



# N M D C LTD.

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Email : hois@nmdc.co.in

## MINING PLAN FOR SHAHPUR WEST COAL BLOCK SOHAGPUR COALFIELD DISTRICT SHAHDOL & UMARIA, MADHYA PRADESH

{Under Rule 22 (4) of Mineral Concessions (Amendment) Rules, 1994}  
{(EXTENT OF AREA OF BLOCK 587.5 HA;  
(CAPACITY : 0.60 MTPA by UG Method )  
[Re-submission after Incorporation of Suggestions of Standing  
Committee Vide MOC Letter No. 34011/34/2010-CPAM dt. 26-11-2010]

(VOLUME I : TEXT & ANNEXURES)

JUNE, 2011

Prepared by:

**B.D.SHARMA**  
(Recognised Qualified Person)  
(No. 13016/18/2004-CA Dt. 24<sup>th</sup> August, 2004 valid upto 31-05-2014)

*B.D. Sharma*  
**B.D.SHARMA**  
RQP

*[Signature]*  
Joint Secretary  
Ministry of Coal  
New Delhi-110001



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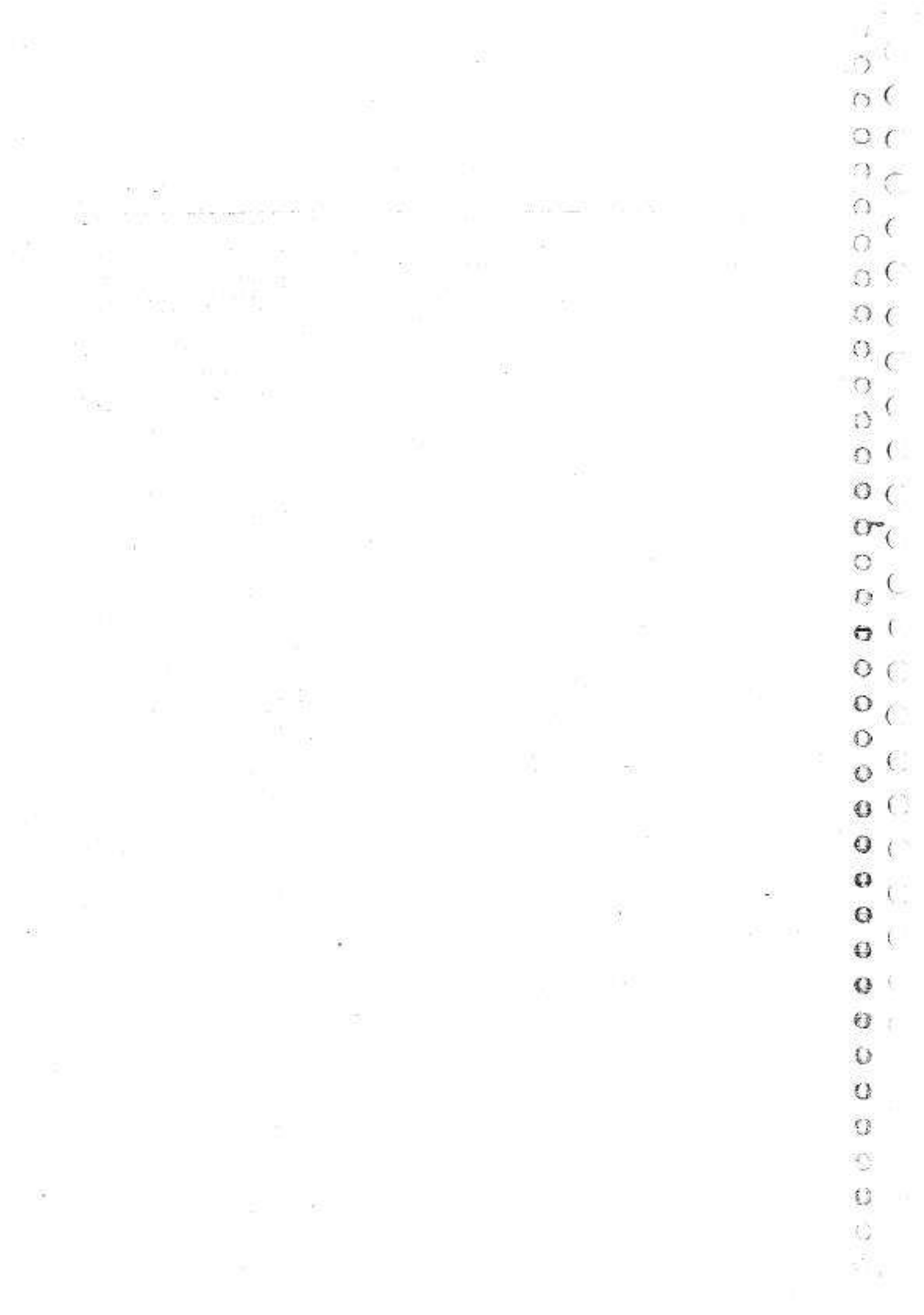
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संजीव गुप्ता/SANDEEP GUPTA  
अवर सचिव/Under Secretary  
कोयला मंत्रालय/Ministry of Coal  
भारत सरकार/Government of India  
नई दिल्ली/New Delhi-110001



No.13016/28/2010-CA-1

Government of India

Ministry of Coal

New Delhi, dated 17<sup>th</sup> February, 2012

To  
The Project Manager (Coal),  
M/s National Mineral Development Corporation,  
(A Govt. of India Enterprise),  
Khanij Bhavan, 10-3-311/A,  
Castle Hills, Masab Tank,  
Hyderabad-500173.

Subject : Approval of Mining Plan (June, 2011) including Mine Closure Plan for Shahpur West coal block of Sohagpur Coalfields, District Shahdol & Umaria (Madhya Pradesh) to M/s National Mineral Development Corporation Ltd. (NDMC).

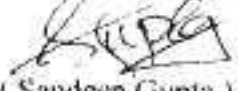
Sir,

I am directed to refer to your letter No.NMDC/Coal Division/Shahpur/Coal/2010/44 dated 31.05.2010 on the above subject and to state that the Mining Plan (June, 2011) including Mine Closure Plan for Shahpur West coal block of Sohagpur Coalfields, District Shahdol & Umaria (Madhya Pradesh) to be read alongwith company's letter dated 09.06.2011 submitted by M/s National Mineral Development Corporation Ltd. (NDMC), has been considered and the approval of the Central Government thereon is hereby conveyed under Section 5 (2) (b) of the Mines & Minerals (Development & Regulation) Act, 1957 subject to the following condition :-

- 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 and mine closure plans duly signed by the competent authority are returned herewith with the request that a copy of the approved mining plan and mine closure plan may be submitted to the concerned State Government for necessary action and also a photocopy of the approved mining plan and mine closure plan may be sent to the Coal Controller for monitoring the block.

Yours faithfully,

  
( Sandeep Gupta )

Under Secretary to the Govt. of India.

Encls. As above.





No. NMDC/ Coal / Shahpur/2010

Dated 09.06.2011

To,

The Under Secretary  
Ministry of Coal,  
Shastri Bhawan  
New Delhi - 110001



Sub. Submission of corrected final Mining Plan of Shahpur West Coal Block, Shahdol &  
Umaria district, MP to MoC, for approval.  
Ref: 1) Presentation of Shahpur West coal Block held on 15.11.2010  
2) Govt. Of India, Ministry of Coal Letter No.34011/34/2010-CPAM, Dtd. 26/11/2010

Dear Sir,

On the subject and reference above, it is to inform that, we have incorporated all the suggestions of Standing committee of Coal in the revised Mine Plan of Shahpur West Coal Block and is being submitted in 4 copies each (text and plates) for approval. We are also enclosing NMDC's Board resolutions on Escrow amount towards Mine Closure Plan as per guide lines of MoC.

We request you to kindly approve the above Mine plan at the earliest so as to adhere to the Mile stone chart of MoC.

Kindly acknowledge the receipt of the above.

Thanking You,

संयोजक, खनिज  
Under Secretary  
खनिज भवन / Ministry of Coal  
कैसल हिल्स / Govt. of India  
नई दिल्ली / New Delhi

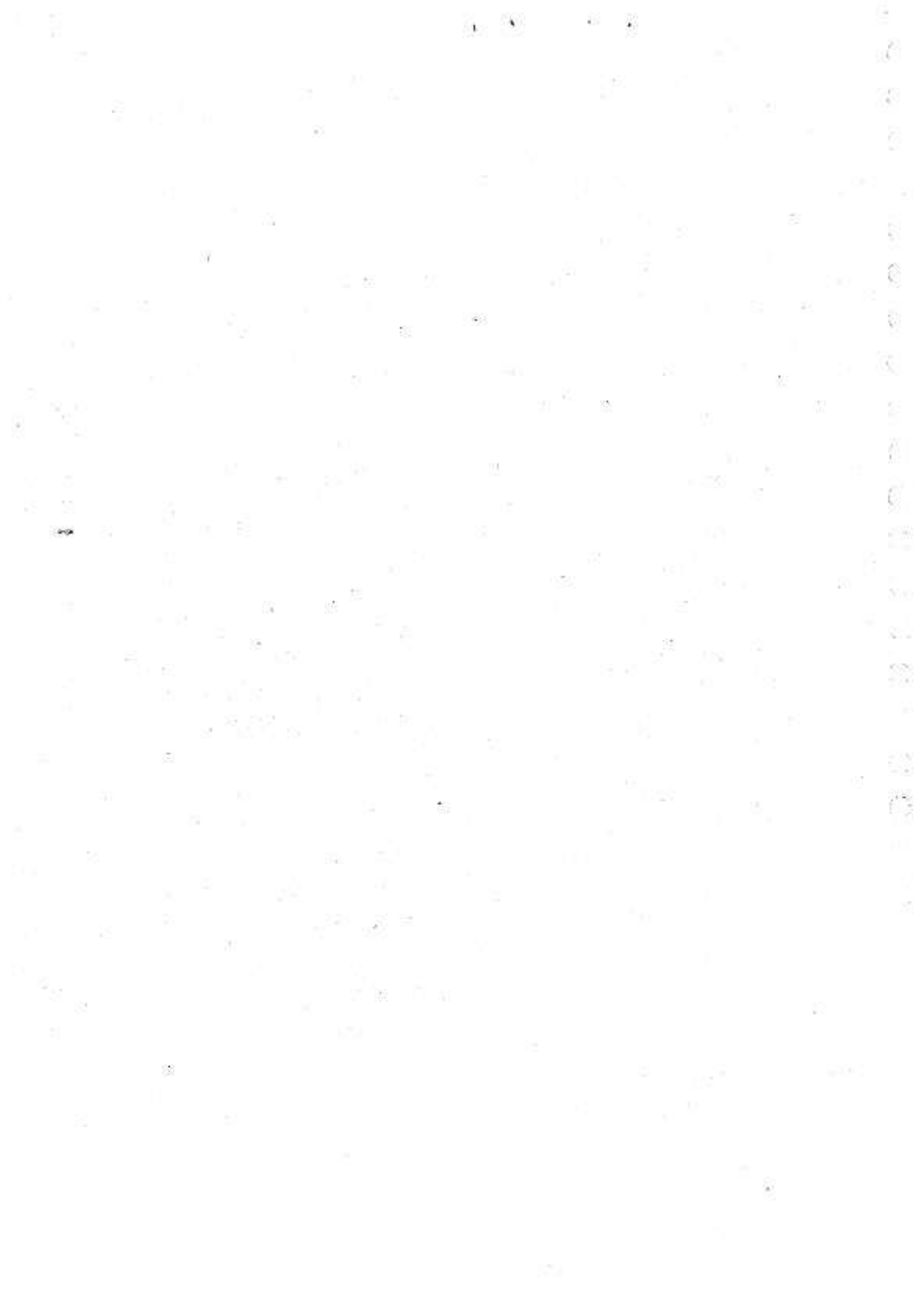
Yours faithfully

(D.P.Selvan)

Jt. General Manager (Inv.)

Encl: 4 copies of revised Mining Plan of Shahpur West Coal block - Text & Plates.

Attachment-I : Compliance to MOC Suggestions



## Attachment - I

Compliance to suggestions made on Mining Plan by MOC vide their letter No. 34011/34/2010-CPAM dt 26-11-2010 in respect of Shahpur West Coal Block, MP

| Sl No. | Suggestion made by MOC                                                                                                                                                                    | Compliance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1      | The project proponent should explain the reasons for delay in submission of mining plan.                                                                                                  | ML application for Shahpur West coal block was submitted on 14.12.2009 based on the draft Geological Report received from MECL, Nagpur. Work order was issued on 05.12.2009 to M/s Min Mec Consultancy Pvt Ltd, New Delhi for preparation of Mining Plan. Later it was found that area of Shahpur East and Shahpur West blocks are not matching in the surface plan & text parts of draft GR as per the allotted area by MOC. After incorporating the suggestions and comments from NMDC, MECL submitted final GR on 26.03.2010. The same was conveyed to M/s Min Mec, New Delhi for preparation of Mining Plan and Min Mec, has prepared the draft Mine plan & submitted to MoC on 07.06.2010 (May, 2010 version). In view of above there was slight delay in submitting the draft Mine Plan. |
| 2      | The block boundary on the southern side of the block at para 3.1 should be properly described.                                                                                            | The block boundary has been adopted from para 1.03.01 of GR. However more exact description is also now additionally given vide para 3.1 in Chapter 3 of Mining Plan.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 3      | Justification and method of driving ventilation shaft (4mx3m) with 70° inclination instead of vertical shaft should be furnished.                                                         | Vertical ventilation shaft of 5.00m diameter has now been adopted in this re-submission of the Mining Plan instead of incline shaft previously proposed. (Refer para 7.1 in Chapter 7 of Mining Plan)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 4      | Life of the project mentioned as 64 years at para E(d) of Executive Summary should be corrected.                                                                                          | It is now corrected as 24 years in this resubmission of Mining Plan. (refer para E(d) of Executive Summary).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 5      | How the surface features viz, villages, nalas & roads etc over the block would be dealt with and the basis of conclusion that there would be no impact of subsidence should be explained. | No coal will be won up to a depth of 90m below the villages and only developmental activities (no depillaring) are proposed for >90m surface cover. Only cross galleries are proposed under roads and nalas for all seams. No subsidence is expected to take                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

*[Signature]*  
 Joint Director, CPAM  
 Nagpur  
 26/11/2010

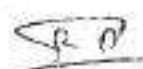
*[Signature]*  
 B.D. SHARMA  
 RQP

|    |                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    |                                                                                                                                                                                                                                                             | place under above circumstances. However, a scientific study is under progress to assess the actual position and accordingly recommendations will be complied during mining. A copy of the Subsidence Study will be submitted to MOC when it is completed. (refer 1 <sup>st</sup> paragraph on page 5-6 in Chapter 5 of Mining plan and para 14.4.1 of Chapter 14).                                                                                                                                                               |
| 6  | Meaning of Base data for Mining Plan given in para I(a) of executive summary as July 2011+ time taken for exploration should be explained/corrected.                                                                                                        | There was an inadvertent error. It should be "May, 2010" which has now been corrected.<br>{Refer para I(a) of Executive Summary}                                                                                                                                                                                                                                                                                                                                                                                                  |
| 7  | The manner in which the height of the galley is proposed to be maintained at 1.8 mtrs in areas where Seam thickness is less than 1.8 mtrs should be explained together with the manner of disposal of stone obtained in the process of gallery heightening. | Now it is dealt vide para 5.6 in Chapter 5 and para 11.4 in Chapter 14.<br>This will be done through floor dinting and the massive sand stone roof will be kept intact with roof bolting. The wastage produced during the floor dinting will be dealt separately to avoid any mixing with the coal produced from the drivage of the gallery. The floor dinting will be carried out after driving of one complete pillar length as the simultaneous activity may degrade the coal. It will be taken out to surface by rope haulage |
| 8  | Coal Reserves in areas having seam thickness of less than 1.2 mtrs are also be calculated and shown in the tables covering the total reserves and the Extractable Reserves.                                                                                 | It has been incorporated in Table 5.2 at page 5-2 in Chapter 5 of Mining Plan.                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 9  | The Mining Plan proposed working of 3 Seams at a time and allowance has been made for Air leakage of only 20%. This should be re-examined.                                                                                                                  | The whole aspect has been re-examined. Now the Mining Plan proposes working of only one seam at a time except during change over from one seam to another. In view of the above, a 20% leakage is considered adequate. The bar chart given in Plate XI shows that the mining is normally restricted to one seam at a time except in case of change over from one seam to another.                                                                                                                                                 |
| 10 | The assumptions made in projecting                                                                                                                                                                                                                          | The calculation is incorporated at page 5-                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

*[Signature]*  
 Joint Secretary  
 Under Secretary  
 Ministry of Coal  
 Govt. of India  
 New Delhi

*[Signature]*  
 B.D.SHARMA  
 RQP

|    |                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                          |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | the production level of 0.405 mtpa with SDL & LHD should be furnished giving detailed computations.                                                                                                                                                                                                                                                 | 19 vide para 5.5 in Chapter 5 for revised production target of 0.60 MTPA. The detail computation is given in Annexure 5-1.                                                                                                                                                                                                               |
| 11 | Feasibility of adopting continuous Mining System should be examined by this method, the reserves in top Seams can be liquidated fast and the equipment then can be moved to seam II which accounts for the largest portion of coal Reserves. This way ventilation would be easier and production level could be increased to say 0.6 mill tons p.a. | The suggestion made by MCC is incorporated in para 5.4.2; 5.4.2.2; 5.4.2.3 and 5.5. One Continuous Miner has also been introduced along with other panels with SDLs and LHDs. The production is also revised to 0.60 MTPA. (Refer pages 5-8 to 5-19)                                                                                     |
| 12 | While at para 12.1.3, it has been mentioned that the drinking water will be supplied from bore well, in an earlier paragraph it has been indicated that mine water will be used for washing as well as drinking. This should be reconciled.                                                                                                         | Initially the total requirement of water (Industrial as well as potable) will be met from bore well. Later on, when water is available from the mine, the industrial water requirement will be met from the mine water while the drinking water requirement will continue to be met from the bore well. (refer para 12.1.3 at page 12-1) |
| 13 | Location of office should be re-examined as proposed location being close to CHP, poses the problem of air pollution.                                                                                                                                                                                                                               | The location of office has been re assessed and shifted from the old location to new location i.e near the main Administrative building. (refer para 12.1 at page 4-1 and Master Surface Plan Plate-V).                                                                                                                                  |
| 14 | Chapter on transport describes only district transport. It should also cover main transport and transportation of stone as well.                                                                                                                                                                                                                    | Transport is described in Chapter 11 completely. A dedicated road on surface is described under para 11.3 at page 11-2 and shown in Master Surface Plan Plate-V                                                                                                                                                                          |
| 15 | Figures of reserves in para 4.3.4.2 should be corrected to 4.614 in place of 3.455 as wrongly mentioned in table.                                                                                                                                                                                                                                   | It is reconciled now and corrected in para 4.3.4.2 at page 4-15 as suggested.                                                                                                                                                                                                                                                            |
| 16 | Tables 5.2 & 5.3 should include                                                                                                                                                                                                                                                                                                                     | The reserves of un-workable seams are                                                                                                                                                                                                                                                                                                    |

  
B.D.SHARMA  
RQP

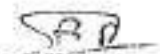
|    |                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                       |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | reserves of un-workable seams also.                                                                                                                                                                                                                                               | included in table 5.2 at page 5-2.                                                                                                                                                                                                                                                                                                                    |
| 17 | Total requirement of power is not covered in para 12.1.4.                                                                                                                                                                                                                         | Now it is covered in para 12.1.4 at page 12-2.                                                                                                                                                                                                                                                                                                        |
| 18 | Total lease area of village Kushmaha Khurd in table 3.1 & annexure 3-1 is different. It should be reconciled.                                                                                                                                                                     | The area of village Kushmaha Khurd in table 3.1 & annexure 3-1 has been reconciled now and corrected.                                                                                                                                                                                                                                                 |
| 19 | Possibility of working Mineable seams blocked under Surface Constraints with development/ splitting as the final operation should be examined.                                                                                                                                    | The possibility of working Mineable seams blocked under Surface Constraints with development/ splitting as the final operation has been examined and proposed by winning the coal through development under the villages and barriers with minimum cover of 90m. Additionally 0.67MT of coal will be received as shown in Table No. 5.4A at page 5-6. |
| 20 | Revenues map (plate No. III) is not legible (particularly khasra Nos). It should be re-submitted in legible form.                                                                                                                                                                 | Legible copy of Revenues map (plate No. IV) is now incorporated.                                                                                                                                                                                                                                                                                      |
| 21 | RQP should submit the certificate stating that lease area is within the allotted block boundary.                                                                                                                                                                                  | The required certificate has been submitted as annexure A-5.                                                                                                                                                                                                                                                                                          |
| 22 | Details of individual boreholes should be incorporated.                                                                                                                                                                                                                           | Details of individual boreholes have now been incorporated (refer Plate-VIII).                                                                                                                                                                                                                                                                        |
| 23 | The quantum of work done by MECL/CMPDI or other agency. If any, under different activities viz. Survey & mapping, exploratory drilling coal sampling core logging Proximate analysis wash ability test, geo-physical logging & petro graphic analysis etc should be incorporated. | The quantum of work done by agencies under different activities is incorporated in table 4.1 at page 4-1                                                                                                                                                                                                                                              |
| 24 | "Progressive" word should be removed from heading of chapter on Mine Closure plan.                                                                                                                                                                                                | It has now been corrected (refer page 15-1).                                                                                                                                                                                                                                                                                                          |
| 25 | Reason for Mine closure and the approval of the Board of Directors of the mining company on the decision on mine closure should be furnished.                                                                                                                                     | Reason for Mine closure has been explained in para 15.1.4 at page 15-2. The approval of Board of Directors of the company on the decision on mine closure is attached in Annexure A-3.                                                                                                                                                                |

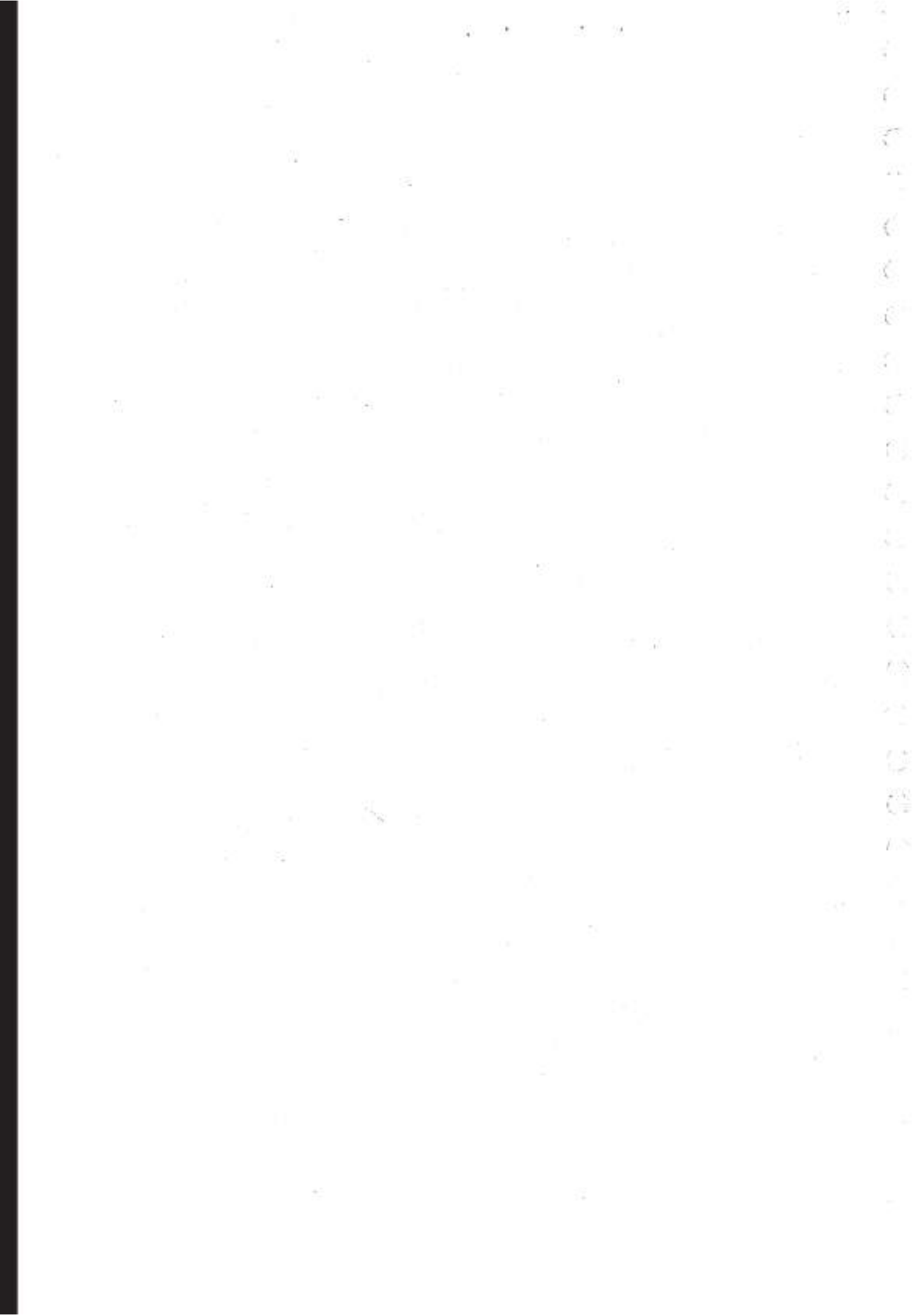
*[Signature]*  
**SANDEEP GUPTA**  
 Joint Secretary / Under Secretary  
 Ministry of Coal  
 Govt. of India  
 New Delhi

*[Signature]*  
**B.D.SHARMA**  
 RQP

|    |                                                                                                              |                                                                                                                                                                            |
|----|--------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 26 | Mine closure plan should be prepared covering all the topics given in guidelines issued by Ministry of Coal. | Mine closure plan is prepared as per MOC guidelines.                                                                                                                       |
| 27 | Amount to be deposited in Escrow account is to be given in tabular form for 33 years.                        | It is now provided in Table 15.16 at page 15-40 as suggested.                                                                                                              |
| 28 | Air pollution during transport of coal from mine to siding should be covered.                                | This is covered under para 15.7.3 (refer pages 15-32 to 15-34)                                                                                                             |
| 29 | Post mining land use giving details of facilities to be retained / dismantled should be furnished.           | The facilities to be dismantled have been spelt out in Table under para 15.7.9 and facilities to be retained are mentioned below that table. (refer page 15-39 and 15-40). |
| 30 | All the Statutory obligations & the manner in which they will be complied with should be incorporated.       | These are now covered under para 15.1.5. (refer page 15-2 and 15-3)                                                                                                        |

  
 सचिव / Joint Secy to  
 कोयला विभाग / Ministry of C.  
 भारत सरकार / Govt. of India  
 नई दिल्ली / New Delhi

  
**B.D. SHARMA**  
 RQP



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 सारदीप गुप्ता / SARDEEP GUPTA  
 अवर सचिव / Under Secretary  
 कोयला विभाग / Ministry of Coal  
 भारत सरकार / Govt. of India  
 नई दिल्ली / New Delhi

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 B.D. SHARMA  
 RQP  
 (Signature)  
 26/11/2010

## LIST OF PLATES

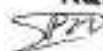
**Sd/-** **VINOD KUMAR GUPTA**  
Joint Secretary  
Ministry of Coal  
New Delhi

## ABBREVIATIONS

|           |                                                    |
|-----------|----------------------------------------------------|
| AMSL      | - Above Mean Sea Level                             |
| bgl       | - Below ground level                               |
| CV        | - Calorific Value                                  |
| CSM       | - Continuous Surface Miner                         |
| cum       | - Cubic metre                                      |
| EIA       | - Environmental Impact Assessment                  |
| EMP       | - Environmental Management Plan                    |
| E&M       | - Electrical and Mechanical                        |
| FE Loader | - Front End Loader                                 |
| FC        | - Fixed Carbon                                     |
| GT        | - Grand Trunk                                      |
| GR        | - Geological Report                                |
| GSI       | - Geological Survey of India                       |
| HFL       | - High Flood Level                                 |
| HEMM      | - Heavy Earth Moving Machinery                     |
| Ha        | - Hectare                                          |
| IB        | - Interburden                                      |
| IMD       | - India Meteorological Department                  |
| K.Cal/kg  | - Kilo Calorie per Kilogram                        |
| Ltd.      | - Limited                                          |
| LTPA      | - Lakh Tonne Per Annum                             |
| LHV       | - Load Haul Dump                                   |
| MTPA      | - Million Tonne Per Annum                          |
| MCPA      | - Million Cubic Metre Per Annum                    |
| M cum     | - Million cubic metre                              |
| MBCM      | - Million Bank Cubic Metre                         |
| M         | - Metre                                            |
| Mt        | - Million tonne                                    |
| ML        | - Mining Lease                                     |
| Mty       | - Million tonne per year                           |
| MOC       | - Ministry of Coal                                 |
| Mil. cum. | - Million cubic metre                              |
| Mil. Te.  | - Million Tonne                                    |
| MoEF      | - Ministry of Environment and Forest               |
| NMDCL     | - National Mineral Development Corporation Limited |
| NTU       | - Units of measurement                             |

  
 सहायक मुपा / ASDESP GUPTA  
 जल विभाग / Under Secretary  
 कोयला मंत्रालय / Ministry of Coal  
 भारत सरकार / Govt. of India  
 नई दिल्ली / New Delhi

**B.D.SHARMA**  
**RQP**



|     |                                      |
|-----|--------------------------------------|
| NH  | - National Highway                   |
| OC  | - Opencast                           |
| OB  | - Overburden                         |
| PA  | - Per Annum                          |
| R&R | - Rehabilitation & Resettlement Plan |
| RQP | - Recognised Qualified Person        |
| ROM | - Run of Mine                        |
| RH  | - Relative Humidity                  |
| RPM | - Respirable Particulate Matter      |
| SDL | - Side Discharge Loader              |
| SPM | - Suspended Particulate Matter       |
| SC  | - Scheduled Cast                     |
| SH  | - State Highway                      |
| ST  | - Scheduled Tribe                    |
| TPD | - Tonne Per Day                      |
| TS  | - Topsoil                            |
| UG  | - Under Ground                       |
| UHV | - Useful Heat Value                  |
| VM  | - Volatile Matter                    |

  
 सहायक सचिव / Under Secretary  
 कोयला विभाग / Ministry of Coal  
 भारत सरकार / Govt. of India  
 नई दिल्ली / New Delhi

**B.D. SHARMA**  
**RQP**



## EXECUTIVE SUMMARY AS PER GUIDELINES OF MOC

## A. Summarised Data

| 1. General |                                                                                                                                                         |                                                                                                                                                                                        |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| a)         | Name and address of the Applicant Company                                                                                                               | National Mineral Development Corporation Limited<br>Khanij Bhawan,<br>10-3-311/A, Castle Hills<br>Masab Tank,<br>Hyderabad – 500173, India.                                            |
| b)         | Name and address of the Block Allottee                                                                                                                  | As above                                                                                                                                                                               |
| c)         | Relationship between the applicant and allottee company                                                                                                 | Same applicant and allottee                                                                                                                                                            |
| d)         | Status of the Applicant Company :<br>Central /Public Sector Undertaking/State Government Undertaking/JV Company/ Pvt Company/Public Co/Others (Specify) | Govt. Of India Enterprises<br><br>संदीप गुप्ता / SANDEEP GUPTA<br>अवर सचिव / Under Secretary<br>कोयला विभाग / Ministry of Coal<br>भारत सरकार / Govt. of India<br>नई दिल्ली / New Delhi |
| e)         | Name of the Coal Block together with name of Coalfield & State where located                                                                            | Shahpur West Coal Block in north western part of Sohagpur Coalfield, Madhya Pradesh                                                                                                    |
| f)         | Date of allotment                                                                                                                                       | letter No. 13016-08-2007-CA-I Dated 25 <sup>th</sup> July, 2007.                                                                                                                       |
| g)         | End Use of Coal/Lignite as per Approval by the Competent Authority                                                                                      | The allocation has been made under Govt. dispensation route.                                                                                                                           |
| h)         | ROM Quantity proposed to be produced as per Mining Plan                                                                                                 | 0.60 MTPA                                                                                                                                                                              |
| i)         | Norms adopted for calculating ROM quantity requirement in case it differs from the quantity indicated in the Allotment Order.                           | Not applicable as the allocation has been made under Govt. dispensation route and coal quality is not required to be specific to the end user plant.                                   |
| j)         | Beneficiation required – Yes/No                                                                                                                         | NO                                                                                                                                                                                     |
| k)         | Requirement of Beneficiated Coal & expected availability thereof.                                                                                       | No beneficiation of coal at site is required.                                                                                                                                          |
| l)         | Period for which Mining Lease has been granted/is to be renewed/ is to be applied for.                                                                  | Mining lease is applied for 30 years                                                                                                                                                   |
| m)         | Date of Expiry of earlier Mining Lease, if any                                                                                                          | Not applicable as the mining lease is being applied for the 1 <sup>st</sup> time                                                                                                       |

|    |                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                    |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| n) | RQP who has prepared the Mining Plan<br>Name<br>Address<br><br>Phone No.<br>Fax<br>Email ID<br><br>Registration No & date till valid<br>Date of grant/Renewal of RQP Status<br>Validity | Mr. B. D. Sharma<br>A-121,<br>Paryavaran Complex,<br>IGNOU Road,<br>New Delhi - 110030<br>29534777, 29532236, 29535891<br>091-011-29532568<br>min_mec@vsnl.com;<br>minmec@bol.net.in<br>13016/18/2004-CA<br>10 years from last recognition dated 01.06.2004 and is therefore valid upto 31-05-2014 |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**B. Information regarding earlier approved Mining Plans, if any. N/A (First Submission)**

|    |                                                                                                              |                                                                                      |          |
|----|--------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|----------|
| a) | Approval Letter no. and Date                                                                                 |  |          |
| b) | Lease Area                                                                                                   |                                                                                      |          |
| c) | Date of grant of Lease                                                                                       |                                                                                      |          |
| d) | Date of Expiry of Lease                                                                                      |                                                                                      |          |
| e) | Targetted Production                                                                                         |                                                                                      |          |
| f) | Proposed date of start of Production                                                                         |                                                                                      |          |
| g) | Proposed date of achieving the targeted production level                                                     |                                                                                      |          |
| h) | Envisaged life of the mine (in years)                                                                        |                                                                                      |          |
| i) | Date of actual commencement of Mining Operations, if operations already started                              |                                                                                      |          |
| j) | Likely date of Mining Operations, if operations not yet started & reasons for non-commencement of operations |                                                                                      |          |
| k) | Planned production and actual levels achieved in last 3 years                                                |                                                                                      |          |
| l) | Coal :-<br>U/G<br>O/Cast<br>OB                                                                               |                                                                                      |          |
| m) | Reasons for difference between the planned and actual production levels                                      |                                                                                      |          |
| n) | Reason for revision of the Mining Plan                                                                       | Old Plan                                                                             | New Plan |
| o) | Details of changes in the new mining plan compared to earlier approval                                       |                                                                                      |          |
|    | (i) Lease Area                                                                                               |                                                                                      |          |
|    | (ii) Block Boundary                                                                                          |                                                                                      |          |
|    | (iii) Production level                                                                                       |                                                                                      |          |
|    | (iv) Reserves                                                                                                |                                                                                      |          |
|    | (v) Mining Technology(Additional sheets to be used, if required)                                             |                                                                                      |          |

|                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                       |       |                                                                                     |      |                              |       |                                                        |      |                                                         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------------------------------------------------------------------------|------|------------------------------|-------|--------------------------------------------------------|------|---------------------------------------------------------|
| <b>C Location</b>                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                       |       |                                                                                     |      |                              |       |                                                        |      |                                                         |
| a) Location of the Block<br>Taluka/ Village/ Khasra/ Plot / Block Range /<br>etc. District / State                                                                                                                                                            | Village- Shahpur, Khamaria, Kathotia<br>and Kosmaha Taluq - Sohagpur<br>(Dist.-Shahdol), Pali (Dist.-Umariya),<br>District - Umariya & Shahdol, Madhya<br>Pradesh                                                                                                                                                                                                                                                     |       |                                                                                     |      |                              |       |                                                        |      |                                                         |
| b) Name of the Coalfield/ Coal belt                                                                                                                                                                                                                           | Sohagpur Coalfield.                                                                                                                                                                                                                                                                                                                                                                                                   |       |                                                                                     |      |                              |       |                                                        |      |                                                         |
| c) Particulars of adjacent blocks: North, South,<br>East, West                                                                                                                                                                                                | <table border="1"> <tr> <td>North</td> <td>Shahpur Block &amp; West of<br/>Shahdol block explored / being<br/>explored by GSI &amp; MECL</td> </tr> <tr> <td>East</td> <td>Shahpur (East) block of NMDC</td> </tr> <tr> <td>South</td> <td>The blocks of CMPDIL/GSI<br/>(exploration in progress).</td> </tr> <tr> <td>West</td> <td>Marwatola block of MECL &amp;<br/>CMPDIL (work in progress).</td> </tr> </table> | North | Shahpur Block & West of<br>Shahdol block explored / being<br>explored by GSI & MECL | East | Shahpur (East) block of NMDC | South | The blocks of CMPDIL/GSI<br>(exploration in progress). | West | Marwatola block of MECL &<br>CMPDIL (work in progress). |
| North                                                                                                                                                                                                                                                         | Shahpur Block & West of<br>Shahdol block explored / being<br>explored by GSI & MECL                                                                                                                                                                                                                                                                                                                                   |       |                                                                                     |      |                              |       |                                                        |      |                                                         |
| East                                                                                                                                                                                                                                                          | Shahpur (East) block of NMDC                                                                                                                                                                                                                                                                                                                                                                                          |       |                                                                                     |      |                              |       |                                                        |      |                                                         |
| South                                                                                                                                                                                                                                                         | The blocks of CMPDIL/GSI<br>(exploration in progress).                                                                                                                                                                                                                                                                                                                                                                |       |                                                                                     |      |                              |       |                                                        |      |                                                         |
| West                                                                                                                                                                                                                                                          | Marwatola block of MECL &<br>CMPDIL (work in progress).                                                                                                                                                                                                                                                                                                                                                               |       |                                                                                     |      |                              |       |                                                        |      |                                                         |
| d) Area of the Allotted Block (hectares)<br>i Geological block area<br>ii Mining Block Area                                                                                                                                                                   | 587.5 Ha.<br>587.5 Ha.                                                                                                                                                                                                                                                                                                                                                                                                |       |                                                                                     |      |                              |       |                                                        |      |                                                         |
| e) Reference no. of plan of block boundary<br>issued by CMPDI/ SCCL/ NLC (A copy of<br>the Plan also to be annexed)                                                                                                                                           | Block boundary marked by CMPDIL<br>along with letter No.<br>CMPDI/DG/033.4/887 Dated 20/21-09-<br>2007 from CMPDI to NMDC enclosed<br>as Annexure No. 1-4                                                                                                                                                                                                                                                             |       |                                                                                     |      |                              |       |                                                        |      |                                                         |
| f) Whether the lease boundary/ required<br>boundary is same as demarcated by<br>CMPDI/ SCCL/ NLC for delineating block/sub-<br>block.                                                                                                                         | Yes                                                                                                                                                                                                                                                                                                                                                                                                                   |       |                                                                                     |      |                              |       |                                                        |      |                                                         |
| g) Existing mining Lease Area in case of existing<br>mines, (hectares)                                                                                                                                                                                        | N/A                                                                                                                                                                                                                                                                                                                                                                                                                   |       |                                                                                     |      |                              |       |                                                        |      |                                                         |
| h) Applied/ required Lease Area as per the<br>Mining Plan under consideration<br>(hectares)                                                                                                                                                                   | 587.5 Ha.                                                                                                                                                                                                                                                                                                                                                                                                             |       |                                                                                     |      |                              |       |                                                        |      |                                                         |
| i) Whether the applied lease area falls within the<br>allotted block                                                                                                                                                                                          | Yes                                                                                                                                                                                                                                                                                                                                                                                                                   |       |                                                                                     |      |                              |       |                                                        |      |                                                         |
| j) Area (hectares) of lease which falls outside the<br>block/sub-block delineated by<br>CMPDI/SCCL/NLC.                                                                                                                                                       | Nil                                                                                                                                                                                                                                                                                                                                                                                                                   |       |                                                                                     |      |                              |       |                                                        |      |                                                         |
| k) Details of outside area:<br>- Whether forms part of any other coal block<br>- Whether it contains any coal/lignite<br>reserves<br>- Purpose for which it is required, e.g. roads/<br>OB dumps/ service buildings/ colony/<br>safety zone/ others (specify) | N/A<br><br><br>श्री हरीश चंद्र शर्मा / H. D. SHARMA<br>जूनियर सचिव / Under Secretary<br>कोयला विभाग / Ministry of Coal<br>कक्षा ३०३, १००, १००, १००<br>नई दिल्ली / New Delhi                                                                                                                                                      |       |                                                                                     |      |                              |       |                                                        |      |                                                         |
| l) Whether some part(s) of the allotted block has<br>not been applied for mining lease.<br>- Total area in Ha. of such part(s).                                                                                                                               | Applied the same part with total area<br>587.5 Ha.                                                                                                                                                                                                                                                                                                                                                                    |       |                                                                                     |      |                              |       |                                                        |      |                                                         |

| - Total reserves in such part(s).                                                            | Total Geological Reserves 38.376 MT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |              |       |            |        |              |        |                  |       |      |       |       |        |               |       |        |       |              |       |                  |       |        |       |        |       |           |       |              |        |        |        |           |         |                  |         |            |         |
|----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-------|------------|--------|--------------|--------|------------------|-------|------|-------|-------|--------|---------------|-------|--------|-------|--------------|-------|------------------|-------|--------|-------|--------|-------|-----------|-------|--------------|--------|--------|--------|-----------|---------|------------------|---------|------------|---------|
| - Brief reasoning for leaving such part(s),                                                  | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |              |       |            |        |              |        |                  |       |      |       |       |        |               |       |        |       |              |       |                  |       |        |       |        |       |           |       |              |        |        |        |           |         |                  |         |            |         |
| m) Type of Land involved in Hectares                                                         | Major part of the block is covered by agriculture land.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |              |       |            |        |              |        |                  |       |      |       |       |        |               |       |        |       |              |       |                  |       |        |       |        |       |           |       |              |        |        |        |           |         |                  |         |            |         |
| n) Broad Land Use Pattern (Forest, Township, Industrial, Agricultural, Grazing, Barren etc.) | <table border="1"> <thead> <tr> <th>Type of land</th><th>Total</th></tr> </thead> <tbody> <tr><td>Habitation</td><td>66.657</td></tr> <tr><td>Grazing Land</td><td>12.347</td></tr> <tr><td>Cremation Ground</td><td>0.883</td></tr> <tr><td>Road</td><td>5.503</td></tr> <tr><td>Ponds</td><td>15.119</td></tr> <tr><td>River &amp; Nalla</td><td>7.855</td></tr> <tr><td>School</td><td>0.529</td></tr> <tr><td>Khal Khaddar</td><td>0.303</td></tr> <tr><td>Fertilizer Ditch</td><td>0.237</td></tr> <tr><td>Gothan</td><td>1.805</td></tr> <tr><td>Temple</td><td>0.012</td></tr> <tr><td>Bag Bagia</td><td>1.391</td></tr> <tr><td>Judpi Jungle</td><td>16.342</td></tr> <tr><td>Forest</td><td>18.921</td></tr> <tr><td>Sub Total</td><td>147.904</td></tr> <tr><td>Agriculture Land</td><td>439.596</td></tr> <tr><td>Total Land</td><td>587.500</td></tr> </tbody> </table> | Type of land | Total | Habitation | 66.657 | Grazing Land | 12.347 | Cremation Ground | 0.883 | Road | 5.503 | Ponds | 15.119 | River & Nalla | 7.855 | School | 0.529 | Khal Khaddar | 0.303 | Fertilizer Ditch | 0.237 | Gothan | 1.805 | Temple | 0.012 | Bag Bagia | 1.391 | Judpi Jungle | 16.342 | Forest | 18.921 | Sub Total | 147.904 | Agriculture Land | 439.596 | Total Land | 587.500 |
| Type of land                                                                                 | Total                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |              |       |            |        |              |        |                  |       |      |       |       |        |               |       |        |       |              |       |                  |       |        |       |        |       |           |       |              |        |        |        |           |         |                  |         |            |         |
| Habitation                                                                                   | 66.657                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |              |       |            |        |              |        |                  |       |      |       |       |        |               |       |        |       |              |       |                  |       |        |       |        |       |           |       |              |        |        |        |           |         |                  |         |            |         |
| Grazing Land                                                                                 | 12.347                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |              |       |            |        |              |        |                  |       |      |       |       |        |               |       |        |       |              |       |                  |       |        |       |        |       |           |       |              |        |        |        |           |         |                  |         |            |         |
| Cremation Ground                                                                             | 0.883                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |              |       |            |        |              |        |                  |       |      |       |       |        |               |       |        |       |              |       |                  |       |        |       |        |       |           |       |              |        |        |        |           |         |                  |         |            |         |
| Road                                                                                         | 5.503                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |              |       |            |        |              |        |                  |       |      |       |       |        |               |       |        |       |              |       |                  |       |        |       |        |       |           |       |              |        |        |        |           |         |                  |         |            |         |
| Ponds                                                                                        | 15.119                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |              |       |            |        |              |        |                  |       |      |       |       |        |               |       |        |       |              |       |                  |       |        |       |        |       |           |       |              |        |        |        |           |         |                  |         |            |         |
| River & Nalla                                                                                | 7.855                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |              |       |            |        |              |        |                  |       |      |       |       |        |               |       |        |       |              |       |                  |       |        |       |        |       |           |       |              |        |        |        |           |         |                  |         |            |         |
| School                                                                                       | 0.529                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |              |       |            |        |              |        |                  |       |      |       |       |        |               |       |        |       |              |       |                  |       |        |       |        |       |           |       |              |        |        |        |           |         |                  |         |            |         |
| Khal Khaddar                                                                                 | 0.303                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |              |       |            |        |              |        |                  |       |      |       |       |        |               |       |        |       |              |       |                  |       |        |       |        |       |           |       |              |        |        |        |           |         |                  |         |            |         |
| Fertilizer Ditch                                                                             | 0.237                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |              |       |            |        |              |        |                  |       |      |       |       |        |               |       |        |       |              |       |                  |       |        |       |        |       |           |       |              |        |        |        |           |         |                  |         |            |         |
| Gothan                                                                                       | 1.805                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |              |       |            |        |              |        |                  |       |      |       |       |        |               |       |        |       |              |       |                  |       |        |       |        |       |           |       |              |        |        |        |           |         |                  |         |            |         |
| Temple                                                                                       | 0.012                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |              |       |            |        |              |        |                  |       |      |       |       |        |               |       |        |       |              |       |                  |       |        |       |        |       |           |       |              |        |        |        |           |         |                  |         |            |         |
| Bag Bagia                                                                                    | 1.391                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |              |       |            |        |              |        |                  |       |      |       |       |        |               |       |        |       |              |       |                  |       |        |       |        |       |           |       |              |        |        |        |           |         |                  |         |            |         |
| Judpi Jungle                                                                                 | 16.342                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |              |       |            |        |              |        |                  |       |      |       |       |        |               |       |        |       |              |       |                  |       |        |       |        |       |           |       |              |        |        |        |           |         |                  |         |            |         |
| Forest                                                                                       | 18.921                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |              |       |            |        |              |        |                  |       |      |       |       |        |               |       |        |       |              |       |                  |       |        |       |        |       |           |       |              |        |        |        |           |         |                  |         |            |         |
| Sub Total                                                                                    | 147.904                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |              |       |            |        |              |        |                  |       |      |       |       |        |               |       |        |       |              |       |                  |       |        |       |        |       |           |       |              |        |        |        |           |         |                  |         |            |         |
| Agriculture Land                                                                             | 439.596                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |              |       |            |        |              |        |                  |       |      |       |       |        |               |       |        |       |              |       |                  |       |        |       |        |       |           |       |              |        |        |        |           |         |                  |         |            |         |
| Total Land                                                                                   | 587.500                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |              |       |            |        |              |        |                  |       |      |       |       |        |               |       |        |       |              |       |                  |       |        |       |        |       |           |       |              |        |        |        |           |         |                  |         |            |         |
| o) Proximity of public road / railway line/major water body if any and approximate distance  | The block is well connected by road and rail. The nearest railway station is Shahdol located 12 Km. south-east of the block on Anuppur-Chirimiri & Bilaspur - Katni broad gauge line of South Eastern Railways. The National highway No. 78 passes through Shahdol.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |              |       |            |        |              |        |                  |       |      |       |       |        |               |       |        |       |              |       |                  |       |        |       |        |       |           |       |              |        |        |        |           |         |                  |         |            |         |
| p) Topo sheet No. with latitude and longitude                                                | <p>It is covered by S.O.I toposheet No. 64 E/7 &amp; 64 E/8 and is bounded by the following coordinates.</p> <p>Lat : 23°14'21" to 23°15'37"</p> <p>Long : 81°17'20" to 81°18'48".</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |              |       |            |        |              |        |                  |       |      |       |       |        |               |       |        |       |              |       |                  |       |        |       |        |       |           |       |              |        |        |        |           |         |                  |         |            |         |

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 नई दिल्ली / New Delhi

|                                                                   |                                                                                                                                                                               |
|-------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>D. Geology and exploration</b>                                 |                                                                                                                                                                               |
| a) Name of the Geological Block and area in hectares              | Shahpur West Coal Block of 587.5 Ha.                                                                                                                                          |
| b) Name of the Geological Report (GR) with year of preparation    | Geological report on detailed exploration for coal, Shahpur West Coal Block, Sohagpur Coalfield, District - Shahdol & Umaria, Madhya Pradesh prepared by MECL in August 2009. |
| c) Name of the agency which conducted exploration and prepared GR | Mineral Exploration Corporation Limited.                                                                                                                                      |
| d) Period of conducting exploration                               | 18.11.2008 to 04.04.2009 by MECL                                                                                                                                              |

| e) Details of drilling (by all agencies)                                                                                                                                                              | Agency       | Meterage                    | No. of BHs     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-----------------------------|----------------|
|                                                                                                                                                                                                       | MECL         | 10107m                      | 59             |
|                                                                                                                                                                                                       | GSI          | 1390m                       | 5              |
|                                                                                                                                                                                                       | <b>Total</b> | <b>11497m</b>               | <b>64</b>      |
| f) No. of boreholes drilled within the block                                                                                                                                                          | 64 Nos.      |                             |                |
| g) Overall borehole density within the block (no./sq. km)                                                                                                                                             | 9.12         |                             |                |
| h) Area covered by 'detailed' exploration within the block (hectares)                                                                                                                                 | 587.5        |                             |                |
| i) Area covered by 'detailed' exploration outside the block (hectares)                                                                                                                                | N/A          |                             |                |
| - 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 time frame in which it is to be completed                                                                                             | No           |                             |                |
| l) Number of coal/lignite seams/horizons<br>- Thickness range of coal seams<br>- mean Thickness of total coal horizon<br>- Standard Deviation of thickness<br>- Minimum & maximum depth of coal seams | Seam         | Range of Seam Thickness (m) |                |
|                                                                                                                                                                                                       |              | Minimum                     | Maximum        |
|                                                                                                                                                                                                       | IV           | 0.15                        | 1.7            |
|                                                                                                                                                                                                       | L2           | 0.55                        | 3.16           |
|                                                                                                                                                                                                       | III A        | 0.35                        | 2.84           |
|                                                                                                                                                                                                       | III B        | 0.14                        | 1.78           |
|                                                                                                                                                                                                       | III L        | 0.62                        | 1.4            |
|                                                                                                                                                                                                       | II           | 0.92                        | 4.16           |
|                                                                                                                                                                                                       | I            | 0.03                        | 1.25           |
|                                                                                                                                                                                                       | L1           | 0.1                         | 1.66           |
| m) Gross Calorific Value (GCV in K Cal/kg) and Useful Heat Value(UHV in K.Cal/Kg), of coal as per GR :<br>Range<br>Mean                                                                               | Seam         | Grade Range (on UHV)        | G.CV K.Cal/Kg. |
|                                                                                                                                                                                                       | IV           | A to F<br>6844-2773         | 5300-7020      |
|                                                                                                                                                                                                       | L2           | A to G<br>6223-2483         | 4030-6390      |
|                                                                                                                                                                                                       | IIIA         | A to G<br>6954-1310         | 3090-6220      |
|                                                                                                                                                                                                       | IIIB         | B to G<br>6057-1310         | 3240-6170      |
|                                                                                                                                                                                                       | IIIL         | B to E<br>5961-3394         | 5570-6060      |
|                                                                                                                                                                                                       | II           | A to F<br>6733-3325         | 4350-7060      |
|                                                                                                                                                                                                       | I            | B to F<br>5905-3256         | 4420-6040      |
|                                                                                                                                                                                                       | L1           | A to G<br>6457-2262         | 4450-6840      |
|                                                                                                                                                                                                       |              |                             |                |

  
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 Under Secretary  
 Ministry of Coal  
 Govt. of India  
 New Delhi

|                                                                                        |                  |             |                 |
|----------------------------------------------------------------------------------------|------------------|-------------|-----------------|
| n) Quality (Grade) of coal as per GR :<br>Range<br>Mean                                | Seam             | Grade Range | Prevalent Grade |
|                                                                                        | IV               | A to F      | B to C          |
|                                                                                        | L2               | A to G      | C to D          |
|                                                                                        | IIIA             | A to G      | D to F          |
|                                                                                        | IIIB             | B to G      | C to E          |
|                                                                                        | IIIL             | B to E      | C to E          |
|                                                                                        | II               | A to F      | C to E          |
|                                                                                        | I                | B to F      | C to E          |
|                                                                                        | L1               | A to G      | C to E          |
| o) Total geological reserves in the block                                              | 38.376MT         |             |                 |
| p) Depletion of reserves (in case of running mine)                                     | N/A              |             |                 |
| q) Additional reserves established (if any for running mine)                           | N/A              |             |                 |
| r) Geological reserves considered for mining:<br>by opencast<br>by Underground         | 0.00<br>38.376MT |             |                 |
| s) Corresponding Extractable reserves:<br>by opencast<br>by Underground                | 0.00<br>13.433   |             |                 |
| t) Percentage of recovery w.r.t. geological reserves:<br>by opencast<br>by Underground | 0.00<br>35%      |             |                 |

\* Seam wise details of items (f) to (t) to be included in the relevant chapter.

|                                                                                                                                                                                                                             |                                                                                                                                          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| <b>E. Mining</b>                                                                                                                                                                                                            |                                                                                                                                          |
| a) Existing and proposed method of mining<br>(Opencast for OB & coal separately with dragline/ shovel/ surface miners/ manual/ etc.)<br>(underground by longwall/ bord & pillar/ continuous miners/LHD/ SDL/ manual/ etc.,) | Mechanised bord and pillar underground mining by Continuous Miner with shuttle cars as well as LHDs and SDLs with solid blasting method. |
| b) Targeted capacity in MTPA when the mine is fully developed and the year in which proposed to be achieved<br>By Underground<br>By opencast<br>Total                                                                       | 0.60MTPA from 2 <sup>nd</sup> Year<br>0.0<br>0.60 MTPA                                                                                   |
| c) Life of the mine<br>Underground workings<br>Opencast workings<br>Overall                                                                                                                                                 | 24 Years<br>0.0<br>24 Years                                                                                                              |

d) Indicate quantum of production and expected grade as in table below :-

| Year                                                   | UG Production<br>Mt             |         | Opencast         |              |                            | ROM<br>coal/<br>lignite<br>(Mt) | Saleable/<br>Beneficiated<br>coal/ lignite<br>(Mt) | Washery<br>Rejects<br>(Mt) |
|--------------------------------------------------------|---------------------------------|---------|------------------|--------------|----------------------------|---------------------------------|----------------------------------------------------|----------------------------|
|                                                        |                                 |         | Production<br>Mt | OB<br>(Mcum) | Stripping<br>ratio (cum/t) |                                 |                                                    |                            |
| Year wise till<br>targeted<br>production is<br>reached | 1 <sup>st</sup> Year            | 0.09610 | 0.0              | 0.0          | 0.0                        | 0.096                           | All                                                | N/A                        |
|                                                        | 2 <sup>nd</sup> Year            | 0.60    | 0.0              | 0.0          | 0.0                        | 0.60                            | All                                                | N/A                        |
| Total for full<br>lease period                         | End of 24 <sup>th</sup><br>Year | 13.433  | 0.0              | 0.0          | 0.0                        | 13.433                          | All                                                | N/A                        |

|                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Furnish the detailed calendar programme of coal production year wise and seam wise along with OB removal in the relevant chapter                                                                                                                                                                                                  | Detailed calendar programme of coal production year wise and seam wise enclosed in page 14 of Chapter 5.                                                                                                                                                                                                                                                |
| e) Whether the proposed external OB dump site is coal/ lignite bearing:<br>- If so, whether coal/lignite below waste disposal area is extractable.                                                                                                                                                                                | No major Dump due to underground mining.<br><br>Yes                                                                                                                                                                                                                                                                                                     |
| f) Whether negative proving for coal / lignite in the proposed site for OB dump/ infrastructure has been done.                                                                                                                                                                                                                    | Not required.                                                                                                                                                                                                                                                                                                                                           |
| g) Proposed configuration of HEMM for OC (Coal & OB) & Major Equipment for UG.<br><br><br>संदीप गुप्ता / SANDEEP GUPTA<br>असल सचिव / Under Secretary<br>मंत्रालय नगरपालिका / Ministry of Coal<br>नयाँ बजार / New Bazar<br>काठमाडौं / Kathmandu | No OC operation envisaged. In UG mining followin equipment is envisaged. Continuous Miner (JOY 12CM27), Shuttle Cars and their accessories, Twin mast Roof Bolter, 1200mm and 1000mm PVC belt Conveyor, LHDs(4 Nos.) & SDLs (6 Nos.) Coal Drills with panels (12 Nos.), Medium duty belt conveyor, Roof Bolting M/Cs (7 Nos.) & 5 Nos. Endless Haulage. |
| h) Mode of entry for underground mines (shaft, incline, adit,):                                                                                                                                                                                                                                                                   | A set of two Inclines for transport of coal and material including walkway and one ventilation shaft.                                                                                                                                                                                                                                                   |
| i) Operations that are proposed to be outsourced                                                                                                                                                                                                                                                                                  | Security                                                                                                                                                                                                                                                                                                                                                |
| j) Proposed coal evacuation facilities Face to Surface to end use plants                                                                                                                                                                                                                                                          | System of Gate and trunk belt Conveyors to main conveyor for underground transport. Railways and trucks for final destination                                                                                                                                                                                                                           |

#### F. End Use of Coal/ Lignite

|                                                     |              |
|-----------------------------------------------------|--------------|
| a) Capacity of the approved end use plants          | N/A          |
| b) Coal/ lignite requirement for end use plant with | N/A as above |

|                                                                                                                                                                                               |                                                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
| grade/quality                                                                                                                                                                                 |                                                         |
| c) %age of end use requirement to be met from this mine                                                                                                                                       | N/A                                                     |
| 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. | No coal beneficiation is required.                      |
| e) Proposed Use of Rejects/Middlings                                                                                                                                                          | No coal beneficiation at site, So no rejects/middlings. |

**G. Environmental Management****a) Existing land use pattern**

| Type of land      | Total        |
|-------------------|--------------|
| Habitation        | 66.657       |
| Grazing Land      | 12.347       |
| Cremation Ground  | 0.883        |
| Road              | 5.503        |
| Ponds             | 15.119       |
| River & Nalla     | 7.855        |
| School            | 0.529        |
| Khal Khaddar      | 0.303        |
| Fertilizer Ditch  | 0.237        |
| Gothan            | 1.805        |
| Temple            | 0.012        |
| Bag Bagia         | 1.391        |
| Judpi Jungle      | 16.342       |
| Forest            | 18.921       |
| Sub Total         | 147.904      |
| Agriculture Land  | 439.596      |
| <b>Total Land</b> | <b>587.5</b> |

**b) Land area indicating the area likely to be degraded due to mining, dumping, roads, workshop, washery, township etc.**

| Sl. No. | Description of area                                                                                                                                    | End of life  |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| 1       | Top soil dump                                                                                                                                          | 0.36         |
| 2       | Surface dump                                                                                                                                           | 0.5          |
| 3       | Settling ponds                                                                                                                                         | 0.4          |
| 4       | Ventilation shaft                                                                                                                                      | 0.18         |
| 5       | Coal stack yard                                                                                                                                        | 0.6          |
| 6       | Facilities including road, Office, W shop, Store, CHP, mouth of inclines, VTC, Canteen, Diesel Bunk and area between the buildings and lawn plantation | 4.73         |
| 7       | Green belt around facilities                                                                                                                           | 1.27         |
| 8       | Approach Road                                                                                                                                          | 4.83         |
| 9       | <b>Sub Total *Disturbed (including green belt and lawn plantation)</b>                                                                                 | <b>12.87</b> |
|         | Undisturbed area                                                                                                                                       | 574.63       |
|         | <b>Total</b>                                                                                                                                           | <b>587.5</b> |

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 नई दिल्ली / New Delhi

|                                                                                                                               |                                                                                                                                                                                                                                                                                                                       |
|-------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| c) Surface features over the block area                                                                                       | Two villages Khamaria Kalan & Kathotia of Shahdol district and Three villages Kushmaha Khurd, Khamaria Khurd, Shahpur of Umaria District of Madhya Pradesh. Two nalas named Ghogra and Ghinachuhia Nala and tar roads from Shahdol to Malachua passing through the block are the major surface features on the block. |
| d) No. of villages/Houses to be shifted                                                                                       | No shifting of villages/houses are required                                                                                                                                                                                                                                                                           |
| e) Population to be affected by                                                                                               | NIL                                                                                                                                                                                                                                                                                                                   |
| f) Year wise proposal for reclamation of land affected by mining activities                                                   | A total of 12.87Ha. area will be disturbed during the initial 3 years. Later it will,not change.                                                                                                                                                                                                                      |
| g) Monitoring schedules for different environmental components after the commencement of mining and other related activities. | Ambient air quality twice a week, water once a season, soil once a year, noise once a year                                                                                                                                                                                                                            |

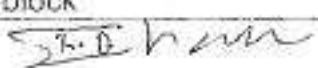
**H Progressive And Final Mine Closure Plan**  
(A separate chapter is also to be incorporated)

|                                                                    |                |
|--------------------------------------------------------------------|----------------|
| a) Estimated total capital expenditure for mine closure activities | 510.495 lakhs  |
| b) Major closure Activities with proposed Capital expenditure      | As given below |

| YEAR                             | ACTIVITIES |                                                                                  | Unit | Vol. of work | Rate, Rs./Unit | Total amt., Rs. Lakh |
|----------------------------------|------------|----------------------------------------------------------------------------------|------|--------------|----------------|----------------------|
| I. PROGRESSIVE MINE CLOSURE PLAN |            |                                                                                  |      |              |                |                      |
| 01-05                            | 1          | Barbered wire around inclines, around ventilation shaft (500m) @ Rs 1500/m       | m    | 352          | 1500           | 5.28                 |
|                                  | 2          | Fencing around surface dump                                                      | m    | 300          | 1500           | 4.5                  |
|                                  | 3          | Toe wall around dump                                                             | m    | 300          | 1000           | 3                    |
|                                  | 4          | Garland drain around dump                                                        | m    | 300          | 500            | 1.5                  |
|                                  | 5          | Barbered wire around facilities                                                  | m    | 1425         | 1500           | 21.375               |
|                                  | 6          | Top soil management                                                              | cum  | 11400        | 50             | 5.7                  |
|                                  | 7          | Rehabilitation/ plantation                                                       | ha   | 4.51         | 200000         | 9.02                 |
|                                  | 8          | Settling Pond                                                                    | cum  | 8000         | 50             | 4                    |
| 6 - 23                           | 1          | Fire stoppings (80 panels)                                                       | cum  | 9600         | 2000           | 192                  |
|                                  |            | TOTAL (I)                                                                        |      |              |                | 246.375              |
| II. POST MINE CLOSURE PLAN       |            |                                                                                  |      |              |                |                      |
| 24                               | 1          | Under Ground stoppings and sealings for prevention of future fire etc (LS)-10 no | cum  | 1200         | 2000           | 24                   |
| 25                               | 1          | Under Ground stoppings and sealings for prevention of future fire etc (LS)-10 no | cum  | 1200         | 2000           | 24                   |
|                                  | 2          | Dismantling ventilation fan                                                      |      |              |                |                      |

| YEAR | ACTIVITIES |                                                                       | Unit | Vol. of work | Rate, Rs./Unit | Total amt., Rs. Lakh |
|------|------------|-----------------------------------------------------------------------|------|--------------|----------------|----------------------|
|      | 3          | Dismantling of conveyors (inclines and in seam about 4000m @ 2000/m)  |      |              | LS             | 80                   |
|      | 4          | Dismantling of rail tracks 4000m @ Rs 500/M                           |      |              | LS             | 20                   |
|      | 5          | Dismantling of Pumps and pipes (LS)                                   |      |              | LS             | 5                    |
|      | 6          | Dismantling of CHP (LS)                                               |      |              | LS             | 10                   |
|      | 7          | Dismantling of HTL/LTL                                                |      |              | LS             | 5                    |
|      | 8          | Monitoring of environmental parameters (air, water, noise etc)        |      |              | LS             | 10                   |
| 26   | 1          | Plugging of 2 NOS. of incline @ Rs 3 lakh/incline                     |      |              | LS             | 6                    |
|      | 2          | Plugging of 1 ventilation shaft                                       |      |              | LS             | 2                    |
|      | 3          | Dismantling of part of the facilities (buildings & workshop etc) (LS) |      |              | LS             | 20                   |
|      | 4          | Rehabilitation/ plantation approach road part width                   | Ha.  | 3.6          | 200000         | 7.2                  |
|      | 5          | Monitoring of environmental parameters (air, water, noise etc)        |      |              | LS             | 10                   |
| 27   | 1          | Rehabilitation/ plantation (facilities, stacks etc)                   | Ha.  | 4.46         | 200000         | 8.92                 |
|      | 2          | Monitoring of environmental parameters (air, water, noise etc)        |      |              | LS             | 10                   |
|      | 3          | Others (Miscellaneous)                                                |      |              | LS             | 20                   |
|      |            | <b>TOTAL (II)</b>                                                     |      |              |                | <b>264.12</b>        |
|      |            | <b>GRAND TOTAL (I&amp; II)</b>                                        |      |              |                | <b>510.495</b>       |

**I Others**

|    |                                                                                                                                           |                                                                                                                 |
|----|-------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| a) | Base date of Mining Plan.                                                                                                                 | May, 2010                                                                                                       |
| b) | Calendar year from which the production will start                                                                                        | 24th July, 2014                                                                                                 |
| c) | Results of any investigation carried out for scientific mining, conservation of minerals and protection of environment, future proposals. | Exploration study done by MECL after allotment of the block                                                     |
| d) | Signature of RQP<br>Date<br>Place                                                                                                         | <br><br>B.D. SHARMA<br>RQP |

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कोयला मंत्रालय / Ministry of Coal  
नई दिल्ली / New Delhi

B.D. SHARMA  
RQP

## CHAPTER 1

### INTRODUCTION

#### 1.1 NAME OF APPLICANT WITH COMPLETE ADDRESS

**Works & Corporate Office:**

N M D C Limited.

Khanij Bhavan,

10-3-311/A, Castle Hills,

Masab Tank,

Hyderabad - 500173, India

Phone : 23538713 -21 (9 Lines), 23538723, 23538767

Fax : +91-40-23538711, Grams : "MINDEV " HYDERABAD

Email : hois@nmdc.co.in

Website : www.nmdc.co.in

#### 1.2 STATUS OF THE APPLICANT

A Government of India Enterprise.

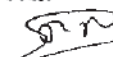
  
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अवर सचिव / Under Secretary  
कोयला मंत्रालय / Ministry of Coal  
भारत सरकार / Govt. of India  
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#### 1.3 BACKGROUND OF THE COMPANY

NMDC Limited (NMDC) is a consistently profit making and dividend paying Navaratna mining company under the ministry of Steel, Government of India which has been contributing extensively for the state exchequer for the last 51 years of its existence. The company operates four iron ore mines in Bailadila (Chattisgarh), two in Bellary-Hospet range (Karnataka), one Diamond Mine at Panna, Madhya Pradesh and one Silica Sand Mine in Lalapur (Uttar Pradesh). Its mines in Bailadila and Donimalai are highly mechanized and ISO 9001-2000 and ISO-14001-2004 accredited. NMDC has full-fledged Investigation Division and R & D facilities.

The company is a consistently profit making company with a turnover of Rs. 7564 Crores and profit after tax of Rs. 4372 crores for the years 2008-09. The net worth of the company for the year ended March 31, 2009 stood at Rs. 11,615 crores.

NMDC, a major mining company of India, is looking forward for expanding and diversifying its activities for value addition in the various minerals for optimal growth of the national economy. NMDC is geared up to embark upon to develop coal blocks for future power and steel requirement of the nation which have been allotted by the Ministry of Coal (MOC), GOI, New



Delhi. NMDC is constantly pursuing for allocation of additional coal blocks for its proposed steel plant, sponge iron & pellet plants

Shahpur West Coal Block covering an area of 587.5 Ha. has been allotted to M/s National Mineral Development Corporation vide letter No. 13016-08-2007-CA-I Dated 25<sup>th</sup> July, 2007.

**1.4 MINERAL OR MINERALS WHICH ARE OCCURRING IN THE AREA AND WHICH THE APPLICANT INTENDS TO MINE**

Coal

**1.5 PERIOD FOR WHICH THE MINING LEASE IS REQUIRED**

30 years.

**1.6 REFERENCE NO. AND DATE OF LETTER FROM THE MINISTRY OF COAL**

MOC allotment letter No. 13016/08/2007-CA-I Dated 25<sup>th</sup> July, 2007 from Government of India (**Annexure 1-1**).

Receipt No A-12541 dated 04.01.2008 and A-13981 dated 15.05.2008 for payment as exploration cost paid against Shahpur East and Shahpur West to CMPDIL (**Annexure 1-2**).

Vide letter No INV/CMPDIL/COAL dated. 1.1.2008, Central Mine Planning and Design Institute Limited, the Geological data was handed over to NMDC (same **Annexure 1-2**).

**1.7 END USERS**

The block has been allotted to NMDC under Government dispensation route. The coal will be sold to needy users in the open market excluding those who are having linkage with Coal India Ltd and Singareni Collieries Company Ltd. The production capacity of the block is therefore not limited by the end users but the capacity of the block to produce coal based on the geological conditions and applicable method of mining.

All the coal produced from the mine will be directly transported to plants by Rail/Road. The coal will be transported by road to nearest railway station Burhar (aerial 20 km in east direction) or Shahdol (about 4 km aerial distance and 6 km by road in NE direction) from where it will be transported by railways.

Provision has been made to keep a stock of coal at the mine site to accommodate upto 10 day's production which will take care of feeding the down stream in case of any breakdown. The provision of 0.600 Ha area for stacking coal has been made with a height of less than 3m. The quantity involved will be for over 13500 T coal.

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**1.8 COAL BENEFICIATION**

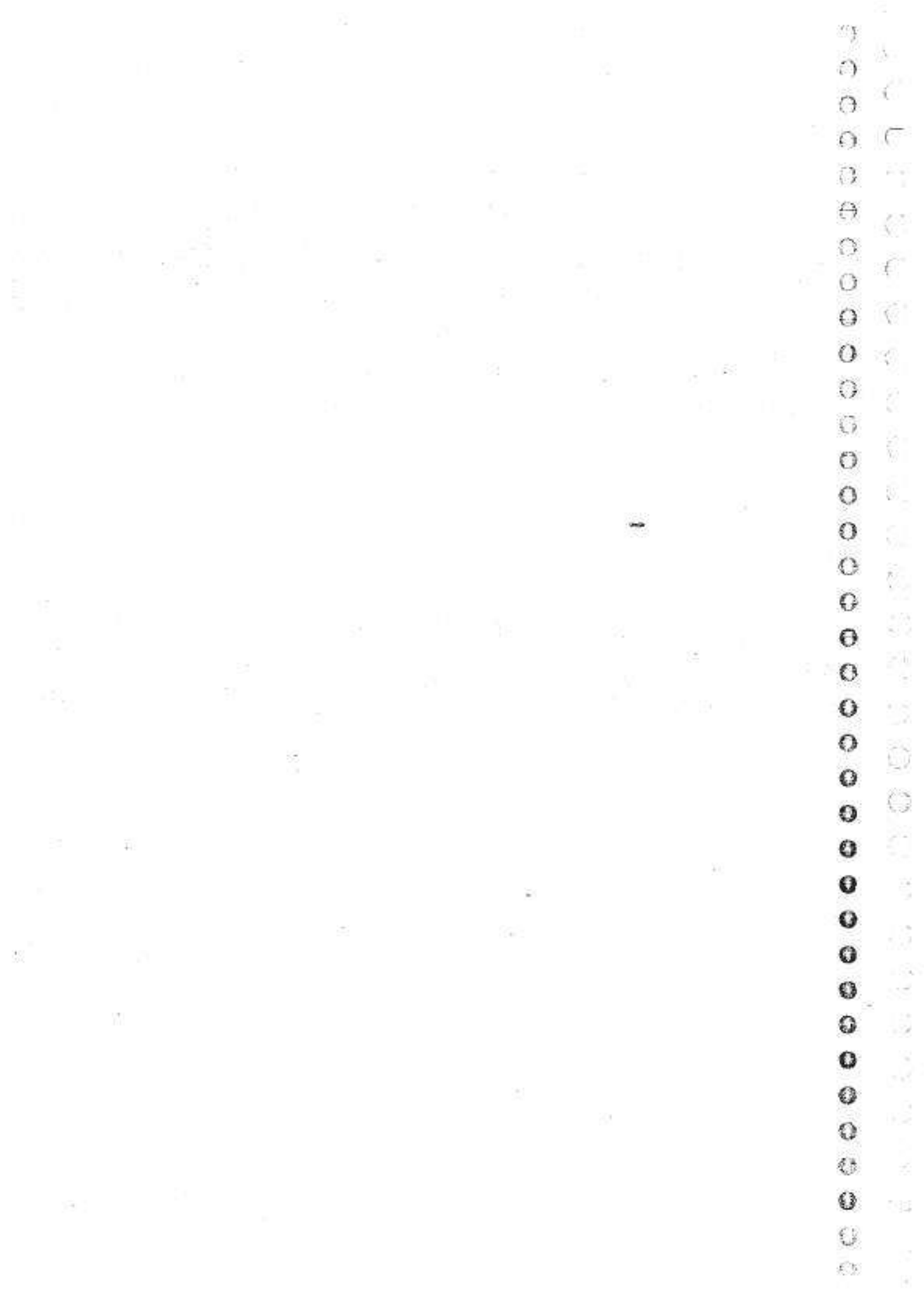
No coal beneficiation process is proposed at the pit head by the company. The overall quality of all four mineable individual coal seams IV, L2, IIIA, & II is good as elaborated in chapter 4. The other reason for not considering pit head beneficiation is that the coal is not tied up to a particular consumer, hence the end use quality is not known.

**1.9 NAME OF RQP PREPARING MINING PLAN**

Name : Mr. B. D. Sharma  
 Address :  
 (i) Office : A-121,  
 Paryavaran Complex,  
 IGNOU Road,  
 New Delhi – 110030  
 Phone : 29534777, 29532236, 29535891  
 Fax : 091-011-29532568  
 E-mail : min\_mec@vsnl.com; minmec@bol.net.in  
 Web site : <http://www.minmec.co.in>  
 Registration Number : 13016/18/2004-CA  
 Date of grant / renewal : 01.06.2004  
 (ii) Residence : A-121,  
 Paryavaran Complex,  
 IGNOU Road,  
 New Delhi – 110030  
 Phone : 29534777, 29535891

(Xerox copy of certificate is attached as **Annexure 1-3**)

  
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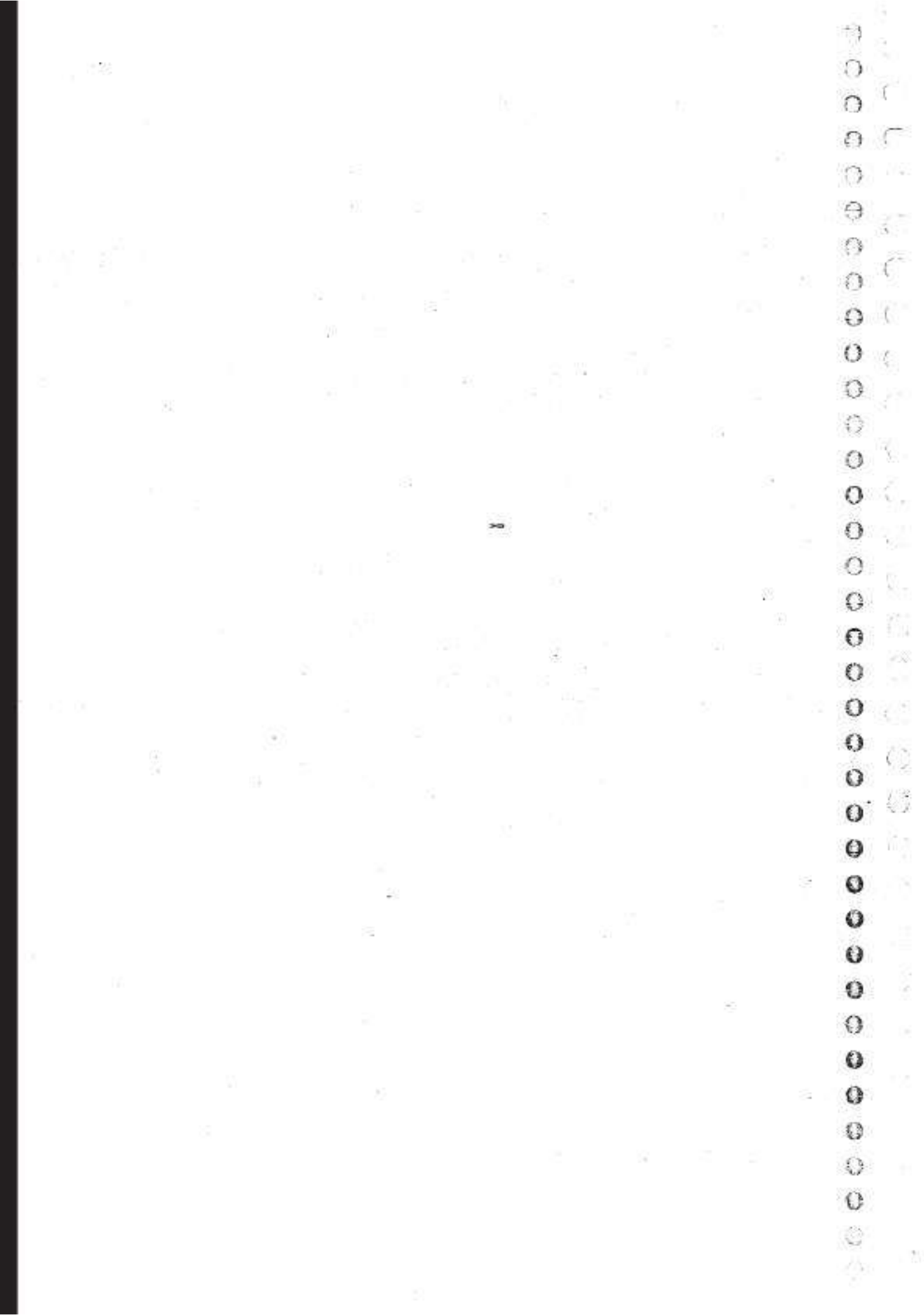


## CHAPTER 2

### DETAILS OF EARLIER APPROVAL OF MINING PLAN

No Mining Plan has been prepared in the past. This document is the 1<sup>st</sup> Mining Plan being prepared for this block.

  
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## CHAPTER 3

## LOCATION, TOPOGRAPHY AND COMMUNICATION

## 3.1 GENERAL LOCATION AND VICINITY MAP

Shahpur West Block area falls under administrative control of Shahdol & Umaria districts in Madhya Pradesh state. It lies in the north western part of Sohagpur Coalfield. It is about 12 Km. North-West of Shahdol township. The part of the block is also located in Pali taluqa of Umaria district. The block falls in the Survey of India Toposheet Nos. 64 E/7 and 64 E/8 (R.F. 1:50,000) and is bounded by (Annexure 3-2):

Latitude = 23°14'21" to 23°15'37"  
Longitude = 81°17'20" to 81°18'48"

The geological boundary of the coal block is as follows:

|              |                                                                                                                                                                                                                                      |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>North</b> | Shahpur Block & West of Shahdol block explored / being explored by GSI & MECL.                                                                                                                                                       |
| <b>East</b>  | Shahpur (East) block of NMDC.                                                                                                                                                                                                        |
| <b>South</b> | The blocks of CMPDIL/GSI (exploration in progress)*.<br>{The southern boundary is a horizontal line (W to E) drawn from SW corner point (of the block) located 275m south of PF boundary measured along the Western Block boundary}. |
| <b>West</b>  | Marwatola block of MECL & CMPDIL (work in progress).                                                                                                                                                                                 |

\* The boundary details as given in para 1.03.01 of GR.

The Location map and the key Map has been shown as Plate No. I & II respectively in the mining plan.

## 3.2 DETAILS OF AREA

- District and state : Umaria & Shahdol, Madhya Pradesh
- Taluka : Sohagpur (Dist.-Shahdol), Pali (Dist.-Umaria)
- Village : Shahpur, Khamaria, Kathotia and Kosmaha
- Khasra No./Plot No./Block : Refer Annexure 3-1 (Plate No. IV)  
range/ felling series etc.
- Lease area (Ha.) : 587.5 Ha
- Whether the area is recorded to be in forest (Please specify whether protected, reserved etc.) : Northern & Southern part of the block covered with patches of protected and Reserve forest respectively
- Ownership / occupancy : Refer Annexure 3-1

**3.3 OWNERSHIP/OCCUPANCY AND LAND USE INCLUDING FOREST**

The details of ownership / occupancy and land use are given in **Annexure 3-1**.

Summary of the land use details are given in Table 3.1.

**TABLE 3.1**  
**AREA DETAILS FOR MINING LEASE APPLIED (IN HECTARES)**  
**(SUMMARY OF LAND - SHAHPUR WEST COAL BLOCK)**

| Sl. No. | Type of land             | District Shahdol |              | District Umaria |                |               | Total          |
|---------|--------------------------|------------------|--------------|-----------------|----------------|---------------|----------------|
|         |                          | Khamaria Kalan   | Kathotia     | Kushmaha Khurd  | Khamaria Khurd | Shahpur       |                |
| 1       | Habitation               | 31.688           | 0            | 18.58           | 2.581          | 13.805        | 66.657         |
| 2       | Grazing Land             | 1.687            | 0            | 1.046           | 7.189          | 2.425         | 12.847         |
| 3       | Cremation Ground         | 0.681            | 0            | 0.202           | 0              | 0             | 0.883          |
| 4       | Road                     | 0.926            | 0            | 1.57            | 2.472          | 0.535         | 5.503          |
| 5       | Ponds                    | 6.076            | 0            | 4.986           | 1.692          | 2.365         | 15.119         |
| 6       | River & Nalla            | 3.496            | 1.582        | 1.198           | 1.085          | 0.494         | 7.855          |
| 7       | School                   | 0.202            | 0            | 0.125           | 0              | 0.202         | 0.529          |
| 8       | Khal Khaddar             | 0                | 0            | 0.202           | 0.101          | 0             | 0.303          |
| 9       | Fertilizer Ditch         | 0.036            | 0            | 0.1             | 0.101          | 0             | 0.237          |
| 10      | Gothan                   | 0.401            | 0            | 0.405           | 0.999          | 0             | 1.805          |
| 11      | Temple                   | 0.012            | 0            | 0               | 0              | 0             | 0.012          |
| 12      | Bag Bagia                | 0.526            | 0            | 0               | 0              | 0.865         | 1.391          |
| 13      | Judpi Jungle             | 8.631            | 0            | 3.521           | 1.563          | 2.627         | 16.342         |
| 14      | Forest                   | 0                | 0            | 9.194           | 9.727          | 0             | 18.921         |
|         | <b>Sub Total 1 to 14</b> | <b>54.362</b>    | <b>1.582</b> | <b>41.129</b>   | <b>27.51</b>   | <b>23.318</b> | <b>147.904</b> |
| 15      | Agriculture Land         | 166.128          | 0.557        | 140.550         | 88.43          | 43.934        | 439.599        |
|         | <b>Total Land</b>        | <b>220.49</b>    | <b>2.139</b> | <b>181.679</b>  | <b>115.94</b>  | <b>67.252</b> | <b>587.5</b>   |

**3.4 TOPOGRAPHY & DRAINAGE**

The land form in Sohagpur Coalfield is controlled by the lithological set up of the different formations. The Talchirs have formed low-lying plains with average altitude of 450 m to 500 m above MSL. The area to the north rises to an elevation of over 1000m with successive escarpments. The Barakar strata with their undulatory to low dips have given rise to a feature of less rolling topography. However, the Barakar sandstones stand out prominently against the surrounding plains, wherever they are capped by basic sills-dyke. To the east of Singara, one such prominent ridge is noted. The dolerite, a common feature of this coalfield, forms a rugged to hilly topography. In contrast to the featureless topography of the areas where Lower Gondwana strata occurs, the Upper Gondwana rocks form prominent ridges. They constitute the prominent plateau to the north. This plateau joins with the Sonhat plateau in the east.

The Son river (17.23 km on NE side) with a north-westerly flow is the main drainage channel of Sohagpur coalfield. Several streams originate in the high trappean region in the south and join the Son. These north flowing streams include Nargara, Sarpa, Bagiha, Bakan, Suthna, Tipon etc. The Kewai river originating in the Supra Barakar plateau of the Sonhat coalfield, forms the main drainage in the eastern part of the coalfield. The eastern most part of the coalfield is also drained by the Jhiria and Kulharia nalas, which ultimately discharge into the Hasdo river, which flows close by.

In Shahpur West Block, the maximum elevation is around 503 m. observed in the south-west part near Bh No. SSH-26 and minimum elevation is 478 m. as observed in the north-east corner of the block for Bh No. MSSW-37.

The Shahpur West Block is marked by dendritic pattern of drainage system formed by north-ward flowing nala namely Ghogra nala. The Ghinachuhia nala also passes in south eastern part before entering in Shahpur east block. A number of small ponds are found within the block. Vicinity map is given as Plate No.III.

### 3.5 CLIMATE AND RAINFALL

The area experiences three seasons during the year. The summer is from March to June when the day temperature varies from 25°C to 46°C and at night, it is between 18°C to 24°C. Mid June to September is the rainy season and from October, the winter sets in and continues upto February. During winter season, the maximum day temperature varies from 26°C to 31°C while the minimum night temperature shows variation from 7°C to 15°C.

The average rainfall in the area varies from 1000 mm to 1700 mm annually.

Northern & Southern part of the block is covered with patches of protected forest in an area of 18.921 Ha. in Shahpur West Block. The rest of area covered by cultivated land where paddy is the main annual crop of the area.

### 3.6 COMMUNICATION

The block is well connected by road and rail. The Sohagpur and Shahdol townships are close to the area connected through metalled road. The Shahdol town located on National Highway No. 78 is only 12-KM from the site. The nearest railway station is Shahdol (4 km aerial and 12km by road) connected from Jabalpur and Bilaspur in South Eastern Railway.

The Bilaspur-Katni section of the South Eastern railway traverses the western part of the Sohagpur Coalfield through the important mining centres of Burhar-Amlai & Dhanpuri. The eastern part of the field is served by the Anuppur-Chirmiri branch line which passes through Katma, Bhadra, Yamuna & Bijuri Collieries.

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Jabalpur is the nearest Airport located about 300 KM well connected by air route to New Delhi.

### 3.6.1 Major diversions

There are following constraints for mining within the block area:

1. A road passing through the western part of the block and another road which connects Shahdol on north east and Khamaria in south East.
2. The Ghogra nala flowing almost along the central part of the block enters the block from its south corner and exits from the northern boundary. The ghinachuhia nala also passes through the small part in south western part of the block.
3. There are habitations of 3 villages (Kosmaha, Khamaria and Shahpur) lying within the block boundaries.

All the above constraints can be seen on the Master Surface Plan (Plate No. V).

