

COST ESTIMATE

The estimated phased capital investment requirement for electrical plant and machinery and communication along with brief specifications are given in Appendix A.3.2 & A.3.7. The present two part tariff of MSEDCL as applicable for March, 2009 is as follows :-

Description	Industrial/Mine load	Township
i) M.D Charges	Rs.150 / kVA / month	Rs.150 / kVA / month (Considering industrial feeder)
ii) Energy charges	Rs.4.30 / KWH	Rs.3.00 / KWH
Weighted Average of TOD rates for		
22.00 to 06.00	Rs.4.30 - Rs.0.85	
06.00 to 09.00	Rs. 4.30 + Nil	
09.00 to 12.00	Rs. 4.30 + Rs.0.80	
12.00 to 18.00	Rs. 4.30 + Nil	
18.00 to 22.00	Rs. 4.30 + Rs.1.10	
iii) FCA charges	Rs. 0.31 / kWH	Rs. 0.31 / kWH
iv) Electricity duty	NIL	12% of [(i)+(ii)+(iii)]
v) Additional Supply Charges i.e. ASC	NIL	NIL
vi) TAX ON SALE (on total unit consumed)	Rs. 0.04 / kWH	Rs .0.04 / kWH

13.5 COMMUNICATION SYSTEM, SYSTEM PROPOSED AND COST ESTIMATE

13.5.1 INTRODUCTION

For effective management of different production, service units and for ensuring safety, the following communication facilities have been envisaged for Pauni III OC Mine.

Coal production has become highly capital intensive due to large scale mechanization and use of modern technology. To cope up with mechanization and improve the efficiency there is a need to establish efficient means of communication in terms of providing integrated voice and data connectivity. The effectiveness and reliability of decision making process depends on a reliable means of information exchange between different units and establishments of an integrated telecommunication system incorporating both voice and data is of utmost importance.

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In order to improve operational efficiency of Pauni III OC Mine, it is necessary to integrate its operational units, service units, maintenance units, stores, workshops, administration departmental Road and rail dispatches etc. with efficient and reliable communication links which may provide multimedia facilities to be made available for quick decision making.

13.5.2 Proposed Communication System :

The proposed communication system should cater the need of voice communication among the mobile, fixed personnel related to mine operation, administration and equipment maintenance. The system also take into account the data communication requirement for the mine operation and planning along with the latest office automation facilities. Suitable provision has also been kept for tracking the critical responsible persons.

While proposing the system due consideration has been given to the state of art networking architecture involving the communication of voice, data and multimedia over the same network path, so as to avoid the duplicated investment in network and proper conservation of bandwidth.

13.5.3 Administrative Communication :

a) IP Enabled Exchange :

In order to cater to the need of surface communication an IP enabled Exchange of 120 lines for departmental option and 100 lines for partial & total hiring options is proposed for facilitating voice communication between various offices, residential buildings and other strategic points within the mines. This exchange is directly interfaced with the Ethernet layer 3 switch and radio modems so that any subscriber of this exchange can communicate with area office also. The proposed IP enabled exchange should have the following main features :

i) Offered system should be a fully digital system using time division multiplexing/ pulse code modulation with 100% non-blocking architecture.

- ii) The main controller card should have CPU of 32-bit microprocessor or more with stored programme controlled technology.
- iii) The main system memory should be ROM based for faster booting time, faster initialization etc.
- iv) It should be possible to save the data from system memory to the hard disk.
- v) The system should be equipped with 1 No. in built-Ethernet LAN port for direct connecting to the office LAN.
- vi) The system should be equipped with 2 Nos. RS-232C interfaces for direct connectivity with PCs, printers etc.
- vii) It should be possible to maintain the system from any PC in the LAN.
- viii) The system should have in built Auto-Diagnostic features for regular & periodic administration, diagnostic maintenance etc. and generation of various reports related to the health of the system.
- ix) The system should be able to support simultaneous transmission of voice and data upto 19.2 Kbps in Asynchronous mode and 64 Kbps in synchronous mode.
- x) The system should support incoming CL1 facility on Analog lines using CL1 analog phones.
- xi) The system should be capable of accommodating the DTMF phones, cordless phone, answering machines, digital nutlike telephone, ISDN phones, DECT wireless phones.
- xii) The system should support the following types of signaling as given below :

TYPES OF SIGNALING											
CO & P&T trunk lines	DTMF loop	2 wire E&M	4 wire E&M	LD-DID lines	DTMF analogue subscriber lines	R2MFC	2 Mb E1	ISDN (BRI & PRI) signaling	Digital tie lines	VOIP on trunks	DECT Wireless

- xiii) The system should be able to support upto 16 parting in 1 single conference.
- xiv) The system should be able to support in skin IP Gateway card, which converts the circuit, switched voice into data packets and transmit them across the office LAN & WAN to distant location. The same in skin IP Gateway converts the incoming data packets into circuit switched voice and transfers them to the desired extension during reception.

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- xv) The system should be able to support in skin card based 8 port Voice Mail System.
- xvi) The system should be able to support Computer Telephony Integration (CTI).
- xvii) The offered system must be compatible with DSL technology (ADSL) for providing data over the existing copper network.
- xviii) The system should be able to provide CL1 (Calling line identification) facility on analog extension with analog CLIP phones.
- xix) The EPABX system should support call detailed recording, billing facility.

b) BSNL Communication :

It is proposed to provide 10 Nos. BSNL telephone extensions to the project in order to facilitate external communication and to link the project with the BSNL's national telephone network. The BSNL telephones shall be provided at the offices and residences of important officials. The BSNL communication facility can be extended by terminating about 4 BSNL lines on the proposed IP enabled EPABX and configuring the same.

c) Point to Point Radio Communication :

To connect Pauni III OC Mine with Area (HQ), a point to point radio is proposed for voice & data communication. The IP based Point to Point System shall operate at 2.4 to 2.5 Hz ISM band with data speed upto 11 Mbps. Each MW Radio shall be IP configured and compatible to the proposed VSAT based COAL NET of CIL with following important features :

- Easy configuration
- VOIP gateway with quality voice and Analog Interface with easy configuration
- Should support dynamic polling
- 10/100 Base T Ethernet Interface
- System shall be highly secured
- Enable connectivity with multiple LAN with different IP subnet
- Capable of software up-gradation and configuration of remote radios from any node in the proposed network
- Routing support for all standard IP protocol

- Should work without signal fading out of 10 km from point to Multipoint under LOS
- The system should have high gain antenna for successful performance and safe transmission of data/voice
- The system shall support one point to 300 remote base stations

A.15.4 Operational Communication

a) VHF/UHF Communication

To facilitate Voice Communication among the moving maintenance and operational persons, walkie-talkie sets are proposed.

VHP dialing type Walkie-talkie sets/ trunked radio will be provided to important personnel for communication in the mine. These will be working in the band 150-174/450-527 MHz with a channel spacing of 12.5 KHz/25 25 KHz, with an output of 5 W. Type of operation will be FM simplex. The systems shall have telephone patch facility for interfacing with the exchange. It should also have control channels for trunking facilities.

