was issued for the PM-Surya Ghar: Muft Bijli Yojana, aimed at installing rooftop solar plants in one crore households, with a total financial outlay of Rs. 75,021 crore.

2. The Operational Guidelines for "Saturation of Government Buildings with Rooftop Solar" under PM-Surya Ghar: Muft Bijli Yojana is enclosed.

3. This issues with the approval of competent authority.

(Divyanshu Jha)
Deputy Secretary
d.jha1989@ias.nic.in

To

1. Secretaries to the Government of India
2. All Chief Secretaries of State Governments
3. All Adviser to Administrator of UT Government

Copy for information to:

1. PS to Hon'ble Minister of New & Renewable Energy
2. PS to Hon'ble Minister of State of New and Renewable Energy
3. PPS to Secretary/AS/JS/JS&FA, MNRE
4. All Advisers & Group Heads
5. Director (NIC) for uploading on Ministry's website

***

PM Surya Ghar: Muft Bijli Yojana
Guidelines for Saturation of Government Buildings With Rooftop Solar

1. **Background**

1.1 The Government of India has approved the PM Surya Ghar: Muft Bijli Yojana on 29th February, 2024 to increase the share of solar rooftop capacity and empower residential households to generate their own electricity. The scheme has an outlay of Rs 75,021 crore and is to be implemented till FY 2026-27. The administrative approval was granted to the scheme vide Order No. 318/17/2024-Grid Connected Rooftop dated 16th March, 2024.

1.2 Under the scheme, all Government rooftops under the administrative control of Central Government Ministries/Departments, including autonomous bodies, subordinate offices etc. shall be saturated with rooftop solar to the extent that is technically feasible by 31st December, 2025. Ministries may utilize available rooftop space for such saturation, through the RESCO mode or capex mode, on a priority basis. Through high levels of automation and energy generation data flows, investment in RESCO models in Government rooftops may be de-risked and enforcement and monitoring of contracts enabled without major administrative overheads. State/UTs shall be encouraged to undertake a similar exercise for RTS saturation in their buildings.

1.3 The Central Public Sector Enterprises (CPSEs) with experience in deployment of renewable energy technologies will be allocated on a nomination basis to Central Ministries for assisting these Ministries in deploying rooftop solar on their assets on a priority basis.

1.4 Ministry of New and Renewable Energy (MNRE) will monitor and track installations in the Government sector. All Central Ministries/Departments will collate information regarding available potential and expedite coverage within 2 months from issue of guidelines to ensure saturation of Government assets by December 2025. All buildings under Central Government shall deploy RTS in a mission mode to achieve saturation by December 2025. State/UTs shall be encouraged to undertake a similar exercise for RTS saturation in their buildings.

2. Scope

2.1. These guidelines cover the role of various stakeholders in ensuring saturation of Government buildings at both Central and State levels under the PM Surya Ghar: Muft Bijli Yojana. These include select Central Public Sector Enterprises (CPSEs) with experience in the renewable energy sector, Central Ministries, State/UT Government Departments, autonomous bodies, Public Sector Enterprises and other units under the administrative control of Central Ministries and State/UT Government Departments.

2.2. These Guidelines lay down the process for saturation of government buildings in general and shall apply to both Central government and State/UT Government buildings.

3. Implementation

3.1 No Central Financial Assistance shall be provided under the Scheme for buildings in the Government sector. The installation of rooftop solar on Government buildings have to be undertaken as per the implementation plan of the Administrative Ministry or its units.

3.2 The Ministry of New and Renewable Energy (MNRE) shall identify CPSEs, which have experience in the renewable energy sector as Scheme Implementation Partners (SIPs) for Government Rooftop Solar under the PM Surya Ghar: Muft Bijli Yojana.