It has been found out that only 9.491 MT reserves will be blocked under these constraints (at surface) out of the total of mineable reserves 30.770 MT which accounts for about 30.84%. It has been decided that these surface constraints are not advisable to disturb, hence no diversion or rehabilitation has been proposed. Accordingly the Mining Plan has been prepared on the basis of the remaining reserves of 21.279 MT mentioned in Table 5.3

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## CHAPTER 4

EXPLORATION, GEOLOGY, SEAM SEQUENCE,  
COAL QUALITY AND RESERVES

## 4.1 EXPLORATION

Geological Survey of India has conducted regional exploration of coal in Shahdol, Kelmania-Mithauri Patasi, Diapipar areas (1994-99) in the western part of Sohagpur coalfield to delineate potential area of high rank coal and also to decipher structure and tectonic set up of the area.

GSI drilled 5 Bh's in this block (SSH-7,17,26, 29 & 30) and band by band analysis is supplied for 2 Bh's only (SSH-7 & 17).

The detailed exploration by M.E.C.L. in Shahpur West Block involve geological mapping of 587.5 Sq. km. area, exploratory drilling of 59 boreholes involving meterage of 10,107.00 m, chemical analysis of 403.95m. (band by band analysis) and 219 nos. of seam overall analysis (at 60% Rh and 40°C) & special tests were done as per schedule.

## 4.1.1 Quantum of work done

A total of 64 boreholes have been drilled by Geological Survey of India (5 Bhs.) and Mineral Exploration Limited (59 Bhs.) within the block boundary as detailed in Table 4.1.

TABLE 4.1  
QUANTUM OF WORK DONE IN SHAHPUR WEST BLOCK

| Sl. No. | Item of Work                   | Work done              |
|---------|--------------------------------|------------------------|
| 1.      | Geological Mapping             | 5.875 Sq. km           |
| 2.      | Topographic Surveying          | 5.875 Sq.km.           |
|         | a) Traverse Stations           |                        |
|         | i) Co-ordinates                | 29 Nos.                |
|         | ii) Reduced Level (m)          | 29 Nos.                |
|         | b) Boreholes                   |                        |
|         | i) Co-ordinates (MECL & GSI)   | 59 Nos. (MSSW Series)  |
|         | ii) Reduced Level (MECL & GSI) |                        |
|         |                                | 5 Nos. (SSH series)    |
|         |                                | <b>Total 64 Bhs.</b>   |
| 3.      | Exploratory Drilling (m)       | 10,107. m in 59 Bhs.   |
| 4.      | Geological Core Logging (m)    | 10,107 m in 59 Bhs.    |
| 5.      | Geophysical Logging (m)        | 7397 m in 43 Bhs.      |
| 6.      | Coal Sampling (m)              | 532 Nos. in 56 Bhs.    |
| 7.      | Chemical Analysis              |                        |
|         | i) Band by band (m)            | 403.95 m in 56 Bhs.    |
|         | ii) Overall Analysis (Nos.)    | 219 Samples in 43 Bhs. |

| Sl. No. | Item of Work                                                                                                                                                                                  | Work done                                                                                                                                                                                |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8.      | Special Tests (Nos.)<br>a) Calorific value<br>b) Ultimate Analysis<br>c) Ash Fusion Temp.<br>d) Ash Analysis<br>e) HGI<br>f) Total sulphur<br>g) Distribution of sulphur<br>h) Swelling Index | 219 Samples in 43 Bhs<br>36 Samples in 10 Bhs<br>18 Samples in 5 Bhs<br>18 Samples in 5 Bhs<br>18 Samples in 6 Bhs<br>18 Samples in 6 Bhs<br>18 Samples in 6 Bhs<br>30 Samples in 10 Bhs |
| 9.      | Physico Mechanical Test                                                                                                                                                                       | 334 m in 2 Bhs.<br>(MSSW-27 & 33)                                                                                                                                                        |
| 10.     | Dove Tailing of GSI Bh's<br>i) Drilling (m)<br><br>ii) Analytical Results                                                                                                                     | 1387 m. (5 Bhs SSH-7,<br>17, 26, 29 & 30)<br><br>15.02 m (2 Bh's : SSH-7<br>& 17)                                                                                                        |

#### 4.1.2 Surveying

The survey work in the block was carried out by using EDM, theodolite and auto level. The block was traversed by laying 29 numbers of triangulation stations. In order to connect the present block under National Grid, the survey stations S1 and S2 (situated in the adjoining West of Shahdol Block explored by MECL) are connected with Survey of India National Grid Pillar 975, which is taken as reference point. The entire network was extended for these points into the block. The calculated bearing of National Grid co-ordinates is furnished below:

|    |                                                                     |    |                               |           |
|----|---------------------------------------------------------------------|----|-------------------------------|-----------|
| a) | Co-ordinates of Station 975 SOI National Grid Pillar.               |    | Latitude<br>1019803.2901 m.   |           |
|    |                                                                     |    | Departure<br>2742076.2231 m.  |           |
| b) | Measured distance between S1 and S2 traverse stations is 470.1600m. | S1 | Latitude<br>1034375.8100 m.   | RL 446.80 |
|    |                                                                     |    | Departure-<br>2729154.4600 m. |           |
|    |                                                                     | S2 | Latitude<br>1033919.0100 m.   | RL 443.95 |
|    |                                                                     |    | Departure-<br>2729043.1900 m. |           |
| c) | Bearing from station S1 to S2                                       |    | 13° 41'23"                    |           |

The reduced levels of all the boreholes and the triangulation stations have been carried out from the adjoining West of Shahdol Block triangulation station No. S-28 (R.L. 458.88m) located to the east of Amiliha village and

  
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south of National Highway No.78. The traverse station S-28 falling in West of Shahdol Block is connected with the Survey of India Bench Mark (R.L. 456.70m) on Katni – Bilaspur railway line, around 5 km NW of the block.

## 4.2 GEOLOGY

### 4.2.1 Regional geology

The rocks of Sohagpur Coalfield, located within Son Valley, exhibit a general E-W trend with a low northerly dip, forming the main coal bearing area of South Rewa. The Sohagpur Coalfield is bounded by latitudes  $23^{\circ}05'$  and  $23^{\circ}30'$  & longitudes  $81^{\circ}13'$  and  $82^{\circ}12'$ . It is located in the Shahdol and Umaria districts of Madhya Pradesh, while a small area is included within the Surguja district.

The southern margin of the Sohagpur Coalfield runs close to the junction of Kewai and Tipon rivers with the Son. The eastern and north eastern boundaries merge imperceptibly with the Sonhat-Jhilimili Coalfields. Towards north, the boundary with the Upper Gondwana formations defines the limit of the exposed coal measures. The Upper Gondwana Formations occur over a vast expanse linking the Sohagpur Coalfield with the Singrauli Coalfield on the north. Towards west, post Barakar sediments cover the area in between Sohagpur and Johilla Coalfields, while towards south-west, the coal measures are separated from the Deccan Trap of Maikal range by narrow outcrops of Lameta beds.

The geological and stratigraphic sequence of formation occurring in the Sohagpur Coalfield are given in Table 4.2.

**TABLE 4.2**  
**REGIONAL GEOLOGY OF SOHAGPUR COALFIELD**

| Age                                  | Formation                   | Lithology (thickness)                                     |
|--------------------------------------|-----------------------------|-----------------------------------------------------------|
| Recent                               |                             | Soil & Alluvium                                           |
| ----- Unconformity -----             |                             |                                                           |
| Eocene to Up. Cretaceous             | Deccan Trap                 | Effusive and intrusive rocks, mostly basalt and dolerite. |
| ----- Unconformity -----             |                             |                                                           |
| Up. Cretaceous                       | Lameta Beds                 | Reddish & greenish sandstones & nodular limestones        |
| ----- Unconformity -----             |                             |                                                           |
| Up. Triassic<br>(Up. Gondwana Group) | Supra Barakars/<br>Mahadeva | Pink, buff & red sandstone, red shales etc.               |
| ----- Unconformity -----             |                             |                                                           |
| Lw. Permian                          | Barakar                     | Coarse to medium grained sandstone, sub-ordinate          |

| Age                                                           | Formation    | Lithology (thickness)                                                                           |
|---------------------------------------------------------------|--------------|-------------------------------------------------------------------------------------------------|
| Lw. Permian to<br>Up. Carboniferous<br>(Lower Gondwana Group) | Talchir      | shales & coal seams (320m+).<br>Diamictite, sandstone,<br>siltstones & needle shales<br>(430m+) |
| -----Unconformity-----                                        |              |                                                                                                 |
| Pre-Cambrian                                                  | Metamorphics | Porphyritic granite-gneiss with<br>aplite and pegmatite veins.                                  |

#### 4.2.2 Regional structure

The Sohagpur Coalfield constitutes the middle segment of the Rewa Gondwana basin and has a regional east-west elongation in conformity with the alignment of the basin belt. The beds have a general WNW-ESE to East-west trend and dip at very low angles ( $1^{\circ}$  to  $4^{\circ}$ ) towards NNE or North. Considerable variation in the direction and amount of dip have been observed near fault planes

The Sohagpur basin is composed of three well-defined sub-basinal structures. These include the Jhagrakhand sub-basin to the east, Kotma-Jamuna sub-basin in the middle and the Burhar-Amlai sub-basin to the west. The prominent structural feature of the Sohagpur basin is the system of ENE-WSW to east-west trending sub-parallel faults. The most important of these faults is the Bamni-Chilpa fault, which runs along the middle part of the coalfield. From Bamni to Patgaua, the fault trends east-west. Further east, upto Bargaua, its position is concealed by a thick sill. From there onwards it swerves to ENE and continues upto Thangaon. Westwards, the fault is traced north of Balehi in Dhanpuri area. A salient feature is the emplacement of a dolerite sill and dykes along this fault zone. The throw of this fault is likely to be over 400m at places. In addition to this major fault, there are a number of east-west or ENE-WSW trending faults. Two more sets of faults trend NW-SE and NE-SW, but the frequency of these faults is low. It can be summarised that the east-west trending faults were active periodically during sedimentation and the fault movement might have taken place over a protracted period of time.

#### 4.2.3 Description of formations

The formations of Sohagpur Coalfield are briefly described below:

##### a) Precambrian rocks

The Precambrian basement rocks are not exposed in the vicinity of the coalfield. But these rocks crop out as inliers within the Talchir Formation south of the Son river and also in the Hasdo river section east of

Manendragarh. The predominant rock type is pink porphyritic gneiss. The gneisses are traversed by aplite and pegmatite bodies.

#### **b) Talchir formation**

The Talchir sediments are found to the south of the coalfield and cover the large tract between Sohagpur in the west and the Bistrampur-Lakhanpur-Hasdo-Arand basins to the east and south-east. The lithological assemblage of the Talchir Formation includes tillite, green and chocolate shales, rhythmites and sandstones of varying grain size.

#### **c) Barakar formation**

The Barakar Formation shows characteristic vertical variation in the arrangement of litho facies and this permits sub dividing into three distinct litho stratigraphic units. The strata grouped within the Lower member conformably overlies the Talchir Formation. The lower part of this member comprises greyish white, feldspathic sandstones with minor amounts of shale and is usually devoid of any workable coal seams. The Lower member shows a variation in thickness from 80 m to 150 m.

The 200m to 300m thick overlying strata form the upper part. It includes several workable coal seams, which are developed in Malga-Bijuri-Kotma-Dhanpuri areas. The sandstones of this part of the Lower member are dominantly feldspathic and are thick bedded with a profusion of cross-stratification. Garnet grains, which are ubiquitous in the lower beds, are present in lesser amounts in the coal-bearing unit.

Succeeding this coal-bearing unit is a 200m thick sequence of ferruginous sandstones, shales and laminated siltstones, which present a sharp lithological contrast with the underlying coal-bearing sequence. A Barren Measures status has been assigned to this lithostratigraphic unit.

The Upper member the Raniganj formation shows the re-appearance of coal seams, which are however of inferior quality. The sandstones of the Upper member are fine grained with micaceous siltstone and ferruginous shale bands. The thickness of this member is 300 m to 500 m.

#### **d) Supra barakara/mahadeva formation**

In the northern part of the Sohagpur Coalfield, a sequence of very coarse grained, pebbly sandstones and ferruginous sandstones constitute the prominent ridge referred to as 'Mahadeva beds'. The lower units of this sequence are characterised by predominance of pebbly sandstones, while red ferruginous sandstones are found in the upper part of the succession. These beds occur over a vast area between Sohagpur and Singrauli Coalfields and maintain a more or less similar lithological make up over the entire tract. There is every likelihood of this succession being equivalent to the Parsora Formation, which is well developed in the adjacent Johilla Valley area, as the two are in physical continuity.

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### e) *Lameta Beds*

These rocks occur along the fringes of the trap covered hills in the south west and are well exposed in the neighborhood of Kapildhar, Turri and Ghitouri villages. They rest unconformably over the Gondwana strata and consist of poorly consolidated sandstones, having greenish and reddish tint at its base. Towards the top, nodular limestones make their appearance.

### f) *Basic rocks*

The Barakar measures of Sohagpur Coalfield are traversed by a large number of basic dykes and sills. The most prominent sill is noted in the eastern part of the coalfield near Patraundih. Westwards, the sill continues almost uninterruptedly over a strike length of about 70 Km. across the river Son and the outcrop attains a width of over 4 Km. at places. The northern limit of this sill is apparently marked by the east-west trending Bamni-Chilpi fault with down throw towards north along which detached outcrops of Talchir rocks occur juxtaposed against the upper part of the Barakar Formation. Another prominent dolerite body occurs to the north of the Son river and this extends over a length of over 50 Km. Dykes of dolerite are quite common both in the eastern and western parts of the field. They vary in length from a few metres to over 5 Km. and in width from 2m to about 25m. Most of the dykes trend ENE-WSW to east-west. In a number of cases, the dykes are found to be aligned along prominent fault planes. At places, the dykes have been affected by transverse NNW-SSE trending faults.

## 4.2.4 Geology of the block

### i) *Location*

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The Shahpur West Block falls in the northwestern part of Sohagpur coalfield. The area explored is mostly covered by sandy soil and few scanty exposures of Barren Measure sandstones are marked along the Ghogra nala. A dolerite dyke outcrop is deciphered based on its intersection in BH MSSW-42 in the south-eastern corner of the block.

### ii) *Geological succession*

The geological succession established in the block is given in Table 4.3.

**TABLE 4.3**  
**GEOLOGICAL SUCCESSION OF SHAHPUR WEST BLOCK**

| Age          | Formation       | Lithology                                                            |
|--------------|-----------------|----------------------------------------------------------------------|
| Recent       | Soil            | Soil & Alluvium                                                      |
| Mid. Permian | Barren Measures | Pink, buff, red sandstone, red shale etc.                            |
| Lw. Permian  | Barakar         | Coarse to medium grained sandstone subordinate shales and coal seams |

| Age                              | Formation    | Lithology                                                                           |
|----------------------------------|--------------|-------------------------------------------------------------------------------------|
| Lw. Permian to Up, Carboniferous | Talchir      | Sandstone & siltstones with pebbles of Granite. (Intersected only in GSI boreholes) |
| ----- Unconformity -----         |              |                                                                                     |
| Pre-Cambrian                     | Metamorphics | Not intersected in any borehole.                                                    |

The thickness range of each formation within the block as intersected in the boreholes are as in Table 4.4.

**TABLE 4.4**  
**THICKNESS RANGE OF DIFFERENT GEOLOGICAL FORMATIONS**  
**INTERSECTED IN SHAHPUR WEST BLOCK**

| Formation        | Thickness Range (m)        |                  |
|------------------|----------------------------|------------------|
|                  | Minimum                    | Maximum          |
| Soil / Alluvium  | 3.00 (MSSW-5)              | 7.75 (SSH-7)     |
| Weathered Mantle | 11.00 (MSSW-42)            | 28.50 (MSSW-1)   |
| Barren Measures  | 9.00 (MSSW-23)             | 76.00 (MSSW -24) |
| Barakars         | 99.50 (MSSW -39)           | 239.00 (SSH-30)  |
| Talchirs         | 4.05 (SSH-30)              | 24.30 (SSH-29)   |
| Metamorphics     | Not drilled up to basement |                  |

### iii) Description of formations

The different geological formations encountered in the boreholes drilled in Shahpur West Block are summarized below:

#### a) Talchirs

The Talchir Formation is not exposed in Shahpur West Block. It has been intersected in 5 GSI boreholes (SSH-7, 17, 26, 29 & 30). They are represented by greenish sandstone with pebbles of granite.

#### b) Barakars

The Barakar Formation overlies the Talchirs and comprises dominantly sandstones with sub-ordinate shales, carbonaceous shale, intercalation of shale and sandstone and six regionally persistent coal seams, viz. IV, L2, III, II, I and L1 in descending order. Seams-III occurs in 3 sections, the top prominent & consistent IIIA and the bottom impersistent IIIB & IIIL seams. The sandstones are fine to coarse grained, micaceous and feldspathic. The cementing material of the sandstone is normally kaolinised feldspar. The shale is typically grey and is rather insignificant in the sedimentary pile.

The Barakar Formation has been intersected in all the boreholes drilled by MECL & GSI except MSSW-42, which is intruded by dyke. The full thickness of Barakar column has been intersected in only 5 boreholes of

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GSI and the thickness of barakar varies from 99.50m (MSSW-39) to 239.00 m (SSH-30).

**c) Barren measures**

The Barakar formation is overlain by ferruginous sandstones and shales of Barren Measures. This horizon is found about 25m to 40m above the youngest coal horizon viz. seam IV of Barakar Formation. Unlike Barakar, the Barren Measures contains shale laminations and shale bands. The persistent shale band at about 25 m to 40 m above seam IV is taken as a marker horizon for delineating the contact between Barakars and Barren Measures.

The Barren Measures have been intersected in 63 boreholes drilled in the block. The thickness of Barren Measures intersected in Shahpur West Block varies from 9.00m (MSSW-23) to 76.00m (MSSW-24).

**d) Soil / Alluvium**

The soil / alluvium in the block is sandy. Its thickness ranges from 3.00 m (MSSW-5) to 7.75 m (SSH-7).

**e) Weathered mantle**

Weathering has affected all strata. The minimum and maximum depth of weathering ranges from 11.00m (MSSW-42) to 28.50m (MSSW-1).

**f) Structure of the block**

Area of is entirely covered by Barren Measures formation, & hence devoid of seam exposures. The structure is based on integrated floor contour plan (Plates IX-A to IX-D) drawn for major seams i.e. IV, L2, IIIA, IIIB, II & L1 and Geological & Topographical plan (Plate No. VI along with Geological cross sections (Plate VII).

The structure of Shahpur West Block is simple over a major part of the block i.e. in the northern & central parts except in the southern strip where 4 faults have been deciphered. The faults F1 - F1 (25 m to 40 m) & F2 - F2 (15 m throw) are of higher magnitude & the remaining two faults F3 - F3 (5 m) & F4 - F4 (0 - 5 m) are minor faults. The description of faults in Shahpur West block is given in Table 4.5.

Due to existence of E-W trending regional faults (Chilpi - Bamni) the long anal cracks can be seen & are manifesting in 5 minor slips of very low magnitude of around 2 m throw. These have been designated as MS-1 to Ms-5.

The strike of coal seam in general is NW-SE shifting to EW due to rolling of dip throughout the block. The dip of the coal seam is due north easterly in general shifting to south easterly in the southern part. The gradient of

seams is varies from 1 in 23 to 1 in 57. The dip is generally very low i.e.  $1^{\circ}$  to  $2^{\circ}$ . One dolerite dyke which has been intersected in borehole MSSW-42 & its outcrop is interpreted to extend upto 300 m length & 8 m width along NW-SE direction. It is depicted as sub vertical/vertical in 3D model.

**TABLE 4.5**  
**DESCRIPTION OF FAULTS, SHAHPUR WEST BLOCK**

| Fault No.                            | Location                                                                           | Strike/Dip                        | Nature of fault | Throw (m) | Evidences                                                                                                                                                        |
|--------------------------------------|------------------------------------------------------------------------------------|-----------------------------------|-----------------|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| F1- F1                               | 650 m within block in the SW corner near BH-MSSW-56.                               | NW-SE<br>Dipping in SW direction. | Dip fault       | 25 - 40   | i) Intersected in BH SSH-26, resulting in reduction of strata. (Lower Barakar by 40m.)<br>ii) Intersected in BH MSSW-56, resulting in contact reduction of BM/B. |
| F2- F2                               | 300 m within the block near BH MSSW-24.                                            | E-W<br>Dipping Southerly          | Oblique fault.  | 15        | Seam IV faulted in BH MSSW-24.                                                                                                                                   |
| F3- F3                               | 1.5 to 2 km length within the block from BH MSSW-21 in the NW to BH MSSW-45 in SE. | WNW-ESE                           | Oblique fault.  | 5         | It is not intersected in any BH, but interpreted based on FRL difference.                                                                                        |
| F4 -F4                               | 900 m length within the block near BH MSSW-10 in the NE to BH MSSW-48 in the SW.   | Curvilinear                       | Strike fault    | 2 - 5     | Seam IV faulted in BH MSSW-48.                                                                                                                                   |
| MS-1<br>MS-2<br>MS-3<br>MS-4<br>MS-5 | MSSW-49<br>MSSW-13<br>MSSW-13<br>MSSW-19<br>MSSW-7                                 | -                                 | -               | -         | Seam IIIA - Faulted<br>Seam IV absent<br>Seam IIIA absent.<br>Seam IIIA absent<br>Seam II - reduction in thickness                                               |

#### 4.2.5 Description of coal seams

##### General

Detailed exploration of Shahpur West block has revealed the existence of 8 coal horizons. Out of these four correlatable seams IV, III, II & I in descending order have been established along with a few local coal seam. In Seam-III there are three sections (IIIA, IIIB & IIIL). The top section IIIA is persistent throughout the block whereas seam-IIIB & IIIL are developed imperisistently in the block. The seam II is the thickest and most potential. Whereas seams IIIB, IIIL, I & L1 are thin & partially developed seam in the block.

- The standard norms applicable to non-coking coal have been followed for identification of coal seams and bands. These are as follows:-

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|    |                                       |                                |
|----|---------------------------------------|--------------------------------|
| a) | Coal                                  | Ash + Moisture Up to 40%       |
| b) | Shaly Coal                            | Ash + Moisture >40% up to 55%  |
| c) | Carbonaceous shale (combustible band) | Ash + Moisture > 55% up to 75% |
| d) | Shale (non-combustible band)          | Ash + Moisture >75%            |

- The carbonaceous shale band has been considered as part of the seam only in cases where its thickness is less than or equal to the thickness of coal/shaly coal forming the roof & floor of the band.
- A dirt band which is combustible band has been defined as having more than 55% to 75% Ash + Moisture irrespective of thickness (carb shale band).
- The obvious dirt band of non-carbonaceous matter has been considered as non-combustible band (NCB) irrespective of its thickness (shale & variants and Sst bands). When the NCB is in continuation with carbonaceous shale, then both the bands are excluded for determining the In-band thickness irrespective of their thicknesses.
- The BCS & I-30 thickness are always excluding NCB.
- The BCS thickness is excluding NCB and all bands having more than 55% Ash + moisture.
- The I-30 thickness is excluding NCB and all carb shale bands i.e. more than 55% to 75% (Ash + Moisture) which are having thickness, more than 0.30m.

#### 4.2.6 Correlation

The detailed exploration carried out by MECL in Shahpur West Block has revealed the presence of eight regionally correlatable Barakar coal seams viz. IV, L2, IIIA, IIIB, IIIL, II, I and L1 in descending order.

The correlation of coal seams is mainly based on –

- i) Lateral continuity/persistency of coal seams.
- ii) Actual thickness of individual seams.
- iii) Thickness and nature of parting between seams.
- iv) Presence of marker dirt bands/non-combustible bands within the seam.
- v) Overall of the seam based on band by band data.
- vi) Quality parameter of seam.
- vii) Nature of roof & floor lithology of the seam.
- viii) Special identification regarding deterioration /non-development of individual seam.

The sequence of coal seams, their thickness ranges and range of intervening parting between the seams as established and quality parameters in Shahpur West block is presented in Table 4.6 & 4.7 respectively (refer Plate No. VIII).

**TABLE 4.6**  
**SEQUENCE OF COAL SEAMS, SHAHPUR WEST BLOCK**

| Sequence of Seam / Parting | Range of Seam Thickness (m) |                    | No. of full intersections | Dominant thickness (m) |
|----------------------------|-----------------------------|--------------------|---------------------------|------------------------|
|                            | Minimum                     | Maximum            |                           |                        |
| IV                         | 0.15<br>(MSSW-21)           | 1.70<br>(MSSW-37)  | 60                        | 0.50 – 1.50            |
| Parting                    | 41.03<br>(MSSW-56)          | 55.53<br>(MSSW-37) | -                         | -                      |
| L2                         | 0.55<br>(MSSW-21)           | 3.16<br>(SSH-15)   | 63                        | 0.50 – 2.00            |
| Parting                    | 9.58<br>(MSSW-14)           | 23.24<br>(MSSW-7)  | -                         | -                      |
| III A                      | 0.35<br>(MSSW-12)           | 2.84<br>(MSSW-11)  | 60                        | 0.50 – 1.50            |
| Parting                    | 0.30<br>(MSSW-56)           | 2.93<br>(MSSW-25)  | -                         | -                      |
| III B                      | 0.14<br>(MSSW-32)           | 1.78<br>(MSSW-40)  | 35                        | 0.50 – 1.20            |
| Parting                    | 0.72<br>(MSSW-30)           | 1.62<br>(MSSW-31)  | -                         | -                      |
| III L                      | 0.62<br>(MSSW-29)           | 1.40<br>(MSSW-58)  | 9                         | 0.05 – 0.90            |
| Parting                    | 12.75<br>(MSSW-58)          | 20.32<br>(MSSW-29) | -                         | -                      |
| II                         | 0.92<br>(MSSW-56)           | 4.16<br>(SSH-30)   | 62                        | 1.50 – 3.00            |
| Parting                    | 18.54<br>(MSSW-24)          | 41.65<br>(SSH-17)  | -                         | -                      |
| I                          | 0.03<br>(MSSW-37)           | 1.25<br>(SSH-17)   | 29                        | 0.50 – 0.90            |
| Parting                    | 10.11<br>(MSSW-31)          | 25.76<br>(MSSW-38) | -                         | -                      |
| L1                         | 0.10<br>(MSSW-37)           | 1.66<br>(SSH-30)   | 46                        | <0.50-0.90             |

**TABLE 4.7**  
**QUALITY PARAMETERS OF THE SEAMS**  
**(ON 60% RH AT 40°C & EQUILIBRATED BASIS)**

| Seam | Moisture %        |                    | Ash%               |                    | Grade Range<br>(on UHV) | Prevale<br>NT Grade<br>(on UHV) | G.CV<br>K.CAL/KG. |
|------|-------------------|--------------------|--------------------|--------------------|-------------------------|---------------------------------|-------------------|
|      | Min               | Max                | Min                | Max                |                         |                                 |                   |
| IV   | 1.45<br>(MSSW-45) | 10.90<br>(MSSW-18) | 11.00<br>(MSSW-25) | 40.40<br>(MSSW-53) | A to F<br>6844-2773     | B to C                          | 5300-7020         |
| L2   | 2.20<br>(MSSW-4)  | 11.40<br>(MSSW-45) | 12.60<br>(MSSW-26) | 80.00<br>(MSSW-48) | A to G<br>6223-2483     | C to D                          | 4030-6390         |
| IIIA | 2.00<br>(MSSW-20) | 9.80<br>(MSSW-31)  | 7.30<br>(MSSW-3)   | 50.50<br>(MSSW-5)  | A to G<br>6954-1310     | D to F                          | 3090-6220         |
| IIIB | 2.50<br>(MSSW-21) | 9.80<br>(MSSW-14)  | 13.10<br>(MSSW-45) | 50.40<br>(MSSW-58) | B to G<br>6057-1310     | C to E                          | 3240-6170         |
| IIIL | 1.70<br>(MSSW-21) | 9.00<br>(MSSW-30)  | 12.50<br>(MSSW-58) | 32.80<br>(MSSW-55) | B to E<br>5961-3394     | C to E                          | 5570-6060         |
| II   | 2.20<br>(MSSW-35) | 3.30<br>(MSSW-3)   | 11.90<br>(MSSW-9)  | 37.60<br>(MSSW-19) | A to F<br>6733-3325     | C to E                          | 4350-7060         |
| I    | 5.10<br>(MSSW-17) | 8.00<br>(MSSW-12)  | 11.90<br>(SSH-17)  | 35.60<br>(MSSW-20) | B to F<br>5905-3256     | C to E                          | 4420-6040         |
| L1   | 2.00<br>(MSSW-24) | 9.50<br>(MSSW-40)  | 8.90<br>(MSSW-31)  | 42.40<br>(MSSW-52) | A to G<br>6457-2262     | C to E                          | 4450-6840         |

#### 4.3 DETAILS OF INDIVIDUAL COAL SEAMS

##### 4.3.1 General

Based on the data of 64 boreholes drilled within the block, occurrence of 5 group of seam in eight sections has been established. Out of these, only 4 horizons viz. Seam-IV, L2, IIIA & II are persistent while the remaining horizons, viz. IIIB, IIIL, I and L1 are impersistent and patchy in development. Hence, the potentiality for mining of only four persistent seams has been assessed. However all the seams has been studied for their quality and geological parameters. The details of individual coal seams are as under:

##### 4.3.2 Seam-IV

Seam-IV is a prominent & consistently developed coal seam occurring in Barakar formation. It is the top most & youngest coal seam in Shahpur West Block. Seam-IV occurs below 10 to 25m BM/B contact with a parting of 10 to 25 m. It overlies seam L2 with a parting of 41.03 m. to 55.53 m. The parting lithology from Barren Measures/Barakar contact up to seam IV is mostly feldspathic sandstone.

The full seam thickness has been intersected in 60 boreholes. The maximum seam thickness is 1.70 m. The dominant thickness range of 0.50 – 1.50 in the North East part of the block the seam attains better thickness of 1.20 m over a larger area. Whereas, in the South West part, its thickness is <0.50 m.

The seam occurs in the depth range of 24 to 100 m within the block. Over a vast part of the block in the North & north west the depth occurrence of seam is < 50 m and relatively smaller part in south west its depth of occurrence is < 50 m. relatively smaller part in the southwest, it occurs at >0.50m depth. Seam occurs at around 100m depth in sector D between faults F1 & F2.

#### 4.3.2.1 Seam overall quality

The seam is devoid of any dirt band in all the boreholes content. The moisture content varies from 1.40% to 10.90%. The Ash content varies from 11.00% to 40.40%. The calorific value varies between 5300 to 7020 K.Cal/kg. The seam grade varies from A to F. The seam grade is superior – A, B & C grade over a larger part of the block in the central & eastern part.

#### 4.3.2.2 Reserves

The estimated total Net Proved in situ reserves for the seam IV in Shahpur West Block is 8.014 million tonnes. Out of total reserves, 6.502 million tonnes belong to superior coal with >0.90 m thickness and inferior coal with > 1.2 m thickness while the reserves 1.512 million tonnes are available for thickness less than the mentioned above.

Grade wise distribution is as below :

| Grade        | *Reserves, Mil Tonnes<br>(% of total reserves) | **Reserves, Mil Tonnes<br>(% of total reserves) |
|--------------|------------------------------------------------|-------------------------------------------------|
| A            | 0.703 (11.00%)                                 | 0.139 (9.00%)                                   |
| B            | 2.943 (45.00%)                                 | 0.521 (34.50%)                                  |
| C            | 2.689 (41.50%)                                 | 0.538 (36.00%)                                  |
| D            | 0.167 (2.50%)                                  | 0.195 (13.00%)                                  |
| E            | -                                              | 0.092 (6.00%)                                   |
| F            | -                                              | 0.027 (1.50%)                                   |
| <b>Total</b> | <b>6.502 (100%)</b>                            | <b>1.512 (100%)</b>                             |

\* I-30 for seam thickness > 0.9m for superior coal (Gr A, B, C) and >1.2m for inferior coal (Gr D, E, F)

\*\* I-30 for seam thickness < 0.9m for superior coal (Gr A, B, C) and <1.2m for inferior coal (Gr D, E, F)

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#### 4.3.3 Seam-L2

Seam L2 is the second persistent seam in descending order, which has attained workable thickness throughout the block. It is intersected in all the

boreholes except MSSW-42. The seam thickness varies from 0.55 m to 3.16 m. The seam occurs mostly in depth range of 73 – 153 m from surface. Dominant thickness is 1.00 to 2.00m over a larger part of the block. The depth of occurrence if the seam is mostly <100m over a major part of the block.

#### 4.3.3.1 Seam overall quality

The coal seam quality on I-30 and Bcs analysis basis (on 60% RH and 40°C and on calculated basis) is given in Annexure IV of GR. The seam has clean coal in all the boreholes except in two boreholes i.e. MSSW-15 (0.35m sandstone band) & MSSW-20 (0.15 shale band). The moisture varies from 2.20% to 11.40%. The Ash varies from 12.60% to 42.80%.

The calorific value varies between 4030 to 6390 Kcal/Kg. and the grade ranges between A to G. The dominant grade is C & D.

#### 4.3.3.2 Reserves

The total Net Proved in situ reserves for the seam L2 are estimated as 9.492 million tonnes. Out of total reserves, 6.037 million tonnes belong to superior coal with >0.90 m thickness and inferior coal with > 1.2 m thickness and 3.455 million tonnes are available for thickness less than the mentioned above.

Grade wise distribution is as below:

| Grade        | Reserves, Mil Tonnes<br>(% of total reserves) | Reserves, Mil Tonnes<br>(% of total reserves) |
|--------------|-----------------------------------------------|-----------------------------------------------|
| A            | -                                             | 0.003 (0.10%)                                 |
| B            | 0.180 (3%)                                    | 0.013 (0.40%)                                 |
| C            | 4.057 (67%)                                   | 0.243 (7.00%)                                 |
| D            | 1.682 (28%)                                   | 2.061 (59.5%)                                 |
| E            | 0.118 (2%)                                    | 0.894 (26%)                                   |
| F            | -                                             | 0.241 (7%)                                    |
| <b>Total</b> | <b>6.037 (100%)</b>                           | <b>3.455 (100%)</b>                           |

\* I-30 for seam thickness > 0.9m for superior coal (Gr A, B, C) and >1.2m for inferior coal (Gr D, E, F)

\*\* I-30 for seam thickness < 0.9m for superior coal (Gr A, B, C) and <1.2m for inferior coal (Gr D, E, F)

#### 4.3.4 Seam-III A

Seam IIIA is developed throughout the block except in borehole MSSW-42, in which, seam is emplaced by dyke. The seam is not intersected in 4 boreholes (MSSW-19 in the SW, MSEW-13 and 49 in the north) due to minor slip / minor fault of around 2 m throw. It overlies seam IIIB with a

parting range 0.30 m to 2.93 m. The thickness range varies from 0.35 m to 2.84 m. (Dominant 0.50 – 1.50 m). The seam occurs in the depth range of 85 – 173 m from surface mostly >100 m over larger part of the block. In north-eastern corner, seam occurs at > 150 m depth.

The seam has attained good workable thickness in the central part continuing upto southern boundary of the block. But in the SW corner and in patches in the northern part of the block the seam displays poor thickness.

#### 4.3.4.1 Seam overall quality

The coal seam quality on I-30 and Bcs analysis basis (on 60% RH and 40°C and on calculated basis) is given in Annexure IV of GR. The moisture content varies between 2.00% to 9.80% and ash varies from 7.30 % to 50.50 %. The calorific value varies between 3090 to 6220K.Cal/kg. The seam grade ranges between A to G (generally D to F). 'C' grade coal occurs in discontinuous patches in the block.

#### 4.3.4.2 Reserves

The total Net Proved in situ reserves for the seam IIIA are estimated as 9.206 million tonnes. Out of 9.206 million tonnes, 4.592 million tonnes belong to superior coal with >0.90 m thickness and inferior coal with > 1.2 m thickness and 4.614 million tonne reserves are available for thickness less than the mentioned above.

Grade wise distribution is as below :

| Grade        | Reserves in Million Tonnes<br>(% of total reserves) | Reserves in Million Tonnes<br>(% of total reserves) |
|--------------|-----------------------------------------------------|-----------------------------------------------------|
| A            | 0.018 (0.40%)                                       | -                                                   |
| B            | 0.030 (0.65%)                                       | 0.020 (0.40%)                                       |
| C            | 1.056 (23%)                                         | 0.227 (5%)                                          |
| D            | 0.914 (20%)                                         | 1.772 (39)                                          |
| E            | 0.670 (15%)                                         | 1.439 (31%)                                         |
| F            | 1.241 (27%)                                         | 1.078 (23%)                                         |
| G            | 0.663 (14%)                                         | 0.078 (1.60)                                        |
| <b>Total</b> | <b>4.592 (100%)</b>                                 | <b>4.614 (100%)</b>                                 |

\* I-30 for seam thickness > 0.9m for superior coal (Gr A, B, C) and >1.2m for inferior coal (Gr D, E, F)

\*\* I-30 for seam thickness < 0.9m for superior coal (Gr A, B, C) and <1.2m for inferior coal (Gr D, E, F)

#### 4.3.5 Seam-IIIB

The Seam IIIB overlies seam IIIL with varying parting of 0.72 m to 1.62 m. The seam is developed only in Western & South Eastern part of the block. In rest of the area this seam is not developed. The thickness range of the

seam is from 0.14 m to 1.78 m. The seam has attained workable thickness of about 1.20 m in 3 patches in the western part. The seam occurs mostly in the depth range of 88 m to 130 m.

The seam IIIB is intersected in 35 boreholes. It is not developed in 28 boreholes. The seam is emplaced by dolerite in one boreholes i.e. MSSW-42. Out of 35 boreholes 22 boreholes got clean section of coal. Thin dirt bands are developed in one borehole (MSSW-47). In the extreme western part near MSSW-57 the seam has attained C grade.

#### 4.3.5.1 Seam overall quality

The coal seam quality on I-30 and Bcs analysis basis (on 60% RH and 40°C and on calculated basis) is given in Annexure IV of GR. The moisture content varies between 2.50% to 9.80% and ash varies from 13.10% to 50.40%. The calorific value ranges from 3240 to 6170 KCal/kg. and the seam grade varies from B to G.

#### 4.3.5.2 Reserves

The total Net Proved in situ reserves for the seam IIIB are estimated as 2.738 million tonnes. Out of total 2.738 million tonnes, 1.189 million tonnes belong to superior coal with >0.90 m thickness and inferior coal with > 1.2 m thickness and 1.549 million tonnes are available for less thickness than mentioned above.

Grade wise distribution is as below:

| Grade        | Reserves in Million Tonnes<br>(% of total reserves) | Reserves in Million Tonnes<br>(% of total reserves) |
|--------------|-----------------------------------------------------|-----------------------------------------------------|
| B            | 0.103 (9%)                                          | 0.063 (4%)                                          |
| C            | 0.465 (39%)                                         | 0.359 (23%)                                         |
| D            | 0.213 (18%)                                         | 0.282 (18%)                                         |
| E            | 0.050 (4%)                                          | 0.341 (22%)                                         |
| F            | 0.51 (4%)                                           | 0.409 (27%)                                         |
| G            | 0.307 (26%)                                         | 0.095 (6%)                                          |
| <b>Total</b> | <b>1.189 (100%)</b>                                 | <b>1.549 (100%)</b>                                 |

\* I-30 for seam thickness > 0.9m for superior coal (Gr A, B, C) and >1.2m for inferior coal (Gr D, E, F)

\*\* I-30 for seam thickness < 0.9m for superior coal (Gr A, B, C) and <1.2m for inferior coal (Gr D, E, F)

#### 4.3.6 Seam-III L

Seam III L is a thin coal seam and it overlies seam II with varying parting of 12.75 m to 20.32 m. The seam has been intersected only in 9 boreholes. It is mostly not developed over a major part of the block except in the NW

corner of the block. In one borehole i.e. MSSW-42, it is emplaced by dolerite dyke. Thickness range is from 0.62m to 1.40m.

#### 4.3.6.1 Seam overall quality

The coal seam quality on I-30 and Bcs analysis basis (on 60% RH and 40°C and on calculated basis) is given in Annexure IV of GR. The moisture varies from 1.70% to 9.00%. Ash varies from 12.50% to 32.80%. The Calorific value varies from 3394 to 5961 K.Cal/kg. and the grade varies from B to E.

#### 4.3.6.2 Special tests

Since seam is thin and considering its poor development no sample has been advised for special tests.

#### 4.3.6.3 Reserves

The total Net Proved in situ reserves for the seam III L is estimated as 0.413 million tonnes belonging to grade C to G. The maximum reserves viz. 0.280 million tonnes are available in less than 0.90 m thickness of superior coal and inferior coal with > 1.2 m thickness.

Where as, 0.133 million tones reserves are available belonging to superior coal with >0.90 m thickness and inferior coal with > 1.2 m thickness.

Grade wise distribution is as below:

| Grade | Reserves in Million Tonnes<br>(% of total reserves) | Reserves in Million Tonnes<br>(% of total reserves) |
|-------|-----------------------------------------------------|-----------------------------------------------------|
| B     | 0.052 (39%)                                         | 0.068 (24%)                                         |
| C     | 0.066 (50%)                                         | 0.068 (24%)                                         |
| D     | 0.015 (11%)                                         | 0.292 (33%)                                         |
| E     | -                                                   | 0.052 (19%)                                         |
| Total | 0.133 (100%)                                        | 0.280 (100%)                                        |

\* I-30 for seam thickness > 0.9m for superior coal (Gr A, B, C) and >1.2m for inferior coal (Gr D, E, F)

\*\* I-30 for seam thickness < 0.9m for superior coal (Gr A, B, C) and <1.2m for inferior coal (Gr D, E, F)

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#### 4.3.7 Seam-II

Seam-II is thick, consistent & main workable coal seam, which overlies seam-I with varying parting of 18.54 m to 41.65 m. The seam has been intersected in 62 Nos. of boreholes. In one borehole i.e. in MSSW-42, it is emplaced by dolerite dyke. In MSSW-7 minor slip has resulted into part seam intersection. The thickness of seam II varies from 0.92 m to 4.16 m. The seam occurs mostly in depth range of 109 – 193 m, over 70 % of area,

while about 30% area towards western part occurs in depth range of 100 – 150 m.

#### 4.3.7.1 Seam overall quality

The coal seam quality on I-30 and Bcs analysis basis (on 60% RH and 40°C and on calculated basis) is given in Annexure IV of GR. The seam has clean coal in 51 boreholes. In 11 boreholes dirt band developed. The moisture varies from 2.20% to 9.30%. Ash varies from 11.90% to 37.60%. The calorific value ranges from 4350 to 7060 K.Cal/Kg. The grade varies from A to F.

#### 4.3.7.2 Reserves

The total net proved in situ reserves for the seam II is estimated as 18.579 million tonnes. Out of total 18.579 million tonnes reserves, 18.451 belong to superior coal with >0.90 m thickness and inferior coal with > 1.2 m thickness. Grade wise distribution is as below:

| Grade        | Reserves in Million Tonnes<br>(% of total reserves) |
|--------------|-----------------------------------------------------|
| A            | 0.030 (<1%)                                         |
| B            | 0.194 (1%)                                          |
| C            | 6.422 (11%)                                         |
| D            | 8.643 (47%)                                         |
| E            | 3.126 (17%)                                         |
| F            | 0.036 (<1%)                                         |
| <b>Total</b> | <b>18.451 (100%)</b>                                |

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#### 4.3.8 Seam-I

Seam- I is a thin seam developed in southwestern & Central part of the block. It has unworkable thickness of < 0.50m over a larger area of it development. Hence, its reserves estimation is not done. Its thickness range is from 0.03-1.25m and occurrence depth range of 150m in the Southwest. It overlies seam L1 with parting range of 10.11-25.76m in the block.

##### 4.3.8.1 Seam overall quality

For 10 boreholes intersections of Seam-I overall is available and mostly the seam is thin (<0.50m). In other boreholes, the seam is not developed over a major part of the area.

##### 4.3.8.2 Reserves

No reserves have been estimated for seam I.

### 4.3.9 Seam-L1

It is oldest seam of barakar column which has attained workable thickness towards western part of the block. The thickness varies from 0.10m to 1.66m. The seam has been intersected in 46 Nos. of boreholes. The 14 boreholes are not drilled up to the seam. L1 seam is not developed in 3 BHs. In one borehole i.e. MSSW-42, it is emplaced by dolerite dyke. The seam mostly occurs at depth range of 151 – 230 m.

#### 4.3.9.1 Seam overall quality

The coal seam quality on I-30 and Bcs analysis basis (on 60% RH and 40°C and on calculated basis) is given in Annexure IV of GR. The seam has clean coal in all boreholes. The moisture varies from 2.00% to 9.50%. The ash varies from 8.90% to 42.40%. The calorific value varies from 2262 to 6457 K.Cal/kg. The grade varies from A to G.

#### 4.3.9.2 Reserves

The total Net Proved in situ reserves are estimated as 4.237 million tonnes. Out of total 4.237 million tonnes reserves, 1.472 belong to superior coal with >0.90 m thickness and inferior coal with > 1.2 m thickness, while 2.765 million tonnes are available in less thickness than mentioned above.

Grade wise distribution is as below:

| Grade        | Reserves in Million Tonnes<br>(% of total reserves) | Reserves in Million Tonnes<br>(% of total reserves) |
|--------------|-----------------------------------------------------|-----------------------------------------------------|
| A            | 0.012 (<1%)                                         | 0.091 (3%)                                          |
| B            | 0.060 (4%)                                          | 0.196 (7%)                                          |
| C            | 0.850 (58%)                                         | 0.545 (20%)                                         |
| D            | 0.466 (32%)                                         | 1.226 (44%)                                         |
| E            | 0.065 (4%)                                          | 0.611 (22%)                                         |
| F            | 0.014 (1%)                                          | 0.096 (4%)                                          |
| G            | 0.005 (<1%)                                         | -                                                   |
| <b>Total</b> | <b>1.472 (100%)</b>                                 | <b>2.765 (100%)</b>                                 |

\* I-30 for seam thickness > 0.9m for superior coal (Gr A, B, C) and >1.2m for inferior coal (Gr D, E, F)

\*\* I-30 for seam thickness < 0.9m for superior coal (Gr A, B, C) and <1.2m for inferior coal (Gr D, E, F)

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#### 4.3.9.3 Bands

In Barakar formation, besides eight persistent seams described above, one or two persistent bands occur which vary in thickness from 0.22m to 0.74m. They are not processed for reserves because of their thin nature and impersistancy

Altogether there are 31 bands delineated in all the 64 boreholes in the block. Band-by band analysis was advised and results are obtained for 12

bands, which have thickness of around 0.50m and rest, are delineated on visual basis. For two borehole intersections Overall at 60% RH & 40°C was obtained. All the band details are furnished in Annexure IV of GR.

The band below seam II attains invariably a thickness of 0.50m and band below seam L1 is fairly consistent though thin (<0.50 thickness), throughout the block.

#### 4.3.9.4 Special tests

##### A) Range of ultimate analysis for Seams IV, L2, IIIA, IIIB, II and L1

| Seam                     | Range   | Carbon % | Hydrogen % | Nitrogen % | Sulphur % | Oxygen % |
|--------------------------|---------|----------|------------|------------|-----------|----------|
| IV (no. of samples-6)    | Minimum | 58.39    | 1.89       | 0.56       | 0.61      | 6.49     |
|                          | Maximum | 64.72    | 3.52       | 0.61       | 1.24      | 9.27     |
| L2 (no. of samples -6)   | Minimum | 47.57    | 1.21       | 0.50       | 0.65      | 0.56     |
|                          | Maximum | 65.28    | 2.64       | 0.61       | 1.12      | 10.10    |
| IIIA (no. of Samples-6)  | Minimum | 37.13    | 0.57       | 0.48       | 0.73      | 0.94     |
|                          | Maximum | 57.83    | 3.19       | 0.58       | 1.21      | 9.46     |
| IIIB (no. of Samples -5) | Minimum | 52.32    | 1.24       | 0.46       | 0.49      | 1.96     |
|                          | Maximum | 64.94    | 3.82       | 0.60       | 0.79      | 8.43     |
| II (no. of Samples -10)  | Minimum | 47.07    | 1.47       | 0.51       | 0.60      | 3.26     |
|                          | Maximum | 59.08    | 2.74       | 0.58       | 0.91      | 8.57     |
| L1 (no. of Samples - 4)  | Minimum | 54.56    | 2.31       | 0.52       | 0.58      | 6.45     |
|                          | Maximum | 61.00    | 2.81       | 0.59       | 0.92      | 9.57     |

##### B) Total sulphur & Distribution in Seams IV, L2, IIIA, IIIB and II

| Seam                    | Range   | Distribution of sulphur |                     |                   |
|-------------------------|---------|-------------------------|---------------------|-------------------|
|                         |         | Pyritic Sulphur %       | Inorganic Sulphur % | Organic Sulphur % |
| IV No. of samples 2     | Minimum | 71.92                   | 3.84                | 8.57              |
|                         | Maximum | 85.72                   | 5.71                | 19.24             |
| L2 No. of Samples - 3   | Minimum | 55.88                   | 1.47                | 15.11             |
|                         | Maximum | 81.04                   | 4.41                | 42.65             |
| IIIA No. of Samples - 4 | Minimum | 76.03                   | 4.13                | 5.20              |
|                         | Maximum | 84.52                   | 16.88               | 19.84             |
| IIIB No of Samples - 3  | Minimum | 32.76                   | 1.59                | 17.65             |
|                         | Maximum | 79.41                   | 2.94                | 62.52             |
| II No. of Samples - 5   | Minimum | 34.92                   | 1.61                | 13.75             |
|                         | Maximum | 82.50                   | 7.61                | 61.91             |

**C) Ash Analysis for main seams**

| Constituent                    | Seam-IV, No. of Sample-2 |       | Seam – L2, No. of Sample-2 |       | Seam – IIIA, No. of Sample-4 |       | Seam – IIIB, No. of Sample-3 |       | Seam – II, No. of Sample-5 |       |
|--------------------------------|--------------------------|-------|----------------------------|-------|------------------------------|-------|------------------------------|-------|----------------------------|-------|
|                                | Range - %                |       | Range - %                  |       | Range - %                    |       | Range - %                    |       | Range - %                  |       |
|                                | Min.                     | Max.  | Min.                       | Max.  | Min.                         | Max.  | Min.                         | Max.  | Min.                       | Max.  |
| Sio <sub>2</sub>               | 55.04                    | 58.88 | 51.20                      | 61.92 | 56.28                        | 65.20 | 57.08                        | 64.06 | 60.74                      | 65.56 |
| Al <sub>2</sub> O <sub>3</sub> | 30.14                    | 31.25 | 25.58                      | 27.64 | 25.16                        | 28.29 | 26.11                        | 28.83 | 21.30                      | 28.66 |
| Fe <sub>2</sub> O <sub>3</sub> | 3.79                     | 8.55  | 4.89                       | 13.82 | 5.13                         | 9.16  | 5.06                         | 7.52  | 3.45                       | 6.95  |
| TiO <sub>2</sub>               | 1.40                     | 1.97  | 1.43                       | 1.83  | 1.22                         | 1.51  | 1.54                         | 2.14  | 1.42                       | 2.68  |
| CaO                            | 0.61                     | 0.96  | 1.71                       | 1.82  | 0.32                         | 2.27  | 0.32                         | 1.52  | 0.35                       | 3.73  |
| MgO                            | 1.33                     | 2.21  | 1.19                       | 1.69  | 1.07                         | 1.14  | 1.06                         | 1.40  | 0.67                       | 1.08  |
| Na <sub>2</sub> O              | 0.15                     | 0.32  | 0.20                       | 0.25  | 0.14                         | 0.24  | 0.10                         | 0.27  | 0.11                       | 0.21  |
| K <sub>2</sub> O               | 0.26                     | 0.60  | 0.42                       | 0.42  | 0.50                         | 0.66  | 0.34                         | 0.42  | 0.22                       | 0.50  |
| So <sub>3</sub>                | 0.64                     | 1.17  | 0.81                       | 1.15  | 0.12                         | 1.45  | 0.29                         | 1.53  | 0.43                       | 1.37  |
| P <sub>2</sub> O <sub>5</sub>  | 0.12                     | 0.13  | 0.20                       | 0.24  | 0.14                         | 0.32  | 0.16                         | 0.26  | 0.14                       | 0.18  |

**D. Ash Fusion Temperature (AFT) in °C**

| Seam           | Range | IT   | ST    | HT    | FT    |
|----------------|-------|------|-------|-------|-------|
| IV Samples-2   | Min.  | 1393 | >1450 | >1450 | >1450 |
|                | Max.  | 1405 | "     | "     | "     |
| L2 Samples-2   | Min.  | 1374 | >1450 | >1450 | >1450 |
|                | Max.  | 1406 | "     | "     | "     |
| IIIA Samples-4 | Min.  | 1368 | >1450 | >1450 | >1450 |
|                | Max.  | 1397 | "     | "     | "     |
| IIIB Samples-3 | Min.  | 1384 | >1450 | >1450 | >1450 |
|                | Max.  | 1395 | "     | "     | "     |
| II             | Min.  | 1382 | >1450 | >1450 | >1450 |
|                | Max.  | 1440 | "     | "     | "     |

**E. Swelling Index (SI)**

Swelling Index of Seam IV through sample tests of 5, Seam L2 through sample tests of 4, IIIA by sample tests of 5, IIIB sample tests- 4, II sample tests – 10 and seam L1 through 2 sample tests have been noted to be only – 0.

**F. Hard Grove Index (HGI)**

| Seam | No. of samples tested | Range of results |
|------|-----------------------|------------------|
| IV   | 2                     | 53 to 75         |
| L2   | 3                     | 61 to 68         |
| IIIA | 3                     | 56 to 65         |
| IIIB | 2                     | 58 to 62         |
| II   | 6                     | 60 to 73         |
| L1   | 2                     | 57 to 71         |

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#### 4.4 RESERVES ESTIMATION OF INDIVIDUAL COAL SEAMS

The detailed exploration for coal in Shahpur West Block revealed the existence of 8 seams viz. seam IV, L2, IIIA, IIIB, IIIL, II, I & L1. Out which reserves have been assessed for 7 seams excluding seam-I as it has not attained workable thickness in the block. Four seams viz. IV, L2, IIIA & II are the prominent seams in the block, whereas seam-IIIB, IIIL & L1 are less prominent developed over limited area of the block. The Shahpur West Block coal is high moisture, low rank, high volatile, non-coking coal. The superior grade coal i.e. A, B, C grades, accounts for 52% of coal reserves, whereas 48% of coal reserves fall under inferior grade of D, E & F. The lowest G grade reserves are of negligible quantity.

The coal reserves are estimated in Shahpur West Block based on UNFC norms (superior coal >0.90 m thickness and inferior coal with > 1.2 m thickness). The total reserves are 38.376 million tonnes for both superior grade (> 0.90m. thickness) and inferior grade (> 1.20m. thickness). However, reserves from 0.50m. to 1.20m thickness reserves are also estimated which are lesser than thickness mentioned above.

##### 4.4.1 — Basic assumptions

The following basic assumptions have been considered for reserves estimation.

- The isochors have been drawn by sophisticated MINEX Software, which create segments/cells on the principle of gradual and uniform change over the area.
- The coal in Shahpur West Block is non-coking; the workable thickness considered for the estimation of reserves are as per UNFC norms. The reserves are grouped as per underground norms.
- The coal seams have been estimated based on 1-30 thickness & quality and have been estimated seam-wise, thickness-wise, grade-wise, village wise, sector-wise, barrier-wise & forest-wise. The barriers considered, are road and nala.

Depth-wise reserves have also been given for the 0-50 m, 50-100 m, 100-150 m, 150-200 m, & 200-250 m depth by drawing depth lines for seams IV, L2, IIIA, IIIB, IIIL, II & L1.

- As per approved Norms of UNFC Classification, the thickness wise reserves have been estimated for the thickness ranges as follows:  
For superior grade coal the thickness ranges are :

| Thickness Range  | Superior grade coal<br>(A, B, C grade) |
|------------------|----------------------------------------|
| 0.90m. to 1.20m. |                                        |
| 1.20m. to 1.50m. |                                        |
| 1.50m. to 3.00m. |                                        |
| 3.00m. to 5.00m. |                                        |
| > 5.00m.         |                                        |

For inferior grade coal the thickness ranges are :

| Thickness Range  | Inferior grade coal<br>(D, E, F, G grade) |
|------------------|-------------------------------------------|
| 1.20m. to 1.50m. |                                           |
| 1.50m. to 3.00m. |                                           |
| 3.00m. to 5.00m. |                                           |
| > 5.00m.         |                                           |

However reserves have been estimated also for less than approved UNFC norms for the thickness ranges 0.50 m to 0.90 m, 0.90 m to 1.20m separately.

- v) The limits of non-development zones of seams have been marked by taking half of the influence of the borehole with positive seam intersection. These limits have also been considered to be the line of zero seam thickness.
- vi) The linear extending dolerite dyke in the south east part has emplaced coal seam in BH MSSW-42. The dyke marked area around the borehole is excluded from reserve estimation.

#### 4.4.2 Area considered for reserves estimation

The block boundary of Shahpur West Block within Latitude (N) 23°14'21" to 23°15'37" and Longitude (E) 81°17'20" to 81°18'48", marked as under has been considered for reserve estimation.

- North** - Shahpur Block & West of Shahdol block explored / being explored by GSI & MECL.
- East** - Shahpur (East) block of NMDC.
- South** - The blocks of CMPDIL/GSI (exploration in progress).
- West** - Marwatola block of MECL & CMPDIL (work in progress).

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#### 4.4.3 Category of reserves

The entire reserves of all coal seams available within Shahpur West Block have been grouped under 'Proved Category' due to the following reasons.

- i) The block is explored by detailed exploration norms having <400 m. grid interval for boreholes drilled.
- ii) The borehole density is 10 boreholes per Sq. Km. The structure is simple except some disturbances towards southern boundary.

- iii) In the protected forest area, in northern part of the block with 250 m. forest barrier and a small patch of forest in southern part, entry was not allowed by forest official but, the boreholes were drilled in the forest / barrier periphery to obtain the coal seam data. Hence, reserves are grouped as "Proved Category" in the forest area of 0.316 sq.km. and 250 m. barrier area of 0.64 sq.km.
- iv) Sector- wise reserves are given for sectors-A, B, C & D demarcated by 4 faults in the blocks. The details of sector are given below :

**Sector A** - This is a major sector bound by block boundary and fault F3-F3 in the southern and southern western part.

**Sector B** - It is formed by the area between faults F3-F3 and F1-F1 and the block boundary in the south and east.

**Sector C** - It is a small triangular area between faults F1-F1 and F2-F2 and block boundary in the west.

**Sector D** - It is a trapezoidal area bound by fault F2-F2 in the north, F1-F1 in east and block boundary towards south and west.

#### 4.4.4 Methodology of reserves estimation

In Shahpur West Block, 'net proved' underground reserves by MINEX Software are estimated. For this purpose isochores of 0.90 m, 1.20 m., 1.50 m, 3.00 m, 5.00 m and > 5.00 m (for superior grade) and 1.20 m, 1.50 m, 3.00 m, 5.00 m & >5.00m (for inferior grade) on I 30 basis along with isogrades lines, have been drawn on folio plans (Plate XA to XD) for the seam workability. The area of seam non-development and the workability have been demarcated. The 50 m, 100 m, 150 m, 200 m & 250 m depth lines have also been marked on the seam folios of different seams. The reserves are computed accurately by MINEX Computer Software.

Each MINEX cell having area (sq.m) x Isochore thickness (m) Value x Specific gravity by grade gives the reserves tonnage

The reserves of coal in Shahpur West Block have been estimated by using standard formula as given below :

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

Where R = Reserves in million tonnes, A = Area in Sq. km.  
Th. = Thickness in metres.  
Sp.Gr. = Specific Gravity of coal.

10% deduction has been made from gross reserves to arrive at net in situ reserves, available in the block.

The specific gravity for different grades of coal for reserves estimation is as follows:

| Grade | Sp. Gr. |
|-------|---------|
| A     | 1.40    |
| B     | 1.45    |
| C     | 1.50    |
| D     | 1.55    |
| E     | 1.60    |
| F     | 1.65    |
| G     | 1.75    |

#### 4.4.5 Methodology of grade estimation

The proximate analysis at 60% RH & 40°C and on calculated basis forms the basis for grade estimation.

The grade of the seam is based on Useful Heat Value (UHV) calculated as per Government of India, Notification No. 28012/1/82/CA dt. 7.1.1984 using formula,

$$\begin{aligned} \text{UHV} &= 8900 - 138 (A+M) \\ \text{Where A} &= \text{Ash \% on 60\% RH \& 40}^\circ\text{C} \\ \text{M} &= \text{Moisture \%} \end{aligned}$$

The unit of the UHV is Kilo Calories/Kg (K.Cal/Kg.)

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 Table 4.8.

**TABLE 4.8**  
**GRADES OF NON-COKING COAL BASED ON U.H.V.**

| Grade | Ash% + Moisture%<br>(on 60% RH & 40°C) | Useful Heat Value (UHV)<br>(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                            |

#### 4.4.6 Limitations

The structural set up evolved in the block and the lay and disposition of the coal seams has been interpreted based mainly on the borehole data coupled with surface geology

## 4.4.7 Summary of reserves

In Shahpur West Block a total of 38.376 million tonnes of "Net Proved", in-situ, underground reserves of non-coking coals have been estimated from seven coal seams viz. seam IV, L2, IIIA, IIIB, IIIL, II & L1. The gist of reserves is given in Table 4.9.

**TABLE 4.9**  
**GIST OF RESERVES : SHAHPUR WEST BLOCK**

| Classification                    | Thickness Range (m)    | Reserves (m.t.)       |                       | Total Reserves (m.t.)    |
|-----------------------------------|------------------------|-----------------------|-----------------------|--------------------------|
|                                   |                        | Superior Coal (>0.90) | Inferior Coal (>1.20) |                          |
| As per approved norms of UNFC     | > 0.90 & >1.20 to 5.00 | 19.930 (52%)          | 18.446 (48%)          | 38.376<br>100 %<br>(73%) |
| Less than the approved UNFC norms | < 0.50 to 1.20         | 3.094 (22%)           | 11.209 (78%)          | 14.303<br>100% (27%)     |
| <b>Total</b>                      |                        | <b>23.024 (44%)</b>   | <b>29.655 (56%)</b>   | <b>52.679 (100%)</b>     |

The grade-wise availability of reserves for workable seams in Shahpur West Block as per UNFC approved norms are as below, with lesser thickness norms reserves. The Grade-Wise Availability of Reserves is given in Table 4.10.

**TABLE 4.10**  
**GRADE-WISE AVAILABILITY OF RESERVES: SHAHPUR WEST BLOCK**

| Grade                                               | Reserves in Million Tonnes<br>(% of total reserves) Thickness<br>as per UNFC Norms | Reserves in Million Tonnes<br>(% of total reserves)<br>Thickness < UNFC Norms |
|-----------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| A                                                   | 0.763 (2%)                                                                         | 0.233 (1.5%)                                                                  |
| B                                                   | 3.562 (9%)                                                                         | 0.881 (6%)                                                                    |
| C                                                   | 15.605 (41%)                                                                       | 1.980 (14%)                                                                   |
| D                                                   | 12.100 (32%)                                                                       | 5.693 (40%)                                                                   |
| E                                                   | 4.029 (10%)                                                                        | 3.492 (24.5%)                                                                 |
| F                                                   | 1.342 (3.5%)                                                                       | 1.851 (13%)                                                                   |
| G                                                   | 0.975 (2.5%)                                                                       | 0.173 (1%)                                                                    |
| <b>Total</b>                                        | <b>38.376 (100%)</b>                                                               | <b>14.303 (100%)</b>                                                          |
| <b>Grand Total Reserves : 52.679 million tonnes</b> |                                                                                    |                                                                               |

The coal grade ranges from A to G. The dominant grade is C & D for UNFC norms. The lesser thickness coal is C, D & E grade. The summary of thickness wise total reserves is given in Table 4.11.

**TABLE 4.11**  
**SUMMARY OF THICKNESS WISE TOTAL RESERVES :**  
**SHAHPUR WEST BLOCK**

| I. Thickness as per UNFC Norms | Reserves % Superior (>0.90m. Th.) | Reserves % Inferior (>1.20m. Th.) | Total                |
|--------------------------------|-----------------------------------|-----------------------------------|----------------------|
| 0.90 – 1.20                    | 5.702 (15%)                       | -                                 | 5.702 (15%)          |
| 1.20 – 1.50                    | 6.063 (16%)                       | 5.279 (14%)                       | 11.342 (29%)         |
| 1.50 – 3.00                    | 7.826 (20%)                       | 11.745 (31%)                      | 19.571 (51%)         |
| 3.00 – 5.00                    | 0.339 (1%)                        | 1.422 (4%)                        | 1.761 (5%)           |
| <b>Total – I</b>               | <b>19.930 (52%)</b>               | <b>18.446 (48%)</b>               | <b>38.376 (100%)</b> |
| II. Thickness < UNFC Norms     | Reserves % (0.50 – 0.90m. Th)     | Reserves % (0.50 – 1.20m. Th)     |                      |
| 0.50 – 0.90                    | 3.094 (22%)                       | 4.560 (32%)                       | 7.654 (54%)          |
| 0.90 – 1.20                    | -                                 | 6.649 (46%)                       | 6.649 (46%)          |
| <b>Total – II</b>              | <b>3.094 (22%)</b>                | <b>11.209 (78%)</b>               | <b>14.303 (100%)</b> |
| <b>Combined Thickness</b>      |                                   |                                   |                      |
| 0.50 – 0.90                    | 3.094                             | 4.560                             | 7.654 (15%)          |
| 0.90 – 1.20                    | 5.702                             | 6.649                             | 12.351 (23%)         |
| 1.20 – 1.50                    | 6.063                             | 5.279                             | 11.342 (22%)         |
| 1.50 – 3.00                    | 7.826                             | 11.745                            | 19.571 (37%)         |
| 3.00 – 5.00                    | 0.339                             | 1.422                             | 1.761 (3%)           |
| <b>Grand Total I + II</b>      | <b>23.024 (44%)</b>               | <b>29.655 (56%)</b>               | <b>52.679 (100%)</b> |

Out of 52.679 million tonnes, 38.376 (73%) million tonnes are available as per UNFC norms and a total of 14.303 million tonnes reserves (27%) are available under less than approved UNFC norms for thickness range of 0.50 m to 1.20m. Depth wise availability of reserves is given in Table 4.12.

**TABLE 4.12**  
**SUMMARY OF DEPTH WISE TOTAL RESERVES : SHAHPUR WEST BLOCK**

| Depth        | Reserves in Million Tonnes (% of total reserves) as per UNFC Norms | Reserves in Million Tonnes (% of total reserves) Thickness < UNFC Norms |
|--------------|--------------------------------------------------------------------|-------------------------------------------------------------------------|
| <50          | 4.872 (12.5%)                                                      | 1.091 (7.5%)                                                            |
| 50 – 100     | 7.555 (19.5%)                                                      | 5.397 (38%)                                                             |
| 100 – 150    | 24.063 (63%)                                                       | 4.986 (35%)                                                             |
| 150 – 200    | 1.886 (5%)                                                         | 2.771 (19%)                                                             |
| 200 – 250    | -                                                                  | 0.058 (0.50%)                                                           |
| <b>Total</b> | <b>38.376 (100%)</b>                                               | <b>14.303 (100%)</b>                                                    |

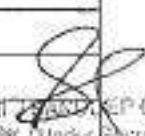
  
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 RQP  
 11/12/2020  
 Director / Under Secretary  
 Coal Division / Ministry of Coal  
 Government of India  
 New Delhi

**TABLE 4.13**  
**SEAM-WISE, THICKNESS-WISE AND GRADE-WISE NET PROVED INSITU RESERVES**  
**SHAHPUR WEST BLOCK**

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Secretary  
Ministry of Coal  
Govt. of India  
New Delhi

(RESERVES IN '000 TONNES)

| SEAM | THICKNESS                     | SUPERIOR GRADE RESERVES    |      |      |       |                            | INFERIOR GRADE RESERVES    |      |     |   |       | GRAND TOTAL |
|------|-------------------------------|----------------------------|------|------|-------|----------------------------|----------------------------|------|-----|---|-------|-------------|
|      |                               | A                          | B    | C    | TOTAL | RESERVES > 1.20m THICKNESS | D                          | E    | F   | G | TOTAL |             |
|      |                               | RESERVES > 0.90m THICKNESS |      |      |       |                            | RESERVES > 1.20m THICKNESS |      |     |   |       |             |
| IV   | 0.9-1.20                      | 293                        | 1240 | 1142 | 2675  |                            |                            |      |     |   |       | 2675        |
|      | 1.2-1.5                       | 410                        | 1609 | 1421 | 3440  |                            | 134                        |      |     |   | 134   | 3574        |
|      | 1.5-3.0                       |                            | 94   | 126  | 220   |                            | 33                         |      |     |   | 33    | 253         |
|      | TOTAL                         | 703                        | 2943 | 2689 | 6335  |                            | 167                        |      |     |   | 167   | 6502        |
|      | RESERVES 0.50-0.9m THICKNESS  |                            |      |      |       |                            |                            |      |     |   |       |             |
| L2   | 0.5-0.90                      | 139                        | 521  | 538  | 1198  |                            | 96                         | 88   | 27  |   | 211   | 1409        |
|      | 0.9-1.20                      |                            |      |      |       |                            | 99                         | 4    |     |   | 103   | 103         |
|      | TOTAL                         | 139                        | 521  | 538  | 1198  |                            | 195                        | 92   | 27  |   | 314   | 1512        |
|      | GRAND TOTAL                   | 842                        | 3464 | 3227 | 7533  |                            | 362                        | 92   | 27  |   | 481   | 8014        |
|      | RESERVES > 0.90m THICKNESS    |                            |      |      |       |                            |                            |      |     |   |       |             |
|      | 0.9-1.20                      |                            | 57   | 1504 | 1561  |                            |                            |      |     |   |       | 1561        |
|      | 1.2-1.5                       |                            | 45   | 1187 | 1232  |                            | 1283                       | 95   |     |   | 1378  | 2610        |
|      | 1.5-3.0                       |                            | 78   | 1366 | 1444  |                            | 399                        | 23   |     |   | 422   | 1866        |
|      | TOTAL                         |                            | 180  | 4057 | 4237  |                            | 1682                       | 118  |     |   | 1800  | 6037        |
|      | RESERVES 0.50-0.9m THICKNESS  |                            |      |      |       |                            |                            |      |     |   |       |             |
|      | 0.5-0.90                      | 3                          | 13   | 243  | 259   |                            | 372                        | 410  | 189 |   | 971   | 1230        |
|      | 0.9-1.20                      |                            |      |      |       |                            | 1689                       | 484  | 52  |   | 2225  | 2225        |
|      | TOTAL                         | 3                          | 13   | 243  | 259   |                            | 2061                       | 894  | 241 |   | 3196  | 3455        |
|      | GRAND TOTAL                   | 3                          | 193  | 4300 | 4496  |                            | 3743                       | 1012 | 241 |   | 4996  | 9492        |
|      | RESERVES 0.50-1.20m THICKNESS |                            |      |      |       |                            |                            |      |     |   |       |             |

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 भारत सरकार / Govt. of India  
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| SEAM        | THICKNESS                    | SUPERIOR GRADE RESERVES |     |      |       | INFERIOR GRADE RESERVES |      |      |      |       |      | GRAND TOTAL |
|-------------|------------------------------|-------------------------|-----|------|-------|-------------------------|------|------|------|-------|------|-------------|
|             |                              | A                       | B   | C    | TOTAL | D                       | E    | F    | G    | TOTAL |      |             |
| IIIA        | RESERVES >0.90m THICKNESS    |                         |     |      |       |                         |      |      |      |       |      |             |
|             | 0.9-1.20                     | 18                      | 19  | 460  | 497   |                         |      |      |      |       |      | 497         |
|             | 1.2-1.5                      |                         | 11  | 312  | 323   | 759                     | 546  | 723  | 289  | 2317  |      | 2640        |
|             | 1.5-3.0                      |                         |     | 284  | 284   | 155                     | 124  | 518  | 374  | 1171  |      | 1455        |
|             | 3.0-5.0                      |                         |     |      |       |                         |      |      |      |       |      |             |
|             | TOTAL                        | 18                      | 30  | 1056 | 1104  | 914                     | 670  | 1241 | 663  | 3488  |      | 4592        |
|             | RESERVES 0.50-0.9m THICKNESS |                         |     |      |       |                         |      |      |      |       |      |             |
| IIIB        | 0.5-0.90                     |                         | 20  | 227  | 247   | 604                     | 674  | 311  |      | 1589  |      | 1836        |
|             | 0.9-1.20                     |                         |     |      |       | 1168                    | 765  | 767  | 78   | 2778  |      | 2778        |
|             | TOTAL                        |                         | 20  | 227  | 247   | 1772                    | 1439 | 1078 | 78   | 4367  |      | 4614        |
|             | GRAND TOTAL                  | 18                      | 50  | 1283 | 1351  | 2686                    | 2109 | 2319 | 741  | 7855  |      | 9206        |
|             | RESERVES >0.90m THICKNESS    |                         |     |      |       |                         |      |      |      |       |      |             |
|             | 0.9-1.20                     |                         | 57  | 360  | 417   |                         |      |      |      |       |      | 417         |
|             | 1.2-1.5                      |                         | 21  | 81   | 102   | 134                     | 43   | 44   | 232  | 453   |      | 555         |
| IIIC        | 1.5-3.0                      |                         | 25  | 24   | 49    | 79                      | 7    | 7    | 75   | 168   |      | 217         |
|             | 3.0-5.0                      |                         |     |      |       |                         |      |      |      |       |      |             |
|             | TOTAL                        |                         | 103 | 465  | 568   | 213                     | 50   | 51   | 307  | 621   |      | 1189        |
|             | RESERVES 0.50-0.9m THICKNESS |                         |     |      |       |                         |      |      |      |       |      |             |
|             | 0.5-0.90                     |                         | 63  | 359  | 422   | 111                     | 188  | 205  | 25   | 529   |      | 951         |
|             | 0.9-1.20                     |                         |     |      |       | 171                     | 153  | 204  | 70   | 598   |      | 598         |
|             | TOTAL                        |                         | 63  | 359  | 422   | 282                     | 341  | 409  | 95   | 1127  |      | 1549        |
| GRAND TOTAL |                              | 166                     | 824 | 990  | 495   | 391                     | 460  | 402  | 1748 |       | 2738 |             |

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DR  
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संशोधन गुरु  
B.D. SHARMA  
Under Secretary  
Ministry of Coal  
Government of India  
New Delhi

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ROP

| SEAM                         | THICKNESS                    | SUPERIOR GRADE RESERVES   |     |      |       | INFERIOR GRADE RESERVES |      |    |   |       | GRAND TOTAL |
|------------------------------|------------------------------|---------------------------|-----|------|-------|-------------------------|------|----|---|-------|-------------|
|                              |                              | A                         | B   | C    | TOTAL | D                       | E    | F  | G | TOTAL |             |
| III L                        | RESERVES >0.90m THICKNESS    |                           |     |      |       |                         |      |    |   |       |             |
|                              | 0.9-1.20                     |                           | 38  | 47   | 85    |                         |      |    |   |       | 85          |
|                              | 1.2-1.50                     |                           | 14  | 19   | 33    | 15                      |      |    |   | 15    | 48          |
|                              | TOTAL                        |                           | 52  | 66   | 118   | 15                      |      |    |   | 15    | 133         |
|                              | RESERVES 0.50-0.9m THICKNESS |                           |     |      |       |                         |      |    |   |       |             |
|                              | 0.5-0.90                     |                           | 68  | 68   | 136   | 49                      | 41   |    |   | 90    | 226         |
|                              | 0.9-1.20                     |                           |     |      |       | 43                      | 11   |    |   | 54    | 54          |
|                              | TOTAL                        |                           | 68  | 68   | 136   | 92                      | 52   |    |   | 144   | 280         |
|                              | GRAND TOTAL                  |                           | 120 | 134  | 254   | 107                     | 52   |    |   | 159   | 413         |
|                              | III                          | RESERVES >0.90m THICKNESS |     |      |       |                         |      |    |   |       |             |
| 0.9-1.20                     |                              | 22                        | 39  | 18   | 79    |                         |      |    |   |       | 79          |
| 1.2-1.5                      |                              | 8                         | 75  | 361  | 444   | 282                     | 136  | 14 |   | 432   | 876         |
| 1.5-3.0                      |                              |                           | 80  | 5704 | 5784  | 7395                    | 2546 | 10 |   | 9951  | 15735       |
| 3.0-5.0                      |                              |                           |     | 339  | 339   | 966                     | 444  | 12 |   | 1422  | 1761        |
| TOTAL                        |                              | 30                        | 194 | 6422 | 6646  | 8643                    | 3126 | 36 |   | 11805 | 18451       |
| RESERVES 0.50-0.9m THICKNESS |                              |                           |     |      |       |                         |      |    |   |       |             |
| 0.9-1.20                     |                              |                           |     |      |       |                         | 65   | 63 |   | 128   | 128         |
| TOTAL                        |                              |                           |     |      |       |                         | 65   | 63 |   | 128   | 128         |
| GRAND TOTAL                  |                              | 30                        | 194 | 6422 | 6646  | 8643                    | 3191 | 99 |   | 11933 | 18579       |

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कोयला विभाग / Ministry of Coal  
भारत सरकार / Govt. of India  
(राजस्थान - Jaipur)

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 और एम. टी. ए. डी. सेक्रेटरी  
 नगर, अजमेर / Ministry of Coal  
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| SEAM                         | THICKNESS                    | SUPERIOR GRADE RESERVES |       |       |       | INFERIOR GRADE RESERVES |      |      |       |       | GRAND TOTAL |
|------------------------------|------------------------------|-------------------------|-------|-------|-------|-------------------------|------|------|-------|-------|-------------|
|                              |                              | A                       | B     | C     | TOTAL | D                       | E    | F    | G     | TOTAL |             |
| L1                           | RESERVES >0.90m THICKNESS    |                         |       |       |       |                         |      |      |       |       |             |
|                              | 0.9-1.20                     | 12                      | 20    | 356   | 388   |                         |      |      |       |       | 388         |
|                              | 1.2-1.5                      |                         | 22    | 467   | 489   | 466                     | 65   | 14   | 5     | 550   | 1039        |
|                              | 1.5-3.0                      |                         | 18    | 27    | 45    |                         |      |      |       |       | 45          |
|                              | TOTAL                        | 12                      | 60    | 850   | 922   | 466                     | 65   | 14   | 5     | 550   | 1472        |
|                              | RESERVES 0.50-0.9m THICKNESS |                         |       |       |       |                         |      |      |       |       |             |
|                              | 0.5-0.90                     | 91                      | 196   | 545   | 832   | 704                     | 426  | 40   |       | 1170  | 2002        |
|                              | 0.9-1.2                      |                         |       |       |       | 522                     | 185  | 56   |       | 763   | 763         |
|                              | TOTAL                        | 91                      | 196   | 545   | 832   | 1226                    | 611  | 96   |       | 1933  | 2765        |
|                              | GRAND TOTAL                  | 103                     | 256   | 1395  | 1754  | 1692                    | 676  | 110  | 5     | 2483  | 4237        |
| RESERVES >0.90m THICKNESS    |                              |                         |       |       |       |                         |      |      |       |       |             |
| 0.9-1.20                     | 345                          | 1470                    | 3887  | 5702  |       |                         |      |      |       | 5702  |             |
| 1.2-1.5                      | 418                          | 1797                    | 3848  | 6063  | 3073  | 885                     | 795  | 526  | 5279  | 11342 |             |
| 1.5-3.0                      |                              | 295                     | 7531  | 7826  | 8061  | 2700                    | 535  | 449  | 11745 | 19571 |             |
| 3.0-5.0                      |                              |                         | 339   | 339   | 966   | 444                     | 12   |      | 1422  | 1761  |             |
| TOTAL                        | 763                          | 3562                    | 15605 | 19930 | 12100 | 4029                    | 1342 | 975  | 18446 | 38376 |             |
| RESERVES 0.50-0.9m THICKNESS |                              |                         |       |       |       |                         |      |      |       |       |             |
| 0.5-0.90                     | 233                          | 881                     | 1980  | 3094  | 1936  | 1827                    | 772  | 25   | 4560  | 7654  |             |
| 0.9-1.20                     |                              |                         |       |       | 3757  | 1665                    | 1079 | 148  | 6649  | 6649  |             |
| TOTAL                        | 233                          | 881                     | 1980  | 3094  | 5693  | 3492                    | 1851 | 173  | 11209 | 14303 |             |
| GRAND TOTAL                  | 996                          | 4443                    | 17585 | 23024 | 17793 | 7521                    | 3193 | 1148 | 29655 | 52679 |             |

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#### 4.5 SUMMARY

Shahpur West Block is located in the western part of Sohagpur coalfield, falling under administrative control of Shahdol & Umaria districts, in Madhya Pradesh. M/s NMDC Ltd. was allocated this block for Captive Mining by Ministry of Coal, Government of India. The detailed exploration work was carried out by MECL as per MOU between NMDC Ltd. & MECL.

MECL commenced exploration in Shahpur West Block on 18.11.2008 and carried out exploration by drilling in an area of 5.875 Sq.km and concluded the physical work on 4.04.2009. A total of 10,107 m drilling was achieved in 59 boreholes (MSSW - 1 to 59). This report is prepared, based on 59 MECL boreholes and 5 old GSI boreholes (SSH-7, 17, 26, 29 & 30) involving 1387 m. of drilling.

This report embodies a total meterage of 11,494 m of drilling in 64 Bh's. The area is located in Survey of India toposheet No. 64 E/7 & E/8 bounded by Latitudes (N)  $23^{\circ}14'21''$  to  $23^{\circ}15'37''$  & Longitudes (E):  $81^{\circ}17'20''$  to  $81^{\circ}18'48''$ .

The entire area of the block is covered by Barren measures Formation. The topography of the block is slightly undulating and mostly covered by cultivated land and partially by protected forest in the north and southwestern part of the block.

The main objective of the detailed exploration in the block by MECL involves proving the existence & continuity of coal seams, its disposition, potentiality and assessment of grade wise proved coal reserves. This Geological report is prepared by using MINEX Software, in digital format and ore body modelling has been prepared.

A total of 403.95 m (56 BHs of MECL) of coal samples were analysed for band by band analysis and 219 Nos. of samples were analysed for seam overalls. The entire core of two boreholes (MSSW - 27 & 33) was sent for physico-mechanical tests to CIMFR, Dhanbad and they were not subjected to band by band analysis.

The exploration indicate that, structure of Shahpur West Block is simple over a major part of the block in the northern & central part of the block. In the southern strip, four faults have been deciphered. The general strike of the coal seams is NW - SE with very low NE dip which is in general  $1^{\circ}$  to  $2^{\circ}$ . Dolerite dyke is encountered in one borehole (MSSW-42) in the southeastern corner of the block and its linear outcrop is marked on the geological map.

The dyke configuration is based on limited data of mapping and dyke intersection in the borehole.

The detailed exploration in the block has revealed the existence of eight correlatable coal seams viz. IV, L2, IIIA, IIIB, IIIL, II, I & L1 within Barakar

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formation. Of these seams IV, L2, IIIA, II & L1 are the prominent seams contributing almost the entire coal reserves of the block.

The coal seams are high in moisture, non-coking type. Both superior & inferior grade coal occur in the block. Out of total reserves of 38.376 million tonnes in the block, grade wise reserves break up is as below. Reserves of 0.50m-0.90m and 0.90-1.20m seam thickness are also given separately in Table 4.14.

**TABLE 4.14**  
**GRADE WISE AVAILABILITY OF RESERVES**

| Grade                                      |   | Reserves in Million Tonnes<br>(% of total reserves) as per<br>UNFC Norms | Reserves in Million Tonnes<br>(% of total reserves)<br>Thickness < UNFC Norms |
|--------------------------------------------|---|--------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| Superior                                   | A | 0.763 (2%)                                                               | 0.233 (1%)                                                                    |
|                                            | B | 3.562 (9%)                                                               | 0.881 (6%)                                                                    |
|                                            | C | 15.605 (41%)                                                             | 1.980 (14%)                                                                   |
| Inferior                                   | D | 12.100 (32%)                                                             | 5.693 (40%)                                                                   |
|                                            | E | 4.029 (10%)                                                              | 3.492 (25%)                                                                   |
|                                            | F | 1.342 (3.5%)                                                             | 1.851 (13%)                                                                   |
|                                            | G | 0.975 (2.5%)                                                             | 0.173 (1%)                                                                    |
| <b>Total Reserves</b>                      |   | <b>38.376 (100%)</b>                                                     | <b>14.303 (100%)</b>                                                          |
| <b>Grand Total : 52.679 million tonnes</b> |   |                                                                          |                                                                               |

Out of the 59 boreholes drilled by MECL, 43 boreholes were geophysically logged involving meterage of 7397 m. Geophysical log supplemented the lithological information obtained by core drilling.

A total of 52.679 million tonnes of reserves in UG category is estimated in Shahpur West Block. Out of total reserves, 38.376 million tonnes are as per approved norms of UNFC, while 14.303 million tonnes are less thickness (0.50 to 1.20 m.) than approved by UNFC. The reserves for all seams in Shahpur West Block, depth wise are given in Table 4.15.

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**TABLE 4.15**  
**DEPTH WISE AVAILABILITY OF RESERVES**

| Depth              | Reserves in Million Tonnes<br>(% of total reserves) as per<br>UNFC Norms | Reserves in Million Tonnes<br>(% of total reserves)<br>Thickness < UNFC Norms |
|--------------------|--------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| < 50               | 4.872 (12.5%)                                                            | 1.091 (7.5%)                                                                  |
| 50 – 100           | 7.555 (19.5%)                                                            | 5.397 (38%)                                                                   |
| 100 – 150          | 24.063 (63%)                                                             | 4.986 (35%)                                                                   |
| 150 – 200          | 1.886 (5%)                                                               | 2.771 (19%)                                                                   |
| 200 – 250          | -                                                                        | 0.058 (0.50%)                                                                 |
| <b>Total</b>       | <b>38.376 (100%)</b>                                                     | <b>14.303 (100%)</b>                                                          |
| <b>Grand Total</b> |                                                                          | <b>: 52.679 million tonnes</b>                                                |

The reserves of Shahpur West Block are estimated as Proved Category as drilling has been carried out on 400 x 400 m & < 400 m grid interval. A small area of 0.316 sq km is covered by protected forest in the north and southern part of the block. This area is also grouped as proved reserved area as boreholes were taken up and completed in its periphery, and as such the forest cover within the block is patchy.

  
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## CHAPTER 5

## MINING

## 5.1 GEO-MINING PARAMETERS

The geological parameters of coal seams considered for reserve and mining (As per GR) are as follows:

|                                                                |   |           |
|----------------------------------------------------------------|---|-----------|
| Shahpur West Coal block area                                   | = | 587.5 Ha  |
| Total Net Geological reserve of the Coal Block                 | = | 52.679 MT |
| (-)Reserves not confirming to UNFC guidelines                  | = | 14.303 MT |
| Balance Net Geological reserve of the Coal Block               | = | 38.376 MT |
| Shahpur West Coal block Mineable Reserves with thickness >1.2m | = | 21.28 MT  |

|                                                                                                           |   |           |
|-----------------------------------------------------------------------------------------------------------|---|-----------|
| Extractable Reserves (Expected. 60% of Mineable Reserves+25% of blocked reserves under village & barrier) | = | 13.433 MT |
|-----------------------------------------------------------------------------------------------------------|---|-----------|

The Shahpur West Block consists of geological reserves of 52.679 MT. It includes 14.303MT of coal reserves, which do not confirm to UNFC guidelines. So, only 38.376 million tonnes of "Net Proved", in situ, underground geological reserves of non-coking coals have been estimated from seven seams viz. seam IV, L2, IIIA, IIIB, IIIL, II & L1 (Table 5.1).