Specifications :

General

Frequency	Channel capacity	Power supply	Weight	Average battery life Ni Cd/Ni MH	Environment Protection
136-174/403-470/450-527mMHz (on-line programmable)	Min. 4	7.5 V +/-20%	Max. 500 grams.	8 – 10 hrs.	1 P 54, impact resistant, dust & humidity protection

Transmitter

Frequency	Frequency separation	Channel Spacing	Frequency stability	Power	Modulation	Audio response	Audio Distortion
136-174/403-470/540-527 MHz	Full band split	12.5/20/25 KHz	+/- 0.00025% approx.	5 W	FCC or any other	+ 1 to -3 dB	3 %

Receiver

Frequency	Frequency separation	Frequency stability	Sensitivity	Inter-modulation	Adjacent channel sensitivity	Spurious rejection	Rated Audio	Audio Distortion	Hum and Noise	Audio response
136-174 / 403	Full	+/-	0.25	EIA	60 dB	70	500	3%	45	+1 to

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Multipoint

- 470 / 540 - 527 MHz(on line programmable)	band split	0.00025 % approx	mV	70 dB	@12.5 KHz/70 dB@25 25KHz	dB	mW		dB@ 12.5 KHz	3 dB
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Data Communication :

In view of growing need of information technology and an efficient and reliable means to access data from anywhere, a local area network (LAN) for Pauni III OC Mine is required to share the existing resources.

The objective of this proposal is to link all proposed 10 PCs of the Project with each other and with area, in a single network facilitating sharing of information and computing resources amongst different departments/disciplines. The network shall be capable to add more nodes as and when the No. of users grow and it will be equipped with the latest state of art technology.

The PCs will be utilized for the following applications

Personnel Information System (Payroll, Bio- data etc.)	Financial accounting	Project Planning & Monitoring	Sales Accounting and Analysis	Material Management	HEMM utilization, breakdown analysis, idle-time analysis etc.	Production & Planning Monitoring	Resource Utilisation & MIS
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For optimum utilization of hardware and software, a Local Area Networking of 10 PCs is proposed. Through LAN, Data Transfer, Message transfer and Mail Transfer are possible. Following LAN Components are needed :

Layer 3 Managed Ethernet Switch :

Switches are required to interface the radio modems with the local area networking (LANs) and also with IP enabled exchanges. 24 Port Layer 3 Managed Switches are proposed here for non-blocking routing of voice and data over the network with bandwidth aggregation.

The proposed layer 324 Port Ethernet switches have the following facilities :

- Non-blocking, wire speed switching and routing for Ethernet, Fast Ethernet and Gigabit Ethernet.
- Support for VOIP (H-323) transcending and gateway capability for 4.729 and 4.711
- Intelligent QOS to clarify the traffic based on application importance and priority
- Routing & Switching services for IP enabled exchanges

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- Support for IEEE 802.3X half and full duplex on all ports.
- Supports for all types of authorization, authentication and security services.

Details of item wise capital expenditure on communications have been shown in Appendix - A.3.1.1.

13.6 CONSERVATION OF ENERGY :

The under mentioned points have been considered, while making this report, keeping in mind the utmost need for conservation of energy.

i) Planning and designing of transmission and distribution network.

While planning / designing of power transmission and distribution network, adequate sizes of cables are selected to minimize line losses and voltage drop. It is also suggested to lay ultimate sizes of cables so that the duplicate work is avoided and line losses are bare minimum during construction stage also.

ii) Improvement of Power Factor :

Capacitor banks at 3.3 kV side in quarry & 415 V side in township have been provided to improve the system power factor to 0.96 and thereby reduce the maximum demand.

iii) Staggering of Pumping Load :

Pumping should not normally be done during peak hours of production. Adequate sump capacity has been provided so that frequent running of pumps are avoided to facilitate staggered pumping. Desilting of main sump is also to be done at regular intervals.

iv) Illumination and Township Power Consumption :

Illumination contributes a substantial percentage of total power consumption. For efficient use of energy as well as to conserve it, high lumen output lamps like HPSV lamps have been proposed for general illumination of township and the areas in the vicinity of the mine, viz Workshops, yards, roads etc. Other major actions proposed for reducing the lighting energy consumption are -

- a) Use of time limit switches in street lighting circuits to establish control over lighting operations as well as to reduce wastages during daylight hours.

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- b) Reducing illumination level in non-productive areas ;
- c) Switching off departmental lights during lunch periods and other extended off periods ;
- d) Checking soundness of capacitors, chokes, starters etc.
- e) Introduction of Electronic static energy meters in individual quarters to control the energy consumption.
- f) Use of electronic chokes for fluorescent lamps.
- v) Providing Energy Meters:
To monitor actual consumption of energy in different areas such as pumping feeder, CHP feeder , OCM installations, township, etc. provision of energy meters has been kept on outgoing feeder control circuit breakers.
- vi) It is highly recommended to use compact fluorescent lamps (CFL, 1x18 W or 2x18 W) in place of incandescent lamps (100 W) and T-5 type tube lights with electronic chokes (28 W) in place of conventional fluorescent tube lights, (55W) where ever possible in the project or township. This will result in substantial energy savings.
- vii) It is also recommended to use hard PVC coated bunch of conductors, in place of ACSR conductors for overhead lines wherever supply is to be given to residential complexes or township to avoid pilferage of electricity in between by unauthorized shops and Jhuggi-Jhopadi .

Chapter - XIV

CIVIL CONSTRUCTION

14.1 CIVIL CONSTRUCTION**14.1.1 Life of the project & specifications**

The estimated life of the project Sakhari-Irawati (Pauni-III) OC of Ballarpur Area, WCL is about 23 years. As such all civil works have been envisaged on permanent specifications. It should be ensured that all the service & residential buildings are constructed on non-coal bearing area.

14.1.2 Nature of Soil

The topsoil in this region is predominantly black cotton. Hence provision in the estimate has been made for poor/black cotton soil, safeguarding against the settlement of foundations. Hence, provision for soil investigations has also been in the estimates. Therefore, it is suggested that before undertaking detailed engineering and construction work, geo-engineering investigations of soil should be done.

14.1.3 Building Cost Index

The Building Cost Index for the Maharashtra has been worked out to 341 in 2008 (2nd half) taking the prevalent rates of materials and labours. This Building Cost Index is with reference to base 100 in Nagpur as on 1.1.1992. The detailed calculations of Building Cost Index are shown in Appendix-A.2.3. Cost index with reference to base 100 at Delhi as on 1.10.1976 works out to 2046.

14.1.4 Contingencies & Sales Tax on Works Contracts

Contingencies @ 3% and Sales tax on Works Contracts @ 2% have also been taken for all items of Civil Works.

14.1.5 External Services

The details of different External Services viz. Roads, Culverts, Water Supply, Sewage Disposal etc. are provisional and may vary after detailed layout and engineering as per site requirements.

14.2 SERVICE BUILDINGS (FOR DEPARTMENTAL & PARTIAL HIRING OPTIONS)

Keeping in view the needs and requirements of this mine, provision for service buildings such as Manager Office, Excavation Workshop, E&M Workshop, Sub-station, dispensary, first aid center, canteen, primary school and other buildings have been provided.

