PROJECT REPORT ON REVISION OF SHOBHAPUR PROJECT.

SUMMARISED DATA

Sr. No.	Particulars	Unit	As per approved F.R.	As per revised P.R.
1	2	3	4	5
I.	**TECHNICAL INDICES**			
1.	**RESERVES**			
i)	Geological(net)	m.te	39.80	39.687
ii)	Mineable	m.te	-	33.949
iii)	Extractable	m.te	25.70	22.574
2.	**TARGET OUTPUT PER ANNUM**	m.te	0.95	(1.00)
3.	**LIFE OF MINE**	years	27	25
4.	**THICKNESS OF SEAMS**			
i)	Upper Workable Seam	metres	1.46 to 1.91	
ii)	Lower Workable Seam	-do-	1.85 to 4.10	
iii)	Bagdona Seam	-do-	1.75 to 2.10	
5.	**GRADIENT OF SEAMS**	Degrees	6 to 7° (1 in 8 to 1 in 10)	
6.	**QUALITY OF SEAMS**			
i)	Upper Workable Seam	K.Cal/kg	3200-3725(Inclusive of Band)	
ii)	Lower Workable Seam	-do-	3350-4746	-do-
iii)	Bagdona Seam	-do-	4300-5230	-do-

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7.	EXPECTED QUALITY OF COAL DESPATCH (R.O.M. of U.W.S. & L.W.S. only)		GRADE 'F'	
II	ECONOMIC INDICES			
1.	INITIAL CAPITAL OUTLAY			
i)	Total	Rs. lakhs	1060.21	1996.87
ii)	Per te. of rated annual production	Rs.	111.60	199.69
iii)	Additional capital now required for revision(over capital upto March 1979)	Rs. lakhs	-	1757.49
2.	CAPITAL REQUIREMENT FOR PLANT & MACHINERY			
i)	Total	Rs.lakhs	657.48	1300.95
ii)	Per te. of rated annual production	Rs.	69.21	130.10
3.	CAPITAL REQUIREMENT ON TOWNSHIP ETC.			
a)	Total			
i)	Initial	Rs. Lakhs	200.56	252.16
ii)	Net	-do-	142.93	157.95
b)	Per Tonne			
i)	Initial	Rs.	21.11	25.22
ii)	Net	Rs.	15.05	15.80
4.	ESTIMATED COST OF PRODUCTION			
i)	At 100% Capacity Level	Rs.	39.83	67.72
5.	SELLING PRICE PER TE.	Rs.	38.25	55.00

1	2	3	4	5
6.	PROFIT/LOSS PER TE.			
i)	At 100% Capacity Level	Rs.	(-)1.58	(-)24.34
7.	ESTIMATED ANNUAL PROFIT/LOSS			
i)	At 100% Capacity Level	Rs,Lakhs	(-)15.01	(-)243.40
8.	MINIMUM SELLING PRICE TO YIELD 12% RETURN ON EQUITY			
i)	At 100% Capacity Level	Rs.	47.79	92.83
9.	MANPOWER	No.	2312	2242
10.	OUTPUT PER MANSHIFT			
i)	At 100% Capacity Level	te.	1.50	1.70
11.	MANSHIFT REQUIRED PER 1000 TES. PRODUCTION	No.	667	588
12.	ANTICIPATED DATE OF OPENING REVENUE ACCOUNT		1978-79	1982-83
13.	ESTIMATED YEAR OF ACHIEVING TARGET PRODUCTION		1981-82	1986-87

PROJECT REPORT ON REVISION
OF SHOBHAPUR PROJECT.

CHECK LIST

I. INTRODUCTION

This report deals with revision of Shobhapur Project which forms part of Pathakhera Coalfield. The project is captive to Satpura Thermal Power Station which is about 6 kms. away to the east of the project. The nearest railway station Ghoradongri on Nagpur-Itarsi main line of Central Railway is about 18 kms. away from the project. The project is also communicated by tarred road.

Feasibility Report for Shobhapur Project was drawn in March 1974 for the production capacity of 0.95 mte. per annum. The Project Report was approved by Government of India in January '75 with a capital outlay of 1060.21 lakhs. The investment upto 31.3.79 has been Rs. 239.38 lakhs. The production envisaged for 79-80 is 0.20 million tonnes.

The revision of the Feasibility Report has been considered necessary for the following major reasons:

i) To change the technology of winning of coal deposits from longwall system of mining(as envisaged in earlier report) to mechanised bord and pillar system of mining

ii) To provide for additional intake to cater for the ventilation requirements.

iii) If possible, to enhance the production capacity of existing units.

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II. PRODUCTION

1. RESERVES

a) Total Net Reserves — 39.687 million tonnes

b) Total Mineable Reserves — 33.949 million tonnes

c) Total extractable reserves — 22.574 million tonnes

2. TARGET OUTPUT PER ANNUM — 1.0 million tonnes

3. GRADE — 'F'

4. INFRASTRUCTURES

A. POWER

a) Existing

Shobhapur Project receives power at 3.3 KV by means of overhead lines from Central Sub-Station (33/3.3KV) at Pathakhera I. The Central Sub-Station is supplied power at 33 KV by MPEB from their Satpura Power House situated at a distance of about 3 kms. from Central Sub-Station.

The power demand of Central Sub-Station at present is 2600 KW of which Shobhapur project consumes around 500 KW.

b) Proposed Arrangements

A separate 33 KV overhead feeder from MPEB has already been drawn upto this project site. A new 33 KV/3.3KV sub-station will be constructed at Shobhapur project. Supply from central sub-station at Pathakhera will be discontinued thereafter.

The total connected load after revision would be about 6290 KW. The Shobhapur colony which will be situated at about 6-7 kms. away from Sobhapur will be conveniently fed from Pathakhera sub-station. So the total connected load to Shobhapur sub-station is

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estimated to be 5890 KW. Considering the [illegible] diversity factor, maximum demand is estimated as [illegible] 2350 KW i.e. with the corrective power factor of .9, maximum demand is assessed as 2600 KVA.

It is proposed to install 33KV/3.3KV main sub-station at the load centre i.e. near the proposed winding house. The capacity of this sub-station will be 2x2500KVA,33KV/3.4KV. The necessary provisions for controls and protections have been kept. The average consumption is expected to be 14.67 KWH per tonne. Arrangements for signalling and telecommunication have been kept in the report.

B. WATER SUPPLY

The total project manpower is 2242. The total water demand assessed is 0.275 MGD. The project water supply arrangements would form part of the integrated water supply arrangements having capacity of 1.2 M.G.D. Water reservoir of Tawa dam would be the source of water supply.

C COAL HANDLING ARRANGEMENTS

a) Existing

At present ROM coal from the mine is transported by tipping trucks onto MPEB bunker near Pathakhera Mine No. I.

b) Proposed Arrangements

Coal from this mine is proposed to be discharged onto 1000 tonnes ground bunker(with increase in capacity upto 5000 te. by spreading 4000 tonnes coal at surface with dozer etc.). Coal from bunker is proposed to be fed into MPEB surface belt conveyor system which shall be constructed by MPEB.

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D. TRANSPORT

a) Existing

The existing transport arrangement is by rope haulages.

b) Proposed Arrangements

The main trunk, cum the trunk and gate transport system will be by series of belt conveyors installed in Lower Workable and Upper Workable Seams. Coal from different seams would ultimately be discharged onto 450 tonnes underground bunker near the incline No. 2. Through a feeder conveyor coal from this underground bunker will be fed into main trunk transport system. The light and medium duty chain conveyors are the face transport equipment.

Material transport will be through system of direct/endless haulages. From surface, material would be fed through direct haulage or by winder installed over proposed DC shaft.

Men are proposed to be transported through DC shaft which has been centrally located for the purpose.

5. SAND STOWING ARRANGEMENTS :

NOT REQUIRED

6.	MANPOWER	EXISTING	PROPOSE.
a)	Officers	8 1/3	40 1/3
b)	Monthly paid	67 2/3	286 2/3
c)	Daily Rated		
	i) Unskilled(Cat.I &II)	169	906
	ii) Semi-Skilled(Cat. III)	36	541
	iii) Skilled(Cat. IV & VI)	32	468
d)	Piece Rated	39	-
e)	Casual Daily Rated	362	-
f)	Casual Piece Rated	245	-
	TOTAL	959	2242

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7. O.M.S(Tonnes)

	At various capacities as under			
	80%	85%	90%	100%
i) Underground	1.70	1.80	1.91	2.12
ii) Overall	1.36	1.44	1.53	1.70

8. SCHEDULE OF PRODUCTION

a)

year	80-81	81-82	82-83	83-84	84-85	85-86	86-87
Production capacity (in m.te)	0.25	0.35	0.40	0.60	0.75	0.90	1.00

b) Year of Opening Revenue A/C 1982-83

III TECHNOLOGY

1. AVERAGE STRIPPING RATIO

NOT APPLICABLE

2. LIFE IN YEARS 25

3. TOPOGRAPHY AND GEOLOGY

Pathakhera coalfields is flanked on its eastern border by Satpura hills. The area slopes towards west, the elevation ranging from 410 metres to 440 metres above mean sea level. Tawa river which flows through the property forms the main drainage system of the area. The highest flood level(HFL) recorded at a place about 1.24 kms. from the mine openings is 409.50 above the mean sea level(in Aug. 1975). The reduced level of mine openings is 432.0 metres and above, which is more than 5 metres above HFL.

The rocks ... formations comprising of sandstones, shales and coal seams exist in Pathakhera Coalfield. The coal deposits belong to Barakar measures. The total thickness of Barakars is around 475 metres. The middle 150 metres of Barakars is composed predominantly of sandstone with shale and coal seams. All the three workable seams of the area occur in this zone.

The property is traversed by basic intrusive of Dolerite dyke on its southern part of the boundary. One dyke 'D' exposed in Tawa River of about 25-30 metres thickness is likely to be encountered in the mine workings. The exact extent, trend etc. is to be established when the area is proved further. The property appears to be structurally not much distrubed as no major fault, especially in the proved area is expected.

4. SEAMS TO BE WORK D

There are three workable coal seams in the area. These are:-

i) Upper Workable Seam(UWS)
ii) Lower Workable Seam(LWS)
iii) Bagdona Seam

5. AVERAGE THICKNESS OF THE SEAMS

The seams, their thickness and nature of parting is given in Table 'A' below:

TABLE A

Seam	Thickness	Parting
Upper Workable Seam	1.46-1.91 m	15.0 to 20.0 metres consists of sandstone
Lower Workable Seam	1.88-4.10 m	50.0 metres mostly consists of alternate layers of sandstone shale and coal bands.
Bagdona Seam	1.75 to 2.10 m	

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6. DIP OF THE SEAMS

The area under consideration is characterised by ENE-WSW strike with 6-7 degree(1 in 8 to 1 in 10) northerly dips.

7. TYPE

Non-Coking Coal.

8. AVERAGE UHV

U.W.S	4525 to 5000 (Excluding Bands)
	3200-3725 (Including Bands)
L.W.S	4700-4980 (Excluding Bands)
	3350-4746 (Including Bands)
Bagdona	5000-5878 (Excluding Bands)
	4300-5230 (Including Bands)

9. WASHABILITY

Washability characterists have not been studied so far.

10. MINING TECHNOLOGY

(A) MODE OF ENTRY

The Upper Workable and Lower Workable Seams have already been approached by a pair of inclines and air shaft (presently upto UWS-to be deepened upto LWS) and additional opening by way of shaft to meet the ventilation requirement has been proposed for the project. Upper Workable and Bagdona Seams of different sectors are proposed to be entered by suitable drifts/staple shafts of adequate cross-section for ventilation purposes and for coal, material and men transport.

...viii.

(B) METHOD OF MINING

Coal is hard, banded in nature and occurs in layers. The immediate roof of UWS is soft and grey/carb. shale of variable thickness ranging from 0.90 to 1.61 metres. The shale roof will have to be dressed down thoroughly thereby increasing the average height of gallaries, in U.W.S. to about 2.5 metres. The immediate roof of L.W.S. is sandstone and at places it is shale. The immediate roof of Bagdona Seam is fairly strong shale and may need to be supported occasionally. In most of the area there are no important surface features except Tawa river in north and north east part of the area and as such caving is possible in major part of the property except under built up area and under Tawa river where partial extraction/development as the final operation is recommended. The gradient of seams and their roof conditions are favourable for winning coal by mechanised means.

Because of higher thickness of LWS, this seam is suitable for exploitation with Bord and Pillar. The tendency of immediate carb./grey shale just above UWS is to part off easily. Supporting of this immediate roof either by Bord & Pillar or in longwall is fairly difficult. (Wining of Upper Workable Seam by longwall was considered at depth. With such a soft immediate shale roof except for shield support system no other support system would work effectively. The shield support system longwall face is quite costly and has not been tried in the country as yet. Hence Bord and Pillar method of mining with dressing down of immediate shale roof is suggested for this seam also. On techno-economic considerations (refer para 14.5.4.2 and Annexure II) development and depillaring by side loaders has been

envisaged in this report. Production from one pitch in UWS would give about 0.117 million tonnes per annum and the production from one such pitch in LWS would be 0.135 million tonnes per annum.

Bagdona seam is suitable for longwall by caving due to suitable seam thickness and shale as immediate roof which caves in more easily than sandstone. The longwall faces are suggested to be worked with shearer either with individual hudraulic props or with powered supports as face support in future. One such longwall shearer with powered support face is being considered for Bagdona Seam in Pathakhera Mine No. I. Longwall shearer face, if proposed now for Bagdona Seam will have faster rate of advance compared to advance of Upper and Lower Workable Seams, proposed to be won by mechanised Bord and Pillar method of mining. Till upper seams are minedlongwall panels by caving at Bagdona Seam cannot be worked. The extractable reserves of Bagdona seam by longwall system would be about 5 million tonnes.As such longwall panel may be required to be worked after about 12-15 years. The selection of face equipment for working this seam with longwall system of mining is not being considered at this stage.

(C) PRODUCTION PARAMETERS

The Seamwise production target envisaged to be achieved would be as follows:

i)	Upper Workable Seam (Five panels)	0.117x5=0.585 m.tes.
ii)	Lower Workable Seam (Three panels)	0.135x3=0.405 m.tes.
iii)	Dip Development heading in UWS	1x0.033 =0.033 m.tes.
iv)	Dip Development heading in LWS	1 x 0.054 =0.054 m.tes.
		=1.077 m.tes.

Say 1.00 million tonnes per annum.

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(D) VENTILATION

The total quantity of air required for Shobhapur is 18000 cu.m./min. A single fan to deal with high quantity of air has not been considered appropriate and instead two fans running in parallel over the single airshaft(6 metres dia.) has been proposed in the report. Each main mechanical ventilator will have capacity of about 230 cu.m./sec. and 75-100 mm water gauges. With two such fans efficiency of 65 to 70% can easily be achieved and as such two fans will be in a position to meet with the air requirement of the mine. In addition at the initial stages and towards the exhausting stage of mine and as well to deal with emergency, two separate fans would be more useful over the single high capacity fan. Auxiliary fan with necessary complements of ducting etc. have also been provided for ventilating development headings.

(E) WINDING

Men and material are proposed to be lowered through DC shaft and for the purpose an electrically driven winding engine is proposed.

IV CAPITAL INSTALLATION AND PURCHASES

1.	Capital Investment(Rs.Lakhs) (Break-ups detailed in Annexure A)	1996.87
2.	Foreign Exchange Requirement	-
3.	Capital Requirement for Plant and Machinery(Rs.lakhs)	1300.95
4.	Capital Requirement for Plant and Machinery per te.(Rs.)	130.095

V. FINANCE

1.	Reference of provision for fund in the budget if any				-
2.	Levels of Production	80%	85%	90%	100%
	Production in m.tes	0.80	0.85	0.90	1.00
3.	Variable cost per te. in Rs.				
	i) Stores				9.00
	ii) Power				1.47
	iii) Royalty				-
	iv) Misc. Expenditure				0.60
	v) Interest on working capital				0.55
	TOTAL				11.62
	Less				
	i) Subsidy for sand stowing				-
	ii) Gassiness				-
4.	Fixed cost per tonne in Rs.				67.72
5.	Total cost per tonne in Rs.				79.34
6.	Capital Investment per tonne of annual output(Rs.)				199.69
7.	Equity capital per te.(Rs.)				112.45
8.	Return on Equity @ 12%(Rs.)				13.49
9.	Minimum selling price to yield the above return(Rs.)				92.83
10.	Present selling price per tonne(Rs.)				55.00
11.	Profit/Loss per tonne(Rs.)				(-)24.34
12.	R.O.E				(-)21.65
13.	R.O.E Gross i.e before charging interest on loan capital				(-)7.60
14.	Net profit(Rs.per tonne) after charging interest on loan capital				-
15.	Net annual profit/loss at production level(Rs. Lakhs)				

80%	85%	90%	100%
(-)330.16	(-)308.47	(-)286.74	(-)243.40

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VI	MARKETING	
1.	Linkage	Satpura Thermal Power Station(MPEB)
2.	Marketability/Result of market survey/demand	Fully linked to above power station.
3.	Current market price (Rs. per tonne)	Rs. 75.00
		With the substantial production in Shobhapur Project from UWS its sale price would be around Rs. 55.00per tonne and same has been considered in this report

VII PERSONNEL

Social Consideration and Overheads

The project is expected to give employment to 2242 persons in all against the existing manpower strength of 959 as on 20.2.80.

VIII CONCLUSION

Because of the need to change the technology for exploitation of deposits from the methods envisaged in the earlier approved Feasibility Report it would be necessary to revise the Project Report. Arising out of this change in technology there is marginal increase in production which would meet the part requirement of Satpura Thermal Power Station.

The project is not economically viable at the selling price of Rs. 55.00 per tonne; but keeping overall national economy in view, it is advantageous to MPEB to take coal from nearby source rather than getting supplies from far off sources.

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PROJECT REPORT ON REVISION OF SHOBHAPUR PROJECT.

ANNEXURE A

CHECK LIST

Amt. in lakhs

A/C head	Particulars	Expenditure as on 31st March 1979	Total amount
01	Land	-	12.50
02	Buildings		
	a) Service	-	41.97
	b) Residential	20.90	182.14
	Sub Total of 02	20.90	224.11
03	Plant and Machinery	137.42	1300.95
04	Furniture & Fittings	-	3.00
05	Railway Siding	-	-
06	Vehicles	0.07	9.07
07	Prospecting & Boring		
08	Development		
	081 Capital outlay in mines 082 Roads & Culverts 083 Water supply 084 Pilot Schemes, R&D P.R. preparations	80.99	447.24
	Sub-Total of 07 & 08		
	TOTAL CAPITAL(INITIAL)	239.38	1996.87
	LESS SUBSIDY(Miners Quarters & Water Supply)		94.21
	TOTAL NET CAPITAL		1902.66

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PROJECT REPORT ON REVISION
OF SHOBHAPUR PROJECT.....

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PROJECT REPORT ON REVISION OF SHOBHAPUR PROJECT

LIST OF APPENDILES

S.No.	PARTICULARS	APPENDIX NO.
1.	Statement showing estimated phased capital investment and depreciation	A
2.	Statement showing requirement of land cost etc. for 10 years	A.1
3.	Statement showing estimated additional requirement of capital on buildings	A.2
4.	Statement showing the estimated capital expenditure on service buildings	A.2.1
5.	Statement showing the estimated capital expenditure(additional) for Residential buildings	A.2.2
6.	Statement showing building cost Index	A.2.3
7.	Statement showing unit cost of BPE type quarters	A.2.4
8.	Summary of investment on Plant & Machinery under various heads	A.3
9.	Statement showing additional capital requirment for Plant and Machinery	A.3
10.	Statement showing estimated capital expenditure for electrical plant and machinery	A.3.1
11.	Statement showing capital investment on coal handling plant	A.3.2
12.	Statement showing additional capital investment on Pumps, Pipes, & Pipe fittings etc.	A.3.3
13.	Statement showing investment on workshop equipments	A.3.4

S.No.	PARTICULARS	APPENDIX NO.
14.	Statement showing estimated capital investment on furniture and fittings	A.4
15.	Statement showing estimated investment on railway siding	A.5
16.	Statement showing estimated capital expenditure on prospecting and boring	A.7
17.	Statement showing additional estimated investment on capital outlay in mines	A.8.1
18.	Statement showing estimated additional capital investment on roads & culverts	A.8.2
19.	Statement showing forecast of cost estimates for the water supply arrangements	A.8.3
20.	Statement showing estimated capital expenditure on research, development etc.	A.8.4
21	Statement showing the estimated revenue expenditure during the development period	A.9
22.	Statement showing the administration charges during development period in cost of 'Development Others'	A.9.1
23.	Statement showing the interest on capital during development period included in the cost of 'Development Others'	A.9.2
24.	Statement showing jobwise/categorywise, Existing and total manpower requirement	B
25.	Statement showing jobwise/categorywise requirement of manpower, wages and benefits	B 1
26.	Statement of Unit cost estimates	C
27.	Estimated cost and profitability at various levels of production	C 1

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PROJECT REPORT ON REVISION OF SHOBHAPUR PROJECT.

LIST OF ANNEXURES

S.NO.	PARTICULARS	ANNEXURE NO.
1.	Statement showing carb./grey shale above upper workable seam(as indicated by lithologs of boreholes upto lower workable seam)	I
2.	Techno-Economic comparison of different methods of development of bord and pillar panel	II

PROJECT REPORT ON REVISION OF SHOBHAPUR PROJECT

LIST OF PLATES

S.NO.	PARTICULARS	PLATE NO.	DRAWING
1.	Location plan	I	3-00227
2.	Analytical section of boreholes	II	2-00274
3.	General layout of mine	III	2-00310
4.	Plan showing floor contours, existing workings, proposed panels etc in U.W.S.	IV	2-00314
5.	Plan showing floor contours existing workings, proposed panels etc. in L.W.S	V	2-00316
6.	Plan showing floor contours transport arrangements, ventilation and proposed longwall panels in Bagdona Seam	VI	2-00317
7.	Development by side loaders	VII	3-00362
8.	Depillaring by side loaders showing syste of supports	VIII	2-00313
9.	Schematic diagram showing system of supports in mechanised depillaring panel for seam thickness more than 3 metres	IX	3-00360
10	Schematic layout of coal and materials transport	X	3-00363
11.	C.H.P. alignment	XI	1-00259B
12.	Schematic diagram of power distribution-Surface	XII	1-00465
13.	Schematic diagram of underground power distribution for Lower Workable Seam	XIIIA	1-00466
14.	Schematic diagram of Underground power distribution for Upper Workable Seam	XIIIB	2-00312
15.	Harmonogram	XIV	1-00412
16.	Pert Net work	XV	1-00413

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PROJECT REPORT ON REVISION OF SHOBHAPUR PROJECT.

CHAPTER I

I. INTRODUCTION

1.1 This report deals with the revision of Shobhapur Project. The project forms part of the Pathakhera Coalfield. Pathakhera Coalfield forms southern part of the Satpura basin, which is a part of the Pench-Kanhan-Tawa Valley Coalfield. This is the western most coalfield presently being exploited.

1.2 Four mines namely, Pathakhera-I, Pathakhera-I Satpura I & Satpura II are presently working to meet the requirment of the Satpura Thermal Power Station. Due to expansion of the Power House, Feasibility Report for Shobhapur Project was drawn to meet the part requirement. The annual capacity of the project was envisaged to be 0.95 million tonnes.

1.3 The Project was approved by Government of India in January 1975 for a capital outlay of Rs.1060.21 lakhs. The production from the project for the year 1978-79 was about 0.051 million tonnes. The production envisaged for the year 1979-80 is 0.20 million tonnes.

1.4 Shobhapur Project forms part of G.S.I. Sector II(refer Plate I). The total leasehold area considered for this report is 4.38 sq.km. i.e. upto the present indicated reserves limit.

CHAPTER II

MARKET AND JUSTIFICATION FOR REVISION

2.1 DEMAND

2.1.1 Satpura Thermal Power Station of MPEB has already been sanctioned for the increased capacity upto 722.50 MW by the Government. Central Electricity Authority has already cleared 8th and 9th sets thereby increasing the installed capacity upto 1142.50 MW.

2.1.2 The demand of power coal for Satpura Thermal Power Station was reviewed in a meeting held by the Secretary, Department of Coal alongwith WCL, CEA, MPEB, MSEB authorities on 26th March 1979. The coal requirement of Satpura Thermal Power Station linked to WCL, as evolved in the above meeting, has been stated as given in Table I below:

TABLE I

Figure in million tonnes

Thermal Power Unit	Capacity MW	Schedule of commissioning	Requirement of coal in million tonnes 79-80	80-81	81-82	82-83	83-84	84-85	87-88
Existing	5x62.5	Existing	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Extension Phase I									
6th Set	1x200	79-80	0.40	0.60	0.70	0.70	0.70	0.70	0.70
7th Set	1x210	79-80	0.20	0.50	0.70	0.70	0.70	0.70	0.7
Extension Phase II									
8th Set	1x210	81-82	-	-	-	0.40	0.60	0.70	0.7
9th Set	1x210	81-82	-	-	-	0.20	0.50	0.70	0.7
	1142.50		1.60	2.10	2.40	3.00	3.50	3.80	3.8

2.2 COAL AVAILABILITY

2.2.1 To meet the above coal demand, availability and linkage of coal from Pathakhera area collieries and from other sources were also assessed in the said meeting as given in Table No. II below:

TABLE II

Figure in million tonnes

Sr. No.	Coal Mines	Capacity	79-80	80-81	81-82	82-83	83-84	84-85	87-
1.	Pathakhera Mine No. I & II (Before revision)	0.90	1.21	1.21	1.21	1.21	1.15	1.15	1.15
2.	Satpura Mine No. I & II (Before revision)	0.45							
3.	Shobhapur (before revision)	0.95	0.22	0.32	0.42	0.52	0.62	0.72	0.80
4.	Sarni	0.42	-	0.06	0.18	0.25	0.30	0.36	0.36
5.	Sarni Ext. (Proposed)	0.36	-	-	0.06	0.18	0.25	0.30	0.30
6.	Dulhera (Proposed)	0.50	-	-	-	-	0.06	0.18	0.42
7.	Tawa(Proposed)	1.00	-	-	-	-	0.06	0.18	0.42
	Total availability from Pathakhera Mines	4.58	1.43	1.59	1.87	2.16	2.44	2.89	3.45
	Availability from other sources								
8.	Stock at Pathakhera		0.05	-	-	-	-	-	-
9.	Pench Area		0.10	0.20	0.20	0.30	0.30	0.30	0.30
10.	Sohagpur area (Dhanpuri)		-	0.31	0.33	0.54	0.76	0.61	0.80
	TOTAL		1.60	2.10	2.40	3.00	3.50	3.80	3.80

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2.2.2 Recent drilling in Sarni area has indicated that most of the seams except Seam-I are thinned down to less than 1.00 metre and as such the results are not encouraging for opening up new mines in the area for the present. The Project Report for Satpura Mine No. I & II has already been revised to production capacity of 0.60 million tonnes per annum. Pathakhera Mine No. I & II is also being revised upto about 1.32 million tonne per annum capacity. Similarly, Shobhapur Project is being identified to be revised upto 1.00 million tonnes per annum(as explained in para 10.1.2). The Sarni Expansion Project is not proposed to be taken up now as some areas are to be kept reserved for future exploitation since Pathakhera Mine No. I & II will exhaust faster due to proposed expansion. The latest (tentative) coal availability position is given in Table No. III below:

TABLE III

Figure in million tonnes

Sr. No.	Coal Mines	Capacity	79-80	80-81	81-82	82-83	83-84	84-85	87-88
1.	Pathakhera Mine No. I & II (After revision) (Tentative)	1.32	0.76	0.76	0.81	1.08	1.10	1.12	0.90
2.	Satpura Mine No. I & II (Revised PR submitted to Govt.)	0.60	0.38	0.42	0.47	0.51	0.51	0.51	0.51
3.	Shobhapur Project(Revised PR under Preparation)	1.00	0.20	0.25	0.35	0.40	0.60	0.75	0.85
4.	Sarni	0.42	-	0.06	0.18	0.25	0.30	0.36	0.36
5.	Tawa Project	1.00	-	-	-	-	0.06	0.18	0.42
	TOTAL	4.34	1.34	1.49	1.81	2.24	2.57	2.92	3.04

2.2.3 Table No. I & III indicate that there is still shortfall in supplies of coal from Pathakhera Coalfield and the shortfall has to be covered up by importing coal from Pench-Kanhan areas. Dhanpuri (Sohagpur) coal is now linked to the proposed Birsingpur Power Station of MPEB. The yearwise shortfall for Satpura Power Station as envisaged now is shown in Table No. IV-.

TABLE IV

Figure in million tonnes

	1979-80	80-81	81-82	82-83	83-84	84-85	87-88
Demand	1.60	2.10	2.40	3.00	3.50	3.80	3.80
Availability of coal from Pathakhera area	1.34	1.49	1.81	2.24	2.57	2.92	3.04
Supplies from Pench-Kanhan	0.26	0.61	0.59	0.76	0.93	0.88	0.76

2.3-. JUSTIFICATION FOR REVISION

In order to ensure production as envisaged in Table No. III from Pathakhera mines, it is essential to take following measures:

a) To change the technology for wining of coal deposits with the extra emphasis on achieving the targetted production at the earliest.

b) To enhance the production capacity of existing units.

c) To cut down the developmental time to the minimum.

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2.3.1 (A) CHANGE IN TECHNOLOGY

The earlier approved feasibility report had envisaged winning of Lower Workable Seam by Bord and Pillar with the extraction of pillars so formed on knife edge method. Upper Workable and Bagdona Seams were proposed to be worked by retreating longwall with flight loading. Upper Workable Seam is now proposed to be won by mechanised Bord and Pillar method of mining. Lower Workable Seam is also now envisaged to be worked with side loaders for development and depillaring. Eight such mechanised Bord and Pillar panels(development/depillaring) in both the seams would produce about 1.00 million tonnes of coal per annum. The technology proposed would facilitate achieving the targetted production at the earliest. The method of winning proposed earlier requires to be changed to the one proposed now for the following reasons as well:-

i) Upper Workable and Bagdona Seams were envisaged to be worked by retreating longwall with flight loaders and hydraulic props as face equipment. Such longwall faces which are in operation in two mines of WCL are not giving encouraging results. Moreover, the immediate shale roof above Upper Workable Seam is not self supporting and comes down with blasting. This would increase the height of the longwall face above 2.5 metres thus making the longwall face inefficient in operation. It is now proposed to win Upper Workable Seam by mechanised Bord and Pillar using coal cutting machines and Side loaders as face equipment. The reasons for the choice of this method of exploitation of coal seams have been brought in para 14.5.4.2 and Annexure II.

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ii) Lower Workable Seam was envisaged to be developed on Bord and Pillar and extraction of the developed pillars was to be done by knife-edge method. Directorate General of Mines Safety now do not approve extraction of pillars by this method of mining. The seam thickness ranges from 1.88 to 4.10 metres and is not suitable for longwall. It is now proposed to work this seam by mechanised Bord and Pillar method of mining. Coal cutting machines, side loaders would be used for development and side loaders and face chain conveyors are proposed to be used during depillaring operations.

iii) Because of seam thickness, immediate roof condition etc., lowermost workable Bagdona Seam is suitable for longwall by caving. The area is suitable for adopting shearer face(refer Para 14.5.6). The Longwall shearer faces are proposed for few mines of WCL and such faces would be commissioned in due course. The longwall shearer face will have a faster rate of advance compared to advance of Upper and Lower Workable Seams proposed to be won by mechanised Bord and Pillar method of mining. Therefore, till the upper seams are liquidated in the major part of the area, the lowermost Bagdona Seam cannot be worked by longwall panels by caving. Such longwall panels may be required to be worked after about 12 to 15 years. Hence except for essential work of developmental nature no other mining activities are proposed for this seam at this stage.

iv) Main dip development or other development headings are proposed to be developed by using coal cutting machines, side loaders and face chain conveyors etc. Two such main dip or other development headings are proposed to be worked at a time.