**TABLE 5.1**  
**GRADE WISE AVAILABILITY OF RESERVES AT**  
**SHAHPUR WEST COAL BLOCK**

| Grade          |   | Reserves in Million Tonnes (% of total reserves) |
|----------------|---|--------------------------------------------------|
| Superior       | A | 0.763 (2%)                                       |
|                | B | 3.562 (9%)                                       |
|                | C | 15.605 (41%)                                     |
| Inferior       | D | 12.100 (32%)                                     |
|                | E | 4.029 (10%)                                      |
|                | F | 1.342 (3.5%)                                     |
|                | G | 0.975 (2.5%)                                     |
| Total Reserves |   | 38.376 (100%)                                    |

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Only the seam IV, L2, III A and II are developed for consideration of mining. The other coal horizons are very thin and in patchy formation so the reserves of these seams are not considered for mining. The mining is considered for seam thickness of more than 1.2m in these four seams only. The details of these mineable reserves are as under:

**TABLE 5.2**  
**THICKNESS WISE MINEABLE RESERVES AT SHAHPUR WEST COAL BLOCK**

| Seam         | Total Geological Reserves (MT) | Geological Reserves <1.2M Thickness (MT) | Geological Reserves >1.2M Thickness (MT) | Net Geological Reserves for Mining (MT) |
|--------------|--------------------------------|------------------------------------------|------------------------------------------|-----------------------------------------|
| IV           | 8.01                           | 4.19                                     | 3.83                                     | 3.83                                    |
| L2           | 9.49                           | 5.02                                     | 4.48                                     | 4.48                                    |
| IIIA         | 9.21                           | 5.11                                     | 4.10                                     | 4.10                                    |
| IIIB         | 2.74                           | 1.97                                     | 0.77                                     | 0.00                                    |
| IIIL         | 0.41                           | 0.37                                     | 0.05                                     | 0.00                                    |
| II           | 18.58                          | 0.21                                     | 18.37                                    | 18.37                                   |
| L1           | 4.24                           | 3.15                                     | 1.08                                     | 0.00                                    |
| <b>TOTAL</b> | <b>52.68</b>                   | <b>20.01</b>                             | <b>32.67</b>                             | <b>30.77</b>                            |

The thickness wise and grade wise details of above available coal reserves for mining in these seams are as under:

**TABLE 5.2A**  
**THICKNESS WISE AND GRADE WISE COAL AVAILABLE FOR MINING IN SHAHPUR WEST COAL BLOCK**

,000 metric tonnes

| Seam               | Thickness    | Superior Grade Reserves |             |              |              | Inferior Grade Reserves |             |             |            |              | Grand total  |
|--------------------|--------------|-------------------------|-------------|--------------|--------------|-------------------------|-------------|-------------|------------|--------------|--------------|
|                    |              | A                       | B           | C            | Total        | D                       | E           | F           | G          | Total        |              |
| IV                 | 1.2-1.5      | 410                     | 1609        | 1421         | 3440         | 134                     |             |             |            | 134          | 3574         |
|                    | 1.5-3.0      |                         | 94          | 126          | 220          | 33                      |             |             |            | 33           | 253          |
|                    | <b>TOTAL</b> | <b>410</b>              | <b>1703</b> | <b>1547</b>  | <b>3660</b>  | <b>167</b>              |             |             |            | <b>167</b>   | <b>3827</b>  |
| L2                 | 1.2-1.5      |                         | 45          | 1187         | 1232         | 1283                    | 95          |             |            | 1378         | 2610         |
|                    | 1.5-3.0      |                         | 78          | 1366         | 1444         | 399                     | 23          |             |            | 422          | 1866         |
|                    | <b>TOTAL</b> |                         | <b>123</b>  | <b>2553</b>  | <b>2676</b>  | <b>1682</b>             | <b>118</b>  |             |            | <b>1800</b>  | <b>4476</b>  |
| III A              | 1.2-1.5      |                         | 11          | 312          | 323          | 759                     | 546         | 723         | 289        | 2317         | 2640         |
|                    | 1.5-3.0      |                         |             | 284          | 284          | 155                     | 124         | 518         | 374        | 1171         | 1455         |
|                    | 3.0-5.0      |                         |             |              |              |                         |             |             |            |              |              |
|                    | <b>TOTAL</b> |                         | <b>11</b>   | <b>596</b>   | <b>607</b>   | <b>914</b>              | <b>670</b>  | <b>1241</b> | <b>663</b> | <b>3488</b>  | <b>4095</b>  |
| II                 | 1.2-1.5      | 8                       | 75          | 361          | 444          | 282                     | 136         | 14          |            | 432          | 876          |
|                    | 1.5-3.0      |                         | 80          | 5704         | 5784         | 7395                    | 2546        | 10          |            | 9951         | 15735        |
|                    | 3.0-5.0      |                         |             | 339          | 339          | 966                     | 444         | 12          |            | 1422         | 1761         |
|                    | <b>TOTAL</b> | <b>8</b>                | <b>155</b>  | <b>6404</b>  | <b>6567</b>  | <b>8643</b>             | <b>3126</b> | <b>36</b>   |            | <b>11805</b> | <b>18372</b> |
| <b>GRAND TOTAL</b> |              | <b>418</b>              | <b>1992</b> | <b>11100</b> | <b>13510</b> | <b>11406</b>            | <b>3914</b> | <b>1277</b> | <b>663</b> | <b>17260</b> | <b>30770</b> |

The above geological reserves of more than 1.2m thickness are partly blocked due to surface and underground restrictions. These are further analysed and calculated for seamwise mineable reserves excluding blocked reserve in Shahpur west as under:

**TABLE 5.3**  
**SEAMWISE MINEABLE RESERVES EXCLUDING BLOCKED RESERVE**  
**IN SHAHPUR WEST**

| Seam         | Net Geological Reserves >1.2M Thickness | Safety Barrier (7.5 m) | Road Barrier (45 m) | River & Safety Barrier (15 m) | Village & Barrier (50 m) | Fault Safety Barrier (25M ) | Reserve Blocked in Barrier | Reserve Blocked in Not Workable Patches | Total blocked reserves | Mineable Reserve >1.2M Thickness |
|--------------|-----------------------------------------|------------------------|---------------------|-------------------------------|--------------------------|-----------------------------|----------------------------|-----------------------------------------|------------------------|----------------------------------|
| IV           | 3.83                                    | 0.03                   | 0.29                | 0.08                          | 0.40                     | 0.00                        | 0.81                       | 0.38                                    | 1.19                   | 2.64                             |
| L2           | 4.48                                    | 0.02                   | 0.21                | 0.05                          | 0.36                     | 0.03                        | 0.66                       | 1.38                                    | 2.04                   | 2.44                             |
| III-A        | 4.10                                    | 0.03                   | 0.13                | 0.09                          | 0.01                     | 0.00                        | 0.26                       | 1.63                                    | 1.89                   | 2.20                             |
| II           | 18.37                                   | 0.20                   | 0.73                | 0.71                          | 2.29                     | 0.36                        | 4.29                       | 0.09                                    | 4.38                   | 14.00                            |
| <b>Total</b> | <b>30.77</b>                            | <b>0.29</b>            | <b>1.34</b>         | <b>0.93</b>                   | <b>3.06</b>              | <b>0.39</b>                 | <b>6.02</b>                | <b>3.47</b>                             | <b>9.49</b>            | <b>21.28</b>                     |

## 5.2 OPTIONS FOR MAKING OVERALL BROAD STRATEGY FOR EXPLOITING THE BLOCK

There are altogether 8 co-relatable coal horizons, viz. seams IV, L<sub>2</sub>, IIIA, IIIB, IIIL, II, I and L<sub>1</sub> and one to two thin bands in Block. The seams viz. IV, L<sub>2</sub>, IIIA and II are thick whereas the seams L<sub>1</sub> and I are thin seams. The reserves are considered for mining for the thick 4 Nos. of seams only. There are certain problems in deciding the option for mining the number of seams and their depths of mining. The following main parameters are considered for deciding the broad mining strategy at Shahpur West coal Block:

- 91% of Geological reserves are available within 150m depth in Shahpur West block.
- The entire area of the block extending over 5.875 sq km, is mainly covered by agriculture land.
- The block is virgin and it is rectangular in shape.
- The structure of the block is simple. The general strike of the coal seams is NW-SE with dip of 1° to 2° south easterly. Though there are four numbers of faults with different magnitude of throw but all these are at close to southern boundary of the block.
- The seam II is the most potential seam for mining.
- OB: Coal ratio for various seams and its economic viability. The minimum coal : overburden is high and as such there is no area which is considered suitable for open cast mining.

  
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The lay and disposition of Seams is suitable for underground mining.

### **Under ground mining**

As a result of close scrutiny, it has been found that all the above mentioned four seams (IV, L<sub>2</sub>, IIIA & II) are viable for working through underground

mining due to various reasons (quality of coal varying from C to E, patchy thickness of seam IV, L2, IIIA, IIIB and IIIL, high OB:Coal ratio etc.). These seams can be approached by driving inclines in stone.

The underground mining will be carried out by one pair of inclines from surface along with one separate ventilation shaft for return of exhaust air for all the four seams.

### 5.3 MODE OF MINE ENTRY

Following considerations have been given while locating the main entry to the proposed mine.

1. The entry to be central, allowing access to both extremities and the majority of the reserves almost at equal distance on either side of the main entry.
2. The main entry should serve for the whole mine, if possible and support evacuation of the total extractable coal reserve on a long term economically.
3. The existing surface features should make it feasible to acquire land over adequate area for locating the basic infrastructure at the main mine entry.
4. The location of the Mine entry should facilitate maximum percentage extraction of the coal reserve and ensure minimum sterilization of coal to be left in barriers for protection of existing surface structures.
5. The location of the Mine entry should take advantage of existing infrastructure facilities like highways, power lines, drainage, roads, availability of water, industrial development in the neighborhood etc. to make operational costs optimum.
6. The coal transportation should be economical and take advantage of the existing infrastructure

The block includes multiple seams. The selection of main entry needs to take into consideration accessibility to various coal seams for mining to ensure highest overall percentage of extraction.

8. The adequacy of ventilation from single intake and return for all seams.

In view of the fact that the coal reserves are quite shallow in Shahpur West Coal Block, access to the coal reserve is considered by inclines only in the centre of the block. Also the orientation of the block is rectangular extends almost equal on either side of the centre of the block. It is therefore considered prudent to take advantage of this orientation and shape of the block and locate the main entries in the central region of the property.

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The underground mining will be carried out by one pair of inclines from surface named as Incline No.1 and No.2. These Inclines will be driven with height of 2.5 meters and width of 4.5 meters having gradient of 1 in 4. The mouths of inclines are located near borehole No. 39 at Surface RL 489 and are aligned towards borehole No.14. The Incline will reach the floor of seam IV at 451.25 m FRL and will have a length of 151 Meters in stone. We can approach the seam IV by driving Inclines @35m per month with the current technologies available in mining field. The development starts in this seam as soon as it is joined with the inclines. Most of the reserves in this seam are between thickness range of 1.2m to 1.5m. Hence the coal of Seam-IV is mineable as thin seam mining. Accordingly, this seam has been considered for exploitation by low height equipments in this Mining Plan. Vertical ventilation shaft of 5m diameter will be driven separately for exhaust of return air from all the seams with a monthly progress of 10m. The length of ventilation shaft will be 42.5m from surface up to seam IV.

These main inclines will continue straight towards seam L2 and touch the bottom of seam L2 at FRL 399.25m keeping the same gradient for a length of 208 meters from floor of seam IV. The seam L2 will also be connected to seam IV by vertical ventilation shaft (length 48m) to seam IV for keeping the single exhaust for all seams.

The same Inclines will continue up to the floor RL of 358.75m of seam II crossing the seam IIIA at FRL 383.75 m and a length of 62 meters from seam L2 to seam IIIA. The length of Inclines from seam IIIA to seam II will be 100 meters. Both these seams will be also connected to ventilation shaft with a length of 18.5m from seam IIIA to L2 and 21.0m from seam II to IIIA.

## 5.4 RESERVES AND SELECTION OF MINING METHOD

### i. Reserves for under ground mining

This mining plan is prepared for a thickness range of more than 1.2 meters as typical mining practice for thin seam of less than 1.2m is not popular in India due to heavy cost parameters involved for current available technologies and grade of available coal. So the following base line reserves are considered at Shahpur West block for mining in seams IV, L2, IIIA and II.

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TABLE 5.4  
SUMMARY OF EXTRACTABLE RESERVES AT SHAHPUR WEST COAL BLOCK (MT)

| Seam  | Net Geological Reserves >1.2M Thickness | Total Blocked Reserves | Mineable Reserve >1.2M Thickness | Extractable Reserves (60% of Mineable Reserves) | Overall Extractable Reserves |             |
|-------|-----------------------------------------|------------------------|----------------------------------|-------------------------------------------------|------------------------------|-------------|
|       |                                         |                        |                                  |                                                 | Development                  | Depillaring |
| IV    | 3.827                                   | 1.185                  | 2.642                            | 1.585                                           | 0.396                        | 1.189       |
| L2    | 4.475                                   | 2.037                  | 2.438                            | 1.463                                           | 0.366                        | 1.097       |
| III-A | 4.095                                   | 1.891                  | 2.204                            | 1.322                                           | 0.331                        | 0.992       |
| II    | 18.372                                  | 4.376                  | 13.996                           | 8.397                                           | 2.099                        | 6.298       |
| Total | 30.770                                  | 9.491                  | 21.279                           | 12.768                                          | 3.192                        | 9.576       |

The mining is also proposed under the villages and their barriers beyond a minimum surface cover of 90m. The coal will be extracted through development only and no depillaring is proposed in this area. The percentage extraction will be limited up to maximum 25% and quantity of coal available from under villages and barriers by development is given in Table 5.4A. No development work is proposed for depth shallower than 90m of solid surface cover under this constraint. No subsidence is anticipated under the villages under such circumstances. However a subsidence study is being prepared and compliance to its recommendations will be done. A small quantity of 12000 te of coal of seam IV will be blocked under proposed approach captive road for transport of coal from pit head to out side the block. The quantity being negligible, has not been considered for accounting.

**TABLE 5.4A**  
**EXTRACTABLE COAL FROM BLOCKED RESERVES UNDER VILLAGE/**  
**BARRIER BY DEVELOPMENT ONLY BEYOND 90M SURFACE COVER (MT)**

| Seam         | Reserves blocked under village and barrier (50m) | Reserves under less than 90m surface cover | Net mineable reserves under more than 90m surface cover | Coal quantity extractable only through development |
|--------------|--------------------------------------------------|--------------------------------------------|---------------------------------------------------------|----------------------------------------------------|
| 1            | 2                                                | 3                                          | 4=2-3                                                   | 5=25% of 4                                         |
| IV           | 0.40                                             | 0.40                                       | 0.00                                                    | 0.00                                               |
| L2           | 0.36                                             | 0.00                                       | 0.36                                                    | 0.09                                               |
| III-A        | 0.01                                             | 0.00                                       | 0.01                                                    | 0.00                                               |
| II           | 2.29                                             | 0.00                                       | 2.29                                                    | 0.57                                               |
| <b>Total</b> | <b>3.06</b>                                      | <b>0.40</b>                                | <b>2.66</b>                                             | <b>0.67</b>                                        |

Thus the following quantity of coal will be received from the development and depillaring from the Shahpur west coal block:

**TABLE 5.4B**  
**OVERALL EXTRACTABLE RESERVES IN SHAHPUR WEST (MT)**

| Extractable Reserves from constraints free area for mining |              | Extractable reserves from the blocked reserves under the village and barrier |              | Overall extractable reserves from Shahpur West Coal Block |              | Total extractable reserves |
|------------------------------------------------------------|--------------|------------------------------------------------------------------------------|--------------|-----------------------------------------------------------|--------------|----------------------------|
| Development                                                | Depillaring  | Development                                                                  | Depillaring  | Development                                               | Depillaring  |                            |
| 0.396                                                      | 1.189        | 0.000                                                                        | 0.000        | 0.396                                                     | 1.189        | 1.585                      |
| 0.366                                                      | 1.097        | 0.090                                                                        | 0.000        | 0.456                                                     | 1.097        | 1.553                      |
| 0.331                                                      | 0.992        | 0.003                                                                        | 0.000        | 0.334                                                     | 0.992        | 1.326                      |
| 2.099                                                      | 6.298        | 0.573                                                                        | 0.000        | 2.672                                                     | 6.298        | 8.970                      |
| <b>3.192</b>                                               | <b>9.576</b> | <b>0.665</b>                                                                 | <b>0.000</b> | <b>3.857</b>                                              | <b>9.576</b> | <b>13.433</b>              |

**ii. Selection of underground mining technology**

The above details of mineable reserves compel to extract the seams through systematic underground mining method. There are two primary methods of underground mining viz. Longwall and Bord & Pillar or Room & Pillar. Both the methods of mining are being practiced in India. The selection of the most suitable method of mining for Shahpur West Coal

Block is to be considered under the prevailing parameters, summarized below:

- a) The depth range of occurrence of the coal Seams in Shahpur West Coal Block is 50m to 150m.
- b) Some of the reserves are blocked against the provision of safety pillars for surface features.
- c) A good quality coal reserves are available in all the seams with prominent grade range from D to E.
- d) The structure of the block is simple. Only three faults appear in the south and south west part of the block.
- e) No historically important structure or monuments exists in and around the coal block.
- f) Underground mining in Indian working system generally operates in coal thickness up to 1.8m and whereas in some mines up to 1.5m also. In view of the available latest technologies, the working thickness considered for the coal seams vary from 1.2m to 4.5m in Shahpur West Coal Block.
- g) The gradient of the coal Seams vary from 1 in 2 degree. Thus the seams are almost flat.

Based on the above, the following mining techniques may be used for extraction of coal through underground method.

#### 5.4.1 Longwall method

  
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This method is applicable to deposits having following types of parameters:

- A globally recognized mining method with very high potential production rates up to 1 million tones per month (in China – with Western equipment).
- Some Seams can only be extracted by longwall method and most suitable for depths exceeding 450 m
- High capital cost
- High risk
- Equipment is designed site specific and for a set of seam parameters and as such cannot be adopted easily for a different site.
- Very dependant upon excellent geological condition and mine infrastructure

- Sophisticated system requiring strong management techniques and discipline
- Requires very strict operator discipline
- Not very successful in Indian applications in the past due mainly to unsuitable geological conditions.

Longwall technology is not fit for the mining parameters prevailing at Shahpur West Block considering depth range of the coal Seams is only 50 to 150m. Other geo-mining conditions, particularly geology of seam II are favorable for application of longwall technology. But the required production level of 0.60 MTPA and available total reserve of the seam is not favorable. As such longwall technology is not proposed for Shahpur West Coal block.

#### 5.4.2 Bord & pillar / room & pillar technology

- Globally recognized method of mining and practiced in India over 200 year
- Mechanized Bord & Pillar method is highly productive mining method.
- Very flexible system and can be designed and adopted in faulted coal Seams or working below surface features.
- Easier managed than longwall
- Much lower capital cost than longwall
- Low cost production / competitive with longwall
- Pillar extraction possible
- Very suited to Shahpur West Block geological conditions

Accordingly Bord & Pilar (B&P) or Room & Pillar (R&P) Methods are only proposed for Shahpur West Coal Block.

Because of the prevailing mining parameters, mainly arising out of flat seam geology, need for economic exploitation of the multiple seams with maximum percentage of extraction, optimum production and productivity, both the "Fully mechanized" and "Semi Mechanized B&P Method with application of blasting with explosives and LHD" has been proposed. The positive points are discussed below:

- Universal acceptance of the technology
- Higher percentage of extraction both in first extraction and final extraction is achievable
- Pillar extraction achieved successfully
- Production levels being maintained till the life of the machine by involving manufactures in maintenance of the equipment
- Huge potential to improve performance

  
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- Dispensation from DGMS have been available in India for developing coal seams with gallery widths up to 6.5m and heights up to 4.5m where mining conditions permit, thus allowing much higher percentage of extraction in first extraction which is particularly advantageous in developing coal seams-below surface features like villages provided adequate long term factor of safety is maintained.

The coal with semi-mechanized B&P method will be won by deploying low height LHD's and SDLs for loading on to chain conveyors or ponny belt conveyors and belt conveyors providing gate and trunk transport. The coal will be blasted off solid with permitted explosives. The development will be carried out in 5 to 6 heading panels in maximum 2.5m height or the seam thickness and 4.8m wide headings. However it is to ensure that where the man usually walk, the height of the gallery will not be less than 1.8 m. This height will be maintained by floor dinting for a complete pillar length in one round, as the roof of the coal seam is sandstone and the floor consists shale at few places. The blasted rock will be loaded in the tubs and dispatched to surface by rope haulage system.

The fully mechanized panel will be deployed with a set of Continuous Miner along with accessories. It will cut the coal and load in the shuttle cars. These shuttle cars will unload the coal in the breaker for loading on to chain conveyors or ponny belt conveyors and belt conveyors providing gate and trunk transport.

The maximum depth of workings in the seams will be as under:

**TABLE 5.5**  
**SEAM WISE MAXIMUM DEPTH OF WORKINGS AT SHAHPUR WEST**  
**COAL BLOCK OF NMDC LTD.**

| Seam  | Deepest RL (M) | Shallowest RL (M) | Location of         |                                      | Surface RL at Deepest Location (m) | Maximum Depth of Working in the Seam (m) |
|-------|----------------|-------------------|---------------------|--------------------------------------|------------------------------------|------------------------------------------|
|       |                |                   | Deepest Point       | Shallowest Point                     |                                    |                                          |
| IV    | 425            | 459               | Near BH No. MSSW 5  | North BH No. MSSW 25 & 58            | 484                                | 59                                       |
| L2    | 390            | 406               | Near BH No. MSSW 3  | Between BH No. MSSW 36 & 39          | 485                                | 95                                       |
| III A | 349            | 388               | Near BH No. MSSW 37 | Near BH No. MSSW 26                  | 478                                | 129                                      |
| II    | 334            | 387               | NEAR BH No. MSSW 37 | West of BH No. MSSW 23 Near Boundary | 478                                | 144                                      |

The maximum of workings in all the seams are under a surface cover of 50m to 150m. So, the pillar size is allowed up to 21.0m from center to center for all the seams with gallery width of 4.8m as per statute vide Regulation No. 99 of CMR 1957 reproduced in Table 5.6. But the pillar size will be kept 34.5m for longer stability and fast development of all the seams as depillaring is proposed after completion of development in the respective seams. This will be beneficial for caving pattern in less surface cover.

**TABLE 5.6**  
**PILLARS SIZES IN RESPECT OF SURFACE COVER (SQUIRE IN SHAPE)**

| Depth of seam from surface                 | Where the width of the galleries does not exceed 3.0 metres             | Where the width of the galleries does not exceed 3.6 metres | Where the width of the galleries does not exceed 4.2 metres | Where the width of the galleries does not exceed 4.8 metres |
|--------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------|
|                                            | The distance between centres of adjacent pillars shall not be less than |                                                             |                                                             |                                                             |
| 1                                          | 2                                                                       | 3                                                           | 4                                                           | 5                                                           |
|                                            | Metres                                                                  | Metres                                                      | Metres                                                      | Metres                                                      |
| Not exceeding 60 metres                    | 12.0                                                                    | 15.0                                                        | 18.0                                                        | 19.5                                                        |
| Exceeding 60 but not exceeding 90 metres   | 13.5                                                                    | 16.5                                                        | 19.5                                                        | 21.0                                                        |
| Exceeding 90 but not exceeding 150 metres  | 16.5                                                                    | 19.5                                                        | 22.5                                                        | 25.5                                                        |
| Exceeding 150 but not exceeding 240 metres | 22.5                                                                    | 25.5                                                        | 30.5                                                        | 34.5                                                        |
| Exceeding 240 but not exceeding 360 metres | 28.5                                                                    | 34.5                                                        | 39.0                                                        | 45.0                                                        |
| Exceeding 360 metres                       | 39.0                                                                    | 42                                                          | 45                                                          | 48.0                                                        |

The semi mechanized panels shall be laid down on apparent gradient for self draining. Development will be carried out by using a set of two LHD's or SDLs in one panel thus having a production capacity of 1000 TPD or 0.30 MTPA from five such panels. The four heading dip drives will be developed with Continuous Miner for faster progress. A fully mechanized panel developed with Continuous Miner will also give annual production @ 0.30MTPA i.e., 1000TPD. (Refer Plate XIII and XIV)

#### 5.4.2.1 Support for Semimechanised Method

In the semi-mechanized R&P technology area all the supports will be carried out with full column resin/cement grouted roof bolts installed by roof bolter machine. The grouting will be carried out with resin roof bolts or cement capsules. In addition conventional supports like props, bars, wooden chocks etc will be used.

The scientific studies will need to be carried out to assess the support requirement and design by measurement the pattern of roof bolting and their specifications. During both development and depillaring monitoring of effectiveness of supports will have to be carried out by actual measurements.

#### 5.4.2.2 Operating Methods for De-pillaring

The depillaring is proposed primarily through Continuous Miner.

### 5.4.2.3 Mechanized Continuous Miner Technology–Development & Depillaring

#### Application of Room and Pillar Mining in India

Indian coal mines have a long history of successfully applying Room & Pillar mining methods. Until recently labour intensive manual loading methods were universally applied. Mechanization to improve productivity by the application of "Side Dump Loaders" (SDL), Load Haul Dump (LHD) and now Continuous Miner (CM) has been successful and is being widely practiced in the CIL mines.

A mechanized room and pillar mining culture therefore already exists. The Indian coal mining industry has also introduced with limited success fully mechanised longwall mining.

The mechanization program is now aimed to increase the tonnage produced from each district with minimum capital expenditure with the obvious resultant saving in new mine development cost, utilization of developed coal standing in pillars and a further improvement in productivity.

The district layout to introduce one fully mechanized room and pillar mining district may use a combination of 5 heading pillar development and pillar extraction using Continuous Miners and ancillary equipment.

#### Typical Face Equipment

Typically the face will be equipped with the following:

- One of suitable "Continuous Miner" equipped with radio/umbilical core remote control, dust scrubber and methane monitor approved by the Director General of Mine Safety (DGMS) for use in Indian Coal Mines. The Continuous Miner cuts and loads the coal in a single operation.
- Two approved "Shuttle Cars", one left and one right hand including service jacks and side boards. The shuttle cars transport the cut coal from the Continuous Miner loading conveyor to the feeder breaker.
- One "Twin Roof bolter" track mounted mobile roofbolting machine with two roof drilling rigs, equipped with a "Temporary-Roof-Support"(TRS) system and set up for wet drilling operations.
- One electric cable reel "Load-Haul-Dump" (LHD) machine to be dedicated to the face operation is a multi-purpose vehicle and is essential for the efficient of the district by maintaining the panel floor to the high standard required to sustain high performance. Other uses include but are not restricted to cleaning up spillages in the district from the shuttle cars, to assist with transport for materials to site (from the end of the haulage), to spread stone dust, to lift items and assist with the repair of equipment during break downs and to carry spare parts from

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the haulage to the equipment. This vehicle is also used to carry out electrical move ups of the load centre/transformer complex.

- One "Feeder/Breaker" mounted on tracks to size and feed the tipped coal from the shuttle car on to the conveyor at a consistent controlled rate. The feeder/breaker has a hopper sufficient to hold a complete shuttle car load. The shuttle car is capable of tipping at two speeds. With a feeder/breaker in the system the shuttle car can tip at high speed into the hopper, the feeder/breaker (or with just a breaker plate) then sizes the coal (possibly to 150mm) and feeds the conveyor at a controlled even rate thus preventing belt damage, maximizing conveyor capacity and allowing the shuttle car to travel back to the Continuous Miner for loading in the shortest time possible.
- Complete set of special maintenance tools with secure storage box.
- Hand tools, shovels, picks, brushes, pinch bars for scaling roof and an assortment of pulling, jacks and lifting tools.

### **Typical Development Mining Method**

#### **Strike Development**

It is proposed that the "strike" or "near strike" development and bulk tonnage producing areas be mined by Continuous Miners and ancillary equipment where the face equipment is, installed, maintained and operated by the Contractor as described above. The standard layout consists of a five road development, with the main conveyor and feeder breaker positioned in the Central roadway {Plate No. XIV (FIG 1)}

#### **Place Changing**

Place changing is where the Continuous Miner cuts for a specific distance beyond the last row of support (up to a maximum 15m called a "Place") using radio remote control of the Continuous Miner. The workforce at all times operates under supported roof. A lesser distance may be advanced depending on DGMS approvals. The time to cut a place is largely dependant upon the efficiency of shuttle car operation (wheeling"). Once a "Place" is cut the Continuous Miner is trammed to an adjacent heading to commence the cutting cycle over again. A roof bolting machine then supports the area mined by the Continuous Miner as a separate operation then the roadway is cleaned by LHD and ventilation extended in preparation for the Continuous Miner returning. The machines, therefore, operate independently and hence with greater flexibility for both cutting and roofbolting operations.

The work of the LHD is to maintain the floor clean and clear. The quality of floor is one of the keys to success in place changing. A clean and well maintained floor provides a safer working environment, enables shuttle cars to operate at fast speeds, lessens the potential for cable damage and allows for unhindered Continuous Miner and bolter relocations.

### Mining Geometry

The Continuous Miner typically have a cutting head 3.3m to 3.5m wide. The machine is usually "sumped in" between 0.5m and 0.75m at roof level, the rear stab jack on the machine lowered and the head sheared down to floor level. This cycle is repeated 3 to 4 times, the roof and floor trimmed and the operation repeated.

**"Bord Width"**- Indian Coal Mines Regulations restrict "bord", "room" or "roadway" width to a maximum of 4.8m. The Continuous Miner and all ancillary equipment proposed by JOY is able to operate at this dimension however productivity and safety around moving equipment is greatly enhanced with wider roads.

### Mining Height

Indian Coal Mines Regulations restrict the mining height during development to 3m. Therefore the mining height should be restricted by the operating range of the equipment or the thickness of the seam. It is good practice to mine and support as one phase.

The impact on strata control of working at increased height will be assessed by the scientific consultant and the contractor envisages that the DGMS will be approached for exemption to permit the mining height during the development phases be restricted by the operating range of the equipment or seam height whichever ever the lesser. DGMS is currently giving permission to mine upto 4.6m height with continuous miner.

### Pillar Dimensions

Indian Coal Mines Regulations define pillar dimensions in terms of depth of workings and bord width. In the case where the bord width is 4.8m the distance between the centres of any two adjacent pillars shall not be less than:

| Depth                                 | Centres |
|---------------------------------------|---------|
| Not exceeding 60m                     | 19.5m   |
| Exceeding 60m but not exceeding 90m   | 21.0m   |
| Exceeding 90m but not exceeding 150m  | 24.5m   |
| Exceeding 150m but not exceeding 240m | 34.5m   |
| Exceeding 240m but not exceeding 360m | 45.0m   |
| Exceeding 360m                        | 48.0m   |

It is likely that the Continuous Miner will be operating at depths around 50 to 150m. The pillar sizes, under current Indian regulations should therefore be 21.0m to 34.5m (centre to centre) with 4.8m bord width to comply with the Indian Coal Mines Regulations. However the pillar size for this block is recommended to be kept 34.5m for longer stability and fast development of all the seams as depillaring is proposed after completion of development in

the respective seams. This will be beneficial for caving pattern in less surface cover. Scientific studies and practices to date in India indicate that the legislated design criteria are very conservative. These pillar dimensions are considered excessive for the desired Factor of Safety and the contractor envisages that application will be made to DGMS to reduce the pillar dimensions in order to increase the productivity of the purposed system. Optimization of the bord width, mining height and pillar sizing may be carried out by calculating and using safety factors from established formulae.

### **Typical method of support**

A typical support system consists of 4 X 1.8m full column resin grouted roofbolts, the roofbolts being installed and tensioned by the roofbolter. It is anticipated that with bord widths exceeding 4.8m an additional bolt would be required.

Pillar extraction generates additional roof stresses and the additional support applied before bed separation can take place, during the development phases, would be beneficial in the long term.

It is necessary that Coal Company retain the responsibility for the management the legal aspects of the mine. It is therefore the responsibility of Coal Company to ensure that any support system suggested by the contractor is adequate and approved by the DGMS.

### **Typical Pillar Extraction Methods**

Pillar removal plans are an important part of the Continuous Miner operations and must be full considered prior to the mining of the advancing panel. There are many different methods of pillar removal and these must be assessed to determine the most appropriate to suit the conditions at the mine. This requires full assessment of the mining height, depth, roof strata, floor strata, immediate roof and floor properties, rib stability, pillar size and roadway width. All Continuous Miners supplied to India have radio remote control operation ensuring that the operators are always standing in a place of safety under fully supported ground, some 15 to 30 meters behind the working face. The Mine Managers safety and mining rules should specify where the operators must position themselves.

The size of pillar and the roadway width depends on the depth and geological conditions, as well as the proposed method of de-pillaring. The safety factors, method of operation and layout of de-pillaring have a marked effect on the choice of roadway width and pillar size on development.

Knowledge of the composition of the overburden is important in deciding whether to carry out retreat mining. This affects pillar dimensions, roof control plans and selection of the technique. The overburden should be strong enough, given the pillar sizes and temporary support, to allow the development work to be carried out safely, yet weak enough to fall at the

proper time during retreat. If this is not the case, then variations to the pillaring plan, such as increasing or decreasing pillar dimensions or utilizing a different sequence of cuts must be employed.

The composition of the floor under the coal is another important consideration. The floor is often weaker than the roof and if mixed with water can create mud and poor mining conditions. Plastic flow of the floor can cause instability in the pillars. A full geological survey and interpretation of the conditions is necessary to establish the pillar sizing, roadway width and retreat mining sequence of extraction.

The seam gradient is another factor that requires careful consideration, with slight grades affecting haulage effort and time for operations, which in turn affects the productivity. Also the gradient may have an effect on the shape of the pillars and layout and direction of the panel with main working along the line of strike and cross cuts angled to reduce the angle of apparent dip.

There are many different methods of pillar removal and these must be assessed to determine the most appropriate to suit the conditions at the mine. Typical layouts for Depillaring are shown in figures 2, 3 and 4 in Plate No. XIV.

### ***Operating Methods for De-pillaring***

The standard operating method in India is to fully develop the panel, with typically 5 to 6 entries on advance, to the panel boundary. At the boundary, the panel may be connected to other 'bleeder' ventilation roadways depending on the mine layout. Height of development and extraction is usually the full seam section or 3.4m (the maximum extraction height of the Continuous Miner in operation).

During retreat from the panel, the pillars are split (either a single split as in Fig 2 or two splits as in fig 3 (Plate NO.XIV), depending on panel size and caving conditions) and extracted on their side or at angles to take the ribs in an arranged and safe extraction method. Extra roofbolting is used at the edges of the pillars to provide an effective 'breaker line' and ensure that after the extraction sequence is complete the roof collapses in a controlled manner up to the roof bolt breaker line.

In poor ground conditions, different methods of pillar extraction or partial pillar extraction such as the Nevid method, as in fig 4 (Plate No. XIV), may be more appropriate. This method has been extensively used in South Africa and allows a series of cuts into the pillar sides in a sequential manner ensuring minimum tramming distances for the Continuous Miner and improved safety for the operator. Depending upon the depth and width of the cuts, the central core of the pillar is also kept intact, resulting in a higher factor of safety and better control of caving in areas of weak roof.

During retreat mining/pillar removal the aim is to keep active working places (where the Continuous Miner is operating) away from the caved areas. Also

the length of time that openings are maintained must be kept to a minimum and workplaces should be concentrated in a limited area.

The infrastructure, conveyors, material transport system, power, water, pumping and ventilation are in place from the development phase.

The same equipment is required for pillar extraction as for development.

Pillar extraction techniques may follow the traditional 45° "stopping" line, or the preferred straight line method employed with Continuous Miners.

Two pillars are mined simultaneously using either system.

The disadvantage of the traditional "45° System" with FULLY mechanized equipment is the creation of excessive tramming distances which effectively restricts production.

The protection afforded by the 45° line was originally developed for a hand loading scenario due to the long time period the pillar had to stand whilst being extracted and the number of working places required by the cyclic, drill, blast and hand load method.

The straight line method reduces both tramming distances and cable lengths to a minimum whilst optimizing tramming routes.

### **Percentage extraction**

The "IN PANEL" extraction is estimated with both the 45° and straight line methods as shown above to typically be 80% by area, this may increase by "robbing snooks" (pillar remnants) whilst retreating from the pillar.

### **Conveyor**

A 1000mm "fire resistant" conveyor at around 3m/s with a duty equivalent to average 500 tonnes per hour (tph) should be installed in the centre roadway to ensure equal tramming distances and cable lengths on each side of the loading point. Peaks of 750 tph are expected.

The conveyor should be equipped with a look take-up at least of sufficient capacity to hold belt stretch for one week and preferably to hold one roll (usually 300m) of conveyor belting for extension and retreat of the conveyor.

At the inbye end of the conveyor, a sledge mounted and guarded return pulley frame, graduated loading section (at least 3m in length) equipped with impact rollers, and anchor chains should be provided.

The "head" end of the conveyor should be equipped with a suitable loading section on to the trunk conveyor, dust suppression equipment, belt alignment, belt slack and belt slip detectors. The "gate" belt should be

electrically interlocked with the "trunk" conveyor to automatically stop the gate belt should the trunk belt stop.

Communication and continuous signaling and "stop pulls" should be provided along the length of the conveyor. The conveyor should also be provided with an effective bottom belt scrapper.

One side of the conveyor should be designated as the "man walkway" into the district. To prevent "Tripping and Falling" accidents, this walkway should be kept clear of any supplies, materials, be clean, level and well illuminated.

District materials should not as far as possible be transported along the conveyor belt route.

### **Material Transport**

Materials such as timber, roof bolts, grouts/resins, spare parts, cables, lubricants, ventilation stopping materials etc. are to be transported by the mine to within one split of the gate belt "tail end".

It is proposed that a method is used with which the mine is familiar such as an endless rope haulage system using 15 kg track with a 0.6m gauge. The track and return wheel should lag no more than 2 pillars behind the conveyor tail end.

### **Pumping**

Water made in the district shall be pumped out via at least a 100 mm pump range running along side of the conveyor. This district range shall be connected to intermediated sumps in the district and ultimately in the mine main sump.

The pump range, intermediate sumps and pumps shall be provided, installed and maintained by the mine. The pump range shall at all times be advanced or retreated to the gate belt tail end and provided with a 100 mm valve at each end. The CM district will require two mobile face pumps, cables, switchgear, flexible hoses and manifold to connect to the 100 mm valve provided by the mine.

Should more "permanent" or intermediate pump installations be required within the district as a result of "hitting" water, "permanent / intermediate pumps" shall always be kept supplied, installed, maintained and operated by the mine (including all electrical and pipe connections) to appropriate standards.

### **Clean water**

In the case of CM districts clean water at neutral pH and minimum suspended solids is required to be provided at the rate of 250 l/min at 2000

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kpa for cooling motors, drilling and dust suppression of the CM system. In all cases drinking water need to be provided in the district inbye.

The clean water shall be supplied by means of a 100 mm pipe range installed in the conveyor road. A 100 mm valve shall be provided at each end of the district clean water range. Fire hydrants shall be installed along the clean water range at intervals not exceeding 200m. At each hydrant in box containing fire hoses (sufficient for 200 m), nozzles etc. shall be provided.

The clean water range to the gate belt "tail end", valves, fire hydrants hoses etc. shall be supplied, installed and maintained by the mine.

### **Power supply**

Power is to be supplied to the districts at a tension of 3.3 KV. The main feed cable to the district transformers (HT) shall be supplied and installed along the No 4 roadway. This would be required whichever technology is employed. It is required to have an installed capacity of 1500 KVA to supply the face equipment in the mechanized R&P district from the conveyor tail end inbye.

The face equipment will operate at 1100V. The CM package will include all electrical equipment, transformer (3.3 to 1.1 KV), switchgear, cables sockets etc. for the face equipment. It is necessary to provide separate HT cable and section isolator to the face transformer and between the district transformer and the face switchgear.

### **Communications**

A suitable communication system shall be provided between the district gate belt tail end, mid-point of the conveyor run, gate belt head end and the office on the surface of the mine (or control centre if available) by the mine.

### **Safety Management**

Safe is paramount to all operations. A project management plant will be developed specific to the Continuous Miner operations. The plan will include standards and procedures for the safe and efficient undertaking of all activities and tasks within the project scope. Standards will, as an absolute minimum, comply with the Indian Coal Mines Regulations 1957.

### **Development of Panels**

The pattern of panel formation and likely number of faces as available during initial stage is shown in Plate XIV. The Conveyor and haulage are kept in inclines which also serves the purpose of intake for the panels. The same extends in the seam with four headings dip drives. The idea is to keep six panels operating. The panels shall be laid out on apparent gradient, thus reducing the gradient of the headings and to be self draining.

## 5.5 COAL PRODUCTION

The semi-mechanised panel of 5 headings deployed with two numbers of LHD's in a seam with average thickness range of 2m will give production @ 250 TPD. Further such panel deployed with two numbers of SDLs with seam thickness range of 1.2m to 1.5m can produce 167 TPD (Refer Annexure 5-1 for detailed computation of coal production for LHD/SDL).

Output from two semi-mechanised panels deployed with two number of 2.1CUM capacity LHDs in each panel = 500 TPD

Output from three semi-mechanised panel deployed with two number of 1.2CUM capacity SDLs in each panel = 500 TPD

So, Output from five such panels = 1000 TPD

Hence, a total of 1000TPD or 0.30MTPA production of coal is achievable from three SDL panels and two LHD panels at Shahpur West coal block of NMDC.

In addition to above, the production from one Continuous Miner (JOY 12CM27) will be 0.30MTPA.

|                                                |   |                 |
|------------------------------------------------|---|-----------------|
| Production from one set of JOY 12CM27 standard | = | 0.30MTPA        |
| Production from five semimechanised panels     | = | 0.30MTPA        |
| <b>TOTAL</b>                                   | = | <b>0.60MTPA</b> |

The main dip drives will also be driven with Continuous Miners. All the four heading main dip drives will be developed with Continuous Miners along with two shuttle cars with one Continuous Miner.

Accordingly, this mining plan has been prepared to achieve a coal production of 0.60 MTPA.

## 5.6 STRATEGIC APPROACH FOR UG MINING IN THE BLOCK

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The lower most coal seam II is the most potential coal seam of Shahpur West Coal Block.

The width of the gallery/bord will be kept 4.8m in all the seams. The height will be normally 2.5m. It is to further note that the mining plan of Shahpur West Coal Block is prepared for minimum workable coal seam thickness up to 1.2m. So the gallery height may be restricted in parts where the seam thickness does not permit and it may be a maximum up to seam thickness. However, it will not be less than 1.8m in the area used for traveling road way. This will be done through floor dinting and the massive sand stone roof will be kept intact with roof bolting. The wastage produced during the floor dinting will be dealt separately to avoid any mixing with the coal produced from the drivage of the gallery. The floor dinting will be carried out after

driving of one complete pillar length as the simultaneous activity may degrade the coal. It will be taken out to surface by rope haulage.

## 5.7 SEQUENCE OF MINING

The approach to the mine is through a pair of inclines. It will have access to all the four seams viz. IV, L2, IIIA and II with a provision of air shafts for ventilation. The mining thickness is proposed up to a seam thickness of 1.2m in all the four seams due good quality coal at shallow depth. The production starts at early stage from seam IV. The upper seams are won first and then advanced to lower seams.

## 5.8 YEAR WISE DEVELOPMENT DURING INITIAL YEARS

The year wise activities are described and plotted in bar chart (Refer Plate XI). The year wise major activities at Shahpur West Coal Block will be as under (Refer Plate XV, XVI XVII & XX1-A for 1<sup>st</sup> 5 years):

### 1<sup>ST</sup> Year of operation:

The pair of Inclines will be started @ 35m per month along with ventilation shaft @ 10m per month from the surface. Both the inclines and ventilation shaft will touch the floor of seam IV within 5 months. The production starts from this seam in 6<sup>th</sup> month from development of four heading dip drives and then after panel development with low height LHDs and SDLs.

The preparation for sump starts and connection is made to ventilation shaft. The production is limited from four heading development and partly from some panel development. The production achieved in first year is 96000 T.

### 2<sup>nd</sup> Year of operation:

The development of seam IV is complete within two years and depillaring starts in second year. During this year we get our targeted coal production @ 0.60MTPA. This includes 0.300MT coal from development.

### 3<sup>rd</sup> Year of operation:

About 75% of depillaring activity also completed at the end of third year. The driveage of incline pair and shaft sinking also continue again at the end of 32 months for approach to lower seam L2. The access to L2 seam is ready at the end of 38 months. During third year all the coal production @ 0.600MTPA is achieved from depillaring of seam L2.

### 4<sup>th</sup> Year of operation:

The depillaring of seam IV is completed in 45<sup>th</sup> month. So the production is also achieved from development of seam L2 from 40<sup>th</sup> month. A total of 0.600MTPA of coal production is achieved in this year. This includes

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0.289MT from depillaring of seam IV and 0.311MT from development of seam L2.

**5<sup>th</sup> Year of operation:**

The development in seam L2 is completed in 51<sup>st</sup> month and depillaring in this seam starts in the same month. Out of total targeted coal production, 0.145MT is achieved from development of seam L2 and balance from the depillaring of the same seam.

**6<sup>th</sup> to 10<sup>th</sup> year of operation (Refer Plate XVIII, XIX AND XXI-B):**

The pair of inclines and ventilation shaft continues to lower seam IIIA in 67<sup>th</sup> month and joins at the end of 69<sup>th</sup> month. Subsequently production starts from seam IIIA through development. The depillaring of seam L2 is completed in 7<sup>th</sup> year. The development of seam IIIA is also completed in 7<sup>th</sup> year. The depillaring of seam IIIA is completed in 9<sup>th</sup> year. (Plate No. XVIII). So, the inclines and ventilation shaft from seam IIIA starts in 8<sup>th</sup> year and completed in the same year. Consequently the development of seam II starts in the next year. The development of the seam II continues till this seam is fully developed. There will be 3.00MT(0.642MT, 1.326MT and 1.032MT from seam L2, IIIA and II respectively) coal production during 6<sup>th</sup> to 10<sup>th</sup> year.

**11<sup>th</sup> to 20<sup>th</sup> year of operation (Refer Plate XX):**

All the upper three seams are exhausted and development of seam II is also completed at the end of 13<sup>th</sup> year. So the depillaring of seam II starts in 13<sup>th</sup> year by solid blasting as well as Continuous Miner. The total coal production achieved during this period is 6.000MT

**21<sup>st</sup> to 24<sup>th</sup> Year( Final year) of operation (Refer Plate XXI C):**

Now all the production comes from depillaring and no further development will be there. The total coal production achieved during this period is 1.9380MT

## 5.9 CALENDAR PROGRAMME OF PRODUCTION

The calendar programme of production from underground mining is given in Table 5.7 below.

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**TABLE 5.7**  
**CALENDER PROGRAMME SHAHPUR WEST COAL BLOCK**

| YEAR                          | SEAM IV |       |       | SEAM L2 |       |       | SEAM III A |       |       | SEAM II |       |       | TOTAL |       |       |
|-------------------------------|---------|-------|-------|---------|-------|-------|------------|-------|-------|---------|-------|-------|-------|-------|-------|
|                               | 0.096   | 0.000 | 0.096 | 0.000   | 0.000 | 0.000 | 0.000      | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.096 | 0.000 | 0.096 |
| 1                             | 0.096   | 0.000 | 0.096 | 0.000   | 0.000 | 0.000 | 0.000      | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.096 | 0.000 | 0.096 |
| 2                             | 0.300   | 0.300 | 0.600 | 0.000   | 0.000 | 0.000 | 0.000      | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.300 | 0.300 | 0.600 |
| 3                             | 0.000   | 0.600 | 0.600 | 0.000   | 0.000 | 0.000 | 0.000      | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.000 | 0.600 | 0.600 |
| 4                             | 0.000   | 0.289 | 0.289 | 0.311   | 0.000 | 0.311 | 0.000      | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.311 | 0.289 | 0.600 |
| 5                             | 0.000   | 0.000 | 0.000 | 0.145   | 0.455 | 0.600 | 0.000      | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.145 | 0.455 | 0.600 |
| Sub. Total<br>(1 to 5 Years)  | 0.396   | 1.189 | 1.585 | 0.456   | 0.455 | 0.911 | 0.000      | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.852 | 1.644 | 2.496 |
| 6                             | 0.000   | 0.000 | 0.000 | 0.000   | 0.550 | 0.550 | 0.050      | 0.000 | 0.050 | 0.000   | 0.000 | 0.000 | 0.050 | 0.550 | 0.600 |
| 7                             | 0.000   | 0.000 | 0.000 | 0.000   | 0.092 | 0.092 | 0.284      | 0.224 | 0.508 | 0.000   | 0.000 | 0.000 | 0.284 | 0.316 | 0.600 |
| 8                             | 0.000   | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.000      | 0.600 | 0.600 | 0.000   | 0.000 | 0.000 | 0.000 | 0.600 | 0.600 |
| 9                             | 0.000   | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.168      | 0.168 | 0.168 | 0.432   | 0.000 | 0.432 | 0.432 | 0.168 | 0.600 |
| 10                            | 0.000   | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.000      | 0.000 | 0.000 | 0.600   | 0.000 | 0.600 | 0.600 | 0.000 | 0.600 |
| Sub. Total<br>(6 to 10 Years) | 0.000   | 0.000 | 0.000 | 0.000   | 0.642 | 0.642 | 0.334      | 0.992 | 1.326 | 1.032   | 0.000 | 1.032 | 1.366 | 1.634 | 3.000 |
| 11                            | 0.000   | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.000      | 0.000 | 0.000 | 0.600   | 0.000 | 0.600 | 0.600 | 0.000 | 0.600 |
| 12                            | 0.000   | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.000      | 0.000 | 0.000 | 0.600   | 0.000 | 0.600 | 0.600 | 0.000 | 0.600 |
| 13                            | 0.000   | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.000      | 0.000 | 0.000 | 0.440   | 0.161 | 0.600 | 0.440 | 0.160 | 0.600 |
| 14                            | 0.000   | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.000      | 0.000 | 0.000 | 0.000   | 0.600 | 0.600 | 0.000 | 0.600 | 0.600 |
| 15                            | 0.000   | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.000      | 0.000 | 0.000 | 0.000   | 0.600 | 0.600 | 0.000 | 0.600 | 0.600 |
| 16                            | 0.000   | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.000      | 0.000 | 0.000 | 0.000   | 0.600 | 0.600 | 0.000 | 0.600 | 0.600 |

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| YEAR                                                       | SEAM IV |       |       |       | SEAM L2 |       |       |       | SEAM III A |       |       |       | SEAM II |       |        |       | TOTAL |       |       |       |
|------------------------------------------------------------|---------|-------|-------|-------|---------|-------|-------|-------|------------|-------|-------|-------|---------|-------|--------|-------|-------|-------|-------|-------|
| 17                                                         | 0.000   | 0.000 | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.000 | 0.000      | 0.000 | 0.000 | 0.000 | 0.000   | 0.000 | 0.600  | 0.000 | 0.600 | 0.600 | 0.600 | 0.600 |
| 18                                                         | 0.000   | 0.000 | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.000 | 0.000      | 0.000 | 0.000 | 0.000 | 0.000   | 0.000 | 0.600  | 0.000 | 0.600 | 0.600 | 0.600 | 0.600 |
| 19                                                         | 0.000   | 0.000 | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.000 | 0.000      | 0.000 | 0.000 | 0.000 | 0.000   | 0.000 | 0.600  | 0.000 | 0.600 | 0.600 | 0.600 | 0.600 |
| 20                                                         | 0.000   | 0.000 | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.000 | 0.000      | 0.000 | 0.000 | 0.000 | 0.000   | 0.000 | 0.600  | 0.000 | 0.600 | 0.600 | 0.600 | 0.600 |
| Sub. Total<br>(11 <sup>th</sup> to 20 <sup>th</sup> Years) | 0.000   | 0.000 | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.000 | 0.000      | 0.000 | 0.000 | 0.000 | 1.640   | 4.361 | 6.000  | 1.640 | 4.360 | 6.000 | 6.000 | 6.000 |
| 21                                                         | 0.000   | 0.000 | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.000 | 0.000      | 0.000 | 0.000 | 0.000 | 0.000   | 0.000 | 0.600  | 0.000 | 0.600 | 0.600 | 0.600 | 0.600 |
| 22                                                         | 0.000   | 0.000 | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.000 | 0.000      | 0.000 | 0.000 | 0.000 | 0.000   | 0.000 | 0.600  | 0.000 | 0.600 | 0.600 | 0.600 | 0.600 |
| 23                                                         | 0.000   | 0.000 | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.000 | 0.000      | 0.000 | 0.000 | 0.000 | 0.000   | 0.000 | 0.600  | 0.000 | 0.600 | 0.600 | 0.600 | 0.600 |
| 24                                                         | 0.000   | 0.000 | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.000 | 0.000      | 0.000 | 0.000 | 0.000 | 0.137   | 0.137 | 0.138  | 0.000 | 0.138 | 0.138 | 0.138 | 0.138 |
| Sub. Total<br>(21 <sup>st</sup> to Final Year)             | 0.000   | 0.000 | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.000 | 0.000      | 0.000 | 0.000 | 0.000 | 1.937   | 1.937 | 1.938  | 0.000 | 1.938 | 1.938 | 1.938 | 1.938 |
| Grand Total<br>(1 <sup>st</sup> to Final Years)            | 0.396   | 1.189 | 1.585 | 0.456 | 1.097   | 1.553 | 0.334 | 0.992 | 1.326      | 2.672 | 6.298 | 8.970 | 3.857   | 9.576 | 13.433 |       |       |       |       |       |

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## 5.10 LIST OF MAIN EQUIPMENT FOR SEMI-MECHANISED MINING

The following are the main equipments required for semi-mechanised room and pillar method deployed with LHDs and SDLs in Table 5.8 at Shahpur West Coal block.

**TABLE 5.8**  
**EQUIPMENT CONFIGURATION FOR SEMI-MECHANISED PANEL**

| SI No. | Equipment                                        | No. |
|--------|--------------------------------------------------|-----|
| 1      | LHD with Bucket capacity 2.1 M <sup>3</sup>      | 4   |
| 2      | SDL /ISL with Bucket capacity 1.2 M <sup>3</sup> | 6   |
| 2      | Medium duty belt conveyors                       | 5   |
| 3      | Coal drill with panels                           | 12  |
| 4      | Roof bolting machines                            | 7   |
| 5      | Endless haulage                                  | 5   |
| 6      | Auxiliary fans 11 M <sup>3</sup> / sec           | 18  |
| 7      | Face pumps                                       | 10  |

In addition to above, the main belt conveyor of 1200mm will be installed in main incline. It will be fed through 1000mm conveyors from individual coal seams.

## 5.11 BRIEF DESCRIPTION OF UNDER GROUND EQUIPMENTS

### 5.11.1 SDL/ISL general specification

A large number of such equipment supplier are available in the market with different specification viz. EIMCO, Atlas Copco, Joy, Sandvick etc. The general specification of one ISL supplied by EIMCO ELECON (INDIA) LTD. are reproduced as under for reference.

|                          |                                                                                                                       |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------|
| Bucket Capacity          | 1.2 CUM                                                                                                               |
| Breaking Force           | 2700 KGS                                                                                                              |
| Operating Weight         | 10000 KGS                                                                                                             |
| Electric Motor           | 550 V, 66 HP                                                                                                          |
| Ground Pressure          | 0.8 KG / Sq.cm                                                                                                        |
| Hydraulic Pump           | Gear Type                                                                                                             |
| Hydraulic Traction Motor | Axial Piston type                                                                                                     |
| Conveyor Motor           | LSHT, Gear Motor                                                                                                      |
| Brakes                   | SAHR type brakes on both Traction gear Box ( Shrink Disk Negative) in addition to Hydrostatic on both traction motors |
| Traveling speed          | 3.6 kmph (Max.)                                                                                                       |
| Lights                   | 12 or 24 Volts, 2F and 1R                                                                                             |

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### 5.11.2 LHD general specification

The above mentioned companies also supply the LHDs. The general specification of one such LHD supplied by Atlas copco are reproduced as under for reference.

|                                    |         |
|------------------------------------|---------|
| Bucket Capacity (CUM)              | : 2.1   |
| Tramming capacity (kg)             | : 1 361 |
| Mechanical breakout force (kg)     | : 3 157 |
| Hydraulic breakout force (kg)      | : 3 824 |
| Operating weight of vehicle** (kg) | : 5 700 |
| Length (m)                         | : 5.272 |
| Height, canopy/cabin (m)           | : 1.937 |
| Bucket height, max (m)             | : 3.041 |
| Width, vehicle (m)                 | : 1.256 |

### 5.12 SPECIFICATIONS OF SOME EQUIPMENT FOR FULLY MECHANISED MINING

The brief technical specifications of main equipments are as under:

#### 5.12.1 Continuous miner

**TABLE 5.9**  
**BRIEF TECHNICAL SPECIFICATIONS OF CONTINUOUS MINER**

| Sl. No. | Operating Parameters                                                          | 14CM27          |
|---------|-------------------------------------------------------------------------------|-----------------|
| 1       | Loading Rate                                                                  | 15-29 tonne/min |
| 2       | Cutter Head Diameter (Optional)                                               | 1000 mm         |
| 3       | Conveyor                                                                      |                 |
| i       | Width                                                                         | 965 mm          |
| ii      | Chassis Depth                                                                 | 300 mm          |
| iii     | Chain Pitch                                                                   | 83 mm           |
| iv      | Speed                                                                         | 145 m/min       |
| 4       | Crawler Chain                                                                 |                 |
| i       | Width                                                                         | 560 mm          |
| ii      | Pitch                                                                         | 184 mm          |
| 5       | Cutter Drums JOY Bit Blocks, Spacing, Fixed Head Width, Interlocked End Rings | 95 mm           |
| 6       | Cutting Width                                                                 | 3500 mm         |
| 7       | Ground Pressure                                                               | 207 kPa         |
| 8       | Weight                                                                        | 67.3 tonnes     |
| 9       | Maximum Cutting Height                                                        | 3400 mm         |
| 10      | Minimum Cutting Height                                                        | 1000 mm         |

| Sl. No. | Operating Parameters                          | 14CM27          |
|---------|-----------------------------------------------|-----------------|
| 11      | Basic Chassis Height                          | 1118 mm         |
| 12      | Ground Clearance                              | 200 mm - 300 mm |
| 13      | Sump Range                                    | 0-7.6 m/min     |
| 14      | Tram Speed                                    |                 |
| i       | Slow                                          | 4.6 m/min       |
| ii      | Intermediate                                  | 13.7 m/min      |
| iii     | High                                          | 19.8 m/min      |
| 15      | Centrifugal Loading Arm Speed                 | 54 rpm          |
| 16      | Cutter Speed                                  | 60 rpm          |
| 17      | Bit Tip Speed                                 | 3.51 m/sec      |
| 18      | Motors (Water Cooled)<br>950 Volt, 60 Hz      |                 |
| i       | Cutter - 2                                    | 185 kW          |
| ii      | Pump - 1                                      | 40 kW           |
| iii     | Gathering Head - 2                            | 50 kW           |
| v       | Traction (OPTIDRIVE) - 2                      | 60 kW           |
| vii     | Total Power (OPTIDRIVE)                       | 630 KW          |
| 19      | Motors (Water Cooled)<br>950/1050 Volt, 50 Hz |                 |
| i       | Cutter - 2                                    | 185 kW          |
| ii      | Pump - 1                                      | 40 kW           |
| iii     | Gathering Head - 1                            | 45 kW           |
| v       | Traction (OPTIDRIVE) - 2                      | 60 kW           |
| vii     | Total Power (OPTIDRIVE)                       | 620 kW          |

## 5.12.2 Shuttle cars

**TABLE 5.10**  
**BRIEF TECHNICAL SPECIFICATIONS OF SHUTTLE CARS**

| 2.2   | Operating parameters                      | Values                    |
|-------|-------------------------------------------|---------------------------|
| 2.2.1 | Payload (coal) (kg) cubic capacity (cu.m) | 10.1 / 10.19              |
| 2.2.2 | Unladen weight (kg)                       | 22000 kg                  |
| 2.2.3 | Power (KW)                                | 219                       |
| 2.2.4 | Vehicle speed (kmph)                      | 8.5 max                   |
| 2.2.5 | Grade ability                             | 20% max                   |
| 2.2.6 | Turning radius (mm)                       | inside 2590/Outside 64300 |
| 2.2.7 | Fuel consumption (L/shift) (if operated)  | N/A                       |

|            |                                       |                          |
|------------|---------------------------------------|--------------------------|
| 2.2.8      | Operating voltage                     | 1050 Volt AC 50 Hz       |
| 2.2.9      | Total service life (million tones)    | 1.5 depending conditions |
| 2.2.10     | Ground clearance (mm)                 | 290                      |
| 2.2.11     | Ground pressure (kPa)                 | 984 Laden to 14 T        |
| 2.2.12     | Cable reel capacity (electrically (m) | 200                      |
| <b>2.3</b> | <b>Dimensions</b>                     |                          |
| 2.3.1      | Overall length (mm)                   | 8990                     |
| 2.3.2      | Width (mm)                            | 2580                     |
| 2.3.3      | Height (mm)                           | 1310                     |
| <b>2.4</b> | <b>Wheel</b>                          |                          |
| 2.4.1      | Size                                  | 14.00 X 20               |
| 2.4.2      | Ply rating                            | 24                       |
| 2.4.3      | Filling                               | Pneumatic or Foam Filled |

## 5.12.3 Twin mast roof bolter

**TABLE 5.11**  
**BRIEF TECHNICAL SPECIFICATIONS OF TWIN MAST ROOF BOLTER**

| 3.2        | Operating parameters                             | Values                                                                                                             |
|------------|--------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| 3.2.2      | Operating mining height (m)                      | 2.6 m – 5.0 m                                                                                                      |
| 3.2.3      | Drilling length (m)                              | Single pass stroke 2.845m, retracted length 1.885mm extended length 3.170m                                         |
| 3.2.4      | Drill hole size (mm)                             | Nominal 24mm-38mm, Up to 56mm dia, if larger required please confirm suitability of drill as options are available |
| 3.2.5      | Tram speed (m/min)                               | 0-20 m/min max speed                                                                                               |
| 3.2.6      | Weight (t)/ Ground Pressure (MPa)                | Approximately 140 Kpa, depending on final machine specification                                                    |
| 3.2.7      | Tire/Track chain                                 | Crawler Chain Manufacture-JOY                                                                                      |
| 3.2.8      | Max. Platform elevation from ground (m)          | 2.80m                                                                                                              |
| 3.2.9      | Drilling nature                                  | Rotary Wet Flush Drilling                                                                                          |
| 3.2.10     | Power (kW)                                       | 112 KW                                                                                                             |
| 3.2.11     | Operating voltage (v)                            | 1050v ac+/- 10%                                                                                                    |
| 3.2.12     | Bolting rate (bolts/hr.)                         | 12 min to install 4 X 2.1m roofbolts and 4 X 1.2m rib bolts = 40 bolts/hr                                          |
| 3.2.13     | Max. material hardness that can be drilled (MPa) | 40-60 Mpa                                                                                                          |
| <b>3.3</b> | <b>Dimensions</b>                                |                                                                                                                    |
| 3.3.1      | Overall length(mm)                               | 8008 mm                                                                                                            |
| 3.3.2      | Width (mm)                                       | 3160 mm retracted, 5680 mm platforms extended                                                                      |
| 3.3.3      | Height (chassis) mm                              | 2180 mm                                                                                                            |

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|            |                        |                                                                               |
|------------|------------------------|-------------------------------------------------------------------------------|
| 3.3.4      | Wheel base (mm)        | Length 3250 mm                                                                |
| 3.3.5      | Ground clearance (mm)  | 269 mm                                                                        |
| <b>3.4</b> | <b>Drilling system</b> |                                                                               |
| 3.4.1      | Torque (Nm)            | 320 Nm at 175 Bar. (Adjustable to suit application)                           |
| 3.4.2      | Rotation (rpm)         | Typical 450-550 RPM, 71 l/min. (adjustable to suit application)               |
| 3.4.3      | Feed thrust            | 2000 kg at 190 Bar (adjustable to suit application)                           |
| 3.4.4      | Feed length (m)        | Single pass stroke 2.845m, retracted length 1.885m, extended length 3.170m    |
| 3.4.5      | Feed rate (m/min)      | 0.25 m/min (Adjustable to suit application)                                   |
| 3.4.6      | Mast height range (m)  | Single pass stroke 2.845 m, retracted length 1.885 m, extended length 3.170 m |
| 3.4.7      | Mast tilt (deg.)       | 10° past vertical to 10° past horizontal, total 110°                          |

#### 5.12.4 Feeder Breaker

**TABLE 5.12**  
**BRIEF TECHNICAL SPECIFICATIONS OF FEEDER BREAKER**

| Sl. No.    | Particulars                   | Values                                     |
|------------|-------------------------------|--------------------------------------------|
| 4.1.1      | Make                          | Continental Crushing & Conveying – Stamler |
| 4.1.2      | Machine model                 | BF – 14B-58-64C                            |
| <b>4.2</b> | <b>Operating parameters</b>   |                                            |
| 4.2.1      | Capacity (TPH)                | 0-500 mtph                                 |
| 4.2.2      | Input size (mmxmmxmm)         | 400 mm x 600 mm x 700 mm                   |
| 4.2.3      | Output size (mmxmmxmm)        | 200 mm – one dim only                      |
| 4.2.4      | Weight (t)                    | 33 tonnes                                  |
| 4.2.5      | Ground pressure (MPa)         | 0.14                                       |
| 4.2.6      | Tram speed (m/min)            | 12                                         |
| 4.2.7      | Crusher Power (kW)            | 110                                        |
| 4.2.8      | Dust suppression              | Water – Spray                              |
| 4.2.9      | Hopper size (m <sup>3</sup> ) | 11                                         |
| <b>4.3</b> | <b>Dimensions</b>             |                                            |
| 4.3.1      | Overall length (mm)           | 9493                                       |
| 4.3.2      | Width over bucket type hopper | 2972                                       |
| 4.3.3      | Overall width (frame) (mm)    | 3243                                       |
| 4.3.4      | Tram height (mm)              | 1397                                       |

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| Sl. No.    | Particulars                | Values       |
|------------|----------------------------|--------------|
| 4.3.5      | Max. discharge height (mm) | 1426         |
| <b>4.4</b> | <b>Conveyor</b>            |              |
| 4.4.1      | Conveyor width (mm)        | 1270         |
| 4.4.2      | Conveyor chain (mm)        | 89 (nominal) |
| 4.4.3      | Conveyor fights (mmxmm)    | 44 x 101     |

#### 5.12.5 Brief technical specifications of load centre and transformer

##### *HV Circuit Breaker*

- Circuit Breaker
- Off load Isolator (ON/OFF/EARTH)
- Static overload and short circuit transformation protection
- Voltage and current display.

##### *Power Transformer Specification*

- Rating 1500 kVA at 40°C ambient.
- Off load ratio 3300/1130V
- Tappings  $\pm 5\%$ ,  $\pm 10\%$
- Impedance 3-4% (Typical)

  
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##### *Load centre Specification*

- Transformer secondary 1100V earth fault protection
- 1100V, 1200Amp circuit breaker with short circuit tripping function
- 1100V Test switch
- 5 kVA 120V lighting transformer with 4 switched outlets
- 3.5 kVA 110V 3 phase drill transformer with 2 outlets
- 2 off 400A vacuum contactors feeding 350 Amp 1100V restrained Victor sockets
- 8 off 160A vacuum contactors feeding 200 Amp 1100V restrained Victor sockets
- Individual pilot circuit control on all outgoing motor drives sockets
- Individual short circuit protection on all 1100V motor drives
- Individual overload protection on all 1100V motor drives
- Earth fault protection on all 1100V motor drives
- Loss of vacuum protection on all 1100V motor drives
- Indication of voltage, current and power for all 1100V socket outlets

**5.13 BRIEF DESCRIPTION ON UNDER GROUND ELECTRICAL LAY OUT**

Power is to be supplied to the districts at a tension of 3.3 KV. The main feed cable to the district transformers (HT) shall be supplied and installed along the central roadway. This would be required whichever technology is employed.

It is required to have an installed capacity of 1500 KVA to supply the face equipment in the mechanized B&P district from the conveyor tail end in by.

The face equipment will operate at 1100V. The CM package will include all electrical equipment, transformer (3.3 to 1.1 KV), switchgear, cables sockets etc. for the face equipment.

It is necessary to provide separate HT cable and section isolator to the face transformer and between the district transformer and the face switchgear.

**5.14 UNDERGROUND COMMUNICATION AND TELEPHONE**

A suitable communication system shall be provided between the district gate belt tail end, mid-point of the conveyor run, gate belt head end and the office on the surface of the mine (or control centre if available) by the mine.

**5.15 TARGET OUTPUT & LIFE OF THE MINE**

The target is kept 0.60 MTPA. The life of the mine will be 24 years. Additionally, there will be construction activities for 1 year prior to start of production.

  
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## CHAPTER 6

### BLASTING

#### 6.1 BROAD BLASTING PARAMETERS

Mine is planned to be worked with bord & pillar system of mining. The width of the development galleries will be 4.8 m and height of such gallery will generally be as per thickness of the seam which may be between 1.2m. to 3m and the average may be around 2.5m. The advances in the galleries are done generally by resorting to solid blasting these days by use of hand held coal drills through coal bits and drill rods of around 2 m length and dia. of about 38 mm.

The drilling pattern has to be evolved for best results on the basis of hardness, cleat, and other parameters. However, wedge cut is generally practiced and in section of 4.8X2.5 by putting around 12 holes, a pull of 1.5 m. could be obtained getting coal around 25 tonnes in one round of blast, charging the holes between 0.6 to 0.7 kg each with permitted explosive like Soligex etc. Blasting efficiency could be achieved to over 3 tonnes/ kg. Average efficiency may be taken only as 2.5 tonne per kg.

It is understood that trial is being conducted by one manufacturer of explosive with some special type of approved explosive on solid blasting which is able to give pull of 2 m. Blasting efficiency will improve if such explosive come in regular use.

Alternatively there may be a trial with large diameter empty holes in the middle of coal seams, drilled to act as pre-cut along with regular short holes. A number of 2 to 3 large empty drill holes of 280-300 mm dia. are drilled in the coal face by crawler-mounted Auger drill in the middle of coal face, and regular short holes are drilled in suitable pattern around the large empty hole using the same drill. The large empty holes act as a free face for the coal. During such trial up to 2 meters pull has been achieved satisfactorily. Powder factor of 3-4 tonnes per kg of explosive and detonator factor of 3-4 tonnes per detonator are possible with this method.

In this way free face blasting enables us to use P1/P3 explosive, depending upon gassiness of seams, for blasting without lowering safety standard in any way.

Moreover, higher pull is achieved. Hence, more broken coal is available for loading by LHD.

Thus, this method of blasting has advantage of higher pull & 10% reduction of RMR (Rock mass rating) value for immediate roof over solid blasting method (Table 6.1).

  
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**TABLE 6.1**  
**TYPES OF EXPLOSIVE, DETONATOR & CHARGE/HOLE**  
**IN AUGOR DRILLING**

| Particular                    | Degree I       | Degree II      | Degree III     |
|-------------------------------|----------------|----------------|----------------|
| <b>B&amp;P development</b>    |                |                |                |
| Detonator                     | Instantaneous  | Instantaneous  | Instantaneous  |
| Explosive                     | P <sub>1</sub> | P <sub>3</sub> | P <sub>3</sub> |
| Max. Charge per hole          | 1000gm         | 565 gms        | 565 gms        |
| <b>Depillaring /Splitting</b> |                |                |                |
| Detonator                     | Instantaneous  | Instantaneous  | Instantaneous  |
| Explosive                     | P <sub>1</sub> | P <sub>3</sub> | P <sub>3</sub> |
| Max. Charge per hole          | 1000 gm        | 565 gms        | 565 gms        |
| <b>Slice</b>                  |                |                |                |
| Detonator                     | Instantaneous  | Instantaneous  | Instantaneous  |
| Explosive                     | P <sub>1</sub> | P <sub>3</sub> | P <sub>5</sub> |
| Max. charge/hole              | 800 gms        | 1000 gms       | 600 gms        |

## 6.2 TYPE AND QUANTITY OF EXPLOSIVES TO BE USED

The mining at Shahpur west coal block is proposed through fully mechanized as well as semi-mechanised system. The fully mechanized panel is equipped with Continuous Miner. No blasting is required with Continuous Miner. Blasting is required in semimechanised panel. It will give half of total production i.e., 0.30MTPA. Total five panels are required for semimechanised mining. Only Permitted Explosive will be used in UG mining. It is proposed that five panels will be deployed with two nos. of LHD in each panel to give annual output @ 0.30 MTPA through solid blasting with approved type of explosives. The five panels with two nos. of LHDs in each panel will produce 1000 tonnes of coal production per day.

The daily requirement of explosives for mining @ 0.30 MTPA from UG with semimechanised panels will be  $300\ 000/2.5/300/1000 = 0.400$  te/day.

## 6.3 STORAGE OF EXPLOSIVES TO BE USED

Manufacturers and suppliers of permitted explosives are few and there could be delay in supplies for several reasons. 20 tonnes magazine capacity for 3 weeks of storage of permitted explosive, detonators primers and fuse etc will be reasonable for the storage of explosives for both Shahpur East and Shahpur west block of same owner. A provision for such magazine has been made in the Shahpur East Block.

  
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## CHAPTER 7

### VENTILATION

#### 7.1 GENERAL ROUTE OF AIR CURRENT

There is one pair of incline as No. 1 and 2 almost in the central part of the block aligned parallel to the line joining Borehole No. 39 and Borehole No.14. Both of these inclines will work as intake airway. One air shaft at a distance of 152 meters on SE side of Borehole No.MSSW-11 at Surface RL 487m will work as return airways. The air shaft will be driven vertically from surface up to seam IV at FRL 444.5m for a total length of 42.5 meters with diameter 5m. It will be sequentially joined in lower seams vertically up to seam II as detailed below:

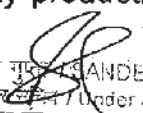
| Seam  | FRL of Seam (M) | Length of Shaft From Upper Seam (M) | Length of Shaft from surface (M) (Cuml. Length) |
|-------|-----------------|-------------------------------------|-------------------------------------------------|
| IV    | 444.5           | 42.5                                | 42.5                                            |
| L2    | 396.5           | 48.0                                | 90.5                                            |
| III A | 378             | 18.5                                | 109.0                                           |
| II    | 357             | 21.0                                | 130.0                                           |

#### 7.2 REQUIREMENT OF QUANTITY OF AIR

- a) Requirement of air, based on production basis (i.e, daily production of coal ) is given by :

$$= 2.5 \text{ m}^3 / \text{minute} \times 2000 \text{ te of coal/ day}$$

$$= 5000 \text{ m}^3 / \text{minute.}$$

  
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- b) Requirement of air, based on manpower basis i.e. manpower working in general shift are:

$$= 6 \text{ m}^3 / \text{minute} \times 500 \text{ persons in largest shift}$$

$$= 3000 \text{ m}^3 / \text{minute}$$

- c) A quantity of 284 Cum of air is required for individual Blasting off the Solid (BOS) face. The required production of 1000 tonnes per day from blasting only can be achieved from about 21 number of faces in five development districts out of which only about 18 faces may have to be blasted simultaneously which can be considered for the calculation of ventilation.

So, Air quantity required per minute =  $284 \times 18 = 5112 \text{ cum/minute}$

Hence, considering all the options from a) to c), option-c) is selected with 5112 cum/min. After Considering 20% leakage during circulation and requirement of panels individually, It will be preferable to install the main

mechanical Ventilator of 6200 m<sup>3</sup>/min at air shaft on surface through evacuee. The exhaust fan will have the provision of variable pitch of blades to improve the quantity of air required in future.

### 7.3 ONE MECHANICAL VENTILATOR

One mechanical ventilator is proposed to be located at close to centre of the block at ventilation air shafts.

### 7.4 SIZE AND CAPACITY OF MAIN FAN

Therefore one mechanical ventilator of following specification will be installed at incline through evacuee.

|          |   |                       |
|----------|---|-----------------------|
| Type     | - | Axial flow fan        |
| KW       | - | 150                   |
| RPM      | - | 750                   |
| Air flow | - | 6 m <sup>3</sup> /Sec |
| W.g.     | - | 75-110 mm.            |

Evacuee of suitable design will be constructed for improving the efficiency of the main mechanical ventilator.

### 7.5 THE GENERAL SCHEME OF VENTILATION

The general layout of ventilation route is shown in ventilation plan (Plate XIII and XIV).

The main mechanical Ventilator will be installed at surface for exhaust ventilation system for all four seams. Both the inclines will be kept as air intake. The four heading dip drives will serve the purpose of ventilation for entire seam. The pair of middle dip drives connected to panels will be kept as air intakes and outer side dip drives will work as exhaust from the panels. The air route will be maintained by erecting proper air crossings in the panels. The exhaust air shaft will be 152 meters on SE side of Borehole No.MSSW-11 at Surface RL 487m connected through drives in the seams. The air shaft barrier pillar will be maintained throughout the life of the mine to ventilate all the seams from the single ventilation shaft with the lower seams. Auxiliary Fans with suitable ducts will be used for blind headings of more than 30 meters length for a sufficient supply of air.

Following objectives are to be attained by adequate ventilation :-

- The inflammable gas does not exceed 0.75% in return air of any district and 1.25% in any place in the mine.
- The velocity of air at immediate out bye connection from the face should not be less than 30m/minute.

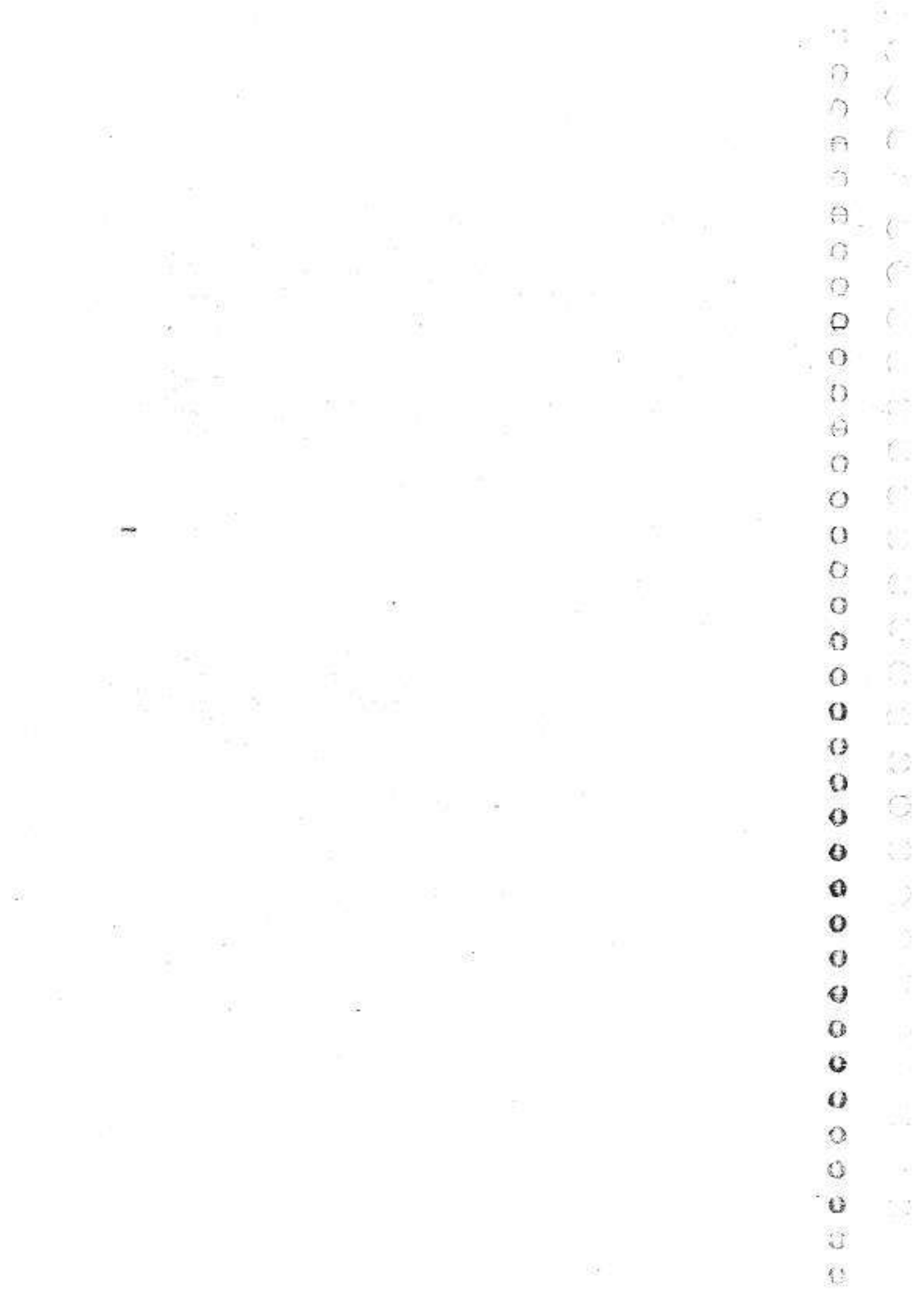
For other places it should be as follows :

| Degree of Gassiness                                        | Places where velocity of air is to be measured                                                                        | Velocity of Air     |
|------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|---------------------|
| 1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup> degree | Immediate out bye ventilation connection from the face.                                                               | 30m/min.            |
| 1 <sup>st</sup> & 2 <sup>nd</sup> degree                   | i) 4.5m from any face in intake side of brattice or partition<br>ii) 7.5m outbye of the discharge end of air pipe     | 30m/min             |
| 3 <sup>rd</sup> degree                                     | i) 4.5 m from any face on intake side of brattice or partition<br>ii) 7.5m outbye of the discharge end of an air pipe | 45m/min<br>25m/min. |

- c) In case of solid blasting, a minimum of 284 m<sup>3</sup>/min of air should be circulated to every face.
- d) If wet bulb temp at any working place exceeds 30.5<sup>0</sup>C, the air current should be less than 60m/min and more.
- e) Provision and transport of the ventilation stopping materials (including access doors), building of the walls, air crossings etc. shall be the responsibility of the mine. Nowadays a range of pre-fabricated pressure rated ventilation structures may also be used which can offer significant savings in installation time and cost and also in materials transport.
- f) Ventilation monitoring, measurements, updating of plans etc. and all legal responsibilities as required by the Indian Coal Mines Regulations shall be the responsibility of the mine. Exemption from existing quantity requirements as specified in the Indian Coal Mines Regulations would be required. Anticipated high tonnage to be produced would require in many instances district ventilation quantities in excess of the capacity of the mine fan.

The Shahpur West coal seams are considered as degree 2<sup>nd</sup> gassiness for the purpose for calculation of ventilation.

  
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## CHAPTER 8

### MINE DRAINAGE

The lease area forms a part of Son river catchment and is drained by Ghogra nala which flow northerly draining the storm water from the lease area and from the upper catchment of these streams. These streams are seasonal over flooding their bank during monsoon season and fed through groundwater in parts during summer season. Besides the lease hold is studded with several natural ponds.

#### 8.1 GROUND WATER

The thickness of Quaternary alluvial sediments in the lease hold is hardly 2 to 3 m. The Gondwana sediments (Barren Measure & Barakar) form the main water bearing zone in the area. Mostly the groundwater in the area is exploited through open wells range in depth from 10 – 15 m. Few shallow tubewells tapping aquifer down to 60 m depth are also present. The water table in the area varies between 2.0 to 14.0 m. In the south-eastern corner of coal block artesian condition is reported.

##### 8.1.1 Estimation of make of water

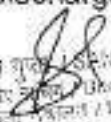
The probable source of water to be taken care as mine drainage in any mine could be either accumulation of rain/surface water in working area or contribution of groundwater as mine seepage. The proposed mine will be worked out though underground mining technique. Hence accumulation of rain / surface water has not been considered. Only the groundwater seepage will form the source water for mine drainage. The make of water in the underground mine will be from following sources.

- a) Normal seepage / leakage from overlying sandstone of Barren measure / Barakar formation.
- b) Inflow of water from Barakar sandstone roof during underground mining.

The water will be automatically drained to the sump in underground working at the lower most part of the mine. Adequate provision for draining out the seepage water from the sump will be provided and the working face will be kept dry. The pumped out water shall be utilised to meet the industrial need of mine working and only surplus water, if any, will be discharged into natural drainage.

##### 8.1.2 Quantification of mine seepage

The average thickness of overlying sandstone (Barren measure) as per geological report range between 9 & 76 m. The coal bearing Barakar formation range in thickness between 99.5 to 239 m. If we consider average

  
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depth to water table as 8 to 10 m below ground the saturated aquifer thickness will be between 110 to 250 m.

No pump test has been done in the core zone to evaluate the aquifer parameters. Based on general experience of the area, 1000 GPM water make has been adopted to be available for pumping from underground. The actual make of water will be considered later after the systematic hydrological study is available.

### 8.1.3 Pumping arrangements

The pumps will be required for approximately 1200GPM to 1300GPM. It is expected that during monsoon days the same go up to one and half times. The pumping will be done through stages with sumps in all four working seams.

There will be sumps in all four working seams in the close proximity of incline landing. The seepage water from the individual coal seam will be collected in these sumps via face pumps. The table below gives the details of deepest and shallowest points of all four coal seams.

**TABLE 8.1**  
**DEEPEST AND SHALLOWEST AREAS OF COAL SEAMS OF SHAHPUR WEST COAL BLOCK AT FULLY DEVELOPED STAGE (INCLINE SRL 485 M)**

| Seam  | Deepest RL m | Shallowest RL m | Location of         |                                      | RL of sump located in the seam near Incline landing area |
|-------|--------------|-----------------|---------------------|--------------------------------------|----------------------------------------------------------|
|       |              |                 | Deepest Point       | Shallowest Point                     |                                                          |
| IV    | 425          | 459             | Near BH No. MSSW 5  | North BH No. MSSW 25 & 58            | 445                                                      |
| L2    | 390          | 406             | Near BH No. MSSW 3  | Between BH No. MSSW 36 & 39          | 398                                                      |
| III A | 349          | 388             | Near BH No. MSSW 37 | Near BH No. MSSW 26                  | 384                                                      |
| II    | 334          | 387             | NEAR BH No. MSSW 37 | West of BH No. MSSW 23 Near Boundary | 358                                                      |

The layout of mine development is such that the seepage water from higher levels is directly coming in the sumps and no pumping is required above sump level. The face pumps are required only in northern part of the block. The maximum discharge height of face pumps of individual coal seams are as under:

| Seam  | Deepest RL (m) | Discharge level(m)/ RL of seam sump | Maximum discharge height(m) |
|-------|----------------|-------------------------------------|-----------------------------|
| IV    | 425            | 445                                 | 20                          |
| L2    | 390            | 398                                 | 8                           |
| III A | 349            | 384                                 | 35                          |
| II    | 334            | 358                                 | 24                          |

The dip of the coal seams at Shahpur West block is almost flat and the incline landing is also at central place. So the face pumps will directly discharge in the sumps of individual coal seams.

The surface R.L. of the incline is 489m. Table 8.2 gives the details of minimum discharge head of individual coal seams as under up to surface.

**TABLE 8.2**  
**MINIMUM DISCHARGE HEAD OF INDIVIDUAL COAL SEAMS**  
**UP TO SURFACE (INCLINE MOUTH SRL 489M)**

| Location | RL of the sump location (m) | Depth from Incline Mouth (m) |
|----------|-----------------------------|------------------------------|
| IV       | 445                         | 44                           |
| L2       | 398                         | 91                           |
| III A    | 384                         | 105                          |
| II       | 358                         | 131                          |

The minimum discharge height required for pumping from deepest seam II will be 131m. Again it will be 105m from seam III A and 91m for seam L2. The shallowest seam IV has discharge height of 44m.

The discharge height of seam II is 131m as mentioned above, so, stage pumping will be required. In view of this, it is proposed to install the main regular sump and pumping station in seam L2 near incline landing for a discharge height of approximately 90m. A main pumping station will be created with adequate size of sump for collection of 4 hours of water discharge in underground mine. It will have two compartments with arrangements for cleaning sump at intervals and pump house with lifting arrangements for convenience of any change and repairs at suitable location. The water generated during working in seam L2 will be collected in this main sump with the help of low capacity face pumps. The water from seam II at a discharge height of around 40m up to main sump and 14m from seam III A will be also collected in this sump.