3.3 The following CPSEs have presently been considered as SIPs under the scheme:

i. NTPC Limited
ii. NHPC India Limited
iii. SJVN Limited
iv. THDC India Limited

v. Power Grid Corporation of India Limited (PGCIL)
vi. Energy Efficiency Services Limited (EESL)
vii. Solar Energy Corporation of India Limited (SECI)
viii. North Eastern Electric Power Corporation Limited (NEEPCO)
ix. Damodar Valley Corporation (DVC)
x. REMC Limited (REMCL)
xi. NTPC Vidyut Vyapar Nigam Ltd. (NVVN)

However, the Ministry may identify additional SIPs under the scheme from time to time.

3.4 The SIPs may also create Special Purpose Vehicles or fully owned subsidiaries to undertake the work relating to saturation of government buildings for their respective Ministries/Departments/States/UTs.

3.5 MNRE shall allocate SIPs to Ministries under the Central Government and to State/UT Governments.

3.6 All Central Ministries shall decide within a period of one month of the release of these guidelines on utilizing the services of the allotted CPSE for saturating their buildings with rooftop solar or alternatively to choose a different SIP (which can be the Department itself, or a different CPSE under the Ministry/Department or a different agency).

3.7 All State Departments shall decide within a period of one month of the release of these guidelines on utilizing the services of the allotted CPSE for saturating their buildings with rooftop solar or alternatively to choose a different SIP (which can be the Department itself, or a different CPSE under the Ministry/Department or a different agency). State/UT governments may carry out part allocation of their Departments to the nominated SIP and part allocation to other entities as per their implementation roadmap, with complete flexibility.

3.8 The role of the SIP is to act as the primary agency to assist Ministries/Departments allocated to them in achieving rooftop solar saturation. In this regard, the SIPs shall conduct the necessary due diligence on behalf of the Implementing Ministry/State/UT, conduct necessary baseline studies and assessments, present action plans and options for the Ministry/State/UT and to implement the plan for saturation of rooftops on buildings that are under the control of the Implementing Ministry/State/UT.

3.9 The SIPs shall also act as single points of contact on behalf of the Implementing Ministry/State/UT to coordinate with MNRE and the National Program Implementation Agency for the PM Surya Ghar Scheme, and shall generally assist the Implementing Ministry/State/UT in all aspects of rooftop solar installation on their buildings for the work allocated to the SIP.

3.10 The SIPs need to submit the action plan covering all the assets pertaining to the Ministry in consultation with Implementing Ministry, within one month from date of selection of SIP.

3.11 At any given time, each Ministry/Department will be allocated one dedicated SIP for the purpose of saturating their buildings with rooftop solar. In case of lack of progress in implementation of rooftop solar on the Government buildings, the Implementing Ministry may change the SIP at any point of implementation under intimation to MNRE. However, works undertaken by an earlier SIP for saturating Government rooftops that are bound through pre-existing contractual provisions shall continue to be governed by the contractual provisions.

3.12 For the purposes of the scheme, the "buildings under Central Ministries/State/UT Departments" shall be considered to be all buildings/assets that are fully owned by these Ministries/Departments as well as by their autonomous institutions/subordinate offices/attached offices/Public Sector Enterprises, irrespective of their status of current possession. Residential colonies under the Central Ministry/State/UT Departments shall also be saturated with rooftop solar.

3.13 Buildings whose roof uses are bound by pre-existing contractual conditions (for e.g. lease condition) that prohibit/curtail the free use of the rooftop may not be considered for saturation. In case long term rooftop utilization rights are available with the Ministries/Departments under such lease/contractual provisions, even these buildings shall be solarized through rooftop solar by the Implementing Ministry.

3.14 At the Central Ministry level, the Implementing Ministry shall be responsible for ensuring saturation of Government buildings under its administrative control. At the State/UT Government level, the State/UT Power/Energy/Renewable Energy Department shall be responsible for ensuring saturation of Government buildings under the administrative control of the State/UT Government as a whole.

3.15 The Central Ministry/State/UT Government shall designate one point of contact not below of level of Deputy Secretary in Central Ministries and not below the level of Joint Secretary in State/UT Energy/Power/Renewable Energy Department to coordinate with the assigned SIP.