(B) Arising out of change in method of exploitation of coal seams, the ventilation requirements as per statute would undergo a change necessitating provision of additional opening by way of shaft(refer para 12.2.2 and Para 18.3.3).

2.3.2 ENHANCE THE PRODUCTION CAPACITY

As brought out in para 15.4 with the change in technology of working of coal as envisaged now it would be possible to marginally increase the production capacity of Shobhapur mine from 0.95 million tonnes to 1.00 million tonnes per annum. This, however, is only an incidental gain and not the reason for revision.

2.3.3 TO CUT DOWN THE DEVELOPMENTAL TIME

Originally it was proposed to drive the inclines upto Bagdona Seam and develop main dip trunk headings after touching this seam. Now it is proposed to keep the inclines upto Lower Workable Seam only. The main dip trunk headings would be driven almost after the Lower Workable Seam being touched. Bagdona Seam would be approached through reverse drifts. This would facilitate cutting down the development period.

2.3.4 GENERAL

With the drivage of main Inclines No. I and No. 2 upto Lower Workable Seam, as stated above, Bagdona Seam would be approached through number of drifts. The additional provision for the same would be required and has been kept in this report. Also for smooth and efficient underground transport arrangements, number of underground bunkers/staple bunkers have been considered in the revised Project Report.

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CHAPTER- III

LOCATION

3.1 Shobhapur Project is located in Pathakhera Coalfield. This Coalfield falls (Plate No. I) in Ranipur Reserve Forest of Betul district of M.P. and is covered by Survey of India Topo Sheet No. 55J/4. The field is bounded by Latitude 28°5' to 28°10' and Longitude 70°5' to 78°12'. Pathakhera and Pathakhera Expansion lie in South-East and Satpura Mines No. I & II lie to the south. The Satpura Thermal Power Station of MPEB lies about 6 Kilometers South-East of the Project. The nearest rail head is at Ghordongri on the Nagpur-Itarsi main line of Central Railway. The Station is about 20 Kms. to the west. Ghoradongri is connected by all weathered tarred road with the Power House and passes nearby the existing project.

CHAPTER-IV

TOPOGRAPHY, DRAINAGE & CLIMATE

4.1 TOPOGRAPHY

Pathakhera Coalfield is flanked on its eastern border by Satpura hills. The area under consideration is densely forested undulating country gently sloping towards north. The general elevation is ranging between 410.0 metres to 440.0 metres above mean sea-level. Towards the west of the coalfield, the country upto Ghoradongri is almost a level plain. The southern part of the area is mostly open cultivated country.

4.2 DRAINAGE

Tawa river forms the principal drainage system of the area. There are number of small streams and nalas within the property, but they are generally dry except during monsoon. Tawa river, however, retains water during dry season also. The highest flood level(H.F.L.) recorded at a place about 1.24 Km. from the mine openings (at Tawa River in Aug., '75) is 409.5 metres above mean sea level(refer Plate No.III). The reduced level of mine openings is 432.0 metres and above which is much more than 5.00 metres above H.F.L.

4.3 CLIMATE

The climate is tropical. During summer the

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temperature in general varies from about 41°C to 24°C and in winter the temperature ranges from about 24° to 10° Monsoon starts towards middle of June and continues upto September end. The annual rainfall varies from 1750 to 2100 mm. The maximum rainfall recorded in a year is 2134 mm. The average daily rainfall during monsoon has been considered as 18mm.

CHAPTER- V

DRILLING AND PROSPECTING

5.1 The Pathakhera area was known as coal bearing since 1867 but mining activities were carried out in a very small scale by private parties. The area attracted attention after the Deptt. of Geology and Mining, M.P. had drilled 11 boreholes in the central part of the area. At the instance of the N.C.D.C., the north-central part of the coalfield was prospected in 1962-64 by IBM. The area further in the north was prospected in 1968-69 by N.C.D.C. All the three major coal seams have been proved in the area.

earst- while

5.2 A total of 82 boreholes were drilled by IBM and N.C.D.C. in the whole block. For the area under consideration 6 boreholes have been drilled in the proved part, the total meterage drilled being about 103[illegible] mts. Though the number of holes are adequate for interpreting the major geological structures, Seven(7) number of boreholes totalling about 1200 metres may be necessary for fairly accurate interpretation of geological structures, in the proved area.

5.3 In the indicated reserves part of the property about 11 boreholes totalling about 2200 metres, may be necessary for proving the part of property and interpreting the geological structures.

5.4 Additional boreholes may also be required around the proposed Shaft location.

5.5 A total of 25 boreholes may be required for the property under consideration requiring about 5000 metres of drilling. These boreholes would be completed in about three years' time.

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CHAPTER- VI

GEOLOGY

6.1 The rocks of the Lower Gondwana formations comprising of sandstones, shales and coal seams exist in Pathakhera Coalfield. The coal deposits belong to Barakar Measures. The total thickness of Barakars is composed predominantly of sandstones with shales and coal seams. Intrusives in the form of Dolerite dykes have affected the area. Dolerite dykes of the area might be the intrusives facies of the Deccan Trap.

6.2 STRATIGRAPHY

6.2.1 The generalised stratigraphic sequence in and around the area is furnished in Table No. V below:

TALBE V

FORMATION	LITHOLOGY	REMARKS
Recent	Soil & Sub Soil	
Intrusives	Dolerite dyke	Intrusive phase of Deccan Trap
	Unconformity	

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	FORMATION	LITHOLOGY	REMARKS
Damuda Series	Bijori	Mostly sandstone	Not exposed in the present [illegible]
	Motur	Greenish sandstone with minor mottled greenish and pink shale bands	
	Barakar	Coarse sandstone, shale, and coal seams	
	Talchir	Greenish shales and fine grained Khaki Sandstone	Not exposed in the area
		.....UNCONFORMITY.....	
	Precambrian	Metamorphics	Not exposed in the area.

6.2.2 LOCAL GEOLOGY

The area under consideration is mostly covered with sandstones of the Motur formations. The stratigraphic sequence encountered in different boreholes drilled within the area is given in Table No. VI below:

TABLE VI.

STRATIGRAPHIC SEQUENCE

LITHOLOGY	GENERALISED THICKNESS IN MTS.	REMARKS
Predominantly sandy soil	3 - 8	
Dolerite intrusive	20-30	

1	2	3
MOTURS		
Greenish to greyish sandstone with thin mottled shale and clay bands	Over 94	
Mottled shale(marker horizon)	1-3	Base of Motur
BARAKAR		
Medium to coarse grained sandstone with a few thin shale bands	70 -80	Barren of coal
Coal Horizon VIII	Impersistent	Mainly carbonaceous shale with coal bands.
Medium-grained sandstone with an impersistent shale band at the base	16 - 20	
Coal Horizon VII	1.46 to 1.91	Average 1.5 mts.
(UPPER WORKABLE SEAM)		
Medium to coarse grained sandstone with a few shale streaks	15 - 20	Decreasing towards east
Coal Horizon VI	1.88 to 4.10	Generally 2.5 to 3.5 mts. thick inclusives of carb. shale bands
(LOWER WORKABLE SEAM)		

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1	2	3
Sandstone and shale	7 - 12	
Coal Horizon V	0.11 - 0.63	
Intercalation of shale and Sandstone	2.0 - 6.0	
Coal Horizon IV	0.10 - 0.50	
Sandstone with shale bands	6 - 10	
Coal Horizons III	0.30 - 0.65	
Intercalation of shale and sandstone	4 - 8	
Coal Horizon II	0.2 - 0.45	Impersistent
Intercalation of shale and sandstone with carb. shale bands	8 - 15	
Coal Horizon I	1.75-2.10	Thickness generally between 1.8 to 2.0
(BAGDON. SEAM)		
Sandstone with a few shale and thin coal bands	45 - 50	
Coal Horizon IA	1.08 - 1.36	Impersistent
Sandstone	4 - 8	
Coal with shale	0.33 - 0.75	Impersistent
Sandstone with a few shale and thin coal layers	?	Not proved by drilling in this block.

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6.2.3 PRE-CAMBRIAN METAMORPHICS

Gneiss and Schist form the basement on which Gondwana sediments were deposited.

6.2.4 TALCHIR FORMATION

Talchirs unconformably overlies the Pre-cambrian. The Talchirs are mainly composed of greenish shale and a Khaki sandstone.

6.2.5 BARAKAR FORMATION

The Barakar formations overlie Talchirs. The total thickness of Barakars is around 475 mts. The lower 250 metres is composed of garnetiferous sandstone with thin coal seams(less than 0.5 mts) and shale layers. The middle 150 metres of Barakars is composed predominantly of sandstone with shale and coal seams. All the three workable seams of the area occur in this zone. The upper 75 metres is coarse grained sandstone with thin shale and clay bands.

6.2.6 MOTUR FORMATION

The Barakars is overlain by the Motur formation. 1.0 to 3.0 mtrs. thick mottled shale at the base of Motur is taken as marker horizon demarcating the boundary between Moturs and the Barakars. Moturs are equivalent of the barren measures of Jharia Coalfield and are devoid of coal seams. Moturs are composed predominantly of green to grey sandstones with minor clay and shale bands. Unlike thick plastic clay bands in Moturs of Kamptee Coalfield these Moturs have minor clay band not more than 0.60 mts. thick. These beds are present in the northern and north western part of the area.

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6.3 INTRUSIVES

6.3.1 The property is traversed by basic intrusive of Dolerite dyke on its southern part of the property. The major east-west trending dyke(Dyke-C) separates Shobhapur from Pathakhera Mine I. The coal seams of boreholes in close proximity of dyke 'C', on either side, is found to be devolatalised to varying extent more or less proportional to the distance from the dyke. The thickness of devolatalised zone more or less equals to the thickness of the dyke. Geological mapping reveals that the thickness of Dyke 'C' varies from 40 mts. to 60 mts. The trend of the dyke is North east South West.

6.3.2 In the area north of Dyke 'C' no dolerite dyke is encountered in the borehole. Geological Survey of India, in course of regional prospecting in the NE part of the area, mapped a few small dykes. The general trend of dykes is NE-SW. One dyke 'D'(refer plate No.III) exposed in Tawa river is about 25 to 30 metres thick. The exact trend etc, is to be established when the area is proved further.

6.4 STRUCTURE

The area north of Dyke 'C' is divided into two more or less equal parts by a major NE trending transverse fault(F_7). The area under consideration (the upthrown block i.e to the west of this fault)is characterised by ENE-WSW strike with 6° to 7°(1 in 8 to 1 in 10) northerly dips.

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6.5 FAULTS

6.5.1 The property appears to be structurally not much disturbed as no major fault, specially in the proved area, is expected within the area under consideration. The faults F_7F_7, F_8F_8 and $F_{16}F_{16}$ on south-east, south-west and western sides respectively, separates the Shobhapur Project from Pathakhera and Satpura Projects. These faults have been deciphered mainly on the basis of borehole data. The tentative position of faults have been shown in Plate No.III Drg. No. 2-00280. The details of three major faults are :

6.5.2 FAULT F_7F_7

It is a transverse fault and runs in a NE-SW direction. The hade of the fault is towards South East. The fault has branched into two. The western branch fault(F_7F_7) is the major branch with about 100.0 metres throw. The eastern branch fault(F_{7A}-F_{7A}) has throw of about 30.0 metres. The fault separates Shobhapur Project from Pathakhera mine No. I.

6.5.3 FAULT F_8F_8

This is also transverse fault trending NNW-SSE with the downthrow of about 40 to 50 metres towards west. The hade of the fault is towards south-west. This fault separates Shobhapur Project from Satpura Mine No. II.

6.5.4 In addition to two faults mentioned above the existence of a few more faults, especially in the indicated area may be there. The dyke 'D' also may or may not be associated with the fault.

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CHAPTER VII

COAL SEAMS AND THEIR QUALITY

7.1 COAL SEAMS

7.1.1 There are in all nine coal horizons in Barakars in the area. The numbering of seams is bottom upwards. Out of these only three coal horizons namely Bagdona Seam(Seam-I), Lower Workable Seam(Seam-VI) and Upper Workable Seam(Seam VII) have attained persistent thickness above the working limit of 0.9 metres in the entire area under consideration. These three seams only have been considered for economic exploitation.

7.1.2 The sequence of seams, their nature of parting and general range of thickness etc. is given in Table No. VII below(also refer plate No. II. Drg. No.1-00332)

TABLE VII

Seam & Range of thickness in mts.	Nature of partings & thickness of parting in mts.	Roof of seam	Floor of Seam	Remarks
1	2	3	4	5
Upper Workable 1.46-1.91		Generally compact med. to coarse grained sandstone followed by grey shale as the immediate roof.	Generally sandy shale followed by medium grained sandstone	Number of dirt bands vary from 1 to 4 distributed throughout Total thickness varies from 0.12

1	2	3	4	5
	Medium to coarse grained sandstone parting 15 to 20 m	At place soft grey or carb shale or clay horizon as an immediate roof		to 0.38 mts.
Lower Workable 1.88-4.1	Alternate layers of sandstone, shale and coal bands parting 50.0	Medium to coarse grained sandstone with immediate 0.10 to 0.25 mt carb shale roof at places	Medium grained sandstone and sandy shale	Dirt bands varying from 1 to 7. Total thickness of bands vary from 0.14 mts. to 0.57 mts.
Bagdona 1.75 - 2.10		Immediate roof carb shale followed by intercalation of shale and sandstone	Fine to medium grained sand-stone with shale bands	Free of bands.

BAGDONA SEAM

7.1.3 Bagdona seam overlies Seam I A with a parting of 37 to 40 metres. This is the oldest workable coal seam in the area. This coal seam lies beneath the Lower Workable Seam with parting of more or less 50.0 metres. This seam has thickness varying from 1.75 mts. to 2.10 mts. the average thickness being 1.8 to 2.00 metres. The

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immediate roof of the seam is Carbonaceous Shale band of variable thickness, maximum being 2.71 metres(NCP-30). Intercalation of shale and sandstone overlies the carbonaceous shale, the shale section being predominant. Compact sandstones are usually found 4.5 to 6.75 metres above the roof of this seam. The floor of the seam is composed of fine to medium grained sandstone with shale bands. The coal of this seam is less hard compared to either Lower or Upper Workable Seam of the area. The cutting resistance of the coal has been determined to be 215-220 kg/cm^2,

LOWER WORKABLE SEAM

7.1.4 This is the main workable coal seam of this coalfield. The Lower Workable Seam lies above Bagdona Seam with ain intervening parting of 45.0 to 50.0 metres. The Upper Workable Seam in turn overlies Lower Workable Seam with parting varying from 15.0 to 20.0 metres. The roof of the seam is generally composed of medium to coarse grained sandstone. A carbonaceous shale band is found as immediate roof of the seam in part of the area in the region of boreholes NCP-31 and NCP-34. The thickness of this carbonaceous shale band is 0.86 to 0.88 metres. The floor of the seam is sandy shale with sandstone intercalations. The thickness of seam varies from 1.88 metres(NCP-34) to 4.10 metres(PK-45). The general range of thickness being 2.5 to 3.5 metres. The coal of this seam is harder compared either to Upper Workable Seam or Bagdona Seam. The crushing strength of coal has been determined to be 540-572 kg/cm^2, which is considered to be very high.

UPPER WORKABLE SEAM

7.1.5 This is the topmost workable coal horizon. The seam occurs above Lower Workable Seam separated by a parting of 15.0 to 20.0 metres. The seam is about 90 to 100 metres below the Motur-Barakar boundary. In the area under consideration the seam has attained workable thickness throughout the area. The thickness of seam varies from 1.46 metres (NCP 31) to 1.91 metres (PK 45). The average thickness being about 1.5 metres. Carbonaceous shale varying in thickness from 0.98 to 1.60 metres is found as immediate roof of the seam. At places a clay band upto 200 mm has also been found in this contact plane. This immediate roof of carb. shale or clay horizon may cause mining troubles. The strata above carb. shale generally is comprised of slightly compact medium to coarse grained sandstone. The floor of the seam is mainly composed of carb.shale and shale. The coal of this seam appears to be harder than that of Bagdona.

7.2 QUALITY OF COAL

7.2.1 The assessment of the coal qualities of these seams are based on the studies of proximate analysis and other tests carried out by the Regional Coal Survey Station, Nagpur. The studies are confined only to three seams namely Bagdona, Lower and Upper Workable Seams.

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7.2.2 BAGDONA SEAM

Bagdona seam is superior in quality to both Lower and Upper Workable Seams, being mostly Grade 'C'. The seam is rather cleam as compared to the other seams of the area. Proximate analysis on air dried basis indicate that moisture and ash percentage vary between 1.4 to 3.7 and 19.0 to 27.0 respectively (excluding band). On equilibriated basis, the volatile matter contents(ex.dirt) of seam varies from 26.91 (NCP-30) to 29.3. V.M. content of unit coal basis ranges from 34.3% to 37.8%. Including dirt band, the V.M. content of the seam ranges from 35.1 to 35.9 . The caking index is 9 (PK 45 & 45A). The U.H.V. including dirt band varies from 4300 to 5230 K.Cal/kg and U.H.V excluding dirt band varies from 5000 to 5878 K.Cal/kg. The H.G.I value available from one borehole (NCP-35) is 44. No ash fusion data are available for the present afea. In Pathakhera I & extension area, the ash fusion temperature range(in mildly reducing atmosphere) is from 1170°C to 1400°C.

7.2.3 LOWER WORKABLE SEAM

The seam is no where clean in the area and number of dirt bands vary from 1 to 7. The total thickness of dirt bands range from 0.14 mts(NCP-34) to 0.67 mts(NCP-35) with ash contents of bands varying from 42.0% to 89.1%. The moisture and ash contents(at 60% R.H. and 40°C) of coal from this seam (excluding dirt bands) vary between 2.3 to 3.7% and 24.8 to 26.7% respectively.

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Moisture and ash contents including dirt bands(on 60% R.H. and 40°C) vary between 1.8 to 3.3% and 28.0 to 36.9% as observed from the analysis of boreholes NCP-30,31,34,35 and PK 45,45A. Volatile Matter range (on 60% R.H. and 40 °C) is from 26.0 to 28.4%. The coal seams near dyke 'C' are devolatalised to varying degrees. The proximate analysis on air dried basis including bands indicate moisture and ash vary between 1.7 to 3.9% and 30.6 to 38.5% respectively. The caking index varies from 5 to 8 . The U.H.V. including dirt band varies from 3352 to 4746 K.Cal/kg, and U.H.V. excluding dirt bands varies from 4700 to 4980 K.Cal/kg. The H.G.I value available for only one borehole (NCP-35) is 43. In pathakhera and its extension area the value ranges from 44 to 50. No ash fusion temperature data are available for area under consideration. In Pathakhera I and extension area, the ash fusion temperature range from around 1160-1290°C to over 1400°C in mildly reducing atmosphere.

7.2.4 UPPER WORKABLE SEAM

The number of dirt bands in the seam varies from 1 to 4 distributed throughout the seam. The total thickness of dirt band shows a variation from 0.12 to 0.41 metres with the ash contents of 52. 3% to 73.3%. The moisture contents of the seam(on 60% RH and 40°C) vary from 2.2 to 3.7%. On air dry basis the range is from 1.6% to 4.4 %. The ash contents of the seam is on the higher side even after excluding the dirt bands of 5 cms. and above in thickness.

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This is because the seam is intimately banded with carb. shale streaks of thickness less than 5 cms. The ash contents, excluding dirt bands of 5 cm and above in thickness, varies from 23.0 to 35.8 % on equilibriated basis. Including dirt bands, the ash contents of the seam on equilibriated basis increases to 32.7%to 44.7%. On air dry basis, the ash percentage including dirt bands falls within the same range. In general, the ash content of the seam on equilibriated basis and inclusive of all dirt bands is from 35 to 38%. The volatile Matter of the seam varies from 21.0 to 28.2 %(on 60% R.H. & 40°C). Caking index of the seam varies from 3 to 6 . The U.H.V. of seam excluding dirt bands varies from 4525 to 5000 K.Cal/kg. The value including dirt band varies from 3200 to 3725 K.Cal/kg. H.G.I. value for the area is not available. In the area to its immediate south, in Pathakhera-I and extension, H.G.I ranges from 47 to 51. The ash fusion temperature range is from 1130-1250 to over 1400°C(in mildly reducing atmosphere) in Pathakhera-I and extension area. For the present area no data are available.

7.2.5 The broad qualitative characteristics of the various seams are shown in Table No. VIII below:

TABLE VIII

Seam	Proximate analysis at 60% RH & 40°C			U.H.V in K. Cal/kg	Ash Fusion °C	Caking Index	H.C.
	Moisture %	Ash %	V.M. %				
Bagdona Seam	1.4 to 3.7	19.0 to 27.0	26.91 to 29.3	5000 to 5878 (4300 to 5230)	1170 to 1400	9	44
Lower Workable Seam	2.3 to 3.7 (1.8 to 3.3)	24.8 to 26.7 (28.0 to 36.90)	26.0 to 28.4	4700 to 4980 (3350 to 4746)	1160 to 1290 to over 1400	5-8	43
Upper Workable Seam	2.2 to 3.7	23.0 to 35.8 general range 35 to 38% (32.7 to 44.7)	21.0 to 28.2	4525 to 5000 (3200 to 3725)	1130 to 1250 to over 1400	3-6	47-51

Figures in bracket indicate analysis with dirt band.

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7.3 QUALITY OF COAL SUPPLY

From the above table No.VIII it is seen that the likely grade of Upper and Lower Workable Seams would vary between Grade 'F' to 'E' and that of Bagdona Seam would vary between Grade 'C' and 'B' . As brought out in Para 7.1.5 and Table No. VII , the immediate clay band and soft carb./grey shale above U.W.S would have a tendency to part during mining operations thereby deteriorating the quality of coal supply. At present the major share of production is from Upper Workable Seam and the balance from Lower Workable Seam. The present declared grade of Upper and Lower Workable Seams of Pathakhera area as per new grade classifications is Grade 'E'. The result of various joint sample analysis of coal despatches of the area indicate the U.H.V. ranging from 3400 to 3500 K.Cal/Kg, the despatch grade of coal being F(for Bhobhapur Project Subseq uently better quality Bagdona Seam would be worked. The coal of this seam would get mixed up with UWS/LWS coal. It is expected that in future the despatch grade of coal is bound to be better than the existing grade.

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CHAPTER VIII

DEMARCATION OF MINE BOUNDARIES

8.1 The present report deals with exploitation of G.B. Sector II which is bounded by fault F_7F_7 in the south-east and fault F_8F_8 in the south-west. Part of southern side is limited by dyke 'C'. Northern boundary is formed by the line considered for arriving at indicated reserves. With proving of additional area on the north side, depending upon the geological information then available, the northern boundary may subsequently be adjusted and area may be worked from existing outlets or new mine may be opened separately.

8.2 For convenience of mining operations, the area under consideration is divided into two sectors- Sectors 'A' and Sector'B'(refer Plate No.III

8.2.1 SECTOR 'A'

This sector is on west of Tawa river and is bounded by faults F_7F_7, F_8F_8 on south-east and south-west side respectively, the norther limit being the indicated limit line.

8.2.2 SECTOR 'B'

This triangular shaped sector is on east of Tawa river and is bounded by fault F_7F_7 on eastern side. The northern limit in this case is also the indicated limit line.

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CHAPTER IX

RESERVES.

9.1 The reserves for individual seams have been estimated by taking their average thickness and specific gravity. The reserves for each seam have been calculated separately. The reserves standing on pillars have been calculated by reducing the gross reserves by 35% due to coal taken out during development stage. For arriving at net total reserves a deduction of 10% of proved geological reserves and 20% of indicated reserves respectively has been effected from the gross reserves to account for any geological disturbances.

9.2 The total area of leasehold being considered for the report, is 4.38 Sq.KM. The seamwise net proved, indicated and extractable reserves for the area marked ABCDE in Plate No.III Drg. No. 2-OC310 are given in Table No.IX below:

TABLE IX

Seam	Net Proved Geological Reserves			Indicated Reserves in million tonnes	Net total reserves in M.Tes	Mineable reserve in M.te.	Extractable reserve in M.te.
	Standing on pillars in million tonnes	Virgin area in million tonnes	Net reserves in million tonnes.				
1	2	3	4	5	6	7	8
Upper Workable Seam	0.08	4.506	4.586	6.00	10.514	9.033	5.871

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1	2	3	4	5	6	7	8	9
Lower Workable Seam	0.13	7.251	7.381	10.00	17.381	14.765	9.597	extractable reserves, the reserves locked under & around Tawa river have not been considered
Bagdona Seam	-	5.280	5.280	6.440	11.720	10.151	7.106	
TOTAL	0.21	17.037	17.247	22,44	39.687	33.949	22.574	

Total Net Reserves 39.687 million tonnes
Total Extractable Reserves 22.574 million tonnes.

9.3 There are about 5.492 million tonnes reserves below Tawa river and within 60.00 metres of its banks. These reserves lie at a depth of more than 70 metres. Subject to approval of D.G.M.S., partial extraction (ref. para 14.5.5) these reserves will be possible. The seamwise net and extractable reserves is detailed in Table No. X below:

TABLE X

Seams	Net Reserves under and around river	Extractable
YUpper Workable Seam	1.307	0.588
Lower Workable Seam	2.616	0.915
Bagdona	1.569	0.549
Total	5.492	2.052

9.4 For the purpose of this report the net extractable reserves considered at this stage are about 22.574 million tonnes only and do not contain reserves locked up under Tawa river.

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CHAPTER X

TARGET OUTPUT AND LIFE

10.1 TARGET OUTPUT

10.1.1 The total extractable reserves are estimated to be about 22.54 million tonnes(this excludes the reserves locked up under Tawa river). The project was originally planned for the production capacity of 0.95 million tonnes per annum. With the change in technology as envisaged in this report(refer Para 2.3.1), the target rate of production has been kept at 1.00 million tonnes per annum (refer para 15.4)

10.1.2 As brought out in para 18.3.1(Ventilation) the existing airshaft would be used as main return airway for the project. For the optimum utilisation of existing airshaft, it would be possible to achieve production upto 1.00 million tonne per annum (refer para 18.3.2. Any increase in production beyond this capacity would need additional opening in the form of return airway. Hence the target capacity of the project has been kept at 1.00 million tonnes per annum.

10.1.3 This production capacity of 1.00 million tonnes per annum would be obtained by working eight Bord and Pillar(Development/Depillaring) panels in both the Upper and Lower Workable Seam(Refer Para 15.4).

10.2 LIFE

10.2.1 The extractable reserves of Shobhapur are million tonnes. The reserves envisaged to be extracted in first six years would be 3.25 million tonnes as indicated below:

1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	Total
0.25	0.35	0.40	0.60	0.75	0.90	3.25

The balance reserves available would be 19.324 million tonnes. The total life of the project would be about 25 years(19 yrs + 6 yrs.).

10.2.2 Subject to approval from D.G.M.S., the extractable reserves under Tawa river would be 2.052 million tonnes. This would increase the life by about two years.

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CHAPTER XI

PRESENT STATUS OF MINE

11.1 MINE OPENINGS

Shobhapur Project has three openings- two of them inclines and one shaft. The details of mine entries regarding dimension, length, gradient etc. of various openings is given in Table No. XI below:

TABLE XI

Sr. No.	Names of Entry.	Length upto Lower Workable Seam in mts.	Gradient	Cross Section are in Sq.Mts.	REMARKS
1.	Incline No.1	334	1 in 4	4.8 x 3.0 upto U.W.S. (4.5 x 2.4 mts) beyond & upto L.W.S.(at places	Presently fi with haulage raising coal from U.W.S. an acting as ret for mine.
2.	Incline No. No. 2.	373	1 in 4	4.8 x 3.0 upto U.W.S. (4.51x 2.4 mts) beyond & upto L.W.S.(at plac- es)	Presently fi with haulage for raising coal from L. and acting intake for th mine.
3.	Air shaft	60.0	Vertical	6.00 mts. dia	Sunk upto U. to be deepe upto L.W.S.

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11.2 SEAMS BEING WORKED

At present the work is confined only to two upper seams i.e. Upper Workable and Lower Workable Seams. In addition to drivage of main dip headings in each of the seams, one development panel is also being worked in each of Upper and Lower Workable Seams for the present. The extent of present workings of Upper and Lower Workable Seams have been shown in Plate No.IV& V respectively.

11.3 VENTILATION

11.3.1 The mine is category II in gassiness. In Shobhapur in boreholes and at faces and in cavities no gas is found, but in the adjoining Satpura Project at times upto 5% of gas has been found in the borehole.

11.3.2 At present Incline No. 2 is acting as intake and Incline No. 1 is acting as the return. A main fan having a capacity of 4300 cu.mt/min. has been fitted in this incline. The total air circulating in the mine is about 4300 cu.mt/min. An airshaft which has been sunk upto Upper Workable Seam at present would ultimately act as the main return airway and both inclines would act as intakes. The shaft would also be deepened upto Lower Workable Seam.

11.4 PUMPING AND DRAINAGE

The existing main sump of very small capacity in Lower Workable Seam is located in 7th dip of 7th level. Two main pumps(each of about 400 G.P.M.

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capacity) deal with the existing make of mine water. There are adequate number of pumps, pipes and pipe fittings to deal with the existing make of water.

11.5 POWER SUPPLY

11.5.1 Power is received at Pathakhera Central Sub-Station from M.P.E.B. by means of 33 KV overhead line. This substation has an installed capacity of 3600 KVA to step down the voltage at 3.3KV for distribution to different mines of the area. The power demand on central substation at present is about 2500 KW of which Shobhapur Project consumes about 500 KW.

11.5.2 Shobhapur Project is undergoing its initial development phase. The total connected load is 1007 KW of which surface connected load is 299 KW and the balance is underground load.

11.6 UNDERGROUND TRANSPORT ARRANGEMENTS

11.6.1 100 KW direct haulage is installed at Incline No. I. This is acting as Trunk transport haulage system for Upper and Lower Workable Seams.

11.6.2 50 KW endless haulage is installed in 5th level in U.W.S. which would feed coal onto U/G bunker. This endless haulage would be fed coal through three 37 KW direct haulages installed in B L level(3rd rise), in CL and HL levels.

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11.6.3 In L.W.S. also 50 KW endless haulage installed in 5th L in between No. 1 and No. 2 Inclines feeds coal onto main trunk transport haulage. This endless haulage would be fed coal through 32 HP Tugger Haulage(1 R of EL level) and 37 KW direct haulage to be installed just above 0 rise in AL level. At present material is also transported through net work of existing haulage system

11.7 SURFACE TRANSPORT AND DESPATCH

The coal from Incline No. 2 is tippled onto a small elevating belt conveyor about 45 metres in length. The belt conveyor discharges coal onto 80 tonnes overhead bunker. Coal from this bunker is transported upto MPEB. Coal transporting system near Pathakhera Mine No. I through tipping trucks.

11.8 CURRENT PRODUCTION

Shobhapur produced 0.051 million tonnes in year 1978-79. The production so far upto Jan., '80 is 0.145 million tonnes and the mine is programmed to produce 0.20 million tonnes in 1979-80. The production per development panel and for dip headings, presently being worked by manual means, is 270 and 150 tonnes per day respectively. The mine is still in development stage.

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11.9 MANPOWER

The existing total manpower is 959 (Feb '80). This also includes the manpower being engaged for development works. The details of existing manpower, category-wise and designation wise are given in Appendix B. The manpower engaged for production i.e. non developmental works on a average is estimated to be 809 . The average O.M.S. is 0.85

11.10 EXISTING WELFARE AMENITIES

Basic welfare amenities like houses, roads, water supply, etc. are meagre and need to be augumented. Such other facilities like workers Institute, Pit head bath, dispensary, shopping centre etc. are not existing and are required to be provided.

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CHAPTER XII

MODE OF ENTRIES.