Excavation Workshop

Excavation workshop consists of main workshop building, dumper repair sheds for 60 te capacity dumpers as per requirement, washing ramps, office and store, canteen, switch room, effluent treatment plant etc. for departmental and partial hiring options only, as shown in Annexure A.2.1.

E & M workshop

E & m workshop consists of main workshop building, underground water tank, pump house, washing platform, office and store, switch room, etc with bituminous pavement and a boundary wall with gate.

Sub-Station

Separate provisions of sub-stations for the project and the colony have been made. Substation building has been proposed with a clear height of 4.5m, foundation and flooring for heavy electrical equipment, cable ducts, RCC louvers for ventilation etc.

Service Magazine

Three number of service magazines of capacity 3.00 te each has been considered to cater the need of the project.

Estimated amount for Service Building

Details and estimated amount of the proposed service buildings are shown in appendix -A.2.1

14.3 RESIDENTIAL BUILDING

Appendix A.2.2 - A.2.4 respective

14.4 ROADS AND CULVERTS

14.4.1 Colony Road and Culverts

Appendix A.2.2

14.4.2 Haul Roads Culverts

Appendix A.2.2

14.4.3 Service Road Culverts

Appendix A.2.2

14.5 WATER SUPPLY

Water Supply

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	FOR DEPARTMENTAL OPTION	FOR PARTIAL HIRING OPTION
14.3 <u>RESIDENTIAL BUILDING</u> Appendix A.2.2 & A.2.4 respectively.	Total manpower proposed is 755. total 406 typed quarters have been envisaged which satisfies the 53.8 % of the required manpower of the project. Typed quarter consists of 280 units of MQ's, 16 B-type, 24 C-type, 1 D-type, and 25 Hostel type accommodation.	Total manpower proposed is 333. total 183 typed quarters have been envisaged which satisfies the 55.0 % of the required manpower of the project. Typed quarter consists of 103MQ's, 46 B-type, 17 C-type, 1 D type and 16 Hostel type accommodation.
14.4 <u>ROADS AND CULVERTS</u>	FOR DEPARTMENTAL OPTION	FOR PARTIAL HIRING OPTION
14.4.1 <u>Colony Roads and Culverts</u> Appendix A.8.2.2.	For 755 numbers of quarters 2800 m long colony road with culverts, drains, etc. has been envisaged.	For 183 numbers of quarters 1300 m long colony road with culverts, drains, etc. has been envisaged.
14.4.2 <u>Haul Roads & Culverts</u> Appendix A.8.2.3.	For transportation of over burden and coal, provision of Haul Road of 2000 m length.	For transportation of over burden and coal, provision of Haul Road of 2000 m length.
14.4.3 <u>Service Roads & Culverts</u> Appendix A.8.2.4	Service road for the Project 1000 m. long Sector road Stratum C (single lane for CHP has been proposed.	

14.5 WATER SUPPLY ARRANGEMENT

Water Demand

Separate water supply arrangements have been envisaged for the project site and the colony site. The total water requirement for the colony and for project site has been worked out and tabulated for Departmental option & Partial Hiring Option. Water demand for project site includes water to be supplied for dust suppression, fire fighting, water sprinkling on roads, etc.

WATER DEMAND

	PARTICULARS	DEPARTMENTAL	PARTIAL HIRING
1	Manpower	755	333
2	Total No. of houses required	406	183
3	Residential Population @ 5 persons per house	2030	870

4	Non Residential workers	349	134
5	Water Demand for Colony		
i	Water requirement for residential population @ 135 litres per capita per day in litres.	274050	117450
ii	Water requirement for Welfare/ Community buildings to be located in the colony @ 10% of item (5) (i) above in lts.	27405	11745
iii	Process and other losses @ 10% of item (5) (i) & (ii) above	30146	12919
	Total of (5)	331601 SAY 340000 Litres	142114, Say 145000 lts
	Water demand for colony	340 KI	145 KI
6	Industrial Water Demand for Project including Potable Water demand for Persons working in the Project For Opencast Projects		
a)	Water requirement for total manpower of Project @45 litres/capita/day in lts.	33975	13860
b)	Water requirement for washing of dumpers @ 1800 litres/day/dumper	111600	14400
c)	Water requirement for dust suppression in CHP & other Industrial premises @ 22500 litres/day/ Mty	28125	28125
d)	Water requirement for fire fighting in coal @45000 litres/day/Mty	56250	56250
e)	Water requirement for road watering @67500 litres/day/Mty	84375	84375
f)	Water requirement of Service Buildings @10% of item (a) above	3400	1386
g)	Allowance for loss & wastage @ 10% of (a) to (f)	31800	19840
	Total Water Demand	349525 Say 350000 Litres	218236, say 220000lts.
	Water demand for Project site	350 KI	220KL

NOTE: Industrial water demand for Partial Hiring and Total Hiring options are considered as per the Departmental option, i.e. 350 kl.

Source of Water

For Both colony and project site, sub-soil water has been envisaged as the source. Accordingly, bore-well provisions have been made for the both. However, it is suggested that the source of water may be ascertained after carrying out hydro geological investigations as regards the quality and quantity of water.

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Salient features of Water Supply arrangementColony site and Project Site

Sub-soil water through bore well has been proposed to be conveyed to O.H. reservoirs via ground sumps. Further, water from O.H. reservoir shall be supplied under gravity to different buildings after chlorination.

It is, however, suggested that permanent water supply arrangement should be formulated after carrying out detailed survey, investigations for the adequate source of water and detailed engineering.

Estimated Amount of Water Supply

The details and estimated amount for Water supply for colony and the industrial use are given in Appendix- A.8.3.1 and Appendix- A.8.3.3 respectively.

14.6 SEWAGE DISPOSAL ARRANGEMENT

To avoid any discharge of effluent into natural watercourses, sewage disposal arrangement has been envisaged. Estimated amount for sewage disposal arrangement in colony site and project site along with required surface drains are given in Appendix A.8.3.2 and Appendix A.8.3.4 respectively. However, final economical scheme may be formulated after detailed survey & engineering considering the site parameters.

14.7 DIVERSION OF NULLAH:

Existing nullahs passing through the proposed mine area needs to be diverted, which are as below:-

- (i) Diversion of Western nalla to Lendi nalla , length 1.50 km.
- (ii) Diversion of Lendi nala to Shakhri nalla , length 1.80 km.
- (iii) Diversion of Shakhri nalla to Pauni nalla , length 1.25 km

14.8 CONSTRUCTION MANPOWER

The proposed civil engineering manpower in the project report is for the repair & maintenance works of the project i.e., for repair & maintenance of buildings, roads, water supply, sewage disposal arrangement, etc. Personnel required for the construction period of the project are not included in the total manpower proposed for the project. Following construction manpower has been proposed for the construction period only.

i)	DY. C E (C)	1 No
ii)	S.E.(C)	2 No.
ii)	Sr EE/ EE (C)	2 Nos.
iii)	Engineering Asstt./Overseer (C)	3 Nos.
iv)	Accountant	1 No
v)	Clerk	1 No

It is proposed to arrange this manpower for the construction period from the total available manpower in WCL under Civil Engineering Discipline.