No seam sumps are required in seam IV and Seam III A. The water from seam IV will be directly discharged to surface with the help of face pumps. Approximately 300 GPM discharge of water is expected in seam IV. A set of two pumps with the following specifications will be installed in seam IV for direct discharge of water up to surface.

|                  |   |                                 |
|------------------|---|---------------------------------|
| Capacity         | = | 25 lps                          |
| Delivery Head    | = | 100m                            |
| Motor power (KW) | = | 60KVA each                      |
| Delivery size    | = | 100mm (two separate pipe lines) |

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The face pumps in seam III A will also discharge the water directly in main sump in seam L2 provided with a set of two numbers face pumps of following capacity:

|                 |   |                                 |
|-----------------|---|---------------------------------|
| Capacity        | = | 20 lps                          |
| Delivery Head   | = | 80m                             |
| Motor power(KW) | = | 40 KVA each                     |
| Delivery size   | = | 100mm (two separate pipe lines) |

The workings in seam II will be vast due to highest reserves available for mining in the seam and thus more accumulation of underground water. It is expected that there may be a discharge of more than 500 GPM in this seam. Most of the water from workings in upper levels will be directly collected in seam sumps. The water from the lower levels will be collected with the help of face pumps up to sump in the seam provided with the following specification:

|                  |   |                |
|------------------|---|----------------|
| A Capacity       | = | 25 lps(2 Nos.) |
| Delivery Head    | = | 50m            |
| Motor power (KW) | = | 30KVA each     |
| Delivery size    | = | 100mm          |

The overall inflow of water in main sump is expected @1000 GPM as cumulative of all three lower seams. It may further increase as high as one and half times during rainy season. So, a set of three pumps with following capacity each will be installed in seam L2:

|                 |   |                                 |
|-----------------|---|---------------------------------|
| Capacity        | = | 45 lps                          |
| Delivery Head   | = | 150m                            |
| Motor power(KW) | = | 100 KVA each                    |
| Delivery size   | = | 200mm (two separate pipe lines) |

The third pump set with the common delivery with other two pumps is installed in main sump for emergency applications.

The underground make of water collected in the sumps will be free from suspended particles settled in the sump and clean water will be pumped to the surface reservoir from where it will be used for industrial needs of the mine and surplus water, if any, will be discharged into Ghogra nala flowing in the block after treating in a limited manner, if required to meet the discharge standards.

## 8.2 SURFACE WATER

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The Ghogra Nala passes through the block almost dividing the block in two equal parts. It enters the the block at 494m RL in south and flows towards North at 478m RL at north boundary. This is only 186m away from the Incline mouth located almost in the centre of the block. The territory of the block area is mostly flat and the nala is a seasonal one which acts as a catchment drain at surface of the coal block. Since the altitude of the Incline mouth is 489m, so there may be instance that the surface water from Ghogra Nala may enter in the mine with existing positions. In view of the above the following provisions are proposed in the mine plan as a safety measure to avoid entering the surface water in the mine:

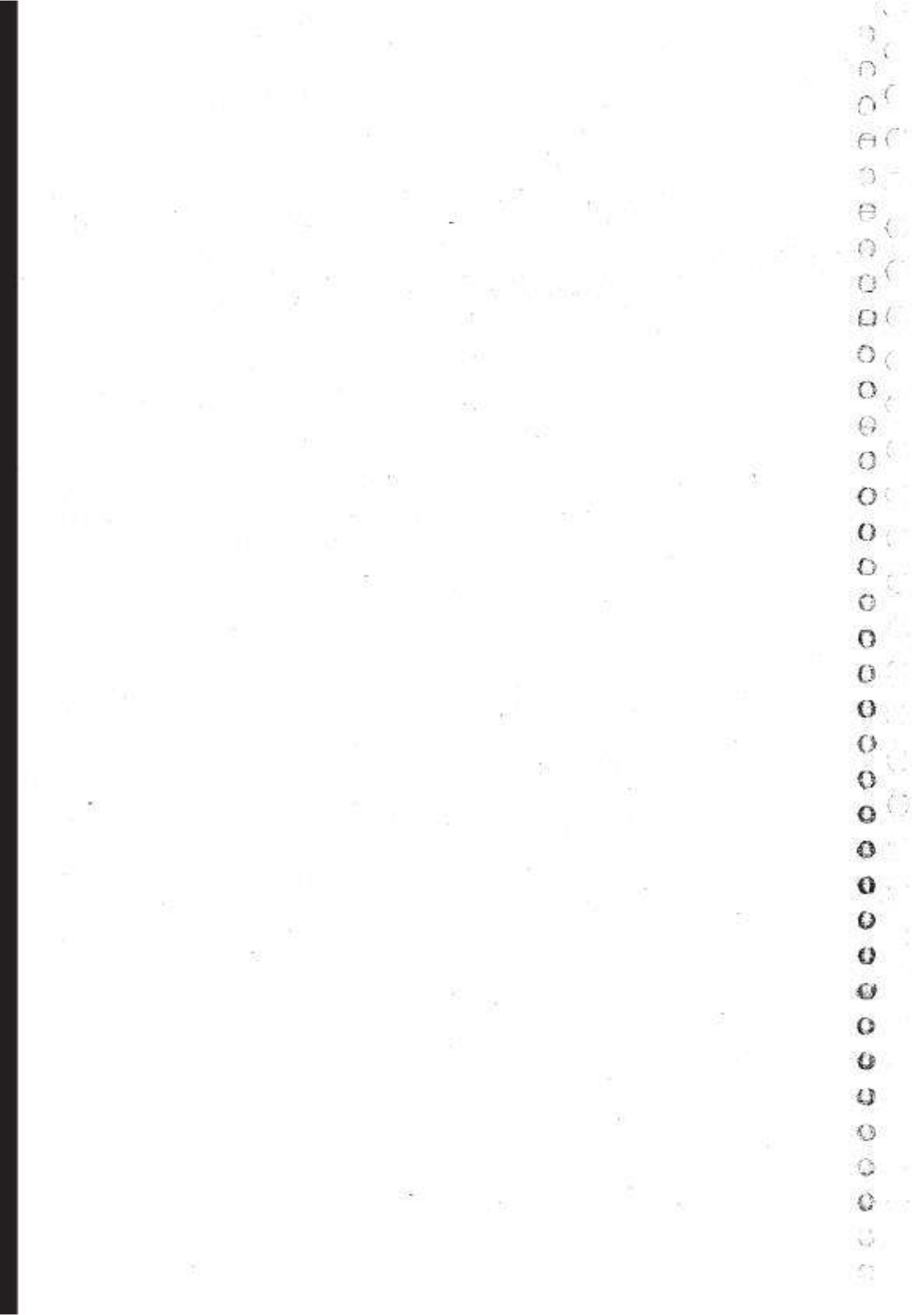
- I. A pucca bundh will be constructed along the nala with a height of 2m above HFL for a length of 1.00 KM from 492m RL in South up to 486m RL towards North. It will protect the facility area as well as Incline and Ventilation shaft.
- II. The mouth of the Inclines and Ventilation shaft will be raised 1.5m above the HFL of Ghogra Nala with the help of locally raised platform duly protected by walls along the sides

### 8.3 REQUIREMENT OF WATER

The overall requirement of water for the project is 627 cum/day. The requirement of water for dust suppression (at surface and underground), plantation, vehicles washing workshop etc. is estimated to be about 345 cum/day. The requirement of potable water for other site services i.e. canteen, Rest shelter, Offices, colony etc will be 282 cum/day.

The water requirement projected above can be easily met from the mine water (after treatment as required) after the mine is adequately developed. However, during the initial stage of few years, the water requirement will have to be met from the ground water through bore wells.

  
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## CHAPTER 9

## COAL HANDLING, WASHING &amp; MODE OF DISPATCH

The overall grade of coal at Shahpur West is good for most consumers in the market. The coal washing is not proposed at the block. The coal produced from the underground mine will be directly dispatched from CHP to consumer plant or the railway sidings. Occasionally it may be required to stack at site. The wastage generated due to mining will be handled at site in a scientific way and separately disposed at designated place.

## 9.1 GENERATION OF WASTAGE AND REJECTS

The mining at Shahpur West Coal Block is proposed through underground system of mining. So there is minimum damage to surface ecology of the area as well as minimum quantity for wastage handling. The wastage produced during development of Inclines and driving of shaft in the initial stage of start of work will be used for surface structures like ramp for haulage and improvement of surface territory near mine office etc. The remaining waste rock will be stacked in proper dumps. No generation of middlings will be there as the beneficiation of coal is not proposed.

## 9.2 WASTE GENERATION

The waste will be generated during development of Inclines and shaft sinking in the initial stage of operation.

The waste generation will be as under in Table 9.1.

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TABLE 9.1  
WASTE GENERATION IN CUM (BANK)

| Working with location                                                                               | Dimensions in meters<br>of Nos. X (L X W X H)                         | Waste<br>(Cum) |
|-----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|----------------|
| Pair of Incline in stone from surface to Seam IV at 1:4 Gradient @ 35 meters per Month              | 2 x (151 X 4.5 X 2.5) from surface RL 489m to FRL 451.25m of Seam IV. | 3397.5         |
| Ventilation shaft in stone from Surface RL 487m to seam IV FRL 444.5m @10m per Month, Length 42.5m  | Dia. 5.0m                                                             | 834.8          |
| <b>Sub Total (1)</b>                                                                                |                                                                       | <b>4232.3</b>  |
| Pair of Incline in stone from Seam IV to Seam L2 at 1:4 Gradient @ 40 meters per Month              | 2 (208m X 4.5 X 2.5)                                                  | 4680.0         |
| Ventilation shaft in stone from Seam IV FRL 444.5m to seam L2 FRL 396.5m @10m per Month, Length 48m | Dia. 5.0m                                                             | 942.9          |
| <b>Sub Total (2)</b>                                                                                |                                                                       | <b>5622.9</b>  |

| Working with location                                                                                 | Dimensions in meters of Nos. X (L X W X H) | Waste (Cum)    |
|-------------------------------------------------------------------------------------------------------|--------------------------------------------|----------------|
| Pair of Incline in stone from Seam IIIA to Seam L2 at 1:4 Gradient @ 40 meters per Month              | 2(62m X 4.5 X 2.5)                         | 1395.0         |
| Ventilation shaft in stone from Seam L2 FRL 396.5m to seam IIIA FRL 378m @10m per Month, Length 18.5m | Dia. 5.0m                                  | 363.4          |
| <b>Sub total (3)</b>                                                                                  |                                            | <b>1758.4</b>  |
| Pair of Incline in stone from Seam IIIA to Seam II at 1:4 Gradient @ 40 meters per Month              | 2(100m X 4.5 X 2.5)                        | 2250.0         |
| Ventilation shaft in stone from Seam IIIA FRL 378m to seam II FRL 357m @10m per Month, Length 21.0m   | Dia. 5.0m                                  | 412.5          |
| <b>Sub total (4)</b>                                                                                  |                                            | <b>2662.5</b>  |
| <b>Total Waste generation(1+2+3+4)</b>                                                                |                                            | <b>14276.1</b> |

Thus a total of 14276.1 cum(B), waste rock is generated during drive of inclines and ventilation shaft.

In addition to above a small quantity of waste will be generated while drifting in fault F3 and F4 as detailed below:

Details of Stone drifting/Waste rock generation in underground mining of Shahpur west Coal block

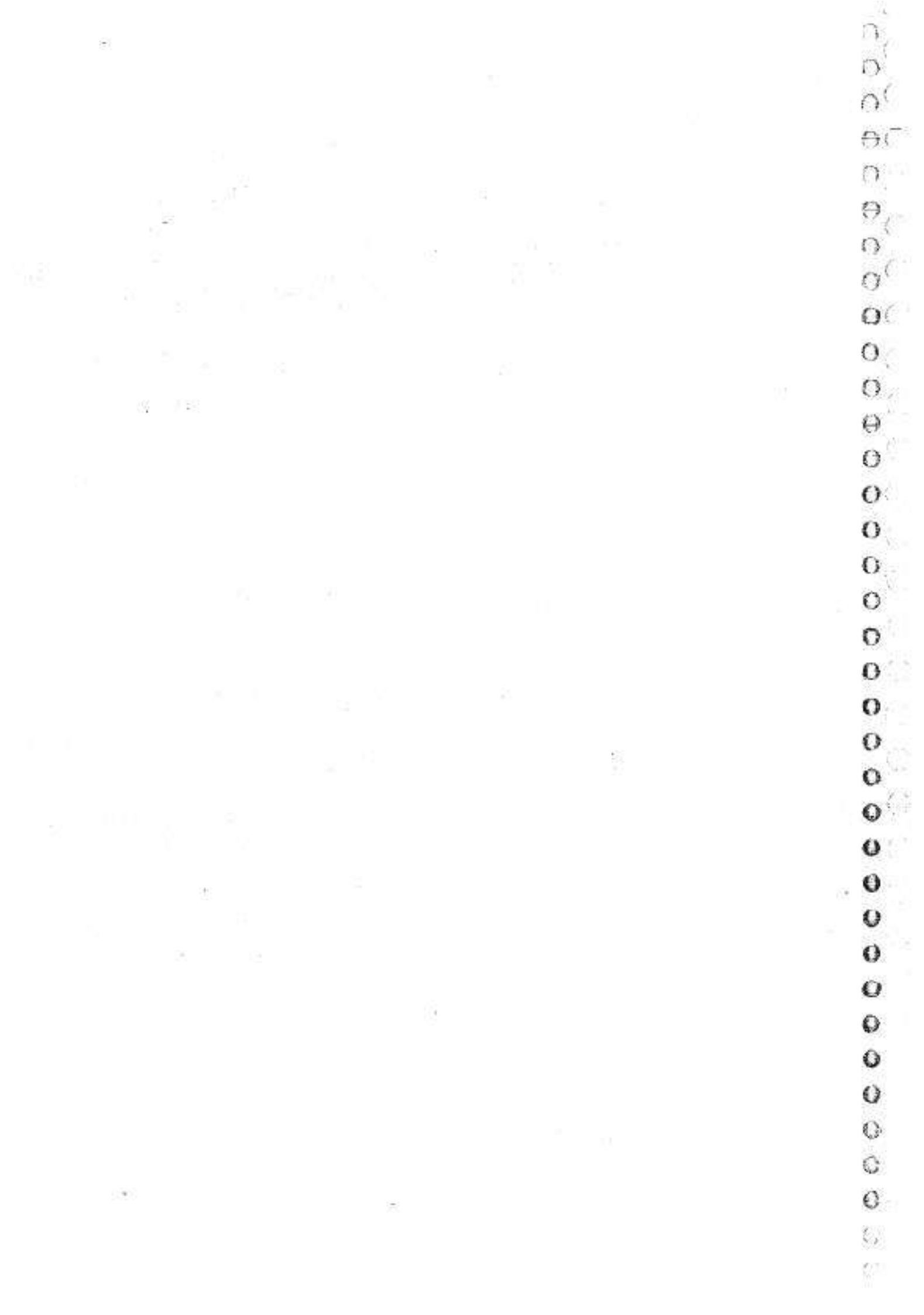
| Sl. No.      | Area of Stone drive                                      | No. of Drives | Gradient | Location of drifts                                       | Seam/ RL (m) |     | Length (meters) | Breadth (meters) | Height (meters) | Bank CUM    | Remark, if any |
|--------------|----------------------------------------------------------|---------------|----------|----------------------------------------------------------|--------------|-----|-----------------|------------------|-----------------|-------------|----------------|
|              |                                                          |               |          |                                                          | From         | To  |                 |                  |                 |             |                |
| 1            | Four heading drives in seam II passing through fault F3  | 4             | 1 in 4   | Near B H No. MSSW 53                                     | 360          | 355 | 20              | 4.8              | 2.5             | 960         | DOWN           |
| 2            | Three heading drives in seam II passing through fault F4 | 3             | 1 in 5   | South east of Khamaria village boundary & B H No. MSSW 9 | 355          | 358 | 15              | 4.8              | 2.5             | 1823        | UP             |
| 3            | Three heading drives in seam II passing through fault F4 | 3             | 1 in 5   | West of B H No. MSSW 10                                  | 355          | 367 | 10              | 4.8              | 2.5             | 360         | UP             |
| <b>TOTAL</b> |                                                          |               |          |                                                          |              |     |                 |                  |                 | <b>3143</b> |                |

A minor quantity of waste may further increase in some staple shafts to join the seams for improvement of ventilation.

### 9.3 WASTE DISPOSAL SITES

The above waste produced in development of mine will be used for development of terrain near mine entries, office, workshop, roads, haulage ramp etc. The rest of waste produced during mining of coal will be stacked in selected space within the mine boundary. This surface dump has been proposed on the northern side of the mine entry. The area of waste disposal site is 0.5 Ha and the height will be kept below 5m.

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## CHAPTER 10

## MANPOWER, SAFETY AND SUPERVISION

## 10.1 SUPERVISION AND MANPOWER REQUIREMENT

Large number of local personnel including land losers would be mostly recruited in unskilled, semi skilled office assistant categories etc. These personnel need training and orientation before the project starts. Besides, some I.T.I qualified young people from the region can be recruited for operation and maintenance 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. But, some skilled and highly skilled personnel have to be brought from outside.

Employment potential for the proposed mine is given in Table 10.1.

**TABLE 10.1**  
**EMPLOYMENT POTENTIAL**  
**FOR A PRODUCTION OF 2000 TPD (0.60 MTPA) FROM FIVE DISTRICTS**

| Sl. No   | Designation                                                                            | Manpower Required |
|----------|----------------------------------------------------------------------------------------|-------------------|
| <b>A</b> | <b>Mine production &amp; maintenance supervision, safety, survey, welfare, medical</b> | <b>A</b>          |
| 1        | Agent                                                                                  | 1                 |
| 2        | Manager                                                                                | 1                 |
| 3        | ACM (1st Class)                                                                        | 1                 |
| 4        | Under Manager (2nd class)                                                              | 5                 |
| 5        | Safety Officer (1st Class)                                                             | 1                 |
| 6        | Ventilation Officer                                                                    | 1                 |
| 7        | Colliery Engineer                                                                      | 1                 |
| 8        | Electrical engineer                                                                    | 1                 |
| 9        | Mechanical engineer                                                                    | 1                 |
| 10       | Electrical Supervisor                                                                  | 2                 |
| 11       | Foreman In charge (Mechanical)                                                         | 2                 |
| 12       | Surveyor                                                                               | 1                 |
| 13       | Asst. Surveyor                                                                         | 1                 |
| 14       | Draughtsman's /Tracer                                                                  | 2                 |
| 15       | Chain Man                                                                              | 3                 |
| 16       | Welfare Officer                                                                        | 1                 |
| 17       | Accounts Officer                                                                       | 1                 |

| Sl. No   | Designation                                              | Manpower Required |
|----------|----------------------------------------------------------|-------------------|
| 18       | Medical Officer                                          | 1                 |
| 19       | Para Medical Staff                                       | 4                 |
| 20       | Sanitation                                               | 6                 |
| 21       | Vocational Training staff                                | 5                 |
| 22       | Rescue Room Staff                                        | 5                 |
| 23       | Office Staff                                             | 6                 |
|          | <b>Sub Total-A</b>                                       | <b>53</b>         |
| <b>B</b> | <b>Underground manpower for 5 Semi-mechanised panels</b> |                   |
| 1        | Over Man 3 x 3                                           | 9                 |
| 2        | Mining Sirdar 3 x 3                                      | 9                 |
| 3        | Shot Firer 3 x 3                                         | 9                 |
| 4        | LHD Operator 4 x 3                                       | 12                |
| 5        | LHD Helper 4 x 3                                         | 12                |
|          | SDL Operator 6 x 3                                       | 18                |
|          | SDL Helper 6 x3                                          | 18                |
| 8        | Drillers and Helpers 15 x 3                              | 45                |
| 9        | Explosives Carriers 15 x 3                               | 45                |
| 10       | Timber Gang 12 x 3                                       | 36                |
| 11       | Roof Bolting Gang 12 x 3                                 | 36                |
| 12       | Dressers 10 x 3                                          | 30                |
| 13       | Belt Operators 6 x 3                                     | 18                |
|          | <b>Sub Total-B</b>                                       | <b>297</b>        |
|          | <b>Underground manpower for Fullymechanised panel</b>    |                   |
| 1        | Continuous Miner Operator 1 X 3                          | 3                 |
| 2        | Shuttle Car Operator 2 x 3                               | 6                 |
| 3        | Cable boys 2 X 3                                         | 6                 |
| 4        | Roof bolting machine operator 1 X 3                      | 3                 |
| 5        | Roof bolting machine helper 1 X 3                        | 3                 |
| 6        | Feeder Breaker Operator 1 X 3                            | 3                 |
| 7        | Gate belt Conveyor operator 1 X 3                        | 3                 |
| 8        | E&M Overman / Supervisor 1X 3                            | 3                 |
|          | <b>Sub Total-C</b>                                       | <b>30</b>         |
| <b>D</b> | <b>Underground manpower for Services</b>                 |                   |
| 1        | Mechanical Fitters 3 x 3                                 | 9                 |
| 2        | Helpers for above 3 x 3                                  | 9                 |

| Sl. No   | Designation                                  | Manpower Required |
|----------|----------------------------------------------|-------------------|
| 3        | Electrician 3 x 3                            | 9                 |
| 4        | Helpers for above 3 x 3                      | 9                 |
| 5        | Tyndle                                       | 12                |
| 6        | General Labourers 6 x 3                      | 18                |
| 7        | Belt Cleaners 10 x 3                         | 30                |
| 8        | Pump Khalasi 6 x 3                           | 15                |
| 9        | Underground Haulage Operators 5 x 3          | 9                 |
| 10       | Line Mistry Gang 2 x 3                       | 6                 |
|          | <b>Sub Total-D</b>                           | <b>126</b>        |
| <b>E</b> | <b>Production Services</b>                   |                   |
| 1        | Attendance Clerk 1 x 3                       | 3                 |
| 2        | Lamp Room Incharge                           | 1                 |
| 3        | Lamp Issue Clerk 1 x 3                       | 3                 |
| 4        | Lamp Fitter                                  | 2                 |
| 5        | Lamp Fitter Helper                           | 2                 |
| 6        | Safety Lamp & Self Rescuer issue clerk 1 x 3 | 3                 |
| 7        | Main Fan Operator 1 x 3                      | 3                 |
| 8        | Surface Belt Operator 1 x 3                  | 3                 |
| 9        | Surface Haulage Operator 1 x 3               | 3                 |
| 10       | Body Checker 1 x 3                           | 3                 |
| 11       | Sub-station Attendant 1 x 3                  | 3                 |
| 12       | Stores 3 x 2                                 | 6                 |
| 13       | HMV Operator (8) + LMV (2) 10 x 3            | 30                |
| 14       | HMV Helper (1) 8 x 3                         | 24                |
| 15       | CHP Maintenance 4 x 3                        | 12                |
| 16       | Weighbridge 3 x 3                            | 9                 |
| 17       | Magazine 1 x 3                               | 3                 |
| 18       | Dozer Operator 1 x 3                         | 3                 |
| 19       | Pay Loader operator 1 x 3                    | 3                 |
| 20       | Security 10 x 3                              | 30                |
| 21       | DG Operator 1x 3                             | 3                 |
| 21       | Pumping & Water Supply at Surface            | 6                 |
|          | <b>Sub Total-E</b>                           | <b>158</b>        |
|          | <b>Total A+B+C+D+E</b>                       | <b>664</b>        |
|          | <b>Add : 25% for absenteeism</b>             | <b>166</b>        |
|          | <b>Grand Total</b>                           | <b>830</b>        |

Note : Security services will be Outsourced (Say 20)

## 10.2 SAFETY ASPECTS AND DISASTER MANAGEMENT

All types of industries face certain types of hazards which can disrupt normal activities abruptly and lead to disaster like fires, inundation, failure of machinery, explosion to name a few. Similarly coal mines also have impending dangers or risk which need be investigated addressed, disaster management plan formulated with an aim of taking precautionary steps to avert disaster and also to take such action after the disaster which limits the damage to the minimum. The few general precautions to be taken in normal daily routine of working are summarized below:

### 10.2.1 Implementation of general rules and regulations

The Mines Act 1952 and all the regulations and schedules of CMR 1957 relating to opencast & underground mining shall be adhered to and implemented in order to maintain day to day safety. All statutory rules, regulations, applicable laws etc. and statutory requirement related to Government licenses, workmen compensation, insurance etc. including Minimum Wages Act for workers shall be adhered to. Rules, if any, imposed by Local / State / Central authorities shall be complied with. Personal protective equipment like helmets, safety shoes etc. shall be provided.

### 10.2.2 Employment of persons

- a. No persons shall be deployed unless he is vocationally trained.
- b. Record in Form-B, Form C & Form-D shall be maintained.
- c. Records of Vocational Training Certificates and driving licenses of operators shall be kept at the mine and shall be made readily available for inspection.
- d. Qualified competent persons shall maintain adequate supervision.
- e. Outside agency (If any deployed in mine) shall follow safety guidelines and safety instructions from project authorities.
- f. No person / vehicle shall be deployed at any place other than authorized place.
- g. All workers shall obey lawful instructions of mine management.
- h. All drivers shall obey systematic traffic rules framed by the management.
- i. Before deployment, workers shall be trained and briefed about safety aspects in mine operations. However during course of execution of the work, if any accident occurs whether major or minor, the matter shall be immediately informed to concerned authorities.

### 10.2.3 Deployment of Equipments and Machineries

- a. All the machineries to be deployed shall be checked by competent authority before deployment in the mine.

- b. Regular checking of machines shall be done. No unfit machine shall be used before the defect is rectified.
- c. A proper record of repairs and maintenance along with inspections done by management and defects pointed out shall be maintained and signed by authorized person.
- d. The trucks deployed shall be provided with audio visual alarms and proper lights.
- e. Photocopies of RTO certificates of all vehicles shall be submitted to and maintained by the management.
- f. Daily monitoring, inspection shall be done by a competent person.
- g. The manufacturers shall be asked to give risk analysis details in respect of their equipment.
- h. Suitable type of fire extinguishers shall be provided in every equipment.

#### 10.2.4 Inundation

The nearest river is Sone river located at a distance of 17.23 km in the ENE direction flowing from SE to NW. Another nala called Bagaiha nala is located at a distance of 3 km in NE. The above mentioned nala and river are not posing any danger of inundation as their HFLs are far below the general level of the block (The level of river is 400 m AMSL and that of the nala is 450m AMSL while the lowest RL at surface of block is 478 m AMSL. The danger from inundation is worth discussing about the Ghogra nala passing through the block almost centre of the block with minor deviation towards western part in southern portion. It flows from south to north. There may be possibility of inrush rain water from flooding of this nala into the inclines or ventilation shaft. The Inclines mouth is at 489m RL and the mouth of the ventilation shaft is at 487m RL. The arrangement of the surface contours shows that there is a possibility of water entering the shaft and the inclines in case of flood. It has, therefore been proposed that

1. A pucca bundh will be constructed along the nala with a height of 2m above HFL for a length of 1.00 KM from 492m RL in South up to 486m RL towards North. It will protect the facility area as well as Incline and Ventilation shaft.
2. The mouth of the Inclines and Ventilation shaft will be raised 1.5m above the HFL of Ghogra Nala with the help of locally raised platform duly protected by walls along the sides

Hence, inundation from Ghogra nala will be well managed.

Moreover in order to control the in-rush of water into the inclines and shaft in rainy season from the surface or through seepage from the strata, sufficient garland drains will be made around them. Besides, pumps of required capacity and HP will be installed to pump out the seepage and rain

  
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water continuously. A stand by diesel generator will be provided for uninterrupted supply of power to the pumps in the event of failure of power.

In addition to above, the following precautions will be specially taken care off:

- a. A careful assessment shall be made against the danger from surface water before the onset of rainy season. The necessary precaution shall be clearly laid down and implemented. A garland drain shall be provided to drain away the surface rain water.
- b. Inspection for any accumulation of rain water, obstruction in normal drainage and weakening of embankment shall be carried out regularly.
- c. Standing order for withdrawal of persons in case of apprehended danger shall be framed and implemented.
- d. During heavy rains, inspection of vulnerable points shall be carried out.
- e. Nala or water inlets shall be diverted or isolated by embankments, if so required.

#### 10.2.5 Disaster due to failure of waste dump

There is only one waste dumps for the disposal of stone generated from the underground drifts. Its height will be less than 5 m, hence there is no danger of its failure.

The waste dump will be stabilised by tree plantations and other arrangements as detailed below:-

1. Gullies (chutes) will be cut for flow of water from the waste dump slowly to channelise it to garland drain. This precaution is necessary to prevent erosion of waste dump here and there due to erratic flow of rainwater.
2. On the slope of the dump, small pits of 0.3 x 0.3 x 0.3 m will be cut and seedlings will be planted and also over the 1.5 m width of top from edge of the bench similar plantation shall be done so that the top of the waste dump slope will get stabilized.
3. A stone toe wall will be made all around the waste dump to prevent waste dump material being carried out of the dump area and mixing with the general drainage system of the area.
4. A garland drain will be constructed all around the waste dump area for smooth flow of water.
5. The overall slope of dump sides will be kept below 28°.

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उप सचिव  
सह सचिव  
मुख्य सचिव  
नमो नमो

**10.2.6 Disaster due to surface fire/coal stock fires**

Sufficient fire extinguishers will be installed at selected locations on surface like Electrical Sub-stations, work-shop, Garage, Diesel Depot, Stores etc. Besides, sufficient number of water hydrants with sufficient hose pipes will be made available in the surface for fire protection. In order to prevent fire hazards in coal stock piles, following types of precaution shall be taken.

- (i) Prevent the happening or presence of any external source of fire in the vicinity of coal stockpiles i.e.
  - naked fire
  - electric fire
  - fuel oil fire

In case of electric equipment operating in the vicinity of fuel oil being used or stored in the vicinity of the coal stock piles, appropriate types of fire extinguishers will be provided on or near such equipment in order to extinguish the fire at the very start.

- (ii) Restrict the stacking height of the coal to below 2 meters. Higher height may only be attempted for shorter interval of stacking. The time and height shall be established with respect to spontaneous combustion which will help in restricting to safe parameters.
- (iii) Appropriate arrangement will be made by inserting pipes in the stack to monitor the internal temperature of coal. In case, temperature is found to shoot above safe limits, the coal from the part of stack shall be immediately dug out and disposed safely.
- (iv) Intrinsically safe equipment will be used underground to prevent spark from electricity being used.

**10.2.7 Possible dangers due to storage of explosives in the magazine**

The total production of coal will be 0.60 MT. Out of this total annual production, half (0.3 MT) will be produced by continuous miner and the balance (0.3 MTPA) will be achieved through solid blasting. It has been calculated that the daily requirement will be about 0.40T. For keeping a buffer stock of 3-4 weeks, 10T capacity magazine would have been required but keeping in view that the adjoining block "Shahpur East Block" also belongs to NMDC, it has been thought appropriate to have 20T capacity magazine to serve both the blocks for the storage of explosives, primers, detonators etc.

The explosive magazine will be designed in such a manner that normal chances of fire inside the magazine is ruled out. Still following precaution will be taken:

- Clearance of dried vegetation within 15 m of Magazine House.

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- Installation of lightening arresters on the Magazine to prevent damages in the event of an explosion.
- Provision of fire extinguishers, water and sand filled buckets.
- Arrangement of mounds around the magazine to mitigate damage in the event of an explosion.

Appropriate safety zone margin around the Magazine will be kept as per the guidelines given in Schedule VIII of The Explosives Rules, 1983.

#### 10.2.8 Prevention of electric shock

During mining operations, all the statutory provisions of Indian Electricity Rules 1956, and Indian standards for installation and maintenance of electric equipment etc. shall be observed.

- For protection of electric shocks to persons, Earth Leakage Relay shall be provided which will automatically disconnect electrical circuits in case of fault.
- Closed mobile substations and switchgears shall be mechanically interlocked which shall eliminate the possibility of opening of the door when oil switch and air circuit breakers are in operation.
- All metallic parts of electrical equipment shall be properly earthed.

#### 10.2.9 Safety management

Safety is paramount to all operations. A safety management plan will be developed specific to operations of individual equipments and the other operations. The plan will include standards and procedures for the safe and efficient undertaking of all activities and tasks within the project scope. Standards will, as an absolute minimum, comply with the Indian Coal Mines Regulations 1957.

##### **Fencing**

All the areas where access to unauthorized persons or animals is prohibited, will be protected by barbed wire. Abandoned UG workings and depillared or unsafe goaves shall also be fenced or closed with the help of stopping. Waste disposal areas at surface shall be fenced to prevent inadvertent entry.

##### **ii. Frisking**

All persons, entering the mine, will be frisked before entering to prevent them from taking any prohibited article especially the fire generating articles like matches.

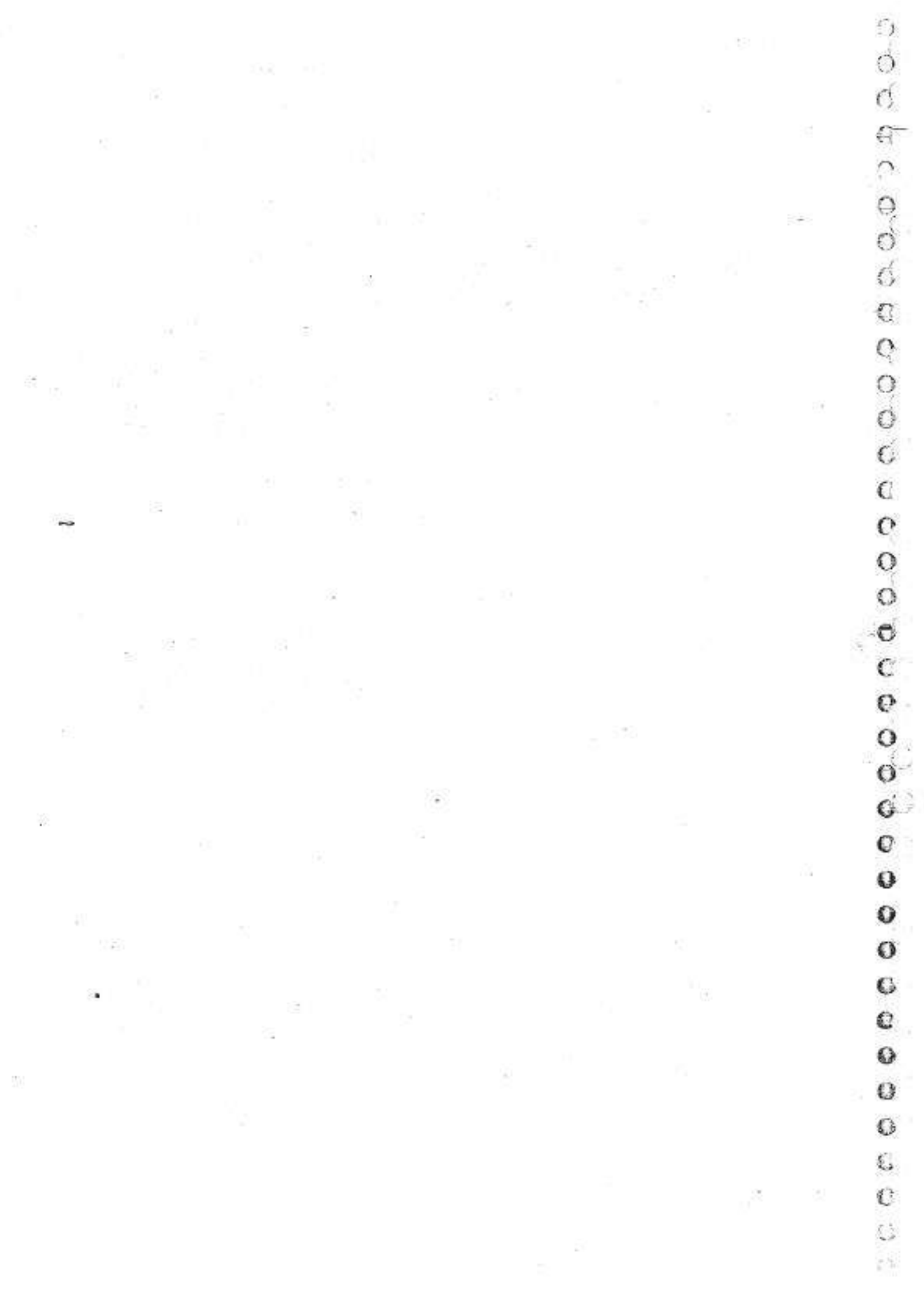
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### 10.3 APPREHENSION OF SUBSIDENCE

It is apprehended that there will be any subsidence due to mining at shahpur west coal block due to mining. The adequate provision for safety pillars has been made in underground mining. The maximum of the mining in the block is in a depth range of 50m to 150m. The general lay and deposition of mineable coal seams at Shahpur West Coal Block resemble that mineable coal reserves in upper most coal seam are available in north central part and further trending on both east and West side of seam IV. In the southern part of this seam, it is mostly devoid of coal. The northern part of the seam is also non mineable coal bearing area due to less thickness or non development of coal seam. The workable coal thickness in seam L2 is restricted in south East and one small patch in central part of the block. The deposition of coal in seam III A is restricted in north East area only. The seam II is fully developed in almost entire area except in small southern part. The overall thickness of the extractable coal seams is also less. The specific provision for not to win the coal by depillaring under the prominent features like village, nalas and road etc. have been made. Only 25% coal is to be won through development only under these features.

The scientific studies will be carried out to assess the impact of mining and subsidence. The support requirement, design and the pattern of roof bolting and their specifications will be accessed after scientific studies. During both development and depillaring monitoring of effectiveness of supports will have to be carried out by actual measurements.

  
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## CHAPTER 11

## TRANSPORT OF COAL AND MATERIAL

## 11.1 UNDERGROUND TRANSPORT OF COAL

The coal produced in underground will be handled with a system of conveyors up to 4 nos. of surface bunkers with a capacity of 100 tonnes each. A 1000mm "fire resistant" conveyor at around 2m/s with a capacity of average 200 tonnes per hour (TPH) will be installed in the centre roadway to ensure equal conveying distances and cable lengths on each side of the loading point. Peaks of 300 TPH are expected.

The conveyor will be equipped with a loop take-up at least of sufficient capacity to hold belt stretch for one week and preferably to hold one roll (usually 300m) of conveyor belting for extension and retreat of the conveyor.

At the in bye end of the conveyor, a sledge mounted and guarded return pulley frame, graduated loading section (at least 3m in length) equipped with impact rollers, and anchor chains should be provided.

The "head" end of the conveyor should be equipped with a suitable loading section on to the trunk conveyor, dust suppression equipment, belt alignment, belt slack and belt slip detectors. The "gate" belt should be electrically interlocked with the "trunk" conveyor to automatically stop the gate belt should the trunk belt stop.

Communication and continuous signaling and "stop pulls" should be provided along the length of the conveyor. The conveyor should also be provided with an effective bottom belt scrapper.

One side of the conveyor will be designated as the "man walkway" into the district. To prevent "Tripping and Falling" accidents, this walkway should be kept clear of any supplies, materials, be clean, level and well illuminated. (Refer Plate XIII & XIV)

## 11.2 MATERIAL TRANSPORT

Materials such as timber, roof bolts, grouts/resins, spare parts, cables, lubricants, ventilation stopping materials etc. are to be transported by the mine to within one split of the gate belt "tail end".

An endless rope haulage system using 15 kg track with a 0.6m gauge will be used for transport of material. The track and return wheel should lag not more than 2 pillars behind the conveyor tail end.

  
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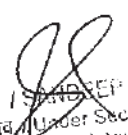
**11.3 SURFACE TRANSPORT OF COAL AND WASTAGE**

The surface transport of coal at Shahpur West Coal Block will be done by Coal Tippers to the pit head stockpile and stock yards at railway sidings. The wastage produced during drifting will be transported by dumpers to the surface dumps.

The transportation of coal from the Shahpur West block to the nearest railway siding for further transport to different destinations will be carried by 20T capacity dumpers. A dedicated road has been proposed in N-E direction from the pit head for transportation of coal on surface avoiding any disturbance to habitations and public roads within the block (refer Plate-IV). A meagre quantity of 12000 te of coal of seam IV will be blocked under this road

**11.4 TRANSPORT OF WASTE ROCK FROM UNDERGROUND**

The wastage produced during the floor dinting will be dealt separately to avoid any mixing with the coal produced from the drivage of the gallery. The floor dinting will be carried out after driving of one complete pillar length as the simultaneous activity may degrade the coal. It will be taken out to surface by rope haulage which is mainly meant for material transport from surface to underground workings and vice versa. It may be noted that roof dinting has not been recommended as the roof is comprising strong sandstone lest it should weaken as a result of blasting to be carried out for dinting.

  
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## CHAPTER 12

INFRASTRUCTURE FACILITIES PROPOSED  
AND THEIR LOCATION

## 12.1 SITE SERVICES

Complete facilities near to the site are very important for coal production. It is imperative to develop core infrastructure like power, road, telecommunication, housing, service buildings viz. office, store, first aid centre, canteen, etc. for a large number of employees for the project. The mine project is at a remote place from the district headquarter. The site services required at proposed mine will be housed within the premises of proposed mine complex shown in Plate V. The mine office has been provided near to the main administrative building (away from the CHP) as suggested by MOC.

## 12.1.1 Workshop

Garage-cum-workshop-cum-engineering stores is meant for regular repairs and maintenance of equipments and dumpers etc. for mine operation. The garage and workshop complex comprises repairs bays for dumpers and pay-loaders, washing bays, storage rooms, inspection pits, engine repair room, auto-electrician room, open yard for parking of vehicles.

## 12.1.2 Road and rail

The block is well connected by road and rail. The nearest railway station is Shahdol located 12 Km. south-east of the block on Anuppur-Chirimiri & Bilaspur - Katni broad gauge line of South-Eastern Railways. National highway No. 78 passes through Shahdol. The area is connected through all-weather road up to Shahdol.

## 12.1.3 Water supply

Total requirement of water for mining and allied activities is 627m<sup>3</sup>/day. The whole requirement will be met from borewell in the initial stage as the water will not be available during the initial period of development from the mine.

Industrial water required for washing, sprinkling on mine roads for dust suppression and for watering the mine site plantations, will be supplied from pumping installation at mine sump and surface reservoir.

The drinking water will continue to be supplied from bore well through the life of the mine. The water will be first stored in overhead tank near the facilities area and distributed through pipe lines to different facilities area for drinking and domestic purposes.

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The break up of the required water for different activities is as follows:

|                                                                                                                            |   |            |
|----------------------------------------------------------------------------------------------------------------------------|---|------------|
| Underground Spraying (after blasting (not common), conveyor transfer points etc)                                           | = | 10         |
| Underground water requirement for continuous miner @ 250 lpm/machine for one units assuming 50% effective operational time | = | 180        |
| Sprinkling @ 30 cum per km per day of haul road for 2 km                                                                   | = | 60         |
| Fire water makeup                                                                                                          | = | 10         |
| Plantation @ 15 cum/hac for 5 hac.                                                                                         | = | 75         |
| Vehicles washing @ 2.0 m <sup>3</sup> /vehicle/day for 10 vehicles considering 50% recirculation                           | = | 10         |
| Drinking water at working place @ 45 lpd/head for 830 workers                                                              | = | 38         |
| For colony (total manpower in mine 830 out of which colony provision has been made for 50% (415) i.e. 415 x 4 x 135lpd     | = | 224        |
| For peripheral villages (potable)                                                                                          | = | 20         |
| <b>Total KL Per Day</b>                                                                                                    |   | <b>627</b> |

#### 12.1.4 Power supply

The required 7 MW power supply at 33 KV will be drawn from nearest sub station to the local sub-station from where the power will be supplied to the mine and other functional buildings. An emergency arrangement for power supply has been made by providing a set of 1000 KVA and 500 KVA DG sets which will take care of ventilation and pumping and other essential services. This requirement is based on the following details:

| Sl. No. | Equipment                                        | No. | Unit power(KW) | Total power |
|---------|--------------------------------------------------|-----|----------------|-------------|
| 1       | LHD with Bucket capacity 2.1 M <sup>3</sup>      | 4   | 62             | 248         |
| 2       | SDL /ISL with Bucket capacity 1.2 M <sup>3</sup> | 6   | 65             | 390         |
| 2       | Medium duty belt conveyors                       | 5   | 50             | 250         |
| 3       | Coal drill with panels                           | 12  | 5              | 60          |
| 4       | Roof bolting machines                            | 7   | 10             | 70          |
| 5       | Endless haulage                                  | 5   | 50             | 250         |
| 6       | Auxiliary fans 11 M3/ sec                        | 18  | 10             | 180         |
| 7       | Face pumps                                       | 10  | 20             | 200         |
| 8       | Main pumps seam IV                               | 2   | 60             | 120         |
| 9       | Main pumps seam IV                               | 2   | 40             | 80          |
| 10      | Continuous miner                                 | 1   | 620            | 620         |
| 11      | Shuttle cars                                     | 2   | 219            | 438         |
| 12      | Roof bolter                                      | 1   | 112            | 112         |
| 13      | Feeder breaker                                   | 1   | 200            | 200         |

| Sl. No.                                              | Equipment                        | No. | Unit power(KW) | Total power |
|------------------------------------------------------|----------------------------------|-----|----------------|-------------|
| 14                                                   | Main fan                         | 1   | 150            | 150         |
| 15                                                   | Conveyors in gates               | 6   | 35             | 210         |
| 16                                                   | Main trunk conveyor              | 1   | 200            | 200         |
| 17                                                   | Material haulage in main incline |     |                | 80          |
| 18                                                   | Workshop                         | 1   | 500            | 500         |
| 19                                                   | CHP                              | 1   | 500            | 500         |
| 20                                                   | Office, VT, disp, etc            | 1   | 500            | 500         |
| 21                                                   | Misc                             |     | 500            | 500         |
|                                                      | <b>Total</b>                     |     |                | <b>5858</b> |
| <b>Adopted with additional 15% unforeseen demand</b> |                                  |     |                | <b>7000</b> |

#### 12.1.5 Residential facilities

Mining activities are existing in Sohagpur Coalfield, hence most of the required type of manpower will be available in the area. However a provision for colony for about 50% manpower has been made. The colony is proposed to be located outside the block boundary for both Shahpur East and Shahpur West blocks.

#### 12.1.6 Stores

A store will be provided alongside the workshop to take care of providing necessary consumable, maintenance and repair store house.

#### 12.1.7 Diesel storage

A large number of transport vehicles will operate on diesel. Hence, an underground 30 KL diesel pump will be established at the mine site. A diesel tanker will also be provided for the transport of diesel up to DG sets at mine.

#### 12.1.8 Canteen and site office

A temporary canteen, first aid center, rest shelter and site office will be available at site while the main facilities will be within the ML area.

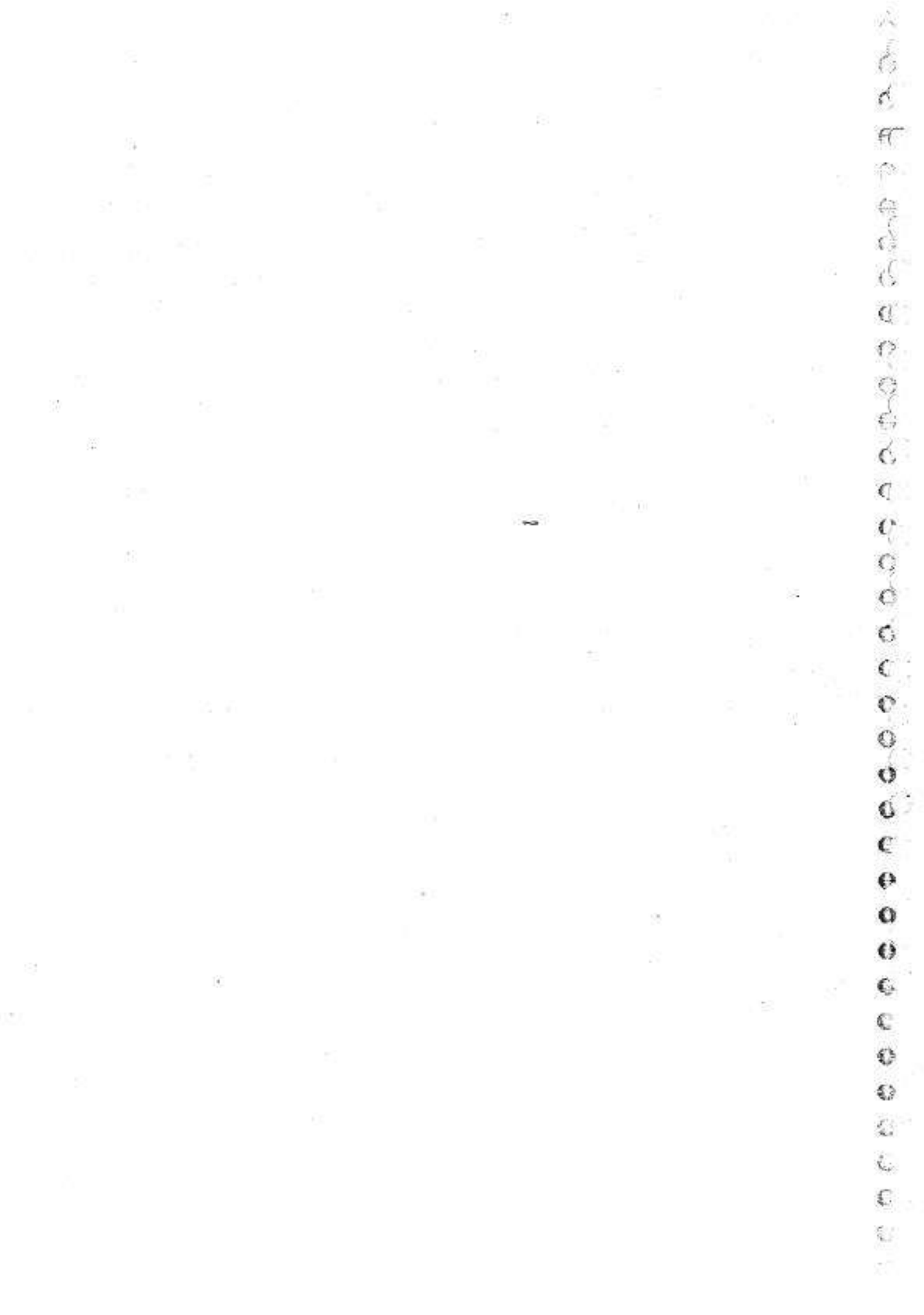
#### 12.1.9 Vocation training centre

A Vocational Training Centre will be provided for training of operators and other workmen adjoining to the main mines office located inside mine site.

#### 12.1.10 Explosive magazine

A 20.00 Tonnes capacity magazine will be provided within the ML area of Shahpur East block which will take care of the requirement of both Shahpur East and Shahpur West block.

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## CHAPTER 13

### LAND REQUIREMENT

#### 13.1 PRESENT LAND USE AND OCCUPANCY

Summary of the land use and occupancy details are given in Table 13.1.

**TABLE 13.1**  
**AREA DETAILS FOR MINING LEASE APPLIED (IN HECTARES)**  
**(SUMMARY OF LAND – SHAHPUR WEST COAL BLOCK)**

| Sl. No. | Type of land             | District Shahdol |              | District Umaria |                |               | Total          |
|---------|--------------------------|------------------|--------------|-----------------|----------------|---------------|----------------|
|         |                          | Khamaria Kalan   | Kathotia     | Kushmaha Khurd  | Khamaria Khurd | Shahpur       |                |
| 1       | Habitation               | 31.688           | 0            | 18.58           | 2.581          | 13.805        | 66.657         |
| 2       | Grazing Land             | 1.687            | 0            | 1.046           | 7.189          | 2.425         | 12.347         |
| 3       | Cremation Ground         | 0.681            | 0            | 0.202           | 0              | 0             | 0.883          |
| 4       | Road                     | 0.926            | 0            | 1.57            | 2.472          | 0.535         | 5.503          |
| 5       | Ponds                    | 6.076            | 0            | 4.986           | 1.692          | 2.365         | 15.119         |
| 6       | River & Nalla            | 3.496            | 1.582        | 1.198           | 1.085          | 0.494         | 7.855          |
| 7       | School                   | 0.202            | 0            | 0.125           | 0              | 0.202         | 0.529          |
| 8       | Khal Khaddar             | 0                | 0            | 0.202           | 0.101          | 0             | 0.303          |
| 9       | Fertilizer Ditch         | 0.036            | 0            | 0.1             | 0.101          | 0             | 0.237          |
| 10      | Gothan                   | 0.401            | 0            | 0.405           | 0.999          | 0             | 1.805          |
| 11      | Temple                   | 0.012            | 0            | 0               | 0              | 0             | 0.012          |
| 12      | Bag Bagia                | 0.526            | 0            | 0               | 0              | 0.865         | 1.391          |
| 13      | Judpi Jungle             | 8.631            | 0            | 3.521           | 1.563          | 2.627         | 16.342         |
| 14      | Forest                   | 0                | 0            | 9.194           | 9.727          | 0             | 18.921         |
|         | <b>Sub Total 1 to 14</b> | <b>54.362</b>    | <b>1.582</b> | <b>41.129</b>   | <b>27.51</b>   | <b>23.318</b> | <b>147.904</b> |
| 15      | Agriculture Land         | 166.128          | 0.557        | 140.550         | 88.43          | 43.934        | 439.599        |
|         | <b>Total Land</b>        | <b>220.49</b>    | <b>2.139</b> | <b>181.679</b>  | <b>115.94</b>  | <b>67.252</b> | <b>587.5</b>   |

#### 13.2 PROPOSED LAND USE

There will be only underground mining activity within the applied mining lease area. So the profile of the land use will not change to a large extent after mining due to underground mining activity.

The details of land use during mining up to last year of mining operation and post mining land use with environment management is given in Table 13.2 & 13.3.

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Under Secretary  
Ministry of Coal  
Government of India  
New Delhi

**TABLE 13.2**  
**LAND USE WITH ENVIRONMENT MANAGEMENT WITHIN ML UPTO**  
**END OF MINING OPERATION**

| Sl. No. | Description of area                                                                                                                                    | Land use (ha.) |          |            |            |               |                         |              |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------|------------|------------|---------------|-------------------------|--------------|
|         |                                                                                                                                                        | Plantation     | Void     | Water body | Public use | Undisturbed   | Self use under facility | Total        |
| 1       | Top soil dump                                                                                                                                          | 0              | 0        | 0          | 0          | 0             | 0.36                    | 0.36         |
| 2       | Surface dump                                                                                                                                           | 0              | 0        | 0          | 0          | 0             | 0.5                     | 0.5          |
| 3       | Settling ponds                                                                                                                                         | 0              | 0        | 0          | 0          | 0             | 0.4                     | 0.4          |
| 4       | Ventilation shaft                                                                                                                                      | 0.17           | 0        | 0          | 0          | 0             | 0.01                    | 0.18         |
| 5       | Coal stack yard                                                                                                                                        | 0              | 0        | 0          | 0          | 0             | 0.6                     | 0.6          |
| 6       | Facilities including road, Office, W shop, Store, CHP, mouth of inclines, VTC, Canteen, Diesel Bunk and area between the buildings and lawn plantation | 1.73           | 0        | 0          |            | 0             | 3                       | 4.73         |
| 7       | Green belt around facilities                                                                                                                           | 1.27           | 0        | 0          | 0          | 0             | 0                       | 1.27         |
| 8       | Approach Road                                                                                                                                          | 0              | 0        | 0          | 0          | 0             | 4.83                    | 4.83         |
| 9       | <b>Sub Total *Disturbed (including green belt and lawn plantation)</b>                                                                                 | <b>3.17</b>    | <b>0</b> | <b>0</b>   | <b>0</b>   | <b>0</b>      | <b>9.7</b>              | <b>12.87</b> |
|         | Undisturbed area                                                                                                                                       | 0              | 0        | 0          | 0          | 574.63        | 0                       | 574.63       |
|         | <b>Total</b>                                                                                                                                           | <b>3.17</b>    | <b>0</b> | <b>0</b>   | <b>0</b>   | <b>574.63</b> | <b>9.7</b>              | <b>587.5</b> |

**TABLE 13.3**  
**MINING LAND USE AFTER MINE CLOSURE**

| Sl. No. | Description of area                                                                                                                                    | Land use (ha.) |             |            |             |               |              |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-------------|------------|-------------|---------------|--------------|
|         |                                                                                                                                                        | Plantation     | Void        | Water body | Public use  | Undisturbed   | Total        |
| 1       | Top soil dump                                                                                                                                          | 0.36           | 0           | 0          | 0           | 0             | 0.36         |
| 2       | Surface dump                                                                                                                                           | 0.5            | 0           | 0          | 0           | 0             | 0.5          |
| 3       | Settling ponds                                                                                                                                         | 0              | 0           | 0.4        | 0           | 0             | 0.4          |
| 4       | Ventilation shaft                                                                                                                                      | 0.17           | 0.01        | 0          | 0           | 0             | 0.18         |
| 5       | Coal stack yard                                                                                                                                        | 0.6            | 0           | 0          | 0           | 0             | 0.6          |
| 6       | Facilities including road, Office, W shop, Store, CHP, mouth of inclines, VTC, Canteen, Diesel Bunk and area between the buildings and lawn plantation | 4.00           | 0.3         | 0          | 0.43        | 0             | 4.73         |
| 7       | Green belt around facilities                                                                                                                           | 1.27           | 0           | 0          | 0           | 0             | 1.27         |
| 8       | Approach Road                                                                                                                                          | 3.6            | 0           | 0          | 1.23        | 0             | 4.83         |
| 9       | <b>Sub Total *Disturbed (including green belt and lawn plantation)</b>                                                                                 | <b>10.50</b>   | <b>0.31</b> | <b>0.4</b> | <b>1.66</b> | <b>0</b>      | <b>12.87</b> |
| 10      | Undisturbed area                                                                                                                                       | 0              | 0           | 0          | 0           | 574.63        | 574.63       |
|         | <b>Total</b>                                                                                                                                           | <b>10.50</b>   | <b>0.31</b> | <b>0.4</b> | <b>1.66</b> | <b>574.63</b> | <b>587.5</b> |

## CHAPTER 14

## ENVIRONMENTAL MANAGEMENT PLAN

## 14.1 INTRODUCTION

Baseline environmental status in and around proposed project depicts the existing environmental conditions of air, noise, water, soil, biological and socio-economic environment. With proposed project as the center, a radial distance of 10 Km is considered as 'study area' for baseline data collection and environmental monitoring. Baseline data was collected for various/environmental attributes so as to compute the impacts that are likely to arise due to proposed developmental activity.

The baseline data generation was carried out to use the baseline monitoring data for future impact studies. This study is carried out during the project planning stage itself, so that the proponent can implement the project in a technically, financially and environmentally viable way.

The success of any impact assessment study depends mainly on two factors. One is estimation of impact from proposed project on the environment and the second one is assessment of the environmental condition. Both are key factors to arrive at the post project scenario. The estimated impact due to the proposal can be superimposed over the existing conditions to arrive at the post project scenario. The scope of the baseline studies includes detailed characterization of following environmental components, which are most likely to be influenced by the setting up an industry:

- ❖ Meteorological conditions
- ❖ Ambient Air Quality
- ❖ Noise Levels
- ❖ Water Quality (Surface + Ground water)
- ❖ Soil Quality and
- ❖ Socio Economic studies.

  
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## a) Study period

The baseline data generation was carried out during the winter season (Dec 2009 to Feb 2010).

## b) Study Area

The study area for the Baseline monitoring studies has been taken as 10Km radius from the centre of the Shahpur west exploration block, keeping in view the guide-lines of Ministry of Environment and Forest (MOEF), Govt. of India.

**c) Location and Accessibility**

The area is situated in the Shahdol and Umaria district, Eastern part of Madhya Pradesh State and is bound by Latitudes 23°14'21" to 23°15'37" and Longitudes 81°17'20" to 81°18'48" It forms a part of the survey of India Toposheet No.64 E/7 & 64E/8.

The area forms a part of Shahdol and Umaria district. Administratively the area is a part of Sohagpur Tehsil of Shahdol district and Pali Teshsil of Umaria district, Madhya Pradesh. Shahdol and Sohagpur towns are located well within the area.

The area can be approached by road by National Highway No.78 from Katni (Approx. 69 Kms) and by rail (South-Eastern Railway) either from Jabalpur or Bilaspur. The nearest railway station is Shahdol. Jabalpur is the nearest Airport, about 300 K from the area, which is well connected with New Delhi by Air route.

|                          |                    |
|--------------------------|--------------------|
| Lease area               | 587.5 Ha           |
| Nature of land           | Mainly agriculture |
| Mineral to be mined      | Coal               |
| Anticipated life of mine | 33                 |
| Method of mining         | Underground        |
| Surface transport        | By coal tippers    |

**14.2 BASELINE STATUS OF ENVIRONMENT****a) Meteorology**

Shahdol and Umaria districts experience an extreme climate. December and January months are the coldest months in the year, the former being cooler by day time but later having cooler nights. From the month of February the temperature starts rising both by day and night and this trend continuous till may. The nights are usually warmer in the June than in May. From the month of June end the temperature again starts falling. The fall being, somewhat, steep from May to June & June to July. The downward trend in temperature continues till August but thereafter in September and October the day temperatures registers a small increase. The night temperature however continues to decline during September and October. After October, the maximum and minimum temperature also resumes the downward trend till the lowest temperature are reached in December and January.

Summary of the climatologically data (IMD station Umaria) is presented here under.

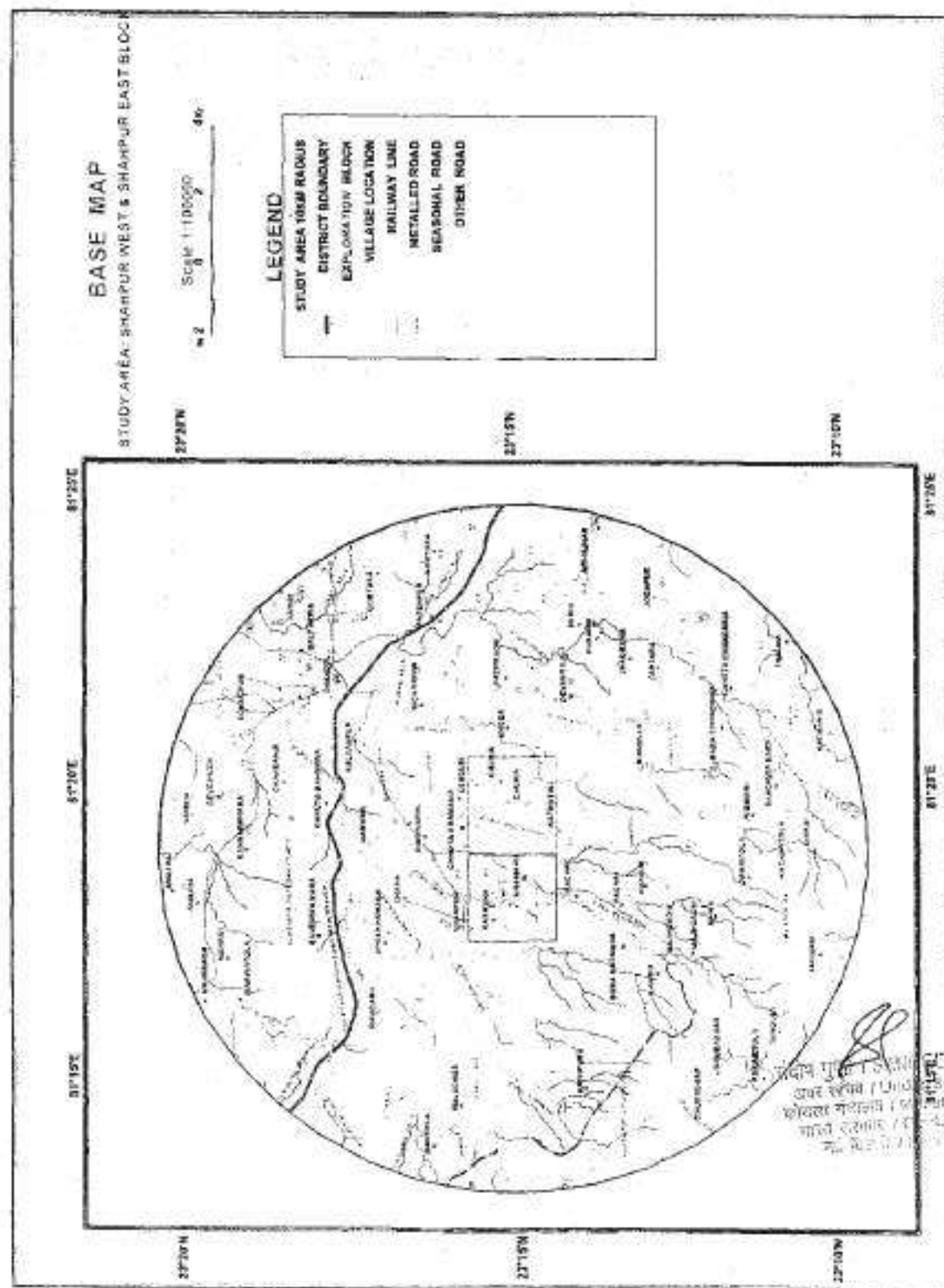


**Fig 14.1 : 10 km Study Area Map**

**b) Analysis of the IMD Umaria Meteorological Data:****Temperature**

The temperature profile of this region based on 30 years old data is as follows:

| Description         | Minimum temp.<br>(°C) | Maximum temp.<br>(°C) |
|---------------------|-----------------------|-----------------------|
| Post monsoon season | 7.6                   | 33.5                  |
| Winter Season       | 3.3                   | 33.1                  |
| Summer Season       | 10.1                  | 44.1                  |
| Monsoon season      | 21.6                  | 43.1                  |

Note: IMD (1951 – 1980)

**Humidity**

|                                          |   |      |
|------------------------------------------|---|------|
| Annual mean humidity (Morning – 8.30 am) | - | 66 % |
| Annual mean humidity (Evening – 5.30 pm) | - | 53 % |
| Maximum Humidity                         | - | 73 % |
| Minimum Humidity                         | - | 40 % |

**Rainfall**

|                              |   |                 |
|------------------------------|---|-----------------|
| Predominant rainy season     | - | June to October |
| Average annual rainfall      | - | 365.3 mm        |
| Average number of rainy days | - | 60.2 days       |
| Lean Rainy periods           | - | March to May    |

The preliminary data collection schedule is given in Table 14.1. The Secondary data sources were utilized for collection of information about hydro-geological conditions, socio-economics, seismicity and important places and industries in surrounding areas.

**TABLE 14.1**  
**MONITORING SCHEDULE AND PARAMETERS**

| Sl. No. | Description of parameters                                                                     | Schedule and duration of monitoring      |
|---------|-----------------------------------------------------------------------------------------------|------------------------------------------|
| 1       | Air quality in the vicinity of the mine – SPM, RSPM, SO <sub>2</sub> , NO <sub>x</sub> and CO | 8 samples, twice a week for three months |
| 2       | Water quality (all parameters as per drinking water standards IS:10500)                       | 8 samples once in a season               |
| 3       | Ambient noise levels                                                                          | 8 stations once in a season              |
| 4       | Study of Flora and Fauna                                                                      | Within the study area                    |
| 5       | Soil quality                                                                                  | 5 stations once in a season              |

## 14.2.1 Existing land use pattern

## a) Core zone

The total area of core zone is 587.5 Ha. The details are given in Table 14.2.

**TABLE 14.2**  
**LAND USE OF CORE ZONE**

| Sl. No. | Type of land             | District Shahdol |              | District Umaria |                |               | Total          |
|---------|--------------------------|------------------|--------------|-----------------|----------------|---------------|----------------|
|         |                          | Khamaria Kalan   | Kathotia     | Kushmaha Khurd  | Khamaria Khurd | Shahpur       |                |
| 1       | Habitation               | 31.688           | 0            | 18.58           | 2.581          | 13.805        | 66.657         |
| 2       | Grazing Land             | 1.687            | 0            | 1.046           | 7.189          | 2.425         | 12.347         |
| 3       | Cremation Ground         | 0.681            | 0            | 0.202           | 0              | 0             | 0.883          |
| 4       | Road                     | 0.926            | 0            | 1.57            | 2.472          | 0.535         | 5.503          |
| 5       | Ponds                    | 6.076            | 0            | 4.986           | 1.692          | 2.365         | 15.119         |
| 6       | River & Nalla            | 3.496            | 1.582        | 1.198           | 1.085          | 0.494         | 7.855          |
| 7       | School                   | 0.202            | 0            | 0.125           | 0              | 0.202         | 0.529          |
| 8       | Khal Khaddar             | 0                | 0            | 0.202           | 0.101          | 0             | 0.303          |
| 9       | Fertilizer Ditch         | 0.036            | 0            | 0.1             | 0.101          | 0             | 0.237          |
| 10      | Gothan                   | 0.401            | 0            | 0.405           | 0.999          | 0             | 1.805          |
| 11      | Temple                   | 0.012            | 0            | 0               | 0              | 0             | 0.012          |
| 12      | Bag Bagia                | 0.526            | 0            | 0               | 0              | 0.865         | 1.391          |
| 13      | Judpi Jungle             | 8.631            | 0            | 3.521           | 1.563          | 2.627         | 16.342         |
| 14      | Forest                   | 0                | 0            | 9.194           | 9.727          | 0             | 18.921         |
|         | <b>Sub Total 1 to 14</b> | <b>54.362</b>    | <b>1.582</b> | <b>41.129</b>   | <b>27.51</b>   | <b>23.318</b> | <b>147.904</b> |
| 15      | Agriculture Land         | 166.128          | 0.557        | 140.550         | 88.43          | 43.934        | 439.599        |
|         | <b>Total Land</b>        | <b>220.49</b>    | <b>2.139</b> | <b>181.679</b>  | <b>115.94</b>  | <b>67.252</b> | <b>587.5</b>   |

## b) Buffer zone

The study of land use/ land cover has been done by studying remote sensing data, by using IRS-P6, LISS-III, PATH-101, ROW-055 (30% SAT), DOP- 21-02-2009 and by collecting Government record from Census data. The breakup of major landuse/land cover is:

**TABLE 14.3**  
**SUMMARY OF MAJOR LAND USE / LAND COVER COMPARISON OF REMOTE SENSING DATA & GOVT. RECORDS**

*(Signature)*  
Joint Secretary  
Ministry of Coal  
Government of India  
New Delhi

| Land use / Land cover classes                                            |                   |                 |              |                                       |                                    |                |              |
|--------------------------------------------------------------------------|-------------------|-----------------|--------------|---------------------------------------|------------------------------------|----------------|--------------|
| Based on Remote Sensing Studies<br>(Date of pass of LISS-III 21.02.2009) |                   |                 |              | Based on Govt. Records, (Census 2001) |                                    |                |              |
| Sl. No.                                                                  | Name of the Class | Area (Ha)       | % Area       | Sl. No.                               | Name of the Class                  | Area (Ha)      | % Area       |
| 1.                                                                       | Forest Land       | 10281.60        | 32.69        | 1.                                    | Forest Land                        | 13278.0        | 30.52        |
| 2.                                                                       | Agriculture       | 12449.12        | 39.58        | 2.                                    | Agriculture                        | 19961.0        | 45.88 ✓      |
| 3.                                                                       | Waste Land        | 4985.20         | 15.85        | 3.                                    | Culturable Waste                   | 4249.0         | 09.77        |
| 4.                                                                       | Built Up Area     | 3421.60         | 10.88        | 4.                                    | Area not available for Cultivation | 6016.0         | 13.83        |
| 5.                                                                       | Water Bodies      | 314.0           | 1.00         |                                       |                                    |                |              |
|                                                                          | <b>Total</b>      | <b>31451.52</b> | <b>100.0</b> |                                       | <b>Total</b>                       | <b>43504.0</b> | <b>100.0</b> |

Source: A report on The Environmental & Land use studies Shahpur (E&W) coal exploration block Sohagpur coal filed, Prepared by MECL-Nagpur.



### 14.2.2 Soil quality

Top soil samples were collected from core zone and buffer zone. pH shows that the soil is neutral, but some are acidic. The conductivity is normal. The soil has sufficient organic carbon is available. The soils are poor in available water retention capacity, which does not permit post rainy season cropping under rain fed conditions. Soils are low to medium in Nitrogen and Phosphorous and medium in Potassium. These soils are deficient in zinc. Some of the soils in the study area are deficient in phosphorous due to high free iron oxide content, which causes nutrient imbalance.

### 14.2.3 Water regime

#### a) Surface water regime

The source of the surface water is mainly River, Nalas and ponds. The drainage of the study area is of sub dendritic type and well developed. The area lies in the catchments of Son River basin. The important tributaries of the area are Murna and Based and are Flowing Northerly.

Murna nala is the main stream of the study area which is a tributary to Son river. It is a perennial stream. Another small perennial stream based originates within the study area and joins the main stream Murna nala about 3 kms in the North from the study area.

Shallow low capacity local ponds exist in almost all the villages. In addition to these, other existing tanks constructed by Irrigation department are also of smaller capacity and are named as Chandaniya and Chhatwai are in the study area. Besides springs are also located near Jugwari village at the southern part of the study area.

#### b) Ground water

The ground water is mainly exploited through dug wells in the area. Dug wells are mostly used for domestic (drinking) purposes only. These dug wells are also used for irrigation either by traditional lifting devices or electric pump sets. The average depth of the dug wells range from 10-15 m.

Tube wells existing in the area are drilled by Public Health Engineering Department for their water supply purposes. These tube wells have an average depth of 60 m.

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### 14.2.4 Ecology

The leasehold area can be demarcated under two major groups of vegetational structure i.e. Forest land and non forest land. The non forest land under Government ownership is barren land while under private ownership it is agriculture land.

According to the Annual Administrative report of Forest department, Govt. of M.P., the district has 5492.71 sq.km Forest Area. Out of this, about 3843.07 sq.km Area is in reserve forest and the rest of 1649.64 sq.km area is covered under protected forest.

**a) Flora**

The types of forest found in the area are dry deciduous mixed forests. The forests are mostly confined to western part of the study area and mainly comprise of Teak, Sal, Bija, Palas, Salai, Tendu etc.

**TABLE 14.4  
FLORA & FAUNA DETAILS**

| Local Name                        | Botanical Name         |
|-----------------------------------|------------------------|
| <b>A. LARGE TREES</b>             |                        |
| JAMUN                             | SYZYGIIUM CUMINIL      |
| NILGIRI                           | EUCAL YPTUS SPP        |
| KEKAR                             | GARUGA PINNALA         |
| S ARAI                            | SHOREA ROBUSTA         |
| MAHUA                             | MADHUCA INDICA         |
| PALAS                             | BUTEA FRONDOSA         |
| SAGON                             | TECTONA GRANDIS        |
| SAJA                              | TERMINALIA TOMENTOSA   |
| IMLI                              | TAMARINDUS INDICA      |
| BABUL                             | ACACIA CATACHUA ARABTA |
| AMLA                              | EMBLICA OFFICINALIS    |
| TENDU                             | DIOSPYROS MELANOXYLON  |
| KUSH                              | DESMOSTACHYE BIPINNATA |
| NEEM                              | AZADIRAUHT A INDICA    |
| AAM                               | MANGIFERRA INDICA      |
| <b>B. SMALL TREES</b>             |                        |
| MAHUA                             | BAUHINIA RACERNOSA     |
| AAMTA                             | BAUHINIA MALABARICA    |
| KAHA!                             | FLACOURTIA INDICA      |
| KACHNAR                           | BAUHINIA V ANEGA T A   |
| TILWAN                            | WENDLANDIA EXSERTA     |
| BEAR                              | ZIZYPHUS JUJUBA        |
| JAMRASI                           | ELAEODENDRON GLAUCUM   |
| MANHAR                            | RANDIA DUMETORUM       |
| <b>C. SHRUBS AND UNDER SHRUBS</b> |                        |
| ADUSA                             | ADHA TODA V ASICA      |
| CHIRCHIT A                        | ACHYRANTHES ASPERA     |
| ARANDI                            | RICINUS COMMUNIS       |
| AAK                               | CALOTROPIS GIGANTEA    |
| KARADA                            | CANSSA OPACA SLAPL.    |
| SURSI                             | GREWIA ROTHIL          |
| JANGLI MEHENDI                    | DODONAESCOSA           |
| TULSI                             | OCLMUM SANCTUM         |

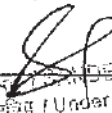
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| Local Name             | Botanical Name                 |
|------------------------|--------------------------------|
| VANTULSI               | DAEDALACANTHUS<br>PUROURASEENS |
| BESHARAM               | IPOMOEIA PES-CAPARA!           |
| <b>D. CLIMBERS</b>     |                                |
| KEVATO                 | ABRUS PRECALORIOUS             |
| DUDHI                  | CRYPTOLEPIS BUCHANANI          |
| DUDHBEL                | VALLARIS SOLANACEAE            |
| KUKUNDAN               | CELASTRUS PANICULATA           |
| MAKORE                 | ZIZYPHUS OENOPLIA              |
| VIEL                   | ACACIA PENNALA                 |
| <b>E. GRASSES</b>      |                                |
| KANSA                  | SACCHARUM SPONTANUEUM          |
| KUSA                   | DESMOSTACHYA BIPINNALA         |
| URAI                   | VELLVOIA ZIZANLODES            |
| CHIR                   | IMPERA T A CYLINDRICA          |
| DUB                    | CYNODON DACTYLON               |
| FUZBARI                | THYSANOLAENA MAXIMA            |
| CHOTI BHUT BHUSI       | ERAGROSTIS INTERRUPT A         |
| RUSA                   | CYMBOPOGON MARTINT             |
| BAGAI                  | EULALIOPSIS BINA T A           |
| <b>F. OTHER PLANTS</b> |                                |
| AMARVEL                | CUSCUTA REFLEXA                |
| GEEDH                  | PHOENIX ACAULIS                |
| V ANDA TENS            | GRIHIDA CEAE                   |
| VEERA                  | DENDRO CALAMUS STRICLUS        |

### b) Fauna

The shahdol and Umaria district, which has forests fauna in central India, is even now rich in wild life both from point of view of beauty and variety. Tiger that was once plentiful in the district has been considerably reduced in numbers. The panther however are still numerous Wild dog is also a fast disappearing species. Other wild fauna which are yet fairly, well represented in the forest consists of Hyaena, Sloth Bear, Sambhar Neel gai, Cheetal, Chinara, Black buck etc. Common animals like Jackal, Hare, and Monkey are also plentiful. All ordinary wild Fowls and the species common to peninsular India are also around in the forests.

### 1) ANIMALS : CLASS - MAMMALIA

|    |                   |                                                                                                                                                                           |
|----|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| a. | Order Primates    | <br>DEEP GUPTA<br>Under Secretary<br>Ministry of Coal<br>Govt. of India<br>New Delhi |
|    | Common langur     |                                                                                                                                                                           |
|    | Bandar (Monkey)   |                                                                                                                                                                           |
| b. | Order Insectivore |                                                                                                                                                                           |
|    | Musk-shrew        |                                                                                                                                                                           |
|    | (Chuchundar)      |                                                                                                                                                                           |

|           |                                  |                        |
|-----------|----------------------------------|------------------------|
| <b>c.</b> | <b>Order - Chiropter</b>         |                        |
|           | Bat                              | Cynopterus sphinx      |
| <b>d.</b> | <b>Order - Pholidata</b>         |                        |
|           | Silu                             | Manis                  |
|           | Scaly ant eater                  | Crassicandata          |
| <b>e.</b> | <b>Order - Carnivora</b>         |                        |
|           | Bear                             | Melursus Ursinus       |
|           | Tiger                            | Panthera tigris        |
|           | Panther                          | Panthera Pardus        |
|           | Jangli Billi                     | Felis chaus            |
|           | Lakad bagga                      | Hyaena Hyaena          |
|           | Mongoose                         | Herpeates edwardsi     |
|           | Jackal                           | Canis aureus           |
|           | Fox                              | Vulpes benglensis      |
|           | Wild dog                         | Cuon alpinus           |
| <b>f.</b> | <b>Order - Rodentia</b>          |                        |
|           | Squirrel                         | Faunambutus Pennanti   |
|           | Field rat                        | Bandiota bengalensis   |
|           | Bandicoot                        | Nerocia Bandicota      |
|           | Common Indian procupine          | Hystrix Indica         |
| <b>g.</b> | <b>Order - Ungulata</b>          |                        |
|           | Wild Boar                        | Sus Serota             |
|           | Neel Gai                         | Bosela Phus            |
|           | Cheetal                          | Axis axis              |
|           | Gour                             | Bos gaorus             |
| <b>h.</b> | <b>Birds</b>                     |                        |
|           | Little Corunorant<br>(Pan Kauaa) | Phalacrocoraxnizar     |
|           | Galgar                           | Threskiornis           |
|           | Gilhi                            | Dendrocygna            |
|           | Shikra                           | Accipiter badius       |
|           | Safed Gidoh                      | Neophron Perencopterus |
|           | Jangli Murgi                     | Galloperdix spondica   |
|           | More/Mayur                       | Pavo cristalus         |
|           | Jal Murgi                        | Gallinula chloropus    |
|           | Kala Titar                       | Francolinus Pictus     |
|           | Koel                             | Eudynamys solopaccae   |
|           | Owl                              | Budo Budo              |
|           | Papiah                           | Cuculus varius         |
|           | Kabooter                         | Columba livia          |
|           | Kathphoda                        | Dinopim bengalensis    |
|           | Janglee Kauva                    | Corvus Macrorhynchos   |
|           | Navrang                          | Pitta brachyuran       |
|           | Maina                            | Aeridotheres Irisils   |

## 14.2.5 Quality of air, ambient noise, water and soil

## i. Air quality

Ambient air quality monitoring was carried out at 7 different stations within the study area during winter season. The details of the locations are given in Table 14.5 & results and standards are presents in Table 14.6 to 14.9 respectively.

**TABLE 14.5**  
**AMBIENT AIR QUALITY MONITORING LOCATIONS**

| Code | Name of the village                  | Direction/distance with respect to site |               |
|------|--------------------------------------|-----------------------------------------|---------------|
|      |                                      | Direction                               | Distance (Km) |
| A1   | Khamaria Kala (Main Road)            | Core Zone                               | 0.0           |
| A2   | Malachua (Near Malachua bus stand)   | WNW                                     | 7.5           |
| A3   | Pachiri (Near Main Road)             | SSW                                     | 3.6           |
| A4   | Jugwari (Near Masjeed)               | SSE                                     | 6.8           |
| A5   | Kalyanpur (Near Central School)      | NE                                      | 5.0           |
| A6   | Shahdol (Near Shahdol old Bus Stand) | NE                                      | 7.0           |
| A7   | Shahpur (Near School Chowk)          | NW                                      | 2.5           |

**TABLE 14.6**  
**AMBIENT AIR QUALITY MONITORING RESULTS (SPM AND RSPM)**

| Code | Location                             | SPM - $\mu\text{g}/\text{m}^3$ |       |       |                      | RSPM - $\mu\text{g}/\text{m}^3$ |      |      |                      |
|------|--------------------------------------|--------------------------------|-------|-------|----------------------|---------------------------------|------|------|----------------------|
|      |                                      | Min                            | Avg   | Max   | 98 <sup>th</sup> per | Min                             | Avg  | Max  | 98 <sup>th</sup> per |
| A1   | Khamaria Kala (Main Road)            | 96.2                           | 102.7 | 120.2 | 116.66               | 38.1                            | 42.0 | 46.8 | 46.1                 |
| A2   | Malachua (Near Malachua bus stand)   | 100.6                          | 112.1 | 121.3 | 120.8                | 44.9                            | 48.2 | 51.9 | 51.8                 |
| A3   | Pachiri (Near Main Road)             | 98.5                           | 105.4 | 116.3 | 115.6                | 40.1                            | 43.8 | 50.2 | 49.3                 |
| A4   | Jugwari (Near Masjeed)               | 98.9                           | 113.5 | 123.5 | 122.4                | 43.9                            | 49.9 | 54.6 | 54.6                 |
| A5   | Kalyanpur (Near Central School)      | 98.5                           | 104.8 | 116.3 | 115.8                | 40.0                            | 44.2 | 48.4 | 48.1                 |
| A6   | Shahdol (Near Shahdol old Bus Stand) | 95.6                           | 103.2 | 112.5 | 112.41               | 38.1                            | 42.4 | 48.2 | 48.2                 |
| A7   | Shahpur (Near School Chowk)          | 95.2                           | 106.9 | 121.6 | 121.09               | 42.7                            | 45.6 | 50.1 | 49.2                 |

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**TABLE 14.7**  
**AMBIENT AIR QUALITY MONITORING RESULTS (SO<sub>2</sub> AND NO<sub>x</sub>)**

| Cod | Location                             | SO <sub>2</sub> - $\mu\text{g}/\text{m}^3$ |      |      |                      | NO <sub>x</sub> - $\mu\text{g}/\text{m}^3$ |      |      |                      |
|-----|--------------------------------------|--------------------------------------------|------|------|----------------------|--------------------------------------------|------|------|----------------------|
|     |                                      | Min                                        | Avg  | Max  | 98 <sup>th</sup> per | Min                                        | Avg  | Max  | 98 <sup>th</sup> per |
| A1  | Khamaria Kala (Main Road)            | 11.1                                       | 15.1 | 20.4 | 19.0                 | 20.5                                       | 26.4 | 32.1 | 31.7                 |
| A2  | Malachua (Near Malachua bus stand)   | 13.1                                       | 16.4 | 22.7 | 21.6                 | 22.5                                       | 29.5 | 38.1 | 36.8                 |
| A3  | Pachiri (Near Main Road)             | 12.2                                       | 17.0 | 24.1 | 22.4                 | 20.9                                       | 31.0 | 40.2 | 39.5                 |
| A4  | Jugwari (Near Masjeed)               | 12.9                                       | 16.8 | 23.8 | 22.6                 | 20.5                                       | 29.8 | 38.6 | 37.0                 |
| A5  | Kalyanpur (Near Central School)      | 13.5                                       | 18.6 | 24.9 | 24.3                 | 25.6                                       | 33.9 | 41.2 | 40.9                 |
| A6  | Shahdol (Near Shahdol old Bus Stand) | 12.8                                       | 15.3 | 20.5 | 19.6                 | 21.5                                       | 28.7 | 36.9 | 36.6                 |
| A7  | Shahpur (Near School Chowk)          | 12.9                                       | 16.1 | 24.1 | 23.3                 | 19.8                                       | 28.1 | 35.8 | 35.0                 |

**TABLE 14.8**  
**AMBIENT AIR QUALITY MONITORING RESULTS (CO)**

| Code | Location                             | CO - $\mu\text{g}/\text{m}^3$ |      |      |                      |
|------|--------------------------------------|-------------------------------|------|------|----------------------|
|      |                                      | Min                           | Avg  | Max  | 98 <sup>th</sup> per |
| A1   | Khamaria Kala (Main Road)            | 10.2                          | 12.6 | 16.9 | 16.2                 |
| A2   | Malachua (Near Malachua bus stand)   | 10.2                          | 12.3 | 15.9 | 15.6                 |
| A3   | Pachiri (Near Main Road)             | 9.8                           | 11.6 | 15.2 | 14.4                 |
| A4   | Jugwari (Near Masjeed)               | 10.2                          | 11.8 | 15.6 | 15.1                 |
| A5   | Kalyanpur (Near Central School)      | 10.5                          | 14.6 | 20.1 | 19.5                 |
| A6   | Shahdol (Near Shahdol old Bus Stand) | 9.6                           | 13.1 | 16.1 | 15.8                 |
| A7   | Shahpur (Near School Chowk)          | 9.5                           | 11.8 | 15.2 | 15.1                 |

The Indian Ambient Air Quality Standards permitting the maximum concentration of contaminants for ambient air quality, set for different categories of areas are given in Table 14.9.