12.1 NECESSITY OF ADDITIONAL ENTRY

As stated in para 11.1, the mine has two inclines and an airshaft as mode of entries. From the existing a openings, from the ventilation standards alone, it is not possible to have production beyond .40 million tonnes per annum(refer para 18.3.3) To revise the mine upto the production capacity of 1.00 million tonnes per annum, another opening is needed.

12.2 TYPE OF NEW ENTRY

12.2.1 As mentioned in para 18.3 and brought out in Table No. XV, , the existing shaft is proposed to be utilised as the main return airways even after revision. The maximum quantity of air the mine openings would be required to deal works out to be 18000 cu.m./min(refer para 18.2.3) Within the recommended velocity limit of 4 mts/sec. (because of belt conveyor being installed in one of the inclines and other incline being in parallel), the existing inclines can deal upto maximum of 6566 cu.m./min of air. The balance of 11434 cu.m./min. has to be dealt with by the new outlet.

12.2.2 The cross section of the airway, keeping the velocity in main intake airway, at 8 m /sec(opening proposed to be used for men and material transport) comes to 2382 Sq. m. For this effective cross section area single outlet in the form of an Incline is ruled out. So, it is proposed to have additional opening in the form of shaft having diameter of about 6.00 mts.

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12.3 LOCATION OF SHAFT

12.3.1 Two possible locations('X' and 'Y') considered have been shown in the Plate No.III , Drg. No. 2-00313. The shaft is proposed to be used for man & material transport, the shaft at location 'Y' is the most suitable position. Minimum essential headings are supposed to be driven in shaft pillar. With siting shaft at location 'Y', the purpose is well served as the maximum advantage of panel barriers is taken. The proposed location of shaft being near to the mine trunk headings, the area locked up because of surface infra-structure and service buildings would be less.

12.3.2 The proposed shaft site would be about 150.0 mts. north-west of BCP-34. The shaft will be sunk upto Lower Workable Seam and would be 370 ± 5 m. in depth.

12.3.3 The location of the proposed shaft opening is more than 5.0 mts. above H.F.L. and as such no danger of surface inundation is expected. The site proposed for the shaft is only tentative. The final location would be decided after obtaining detailed geological information around the shaft area and also after surveying and contouring the area. Surface features such as nalas, ground configuration etc. would also be considered before finally locating the shaft site.

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CHAPTER XIII

METHOD OF DEVELOPMENT OF SEAMS

13.1 The pair of inclines have been driven upto Lower Workable Seam and an airshaft has been sunk upto Upper Workable Seam. For the purpose of seam developments, the property is divided into Sectors 'A' and 'B'(refer Plate No.III).

13.2 SECTOR 'A'

13.2.1 The trunk transportation of coal would be through Lower Workable Seam. Coal from L.W.S. is conveyed through a drift(from Lower Workable Seam to Upper Workable Seam) onto 450 tonnes bunker. The proposed drift would be rising at 1 in 4 in the direction of the rise of the beds. The length of the drift would be about 140.0 mts. The location of the drift is marked in Plate No. III,IV & V The provisions for bunker and drift has been kept in the Report.

13.2.2 APPROACH TO UPPER WORKABLE SEAM

The Upper Workable Seam is being approached by the Inclines No. 1 and 2. Both the inclines would be intakes. An airshaft will act as return. For material supply to Upper Workable Seam a drift rising at gradient of 1 in 4 in the direction of the dip of beds is proposed. The length of drift would be about 60.0 mts. and the dimensions would be 4.2 mts. x 2.5 mts. One staple shaft will act

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as bunkers for the coal of Upper Workable Seam. The staple bunker would be about 20 mts. depth i.e. parting between the U.W.S. and L.W.S. The dimensions would be 3.0 mts. x 3.0 mts. The staple shaft would be inverted truncated pyramid at its bottom and with the footwall sloping so that coal on its fall does not directly hit the chute. The capacity of staple bunker would approximately be 150 tonnes. A staple air shaft, 4.5 mts. dia., is proposed to be driven from Lower Workable Seam to Upper Workable Seam. This airshaft would act as return for sector 'B' area. The proposed location of drifts staple afrshaft and staple bunkers is shown in Plate No. III, IV & V.

13.2.3 APPROACH TO LOWER WORKABLE SEAM

Both the inclines are driven upto Lower Workable Seam. The shaft which has been sunk upto Upper Workable Seam is ultimately to be sunk upto Lower Workable Seam. This shaft would act as the main return airways for the mine. Incline No. 1 which is fitted with haulage would be utilised for material supply as well. Incline No. 2 would be fitted with Belt Conveyor and would be used for coal transportation. Men and material transportaion is also proposed to be done by the proposed shaft.

13.2.4 APPROACH TO BAGDONA SEAM

A 4.2 mts. x 2.5 mts. intake drift dipping at 1 in 4 against the general dip of the beds is proposed to be driven from Lower Workable Seam to Bagdona Seam for material supply. The length of

drift would be about 140 mts. In addition, coal supply drift (intake) dipping at 1 in 4 against the dip of the beds is proposed to be driven from about 7.5 mts. above the Lower Workable Seam. 7.5 mts. staple bunker would be driven upto Lower Workable Seam. The length of the drift would be about 155.0 mts. The belt conveyor is proposed to be installed in the drift with the discharge of coal onto staple bunker. For ventilation and communication purposes one or two 10 cm. dia. boreholes would be drilled around the staple bunker. Both these driftswould also be used as travelling roadway. For establishing ventilation system quicker, it is proposed to drive a drift(4.2 x 2.5 mt)dipping at 1 in 4 against the dip of the beds near coal supply drift. This drift will not as return airway. The length of the drift would be about 140 mts. The location of various staple shafts and drifts is shown in Plate No. III, V and VI.

13.3 SECTOR 'B'

13.3.1 The area on east and north east side of the property across Tawa river is also proposed to be exploited from the existing outlets. In the intial stages, it is proposed to drive four headings in Lower Workable Seam, two intakes and two return on the rise side and set of another intake headings in alignment of shaft level. These galleries would be driven with the suitable precautions and with the prior approval for working under river from Directorate General of Mines Safety. The proposed place of drivage of galleries is shown in Plate No. III and V . The approach to different seams in this sector is discussed as under:

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13.3.2 APPROACH TO UPPER WORKABLE SEAM

The Upper Workable Seam in this sector is proposed to be approached by two rising drifts, both acting as intakes and a staple shaft(as return) is also proposed to be driven. Both the drifts would be driven in the direction of dip of beds at the gradient of 1 in 4 (rising). The length of the drifts would be about 60.0 mts. The dimensions of the drifts are 4.2 x 2.5 mts. The staple shaft is proposed to be of 4.5 mts. dia. For coal transport from Upper Workable Seam to Lower Workable Seam one staple bunkers (3.0 x 3.0 x 20 mts.) is proposed to be driven. The bunker would be of the type as mentioned in Para 13.2.2. The bunkerage capacity would approximately be 150 tonnes. The location of different drifts and staple shaft/bunker have been shown in Plate No.III Drg. No. 2-OC310.

13.3.3 APPROACH TO BAGDONA SEAM

4.2 x 2.5 mts. intake drift dipping at 1 in 4 against the general dip of the beds is proposed to be driven from Lower Workable to Bagdona Seam for material supply purposes. The length of drift would be about 140.0 mts. Also coal supply drift (intake) dipping at 1 in 4 against the dip of the beds is proposed to be driven from about 7.5 mts.

above the Lower Workable Seam. 7.5 mts. staple bunker would be driven upto Lower Workable Seam. For ventilation and communication purposes one or two 10 cm. dia boreholes would be drilled around the staple bunker. The length of drift would be about 155.0 mts. The dimensions of the drift are proposed to be 4.2 x 2.5 mts. The belt conveyor is proposed to be installed in this drift. This would also be used for travelling purposes. 4.5 mts. dia. staple shaft (extension of staple shaft from Upper to Lower Workable Seam) upto Bagdona Seam is proposed to be sunk to act as the return airways. The proposed location of drifts and staple shaft is shown in Plate No.III Drg. No. 2-OC/10, and Plate No. V. and VI.

13.4 OTHER DRIFTS

In addition to provision of various drifts and staple shafts mentioned above, for crossing various minor faults and dykes the extra provision is being kept in the report and is shown in Appendix A. 8.1

NOTE

In event of dyke 'D' being proved in the property, the drifts for approaching various seams

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may undergo a locational change. The drifts driven to various seams in Sector 'B' would not be driven and instead such drifts would be driven in Sector 'A' on the dip side of the dyke 'D'. The sector B workings in such case, would be approached seamwise through Sector 'A' separately on rise and dip side of dyke 'D'. This change in developmental activities would be met within the provisions kept for in the report.

CHAPTER XIV

METHOD OF WORK

14.1 As brought out in Chapter-VIII, the leasehold area of the property is divided into two sectors i.e.:

1) Sector 'A'
2) Sector 'B'

14.2 The extractable reserves of sector B is approximately 23 % of total extractable reserves. Upper and Lower Workable Seams are being developed in Shobhapur Project. Seamwise extractable reserves in the virgin area and the reserves standing on pillars have been brought in Table No. IX

14.3 SPECIAL PHYSICAL PROPERTIES OF COAL AND STRATA

14.3.1 Before deciding the method of work to be adopted in the project, it is considered necessary to spell out the physico-mechanico properties of the coal and strata which have great bearing on selecting the face machinery and planning the mine.

14.3.2 Coal is banded in nature and occurs in layers. It is very hard. The protodyknov index of hardness of Lower Workable Seam has been found to be 2.5. The immedia[illegible] roof of Upper Workable Seam is soft carb./grey shale of variable thickness ranging from 0.98to 1.61mts. (refer Annexure I) and would have to be dressed down or thorough[illegible] supported. The immediate roof of Lower Workable seam is sandstone and at places it is shale. This coal seam in general is more than 2.5 mts. thick; but wherever thickn[illegible] is more than 3.0 mts. the development is proposed to be done along the roof(as experienced in Pathakhera I,II and in Satpura I and II the coal left in the roof parts and comes down whereas sandstone roof is very good.) The

immediate roof above Brgdone Seam is fairly strong shale co... may need to be supported occasionally. The strata in gen... above Upper Workable Seam consists of sandstone.

14.3.3 Coal seams have low moisture content varying 1.80 to 3.7 %. The coal is not liable for spontaneous heating and there is no history of fire even in the caved areas in the adjoining Pathakhera No. I.

14.3.4 Shobhapur Project is Cat. II in gassiness. No gas has been found in measurable quantity in the district or main return, but in the adjoining Satpura Project in roof cavities or near dyke, upto 5 % of fire-damp has at times been found.

14.3.5 The mine is fairly dry. During development hardly any water seepages are noticed but during depillaring operations, on a average 250 g.p.m. of make of water has been observed in a panel in Pathakhera -I.

14.3.6 Motur beds are present in the northern part of the area only(refer para 6.2.6). The parting(consisting of sandstone, shale and thin coal seams of Barakar measures) between moturs and topmost workable coal seam i.e. Upper Workable Seam is 100 metres. These beds have very thin claybands. So far no problem whatsoever has been encountered due to presence of moturs in the depillaring areas of Pathakhera I mine.

14.4 FACTORS TO BE CONSIDERED FOR SELECTING METHOD OF WORK

14.4.1 The following points would be considered for selecting the method of work:

(i) The method selected should improve the productivity and economics of the mine.

(ii) Improvement in working conditions of work

persons by trying to eliminate ardous job of basket loading, etc.

(iii) Method selected should be such that it improves safety standards especially by reducing concentration of face manpower where rate of accidents in coal mines are highest.

(iv) Method of work selected should be such as to ensure maximum conservation of coal by optimising extraction percentage.

14.4.2 At present Bord and Pillar system of mining is being followed in Satpura-I and II and adjoining Pathakhera I & II mines. Extraction of these developed pillars is being done by caving in Pathakhera Mine No. I and also in Satpura Mine No. I. In the earlier approved Shobhapur Project Report, longwall retreating by caving had been recommended for Upper Workable and Bagdona Seams. Also, longwall panel is being proposed to be opened in Bagdona Seam in Pathakhera Mine No. I.

14.4.3 In most of the area there are no important surface features except Tawa river in north and north east part of the area. Also, there are surface buildings and other infra-structure of Shobhapur Project.

14.4.4 Sandstone beds in the area in general are very hard and tend to be massive, especially the sandstone beds above Lower Workable Seam do not cave in easily and at times the roof has to be brought down by blasting. The physico-mechanico properties of the strata immediately above the three seams should be studied in collaboration with C.M.R.S. The test will also help in establishing the support density of the face and goaf edge.

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14.4.5 The surface contouring has to be done for the major part of the area but most of the area is much above H.F.L. Hence almost entire area except the area mentioned in para 12.4.2 can be extracted by caving.

14.4.6 As discussed above, extraction by caving is possible in major area of the property except under built up area where full or partial extraction could have been possible with hydraulic sandstowing. But because of non-availability of sand in the area partial extraction/development as the final operation is recommended for such a part of the area.

14.5 PROPOSED METHOD OF WORK AND FACE MACHINERY

14.5.1 Because of higher thickness of Lower Workable Seam, this seam is suitable for Bord and Pillar. The tendency of immediate carb.shale/grey shale just above Upper Workable Seam is to part off easily. Supporting of this immediate roof either by Bord and Pillar or in longwall is fairly difficult. Winning of Upper Workable Seam by longwall was considered at depth. With such a soft immediate roof except for shield support system no other support system would work effectively. The shield support system longwall face is quite costly and has not been tried in the country as yet. The height of coal seam after dressing of this carb.shale is above 2.5 mts. (refer Annexure I). Hence Bord and Pillar method of mining with dressing down of immediate grey/carb.shale roof is suggested for this seam. The gradient of seams and the roof conditions are suitable for winning coal by mechanised means.

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14.5.2 Bagdona seam is suitable for longwall by caving due to suitable seam thickness and shale as immediate roof which caves in more easily than sandst There are certain areas where due to several reasons longwall is not recommended. These reasons are:

i) Occurrence of seam in small patches.

ii) Shape of the areas due to which regular and systematic longwall panels cannot be formed.

iii) Working under surface features, such as river, nalas, roads, buildings etc.

14.5.3 The seams and the sectors where different methods of work are to be followed have been shown in Plate~~I~~V,V ,VI . The method of winning coal from the face including the coal face machinery is being spelt herewith.

14.5.4 DEVELOPMENT METHODS

14.5.4.1 A number of development panels will be needed to be worked out at the mine by Bord and Pillar. The use of scrapers for development of workings on Bord and Pillar has not been considered in this report, as the performance of the same had not been satisfactory while developing Lower Workable Seam with Scrapers in Satpura Mine No. II. Four alternatives have been considered for such drivages.

Alt. I Cutting, drilling, blasting and manually loading the blasted coal into coal tubs.

Alt.II Cutting, drilling, blasting and manually shoveling the blasted coal nto chain conveyor which would deliver coal onto coal tubs.

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Alt. III — Cutting, drilling, blasting and loading the blasted coal by side loaders onto chain conveyor which would feed coal to gate belt conveyor.

Alt.IV — Cutting, drilling, blasting and loading the blasted coal by load haul dumper onto stage loader which would feed coal to gate belt conveyor.

14.5.4.2 The economic indices of each of the methods described above has been shown in Annexure-II . Table No. XII below gives the district cost/te. for each of the method listed above.

TABLE XII

ECONOMIC INDICES OF DIFFERENT METHODS OF DEVELOPMENT

Sr. No.	Particulars	Alt.I	Alt.II	Alt.III	Alt.IV
1.	Coal production/ day m.tes	300	450	450	480
2.	Coal production/ annum m.tes	0.09	0.135	0.135	0.144
3.	Manshift/day	211	244	140	124
4.	E.M.S(Rs)	40.0	40.0	40.0	40.0
5.	O.M.S(tes.)	1.42	1.64	3.21	3.87
6.	Wages cost/te(Rs)	33.00	26.09	14.95	12.40
7.	Int. and depre-ciation per te. of coal output(Rs.).	6.42	7.15	8.34	8.18
8.	Power cost/te of coal output	2.00	2.50	2.50	2.25
9.	Stores cost/te of coal output	6.25	6.75	7.25	7.25
	District cost/te of coal output	52.79	47.49	41.54	37.26

14.5.4.3 Though the last alternative is the cheapest it has not been preferred on the ground of standardisation as, for the present, mechanised pillar extraction is not feasible with this system. The third alternative is costlier than the last alternative but is cheaper compared to other two alternatives. In actual performance with this system the results are fairly encouraging. This system may be extended even for final extraction of pillars. As such this alternative is suggested for Shobhapur Project. Different capacity of side loaders are available in the market. The one with about 0.6 cu.m. bucket capacity has been preferred as that would suit the duty conditions. The layout of such panel is given in Plate No. VII Drg. No. 3-00362

14.5.4.4 The development would be done on panel system. Six headings development panel is proposed both for Upper and Lower Workable Coal Seams. As stated in para 14.5.6, the lowest most Bagdona Seam is envisaged to be worked by longwall. Though U.W.S., L.W.S. & Bagdona Seams are not contiguous in nature, for good mining practice it is envisaged to maintain verticality of panels and barriers in different seams as far as possible. The length of longwall face envisaged for Bagdona Seam is 120 mts. This would necessitate six level panel to be developed in Upper and Lower Workable Seams. Where depth of Upper & Lower Workable Seams is more than 150 mts., the pillar size for gallery width of 4.2 mts. would be 30 mts x 30 mtswith six level panel for maintaining verticality of barrier over barrier, the length of longwall face would be about 150 mts. The length of longwall face of 120 mts., and

with subsequent gain in experience of running of such the increased length upto 150 mts. would be convenient to manage. For this reason six heading development panels have been envisaged for both Upper and Lower Workable Seams. From strata control, supervision and production considerations also six level headings would be appropriate. The sequence of operation of side loa panel has been shown in Plate No. VII. The dip and ris galleries are proposed to be driven first and level headings would be driver after dip rise connections are established. The dips would be driven for one third and rises for two third of length of pillar. This woul help in keeping the chain conveyors extended inbye sufficiently thereby minimising the side loader movement. For each development panel 3 middle cut arcwall crawler mounted coal cutting machines, 3 coal drill machines with drill panels, 3 - 0.6 cu.m. capacity side loaders, 7 light duty chain conveyors, 1 medium d chain conveyor, gate belt conveyor, one single track reversible endless haulage for material supply, rope, rail and other accessories have been provided.

14.4.4.5 One such mechanised panel in Upper Workable Seam is envisaged to produce about 330 tes./d i.e 0.117 m.tes per annum(refer page 67 para 15.3.1 The production envisaged from Lower Workable Seam panel is about 450 tes./day i.e. 0.135 m.tes per ann (refer para15. 3.1) In addition to panel development dip heading in different seams will also be worked. Coal from these dip headings and small irregular areas is also proposed to be won with side loaders and chain conveyors combination .

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14.5.5 METHOD OF EXTRACTION BY BOARD AND PILLAR

i) Partial extraction under built up areas

(a) Tawa river, nalas and other infrastructures exist in southern, central and north eastern part of Shobhapur Project. In such an area development/partial extraction of different seams as final operation may have to be done by obtaining permission from D.G.M.S. Two alternative methods of partial extraction have been considered. In the first alternative, larger pillars are formed and then split into smaller pillars on retreat. In the second alternative the virgin block is developed upto the boundary with three headings and on the retreat form the pillars of smaller dimensions. In this report, the first alternative has been proposed as this would yield higher production from the initial stage.

(b) Upper Workable Seam is proposed to be split and Lower Workable Seam and Bagdona Seam are proposed to be developed only. With the factor of safety of 2.5 (as per Salomon's formula), it is envisaged to have about 45 % extraction in Upper Workable. By forming pillars as per statute about 30% extraction in Lower Workable and Bagdona Seams is contemplated. The pillar size, size of stook after splitting or final pillar size after widening, the width of gallery in first and final workings, height of workings and final %age extraction at different depths of working has been given in Table No XIII below:

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TABLE XIII

SIZE OF PILLARS FOR PARTIAL EXTRACTION IN UPPER WORKABLE SEAMS.

Depth of upper workable seam (upto floor in Ft.(H)	Width of galleries in ft.(B)	Height of galleries (total of UWS) in ft.(h)	Width of pillars in ft. (W)	%age extra of mineable reserves
150 (50.0 mts)	16	8 (2.4 m)	20 (6.0m)	69.0
230 (70.0m)	16 (4.8m)	8 (2.4m)	28 (8.4m)	59.5
330 (100.0m)	16 (4.8m)	8 (2.4m)	38 (11.5m)	50.5
400 (120.0m)	16 (4.8m)	8 (2.4m)	50 (15.0m)	42.6
550 (170.0m)	16 (4.8m)	8 (2.4m)	70 (21.0m)	33.7
640 (200mts)	16 (4.8 m)	8 (2.4m)	80 (24.5)	30.6

The formula considered is as follows:

$$S = \frac{1320 \times W^{0.46}}{p \times h^{0.66}} \qquad (1)$$

Where

a = Factor of safety

W = Width of pillars in feet

h = hei ght of galleries in feet

p = load on pillar in lbs/sq.ft.

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(c) (c) The value of 'p' is to be deduced from the following formula and the value substituted in equation(1)

$$p = 1.1\ H \left(\frac{W+B}{2}\right)^2 \qquad (2)$$

Where

H = depth of seam in feet

W = width of pillar in feet

B = breadth of galleries in feet

(d) For determining the size of pillars in the Upper Workable Seam, depth of Upper Workable Seam has been taken and the height of galleries has been taken as 2.5 m.

(e) Salomon's formula is based on the assumption of the crushing strength of coal as 350 kg/cm^2 to 420 kg/cm^2. The mean crushing strength of Lower Workable coal seam as determined for Pathakhera mine by C.M.R.S. varies from 540 kg/cm^2 to 572 kg/cm^2. Therefore, permanent stability of the area with the dimensions of pillars and galleries as stated in Table No. XIII is almost a certainity. The verticality of the workings in Upper Workable, Lower Workable and Bagdona Seams would have to be maintained by boreholes to be put down systematically. Precise correlation survey would also be done. It is also suggested that model studies are made by Research and Development Wing of CMPDI Limited with Central Mining Research Station, Dhanbad, for determining the efficiency of the proposed method.

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(ii) Extraction by caving:

During final extraction of Bord and Pillar panels, coal is proposed to be won by blasting off the solid and mechanically loading the blasted coal with side loaders onto chain conveyor. It has been stated in para 14.5.1 that immediate grey/carb.shale over Upper Workable Seam is not self supporting and would come down during development. During depillaring stage, while attacking slices, attemptwould be made to leave shale in the roof. This would help improve the despatch quality of coal. The method of extraction of pillars would be on diagonal pattern and three pillars would be under attack at a time. Each pillar would be split into two halves by dip rise split. During final extraction if required, the pillars under attack is proposed to be heightened upto full seam thickness and the split gallery is driven to full thickness of seam. Wooden props-cogs/ 40 te. friction props with girders or channels as cross-bars would be used as supports. Plate No.VIII shows the sequence of extraction, district transport and support system of a typical mechanised depillaring panel. The ribs left during slicing are proposed to be robbed judiciously on retreat. The equipment provided in one depillaring panel would be 3 to 4 coal drill machines with drill panels, 4 0.6 cu.m. side loaders(for U.W.S. during slicing 0.4 cu.m. capacity low ht. side loaders may be used), 9 light duty chain conveyors, one medium duty chain conveyor, one gate belt conveyor about 175 to 200 friction props,one single track reversible endless haulage for material supply, rope, rails and other accessories. One such mechanised depillaring panel is envisaged to produce 450 tes. per day i.e. 0.135 m.tes per annum (refer para15.3.3)

14.5.6 LONGWALL PANELS

As mentioned in para 14.5.2 Bagdona Seam is suitable for longwall by caving. The area proposed to be worked by longwall system of mining is demarcated in Plate No. VI . The present experience of working longwall faces with friction props in WCL mines is not encouraging. The longwall faces are proposed to be worked with shearer either with individual hydraulic props or with Powered Supports as face support in near future. One such longwall shearer face with Powered Support face is being considered for Bagdona Seam in Pathakhera Mine No. I. Longwall shearer face, if proposed for Bagdona Seam, has a faster rate of advance compared to advance of Upper and Lower Workable Seams proposed to be won by mechanised Bord and Pillar method of miring . Till the upper seams are mined longwall panels by caving at Bagdona Seam cannot be worked. The extractable reserves of Bagdona Seam by longwall system would be about 5.0 million tonnes. One powered support longwall face with gate road drivage is envisaged to produce about 0.40 million tonnes. The balance production would continue to come from part of Bagdona Seam envisaged to be worked by Bord and Pillar and from Lower Workable Seam. For consistent and continuous flow of production from this seam it is proposed to work this seam after about 12 to 15 years from now, the life of the project being 25 years. The technology which would give better production and economics consistent with safety would then be selected accordingly for Bagdona Seam. Hence, the selection of face equipment for working this seam with longwall system of mining is not being considered at this stage.

14.6 WORKING OF SEAMS IN SECTOR 'A' AND 'B'

14.6.1 At present development by Bord and Pillar(by manual means) is being done in Upper Workable and Lower Workable Seams in Sector 'A'. It is proposed to develop both the seams in this area and as well the dip drivages headings by mechanised methods. For faster liquidation of Upper Workable Seam it is envisaged to work five panels (dev./dep.) on either side of trunk headings in Lower seam and three panels(dev./dep.) would be worked in Upper Workable Seam. Subsequently sector 'B' would be approached and additional panels would be opened up there. On an average two panels(dev./dep.) would be worked in Sector 'B' the remaining being in Sector 'A'. Most of the areas in these sectors would finally be extracted by caving.

14.6.2 Under built up areas and under Tawa River, subject to approval from D.G.M.S. and conditions imposed therein from the Directorate it is proposed to split the pillars as final operation of extraction(refer Para 14.5.5) and Table No XIII) in Upper Workable Seam. Lower Workable Seam and Bagdona Seam have been envisaged to be developed only. Extraction of these areas especially under Tawa river would be done towards winding up stage of the project and also when the area northeast of trunk headings of sector B has been worked. For the purpose of this report the reserves locked up under Tawa river, have not been taken into account while assessing the life of the project.

14.6.3 Bagdona Seam is envisaged to be worked by longwall retreating by caving except in small patches(refer plate No. V) where development and final extraction by Bord and Pillar has been contemplated. As stated in Para

14.5.6 the method of winning this seam has been spelt at this stage. However, the area earmarked for working by Bord and Pillar has been shown in Plate No. VI . Also the essential developmental work for the part of the seam to be worked at later stage would be taken up and provision for the same has been kept in the report.

14.7 Plates No.IV,V. and VI give the tentative panel layout in Upper,Workable, Lower Workable and Bagdona Seam respectively. The known existing faults and dykes have been taken into consideration while proposing layout of panels. As mentioned in Paras 6.3.2 and 6.5.4 specially in the indicated reserves area, the possibility of small faults and dykes cannot be ruled out. Depending upon the location and extent of faults and dykes there may be slight change in layout of particular panels. This variation would not change the general layout of the mine.

14.8 SEQUENCE OF EXTRACTION

14.8.1 The method of extraction of seams is by caving in most of the areas and hence sequence of extraction is in the fdecending order. Almost entire production in first 12 to 15 years would be from Upper and Lower Workable Seams. Subsequently, after exhaustion of reserves of upper seams, the major share of production would be from Bagdona Seam .

14.8.2 After working of isolated patches and dip development headings in Upper and/or Lower Workable Seams the equipment used for its development would be utilised in dip development and gate road drivage of Bagdona Seam. The areas in Bagdona Seam which have essentially to be worked on Bord and Pillar would also be taken up. The equipment for this purpose would be transported from

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Upper Workable Seam.

14.8.3 The area earmarked to be worked by longwall has been shown in Plate No. VI . The approximate reserves of the area to be worked by longwall system of mining would be about 5.00 million tonnes.

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CHAPTER XV

PRODUCTION PARAMETER AND PRODUCTION PHASING.

15.1 The production capacity from Shobhapur Project in the initial stages is envisaged to be achieved by working five Bord and Pillar mechanised development / depillaring panels in Upper Workable Seam and three Bord and Pillar mechanised development/depillaring panels in Lower Workable Seam. In addition one main development heading panel(dips or levels) would also be worked in each seam. At later stage after exhaustion of reserves in Upper Workable Seam, Bagdona Seam would be worked by longwall, the method of winning of this seam has not been spelt out in the report and so the production parameters for the panels to be worked on longwall has not been mentioned at this stage.

15.2 BASIC CONSIDERATIONS

15.2.1 Coal Preparation:

(i) Production per cut in Upper Workable Seam = width x thickness x Depth of cut x Density
= 4.8 x 1.5 x 1.2 x 1.55
= 13.39 say 13 tonnes.

(ii) Production per cut in Lower Workable Seam = 4.8 x 3 x 1.2 x 1.55
= 26.78 say 25 tonnes

15.2.2 Loading by Side Loaders

a)

(i) Rated bucket capacity	0.6 cu. mt.
(ii) Fill factor of bucket	0.95 "
(iii) Swell factor of coal	0.74 "
(iv) Fill cum swell factor	0.70 "
(v) Effective solid capacity	0.60 x 0.7[illegible] = 0.42 cu. mts.
(vi) Pay load capacity(Solid coal)	0.42 x 1.5[illegible] = 0.65 tonnes

b) Performance of the side loader based on the " Time Studies" conducted at West Chirimiri Colliery are given below:

(i) Loading & unloading time	0.63 min
(ii) Travelling speed	0.054 min/[illegible]
(iii) Average lead	8.0 mts.

Cycle Time = (i) +(ii) x(iii) x 2
= 0.63 + 0.054 x8 x 2
= 0.63 + 0.864
= 1.5 min.

c) Rate of loading per hour = $\frac{60}{1.5}$ x 0.65
= 26 tonnes

15.2.3 Cycle of operation

Time required for each operation of cycle in Upper and Lower Workable Seam is as given under:

	U.W.S	L.W.S
(i) Cutting	45 min	45 min
(ii)Drilling, Blasting and Fume clearing	30 min	45 min
(iii)Dressing	15 min	30 min
(iv) Loading	30 min	60 min.
Total	120 mins i.e.2 hours	180 mins i.e 3 hours

By suitably organising, variation upto 1½ to the most 2 cycles per face per shift in Upper Workable Seam and 1¼ cycles in Lower Workable Seam, for set of face workers(for 3 levels) in a six level panel can be obtained. Considering delays etc. it would be possible to achieve 1½ cycle per face in Upper Workable Seam and 3/4 cycle per face in Lower Workable Seam. In the dip development headings it would be possible to achieve 2/3 rd cycle in Upper Workable and ½ cycle in Lower Workable Seam per face per shift.

15.3 PRODUCTION PARAMETERS

15.3.1 Development Panel(Side Loaders)

No. of galleries in a panel	6
Max. No. of faces	10
Min. No. of faces	6
Average No. of faces	8

(i) Upper Workable Seam

No. of cycles per panel per shift	= 8 x 1½ =10cycl = 10 cycles
Production per shift	10 x 13 = 130tes.
Production per day	390 tonnes
Production per annum	0.117 m.tes.

(ii) Lower Workable Seam

No. of cycles per panel per shift	= ¾ x 8 = 6 cycles
Production per shift	= 6 x 25 =150t s.
Production per day	= 150 x 3=450tes.
Production per annum	= 450 x 300 = 0.135 m.tes.

15.3.2 Dip Development Headings

No. of headings in a panel	4
Maximum number of faces	6
Minimum number of faces	4
Average number of faces	5

(i) Upper Workable Seam

No. of cycles per panel per shift	$\frac{5 \times 2}{3} = 3.3$ say 3 cycles
Production per shift	= 3 x 13 = 39 tonnes
Production per day	= 39 x 3 = 117 tonnes say 110 tonnes
Production per annum	= 110 x 300 te = 0.033 m.tes.