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Chapter - XV

SAFETY & CONSERVATION**15.1 DEGREE OF GASSINESS**

Criteria for degree of gassiness for coal seam in opencast working does not apply.

15.2 DEGREE OF GASSINESS

Criteria for degree of gassiness for coal seam in opencast working does not apply.

15.2 INUNDATION

The whole proposed mine area is above the available recorded HFL (17 hence; no provision of flood protection embankment has been made in this PR. However, three numbers of nallas namely Sakhri, Lendi & one seasonal nala are flowing over the property, which have to be diverted. The proposed diverted alignment has been shown in Quarry & Surface Layout Plan (Plate No. X). Surface water would be channelised through proper garland drains.

15.3 DUST SUPPRESSION

For suppression of dust fixed type water sprinklers have been provided. Suppression of mine dust may be done by using package bond & dust bond, for methodology of application DGMS Circular No.8 of 1997 may be referred.

15.4 FIRE AND SPONTANEOUS HEATING

- 1) Wild or herbaceous plants shall be removed from the mine

(2) No person shall deposit heated material or ashes on any opencast working. Also no person shall light a fire or permit a fire to be lighted in any OC working except by the permission in writing of the Manager and only for a special purpose specified therein.

(3) No coal shall be left exposed more than its incubation period to avoid fire in seam due to spontaneous heating.

15.5 SLOPE STABILITY

It is suggested that following action may be taken to deal with slope stability problem.

- i) Vulnerable area may be identified and marked on quarry plan.
- ii) Observation of actual alignment of fault plans, its throw, joints, etc. may be recorded during the process of exploitation.
- iii) Water drainage system may be properly implemented.
- iv) Regular monitoring of tension cracks, horizontal and vertical movement of strata in critical area may be done.

15.6 HAUL ROAD MAINTENANCE

Haul road would be prepared & maintained by Hiring agency as per the existing guidelines.

15.7 BLASTING

Special precautions has to be taken while performing blasting operations to avoid from fly rock.

15.8 CONSERVATION OF COAL

Quarry limits are finalised in such a way to exploit maximum possible coal. Although for calculation of mineable coal reserves 10% mining losses has been taken into account, but in practice all efforts would be made to minimise the losses.

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Separate excavator is provided for mining coal. OB benches would be kept sufficiently advanced to avoid mixing of coal & OB. Maximum possible backfilling is proposed in mine.

15.9 SCIENTIFIC STUDIES

Provision for scientific studies regarding Slope stability & Hydro-geological study etc. have been made in this PR

15.10 ADDITIONAL PERMISSION / RELAXATIONS REQUIRED FROM DGMS

• SAFETY ASPECTS FOR OUTSOURCING/HIRING OF HEMM (PARTIAL HIRING OPTION)

Special precaution should be taken while employing contractual labours in the mine. Before employing them to the mine proper vocational training should be imparted and recommendations of VIII Safety Conference should be strictly followed. Terms and conditions shall be fixed by management for deployment of contractual labours as well as machineries. Some of the major aspects are as follows :

A) For persons :

- i) Records in Form-B & Form-E shall be maintained.
- ii) Records of VTC driving licence of operators shall be kept by Operators and readily available for inspection by management
- iii) Salaries shall be distributed in front of management representative
- iv) No person shall be employed unless person holds VTC certificate and Management is informed.
- v) Adequate supervision shall be maintained by competent person.

B) For Machineries :

- i) All the machineries to be deployed in mines should be passed by the management.
- ii) RTO certificate photo copies of all vehicles shall be submitted to management.

iii) Daily welding, monitoring, inspection shall be done by contractor's mechanic as directed by management.

iv) Machine manufacturers should be asked to give risk analysis.

C) General :

i) No person/vehicle shall be deployed at any place other than authorised place.

ii) All employees of contractors should obey lawful instruction of mine management.

iii) Risk Management Plan by contractor of tipper/pay loader

iv) Trained Manpower

v) Restricted traffic & traffic control planning.

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Chapter - XVI

ENVIRONMENT MANAGEMENT

16.1 EXISTING ENVIRONMENT QUALITY

Sl. No.	PARAMETER	ACTION TAKEN
16.1.1	AMBIENT AIR QUALITY IN CORE AND BUFFER ZONE	For all the above parameters Base line data will be generated in post monsoon season of year 2008-09 to assess the existing Environment Quality.
16.1.2	WATER QUALITY	
16.1.3	NOISE LEVEL	
16.1.4	FLORA AND FAUNA	
16.1.5	SOCIO-ECONOMIC STATUS	

16.2 ENVIRONMENT IMPACT

16.2.1 AIR QUALITY

Due to coal transportation, wind erosion of OB dumps, and coal handling dust is likely to be generated.

16.2.2 WATER QUALITY

Mine pumped out water, after sedimentation, will be utilized within mine premises and balance will be used for supplementing any shortage of water in the affected villages. Moreover, analysis of water pumped out from existing mines around the proposed project shows that even untreated water meets the acceptable limits, as such quality of water pumped out from the proposed project not likely to have any significant pollution load even in untreated condition.

16.2.3 GROUND WATER RESOURCE

Due to proposed project, it is anticipated that the effect on ground water regime will be pronounced upto around 500 m from mine edge and effect will be pronounced in the down-dip side and milder in the up-dip side. But this effect will be temporary in nature and once the project is over, after 2 - 3 rains, the regime will regain its almost original status.

16.2.4 NOISE IMPACT

Existing noise level at the mine site (wrt pre-mining level) is likely to increase but will be duly controlled (to keep well within acceptable limit) by developing green belt around CHP, workshop, and along roads, around colony, etc.

16.2.5 FLORA AND FAUNA

No Changes in the diversity of species or number of any species of animal are anticipated.

16.2.6 LAND USE

Regarding land use during mining, in addition to excavation of quarry for coal overburden dump will be created along with development of other mine related infrastructures. Overburden dump is proposed to be technically and biologically reclaimed along with Quarry (backfilled portion) and sufficient greenery will be developed. As such no significant change in present land use pattern is anticipated.

16.2.7 SOCIO-ECONOMIC STATUS

821.84 ha of land will be required for the project. All the eligible land losers will be suitably rehabilitated.

16.3 ENVIRONMENT MANAGEMENT

16.3.1 AIR QUALITY MANAGEMENT

Ambient Air Quality will be controlled by black topping of roads, water spraying on roads, biological reclamation of OB dumps, green belt around CHP, OB dump, and along coal transportation roads on both sides etc.

16.3.2 WATER

Mine premises and the affected village around the project limits, as such have any significant

Effluent water from the adequate sewerage

16.3.3 NOISE I

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16.3.4 FLORA

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16.3.5 LAND F

Regarding coal, overburden infrastructures reclaimed also developed.

16.3.2 WATER QUALITY

Mine pumped out water, after sedimentation, will be utilized within mine premises and balance will be used for supplementing any shortage of water in the affected villages. Moreover, analysis of water pumped out from existing mines around the proposed project shows that even untreated water meets the acceptable limits, as such quality of water pumped out from the proposed project is not likely to have any significant pollution load even in untreated condition.