3.16 The SIP will implement the target of saturating all building rooftops for the concerned Ministry/Department/State/UT by undertaking the following steps:

a. The Ministry/Department shall nominate a point of contact/nodal officer to facilitate the SIP in undertaking a baseline exercise for the Ministry/Department by collecting relevant details about all buildings such as availability of roof space, nature of roof usage rights, location, electricity connection, electricity consumption trends, electricity billing and payment history, physical status including structural stability and safety of the roof etc.

b. This exercise should ideally be undertaken through trained site assessors who shall assess rooftop capacity, shadow free areas, building age and strength of rooftop, available ground space etc. that may be collated digitally. The administrative heads of the building shall undertake the necessary assessment with the guidance of the SIP. The Ministry/Department shall provide all necessary administrative support for completion of this exercise in a timely manner.

c. The SIP shall calculate the capacity deployment required for Ministry/Department to reach saturation as per the target given under the scheme. The SIP shall also present the alternative approaches that may be suitable for the Ministry/Department for coverage of rooftops with rooftop solar. The alternative approaches are outlined in Para 4.

d. The Ministry/Department shall choose a particular approach and implement the programme for saturation of rooftops with rooftop solar in the Government sector within the declared timelines of the scheme. Based on the methods of implementation, the SIP may create separate bid packages based on aggregation of sites and rooftop solar capacities.

4. Mechanisms for SIP for saturating Government rooftops under Implementing Ministries

4.1 After the baseline exercise, the SIP shall assist the concerned Ministry/Department through any combination of the following mechanisms. The choice of mechanism shall be mutually decided between the Ministry/ Department and the SIP, and the SIP shall present all feasible alternatives to the Implementing Ministry/State/UT in order for it to decide on its implementation plan.

4.2 Mechanism 1: SIP Owned Deployment

i) In this model, the SIP shall undertake to invest its own resources as part of their capital expenditure plans to install, own and operate the rooftop solar plants for the Ministry/Department. The SIP may undertake its own Engineering, Procurement and Construction (EPC) contracts as it may deem fit, and install RTS plants in the sites. The power generated from these sites shall be sold by the SIP to the concerned building unit connection at a particular per unit charge of electricity and the surplus may be fed into the local DISCOM grid for additional compensation through appropriate metering arrangements. The PPA period shall not be less than 10 years and not more than 25 years. The SIP may also install RTS plants under gross metering/net billing arrangements or any other arrangement approved by the respective State Electricity

Regulatory Commission (SERC), as per the requirements of the implementing Ministry/State/UT.

ii) The SIP shall enter into an agreement with the Ministry/Department or any of its nominated central/regional billing settlement agencies for the monthly settlement of bills on account of power generated by these systems. The SIPs shall ensure that the energy generation reporting is automatic and enabled through necessary real-time/daily generation data pooled into a data repository that is accessible and available for monitoring by the Ministry/Department or its billing settlement units.

iii) The Ministry/Department shall ensure that the billing settlement is not decentralized into a large number of centres and the SIP should have to settle its monthly bills from no more than 8 regional billing and settlement centres within 15 days of being raised. To the extent possible, the billing and settlement processes should be automated and require minimum physical interfacing between the SIP and the settlement agencies to reduce administrative overhead costs, translating into lower tariffs for the Ministries/Departments. In exceptional cases, in remote locations where communication network availability might be an issue, the billing mechanism may be undertaken through physical reconciliation of generation data but the settlement will be done through the billing and settlement center.

iv) In case of delay in payment of bills by the Implementing Ministry, the SIP shall be authorized to levy a late payment surcharge @ 12% per annum on the Implementing Ministry. This late payment surcharge shall accrue to the SIP.

v) In case the SIP undertakes a price discovery through EPC tenders, the Central Electricity Authority (CEA) shall establish a methodology to determine the state-wise applicable per unit charge of electricity on the basis of total discovered cost, after accounting for relevant costs and returns on capital for the SIP. The applicable per unit charge of electricity shall include a 5% administrative overhead to the SIP

exclusive of taxes. This per unit charge shall be a single levelised charge for the PPA period.