(ii) Lower Workable Seam

No. of cycles per panel per shift	= 5 x ½ = 2.5
Production per shift	= 25 x 2.5 = 62. say 60 tonnes
Production per day	= 60 x 3 = 180
Production per annum	= 180 x 300 = 0.054 m.tes.

15.3.3 Bord & Pillar Depillaring Panel(with side loaders)

The production from mechanised depillaring panels would be the same as from the development dist i.e. 390 tonnes and 450 tonnes per day from Upper and Lower Workable Seams respectively. Coal preparation depillaring panels would not pose a problem as can be seen from time cycle study.

	U.W.S.	L.W.S.
(i) Drilling	20 min	30 min
(ii) Charging, stemming, blasting	15 min	20 min
(iii) Waiting time	15 min	15 min.
(iv) Dressing time	15 min	30 min
(v) Supports and loading (inclusive of overlap time)	40 min	60 min
	105 min.	155 min.
Slack time	45 min	45 min.
	150 min.	200 min.

In eight hours shift 3 cycles per shift is possible in Upper Workable and 2 cycles per shift is possible in Lower Workable Seam. At any one time three pillars are proposed to be under extraction. In one pillar, one slice would be under extraction at a time. Production obtainable from one round of blasting in one slice would be = width of slice/split x pull per round x Ht. of seam x Sp. Gravity

Proudction /cycle for U.W.S = 4.8 x 1 x 1.5 x 1.55 =11.16
say 11 tonnes

Production/cycle for L.W.S = 4.8 x 1 x 3 x 1.55 =22.32 tes.
say 20 tonnes.

Production per shift from extraction of pillars is = No. of Pillars x No. of cycles x Production per round

Production from U.W.S = 3 x 3 x 11 = 99 tonnes
say 100 tes.

Production from L.W.S.= 3 x 2 x 20 = 120 tonnes

About 30% to 40% of production would come from splitting, roof heightening (for L.W.S) from Upper and Lower Workable Seams respectively. So on an average consistent production of 390 te/day and 450 te/day respectively would be available from Upper and Lower Workable Seam from depillaring districts with side loaders.

15.4 As stated in para 15.1, five panels would be worked in Upper Workable Seam and three panels would be worked in Lower Workable Seam. In addition one dip development heading would be worked in each of U.W.S & L.W.S. The seamwise production target envisaged to be achieved would be as follows:

(i)	Upper Workable Seam (five panels)	0.117 x 5 = 0.585 m.tes.
(ii)	Lower Workable Seam (three panels)	0.135 x 3 = 0.405 m.tes.
(iii)	Dip Development heading in U.W.S	1 x 0.033 = 0.033 m.tes.
(iv)	Dip Development heading in L.W.S	1 x 0.054 = 0.054 m.tes.
		1.077 m.tes.

say 1.00 million tonnes per annum.

15.5 PRODUCTION PHASING

As discussed in para 10.3.3 it would not be possible to increase production beyond 0.4 m. tes. per annum. So till the shaft is sunk, it would not be possible to go beyond 0.4 m.tes per annum. While working out production phasing this aspect has been considered.

	1980-81	81-82	82-83	83-84	84-85	85-86	86-87
Production (in million tonnes)	0.25	0.35	0.40	0.60	0.75	0.90	1.00

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CHAPTER XVI

MINE SUPPORTS

16.1 GENERAL ROOF CONDITIONS

Roof condition in general is good except for the immediate carb./grey shale roof of upper workable seam. This shale roof above U.M.S. does not stick and parts of . It would be difficult to support such a roof. This shale roof is being dressed down at present. The roof exposed subsequent to dressing is good and practically needs no support. In this report also it is suggested to continue with this system.

16.2 ROOF SUPPORTS:

16.2.1 Permanent, Semi-permanent Roadways and Development panels

The roof in general being good, permanent and semi- permanent roadways do not need regular support. At places, where roof is bad, girders with suitable lagging material are proposed for permanent roadways. In semi-permanent roadways such as gate transport, district intake and return roadways, the roof may be supported by roof bolting etc., if required.

16.2.2 Depillaring panels:

In a mechanised depillaring panel, the support system of galleries upto two pillars ahead of pillar under extraction would be by having conventional wooden supports. For seam upto 3.0 m thick in the dip splits of the pillars under extraction and also in the slices being extracted two rows of 40 to. friction props set at 1.20 m apart in the same rows would be provided. The rows of

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clearance(minimum clearance required being 2.4 m
2.4 m) for movement of side loaders. With this type
of supports, the side loader operator would
under supported area. The arrangement of
shown in Plate No.VIII(Drg. No. 2-00313). In
mechanised depillaring panel for seams more
thick, the proposed supports arrangements is
Plate No.IX (Drg. No 3-00360). Two types of
system havebeen proposed.

(a) In the first system of support slices
supported by one row of cogs on solid pillar side
rise side of slice and other row of props on rib
The distance between props in the same row will be
whereas distance between cogs in the same row will
2.4 m. In between cogs, props will be set. The clear
distance between rows of props and cogs will be 2.4
Splits will be supported by two rows of props. Clear
distance between rows of props will be 2.4 m and distance
between the props in the same row will be 1.2 m. In
case of emergency such as at times of weighting side
can be brought in splits. The width of side loaders is
1.8 mts. and as such there will not be much difficulty
in flitting of side loaders between row of props(in
splits). Split slice junctions will be supported
by 40 tc.ffic. Props and girders (150 mm x 75 mm). Lagging
supported by cogs. This system will be used till the
preliminary sign for first fall is indicated.

(b) The second type of support system is proposed to be used after preliminary indication of first fall are observed(refer Plate No.IX). In this case, slants and junctions will be supported in the similar manner as described earlier but in splits row of cogs(2.4 m interval in the same row) and row of props (1.2 m interval in the same row) will be provided. Clear distance between rows of cogs will be 2.2 m. In between two cogs props will also be given.

16.3 Adequate provision of manpower has been kept for the support work needed in the project and has been detailed in Appendix-B.

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CHAPTER XVII
UNDERGROUND TRANSPORT SYSTEM

17.1 COAL TRANSPORT

17.1.1 While considering underground transport system the advantage of different coal horizon is taken. Staple bunkers or bunker drifts between the coal horizon, wherever possible would be made. The Plate No. X Drg. No 3-00363 shows the schematic diagram of the proposed transport layout.

17.1.2 FACE TRANSPORT

Coal at the face would be mechanically loaded by side loaders onto 60-90 T.P.H. capacity light duty chain conveyors. The average load for the side loaders upto the chain conveyor would be about 8.0 metres. Side loader of 0.6 cu.m. capacity has been chosen. The light duty chain conveyors would discharge coal onto 100-120 T.P.H. capacity medium duty chain conveyor.

17.1.3 GATE TRANSPORT

The medium duty chain conveyor would feed coal onto 800 mm wide gate belt conveyor. The belt conveyor is envisaged to have the capacity of 100 T.P.H. The belt conveyor is proposed to be installed in 4th level of the panel(refer Plate No. VII Drg. No 3-00362.

17.1.4 TRUNK TRANSPORT

Coal from different gate belt conveyors is fed onto 1000 mm wide trunk belt conveyor installed in the seam. Wherever possible coal from U.W.S.

would be transported to L.W.S. through staple bunker (refer Plate No. X Drg. No. S-00303

17.1.5 MAIN TRUNK TRANSPORT

Coal from different seams through staple bunkers/drifts is proposed to be transported to Lower Workable Seam which would have the main trunk belt conveyors of 1000 m width. The trunk and main trunk belt conveyors would be of about 70 mts. lift. As shown in Plate No. X the main trunk belt conveyor to be installed in the drift from Lower to Upper Workable Seam would have a tripper arrangement so as to fully utilise the bunkerage capacity of Bunker Drift(450-500 tonnes capacity). Coal through this bunker drift would be discharged on the main trunk belt conveyor installed in Incline No. 2 through a feeder belt conveyor.

17.2 MATERIAL SUPPLY

From the surface material is proposed to be supplied through Incline No. 1(fitted with direct haulage) and D.C. shaft proposed to be sunk almost in the middle of the property. Material would be transported upto the gate roads through direct haulage/ endless haulage installed for the purpose. Material inbye upto the face would be supplied through endless haulage. The proposed material supply arrangement is shown in Plate No. X & Plate No VII (for material supply through gate roadways). The material supply from various seams would be through direct haulages installed in drifts.

17.3 MEN TRANSPORT

The maximum travelling distance upto the farthest point through the existing incline is envisaged to be about 4 Km and dipmost point would be about 270 metres. For a mine designed for the production capacity of 1.00 million tonne per annum an efficient men and material transport system is a must. To facilitate travel of men in vertical and horizontal planes D.C shaft(Proposed) is envisaged to be equipped with men winding arrangement. For this reason also, the location of shaft has almost been kept in the middle of the property.

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CHAPTER XVIII

VENTILATION

18.1 EXISTING STATUS

The ventilation requirements for the existing production of Shobhapur Project have been stated in Para 11.3.2 . The different openings, their cross section, their existing status etc. are detailed below:

TABLE NO XIV

Sr. No.	Type of Openings	Name	Effective cross section area in sq.mts.	Purpose	Quantity of air in cu.m/ min.	Remarks
1.	Incline	No.1	4.8 x 3 = 14.4	Return airway cum travelling	4300	Finally it would be intake and would be fitted with haulage for material supply.
2.	Incline	No.2	4.8 x 3 = 14.4	Intake airway cum Haulage roadway	4300	Finally it would be intake & would be fitted with belt conveyor; would also be used as travelling roadway.
3.	Air Shaft	-	6 mts.dia'	Not operative yet, sunk upto U.W.S & being deepened upto L.W.S	-	Would be the main return.

18. [illegible]

18.1 The total quantity of air necessary for ventilating the whole mine can be calculated from the following expression :

Q Mine = 1.2 K Q cu.m./min.

Where 1.2 is reserve factor and

K - is total safety factor; the value of K for central ventilation system with 5-10 Bord and Pillar panels is 1.8.

Q - total air quantity required as per stipulation in cu.m./min.

Therefore Q Mine = 1.2 x 1.8 Q cu.m./min

= 2.16 Q. cu.m./min.. ✓

18.2.2 The various methods adopted for calculating the total quantity of air as per stipulation are :

a) Based on the maximum number of men employed underground at any time;
b) Based on daily mine output
c) Based on quantity of methane gas actually liberated.
d) To comply with the specific velocities at each face and working place.

The maximum quantity of air as per the above calculation methods is, generally considered and accepted. The various system of computing air quantity is being elaborated below:

a) BASED ON MEN ENGAGED UNDERGROUND

As per statute not less than 6 cu.m/min of air per person has to be ensured in every ventilating district on the largest shift. Maximum of 900 workmen would be engaged in 1st shift in this mine. So

quantity of air required as per above would be
Q_1 = 6 x 900 = 5400 cu.m./min.
So the total quantity necessary would be
Q mine = 2.16 x 5400
= 11664 cu.m./min. (1)

b) BASED ON DAILY OUTPUT

Again as per statute, the quantity of air required should not be less than 2.5 cu.m./min of air per tonne daily output. So with the daily production of 3340 tonne, the quantity necessary as per the DGMS stipulation becomes

Q = 2.5 x 3340
= 8350 cu.m. per min.

The total quantity necessary would be

Q mine = 2.16 x 8350
= 18036 cu.m. per min (2)

c) BASED ON VOLUME OF GAS LIBERATED

Coal Mine Regulations, 1957, stipulate that the percentage of inflammable gas should not exceed 0.75 in the general body of the return air of any ventilating district and 1.25% in any place in mine. For planning purposes, it is considered to take methane dilution level at 0.5 %. In order to meet the condition, the volume air in each district should be

$$Q = \frac{100\ W\ A}{24 \times 60 \times 0.5} \text{ cu.m./min}$$

Where

W = Quantity of Methane liberated from 1 tonne of coal (for Cat. II mine the rate of emission has

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been considered to be 10 cu.m. per tonne of coal- which is max. in Cat.II mine)

A = Production per day.

So total calculated quantity for underground

Q = 0.138 x 10 x 3340

= 4609.2 cu.m./min.

Therefore Qm = 2.16 c 4609

= 9955 cu.m. per min. (3)

d) BASED ON AIR VELOCITY

The norms for the velocity of air current measured at various places has been laid down. The volume of air and cross sectional areas should be suitably adjusted to meet the stipulated air velocity requirements.

18.2.3 It is thus observed that the maximum quantity of air required is on the basis of daily output and comes to 18036 cu.m per min. or say 18000 cu.m. per min. or 300 cu.m./sec.

18.3 MINE OPENING

18.3.1 Existing two inclines i.e. Inclines No. 1 & 2 would act as intakes and existing airshaft which is being deepened upto Lower Workable Seam would act as main return airshaft. Keeping in view the permissible velocity limits, the following studies show the maximum quantity of air which can be handled by the existing openings.

Sr. No.	Openings	Effective cross section area in sq.mts.	Purpose	No. of air-ways	Quantity of air required in cu.m/min.
1.	Incline No.1	12.96	Belt conveyor intake roadway	4	3110
2.	Incline No.2	14.40	Haulage cum intake roadway	4	3456
			Sub-Total		6566
3.	Airshaft	28.28	Return airshaft	12	20360

18.3.2 Table No. XV above reveals that the main return airway is adequate to deal with ultimate air requirements(for ventilation purposes keeping 10% extra capacity of the mine outlets) for the production capacity of 1.00 million tonnes per annum.

18.3.3 The two existing intake inclines would not be adequate to cater for the ventilation requirements. So the new opening acting as intake would be required and till the time the new opening is completed it would not be possible to go beyond the production capacity of 0.4 million tonnes per annum.

18.3.4 The maximum quantity of air required to be dealt by the proposed new opening works out to be 1.000-6566= 11434 cu.m./min. The effective cross sec of airway, keeping the velocity in the main intake airway, at 8 mts/sec.(opening proposed to be used for men and material transport) comes to 23.82 sq.mts. B this cross section area single outlet in the form of incline is ruled out. The proposed additional opening in the form of shaft having a diameter of about 6.00 (considering spece factor as 0.9) would be adequate to deal with the ventilation requirements.

18.4 FAN

18.4.1 As brought out in para 18.2.3 the total quantity of air required would be about 18000 cu.m./ min i.e. 300 cu.mts/sec. For this quantity to circul through the mine workings, fan would be required to develop water gauge ranging from 75 mm to 100 mm. A single fan with sucha high capacity would have to be imported. Instead two similar fans in parallel are proposed at one shaft i.e. existing shaft which would be used as upcast shaft. With such parallel operation the increase of discharge may reach upto 80% of total capacity of each fan. For the purpose of this report the efficiency of such operation is being considered at 6 to 70%. Two such similar fans having capacity of eac 230 cu.m./sec and capable of producing about 100 mm would be installed. Before ordering for particular the fan and mine characteristic curves should be suitably matched.

18.4.2 In addition, at the initial stages and towar exhausting stage of mine and as well to deal with exigencies, two separate fans would be more useful the single high capacity fan.

18.4 VENTILATION CIRCUIT

With the addition of intake through a shaft, the ventilation circuit for the project needs to be properly made. The general system of ventilation has been shown in Plate No.III Drg. No. 2-00200 . To increase the equivalent orifice of the mines, in each seam number of intakes and return airways have been kept. The workings of Sector 'B' are farthest away and the reserves of this sector are about 23% of the total reserves of the property. From ventilati considerations alone it would be better to produce about 25% of production from sector 'B' and balance from Sector 'A'. This would help in keeping low the total w.g. over the entire life of the mine.

18.6 VENTILATION SYSTEM FOR MECHANISED BORD AND PILLAR DEVELOPMENT PANEL

18.6.1 For a mechanised Bord and Pillar development panel minimum of 975 and 1125 cu.m./min. of air is required at the last inbye connection in Upper and Lower Workable Seams respectively. For II category gassy mine the faces have to be ventilated by coursing the air upto the faces. With the mechanisation as envisaged the air would be coursed to the faces throug auxiliary fans in such a manner that the minimum velocity (as per DGMS stipulation) for Category II is 15 mts/min. This velocity should be available at 7.5 mts. out-bye of the discharge end of the ventilation ducting. This requirement would be conveniently met with by having auxiliary fan of about

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300 to 350 cu.m/min. capacity. The general arrangement of ventilation system of the development panel showing the position of auxiliary fans is indicated in Plate No. VII Drg. No 3-00362 . In each development panel six auxiliary fans would be required.

18.6.2 The following conditions would be required to be fulfilled for ventilating headings with auxiliary fans:

i) The quantity of air at the place fan is installed should be atleast double the capacity of fan.

ii) All auxiliary fans should be in series.

iii) Methane percentage in general body of air at the site of fan should not go beyond 0.5%.

iv) Auxiliary fans should have sequence control system so that in event of stoppage of outby fan, the inbye fans should stop working.

With the system of development envisaged all the parameters stated above would easily be met with.

18.7 GENERAL

In working out details, it is envisaged that minimum of two seams shall be worked to cope with the required production. The production is to be achieved from eight number of panels(Dev./Dep.). It is important that proper ventilation survey is conducted for proper distribution of air quantity for each panel. The adequate provision for different ventilation appliances (refer appendix A.3) and for manpower(refer appendix B) has been kept.

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CHAPTER XIX

PUMPING AND DRAINAGE

19.1 MAKE OF WATER & PUMPING CAPACITY

The neighbouring Pathakhera No. I & II and Satpura Mine No. I & II are moderately watery mines. As such Shobhapur Project is also assessed to be moderately watery. The present experience of working other mines of this area shows that the maximum make of water during depillaring of a Bord and Pillar panel is around 250 G.P.M. Five depillaring panels have been envisaged to be worked in this project. The project may be required to deal with 1500-2000 g.p.m. i.e. about 110 to 150 litre per sec. of water. The provision for the instant maximum flow during rainy season and additional flow due to caving operations have to be kept. The mine is proposed to have the pumping capacity of about 3500 g.p.m. i.e. about 265 litres per sec.

19.2 SUMPS AND PUMPING SYSTEM

19.2.1 During initial stage, a sump being constructed in Lower Workable Seam(refer Plate No. V) is proposed to be retained. Subsequently main sump is proposed to be made in Lower Workable Seam near proposed D.C.shaft. Water from different parts of Lower Workable Seam and Bagdona Seam would be pumped to this sump. At various convenient places water from Upper Workable Seam is proposed to be drained down to Lower Workable Seam, through

boreholes. The main sump is proposed to be of 10000 cu.m. capacity i.e. having standage for about 20-24 hours. Through a single stage pumping water is pumped out of the mine through 150 m dia. range. The pumps installed would have total capacity of 3500 g.p.m. i.e 265 l.p.s . For this purpose 7 pumps of about 60l.p.s. each and 175 mt. static head would be required. This includes standbye 2 pumps.

19.2.2 In addition to main sump near the shaft, two more sumps, one in dip most point of Sector 'A' and other in dip most point in Sector 'B' are proposed. At both these sumps 2 pumps of about 100 metres static heading having pumping capacity of 300 l.p.s. each are proposed to be provided.

19.2.3 Auxiliary sumps would be located in different seams wherefrom water shall be pumped to either of the sumps mentioned above. These intermediate sumps would be provided with suitable pumps.

19.3 DRAINAGE

Dip drivages are proposed to be driven with the help of face pumps having a head of 30 to 45 metres head. Water from these headings is pumped to intermediate or main sumps. All the gate road or panel drivages would be driven at slightly rising gradient (1 in 40 to 1 in 70) inbye so as to be self draining galleries.

19.4 Adequate provision for face pumps, pumps for intermediate stage and main pumps and also for delivery pipe ranges have been kept in the report and has been detailed in Appendix A.3.3

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CHAPTER XX
POWER SUPPLY AND TELECOMMUNICATION

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20.1 EXISTING FACILITIES IN THE MINE

20.1.1 Power is received at the Pathakhera Central Substation from Madhya Pradesh Electricity Board by means of 33 KV overhead line. This substation has an installed capacity of 3600 KVA (1 x 1600 KVA + 1 x 2000 KVA) to step down the voltage at 3.3 KV for distribution to Pathakhera I & II, Satpura Mine No. I & II and Shobhapur mine. The power demand on the Central substation at present is about 2600 KW, of which Shobhapur project consumes around 500 KW. A separate 33 KV/3.3 KV substations will be consturcted at this project. A 33 KV overhead feeder from M.P.E.B. has already been drawn upto this project site. Supply from the central substation at Pathakhera I at 3.3 KV will be discontinued as soon as the 33 KV substation at Shobhapur is commissioned.

20.1.2 PRESENT CONNECTED LOAD

Shobhapur project is undergoing its intial development phase. Following are the connected loads:

Name of the Installation	Quantity	Approximate Load
a) Surface		
Direct Haulage	1	100 KW
Ventilator	1	82 KW
River bed pump	1	40 KW
Conveyor belt	1	22 KW
Compressor	1	55 KW
b) Underground		
Tugger haulage	5	150 KW
Endless haulage	3	130 KW
Winch	1	11KW
Coal cutting m/c	4	200 KW
Drills	12	12 KW
Pumps	-	190 KW
Auxiliary fan	1	15 KW
		1007 KW

20.2 REORGANISATION

20.2.1 As per the reorganisation proposals for mechanised Bord and Pillar workings a large number of equipments will be deployed to the mine. Follow are the major installations:

Name of the Equipment/ Installation	Quantity in operation	Unit Load in KW	Approximate connected load in KW
A) Surface			
Direct Haulage (material transport)	1	100 KW	100 KW
Trunk belt conveyor	2	90 KW	180 KW
Ventilator	2	250 KW	500 KW
CHP &Workshop	-	-	200 KW
Winder	1	250 KW	250 KW
Office & Surface lighting	-	-	100 KW
Colony and water supply	-	-	400 KW
Total			1730 KW
B) Underground			
Side Loader	23	48 KW	1104 KW
Light duty chain conveyor	50	20 KW	1000 KW
Medium duty chain conveyor	10	37 KW	370 KW
E.Drill	30	1 KW	30 KW
Auxiliary Fan	14	11KW	154 KW
Pumps	-	-	600 KW
Underground trunk transport	-	-	694 KW
Underground gate transport	-	-	608 KW
Sub Total			4560 KW
TOTAL			6290 KW

20.2.2 Colony will be situated about 6-7 Km. away from the Shobhapur mine. As such colony will be conveniently fed from the Pathakhera Central Substation. In view of this, total connected load to the Shobhapur 33 KV/3.3 KV substation is 5890 KW. Considering demand and diversity factors maximum demand is estimated as about 2350 KW i.e., with a corrective power factor of 0.9, maximum demand is assessed as 2600 KVA.

20.3 MAIN SUB-STATION

21.3.1 It is proposed to install the 33KV/3.3 KV main substation at the load centre near the proposed winding engine house. The capacity of this substation will be 2 x 2500 KVA,33KV/3.4 KV.

21.3.2 The substation on receiving power at 33 KV will step down to 3.3 KV for colliery power distribution and utilization. The major functional components of the substation are as follows:

- 33 KV sectionalised bus
- 2 nos, 33KV circuit breakers for primary control of 33 KV/3.4 KV,2500 KVA main transformer
- 3.3 KV indoor switch board
- Station transformer and 415V switch board and
- Battery and Battery charging equipments.

20.3.3 3.3 KV INDOOR SWITCH BOARD

A 15 circuit breaker panel 3.3 KV indoor switch board has been proposed to facilitate control for 3.3 KV power distribution network at this project. It will function as follows:

- Incoming power supply control breaker panel(for secondary control of 2500 KVA transformers)	- 2 nos
- Sectionaliser	- 1 no.
- Underground Power Supply Control	- 2 nos
- Capacitor bank control	- 2 nos.
- Winder	- 2 nos.
- Ventilator	- 2 nos
- 500 KVA transformers	- 2 nos
- Reserve	- 2 nos
Total	-15 nos.

20.4 ENERGY CONSUMPTION & VOLTAGES

20.4.1 Likely pattern of energy consumption by the various groups of receivers have been calculated on the basis of their quantum of work or number of working hours per year.

The details of energy consumption figures have been tabulated in the table given below:

Equipment/ Installation	Average power demand	Working hours per year/Avg. work done per year	Energy consumption in KWH.
-Winder	125 KW	3200 hrs.	0.40×10^6
-Ventilator	400 KW	8700 hrs.	3.48×10^6
-CHP&Workshop	100 KW	3500 hrs.	0.35×10^6
-Township	160 KW	4000 hrs.	0.64×10^6
-Underground installation	2000KW	3600 hrs	7.2×10^6
-Pumping	5.33 KWH/ $1000m^3$ x m head	$480 \times 10^6 m^3$ x m head	2.6×10^6
TOTAL			14.67×10^6 KWH
Specific Energy Consumption		=	14.67 KWH/T.

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20.4.2 VOLTAGES

The various voltages as proposed are as follows:

a) 33 KV- incoming supply voltage
b) 3.3 KV- ventilator and winding motors
c) 415/230V- Surface installations
d) 550 V- Major underground utilisation voltage
e) 110 V- Drills and underground lighting
f) 3.3 KV- Underground distribution voltage.

20.4.3 CONTROL

The airbreak switch associated with 33 KV circuit breakers will be interlocked with circuit breakers to avoid mal-operation. The 3.3 Kv sectionalizing breakers will have electrical interlocks with the incoming 3.3 KV circuit breakers to avoid parallel operation of transformers.

Primary and secondary control circuit breakers of 33 Kv/3.4 Kv step down transformers are to be connected for intertripping, that is, the secondary control breaker will trip outomatically when the primary control circuit breaker trips.

20.5 PROTECTION OF SUBSTATION

20.5.1 PROTECTION OF EQUIPMENT

Lightning Arrestors will be installed to protect the equipments against high voltage surge taking the form of travelling waves. Lightning masts are to be employed to prevent direct stroke of lightning from reaching the equipments in the main substation. Suitable earthing system will be

established and all metallic frames, coverings, sheaths, handles, joint boxes, transformers etc., will be earthed by connection to the earthing system.

20.6 PROTECTION OF TRANSFORMERS(33KV/3.3 KV)

20.6.1 OVERTEMPERATURE PROTECTIONS:-

The transformers are to be provided with winding temperature indicators having two alarms- one alarm is to ring a bell as a warning of rising temperature and the second alarm system will trip the primary side circuit breaker controlling the transformer.

20.6.2 OVERLOAD PROTECTION

Inverse definite minimum time lag (IDMT) relays will be incorporated in the primary and secondary control circuit breakers to provide overload and earth leakage protections to transformers. Earth leakage protections installed at the lower voltage side will be of restricted type so that the relay will respond to a fault occuring within the zone from the secondary winding of the transformer to 3.3 KV circuit breakers. It will not respond to a fault outside this zone.

20.6.3 GAS AND OIL ACTUATED PROTECTION(BUCHHOLZ)

The upper float of the Buchholz relay would normally initiate audible and visible alarm, while the lower float would trip the transformer from the supply when there is a serious internal fault.

20.7 UNDERGROUND POWER DISTRIBUTION

20.7.1 Power at 3.3 KV will be taken to underground through the winding shaft by means of two double armoured power cables having copper conductors of 3 x 95 sq.m.m. size. To facilitate power distribution at 3.3 KV to different underground load centres, it is proposed to install a 12 panel, 3.3 KV, non-FLP, low height switch board in the substation at the L.W.S., near pit bottom. The function of the 3.3 KV switch board is as follows:

- Incoming power supply control	- 2 nos.
- Sectionalizer	- 1 no.
- U.W.S. power supply control	- 1 no.
- L.W.S. power supply control	- 5 nos.
- Pump house	- 2 nos.
- Reserve	- 1 no.
TOTAL	-12 nos.

To facilitate power distribution at districts, FLP, 3.3 KV/565V transwitch units will be installed. 5 nos. FLP 315KVA,3300V/560V transwitch units will be deployed at different load centres of U.W.S, 10 nos. FLP 315 KVA,3300V/565V and 2 nos. FLP, 200KVA,3300V/565V transwitch units will be deployed at L.W.S.

20.7.3 Main pump house will be located at the pit bottom of L.W.S. To facilitate power distribution to the pumps, it is proposed to install a 7 panel,3.3 non-FLP switch board at the pump house. The function of the switch board is as follows:-

- Incoming power supply	- 2 nos.
- Sectionalizer	- 1 no.
- Group control of pumps	- 2 nos.
- Intermediate pump house	- 1 no.
- Reserve	- 1 no.
TOTAL	- 7 nos.

20.7.4 U.W.S. will be fed power from the main underground distribution centre at L.W.S. pit bottom substation by means of a feeder. This feeder will terminate onto a 3 panel FLP, 3.3 KV switch board. The function of the switch board is as follows:

- Incoming Power Supply	- 1 no.
- U.W.S. load centre power supply	- 2 nos.
TOTAL	- 3 nos.

20.8 POWER FACTOR:

It is proposed to maintain a high system power factor by installing two nos. 3.3 KV capacitor banks at the surface. Each capacitor bank of total built in capacity of 350 KVAR, will be available at the main substation for effective control of system power factor.

TELECOMMUNICATION

20.9 P & T TELEPHONES

20.9.1 At present P & T telephones facility available at the area office,has not been extended to this project. It is proposed that the project should be linked to the P & T telephone system by means of four incoming lines, which includes two at the residences.

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20.9.2 The capacity of automatic telephone exchange available in this area will be expanded by 50 lines to meet the requirments adequately.

20.10 CENTRAL DESPATCH CONTROL

20.10.1 A central despatcher system with tele-communication and tele-metering facilities covering the mine workings will be provided at a central point of surface complex. The despatch centre thus established will function as a focal point for monitoring and controlling of all operations of the mines. Intrinsically safe loud speaking telephone system is required for communication among various underground control points such as working districts, main pumping station, main underground substations, Pit bottom, important transfer points in the coal flow circuit and between underground and surface. A minimum 20 line capacity will be required for this, the financial provision for which has been made in the report.

20.10.2 For effective control of various operations in the mine it is proposed to display on a console at the despatch centre by means of meters and indications lamps for the mining operations and various enviornmental conditions, such as coal despatch, operations of mechanised districts, operation of main ventilators, main conveyor lines, main pumps, level of water in the main sump, strata pressure concentration of methane, carbon monoxide, temperature humidity etc.

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तार : माईनप्लान
टेलेक्स : 0715 – 259
फोन : 26134, 23772, 26043, 33134
सेन्ट्रल माईन प्लानिंग एण्ड
डिज़ाईन इन्स्टीट्यूट लिमिटेड
(कोल इंडिया लिमिटेड की एक सहायक कंपनी)
रजि. कार्यालय : गोण्डवाना प्लेस,
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NAGPUR-44[illegible]

रीजनल डायरेक्टर का कार्यालय
OFFICE OF THE REGIONAL DIRECTOR

Dt. 26.7.80

RDH/Shobhapur/80

To

The General Manager(P.Khadan),
P.O.P Tintheria colliery,
Distt. Betul(MP)

Dear Sir,

As desired by you I am sending herewith 5 copies of revised project report of Shobhapur.

Yours faithfully,

for REGIONAL DIRECTOR

Encl: As above

20.11 FACE SIGNALLING AND COMMUNICATION

20.11.1 Mechanised faces would be provided with suitable signalling and communication equipments for the following facilities:

a) Loud speaker voice communication along the light duty and medium duty chain conveyor and gate belt conveyor,
b) Audio-signalling calls, pre-start warning etc.,
c) Lockout orders, pull-wire keys,
d) Remote indication of fault condition, and
e) Local identification of fault condition.

20.12 Plate No. XII, XIII A & XIII B show the proposed schematic diagram of power distribution for Shobhapur Project.

20.13 The capital investment is expected to be Rs. 100.00 lakhs. The details of the investment have been shown in Appendix A.3.1.