**TABLE 14.9**  
**NATIONAL AMBIENT AIR QUALITY STANDARDS**  
**CENTRAL POLLUTION CONTROL BOARD (CPCB) JUNE'95, INDIA**

| Pollutants                                         | Time weighted average | Concentration in Ambient Air |                           |                       | Method of Measurement                                                             |
|----------------------------------------------------|-----------------------|------------------------------|---------------------------|-----------------------|-----------------------------------------------------------------------------------|
|                                                    |                       | Industrial Area              | Resi. Rural & Other areas | Sensitive Areas       |                                                                                   |
| Sulphur Dioxide (SO <sub>2</sub> )                 | Annual Average *      | 80 µg/m <sup>3</sup>         | 60 µg/m <sup>3</sup>      | 15 µg/m <sup>3</sup>  | 1. Improved West and Geakemethod                                                  |
|                                                    | 24 hours**            | 120 µg/m <sup>3</sup>        | 80 µg/m <sup>3</sup>      | 30 µg/m <sup>3</sup>  | 2. Ultraviolet fluorescence                                                       |
| Oxides of Nitrogen (NO <sub>2</sub> )              | Annual Average *      | 80 µg/m <sup>3</sup>         | 60 µg/m <sup>3</sup>      | 15 µg/m <sup>3</sup>  | 1. Jacob & Hochheiser modified (Na - Arsenite) Method                             |
|                                                    | 24 hours* 8           | 120 µg/m <sup>3</sup>        | 80 µg/m <sup>3</sup>      | 30 µg/m <sup>3</sup>  | 2. Gas Phase Chemiluminescence                                                    |
| Suspended Particulate Matter (SPM)                 | Annual Average *      | 360 µg/m <sup>3</sup>        | 140 µg/m <sup>3</sup>     | 70 µg/m <sup>3</sup>  | High Volume sampling, (Average flow rate not less than 1.1 m <sup>3</sup> /minute |
|                                                    | 24 hours**            | 500 µg/m <sup>3</sup>        | 200 µg/m <sup>3</sup>     | 100 µg/m <sup>3</sup> |                                                                                   |
| Respirable Particulate Matter (size > 10 µm) (RPM) | Annual Average *      | 120 µg/m <sup>3</sup>        | 60 µg/m <sup>3</sup>      | 50 µg/m <sup>3</sup>  | Respirable particulate matter sampler                                             |
|                                                    | 24 hours**            | 150 µg/m <sup>3</sup>        | 100 µg/m <sup>3</sup>     | 75 µg/m <sup>3</sup>  |                                                                                   |
| Carbon Monoxide (CO)                               | 8 hours**             | 5.0 mg/m <sup>3</sup>        | 2.0 mg/m <sup>3</sup>     | 1.0 mg/m <sup>3</sup> | Non dispersive infrared spectroscopy                                              |
|                                                    | 1 hour                | 10.0 mg/m <sup>3</sup>       | 4.0 mg/m <sup>3</sup>     | 2.0 mg/m <sup>3</sup> |                                                                                   |

\* Annual arithmetic mean of minimum of 104 measurements in a year taken twice a week 24 hourly at uniform interval

\*\* 24 hourly / 8 hourly values should be met 98% of the time in a year. However, 2% of the time, it may exceed but not on two consecutive days

**Note :**

1. National Ambient Air Quality Standard : The levels of air quality with an adequate margin of safety, to protect the public health, vegetation and property.
2. Wherever and whenever two consecutive values exceeds the limit specified above for the respective category, it would be considered adequate reason to institute regular / continuous monitoring and further investigations.
3. The State Government / State Board shall notify the sensitive and other areas in the respective states within a period of six months from the date of Notification of National Ambient Air Quality Standards.

(S.O. 384 (E), Air (Prevention & Cont. of Pollution) Act, 1981 dated April 11, 1994).

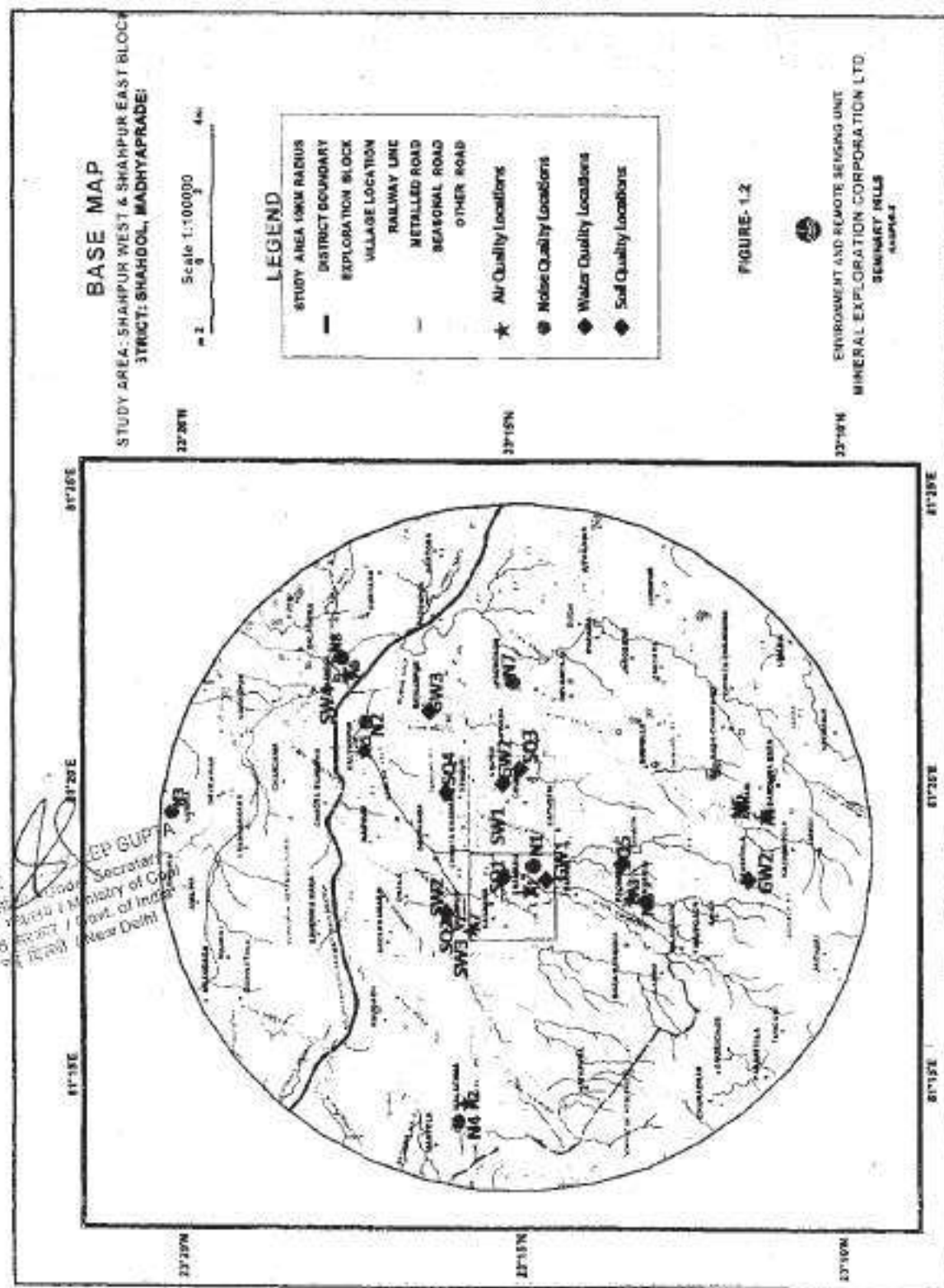


Fig 14.3 : Sampling Location Map

ii). **Ambient Noise Quality**

Noise level survey has been conducted at 8 locations including 1 at core zone and 7 in the buffer zone. The noise level monitoring data was recorded round the clock for 24 hours. The ambient noise levels were found within the permissible limits as per the statutory norms. The location and results of ambient noise quality monitoring stations are summarized in the Table 14.10 to Table 14.12 respectively.

**TABLE 14.10**  
**AMBIENT NOISE MONITORING LOCATIONS**

| Code | Name of the Station | W.R.T. Site |          |
|------|---------------------|-------------|----------|
|      |                     | Direction   | Distance |
| N1   | Khamaria Kala       | Core Zone   | 0.0      |
| N2   | Kalyanpur           | NE          | 5.0      |
| N3   | Samria              | N           | 9.0      |
| N4   | Malachaua           | NW          | 7.5      |
| N5   | Pachri              | SSW         | 3.6      |
| N6   | Jugwari             | SSE         | 6.8      |
| N7   | Pachgaon            | E           | 4.7      |
| N8   | Shadol              | NE          |          |

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**TABLE 14.11**  
**NOISE LEVELS IN THE STUDY AREA – DB(A)**

| TIME – HOURS | N1   | N2   | N3   | N4   | N5   | N6   | N7   | N8   |
|--------------|------|------|------|------|------|------|------|------|
| 1.00         | 40.3 | 40.2 | 40.1 | 41.0 | 40.2 | 40.5 | 41.2 | 40.1 |
| 2.00         | 41.2 | 40.1 | 40.0 | 40.3 | 41.3 | 42.3 | 40.8 | 41.2 |
| 3.00         | 40.3 | 40.3 | 40.9 | 42.3 | 40.2 | 43.5 | 40.2 | 40.3 |
| 4.00         | 41.3 | 41.5 | 41.5 | 42.9 | 41.3 | 40.3 | 41.2 | 41.6 |
| 5.00         | 43.2 | 42.6 | 42.3 | 43.5 | 42.3 | 41.5 | 42.5 | 42.3 |
| 6.00         | 44.8 | 43.6 | 43.1 | 44.6 | 43.2 | 43.7 | 43.6 | 43.9 |
| 7.00         | 48.4 | 48.6 | 45.9 | 49.3 | 48.6 | 49.6 | 49.3 | 49.3 |
| 8.00         | 51.3 | 50.3 | 49.7 | 52.3 | 51.3 | 53.6 | 52.3 | 52.3 |
| 9.00         | 53.5 | 53.2 | 53.4 | 56.4 | 54.8 | 57.2 | 54.6 | 55.4 |
| 10.00        | 53.2 | 52.8 | 52.4 | 55.3 | 53.2 | 54.6 | 53.2 | 54.2 |
| 11.00        | 54.9 | 52.1 | 53.4 | 54.2 | 53.1 | 53.2 | 53.1 | 54.1 |
| 12.00        | 53.4 | 51.9 | 52.4 | 51.2 | 52.9 | 53.1 | 52.1 | 53.7 |
| 13.00        | 54.6 | 51.7 | 53.6 | 52.3 | 52.1 | 52.1 | 51.8 | 53.1 |
| 14.00        | 54.8 | 50.9 | 52.3 | 52.7 | 51.8 | 51.8 | 52.6 | 52.7 |
| 15.00        | 52.3 | 52.3 | 52.1 | 53.1 | 52.7 | 52.3 | 53.4 | 52.9 |
| 16.00        | 51.6 | 53.4 | 53.4 | 53.7 | 52.9 | 53.7 | 53.9 | 53.4 |
| 17.00        | 50.5 | 55.4 | 56.7 | 54.6 | 54.6 | 55.2 | 55.4 | 54.9 |

| TIME – HOURS     | N1   | N2   | N3   | N4   | N5   | N6   | N7   | N8   |
|------------------|------|------|------|------|------|------|------|------|
| 18.00            | 48.9 | 54.2 | 54.1 | 52.3 | 53.2 | 53.2 | 53.2 | 53.1 |
| 19.00            | 47.2 | 52.1 | 52.1 | 51.3 | 52.8 | 51.2 | 52.7 | 52.8 |
| 20.00            | 46.3 | 51.3 | 50.8 | 50.2 | 51.9 | 49.3 | 50.2 | 50.1 |
| 21.00            | 45.9 | 48.3 | 47.3 | 49.3 | 49.6 | 48.2 | 49.2 | 48.3 |
| 22.00            | 42.2 | 44.1 | 45.2 | 43.5 | 44.3 | 44.3 | 44.3 | 44.3 |
| 23.00            | 41.3 | 41.3 | 41.3 | 42.3 | 41.2 | 42.1 | 42.1 | 41.3 |
| 24.00            | 40.1 | 40.3 | 40.8 | 41.1 | 40.2 | 41.1 | 40.1 | 40.5 |
| MINIMUM          | 40.1 | 40.1 | 40.0 | 40.3 | 40.2 | 40.3 | 40.1 | 40.1 |
| MAXIMUM          | 54.9 | 55.4 | 56.7 | 56.4 | 54.8 | 57.2 | 55.4 | 55.4 |
| DAY EQUIVALENT   | 51.8 | 52.0 | 52.4 | 52.8 | 52.4 | 52.9 | 52.5 | 52.8 |
| NIGHT EQUIVALENT | 40.4 | 40.8 | 41.2 | 41.5 | 40.9 | 41.7 | 41.1 | 41.0 |

TABLE 14.12  
AMBIENT NOISE LEVELS IN THE STUDY AREA ( IN LEQ\*)

| Location      | Day  | Night | Permissible day time | Permissible Night time |
|---------------|------|-------|----------------------|------------------------|
| Khamaria Kala | 51.8 | 40.4  | 55                   | 45                     |
| Kalyanpur     | 52.0 | 40.8  | 55                   | 45                     |
| Samria        | 52.4 | 41.2  | 55                   | 45                     |
| Malachaua     | 52.8 | 41.5  | 55                   | 45                     |
| Pachri        | 52.4 | 40.9  | 55                   | 45                     |
| Jugwari       | 52.9 | 41.7  | 55                   | 45                     |
| Pachgaon      | 52.5 | 41.1  | 55                   | 45                     |
| Shadol        | 52.8 | 41.0  | 55                   | 45                     |

Note: \* All units in dB (A)

### iii). Water Quality

Water quality survey to assess the quality of both surface & ground water has been conducted during the winter season. 4 surface water samples and 4 ground water samples were collected for assessing the water quality in study area. The samples were tested as per the drinking water standards (IS: 10500). The details of water test sampling locations are given in Table

14.13.

TABLE 14.13  
WATER SAMPLING LOCATIONS

| Location Code | Name of the Location  | Direction/distance with respect to the West Block site |          |           |
|---------------|-----------------------|--------------------------------------------------------|----------|-----------|
|               |                       | Direction                                              | Distance | Source    |
| Ground Water  |                       |                                                        |          |           |
| GW1           | Khamaria Kala village | Core Zone                                              | 0.0      | Tube well |
| GW2           | Chunia village        | E                                                      | 1.5      | Tube well |
| GW3           | Bicharpur Village     | NE                                                     | 4.9      | Tube well |
| GW4           | Devantila village     | S                                                      | 6.5      | Tube well |

| Location Code | Name of the Location | Direction/distance with respect to the West Block site |          |               |
|---------------|----------------------|--------------------------------------------------------|----------|---------------|
|               |                      | Direction                                              | Distance | Source        |
| Surface Water |                      |                                                        |          |               |
| SW1           | Ghinaucha Nalla      | Core Zone                                              | 0.0      | Surface water |
| SW2           | Tanki Nallah         | NW                                                     | 2.5      | water         |
| SW3           | Shahpur              | NW                                                     | 2.5      | Surface water |
| SW4           | Shadol               | NE                                                     | 7.0      | Surface water |

The water samples collected from the above locations were analyzed for important major and minor ions, and the analytical results of the water samples were compared with IS: 10500 drinking water standards and the results are shown in as given in Table 14.14.

**TABLE 14.14**  
**WATER SAMPLE ANALYSIS RESULTS**

| S. No | Parameter                     | GW1   | GW2   | GW3   | GW4   | SW1   | SW2   | SW3   | SW4   |
|-------|-------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1     | Colour Hazen Units            | 4     | 4     | 4     | 4     | 4     | 4     | 4     | 4     |
| 2     | pH                            | 7.15  | 7.59  | 7.21  | 7.12  | 7.54  | 7.15  | 7.28  | 7.19  |
| 3     | Turbidity NTU                 | <5    | <5    | <5    | <5    | <5    | <5    | <5    | <5    |
| 4     | Elec. Cond ( $\mu$ mhos/cm)   | 450   | 495   | 485   | 502   | 294   | 305   | 283   | 286   |
| 5     | Sus. Solids                   | <10   | <10   | <10   | <10   | <10   | <10   | <10   | <10   |
| 6     | T. Dissolved Solids           | 293   | 322   | 315   | 326   | 191   | 195   | 188   | 186   |
| 7     | Alkalinity as $\text{CaCO}_3$ | 120   | 176   | 175   | 181   | 101   | 101   | 105   | 104   |
| 8     | Chlorides as Cl               | 58    | 41    | 39    | 39    | 24    | 25    | 22    | 26    |
| 9     | Sulphates as $\text{SO}_4$    | 28    | 19    | 20    | 20    | 15    | 17    | 15    | 18    |
| 10    | Nitrate as $\text{NO}_3$      | 8     | 10    | 15    | 9     | 1.2   | 1.4   | 1.3   | 1.3   |
| 11    | Phosphates as $\text{PO}_4$   | <0.01 | 1.2   | 1.12  | 1.08  | 1.82  | 1.21  | 1.62  | 1.29  |
| 12    | T.Hardness as $\text{CaCO}_3$ | 150   | 173   | 159   | 155   | 69    | 74    | 65    | 60    |
| 13    | Calcium as Ca                 | 42    | 47    | 40    | 42    | 17    | 17    | 18    | 20    |
| 14    | Magnesium as Mg               | 5     | 8     | 10    | 8     | 5     | 8     | 6     | 5     |
| 15    | Sodium as Na                  | 44    | 42    | 48    | 54    | 32    | 31    | 31    | 34    |
| 16    | Potassium as K                | 3     | 5     | 3     | 4     | 3     | 5     | 4     | 5     |
| 17    | Fluoride as F                 | 0.31  | 1.25  | 1.14  | 0.88  | 0.95  | 0.86  | 1.01  | 0.96  |
| 18    | Iron as Fe                    | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| 19    | MPN count 100ml               | -     | -     | -     | -     | -     | -     | -     | -     |

Note: Heavy Metals Pb, Mn, Cd, Cr, Cu, Zn were below detectable limits

#### iv) Soil quality

The present study on soil quality establishes the baseline characteristics in the study area surrounding the project site. The study has been addressed with the following objectives.

- ✓ To determine the base line characteristics
- ✓ To determine the soil characteristics of proposed project site.
- ✓ To determine the impact of industrialization/urbanization on soil characteristics
- ✓ To determine the impacts on soils from agricultural productivity point of view.

#### a) Criteria Adopted For Selection of Sampling Locations

For studying the soil types and soil characteristics, 5 sampling locations were selected to assess the existing soil conditions representing various land use conditions and geological features.

The homogenized soil samples collected at different locations were packed in a polyethylene plastic bag and sealed. The sealed samples were sent to laboratory for analysis. The important physical, chemical parameter concentrations were determined from all samples.

#### b) Soil Sampling Locations

Details of the soil sampling locations are given in Table 14.15. The soil analysis results are shown in Table 14.16.

**TABLE 14.15**  
**SOIL SAMPLING LOCATIONS**

| Location Code | Name of the Location | Direction/distance with respect to the Mine |          |
|---------------|----------------------|---------------------------------------------|----------|
|               |                      | Direction                                   | Distance |
| SQ1           | Khamaria Kala        | Core Zone                                   | 0.0      |
| SQ2           | Shahpur              | NW                                          | 2.5      |
| SQ3           | Chunia               | E                                           | 1.5      |
| SQ4           | Senduri              | NE                                          | 2.1      |
| SQ5           | Pachri               | SSW                                         | 3.6      |

**TABLE 14.16**  
**SOIL ANALYSIS RESULTS**

| Sl. No. | Parameter              | Unit                | S1   | S2   | S3   | S4   | S5   |
|---------|------------------------|---------------------|------|------|------|------|------|
| 1       | EC (1:2 water extract) | $\mu\text{mhos/cm}$ | 1.1  | 1.5  | 1.0  | 1.5  | 1.2  |
| 2       | pH (1:2 water extract) | --                  | 7.95 | 7.24 | 7.31 | 8.12 | 7.41 |
| 3       | Avail Nitrogen as N    | kg/ha               | 289  | 304  | 312  | 324  | 317  |
| 4       | Avail Phosphorus as P  | kg/ha               | 19.4 | 18.6 | 19.4 | 20.5 | 19.1 |
| 5       | Avail Potassium as K   | kg/ha               | 234  | 256  | 198  | 205  | 218  |
| 6       | Org. Carbon            | %                   | 1.24 | 1.12 | 1.14 | 1.07 | 1.18 |
| 7       | Calcium as Ca          | mg/kg               | 1020 | 975  | 964  | 854  | 985  |
| 8       | Magnesium as Mg        | mg/kg               | 234  | 198  | 196  | 178  | 191  |
| 9       | Sodium as Na           | mg/kg               | 48   | 68   | 65   | 45   | 63   |
| 10      | Chlorides as Cl        | mg/kg               | 210  | 224  | 221  | 176  | 207  |

| Sl. No. | Parameter    | Unit              | S1              | S2              | S3              | S4              | S5              |
|---------|--------------|-------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| 11      | Boron as B   | mg/kg             | 0.42            | 0.36            | 0.41            | 0.47            | 0.35            |
| 12      | Iron as Fe   | mg/kg             | 29              | 27              | 24              | 22              | 25              |
| 13      | Bulk density | g/cm <sup>3</sup> | 1.36            | 1.37            | 1.26            | 1.28            | 1.28            |
| 14      | Texture      | —                 | Sandy Clay Loam | Sandy Clay Loam | Sandy Clay Loam | Sandy Clay Loam | Sandy Clay Loam |

#### 14.2.6 Climatic conditions

The area experiences a tropical climate. The meteorological data recorded at IMD station Umaria are given in Table 14.17.

TABLE 14.17  
METEOROLOGICAL DATA OF UMARIA (1951-1980)

| Month          | Relative Humidity (%) |             | Temperature (°C) |             | Wind velocity km./hr | Rainfall in mm |
|----------------|-----------------------|-------------|------------------|-------------|----------------------|----------------|
|                | 8.30 hrs              | 17.30 hrs   | Min.             | Max.        |                      |                |
| January        | 73                    | 50          | 3.3              | 29.4        | 2.8                  | 22.8           |
| February       | 64                    | 40          | 5.3              | 33.1        | 3.3                  | 19.9           |
| March          | 50                    | 32          | 10.1             | 38.2        | 4.1                  | 17.1           |
| April          | 39                    | 27          | 16.1             | 42.1        | 5.0                  | 6.4            |
| May            | 38                    | 27          | 21.6             | 44.1        | 5.6                  | 7.5            |
| June           | 61                    | 50          | 22.6             | 43.1        | 6.6                  | 122.7          |
| July           | 85                    | 79          | 21.7             | 35.7        | 6.2                  | 369.2          |
| August         | 88                    | 81          | 21.6             | 33.5        | 5.7                  | 424.1          |
| September      | 82                    | 75          | 20.4             | 33.5        | 4.4                  | 186.4          |
| October        | 71                    | 60          | 13.0             | 33.3        | 2.6                  | 37.3           |
| November       | 67                    | 55          | 7.6              | 31.2        | 2.4                  | 8.5            |
| December       | 73                    | 54          | 4.0              | 28.7        | 2.3                  | 13.1           |
| <b>Average</b> | <b>65.9</b>           | <b>52.5</b> | <b>13.9</b>      | <b>35.5</b> | <b>4.3</b>           | <b>102.9</b>   |

#### Meteorological Scenario of the Study Area

Regional meteorological scenario helps to understand the trends of the climatic factors. It also helps in determining the sampling stations in predicting the post project environmental scenario. Meteorological Scenario exerts a critical influence on Air Quality as the pollution arises from the interaction of atmospheric contaminants with adverse meteorological conditions such as temperature inversions. Atmospheric stability and topographical features like hills, canyons and valleys.

The critical weather elements that influence air pollution are wind speed, wind direction, temperature, which together determines atmosphere

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stability. Hence it is an indispensable part of any air pollution studies and required for interpretation of base line information. The details of the temperature, relative humidity and rainfall observed during study period are given in the Table 14.18.

**TABLE 14.18**  
**OBSERVED METEOROLOGICAL DATA**

| Period   | Temperature<br>(°C) |      | R. Humidity<br>(%) |     | Rain<br>fall<br>(mm) | Predominant wind<br>direction Blowing<br>from |
|----------|---------------------|------|--------------------|-----|----------------------|-----------------------------------------------|
|          | Min                 | Max  | Min                | Max |                      |                                               |
| Dec-2009 | 8.0                 | 28.7 | 59                 | 79  | --                   | E to N                                        |

Wind speed and direction data recorded during the study period is useful in identifying the influence of meteorology on the air quality of the area. Based on the IMD meteorological data wind roses that is the diagrammatic representation of wind speed and wind direction along with their persistence for a fractional period of occurrence at a given location is constructed. Wind roses on sixteen sector basis have been drawn. Wind directions and wind speed frequency observed during study period

The winds were predominantly recorded from E closely followed by N during December 2009. Calm conditions prevailed for 17.34% of the total time. Averaged wind speed for the month of December is 1.17 m/sec. The recording of meteorological data will be continued up to February 15<sup>th</sup> 2010.

**TABLE 14.19**  
**DECEMBER 2009-FREQUENCY DISTRIBUTION TABLE**

| Direction                       | 0.5-1.5 | 1.5-2.5 | 2.5-3.5 | 3.5-4.5 | 4.5-5.5 | >=5.5 | Total  |
|---------------------------------|---------|---------|---------|---------|---------|-------|--------|
| N                               | 10.48   | 4.17    | 0.67    | 0.00    | 0.00    | 0.13  | 15.46  |
| NNE                             | 2.02    | 2.55    | 1.08    | 0.00    | 0.00    | 0.00  | 5.65   |
| NE                              | 5.51    | 2.02    | 0.54    | 0.00    | 0.00    | 0.00  | 8.06   |
| ENE                             | 0.27    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00  | 0.27   |
| E                               | 15.19   | 6.72    | 0.54    | 0.00    | 0.00    | 0.00  | 22.45  |
| ESE                             | 2.69    | 2.15    | 0.13    | 0.00    | 0.00    | 0.00  | 4.97   |
| SE                              | 6.72    | 3.76    | 1.75    | 0.00    | 0.00    | 0.13  | 12.37  |
| SSE                             | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00  | 0.00   |
| S                               | 2.15    | 0.54    | 0.00    | 0.00    | 0.00    | 0.00  | 2.69   |
| SSW                             | 1.21    | 0.81    | 0.27    | 0.00    | 0.00    | 0.00  | 2.28   |
| SW                              | 0.54    | 1.08    | 0.13    | 0.00    | 0.00    | 0.00  | 1.75   |
| WSW                             | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00  | 0.00   |
| W                               | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00  | 0.00   |
| WNW                             | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00  | 0.00   |
| NW                              | 2.96    | 2.02    | 0.13    | 0.00    | 0.00    | 0.00  | 5.11   |
| NNW                             | 1.08    | 0.54    | 0.00    | 0.00    | 0.00    | 0.00  | 1.61   |
| Total                           | 50.81   | 26.34   | 5.24    | 0.00    | 0.00    | 0.27  | 82.66  |
| Frequency of Calm Winds: 17.34% |         |         |         |         |         |       | 17.34  |
| Average Wind Speed: 1.17 m/s    |         |         |         |         |         |       |        |
| Total                           |         |         |         |         |         |       | 100.00 |

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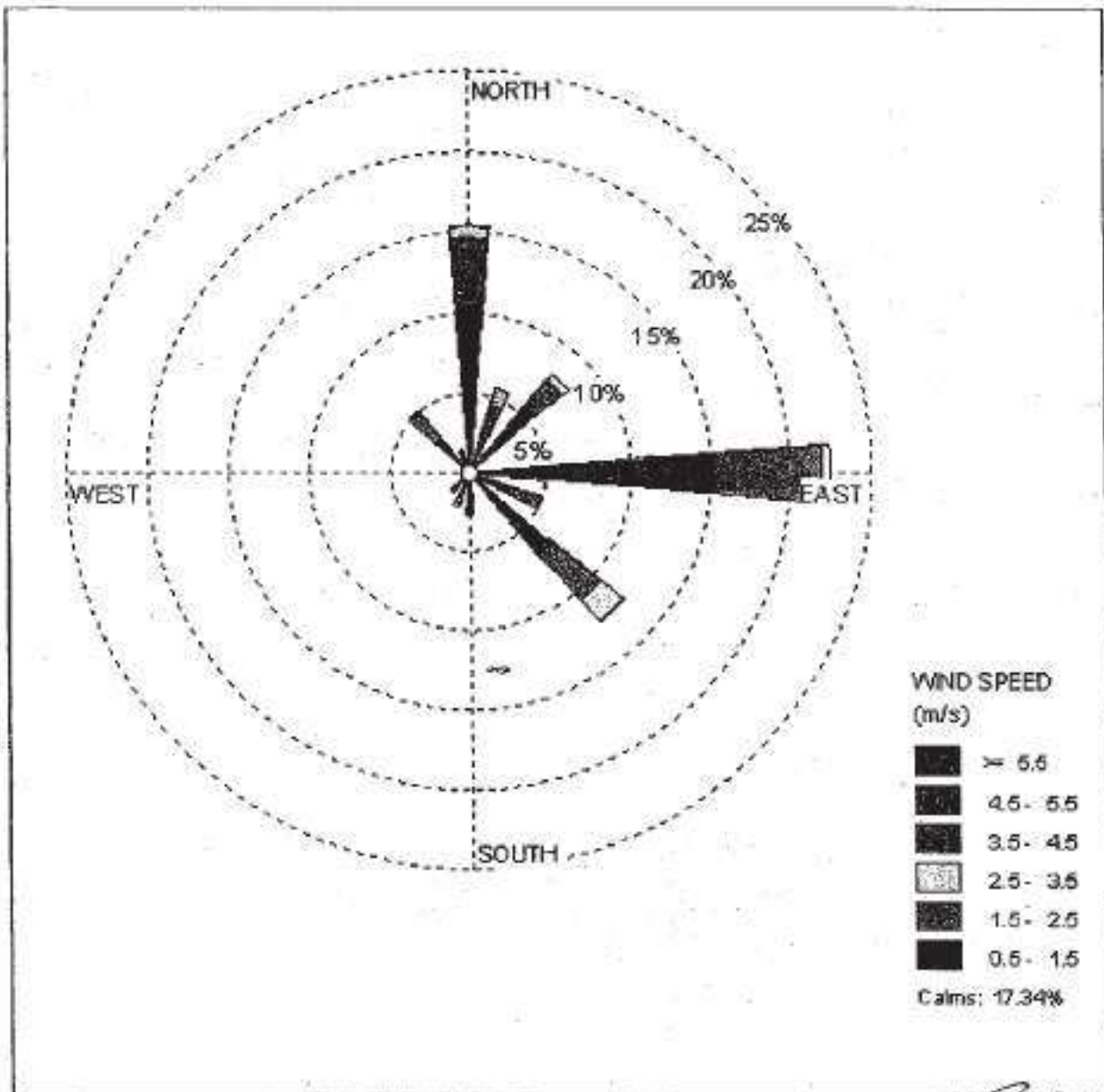


Fig 14.4 : Wind Rose Diagram – for the month of December 2009

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#### 14.2.7 Human settlements

**Socio-Economics:** The study area is a part of Sohagpur Tehsil, Shahdol district and Pali Tehsil of Umaria District, M.P. The villages, which are situated at the periphery and falling partly within & outside the study area, are also considered for summarizing the demographic details. The study area covers a total of 78 villages and 2 towns.

**TABLE 14.20**  
**DISTRICT AND BLOCK WISE POPULATION IN THE STUDY AREA**

| District | Tehsil | No. of villages | Total population | Male  | Female |
|----------|--------|-----------------|------------------|-------|--------|
| Shahdol  | Pali   | 78              | 174327           | 90533 | 83794  |

| Item                                                 | Town Data |                       | Village Data |                       | Total Study Area |                       |
|------------------------------------------------------|-----------|-----------------------|--------------|-----------------------|------------------|-----------------------|
|                                                      | Persons   | % of total population | Persons      | % of total population | Persons          | % of total population |
| i) Total Population                                  | 100963    |                       | 73364        |                       | 174327           | --                    |
| ii) Total male population                            | 53049     | 52.54                 | 37484        | 51.09                 | 90533            | 51.93                 |
| iii) Total Female Population                         | 47914     | 47.46                 | 35880        | 48.91                 | 83794            | 48.07                 |
| iv) Child (0-6) population                           | 12949     | 12.83                 | 13404        | 18.27                 | 26353            | 15.12                 |
| v) Scheduled Caste Population                        | 8226      | 8.15                  | 3410         | 4.65                  | 11636            | 6.67                  |
| vi) Scheduled Tribe population                       | 7296      | 7.23                  | 42163        | 57.47                 | 49459            | 28.37                 |
| vii) Average population density (per sq.km)          | 3715      | --                    | 180          | --                    | 400              | --                    |
| viii) Average Sex Ratio (Female per thousand male)   | 903       | --                    | 957          | --                    | 926              | --                    |
| ix) Average literacy rate (Adult population >6 year) | 70562     | 80.17                 | 29363        | 48.97                 | 99925            | 67.53                 |
| a) Male literacy                                     | 39828     | 92.21                 | 18925        | 61.65                 | 58753            | 79.52                 |
| b) Female Literacy                                   | 30734     | 79.36                 | 10438        | 35.67                 | 41172            | 60.55                 |
| c) Total literacy                                    | 70562     | 80.17                 | 29363        | 48.97                 | 99925            | 67.53                 |

| Item                     | Town Data         |                 |                   | Village Data      |                   |                   | Total Study Area  |                  |                    |
|--------------------------|-------------------|-----------------|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|--------------------|
|                          | Main Work.        | Margi. Work.    | Non Work.         | Main Work.        | Margi. Work.      | Non Work.         | Main Work.        | Margi. Work.     | Non Work.          |
| x) Employment level      |                   |                 |                   |                   |                   |                   |                   |                  |                    |
| a) Total Population (%)  | 27402<br>(27.14%) | 3147<br>(3.12%) | 70414<br>(69.74%) | 21943<br>(29.91%) | 11173<br>(15.23%) | 40248<br>(28.31%) | 49345<br>(28.31%) | 14320<br>(8.21%) | 110662<br>(63.47%) |
| b) Male Population (%)   | 23490<br>(23.27%) | 3147<br>(3.12%) | 27878<br>(27.61%) | 16006<br>(21.82%) | 4256<br>(5.80%)   | 17222<br>(23.47%) | 39496<br>(22.66%) | 5936<br>(3.41%)  | 45100<br>(25.87%)  |
| c) Female Population (%) | 3912<br>(3.87%)   | 1467<br>(1.45%) | 42536<br>(42.13%) | 5937<br>(8.09%)   | 6917<br>(9.43%)   | 23026<br>(31.39%) | 9849<br>(5.65%)   | 8384<br>(4.81%)  | 65562<br>(37.61%)  |

| Items                                     | Town Data | Village Data | Total Study Area |
|-------------------------------------------|-----------|--------------|------------------|
| xi) Educational Facilities:               |           |              |                  |
| a) Total Villages / Town                  | 2         | 78           | 80               |
| b) Inhabited villages / Town              | --        | --           | --               |
| c) Villages/Town having primary school    | 42        | 71           | 113              |
| d) Villages/Town having Middle school     | 20        | 16           | 36               |
| e) Villages /Town having secondary school | 13        | 3            | 16               |
| f) Villages /Town having S. Secondary     | 13        | 2            | 15               |
| g) College                                | 4         | 0            | 4                |

The salient observations on the community structure based on 2001 census data are given as under:

**(A) Un-inhabitation**

**Rural Area:** All 78 villages are inhabited in the study area.

**(B) Households**

The total number of household in the study area are 34210, out of which 18963 (55.43%) are in town area. The total households in the rural area are 15247 (44.57%) and is comparatively much lower than the town area.

**(C) Total Population and Population Density**

The total population of the study area is 174327 persons with an average population density of 400 persons / sq.km.

i) **Urban Area:** The total population of the urban area is 100963 persons with an average population density of 3715 persons / sq.km.

ii) **Rural Area:** The total population pertaining to rural area is 73364 persons with an average population density of 180 persons / sq.km. Among rural area Padmania Khurd village is the most densely populated (727 persons/sq/km.) village whereas Basin and Mekal Pahad village has the lowest population density of 5.0 persons/sq.km. in the study area.

The population range-wise distribution of village is as under:

| Population Range (Persons) | Number of Town/Villages |
|----------------------------|-------------------------|
| <b>A) Urban Area</b>       |                         |
| UP to 50000                | 1                       |
| >50000                     | 1                       |
| <b>Sub -Total</b>          | <b>2</b>                |
| <b>B) Rural Area</b>       |                         |
| 1001 to 5000               | 27                      |
| 501 to 1000                | 24                      |
| 201 to 500                 | 16                      |
| Less than 200              | 11                      |
| <b>Sub -Total</b>          | <b>78</b>               |
| <b>Total</b>               | <b>80</b>               |

**(D) Sex Ratio**

The male and female population in the study area are 90533 and 83794 persons respectively with an average sex ratio (i.e. female per thousand male) of 926.

**i) Urban Area:** The male and female population in the urban area are 53049 and 47914 persons respectively with an average sex ratio (i.e. female per thousand male) of 903. However in Shahpur the average sex ratio (913 i.e. female per thousand male) is higher than Shahdol

**ii) Rural Area:** The male and female population in the rural area are 37484 and 35880 persons respectively with an average sex ratio (i.e. female per thousand male) of 957. However there are 22 villages where female population is marginally more than male population. The highest sex ratio (1175) is of Chandaniya Khurd village. Whereas the lowest sex ratio (739) is in Belaha village.

#### **(E) Child Population: (0-6 age group)**

The child population in the study area as per 2001 census is 26353 i.e. 15.12% of the total population. The male and female child population in the study area is 16645 (9.55%) and 15801 (9.06%) respectively with an average sex ratio of about 949. The population density of child population in the study area is about 61 child/sq.km.

**i) Urban Area:** The child population in the urban area as per 2001 census is 12949 i.e. 12.83 % of the total population. The male and female child population in the study area is 9856 (9.76 %) and 9186 (9.10%) respectively with an average sex ratio of about 932. The population density of child population in the study area is about 476 child/sq.km.

**ii) Rural Area:** The child population in the rural area as per 2001 census is 13404 i.e. 18.27% of the total population. The male and female child population in the study area is 6789 (9.25%) and 6615 (9.02%) respectively with an average sex ratio of about 974. The population density of child population in the study area is about 33 child /sq. km

#### **(F) Schedule Castes**

The schedule Castes (SC) population within the study area is 11636 persons amounting to 6.67% of the total population. The sex ratio is 986 with male and female population being 5858 and 5778 respectively.

**i) Urban Area:** The schedule Castes (SC) population within the urban area is 8226 persons amounting to 8.15% of the total population. The sex ratio is 996 with male and female population being 4122 and 4104 respectively.

**ii) Rural Area:** The schedule Castes (SC) population within the rural area is 3410 persons amounting to 4.65 % of the total population. The sex ratio is 964 with male and female population being 1736 and 1674 respectively. There are 28 villages in the study area having no SC population. Chandaniya Khur village has the highest proportion of SC population i.e. 26.88%.

**(G) Schedule Tribes**

The population of Schedule Tribes (ST) is 49459 persons i.e. 28.37% of the total population in the study area. The sex ratio is about 967 with male and female ST population being 25144 and 24315 respectively. There are two villages in the study area where there is no S.T. population.

**i) Urban Area:** The population of Schedule Tribes (ST) is 7296 persons i.e. 7.23% of the total population in the urban area. The sex ratio is about 921 with male and female ST population being 3799 and 3497 respectively.

**ii) Rural Area:** The population of Schedule Tribes (ST) is 42163 persons i.e. 57.47% of the total population in the rural area. The sex ratio is about 975 with male and female ST population being 21345 and 20818 respectively. The highest ST population in the rural area is in village Baghal Bahara, Birhuliya and Belaha i.e. 100%.

**(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 only 67.53% of the total population. The male literacy rate is 76.30% of total male population and the female literacy rate is 58.01% of the total female population in the study area. All the villages are having some percentage of literacy

**i) Urban Area:** The average literacy rate of the urban area is only 80.17% of the total population. The male literacy rate is 80.17% of total male population and the female literacy rate is 73.69% of the total female population in the urban area.

**ii) Rural Area:** The average literacy rate of the study area is only 48.97% of the total population. The male literacy rate 61.65% of total male population and the female literacy rate is 35.67% of the total female population in the rural area. All the villages are having some percentage of literacy.

**14.2.8 Places of historical, tourist and religious importance**

There is no such place within core or study area.

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**14.2.9 Mines within study area**

The block is free from any mining activity. Still there is no activity started.

Does area (Partly or fully) fall under notified area under water (Prevention & control of Pollution) Act 1974.

### 14.3 ENVIRONMENTAL IMPACT ASSESSMENT

Baseline information on various relevant environmental aspects generated and compiled for the project area, covering both core and buffer zones has been incorporated in para 14.2. This information provides 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:

#### 14.3.1 Land environment

##### a) Land degradation and Aesthetic Environment

The total mine lease area is 587.5 ha. out of which, 4.16 ha of land will be disturbed at conceptual stage which is negligible. The disturbed area within ML will comprise dug up area for inclines and shaft, surface dump, area occupied by infrastructure, roads etc.

TABLE 14.21 ~  
LAND USE WITHIN ML AREA AT END OF 5<sup>TH</sup> YEAR AND END OF MINING

| Sl. No. | Description of area                                                                                                                                    | End of 5th year | End of life  |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|--------------|
| 1       | Top soil dump                                                                                                                                          | 0.36            | 0.36         |
| 2       | Surface dump                                                                                                                                           | 0.5             | 0.5          |
| 3       | Settling ponds                                                                                                                                         | 0.4             | 0.4          |
| 4       | Ventilation shaft                                                                                                                                      | 0.18            | 0.18         |
| 5       | Coal stack yard                                                                                                                                        | 0.6             | 0.6          |
| 6       | Facilities including road, Office, W shop, Store, CHP, mouth of inclines, VTC, Canteen, Diesel Bunk and area between the buildings and lawn plantation | 4.73            | 4.73         |
| 7       | Green belt around facilities                                                                                                                           | 1.27            | 1.27         |
| 8       | Approach Road                                                                                                                                          | 4.83            | 4.83         |
| 9       | <b>Sub Total *Disturbed (including green belt and lawn plantation)</b>                                                                                 | <b>12.87</b>    | <b>12.87</b> |
|         | Undisturbed area                                                                                                                                       | 574.63          | 574.63       |
|         | <b>Total</b>                                                                                                                                           | <b>587.5</b>    | <b>587.5</b> |

##### b) Impact due to solid waste

There would one OB surface dump located within the ML area. The solid waste dumping of OB dump will lead to land degradation. Its area will be 0.5 ha with a 5m height which will accommodate all the stone waste. As top soil will be negligible, no separate arrangement for its stacking has been made.

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However any small quantity available will be kept within the area designated for waste dump.

**c) Land profile**

No voids will be formed within the ML as there are no OC operations proposed. The dump will be only 5 m high. Hence virtually no impact on profile is envisaged.

**d) 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 railway siding or directly to the customers plant may cause some intrusion. Appropriate measures such as green belt cover will be needed to reduce visual intrusion from dumps, roads and facilities.

**14.3.2 Impact on air quality**

This being an underground mine, dust producing activities are only a few. Coal from mine is to be loaded to trucks via a surge bunker & transported to railway siding. Therefore, impact on ambient air, in the mine lease area would be marginal. Transport vehicles will generate dust and gaseous emission while playing on haul roads. Air pollution may result in irritation and inflammation of eyes and congestion of throat and oedema of lungs, if care is not taken. Carbon monoxide can cause loss of haemoglobin in blood and subsequently stresses on these suffering from cardio vascular and pulmonary diseases.

**14.3.3 Impact on water quality**

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 stone waste, 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.

Meager 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.

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**14.3.4 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 at surface
- Moving road vehicles

The impact of this airborne noise will be more on the operating personnel and on the persons working nearby and not so much on the surroundings, especially due to mining operation being restricted to underground only. However, the transportation activities will have impact on the noise levels enroute to the railway siding. The noise level data recorded at various places in the study area is well within the desired limit.

**14.3.5 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 exactly anticipated. But, based on experience of similar mines appropriate control measures have been spelt out in management plan.

**14.3.6 Impact on water regime**

The impact due to the seepage of water into the UG mine workings and its evacuation has been dealt in detail in Chapter 8. It has been estimated that about 1200 GPM water will be generated in the mine during non monsoon season which may become about 1.5 times (1800 GPM) during rainy season which will not cause much adverse impact on the ground water regime.

**14.3.7 Impact on socio-economic environment****a) Human settlement**

The study area is a part of Sohagpur Tehsil of Shahdol district and Pali teshsil of Umaria District, M.P. The villages, which are situated at the periphery and falling partly within the study area, are also considered for summarizing the demographic details. A total of 78 villages and 2 towns are covered by the study area.

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

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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.

#### 14.3.8 Impact on Historical Monument/ Religious place/ Tourist places

There is no such place within and outside the ML boundary upto 10 km radius. Hence, question of impact on historical monument does not arise.

#### 14.4 ENVIRONMENTAL MANAGEMENT PLAN

The environmental impact assessment made in the preceding section has identified the areas where certain control measures are called for to minimize the negative impacts. Subsequent paragraphs deals 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.

- Land Environment
- Air pollution control
- Blasting and noise control
- Water pollution control
- Socio-economic aspects

  
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##### 14.4.1 Land environment

Land degradation is low in case of an underground mine since the mine operations are below ground. On the surface, only the mine facilities and the dumps shall be visible. The UG operations being at considerable depth, no subsidence is anticipated at surface. However a subsidence study is being prepared and compliance to its recommendations will be done. Plantation shall be carried out on undisturbed areas and greenbelt shall be planted in the statutory barrier along the mine lease boundary. Garland drains will be provided around the dump to arrest any soil being carried away by the rain water. Special local stone paved chutes and channels will be provided, wherever required to allow controlled descent of water, especially from external dumps.

Reclamation/afforestation procedure has been described stage wise in the following paragraphs. Year wise reclamation programme is as shown in following table.

##### i. Post reclamation land Use

The post mining land use will remain almost unchanged as there is no much change in the surface land use. The details of land use during mining up to last year of mining operation and post mining land use with environment management is given in Table 14.22 & 14.23.

**TABLE 14.22**  
**LAND USE WITH ENVIRONMENT MANAGEMENT WITHIN ML UPTO**  
**END OF MINING OPERATION**

| Sl. No. | Description of area                                                                                                                                    | Land use (ha.) |          |            |            |               |                         |              |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------|------------|------------|---------------|-------------------------|--------------|
|         |                                                                                                                                                        | Plantation     | Void     | Water body | Public use | Undisturbed   | Self use under facility | Total        |
| 1       | Top soil dump                                                                                                                                          | 0              | 0        | 0          | 0          | 0             | 0.36                    | 0.36         |
| 2       | Surface dump                                                                                                                                           | 0              | 0        | 0          | 0          | 0             | 0.5                     | 0.5          |
| 3       | Settling ponds                                                                                                                                         | 0              | 0        | 0          | 0          | 0             | 0.4                     | 0.4          |
| 4       | Ventilation shaft                                                                                                                                      | 0.17           | 0        | 0          | 0          | 0             | 0.01                    | 0.18         |
| 5       | Coal stack yard                                                                                                                                        | 0              | 0        | 0          | 0          | 0             | 0.6                     | 0.6          |
| 6       | Facilities including road, Office, W shop, Store, CHP, mouth of inclines, VTC, Canteen, Diesel Bunk and area between the buildings and lawn plantation | 1.73           | 0        | 0          |            | 0             | 3                       | 4.73         |
| 7       | Green belt around facilities                                                                                                                           | 1.27           | 0        | 0          | 0          | 0             | 0                       | 1.27         |
| 8       | Approach Road                                                                                                                                          | 0              | 0        | 0          | 0          | 0             | 4.83                    | 4.83         |
| 9       | <b>Sub Total *Disturbed (including green belt and lawn plantation)</b>                                                                                 | <b>3.17</b>    | <b>0</b> | <b>0</b>   | <b>0</b>   | <b>0</b>      | <b>9.7</b>              | <b>12.87</b> |
|         | Undisturbed area                                                                                                                                       | 0              | 0        | 0          | 0          | 574.63        | 0                       | 574.63       |
|         | <b>Total</b>                                                                                                                                           | <b>3.17</b>    | <b>0</b> | <b>0</b>   | <b>0</b>   | <b>574.63</b> | <b>9.7</b>              | <b>587.5</b> |

**TABLE 14.23**  
**MINING LAND USE AFTER MINE CLOSURE**

| Sl. No. | Description of area                                                                                                                                    | Land use (ha.) |             |            |             |               |              |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-------------|------------|-------------|---------------|--------------|
|         |                                                                                                                                                        | Plantation     | Void        | Water body | Public use  | Undisturbed   | Total        |
| 1       | Top soil dump                                                                                                                                          | 0.36           | 0           | 0          | 0           | 0             | 0.36         |
| 2       | Surface dump                                                                                                                                           | 0.5            | 0           | 0          | 0           | 0             | 0.5          |
| 3       | Settling ponds                                                                                                                                         | 0              | 0           | 0.4        | 0           | 0             | 0.4          |
| 4       | Ventilation shaft                                                                                                                                      | 0.17           | 0.01        | 0          | 0           | 0             | 0.18         |
| 5       | Coal stack yard                                                                                                                                        | 0.6            | 0           | 0          | 0           | 0             | 0.6          |
| 6       | Facilities including road, Office, W shop, Store, CHP, mouth of inclines, VTC, Canteen, Diesel Bunk and area between the buildings and lawn plantation | 4.00           | 0.3         | 0          | 0.43        | 0             | 4.73         |
| 7       | Green belt around facilities                                                                                                                           | 1.27           | 0           | 0          | 0           | 0             | 1.27         |
| 8       | Approach Road                                                                                                                                          | 3.6            | 0           | 0          | 1.23        | 0             | 4.83         |
| 9       | <b>Sub Total *Disturbed (including green belt and lawn plantation)</b>                                                                                 | <b>10.50</b>   | <b>0.31</b> | <b>0.4</b> | <b>1.66</b> | <b>0</b>      | <b>12.87</b> |
| 10      | Undisturbed area                                                                                                                                       | 0              | 0           | 0          | 0           | 574.63        | 574.63       |
|         | <b>Total</b>                                                                                                                                           | <b>10.50</b>   | <b>0.31</b> | <b>0.4</b> | <b>1.66</b> | <b>574.63</b> | <b>587.5</b> |

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**ii. Afforestation**

A plantation program over life of the mine will be planned in a phase wise manner. The plantation will be started from first year of mining along the boundary of ML area. A 7.5 m width of green belt development around the ML area will be carried out and more width of green belt will be taken up wherever space is available. A thick plantation is proposed to be provided and maintained along the roads. 2500 trees will be planted per ha.

**14.4.2 Air and dust pollution control measures**

- The SPM, RSPM, SO<sub>2</sub>, NO<sub>x</sub> and CO concentrations are within limits in the monitored ambient air quality.
- The control measures to be adopted are comfortable working conditions by good ventilation for employees working below ground.
- Dust control measures on belt transfer and truck loading points.
- Water sprinkling by fixed and mobile sprinklers on transport road and at the railway siding, development green belt around coal loading point, Railway siding and along coal transport road.
- The ventilation system will be circulating air at the rate of 6200 m<sup>3</sup>/min. Greenbelt will be planted around the mine and loading facilities.
- Dust masks will be provided as safety measures to the workers engaged at dust generation points like drills, loading / unloading points, material handling etc.,

**14.4.3 Noise and blasting**

- Provision and maintenance of peripheral green belts avenue plantation.
- Periodic maintenance of noise generating machinery and transportation vehicles will be ensured.
- Provision of the air silencer to modulate the noise generated by machines will be made wherever required.
- To protect the workers from exposures to higher noise levels protective devices like ear muffs / ear plugs shall be provided.
- The exposure time of workers to the higher noise level shall also be reduced.

**14.4.4 Water pollution control measures**

- The water accumulated in the mine in the sump will be pumped out and brought to surface in to a water storage tank. After necessary desilting, the water will be used for dust suppression and for green

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development. Any water left after meeting the water requirement, will be released in the nearby pench stream.

- There will not any impact on the ground water resources of buffer zone due to mining activity which will be confined to surface area of 1041 hectares. All effluent from mine, workshop, domestic water shall be treated.
- For the workshop and oil water separator and settling the suspended solids, which are the two main contaminants.
- The layer is skimmed off and subsequently re-processed or disposed of, and the bottom sediment layer is removed by a chain and flight scraper (or similar device) and a sludge pump.

**a) 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 stone waste dump before reclamation so that the soil is not carried away by storm water.
- 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 settling ponds to arrest any loose material being carried away with water.
- Any areas with loose debris within the lease hold will be planted.

**14.4.5 Socio-Economic aspects including resettlement and benefits**

The land oustees will be given rehabilitation and resettlement benefits according to the Govt. of Madhya Pradesh Policies and prevailing practice in industries in the vicinity. Advisory Committee will be formed by Collector/ Revenue Divisional Commissioner. 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 the benefit of the local people.

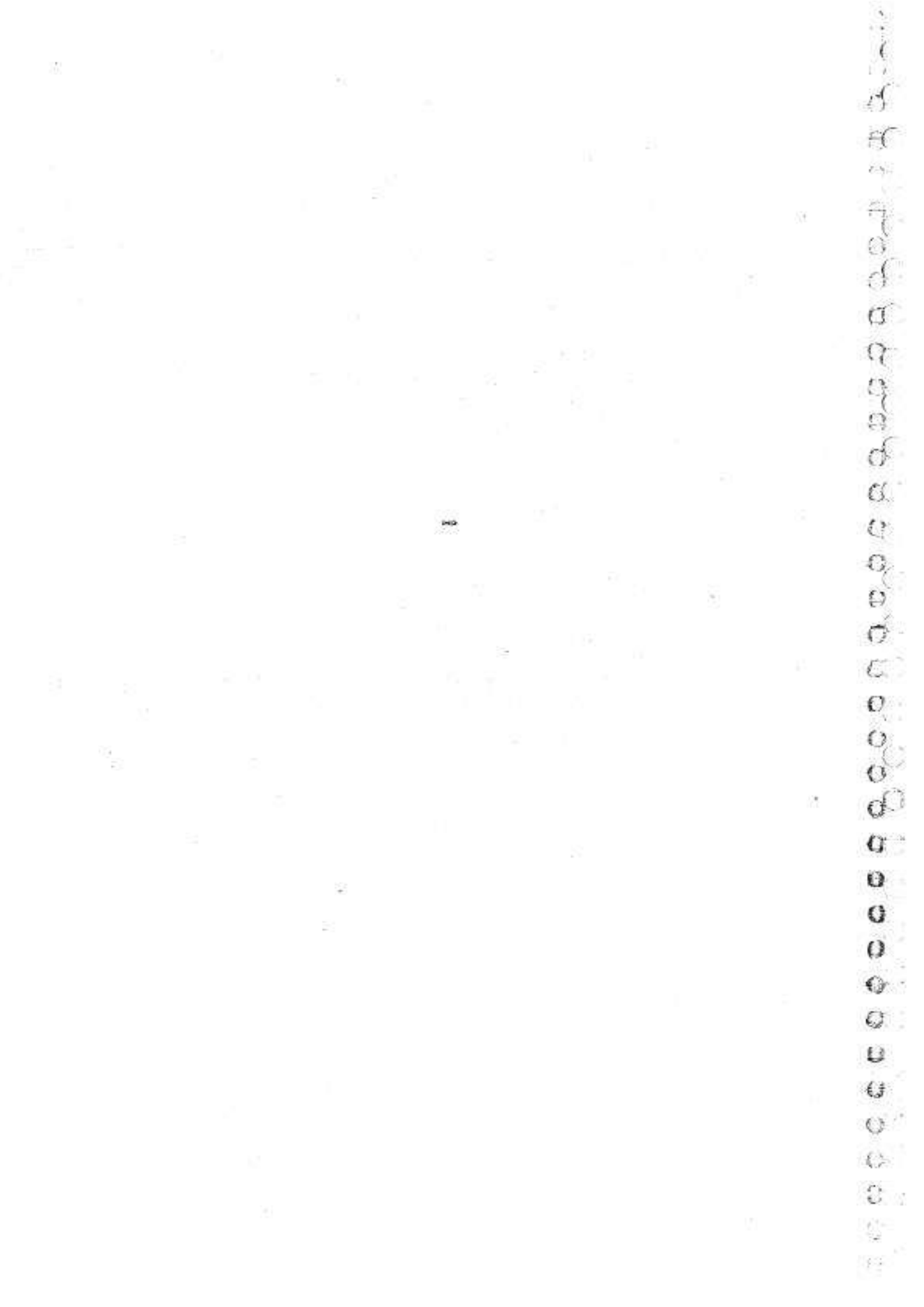
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#### 14.5 MONITORING SCHEDULE OF EMP

- 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 should be done for two days per week and analytical checks made for SPM, SO<sub>2</sub>, NO<sub>x</sub> and CO.
- For effective management of the environment, it is envisaged to have an organizational 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 organization Chart is given in Plate XXIV.

  
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## CHAPTER 15

### MINE CLOSURE PLAN

#### 15.1 INTRODUCTION

##### 15.1.1 Name and address of the owner

**Works & Corporate Office:**

NMDC Limited.

Khanij Bhavan,

10-3-311/A, Castle Hills,

Masab Tank,

Hyderabad - 500173, India

Phone : 23538713 -21 (9 Lines), 23538723, 23538767

Fax : +91-40-23538711, Grams : "MINDEV" HYDERABAD

Email : hois@nmdc.co.in

Website : www.nmdc.co.in

  
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##### 15.1.2 Location

The block is located in part of Pali Tehsil of Umaia district and Sohagpur Tehsil of Shahdol district of Madhya Pradesh and bounded by Latitude 23°14'21" to 23°15'37" and Longitude 81°17'20" to 81°18'48" falling in the Survey of India Topo sheet Nos. 64 E/7 and 64 E/8 (R.F.1:50,000).

The boundaries of the coal block are as follows:

**North** Shahpur Block & West of Shahdol block explored / being explored by GSI & MECL

**East** Shahpur (East) block of NMDC

**South** The blocks of CMPDIL/GSI (exploration in progress).

**West** Marwatola block of MECL & CMPDIL (work in progress).

The Location map has been shown as Plate I in the mining plan.

##### 15.1.3 Extent of ML area and present land use

The extent of ML area and the present land use is given in Table 15.1.

**TABLE 15.1**  
**AREA DETAILS FOR MINING LEASE APPLIED (IN HECTARES)**  
**(SUMMARY OF LAND - SHAHPUR WEST COAL BLOCK)**

| Sl. No. | Type of land             | District Shahdol |              | District Umaria |                |               | Total          |
|---------|--------------------------|------------------|--------------|-----------------|----------------|---------------|----------------|
|         |                          | Khamaria Kalan   | Kathotia     | Kushmaha Khurd  | Khamaria Khurd | Shahpur       |                |
| 1       | Habitation               | 31.688           | 0            | 18.58           | 2.581          | 13.805        | 66.657         |
| 2       | Grazing Land             | 1.687            | 0            | 1.046           | 7.189          | 2.425         | 12.347         |
| 3       | Cremation Ground         | 0.681            | 0            | 0.202           | 0              | 0             | 0.883          |
| 4       | Road                     | 0.926            | 0            | 1.57            | 2.472          | 0.535         | 5.503          |
| 5       | Ponds                    | 6.076            | 0            | 4.986           | 1.692          | 2.365         | 15.119         |
| 6       | River & Nalla            | 3.496            | 1.582        | 1.198           | 1.085          | 0.494         | 7.855          |
| 7       | School                   | 0.202            | 0            | 0.125           | 0              | 0.202         | 0.529          |
| 8       | Khal Khaddar             | 0                | 0            | 0.202           | 0.101          | 0             | 0.303          |
| 9       | Fertilizer Ditch         | 0.036            | 0            | 0.1             | 0.101          | 0             | 0.237          |
| 10      | Gothan                   | 0.401            | 0            | 0.405           | 0.999          | 0             | 1.805          |
| 11      | Temple                   | 0.012            | 0            | 0               | 0              | 0             | 0.012          |
| 12      | Bag Bagia                | 0.526            | 0            | 0               | 0              | 0.865         | 1.391          |
| 13      | Judpi Jungle             | 8.631            | 0            | 3.521           | 1.563          | 2.627         | 16.342         |
| 14      | Forest                   | 0                | 0            | 9.194           | 9.727          | 0             | 18.921         |
|         | <b>Sub Total 1 to 14</b> | <b>54.362</b>    | <b>1.582</b> | <b>41.129</b>   | <b>27.51</b>   | <b>23.318</b> | <b>147.904</b> |
| 15      | <b>Agriculture Land</b>  | <b>166.128</b>   | <b>0.557</b> | <b>140.550</b>  | <b>88.43</b>   | <b>43.934</b> | <b>439.599</b> |
|         | <b>Total Land</b>        | <b>220.49</b>    | <b>2.139</b> | <b>181.679</b>  | <b>115.94</b>  | <b>67.252</b> | <b>587.5</b>   |

#### 15.1.4 Reasons for closure

It is a new allotted block. Therefore Progressive Mine Closure Plan is described along with the coverage of activities to be taken care of at the closure stage. Reasons for Mine Closure can be exhaustion of mineral, lack of demand, uneconomic operations, natural calamity or directives from a statutory organization.

#### 15.1.5 Statutory obligations

It is a new block allotted hence, there are no statutory obligations imposed by any authority except that there is one allotment letter from the Ministry of Coal i.e. MOC allotment letter no. 13016/08/2007-CA-I Dated 25<sup>th</sup> July, 2007 from Government of India. **Annexure 1-1.**

The main points of the letter are as follows:

**Obligation 1.:-** Mining is allotted for commercial purpose and NMDC can supply coal to any consumer except those who have been given linkage by CIL or SCCL

**Compliance 1.:-** NMDC will supply coal to any consumer except those who have been given linkage by CIL or SCCL

**Obligation 2.:-** A Bank Guarantee worth Rs 2.40 crores will be given within 3 months from the date of issue of the allotment letter.

**Compliance 2.:-** A Bank Guarantee worth Rs 2.40 crores has already been submitted.

**Obligation 3.:-** The company shall apply for prospecting license within 3 months of date of issue of the Allotment letter

**Compliance 3.:-** Complied

**Obligation 4.:-** The exploration shall be completed and Geological Report prepared within 3 years from the date of issue of perspective licence

**Compliance 4.:-** Complied

**Obligation 5.:-** The allotment letter may be cancelled on unsatisfactory progress of the end user plant or the development of the block.

**Compliance 5.:-** Noted

The Company undertakes to fulfil all the obligations which may be imposed in future by other authorities like MOC, MOEF, Coal Controller, Chief Inspector of Explosives, DGMS, SPCB etc.

#### 15.1.6 Closure plan preparation

The Progressive Mine Closure Plan and Mine Closure Plan have the approval of the authorised signatory of the Company and the relevant document is attached as **Annexure A-1**.

#### 15.2 MINE DESCRIPTION

##### i) Geological succession

The geological succession established in borehole-wise stratigraphic sequence in the block is given below in Table 15.2.

**TABLE 15.2**  
**GEOLOGICAL SUCCESSION OF SHAHPUR WEST BLOCK**

| Age                              | Formation       | Lithology                                                                           |
|----------------------------------|-----------------|-------------------------------------------------------------------------------------|
| Recent                           | Soil            | Soil & Alluvium                                                                     |
| Mid. Permian                     | Barren Measures | Pink, buff, red sandstone, red shale etc.                                           |
| Lw. Permian                      | Barakar         | Coarse to medium grained sandstone subordinate shales and coal seams                |
| Lw. Permian to Up. Carboniferous | Talchir         | Sandstone & siltstones with pebbles of Granite. (Intersected only in GSI boreholes) |
| <b>Unconformity</b>              |                 |                                                                                     |
| Pre-Cambrian                     | Metamorphics    | Not intersected in any borehole.                                                    |

The thickness range of each formation within the block as intersected in the boreholes are also as in Table 15.3.

  
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**TABLE 15.3**  
**THICKNESS RANGE OF DIFFERENT GEOLOGICAL FORMATION**

| Formation        | Thickness Range(m)        |                  |
|------------------|---------------------------|------------------|
|                  | Minimum                   | Maximum          |
| Soil / Alluvium  | 3.00 (MSSW-5)             | 7.75 (SSH-7)     |
| Weathered Mantle | 11.00 (MSSW-42)           | 28.50 (MSSW-1)   |
| Barren Measure   | 9.00 (MSSW-23)            | 76.00 (MSSW -24) |
| Barakars         | 99.50 (MSSW -39)          | 239.00 (SSH-30)  |
| Talchirs         | 4.05 (SSH-30)             | 24.30 (SSH-29)   |
| Metamorphics     | Not drilled upto basement |                  |

**ii) Description of formations**

The different geological formations encountered in the boreholes drilled in Shahpur West Block are summarized below:

**a) Talchirs**

The Talchir Formation is not exposed in Shahpur West Block. They are represented by greenish sandstone with pebbles of granite. It has been intersected in 5 GSI boreholes (SSH-7, 17, 26, 29 & 30). Full thickness of Talchir Formation is not intersected in any of the boreholes.

**b) Barakars**

The Barakar Formation overlies the Talchirs and comprises dominantly of sandstones with sub-ordinate shales, carbonaceous shale, intercalation of shale and sandstone and six regionally persistent coal seams, viz. IV, L2, III, II, I and L1 in descending order. Seams-III occurs in 3 sections, the top prominent & consistent IIIA and the bottom impersistent IIIB & IIIL seams. Hence altogether eight seams occur viz. L2, IIIA, IIIB, IIIL, II, I and L1. The sandstones are fine to coarse grained, micaceous and feldspathic. The cementing material of the sandstone is normally kaolinised feldspar. The shale is typically grey and is rather insignificant in the sedimentary pile.

The Barakar Formation has been intersected in all the boreholes drilled by MECL & GSI except MSSW-42, which is intruded by dyke. The full thickness of Barakar column has been intersected in only 5 boreholes of GSI and the thickness of barakar varies from 99.50m (MSSW-39) to 239.00 m (SSH-30).

**c) Barren Measures**

The Barakar formation is overlain by ferruginous sandstones and shales of Barren Measures. This horizon is found about 25m to 40m above the youngest coal horizon viz. seam IV of Barakar Formation. Unlike Barakar, the Barren Measures contains shale laminations and shale bands. The persistent shale band at about 25 m to 40 m above seam IV is taken as a marker horizon for delineating the contact between Barakars and Barren Measures.

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The Barren Measures have been intersected in 63 boreholes drilled in the block. The thickness of Barren Measures intersected in Shahpur West Block varies from 9.00m (MSSW-23) to 76.00m (MSSW-24).

**d) Soil / alluvium**

The soil / alluvium in the block is sandy. Its thickness ranges from 3.00 m (MSSW-5) to 7.75 m (SSH-7).

**e) Weathered Mantle**

Weathering has affected all strata. The minimum and maximum depth of weathering ranges from 11.00m (MSSW-42) to 28.50m (MSSW-1).

**iii) Structure of the Block & Faults**

Area of is entirely covered by Barren Measures formation, & hence devoid of seam exposures. A structure is based on integrated floor contour plan drawn for major seams i.e. IV, L2, IIIA, IIIB, II & L1 and Geological cross sections.

The structure of Shahpur West Block is simple over a major part of the block i.e. in the northern & central parts except in the southern strip where 4 faults have been deciphered. The faults F1 - F1 (25 m to 40 m) & F2 - F2 (15 m throw) are of higher magnitude & the remaining two faults F3 - F3 (5 m) & F4 - F4 (0 - 5 m) are minor faults. The description of faults in Shahpur West block is given in Table 15.4. Due to existence of E-W trending regional faults (Chilpi - Bamni) the long anal cracks can be seen & are manifesting in 5 minor slips of very low magnitude of around 2 m throw. These have been designated as MS-1 to Ms-5.

The strike of coal seam in general is NW-SE shifting to EW due to rolling of dip throughout the block. The dip of the coal seam is due north easterly in general shifting to south easterly in the southern part. The gradient of seams is varies from 1 in 23 to 1 in 57. The dip is generally very low i.e. 1° to 2°. One dolerite dyke which has been intersected in borehole MSSW-42 & its outcrop is interpreted to extend upto 300 m length & 8 m width along NW-SE direction. It is depicted as sub vertical/vertical in 3D model.

**TABLE 15.4**  
**DESCRIPTION OF FAULTS, SHAHPUR WEST BLOCK**

| Fault No. | Location                                             | Strike/Dip                     | Nature of fault | Throw (m) | Evidences                                                                                                                                                       |
|-----------|------------------------------------------------------|--------------------------------|-----------------|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| F1- F1    | 650 m within block in the SW corner near BH-MSSW-56. | NW-SE Dipping in SW direction. | Dip fault       | 25 - 40   | i) Intersected in BH SSH-26, resulting in reduction of strata. (Lower Barakar by 40m.)<br>ii) Intersected in BH MSSW-56, resulting in contact reduction of BMB. |
| F2- F2    | 300 m within the block near BH MSSW-24.              | E-W Dipping Southerly          | Oblique fault.  | 15        | Seam IV faulted in BH MSSW-24.                                                                                                                                  |
| F3- F3    | 1.5 to 2 km length within                            | WNW-ESE                        | Oblique         | 5         | It is not intersected in any BH, but                                                                                                                            |

| Fault No.                            | Location                                                                         | Strike/Dip  | Nature of fault | Throw (m) | Evidences                                                                                                          |
|--------------------------------------|----------------------------------------------------------------------------------|-------------|-----------------|-----------|--------------------------------------------------------------------------------------------------------------------|
|                                      | the block from BH MSSW-21 in the NW to BH MSSW-45 in SE.                         |             | fault.          |           | interpreted based on FRL difference.                                                                               |
| F4 -F4                               | 900 m length within the block near BH MSSW-10 in the NE to BH MSSW-48 in the SW. | Curvilinear | Strike fault    | 2 - 5     | Seam IV faulted in BH MSSW-48.                                                                                     |
| MS-1<br>MS-2<br>MS-3<br>MS-4<br>MS-5 | MSSW-49<br>MSSW-13<br>MSSW-13<br>MSSW-19<br>MSSW-7                               |             |                 |           | Seam IIIA - Faulted<br>Seam IV absent<br>Seam IIIA absent.<br>Seam IIIA absent<br>Seam II - reduction in thickness |

### 15.3 DESCRIPTION OF COAL SEAMS

#### A. General

Detailed exploration of Shahpur West block has revealed the existence of 8 coal horizons. Out of these a total of four correlatable seams IV, III, II & I in descending order have been established along with a few local coal seam. In Seam-III there are three sections (IIIA, IIIB & IIIL). The top section IIIA is persistent throughout the block whereas seam-IIIB & IIIL are developed imperisistently in the block. The seam II has developed into the thickest and most potentially workable. Whereas seams IIIB, IIIL, I & L1 are thin & partially developed seam in the block.

- i) The standard norms applicable to non-coking coal have been followed for identification of coal seams and bands. These are as follows:-

|    |                                       |                                |
|----|---------------------------------------|--------------------------------|
| a) | Coal                                  | Ash + Moisture Up to 40%       |
| b) | Shaly Coal                            | Ash + Moisture >40% up to 55%  |
| c) | Carbonaceous shale (combustible band) | Ash + Moisture > 55% up to 75% |
| d) | Shale (non-combustible band)          | Ash + Moisture >75%            |

The carbonaceous shale band has been considered as part of the seam only in cases where its thickness is less than or equal to the thickness of coal/shaly coal forming the roof & floor of the band.

- iii) A dirt band which is combustible band has been defined as having more than 55% to 75% Ash + Moisture irrespective of thickness (carb shale band).
- iv) The obvious dirt band of non-carbonaceous matter has been considered as non-combustible band (NCB) irrespective of its thickness (shale & variants and Sst bands). When the NCB is in continuation with carbonaceous shale, then both the bands are excluded for determining the In-band thickness irrespective of their thicknesses.

- v) The BCS & I-30 thickness are always excluding NCB.
- vi) The BCS thickness is excluding NCB and all bands having more than 55% Ash + moisture.
- vii) The I-30 thickness is excluding NCB and all carb shale bands i.e. more than 55% to 75% (Ash + Moisture) which are having thickness, more than 0.30m.

### B. Correlation

The detailed exploration carried out by MECL in Shahpur West Block has revealed the presence of eight regionally correlatable Barakar coal seams viz. IV, L2, IIIA, IIIB, IIIL, II, I and L1 in descending order.

The correlation of coal seams is mainly based on:

- a) Lateral continuity/persistency of coal seams.
- b) Actual thickness of individual seams.
- c) Thickness and nature of parting between seams.
- d) Presence of marker dirt bands/non-combustible bands within the seam.
- e) Overall of the seam based on band by band data.
- f) Quality parameter of seam.
- g) Nature of roof & floor lithology of the seam.
- h) Special identification regarding deterioration /non-development of individual seam.

### C. Sequence of Coal Seams

The sequence of coal seams, their thickness ranges and range of intervening parting between the seams as established in Shahpur West block is presented in Table 15.5.

**TABLE 15.5**  
**SEQUENCE OF COAL SEAMS, SHAHPUR WEST BLOCK**

| Sequence of Seam / Parting | Range of Seam Thickness (m) |                    | No. of full intersections | Dominant thickness (m) |
|----------------------------|-----------------------------|--------------------|---------------------------|------------------------|
|                            | Minimum                     | Maximum            |                           |                        |
| IV                         | 0.15<br>(MSSW-21)           | 1.70<br>(MSSW-37)  | 60                        | 0.50 – 1.50            |
| Parting                    | 41.03<br>(MSSW-56)          | 55.53<br>(MSSW-37) | -                         | -                      |
| L2                         | 0.55<br>(MSSW-21)           | 3.16<br>(SSH-15)   | 63                        | 0.50 – 2.00            |
| Parting                    | 9.58<br>(MSSW-14)           | 23.24<br>(MSSW-7)  | -                         | -                      |

| Sequence of Seam / Parting | Range of Seam Thickness (m) |                    | No. of full intersections | Dominant thickness (m) |
|----------------------------|-----------------------------|--------------------|---------------------------|------------------------|
|                            | Minimum                     | Maximum            |                           |                        |
| III A                      | 0.35<br>(MSSW-12)           | 2.84<br>(MSSW-11)  | 60                        | 0.50 – 1.50            |
| Parting                    | 0.30<br>(MSSW-56)           | 2.93<br>(MSSW-25)  | -                         | -                      |
| III B                      | 0.14<br>(MSSW-32)           | 1.78<br>(MSSW-40)  | 35                        | 0.50 – 1.20            |
| Parting                    | 0.72<br>(MSSW-30)           | 1.62<br>(MSSW-31)  | -                         | -                      |
| III L                      | 0.62<br>(MSSW-29)           | 1.40<br>(MSSW-58)  | 9                         | 0.05 – 0.90            |
| Parting                    | 12.75<br>(MSSW-58)          | 20.32<br>(MSSW-29) | -                         | -                      |
| II                         | 0.92<br>(MSSW-56)           | 4.16<br>(SSH-30)   | 62                        | 1.50 – 3.00            |
| Parting                    | 18.54<br>(MSSW-24)          | 41.65<br>(SSH-17)  | -                         | -                      |
| I                          | 0.03<br>(MSSW-37)           | 1.25<br>(SSH-17)   | 29                        | <0.50-0.90             |
| Parting                    | 10.11<br>(MSSW-31)          | 25.76<br>(MSSW-38) | -                         | -                      |
| L1                         | 0.10<br>(MSSW-37)           | 1.66<br>(SSH-30)   | 46                        | <0.50-0.90             |

#### D. Characteristics of individual coal seams

##### General

Based on the data of 64 boreholes drilled within the block, occurrence of 5 group of seam in eight sections has been established. Out of these, only 4 horizons viz. Seam-IV, L2, IIIA & II are persistent while the remaining 4 horizons, viz. IIIB, IIIL, I and L1 are impersistent and patchy in development. Hence, the potentiality for mining of only four persistent seams has been assessed. However all the seams has been studied for their quality and geological parameters. The details of individual coal seams are as under:

##### a) Seam-IV

Seam-IV is a prominent & consistently developed coal seam occurring in Barakar formation. It is the top most & youngest coal seam in Shahpur West Block. Seam-IV occurs below 10 to 25m BM/B contact with a parting of 10 to 25 m. It overlies seam L2 with a parting of 41.03 m. to 55.53 m. The parting lithology from Barren Measures/Barakar contact up to seam IV is mostly feldspathic sandstone.

The full seam thickness has been intersected in 60 boreholes. The maximum seam thickness is 1.70 m. The dominant thickness range of 0.50 – 1.50 in the North East part of the block the seam attains better thickness of 1.20 m over a larger area. Whereas, in the South West part, its thickness is <0.50 m.

The seam occurs in the depth range of 24 to 100 m within the block. Over a vast part of the block in the North & north west the depth occurrence of seam is < 50 m and relatively smaller part in south west its depth of occurrence is < 50 m. relatively smaller part in the southwest, it occurs at >0.50m depth. Seam occurs at around 100m depth in sector D between faults F1 & F2.

#### **a.1) Seam overall quality**

The seam is devoid of any dirt band in all the boreholes content. The moisture content varies from 1.40% to 10.90%. The Ash content varies from 11.00% to 40.40%. The calorific value varies between 5300 to 7020 K.Cal/kg. The seam grade varies from A to F. The seam grade is superior – A,B & C grade over a larger part of the block in the central & eastern part.

#### **a.2) Reserves**

The estimated total Net Proved in situ reserves for the seam IV in Shahpur West Block is 8.014 million tones. Out of total reserves, 6.502 million tonnes belong to superior coal with >0.90 m thickness and inferior coal with > 1.2 m thickness while the reserves 1.512 million tonnes are available for thickness less than the mentioned above.

#### **b) Seam-L2**

Seam L2 is the second persistent seam in descending order, which has attained workable thickness throughout the block. It is intersected in all the boreholes except MSSW-42. The seam thickness varies from 0.55 m to 3.16 m. The seam occurs mostly in depth range of 73 – 153 m from surface. Dominant thickness is 1.00 to 2.00m over a larger part of the block. The depth of occurrence if the seam is mostly <100m over a major part of the block.

#### **b.1) Seam Overall Quality**

The coal seam quality on I-30 and Bcs analysis basis (on 60% RH and 40°C and on calculated basis) is given in Annexure IV. The seam has clean coal in all the boreholes except in two boreholes i.e. MSSW-15 (0.35m sandstone band) & MSSW-20 (0.15 shale band). The moisture varies from 2.20% to 11.40%. The Ash varies from 12.60% to 42.80%.

The calorific value varies between 4030 to 6390 Kcal/Kg. and the grade ranges between A to G. The dominant grade is C & D.

#### **b.2) Reserves**

The total Net Proved in situ reserves for the seam L2 are estimated as 9.492 million tonnes. Out of total reserves, 6.037 million tonnes belong to superior coal with >0.90 m thickness and inferior coal with > 1.2 m thickness

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and 3.455 million tonnes are available for thickness less than the mentioned above.

### c) Seam-III A

Seam IIIA is developed throughout the block except in borehole MSSW-42, in which, seam is emplaced by dyke. The seam is not intersected in 4 boreholes (MSSW-19 in the SW, MSEW-13 and 49 in the north) due to minor slip / minor fault of around 2 m throw. It overlies seam IIIB with a parting range 0.30 m to 2.93 m. The thickness range varies from 0.35 m to 2.84 m. (Dominant 0.50 – 1.50 m). The seam occurs in the depth range of 85 – 173 m from surface mostly >100 m over larger part of the block. In north-eastern corner, seam occurs at > 150 m depth.

The seam has attained good workable thickness in the central part continuing up to southern boundary of the block. But in the SW corner and in patches in the northern part of the block the seam displays poor thickness.

#### c.1) Seam overall quality

The coal seam quality on I-30 and Bcs analysis basis (on 60% RH and 40°C and on calculated basis) is given in Annexure IV. The moisture content varies between 2.00% to 9.80% and ash varies from 7.30 % to 50.50 %. The calorific value varies between 3090 to 6220 K.Cal/kg. The seam grade ranges between A to G (generally D to F). 'C' grade coal occurs in discontinuous patches in the block

#### c.2) Reserves

The total Net Proved in situ reserves for the seam IIIA are estimated as 9.206 million tonnes. Out of 9.206 million tonnes, 4.592 million tonnes belong to superior coal with >0.90 m thickness and inferior coal with > 1.2 m thickness and 4.614 million tonne reserves are available for thickness less than the mentioned above.

### d) Seam-III B

The Seam IIIB overlies seam IIIL with varying parting of 0.72 m to 1.62 m. The seam is developed only in Western & South-Eastern part of the block. In rest of the area this seam is not developed. The thickness range of the seam is from 0.14 m to 1.78 m. The seam has attained workable thickness of about 1.20 m in 3 patches in the western part. The seam occurs mostly in the depth range of 88 m to 130 m.

The seam IIIB is intersected in 35 boreholes. It is not developed in 28 boreholes. The seam is emplaced by dolerite in one boreholes i.e. MSSW-42. Out of 35 boreholes 22 boreholes got clean section of coal. Thin dirt bands are developed in one borehole (MSSW-47). In the extreme western part near MSSW-57 the seam has attained C grade.

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**d.1) Seam overall quality**

The coal seam quality on I-30 and Bcs analysis basis (on 60% RH and 40°C and on calculated basis) is given in Annexure IV. The moisture content varies between 2.50% to 9.80% and ash varies from 13.10% to 50.40%. The calorific value ranges from 3240 to 6170 K.Cal/kg. and the seam grade varies from B to G.

**d.2) Reserves**

The total Net Proved in situ reserves for the seam IIIB are estimated as 2.738 million tonnes. Out of total 2.738 million tonnes, 1.189 million tonnes belong to superior coal with >0.90 m thickness and inferior coal with > 1.2 m thickness and 1.549 million tonnes are available for less thickness than mentioned above.

**e) Seam-III L**

Seam III L is a thin coal seam and it overlies seam II with varying parting of 12.75 m to 20.32 m. The seam has been intersected only in 9 boreholes. It is mostly not developed over a major part of the block except in the NW corner of the block. In one borehole i.e. MSSW-42, it is emplaced by dolerite dyke. Thickness range is from 0.62m to 1.40m.

**e.1) Seam overall quality**

The coal seam quality on I-30 and Bcs analysis basis (on 60% RH and 40°C and on calculated basis) is given in Annexure IV. The moisture varies from 1.70% to 9.00%. Ash varies from 12.50% to 32.80%. The Calorific value varies from 3394 to 5961 K.Cal/kg. and the grade varies from B to E.

**e.2) Reserves**

The total Net Proved in situ reserves for the seam IIIL is estimated as 0.413 million tonnes belonging to grade C to G. The maximum reserves viz. 0.280 million tonnes are available in less than 0.90 m thickness of superior coal and inferior coal with > 1.2 m thickness. Where as, 0.133 million tonnes reserves are available belonging to superior coal with >0.90 m thickness and inferior coal with > 1.2 m thickness.

**f) Seam-II**

Seam-II is thick, consistent & main workable coal seam, which overlies seam-I with varying parting of 18.54 m to 41.65 m. The seam has been intersected in 62 Nos. of boreholes. In one borehole i.e. in MSSW-42, it is emplaced by dolerite dyke. In MSSW-7 minor slip has resulted into part seam intersection. The thickness of seam II varies from 0.92 m to 4.16 m. The seam occurs mostly in depth range of 109 – 193 m, over 70 % of area, while about 30% area towards western part occurs in depth range of 100 – 150 m.

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**f.1) Seam overall quality**

The coal seam quality on I-30 and Bcs analysis basis (on 60% RH and 40°C and on calculated basis) is given in Annexure IV. The seam has clean coal in 51 boreholes. In 11 boreholes dirt band developed. The moisture varies from 2.20% to 9.30%. Ash varies from 11.90% to 37.60%. The calorific value ranges from 4350 to 7060 K.Cal/Kg. The grade varies from A to F.

**f.2) Reserves**

The total net proved in situ reserves for the seam II is estimated as 18.579 million tonnes. Out of total 18.579 million tonnes reserves, 18.451 belong to superior coal with >0.90 m thickness and inferior coal with > 1.2 m thickness.

**g) Seam-I**

Seam- I is a thin seam developed in southwestern & Central part of the block. It has unworkable thickness of < 0.50m over a larger area of it development. Hence, its reserves estimation is not done. Its thickness range is from 0.03-1.25m and occurrence depth range of 150m in the Southwest. It overlies seam L1 with parting range of 10.11-25.76m in the block.

**g.1) Seam overall quality**

For 10 boreholes intersections of Seam-I overall is available and mostly the seam is thin (<0.50m). In other boreholes, the seam is not developed over a major part of the area.

**g.2) Reserves**

No reserves have been estimated for seam I.

  
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**h) Seam-L1**

It is oldest seam of barakar column which has attained workable thickness towards western part of the block. The thickness varies from 0.10m to 1.66m. The seam has been intersected in 46 Nos. of boreholes. The 14 boreholes are not drilled up to the seam. L1 seam is not developed in 3 BHs. In one borehole i.e. MSSW-42, it is emplaced by dolerite dyke. The seam mostly occurs at depth range of 151 – 230 m.

**h.1) Seam overall quality**

The coal seam quality on I-30 and Bcs analysis basis (on 60% RH and 40°C and on calculated basis) is given in Annexure IV. The seam has clean coal in all boreholes. The moisture varies from 2.00% to 9.50%. The ash varies from 8.90% to 42.40%. The calorific value varies from 2262 to 6457 K.Cal/kg. The grade varies from A to G.

**h.2) Reserves**

The total Net Proved in situ reserves are estimated as 4.237 million tonnes. Out of total 4.237 million tonnes reserves, 1.472 belong to superior coal with >0.90 m thickness and inferior coal with > 1.2 m thickness, while 2.765 million tonnes are available in less less thickness than mentioned above.

**15.4 SUMMARY OF RESERVES**

In Shahpur West Block a total of 38.376 million tonnes of "Net Proved", in-situ, underground reserves of non-coking coals have been estimated from seven coal seams viz. seam IV, L2, IIIA, IIIB, IIIL, II & L1 (Table 15.6).

**TABLE 15.6**  
**GIST OF RESERVES : SHAHPUR WEST BLOCK**

| Classification                | Thickness Range (m)   | Reserves (m.t.)       |                       | Total Reserves (m.t.)                         |
|-------------------------------|-----------------------|-----------------------|-----------------------|-----------------------------------------------|
|                               |                       | Superior Coal (>0.90) | Inferior Coal (>1.20) |                                               |
| As per approved norms of UNFC | >0.90 & >1.20 to 5.00 | 19.930 (52%)          | 18.446 (48%)          | <b>38.376</b><br><b>100 %</b><br><b>(73%)</b> |

The grade-wise availability of reserves for workable seams in Shahpur West Block is given Table 15.7 to 15.8 respectively.