vi) In case the SIP undertakes the installation through its own pre-existing entities in which rate discovery of any kind is not undertaken or partially undertaken, in such a scenario, the CEA shall establish a methodology to determine the State-wise applicable per unit charge of electricity for a given aggregation of locations under a Ministry/Department, after consultation with SIPs listed above, MNRE and Ministry of Power (MoP). This per unit charge shall be a single levelised charge for the PPA period. The methodology shall, inter alia, take into account the following factors:

(1) Current indexed prices of solar modules and expected capital costs of the SIP

(2) EPC Tender rate discoveries for similar bids undertaken by other SIP for projects under PM Surya Ghar scheme

(3) Level of clustering and distributed nature of installations and associated higher overhead costs

(4) Included components of special configurations (nature of inverters, battery storage and backup levels etc.

(5) Nature of location of installation

(6) Adequate Returns on Capital for SIP after accounting for all relevant costs incurred

(7) The methodology should also lay out necessary conditions relating to conditions to grid outage and settlement of deemed generation, standards of service by installations and norms for automatic reporting and billing for generated energy by such installations.

4.3 Mechanism 2: SIP as Intermediary Aggregator

i) In this model, the SIP shall bid out the projects for Renewable Energy Service Company vendors who, in turn, shall make the necessary investments in the installation and operation of the RTS plats. The SIP shall ensure payment security to these RESCOs and shall charge the power purchased through a Power Purchase Agreement to a back-to-back Power Sale Agreement to the building owning entity. The surplus may be fed into the local DISCOM grid for additional compensation through appropriate metering arrangements. The PPA period shall not be less than 10 years and not more than 25 years.

ii) The SIP shall enter into an agreement with the Ministry/Department or any of its nominated central/regional billing settlement agencies for the monthly settlement of bills on account of power generated by these systems. The SIPs shall ensure that the energy generation reporting is automatic and enabled through necessary real-time/daily generation data pooled into a data repository that is accessible and available for monitoring by the Ministry/Department or its billing settlement units. The Ministry/Department shall ensure that the billing settlement is not decentralized into a large number of centres and the SIP should have to settle its monthly bills from no more than 8 regional billing and settlement centres within 15 days of being raised. To the extent possible, the billing and settlement processes should be automated and require minimum physical interfacing between the SIP and the settlement agencies to reduce administrative overhead costs, translating into lower tariffs for the Ministries/Departments. The SIP shall make the necessary payments to the RESCO vendors on a regular basis. In exceptional cases, in remote locations where communication network availability might be an issue, the billing mechanism may be undertaken through physical reconciliation of generation data but the settlement will be done through the billing and settlement center.

iii) The applicable per unit charge of electricity for the PSA shall be the rate discovered by the SIP for RESCO arrangement with an addition of 3% administrative overhead for the SIP for its role as an aggregator, exclusive of taxes.

iv) The SIP may install RTS plants under gross metering/net billing/net metering arrangements or any other arrangement approved by the respective State Electricity Regulatory Commission (SERC), as per the requirements of the implementing Ministry/State/UT.

v) The SIP shall apply for trading license, if applicable, as per extant rules and regulations and shall be bound by the same.

vi) In case of delay in payment of bills by the SIP, the RESCO player shall be liable to be paid a late payment surcharge @ 12% per annum on the SIP. In case of delay in payment of bills by the Implementing Ministry, the SIP shall be authorized to levy a late payment surcharge @ 12% per annum on the Implementing Ministry.