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CHAPTER XXI

COAL HANDLING AND DESPATCH ARRANGEMENTS

21.1 LOCATION

The plant will be located near the coal raising Incline No. 2 equipped with belt conveyor.

21.2 COAL FLOW AND BRIEF DESCRIPTION

21.2.1 1000 m trunk belt conveyor is proposed to discharge coal onto elevating belt conveyor with the tripper arrangement. The tripper conveyor would discharge coal onto ground bunker. The conveyor would discharge coal from about 12 metres above the ground. The additional height and tripper arrangement would facilitate in stacking about 5000 tonnes of coal as ground stock. Of the 5000 tonnes of bunkerage about 1000 tonnes would be the free flow capacity of bunker. The balance 4000 tonnes would have to be dozed into the pocket built near the ground bunker by M.P.E.B. authorities. In the normal operation, the 1000 tonnes free(flow capacity bunker would be adequate. In event of unsatisfactory or poor off-take of coal by M.P.E.B the additional ground stock capacity of bunker over and above 4000 tonnes of ground stock built by dozer/Front End Loader, the provision for the same has been kept in the report.

21.2.2 M.P.E.B. would receive coal through their conveyor going down the reclaim tunnel under the 1000 tonne ground bunker which would be part of their surface conveyor transport system(to be commissioned)

21.3 Plate No. XI Drg. No. 1-00259 B shows the flow sheet and surface transport conveying system for Shobhapur Project.

21.4 The total capital required for the proposed arrangement would be Rs. 36.00 lakhs. The details of the investment have been given in Appendix A. 3.2. Appendix B gives the details of manpower needed for coal handling arrangements.

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CHAPTER XXII

WORKSHOP

22.1 For day to day repair, maintenance and overhauls unit workshop facilities are proposed to be provided. The major repairs, maintenance etc. would be done at the Regional Workshop located near Pathamine No. I.

22.2 The total cost of workshop equipment has been estimated to be Rs.11.39 lakhs, the details of the same have been shown in Appendix A.3.4

22.3 The proposed workshop would provide equipment machine shop, electrical repair shop, smithy shop, automobile shop etc.

22.4 The adequate provision of manpower has been kept in this report(refer Appendix B). The workshop would run in first shift with the limited staff in the second shift.

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CHAPTER XXIII

MANPOWER, PRODUCTIVITY, TRAINING AND SCIENTIFIC RESEARCH

23.1 MANPOWER

23.1.1 The manpower requirement at the project with an aggregate production capacity of 1.00 million tonnes per annum(3 development + 5 depillaring + 2 dip development headings panels) has been estimated at 2242 against the existing strength of 959 (for developmental work and production capacity of 0.20 million tonnes). The approved feasibility report had kept manpower requirement at 2312 for the production capacity 0.95 million tonnes per annum. The phased requirement of personnel is estimated as under:

Year	1980-81	81-82	82-83	83-84	84-85	85-86	86-87
Personnel	1050	1400	1525	1830	1970	2175	2242

23.1.2 The additional manpower over the existing one is 1284 of the total manpower for the mine, the persons employed on surface and underground would be 444 and 1798 respectively. The ratio of underground to surface workers work out to be 4.05 : 1.

23.1.3 The above manpower requirement has been arrived at keeping a provision of additional manpower at the rate of 16% against leave and sick. For essential category staff and workmen such as pump Khalasis, fan house attendants, body searchers, electrical-mechanical fitters and their helpers, mining sirdars etc., an additional manpower at the rate of 16% has been kept. Manpower analysis, also existing manpower and manpower as provided in the original F.R. have been given in Appendix B.

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23.1.4 The district manpower of the mechanized development panel is proposed as under (Per day)

	C.C.M. Driver	6
1.	C.C.M. Helper	12
2.	Driller	6
3.	Driller helper	6
4.	Dresser	6
5.	Expl. Carrier/helper	9
6.	Side loader operator	6
7.	Side loader operator/helper	6
8.	Conveyor operators	15
9.	Conveyor Extension men	9
10.	Aux. fan Khalasi	6
11.	Spray Mazdoor	6
12.	Electrical Fitter	3
13.	Mechanical Fitter	3
14.	Elec./Mech. helper	6
15.	Cleaning, dusting, material supply etc.	15
16.	Timber Mistry & Helper	3
17.	Shotfirer	3
18.	Mining Sirdar	3
19.	Overman	1
20.	Foreman	2
21.	Under Manager	1
22.	Total	140

23.2 PRODUCTIVITY

An overall output per man shift(O.M.S.) at its full rated capacity has been worked out at 1.70 underground O.M.S. being 2.12. The productivity at various stages of production of the project would be:

Year	1980-81	81-82	82-83	83-84	84-85	85-86	..
Productivity							
U/G	1.00	1.07	1.17	1.50	1.77	1.96	2.12
Overall	0.91	0.95	1.00	1.25	1.45	1.58	1.7

23.3 TRAINING

23.3.1 Mechanised development and depillaring by side loaders has been proposed at this mine. It will be necessary to impart practical training in operation of such an equipment. Side loaders are being worked at West Chirimiri Colliery and the same would very shortly be introduced at Churcha Colliery and in Satpura Mine No. II. It is, therefore, proposed to send a cross section of workers, staff and officers to these mines for training.

23.3.2 All category of workmen shall be trained in the Group Vocational Training Centre at Pathakhera.

23.4 ORGANISATION

23.4.1 To operate a mechanised mine at its optimum efficiency it is essential that high standard of organisation is evolved and practised. It is essential that the personnels are trained in operation and maintenance of such machine. Preventive maintenance of plant and

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machinery is practised. Motivation of [illegible] develop team spirit and production incentive is introduced.

23.4.2 To improve performance of men and machines and in turn imporve the productivity of the mine, it is considered better proposition to deploy multi-skilled workers at the face. The change in job specification of workers shall require change in wage structure which would have to be fixed by negotiation. Work norm for optimum work load of men under working conditions of Shobhapur Project is suggested to be established by industrial work study at mechanised panel after sufficient training and trials.

23.5 SCIENTIFIC RESEARCH

As in other mines of the area, the extraction of pillars by side loaders with props and girder/channel as cross bars have been envisaged for Shobhapur Project also. Physico-mechanical properties of the strata may be required to be determined for establishing the support density at the face and goaf edge. Also ventilation survey may have to be done for efficient ventilation system in the mine. Trials may also have to be conducted for roof bolting, roof stitching etc. All these would call for the association of R & D Department of CMPDI and other research agencies. A sum of Rs. - lakhs has been provided for such scientific stu-

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CHAPTER XXIV

CIVIL CONSTRUCTION AND WATER SUPPLY

24.1 CIVIL CONSTRUCTION

24.1.1 TYPES OF BUILDINGS

The life of the project at 100% level of production would be 25 years. Therefore, all buildings with permanent construction have been envisaged in this report.

24.1.2 SERVICE BUILDINGS

Appendix A.2.1 shows the list of service buildings provided for the project. Provision has also been made for such amenities like rest shelter, rest house, workers' institute, shopping centre, officers' club etc. in addition to pit head buildings.

24.1.3 RESIDENTIAL BUILDINGS

The total employment in the Project at the full rate of production would be 2242. The residential buildings on scale and type as per the norms laid down by the B.P.E. have been provided in the project. The residential buildings proposed as a percentage of strength of employees of each group would be as under:

(i)	Daily rated employees	50%
(ii)	Monthly paid staff	75%
(iii)	Executives	100%

A total of 1214 residential houses would be

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required for housing employees. 196 residential houses are existing. 1018 additional residential houses would be required. The overall percentage of satisfaction level works out to be 54.15. The details of residential accommodation has been given in Appendix A.2.2

24.1.4 Appendix A.2.3 and A.2.4 show the building index at Pathakhera and the abstract cost for B.P.E. type quarters respectively. The index is based on the cost as in

24.1.5 The subsidy for residential buildings have been taken into account for calculation of economics of the project.

24.2 ROADS AND CULVERTS

Approach road to the proposed shaft and for the colony roads and culverts has been kept in the report. A provision of Rs. 20.96 lakhs has been made to meet the investment on roads and culverts (refer Appendix A.8.2)

24.3 WATER SUPPLY

24.3.1 An integrated water supply scheme of 1.2 M.G.D. for Pathakhera group of mines has been envisaged by the company. The present built up capacity is about 0.40 M.G.D. The proposed provisions for water supply arrangements for the Project would form part of the integrated scheme. The financial provision apportioned for the unit under consideration has been kept in the Report and are given in Appendix A.8.3 The details of proposed water supply arrangements for Shobhapur are as under

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24.3.2 WATER DEMAND

The water supply arrangements for Shobhapur Project would basically include potable water and industrial water demand of the project with a life of about 25 years. The total projected manpower in the above project is 2242. The total housing requirement in the above colliery is assessed as 1214, whereas the existing houses are. The potable water demand of the residential p opulation is based on the assumption of 5 persons per house who are supplied water at the rate of 30 gals. per capita per day. The potable water demand of non-residential workers is based at the rate of 10 gallons per capita per day. The demand of service buildings is based at 10% of the potable water demand of the residential population. The process and other losses have been taken into account at the rate of 10% of the total potaole water demand calculated in the manner as specified above. The industrial water demand is based at the rate of 10@ 10% of the total potable water demand inclusive of process and other losses. Based on the above norms the total water demand is assessed as 275 MGD.

24.3.3 SOURCE OF WATER

Tawa dam which is approximately 4 kms. from the colliery will constitute the main source of water, and hence, it is proposed to plan water supply arrangements for Shobhapur colliery with Tawa Dam as the source.

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24.3.4 SALIENT FEATURES OF PROPOSED WATER SUPPLY ARRANGEMENTS.

While permanent water supply scheme would be formulated after detailed survey and careful appraisal of the existing arrangements, the ttentative proposals and estimates thereof, are given in Appendix A.8.3

24.3.5 FORECAST OF COST ESTIMATES FOR WATER SUPPLY ARRANGEMENTS ENVISAGED.

The forecast of cost estimates for providing water supply arrangements at Shobhapur Project has been prepared with a view to project the probable capital investment involved in the proposed water supply scheme. It would be seen that a capital investment to the tune of Rs. 42.03 lakhs(Gross) would be needed for providing water supply arrangements at Shobhapur Project. Coal Mines Welfare Organisation pays subsidy for the implementation of water supply schemes in coalfields. The quantum of subsidy is 40% of the apprortioned cost of the potable water supply. The subsidy for the proposed water supply scheme is expected to be Rs. 15.67 lakhs, resulting in the net capital investment of Rs. 26.36 lakhs.

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CHAPTER XXV

SAFETY MEASURES, PERMISSION FROM D.G.M.S. ETC.

25.1 SAFETY MEASURES

25.1.1 INFLAMMABLE GAS

In the adjoining Pathakhera and Satpura Mines inflammable gas has been detected in the boreholes and at times in roof cavities near faces (specially in Satpura Mine No. I). Methane gas has also been found near the dyke. All these mines have been declared as Category II gassy mine. Shobhapur mine has also been declared Category II in gassiness. The inflammable gas has not been found in detectable quantity, in the general body of the district or main returns. Flame-proof equipments have been provided for in the report.

25.1.2 MECHANISED DEPILLARING

Mechanised depillaring with side loaders have been envisaged in Shobhapur Project. The side loaders would be manually operated and as such need proper support in its path of travel. It would also need adequate side clearance. Instead of conventional two rows of wooden props at 1.2 mts. interval it is proposed to erect two rows of 40 te. friction props at 1.2 mts. interval but the distance between the rows is proposed to be at 2.0 to 2.4 metres interval in the pillar under attack. Girders or channels would be used as cross bars over these friction props. Spilt and gallery junctions would also be provided adequate clearance for manouvrability of side loader.

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25.1.3 PARTIAL EXTRACTION

Under surface infrastructure and Tawa river partial extraction of pillars in Upper Workable Seam and development of Lower Workable and Bagdona Seams as final operation has been contemplated in this report. It is stressed that the size of pillar and verticality of workings of different seams be strictly followed.

25.1.4 In the areas of known geological disturbances such as faults, dykes etc. and in the likely disturbed areas, before advancing of working would be done under the cover of advance boreholes. The provision of boring machine has been kept in the report(refer Appendix A.3)

25.1.5 SURFACE INUNDATION

All the existing openings and new proposed openings are well above H.F.L. of 409.50 metres. No danger from inundation from the mine openings is envisaged.

25.1. GENERAL SAFETY

All transfer points and pillars under attack would be well lit. Adequate ventilation arrangements would be made at the faces. Adequate manpower has been provided for dealing with coal dust cleaning, stone dusting, stone dust barriers, water spraying etc.

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25.2 SPECIAL PERMISSION FROM D.G.M.S

25.2.1 Mechanised depillaring has been envisaged with 40 te. friction prop and girders/channels as cross bars at faces. The special permission has to be obtained in this regard.

25.2.2 Special permission for partial extraction in Upper Workable Seam and development as final operation in Lower Workable and Bagdona Seams under Tawa river would have to be obtained from the Directorate General of Mines Safety.

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CHAPTER XXVI

DEVELOPMENT WORKS

2.1 MAJOR DEVELOPMENT ACTIVITIES

The development activities identified for creating production potentials have been discussed in various chapters and are shown in Appendix A.8.1 The estimated additional expenditure for the outlay in mines is estimated to be Rs. 200.00 lakhs. The major developmental activities are:-

i) Sinking of D.C.shaft

ii) Drivages of various drifts

iii) Drivages of staple shafts to act as return

iv) Drivage of staple shafts to act as coal bunkers

v) Drivage of main dip trunk and gate roadways in coal

vi) Installation of Main Trunk and trunk belt conveyor

vii) Installation of Main Fan.

viii) Preparation of Bord and Pillar panel for development and extraction with side loaders

ix) Construction of coal handling arrangements.

x) Installation of winder etc.

2.2 NORMS OF WORK

2. The mines of the area are moderately watery, sloping gently and strata does not pose any serious problem except while crossing of dyke. The average rate of drivages of various developmental activities have been taken as under:

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i) Sinking and D.C.Shaft
ii) Drift drivage — 7 mts/month
iii) Drift drivage across dyke — 20 mts/month
iv) Dip headings in coal (with side loaders) — 10 mts/month
a) U.W.S — 45 mts/month
b) L.W.S — 40 mts/month
v) Level headings in coal (with side loaders)
a) U.W.S — 80 mts/month
b) L.W.S — 50 mts/month

26.3 PHASING OF ACTIVITIES

26.3.1 Since the Project has a high target it is essential that all major construction works are completed in time so that development cost does not become high and the production schedules are maintained. The project is proposed to achieve the full production in the year 1986-87 Hence all major development activities should be completed accordingly. To achieve this objective different major activities must be done in a logical and phased manner. Attempt would also be made to see that the capital input is uniformly spread out.

26.3.2 The schedule of various important activities is shown in Harmongram(refer Plate No. XIV Drg. No 1-00412) and PERT net work(refer Plate No. XV Drg. No. 1-00413.

26.3.3 It is seen from the PERT net work that sinking of proposed D.C. shaft falls in the critical path and unless this activity is completed the Project cannot pick up production beyond 0.40 million tonnes per annum(also refer para 18.3.3). All attention would be required to be paid on this single activity.

26.3.4 Construction of coal handling and despatch arrangements, service and residential buildings and other construction works would be timed to match the production programme of the Project.

26.3.5 Depending upon various developmental activities, the financial provisions in respect to various heads of account have been phased out and detailed in Appendix A and various other Appendices.

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CHAPTER XXVII

CAPITAL INVESTMENT & ECONOMICS

CAPITAL INVESTMENT

27.1

27.1.1 The total capital requirement works out to Rs. 1996.87 lakhs initial and Rs. 1902.66 lakhs net. The additional initial capital investment estimated for this revision(over the investment made upto 31.3.79) is Rs. 1757.49 lakhs. The net additional initial capital investment is Rs. 1663.28 lakhs only.

27.1.2 The total capital investment per tonne of annual output capacity of the project works out to Rs. 199.69 only. This capital is required for building up mine to its full rated capacity.

27.1.3 The capital investment on plant and machinery works out to Rs. 1300.95 lakhs or Rs. 130.10 per tonne of the annual capacity. This is considered justifiable keeping in view the method of work, degree of mechanisation and transport system deployed in the project.

27.1.4 The additional investment on capital outlay in the project works out to Rs. 200.00 lakhs. This includes investment on sinking of a D.C.shaft deepening and line ng of the existing air shaft and various other activities detailed in Appendix A.8.1.

27.1.5 The additional investment on account of civil works i.e. building, roads, culverts, and water supply amounts to Rs. 216.26 lakhs(initial) or Rs. 122.05 lakhs(net) This works out to Rs. 21.63 (initial) or Rs. 12.21 (net) per tonne of

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annual production capacity. The major portion of this investment is required to be done to meet the social obligations.

27.1.6 For construction of residential and non-residential buildings and also for undertaking caving operations the investment on land for 10 years works out to be Rs. 12.50 lakhs. The details of land acquisition have been shown in Appendix A.1.

27.1.7 The estimated additional expenditure of revenue nature capitalised during the development period works out to Rs. 74.91 lakhs, the details of the same have been given in Appendix A.9, Appendix A.9.1 and Appendix A.9.2. The year of opening Revenue Account would be 1982-83.

27.1.8 The initial investment during development period has been made out of 'Equity' only. This has been done on the basis of the directive vide O.M. No. BPE/GL020/79/FIN/BPE/1(94)/Adv(F)79 dt. 14.9.79, from the Ministry of Finance, Bureau of Public Investment.

27.2 ECONOMICS

27.2.1 COST OF PRODUCTION

The estimated cost of production per tonne at 100% and 85% of production level have been worked out as Rs. 79.34 and Rs. 91.29 respectively. The details of cost estimates are given in Appedix 'C' and 'C1'.

27.2.2 SALE PRICE

At present the production is from Upper and Lower Workable Seams. The present declared grade of these seams of Pathakhera area, as per the new grade classification, is grade 'E'. The joint sample analysis report of the entire Pathakhera area, with major production from Lower Workable Seam and balance,

from Upper Workable and Bagdona Seams, in general indicated grade'E'. The project under consideration is envisaged to produce about 50% production from Upper Workable Seam and balance from Lower Workable Seam. It is expected that coal from this project would correspond to grade 'F'. The sale price of this coal is taken as Rs. 55.00 per tonne. With the liquidation of Upper Workable Seam and substituting production from better quality Bagdona Seam the despatch grade is bound to improve to grade 'E' fetching sale price of Rs. 75.00 per tonne.

27.2.3 PROFIT AND LOSS

The loss at 100% and 85% of the target capacity with the average realisation of Rs. 55.00 p er tonne is Rs.(-)24.34 and Rs.(-)36.29 per tonne. The total annual losses are Rs.(-)243.40 lakhs and Rs.(-)308.4651akhs at 100% and 85% of target production respectively. The sale price necessary to get a return of 12% on equity at 100% and 85% production level is estimated at Rs. 92.83 and Rs. 107.16 per tonne respectively.

27.3 INVESTMENT DECISION

27.3.1 The Feasibility Report was originally approved by Government of India for a capital outlay of Rs. 1060.21 lakhs. Till March, 1979, the capital spent was rs. 239.38 lakhs i.e. 22.58% of the total approved capital. As discussed in para 2.3.2, the change in technology for exploitation of deposits have been envisaged in this report from one

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contemplated in the earlier approved Feasibility Report. This change in technology has also resulted in marginal increase in production. For change in technology and for the resultant increase in production therefrom additional investment is called for.

27.3.2 No provision for Plant and Machinery (face equipment only) for Bagdona Seam has been kept in this report as the method of winning Bagdona Seam has not been spelt in this report. As discussed in Para 14.5.6; being bottom most seam, Bagdona Seam is likely to be worked after about 12 to 15 years. With the advancement in technology by then, from safety, conservation and techno-economic consideration, the suitable method of winning the seam would then be selected and report would accordingly be revised. With the present project target, the life of Upper and Lower Workable Seams would be about 15 years. The equipment now suggested in the report shall be fully utilised .

CHAPTER XXVIII

CONCLUSION

28.1 As stated in Para 2.3.2, because of the need to change the technology for exploitation of deposits from the methods envisaged in the earlier approved Feasibility Report, it would be necessary to revise the Project Report. Arising out of this change in technology there is marginal increase in production which would meet the part requirement of Satpura Thermal Power Station.

28.2 The project is not economically viable at the selling price of Rs. 55.00 per tonne; but keeping overall national economy in view, it is advantageous to MPEB to take coal from nearby source rather than getting supplies from far off sources.

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CHAPTER XXIX

REFERENCES

(1) Feasibility Report for Shobhapur Project
(2) Geological Report on area north of Pathakhera Mine No. I & II, Pathakhera Coalfield, NCDC Ltd.
(3) Report for depillaring with side loaders at West Chirimiri Colliery, CMPDI. Ranchi.
(4) Ventilation Manual Vo. I(Technical Notes) Sept. '78, CMPDI, Ranchi.
(5) Mine Ventilation by A.S.KOCHINSKY & V.KOMAROV.
(6) Basic datas as made available by Colliery and area authorities in Aug. '79 and Feb. '80.
(7) Record notes of discussions of Planning Committee Meetings on Feasibility Note at Bisesar House, WCL Nagpur(10.11.79), CMPDI Ranchi(15.11.79), WCL Coal Estate, Nagpur(6/7.12.79) and at CMPDI, (RI IV) on 8.1.80.

...DUCT OF ORISSA

...ESTIMATED PHASED C...

...AND DEPRECIATION

...US PROJECT

...PITAL INVESTMENT

ANNEXURE-8

25 years
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Sl. No.	Particulars	Total amount	As per approved F.R.	Capital existing as on 31.3.79	Addl. Capital Investment	19	PHASING OF CAPITAL 80-81	81-82	82-83	83-84	84-85	85-86 onwards	Life in years	Depreciation
1	2	3	4	5	6		7	8	9	10	11	12	13	14
01	Land	1250	3000	-	1250		50	200	150	150	150	450	25	50.0
	Buildings:													
	a) Service	4197	2658	-	4197		10	1...	1000	720	823	-	25	167.9
	b) Departmental(Initial)	18214	15764	2090	16124		50	300	1500	1500	2030	7374	25	330.8
	Total(02)	22411	18432	2090	20321		50	7...	2500	2220	2823	7374		498.7
	Plant & Equipment	130095	65948	13742	116353		37	10379	24600	17442	15250	32949	3-25	1319.5
	Furniture & Fittings	300	250	-	300		30	30	30	30	30	30	28	10.7
	Railway siding	-	-	-	-		-	-	-	-	-	-	-	-
	Vehicles	907	815	7	900		30	7...	325	150	60	-	9-13	95.9
	Prospecting & Boring	1500	1807	-	1500		00	500	500	-	-	-	25	60.0
	Development													
001	Capital Outlay in mines		4480		20000		85	4...	3...	1...	1210	5300	25	800.0
002	Roads & Culverts		1684		2096		91	517	319	147	176	726	25	83.8
003	Water supply arrangements		2600		4203		87	301	391	391	521	1922	25	105.4
004	Pilot Scheme, Scientific research etc. P.R.Preparation		1050		1335		08	229	243	191	194	280	25	53.4
	Total(01 to08)				27654		171	7137	4068	1919	2111	8228		1042.6

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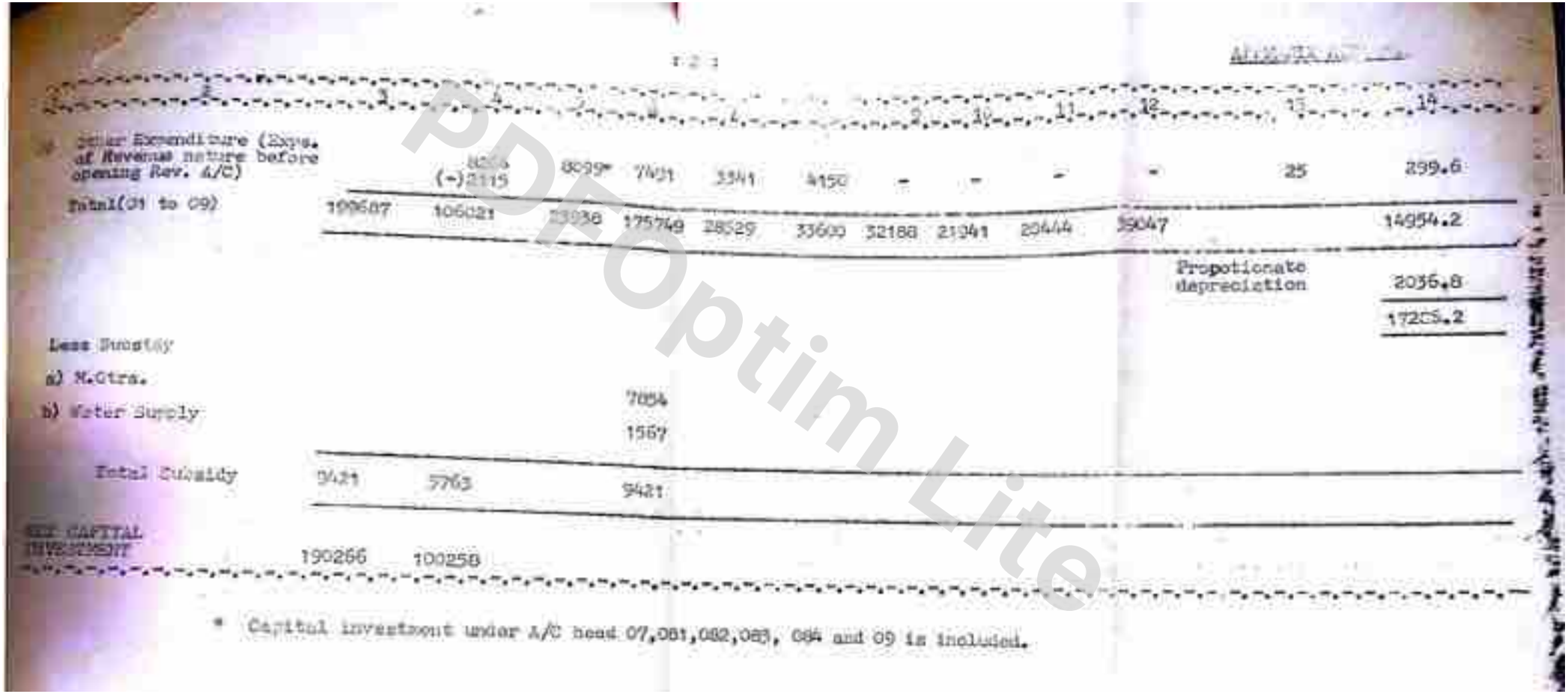

Other Expenditure (Exps. of Revenue nature before opening Rev. A/C)	8255 (-)2115	8099*	7401	3341	4150	-	-	-	-	25	299.6
Total(01 to 09)	199687	106021	23036	175749	28529	33699	32188	21341	29444	59047		14954.2
										Proportionate depreciation		2036.8
												17205.2
Less Subsidy												
a) M.Otrs.												
b) Water Supply			7854									
			1567									
Total Subsidy	9421	5763	9421									
NET CAPITAL INVESTMENT	190266	100258										

* Capital investment under A/C head 07,081,082,083, 084 and 09 is included.

PROJECT REPORT ON
REVISION OF SHODHAPUR PROJECT

APPENDIX A.1

STATEMENT SHOWING REQUIREMENT OF LAND COST ETC. FOR 10 YEARS.

A/C Code	Particulars	Quantity in acres	Rate per acre	Amount	Remarks
1	Land	200	5	1000	
2.	Payment of compensation against damage due to subsidence		L.S	250	
	TOTAL			1250	

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PROJECT REPORT ON
REVISION OF SHOBHAPUR PROJECT

APPENDIX A.2

STATEMENT SHOWING ESTIMATED ADDITIONAL REQUIREMENT OF CAPITAL ON BUILDINGS.

(Amount in Rs. '000)

Sr. No.	Particulars	Total cost	Subsidy	Net Cost
1.	Service Buildings (Appendix A.2.1)	4197	-	4197
2.	Residential Buildings (Appendix A.2.2)	16124	7854	8270
	TOTAL	20321	7854	12467

PROJECT REPORT ON REVISION OF SHOBHAPUR PROJECT

APPENDIX A.2.1

STATEMENT SHOWING THE ESTIMATED CAPITAL EXPENDITURE ON SERVICE BUILDINGS (PERMANENT SPECIFICATIONS) AT C.I.149 W.R.T. 100 BASE AT NEW DELHI IN 1.10.76

Sl. No.	Particulars	Nos.	Plinth area required in sq.m.	Rate per sq.m.	Amount in Rs. '000	80-81	PHASING 81-82	82-83	83-84	84-85 onwards	Remarks
1	2	3	4	5	6	7	8	9	10	11	12
1.	Office of the Project officer	1	461	580	267	-	100	267	-	-	
2.	Manager's office	1	139	580	81	81	-	-	-	-	
3.	a) Store shed & Office	1	646	319	206	150	56	-	-	-	
	b) Boundary wall/ Barbed wire fencing	-	488 R.M.	167/ R.M.	81		81	-	-	-	
4.	Workshop: a) Building	1	1667	441	735	150	200	250	135	-	
	b) Bituminous Pavement	1	1100	49	54	-	-	-	54	-	
	c) Boundary wall barbed fencing	-	127 R.M.	167/ R.M.	21	-	-	-	21	-	
5.	Sub Station	1	65	583	38	38	-	-	-	-	
6.	Service Magazine	1	40	589	24	-	-	24	-	-	
7.	Oil Magazine	1	152	589	9	-	-	-	-	90	

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Appendix A.2.1(Cont.)

1	2	3	4	5	6	7	8	9	10	11	12
8.	Pit Head Bath (Type-D)	1	502	63	303	-	-	-	100	203	
9.	Canteen(160 seater)	-	332	695	201	-	-	100	101-	-	
10.	Contribution to Hospital extn. at Ramakkam I	-	147	672	90	-	-	-	-	90	
11.	Dispensary	1	200	546	113	50	63	-	-	-	
12.	Officer's Club	1	350	544	190	-	-	-	-	190	
13.	Workers' Institute(Big)	1	341	544	186	-	-	100	86	-	
14.	First Aid Centre	1	17	611	11	11	-	-	-	-	
15.	Primary School	1	277	510	141	-	-	100	41	-	
16.	Lavatories & Urinals (10 seated)	1	52	1011	53	-	25	28	-	-	
17.	Officers' Rest House (4 roomed)	1	276	587	162	50	112	-	-	-	
18.	Staff Rest House (10 bedded)	1	284	536	152	-	-	100	52	-	
19.	Shopping Centre	1	193	553	107	-	-	-	50	57	
20.	Group Trg. Centre	-	-	-	EXISTING			-	-	-	
21.	Cap Lamp Room with Pit Office	1	270	439	132	-	100	32	-	-	
22.	Rest Shelter	1	39	492	19	-	19	-	-	-	
23.	Training Centre	1	74	544	40	-	-	-	-	40	
24.	Canteen	-	189	350	66	-	-	33	33	-	
25.	Shooting/Check Shed	-	596	298	149	-	50	-	-	99	

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Appendix A.2.1(Cont.)