Effluent from workshop will be treated in ETP & thereafter recycled. Similarly, water from CHP, after sedimentation will be recycled. For domestic effluent, adequate sewage disposal arrangement has been proposed.

16.3.3 NOISE MANAGEMENT

The workers exposed to high noise level will be provided with earplugs. Provision of enclosed booths at the worksite to protect worker from noisy environment.

16.3.4 FLORA AND FAUNA MANAGEMENT

Adequate plantation has been proposed with native species to maintain the diversity and also to attract the fauna.

16.3.5 LAND RESOURCE MANAGEMENT

Regarding land use during mining, in addition to excavation of quarry for coal, overburden dump will be created along with development of other mine related infrastructures. Overburden dump is proposed to be technically and biologically reclaimed along with Quarry (backfilled portion) and sufficient greenery will be developed.

16.4 ENVIRONMENT MANAGEMENT SYSTEM

To have a close watch on the environmental condition and implementation of the various measures suggested, a multi-disciplinary approach is essential. At present WCL headquarter acts as apex body which supervises the activities relating to environment at project level through the General Manager. General Manager of the area coordinates the activities of various disciplines in the area to render all necessary assistance at the implementing level i.e. the project. Area Nodal Officer (Environment) monitors all aspects of environment on behalf of the General Manager. He also takes suitable steps for generation of environment data alongwith its analysis and interpretations.

As far as plantation is concerned horticulturist with suitable backup staff is provided in the area for undertaking the plantation jobs including raising of a nursery.

Sub-Area Manager is responsible for mechanical reclamation of the area. He is also responsible for biological reclamation with the assistance of GM's office.

16.5 CAPITAL PROVISION

ENVIRONMENTAL AND SOCIAL COST TO BE PROVIDED SEPARATELY

A capital provision of Rs. 61 lakhs has been made against environment protection and details are as under

Sl No.	Particulars	Amount (Rs. Lakhs)
1	Base line data generation	5.00
2	Sedimentation Pond	15.00
3	ETP	10.00
4	Land use plan through Remote sensing	8.00
5	Plantation for initial 2 yrs	15.00
6	Fixed type water sprinkler	8.00

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Chapter - XVII

LAND REQUIREMENT**17.1 GENERAL**

The complete land details (Sat-Barah records) are not available till the filing of final report. The land provision in the PR has been made as per the records available for part of the area and planimeter reading for rest of the area considering tentative leasehold pattern. Total about 821.84 ha land would be required for the Sakharilawati (Pauni-III) Opencast Project. This provision of land may have minor variations at the time of actual acquisition. The break up of type of land required for project is as follows :

Sl.No.	Particulars	Total Area (ha)
1	Tenancy land to be acquired	692.03
2.	Tentative Government land	100.00
3.	Forest land	29.81
	TOTAL	821.84

17.2 LAND REQUIREMENT

The total land required for the project is about 821.84 ha. The area involves acquisition of small area of forest land also. No rehabilitation of village is involved in this PR. The proposed land includes land required for mining quarry upto 200m depth. The land use pattern for the project is as follows:

TABLE:17.1

Sl.No.	Particulars	Total Area (ha)
1	Quarry Area	217.40
2	External OB dump	149.78
3	Infrastructure	20.00
4	Area needed for rationalization and blasting zone	414.66
5	Colony land	20.00
	Total Land	821.84

Revenue Plan of the area is shown in Plate No. :-XIV.

The area for rationalization includes area required for nala diversion & road diversions. This area may be utilised in future during expansion of project.

17.3 STATUS OF LAND ACQUISITION

The process of land acquisition would start after approval of this PR and EMP. However, a period of two year have been marked for land acquisition.

17.3.1 COMPENSATION & REHABILITATION

Payment of compensation for land losers has been estimated as per compensation package of new R&R policy of CIL. One time monetary compensation in lieu of employment is proposed to be paid to the land losers. It is contemplated that the entire exercise of land acquisition shall be completed in initial two years of project before start of quarry operation in third year. Break up of capital provision for land acquisition has been shown in Appendix A.1.

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- c) Forest -
- d) Rehabil
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Chapter - XVIII

MINE CLOSURE PLANNING

18.1 LEGISLATIVE REQUIREMENTS

Mine closure planning has to be carried out at the starting of the mine and needs periodic reviewing and revision during its life cycle to cope with the geo-technical constraints, safety and economic risks, social & environmental challenges. Various other objectives are as follows.

- a) To allow a productive and sustainable after-use of the site which is acceptable to the mine owner and the regulatory authority.
- b) To protect public health and safety.
- c) To alleviate or eliminate environmental damage and thereby encourage environmental sustainability.
- d) To minimise adverse socio-economic impacts.

There is need to define the liabilities, responsibilities and authorities of the mine management, other regulatory bodies Central and State Governments after mine closure. Some obligations relating to the Mine Management Companies are as follows :

- a) Health & Safety - Regulations 6, 61, 106, 112 of Coal Mines Regulations, 1957 and its related DGMS Circulars.
- b) Environment -
 1. Water (Prevention and Control of Pollution Act). 1974.
 2. Air (Prevention and Control of Pollution) Act 1981
 3. Environment (Protection) Act, 1986 and Environment Protection (Amendment) Rule 2000.
 4. DGMS Directives on noise and ground vibration.
- c) Forest - Forest (Conservation) Act, 1980 – Not applicable in this case.
- d) Rehabilitation - CIL's policy, however applicable for land oustees only.
- e) Decommissioning/asset disposal, etc

18.2 TECHNICAL ASPECTS

The proposed Sakhari-Irawati (Pauni-III) OC has been planned upto 200m depth at the floor of composite seam. For the proposed OC Mine, the following technical aspects would be reviewed in the final mine closure planning. Details can be worked in closure plans envisaged to be prepared 4-5 years before completion of coal mining.

18.2.1 SAFETY HAZARDS INCLUDING MANAGEMENT OF FIRE

Wild or herbaceous plants shall be removed from the mine. No person shall deposit heated material or ashes on any opencast working. Also no person shall light a fire or permit a fire to be lighted in any OC working except by the permission in writing of the Manager and only for a special purpose specified therein. No coal shall be left exposed after completion of mining to avoid fire due to spontaneous heating.

18.2.2 MANAGEMENT OF PIT SLOPES AND WASTE DUMPS

The final quarry slopes shall be so designed and then subsequently developed that after the closure of the mine, there is no likelihood of any slope failure. In Sakhari-Irawati (Pauni-III) OC mine, the final slope of the quarry has been designed with above consideration. However, strict compliance with the proposed final slope of quarry would be made as given in Quarry Surface Plan (Plate No.) and subsequent slope stability studies.

The external waste dump must be developed as per the proposed design so that slope failure do not create any safety hazard to the local community. Waste dumps shall be provided with garland drains and vegetational cover on surface of these dumps.

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18.2.3 MANAGEMENT OF HYDROLOGY AND HYDRO-GEOLOGY

In the mine closure plan, the surface flow pattern of precipitation and mine water would be clearly developed and water channel suitably laid down so that it does not disturb the general hydrology of the area.