4.4 Mechanism 3: Process Management Consultant

i) In this model, the Ministry/Department will undertake to fund the project entirely from its own resources. The SIP role shall be restricted to designing the bid document, assisting the Ministry/Department in bid process management and handholding till the commissioning of all plants, and then for further one year of operations of the commissioned plants to resolve operational issues between the Implementing Ministry/Department and the contractor responsible for operation and maintenance of the commissioned plants.

ii) The SIP shall be paid a Consultancy Fees of 3% of the overall project cost, exclusive of taxes.

iii) The SIP shall undertake the activities under the agreement signed with the Ministry/Department. The actual bids can be carried out by the Ministry/Department or any other suitable entity under it.

iv) The bid itself can be capex based (wherein the Ministry/Department undertakes payment to EPC contractor/s for the project) or RESCO based (wherein the Ministry/Department undertakes electricity procurement from a RESCO contractor/s).

v) The bid shall clarify the metering arrangement for the installation. This may be under gross metering/net billing/net metering arrangements or any other arrangement approved by the respective State Electricity Regulatory Commission (SERC), as per the requirements of the implementing Ministry/State/UT.

4.5 Mechanism 4: Turnkey Project

i) In this model also, the Ministry/Department will undertake to fund the project entirely from its own resources and assign the work to the SIP on a turnkey basis. The SIP will undertake the work either by itself or through its own sub-contractors, build the rooftop solar installations and handover the built assets to the concerned Ministry/Department as per the agreement. The SIP and its sub-contractors will provide Operation and Maintenance Services for a minimum period of 5 years.

ii) The SIP shall formulate and finalize the tender document for choosing its sub-contractors and discover the tender-based rate for the project. The SIP shall add a project management charge of 5% on the discovered rate exclusive of taxes and accordingly submit the rates to the Ministry/Department on the basis of which the payment to the SIP shall be made.

iii) The SIP may install RTS plants under gross metering/net billing/net metering arrangements or any other arrangement approved by the respective State Electricity Regulatory Commission (SERC), as per the requirements of the implementing Ministry/State/UT.

5. Monitoring

5.1 The Steering Committee at the national level headed by the Cabinet Secretary, constituted under the scheme, shall monitor the progress regarding saturation of all Government buildings with rooftop solar. The Committee may invite any Secretary to Government of India/Chief Secretary of State/UT or any other person to participate in its deliberations.

5.2 State Level Monitoring Committee (SLMC) headed by the Chief Secretary at the State/UT level, constituted under the scheme, shall monitor the progress regarding saturation of State Government buildings owned/under the control of the State/UT or any of its autonomous bodies/entities with rooftop solar.

5.3 Entire progress of saturation of all Government buildings will be tracked digitally through the PM Surya Ghar National Portal. All Central Government Ministries/ Departments as well as State Governments/Departments as well as their respective SIPs would be provided access to the Portal for updating the baseline data, progress of installation of rooftop solar on their buildings and other relevant data as may be required by MNRE from time to time.

5.4 The National Programme Implementation Agency (NPIA) for PM Surya Ghar: Muft Bijli Yojana shall coordinate with all Central Ministries/State/UT Governments and their SIPs in order to regularly track progress in achievement of rooftop solar saturation in Government buildings and provide necessary assistance to all stakeholders with regards to capacity building and awareness generation.

5.5 All SIPs shall also appoint respective Nodal Officers(s) for effective coordination between stakeholders.

6. Model Documents

6.1 In order to implement the solarization of Government rooftops, the implementing Ministries/Departments and the SIPs may refer to model documents prepared by MNRE vide OM no. File No. 03/12/2016-17/GCRT dated: 11-11-2016 (Copy at Annex A).

However, these documents are indicative in nature and may be modified as per the context and mutual discussions between SIPs and the Implementing Ministries.

7. Amendment

7.1 MNRE may make necessary amendments in the guidelines or issue any clarification to remove difficulties in the implementation of the scheme, as and when required, with the approval of Hon'ble Minister, New and Renewable Energy.

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 Dulanga 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 JAMTA
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

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	e440275333155722247d6 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		

27.11.2024

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.)

Fee Acknowledgement

Counterfoil (Office Copy)

		Transaction Id.:	e44027533315572247d6
Reference No.:	1007/2024	**Payment Gateway ID:**	807311911240296423
		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 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.)

Nov 20, 2024, 1:33 AM