1	2	3	4	5	6	7	8	9	10	11	12
26.	Winder Engine House	1	L.S	L.S	80		80	-	-	-	
27.	Fan house	1	L.S	L.S	80		40	-	-	-	
28.	Haulage Engine House	1	L.S	L.S	50		50	-	-	-	
29.	Extra provision for foundation in poor soil		6947	22	153	22	38	37	26	30	
30.	Total				4075	22	1014	971	699	799	
31.	Miscellaneous 3%				122	16	30	29	21	24	
32.	GRAND TOTAL				4197	9	1044	1000	720	823	

PROJECT REPORT ON REVISION OF SHOBHAPUR PROJECT

STATEMENT SHOWING THE ESTIMATED CAPITAL EXPENDITURE (ADDITIONAL) FOR RESIDENTIAL BUILDING(PERMANENT SPECIFICATIONS)

Appendix A.2.2

Sl. No.	Cat/ Scale	Type of Qtrs.	Plinth area in M²	No. of persons.	% Satisfaction	No. of Qtrs. Reqd.	No. of Existing qtrs.	No. of Addl. Qtrs Reqd.	Unit Cost Rs.	Total cost Rs.	Less Subsidy for LCH/MOs	Net Cost.
1	2	3	4	5	6	7	8	9	10	11	12	13
1.	Category I to IV Grade B	LCH MQ	40.43	1915	50%	958	55 +123 178**	780	13425	10471500	75% 7853625	2617875
2.	404-512 to 503-650	A	35.78	149 2/3	75%	113	10	103-27 = 76	19859	1509284	-	1509284
3.	572-944 to 722-1278	B	55.76	137	75%	103	5	98-25 = 73	30376	2217448	-	2217448
4.	750-1350 to 800-1400	B	55.76	28	100%	28	-	28	30376	850528	-	850528
5.	1100-1700 to 1400-1950	C	83.61	10 1/3	100%	10	3	7	46403	324821	-	324821
6.	1600-2200 & above	D	176.00*	2	100%	2	-	2	107798	215596	-	215596
7.	TOTAL			2242	54.14	1214	196	966				
8.	Hostel Type@ Accomodation					-	-	52	10280	534560	-	534560
9.	GRAND TOTAL			2242	54.14	1214	196**	1018		16123737	7853625	8270112

* This includes garage-18 M² and Servant quarter -18.6M²

@ Hostel type accomodation to the extent of 20% of typed quarters provided and proportionate reduction in [illegible] made as per [illegible] guidelines

** 80 M.Q are under completion and have not been taken in the existing category.

PROJECT REPORT ON REVISION OF SHOBHAPUR PROJECT

STATEMENT SHOWING BUILDING COST INDEX OF SHOBHAPUR(WITH REFERENCE TO 100 BASE IN DELHI AS ON 1.10.76 IN FEBRUARY 1980)

APPENDIX A.2.3

Sl. No.	Description	Units	Rates as on 1.10.76 at Delhi	Rates at Shobhapur	Percentage increase (Ratio between Col. 5 & 4)	Weightage	Cost Index
1.	Bricks	1000	106.15	150	1.41	16	22.56
2.	Sand	cu.m.	21.92	20	0.91	5	4.55
3.	Cement	Quintal	35.28	58	1.64	21	34.44
4.	Stores aggregate	cu.m.	27.10	60	2.21	6.5	14.34
5.	Timber	cu.m.	2021.00	1800	0.89	18	16.02
6.	Mild Steel	Quintal	183.20	350	1.91	10	19.10
7.	a) Labour: Mason	each	9.89	18	1.82	8.5	15.47
	b) : Carpenter	each	9.89	18	1.82	4	7.28
	c) : Coolie	each	4.41	6	1.36	11	14.96
							148.72
						Say	149

1. Building cost index of Delhi as on 1.10.1976 — 100
2. Cost index of Shobhapur in February 1980 — 149
3. Plinth area rate for residential building(Load bearing construction) :

a) Plinth area for Type-A,B,C, single storeyed, based on rates approved by CPWD for Delhi as on 1.10.1976 — Rs. 275/m^2

Therefore, Plinth area rate at Shobhapur based on cost index of 149 — 275 x $\frac{149}{100}$ — Rs. 409.75/m^2-say Rs.410/m^2

b) Plinth area rate for Type-D, single storeyed, based on rates approved by CPWD for Delhi as on 1.10.1976 — Rs. 325/m^2

Therefore, Plinth area rate at Shobhapur based on cost index of 149 — 325 x $\frac{149}{100}$ — Rs. 484.25/m^2-say Rs. 484/m^2

4. Plinth area rate of garage based on rates approved by CPWD for Delhi as on 1.10.1976 — Rs: 235/m^2

Therefore, Plinth area rate at Shobhapur based on cost index of 149 — 235x $\frac{149}{100}$ — Rs. 350.15/m^2-say Rs. 350/m^2

5. Extra provision for foundation in poor soil based on rates approved by CPWD for Delhi as on 1.10.1976 — Rs. 15/m^2.

Therefore, extra provision for foundation on poor soil based on cost index of 149 at Shobhapur — 15 x $\frac{149}{100}$ — Rs. 22.35/m^2-say Rs. 22/m^2

6. Plinth area rate for Scooter/Cycle Shed based on rates approved by CPWD for Delhi as on 1.10.1976 — Rs. 200/m^2

Therefore, plinth area rate at Shobhapur based on cost index of 149 — 200 x $\frac{149}{100}$ — Rs. 298/m^2- say Rs. 298/m^2

PROJECT REPORT ON REVISION OF SHOBHAPUR PROJECT

STATEMENT SHOWING Appendix A.2.4

UNIT COST OF BPE TYPE QUARTERS BASED ON THE COST INDEX 149 AT SHOBHAPUR IN FEB.1980

1. TYPE 'A'

		Rs.
a) Plinth area = 35.78 m^2 @ Rs. 410/m^2	=	14670
b) Internal water supply & sanitary installations @ 15% of the building cost	=	2201
c) Internal electrification @ 10% of the building cost	=	1467
d) External service connection @ 5% of the building cost	=	734
e) Extra for foundations in poor soil = 35.78 m^2 @ Rs. 22/sq.m.	=	787
f) Unit cost with permanent specification		19859

2. TYPE 'B'

a) Plinth area = 55.76 m^2 @ Rs. 410/m^2	=	22862
b) Internal water supply & sanitary installations @ 12½% of the building cost	=	2858
c) Internal electrification @ 10% of the building cost	=	2286
d) External service connections @ 5% of the building cost	=	1143
e) Extra for foundation in poor soil = 55.76 sq. km. @ Rs. 22/m^2	=	1227
f) Unit cost with permanent specifications		30376

....2" ....

Appendix A.2 4(Cont.)

3. TYPE 'C'

a) Plinth area = 83.61 m^2 @ Rs. 410/m^2 = 34280

b) Internal water supply & sanitary installations @ 12½% of the building cost = 4285

c) Internal electrifications @ 12½% of the building cost = 4285

d) External service connection @ 5% of the building cost = 1714

e) Extra for foundation in poor soil=83.61 sq.m. @ Rs. 22/sq.m. = 1839

f) Unit cost with permanent specifications = 46403

4. TYPE 'D'

A. a) Plinth area = 139.4 m^2 @ Rs. 484/m^2 = 67470

b) Internal water supply & sanitary installations @ 12½% of the building cost = 8434

c) Internal electrifications @ 12½% of the building cost = 8434

d) External service connections @ 5% of the building cost = 3374

e) Add extra for foundations in poor soil = 139.4 sq.m. @Rs.22/m^2 = 3067

f) Unit cost with permanent specifications 90779

...3....

Appendix A.2.4 (Cont.)

B. Servant's quarter(adopt the plinth area rate and specifications as per Type-A)

a) Plinth area = 18.6m^2@ Rs.410/m^2	= 7626
b) Internal water supply & sanitary installations @ 15% of the building cost	= 1144
c) Internal electrification @ 10% of the building cost	= 763
d) External service connection @ 5% of the building cost	= 381
e) Add extra for foundations in poor soil = 18.6 sq.m. @ Rs. 22/sq.m.	= 409
f) Unit cost with permanent specifications	10323

C. GARAGE-

a) Plinth area = 18 m^2@ Rs. 350/m^2	= 6300
b) Add extra for foundation in poor soil= 18. sq.m. @ Rs. 22/sq.m.	= 396
c) Unit cost with permanent specifications	6696
GRAND TOTAL OF (A),(B), (C)	=107798

5. MINER'S QUARTERS

Rate for miners' quarters under New Housing Scheme	= 11352.00
Add extra for foundation in poor soil	= 2100.00
TOTAL	= 13425.00

....4....

APPENDIX I.2.4(

6. HOSTEL TYPE ACCOMMODATION

(Adopt the plinth area rate and specifications as per Type 'A')

a) Plinth area = 20 m^2 @ Rs. 410/m^2 = 8200

b) Internal water supply, sanitary, internal electrification and external service connections etc. @ 25 % of building cost = 1640

c) Add extra for foundation in poor soil = 20 sq.m. @ Rs. 22/sq.m. = 440

d) Unit cost with permanent specifications = 10280

PROJECT REPORT ON REVISION OF SHOBHAPUR PROJECT

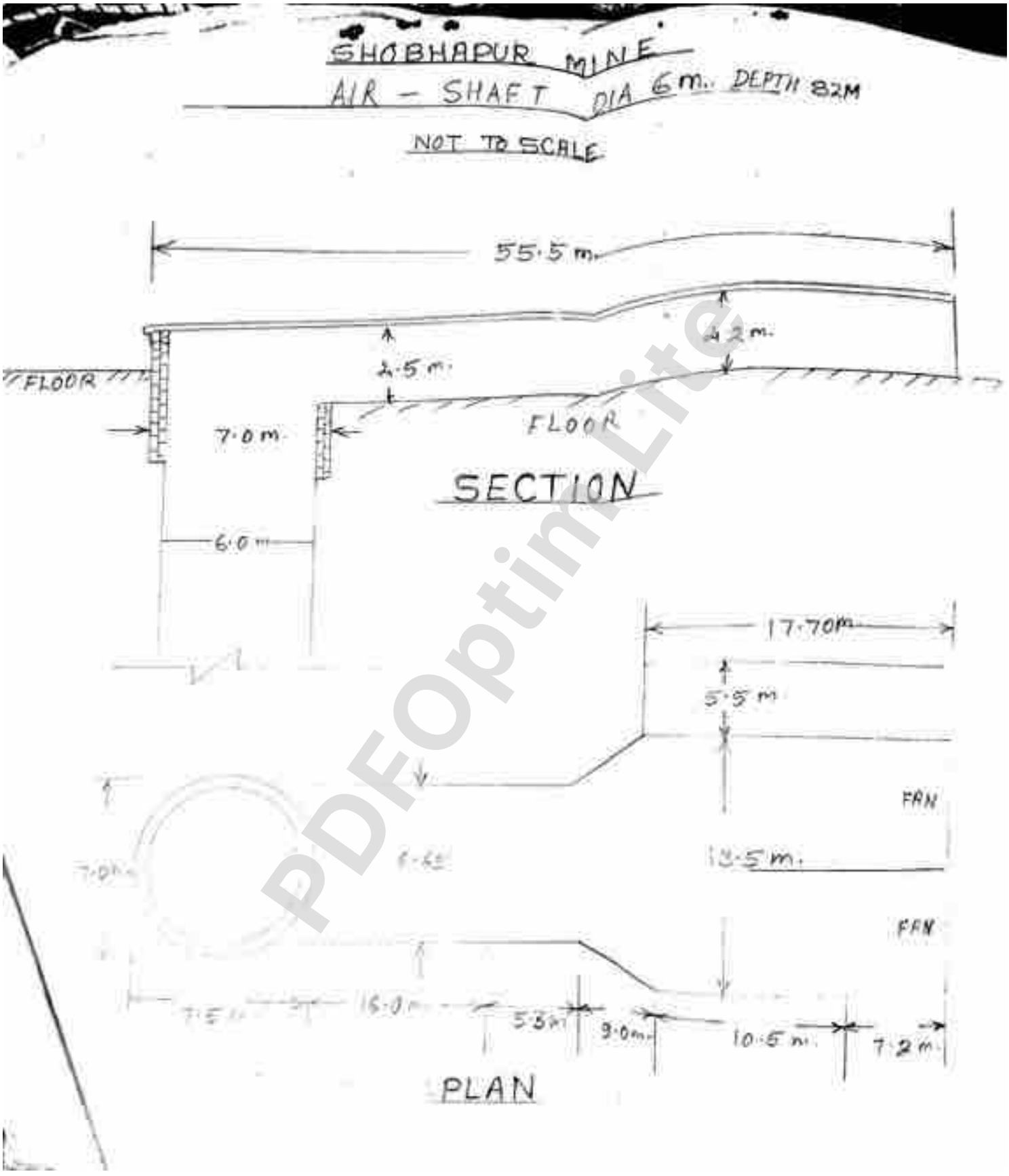
SUMMARY OF INVESTMENT ON PLANT & MACHINERY UNDER VARIOUS HEADS

APPENDIX A. 3

(Amount in Rs.'000)

	Total Cost	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86 onwards	Depreciation
A.Face Equipment	41281	7080	7880	7992	8026	6432	3871	4696.7
B.Face Transport	11920	1700	1740	2040	=940	2580	1920	1324.5
C.Gate Transport	9140	670	1670	1260	1240	1340	3960	1730.0
D.Main and Trunk Transport	16380	2580	1575	1105	2035	1735	7350	2743.3
E.Auxiliary Transport	2284	686	474	297	272	247	308	271.7
F.Winding	8610	-	1500	7110	-	-	-	384.5
G.Roof Support	2616	313	70	420	613	500	700	290.7
H.Ventilation	5455	1660	1640	737	582	396	440	562.8
I.Other items	18667	2548	3330	3639	2734	2020	4396	1154.3
TOTAL	116353	17237	18879	24600	17442	15250	22945	13158.5

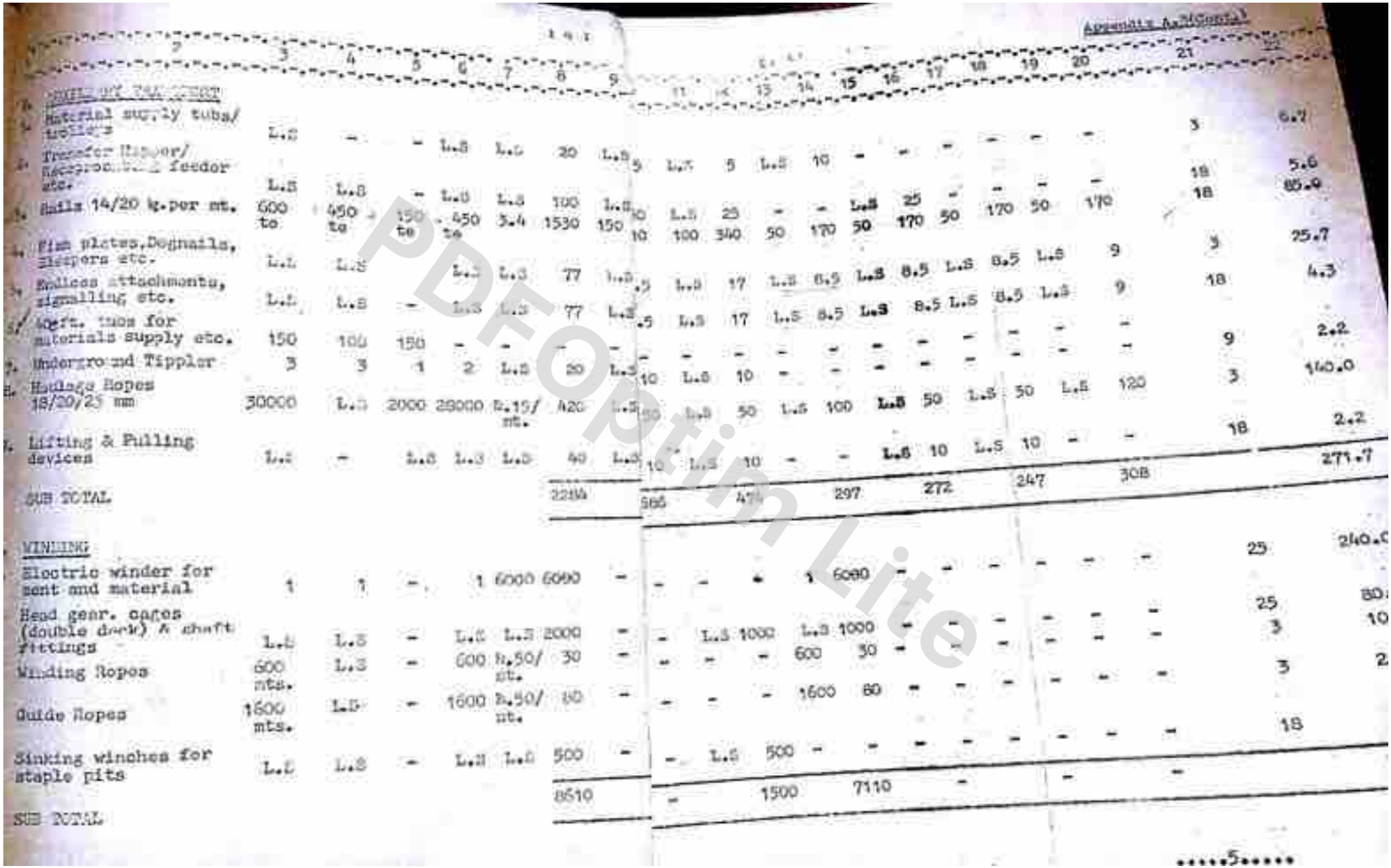
Sl. No.	Particulars	Total Req.	As per Approved P.R	Existing No.	Addl. Req.	Unit Cost	Total cost of Addl. Regs.	1980-81 Unit	1980-81 Amt	81-82 Unit	81-82 Amt	82-83 Unit	82-83 Amt	83-84 Unit	83-84 Amt	84-85 Unit	84-85 Amt	85-86 Unit	85-86 Amt	Life in yrs	Depreciation
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
A.	MINE EQUIPMENT																				
1.	Tractor mounted Arrmil coal cutting machine, SD MM,550V with G.H.S 1x4 100 mts. trailing cable, electricals FLP	17	3	3	14	800	100	3	2400	4	3200	3	2400	3	2400	1	800	-	-	9	1244.4
2.	Conveyor mounted CCM ram flight loaders	-	7	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-
3.	Side Discharge Loaders Crawler mounted FLP 45 KW,0.60 cu.m. capacity	32	-	-	32	760	4320	5	3800	5	3800	6	4560	6	4560	6	4560	4	3040	9	2702.2
4.	Spares for Side Discharge loaders 20% of capital	-	-	-	-	-	4864	L.S	760	L.S.	760	L.S.	912	L.S	912	L.S	912	L.S	608	9	540.4
5.	40-45 HP Slusher/ Scrapers	-	67	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6.	1 No. ½ hr rated electric coal/stone drill with 100 mts. trailing cable	60	45	15	45	11	495	6	66	6	66	6	66	8	88	8	88	11	121	3	165.0
7.	Single Unit drill panel	55	45	19	36		216	5	30	5	30	5	30	6	36	6	36	9	54	9	24.0
8.	Multi Shot(25/10 shots)intrinsically safe exploders	40	25	9	31		186	4	24	4	24	4	24	5	30	6	36	8	48	9	20.7
	SUB TOTAL						11281		7080		7880		7992		8026		6432		3871		4696.7



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
	FACE TRANSPORT																				
	Light duty chain conveyor, 30 mts. length, 60 to 90 TPH, electricals, FLP, 500V, 12 to 24 KW	90	12	-	90	100	9000	12	1200	12	1200	14	1400	14	1400	20	2000	18	1800	9	1000.0
	Medium duty chain conveyor, 90-100 mts. length, 100-120 TPH, electricals FLP, 500V, 37 KW	10	37	-	10	250	2500	2	500	2	500	2	500	2	500	2	500	-	-	9	277.8
	Spare Drive Head & tail ends for above for(1)	0	4	-	0	40	320	-	-	1	40	1	40	1	40	2	80	3	120	9	35.6
	(1) & (2) for(2)	1	-	-	1	100	100	-	-	-	-	1	100	-	-	-	-	-	-	9	11.1
	Heavy duty armourd face conveyor complete with FLP electricals 150 mts.	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	SUB TOTAL						11920		1700		1740		2040		1940		2580		1920		1324.5
	GATE TRANSPORT																				
	Gate Belt Conveyor 800 mm, 100 TPH, 850 mts, 37 KW, electricals FLP, 500V	6	7	-	8	500	4000	1	400	1	400	2	500	2	700	2	800	1.5	1100	18	222.2
	Spare drive head & tail unit for above	2	2	-	2	120	240	-	-	-	-	1	120	-	-	-	-	1	120	18	13.3
	PVC Belting for (1) above	10000 mts.	11000 mts.	-	10000	0.44/ mt	4400	500	220	500	220	1000	440	1000	440	1000	440	6000	2640	3	1466.7
	Single track reversible endless rope haulage 20/ 30 KW with motor & starter FLP Electricals	10	12	-	10	50	500	1	50	1	50	2	100	2	100	2	100	2	100	18	27.8
	SUB TOTAL						9140		670		670		1260		1240		1340		3950		1730.0

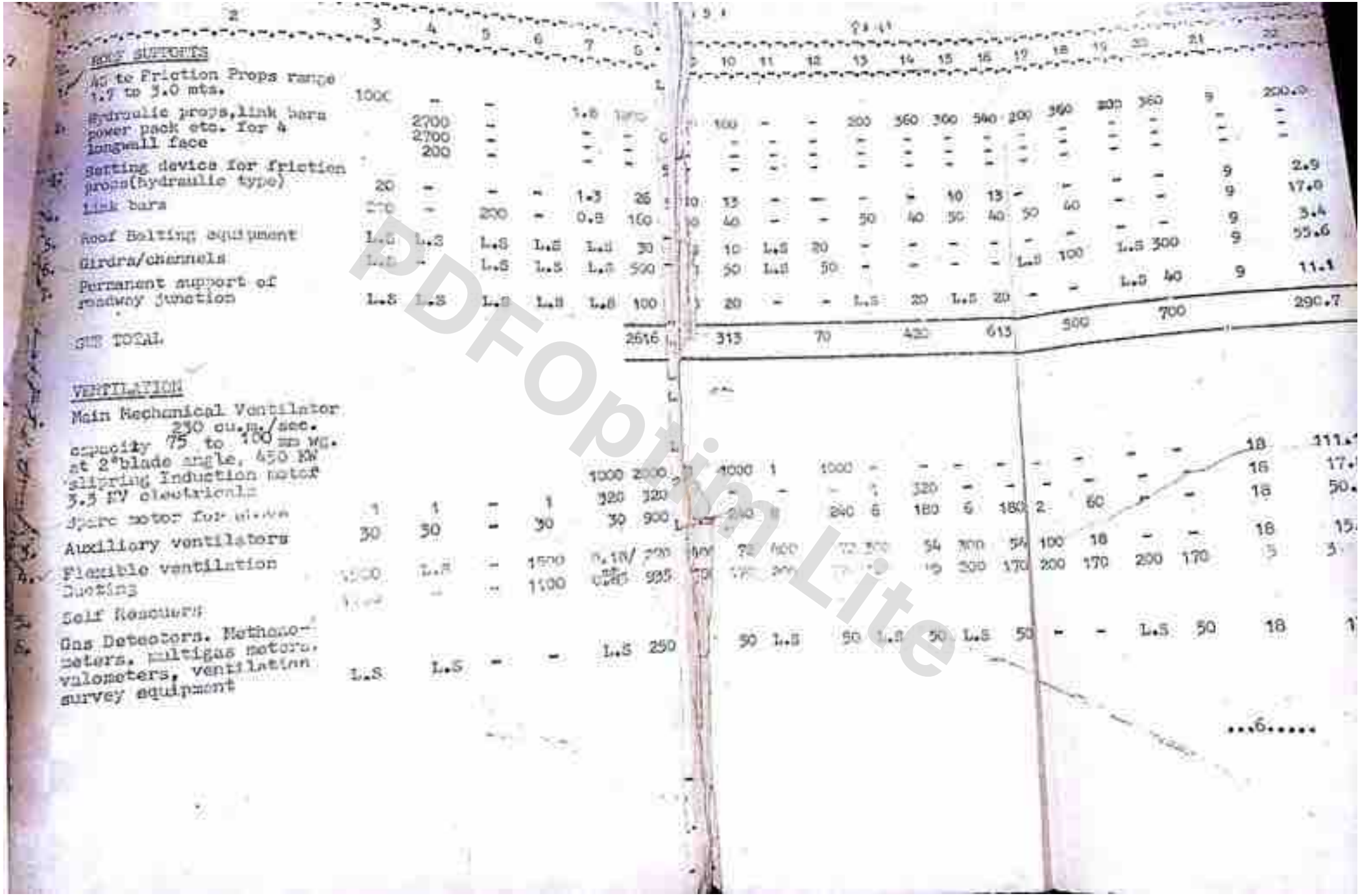
...3....

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1.	[illegible]																				
1.	Trunk Belt Conveyor, 1000 mm complete with drive head tail end, structure, motor, electricals																				
i)	230 mts. long 250 TPH, 70 mts. lift 90 KW motor	3	2	-	3	500	1500	3	1500	-	-	-	-	-	-	-	-	-	-	18	83.5
ii)	700 mts. long, 250 TPH, 70 mts. lift 90 KW motor	5	4	-	5	850	4250	-	-	2	850	LS	600	1	600	1	850	1	1350	18	236.1
iii)	450 mts. long, 250 TPH, 30 mts. lift, 37 KW motor	3	-	-	3	[illegible]	[illegible]	-	-	-	-	-	-	1	400	LS	100	2	1000	18	83.[illegible]
iv)	20 mts. long, 250 TPH, Feeder Conveyor	1	-	-	1	[illegible]	150	1	150	-	-	-	-	-	-	-	-	-	-	18	6.3
2.	Extra drive Head & Tail end for above	2	-	-	2	250	500	-	-	-	-	-	•	1	250	-	-	1	250	18	27.8
3.	P.V.C. Belting for (1) above	12000	5700	-	12000	0.[illegible] mt	[illegible]500	1600	880	800	440	400	220	800	440	800	440	7600	4160	3	2200.0
4.	Tripper arrangement for (1)(i) above	1	-	-	1	50	50	1	50	-	-	-	-	-	-	-	-	-	-	18	2.8
5.	Direct Haulage with electricals 500V																				
i)	100-120 KW Non FLP (Double drum balanced)	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
ii)	65 KW Non FLP	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
6.	Direct Haulage with FLP electricals 100-120 KW	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
7.	20/30 KW Tugger Haulage, Electricals FLP (for material supply)	7	-	5	2	50	120	-	-	-	-	-	-	1	60	1	60	-	-	18	6.7
8.	Direct Haulage with electricals FLP 50 KW (for material supply only)	6	-	-	6	285	1710	-	-	1	285	1	285	1	285	1	285	2	570	18	95.0
9.	Endless Rope Haulage 37/50 KW for material FLP transport in shaft level	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
	SUB TOTAL						16380		2560		1575		1105		2035		1735		7350		2743.[illegible]



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
	CHARGES OF THE SHAFT																								
1.	Material supply tubs/ trolleys	L.S	-	-	L.S	L.S	20	L.S	5	L.S	5	L.S	10	-	-	-	-	-	-	3	6.2				
2.	Transfer Gripper/ Reciprocating feeder etc.	L.S	L.S	-	L.S	L.S	100	L.S	10	L.S	25	-	-	L.S	25	-	-	-	-	18	85.9				
3.	Rails 14/20 kg.per mt.	600 to	450 to	150 to	450 to	3.4	1530	150	10	100	340	50	170	50	170	50	170	50	170	18	25.7				
4.	Fish plates, Dognails, Sleepers etc.	L.S	L.S		L.S	L.S	77	L.S	5	L.S	17	L.S	8.5	L.S	8.5	L.S	8.5	L.S	9	3	4.3				
5.	Endless attachments, signalling etc.	L.S	L.S	-	L.S	L.S	77	L.S	5	L.S	17	L.S	8.5	L.S	8.5	L.S	8.5	L.S	9	18					
6.	40cft. tubs for materials supply etc.	150	100	150	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	2.2				
7.	Undercrond Tippler	3	3	1	2	L.S	80	L.S	10	L.S	10	-	-	-	-	-	-	-	-	3	140.0				
8.	Haulage Ropes 18/20/25 mm	30000	L.S	2000	28000	R.15/ mt.	420	L.S	50	L.S	50	L.S	100	L.S	50	L.S	50	L.S	120	18	2.2				
9.	Lifting & Pulling devices	L.S	-	L.S	L.S	L.S	40	L.S	10	L.S	10	-	-	L.S	10	L.S	10	-	-						
	SUB TOTAL						2284		565		474		297		272		247		308		271.7				
	WINDING																								
1.	Electric winder for cent and material	1	1	-	1	6000	6000	-	-	-	-	1	6000	-	-	-	-	-	-	25	240.0				
2.	Head gear, cages (double deck) & shaft fittings	L.S	L.S	-	L.S	L.S	2000	-	-	L.S	1000	L.S	1000	-	-	-	-	-	-	25	80				
3.	Winding Ropes	600 mts.	L.S	-	600	R.50/ mt.	30	-	-	-	-	600	30	-	-	-	-	-	-	3	10				
4.	Guide Ropes	1600 mts.	L.S	-	1600	R.50/ mt.	80	-	-	-	-	1600	80	-	-	-	-	-	-	3	2				
5.	Sinking winches for staple pits	L.S	L.S	-	L.S	L.S	500	-	-	L.S	500	-	-	-	-	-	-	-	-	18					
	SUB TOTAL						8510		-		1500		7110		-		-		-						

.....5.....



ROOF SUPPORTS

AC to Friction Props range 1.7 to 3.0 mts.	1000	–	–		1.8	180																	200.0
Hydraulic props, link bars power pack etc. for 4 longwall face		2700	–		–	–		100	–	–	200	360	300	540	200	360	300	360	9	–	–		
		2700	–		–	–		–	–	–	–	–	–	–	–	–	–	–	–	–	–		
		200	–		–	–		–	–	–	–	–	–	–	–	–	–	–	–	–	–		
Setting device for friction props(hydraulic type)	20	–	–	–	1.8	36		–	–	–	–	–	–	–	–	–	–	–	9	9	2.9		
Link bars	270	–	200	–	0.8	160		10	13	–	–	–	–	10	13	–	–	–	9	9	17.0		
Roof Bolting equipment	L.S	L.S	L.S	L.S	L.S	30		30	40	–	–	30	40	30	40	30	40	–	–	9	3.4		
Girdrs/channels	L.S	–	L.S	L.S	L.S	500		5	10	L.S	20	–	–	–	–	–	–	L.S	300	9	55.6		
Permanent support of roadway junction	L.S	L.S	L.S	L.S	L.S	100		1	50	L.S	50	–	–	–	–	–	–	L.S	40	9	11.1		
								3	20	–	–	L.S	20	L.S	20	–	–	L.S	40	9	290.7		
SUB TOTAL						2516			313		70		420		613		500		700				

VENTILATION

Main Mechanical Ventilator 250 cu.m./sec. capacity 75 to 100 mm WG. at 2°blade angle, 450 KW slipring Induction motor 3.3 KV electricals					1000	2000		1000	1	1000	–	–	–	–	–	–	–	–	18	111.1			
Spare motor for above	1	1	–	1	320	320		–	–	–	1	320	–	–	–	–	–	–	16	17.0			
Auxiliary ventilators	30	30	–	30	30	900		240	8	240	6	180	6	180	2	60	–	–	18	50.0			
Flexible ventilation Ducting	1200	L.S	–	1500	0.18/	270		100	72	600	72	300	54	300	54	100	18	–	–	18	15.0		
			–	1100	0.20	990		200	170	200	170	200	170	200	170	200	170	200	170	5	5		
Self Rescuers																							
Gas Detectors. Methanometers. Multigas meters. Anemometers, ventilation survey equipment	L.S	L.S	–	–	L.S	250		50	L.S	50	L.S	50	L.S	50	–	–	L.S	50	18	1			

...6.....