**TABLE 15.7**  
**GRADE-WISE AVAILABILITY OF RESERVES: SHAHPUR WEST BLOCK**

| Grade        | Reserves in Million Tonnes<br>(% of total reserves) Thickness as per<br>UNFC Norms |
|--------------|------------------------------------------------------------------------------------|
| A            | 0.763 (2%)                                                                         |
| B            | 3.562 (9%)                                                                         |
| C            | 15.605 (41%)                                                                       |
| D            | 12.100 (32%)                                                                       |
| E            | 4.029 (10%)                                                                        |
| F            | 1.342 (3.5%)                                                                       |
| G            | 0.975 (2.5%)                                                                       |
| <b>Total</b> | <b>38.376 (100%)</b>                                                               |

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**TABLE 15.8**  
**SUMMARY OF THICKNESS WISE TOTAL RESERVES**

| I. Thickness as per UNFC Norms | Reserves % Superior (>0.90m. Th.) | Reserves % Inferior (>1.20m. Th.) | Total                |
|--------------------------------|-----------------------------------|-----------------------------------|----------------------|
| 0.90 – 1.20                    | 5.702 (15%)                       | -                                 | 5.702 (15%)          |
| 1.20 – 1.50                    | 6.063 (16%)                       | 5.279 (14%)                       | 11.342 (29%)         |
| 1.50 – 3.00                    | 7.826 (20%)                       | 11.745 (31%)                      | 19.571 (51%)         |
| 3.00 – 5.00                    | 0.339 (1%)                        | 1.422 (4%)                        | 1.761 (5%)           |
| <b>TOTAL – I</b>               | <b>19.930 (52%)</b>               | <b>18.446 (48%)</b>               | <b>38.376 (100%)</b> |

**TABLE 15.9**  
SEAM-WISE, THICKNESS-WISE AND GRADE-WISE NET PROVED INSITU RESERVES  
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| SEAM | THICKNESS                    | SUPERIOR GRADE RESERVES   |      |      |                               | INFERIOR GRADE RESERVES   |      |     |   |       | GRAND TOTAL |
|------|------------------------------|---------------------------|------|------|-------------------------------|---------------------------|------|-----|---|-------|-------------|
|      |                              | A                         | B    | C    | TOTAL                         | D                         | E    | F   | G | TOTAL |             |
|      |                              | RESERVES >0.90m THICKNESS |      |      |                               | RESERVES >1.20m THICKNESS |      |     |   |       |             |
| IV   | 0.9-1.20                     | 293                       | 1240 | 1142 | 2675                          |                           |      |     |   |       | 2675        |
|      | 1.2-1.5                      | 410                       | 1609 | 1421 | 3440                          | 134                       |      |     |   | 134   | 3574        |
|      | 1.5-3.0                      |                           | 94   | 126  | 220                           | 33                        |      |     |   | 33    | 253         |
|      | TOTAL                        | 703                       | 2943 | 2689 | 6335                          | 167                       |      |     |   | 167   | 6502        |
|      | RESERVES 0.50-0.9m THICKNESS |                           |      |      | RESERVES 0.50-1.20m THICKNESS |                           |      |     |   |       |             |
| L2   | 0.5-0.90                     | 139                       | 521  | 538  | 1198                          | 96                        | 88   | 27  |   | 211   | 1409        |
|      | 0.9-1.20                     |                           |      |      |                               | 99                        | 4    |     |   | 103   | 103         |
|      | TOTAL                        | 139                       | 521  | 538  | 1198                          | 195                       | 92   | 27  |   | 314   | 1512        |
|      | GRAND TOTAL                  | 842                       | 3464 | 3227 | 7533                          | 362                       | 92   | 27  |   | 481   | 8014        |
|      | RESERVES >0.90m THICKNESS    |                           |      |      | RESERVES >1.20m THICKNESS     |                           |      |     |   |       |             |
|      | 0.9-1.20                     |                           | 57   | 1504 | 1561                          |                           |      |     |   |       | 1561        |
|      | 1.2-1.5                      |                           | 45   | 1187 | 1232                          | 1283                      | 95   |     |   | 1378  | 2610        |
|      | 1.5-3.0                      |                           | 78   | 1366 | 1444                          | 399                       | 23   |     |   | 422   | 1866        |
|      | TOTAL                        |                           | 180  | 4057 | 4237                          | 1682                      | 118  |     |   | 1800  | 6037        |
|      | RESERVES 0.50-0.9m THICKNESS |                           |      |      | RESERVES 0.50-1.20m THICKNESS |                           |      |     |   |       |             |
|      | 0.5-0.90                     | 3                         | 13   | 243  | 259                           | 372                       | 410  | 189 |   | 971   | 1230        |
|      | 0.9-1.20                     |                           |      |      |                               | 1689                      | 484  | 52  |   | 2225  | 2225        |
|      | TOTAL                        | 3                         | 13   | 243  | 259                           | 2061                      | 894  | 241 |   | 3196  | 3455        |
|      | GRAND TOTAL                  | 3                         | 193  | 4300 | 4496                          | 3743                      | 1012 | 241 |   | 4996  | 9492        |
|      | RESERVES 0.50-0.9m THICKNESS |                           |      |      | RESERVES 0.50-1.20m THICKNESS |                           |      |     |   |       |             |

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| SEAM        | THICKNESS                    | SUPERIOR GRADE RESERVES |      |      |       | INFERIOR GRADE RESERVES |      |      |      | GRAND TOTAL |       |
|-------------|------------------------------|-------------------------|------|------|-------|-------------------------|------|------|------|-------------|-------|
|             |                              | A                       | B    | C    | TOTAL | D                       | E    | F    | G    |             | TOTAL |
| IIIA        | RESERVES >0.90m THICKNESS    |                         |      |      |       |                         |      |      |      |             |       |
|             | 0.9-1.20                     | 18                      | 19   | 460  | 497   |                         |      |      |      |             | 497   |
|             | 1.2-1.5                      |                         | 11   | 312  | 323   | 759                     | 546  | 723  | 289  | 2317        | 2640  |
|             | 1.5-3.0                      |                         |      | 284  | 284   | 155                     | 124  | 518  | 374  | 1171        | 1455  |
|             | 3.0-5.0                      |                         |      |      |       |                         |      |      |      |             |       |
|             | TOTAL                        | 18                      | 30   | 1056 | 1104  | 914                     | 670  | 1241 | 663  | 3488        | 4592  |
|             | RESERVES 0.50-0.9m THICKNESS |                         |      |      |       |                         |      |      |      |             |       |
|             | 0.5-0.90                     |                         | 20   | 227  | 247   | 604                     | 674  | 311  |      | 1589        | 1836  |
|             | 0.9-1.20                     |                         |      |      |       | 1168                    | 765  | 767  | 78   | 2778        | 2778  |
|             | TOTAL                        |                         | 20   | 227  | 247   | 1772                    | 1439 | 1078 | 78   | 4367        | 4614  |
| GRAND TOTAL | 18                           | 50                      | 1283 | 1351 | 2686  | 2109                    | 2319 | 741  | 7855 | 9206        |       |
| IIIB        | RESERVES >0.90m THICKNESS    |                         |      |      |       |                         |      |      |      |             |       |
|             | 0.9-1.20                     |                         | 57   | 360  | 417   |                         |      |      |      |             | 417   |
|             | 1.2-1.5                      |                         | 21   | 81   | 102   | 134                     | 43   | 44   | 232  | 453         | 555   |
|             | 1.5-3.0                      |                         | 25   | 24   | 49    | 79                      | 7    | 7    | 75   | 168         | 217   |
|             | 3.0-5.0                      |                         |      |      |       |                         |      |      |      |             |       |
|             | TOTAL                        |                         | 103  | 465  | 568   | 213                     | 50   | 51   | 307  | 621         | 1189  |
|             | RESERVES 0.50-0.9m THICKNESS |                         |      |      |       |                         |      |      |      |             |       |
|             | 0.5-0.90                     |                         | 63   | 359  | 422   | 111                     | 188  | 205  | 25   | 529         | 951   |
|             | 0.9-1.20                     |                         |      |      |       | 171                     | 153  | 204  | 70   | 598         | 598   |
|             | TOTAL                        |                         | 63   | 359  | 422   | 282                     | 341  | 409  | 95   | 1127        | 1549  |
| GRAND TOTAL |                              | 166                     | 824  | 990  | 495   | 391                     | 460  | 402  | 1748 | 2738        |       |

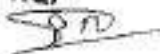
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| SEAM                          | THICKNESS                     | SUPERIOR GRADE RESERVES    |     |      |       |      | INFERIOR GRADE RESERVES |    |   |       |       | GRAND TOTAL |
|-------------------------------|-------------------------------|----------------------------|-----|------|-------|------|-------------------------|----|---|-------|-------|-------------|
|                               |                               | A                          | B   | C    | TOTAL | D    | E                       | F  | G | TOTAL |       |             |
| III L                         | RESERVES > 0.90m THICKNESS    |                            |     |      |       |      |                         |    |   |       |       |             |
|                               | 0.9-1.20                      |                            | 38  | 47   | 85    | 1    |                         |    |   |       |       | 85          |
|                               | 1.2-1.50                      |                            | 14  | 19   | 33    | 15   |                         |    |   | 15    |       | 48          |
|                               | TOTAL                         |                            | 52  | 66   | 118   | 15   |                         |    |   | 15    |       | 133         |
|                               | RESERVES 0.50-0.90m THICKNESS |                            |     |      |       |      |                         |    |   |       |       |             |
|                               | 0.5-0.90                      |                            | 68  | 68   | 136   | 49   | 41                      |    |   |       | 90    | 226         |
|                               | 0.9-1.20                      |                            |     |      |       | 43   | 11                      |    |   |       | 54    | 54          |
|                               | TOTAL                         |                            | 68  | 68   | 136   | 92   | 52                      |    |   |       | 144   | 280         |
|                               | GRAND TOTAL                   |                            | 120 | 134  | 254   | 107  | 52                      |    |   |       | 159   | 413         |
|                               | II                            | RESERVES > 0.90m THICKNESS |     |      |       |      |                         |    |   |       |       |             |
| 0.9-1.20                      |                               | 22                         | 39  | 18   | 79    |      |                         |    |   |       |       | 79          |
| 1.2-1.5                       |                               | 8                          | 75  | 361  | 444   | 292  | 136                     | 14 |   | 432   |       | 876         |
| 1.5-3.0                       |                               |                            | 80  | 5704 | 5784  | 7395 | 2546                    | 10 |   | 9951  |       | 15735       |
| 3.0-5.0                       |                               |                            |     | 339  | 339   | 966  | 444                     | 12 |   | 1422  |       | 1761        |
| TOTAL                         |                               | 30                         | 194 | 6422 | 6646  | 8643 | 3126                    | 36 |   | 11805 |       | 18451       |
| RESERVES 0.50-0.90m THICKNESS |                               |                            |     |      |       |      |                         |    |   |       |       |             |
| 0.9-1.20                      |                               |                            |     |      |       |      | 65                      | 63 |   |       | 128   | 128         |
| TOTAL                         |                               |                            |     |      |       |      | 65                      | 63 |   |       | 128   | 128         |
| GRAND TOTAL                   |                               | 30                         | 194 | 6422 | 6646  | 8643 | 3191                    | 99 |   |       | 11933 | 18579       |

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| SEAM                          | THICKNESS                     | SUPERIOR GRADE RESERVES |       |       |       | INFERIOR GRADE RESERVES |      |      |       |       |       | GRAND TOTAL |
|-------------------------------|-------------------------------|-------------------------|-------|-------|-------|-------------------------|------|------|-------|-------|-------|-------------|
|                               |                               | A                       | B     | C     | TOTAL | D                       | E    | F    | G     | TOTAL |       |             |
| L1                            | RESERVES >0.90m THICKNESS     |                         |       |       |       |                         |      |      |       |       |       |             |
|                               | 0.9-1.20                      | 12                      | 20    | 356   | 388   |                         |      |      |       |       |       | 388         |
|                               | 1.2-1.5                       |                         | 22    | 467   | 489   | 466                     | 65   | 14   | 5     | 550   |       | 1039        |
|                               | 1.5-3.0                       |                         | 18    | 27    | 45    |                         |      |      |       |       |       | 45          |
|                               | TOTAL                         | 12                      | 60    | 850   | 922   | 466                     | 65   | 14   | 5     | 550   |       | 1472        |
|                               | RESERVES 0.50-0.90m THICKNESS |                         |       |       |       |                         |      |      |       |       |       |             |
|                               | 0.5-0.90                      | 91                      | 196   | 545   | 832   | 704                     | 426  | 40   |       | 1170  |       | 2002        |
|                               | 0.9-1.2                       |                         |       |       |       | 522                     | 185  | 56   |       | 763   |       | 763         |
|                               | TOTAL                         | 91                      | 196   | 545   | 832   | 1226                    | 611  | 96   |       | 1933  |       | 2765        |
|                               | GRAND TOTAL                   | 103                     | 256   | 1395  | 1754  | 1692                    | 676  | 110  | 5     | 2483  |       | 4237        |
|                               | RESERVES >0.90m THICKNESS     |                         |       |       |       |                         |      |      |       |       |       |             |
|                               | 0.9-1.20                      | 345                     | 1470  | 3887  | 5702  |                         |      |      |       |       |       | 5702        |
|                               | 1.2-1.5                       | 418                     | 1797  | 3848  | 6063  | 3073                    | 885  | 795  | 526   | 5279  |       | 11342       |
| 1.5-3.0                       |                               | 295                     | 7531  | 7826  | 8061  | 2700                    | 535  | 449  | 11745 |       | 19571 |             |
| 3.0-5.0                       |                               |                         | 339   | 339   | 966   | 444                     | 12   |      | 1422  |       | 1761  |             |
| TOTAL                         | 763                           | 3562                    | 15605 | 19930 | 12100 | 4029                    | 1342 | 975  | 18446 |       | 38376 |             |
| RESERVES 0.50-0.90m THICKNESS |                               |                         |       |       |       |                         |      |      |       |       |       |             |
| 0.5-0.90                      | 233                           | 881                     | 1980  | 3094  | 1936  | 1827                    | 772  | 25   | 4560  |       | 7654  |             |
| 0.9-1.20                      |                               |                         |       |       | 3757  | 1665                    | 1079 | 148  | 6649  |       | 6649  |             |
| TOTAL                         | 233                           | 881                     | 1980  | 3094  | 5693  | 3492                    | 1851 | 173  | 11209 |       | 14303 |             |
| GRAND TOTAL                   | 996                           | 4443                    | 17585 | 23024 | 17793 | 7521                    | 3193 | 1148 | 29655 |       | 52679 |             |

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## 15.5 MINING METHOD

### 15.5.1 Justification of method of mining

#### *Opencast mining*

OB: Coal ratio for various seams and its economy viability. The minimum overburden : coal is more than 20:1, as such there is no area which is considered suitable for open cast mining.

#### *Underground mining*

The lay and disposition of Seams is suitable for underground mining. As a result of close scrutiny, it has been found that out of 8 correlatable coal horizons only four seams (IV, L2, IIIA & II) are viable for working through underground mining due to various reasons (quality of coal varying from C to E, patchy deposit, thickness of seam IV, L2, IIIA, IIIB and IIIL and high OB:Coal ratio). These seams can be approached by driving inclines in stone.

### 15.5.2 Details of underground mining (Selected method)

#### A. Mode of mine entry

Following considerations have been given while locating the main entry to the proposed mine.

- i. The entry to be central allowing access to both extremities and the majority of the reserves almost at equal distance on either side of the main entry.
- ii. The main entry should serve for the whole mine, if possible and support evacuation of the total extractable coal reserve on a long term economically.
- iii. The existing surface features should make it feasible to acquire land over adequate area for locating the basic infrastructure at the main mine entry.
- iv. The location of the Mine entry should facilitate maximum percentage extraction of the coal reserve and ensure minimum sterilization of coal to be left in barriers for protection of existing surface structures.
- v. The location of the Mine entry should take advantage of existing infrastructure facilities like highways, power lines, drainage, roads, availability of water, industrial development in the neighbourhood etc. to make operational costs optimum.
- vi. The coal transportation should be economical and take advantage of the existing infrastructure.

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- vii. The property includes multiple seams. The selection of main entry needs to take into consideration accessibility to various coal seams for mining to ensure highest overall percentage of extraction.
- viii. The adequacy of ventilation from the single intakes and return for all seams.

In view of the fact that the coal reserves at Shahpur West Coal Block are quite shallow for underground mining, these are conveniently accessible in different coal seams through inclines. Also the orientation of the block is rectangular which extends almost equal on either side of the centre of the block. It is therefore considered prudent to take advantage of this orientation and shape of the block and locate the main entries in the central region of the block. So, the access to the coal reserve is considered through a pair of inclines in the centre of the block.

The underground mining will be carried out by one pair of inclines from surface named as Incline No.1 and No.2. These Inclines will be driven with height of 2.5 meters and width of 4.5 meters having gradient of 1 in 4. The mouths of inclines are located near borehole No. 39 at Surface RL 489 and are aligned towards borehole No.14. The Incline will reach the floor of seam IV at 451.25 m RL and will have a length of 151 Meters in stone. It may, however, be noted that seam IV does not have any extractable reserves of seam thickness more than 1.5m except a small patch of 0.253 MT geological reserves out of which not more than 60% can be extracted, hence the working of Seam-IV are mineable as thin seam mining. Accordingly, this seam has been considered for exploitation by low height equipments in this Mining Plan. Ventilation shaft will be driven separately for exhaust of return air from all the seams.

These main inclines will continue straight towards seam L2 and touch the bottom of seam L2 at FRL 399.25m keeping the same gradient for a length of 208 meters from floor of seam IV. The seam L2 will be also connected to seam IV by vertical ventilation shaft (length 48m) to seam IV for keeping the single exhaust for all seams.

The same Inclines will continue up to the floor RL of 358.75m of seam II crossing the seam IIIA at FRL 383.75 m and a length of 62 meters from seam L2 to seam IIIA. The length of Inclines from seam IIIA to seam II will be 100 meters. Both these seams will be also connected through vertical ventilation shaft (length 18.5m IIIA to L2 and 21.0m from II to IIIA).

## **B. Extractable reserves**

### **i. Reserves for under ground mining**

This mining plan is prepared for a thickness range of more than 1.2 meters as most of the coal is of good quality and grade. So the following base line reserves are considered at Shahpur West block for mining in seams IV, L2, IIIA, and II.

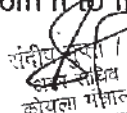
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**TABLE 15.10**  
**SUMMARY OF EXTRACTABLE RESERVES AT SHAHPUR WEST COAL BLOCK**

| Seam         | Net Geological Reserves >1.2M Thickness | Safety Barrier (7.5 m) | Road Barrier (45 m) | River & Safety Barrier (15 m) | Village & Barrier (50 m) | Fault Safety Barrier (25M) | Reserve Blocked in Barrier | Reserve Blocked in Not Workable Patches | Total blocked reserves | Mineable Reserve >1.2M Thickness |
|--------------|-----------------------------------------|------------------------|---------------------|-------------------------------|--------------------------|----------------------------|----------------------------|-----------------------------------------|------------------------|----------------------------------|
| IV           | 3.83                                    | 0.03                   | 0.29                | 0.08                          | 0.40                     | 0.00                       | 0.81                       | 0.38                                    | 1.19                   | 2.64                             |
| L2           | 4.48                                    | 0.02                   | 0.21                | 0.05                          | 0.36                     | 0.03                       | 0.66                       | 1.38                                    | 2.04                   | 2.44                             |
| III-A        | 4.10                                    | 0.03                   | 0.13                | 0.09                          | 0.01                     | 0.00                       | 0.26                       | 1.63                                    | 1.89                   | 2.20                             |
| II           | 18.37                                   | 0.20                   | 0.73                | 0.71                          | 2.29                     | 0.36                       | 4.29                       | 0.09                                    | 4.38                   | 14.00                            |
| <b>Total</b> | <b>30.77</b>                            | <b>0.29</b>            | <b>1.34</b>         | <b>0.93</b>                   | <b>3.06</b>              | <b>0.39</b>                | <b>6.02</b>                | <b>3.47</b>                             | <b>9.49</b>            | <b>21.28</b>                     |

From the above mineable reserves, the quantity of coal available for development and depillaring will be as per Table 15.11. These are based on fact that in the pillar extraction during development, the percentage recovery of coal will be 25% in all the seams for pillar size 25.5m from centre to centre.

**TABLE 15.11**  
**COAL AVAILABLE FOR DEVELOPMENT AND DEPILLARING**

| Seam         | Net Geological Reserves >1.2M Thickness | Total Blocked Reserves | Mineable Reserve >1.2M Thickness | Extractable Reserves (60% of Mineable Reserves) | Overall Extractable Reserves |              |
|--------------|-----------------------------------------|------------------------|----------------------------------|-------------------------------------------------|------------------------------|--------------|
|              |                                         |                        |                                  |                                                 | Development                  | Depillaring  |
| IV           | 3.827                                   | 1.185                  | 2.642                            | 1.585                                           | 0.396                        | 1.189        |
| L2           | 4.475                                   | 2.037                  | 2.438                            | 1.463                                           | 0.366                        | 1.097        |
| III-A        | 4.095                                   | 1.891                  | 2.204                            | 1.322                                           | 0.331                        | 0.992        |
| II           | 18.372                                  | 4.376                  | 13.996                           | 8.397                                           | 2.099                        | 6.298        |
| <b>TOTAL</b> | <b>30.770</b>                           | <b>9.491</b>           | <b>21.279</b>                    | <b>12.768</b>                                   | <b>3.192</b>                 | <b>9.576</b> |

The mining is also proposed under the villages and their barriers for minimum surface cover of 90m. The coal will be extracted through development only and no depillaring is proposed in this area. The percentage extraction will be limited up to maximum 25%. So, the following quantity of coal will be available from the reserves blocked under village

barriers by development. No development work will take place for less than 90m of solid surface cover under this constraint.

**TABLE 15.11A**  
**EXTRACTABLE RESERVES FROM BLOCKED RESERVES UNDER VILLAGE AND BARRIER BY DEVELOPMENT ONLY UP TO 90M SURFACE COVER (MT)**

| Seam         | Reserves blocked under village and barrier (50m) | Reserves under less than 90m surface cover | Net mineable reserves under more than 90m surface cover | Coal quantity extractable only through development |
|--------------|--------------------------------------------------|--------------------------------------------|---------------------------------------------------------|----------------------------------------------------|
| 1            | 2                                                | 3                                          | 4=2-3                                                   | 5=25% of 4                                         |
| IV           | 0.40                                             | 0.40                                       | 0.00                                                    | 0.00                                               |
| L2           | 0.36                                             | 0.00                                       | 0.36                                                    | 0.09                                               |
| III-A        | 0.01                                             | 0.00                                       | 0.01                                                    | 0.00                                               |
| II           | 2.29                                             | 0.00                                       | 2.29                                                    | 0.57                                               |
| <b>Total</b> | <b>3.06</b>                                      | <b>0.40</b>                                | <b>2.66</b>                                             | <b>0.67</b>                                        |

Thus the following quantity of coal will be received from the development and depillaring from the Shahpur west coal block:

**TABLE 15.11B**  
**OVERALL EXTRACTABLE RESERVES IN SHAHPUR WEST (MT)**

| Extractable Reserves from constraints free area for mining |             | Extractable reserves from the blocked reserves under the village and barrier |             | Overall extractable reserves from Shahpur West Coal Block |             | Total extractable reserves |
|------------------------------------------------------------|-------------|------------------------------------------------------------------------------|-------------|-----------------------------------------------------------|-------------|----------------------------|
| Development                                                | Depillaring | Development                                                                  | Depillaring | Development                                               | Depillaring |                            |
| 0.396                                                      | 1.189       | 0.000                                                                        | 0.000       | 0.396                                                     | 1.189       | 1.585                      |
| 0.366                                                      | 1.097       | 0.090                                                                        | 0.000       | 0.456                                                     | 1.097       | 1.553                      |
| 0.331                                                      | 0.992       | 0.003                                                                        | 0.000       | 0.334                                                     | 0.992       | 1.326                      |
| 2.099                                                      | 6.298       | 0.573                                                                        | 0.000       | 2.672                                                     | 6.298       | 8.970                      |
| 3.192                                                      | 9.576       | 0.665                                                                        | 0.000       | 3.857                                                     | 9.576       | 13.433                     |

**C. Selection of underground mining technology**

The above details of mineable reserves compel to extract the seams through systematic underground mining method. There are two primary methods of underground mining viz. Longwall and Bord & Pillar or Room & Pillar. Both the methods of mining are being practiced in India. The selection of the most suitable method of mining for Shahpur West Coal Block is to be considered under the prevailing parameters, summarized below:

- a) The depth range of occurrence of the coal Seams in Shahpur West Coal Block is 50m to 150m.
- b) Some of the reserves are blocked against the provision of safety pillars for surface features.
- c) A good quality coal reserves are available in all the seams with prominent grade range from D to E.
- d) The structure of the block is simple. Only three faults appear in the south and south west part of the block.
- e) No historically important structure or monuments are existing in and around the coal block.
- f) Underground mining in Indian working system generally operates in coal thickness up to 1.8m and whereas in some mines up to 1.5m also. In view of the available latest technologies, the working thickness considered for the coal seams vary from 1.2m to 4.5m in Shahpur West Coal Block.
- g) The gradient of the coal Seams vary from 1 in 2 degree. Thus the seams are almost flat.

Based on the above, the following mining techniques may be used for extraction of coal through underground method.

**D. Strategic approach for UG mining in the block**

The lower most coal seam II is the most potential coal seam of Shahpur West Coal Block.

The width of the gallery/bord will be kept 4.8m in all the seams. The height will be normally 2.5m. It is to further note that the mining plan of Shahpur West Coal Block is prepared for minimum workable coal seam thickness up to 1.2m. So the gallery height may be restricted in parts where the seam thickness does not permit and it may be a maximum up to seam thickness. However, it will be not less than 1.8m in the area used for traveling road way. This may be done through floor dinting and the roof will be kept intact with roof bolting. The wastage produced during the floor dinting will be dealt

saparetaly to avoid any mixing with the coal produced from the drivage of the gallery. The floor dinting will be carried out after driving of one complete pillar length as the simultaneous activity may degrade the coal.

#### E. Support in R&P method

In the semi-mechanized R&P technology area all the supports will be carried out will full column resin/cement grouted roof bolts installed by mechanized roof bolter machine. The grouting will be carried out with resin roof bolts or Cement capsules. In addition conventional supports like props, bars, wooden chocks etc will be used.

The scientific studies will need to be carried out to assess the support requirement and design by measurement the pattern of roof bolting and their specifications. During both development and depillaring monitoring of effectiveness of supports will have to be carried out by actual measurements.

#### F. Operating Methods for De-pillaring

The standard operating method in India is to fully develop the panel, with typically 5 entries on advance, to the panel boundary. At the boundary, the panel may be connected to other 'bleeder' ventilation roadways depending on the mine layout. Height of development and extraction is usually the full seam section.

During retreat from the panel, the pillars are split (either a single split or two splits, depending on panel size and caving conditions) and extracted on their side or at angles to take the ribs in an arranged and safe extraction method. Extra roof bolting is used at the edges of the pillars to provide an effective 'breaker line' and ensure that after the extraction sequence is complete the roof collapses in a controlled manner up to the roof bolt breaker line.

The same equipment is required for pillar extraction as for development.

Pillar extraction techniques will follow the traditional 45° "stooping" line. Two pillars are mined simultaneously.

#### G. Coal production

The semi-mechanised panel of 5 to 6 headings deployed with two numbers of LHD's in a seam with average thickness range of 2m will give production @ 250 TPD. Further such panel deployed with two numbers of SDLs with seam thickness range of 1.2m to 1.5m can produce 167 TPD.

Output from two semi-mechanised panels deployed with  
two number of 2.1CUM capacity LHDs in each panel = 500 TPD

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Output from three semi-mechanised panel deployed with two number of 1.2CUM capacity SDLs in each panel = 500 TPD

So, Output from five such panels = 1000 TPD

Hence, a total of 1000TPD or 0.30MTPA production of coal is achievable from three SDL panels and two LHD panels at Shahpur West coal block of NMDC.

In addition to above, the production from one Continuous Miner (JOY 12CM27) will be 0.30MTPA.

Production from one set of JOY 12CM27 standard = 0.30MTPA

Production from five semimechanised panels = 0.30MTPA

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**TOTAL** = **0.60MTPA**

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The main dip drives will be also driven with Continuous Miners. All the four heading main dip drives will be developed with Continuous Miners along with two shuttle cars with one Continuous Miner.

Accordingly, this mining plan has adopted 0.60 MTPA coal production from underground which will be achieved.

#### H. Sequence of mining

The approach to the mine is through a pair of inclines. It will have access to all the four seams viz. IV, L2, IIIA and II with a provision of air shafts for ventilation. The mining thickness at shahpur West coal block is proposed up to a seam thickness of 1.2m in all the four seams due good quality coal at shallow depth. The production starts at early stage from seam IV. The upper seams are worked in advance in comparative to lower seams. The development work starts in respective seams as soon as these are approached through Inclines.

The Calendar programme of production is given in Table 15.12.

  
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**TABLE 15.12**  
**CALENDAR PROGRAMME OF PRODUCTION**

| YEAR                          | SEAM IV |       |       | SEAM L2 |       |       | SEAM III A |       |       | SEAM II |       |       | TOTAL |       |       |
|-------------------------------|---------|-------|-------|---------|-------|-------|------------|-------|-------|---------|-------|-------|-------|-------|-------|
| 1                             | 0.096   | 0.000 | 0.096 | 0.000   | 0.000 | 0.000 | 0.000      | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.096 | 0.000 | 0.096 |
| 2                             | 0.300   | 0.300 | 0.600 | 0.000   | 0.000 | 0.000 | 0.000      | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.300 | 0.300 | 0.600 |
| 3                             | 0.000   | 0.600 | 0.600 | 0.000   | 0.000 | 0.000 | 0.000      | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.000 | 0.600 | 0.600 |
| 4                             | 0.000   | 0.289 | 0.289 | 0.311   | 0.000 | 0.311 | 0.000      | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.311 | 0.289 | 0.600 |
| 5                             | 0.000   | 0.000 | 0.000 | 0.145   | 0.455 | 0.600 | 0.000      | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.145 | 0.455 | 0.600 |
| Sub. Total<br>(1 to 5 Years)  | 0.396   | 1.189 | 1.585 | 0.456   | 0.455 | 0.911 | 0.000      | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.852 | 1.644 | 2.496 |
| 6                             | 0.000   | 0.000 | 0.000 | 0.000   | 0.550 | 0.550 | 0.050      | 0.000 | 0.050 | 0.000   | 0.000 | 0.000 | 0.050 | 0.550 | 0.600 |
| 7                             | 0.000   | 0.000 | 0.000 | 0.000   | 0.092 | 0.092 | 0.284      | 0.224 | 0.508 | 0.000   | 0.000 | 0.000 | 0.284 | 0.316 | 0.600 |
| 8                             | 0.000   | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.000      | 0.600 | 0.600 | 0.000   | 0.000 | 0.000 | 0.000 | 0.600 | 0.600 |
| 9                             | 0.000   | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.000      | 0.168 | 0.168 | 0.432   | 0.000 | 0.432 | 0.432 | 0.168 | 0.600 |
| 10                            | 0.000   | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.000      | 0.000 | 0.000 | 0.600   | 0.000 | 0.600 | 0.600 | 0.000 | 0.600 |
| Sub. Total (6 to<br>10 Years) | 0.000   | 0.000 | 0.000 | 0.000   | 0.642 | 0.642 | 0.334      | 0.992 | 1.326 | 1.032   | 0.000 | 1.032 | 1.366 | 1.634 | 3.000 |
| 11                            | 0.000   | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.000      | 0.000 | 0.000 | 0.600   | 0.000 | 0.600 | 0.600 | 0.000 | 0.600 |
| 12                            | 0.000   | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.000      | 0.000 | 0.000 | 0.600   | 0.000 | 0.600 | 0.600 | 0.000 | 0.600 |
| 13                            | 0.000   | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.000      | 0.000 | 0.000 | 0.440   | 0.161 | 0.600 | 0.440 | 0.160 | 0.600 |
| 14                            | 0.000   | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.000      | 0.000 | 0.000 | 0.000   | 0.600 | 0.600 | 0.000 | 0.600 | 0.600 |
| 15                            | 0.000   | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.000      | 0.000 | 0.000 | 0.000   | 0.600 | 0.600 | 0.000 | 0.600 | 0.600 |
| 16                            | 0.000   | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.000      | 0.000 | 0.000 | 0.000   | 0.600 | 0.600 | 0.000 | 0.600 | 0.600 |
| 17                            | 0.000   | 0.000 | 0.000 | 0.000   | 0.000 | 0.000 | 0.000      | 0.000 | 0.000 | 0.000   | 0.600 | 0.600 | 0.000 | 0.600 | 0.600 |

**B.D.SHARMA**  
**RQP**

*(Signature)*

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**15.6 MINERAL BENEFICIATION**

No coal beneficiation process is proposed at the pit head by the company. The overall quality of all four mineable individual coal seams IV, L2, IIIA, & II is good as elaborated in chapter 4. The other reason for not considering pit head beneficiation is that the coal is not tied up to a particular consumer, hence the end use quality is not known.

**15.7 CLOSURE PLAN****15.7.1 Mined out land****i. Land degradation control measures**

Land degradation is, though, one of the major adverse outcomes of mining activities but this being an UG mining project, will cause meagre land degradation as the limited land area disturbed will be only due to surface facilities only.

**a) Mined area reclamation**

The lessee will have to take necessary steps to keep the area under disturbance to a minimum. The post mining land use of the core zone shows that all the disturbed areas will be reclaimed before abandoning the mine, excluding the area under the buildings which will be left for the use of villagers.

**b) Reclamation procedure**

As no OC mining operations are envisaged, no reclamation activities will be required. The small excavations made at the mouth of the inclines will be strengthened.

**ii. Post reclamation land use**

The post mining land use with environment management at 5<sup>th</sup> year end and after abandoning the mine is given in Table 15.13.

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**TABLE 15.13**  
**LAND USE AT THE END OF 5TH YEAR AND LAST YEAR OF MINE OPERATION**

| Sl. No. | Description of area | End of 5th year | End of life |
|---------|---------------------|-----------------|-------------|
| 1       | Top soil dump       | 0.36            | 0.36        |
| 2       | Surface dump        | 0.5             | 0.5         |
| 3       | Settling ponds      | 0.4             | 0.4         |
| 4       | Ventilation shaft   | 0.18            | 0.18        |
| 5       | Coal stack yard     | 0.6             | 0.6         |

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|   |                                                                                                                                                        |              |              |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------------|
| 6 | Facilities including road, Office, W shop, Store, CHP, mouth of inclines, VTC, Canteen, Diesel Bunk and area between the buildings and lawn plantation | 4.73         | 4.73         |
| 7 | Green belt around facilities                                                                                                                           | 1.27         | 1.27         |
| 8 | Approach Road                                                                                                                                          | 4.83         | 4.83         |
| 9 | <b>Sub Total *Disturbed (including green belt and lawn plantation)</b>                                                                                 | <b>12.87</b> | <b>12.87</b> |
|   | Undisturbed area                                                                                                                                       | 574.63       | 574.63       |
|   | <b>Total</b>                                                                                                                                           | <b>587.5</b> | <b>587.5</b> |

Minute details of land use during mining up to last year of mining operation and post mining land use with environment management is given in Table 15.14A & 15.14B.

**TABLE 15.14A**  
**LAND USE WITH ENVIRONMENT MANAGEMENT WITHIN ML UPTO**  
**END OF MINING OPERATION**

| Sl. No. | Description of area                                                                                                                                    | Land use (ha.) |          |            |            |               |                         | Total        |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------|------------|------------|---------------|-------------------------|--------------|
|         |                                                                                                                                                        | Plantation     | Void     | Water body | Public use | Undisturbed   | Self use under facility |              |
| 1       | Top soil dump                                                                                                                                          | 0              | 0        | 0          | 0          | 0             | 0.36                    | 0.36         |
| 2       | Surface dump                                                                                                                                           | 0              | 0        | 0          | 0          | 0             | 0.5                     | 0.5          |
| 3       | Settling ponds                                                                                                                                         | 0              | 0        | 0          | 0          | 0             | 0.4                     | 0.4          |
| 4       | Ventilation shaft                                                                                                                                      | 0.17           | 0        | 0          | 0          | 0             | 0.01                    | 0.18         |
| 5       | Coal stack yard                                                                                                                                        | 0              | 0        | 0          | 0          | 0             | 0.6                     | 0.6          |
| 6       | Facilities including road, Office, W shop, Store, CHP, mouth of inclines, VTC, Canteen, Diesel Bunk and area between the buildings and lawn plantation | 1.73           | 0        | 0          | 0          | 0             | 3                       | 4.73         |
| 7       | Green belt around facilities                                                                                                                           | 1.27           | 0        | 0          | 0          | 0             | 0                       | 1.27         |
| 8       | Approach Road                                                                                                                                          | 0              | 0        | 0          | 0          | 0             | 4.83                    | 4.83         |
| 9       | <b>Sub Total *Disturbed (including green belt and lawn plantation)</b>                                                                                 | <b>3.17</b>    | <b>0</b> | <b>0</b>   | <b>0</b>   | <b>0</b>      | <b>9.7</b>              | <b>12.87</b> |
|         | Undisturbed area                                                                                                                                       | 0              | 0        | 0          | 0          | 574.63        | 0                       | 574.63       |
|         | <b>Total</b>                                                                                                                                           | <b>3.17</b>    | <b>0</b> | <b>0</b>   | <b>0</b>   | <b>574.63</b> | <b>9.7</b>              | <b>587.5</b> |

**TABLE 15.14B**  
**MINING LAND USE AFTER MINE CLOSURE**

| Sl. No. | Description of area                                                                                                                                    | Landuse (ha.) |             |            |             |               |              |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-------------|------------|-------------|---------------|--------------|
|         |                                                                                                                                                        | Plantation    | Void        | Water body | Public use  | Undisturbed   | Total        |
| 1       | Top soil dump                                                                                                                                          | 0.36          | 0           | 0          | 0           | 0             | 0.36         |
| 2       | Surface dump                                                                                                                                           | 0.5           | 0           | 0          | 0           | 0             | 0.5          |
| 3       | Settling ponds                                                                                                                                         | 0             | 0           | 0.4        | 0           | 0             | 0.4          |
| 4       | Ventilation shaft                                                                                                                                      | 0.17          | 0.01        | 0          | 0           | 0             | 0.18         |
| 5       | Coal stack yard                                                                                                                                        | 0.6           | 0           | 0          | 0           | 0             | 0.6          |
| 6       | Facilities including road, Office, W shop, Store, CHP, mouth of inclines, VTC, Canteen, Diesel Bunk and area between the buildings and lawn plantation | 4.00          | 0.3         | 0          | 0.43        | 0             | 4.73         |
| 7       | Green belt around facilities                                                                                                                           | 1.27          | 0           | 0          | 0           | 0             | 1.27         |
| 8       | Approach Road                                                                                                                                          | 3.6           | 0           | 0          | 1.23        | 0             | 4.83         |
| 9       | <b>Sub Total *Disturbed (including green belt and lawn plantation)</b>                                                                                 | <b>10.50</b>  | <b>0.31</b> | <b>0.4</b> | <b>1.66</b> | <b>0</b>      | <b>12.87</b> |
| 10      | Undisturbed area                                                                                                                                       | 0             | 0           | 0          | 0           | 574.63        | 574.63       |
|         | <b>Total</b>                                                                                                                                           | <b>10.50</b>  | <b>0.31</b> | <b>0.4</b> | <b>1.66</b> | <b>574.63</b> | <b>587.5</b> |

### iii. Soil conservation measures

There is no OC excavation involved, hence top soil will be generated only from the areas cleared for coal stack, waste dump and water settling pond (Total 11400 cum (B) from 1.9 ha area), it will be stacked near the waste dump over 0.36 ha area with restricted height of 3m and will be utilised for waste dump reclamation, for raising green belts, landscaping, nursery and in lawns.

The following control measures to prevent soil erosion and wash off of fines and dumps will be adopted:

- Garland drains will be provided around the small surface dump and cross drains around the mouths of inclines and shaft to prevent rain water going entering into them.
- Gullies formed, if any, on side of the benches shall be provided with check dams of local stone or sand filled bags.
- The inactive dump slopes will be planted with bushes, grass, shrubs and trees to prevent soil erosion after applying top soil.
- Retaining walls (with gabion, concrete or local stone) will be provided wherever required, to support the benches or any loose dump material and also to arrest sliding of loose debris.

  
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**iv. Afforestation****Compensatory afforestation**

Compensatory plantation is not required as no forest area will be acquired.

**Plantation during mining**

A plantation program within 1<sup>st</sup> 5 years of the mine has been planned in a phase wise manner. The plantation will be started from first year of mining along the boundary of ML area from south to north. A 7.5 m width of green belt development around the facilities area will be carried out and more width of green belt will be taken up wherever space is available. Plantation around the facilities area will be commenced also from 1<sup>st</sup> 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 15.15.

**TABLE 15.15  
REQUIREMENT OF PLANTS (YEAR/STAGE WISE AND LOCATION WISE)**

| Year            | Requirement of plants for mine reclamation/afforestation & green belt |              |            |            |           |               |                   |       | No. of trees @ 2500/Ha |
|-----------------|-----------------------------------------------------------------------|--------------|------------|------------|-----------|---------------|-------------------|-------|------------------------|
|                 | Area (Ha.)                                                            |              |            |            |           |               |                   |       |                        |
|                 | Green belt around facilities                                          | Surface dump | Coal Stack | Facilities | T.S Stack | Approach Road | ventilation shaft | Total |                        |
| 1 <sup>st</sup> | 1                                                                     | 0            | 0          | 0          | 0         | 0             | 0                 | 1     | 2500                   |
| 2 <sup>nd</sup> | 0.27                                                                  | 0            | 0          | 1          | 0         | 0             | 0.17              | 1.44  | 3600                   |
| 3 <sup>rd</sup> | 0                                                                     | 0            | 0          | 0.43       | 0         | 0             | 0                 | 0.43  | 1075                   |
| 4 <sup>th</sup> | 0                                                                     | 0            | 0          | 0          | 0         | 0             | 0                 | 0     | 0                      |
| 5 <sup>th</sup> | 0                                                                     | 0            | 0          | 0          | 0         | 0             | 0                 | 0     | 0                      |
| Conceptual      | 0                                                                     | 0.5          | 0.6        | 3          | 0.36      | 3.6           | 0                 | 8.06  | 20150                  |
| Total           | 1.27                                                                  | 0.5          | 0.6        | 4.43       | 0.36      | 3.6           | 0.17              | 10.93 | 27325                  |

**15.7.2 Water quality management**

The water from the mine will be pumped-out and put into a settling pond and utilised for industrial purposes. The storm water from small waste dump, top soil dump and coal stack area will also be led to the settling pond and after settling will be utilised. Any excess water will be released to the environment only after testing.

**a) Water balance**

Industrial water required for washing, sprinkling on mine roads for dust suppression and for watering the mine site plantations, will be supplied from pumping installation at mine sump and surface reservoir.

The drinking water will be supplied from bore well and stored in overhead tank near the facilities area and distributed through pipe lines to different facilities area for drinking and domestic purposes.

Total requirement of water for mining and allied activities are estimated as 627 m<sup>3</sup>/day. The requirement of water for drinking purpose @ 282 CUM/day will be met from borewell. The water requirement for other purposes will be met from mine sump and surface water reservoir once it is available from the mine.

The break up of the required water for different activities are as follows:

|                                                                                                                            |   |            |
|----------------------------------------------------------------------------------------------------------------------------|---|------------|
| Underground Spraying (after blasting (not common), conveyor transfer points etc)                                           | = | 10         |
| Underground water requirement for continuous miner @ 250 lpm/machine for one units assuming 50% effective operational time | = | 180        |
| Sprinkling @ 30 cum per km per day of haul road for 2 km                                                                   | = | 60         |
| Fire water makeup                                                                                                          | = | 10         |
| Plantation @ 15 cum/hac for 5 hac.                                                                                         | = | 75         |
| Vehicles washing @ 2.0 m <sup>3</sup> /vehicle/day for 10 vehicles considering 50% recirculation                           | = | 10         |
| Drinking water at working place @ 45 lpd/head for 830 workers                                                              | = | 38         |
| For colony (total manpower in mine 830 out of which colony provision has been made for 50% (415) i.e. 415 x 4 x 135lpd     | = | 224        |
| For peripheral villages (potable)                                                                                          | = | 20         |
| <b>Total KL Per Day</b>                                                                                                    |   | <b>627</b> |

As the water seepage into the UG mine workings is expected to be around 7850 cum/day during non monsoon season (may be 1.5 times of that in monsoon season), the water requirement projected above can be easily met from the mine water (after treatment, if required) after the mine is adequately developed. However, during the initial stage of few years, the water requirement will have to be met from the ground water from bore wells.

#### **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 to remove any oil/grease and the water

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will be recycled. The oil grease will be sold to authorized vendors and sludge disposed off in specially constructed pit.

- 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.
- iv. A domestic waste water treatment plant will be provided in colony so that the water after treatment can be reused.

### **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.
- Construction of garland drains around freshly excavated and dumped / stacked areas so that flow of water with loose material is prevented. The mine water will be passed through specially constructed settling ponds to arrest any loose material being carried away with water.
- Any areas with loose debris within the lease hold will be planted.

### **Measures to minimise adverse effects on water regime**

Limited water will be seeping into the mine workings which will be pumped out for the purpose of safety of mining. Hydrogeological study will be carried out to find out any negative impacts on the ground water regime.

### **15.7.3 Air quality management**

Although all pollutants are generated during blasting in underground and while operating diesel equipment on the surface, these will be kept at minimum levels by ensuring good blast design and good equipment maintenance. Adequate arrangement for water sprinkling has been planned to prevent and suppress dust due to mining and transportation. All the operations are proposed to be carried out by UG method, which is comparatively less polluting.

The control measures to be adopted are mentioned in the following paragraphs:

**i. Controlling fugitive dust**

- a) Dust suppression systems (like water spraying) will be adopted at:
  - Faces before and after blasting in case of solid blasting
  - Faces while loading
- b) Dust suppression systems will be used in drill machines and coal handling systems.
- c) Dust generation will also be reduced by using sharp drill bits for drilling holes, drills with flushing system.
- d) In case of continuous miner, the water shall be utilised @ 250 l/min.

**Transportation roads and stock-piles**

- Dust suppression system (like water spraying) would be adopted at roads, which are used for transportation on the surface upto the nearest pukka road leading to the user plant or to the railway siding.
- Transport vehicles shall be maintained leak proof.
- Suitable dust 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.
- Transfer points of coal will be provided with appropriate hoods/chutes to prevent fugitive dust emission.

**ii. Preventing dispersal of air borne dust**

- Tree belts will be planted around the pits and sites housing handling/loading facilities.
- Dust masks will be provided as safety measure to the workers, engaged at dust generation points like drills, loading/unloading points, crushers etc.

**iii. Measures to mitigate CO levels**

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.

**iv. Measures to mitigate NO<sub>x</sub> levels**

The main reasons of production of NO<sub>x</sub> gases are:

- a. Poor quality of explosive having large oxygen imbalance which can be due to following reasons:
  - Manufacturing defect

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- 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  $\text{NO}_x$  levels do not increase during the proposed mining operations, the following control measures will be adopted:

- 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 ingredients are spotted, the explosives will not be used even if it is within expiry date.
- Primer: Column ratio will be rationalised. The ratio thus established, for producing minimum  $\text{NO}_x$  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.

#### 15.7.4 Waste management

It is expected that a total of 14276 Cum(B) waste rock will be generated by drifting in underground from driveage of Inclines and ventilation shafts.

In addition to this 3143 CUM(B) will be also produced during drifting through faults F 3 & F 4 in seam II.

##### **Waste disposal sites**

##### **i. The surface dump located inside the ML area**

The Surface dump of waste generated during the 1<sup>st</sup> 2 years will be made on the non-forest area near the incline. The height of the dump achieved will be less than 5m and will be spread over 0.50 ha area.

##### **ii. Backfill dump**

There is no OC mining, hence no backfilling will be involved.

##### **iii. Top soil dump**

There is no OC excavation involved, hence top soil will be generated only from the areas cleared for coal stack, waste dump and water settling pond (Total 11400 cum (B) from 1.9 ha area), it will be stacked near the waste dump over 0.36 ha area with restricted height of 3m and will be utilised for

waste dump reclamation, for raising green belts, landscaping, nursery and in lawns.

### **The void**

As there are no OC operations envisaged, no void will be created. However about 0.3 ha area will be left as void at the mouths of the inclines in the post mining scenario as these will be abandoned after plugging and fencing.

## **15.7.5 Topsoil management**

As explained in para iii above

## **15.7.6 Infrastructure**

### **A. Site Services**

Complete facilities near to the site are very important for coal production. It is imperative to develop core infrastructure like power, road, telecommunication, housing, service buildings viz. office, store, first aid centre, canteen, etc. for a large number of employees for the project. The mine project is Shahdol. The site services required at proposed mine will be housed within the premises of proposed mine complex shown in Plate V.

### **B. Workshop**

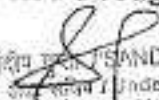
Garage-cum-workshop-cum-engineering stores is meant for regular repairs and maintenance of equipments and dumpers etc. for mine operation. The garage and workshop complex comprises repairs bays for dumpers and pay-loaders, washing bays, storage rooms, inspection pits, engine repair room, auto-electrician room, open yard for parking of vehicles.

### **C. Road and rail**

The block is well connected by road and rail. The nearest railway station is Shahdol located 12 Km. south-east of the block on Anuppur-Chirimiri & Bilaspur - Katni broad gauge line of South-Eastern Railways. National highway No. 78 passes through Shahdol. The area is connected through all-weather road up to Shahdol.

### **D. Power supply**

The required 7 MW power supply at 33 KV will be drawn from nearest sub station to the local sub-station from where the power will be supplied to the mine and other functional buildings. An emergency arrangement for power supply has been made by providing a set of 1000 KVA and 500 KVA DG sets which will take care of ventilation and pumping and other essential services.

  
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**E. Residential facilities**

Mining activities are existing in Sohagpur Coalfield, hence most of the required type of manpower will be available in the area. However a provision for colony for about 50% manpower has been made. The colony is proposed to be located between Shahpur East and Shahpur West within the block boundary.

**F. Stores**

A store will be provided alongside the workshop to take care of providing necessary consumable, maintenance and repair store house.

**G. Diesel storage**

A large number of transport vehicles will operate on diesel. Hence, an underground 30 KL diesel pump will be established at the mine site. A diesel tanker will also be provided for the transport of diesel up to DG sets at mine.

**H. Canteen and site office**

A temporary canteen, first aid center, rest shelter and site office will be available at site while the main facilities will be within the ML area.

**I. Vocation training centre**

A Vocational Training Centre will be provided for training of operators and other workmen adjoining to the main mines office located inside mine site.

**J. Explosive magazine**

A 20.00 Tonnes capacity magazine along with explosive van will be provided within the ML area which will take care of the requirement of the block and also of the adjoining block Shahpur East.

**15.7.7 Economic repercussions of closure of mine and manpower retrenchment**

Manpower as available at the closure stage will be absorbed at alternative locations of the company if available. Those required to be relieved, will be compensated in line with the applicable laws at that time. Gain from development activities in the region will be additional opportunity for local people. The disturbed land would be made fertile by use of reuse of top soil and fertilisers under expert's guidance and use of available water, firstly for the land which remained undisturbed covering an area of 570.54 Ha and also for the land which will partly be recovered after dismantling infrastructures. Improved irrigation system like drip irrigation need to be considered and implemented.

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महाराष्ट्र, नमो  
नमो विकास, नमो

**15.7.8 Time scheduling for abandonment**

The abandonment activities of the mine will start 4 years prior to the abandoning of the mine i.e. from 21<sup>st</sup> year. Study Report of the existing status of the project and tasks required for final abandonment will be identified along with their possible time frame for implementation will be undertaken. Items among others could be as under:

- i) Disposal of other equipments (electrical/mechanical) of the mine either through transfer to other working projects, sale or disposal as scraps.
- ii) Dismantling schedule of permanent and temporary structures excepting few which may have utility in the revised scheme for managing abandoned area.
- iii) Winding up all H. T & L.T. electrical lines, delivery pipe lines for sprinklers and other varied uses other than those which may be required for development of the abandoned area.
- iv) Identifying areas and spots in the developed forest and lagoon (water body) spread for undertaking beautifying works as picnic spots, boating and any other spots to attract visitors and tourists and preparing required schemes for implementation.
- v) Scheme for undisturbed and recovered land development programme for making the land more fertile by use of fertilisers and other measures under expert's guidance to sustain affected population after abandonment of the mine.
- vi) Related matter of land development is also developing irrigation system by following drip irrigation system.
- vii) Any other matter related for gainful development.

The minute details will be worked out in the 21<sup>st</sup> year. The execution of abandonment activities of the mines will be started about four years before the mines get abandoned. One year time is assigned for study of items as indicated above in i to vii and for preparation of detailed schemes and reports for implementation. Many of the required activities will be carried out during last one year of the mine operation. Some abandonment activities will have to be continued for about two to three years more after the mine operations get fully closed by retaining only few temporary essential office / residential structures.

Some of the important activities which will be carried during the post closure period will be part of the items under i, ii & iii and also on iv & v as indicated above on action identified in working locations towards end.

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Details of expenditure on Progressive and Post Mine Closure activities are given in para 15.7.9 along with the time schedule bar chart. The cost calculation is based on present price index as on 31<sup>st</sup> March, 2011.

### 15.7.9 Abandonment cost

#### A. Activities and cost

The following activities will be involved in the progressive and Post Mine Closure with their year of implementation and cost thereof:

| YEAR                             | ACTIVITIES |                                                                                  | Unit | Vol. of work | Rate, Rs./Unit | Total amt., Rs. Lakh |
|----------------------------------|------------|----------------------------------------------------------------------------------|------|--------------|----------------|----------------------|
| I. PROGRESSIVE MINE CLOSURE PLAN |            |                                                                                  |      |              |                |                      |
| 01-05                            | 1          | Barbed wire around inclines, around ventilation shaft (500m) @ Rs 1500/m         | m    | 352          | 1500           | 5.28                 |
|                                  | 2          | Fencing around surface dump                                                      | m    | 300          | 1500           | 4.5                  |
|                                  | 3          | Tog wall around dump                                                             | m    | 300          | 1000           | 3                    |
|                                  | 4          | Garland drain around dump                                                        | m    | 300          | 500            | 1.5                  |
|                                  | 5          | Barbed wire around facilities                                                    | m    | 1425         | 1500           | 21.375               |
|                                  | 6          | Top soil management                                                              | cum  | 11400        | 50             | 5.7                  |
|                                  | 7          | Rehabilitation/ plantation                                                       | ha   | 4.51         | 200000         | 9.02                 |
|                                  | 8          | Settling Pond                                                                    | cum  | 8000         | 50             | 4                    |
| 6 - 23                           | 1          | Fire stoppings (80 panels)                                                       | cum  | 9600         | 2000           | 192                  |
|                                  |            | TOTAL (I)                                                                        |      |              |                | 246.375              |
| II. POST MINE CLOSURE PLAN       |            |                                                                                  |      |              |                |                      |
| 24                               | 1          | Under Ground stoppings and sealings for prevention of future fire etc (LS)-10 no | cum  | 1200         | 2000           | 24                   |
| 25                               | 1          | Under Ground stoppings and sealings for prevention of future fire etc (LS)-10 no | cum  | 1200         | 2000           | 24                   |
|                                  | 2          | Dismantling ventilation fan                                                      |      |              | LS             | 2                    |
|                                  | 3          | Dismantling of conveyors (inclines and in seam about 4000m @ 2000/m)             |      |              | LS             | 80                   |
|                                  | 4          | Dismantling of rail tracks 4000m @ Rs 500/M                                      |      |              | LS             | 20                   |
|                                  | 5          | Dismantling of Pumps and pipes (LS)                                              |      |              | LS             | 5                    |
|                                  | 6          | Dismantling of CHP (LS)                                                          |      |              | LS             | 10                   |
|                                  | 7          | Dismantling of HTL/LTL                                                           |      |              | LS             | 5                    |
|                                  | 8          | Monitoring of environmental parameters (air, water, noise etc)                   |      |              | LS             | 10                   |

| YEAR | ACTIVITIES |                                                                       | Unit | Vol. of work | Rate, Rs./Unit | Total amt., Rs. Lakh |
|------|------------|-----------------------------------------------------------------------|------|--------------|----------------|----------------------|
| 26   | 1          | Plugging of 2 NOS. of incline @ Rs 3 lakh/incline                     |      |              | LS             | 6                    |
|      | 2          | Plugging of 1 ventilation shaft                                       |      |              | LS             | 2                    |
|      | 3          | Dismantling of part of the facilities (buildings & workshop etc) (LS) |      |              | LS             | 20                   |
|      | 4          | Rehabilitation/ plantation approach road part width                   | Ha.  | 3.6          | 200000         | 7.2                  |
|      | 5          | Monitoring of environmental parameters (air, water, noise etc)        |      |              | LS             | 10                   |
| 27   | 1          | Rehabilitation/ plantation (facilities, stacks etc)                   | Ha.  | 4.46         | 200000         | 8.92                 |
|      | 2          | Monitoring of environmental parameters (air, water, noise etc)        |      |              | LS             | 10                   |
|      | 3          | Others (Miscellaneous)                                                |      |              | LS             | 20                   |
|      |            | <b>TOTAL (II)</b>                                                     |      |              |                | <b>264.12</b>        |
|      |            | <b>GRAND TOTAL (I&amp; II)</b>                                        |      |              |                | <b>510.495</b>       |

The facilities to be retained will be main office, mine office, VTC, dispensary, canteen, rest shelter and essential quarters totalling to 0.43 ha which can though, earn some revenue by renting but a corpus fund of about Rs 20 lakh will be provided which could earn an annual interest for maintenance of the facilities. It will be submitted at the time of mine closure as required.

#### B. Escrow account amount

The ML area is 587.5 ha.

The economic involvement will be as follows:

In line with the Guidelines, it has been estimated by MOC that typically closure cost of an UG mine will be about Rs 1 lakhs / ha

The area used for UG mining = 587.5 ha

Total cost to be deposited in Escrow account in 24 years (as the life of the UG mine will be 24 years) will be as follows:

For UG mining:  $587.5 \text{ ha} \times \text{Rs } 1.0 \text{ lakh} = \text{Rs } 587.5 \text{ lakhs}$

The cost in the 1<sup>st</sup> year to be deposited =  $\text{Rs } 587.5 / 24 = \text{Rs } 24.48 \text{ lakhs}$

  
SANDEEP KUMAR  
Joint Secretary  
Ministry of Coal  
Government of India  
New Delhi

The cost to be deposited in every subsequent year will be 5% higher than the cost of the previous year and so on as follows:

**TABLE 15.16**  
**AMOUNT TO BE DEPOSITED IN ESCROW ACCOUNT**

| Year             | Amount to be deposited in Escrow Account<br>(Rs. Lakhs) |
|------------------|---------------------------------------------------------|
| 1 <sup>st</sup>  | 24.48                                                   |
| 2 <sup>nd</sup>  | 25.70                                                   |
| 3 <sup>rd</sup>  | 26.99                                                   |
| 4 <sup>th</sup>  | 28.34                                                   |
| 5 <sup>th</sup>  | 29.76                                                   |
| 6 <sup>th</sup>  | 31.24                                                   |
| 7 <sup>th</sup>  | 32.81                                                   |
| 8 <sup>th</sup>  | 34.45                                                   |
| 9 <sup>th</sup>  | 36.17                                                   |
| 10 <sup>th</sup> | 37.98                                                   |
| 11 <sup>th</sup> | 39.88                                                   |
| 12 <sup>th</sup> | 41.87                                                   |
| 13 <sup>th</sup> | 43.96                                                   |
| 14 <sup>th</sup> | 46.16                                                   |
| 15 <sup>th</sup> | 48.47                                                   |
| 16 <sup>th</sup> | 50.89                                                   |
| 17 <sup>th</sup> | 53.44                                                   |
| 18 <sup>th</sup> | 56.11                                                   |
| 19 <sup>th</sup> | 58.91                                                   |
| 20 <sup>th</sup> | 61.86                                                   |
| 21 <sup>st</sup> | 64.95                                                   |
| 22 <sup>nd</sup> | 68.20                                                   |
| 23 <sup>rd</sup> | 71.61                                                   |
| 24 <sup>th</sup> | 75.19                                                   |
| <b>TOTAL</b>     | <b>1089.41</b>                                          |

Thus, the total amount which will be deposited up to the end of post mine closure plan will be used for technical and biological reclamation, landscaping, plantation, water coursing, dismantling of unwanted structures, creating safe and beautiful ambience etc.

#### 15.7.10 Financial assurance

- The mining company shall open an Escrow account, with the Coal Controller Organisation (on behalf of the Central Govt.) as executive beneficiary. The mining company shall cause payments to be deposited in such Escrow account at the rate computed as indicated in table given above.
- When implementation of the final mine closure scheme is undertaken by the mine owner starting 5 years before the scheduled closure of the mining operations, the Coal Controller may permit withdrawals (4 year

before final mine closure date) from the Escrow account proportionate to the quantum of the work carried out as reimbursement. The withdrawn amount each year will not exceed 20% of the total amount deposited in the account.

- iii. An agreement, outlining the detailed terms and conditions of operating the Escrow account, shall be executed between the Mining company, Coal Controller and the concerned bank in order to give effect to this. The agreement will be executed before the grant of the permission by the Coal Controller to open the mine.

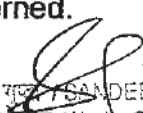
#### 15.7.11 Responsibility of the mine owner

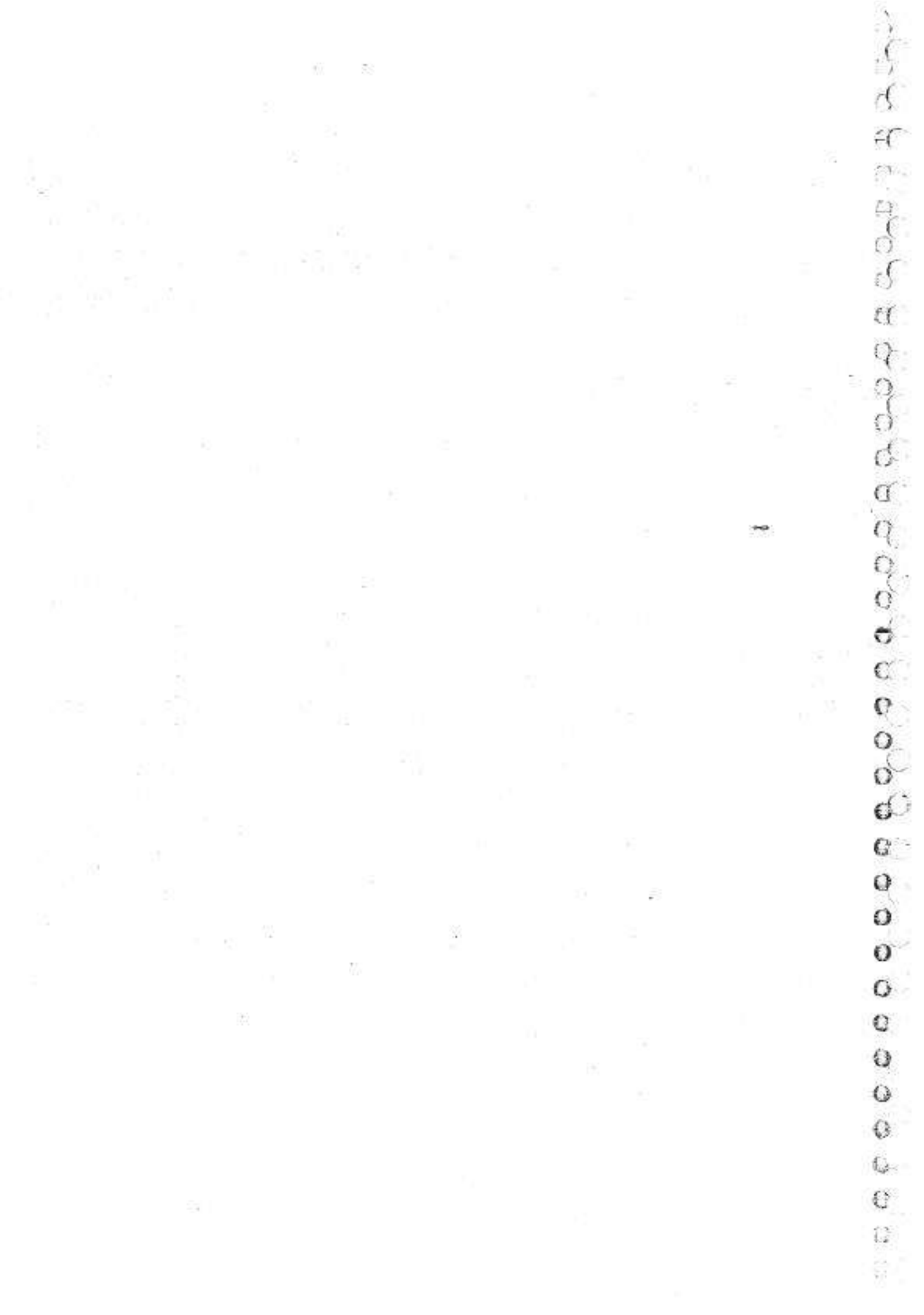
It is the responsibility of the mine owner to ensure that the protective measures contained in the Mine Closure Plan including reclamation and rehabilitation works have been carried out in accordance with the approved Mine Closure Plan and Final Mine Closure Plan.

The owner shall submit an yearly report to the Coal Controller before 1<sup>st</sup> July of every year setting forth the extent of protective and rehabilitative works carried out as envisaged in the approved mine closure plan (Progressive and Post mine Closure Plan).

#### 15.7.12 Provision for mine closure

The mine owner will be required to obtain a mine closure certificate from Coal Controller to the effect that the protective, reclamation and rehabilitation works in accordance with the approved mine closure plan/ Final mine Closure Plan have been carried out by the mine owner for surrendering the reclaimed land to the State Govt. concerned.

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



## ***ANNEXURES TO CHAPTER - 1***

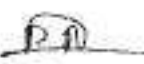
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**1-1 Block allocation letter**

**1-2 Receipt of cost paid to CMPDIL**

**1-3 RQP Certificate from Ministry of Coal and Mines**

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

  
B.D. SHARMA  
RQP



F.No. 13016/8/2007-CA-1  
Government of India  
Ministry of Coal

New Delhi, the 25<sup>th</sup> July, 2007

To :

✓ Deputy General Manager (I&B),  
National Mineral Development Corporation,  
Khanij Bhawan, 10-3-311/A, Castle Hills,  
Mansab Tank, Hyderabad - 500 028

Subject: Allocation of Shahpur West coal block to the National Mineral Development Corporation (NMDC)

Sir,

I am directed to refer to letter number as mentioned below from the National Mineral Development Corporation (NMDC) on the above subject and to convey the 'in principle' consent of the Government of India to the working of Shahpur West block as under:

| Sl.No. | Name of the applicant company                   | Reference No.                       | Project Name      | Share of reserves (MT) |
|--------|-------------------------------------------------|-------------------------------------|-------------------|------------------------|
| 1      | National Mineral Development Corporation (NMDC) | No. I&B/Coal/2006-07 dated 11.01.07 | Commercial mining | 42 MT                  |

2. The above allocation has been made under the Government Company dispensation in pursuance of the provisions of Section 3(3)(a)(i) of the Coal Mines (Nationalisation) Act 1973 and the Revised Policy on Coal Mining by State Government (copy enclosed), subject to further following conditions:

(i) Prospecting/Detailed exploration and coal mining shall be carried out by M/s NMDC or a separate company to be created with participation of allocatee companies provided that the separate created company is a Government company eligible to do coal mining as per the provisions of the Coal Mines (Nationalisation) Act, 1973.

(ii) The mining lease will be executed between the State Government and the allocatee as per the provisions of the MMDR Act 1957 and the rules framed there under.

(iii) The M/s NMDC will do exploration and coal mining in accordance with the provisions of the Coal Mines (Nationalisation) Act 1973, the Mines and Minerals (Development & Regulation) Act, 1957, the Contract Labour

  
B.D. SHARMA  
Joint Secretary  
Ministry of Coal  
Government of India  
New Delhi

  
B.D. SHARMA  
RQP

(Regulation & Abolition) Act, 1970, all the minerals, environmental and labour laws along with other regulations governing coal industry.

(iv) Detailed exploration shall be carried out on their own, subject to guidelines laid down in consultation with the CMPDIL.

(v) Mining of coal from the allocated coal block shall be carried out in accordance with the applicable Statutes/Rules/Orders/Directions governing the mining of coal in the country so as to extract the reserve to the maximum extent possible.

(vi) Those of the conditions mentioned herein 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 Government.

(vii) 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 Government. The final mining lease shall be as vetted/modified by the Central Government. Any deviation from the vetted/modified draft shall render the mining lease deed ab initio null and void and without effect.

(viii) Coal produced from the allocated coal block Shahpur West coal block will not be supplied to the consumers of Coal India Limited/SCCL against their existing linkages.

(ix) M/s NMDC may approach CIL/CMPDIL/GSI to obtain the available geological data on the block on payment of necessary exploration cost.

(x) In respect of an unexplored block, the allocatee company shall apply for a prospecting license within three months of the date of issue of allotment letter. The exploration shall be completed and geological report prepared within two years from the date of issue of prospecting license. After the detailed exploration is completed the allocatee of the block shall proceed for ensuring earliest commencement of production. The milestone chart appended shall be adhered to. Any slippage would render this allocation liable for cancellation, and withdrawal of block from the allocatee.

(xi) M/s NMDC shall submit a bank guarantee of Rs.2.40 crore (equal to one year's royalty amount based on mine capacity of 24 mtpa as assessed by CMPDIL, grade of coal and the weighted average royalty @ Rs.100 per tonne) within three months from the date of this letter. Subsequently, upon approval of mining plan the Bank Guarantee amount will be modified on the basis of final peak/rated capacity of the mine.

(xii) 50% of the bank guarantee shall be linked to the milestones (time schedule) set for development of captive block, and the remaining 50% to the guaranteed production. The bank guarantee shall be liable to be encashed in the following eventuality:

  
B.D. SHARMA  
Under Secretary  
Ministry of Coal  
Govt. of India  
New Delhi

  
B.D. SHARMA  
RQP

(i) There shall be an annual review of progress achieved by an allocatee company. In the event of lapses, if any, in the achievements vis-à-vis the milestones set for that year, a proportionate amount shall be encashed and deducted from the bank guarantee.

(ii) Once production commences, in case of any lag in the production of coal/lignite, a percentage of the bank guarantee amount will be deducted for the year. This percentage will be equal to the percentage of deficit in production for the year with respect to the rated/peak capacity of the mine, e.g., if rated/peak capacity is 100, production as per the approved mining plan for the relevant year is 50 and actual production is 35, then  $(50-35)/100 \times 100 = 15\%$  will lead to deduction of 15% of the original bank guarantee amount for that year. Upon exhaustion of the bank guarantee amount, the block shall be liable for de-allocation/cancellation of mining lease.

(iii) The allocatee shall ensure that the bank guarantee remains valid at all times till the mine reaches its rated capacity or till the bank guarantee is exhausted. Any lapses on this count shall lead to de-allocation/ cancellation of mining lease.

(xiii) Any violation of the conditions imposed above in mining of coal from the Shahpur West coal block will render the mining lease liable for cancellation and withdrawal of allocation.

(V.S. Rana)

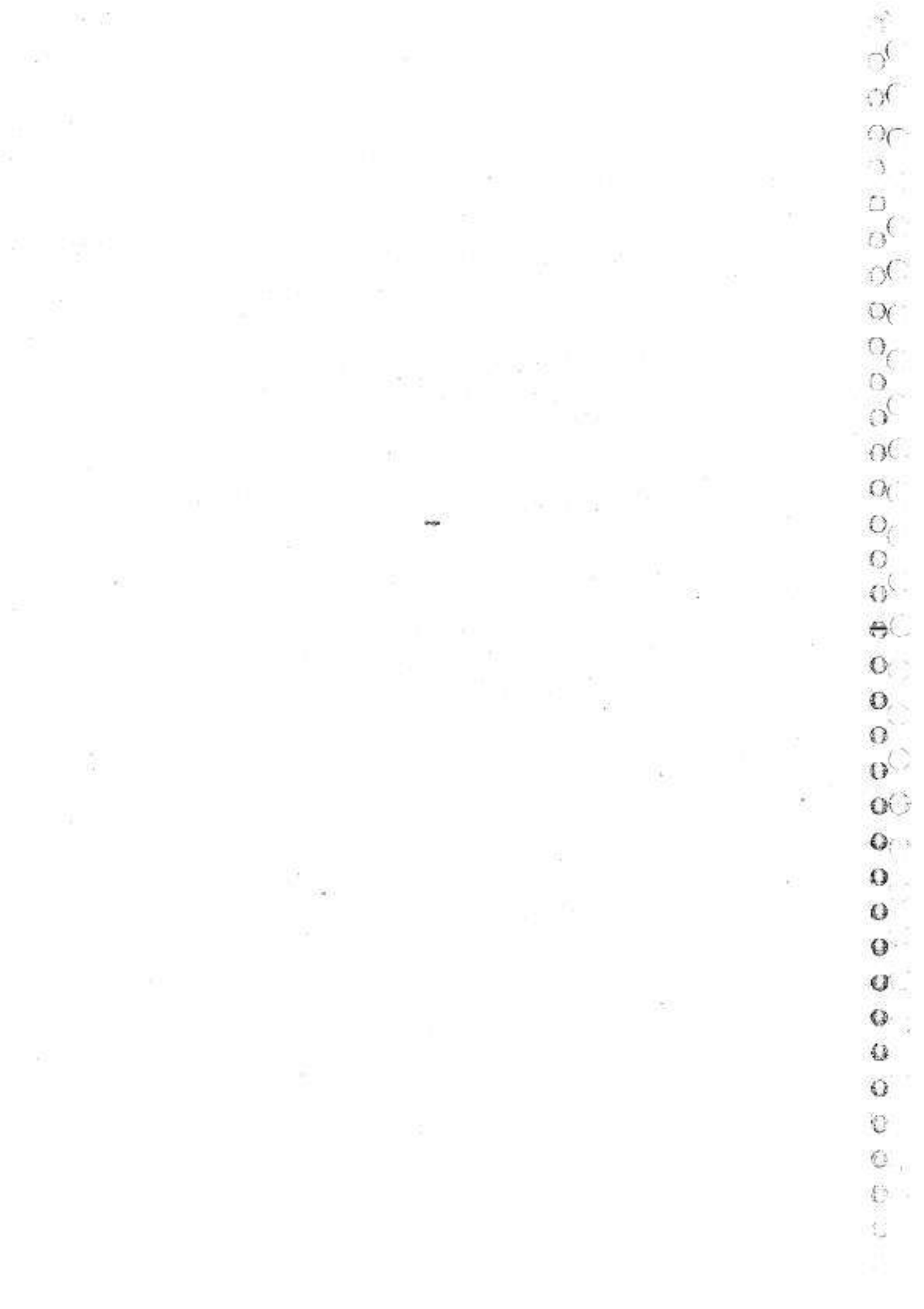
Under Secretary to the Government of India.

Encl: as above  
Copy to

1. The Chief Secretary, Government of Madhya Pradesh, Bhopal.
2. Ministry of Steel, Udyog Bhawan, New Delhi.
3. Chairman, CIL, Kolkata
4. CMD, CMPDIL, Ranchi CIL
5. CMD, SECL
6. Coal Controller, Kolkata
7. Office Folder.

Stamp:   
 1. CHIEF SECRETARY, GOVT. OF INDIA  
 2. UNDER SECRETARY  
 3. MINISTRY OF COAL  
 4. GOVT. OF INDIA  
 5. NEW DELHI

B.D.SHARMA  
RQP





**CMPDI**  
ISO 9001 Company

सेन्ट्रल माइन प्लानिंग एण्ड डिजाइन इंस्टीट्यूट लिमिटेड  
गोंदवाना प्लेस, कार्कि रोड, राँची - 834 006 (झारखण्ड) इण्डिया  
**Central Mine Planning & Design Institute Limited**  
Gondwana Place, Karkee Road, Ranchi - 834 006 (Jharkhand), INDIA



No. CMPD/D/G/033.71

2193-94

Date : 02.11.2007

To,

Sri AK Gupta  
The General Manager (RP),  
National Mineral Development Corpn. Ltd.,  
'Khanj Bhawan', 10-3-311/A,  
Castle Hills, Masab Tank,  
Hyderabad - 500 028.

**Sub: Request for providing Geological Report on Shahapur East and Shahapur West Coal Blocks (MP), allotted to NMDC by MoC**

Dear Sir,

Kindly refer to your letter no. CMPDI/Coal/. Dt 24.10.07 on the above subject. It has already been informed to you that exploration in Shahapur block, Sohagpur Coalfield has been carried out by GSI under the scheme of Promotional Exploration of coal and lignite. The exploration has been concluded very recently and the geological report has been prepared as yet. Shahapur East and Shahapur West blocks which have been allocated to you have been culled out of the bigger Shahapur block. It has further been explained that the basic data of all the boreholes falling in Shahapur East and Shahapur West block shall be provided to you.

In this respect, this is to inform you that policy for recoverable cost of exploration is under review. However, the interim recoverable cost of exploration in respect of Shahapur East and Shahapur West block has been assessed as follows:

|               |                      |
|---------------|----------------------|
| Shahapur East | : Rs. 1,22,05,752=00 |
| Shahapur West | : Rs. 68,54,554=00   |
| Total         | : Rs. 1,90,60,306=00 |

*(Signature)*  
SUNDERP GUPTA  
Under Secretary  
Ministry of Coal  
Govt. of India  
New Delhi

You are, therefore, requested to deposit the interim recoverable cost of Rs. 1,90,60,306 (Rupees One crore ninety lakh sixty thousand three hundred and six) only by Demand Draft on CMPDI Ltd., payable at Ranchi with the undertaking that the balance amount, if any, will be paid by you as and when the policy for recovering the cost of exploration is finalized.

This cost is valid upto March, 2008.

*(Signature)*  
28/10/07  
DGM (Expln)

Yours faithfully  
*(Signature)*  
(S.K. Guha Niskuta)  
GENERAL MANAGER  
(Exploration)



सेन्ट्रल माइन प्लानिंग एण्ड डिजाइन इन्स्टीच्यूट लिमिटेड  
गोन्दवाना प्लेस, काँकि रोड, राँची - ८३४ ००८ (झारखण्ड) इण्डिया  
Central Mine Planning & Design Institute Limited  
Gondwana Place, Karika Road, Ranchi - 834 008 (Jharkhand), INDIA



No. CMPDI/DG/033.4/28

Dt 4.1.08

To  
General Manager (RP)  
National Mineral Development Corporation Ltd.  
Khanij Bhawan, 10-3-311/A, Castle Hills,  
Masab Tank, Hyderabad 500 028.

**Sub: Purchase of Geological data of Sahapur  
East and Sahapur West Coal Block**

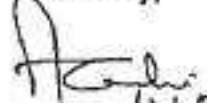
Dear Sir,

This has reference to your letter no. INV/CMPDI/Coal dt. 1.1.2008 on the above subject. The geological data of two blocks i.e. Shahpur East and Shahpur West along with available plans is being handed over to Sri D.P. Selvam, Dy. General Manager (Investigation).

The original money receipt for Rs.1,90,60,306=00 (Rupees One crore ninety lakh sixty thousand three hundred six only) towards cost of exploration of the above two blocks is enclosed.

  
S. DEEP GUPTA  
अवर सचिव / Under Secretary  
कोयला मंत्रालय / Ministry of Coal  
भारत सरकार / Govt. of India  
नई दिल्ली / New Delhi

Yours faithfully,

  
(A.K. Wahi)  
General Manager (ES)

Encl: as above

## CENTRAL MINE PLANING &amp; DESIGN INSTITUTE LIMITED

(A Subsidiary of Coal India Limited)

GONDWANA PLACE, KANKE ROAD, RANCHI-834 008 (JHARKHAND)

VALID SUBJECT TO ENCASHMENT

ORIGINAL

RECEIPT NO. A

DATE

04/01/08

12541

① 8545542 00

② 12205752 00

RS. 1,90,60,306 2 00

M/S National Mine

Received with thanks from

development corporation Ltd

Castle Hills Masab Tank Hyderabad

by Cash/Demand Draft/Cheque No.

① 308276 dated 26/12/07 on 308275 the sum of

Unit

010

Account

820118

Rupees one crore ninty Lakhs sixty thousand three

against Bill No for the geological survey &amp; signed

on account of East and Shapur West Coal Block

Rs. 1,90,60,306

Chief Cashier/Sr. Cashier/Cashier

(Finance Manager)

DR. RANDEEP GUPTA  
 Under Secretary  
 Ministry of Coal  
 Govt. of India  
 New Delhi

B.D. SHARMA  
 RQP


**CMPDI**

An ISO 9001 Company

 Central Mine Planning & Design Institute Limited  
 Gondwana Place Kanke Road, Ranchi-834008(Jharkhand)

 No.CMPDI/DG/033.7/ 888 — 890  
 FAX NO.040-23538711

Date : 18.04.2008

To,

 Shri A.K. Gupta,  
 General Manager (RP),  
 National Mineral Development Corporation Ltd.,  
 'Khanij Bhawan', 10-3-311/A,  
 Castle Hills, Masab Tank,  
 Hyderabad - 500 028.

Sub: Final Cost of Exploration in respect of Shahpur East and Shahpur West Coal Blocks.

Dear Sir,

The interim cost of exploration (Rs.1,22,05,752.00) in respect of Shahpur East and (Rs.68,54,554.00) Shahpur West blocks respectively has been conveyed to you vide our letter No.CMPDI/DG/033.7/2193-94 dated 2/5.11.2007

The policy for recovery of cost of exploration has since been finalized. The final cost of exploration in respect of Shahpur East and Shahpur West coal blocks has been assessed as Rs.1,24,72,490.00 (Rupees One Crore twenty four lakhs seventy two thousand four hundred ninety only) and Rs.70,04,350.00 (Rupees Seventy lakhs four thousand three hundred fifty only) respectively. As such, you are required to pay the balance amount of Rs.2,66,738.00 (Rupees Two lakhs sixty six thousand seven hundred thirty eight only) in respect of Shahpur East and Rs.1,49,796.00 (Rupees One lakh forty nine thousand seven hundred ninety six only) for Shahpur West blocks.

You are, therefore, requested to deposit an amount of Rs.4,16,534.00 (Rupees Four lakhs sixteen thousand five hundred thirty four) only by Demand Draft on CMPDI Ltd., payable at Ranchi.

  
 ANAND DEEP GUPTA  
 Joint Secretary  
 Ministry of Coal  
 Govt. of India  
 New Delhi  
 18/05/08.  
 (Signature)

Yours faithfully,

  
 (P.K. Pal)  
 CHIEF GENERAL MANAGER  
 (Exploration)



सेन्ट्रल माइन्ग प्लानिंग एण्ड डिजाइन इंस्टीट्यूट लिमिटेड  
जोन्स रोड, कलकत्ता, रॉकी - 734 001 (झारखण्ड) इण्डिया  
Central Mine Planning & Design Institute Limited  
Jones Road, Kanki Road, Ranchi 834 001 (Jharkhand) INDIA



ISO 9001:2000 Cert No: CI/8656

DG/693(A)/ 1272

Date - 20-5-2008

To,  
Sri A.K. Gupta  
General Manager (RP)  
National Mineral Development Corpn.(NMDC)  
Khanij Bhavan, 10-3-311/A  
Castle Hills, Masab Tank  
Hyderabad - 28

Sub. - Final payment of exploration cost in respect of Shahpur (E)  
& Shahpur (W) coal blocks.

Ref. - Your letter no. Inv./Coal/Shahpur/ no. nil dt. 8-5-2008

Sir,

Find enclosed the money receipt bearing no. A-13981 dt. 15-5-2008 issued by finance department CMPDI for amount of Rs. 416534/- against the final payment of cost of exploration in respect of Shahpur (E) & Shahpur (W) coal blocks.

We have already informed you that the preparation of GR is likely to take some time. The data of bore holes drilled in the Shahpur East & West blocks has already been provided to you, which is sufficient for programming detailed exploration in the block. Taking up of detailed exploration need not wait for availability of GR.

Encl. - as above.

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

Yours faithfully,

(A.K. Wahi)  
General Manager (ES)

B.D. SHARMA  
RQP

## CENTRAL MINE PLANING &amp; DESIGN INSTITUTE LIMITED

(A Subsidiary of Coal India Limited)

GONDWANA PLACE, KANKE ROAD, RANCHI-834 008 (JHARKHAND)



RECEIPT NO. A

VALID SUBJECT TO ENCASHMENT

DATE 15/05/08

13981

① Rs. 26738.00  
② Rs. 1497962.00  
ORIGINAL

Unit

2103

Account

820118

Received with thanks from

Mineral Development Corpn Ltd

Kharri Bhayan, 10-3-311/A Castle

Hydrabad-28 by Cash/Demand Draft/Cheque No. 308815030846

dated 07.05.08 on S. B. Hyderabad the sum of

Rupees

Four Lakh sixteen thousand S. B. Ranchi

against Bill No

Pinaf exploration cost dated - Sahpur (E)

on account of

Sahpur (W) coal blocks

Rs. 4,16,5342.00

Chief Cashier/Sr. Cashier/Cashier

(Finance Manager)

संदीप गुप्ता / SANDEEP GUPTA  
अवर सचिव / Under Secretary  
लोहमंडी कार्यालय / Ministry of Coal  
भारत सरकार / Govt. of India  
नई दिल्ली / New Delhi

B.D. SHARMA  
RQP

No. Inv/ Coal / Shahpur

Dated: 08.05.08

To,  
Shri P.K. Pal,  
Chief General Manager (Exploration),  
Central Mine Planning & Design Institute Limited,  
Gondwana Place, Kanke Road, Ranchi - 834 008,  
Jharkhand State.

Sub: Payment of Final Cost of exploration in respect of Shahpur East & Shahpur West Coal blocks - reg.

Ref: Your letter No. CMPDI / DG/ 033.7/888-890, dated 18/21.04.2008

Sir,

On the subject and reference above, we are here by enclosing 2 No. of DD's for payment of Final Cost of exploration for Shahpur East & Shahpur West Coal Block. The details of DD's are as follows:

- 1) D.D for Rs. 266738=00 (Rupees Two Lakhs Sixty Six Thousand Seven Hundred Thirty Eight Only ), vide No. 308816, dated 07.05.08 drawn on State Bank of India, Ranchi for Shahpur East block and
- 2) D.D for Rs. 149796=00 (Rupees One Lakh Forty Nine Thousand Seven Hundred Ninety Six Only), Vide No. 308815, dated 07.05.08 drawn on State Bank of India, Ranchi for Shahpur West block.

With this, the commitment of payment of Final Cost of exploration in respect of Shahpur East and Shahpur West Coal blocks is fulfilled without any balance to be paid in future.

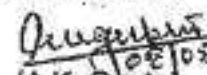
We request you to kindly provide the Geological Report prepared by GSI on Shahpur East & Shahpur West blocks at the earliest as it is required for taking up detailed exploration by NMDC.

With regards,

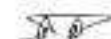
Thanking you,

Yours Faithfully,

 SANDEEP GUPTA  
अवर सचिव / Under Secretary  
कोयला विभाग / Ministry of Coal  
भारत सरकार / Govt. of India  
राज्य विभाग / Jharkhand State

 10/5/08  
(A.K. Gupta)

General Manager (RP)



B.D.SHARMA  
RQP

o/c



नेशनल मिनेरल डेवलपमेंट कॉर्पोरेशन लिमिटेड  
National Mineral Development Corporation Limited

(भारत सरकार का उद्यम) (A GOVT. OF INDIA ENTERPRISE)

पंजीकृत कार्यालय : 'खानि भवन', 10-3-311A, कैसल हिल्स, मासाब टैंक, हैदराबाद - 500 028.

Regd. Office : 'Khanij Bhavan' 10-3-311A, Castle Hills, Masab Tank, Hyderabad - 500 028.

No./CMPDIL/COAL/4/18

Date: 24/10/2007

To,  
Shri. A.K Wahi  
General Manager (Exploration Services)  
Central Mine Planning & Design Institute Ltd  
Gondwana Place, Kanke Road,  
Ranchi-834 008

FAX: 0651-2231447 / 2232633

Sub: Request for providing Geological report on Shahapur East and  
Shahpur West Coal Blocks (MP), allotted to NMDC by Ministry of  
Coal.

Ref: Our letter No. INV/CMPDIL/COAL/279 Dated 4.8.2007

Sir,

On the subject and reference above, we would like to inform you that NMDC has submitted PL application for Shahapur East and Shahpur west Coal Blocks with the Mining Officer, Shahdol District (MP) on 12.10.2007 and Bank Guarantee (Rs.2.40 crore for each block) to the Ministry of Coal on 23.10.2007.

In order to proceed further, Geological Report of the above two Coal blocks are required for study. Therefore, we request you to kindly intimate the status of Geological reports which CMPDIL must have received by this time from GSI and the likely date of providing the same to NMDC on "Sale Basis".

Thanking you,

SANDEEP GUPTA  
Joint Secretary  
Ministry of Coal  
103, 103/1, Govt. of India  
New Delhi



Yours faithfully,

A.K Gupta  
General Manager (RP)

Faxed on 24/10

दूरभाष / PHONES : 23538713-21 (9 Lines), 23538723, 23538767

B.D.SHARMA  
RQP

No.13016/18/2004-CA  
Government of India  
Ministry of Coal & Mines  
Department of Coal

\*\*\*

New Delhi, dated the 19<sup>th</sup> August, 2004.

RA. 10

To

Shri B.D.Sharma,  
M/s Min Mec Consultancy Pvt. Ltd.  
A-121, Parayavaran Complex, IGNOU Road,  
New Delhi - 110 030.

Subject: Grant of recognition as competent person to prepare mining plan.

रविश गुप्ता / RANDEEP GUPTA  
अवर सचिव / Under Secretary  
कोयला मंत्रालय / Ministry of Coal  
भारत सरकार / Govt. of India  
नई दिल्ली / New Delhi

Sir,

I am directed to invite your attention to our letter of even number dated 01.06.2004 on the subject mentioned above and to state that the Government has widened the scope of recognition to prepare mining plan. Under this decision you can prepare mining plan for coal and lignite for any block up-to 10 (ten) years from the date of last recognition i.e., 01.06.2004.