18.2.4 DETAILS OF DE-COMMISSIONING OF THE INFRASTRUCTURES AND PLANT AND MACHINERY

In case further deepening is not considered in future, the decommissioning of the various infrastructures developed for the mine like office complex, residential complex, roads, pipelines and transmission line etc. shall be planned in details so that the land occupied by these infrastructures are released. However, before such decommissioning, the possibility of re-use of these infrastructures for the neighbouring mines shall be explored.

18.2.5 FENCING AROUND MINED OUT AREAS

The access trenches made for entry to the opencast mine shall be properly closed after mine closure and proper planning shall be made in mine closure plan for closure of access trenches.

18.3 ENVIRONMENTAL ASPECTS

18.3.1 MANAGEMENT OF FINAL VOIDS

In the mine closure plan, voids due to mining are to be dealt and the final land use plan will include filling of the voids for land reclamation where possible and for hydro reclamation where feasible.

In the proposed Sakhari-Irawati (Pauni-III) OC Mine, the entire strike of the proposed quarry would be opened. The backfilling would start from western end of the quarry. The backfilling would be continued upto the safe distance from permanent haul road.

In internal dumping the OB will be dumped maintaining 30m benches and slope of benches has been designed taking into consideration the angle of repose, gradient of seam etc. However the study on slope study will be made by some scientific agency and in final closure plan their suggestions will be incorporated. The backfilling as proposed in the report is shown in Post Mining Land Use Plan (Plate-XIII). In case there is no further deepening of OC mine, final void shall be filled up with water to form water reservoir.

18.3.2 RECLAMATION OF FOREST/VEGETATION

After the management of final voids, reclamation of forest/vegetation shall be included in the mine closure planning. The dumps and other area shall be properly planted as a part of reclamation.

18.3.3 MANAGEMENT OF RECHARGE AREAS

The pre-mining and post mining scenario on the hydrogeological recharge system would be included in the closure plan.

18.3.4 ACCEPTABLE SURFACE AND GROUND WATER FLOWS

In the final closure plan of the mine, wherever the mine water is likely to form a reservoir, the quality of water from such mines would be assessed in the final plan.

18.3.5 ALTERNATIVE USE OF LAND

In the proposed Sakhari-Irawati (Pauni-III) OC mine, for external OB dump, vegetation and afforestation has been planned as a final land use. However, for areas other than OB dumps and voids, the alternative land use would be deliberated in the closure plan. While agriculture is the best land use if it is supported by some irrigation facilities, vegetation will be second utility of the land which can be planned.

18.4 SOCIAL

18.4.1 RE-DEPL

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- iv) Transfer c
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18.4 SOCIAL ASPECT

18.4.1 RE-DEPLOYMENT OF WORK FORCE

In proposed Sakhari-Irawati (Pauni-III) OC Mine, near the end of the mine life, manpower starts getting reduced. The reduction of manpower could be done as per the following options:

- i) Natural retirement
- ii) Implementation of VRS schemes for age groups of + 50 years
- iii) Retraining and redeployment of younger groups.
- iv) Transfer of experienced middle aged groups to other projects.
- v) Retirement of people with suitable compensation after exhausting all the above options.

18.4.2 MANAGEMENT OF COMMUNITY FACILITIES

The community facilities developed during the mine life like educational facilities, health facilities etc. would be continued even after the mine closure. The final closure plan will envisage interaction of mining company with the State or local bodies for running these facilities.

18.4.3 CHANNELISATION OF AVAILABLE WATER

After the closure of mine, it can be a source of water for many useful purposes. The final voids filled with water can be used as a water reservoir. All the aspects of channelisation of water shall be dealt in the mine closure plan.

18.4.4 EMANCIPATION FROM PAPs

The project affected persons (PAPs) are provided many civic facilities on the line of the management of community facilities dealt at point No. (b).

18.5 FINANCIAL ASPECT

18.5.1 COST OF CLOSURE ACTIVITIES

It has been discussed in Para above that many activities are to be undertaken after the closure of the mine which involve expenditure. The expenditure of those activities which are done during mine life are met through the revenue of the mine. However, some activities are to be addressed only after completion of coal mining and therefore funds for meeting such expenses should be estimated and provided in the Project Report.

In the proposed Sakhari-Irawati (Pauni-III) OC mine, a provision of Rs. 6.00 per tonne of coal produced has been kept towards mine closure.

18.5.2 COST OF ORGANIZATION FOR EXECUTING THE CLOSURE ACTIVITIES

An organization consisting of persons of different disciplines will be required to undertake and implement the closure activities. Cost of maintaining this organization has been accounted and included in the total cost of the final closure plan of Pauni-III OC mine indicated above.

18.5.3 COST OF THE POST-PROJECT MONITORING

After implementation of closure activities, a small team comprising of 2-3 technical people may be required to see the efficacy of the closure activities. Cost for 2-3 years for such monitoring team functions has to be met through funds generated by collection of Rs. 6.00 per tonne.

18.5.4 BOND / INSURANCE FOR THE CLOSURE COST

Option of issuing Bond or insurance for the closure cost may be worked out through the revenue generated during mine life.

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Sl. No.	Particulars
1.	Executive
2.	Non-executive
i)	Monthly
ii)	Daily rate
3.	Total

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Chapter - XIX

MANPOWER, PRODUCTIVITY AND TRAINING

19.1 MANPOWER ASSESSMENT

The manpower requirement for Sakhari-Irawati (Pauni-III) OCP has been calculated on the basis of 3 shift operation for 330 days in a year. The manpower requirement for this project has been detailed in Appendix-B and B.1 of the project report. The manpower requirement of this project has been summarised as follows :

Table-19.1 Manpower Requirement

Sl. No.	Particulars	DEPARTMENTAL OPTION	PARTIAL HIRING OPTION
1.	Executives	33	22
2.	Non-executives:		
i)	Monthly rated staff	141	89
ii)	Daily rated staff	581	222
3.	Total	755	333

19.2 MANPOWER PHASING

The phasing of manpower in different options are given in the following table:

Table-19.2 Manpower Phasing

Sl. NO.	OPTION	I YEAR	II YEAR	III YEAR	IV YEAR	V YEAR	TOTAL
1	DEPARTMENTAL	-	-	388	226	141	755
2	PARTIAL HIRING OPTION	-	-	183	85	65	333

19.1 PRODUCTIVITY -

The annual capacity of this mine has been rated as 1.25 Mt of coal and 8.45 Mm³ of overburden.

In the Departmental option the manpower employed would be 755 and the overall OMS works out to 6.27. Whereas, in the Partial hiring option the manpower employed would be 333 and the overall OMS works out to 14.22.

19.4 TRANSPORT OF PERSONNEL (OPTIONAL)

Suitable number of Vehicles has been provided for transport of personnel in the appendix A.6.

19.5 TRAINING

Manpower requirement for this project will be taken from various projects of area. However, for unskilled/semiskilled/skilled & highly skilled manpower, persons will be taken as and when required from existing OC mines of Ballarpur Area or from other areas of WCL.

For training of manpower, facilities of existing VTC of Ballarpur Area, will be utilised for both departmental manpower as well as for workers deployed by outsourcing agency as per recommendation of VIII Safety Conference. Hence no extra provision has been made in this report. The Manpower on the basis of group operation has been indicated in table-19.2.