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22				
6.	Fire fighting & rescue equipments	L.S	L.S	-	L.S	L.S	100	L.S	20	-	-	L.S	20	-	-	L.S	20	L.S	40	18	5.0				
6.	Pipes for water services																								
	i) 100 mm dia pipes	5000 mts.	-	-	5000	0.08/ mt.	400	1000	80	1000	80	-	-	1000	80	1000	80	1000	80	18	22.2				
	ii) 50 mm dia pipes	7000 mts.	-	1000	6000	0.04/ mt	240	500	20	500	20	500	20	1000	40	1000	40	2500	100	18	13.5				
	iii) 25 mm dia pipes	3000 mts.	-	500	2500	0.016/ mt	40	500	8	500	8	500	8	500	8	500	8	-	-	18	2.2				
	T.O.																								
	TOTAL							5455		1660		1640		737		582		395		440		562.8			
	SUB TOTAL																								
4.	Electrical Plant & Equipment(A.3.1)	L.S	L.S	-	-	-	10000	L.S	1500	L.S	1500	L.S	2000	L.S	1000	L.S	1000	L.S	3000	18-28	500.0				
																				3-25	224.5				
4.	D.G.P(A.3.2)	L.S	L.S	-	-	-	3600	L.S	600	L.S	1000	L.S	1000	L.S	1000	-	-	-	-						
5.	Pumps, Pipes & its fittings(A.3.3)	L.S	L.S	-	-	-	1527	L.S	200	L.S	200	L.S	100	L.S	300	L.S	200	L.S	527	18	84.8				
																				28	40.7				
6.	Workshop Plant and Equipment(A.3.4)	L.S	L.S	-	-	-	1139	L.S	100	L.S	150	L.S	250	L.S	200	L.S	200	L.S	239						
7.	Surveying equipment & Survey office equipments	L.S	L.S	-	-	L.S	200	L.S	50	L.S	50	L.S	50	-	-	-	-	L.S	50	18	11.				
8.	Cap lamps with ratan & chargers	2000	Room	700	1300	0.4	500	200	40	100	40	100	40	100	160	300	120	200	80	3	175				
		30	-	-	30	0.8	24	10	8	10	8	5	4	5	4	-	-	-	-	3					
9.	Safety lamps	L.S	L.S	-	-	L.S	50	L.S	10	L.S	20	-	-	L.S	20	-	-	-	-	18					
10.	Audio Visual aids	1	-	-	1	100	100	-	-	1	100	-	-	-	-	-	-	-	-	18					
9.	Tractor with trailer	1	-	-	1	120	120	-	-	-	-	1	120	-	-	-	-	-	-	9					
10.	Underground boring equipment																			18					
11.	Mobile compressor 300 cfm @3a 120 p.s.i complete with PLP electricals	1	2	-	1	160	160	-	-	1	160	-	-	-	-	-	-	-	-	3					
		10	20	4	6	4.5	27	-	-	6	27	-	-	-	-	-	-	-	-						
12.	Jack Hammer Drill					L.S	50	-	-	L.S	50	L.S	50	-	-	-	-	-	-	18					
13.	Compressed air pipes & hoses	L.S	L.S	-	-	L.S	100	-	-	L.S	25	L.S	20	L.S	50	-	-	L.S	500	L.S	500	18			
14.	Hospital equipment	L.S	L.S	-	-	L.S	1000	-	-	-	-	-	-	-	-	-	-	-	-						
15	Miscellaneous							18667		2548		3350		3639		2734		2020		4396					
	SUB TOTAL							116353		17237		18879		24600		17442		15250		22945					
	GRAND TOTAL																								

PROJECT REPORT ON REVISION OF SHOBHAPUR PROJECT

APPENDIX A.3.1.

STATEMENT SHOWING
ESTIMATED CAPITAL EXPENDITURE FOR
ELECTRICAL PLANT AND MACHINERY.

(Amount in Rs.'000)

Sr. No.	Description	Quantity			Unit Price	Amount	Remarks
		Total	Existing	Addl.			
1	2	3	4	5	6	7	8
1.	**Main Substation:**						
1.1	Air break switch, three pole, outdoor type, gang operated 33KV, 400A conforming to I.S 1818(current)	5	-	5	3	15	
1.2	Circuit breaker, outdoor type, 33KV, 400A, *500MVA symmetrical breaking capacity, C.T. ratio 50/5	2	-	2	100	200	* to be finalised in consultation with power supply authorities.
1.3	Transformer as per IS: 2026 (current) outdoor type, vector group DY-11, off load tap changer, neutral point brought out on a separate bushing complete with all accessories as per IS:3639 (current) Transformer ratings are as follows: 2.5 MVA, 33000/3400V	2	-	2	220	440	

...2...

1	2	3	4	5	6	7	8
1.4	Transformer, conforming to IS : 2026 (current), outdoor type, Dy-11, off load tap changer, neutral point, brought out on a separate bushing. Transformer ratings are as follows: 500 KVA, 3300V/565-433V	3	-	3	53	159	
1.5	Station Transformer	1	1	-	-	-	
1.6	11 Panel, 3300V, indoor type switch board with 15 circuit breakers panels, 400A, 100MVA symmetrical breaking capacity and sectionalised bus with following particulars :- - 7 nos. incoming feeder control circuit breakers having C.T. ratio 500/5 - 1 no. sectionalising control circuit breaker having C.T. ratio 500/5 - 5 nos. U/G feeder control circuit breaker having C.T. ratio 200/5	1	-	1	525	525	

1 2 3 4 5 6 7 8

- 2 nos. winder feeder control circuit breaker having C.T. ratio 50/5
- 2 nos. ventilator feeder control circuit breaker having C.T. ratio 100/5
- 2 nos. feeder control circuit breaker for the primary control of 500 KVA transformer having C.T. ratio 100/5
- 2 nos. capacitor control circuit breaker having C.T. ratio 75/5
- 2 nos. reserve circuit breaker with C.T. ratios 200/5 and 100/5

All panels should conform to IS:3427(current) and relevant parts as per IS: 2516 (current). They should be provided with cable end boxes. Incoming panel shall be provided with restricted earth fault protection and other panels with oridinary E/F protection. All panels have to be provided with O/C and short ckt protections. Voltmeter on incoming panel and Ammeter on all the panels to be provided.

...b....

Appendix A.3.1(Cont.)

1	2	3	4	5	6	7	8
1.7	Oil Fuse Switch units, 3300 V, 400A, 75 MVA with O/L, E/L, protection	4	-	4	16	60	2-For winder 2-for ventilator.
1.8	Switch board, 415 V, indoor type, comprising 7 nos. of air circuit breakers with E/L, O/L protections, sy m. breaking capacity 25MVA, CT ratio as follows:- 800A,A.C.B. with C.T ratio 600/5- 1 No. 400A,A.C.B with C.T ratio 250/5-2 Nos. 400A,A.C.B with C.T.ratio 200/5- 4 ros.	1 set	-	1 set	61	61	
1.9	Switch board ,550V, indoor type, comprising 5 nos. of A.C.B and with E/L,O/L protection Symmetrical breaking capacity 25 MVA, C.T. ratio as follows:- 800A, A.C.B with CT ratio 500/5- 1 no. 400A, A.C.B. with C.T. ratio 200/5- 2 nos. 400A, A.C.B. with C.T ratio 1[illegible]/5- 2 nos.	1 set		1 set	15	15	3 nos. available

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APPENDIX A.3.1(Cont.)

1	2	3	4	5	6	7	8
1.10	Capacitor Bank, 3.3 KV,350 KVA	2	-	2	49	98	
1.11	Lightning arrester,Station type, 30 KV,10 KA for 33 KV system. It should conform to IS:3070 (Part-I Current)	6	-	6	5	30	
1.12	Battery and Battery charger and emergency lighting arrangement inside the sub-station control room	L.S	-	L.S		13	
1.13	Misc. items including steel structures for the substation	L.S	-	L.S		50	
2.	Underground Power Supply						
2.1	12 panel, 3300V, mining type switch board having 12 nos. FLP circuit breaker panels, having systematic breaking capacity 50 MVA and sectionalised bus with following particulars:-	1 set	-	1	720	720	For main U/G Substation
	- 2 nos. incoming feeder control circuit breaker having C.T. ratio 200/5						
	- 1 no."Trunk transport and Main dip development" control circuit breaker panel having C.T. ratio 100/5						

....6...

- 1 no. sectionaliser control circuit breaker panel having C.T. ratio 200/5
- 2 nos. District power supply control circuit breaker panel having C.T. ratio 100/5
- 1 no. District power supply control circuit breaker having C.T. ratio 50/5
- 1 No. "upper workable seam" power supply control circuit breaker having C.T. ratic 175/5
- 1 no. "Trunk Transport" control circuit breaker panel having C.T. ratio 40/5
- 2 nos. "Main pump house" control circuit breaker panel having C.T. ratio 150/5

...7...

APPENDIX A.3.1(Cont.)

1	2	3	4	5	6	7	8
	- 1 no. "Reserve" circuit breaker panel having C.T ratio 150/5						
	All panels have to be provided with IDMT relays for O/C and E/L protection. Voltmeters on Incoming panels and Ammeter on all the 12 panels to be provided.						
2.2	7-Panel, 3300V, Mining type, switch board having 6 nos. FLP circuit breaker panels having sym. breaking capacity 50 MVA and sectionalised bus with following particulars	1 set	-	1 set	420	420	For main pumping station
	- 2 nos. incoming feeder control circuit breaker having C.T. ratio 150/5						
	- 1 no. sectionalised feeder control circuit breaker having C.T. ratio 150/5						
	- 2 nos. "Main pumps" control circuit breaker panels having C.T. ratio 50/5						

...8....

APPENDIX A.3.1(Cont.)

1	2	3	4	5	6	7	8

- 1 no. "Intermediate Pump House" control circuit breaker having C.T. ratio 50/5
- 1 no. "Reserve" circuit breaker panel having C.T. ratio 50/5

2.3	3300V,400A, mining type circuit breaker, sym. breaking capacity 50 MVA	3	1	2	60	120
2.4	FLP,315 KVA,3300V/565V, transwitch unit	15	-	15	270	4050
2.5	FLP,200 KVA,3300V/565V Transwitch unit	2	1	1	220	220
2.6	F.L.P., 300A,550V,A.C.B	5	-	5	10	50
2.7	F.L.P.,200 A, 550V,A.C.B	40	10	30	8	240
2.8	F.L.P,100A,550V,A.C.B	15	8	7	7	49
3.	U/G Lighting & Light Fittings					
3.1	10 KVA,550/110V Lighting Transformer	1	-	1	15	15
3.2	5 KVA,550/110V/15V Lighting Transformer	14	3	11	10	110
3.3	U/G Light Fittings	L.S		L.S		100

...9...

APPENDIX A.3.1(Cont.)

1	2	3	4	5	6	7	8
4.	**Cables & O/H Line**						
4.1	O/H line, 3.3 KV with A.C.S.R(DOG) conductor(3 x 65 + 1 x 65) mm²						
4.2	Air break Isolator, 3.3 KV,400/200 A,outdoor type, polemounted, gang operated with expulsion type fuses			L.S	100		
4.3	Lightning arrester, 3.3 KV,10KA, distribution class				20		
4.4	PILCDWA Cable, Mining type,3-core cu.conductor, 3.3 KV,95 mm²			L.S			For Main Subs-Station.
4.5	PILCDWA Cable,Mining type,3-core cu-conductor, 1.1 KV,95 mm²				500		
4.6	PILCDWA Cable, Mining type-3 core cu-conductor, 1.1 KV,70 mm²			L.S			
4.7	PILCDWA Cable, Mining type-3 core cu-conductor,1.1 KV, 35 mm²						
4.8*							
5.	**Communication**						
5.1.	Surface communication system			L.S	300		
5.2	U/G communication system			L.S	200		
5.3	Central despatcher system			L.S	500		
5.4	Signalling equipment			L.S	110		
6.	Township Power Supply & Street Lighting				300		
7.	Testing & Maintenance equipment				60		
8.	Miscellaneous				206		
	TOTAL				10000		

* [illegible] Cable, Al.Conductor, [illegible], 1[illegible] mm²

PROJECT REPORT ON REVISION
OF SHOSHAFOR PROJECT.

APPENDIX A.3.2

STATEMENT SHOWING CAPITAL INVESTMENT ON
COAL HANDLING PLANT.

(Amount in '000 Rs.)

S.No.	Description	Quantity	Amount in Rs. '000
1.	Conveyors		
	a) Drive head & Structures	L.S	200
	b) Idlers	L.S	50
	c) Belting	L.S	150
2.	Feeders	L.S	60
3.	Belt Weigher	L.S	100
4.	Sump Pump	L.S	60
5.	Sampler automatic	L.S	300
6.	Electricals	L.S	30
7.	Dozer	L.S	700
8.	Misc. items	L.S	60
9.	Freight, insurance and erection	L.S	90
10.	Total of items 1 to 9	L.S	1800
11.	Civil and Structurals	L.S	1800
12.	Total:		3600

PROJECT REPORT ON REVISION OF SHOBHAPUR PROJECT

APPENDIX A.3.3

STATEMENT SHOWING ESTIMATED ADDITIONAL CAPITAL INVESTMENT ON PUMPS PIPES & PIPE FITTINGS.ETC.

(Amount in Rs.'000)

Sr. No.	Description	Addl. Qty.	Unit Price	Amount	Remarks
1.	Pumps with Bed plates, valves, gauges etc. complete with motor, starters etc.				
	(i) 0 L.P.S x 175 Mts. head with 132 KW motor having 3.3 KV electricals	7	70	490	
	(ii) 30 L.P.S x 100 mts. head with 45 KW motor having 550 V electricals	[illegible]	3[illegible]	21	
	(iii) Face Pump 11 L.P.S. x 40 mts. head with 10 KW motor having 550 V electricals	14	25	350	
2.	G.I. Pipes				
	(i) 150 mm dia.	800 mts	0.12/mt	96	
	(ii) 100 mm dia.	2000 mts	0.0[illegible]/mt	1[illegible]	
	(iii) 75 mm dia	1500 mts	0.06/mt	9	
3.	Other fittings, Tees, Bends, L-bows measuring Instruments etc.	L.S	L.S	100	
	TOTAL			1527	

PROJECT REPORT ON REVISION OF SHOBHAPUR PROJECT

STATEMENT SHOWING INVESTMENT ON WORKSHOP EQUIPMENT

(Amount in Rs. '000)

Sr. No.	Particulars	Unit cost	Qty.	Total Cost
1	2	3	4	5
	MACHINE SHOP			
1.	Heavy duty centre lathe 330 mm(C.H) x 3000 mm (D.B.C), Power of motor = 11 KW	150.0	1	150.0
2.	Light duty centre lathe 190 mm(C.H.) x 1000 mm (D.B.C), power of motor = 3.75 KW	50.0	2	100.0
3.	Shaping machine max. length of stroke= 630 mm power of motor= 5.5KW	45.0	1	45.0
4.	Radial drilling machine capacity of drilling=50mm Max. radius 1190 mm, power of motor= 3.6 KW	80.0	1	80.0
5.	Pillar drilling machine capacity of drilling = 58 mm, power of motor = 1.5 KW	20.0	1	20.0
6.	Bench drill, capacity of drilling = 13 mm	6.0	1	6.0
7.	Hack saw machine to cut rounds upto 225 mm power of motor = 1.5 KW	12.0	1	12.0
8.	Universal screw threading machine, max. threading dia. for pipes = 150 mm	50.0	1	50.0

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1	2	3	4	5
9.	Pedestal grinder wheel dia = 300 m, power of motor = 1.5 H.P.	7.5	1	7.5
10.	Surface plates, guages, instruments, cutting tools etc.	L.S		25.0
	Sub-Total			495.5
	MINING MACHINERY REPAIR SHOP			
1.	Hydraulic press, capacity = 100 T	85.0	1	85.0
2.	Hydraulic jack with puller attachment, capacity = 50 T	8.0	1	8.0
3.	Skid jacks with skid pallet, lifting and steering capacity = 1.5 T	2.0	1	2.0
4.	Pump testing apparatus	10.0	1	10.0
5.	Flexible shaft grinder wheel dia = 100 m	3.0	2	6.0
6.	Portable hand drill	3.0	2	3.0
7.	Double ended grinding machine, wheel dia. 300 m	7.5	1	7.5
8.	Oxy-Acetylene gas cutting and brazing set with standard nozzles	6.0	1 - 2	6.0
9.	Benches, vices, tool kit for fitters, instruments etc.	L.S	L.S	20.0
	Sub Total			150.5
	ELECTRICAL REPAIR SHOP			
1.	Automatic coil winding machine	10.0	2	20.0
2.	Motor draging furnace, size 2 M x 1M x 2M	25.0	1	25.0

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(Appendix A. 3.4...)

1.	2	3	4	5
3.	Motor testing panel upto 75 KW	10.0	1	10.0
4.	Cable vulcaniser.	5.0	1	5.0
5.	Battery charging set, capacity = 12 V	3.0	2	6.0
6.	Bench drill, drilling capacity in steel = 13 mm	4.0	1	4.0
7.	Portable hand drill	3.0	1	3.0
8.	Precision tools and instruments	L.S	L.S	20.0
	Sub Total			93.0
	STRUCTURAL SHOP			
1.	Transformer welding set, capacity 400 A	11.0	2	22.0
2.	Motor generator welding set, capacity 350 Amps	17.5	1	17.5
3.	Oxy-acetylene gas cutting and brazing set	6.00	2	12.0
4.	Hand operated plate sheering machine, max. thickness of plate 8 mm	2.5	1	2.5
5.	Portable hand drill	3.0	1	3.0
6.	Flexible shaft grinder, wheel dia. 100 mm	3.0	1	3.0
7.	Tools and other implements	L.S		10.0
	Sub-Total			70.0
	CARPENTARY SHOP			
1.	Band saw	8.0	1	8.0
2.	Carpentary tools	L.S		5.0
	Sub Total			13.0

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(Appendix A.3.4 ...)

1	2	3	4	5
	SMITHY SHOP			
1.	Hearth with common electric blower	15.0	2	30.0
2.	Anvils, blacksmith tool kit etc.	L.S		15.00
	Sub-Total			45.00
	AUTOMOBILE WORKSHOP			
1.	High pressure washing machine, max. pressure 28 kg/Cm^2, HP of motor 1.5 HP	7.5	1	7.5
2.	Air compressor, capacity 2.5 M3/Min. pressure = 7 kgs/Cm2	20.0	1	20.0
3.	Tools, grease pumps, jacks, chain pulley etc.	L.S		20.0
	Sub Total			47.50
	COMMON ITEMS			
1.	Electric siren, range 3 KM	1.0	1	1.0
2.	Electric clock	0.5	1	0.5
3.	Jacks			
	(a) Mechanical, Capacity 10 T	3.0	1	3.0
	(b) Hydraulic, capacity 10 T	5.0	1	5.0
4.	(a) Electric hoist, capacity 3 T	50.0	1	50.0
	(b) H.O.T. crane, capacity 5 T	45.0	1	45.0
5.	Exhaust fans, size 18"	1.0	&	.0
6.	Fire fighting equipment	L.S		5.0
7.	Miscellaneous item	L.S		20.0
	Sub-Total			135.5

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WCL/ED/ND/73/629

To

Shri S Bandyopadhyay,
Director,
Department of Coal,
Shastri Bhavan,
Ministry of Energy,
NEW DELHI

Dear Sir,

Sub: P.R. for Re-organisation of Shobhapur project of the WCL.

Ref: Letter No.CPP/43011/38/80 dt. 9-1-1981

****

Kindly refer to this office letter No.WCL/EDND/73/607 dated 9/11/4/81 on the above subject.

Enclosed please find 15 copies revised Apendix.C (Cost of production), which was left due to oversight during despatch.

Inconvenience caused to you may kindly be execused.

Yours faithfully,

Sd/-

TECH.SECY. TO E.D. (ND)

cc:
RD, CMPDIL,Nagpur.
GM(Plg) alongwith enclosure.
GM, Pathakhera

WESTERN COALFIELDS LIMITED
Office of the General Manager
PATHAKHERA AREA

WCL/GM-PKD/Sbh/2567 Dt.22/4/81
23-

Copy forwarded for information with enclosure to:-

1. SO(M). Pkd,
2. SO(E&M), Pkd.
3. APH, Pkd.
4. Supdt. of Mines, Shobhapur.

GENERAL MANAGER
PATHAKHERA

(Appendix A.3.4.::)

1	2	3	4	5
Total				1050
Add freight, insurance and installation charges @ 8.5 %				89.25
			say	89.00
GRAND TOTAL				1139

KSW

PROJECT REPORT ON
REVISION OF SHOBHAPUR PROJECT

APPENDIX A.4

STATEMENT SHOWING ESTIMATED CAPITAL INVESTMENT ON FURNITURE AND FITTINGS

(Amount in ₹ '000)

A/C Code No.	Particulars	No. of Items	Total Provision
010	General Furniture and Fittings	L.S.	100
020	Office Equipment	L.S	75
030	Air Conditioning Equipment and Refrigerators	L.S	50
040	Fire arms	L.S	25
050	Misc. Equipments	L.S	50
	TOTAL		300

Note: Provision includes the cost of hospital furniture/ beds etc Rest House furnishings, water coolers, Canteen Equipment and fittings, club furnishing etc. and do not include hospital plant and equipment(shown under P & M A.3) and Electric Fans(shown under buildings A.2).

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PROJECT REPORT ON REVISION
OF SHOBHAPUR PROJECT

Appendix A.5

STATEMENT SHOWING ESTIMATED
INVESTMENT ON RAILWAY SIDING

- - - - - - N I L - - - - -

PROJECT REPORT
ON
SHOBHAPUR PROJECT

(Amount in Rs.'000) Appendix-A.6

Particulars	Total Reqd.	Existing Strength	Addl. Reqd.No.	Unit Cost	PHASING 80-81 Unit	Amt.	81-82 Unit	Amt.	82-83 Unit	Amt.	83-84 Unit	Amt.	84-85 Unit	Amt.	Total	De- pr ec ia tion
Trucks	2	-	2	160	1	160	-	-	1	160	-	-	-	-	320	9 35.5
Petrol/Diesel Jeep (two with two with trull-ies)	3	-	3	60	1	60	1	60	-	-	-	-	1	60	180	13 13.8
Ambulance	1	-	1	80	-	-	1	80	-	-	-	-	-	-	80	9 8.8
School Bus	1	-	1	160	-	-	-	-	1	160	-	-	-	-	160	9 17.7
Explosive Van	1	-	1	160	-	-	-	-	-	-	1	160	-	-	160	9 17.7
Motor cycle	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	13 -
Total	9	1	8		2	220	2	140	2	320	1	160	1	60	900	93.8

PROJECT REPORT ON REVISION
OF SHOBHAPUR PROJECT.

Appendix A.7

STATEMENT SHOWING ESTIMATED CAPITAL EXPENDITURE ON PROSPECTING AND BORING

(Amount in Rs'000)

Sector	Additional No. of bore-holes to be drilled	Additional meterage to be drilled in metres	Total provisions
A & B and area on further dip side	25	5000	1500

KSW

Page- 1&2

PROJECT REPORT ON
REVISION OF SHOBHAPUR PROJECT

APPENDIX A. 8.1

STATEMENT SHOWING ADDITIONAL ESTIMATED INVESTMENT ON CAPITAL OUTLAY IN MINES

Sr. No.	Particulars	No.	Depth/ Length in mts.	Total in mts.	Rate per mts. in Rs.	Amt. in Rs.'000
1	2		3	4	5	6	7
I.	MINE ENTRY					
1.	Intake shaft for men and material transport ation	1	170	170	60000	10200
II	SECTOR 'A'					
1.	Drift from Lower workable seam to Upper workable seam for coal supply(4.2m x 2.5m)	1	140	140	4000	560
2.	J.G Bunker complete with chute etc. Upper to Lower Workable Seam(450 te.capacity)	1	20	20	L.S	250
3.	Drift(intake cum material supply) from Lower to Upper Workable Seam(4.2 mts x 2.5 mts.)	1	60	60	4000	240
4.	Staple shaft from Upper to Lower Workable Seam to act as bunker (3 mts. x 3 mts.)	1	20	20	3000	60
5.	Staple shaft from Lower to Upper Workable Seam to act as return airway to be used mainly for Sector 'B' (4.5 mts dia)	1	20	20	3000	60

...2...

Appendix A. B.1 cont.

1	2	3	4	5	6	7
6. Intake cum coal supply drift from Lower workable seam to Bagdona Seam, grad. 1 in 4 (against the dip of beds) (4.2 mts x 2.5 mts)	1	155	155	4000	620	
7. Staple bunker 7.5 mts. above Lower Workable Seam for receiving coal from Bagdona Seam 3 mts. x 3 mts.)	1	7.5	7.5	2000	15	
8. Intake cum Material supply drift from Lower Workable to Bagdona Seam, grad. 1 in 4(against the dip of beds) (4.2 mts x 2.5 mts.)	1	140	140	4000	560	
9. Return drift from L.W.S. to Bagdona gradient 1 in 4(against the dip of beds(4.2 mt x 2.5 mts)	1	50	140	4000	560	
III SECTOR 'B'						
1. Coal supply and material supply(Intake) drifts from Lower to Upper Workable Seams grad. 1 in 4(rising) 4.2 mts. x 2.5 mts)	2	60	120	4000	480	
2. Return airway staple shaft from Lower to Upper Workable Seam (4.5 mts dia.)	1	20	20	6000	120	
3. Staple shaft(to act as bunker) from Lower to Upper Workable Seam (3mts. x 3 mts.)	1	20	20	3000	60	

...3....

1	2	3	4	5	6	7
4.	Intake cum coal supply drift from Lower Workable to Bagdona DSeam grad. 1 in 4(against the dip of beds) (4.2 mts x 2.5 mts.)	1	155	155	4000	620
5.	Staple bunker 7.5 mts. above Lower Workable Seam for receiving coal from Bagdona Seam (3 mts. x 3 mts.)	1	7.5	7.5	2000	15
6.	Intake cum material supply drift from Lower Workable Seam to Bagdona Seam, grad. 1 in 4(against the dip of beds) (4.2 mts. x 2.5 mts.)	1	140	140	4000	560
7.	Return airway staple shaft from Lower Workable to Bagdona Seam (4.5 mts. dia)	1	50	50	6000	300
IV	Lumpsum provision various minor drifts boreholes for cables, pipes etc.	L.S				2500
V	Sump and Drainage arrangements	L.S				400
VI	Sub-Stations etc.	L.S				100
VI						200
VII	Permanent support of roadways	L.S				100
VIII	Pit Bottom layout	L.S				
IX	Surface water Tank, 70 cu.m. capacity for spraying etc.	1 (1 existing)			150	150
X	Deepening of existing air shaft to L.W.S. &lining the same	L.S			-	600

...4...

Appendix A.8.1(Contd.)

1	2	3	4	5	6	7
XI	Diversion of 220KV overhead line	L.S	-	-	-	400
XII	Miscellaneous	L.S	-	-	-	270
						20000

PROJECT REPORT ON REVISION OF SHOBHAPUR PROJECT.

APPENDIX A.8.2

STATEMENT SHOWING ESTIMATED ADDITIONAL CAPITAL INVESTMENT ON ROADS & CULVERTS

COLONY ROADS AND CULVERTS:

A. Grade 'A' Road:

i) Specifications:

3.35 m wide, 15 cm thick boulder soling

3.05 m wide, 11.25 cm. thick metalling and 2 coats of bitumen painting

ii) Length of Road: 5400 RM @ Rs. 91 = Rs. 491400

B. Grade 'B' Road:

i) Specifications:

3.05 m wide, 15 cm thick boulder soling with 7.5 cm thick moorum top

ii) Length of Road: 3600 RM @ Rs. 48 = Rs. 172800

C. Culverts(7.32 m wide) :

i) 4.57 m span RCC Slab Culvert = 3 Nos. @ Rs. 55875 = Rs. 167625

ii) 3.05 m span RCC Slab Culvert 2 nos. @ Rs. 37250 = Rs. 74500

iii) 1.83 m span RCC slab culvert = 2 nos. @ Rs. 22350 = Rs. 44700

iv) 1.22 m span RCC Slab culvert = 2 nos. @ Rs. 14900 = Rs. 29800

v) 0.61 m diameter hume pipe culvert = 9 nos. @ Rs. 4600 = Rs. 41400

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Appendix A.8.2(Cont.

D. Pucca Drains:

i) 22.5 cm x 30 cm: Length = 2250 RM @ Rs. 42 = Rs. 94500

ii) 30 cm x 45 cm: Length = 1800 RM @ Rs. 85 = Rs. 153000

iii) 60 cm x 90 cm; Length = 900 RM @ Rs. 155 = Rs. 139500

E. Tree Guards = 360 Nos. @ Rs. 46 = Rs. 16560

F. RCC Slab for drain crossing: (1.53 m x 0.61 m x 7½ cm) = 360 nos. @ Rs. 39 = Rs. 14040

G. Extra for poor soil/BC soil on all items other than E & F @ 10% = Rs. 143980

TOTAL = Rs. 1583805

say Rs. 1584000
i.e Rs. 15.84 lakhs

APPROACH ROADS AND CULVERTS

a) Specifications:

i) 3.35 m wide and 15 cm thick boulder soling

ii) 3.05 m wide and 15 cm thick metalling

iii) 3.05 m wide and 2.5 cm thick bitumen carpet

b) Length = 3000 RM @ Rs. 112 = Rs. 336000

c) Culverts(7.32 m wide)

i) 4.57 m span RCC Slab Culvert 1 no. @ Rs. 55875 = Rs. 55875

ii) 3.05 m span RCC Slab Culvert 1 no. @ Rs. 37250 = Rs. 37250

iii) 1.83 m span RCC Slab Culvert 1 no. @ Rs. 22350 = Rs. 22350

iv) 1.22 m span RCC Slab Culvert - no. -

v) 0.61 m diameter hume pipe culvert 3 nos. @ Rs. 4600 = Rs. 13800

.....3.....

Appendix A.8.2(Cont.)

2.	Bridges(7.32 m wide):	-
	Sub-Total	Rs. 465275
3.	Add extra for poor soil/ BC Soil @ 10%	Rs. 46530
	TOTAL	Rs. 511805
		say Rs. 512000
		i.e. Rs. 5.12 lakhs.
	GRAND TOTAL	= Rs. 20.96 lakhs

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...REPORT ON REVISION OF GROUNDWATER PROJECT

STATEMENT SHOWING FORECAST OF COST ESTIMATES FOR THE WATER SUPPLY ARRANGEMENTS.

APPENDIX A.9.2

Sr. No.	Particulars	Quantity	Unit	Rate	Per	Amount (in R. lakhs)	Remarks
1	2			3	6	7	8
1.	Intake well and raw water pump house with suitable raw water drawal arrangements	275000	Gallons	L.S	-	2.06	
2.	Raw water pump set	L.S	-	L.S	-	0.75	
3.	Raw water rising main: i) 10" dia	4000	R.M.	325	R.M.	13.00	
4.	Extension/modification of existing water treatment plant inclusive of provision of chemical house, and clarifloculator etc., and overhauling of existing rapid gravity filter bed.	250000	gallons	-	L.S	1.68	
	Ground water reservoir after treatment plant(for storage of clear water)	25000	gallon	4.36	gallon	1.09	
	Clean water pumps(Centrifugal Type)	L.S	-	-	-	0.60	

...2...

APPENDIX - A.9.1

WATER PROJECT

g development period

(Amount in Rs.000)

tal pi- l pen- - re	Administra- tion char- ges @ 1%	Remarks
561	656	
888	1179	

PROJECT REPORT

Statement showing the inte
in the cost of 'Dev

Year	Capital balance at the beginning excluding township.	Capital expenditure during the year excluding township	Expe ture reve natur capi ised ing year
1980-81	20348	22170	1709
1981-82	45859	27439	2340

APPENDIX A.8.3(Cont.)