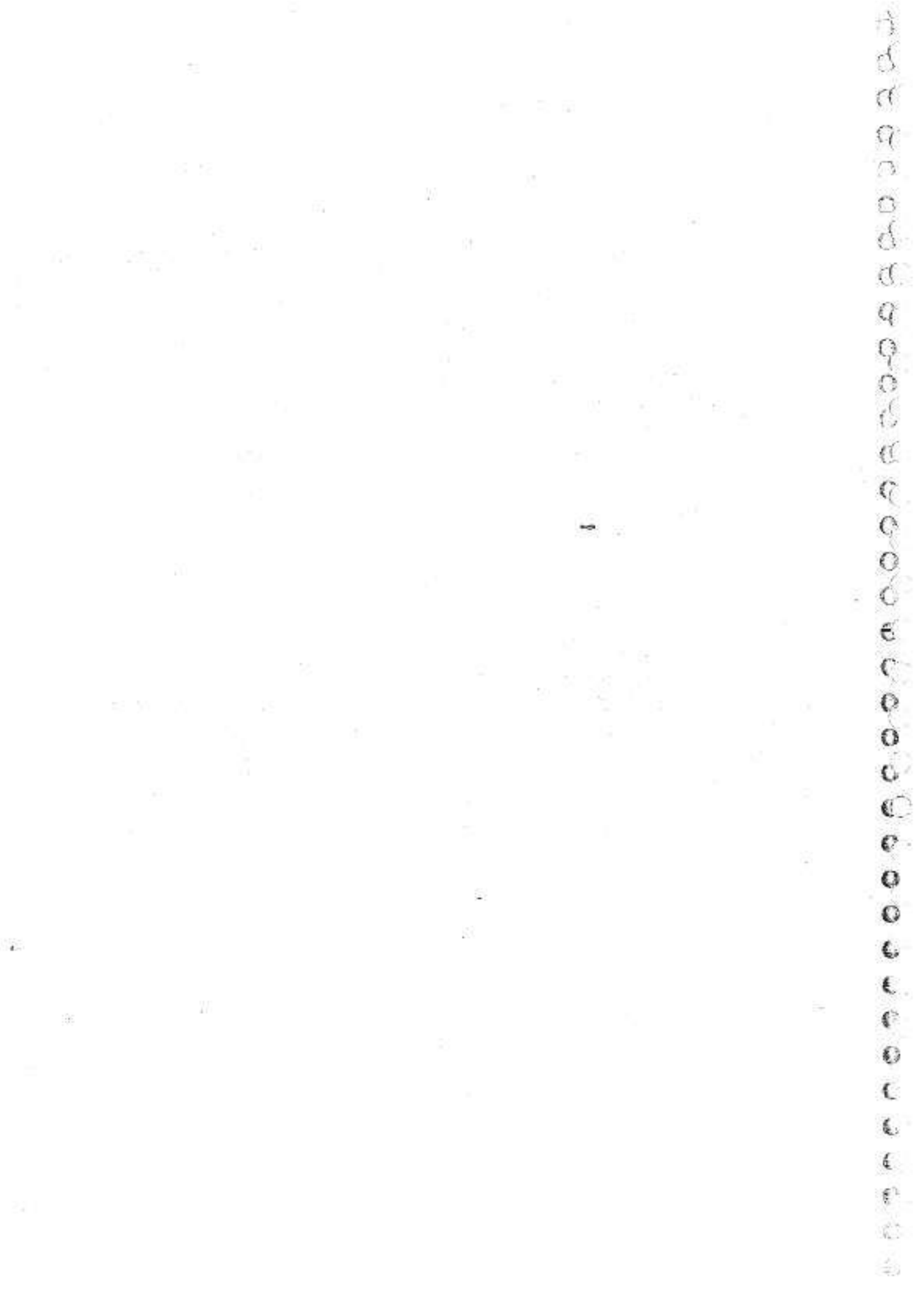
Yours faithfully,



(S.K. Kakkar)

Under Secretary to the Govt. of India

SE 10  
B.D.SHARMA  
RQP

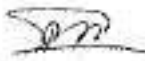


## ANNEXURES TO CHAPTER - 3

3-1 Khasra wise land use details

3-2 Block boundary marked by CMPDI vide letter no.  
CMPDI/DG/033,4/887 dt. 20/21-09-2007

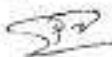
  
संदीप गुप्ता / SANDEEP GUPTA  
अपर सचिव / Under Secretary  
कोयला मंत्रालय / Ministry of Coal  
भारत सरकार / Govt. of India  
नई दिल्ली / New Delhi

  
B.D.SHARMA  
RQP



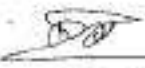
| SHAHPUR WEST BLOCK                           |                           |                            |                           |                 |               |                 |           |
|----------------------------------------------|---------------------------|----------------------------|---------------------------|-----------------|---------------|-----------------|-----------|
| VILLAGE - KHAMAHARIA KALA, TEHSIL - SOHAGPUR |                           |                            |                           |                 |               |                 |           |
| DISTRICT - SHAHDOL (M.P.)                    |                           |                            |                           |                 |               |                 |           |
| SL. NO.                                      | SURVEY NO./<br>KHASRA NO. | M.P. GOVT. LAND            |                           | PRIVATE<br>LAND | TOTAL<br>AREA | APPLIED<br>AREA | REMARKS   |
|                                              |                           | REVENUE LAND<br>(Hectares) | FOREST LAND<br>(Hectares) | (Hectares)      | (Hectares)    | (Hectares)      |           |
| 1                                            | 1                         | 1.927                      | -                         | -               | 1.927         | 1.927           | River     |
| 2                                            | 2                         | -                          | -                         | 3.727           | 3.727         | 3.727           |           |
| 3                                            | 3/1                       | -                          | -                         | 0.680           | 0.680         | 0.680           |           |
| 4                                            | 3/2                       | -                          | -                         | 0.683           | 0.683         | 0.683           |           |
| 5                                            | 3/3                       | -                          | -                         | 0.684           | 0.684         | 0.684           |           |
| 6                                            | 4/1                       | -                          | -                         | 0.053           | 0.053         | 0.053           |           |
| 7                                            | 4/2                       | -                          | -                         | 0.052           | 0.052         | 0.052           |           |
| 8                                            | 5                         | 0.729                      | -                         | -               | 0.729         | 0.729           | M.P. Govt |
| 9                                            | 6                         | 1.785                      | -                         | -               | 1.785         | 1.785           | M.P. Govt |
| 10                                           | 7                         | 0.267                      | -                         | -               | 0.267         | 0.267           | M.P. Govt |
| 11                                           | 8/1                       | -                          | -                         | 0.061           | 0.061         | 0.061           |           |
| 12                                           | 8/2                       | -                          | -                         | 0.060           | 0.060         | 0.060           |           |
| 13                                           | 9                         | -                          | -                         | 0.024           | 0.024         | 0.024           |           |
| 14                                           | 10                        | -                          | -                         | 0.287           | 0.287         | 0.287           |           |
| 15                                           | 11                        | -                          | -                         | 0.474           | 0.474         | 0.474           |           |
| 16                                           | 12                        | -                          | -                         | 0.166           | 0.166         | 0.166           |           |
| 17                                           | 13                        | -                          | -                         | 0.749           | 0.749         | 0.749           |           |
| 18                                           | 14                        | -                          | -                         | 1.647           | 1.647         | 1.647           |           |
| 19                                           | 15                        | -                          | -                         | 0.150           | 0.150         | 0.150           |           |
| 20                                           | 16                        | 0.097                      | -                         | -               | 0.097         | 0.097           | M.P. Govt |
| 21                                           | 17                        | 0.170                      | -                         | -               | 0.170         | 0.170           | M.P. Govt |
| 22                                           | 18                        | 0.202                      | -                         | -               | 0.202         | 0.202           | M.P. Govt |
| 23                                           | 19                        | -                          | -                         | 0.263           | 0.263         | 0.263           |           |
| 24                                           | 20                        | -                          | -                         | 0.235           | 0.235         | 0.235           |           |
| 25                                           | 21/1/1                    | -                          | -                         | 0.080           | 0.080         | 0.080           |           |
| 26                                           | 21/1/2                    | -                          | -                         | 0.080           | 0.080         | 0.080           |           |
| 27                                           | 21/2                      | -                          | -                         | 0.079           | 0.079         | 0.079           |           |
| 28                                           | 22                        | -                          | -                         | 0.251           | 0.251         | 0.251           |           |
| 29                                           | 23                        | -                          | -                         | 0.595           | 0.595         | 0.595           |           |
| 30                                           | 24                        | -                          | -                         | 0.352           | 0.352         | 0.352           |           |
| 31                                           | 25                        | 0.437                      | -                         | -               | 0.437         | 0.437           | M.P. Govt |
| 32                                           | 26                        | -                          | -                         | 0.437           | 0.437         | 0.437           |           |
| 33                                           | 27/1                      | -                          | -                         | 0.538           | 0.538         | 0.538           |           |
| 34                                           | 27/2                      | -                          | -                         | 0.203           | 0.203         | 0.203           |           |
| 35                                           | 28/1                      | -                          | -                         | 0.040           | 0.040         | 0.040           |           |
| 36                                           | 28/2                      | -                          | -                         | 0.259           | 0.259         | 0.259           |           |
| 37                                           | 28/3                      | -                          | -                         | 0.260           | 0.260         | 0.260           |           |
| 38                                           | 29                        | 0.101                      | -                         | -               | 0.101         | 0.101           | M.P. Govt |
| 39                                           | 30                        | -                          | -                         | 1.193           | 1.193         | 1.193           |           |
| 40                                           | 31                        | -                          | -                         | 0.555           | 0.555         | 0.555           |           |
| 41                                           | 32                        | -                          | -                         | 0.671           | 0.671         | 0.671           |           |
| 42                                           | 33                        | -                          | -                         | 0.474           | 0.474         | 0.474           |           |
| 43                                           | 34                        | -                          | -                         | 0.186           | 0.186         | 0.186           |           |
| 44                                           | 35                        | -                          | -                         | 0.081           | 0.081         | 0.081           |           |
| 45                                           | 36                        | -                          | -                         | 0.725           | 0.725         | 0.725           |           |
| 46                                           | 37                        | -                          | -                         | 0.388           | 0.388         | 0.388           |           |
| 47                                           | 38                        | -                          | -                         | 0.324           | 0.324         | 0.324           |           |
| 48                                           | 39                        | -                          | -                         | 0.125           | 0.125         | 0.125           |           |
| 49                                           | 40                        | -                          | -                         | 0.275           | 0.275         | 0.275           |           |
| 50                                           | 41                        | -                          | -                         | 0.154           | 0.154         | 0.154           |           |
| 51                                           | 42                        | -                          | -                         | 0.607           | 0.607         | 0.607           |           |
| 52                                           | 43                        | -                          | -                         | 1.084           | 1.084         | 1.084           |           |
| 53                                           | 44                        | -                          | -                         | 0.045           | 0.045         | 0.045           |           |
| 54                                           | 45                        | -                          | -                         | 1.602           | 1.602         | 1.602           |           |

  
 SANDEEP GUPTA  
 जूनियर सचिव / Under Secretary  
 कोयला विभाग / Ministry of Coal  
 भारत सरकार / Govt. of India  
 नई दिल्ली / New Delhi

  
 B.D. SHARMA  
 RQP

| SHAHPUR WEST BLOCK                         |            |                 |             |            |            |            |
|--------------------------------------------|------------|-----------------|-------------|------------|------------|------------|
| VILLAGE KHAMATIARA KALA, TEHSIL - SOHAGPUR |            |                 |             |            |            |            |
| DISTRICT - SHAHDOL (M.P.)                  |            |                 |             |            |            |            |
| SL. NO.                                    | SURVEY NO. | M.P. GOVT. LAND |             | PRIVATE    | TOTAL      | APPLIED    |
|                                            | KHASRA NO. | REVENUE LAND    | FOREST LAND | LAND       | AREA       | AREA       |
|                                            |            | (Hectares)      | (Hectares)  | (Hectares) | (Hectares) | (Hectares) |
| 55                                         | 46         |                 | -           | 0.049      | 0.049      | 0.049      |
| 56                                         | 47         |                 | -           | 0.482      | 0.482      | 0.482      |
| 57                                         | 48/1       |                 | -           | 0.332      | 0.332      | 0.332      |
| 58                                         | 48/2       |                 | -           | 0.328      | 0.328      | 0.328      |
| 59                                         | 49         |                 | -           | 0.219      | 0.219      | 0.219      |
| 60                                         | 50         |                 | -           | 0.267      | 0.267      | 0.267      |
| 61                                         | 51/1       |                 | -           | 0.137      | 0.137      | 0.137      |
| 62                                         | 51/2       |                 | -           | 0.069      | 0.069      | 0.069      |
| 63                                         | 52         |                 | -           | 0.713      | 0.713      | 0.713      |
| 64                                         | 53/1       |                 | -           | 0.371      | 0.371      | 0.371      |
| 65                                         | 53/2       |                 | -           | 0.370      | 0.370      | 0.370      |
| 66                                         | 54         |                 | -           | 0.397      | 0.397      | 0.397      |
| 67                                         | 55         |                 | -           | 0.166      | 0.166      | 0.166      |
| 68                                         | 56         |                 | -           | 0.162      | 0.162      | 0.162      |
| 69                                         | 57         |                 | -           | 0.166      | 0.166      | 0.166      |
| 70                                         | 58         |                 | -           | 0.162      | 0.162      | 0.162      |
| 71                                         | 59         |                 | -           | 0.210      | 0.210      | 0.210      |
| 72                                         | 60         |                 | -           | 0.247      | 0.247      | 0.247      |
| 73                                         | 61         |                 | -           | 0.049      | 0.049      | 0.049      |
| 74                                         | 62         |                 | -           | 0.166      | 0.166      | 0.166      |
| 75                                         | 63         |                 | -           | 0.097      | 0.097      | 0.097      |
| 76                                         | 64         |                 | -           | 0.077      | 0.077      | 0.077      |
| 77                                         | 65         |                 | -           | 0.036      | 0.036      | 0.036      |
| 78                                         | 66         |                 | -           | 0.036      | 0.036      | 0.036      |
| 79                                         | 67         |                 | -           | 0.105      | 0.105      | 0.105      |
| 80                                         | 68         |                 | -           | 0.174      | 0.174      | 0.174      |
| 81                                         | 69         |                 | -           | 0.045      | 0.045      | 0.045      |
| 82                                         | 70         |                 | -           | 0.166      | 0.166      | 0.166      |
| 83                                         | 71         |                 | -           | 0.587      | 0.587      | 0.587      |
| 84                                         | 72         |                 | -           | 0.049      | 0.049      | 0.049      |
| 85                                         | 73         |                 | -           | 0.032      | 0.032      | 0.032      |
| 86                                         | 74         |                 | -           | 0.049      | 0.049      | 0.049      |
| 87                                         | 75         |                 | -           | 0.117      | 0.117      | 0.117      |
| 88                                         | 76         |                 | -           | 0.931      | 0.931      | 0.931      |
| 89                                         | 77         |                 | -           | 0.255      | 0.255      | 0.255      |
| 90                                         | 78         |                 | -           | 0.271      | 0.271      | 0.271      |
| 91                                         | 79/1       |                 | -           | 0.147      | 0.147      | 0.147      |
| 92                                         | 79/2       |                 | -           | 0.148      | 0.148      | 0.148      |
| 93                                         | 80         |                 | -           | 0.117      | 0.117      | 0.117      |
| 94                                         | 81         |                 | -           | 0.138      | 0.138      | 0.138      |
| 95                                         | 82         |                 | -           | 0.567      | 0.567      | 0.567      |
| 96                                         | 83/1       |                 | -           | 0.111      | 0.111      | 0.111      |
| 97                                         | 83/2       |                 | -           | 0.091      | 0.091      | 0.091      |
| 98                                         | 84         |                 | -           | 0.637      | 0.637      | 0.637      |
| 99                                         | 85         |                 | -           | 0.781      | 0.781      | 0.781      |
| 100                                        | 86         |                 | -           | 0.526      | 0.526      | 0.526      |
| 101                                        | 87/1       |                 | -           | 1.041      | 1.041      | 1.041      |
| 102                                        | 87/2       | 0.202           | -           |            | 0.202      | 0.202      |
| 103                                        | 88         |                 | -           | 1.173      | 1.173      | 1.173      |
| 104                                        | 89/1       |                 | -           | 0.162      | 0.162      | 0.162      |
| 105                                        | 89/2       |                 | -           | 0.543      | 0.543      | 0.543      |
| 106                                        | 89/3       |                 | -           | 0.541      | 0.541      | 0.541      |
| 107                                        | 90         |                 | -           | 0.344      | 0.344      | 0.344      |
| 108                                        | 91         |                 | -           | 0.267      | 0.267      | 0.267      |

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

  
 B.D. SHARMA  
 RQP

| SHAHPUR WEST BLOCK                           |             |                 |             |            |            |            |           |
|----------------------------------------------|-------------|-----------------|-------------|------------|------------|------------|-----------|
| VILLAGE - KHAMAHARIA KALA, TEHSIL - SOHAGPUR |             |                 |             |            |            |            |           |
| DISTRICT - SHAHDOL (M.P.)                    |             |                 |             |            |            |            |           |
| SL. NO.                                      | SURVEY NO.  | M.P. GOVT. LAND |             | PRIVATE    | TOTAL      | APPLIED    | REMARKS   |
|                                              | SIASITA NO. | REVENUE LAND    | FOREST LAND | LAND       | AREA       | AREA       |           |
|                                              |             | (Hectares)      | (Hectares)  | (Hectares) | (Hectares) | (Hectares) |           |
| 109                                          | 92          | 0.243           | -           | -          | 0.243      | 0.243      | Road      |
| 110                                          | 93/1        | -               | -           | 0.460      | 0.460      | 0.460      |           |
| 111                                          | 93/2        | -               | -           | 0.466      | 0.466      | 0.466      |           |
| 112                                          | 94          | -               | -           | 0.024      | 0.024      | 0.024      |           |
| 113                                          | 95          | -               | -           | 0.142      | 0.142      | 0.142      |           |
| 114                                          | 96          | -               | -           | 0.085      | 0.085      | 0.085      |           |
| 115                                          | 97          | -               | -           | 0.101      | 0.101      | 0.101      |           |
| 116                                          | 98          | 0.020           | -           | -          | 0.020      | 0.020      | Road      |
| 117                                          | 99          | -               | -           | 0.008      | 0.008      | 0.008      |           |
| 118                                          | 100         | -               | -           | 0.654      | 0.654      | 0.654      |           |
| 119                                          | 101/1       | -               | -           | 0.194      | 0.194      | 0.194      |           |
| 120                                          | 101/2       | -               | -           | 0.194      | 0.194      | 0.194      |           |
| 121                                          | 102         | -               | -           | 0.162      | 0.162      | 0.162      |           |
| 122                                          | 103         | -               | -           | 0.421      | 0.421      | 0.421      |           |
| 123                                          | 104         | -               | -           | 0.283      | 0.283      | 0.283      |           |
| 124                                          | 105         | -               | -           | 0.170      | 0.170      | 0.170      |           |
| 125                                          | 106         | -               | -           | 0.089      | 0.089      | 0.089      |           |
| 126                                          | 107         | -               | -           | 0.247      | 0.247      | 0.247      |           |
| 127                                          | 108         | -               | -           | 0.279      | 0.279      | 0.279      |           |
| 128                                          | 109         | -               | -           | 0.142      | 0.142      | 0.142      |           |
| 129                                          | 110         | 0.336           | -           | -          | 0.336      | 0.336      | M.P. Govt |
| 130                                          | 111/2       | -               | -           | 0.604      | 0.604      | 0.604      |           |
| 131                                          | 111/1       | -               | -           | 0.202      | 0.202      | 0.202      |           |
| 132                                          | 112/1       | -               | -           | 0.405      | 0.405      | 0.405      |           |
| 133                                          | 112/2       | -               | -           | 0.405      | 0.405      | 0.405      |           |
| 134                                          | 113/2       | -               | -           | 0.374      | 0.374      | 0.374      |           |
| 135                                          | 113/1       | -               | -           | 0.124      | 0.124      | 0.124      |           |
| 136                                          | 114         | -               | -           | 0.348      | 0.348      | 0.348      |           |
| 137                                          | 115         | -               | -           | 0.372      | 0.372      | 0.372      |           |
| 138                                          | 116         | -               | -           | 0.227      | 0.227      | 0.227      |           |
| 139                                          | 117         | -               | -           | 0.445      | 0.445      | 0.445      |           |
| 140                                          | 118         | -               | -           | 0.833      | 0.833      | 0.833      |           |
| 141                                          | 119         | -               | -           | 0.028      | 0.028      | 0.028      |           |
| 142                                          | 120         | -               | -           | 0.413      | 0.413      | 0.413      |           |
| 143                                          | 121         | 0.259           | -           | -          | 0.259      | 0.259      | M.P. Govt |
| 144                                          | 122         | 0.409           | -           | -          | 0.409      | 0.409      | M.P. Govt |
| 145                                          | 123         | 0.316           | -           | -          | 0.316      | 0.316      | M.P. Govt |
| 146                                          | 124/1       | -               | -           | 0.609      | 0.609      | 0.609      |           |
| 147                                          | 124/2       | -               | -           | 0.295      | 0.295      | 0.295      |           |
| 148                                          | 125         | -               | -           | 0.093      | 0.093      | 0.093      |           |
| 149                                          | 126         | -               | -           | 0.437      | 0.437      | 0.437      |           |
| 150                                          | 127         | -               | -           | 0.886      | 0.886      | 0.709      |           |
| 151                                          | 128         | -               | -           | 0.713      | 0.713      | 0.250      |           |
| 152                                          | 129         | -               | -           | 1.619      | 1.619      | 1.295      |           |
| 153                                          | 130         | 0.854           | -           | -          | 0.854      | 0.854      | M.P. Govt |
| 154                                          | 131         | -               | -           | 0.202      | 0.202      | 0.202      |           |
| 155                                          | 132         | -               | -           | 0.186      | 0.186      | 0.186      |           |
| 156                                          | 133         | 0.121           | -           | -          | 0.121      | 0.121      | M.P. Govt |
| 157                                          | 134         | -               | -           | 0.624      | 0.624      | 0.624      |           |
| 158                                          | 135         | 0.045           | -           | -          | 0.045      | 0.045      | M.P. Govt |
| 159                                          | 136         | -               | -           | 0.356      | 0.356      | 0.356      |           |
| 160                                          | 137/1       | -               | -           | 0.632      | 0.632      | 0.632      |           |
| 161                                          | 137/2       | -               | -           | 0.121      | 0.121      | 0.121      |           |
| 162                                          | 138         | 0.356           | -           | -          | 0.356      | 0.356      | M.P. Govt |

  
 श्री देव प्रसाद DEEP GUPTA  
 जूनियर सचिव / Under Secretary  
 कृषि विभाग / Ministry of Coo  
 भारत सरकार / Govt. of India  
 पं. दिल्ली / New Delhi

B.D.SHARMA 3  
 RQP

| SHAHPUR WEST BLOCK                           |            |                 |              |            |            |           |
|----------------------------------------------|------------|-----------------|--------------|------------|------------|-----------|
| VILLAGE - KHAMAHARIA KALA, TEHSIL - SOHAGPUR |            |                 |              |            |            |           |
| DISTRICT - SHAHDOL (M.P.)                    |            |                 |              |            |            |           |
| SL NO.                                       | SURVEY NO. | M.P. GOVT. LAND | PRIVATE LAND | TOTAL      | APPLIED    | REMARKS   |
|                                              | KHASRA NO. | REVENUE LAND    | FOREST LAND  | AREA       | AREA       |           |
|                                              |            | (Hectares)      | (Hectares)   | (Hectares) | (Hectares) |           |
| 163                                          | 139        |                 |              | 0.870      | 0.870      |           |
| 164                                          | 140        | 0.275           |              | 0.275      | 0.275      | M.P. Govt |
| 165                                          | 141        |                 |              | 0.607      | 0.607      |           |
| 166                                          | 142        |                 |              | 0.332      | 0.332      |           |
| 167                                          | 143        |                 |              | 0.081      | 0.081      |           |
| 168                                          | 144        |                 |              | 0.077      | 0.077      |           |
| 169                                          | 145        |                 |              | 0.210      | 0.210      |           |
| 170                                          | 146        |                 |              | 0.441      | 0.441      |           |
| 171                                          | 147        |                 |              | 0.243      | 0.243      |           |
| 172                                          | 148        |                 |              | 0.231      | 0.231      |           |
| 173                                          | 149        |                 |              | 2.217      | 2.217      |           |
| 174                                          | 150        |                 |              | 1.153      | 1.153      |           |
| 175                                          | 151        |                 |              | 0.206      | 0.206      |           |
| 176                                          | 152        |                 |              | 0.170      | 0.170      |           |
| 177                                          | 153        |                 |              | 0.741      | 0.741      |           |
| 178                                          | 154        |                 |              | 0.375      | 0.375      |           |
| 179                                          | 158        |                 |              | 1.197      | 1.197      |           |
| 180                                          | 154        |                 |              | 0.607      | 0.607      |           |
| 181                                          | 165        |                 |              | 0.344      | 0.344      |           |
| 182                                          | 175        |                 |              | 0.607      | 0.607      |           |
| 183                                          | 178        | 1.011           |              | 1.011      | 0.607      | M.P. Govt |
| 184                                          | 177        | 0.101           |              | 0.101      | 0.101      | M.P. Govt |
| 185                                          | 172        |                 |              | 1.011      | 1.011      |           |
| 186                                          | 173        | 1.072           |              | 1.072      | 0.054      | M.P. Govt |
| 187                                          | 354        |                 |              | 1.328      | 1.328      |           |
| 188                                          | 385        | 1.315           |              | 3.315      | 1.328      | M.P. Govt |
| 189                                          | 369/4      |                 |              | 0.809      | 0.809      |           |
| 190                                          | 369        |                 |              | 9.944      | 9.944      |           |
| 191                                          | 370        |                 |              | 1.388      | 1.388      |           |
| 192                                          | 371/1      |                 |              | 0.694      | 0.694      |           |
| 193                                          | 371/2      |                 |              | 0.694      | 0.694      |           |
| 194                                          | 372        |                 |              | 3.298      | 3.298      |           |
| 195                                          | 373        |                 |              | 1.894      | 1.894      |           |
| 196                                          | 374        |                 |              | 1.113      | 1.113      |           |
| 197                                          | 375        |                 |              | 1.343      | 1.343      |           |
| 198                                          | 376/1      |                 |              | 0.061      | 0.061      |           |
| 199                                          | 376/2      |                 |              | 0.031      | 0.031      |           |
| 200                                          | 370/3      |                 |              | 0.761      | 0.761      |           |
| 201                                          | 376/4      |                 |              | 0.251      | 0.251      |           |
| 202                                          | 377        |                 |              | 0.571      | 0.571      |           |
| 203                                          | 378        |                 |              | 1.906      | 1.906      |           |
| 204                                          | 379        |                 |              | 4.314      | 4.314      |           |
| 205                                          | 380/1/1    |                 |              | 1.324      | 1.324      |           |
| 206                                          | 380/1/2    |                 |              | 0.259      | 0.259      |           |
| 207                                          | 380/2      |                 |              | 0.380      | 0.380      |           |
| 208                                          | 381        |                 |              | 1.202      | 1.202      |           |
| 209                                          | 382        |                 |              | 0.615      | 0.615      |           |
| 210                                          | 383/1      | 0.232           |              | 0.232      | 0.232      | M.P. Govt |
| 211                                          | 383/2      |                 |              | 0.405      | 0.405      |           |
| 212                                          | 384        |                 |              | 0.304      | 0.304      |           |
| 213                                          | 385        |                 |              | 0.348      | 0.348      |           |
| 214                                          | 387        |                 |              | 0.854      | 0.854      |           |
| 215                                          | 386/1      |                 |              | 0.461      | 0.461      |           |
| 216                                          | 386/2      |                 |              | 0.461      | 0.461      |           |

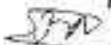
  
 Sandeep Gupta  
 Under Secretary  
 Ministry of Coal  
 Govt. of India  
 New Delhi

B.D. SHARMA  
 RQP  


| SHAHPUR WEST BLOCK                           |            |                 |             |            |            |            |
|----------------------------------------------|------------|-----------------|-------------|------------|------------|------------|
| VILLAGE - KHAMAHARIA KALA, TEHSIL - SOHAGPUR |            |                 |             |            |            |            |
| DISTRICT - SHAHDOL (M.P.)                    |            |                 |             |            |            |            |
| SL. NO.                                      | SURVEY NO. | M.P. GOVT. LAND |             | PRIVATE    | TOTAL      | APPLIED    |
|                                              | KHASRA NO. | REVENUE LAND    | FOREST LAND | LAND       | AREA       | AREA       |
|                                              |            | (Hectares)      | (Hectares)  | (Hectares) | (Hectares) | (Hectares) |
| 217                                          | 388/3      |                 |             | 0.458      | 0.458      | 0.458      |
| 218                                          | 389        | 0.060           |             |            | 0.060      | 0.060      |
| 219                                          | 390        |                 |             | 0.882      | 0.882      | 0.882      |
| 220                                          | 391        |                 |             | 0.206      | 0.206      | 0.206      |
| 221                                          | 405        |                 |             | 1.538      | 1.538      | 1.538      |
| 222                                          | 406        |                 |             | 1.497      | 1.497      | 1.497      |
| 223                                          | 407        |                 |             | 2.963      | 2.963      | 2.963      |
| 224                                          | 178        |                 |             | 2.598      | 2.598      | 2.598      |
| 225                                          | 179        | 0.097           |             |            | 0.097      | 0.097      |
| 226                                          | 180        |                 |             | 0.639      | 0.639      | 0.639      |
| 227                                          | 181        |                 |             | 0.085      | 0.085      | 0.085      |
| 228                                          | 182/1      |                 |             | 0.490      | 0.490      | 0.490      |
| 229                                          | 182/2      |                 |             | 0.489      | 0.489      | 0.489      |
| 230                                          | 183        |                 |             | 0.850      | 0.850      | 0.850      |
| 231                                          | 184/1      |                 |             | 0.178      | 0.178      | 0.178      |
| 232                                          | 184/2      |                 |             | 0.089      | 0.089      | 0.089      |
| 233                                          | 185        |                 |             | 0.461      | 0.461      | 0.461      |
| 234                                          | 186        |                 |             | 0.809      | 0.809      | 0.809      |
| 235                                          | 187        |                 |             | 1.040      | 1.040      | 1.040      |
| 236                                          | 188        |                 |             | 0.684      | 0.684      | 0.684      |
| 237                                          | 189/1      |                 |             | 0.308      | 0.308      | 0.308      |
| 238                                          | 189/2      |                 |             | 0.308      | 0.308      | 0.308      |
| 239                                          | 190        |                 |             | 0.255      | 0.255      | 0.255      |
| 240                                          | 191        |                 |             | 0.166      | 0.166      | 0.166      |
| 241                                          | 192        |                 |             | 0.231      | 0.231      | 0.231      |
| 242                                          | 193        | 0.113           |             |            | 0.113      | 0.113      |
| 243                                          | 194        |                 |             | 0.259      | 0.259      | 0.259      |
| 244                                          | 195        |                 |             | 0.636      | 0.636      | 0.636      |
| 245                                          | 196        |                 |             | 0.121      | 0.121      | 0.121      |
| 246                                          | 197        |                 |             | 0.077      | 0.077      | 0.077      |
| 247                                          | 198/1      |                 |             | 0.004      | 0.004      | 0.004      |
| 248                                          | 198/2      |                 |             | 0.138      | 0.138      | 0.138      |
| 249                                          | 199/1      |                 |             | 0.099      | 0.099      | 0.099      |
| 250                                          | 199/2      |                 |             | 0.053      | 0.053      | 0.053      |
| 251                                          | 200        |                 |             | 0.255      | 0.255      | 0.255      |
| 252                                          | 201        |                 |             |            |            |            |
| 253                                          | 202        | 0.097           |             |            | 0.097      | 0.097      |
| 254                                          | 203        |                 |             | 0.174      | 0.174      | 0.174      |
| 255                                          | 204        |                 |             | 0.332      | 0.332      | 0.332      |
| 256                                          | 205        |                 |             | 0.401      | 0.401      | 0.401      |
| 257                                          | 206        |                 |             | 0.295      | 0.295      | 0.295      |
| 258                                          | 207        | 0.089           |             |            | 0.089      | 0.089      |
| 259                                          | 208        |                 |             | 0.384      | 0.384      | 0.384      |
| 260                                          | 209        | 0.987           |             |            | 0.987      | 0.987      |
| 261                                          | 210        | 0.717           |             |            | 0.717      | 0.717      |
| 262                                          | 211        |                 |             | 0.158      | 0.158      | 0.158      |
| 263                                          | 212        |                 |             |            |            |            |
| 264                                          | 213        |                 |             | 0.709      | 0.709      | 0.709      |
| 265                                          | 214        |                 |             | 0.328      | 0.328      | 0.328      |
| 266                                          | 215        |                 |             | 0.255      | 0.255      | 0.255      |
| 267                                          | 216        |                 |             | 0.349      | 0.349      | 0.349      |
| 268                                          | 217        | 0.210           |             |            | 0.210      | 0.210      |
| 269                                          | 218/1      |                 |             | 0.028      | 0.028      | 0.028      |
| 270                                          | 218/2      |                 |             | 0.033      | 0.033      | 0.033      |

  
 B.D. SHARMA  
 Under Secretary  
 Revenue Department / Ministry of Govt.  
 India  
 New Delhi

B.D. SHARMA  
 RQP



# SHAHPUR WEST BLOCK

VILLAGE - KHAMAHARIA KALA, TEHSIL - SOHAGPUR

DISTRICT - SHAHDOL (M.P.)

| SL.NO. | SURVEY NO. | MP. GOVT. LAND | PRIVATE    | TOTAL      | APPLIED    | REMARKS |
|--------|------------|----------------|------------|------------|------------|---------|
|        |            | REVENUE LAND   | LAND       | AREA       | AREA       |         |
|        |            | (Hectares)     | (Hectares) | (Hectares) | (Hectares) |         |
| 271    | 219        |                | 0.174      | 0.174      | 0.174      |         |
| 272    | 220        |                | 0.121      | 0.121      | 0.121      |         |
| 273    | 221        |                | 0.166      | 0.166      | 0.166      |         |
| 274    | 222        | 0.012          |            | 0.012      | 0.012      | Road    |
| 275    | 223/1/1    |                | 0.085      | 0.085      | 0.085      |         |
| 276    | 223/1/2    |                | 0.045      | 0.045      | 0.045      |         |
| 277    | 223/1/3    |                | 0.061      | 0.061      | 0.061      |         |
| 278    | 223/2      |                | 0.057      | 0.057      | 0.057      |         |
| 279    | 224/1      |                | 0.112      | 0.112      | 0.112      |         |
| 280    | 224/2      |                | 0.057      | 0.057      | 0.057      |         |
| 281    | 225        |                | 0.259      | 0.259      | 0.259      |         |
| 282    | 226        | 0.065          |            | 0.065      | 0.065      | Road    |
| 283    | 227        |                | 0.020      | 0.020      | 0.020      |         |
| 284    | 228        |                | 0.032      | 0.032      | 0.032      |         |
| 285    | 229        |                | 0.089      | 0.089      | 0.089      |         |
| 286    | 230        |                | 0.223      | 0.223      | 0.223      |         |
| 287    | 231        |                | 0.130      | 0.130      | 0.130      |         |
| 288    | 232/1      |                | 0.052      | 0.052      | 0.052      |         |
| 289    | 232/2      |                | 0.049      | 0.049      | 0.049      |         |
| 290    | 233        |                | 0.069      | 0.069      | 0.069      |         |
| 291    | 234        |                | 0.166      | 0.166      | 0.166      |         |
| 292    | 235        |                | 0.162      | 0.162      | 0.162      |         |
| 293    | 236        |                | 0.126      | 0.126      | 0.126      |         |
| 294    | 237/1      |                | 0.149      | 0.149      | 0.149      |         |
| 295    | 237/2      |                | 0.150      | 0.150      | 0.150      |         |
| 296    | 238        |                | 0.089      | 0.089      | 0.089      |         |
| 297    | 239/1      |                | 0.114      | 0.114      | 0.114      |         |
| 298    | 239/2      |                | 0.113      | 0.113      | 0.113      |         |
| 299    | 240/1      |                | 0.093      | 0.093      | 0.093      |         |
| 300    | 240/2      |                | 0.016      | 0.016      | 0.016      |         |
| 301    | 240/3      |                | 0.093      | 0.093      | 0.093      |         |
| 302    | 241        |                | 0.388      | 0.388      | 0.388      |         |
| 303    | 242        |                | 0.299      | 0.299      | 0.299      |         |
| 304    | 243        |                | 0.199      | 0.199      | 0.199      |         |
| 305    | 244        |                | 1.011      | 1.011      | 1.011      |         |
| 306    | 245        |                | 0.202      | 0.202      | 0.202      |         |
| 307    | 246        |                | 0.263      | 0.263      | 0.263      |         |
| 308    | 247        |                | 0.251      | 0.251      | 0.251      |         |
| 309    | 248        |                | 0.219      | 0.219      | 0.219      |         |
| 310    | 249        |                | 0.279      | 0.279      | 0.279      |         |
| 311    | 250        |                | 0.624      | 0.624      | 0.624      |         |
| 312    | 251/1      |                | 0.611      | 0.611      | 0.611      |         |
| 313    | 251/2      |                | 0.142      | 0.142      | 0.142      |         |
| 314    | 252/1      |                | 0.097      | 0.097      | 0.097      |         |
| 315    | 252/2      |                | 0.049      | 0.049      | 0.049      |         |
| 316    | 253/1      |                | 0.346      | 0.346      | 0.346      |         |
| 317    | 253/2      |                | 0.065      | 0.065      | 0.065      |         |
| 318    | 254        |                | 0.473      | 0.473      | 0.473      |         |
| 319    | 255        |                | 1.165      | 1.165      | 1.165      |         |
| 320    | 256        |                | 1.922      | 1.922      | 1.922      |         |
| 321    | 257/1      |                | 0.911      | 0.911      | 0.911      |         |
| 322    | 257/2      |                | 1.505      | 1.505      | 1.505      |         |
| 323    | 258        |                | 0.380      | 0.380      | 0.380      |         |
| 324    | 259        |                | 0.069      | 0.069      | 0.069      |         |

SANDEEP GUPTA  
 Assistant Under Secretary  
 Revenue Department  
 District - SHAHDOL (M.P.)

B.D.SHARMA  
 RQP

# SHAHPUR WEST BLOCK

VILLAGE - KHAMAHARIA KALA, TEHSIL - SOHAGPUR

DISTRICT - SHAHDOL (M.P.)

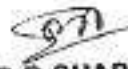
| SL.NO. | SURVEY NO./<br>KHASRA NO. | M.P. GOVT. LAND<br>REVENUE LAND<br>(Hectares) | PRIVATE<br>LAND<br>(Hectares) | TOTAL<br>AREA<br>(Hectares) | APPLIED<br>AREA<br>(Hectares) | REMARKS   |
|--------|---------------------------|-----------------------------------------------|-------------------------------|-----------------------------|-------------------------------|-----------|
| 325    | 260                       |                                               | 0.255                         | 0.255                       | 0.255                         |           |
| 326    | 261                       |                                               | 0.105                         | 0.105                       | 0.105                         |           |
| 327    | 262                       |                                               | 0.045                         | 0.045                       | 0.045                         |           |
| 328    | 263                       |                                               | 0.045                         | 0.045                       | 0.045                         |           |
| 329    | 264/1                     |                                               | 0.081                         | 0.081                       | 0.081                         |           |
| 330    | 264/2                     |                                               | 0.101                         | 0.101                       | 0.101                         |           |
| 331    | 265/1                     |                                               | 0.065                         | 0.065                       | 0.065                         |           |
| 332    | 265/2                     |                                               | 0.121                         | 0.121                       | 0.121                         |           |
| 333    | 266/1                     |                                               | 0.061                         | 0.061                       | 0.061                         |           |
| 334    | 266/2                     |                                               | 0.060                         | 0.060                       | 0.060                         |           |
| 335    | 267                       |                                               | 0.268                         | 0.268                       | 0.268                         |           |
| 336    | 268                       |                                               | 0.097                         | 0.097                       | 0.097                         |           |
| 337    | 269                       |                                               | 0.101                         | 0.101                       | 0.101                         |           |
| 338    | 270                       | 0.040                                         |                               | 0.040                       | 0.040                         | Road      |
| 339    | 271                       |                                               | 0.429                         | 0.429                       | 0.429                         |           |
| 340    | 272                       |                                               | 0.101                         | 0.101                       | 0.101                         |           |
| 341    | 273/1/1                   |                                               | 0.035                         | 0.035                       | 0.035                         |           |
| 342    | 273/1/2                   |                                               | 0.340                         | 0.340                       | 0.340                         |           |
| 343    | 273/2                     |                                               | 0.036                         | 0.036                       | 0.036                         |           |
| 344    | 274                       |                                               | 0.053                         | 0.053                       | 0.053                         |           |
| 345    | 275                       |                                               | 0.299                         | 0.299                       | 0.299                         |           |
| 346    | 276/1                     |                                               | 0.018                         | 0.018                       | 0.018                         |           |
| 347    | 276/2                     |                                               | 0.018                         | 0.018                       | 0.018                         |           |
| 348    | 277/1                     |                                               | 0.168                         | 0.168                       | 0.168                         |           |
| 349    | 277/2                     |                                               | 0.168                         | 0.168                       | 0.168                         |           |
| 350    | 278                       |                                               | 0.024                         | 0.024                       | 0.024                         |           |
| 351    | 279                       |                                               | 0.255                         | 0.255                       | 0.255                         |           |
| 352    | 280/1                     |                                               | 0.474                         | 0.474                       | 0.474                         |           |
| 353    | 280/2                     |                                               | 0.255                         | 0.255                       | 0.255                         |           |
| 354    | 281                       |                                               | 0.186                         | 0.186                       | 0.186                         |           |
| 355    | 282                       |                                               | 0.384                         | 0.384                       | 0.384                         |           |
| 356    | 283/1/1                   |                                               | 0.016                         | 0.016                       | 0.016                         |           |
| 357    | 283/1/2                   |                                               | 0.015                         | 0.015                       | 0.015                         |           |
| 358    | 283/2                     |                                               | 0.014                         | 0.014                       | 0.014                         |           |
| 359    | 284/1                     |                                               | 0.126                         | 0.126                       | 0.126                         |           |
| 360    | 284/2                     |                                               | 0.125                         | 0.125                       | 0.125                         |           |
| 361    | 285                       |                                               | 0.024                         | 0.024                       | 0.024                         |           |
| 362    | 286                       |                                               | 0.312                         | 0.312                       | 0.312                         |           |
| 363    | 287                       |                                               | 0.636                         | 0.636                       | 0.636                         |           |
| 364    | 287                       |                                               | 0.065                         | 0.065                       | 0.065                         |           |
| 365    | 288/1                     |                                               | 0.032                         | 0.032                       | 0.032                         |           |
| 366    | 288/2                     |                                               | 0.033                         | 0.033                       | 0.033                         |           |
| 367    | 289                       |                                               | 1.642                         | 1.642                       | 1.642                         |           |
| 368    | 290/1                     |                                               | 0.910                         | 0.910                       | 0.910                         |           |
| 369    | 290/2                     |                                               | 1.822                         | 1.822                       | 1.822                         |           |
| 370    | 291/1                     |                                               | 0.061                         | 0.061                       | 0.061                         |           |
| 371    | 291/2                     |                                               | 0.113                         | 0.113                       | 0.113                         |           |
| 372    | 292                       | 0.219                                         |                               | 0.219                       | 0.219                         | M.P. Govt |
| 373    | 293                       |                                               | 0.607                         | 0.607                       | 0.607                         |           |
| 374    | 294                       | 0.660                                         |                               | 0.660                       | 0.660                         | M.P. Govt |
| 375    | 295                       |                                               | 0.405                         | 0.405                       | 0.405                         |           |
| 376    | 296                       |                                               | 1.546                         | 1.546                       | 1.546                         |           |
| 377    | 297                       |                                               | 3.440                         | 3.440                       | 3.440                         |           |
| 378    | 298                       | 0.793                                         |                               | 0.793                       | 0.793                         | M.P. Govt |

DEEPA GUPTA  
Under Secretary  
Ministry of Dist.  
Govt. of M.P.  
New Delhi

B.D.SHARMA  
RQP

| SHAHPUR WEST BLOCK                           |            |                 |             |            |            |            |           |
|----------------------------------------------|------------|-----------------|-------------|------------|------------|------------|-----------|
| VILLAGE - KHAMAHARIA KALA, TEHSIL - SOHAGPUR |            |                 |             |            |            |            |           |
| DISTRICT - SHAHDOL (M.P.)                    |            |                 |             |            |            |            |           |
| SL. NO.                                      | SURVEY NO. | M.P. GOVT. LAND |             | PRIVATE    | TOTAL      | APPLIED    | REMARKS   |
|                                              | KHASRA NO. | REVENUE LAND    | FOREST LAND | LAND       | AREA       | AREA       |           |
|                                              |            | (Hectares)      | (Hectares)  | (Hectares) | (Hectares) | (Hectares) |           |
| 379                                          | 299        | 0.405           | -           | -          | 0.405      | 0.405      | M.P. Govt |
| 380                                          | 300        | 1.983           | -           | -          | 1.983      | 1.983      | M.P. Govt |
| 381                                          | 301        | 0.809           | -           | -          | 0.809      | 0.809      | M.P. Govt |
| 382                                          | 302        | 0.849           | -           | -          | 0.849      | 0.849      | M.P. Govt |
| 383                                          | 303        | -               | -           | 0.798      | 0.798      | 0.798      |           |
| 384                                          | 304        | 0.405           | -           | -          | 0.405      | 0.405      | M.P. Govt |
| 385                                          | 305        | 0.097           | -           | -          | 0.097      | 0.097      | Road      |
| 386                                          | 306/1      | -               | -           | 1.179      | 1.179      | 1.179      |           |
| 387                                          | 306/2      | -               | -           | 1.180      | 1.180      | 1.180      |           |
| 388                                          | 307        | -               | -           | 1.485      | 1.485      | 1.485      |           |
| 389                                          | 308        | -               | -           | 2.440      | 2.440      | 2.440      |           |
| 390                                          | 309        | -               | -           | 0.808      | 0.808      | 0.808      |           |
| 391                                          | 310        | 0.975           | -           | -          | 0.975      | 0.975      | M.P. Govt |
| 392                                          | 311        | -               | -           | 1.214      | 1.214      | 1.214      |           |
| 393                                          | 312/1      | -               | -           | 0.897      | 0.897      | 0.897      |           |
| 394                                          | 312/2      | -               | -           | 0.896      | 0.896      | 0.896      |           |
| 395                                          | 313        | -               | -           | 2.477      | 2.477      | 2.477      |           |
| 396                                          | 314/1      | -               | -           | 0.405      | 0.405      | 0.405      |           |
| 397                                          | 314/2      | -               | -           | 0.404      | 0.404      | 0.404      |           |
| 398                                          | 315        | -               | -           | 0.470      | 0.470      | 0.470      |           |
| 399                                          | 316        | 1.509           | -           | -          | 1.509      | 1.509      | River     |
| 400                                          | 317        | 0.231           | -           | -          | 0.231      | 0.231      | M.P. Govt |
| 401                                          | 318        | -               | -           | 1.048      | 1.048      | 1.048      |           |
| 402                                          | 319/1/1    | -               | -           | 0.096      | 0.096      | 0.096      |           |
| 403                                          | 319/1/2    | -               | -           | 0.095      | 0.095      | 0.095      |           |
| 404                                          | 319/2      | -               | -           | 0.096      | 0.096      | 0.096      |           |
| 405                                          | 320        | -               | -           | 1.246      | 1.246      | 1.246      |           |
| 406                                          | 321/1      | -               | -           | 0.831      | 0.831      | 0.831      |           |
| 407                                          | 321/2      | -               | -           | 0.771      | 0.771      | 0.771      |           |
| 408                                          | 322/1/1    | -               | -           | 0.235      | 0.235      | 0.235      |           |
| 409                                          | 322/1/2    | -               | -           | 0.234      | 0.234      | 0.234      |           |
| 410                                          | 322/2      | -               | -           | 0.235      | 0.235      | 0.235      |           |
| 411                                          | 323/1      | -               | -           | 0.081      | 0.081      | 0.081      |           |
| 412                                          | 323/2      | -               | -           | 0.081      | 0.081      | 0.081      |           |
| 413                                          | 324        | -               | -           | 0.186      | 0.186      | 0.186      |           |
| 414                                          | 325        | 0.101           | -           | -          | 0.101      | 0.101      | M.P. Govt |
| 415                                          | 326        | -               | -           | 0.405      | 0.405      | 0.405      |           |
| 416                                          | 327/1/1    | -               | -           | 0.217      | 0.217      | 0.217      |           |
| 417                                          | 327/1/2    | -               | -           | 0.110      | 0.110      | 0.110      |           |
| 418                                          | 327/2      | -               | -           | 0.983      | 0.983      | 0.983      |           |
| 419                                          | 327/3      | -               | -           | 0.656      | 0.656      | 0.656      |           |
| 420                                          | 328        | 0.097           | -           | -          | 0.097      | 0.097      | Road      |
| 421                                          | 329        | -               | -           | 0.186      | 0.186      | 0.186      |           |
| 422                                          | 330/1      | -               | -           | 0.099      | 0.099      | 0.099      |           |
| 423                                          | 330/2      | -               | -           | 0.099      | 0.099      | 0.099      |           |
| 424                                          | 331/1/1    | -               | -           | 0.202      | 0.202      | 0.202      |           |
| 425                                          | 331/1/2    | -               | -           | 0.203      | 0.203      | 0.203      |           |
| 426                                          | 331/2      | -               | -           | 0.204      | 0.204      | 0.204      |           |
| 427                                          | 332/1      | -               | -           | 0.272      | 0.272      | 0.272      |           |
| 428                                          | 332/2      | -               | -           | 0.271      | 0.271      | 0.271      |           |
| 429                                          | 333/1/1    | -               | -           | 0.004      | 0.004      | 0.004      |           |
| 430                                          | 333/1/2    | -               | -           | 0.094      | 0.094      | 0.094      |           |
| 431                                          | 333/2      | -               | -           | 0.095      | 0.095      | 0.095      |           |
| 432                                          | 334        | -               | -           | 0.534      | 0.534      | 0.534      |           |

  
 Under Secretary  
 Ministry of Panchayats / Ministry of Panchayats  
 Government of India  
 New Delhi

  
 B.D. SHARMA  
 RQP

| SHAHPUR WEST BLOCK                           |            |                 |             |            |            |            |
|----------------------------------------------|------------|-----------------|-------------|------------|------------|------------|
| VILLAGE - KHAMAHARIA KALA, TEHSIL - SOHAGPUR |            |                 |             |            |            |            |
| DISTRICT - SHAHDOL (M.P.)                    |            |                 |             |            |            |            |
| SL.NO.                                       | SURVEY NO. | M.P. GOVT. LAND |             | PRIVATE    | TOTAL      | APPLIED    |
|                                              | KHASRA NO. | REVENUE LAND    | FOREST LAND | LAND       | AREA       | AREA       |
|                                              |            | (Hectares)      | (Hectares)  | (Hectares) | (Hectares) | (Hectares) |
| 433                                          | 335/1      |                 | -           | 1.081      | 1.081      | 1.081      |
| 434                                          | 335/2      |                 | -           | 3.344      | 3.344      | 3.344      |
| 435                                          | 335/3      |                 | -           | 0.356      | 0.356      | 0.356      |
| 436                                          | 336        | 0.057           | -           |            | 0.057      | 0.057      |
| 437                                          | 337        |                 | -           | 0.106      | 0.106      | 0.106      |
| 438                                          | 338        |                 | -           | 1.181      | 1.181      | 1.181      |
| 439                                          | 339        |                 | -           | 0.667      | 0.667      | 0.667      |
| 440                                          | 340        |                 | -           | 1.003      | 1.003      | 1.003      |
| 441                                          | 341        |                 | -           | 0.170      | 0.170      | 0.170      |
| 442                                          | 342/1      |                 | -           | 0.408      | 0.408      | 0.408      |
| 443                                          | 342/2      |                 | -           | 0.409      | 0.409      | 0.409      |
| 444                                          | 343/1      |                 | -           | 0.046      | 0.046      | 0.046      |
| 445                                          | 343/2      |                 | -           | 0.049      | 0.049      | 0.049      |
| 446                                          | 344        |                 | -           | 0.113      | 0.113      | 0.113      |
| 447                                          | 345        |                 | -           | 0.275      | 0.275      | 0.275      |
| 448                                          | 346        |                 | -           | 0.231      | 0.231      | 0.231      |
| 449                                          | 347        |                 | -           | 0.522      | 0.522      | 0.522      |
| 450                                          | 348        |                 | -           | 0.279      | 0.279      | 0.279      |
| 451                                          | 349/1      |                 | -           | 0.384      | 0.384      | 0.384      |
| 452                                          | 349/2      |                 | -           | 0.769      | 0.769      | 0.769      |
| 453                                          | 350        |                 | -           | 0.259      | 0.259      | 0.259      |
| 454                                          | 351        |                 | -           | 1.376      | 1.376      | 1.376      |
| 455                                          | 352        |                 | -           | 1.274      | 1.274      | 1.274      |
| 456                                          | 353        |                 | -           | 0.684      | 0.684      | 0.684      |
| 457                                          | 354        |                 | -           | 0.032      | 0.032      | 0.032      |
| 458                                          | 355        |                 | -           | 2.614      | 2.614      | 2.614      |
| 459                                          | 356        |                 | -           | 2.614      | 2.614      | 2.614      |
| 460                                          | 357        |                 | -           | 0.757      | 0.757      | 0.757      |
| 461                                          | 358        |                 | -           | 1.605      | 1.605      | 1.605      |
| 462                                          | 359        |                 | -           | 0.360      | 0.360      | 0.360      |
| 463                                          | 360        |                 | -           | 1.263      | 1.263      | 1.263      |
| 464                                          | 361        |                 | -           | 2.833      | 2.833      | 2.833      |
| 465                                          | 362        | 0.089           |             |            | 0.089      | 0.089      |
| 466                                          | 363        | 0.283           |             |            | 0.283      | 0.283      |
| 467                                          | 364        |                 | -           | 1.328      | 1.328      | 1.328      |
| 468                                          | 355/423    |                 | -           | 0.101      | 0.101      | 0.101      |
|                                              | Total      | 25.931          | -           | 208.462    | 235.393    | 220.490    |

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

  
 B.D. SHARMA  
 RQP

| SHAHPUR WEST BLOCK                    |                           |                                               |                           |                               |                             |                               |         |
|---------------------------------------|---------------------------|-----------------------------------------------|---------------------------|-------------------------------|-----------------------------|-------------------------------|---------|
| VILLAGE - KATHOTIA, TEHSIL - SOHAGPUR |                           |                                               |                           |                               |                             |                               |         |
| DISTRICT - SHAHDOL (M.P.)             |                           |                                               |                           |                               |                             |                               |         |
| SL. NO.                               | SURVEY NO./<br>KHASRA NO. | M.P. GOVT. LAND<br>REVENUE LAND<br>(Hectares) | FOREST LAND<br>(Hectares) | PRIVATE<br>LAND<br>(Hectares) | TOTAL<br>AREA<br>(Hectares) | APPLIED<br>AREA<br>(Hectares) | REMARKS |
| 1                                     | 225                       |                                               |                           | 1.214                         | 1.214                       | 0.450                         |         |
| 2                                     | 226                       |                                               |                           | 1.254                         | 1.254                       | 0.154                         |         |
| 3                                     | 227                       |                                               |                           | 0.348                         | 0.348                       | 0.066                         |         |
| 4                                     | 228                       |                                               |                           | 1.015                         | 1.015                       | 0.677                         |         |
| 5                                     | 229                       | 1.582                                         |                           |                               | 1.582                       | 0.790                         | River   |
|                                       | Total                     | 1.582                                         |                           | 3.831                         | 5.413                       | 2.139                         |         |

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

  
 B.D. SHARMA  
 RQP

# SHAHPUR WEST BLOCK

VILLAGE SHAHPUR TEHSIL PALI

DISTRICT UMARIA (M.P.)

| SL NO. | SURVEY NO. | M.P. GOVT. LAND |             | PRIVATE    | TOTAL      | APPLIED    | REMARKS    |
|--------|------------|-----------------|-------------|------------|------------|------------|------------|
|        | KHASRA NO. | REVENUE LAND    | FOREST LAND | LAND       | AREA       | AREA       |            |
|        |            | (Hectares)      | (Hectares)  | (Hectares) | (Hectares) | (Hectares) |            |
| 1      | 386        |                 |             | 3.117      | 3.117      | 2.500      |            |
| 2      | 388        |                 |             | 0.413      | 0.413      | 0.051      |            |
| 3      | 389        | 0.101           |             |            | 0.101      | 0.101      | M.P. Govt. |
| 4      | 290        | 0.101           |             |            | 0.101      | 0.101      | M.P. Govt. |
| 5      | 381        |                 |             | 1.274      | 1.274      | 0.127      |            |
| 6      | 382        |                 |             | 0.599      | 0.599      | 0.300      |            |
| 7      | 395        |                 |             | 1.151      | 1.151      | 0.500      |            |
| 8      | 390        |                 |             | 0.340      | 0.340      | 0.340      |            |
| 9      | 391        |                 |             | 0.202      | 0.202      | 0.081      |            |
| 10     | 392        |                 |             | 0.583      | 0.583      | 0.583      |            |
| 11     | 393        |                 |             | 0.125      | 0.125      | 0.125      |            |
| 12     | 394        | 0.210           |             |            | 0.210      | 0.168      | Road       |
| 13     | 395        |                 |             | 0.089      | 0.089      | 0.088      |            |
| 14     | 396        |                 |             | 0.089      | 0.089      | 0.027      |            |
| 15     | 412        |                 |             | 0.234      | 0.234      | 0.187      |            |
| 16     | 413        |                 |             | 0.206      | 0.206      | 0.206      |            |
| 17     | 414        |                 |             | 0.040      | 0.040      | 0.040      |            |
| 18     | 415        |                 |             | 0.138      | 0.138      | 0.138      |            |
| 19     | 416        |                 |             | 0.089      | 0.089      | 0.089      |            |
| 20     | 417        |                 |             | 0.652      | 0.652      | 0.652      |            |
| 21     | 418        |                 |             | 0.081      | 0.081      | 0.081      |            |
| 22     | 419        |                 |             | 0.032      | 0.032      | 0.032      |            |
| 23     | 420/1      |                 |             | 0.312      | 0.312      | 0.312      |            |
| 24     | 420/2      |                 |             | 0.231      | 0.231      | 0.231      |            |
| 25     | 421        | 0.089           |             |            | 0.089      | 0.089      | Road       |
| 26     | 422        |                 |             | 0.174      | 0.174      | 0.174      |            |
| 27     | 423/1      |                 |             | 0.020      | 0.020      | 0.020      |            |
| 28     | 423/2      |                 |             | 0.053      | 0.053      | 0.053      |            |
| 29     | 424/1      |                 |             | 0.025      | 0.025      | 0.025      |            |
| 30     | 424/2      |                 |             | 0.121      | 0.121      | 0.121      |            |
| 31     | 425/1      |                 |             | 0.101      | 0.101      | 0.101      |            |
| 32     | 425/2      |                 |             | 0.085      | 0.085      | 0.085      |            |
| 33     | 426        |                 |             | 0.312      | 0.312      | 0.312      |            |
| 34     | 427        | 0.198           |             |            | 0.198      | 0.198      | M.P. Govt. |
| 35     | 428        |                 |             | 0.470      | 0.470      | 0.470      |            |
| 36     | 429/1      |                 |             | 0.160      | 0.160      | 0.160      |            |
| 37     | 429/2      |                 |             | 0.160      | 0.160      | 0.160      |            |
| 38     | 430/1/1    |                 |             | 0.022      | 0.022      | 0.022      |            |
| 39     | 430/1/2    |                 |             | 0.023      | 0.023      | 0.023      |            |
| 40     | 430/2      |                 |             | 1.092      | 1.092      | 1.092      |            |
| 41     | 431        |                 |             | 1.327      | 1.327      | 1.327      |            |
| 42     | 432        |                 |             | 0.761      | 0.761      | 0.647      |            |
| 43     | 433        |                 |             | 0.287      | 0.287      | 0.072      |            |
| 44     | 434        |                 |             | 2.363      | 2.363      | 1.643      |            |
| 45     | 435        |                 |             | 3.302      | 3.302      | 2.311      |            |
| 46     | 436/1/1    |                 |             | 2.543      | 2.543      | 2.543      |            |
| 47     | 436/1/2    |                 |             | 2.544      | 2.544      | 2.544      |            |
| 48     | 436/2      |                 |             | 0.373      | 0.373      | 0.373      |            |
| 49     | 436/590/1  |                 |             | 0.119      | 0.119      | 0.119      |            |
| 50     | 436/590/2  |                 |             | 0.120      | 0.120      | 0.120      |            |
| 51     | 437/1      |                 |             | 0.008      | 0.008      | 0.008      |            |
| 52     | 437/2      |                 |             | 0.004      | 0.004      | 0.004      |            |
| 53     | 437/3/1/1  |                 |             | 0.028      | 0.028      | 0.028      |            |
| 54     | 437/3/1/2  |                 |             | 0.087      | 0.087      | 0.087      |            |
| 55     | 437/3/1/3  |                 |             | 0.027      | 0.027      | 0.027      |            |
| 56     | 438/1      |                 |             | 0.690      | 0.690      | 0.690      |            |
| 57     | 438/2      |                 |             | 0.315      | 0.315      | 0.315      |            |
| 58     | 438/3      |                 |             | 0.458      | 0.458      | 0.458      |            |
| 59     | 439        |                 |             | 0.186      | 0.186      | 0.186      |            |

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 887 T. 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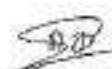
# SHAHPUR WEST BLOCK

VILLAGE SHAHPUR, TEHSIL - PALI

DISTRICT - UMARIA (M.P.)

| Sl. No. | Survey No. | M.P. Govt. Land<br>Revenue Land<br>(Hectares) | Unsurveyed Land<br>(Hectares) | Original<br>Area<br>(Hectares) | Final<br>Area<br>(Hectares) | Approved<br>Area<br>(Hectares) | Remarks    |
|---------|------------|-----------------------------------------------|-------------------------------|--------------------------------|-----------------------------|--------------------------------|------------|
| 50      | 440/1      |                                               |                               | 0.450                          | 0.450                       | 0.450                          |            |
| 51      | 440/2/1    |                                               |                               | 0.243                          | 0.243                       | 0.243                          |            |
| 52      | 440/2/2    |                                               |                               | 0.205                          | 0.205                       | 0.205                          |            |
| 53      | 440/2/3    |                                               |                               | 0.267                          | 0.267                       | 0.267                          |            |
| 54      | 441        |                                               |                               | 0.186                          | 0.186                       | 0.186                          |            |
| 55      | 442        |                                               |                               | 0.154                          | 0.154                       | 0.154                          |            |
| 56      | 443        |                                               |                               | 0.109                          | 0.109                       | 0.109                          |            |
| 57      | 444/1      |                                               |                               | 0.089                          | 0.089                       | 0.089                          |            |
| 58      | 444/2      |                                               |                               | 0.113                          | 0.113                       | 0.113                          |            |
| 59      | 445/1      |                                               |                               | 0.160                          | 0.160                       | 0.160                          |            |
| 60      | 445/2      |                                               |                               | 0.012                          | 0.012                       | 0.012                          |            |
| 61      | 446/1      |                                               |                               | 0.109                          | 0.109                       | 0.109                          |            |
| 62      | 446/2      |                                               |                               | 0.061                          | 0.061                       | 0.061                          |            |
| 63      | 447/1      |                                               |                               | 0.027                          | 0.027                       | 0.027                          |            |
| 64      | 447/2      |                                               |                               | 0.028                          | 0.028                       | 0.028                          |            |
| 65      | 448/1      |                                               |                               | 0.283                          | 0.283                       | 0.283                          |            |
| 66      | 448/2      |                                               |                               | 0.085                          | 0.085                       | 0.085                          |            |
| 67      | 448/3      |                                               |                               | 0.105                          | 0.105                       | 0.105                          |            |
| 68      | 449        | 0.057                                         |                               |                                | 0.057                       | 0.057                          | M.P. Govt. |
| 69      | 450        | 0.020                                         |                               |                                | 0.020                       | 0.020                          | M.P. Govt. |
| 70      | 451        | 0.020                                         |                               |                                | 0.020                       | 0.020                          | M.P. Govt. |
| 71      | 452        | 0.155                                         |                               |                                | 0.155                       | 0.155                          | M.P. Govt. |
| 72      | 453        | 0.024                                         |                               |                                | 0.024                       | 0.024                          | M.P. Govt. |
| 73      | 454        |                                               |                               | 0.008                          | 0.008                       | 0.008                          |            |
| 74      | 455        | 0.093                                         |                               |                                | 0.093                       | 0.093                          | Road       |
| 75      | 456/1      |                                               |                               | 0.130                          | 0.130                       | 0.130                          |            |
| 76      | 456/2      |                                               |                               | 0.028                          | 0.028                       | 0.028                          |            |
| 77      | 457/1      |                                               |                               | 0.012                          | 0.012                       | 0.012                          |            |
| 78      | 457/2      |                                               |                               | 0.012                          | 0.012                       | 0.012                          |            |
| 79      | 458        |                                               |                               | 0.026                          | 0.026                       | 0.026                          |            |
| 80      | 459        |                                               |                               | 0.028                          | 0.028                       | 0.028                          |            |
| 81      | 460        |                                               |                               | 0.142                          | 0.142                       | 0.142                          |            |
| 82      | 461        |                                               |                               | 0.008                          | 0.008                       | 0.008                          |            |
| 83      | 462        |                                               |                               | 0.150                          | 0.150                       | 0.150                          |            |
| 84      | 463        |                                               |                               | 0.178                          | 0.178                       | 0.178                          |            |
| 85      | 464        |                                               |                               | 0.117                          | 0.117                       | 0.082                          |            |
| 86      | 465        | 0.125                                         |                               |                                | 0.125                       | 0.125                          | Road       |
| 87      | 490        |                                               |                               | 0.072                          | 0.072                       | 0.050                          |            |
| 88      | 491        |                                               |                               | 0.065                          | 0.065                       | 0.065                          |            |
| 89      | 492/1      |                                               |                               | 0.097                          | 0.097                       | 0.097                          |            |
| 90      | 492/2      |                                               |                               | 0.032                          | 0.032                       | 0.032                          |            |
| 91      | 493        |                                               |                               | 0.067                          | 0.067                       | 0.017                          |            |
| 92      | 494        | 0.036                                         |                               |                                | 0.036                       | 0.036                          | Road       |
| 93      | 495/1      |                                               |                               | 0.098                          | 0.098                       | 0.098                          |            |
| 94      | 495/2      |                                               |                               | 0.040                          | 0.040                       | 0.040                          |            |
| 95      | 496/1      |                                               |                               | 0.020                          | 0.020                       | 0.020                          |            |
| 96      | 496/2      |                                               |                               | 0.020                          | 0.020                       | 0.020                          |            |
| 97      | 496/3      |                                               |                               | 0.021                          | 0.021                       | 0.021                          |            |
| 98      | 497        |                                               |                               | 0.097                          | 0.097                       | 0.097                          |            |
| 99      | 498        |                                               |                               | 0.117                          | 0.117                       | 0.117                          |            |
| 100     | 499        |                                               |                               | 0.049                          | 0.049                       | 0.049                          |            |
| 101     | 500        |                                               |                               | 0.077                          | 0.077                       | 0.077                          |            |
| 102     | 501        |                                               |                               | 0.384                          | 0.384                       | 0.192                          |            |
| 103     | 502        |                                               |                               | 0.138                          | 0.138                       | 0.138                          |            |
| 104     | 503        |                                               |                               | 0.101                          | 0.101                       | 0.101                          |            |
| 105     | 504        |                                               |                               | 0.121                          | 0.121                       | 0.121                          |            |
| 106     | 505        |                                               |                               | 0.057                          | 0.057                       | 0.057                          |            |
| 107     | 506        |                                               |                               | 0.057                          | 0.057                       | 0.057                          |            |
| 108     | 507        |                                               |                               | 0.177                          | 0.177                       | 0.177                          |            |

  
 B.D. SHARMA  
 Under Secretary  
 Ministry of Coal  
 Govt. of India  
 New Delhi

  
 B.D. SHARMA  
 ROP

# SHAHPUR WEST BLOCK

VILLAGE SHAHPUR, TEHSIL - PALI

DISTRICT - UMARIA (M.P.)

| SL. NO. | SURVEY NO.  | M.P. GOVT. LAND |             | PRIVATE    | TOTAL      | APPLIED    | REMARKS    |
|---------|-------------|-----------------|-------------|------------|------------|------------|------------|
|         | SHAHPUR NO. | REVENUE LAND    | FOREST LAND | LAND       | AREA       | AREA       |            |
|         |             | (Hectares)      | (Hectares)  | (Hectares) | (Hectares) | (Hectares) |            |
| 119     | 500         |                 |             | 0.117      | 0.117      | 0.117      |            |
| 120     | 509         |                 |             | 0.077      | 0.077      | 0.077      |            |
| 121     | 510         |                 |             | 0.125      | 0.125      | 0.125      |            |
| 122     | 511         |                 |             | 0.036      | 0.036      | 0.036      |            |
| 123     | 512         |                 |             | 0.077      | 0.077      | 0.077      |            |
| 124     | 513         |                 |             | 0.121      | 0.121      | 0.121      |            |
| 125     | 514         |                 |             | 0.158      | 0.158      | 0.158      |            |
| 126     | 515         |                 |             | 0.057      | 0.057      | 0.057      |            |
| 127     | 516         |                 |             | 0.105      | 0.105      | 0.084      |            |
| 128     | 517         |                 |             | 0.235      | 0.235      | 0.235      |            |
| 129     | 518/1       |                 |             | 0.020      | 0.020      | 0.020      |            |
| 130     | 518/2       |                 |             | 0.020      | 0.020      | 0.020      |            |
| 131     | 519         |                 |             | 0.129      | 0.129      | 0.129      |            |
| 132     | 520         | 0.279           |             |            | 0.279      | 0.279      | M.P. Govt. |
| 133     | 521         |                 |             | 1.862      | 1.862      | 1.400      |            |
| 134     | 526         | 0.865           |             |            | 0.865      | 0.700      | M.P. Govt. |
| 135     | 527         |                 |             | 1.477      | 1.477      | 0.600      |            |
| 136     | 528         | 1.271           |             |            | 1.271      | 0.381      | M.P. Govt. |
| 137     | 529         |                 |             | 0.696      | 0.696      | 0.696      |            |
| 138     | 530         |                 |             | 0.040      | 0.040      | 0.040      |            |
| 139     | 531         |                 |             | 0.292      | 0.292      | 0.292      |            |
| 140     | 532         |                 |             | 0.077      | 0.077      | 0.077      |            |
| 141     | 533         |                 |             | 0.587      | 0.587      | 0.587      |            |
| 142     | 534         |                 |             | 0.789      | 0.789      | 0.789      |            |
| 143     | 535/1/1     |                 |             | 1.178      | 1.178      | 1.178      |            |
| 144     | 535/1/2     |                 |             | 0.202      | 0.202      | 0.202      |            |
| 145     | 535/2       |                 |             | 0.405      | 0.405      | 0.405      |            |
| 146     | 536         |                 |             | 0.696      | 0.696      | 0.696      |            |
| 147     | 537         |                 |             | 0.575      | 0.575      | 0.575      |            |
| 148     | 538         |                 |             | 0.696      | 0.696      | 0.696      |            |
| 149     | 539         |                 |             | 0.546      | 0.546      | 0.546      |            |
| 150     | 540         |                 |             | 0.231      | 0.231      | 0.231      |            |
| 151     | 541         |                 |             | 1.570      | 1.570      | 1.570      |            |
| 152     | 542         |                 |             | 1.202      | 1.202      | 1.202      |            |
| 153     | 543         |                 |             | 0.243      | 0.243      | 0.243      |            |
| 154     | 544         |                 |             | 0.239      | 0.239      | 0.239      |            |
| 155     | 545         |                 |             | 0.166      | 0.166      | 0.166      |            |
| 156     | 546/1       |                 |             | 0.158      | 0.158      | 0.158      |            |
| 157     | 546/2       |                 |             | 0.182      | 0.182      | 0.182      |            |
| 158     | 547/1       |                 |             | 0.012      | 0.012      | 0.012      |            |
| 159     | 547/2       |                 |             | 0.016      | 0.016      | 0.016      |            |
| 160     | 548/1       |                 |             | 0.142      | 0.142      | 0.142      |            |
| 161     | 548/2       |                 |             | 0.316      | 0.316      | 0.316      |            |
| 162     | 549         |                 |             | 0.045      | 0.045      | 0.045      |            |
| 163     | 550         |                 |             | 0.373      | 0.373      | 0.373      |            |
| 164     | 551         |                 |             | 0.081      | 0.081      | 0.081      |            |
| 165     | 552         |                 |             | 0.040      | 0.040      | 0.040      |            |
| 166     | 553         |                 |             | 0.040      | 0.040      | 0.040      |            |
| 167     | 554         |                 |             | 0.158      | 0.158      | 0.158      |            |
| 168     | 555         |                 |             | 0.040      | 0.040      | 0.040      |            |
| 169     | 556/1       |                 |             | 0.010      | 0.010      | 0.010      |            |
| 170     | 556/2       |                 |             | 0.010      | 0.010      | 0.010      |            |
| 171     | 557/1       |                 |             | 0.283      | 0.283      | 0.283      |            |
| 172     | 557/2       |                 |             | 0.401      | 0.401      | 0.401      |            |
| 173     | 557/3       |                 |             | 0.445      | 0.445      | 0.445      |            |
| 174     | 557/4/1     |                 |             | 0.141      | 0.141      | 0.141      |            |
| 175     | 557/4/2     |                 |             | 0.123      | 0.123      | 0.123      |            |
| 176     | 557/4/3     |                 |             | 0.020      | 0.020      | 0.020      |            |
| 177     | 557/4/4     |                 |             | 0.050      | 0.050      | 0.050      |            |

SHAHPUR / SHAHPUR  
 राज्य / State  
 मंत्रालय / Ministry of Coal  
 भारत सरकार / Govt. of India  
 नई दिल्ली / New Delhi

B.D.SHARMA  
 RQP

VILLAGE SHAHPUR, TEHSIL - PALI

DISTRICT - UMARIA (M.P.)

DR. P. S. SUNDAR GUPTA  
Joint Secy. / Under Secretary  
Ministry of Health / Ministry of Govt.  
New Delhi / New Delhi

B.D.SHARMA  
RQP

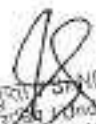
| SHAHPUR WEST BLOCK                     |            |                |             |            |            |            |
|----------------------------------------|------------|----------------|-------------|------------|------------|------------|
| VILLAGE KHAMAHRIA KHURD, TEHSIL - PALI |            |                |             |            |            |            |
| DISTRICT - UMARIA (M.P.)               |            |                |             |            |            |            |
| SL NO                                  | SURVEY NO. | M.P. GOVT LAND |             | PRIVATE    | TOTAL      | APPLIED    |
|                                        |            | REVENUE LAND   | FOREST LAND | LAND       | AREA       | AREA       |
|                                        |            | (Hectares)     | (Hectares)  | (Hectares) | (Hectares) | (Hectares) |
| 1                                      | 371        |                | -           | 0.113      | 0.113      | 0.078      |
| 2                                      | 36         |                | -           | 1.939      | 1.939      | 1.504      |
| 3                                      | 37         |                | -           | 1.121      | 1.121      | 1.000      |
| 4                                      | 38         | 0.263          | -           |            | 0.263      | 0.156      |
| 5                                      | 39         | 0.511          | -           |            | 0.511      | 0.051      |
| 6                                      | 43         | 1.295          | -           |            | 1.295      | 1.076      |
| 7                                      | 44         | 1.741          | -           |            | 1.741      | 1.741      |
| 8                                      | 45         | 1.011          | -           |            | 1.011      | 1.011      |
| 9                                      | 46         | 0.551          | -           |            | 0.551      | 0.500      |
| 10                                     | 47         |                | -           | 1.619      | 1.619      | 1.050      |
| 11                                     | 48         | 1.563          | -           |            | 1.563      | 1.563      |
| 12                                     | 49         |                | -           | 0.648      | 0.648      | 0.648      |
| 13                                     | 50/1       |                | -           | 0.337      | 0.337      | 0.337      |
| 14                                     | 50/2       |                | -           | 0.337      | 0.337      | 0.337      |
| 15                                     | 50/3       |                | -           | 0.337      | 0.337      | 0.337      |
| 16                                     | 50/4       |                | -           | 0.337      | 0.337      | 0.337      |
| 17                                     | 50/5       |                | -           | 0.337      | 0.337      | 0.337      |
| 18                                     | 50/6       |                | -           | 0.337      | 0.337      | 0.337      |
| 19                                     | 51         |                | -           | 0.551      | 0.551      | 0.551      |
| 20                                     | 52         |                | -           | 0.263      | 0.263      | 0.263      |
| 21                                     | 53         |                | -           | 0.405      | 0.405      | 0.405      |
| 22                                     | 54         |                | -           | 0.219      | 0.219      | 0.219      |
| 23                                     | 55         |                | -           | 5.581      | 5.581      | 5.581      |
| 24                                     | 56         | 0.202          | -           |            | 0.202      | 0.202      |
| 25                                     | 57/1       |                | -           | 1.953      | 1.953      | 1.953      |
| 26                                     | 57/2       |                | -           | 1.953      | 1.953      | 1.953      |
| 27                                     | 57/3       |                | -           | 4.641      | 4.641      | 4.641      |
| 28                                     | 58/1       |                | -           | 0.777      | 0.777      | 0.777      |
| 29                                     | 58/2       |                | -           | 0.777      | 0.777      | 0.777      |
| 30                                     | 59/1       | 0.999          | -           |            | 0.999      | 0.999      |
| 31                                     | 59/2       | 0.482          | -           |            | 0.482      | 0.482      |
| 32                                     | 60         | 0.186          | -           |            | 0.186      | 0.186      |
| 33                                     | 61         | 0.348          | -           |            | 0.348      | 0.348      |
| 34                                     | 62         | 1.007          | -           |            | 1.007      | 1.007      |
| 35                                     | 63         |                | -           | 0.405      | 0.405      | 0.405      |
| 36                                     | 64         | 0.405          | -           |            | 0.405      | 0.405      |
| 37                                     | 65         |                | -           | 1.011      | 1.011      | 1.011      |
| 38                                     | 66         | 0.180          | -           |            | 0.180      | 0.180      |
| 39                                     | 67         | 0.162          | -           |            | 0.162      | 0.162      |
| 40                                     | 68         | 0.405          | -           |            | 0.405      | 0.405      |
| 41                                     | 69         |                | -           | 1.120      | 1.120      | 1.120      |
| 42                                     | 70         | 0.733          | -           |            | 0.733      | 0.733      |
| 43                                     | 71         |                | -           | 3.609      | 3.609      | 3.609      |
| 44                                     | 72/1       | 0.074          | -           |            | 0.074      | 0.074      |
| 45                                     | 72/2       |                | -           | 0.958      | 0.958      | 0.958      |
| 46                                     | 73         |                | -           | 0.575      | 0.575      | 0.575      |
| 47                                     | 74         | 0.089          | -           |            | 0.089      | 0.089      |
| 48                                     | 75         |                | -           | 0.243      | 0.243      | 0.243      |
| 49                                     | 76         |                | -           | 1.388      | 1.388      | 1.388      |
| 50                                     | 77         |                | -           | 2.233      | 2.233      | 2.233      |
| 51                                     | 78         | 0.725          | -           |            | 0.725      | 0.725      |
| 52                                     | 79         |                | -           | 1.007      | 1.007      | 1.007      |
| 53                                     | 80         |                | -           | 0.178      | 0.178      | 0.178      |
| 54                                     | 81         |                | -           | 0.231      | 0.231      | 0.231      |
| 55                                     | 82         |                | -           | 2.112      | 2.112      | 2.112      |
| 56                                     | 83         |                | -           | 0.388      | 0.388      | 0.388      |
| 57                                     | 84         |                | -           | 0.676      | 0.676      | 0.676      |
| 58                                     | 85         |                | -           | 0.466      | 0.466      | 0.466      |

0.034  
0.345

SHAH PUR WEST BLOCK  
अवर सचिव / Under Secretary  
कोयला विभाग / Ministry of Coal  
नए संसार / Govt. of India  
नई दिल्ली / New Delhi

SPTD  
B.D.SHARMA  
RQP

| SHAHPUR WEST BLOCK                     |            |                 |              |            |            |            |
|----------------------------------------|------------|-----------------|--------------|------------|------------|------------|
| VILLAGE KHAMAHRIA KHURD, TEHSIL - PALI |            |                 |              |            |            |            |
| DISTRICT - UMARIA (M.P.)               |            |                 |              |            |            |            |
| SL.NO.                                 | SURVEY NO. | M.P. GOVT. LAND | PRIVATE LAND | TOTAL      | APPLIED    | REMARKS    |
|                                        | KHASRA NO. | REVENUE LAND    | FOREST LAND  | LAND       | AREA       |            |
|                                        |            | (Hectares)      | (Hectares)   | (Hectares) | (Hectares) |            |
| 59                                     | 85         |                 | -            | 1.011      | 1.011      |            |
| 60                                     | 87         | 0.049           | -            |            | 0.049      | M.P. Govt. |
| 61                                     | 88         | 0.808           | -            |            | 0.808      | M.P. Govt. |
| 62                                     | 89         |                 | -            | 1.214      | 1.214      |            |
| 63                                     | 90         |                 | -            | 2.512      | 2.512      |            |
| 64                                     | 91         |                 | -            | 0.405      | 0.405      |            |
| 65                                     | 92         | 0.507           | -            |            | 0.507      | M.P. Govt. |
| 66                                     | 93         | 0.498           | -            |            | 0.498      | Road       |
| 67                                     | 94/1       | 0.769           | -            |            | 0.769      | M.P. Govt. |
| 68                                     | 94/2       | 1.416           | -            |            | 1.416      | M.P. Govt. |
| 69                                     | 95         |                 | -            | 1.299      | 1.299      |            |
| 70                                     | 96         |                 | -            | 0.061      | 0.061      |            |
| 71                                     | 97         |                 | -            | 0.506      | 0.506      |            |
| 72                                     | 98         |                 | -            | 0.749      | 0.749      |            |
| 73                                     | 99/1       |                 | -            | 0.101      | 0.101      |            |
| 74                                     | 99/2       |                 | -            | 0.101      | 0.101      |            |
| 75                                     | 99/3       |                 | -            | 0.102      | 0.102      |            |
| 76                                     | 99/4       |                 | -            | 0.101      | 0.101      |            |
| 77                                     | 100        |                 | -            | 0.247      | 0.247      |            |
| 78                                     | 101/1      |                 | -            | 0.081      | 0.081      |            |
| 79                                     | 101/2      |                 | -            | 0.081      | 0.081      |            |
| 80                                     | 101/3      |                 | -            | 0.081      | 0.081      |            |
| 81                                     | 101/4      |                 | -            | 0.081      | 0.081      |            |
| 82                                     | 101/5      |                 | -            | 0.081      | 0.081      |            |
| 83                                     | 102/1      |                 | -            | 0.398      | 0.398      |            |
| 84                                     | 102/2      |                 | -            | 0.198      | 0.198      |            |
| 85                                     | 103        |                 | -            | 0.283      | 0.283      |            |
| 86                                     | 104        | 0.627           | -            |            | 0.627      | M.P. Govt. |
| 87                                     | 105        |                 | -            | 1.214      | 1.214      |            |
| 88                                     | 106        | 0.607           | -            |            | 0.607      | M.P. Govt. |
| 89                                     | 107        | 0.348           | -            |            | 0.348      | M.P. Govt. |
| 90                                     | 108/1      | 0.685           | -            |            | 0.685      | M.P. Govt. |
| 91                                     | 108/2      |                 | -            | 0.405      | 0.405      |            |
| 92                                     | 109        | 0.275           | -            |            | 0.275      | M.P. Govt. |
| 93                                     | 110        |                 | -            | 0.785      | 0.785      |            |
| 94                                     | 111        |                 | -            | 0.567      | 0.567      |            |
| 95                                     | 112        |                 | -            | 0.304      | 0.304      |            |
| 96                                     | 113/1      |                 | -            | 0.723      | 0.723      |            |
| 97                                     | 113/2      |                 | -            | 0.725      | 0.725      |            |
| 98                                     | 113/3      |                 | -            | 0.725      | 0.725      |            |
| 99                                     | 113/4      |                 | -            | 0.725      | 0.725      |            |
| 100                                    | 114        |                 | -            | 2.209      | 2.209      |            |
| 101                                    | 115        | 0.036           | -            |            | 0.036      | M.P. Govt. |
| 102                                    | 116        |                 | -            | 0.032      | 0.032      |            |
| 103                                    | 117        | 0.085           | -            |            | 0.085      | M.P. Govt. |
| 104                                    | 118        |                 | -            | 0.206      | 0.206      |            |
| 105                                    | 119/1      |                 | -            | 0.202      | 0.202      |            |
| 106                                    | 119/2      |                 | -            | 0.118      | 0.118      |            |
| 107                                    | 120        |                 | -            | 2.023      | 2.023      |            |
| 108                                    | 121        | 0.700           | -            |            | 0.700      | M.P. Govt. |
| 109                                    | 122        | 0.202           | -            |            | 0.202      | Road       |
| 110                                    | 123        | 0.700           | -            |            | 0.700      | M.P. Govt. |
| 111                                    | 124        | 0.180           | -            |            | 0.180      | Road       |
| 112                                    | 125        |                 | -            | 0.405      | 0.405      |            |
| 113                                    | 126        | 0.547           | -            |            | 0.547      | Road       |
| 114                                    | 127        | 1.375           | -            |            | 1.375      | M.P. Govt. |
| 115                                    | 128        | 1.753           | -            |            | 1.753      | M.P. Govt. |
| 116                                    | 129/1      | 0.999           | -            |            | 0.999      | M.P. Govt. |

  
 B.D. SHARMA  
 RQP

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# SHAHPUR WEST BLOCK

VILLAGE KHAMAHRIA KHURD, TEHSIL - PALI

DISTRICT - UMARIA (M.P.)