Table-19.3

Production and Manpower Classification.

S.No.	Particulars	
1	Coal Production (Mty)	1.25
2	OB removal (Mm ³ /y)	8.45
3	Manpower on the basis of group operation (Nos.):	
i)	Coal	69
ii)	Overburden	217
iii)	Common	462
iv)	Reclamation	7
	Total	755
		333

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Chapter - XX

PROJECT IMPLEMENTATION SCHEDULE

20.1 INTRODUCTION

Although the proposed Sakhari-Irawati (Pauni-III) OCP is nearby project of approved Pauni-II OCP; this project has to be provided with all infrastructural facilities independently in order to ensure its proper development. The two main phases in project construction would be :

20.2 PROJECT SCHEDULE

PRE AND POST SANCTION ACTIVITIES BEFORE STARTING EXCAVATION

Pre Sanction Activities	Post Sanction activities before starting excavation
Detailed surveying of the area to locate various infrastructural facilities.	Preparation of budgetary estimates for construction of various infrastructural facilities like CHP, Workshop, Approach Road, etc.
Coal despatch arrangements to be finalised.	Posting of core management group.
Dialogue with State Government and other appropriate authorities to expedite land acquisition.	Acquisition of essential land.
Dialogue with MAHAGENCO to finalise temporary and permanent sources of power supply.	Procurement of HEMM and OPM equipment. Creating facilities for erection and commissioning of equipment.
Preparation and submission of EMP.	Starting construction of permanent approach road.
Soil investigation for construction work.	Starting construction of workshop, office, stores, etc.
	Selection, recruitment and training of manpower for the project as per manpower budget.
	Diversion of nalla, road & HT line diversion

DEVELOPMENT ACTIVITIES AFTER STARTING EXCAVATION

1. Completing construction of all infrastructural facilities like Workshop, Office, Garage, Stores, etc.
2. Permanent power supply arrangement.
3. Procurement of OPM equipment.

20.3 BAR CHART OF MAJOR ACTIVITIES (PERT NETWORK)

To ensure timely completion of the project, it would be necessary to have a project construction team for Sakhari-Irawati (Pauni-III) Opencast Project right from the date of sanction of the project. This would ensure proper co-ordination amongst the various agencies essential in the project construction period. After the completion of the project, some of the personnel could be retained at the project itself and some may be shifted to other projects as the need arises.

21.1 CAPITAL**21.1.1 EXISTING**

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Chapter - XXI

FINANCIAL EVALUATION

21.1 CAPITAL INVESTMENT

21.1.1 EXISTING CAPITAL AND ADDITIONAL CAPITAL WITH PHASING

In this chapter financial evaluation of Departmental option have been detailed. The financial evaluation of Partial Hiring option has been detailed in next chapter (Chapter-XXII). The capital required for the project in departmental option works out to Rs. 355.4872 crores The phasing of capital has been given in Appendix- A. The summarised form of Appendix-A is given in Table-21.1.

A/c Head	Particulars	Capital Provisions
01	Land	63.4258
02	Civil Structure	31.3006
03	Plant & Machinery	218.5692
04	Furniture & Fittings	0.2500
05	Railway Siding	0.0000
06	Vehicles	0.8899
07	Prospecting & Boring	0.2000
08	Mine Development	36.5953
09	Revenue Expnd. Capitalised	4.2564
	Total	355.4872

21.1.2 BASIS OF PRICE OF P&M, CIVIL WORKS & HIRING RATE

The price of P&M has been considered based on price list supplied by CMPDI (HQ) as on December,2008 and it has been escalated upto March,2009. The price of civil works has been taken based on civil index 360 (Maharashtra) as on 1 half of year 2009

21.1.3 FOREIGN CAPITAL

No foreign capital is involved in the PR.

21.1.4 ADDITIONAL CAPITAL UPTO TARGET YEAR, CAPITAL REQUIREMENT BEYOND TARGET YEAR, SPECIFIC INVESTMENT RS./t. SPECIFIC INVESTMENT FOR P&M RS./t

The capital involved in the PR is Rs. 344.1004 crores upto target year and Rs. 11.3868 crores after target year. The specific investment for the project is Rs. 2843.90/t while the specific investment for the P&M is Rs. 1743.55/t.

21.2 OPENING OF REVENUE ACCOUNT

The revenue account is opened in the III year. Revenue expenditure has been capitalised upto II year. The mine would be commercially ready in the III year.

21.3 REPLACEMENT CAPITAL

Yearwise replacement capital is indicated in cash flow statement (Appendix-D)

21.4 SOURCES OF FINANCE: INTERNAL RESOURCES OR LOAN

The source of finance will be through internal resources.

21.5 COMPLETION COST:

The completion cost for the project works out to Rs. 460.4340 crores.

21.6 METHOD OF ESTIMATION OF CAPITAL COST:

A) LAND

The rate for tenancy land & government land has been considered as Rs. 2.50 lakh/ha for economic evaluation of the project. Payment of compensation for land losers has been estimated as per compensation package of R&R policy of CIL. One time monetary compensation in lieu of employment is proposed to be paid to the land losers. The details about capital cost for land has been given in Appendix- A.1.

B) CIVIL C

The capital cost of civil works is Rs. 11.3868 crores. The details are given in Appendix-A.2. (Maharashtra).

C) P&M

The capital cost of P&M is Rs. 1743.55/t. The details are given in Appendix-A.3.

21.7 COST C

A) SAL & RI

The details of salaries & remuneration are given in Appendix-A.4. The estimated wage is worked out as Rs. 11.3868/t.

B) STORES

Stores & maintenance cost has been estimated as Rs. 11.3868/t.

C) POWER

The average cost of power is Rs. 2.783/t.

D) MISC. E

This cost includes postage, telephonic, workshop debits has been made Rs. 11.3868/t at 100%.

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B) CIVIL CONSTRUCTION (ALONG WITH COST INDEX)

The capital provision for civil construction has been estimated as Rs. 31.30 crores. The details about capital cost for civil construction has been given in Appendix-A.2. The civil cost index for the I half of the year 2009 works out to 360 (Maharashtra).

C) P&M

The capital provision for P&M has been estimated as Rs. 218.57 crores. The detailed capital cost for P&M has been given in Appendix- A.3.

21.7 COST OF PRODUCTION AT DIFFERENT LEVEL OF PRODUCTION:

A) SALARIES & WAGES COST:

The detail of category-wise /scale-wise manpower requirement and year-wise estimated wages cost is given in appendix-B.1. The estimated salaries & wages cost is worked out as Rs 210.34/t.

B) STORES COST:

Stores cost has been estimated taking into account provision for repair & maintenance, POL, explosive, and miscellaneous stores cost. The estimated stores cost has been worked out to Rs 491.75/t.

C) POWER COST:

The average power cost per tonne of coal production works out to Rs 21.19 and Rs. 23.83 at 100% and 85% level of operation respectively

D) MISC. EXPENDITURE:

This cost has been estimated to cover expenditure on printing & stationary, postage, telephone, repair & maintenance of assets other than P&M, workshop workshop debit, ins. & taxes for vehicles and other repairs and a further provision has been made for deterioration of coal stock. Misc. Expenditure works out to Rs. 71.72 /t at 100% production capacity.