1	2	3	4	5	6	7	8
7.	Clearwater rising main distribution: i) 4" dia.	3000	R.M.	102	R.M.	3.06	
	ii) 6" dia.	2000	R.M.	165	R.M.	3.30	
	iii) 8" dia.	2000	R.M.	241	R.M.	4.82	
8.	Zonal Storage: RCC Overhead tank	100000	Gallon	7.37	Gallon	7.37	
9.	Distribution System: A. Industrial water distribution system	25000	Gallon	3.75	Gallon	0.94	
10.	Electrical Installation: A. Transformer & Switch-gear	15% of above				1.94	
	B. Overhead Line, instruments etc.	11.5				1.22	
11.	Miscellaneous @ 3%					42.03	
12.	TOTAL					15.67	
13.	LESS Anticipated Subsidy from GWD					26.36	
14.	NET CAPITAL INVESTMENT TO BE MADE BY WCL						

PROJECT REPORT ON REVISION OF
SHOBHAPUR PROJECT.

APPENDIX A.8.4

STATEMENT SHOWING ESTIMATED CAPITAL EXPENDITURE ON RESEARCH, DEVELOPMENT ETC.

(Amount in Rs. '000)

Sr. No.	Particulars	Amount
1.	Pilot Schemes, Research, Development, Training and Consultancy	500
2.	PR preparation cost	835
	TOTAL	1335

PROJECT REPORT ON REVISION
OF SHOBHAPUR PROJECT

Appendix-X.9

Statement showing the estimated revenue expenditure during the development period.

(Amount in Rs.000)

Sr. No.	Particulars	1980-81	1981-82	Total
A.	Production in m.tes.	0.25	0.35	0.60
B.1	Salaries & Wages	13160	17546	30706
	2.Stores	1875	2625	4500
	3.Power	750	1050	1800
	4.Misc.expenses includ. W.S. debit	650	1000	1650
	5.Loading charges	-	-	-
	6.Administration Charges	656	1179	1835
	7.Interest	-	-	-
	8.Depreciation	1920	2245	4165
	Total	19011	25645	44656
	Less:Sale proceeds @ Rs.55/ te.	13750	19250	33000
		1920	2245	4165
	Less:Depreciation -	3341	4150	7491
	Net Total Capital-			

PROJECT REPORT ON REVISION OF SHOI

Statement showing the Administration Charges Durir
in cost of 'Development Others'

Years	Capital balance at the beginning.	Capital Expenditure during the year	Expenditure of revenue nature capitalised during the year.	Total Capital expenditure during the year	T C t e d t
1980-81	23938	25188	16435	41623	6
1981-82	66217	29450	22221	51671	1

APPENDIX - A.9.2

ON REVISION OF SHOBHAPUR PROJECT

rest on Capital during development period included
elopment-Others'

(Amount in Rs.000)

li- of ie e al- dur- he	Sale proceeds of coal	Net Capital expenditure during the year	Average Capital expenditure for the year excluding township	Loan portion of Capital for the year	Interest on Capital @ 10.5%	Remarks
	13750	25511	33104	-	-	
	19250	31589	61654	-	-	

PROJECT REPORT ON REVISION OF SHOBHAPUR PROJECT.

APPENDIX B

STATEMENT SHOWING JOBWISE/CATEGORYWISE EXISTING & TOTAL MANPOWER REQUIREMENT.

Sr. No.	Designation	Cat./ Scale	As per approved F.R.	Existing as on [illegible]	Proposed Req'd.
1	2	3	4	5	6
I.	UNDERGROUND				
A.	COAL FACE				
a.	Getting & Loading				
1.	C.C.M. Driver	VI	24	2	28
2.	C.C.M Helper/Crew	III	48	2	49
3.	Side Loader Operator	VI	-	-	63
4.	Side Loader Helper	II	-	-	63
5.	Slusher Operator	IV	13	-	-
6.	Slusher Mazdoor	I	26	-	-
7.	P.R.Loader	P.R.VA	400	39+245*	-
	Sub-Total		511	288	203
b.	Drilling				
1.	Drillers	IV	54	3	63
2.	Driller Helper	II	54	9	80
	Sub-Total		108	12	143
c.	Blasting				
1.	Shot firer	508-860	54	12**	48
2.	Explosive Carrier/ Helper	II	108	3	110
	Sub-Total		162	15	158

...2.....

* Casual Piece Rated

** Not yet regularised.

Appendix B(Cont.)

1	2	3	4	5	6
d.	Dresser	III	75	23	63
	Sub-Total		75	3	63
e.	Face Support				
1.	Timber Mistry	IV/V	60	3	63
2.	Timber Mazdoor	II/III	120	4	140
3.	Roof Bolting Crew	III	12	-	12
4.	Longwall Support Mazdoor	IV	100	-	-
	Sub-Total		292	7	215
B.	PRODUCTION SERVICES				
a.	Trasnportation & Engineering Services				
1.	Conveyor Khalasi	III	67	-	216
2.	Haulage Khalasi	III/IV	27	4	25
3.	Trammers	III/IV	90	25	25
4.	Oil Mazdoor	I	3	2	3
5.	Line Mistry	IV	6	2	3
6.	Line Mazdoor	II	12	7	12
7.	Line Repairer	II	-	-	-
8.	Feeder Operator	III	3	-	12
9.	Belt Cleaner	I	50	-	60
10.	Electrical Fitter	IV/V/VI	32	3	32
11.	Elec. Fitter/ Helper	II	32	2	32
12.	Mechanical Fitter	IV/V/VI	35	2	32
13.	Mech. Fitter/ Helper	II	35	6	32

...3....

(APPENDIX [illegible])

1	2	3	4	5	
14.	Conveyor Shifter	II	40	-	60
15.	Material supply Gang	I	10	10	40
16.	Line Packing Mazdoor	I	10	8	10
17	On Setter	IV	4	-	4
18	Tub-Repairer Mist.	IV		-	1
19.	Tub-Repairer Mazdoor	I		-	1
	Sub Total		456	71+72*	600
b.	Roof Support				
1.	Timber Mistry	IV	4	-	3
2.	Timber Mazdoor	II	8	-	7
3.	Dresser	III	3	-	5
	Sub-Total		15	-	15
c.	Ventilation &Safety				
1.	Mason	IV	6	1	4
2.	Mason Mazdoor	I	12	4	12
3.	Timber Mistry including for S. dust barrier	IV	2	-	15
	Timber Mazdoor	II	4	-	50
4.		IV	2	-	2
5.	Carpenter	I2	2	-	2
6.	Carpenter Helper	IV	6	4	6
7.	Notch Cutter	III	-	-	5
8.	Dresser	IV	-	-	4
9.	Spray Pipe fitter			-	8
10.	Spray Pipe Fitter Helper	II	-		

* engaged for various production works.

Appendix B. (Cont.,)

1	2	3	4	5	6
11.	Spray Mazdoor	I	66	12	60
12.	Cleaning & Dusting	I		12	60
13.	Fan Attendant	III		-	30
	Sub-Total		100	33	250
d.	Pumping & Drainage				
1.	Pump Khalasi	III/IV	16	10	30
2.	Sump Cleaning & Bailing Mazdoor	I	4	4	12
3. ✓	Pipe Fitter	IV/V	4	-	2
4. ✓	Pipe Fitter Mazdoor	II	4	-	2
	Sub-Total		28	14	46
e.	Supervision				
1.	Sr. Overman	722-1278	6	-	6
2.	Overman	640-1160	22	6	21
3.	Mining Sirdar	572-1008	36	8	45
4.	Foreman Incharge Elec.	722-1278	1	1	2
5.	Foreman Incharge Mech.	722-1278	1	-	1
6.	Foreman	640-1160	12	NIL 2	12
7.	Chargeman		10	* 1	-
8. ✓	Sub-Station Attendant	III	13	-	4
9.	Munshi	508-808	-	8	2
10.	Dusting Incharge	640-1160	2	1	2
11.	Sampling Incharge	640-1160	2	1	2
	Sub-Total		105	28	91
	Casual D/R*			362	
	TOTAL(UNDERGROUND WORKERS)		1852	905	1798

* 150 casual D/R engaged for development activities and balance used for various misc. works.

....5....

1	2	3	4	5	6
II.					
II.	SURFACE				
A.	PRODUCTION SERVICES				
1.	Conveyor Khalasi	III	3	-	4
2.	Haulage Khalasi	IV	2	1	3
3.	Trammers	III/IV	4	-	7
4.	Foreman(Electrical)	640-1160	-	-	2
5.	Miners Time Keeper	508-808	5	2	5
6.	Body Searcher	II	4	-	4
7.	Sub-Station Incharge	III	4	-	8
8.	Fan Khalasi	III/IV	4	-	4
9.	Lamp Room Incharge	572-944	1	1	1
10.	Lamp Fitter	IV	5	1	7
11.	Lamp Issuer	460-636	4	-	8
12.	Lamp Room Cleaner	II	6	1	4
13.	Telephone Mechanic	IV/V/VI	-	-	1
14.	Telephone Mechanic Helper	II	-	-	1
15.	Electric Line Mazdoor	II	-	-	2
16.	Winder	VI	4	-	5
17.	Banksman	IV	3	-	4
	Sub-Total		49	6	70
B	WORKSHOP AND MAINTENANCE				
1.	Carpenter	IV	2	1	2
2.	Carpenter Helper	II	2	-	2
3.	Welder	V	5	-	3
4.	Blacksmith/Rope Splicer	IV /V	6	1	4

.....6.....

Appendix B(Cont.)

1	2	3	4	5	6
5.	Hammerman	III	6	-	4
6.	Blacksmith Helper	II	-	2	7
7.	Electrical Fitter	IV/V/VI	6	-	5
8.	Electrical Fitter Helper	II	6	-	6
9.	Mechanical Fitte.	IV/V/VI	6	-	6
10.	Mechanical Fitter Helper	II	6	-	7
11.	Machinist	V	5	-	3
12.	Turner	V	-	(1) NR	3
13.	Bit Sharpener	IVIV	5	-	4
14.	Auto-Mechanic	V/VI	1	-	2
15.	-do- Helper	II	2	-	2
16.	Auto-Electrician	V	-	-	1
17.	Auto-Elect/Helper	II	-	-	1
18.	Tyndal Supervisor	V	1	(1)	2
19.	Tyndals	V	18	(5)	30
20.	W.S.Mazdoor	I	-	-	8
21	Cleaner(Auto Section)	I	3	-	
22	Armature Winder	VI	2	-	2
23.	Foreman	640-1278	4	-	1
24.	Foreman Incharge	722-1278	-	-	1
25.	Asstt. Engineer	800-1400		-	1
	Sub -Total		87	11	107

....7.....

Appendix B(Cont..)

1	2	3	4	5	6
III.	COAL HANDLING PLANT & DESPATCH				
1.	Feeder Attendant	III	4	-	3
2.	Conveyor Operator	III	7	-	4
3.	Cleaner & Misc. Mazdoor	I	3	-	8
4.	Stone/shale pickers	I	16	-	-
5.	Dozer/Front ender operators	Grade B	-	-	2
6.	Khalasi/Cleaner & Misc. Mazdoors	II	-	-	2
7.	Control Room Attendant	III	2	-	-
8.	Tripper Attendant	III	2	-	-
9.	Foreman Incharge		1	-	-
10.	Fitter(Mech.)	V	3	-	-
11.	Fitter(Elec.)	V	2	-	-
12.	Fitter Helper	II	5	-	-
13.	Crusher Attendant	III	3	-	-
	Sub-Total		48		19
IV	(A)WORKING EXPENSES				
1.	By. C.M.E	1900-2500	1	-	1
2.	Supdt. Mines cum Manager	1600-2200	1	1	1
3.	Addl. Colliery Manager	1400-1950	1	1	1
4.	Ventilation Officer	1150-1700	1	1	1
5.	Asstt.Colliery Manager	1100-1700	2	1	3
6.	Safety Officer	1100-1700	1	1	1
7.	Under Manager	800-1400	12	1	12

....8....

Appendix B(Cont..)

1	2	3	4	5	6
8.	Supdt. Engineer	1600 - 2200	1	-	1
9.	Sr. Ex. Engineer (E & M)	1400 - 1950	-	-	1
10.	Ex. Engineer(E&M)	1100- 1700	1	1	2
11.	Asstt. Engineer(E&M)	800 - 1400	5	1*	4
12.	Ex. Engineer(Civil)	1100- 1700	1	-	1
13.	Asstt. Engineer (Civil)	800 - 1400	1	-	1
14.	Engineering Asstt. (Civil)	722 - 1278	1	-	1
15.	Overseer(Civil)	572 - 1008	2	-	1
16.	Personnel Officer	800 - 1400	-	-	1
17.	Administrative Officer	800 - 1400	1	-	1
18.	Office Supdt.	722 - 1278	1	-	1
19.	Sr. Clerk	640 - 1084	-	-	1
20.	U.D.C	572 - 944	8	1	6
21.	LDC/Typist	508 - 808	14	16**	16
22.	Cost Accounts Officer	800 - 1400	1	-	1
23.	Cost Accountant	722 - 1278	3	-	3
24.	Cost Assistant	640 - 1084	3	-	3
25.	Sr. Steno/PA	640 - 1084	3	-	2
24.	Jr. Steno	572 - 944	2	-	3
25.	Pay Clerk	572 - 944	2	-	3
26.	Driver(Heavy Vehicle)	508 - 860	6	1	4
27.	Driver(light Vehicle)	460 - 652	6	1	4
28.	Peon	404- 512	6	1	6
29.	Cleaner/Khalasi	II	-	-	4
30.	Attendants	I	4	-	-
31.	Sr. Cashier		1	-	-
	Sub- Total		92	28	90

* JET(E&M)
**Including13 semi clerks

1	2	3	4	5	6
(B)	COLLIERY SUB-STORE				
1.	Asstt. Controller of Stores				
2.	Chief Store Keeper	800- 1400		-	1
3.	Store.Keeper		1	-	-
4.	Asstt. Store Keeper	640-1084	2	-	2
5.	Store Mazdoor	508-808	12	-	10
7.	L.D.C./Typist	I	6	-	6
		508-808	1	-	1
	Sub-Total		22	-	20
(C)	SECURITY				
1.	Asstt. Security Officer	750-1350	-	-	1
2.	Security Inspector	572-1008	1	-	1
3.	Head Watchman	440-584	1	-	2
4.	Armed Guard	440-584	7	-	4
5.	Watchman	404-512	22	-	18
	Sub- Total		31	-	26
(D)	SURVEY				
1.	Survey Officer	800-1400	-	-	1
2.	Head Surveyor	722-1278	1	-	1
3.	Mine Surveyor	722-1278	4	1	4
4.	Draughtsman/Asstt. Survey	572-1008	2	1	1
5.	Chainman	440-584	6	-	4
6.	UG Survey Mazdoor	I	6	4	8.
7.	Ferro Printer/Tracer	460-652	1	-	1
	Sub-Total		20	6	20

...10....

1	2	3	4	5	6
(E) WELFARE					
1. L.W.O	800-1400	1	1	1	
2. Asstt. L.W.O	800-1400	1	-	1	
3. LDC/Typist	508-808	1	1	2	
4. Canteen Clerk	508-808	1	-	1	
5. Canteen Cook	III	3	-	2	
6. Canteen Boy	I	4	-	4	
7. Teacher		3	-	-	
8. Canteen Cleaner	I	2	-	4	
9. Pit Head Bath Attendant	I	6	-	4	
10. Mali	I				
Sub-Total		22	2	29	
(F) MEDICAL & SANITATION					
1. Medical Officer	800-1400	1	-	1	
2. Lady Medical Officer	800-1400	1	-	1	
3. Compounder	508-860	2	-	2	
4. Dresser	404-512	2	-	2	
5. Nurse	572-1008	5	-	3	
6. Store Keeper	572-944	1	-	1.	
7. LDC/Typist	508-808	1	-	1	
8. Driver(Ambulance)	460-552	1	-	2	
9. Sanitary Inspector	572-1008	1	-	1	
10. Sweeper	I	24	-	25	
11. Peon	404-512	1	-	1	
12. Ward Boy	404-512	6	-	2	
13. Aya	404-512	4	-	2	
14. Cook	III	1	-	1	
15. Mazdoor	I	1	-	-	
Sub-Total		52	-	45	

.....11.....

1	2	3	4	5	6
(G)	GROUP VOCATIONAL TRAINING				
1.	Training Officer	1400-1950	1	1/3	1/3
2.	Instructor	722-1278	1	-	1
3.	Demonstrator	572-1008	1	-	1
4.	LDC/Typist	508-808	1	1/3	1 1/3
5.	Peon	404-512	-	1/3	1/3
	Sub-Total		4	1	4
(H)	WATER SUPPLY & BUILDING MAINTENANCE				
1.	Engg. Asstt.(C)	722-1278	1	-	-
2.	Raw Water Pump Attendant	III	3		2
3.	Filter Operator	III	3		2
4.	Clean Water Pump Attd.	III	3		2
5.	Meter Attendant	III	3		-
6.	Plumber	IV	2		2
7.	Plumber Helper	I	2		2
8.	Valveman	I	6		3
9.	Chemical Mazdoor	I	3		2
10.	Work Supervisor	572-1008	-		1
11.	Mason	IV	1		2
12.	Mason Mazdoor	I	1		2
13.	Carpenter	IV	1		1
14.	Carpenter Helper	II	1		2
15.	Fitter	IV	3		1
16.	Guard Watchman		-		-
	Sub-Total		33		24
	TOTAL SURFACE WORKERS		460	54	444

: 12 :

1 2 3 4 5 6

TOTAL MANPOWER

Proposed	: 2242
Approved F.R.	: 2312
	(-) 70

SUMMARY OF TOTAL MANPOWER

	Daily Rated	Piece rated	Monthly	Officers	Total
PROPOSED	1913	-	288 2/3	40 1/3	2242
EXISTING	237+362*	39+245**	67 2/3	8 1/3	959
ADDITIONAL	(+)1314	(-)284	(+)221	(+) 32	1283

* Casual Daily Rated

** Casual Piece Rated.

PROJECT REPORT ON REVISION
OF SHOBHAPUR PROJECT.

APPENDIX B1

STATEMENT SHOWING JOBWISE/CATEGORYWISE
REQUIREMENT OF MANPOWER, WAGES & BENEFITS

Sr. No.	Category/Scale	Strength	Wages	Benefits	Total
1	2	3	4	5	6
I.	UNDERGROUND				
1.	I	258	1938096	715950	2654046
2.	II	528	4147440	1642608	5790048
3.	III	506	4258496	1768976	6027472
4.	IV	198	1825758	735372	2561130
5.	V	54	558846	217026	775872
6.	VI	113	1371820	498669	1870489
7.	508-808	2	22096	8224	30320
8.	508-860	48	549312	201024	750336
9.	572-1008	45	587565	202680	790245
10.	640-1160	37	545047	178710	723757
11.	722-1278	9	146268	46143	192411
		1798	15950744	6215382	22166126
II	SURFACE				
1	I	76	519384	199044	718428
2.	II	44	314204	129712	443916
3.	III	35	267505	116165	383670
4.	IV	41	342924	144279	487203
5.	V	48	450000	182256	632256
6.	VI	12	131724	49776	181500
7.	B	2	25350	8974	34324
8.	404-512	31 1/3	22491	83745	308726
9.	440-584	10	79050	31050	110100
10.	460-636	8	67104	25888	92992

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APPENDIX-LIV Contd..

1	2	3	4	5	6
11.	460-652	7	59472	22848	82320
12.	508-808	37 1/3	368223	144952	513175
13.	508-860	6	61278	23604	84882
14.	572-944	14	156884	57680	214564
15.	572-1008	9	104715	38736	143451
16.	640-1084	8	100808	35120	135928
17.	640-1160	3	39333	13464	52797
18.	722-1278	12	173424	56964	230388
19.	750-1350	1	15914	5509	21423
20.	800-1400	27	452358	210198	662556
21.	1100-1700	8	165232	68016	233248
22.	1400-1950	2 1/3	53716	25087	78803
23.	1600-2200	1	26204	14144	40348
24.	1900-2500	1	30254	15190	45444
		444	4230041	1702401	5932442

MANPOWER ANALYSIS

		NO.	MANSHIFT	WAGES & BENEFITS
I	UNDERGROUND	1798	471076	22166126
II	SURFACE	444	117660	5932442
		2242	588736	28098568

1.	O.M.S	1.70
2.	E.M.S(Rs.)	47.73
3.	Wages Cost/te.(Rs.)	28.10

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APPENDIX -C

PROJECT REPORT ON REVISION OF SHOHAPUR PROJECT

Statement of Unit cost estimates

Sr.No.	Particulars	Cost per tonne (Rs.)	Variable Cost/te	Fixed Cost/ te
1.	O.M.S.	1.70		
2.	E.M.S. (Rs.)	47.73		
3.	Salaries & Wages	28.10	-	28.10
4.	Stores	12.00	9.00	3.00
5.	Power -	5.87	1.47	4.40
6.	Misc.expenses includ.W.S. debits	2.40	0.60	1.80
7.	Administration charges	2.00	-	2.00
8.	Depreciation	17.29	-	17.29
9	Interest on Working Capital	2.52	0.55	1.97
10.	Interest on Loan Capital @ 10.5%	9.16	-	9.16
	TOTAL:	79.34	11.62	67.72

PROJECT REPORT ON REVISION OF SHOBHAPUR PROJECT.

APPENDIX C 1

ESTIMATED COST AND PROFITABILITY AT VARIOUS LEVELS OF PRODUCTION

Sr. No.	Level of Production	80%	85%	90%	100%
1.	Production in M.Tes	0.80	0.85	0.90	1.00
2.	Variable cost/te(Rs.)	11.62	11.62	11.62	11.62
3.	Fixed cost/te.(Rs.)	84.65	79.67	75.24	67.72
4.	Total cost/te.(Rs.)	96.27	91.29	86.86	79.34
5.	Capital Investment per te. of annual output(Rs.) 249.61	249.61	234.93	221.88	199.69
6.	Equity capital/te. (Rs.)	140.56	132.29	124.94	112.45
7.	Return on Equity @ 12%(Rs.)	16.87	15.87	14.99	13.49
8.	Minimum selling price to yield the above return(Rs.)	113.14	107.16	101.85	92.83
9.	Present selling price/te.(Rs.)	55.00	55.00	55.00	55.00
10.	Profit/Loss per tonne(Rs.)	(-)41.27	(-)36.29	(-)31.86	(-)24.34
11.	R.O.E(%)	(-)29.36	(-)27.43	(-)25.50	(-)21.65
12.	R.O.I(gross i.e. before charging interest on loan capital)	(-)11.95	(-)10.86	(-)9.77	(-) 7.60

ANNEXURE I

STATEMENT SHOWING CARB./GREY SHALE ABOVE UPPER WORKABLE SEAM(AS INDICATED BY LITHOLOGS OF BOREHOLES UPTO LOWER WORKABLE SEAM)

Borehole No. NCP-30		Borehole No. NCP-31		Borehole No. NCP-34		Borehole No. NCP-35	
Lithology	Thickness	Lithology	Thickness	Lithology	Thickness	Lithology	Thickness
1	2	3	4	5	6	7	8
Sludge of sand-stone	3.00	Sludge of sand	3.15	Sludge of sandy soil	4.70	Sludge of sand-stone	7.30
Weathered sand-stone	3.05	Medium grained sandstone (weathered)	1.15	Weathered medium to coarse grained sand-stone	9.10	Medium to coarse grained sandstone weathered	14.70
Medium grained sandstone	0.72	Medium to coarse grained sandstone	38.90	Medium to coarse grained sandstone	9.30	Coarse grained sandstone	13.00
Green shale weathered.	0.93	Shale	1.47	Mottled shale dip 5°	2.14	Coarse grained sandstone with shale & coal patches	9.15
Medium grained sandstone green	4.50	Medium to coarse grained sandstone	24.08	Fine grained sand-stone	2.10	Coarse grained sandstone. Green-ish shale places	33.55
Medium grained sandstone	7.55	Shale & sandstone bands with coal bands	2.50	Medium to coarse grained sandstone	27.35	Medium to coarse grained sandstone	12.25
Sandy shale	0.85	Fine grained sand stone	0.60	Greenish and brownish shale	0.65	Medium grained sandstone	0.46
Medium grained to coarse grained sandstone	17.60	Medium to coarse grained sandstone	16.85	Medium grained sandstone, coarse towards bottom	27.61	Coal	0.32
	2.00	Shale with carb at bottom	1.00	Sandy shale with 0.02 coal bands at middle dip 4°	3.05	Shale with coal bands	0.39

...2...

Annexure I(Cont.)

1	2	3	4	5	6	7	8
Sha	0.85	Shale	0.61	Medium to coarse grained sandstone	15.39	Medium grained sandstone	0.02
Medium grained sandstone	0.07	Coal with shale bands(U.W.S)	1.46	Shale	0.25		
Coal	0.20	Fine grained sandstone with shale streaks at top	0.59	Medium to coarse grained sandstone	4.03	Medium to coarse grained sandstone with shale bands	19.96
Medium to coarse grained sandstone	52.08	Medium to coarse grained sandstone	16.90	Sandy shale,carb. at places with 0.06 coal at top	4.33	Shale	0.40
Coal	0.10			Medium grained sandstone with shale bands at place	15.40		
Medium to coarse grained sandstone	19.39			Carb.shale broken and alicned	1.00	Shale	0.92
Carb.sandy shale	1.01	2.63		Coal with carb. shale bands(UWS)	1.51	Clay	0.06
Coal with shale bands(U.W.S)	1.62			Medium grained sandstone	17.52	Coal with shale bands(UWS)	1.90
Shale	0.45					Medium grained sandstone	16.97
Medium grained sandstone	15.12						

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ANNEXURE II

TECHNO-ECONOMIC COMPARISON OF DIFFERENT METHODS OF DEVELOPMENT OF BORD & PILLAR PANEL

The four alternatives considered for comparison purposes are:-

Alt.I - Cutting, drilling, blasting and manual loading of coal in tubs.

Alt.II - Cutting, drilling, blasting and manually shovelling coal onto chain conveyors.

Alt.III - Cutting, drilling, blasting and loading coal onto chain conveyor by side loaders.

Alt.IV - Cutting, drilling, blasting, and loading coal onto gate belt conveyor by load haul dumper.

Sr. No.	Particulars	Alt.I	Alt.II	Alt.III	Alt.IV	Remarks
1.	Coal production per day in tes.	300	450	450	480	
2.	Coal production per annum in m.tes.	0.09	0.135	0.135	0.144	
3.	Manshifts per day	211	244	140	124	Detailed in An.IIA
4.	E.M.S(Rs.)	48.00	48.00	48.00	48.00	
5.	O.M.S(Tonnes)	1.42	1.84	3.21	3.87	
6.	Wages cost/tonne (Rs.)	33.80	26.09	14.95	12.40	
7.	Depreciation per te.of coal output Rs.)	4.26	5.00	8.00	7.26	Detailed in An. II B.
8.	Interest @12% of total capital per te. of coal output(Rs.)	6.48	7.15	8.84	8.10	
9.	Power cost per tonne of coal output(Rs.)	2.00	2.50	2.50	2.25	
10.	Store cost per tonne of coal output	6.25	6.75	7.25	7.25	Detailed in An.IIC
	District cost per te. of coal output	52.79	47.49	41.54	37.26	

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ANNEXURE IIA

Sr. No.	Designation	Alt. I	Alt. II	Alt. III	Alt. IV	Remarks
1	2	3	4	5	6	7
1.	CCM Operators and Helpers	9	18	18	18	
2.	Drillers and Drill Helpers	9	12	12	12	
3.	Dressers	3	6	6	6	
4.	P/R loaders @3 tonnes/man	100	90**	-	-	** 5 tc./man
5.	Side Loader/L.H.D operators & Helpers	-	-	12	8	
6.	Conveyor Operators including gate belt conveyor operator	-	18	15	9	
7.	Haulage Khalasi	6	3	1*	1*	* for materi supply on
8.	Trammers	24	15	1*	1*	
9.	Shotfirers	3	3	3	3	
10.	Shotfirer Mazdoor	6	9	9	9	
11.	Timber Mistry	5	3	3	3	
12.	Timber Mazdoor	10	6	6	6	
13.	Line Mistry	1	1	-	-	
14.	Line Mistry Helpers	4+2***	2+2***	1***	1***	***For line repair work
15.	Aux. fan operator	-	6	6	6	

...2...

Annexure IIA(Cont.)

1	2	3	4	5	6	7
16.	Conveyor Shifter	-	12	9	6	
17.	Material supply, water spraying, cleaning, dusting, ventilation stoppings etc.	15	18	18	15	
18.	Electric Fitter & Helpers	3	6	6	6	
19.	Mechanical Fitter & Helpers	3	6	6	6	
20.	Mining Sirdars	3	3	3	3	
21.	Overman	1½	1½	1½	1½	
22.	Foreman	2	2	2	2	
23.	Undermanager	1½	1½	1½	1½	
	TOTAL	211	244	140	124	

PROJECT REPORT ON MECHANISATION OF SINGARENI MINES

REQUIREMENT OF CAPITAL FOR PLANT AND MACHINERY

(AMT IN RS.'000)

S. No.	Particulars	Life	Unit Cost	Alternative I Qty.	Alternative I Amt.	Alternative I Dep.	Alternative II Qty.	Alternative II Amt.	Alternative II Dep.	Alternative III Qty.	Alternative III Amt.	Alternative III Dep.	Alternative IV Qty.	Alternative IV Amt.	Alternative IV Dep.
	Crawler mounted coal cutting machine complete with electricals.	9	800	2	1600	177.78	3	2400	266.67	3	2400	266.67	2	1600	177.78
	Coal drills with drill panels cables etc.	9	17	3	51	5.66	3	51	10.20	3	51	10.20	3	51	10.20
	Multi-shot Exploders.	3	6	1	6	2.00	2	12	4.00	2	12	4.00	2	12	4.00
	Side Loaders(inclusive of 20% for spares)	9	760	-	-	-	-	-	-	3	2280	253.33	-	-	-
	Load Haul dumpers (inclusive of 20% for spares) 0.75 cu.m.	3	1200	-	-	-	-	-	-	-	-	-	2	2400	266.67
	Coal tubs	3	2.0	80	160	53.33	80	160	53.33	-	-	-	-	-	-
	Tugger haulage 30 KW	9	60	1	60	6.67	-	-	-	-	-	-	-	-	-
	Endless haulage 30 KW	9	100	1	100	11.11	1	100	11.11	-	-	-	-	-	-
	Track 15 Kg/mt for 700 mts panel	20	0.08/mt	2100	168	8.40	1400	112	5.60	800	64	3.20	800	64	3.20
	Misc. including sleepers etc.	5	18	18	324	64.80	18	324	64.80	18	324	64.80	18	324	64.80
	Light duty chain conveyors	9	100	-	-	-	12	1200	133.33	7	700	77.78	-	-	-
	Med. duty chain conveyors	9	250	-	-	-	1	250	27.78	1	250	27.78	2	500	55.56
	Stage loader	9	700	-	-	-	-	-	-	-	-	-	1	700	77.78
	Gate Belt conveyor complete with electricals (except idlers, belting etc.)	18	900	-	-	-	-	-	-	1	900	27.78	1	900	27.78
	Idlers & belting extra for above	3	850	-	-	-	-	-	-	1	850	283.33	1	850	283.33
	Others including electricals, Aux. fans, props, single track endless haulage for material supply for Alt.III & IV.	20	-	18	250	12.50	18	900	45.00	18	1200	60.00	18	1600	80.00
	Houses, water supply, colony roads and culverts etc. at 54% satisfaction level @ Rs. 21,500/- per house	25	-	114	2451	98.04	152	2858	115.52	76	1634	65.36	67	1441	57.162
	TOTAL				4802.4	383.33		8045.4	675.02		9847.40	1080.71		9724.40	1045.82

PROJECT REPORT ON REVISION OF SHOBHAPUR PROJECT

ANNEXURE

BREAK UP OF STORE COST PER TONNE

Sr. No.	Particulars	Alt.I	Alt.II	Alt.III	Alt.IV	Rs.
1.	Explosives	4.25	4.25	4.25	4.25	
2.	Timber	0.50	0.50	0.50	0.50	
3.	Misc. including P.O.L.	1.50	2.00	2.50	2.50	
	TOTAL	6.25	6.75	7.25	7.25	