| SL.NO. | SURVEY NO./<br>KHAMARIA NO. | M.P. GOVT. LAND            |                           | TOTAL<br>LAND<br>(Hectares) | TOTAL<br>AREA<br>(Hectares) | APPLIED<br>AREA<br>(Hectares) | REMARKS      |
|--------|-----------------------------|----------------------------|---------------------------|-----------------------------|-----------------------------|-------------------------------|--------------|
|        |                             | REVENUE LAND<br>(Hectares) | FOREST LAND<br>(Hectares) |                             |                             |                               |              |
| 117    | 129/2                       | 0.101                      | -                         | -                           | 0.101                       | 0.101                         | M.P. Govt.   |
| 118    | 129/3                       | 0.892                      | -                         | -                           | 0.892                       | 0.892                         | M.P. Govt.   |
| 119    | 130/1                       | -                          | -                         | 0.361                       | 0.361                       | 0.361                         |              |
| 120    | 130/2                       | -                          | -                         | 0.361                       | 0.361                       | 0.361                         |              |
| 121    | 130/3                       | -                          | -                         | 0.361                       | 0.361                       | 0.361                         |              |
| 122    | 130/4                       | -                          | -                         | 0.360                       | 0.360                       | 0.360                         |              |
| 123    | 130/5                       | -                          | -                         | 0.361                       | 0.361                       | 0.361                         |              |
| 124    | 130/6                       | -                          | -                         | 0.361                       | 0.361                       | 0.361                         |              |
| 125    | 131                         | -                          | -                         | 0.813                       | 0.813                       | 0.732                         |              |
| 126    | 132/3                       | -                          | -                         | 0.594                       | 0.594                       | 0.119                         |              |
| 127    | 133                         | -                          | -                         | 0.405                       | 0.405                       | 0.405                         |              |
| 128    | 134                         | -                          | -                         | 1.011                       | 1.011                       | 1.011                         |              |
| 129    | 135/1                       | 0.202                      | -                         | -                           | 0.202                       | 0.202                         | M.P. Govt.   |
| 130    | 135/2                       | 0.202                      | -                         | -                           | 0.202                       | 0.202                         | M.P. Govt.   |
| 131    | 136                         | 1.821                      | -                         | -                           | 1.821                       | 0.091                         | M.P. Govt.   |
| 132    | 137                         | -                          | -                         | 0.809                       | 0.809                       | 0.200                         |              |
| 133    | 138                         | 1.937                      | -                         | -                           | 1.937                       | 0.220                         | Not          |
| 134    | 325                         | 0.020                      | -                         | -                           | 0.020                       | 0.020                         | M.P. Govt.   |
| 135    | 326                         | -                          | -                         | 0.182                       | 0.182                       | 0.184                         |              |
| 136    | 327                         | -                          | -                         | 0.607                       | 0.607                       | 0.303                         |              |
| 137    | 328                         | -                          | -                         | 0.405                       | 0.405                       | 0.202                         |              |
| 138    | 302/1, 2, 3                 | -                          | -                         | 0.222                       | 0.222                       | 0.622                         |              |
| 139    | 302/4                       | -                          | -                         | 0.074                       | 0.074                       | 0.674                         |              |
| 140    | 302/5                       | -                          | -                         | 0.074                       | 0.074                       | 0.674                         |              |
| 141    | 302/6                       | -                          | -                         | 0.075                       | 0.075                       | 0.075                         |              |
| 142    | 303                         | 0.547                      | -                         | -                           | 0.547                       | 0.547                         | Road         |
| 143    | 304                         | 1.458                      | -                         | -                           | 1.458                       | 0.154                         | M.P. Govt.   |
| 144    | 343                         | 0.202                      | -                         | -                           | 0.202                       | 0.101                         | M.P. Govt.   |
| 145    | 344                         | -                          | -                         | 1.707                       | 1.707                       | 0.625                         |              |
| 146    | 335                         | -                          | -                         | 0.636                       | 0.636                       | 0.636                         |              |
| 147    | 336                         | 0.024                      | -                         | -                           | 0.024                       | 0.005                         | M.P. Govt.   |
| 148    | 329                         | -                          | -                         | 1.619                       | 1.619                       | 1.619                         |              |
| 149    | 330/1/1                     | -                          | -                         | 0.161                       | 0.161                       | 0.161                         |              |
| 150    | 330/1/2                     | -                          | -                         | 0.162                       | 0.162                       | 0.162                         |              |
| 151    | 330/1/3                     | -                          | -                         | 0.162                       | 0.162                       | 0.162                         |              |
| 152    | 330/1/4                     | -                          | -                         | 0.162                       | 0.162                       | 0.162                         |              |
| 153    | 330/1/5                     | -                          | -                         | 0.162                       | 0.162                       | 0.162                         |              |
| 154    | 330/2/1                     | -                          | -                         | 0.405                       | 0.405                       | 0.405                         |              |
| 155    | 330/2/2                     | -                          | -                         | 0.202                       | 0.202                       | 0.202                         |              |
| 156    | 330/2/3                     | -                          | -                         | 0.202                       | 0.202                       | 0.202                         |              |
| 157    | 330/3                       | -                          | -                         | 1.101                       | 1.101                       | 1.101                         |              |
| 158    | 330/4                       | -                          | -                         | 0.550                       | 0.550                       | 0.550                         |              |
| 159    | 331/1                       | -                          | -                         | 1.002                       | 1.002                       | 1.002                         |              |
| 160    | 331/2/1                     | -                          | -                         | 0.291                       | 0.291                       | 0.291                         |              |
| 161    | 331/2/2                     | -                          | -                         | 0.291                       | 0.291                       | 0.291                         |              |
| 162    | 331/2/3                     | -                          | -                         | 0.291                       | 0.291                       | 0.291                         |              |
| 163    | 331/2/4                     | -                          | -                         | 0.292                       | 0.292                       | 0.292                         |              |
| 164    | 331/2/5                     | -                          | -                         | 0.291                       | 0.291                       | 0.291                         |              |
| 165    | 331/3/1                     | -                          | -                         | 0.537                       | 0.537                       | 0.537                         |              |
| 166    | 331/3/2                     | -                          | -                         | 0.537                       | 0.537                       | 0.537                         |              |
| 167    | 332                         | -                          | -                         | 0.518                       | 0.518                       | 0.518                         |              |
| 168    | 333                         | -                          | -                         | 1.344                       | 1.344                       | 1.344                         |              |
| 169    | 338                         | 0.231                      | -                         | -                           | 0.231                       | 0.046                         | M.P. Govt.   |
| 170    | 334                         | -                          | -                         | 0.121                       | 0.121                       | 0.121                         |              |
| 171    | 342                         | 0.202                      | -                         | -                           | 0.202                       | 0.162                         |              |
| 172    | P-27                        | -                          | 44.313                    | -                           | 44.313                      | 9.727                         | Forest Dept. |
| Total  |                             | 34.045                     | 44.313                    | 82.416                      | 160.774                     | 115.940                       |              |

  
 B.D. SHARMA / Under Secretary  
 Ministry of Revenue / Ministry of Civil  
 Supplies, Government of India  
 New Delhi

  
 B.D. SHARMA  
 RQP

# SHAHPUR WEST BLOCK

VILLAGE KUSHMAHA KHURD, TEHSIL - PALI

DISTRICT - UMARIA (M.P.)

| SL. NO. | SURVEY NO./<br>KHASRA NO. | M.P. GOVT. LAND            |                           | PRIVATE<br>LAND | TOTAL<br>AREA | APPLIED<br>AREA | REMARKS    |
|---------|---------------------------|----------------------------|---------------------------|-----------------|---------------|-----------------|------------|
|         |                           | REVENUE LAND<br>(Hectares) | FOREST LAND<br>(Hectares) | (Hectares)      | (Hectares)    | (Hectares)      |            |
| 1       | 100                       | 1.291                      | -                         | -               | 1.291         | 1.291           | M.P. Govt. |
| 2       | 101                       | 0.473                      | -                         | -               | 0.473         | 0.473           | M.P. Govt. |
| 3       | 102                       | -                          | -                         | 0.202           | 0.202         | 0.202           |            |
| 4       | 103                       | -                          | -                         | 0.081           | 0.081         | 0.081           |            |
| 5       | 104                       | -                          | -                         | 2.298           | 2.298         | 2.298           |            |
| 6       | 105                       | -                          | -                         | 0.081           | 0.081         | 0.081           |            |
| 7       | 106                       | -                          | -                         | 0.190           | 0.190         | 0.190           |            |
| 8       | 107                       | -                          | -                         | 0.247           | 0.247         | 0.247           |            |
| 9       | 108                       | -                          | -                         | 0.283           | 0.283         | 0.283           |            |
| 10      | 109                       | -                          | -                         | 0.322           | 0.322         | 0.322           |            |
| 11      | 110                       | -                          | -                         | 0.081           | 0.081         | 0.081           |            |
| 12      | 111                       | -                          | -                         | 0.263           | 0.263         | 0.263           |            |
| 13      | 112                       | -                          | -                         | 0.121           | 0.121         | 0.121           |            |
| 14      | 113                       | -                          | -                         | 0.318           | 0.318         | 0.318           |            |
| 15      | 114                       | -                          | -                         | 0.579           | 0.579         | 0.579           |            |
| 16      | 115                       | -                          | -                         | 0.053           | 0.053         | 0.053           |            |
| 17      | 116                       | -                          | -                         | 0.465           | 0.465         | 0.465           |            |
| 18      | 117                       | -                          | -                         | 0.789           | 0.789         | 0.789           |            |
| 19      | 118                       | -                          | -                         | 0.073           | 0.073         | 0.073           |            |
| 20      | 119                       | -                          | -                         | 1.044           | 1.044         | 1.044           |            |
| 21      | 120/1                     | -                          | -                         | 0.293           | 0.293         | 0.293           |            |
| 22      | 120/2                     | -                          | -                         | 0.294           | 0.294         | 0.294           |            |
| 23      | 121                       | -                          | -                         | 0.421           | 0.421         | 0.421           |            |
| 24      | 122                       | -                          | -                         | 0.255           | 0.255         | 0.255           |            |
| 25      | 123                       | -                          | -                         | 0.174           | 0.174         | 0.174           |            |
| 26      | 124                       | -                          | -                         | 0.579           | 0.579         | 0.579           |            |
| 27      | 125                       | -                          | -                         | 0.138           | 0.138         | 0.138           |            |
| 28      | 126                       | -                          | -                         | 0.417           | 0.417         | 0.417           |            |
| 29      | 127                       | -                          | -                         | 0.170           | 0.170         | 0.170           |            |
| 30      | 128                       | -                          | -                         | 0.089           | 0.089         | 0.089           |            |
| 31      | 129                       | -                          | -                         | 0.121           | 0.121         | 0.121           |            |
| 32      | 130                       | -                          | -                         | 0.283           | 0.283         | 0.283           |            |
| 33      | 131                       | -                          | -                         | 0.575           | 0.575         | 0.575           |            |
| 34      | 132                       | -                          | -                         | 0.045           | 0.045         | 0.045           |            |
| 35      | 133                       | -                          | -                         | 0.085           | 0.085         | 0.085           |            |
| 36      | 134                       | -                          | -                         | 0.191           | 0.191         | 0.191           |            |
| 37      | 135                       | -                          | -                         | 0.397           | 0.397         | 0.397           |            |
| 38      | 136                       | -                          | -                         | 0.049           | 0.049         | 0.049           |            |
| 39      | 137                       | -                          | -                         | 1.100           | 1.100         | 1.100           |            |
| 40      | 138                       | -                          | -                         | 0.304           | 0.304         | 0.304           |            |
| 41      | 139/1                     | -                          | -                         | 0.281           | 0.281         | 0.281           |            |
| 42      | 139/2/1                   | -                          | -                         | 0.130           | 0.130         | 0.130           |            |
| 43      | 139/2/2                   | -                          | -                         | 0.131           | 0.131         | 0.131           |            |
| 44      | 14                        | -                          | -                         | 0.841           | 0.841         | 0.873           |            |
| 45      | 140                       | 0.101                      | -                         | -               | 0.101         | 0.101           | M.P. Govt. |
| 46      | 141                       | -                          | -                         | 0.210           | 0.210         | 0.210           |            |
| 47      | 142                       | -                          | -                         | 0.097           | 0.097         | 0.097           |            |
| 48      | 143                       | -                          | -                         | 0.077           | 0.077         | 0.077           |            |
| 49      | 144                       | -                          | -                         | 0.101           | 0.101         | 0.101           |            |
| 50      | 145                       | -                          | -                         | 1.048           | 1.048         | 1.048           |            |
| 51      | 146                       | -                          | -                         | 0.417           | 0.417         | 0.417           |            |
| 52      | 147                       | -                          | -                         | 0.231           | 0.231         | 0.231           |            |
| 53      | 148                       | -                          | -                         | 0.364           | 0.364         | 0.364           |            |
| 54      | 149                       | -                          | -                         | 0.121           | 0.121         | 0.121           |            |
| 55      | 15                        | -                          | -                         | 3.286           | 3.286         | 2.300           |            |
| 56      | 150                       | 0.053                      | -                         | -               | 0.053         | 0.053           | M.P. Govt. |
| 57      | 151                       | -                          | -                         | 0.109           | 0.109         | 0.109           |            |
| 58      | 152                       | -                          | -                         | 0.223           | 0.223         | 0.223           |            |

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# SHAHPUR WEST BLOCK

VILLAGE KUSHMAHA KHURD, TEHSIL - PALI

DISTRICT - UMARIA (M.P.)

| SL.NO. | SURVEY NO./<br>Khasra No. | M.P. GOVT. LAND            |                           | PRIVATE<br>LAND | TOTAL<br>AREA | APPLIED<br>AREA | REMARKS    |
|--------|---------------------------|----------------------------|---------------------------|-----------------|---------------|-----------------|------------|
|        |                           | REVENUE LAND<br>(Hectares) | FOREST LAND<br>(Hectares) |                 |               |                 |            |
| 59     | 153                       |                            |                           | 0.097           | 0.097         | 0.097           |            |
| 60     | 154                       |                            |                           | 0.106           | 0.106         | 0.106           |            |
| 61     | 155                       |                            |                           | 0.113           | 0.113         | 0.113           |            |
| 62     | 156                       |                            |                           | 0.093           | 0.093         | 0.093           |            |
| 63     | 157                       |                            |                           | 0.279           | 0.279         | 0.279           |            |
| 64     | 158                       |                            |                           | 0.057           | 0.057         | 0.057           |            |
| 65     | 158                       |                            |                           | 0.283           | 0.283         | 0.283           |            |
| 66     | 16                        |                            |                           | 2.051           | 2.051         | 0.820           |            |
| 67     | 180                       |                            |                           | 0.162           | 0.162         | 0.162           |            |
| 68     | 161                       |                            |                           | 0.049           | 0.049         | 0.049           |            |
| 69     | 162                       |                            |                           | 0.162           | 0.162         | 0.162           |            |
| 70     | 163                       |                            |                           | 0.105           | 0.105         | 0.105           |            |
| 71     | 164/1                     |                            |                           | 0.066           | 0.066         | 0.066           |            |
| 72     | 164/2                     |                            |                           | 0.131           | 0.131         | 0.131           |            |
| 73     | 164/3                     |                            |                           | 0.066           | 0.066         | 0.066           |            |
| 74     | 165                       | 0.040                      |                           |                 | 0.040         | 0.040           | M.P. Govt. |
| 75     | 166                       | 0.032                      |                           |                 | 0.032         | 0.032           | M.P. Govt. |
| 76     | 167                       |                            |                           | 0.137           | 0.137         | 0.137           |            |
| 77     | 168                       |                            |                           | 0.142           | 0.142         | 0.142           |            |
| 78     | 169/1                     |                            |                           | 0.069           | 0.069         | 0.069           |            |
| 79     | 169/2                     |                            |                           | 0.137           | 0.137         | 0.137           |            |
| 80     | 169/3                     |                            |                           | 0.069           | 0.069         | 0.069           |            |
| 81     | 171                       |                            |                           | 1.637           | 1.637         | 0.115           |            |
| 82     | 172                       |                            |                           | 0.819           | 0.819         | 0.819           |            |
| 83     | 170                       |                            |                           | 0.206           | 0.206         | 0.206           |            |
| 84     | 171                       |                            |                           | 0.129           | 0.129         | 0.129           |            |
| 85     | 172                       |                            |                           | 0.567           | 0.567         | 0.567           |            |
| 86     | 173                       |                            |                           | 0.551           | 0.551         | 0.551           |            |
| 87     | 174                       |                            |                           | 0.150           | 0.150         | 0.150           |            |
| 88     | 175                       |                            |                           | 0.134           | 0.134         | 0.134           |            |
| 89     | 176                       |                            |                           | 0.056           | 0.056         | 0.056           |            |
| 90     | 177                       |                            |                           | 0.097           | 0.097         | 0.097           |            |
| 91     | 178                       |                            |                           | 0.150           | 0.150         | 0.150           |            |
| 92     | 179                       |                            |                           | 0.121           | 0.121         | 0.121           |            |
| 93     | 180                       |                            |                           | 0.057           | 0.057         | 0.057           |            |
| 94     | 181                       |                            |                           | 0.073           | 0.073         | 0.073           |            |
| 95     | 182                       |                            |                           | 0.134           | 0.134         | 0.134           |            |
| 96     | 183                       | 0.154                      |                           |                 | 0.154         | 0.154           | M.P. Govt. |
| 97     | 184                       | 0.020                      |                           |                 | 0.020         | 0.020           | Road       |
| 98     | 185                       |                            |                           | 0.206           | 0.206         | 0.206           |            |
| 99     | 186                       |                            |                           | 0.085           | 0.085         | 0.085           |            |
| 100    | 187                       |                            |                           | 0.368           | 0.368         | 0.368           |            |
| 101    | 188                       |                            |                           | 0.069           | 0.069         | 0.069           |            |
| 102    | 189                       |                            |                           | 0.129           | 0.129         | 0.129           |            |
| 103    | 190                       |                            |                           | 0.124           | 0.124         | 0.124           |            |
| 104    | 191                       | 0.210                      |                           |                 | 0.210         | 0.210           | Road       |
| 105    | 192                       |                            |                           | 0.202           | 0.202         | 0.202           |            |
| 106    | 193                       |                            |                           | 0.125           | 0.125         | 0.125           |            |
| 107    | 194                       |                            |                           | 0.445           | 0.445         | 0.445           |            |
| 108    | 195                       |                            |                           | 0.469           | 0.469         | 0.469           |            |
| 109    | 196                       |                            |                           | 0.150           | 0.150         | 0.150           |            |
| 110    | 197                       |                            |                           | 0.376           | 0.376         | 0.376           |            |
| 111    | 198                       |                            |                           | 0.312           | 0.312         | 0.312           |            |
| 112    | 199                       |                            |                           | 0.202           | 0.202         | 0.202           |            |
| 113    | 200                       |                            |                           | 0.174           | 0.174         | 0.174           |            |
| 114    | 201                       |                            |                           | 0.202           | 0.202         | 0.202           |            |
| 115    | 202/1                     |                            |                           | 0.159           | 0.159         | 0.159           |            |
| 116    | 202/2                     |                            |                           | 0.318           | 0.318         | 0.318           |            |

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# SHAHPUR WEST BLOCK

VILLAGE KUSHMAHA KHURD, TEHSIL - PALI

DISTRICT - UMARIA (M.P.)

| SL. NO. | SURVEY NO. | M.P. GOVT. LAND |             | PRIVATE LAND | TOTAL AREA | APPLIED AREA | REMARKS    |
|---------|------------|-----------------|-------------|--------------|------------|--------------|------------|
|         |            | REVENUE LAND    | FOREST LAND |              |            |              |            |
|         |            | (Hectares)      | (Hectares)  | (Hectares)   | (Hectares) | (Hectares)   |            |
| 117     | 2030       |                 |             | 0.159        | 0.159      | 0.159        |            |
| 118     | 203        |                 |             | 0.190        | 0.190      | 0.190        |            |
| 119     | 204        |                 |             | 0.304        | 0.304      | 0.304        |            |
| 120     | 205        |                 |             | 0.251        | 0.251      | 0.251        |            |
| 121     | 206        |                 |             | 0.198        | 0.198      | 0.198        |            |
| 122     | 207        |                 |             | 0.304        | 0.304      | 0.304        |            |
| 123     | 208        |                 |             | 0.332        | 0.332      | 0.332        |            |
| 124     | 209        |                 |             | 0.429        | 0.429      | 0.429        |            |
| 125     | 210        |                 |             | 0.223        | 0.223      | 0.223        |            |
| 126     | 211        |                 |             | 0.137        | 0.137      | 0.137        |            |
| 127     | 212        | 0.640           |             |              | 0.640      | 0.640        | M.P. Govt. |
| 128     | 213        | 1.384           |             |              | 1.384      | 1.384        | M.P. Govt. |
| 129     | 214        | 0.922           |             |              | 0.922      | 0.922        | M.P. Govt. |
| 130     | 215        |                 |             | 0.506        | 0.506      | 0.506        |            |
| 131     | 216        |                 |             | 0.332        | 0.332      | 0.332        |            |
| 132     | 217        |                 |             | 0.235        | 0.235      | 0.235        |            |
| 133     | 218        |                 |             | 0.162        | 0.162      | 0.162        |            |
| 134     | 219        |                 |             | 0.117        | 0.117      | 0.117        |            |
| 135     | 220        |                 |             | 0.142        | 0.142      | 0.142        |            |
| 136     | 221        |                 |             | 0.077        | 0.077      | 0.077        |            |
| 137     | 222        |                 |             | 0.101        | 0.101      | 0.101        |            |
| 138     | 223        |                 |             | 0.340        | 0.340      | 0.340        |            |
| 139     | 224/1      |                 |             | 0.065        | 0.065      | 0.065        |            |
| 140     | 224/2      |                 |             | 0.141        | 0.141      | 0.141        |            |
| 141     | 225        |                 |             | 0.117        | 0.117      | 0.117        |            |
| 142     | 226        |                 |             | 0.012        | 0.012      | 0.012        |            |
| 143     | 227        |                 |             | 0.101        | 0.101      | 0.101        |            |
| 144     | 228        | 0.081           |             |              | 0.081      | 0.081        | Road       |
| 145     | 229        |                 |             | 0.040        | 0.040      | 0.040        |            |
| 146     | 230        |                 |             | 0.065        | 0.065      | 0.065        |            |
| 147     | 231        |                 |             | 0.016        | 0.016      | 0.016        |            |
| 148     | 232        |                 |             | 0.150        | 0.150      | 0.150        |            |
| 149     | 233        |                 |             | 0.210        | 0.210      | 0.210        |            |
| 150     | 234        |                 |             | 0.251        | 0.251      | 0.251        |            |
| 151     | 235/1      |                 |             | 0.057        | 0.057      | 0.057        |            |
| 152     | 235/2      |                 |             | 0.113        | 0.113      | 0.113        |            |
| 153     | 235/3      |                 |             | 0.057        | 0.057      | 0.057        |            |
| 154     | 236        |                 |             | 0.210        | 0.210      | 0.210        |            |
| 155     | 237        |                 |             | 0.255        | 0.255      | 0.255        |            |
| 156     | 238        |                 |             | 0.308        | 0.308      | 0.308        |            |
| 157     | 239/1      |                 |             | 0.062        | 0.062      | 0.062        |            |
| 158     | 239/2      |                 |             | 0.123        | 0.123      | 0.123        |            |
| 159     | 239/3      |                 |             | 0.062        | 0.062      | 0.062        |            |
| 160     | 240        |                 |             | 0.077        | 0.077      | 0.077        |            |
| 161     | 241        | 0.251           |             |              | 0.251      | 0.251        | Road       |
| 162     | 242        | 0.182           |             |              | 0.182      | 0.182        | Road       |
| 163     | 243        |                 |             | 0.114        | 0.114      | 0.114        |            |
| 164     | 244        |                 |             | 0.057        | 0.057      | 0.057        |            |
| 165     | 245        |                 |             | 0.089        | 0.089      | 0.089        |            |
| 166     | 246        |                 |             | 0.093        | 0.093      | 0.093        |            |
| 167     | 247        |                 |             | 0.061        | 0.061      | 0.061        |            |
| 168     | 248        |                 |             | 0.888        | 0.888      | 0.888        |            |
| 169     | 249        |                 |             | 0.304        | 0.304      | 0.304        |            |
| 170     | 250        | 0.020           |             |              | 0.020      | 0.020        | Road       |
| 171     | 251        |                 |             | 0.081        | 0.081      | 0.081        |            |
| 172     | 252        |                 |             | 0.044        | 0.044      | 0.044        |            |
| 173     | 253/1      |                 |             | 0.053        | 0.053      | 0.053        |            |
| 174     | 253/2      |                 |             | 0.081        | 0.081      | 0.081        |            |

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# SHAHPUR WEST BLOCK

VILLAGE KUSHMAHA KHURO, TEHSIL - PALI

DISTRICT - UMARIA (M.P.)

| SL. NO. | SURVEY NO.<br>KOTASHI NO. | M.P. GOVT. LAND            |                           | PRIVATE<br>LAND | TOTAL<br>AREA | APPLIED<br>AREA | REMARKS   |
|---------|---------------------------|----------------------------|---------------------------|-----------------|---------------|-----------------|-----------|
|         |                           | REVENUE LAND<br>(Hectares) | FOREST LAND<br>(Hectares) |                 |               |                 |           |
| 175     | 254/1/1                   | -                          | -                         | 0.085           | 0.085         | 0.085           |           |
| 176     | 254/1/2                   | -                          | -                         | 0.033           | 0.033         | 0.033           |           |
| 177     | 254/1/3                   | -                          | -                         | 0.033           | 0.033         | 0.033           |           |
| 178     | 254/2                     | -                          | -                         | 0.059           | 0.059         | 0.059           |           |
| 179     | 255                       | -                          | -                         | 0.198           | 0.198         | 0.198           |           |
| 180     | 256/1                     | -                          | -                         | 0.032           | 0.032         | 0.032           |           |
| 181     | 258/2                     | -                          | -                         | 0.061           | 0.061         | 0.061           |           |
| 182     | 257                       | -                          | -                         | 0.061           | 0.061         | 0.061           |           |
| 183     | 258                       | -                          | -                         | 0.522           | 0.522         | 0.522           |           |
| 184     | 259/1                     | -                          | -                         | 0.356           | 0.356         | 0.356           |           |
| 185     | 259/2                     | -                          | -                         | 0.356           | 0.356         | 0.356           |           |
| 186     | 260                       | -                          | -                         | 0.263           | 0.263         | 0.263           |           |
| 187     | 261                       | -                          | -                         | 0.097           | 0.097         | 0.097           |           |
| 188     | 262                       | -                          | -                         | 0.077           | 0.077         | 0.077           |           |
| 189     | 263                       | -                          | -                         | 0.684           | 0.684         | 0.684           |           |
| 190     | 264                       | -                          | -                         | 0.316           | 0.316         | 0.316           |           |
| 191     | 265                       | -                          | -                         | 0.178           | 0.178         | 0.178           |           |
| 192     | 266                       | -                          | -                         | 0.660           | 0.660         | 0.660           |           |
| 193     | 267                       | -                          | -                         | 0.660           | 0.660         | 0.660           |           |
| 194     | 268                       | -                          | -                         | 0.089           | 0.089         | 0.089           |           |
| 195     | 269                       | -                          | -                         | 1.319           | 1.319         | 1.319           |           |
| 196     | 270                       | 0.194                      | -                         | -               | 0.194         | 0.194           | River     |
| 197     | 271                       | 0.899                      | -                         | -               | 0.899         | 0.899           | River     |
| 198     | 272                       | -                          | -                         | 0.433           | 0.433         | 0.433           |           |
| 199     | 273                       | -                          | -                         | 3.104           | 3.104         | 3.104           |           |
| 200     | 274                       | -                          | -                         | 0.725           | 0.725         | 0.725           |           |
| 201     | 275                       | -                          | -                         | 0.534           | 0.534         | 0.534           |           |
| 202     | 276                       | -                          | -                         | 0.547           | 0.547         | 0.547           |           |
| 203     | 277                       | -                          | -                         | 1.408           | 1.408         | 1.408           |           |
| 204     | 278                       | -                          | -                         | 0.506           | 0.506         | 0.506           |           |
| 205     | 279                       | -                          | -                         | 0.243           | 0.243         | 0.243           |           |
| 206     | 280                       | -                          | -                         | 0.129           | 0.129         | 0.129           |           |
| 207     | 281                       | -                          | -                         | 0.134           | 0.134         | 0.134           |           |
| 208     | 282                       | -                          | -                         | 2.403           | 2.403         | 2.403           |           |
| 209     | 283                       | -                          | -                         | 5.666           | 5.666         | 5.666           |           |
| 210     | 284                       | 1.366                      | -                         | -               | 1.366         | 1.366           | River     |
| 211     | 285                       | -                          | -                         | 0.658           | 0.658         | 0.658           |           |
| 212     | 286                       | -                          | -                         | 0.611           | 0.611         | 0.611           |           |
| 213     | 287                       | -                          | -                         | 0.636           | 0.636         | 0.636           |           |
| 214     | 288                       | -                          | -                         | 1.590           | 1.590         | 1.590           |           |
| 215     | 289                       | -                          | -                         | 0.162           | 0.162         | 0.162           |           |
| 216     | 290                       | -                          | -                         | 1.003           | 1.003         | 1.003           |           |
| 217     | 291                       | -                          | -                         | 0.567           | 0.567         | 0.567           |           |
| 218     | 292/1/1                   | 0.809                      | -                         | -               | 0.809         | 0.809           | M.P. Govt |
| 219     | 292/1/2                   | 0.732                      | -                         | -               | 0.732         | 0.732           | M.P. Govt |
| 220     | 292/2                     | -                          | -                         | 0.611           | 0.611         | 0.611           |           |
| 221     | 293                       | -                          | -                         | 0.198           | 0.198         | 0.198           |           |
| 222     | 294                       | -                          | -                         | 0.190           | 0.190         | 0.190           |           |
| 223     | 295                       | -                          | -                         | 0.194           | 0.194         | 0.194           |           |
| 224     | 296/1                     | -                          | -                         | 0.258           | 0.258         | 0.258           |           |
| 225     | 296/2                     | -                          | -                         | 0.518           | 0.518         | 0.518           |           |
| 226     | 296/3                     | -                          | -                         | 0.258           | 0.258         | 0.258           |           |
| 227     | 297/1                     | -                          | -                         | 1.768           | 1.768         | 1.768           |           |
| 228     | 297/2                     | -                          | -                         | 1.768           | 1.768         | 1.768           |           |
| 229     | 298                       | -                          | -                         | 0.162           | 0.162         | 0.162           |           |
| 230     | 299                       | -                          | -                         | 2.792           | 2.792         | 2.792           |           |
| 231     | 300                       | -                          | -                         | 2.898           | 2.898         | 2.898           |           |
| 232     | 301                       | -                          | -                         | 0.522           | 0.522         | 0.522           |           |

381 श्री / SURESH GUPTA  
 Joint Secy / Under Secretary  
 Joint Secy / Ministry of Coal  
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 Joint Secy / New Delhi

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VILLAGE KUSHMAHA KHURD, TEHSIL - PALI  
DISTRICT - UMARIA (M.P.)

संजीव कुमार / SANDEEP GUPTA  
अवर सचिव / Under Secretary  
लोकसभा सचिवालय / Ministry of Lok Sabha  
नई दिल्ली / New Delhi

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RQP

# SHAHPUR WEST BLOCK

VILLAGE KUSHMAHA KHURD, TEHSIL - PALI

DISTRICT - UMARIA (M.P.)

| SL. NO. | SURVEY NO.    | M.P. GOVT. LAND |             | PRIVATE    | TOTAL      | APPLIED    | REMARKS     |
|---------|---------------|-----------------|-------------|------------|------------|------------|-------------|
|         | KHASRA NO.    | REVENUE LAND    | FOREST LAND | LAND       | AREA       | AREA       |             |
|         |               | (Hectares)      | (Hectares)  | (Hectares) | (Hectares) | (Hectares) |             |
| 291     | 56            |                 | -           | 0.498      | 0.498      | 0.498      |             |
| 292     | 57            |                 | -           | 0.194      | 0.194      | 0.194      |             |
| 293     | 58            |                 | -           | 0.190      | 0.190      | 0.190      |             |
| 294     | 59            |                 | -           | 0.381      | 0.381      | 0.381      |             |
| 295     | 60            |                 | -           | 1.108      | 1.108      | 1.108      |             |
| 296     | 61            |                 | -           | 0.688      | 0.688      | 0.688      |             |
| 297     | 62            |                 | -           | 1.206      | 1.206      | 1.206      |             |
| 298     | 63            |                 | -           | 1.149      | 1.149      | 1.149      |             |
| 299     | 64            |                 | -           | 1.676      | 1.676      | 1.173      |             |
| 300     | 65            |                 | -           | 0.093      | 0.093      | 0.074      |             |
| 301     | 66            |                 | -           | 0.881      | 0.881      | 0.881      |             |
| 302     | 67/1          |                 | -           | 6.297      | 6.297      | 6.297      |             |
| 303     | 67/2          |                 | -           | 0.024      | 0.024      | 0.024      |             |
| 304     | 68            |                 | -           | 0.413      | 0.413      | 0.413      |             |
| 305     | 69            |                 | -           | 0.700      | 0.700      | 0.700      |             |
| 306     | 73            |                 | -           | 0.934      | 0.934      | 0.842      |             |
| 307     | 74            |                 | -           | 1.354      | 1.354      | 1.354      |             |
| 308     | 75            |                 | -           | 0.845      | 0.845      | 0.845      |             |
| 309     | 76            |                 | -           | 0.340      | 0.340      | 0.340      |             |
| 310     | 77            |                 | -           | 0.231      | 0.231      | 0.231      |             |
| 311     | 78            |                 | -           | 0.194      | 0.194      | 0.194      |             |
| 312     | 79            |                 | -           | 0.053      | 0.053      | 0.053      |             |
| 313     | 80            |                 | -           | 0.486      | 0.486      | 0.486      |             |
| 314     | 81            |                 | -           | 0.575      | 0.575      | 0.575      |             |
| 315     | 82            |                 | -           | 0.567      | 0.567      | 0.567      |             |
| 316     | 83            |                 | -           | 0.057      | 0.057      | 0.057      |             |
| 317     | 84            |                 | -           | 1.311      | 1.311      | 1.311      |             |
| 318     | 85            |                 | -           | 0.208      | 0.208      | 0.208      |             |
| 319     | 86            | 0.551           | -           | -          | 0.551      | 0.551      | Road        |
| 320     | 87            |                 | -           | 0.498      | 0.498      | 0.498      |             |
| 321     | 88            |                 | -           | 0.603      | 0.603      | 0.603      |             |
| 322     | 89            |                 | -           | 0.121      | 0.121      | 0.121      |             |
| 323     | 90            |                 | -           | 0.324      | 0.324      | 0.324      |             |
| 324     | 91            |                 | -           | 0.162      | 0.162      | 0.162      |             |
| 325     | 92            |                 | -           | 0.162      | 0.162      | 0.162      |             |
| 326     | 93            |                 | -           | 0.142      | 0.142      | 0.142      |             |
| 327     | 94            |                 | -           | 0.142      | 0.142      | 0.142      |             |
| 328     | 95            |                 | -           | 0.101      | 0.101      | 0.101      |             |
| 329     | 96            |                 | -           | 0.183      | 0.183      | 0.183      |             |
| 330     | 97            |                 | -           | 0.462      | 0.462      | 0.462      |             |
| 331     | 98            |                 | -           | 0.663      | 0.663      | 0.663      |             |
| 332     | 99            |                 | -           | 0.628      | 0.628      | 0.628      |             |
| 333     | Sahagpur R.P. |                 | 9.194       | -          | -          | 9.194      | Forest Opt. |
|         | Total         | 17.576          | 9.194       | 154.190    | 181.766    | 181.679    |             |

सचिव / सचिव / DEEPT GUPTA  
 सचिव / सचिव / Under Secretary  
 कृषि विभाग / Ministry of Food  
 भारत सरकार / Govt. of India  
 नई दिल्ली / New Delhi

B.D.SHARMA  
 RQP

No.CMPDI/DG/33.4/ 1883-

Date : 20.09.2007

21

To :

The General Manager (RP),  
National Mineral Development Corp. Ltd.,  
'Khanij Bhawan', 10-3-311/A,  
Castle Hills, Masab-Tank,  
Hyderabad - 500 028.

Sub: Allotment of Shahpur East &amp; Shahpur West coal block to NMDC.

Dear Sir,

Kindly refer to your letter No.INV/CMPDI/COAL/322 dated 31.08.2007 on the above subject. A plan showing Shahpur East and Shahpur West blocks of Sohagpur coalfield, which have been allocated to NMDC is enclosed.

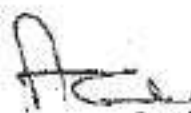
The status in respect of geological data has been explained to your representatives, who had visited Ranchi on 20.09.2007.

Yours faithfully,

Encl : As above.

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

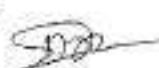
  
20/09/07  
A.K. Wahi

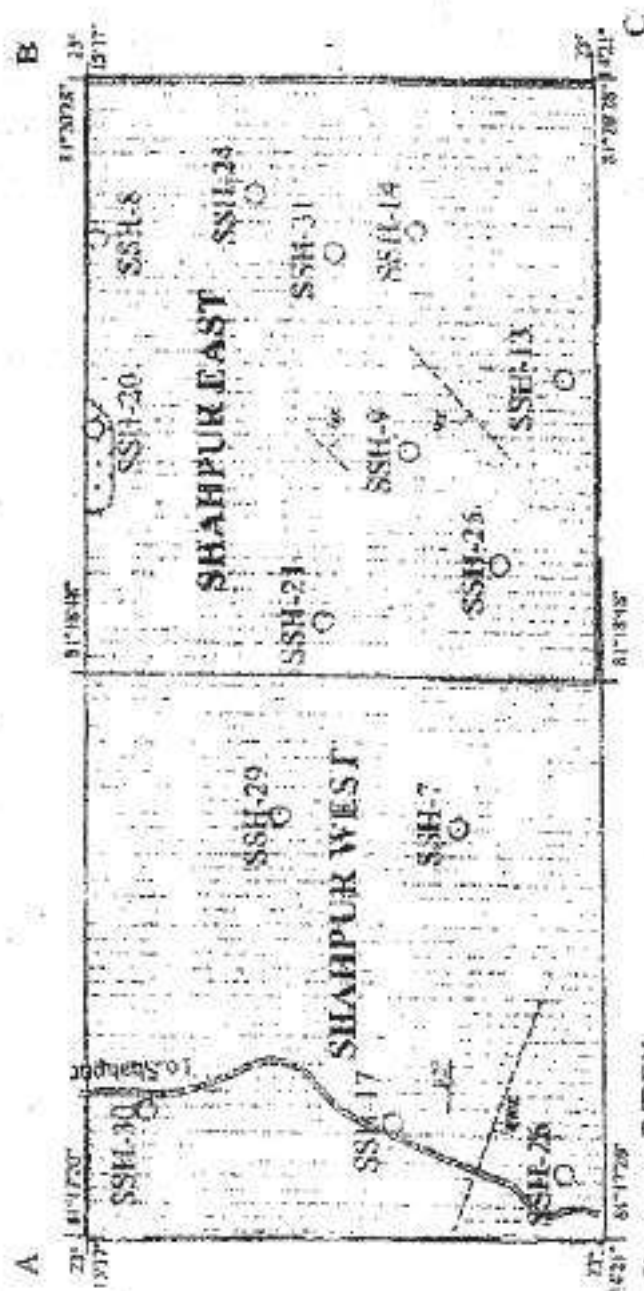
  
20.9.07  
(A.K. Wahi)  
General Manager  
(Exploration Services)



Phone : +91 (65) 225 2301/51 52 53 Fax : +91 (65) 223 1447 223 2333

E-mail : cmpdi@cmpdi.co.in

  
B.D.SHARMA  
RQP



## D INDEX

Recent

Lower Barren Measures Formation

Road

Nala

0 500m 1 km

Scale

SSH-30

Boreholes drilled by GSI

Fault with direction of throw

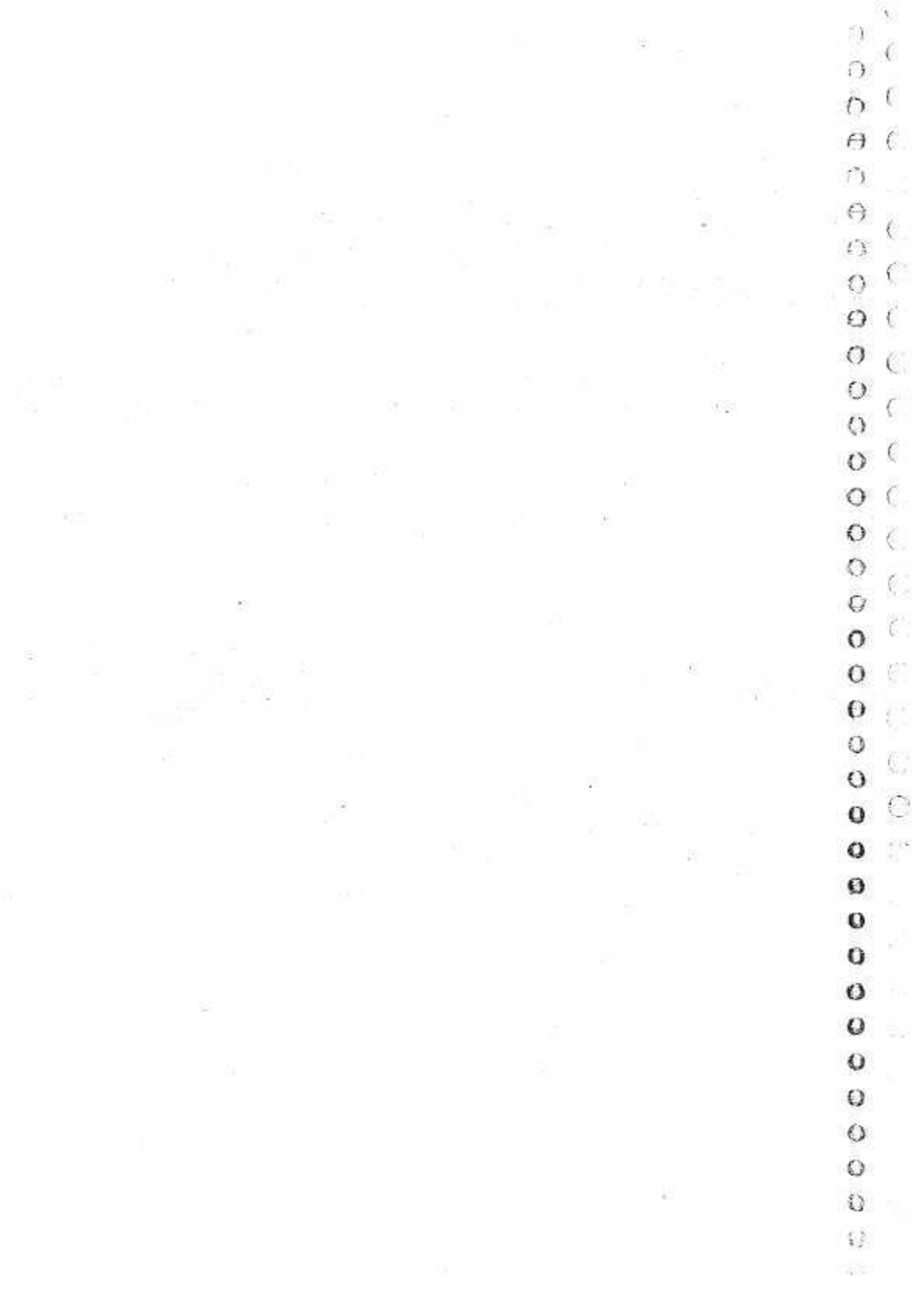
Dip &amp; strike of the bed

GEOLOGICAL MAP OF SHAHPUR AREA,  
SOHAGPUR COALFIELD

सहोम गुप्ता / Under Secretary  
कोयला विभाग / Ministry of Coal  
सरकार भारत / Govt. of India  
नई दिल्ली / New Delhi

Reference to the plate as Rep/Shahpur-GCB/W/GS/1001 of GSI

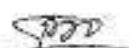
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RQP

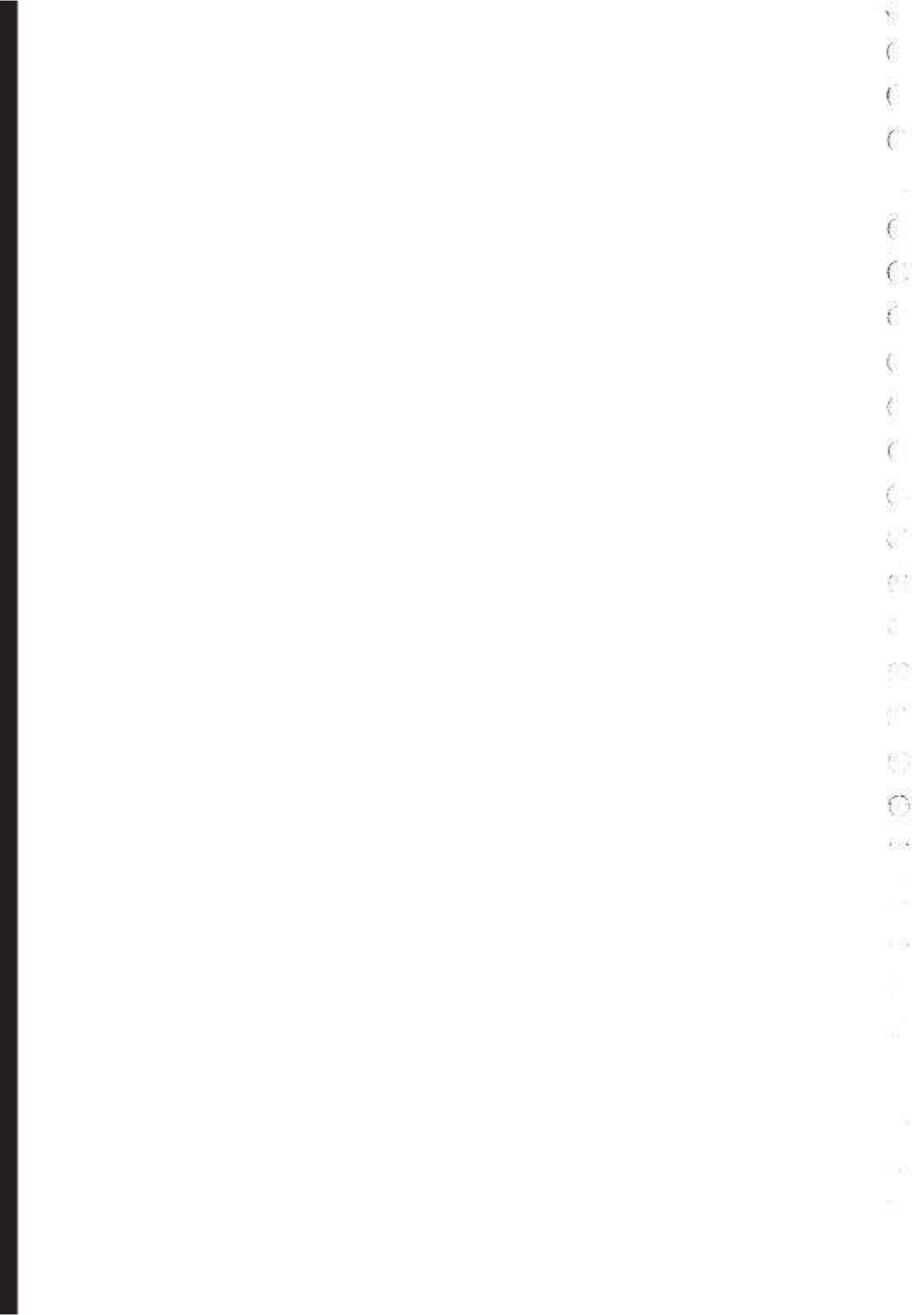


## ANNEXURES TO CHAPTER - 4

### 4-1 Details of Individual Boreholes (Collar RL, depth of Stratigraphic Units, etc.)

  
भारत सरकार / Ministry of Govt.  
भारत सरकार / Govt. of India  
नई दिल्ली / New Delhi

  
B.D.SHARMA  
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# DETAILS OF INDIVIDUAL BOREHOLES (COLLAR RL, DEPTH OF STRATIGRAPHIC UNITS, ETC.)

| BOREHOLE NO. | R.L. (M) | SOIL         | B.M.        |           | BARAKAR     |           | TALCHIRS    |           | THICK W. ZONE<br>(M) | TOTAL DEPTH<br>(M) |
|--------------|----------|--------------|-------------|-----------|-------------|-----------|-------------|-----------|----------------------|--------------------|
|              |          |              | FROM<br>(M) | TO<br>(M) | FROM<br>(M) | TO<br>(M) | FROM<br>(M) | TO<br>(M) |                      |                    |
|              |          | DEPTH<br>(M) |             |           |             |           |             |           |                      |                    |
| MSSW-1       | 490.620  | 6.00         | 6.00        | 30.50     | 24.50       | 30.50     | 182.00      | 151.50    | -                    | 182.00             |
| MSSW-2       | 486.150  | 6.00         | 6.00        | 40.50     | 34.50       | 40.50     | 197.00      | 156.50    | -                    | 197.00             |
| MSSW-3       | 484.230  | 6.00         | 6.00        | 34.50     | 28.50       | 34.50     | 193.00      | 158.50    | -                    | 193.00             |
| MSSW-4       | 487.310  | 6.00         | 6.00        | 34.00     | 28.00       | 34.00     | 136.00      | 102.00    | -                    | 136.00             |
| MSSW-5       | 483.020  | 3.00         | 3.00        | 49.05     | 46.05       | 49.05     | 203.00      | 153.95    | -                    | 203.00             |
| MSSW-6       | 488.080  | 6.00         | 6.00        | 27.90     | 21.90       | 27.90     | 190.00      | 162.10    | -                    | 190.00             |
| MSSW-7       | 492.510  | 6.00         | 6.00        | 31.00     | 25.00       | 31.00     | 196.00      | 165.00    | -                    | 196.00             |
| MSSW-8       | 493.390  | 3.00         | 3.00        | 25.50     | 22.50       | 25.50     | 192.00      | 166.50    | -                    | 192.00             |
| MSSW-9       | 496.630  | 3.00         | 3.00        | 28.95     | 25.95       | 28.95     | 195.50      | 166.55    | -                    | 195.50             |
| MSSW-10      | 491.890  | 3.00         | 3.00        | 28.50     | 25.50       | 28.50     | 193.00      | 164.50    | -                    | 193.00             |
| MSSW-11      | 485.480  | 6.00         | 6.00        | 28.20     | 22.20       | 28.20     | 180.00      | 151.80    | -                    | 180.00             |
| MSSW-12      | 487.680  | 6.00         | 6.00        | 28.00     | 22.00       | 28.00     | 179.50      | 151.50    | -                    | 179.50             |
| MSSW-13      | 478.090  | 3.00         | 3.00        | 25.50     | 22.50       | 25.50     | 229.00      | 203.50    | -                    | 229.00             |
| MSSW-14      | 489.430  | 6.00         | 6.00        | 28.50     | 22.50       | 28.50     | 189.00      | 160.50    | -                    | 189.00             |
| MSSW-15      | 494.930  | 6.00         | 6.00        | 29.00     | 23.00       | 29.00     | 190.00      | 161.00    | -                    | 190.00             |
| MSSW-16      | 481.890  | 3.00         | 3.00        | 13.50     | 10.50       | 13.50     | 177.50      | 164.00    | -                    | 177.50             |
| MSSW-17      | 493.320  | 6.00         | 6.00        | 42.50     | 36.50       | 42.50     | 178.50      | 136.00    | -                    | 178.50             |
| MSSW-18      | 490.690  | 6.00         | 6.00        | 25.50     | 19.50       | 25.50     | 174.00      | 148.50    | -                    | 174.00             |
| MSSW-19      | 496.600  | 6.00         | 6.00        | 28.00     | 22.00       | 28.00     | 185.00      | 157.00    | -                    | 185.00             |
| MSSW-20      | 493.260  | 3.00         | 3.00        | 25.50     | 22.50       | 25.50     | 166.50      | 141.00    | -                    | 166.50             |
| MSSW-21      | 496.200  | 7.50         | 7.50        | 22.12     | 14.62       | 22.12     | 162.00      | 139.88    | -                    | 162.00             |
| MSSW-22      | 488.090  | 6.00         | 6.00        | 23.18     | 17.18       | 23.18     | 173.50      | 150.32    | -                    | 173.50             |
| MSSW-23      | 493.470  | 7.50         | 7.50        | 16.50     | 9.00        | 16.50     | 156.00      | 139.50    | -                    | 156.00             |
| MSSW-24      | 500.330  | 3.00         | 3.00        | 79.00     | 76.00       | 79.00     | 211.00      | 132.00    | -                    | 211.00             |
| MSSW-25      | 492.720  | 6.00         | 6.00        | 28.10     | 22.10       | 28.10     | 168.50      | 140.40    | -                    | 168.50             |
| MSSW-26      | 486.920  | 6.00         | 6.00        | 22.50     | 16.50       | 22.50     | 170.50      | 148.00    | -                    | 170.50             |
| MSSW-27      | 490.920  | 3.00         | 3.00        | 19.50     | 16.50       | 19.50     | 156.00      | 136.50    | -                    | 156.00             |
| MSSW-28      | 488.840  | 3.00         | 3.00        | 22.00     | 19.00       | 22.00     | 165.00      | 143.00    | -                    | 165.00             |
| MSSW-29      | 482.960  | 6.00         | 6.00        | 24.30     | 18.30       | 24.30     | 175.00      | 150.70    | -                    | 175.00             |
| MSSW-30      | 486.330  | 6.00         | 6.00        | 26.88     | 20.88       | 26.88     | 185.00      | 158.12    | -                    | 185.00             |

B.D.SHARMA  
RQP

*SRD*

*SP*  
SANDHEEP GUPTA  
Under Secretary  
Ministry of Coal  
Govt. of India  
New Delhi

ANNEXURE-V/2

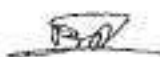
| BOREHOLE NO. | R.L. (M) | SOIL | B.M.     |        |           | BARAKAR        |        |           | TALCHIRS |        |                   | TOTAL DEPTH (M) |
|--------------|----------|------|----------|--------|-----------|----------------|--------|-----------|----------|--------|-------------------|-----------------|
|              |          |      | FROM (M) | TO (M) | THICK (M) | FROM (M)       | TO (M) | THICK (M) | FROM (M) | TO (M) | THICK W. ZONE (M) |                 |
| MSW-31       | 488.320  | 6.00 | 6.00     | 30.20  | 24.20     | 30.20          | 175.00 | 144.80    | -        | -      | 14.40             | 175.00          |
| MSW-32       | 482.400  | 3.00 | 3.00     | 22.50  | 19.50     | 22.50          | 175.00 | 152.50    | -        | -      | 19.90             | 175.00          |
| MSW-33       | 498.300  | 3.00 | 3.00     | 34.50  | 31.50     | 34.50          | 178.00 | 143.50    | -        | -      | 16.50             | 179.00          |
| MSW-34       | 487.770  | 6.00 | 6.00     | 25.75  | 19.75     | 25.75          | 171.00 | 145.25    | -        | -      | 22.00             | 171.00          |
| MSW-35       | 495.170  | 6.00 | 6.00     | 29.22  | 23.22     | 29.22          | 200.50 | 171.28    | -        | -      | 24.77             | 200.50          |
| MSW-36       | 493.780  | 6.00 | 6.00     | 28.50  | 22.50     | 28.50          | 186.00 | 157.50    | -        | -      | 19.50             | 186.00          |
| MSW-37       | 478.270  | 6.00 | 6.00     | 31.00  | 25.00     | 31.00          | 203.00 | 172.00    | -        | -      | 22.00             | 203.00          |
| MSW-38       | 497.170  | 6.00 | 6.00     | 34.56  | 28.56     | 34.56          | 195.00 | 160.44    | -        | -      | 25.50             | 195.00          |
| MSW-39       | 488.800  | 6.00 | 6.00     | 25.50  | 19.50     | 25.50          | 125.00 | 99.50     | -        | -      | 21.40             | 125.00          |
| MSW-40       | 485.490  | 6.00 | 6.00     | 22.50  | 16.50     | 22.50          | 171.00 | 148.50    | -        | -      | 13.50             | 171.00          |
| MSW-41       | 483.451  | 6.00 | 6.00     | 26.28  | 20.28     | 26.28          | 144.00 | 117.72    | -        | -      | 19.40             | 144.00          |
| MSW-42       | 491.070  | 4.00 | -        | -      | -         | DOLENTITE DYKE |        |           | -        | -      | 11.00             | 145.00          |
| MSW-43       | 486.520  | 3.00 | 3.00     | 23.21  | 20.21     | 23.21          | 140.00 | 116.79    | -        | -      | 22.03             | 140.00          |
| MSW-44       | 498.970  | 6.00 | 6.00     | 34.50  | 28.50     | 34.50          | 135.00 | 100.50    | -        | -      | 23.50             | 135.00          |
| MSW-45       | 499.730  | 3.00 | 3.00     | 51.50  | 48.50     | 51.50          | 156.00 | 104.50    | -        | -      | 16.50             | 156.00          |
| MSW-46       | 483.320  | 6.00 | 6.00     | 22.00  | 16.00     | 22.00          | 134.00 | 112.00    | -        | -      | 13.00             | 134.00          |
| MSW-47       | 494.460  | 6.00 | 6.00     | 25.70  | 19.70     | 25.70          | 143.00 | 117.30    | -        | -      | 25.50             | 143.00          |
| MSW-48       | 496.540  | 6.00 | 6.00     | 22.50  | 16.50     | 22.50          | 139.00 | 116.50    | -        | -      | 13.50             | 139.00          |
| MSW-49       | 481.190  | 6.00 | 6.00     | 25.00  | 19.00     | 25.00          | 179.50 | 154.50    | -        | -      | 17.39             | 179.50          |
| MSW-50       | 497.350  | 3.00 | 3.00     | 30.00  | 27.00     | 30.00          | 145.50 | 115.50    | -        | -      | 22.50             | 145.50          |
| MSW-51       | 493.760  | 3.00 | 3.00     | 24.60  | 21.60     | 24.60          | 143.50 | 118.90    | -        | -      | 21.00             | 143.50          |
| MSW-52       | 479.450  | 3.00 | 3.00     | 22.94  | 19.94     | 22.94          | 179.50 | 156.56    | -        | -      | 13.00             | 179.50          |
| MSW-53       | 490.430  | 3.00 | 3.00     | 32.60  | 29.60     | 32.60          | 134.50 | 101.90    | -        | -      | 13.50             | 134.50          |
| MSW-54       | 494.850  | 3.50 | 3.50     | 20.50  | 17.00     | 20.50          | 157.50 | 137.00    | -        | -      | 10.50             | 157.50          |
| MSW-55       | 483.890  | 6.00 | 6.00     | 19.00  | 13.00     | 19.00          | 163.00 | 144.00    | -        | -      | 19.00             | 163.00          |
| MSW-56       | 497.420  | 6.00 | 6.00     | 39.15  | 33.15     | 39.15          | 171.00 | 131.85    | -        | -      | 13.50             | 171.00          |
| MSW-57       | 492.700  | 3.00 | 3.00     | 22.50  | 19.50     | 22.50          | 156.00 | 133.50    | -        | -      | 22.50             | 156.00          |
| MSW-58       | 489.210  | 6.00 | 6.00     | 26.10  | 20.10     | 26.10          | 169.00 | 142.90    | -        | -      | 22.00             | 169.00          |
| MSW-59       | 492.140  | 3.00 | 3.00     | 31.50  | 28.50     | 31.50          | 143.00 | 111.50    | -        | -      | 19.50             | 143.00          |
| SSH-7        | 496.400  | 7.75 | 7.75     | 29.95  | 22.20     | 29.95          | 268.75 | 238.80    | 268.75   | 274.70 | 5.95              | 274.70          |
| SSH-17       | 496.920  | 5.70 | 5.70     | 24.48  | 18.78     | 24.48          | 252.48 | 228.00    | 252.48   | 259.70 | 7.22              | 259.70          |
| SSH-26       | 501.220  | 6.00 | 6.00     | 71.00  | 65.00     | 71.00          | 285.00 | 214.00    | 285.00   | 300.40 | 15.40             | 300.40          |
| SSH-29       | 490.930  | 3.00 | 3.00     | 22.40  | 19.40     | 22.40          | 237.55 | 235.15    | 237.55   | 281.85 | 24.30             | 281.85          |
| SSH-30       | 488.440  | 5.70 | 5.70     | 27.30  | 21.60     | 27.30          | 266.30 | 239.00    | 266.30   | 270.35 | 4.05              | 270.35          |

B.D.SHARMA  
RQP

## ANNEXURES TO CHAPTER - 5

### 5-1 Detailed Computation of Coal Production from LHD/SDL panel

  
अनंद कुमार / ANAND KUMAR GUPTA  
अवर सचिव / Under Secretary  
कोयला मंत्रालय / Ministry of Coal  
भारत सरकार / Govt. of India  
नई दिल्ली / New Delhi



B.D. SHARM  
RQP



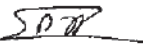
**DETAILED COMPUTATION OF COAL PRODUCTION FROM LHD/SDL PANEL*****Detail computation for production from LHD panel***

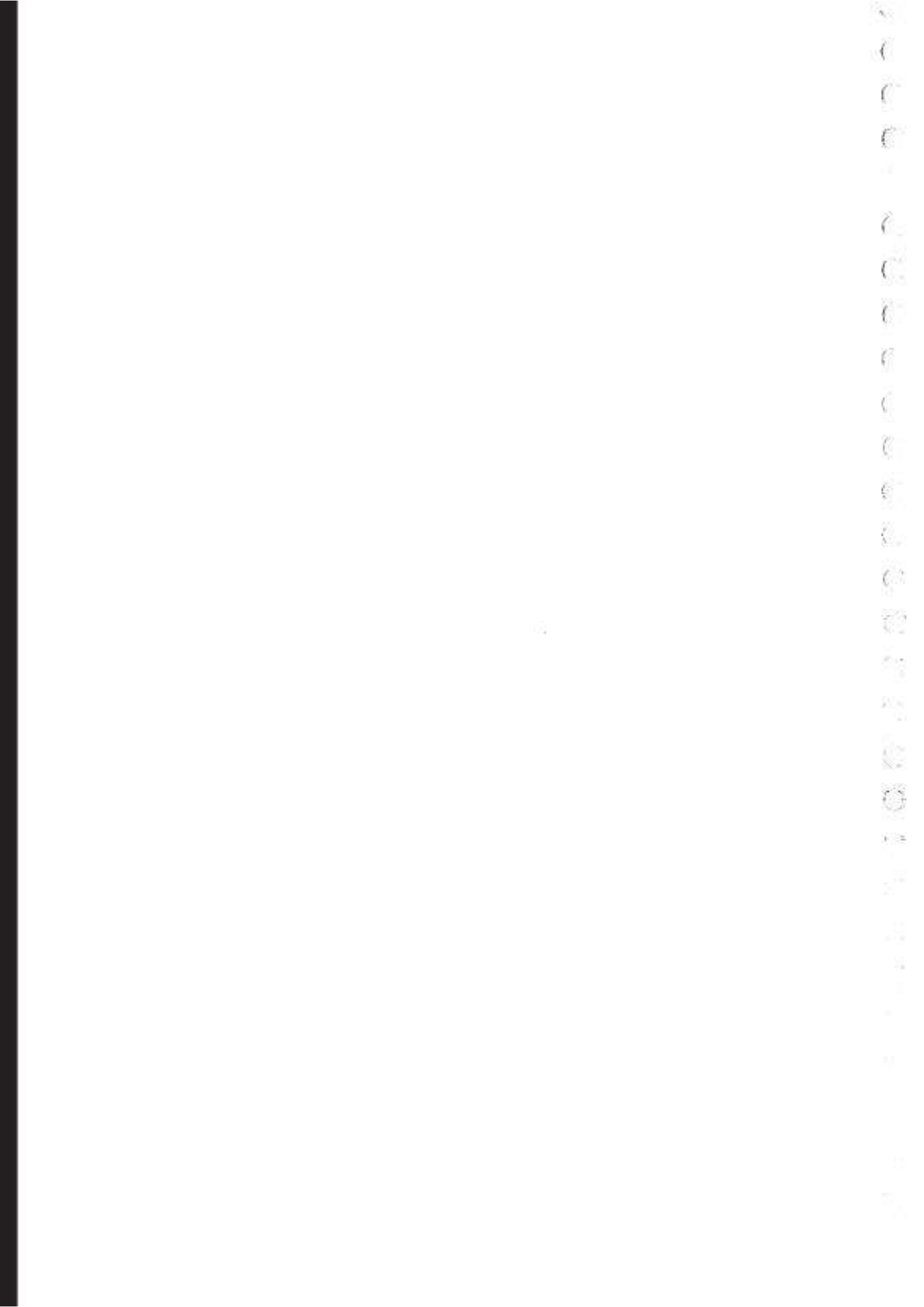
A five heading panel is expected to have number of faces at a time = 7  
 Coal production from one face with 2m avg. height and 4.8m width  
 in one round of blast with a pull of 1.2m =  $2 \times 4.8 \times 1.2 = 11.52 \text{ CUM}$   
 Tonnage of coal receipt per round of blast =  $11.52 \times 1.5 = 17.28 \text{ te}$   
 No. of such faces blast per shift = 5  
 Coal production per shift =  $5 \times 17.28 = 86.4 \text{ te}$   
 Thus production from one panel per day =  $86.4 \times 3 = 259.2 \text{ te}$   
 (in three shift operation) Say 250 te per day  
 The daily capacity of LHD to load the coal = 125 te per day  
 So, no. of LHDs required per panel =  $250/125 = 2$   
 No. of LHDs required per day for 500te of coal output =  $500/125 = 4$

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

***Detail computation for production from SDL panel***

A five heading panel is expected to have number of faces at a time = 7  
 Coal production from one face with 1.6m avg. height and 4.8m wide  
 in one round of blast with a pull of 1.0m =  $1.6 \times 4.8 = 7.68 \text{ CUM}$   
 Tonnage of coal receipt per round of blast =  $7.68 \times 1.5 = 11.52 \text{ te}$   
 No. of such faces blast per shift = 5  
 Coal production per shift =  $5 \times 11.52 = 57.6 \text{ te}$   
 Thus production from one panel per day =  $57.6 \times 3 = 172.8 \text{ te}$   
 Say 170 te per day  
 The daily capacity of LHD to load the coal = 85 te per day  
 So, no. of LHDs required per panel =  $170/85 = 2$   
 No. of LHDs required per day for 500te of coal output =  $500/85 = 5.88$   
 Say 6 per day

  
 B.D. SHARMA  
 RQP



# **ANNEXURES A**

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## **I CERTIFICATES FROM LESSEE**

**A-1 Letter of authorisation to RQP from the allottee to prepare Mining Plan**

**A-2 Certificate from the allottee that the mine will be developed as per approved Mining Plan**

## **II CERTIFICATES FROM RQP**

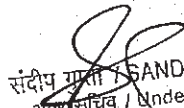
**A-3 That reserves of Geological Report have been adopted in the Mining Plan.**

**A-4 That the block area has been verified and that Mining lease area lies within the block boundaries**

**A-5 That the Mining plan has been prepared by RQP and that the RQP certificate is valid.**

## **III LETTER OF MOC**

**A-6 Letter No.34011/34/2010-CPAM dt 26-11-2010 giving suggestions after presentation of Mining plan**

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

  
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**ANNEXURE : A-1**

**CERTIFICATE**

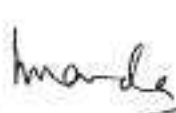
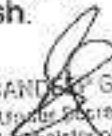
To  
B. D. Sharma  
A-121, Paryavaran Complex  
IGNOU Road  
New Delhi-110030

**Sub: Authorisation as Recognised Qualified Person for Preparation of Mining Plan of Shahpur West Coal Block, Districts Shahdol & Umaria, Madhya Pradesh.**

Dear Sir,

We hereby authorize you as Recognised Person for preparation of Mining Plan as well as discussion, if any, required for the purpose of approval of Mining Plan of the Shahpur West Coal Block, Districts Shahdol & Umaria, Madhya Pradesh.

Place: Hyderabad  
Date:

|                              |   |                                                                                      |                                                                                       |
|------------------------------|---|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Signature                    | : |  |  |
| Name of Authorized Signatory | : | Shri N. K. Nanda                                                                     | संदेश गुप्ता / SANDEEP GUPTA                                                          |
| Designation                  | : | Director (Technical)                                                                 | अवर सचिव / Under Secretary                                                            |
| Organization                 | : | NMDC Limited                                                                         | संयोजक मंत्रालय / Ministry of Coal                                                    |
| Address                      | : | Khanij Bhavan, 10-3-311/A<br>Castle Hills, Masab Tank,<br>Hyderabad -500173          | भारत सरकार / Govt. of India<br>नई दिल्ली / New Delhi                                  |





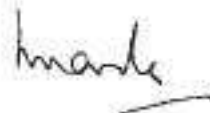
**ANNEXURE: A-2**

**CERTIFICATE**

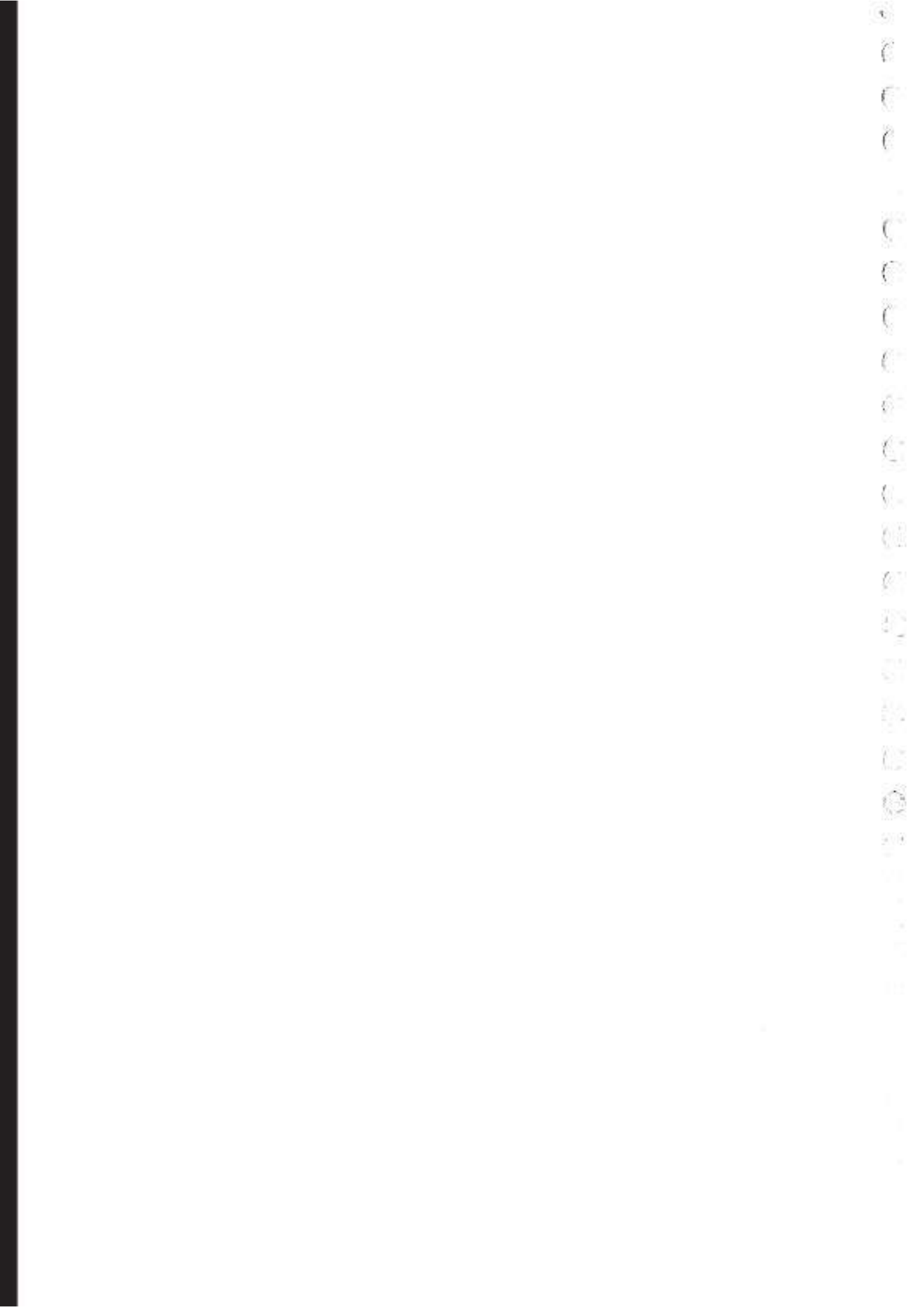
It is certified that Mining Plan of the Shahpur West Coal Block, Districts Shahdol & Umaria, Madhya Pradesh will be developed as per the approval of the Mining Plan from Ministry of Coal and all other approvals, as required, will be obtained from relevant authorities.

Place: Hyderabad

Date:

|                              |   |                                                                                     |
|------------------------------|---|-------------------------------------------------------------------------------------|
| Signature                    | : |  |
| Name of Authorized Signatory | : | Shri N. K. Nanda                                                                    |
| Designation                  | : | Director (Technical)                                                                |
| Organization                 | : | NMDC Limited                                                                        |
| Address                      | : | Khanij Bhavan, 10-3-311/A<br>Castle Hills, Masab Tank,<br>Hyderabad -500173         |

  
संदीप गुप्ता / B.D. SHARMA  
अवर सचिव / Under Secretary  
कोयला मंत्रालय / Ministry of Coal  
भारत सरकार / Govt. of India  
नई दिल्ली / New Delhi



**Extracts of the Minutes of the 437<sup>th</sup> Meeting of the Board of Directors of NMDC Limited held on 10.10.2011 at Hyderabad.**

XXXX XXXX XXXX XXXX XXXX XXXX

- 4. Item No. 437-I-04: Approval for opening of Escrow Account and deposition of required amount towards cost of Mine Closure Plan for Shahpur East and Shahpur West Coal Block, Shahdol / Umaria Dist. (M.P.) - Revised approval in view of directive of Ministry of Coal, Government of India.**

The Board deliberated upon the proposal in detail and thereafter passed the following resolution:-

**RESOLVED THAT:-**

Approval be and is hereby accorded that the plans will be implemented with such modifications / alterations as directed by Ministry of Coal while granting approvals there for in respect of the captioned Board Note.

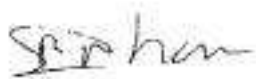
**RESOLVED FURTHER THAT:-**

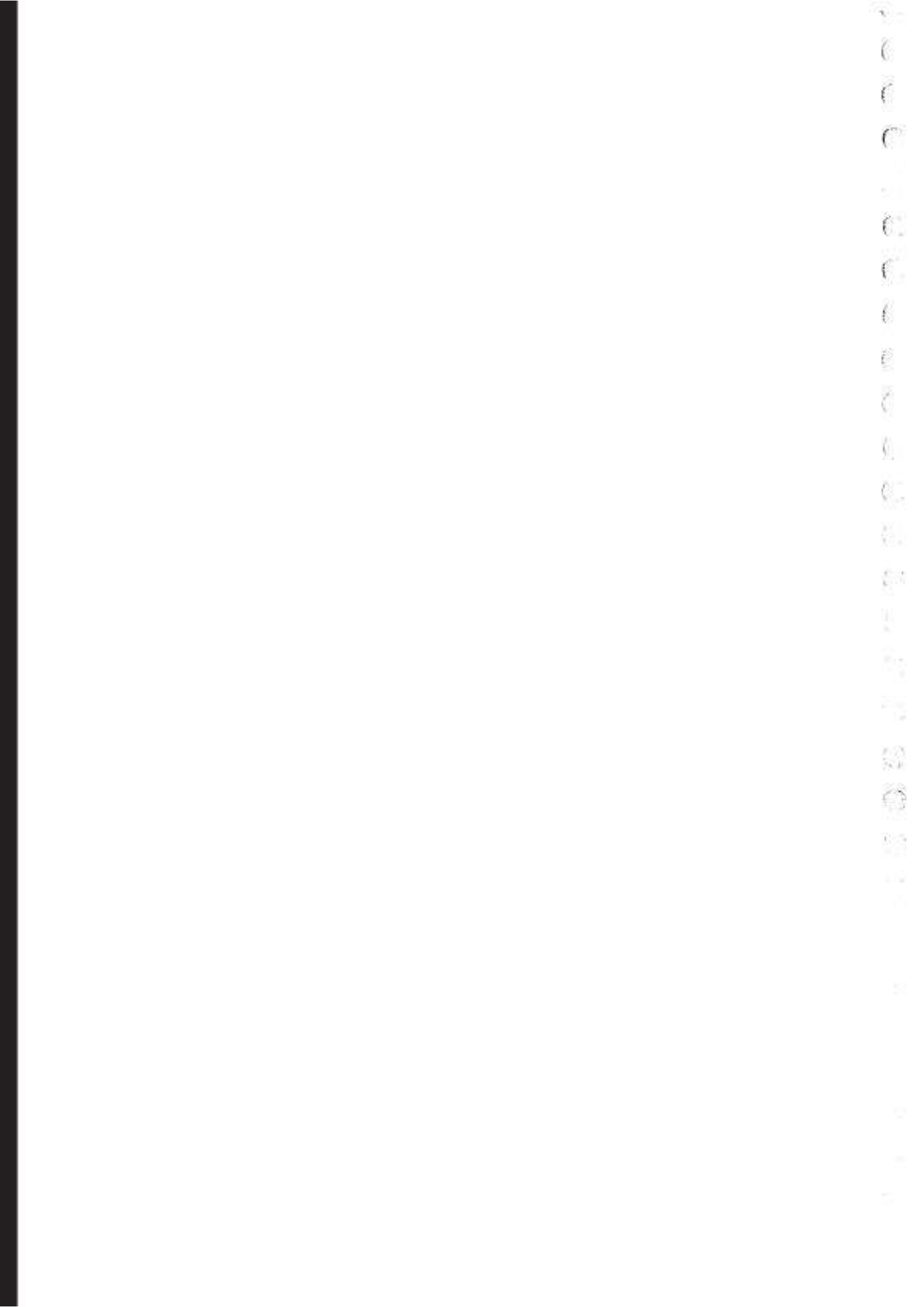
Chairman-cum-Managing Director, NMDC be and is hereby authorized to take further necessary action in this regard.

XXXX XXXX XXXX XXXX XXXX XXXX

  
**KUMAR RAGHAVAN**  
 कंपनी सचिव एवं  
 अधिवक्ता (वि. एवं सं.)  
 Company Secretary  
 Executive Director (Legal)  
 एन.एम.डी.सी. (NMDC)  
 10-3-31/1, कोयला, भारत  
 हासनगर, कोयला पार्क  
 हैदराबाद/HYD. - 500 028.



  
**B.D. SHARMA**  
 ROP



## CERTIFICATION

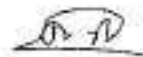
It is to certify that reserves in the mining Plan of Shahpur West Coal Block of M/s  
NMDC Limited have been adopted from the

**"Geological report for detailed exploration of coal,  
on Shahpur West Block, Sohagpur Coalfield,  
Districts Shahdol & Umaria, dt. June 2009"**

  
संदीप गुप्ता / SANDEEP GUPTA  
उप सचिव / Deputy Secretary  
मंत्रालय कोयला / Ministry of Coal  
नई दिल्ली / New Delhi

Prepared by

Mineral Exploration Corporation Ltd., Regional Institute-IV, Nagpur



**B.D. SHARMA  
RECOGNISED QUALIFIED PERSON**

**B.D.SHARMA/  
RQP**

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**ANNEXURE A-5**

**CERTIFICATE FROM RQP TO THE EFFECT THAT THE  
BOUNDARIES OF MINE LEASE APPLIED ARE SAME AS OF  
COAL BLOCK**

This is to certify that I have verified the block area with the Block boundary marked by CMPDIL along with letter No. CMPDI/DG/033.4/887 Dated 20/21-09-2007 from CMPDI to NMDC and the area covered by the Mining plan does not encroach on any other coal block

This is further certified that the applied Mine Lease area of Shahpur West Coal Block of M/s NMDC Ltd. lies within the allotted block boundaries and the boundaries of the applied mine lease area are same as that of the block..

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



**B.D. SHARMA  
RECOGNISED QUALIFIED PERSON**

**B.D.SHARMA  
RQP**



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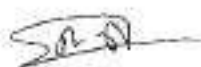
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ANNEXURE : A-6

**CERTIFICATE FROM RQP THAT THE MINING PLAN IS PREPARED  
BY THE RQP AND RQP CERTIFICATE IS VALID**

I, B.D. Sharma, duly recognise that I am a qualified person for preparing the Mining plan under rule 22 of MCR, 1960. My registration no. is RQP No./13016/18/2004-CA dt 01-06-2004 and is valid upto 31-05-2014. I have been duly authorized by M/s NMDC Ltd to prepare the Mining plan of the proposed Shahpur West Coal Block in Districts **Shahdol & Umariya** on their behalf. The various data, working plans and write up enclosed have been compiled and verified by me.

The provisions of all relevant Rules and Regulations have been considered while preparing the Mining Plan.

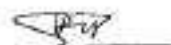


B.D. Sharma  
RQP No.: 13016/18/2004-CA



रन्दीप गुप्ता / RANDEEP GUPTA  
जोयला सचिव / Joint Secretary  
कोयला विभाग / Ministry of Coal  
भारत सरकार / Govt. of India  
नई दिल्ली / New Delhi

Place: New Delhi  
Date: \_\_\_\_\_



B.D. SHARMA  
RQP



No.34011/34/2010-CPAM  
Government of India  
Ministry of Coal

New Delhi, the 26<sup>th</sup> November, 2010

S<sup>r</sup>  
Shri A K Shukla,  
Project Manager (Coal)  
M/s National Mineral Development Corporation Ltd,  
'Khanji Bhavan', 10-3-311/A,  
Castle Hills, Masab Tank,  
Hyderabad - 500 273  
FAX NO.91-40-23538711, Tele :91-40-23538723

|                  |                                                                                                                                                                                   |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Subject :</b> | Presentation of Mining Plan (May, 2010) for Shahpur West Coal Block, Sehappur Coalfield, MP, submitted by M/s National Mineral Development Corporation Ltd. (NMDC) - observations |
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Sir,

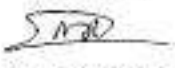
I am directed to inform that the Mining Plan presentation to the Technical Members of the Standing Committee constituted under MMDR Act, 1957 of the above mentioned project was held on 15-11-2010 at Ministry of Coal, Shastri Bhavan, New Delhi

The following suggestions were made:

- 1 The project proponent should explain the reasons for delay in submission of Mining Plan.
- 2 The block boundary on the southern side of the block at para 3.1 should be properly described.
- 3 Justification and method of driving ventilation shaft (4mx3m)-with 70° inclination instead of vertical shaft, should be furnished.
- 4 Life of the project mentioned as 84 years at para E(d) of executive summary should be corrected.
- 5 How the surface features viz. Villages, naals & roads etc. over the block would be dealt with and the basis of conclusion that there would be no impact of subsidence should be explained.
- 6 Meaning of Base date for Mining Plan given in para I(a) of executive summary as July 2011+ time taken for exploration, should be explained/corrected.
- 7 The manner in which the height of the gallery is proposed to be maintained at 1.8 mtrs in areas where Seam thickness is less than 1.8 mtrs should be explained, together with the manner of disposal of stone obtained in the process of gallery heightening.

  
Sandeep GUPTA  
Joint Secretary  
Ministry of Coal  
Govt. of India  
New Delhi

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B.D.SHARMA  
RQP



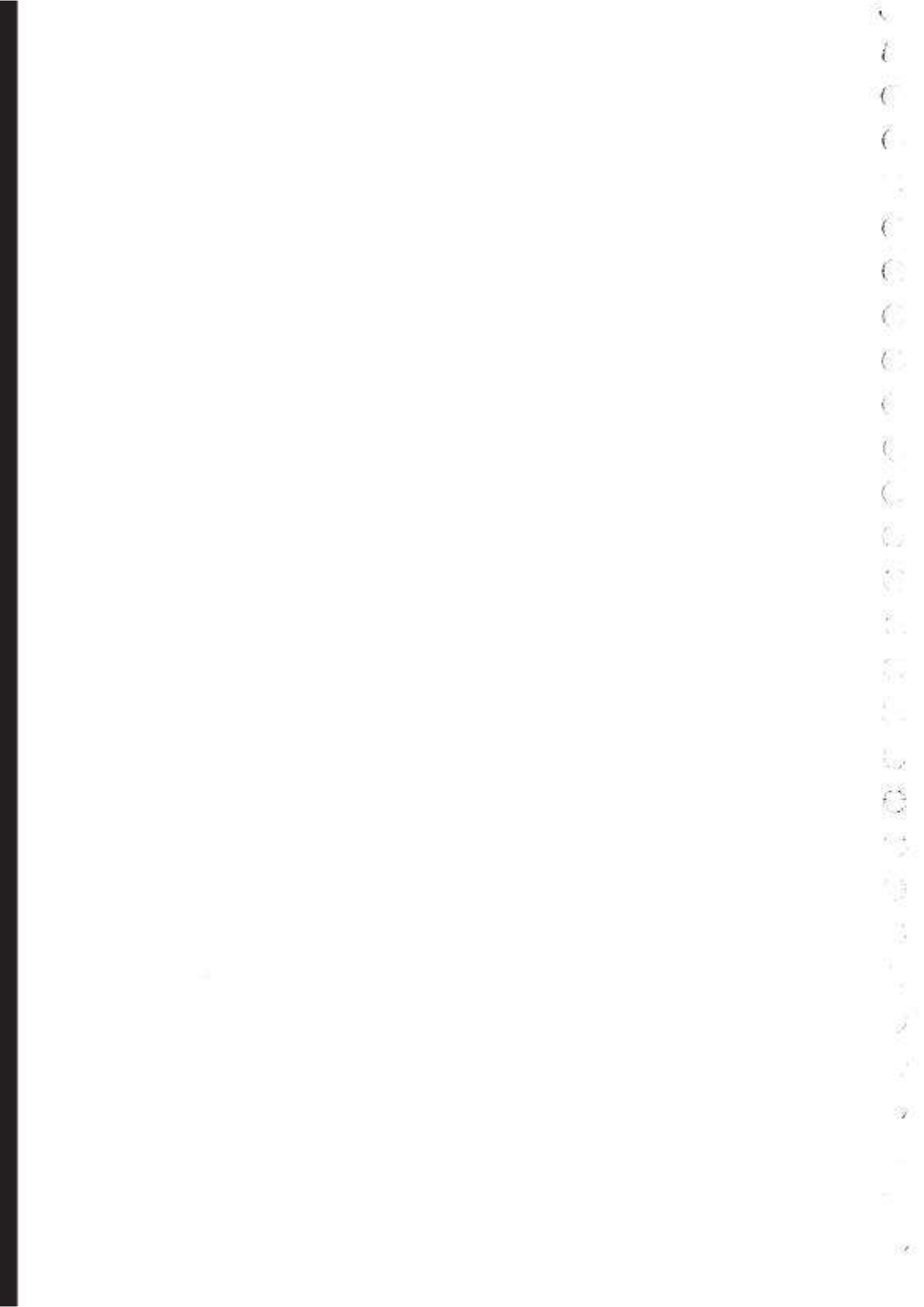
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- 8 Coal Reserves in areas having seam thickness of less than 1.2 mtrs are also to be calculated and shown in the tables covering the total reserves and the Extractable Reserves.
- 9 The Mining Plan proposes working of 3 Seams at a time and allowance has been made for Air leakage of only 20%. This should be re-examined.
- 10 The assumptions made in projecting the production level of 0.405 mtpa with SDL & LHD should be furnished giving detailed computations.
- 11 Possibility of adopting Continuous Mining System should be examined. By this method, the reserves in top Seams can be liquidated fast and the equipment then can be moved to Seam II which accounts for the largest portion of Coal Reserves. This way ventilation would be easier and production level could be increased to say 0.6 mill tons p.a.
- 12 While at para 12.1.3, it has been mentioned that the drinking water will be supplied from bore well, in an earlier paragraph it has been indicated that mine water will be used for washing as well as drinking. This should be reconciled.
- 13 Location of office should be re-examined as proposed location being close to CHP, poses the problem of air pollution.
- 14 Chapter on transport describes only district transport. It should also cover main transport and transportation of stone as well.
- 15 Figures of reserves in para 4.3.4.2 should be corrected to 4.814 in place of 3.455 as wrongly mentioned in table.
- 16 Tables 5.2 & 5.3 should include reserves of un-workable seams also.
- 17 Total requirement of power is not covered in para 12.1.4.
- 18 Total lease area of village Kushmaha Khurd in table 3.1 & annexure 3-1 is different. It should be reconciled.
- 19 Possibility of working Mineable seams blocked under Surface Constraints with development/splitting as the final operation should be examined.
- 20 Revenue map (plate no III) is not legible (particularly khasra nos). It should be re-submitted in legible form.
- 21 RQP should submit the certificate stating that lease area is within the allotted block boundary.
- 22 Details of individual boreholes should be incorporated.
- 23 The quantum of work done by MECL/CMPI or other agency, if any, under different activities viz. survey & mapping, exploratory drilling, coal sampling, core logging Proximate analysis, washability test, geo-physical logging & petrographic analysis etc should be incorporated.

संदीप गुप्ता, B.D. SHARMA  
 जवर सचिव / Under Secretary  
 खोदोला मंत्रालय / Ministry of Coal  
 भारत सरकार / Govt. of India  
 नई दिल्ली / New Delhi

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B.D.SHARMA  
 RQP



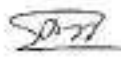
- 24 "Progressive" word should be removed from heading of chapter on Mine Closure Plan.
- 25 Reason for Mine closure and the approval of the Board of Directors of the mining company on the decision on mine closure should be furnished.
- 26 Mine closure plan should be prepared covering all the topics given in guidelines issued by Ministry of Coal.
- 27 Amount to be deposited in Escrow account is to be given in tabular form for 33 years.
- 28 Air pollution during transport of coal from mine to siding should be covered.
- 29 Post mining land use giving details of facilities to be retained/dismantled should be furnished.
- 30 All the Statutory obligations/conditions & the manner in which they will be complied with should be incorporated.

It is requested that Mining Plan incorporating above suggestions should be submitted to this Ministry in quadruplicate duly signed by RQP.

Yours faithfully,

  
 श्रीमान् सन्दीप गुप्ता  
 उप-सचिव / Under Secretary  
 कोयला मंत्रालय / Ministry of Coal  
 भारत सरकार / Govt. of India  
 नई दिल्ली / New Delhi

(Sandeep Gupta)  
 Under Secretary (CPAM)  
 Tele : 011 23073934  
 Fax : 011 23387738



B.D.SHARMA  
 RQP

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