E) ADMINISTRATIVE CHARGES:

A provision has been made in total revenue cost estimate for administrative charges based on the administrative cost per tonne of coal production as was communicated by WCL. Total administrative cost has been calculated at 100% level and treated as fixed cost. The administrative cost works out to Rs 66.90/t.

F) OUTSOURCING COST - YEAR WISE WITH LEAD DISTANCE.

No outsourcing provision has been made in this option.

G) INTEREST ON WORKING CAPITAL:

Interest on working capital has been calculated on the basis of 4 months cash cost of operation. Interest on working capital works out to Rs.42.14/t. Rate of interest is taken as 14.50%.

H) DEPRECIATION:

Straight line method of depreciation has been provided to arrive at depreciation cost per tonne of coal production. The depreciation cost works out to Rs.271.86/t.

I) INTEREST ON LOAN CAPITAL:

Interest @ 11.5% on loan capital has been computed based on given debt equity mix. Interest on loan capital works out to Rs. 45.00 /t.

J) ENVIRONMENT RELATED COST:

Rs. 3.00/t of coal has been provided to absorb environmental related cost in the project.

K) MINE CLOSURE COST:

Rs. 6.00/t has been provided in the project against mine closure cost.

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L) **COST OF PRODUCTION FOR DIFFERENT LEVEL OF PRODUCTION, 100%, 85%, 80%.**

The cost of production for 100%, 85% and 80% production capacity works out to Rs.1230.90, Rs.1396.42 and Rs.1465.39 respectively.

21.8 GRADE OF COAL & WEIGHTED AVERAGE SELLING PRICE

The grade of coal is Grade 'E' considering 5 cm contamination at each contact point at each year of mine life. The selling price for Grade 'E' coal has been considered as Rs 975.50/t.

- **TRANSPORTATION / LOADING / SIZING CHARGES**

Rs. 35/t. has been considered for sizing charges for coal upto (-) 200 mm size.

- **DESPATCH OF COAL & POINT OF SALE.**

Coal from the face would be dispatched to CHP, which will be loaded in Tippers for onward transport to customers.

21.9 PROFITABILITY (PROFIT/LOSS) AT 100%, 85% AND 80% LEVEL OF PRODUCTION.

The loss (Rs/t) at 100%, 85% and 80% production capacity works out to Rs.255.40, Rs.420.92 and Rs.489.89 respectively.

21.10 MANPOWER & OMS

The total requirement of manpower works out to 755 giving OMS of 6.27 t. This includes provision for leave/ sickness. Details of manpower requirement and manpower analysis are given in Appendix-B and B.1.

21.11 EMS

The overall EMS works out to Rs. 1310.39 based on WCL budget of 2008-09 of Ballarpur area (including impact of NCWA-VIII). The salary & wages works out to Rs. 210.34/t.

21.12 FINANCIAL IRR

The I.R.R. of the project works out to (-)14.17% and (-)21.17% at 100% & 85% capacity utilization of the mine respectively in departmental option.

21.13DETAILS OF FSA ENTERED ON COST-PLUS BASIS (OPTIONAL)

The FSA has not been finalized. It will be finalized after approval of PR from competent board with the desired customer.

21.14BREAK-EVEN PRODUCTION:

It is estimated that the project will achieve break-even point at 1.72 t per annum of production which is 137.42% of rated capacity.

21.15DESIRED SELLING PRICE:

The desired selling price to achieve 12% IRR at 100% and 85% level works out to Rs.1430.03 & Rs.1630.71 per tonne respectively.

21.16COMPLETION IRR:

Capital expenditure has been estimated/increased for forward escalation on the phasing of initial estimated capital. The escalation rate is based on W.P.I. / Civil Index of preceding 36 months.

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21.17 SENSITIVITY ANALYSIS:

		IRR AT 100%
BASE CASE		
CAPITAL COST PLUS	10%	-14.86
CAPITAL COST PLUS	15%	-15.16
CAPITAL COST PLUS	20%	-15.44
OPERATING COST PLUS	10%	-20.08
OPERATING COST PLUS	15%	-22.77
OPERATING COST PLUS	20%	-25.26
SALES REVENUE PLUS	5%	-10.71
SALES REVENUE PLUS	10%	-7.33
SALES REVENUE PLUS	15%	-4.13

Chapter - XXII

CHAPTER ON OUTSOURCING**22.1 INTRODUCTION**

This option in the PR is being prepared considering leasing/out sourcing of HEMM for excavation, transport, drilling, dozing, Dumping etc. for top OB only. The Coal & in seam Parting would be mined by departmental HEMM. Blasting and surface illumination would be also done departmentally. Mine target is 1.25 Mty and Grade of coal is Grade 'E' Processed ROM (considering 15 cm dilution at each contact zone between coal and parting).

22.2 SCOPE OF WORK PROPOSED TO BE OUTSOURCED

The scope of work by hiring/outsourcing of HEMM shall include blast hole drilling, earth work excavation, loading, transportation, dumping, dozing, construction of haul road, leveling at dumping sites, water spraying and land reclamation etc. as per guidelines of the project authorities highlighted in this project report or otherwise to suit the local conditions. All statutory rules, regulations and applicable laws are to be followed including those related to government licenses, workmen compensation, insurances etc.

Excavated materials shall have to be dumped at sites, which will be shown by project authorities from time to time in accordance with dump plan of this report. Haul road has to be maintained with the requisite gradient as per regulation and in accordance with the conditions imposed by DGMS in its permission under regulation 98(1) and (3) and other relevant provisions of Coal Mines Regulations, 1957.

22.3 SCOPE OF WORK PROPOSED TO BE DONE DEPARTMENTALLY

The Coal & in-seam Parting would be mined out by departmental HEMM. Blasting operation, surface illumination, pumping and CHP facilities would also be provided departmentally.

22.3.1. POPULATION OF DEPARTMENTAL HEMM

Population of major HEMM are as follows :-

Table 22.1
Population of Major HEMM

Sl. No.	HEMM	Nos.
I For Coal & Parting		
1.	2.8 m ³ Diesel Hydraulic Backhoe	2
2.	60 T RD Dumpers	9
3.	160 mm Dia. Diesel Drill	1
4.	320 HP Dozer	1
II. For Common		
1.	12/15 t Mobile Service Crane	1
2.	5.74 m ³ Front End Loader	1
3.	Fire fighting Truck	1
4.	280 HP Motor Grader	1
5.	28 kL Water sprinkler	1
6.	2.8m ³ Diesel Hyd. Backhoe	1

22.3.2 HEMM PRODUCTIVITY

(A) Coal & In-seam Parting (For 330 days working)

Table 22.2

Sl. No	Particulars	Productivity (Mm ³ /hr)
1.	2.8 m ³ Diesel Hydraulic Backhoe with 60 T Rear Discharge dumpers	0.74 Mm ³ /hr
2.	60 T Rear Discharge Dumpers for 3.5 km lead with Hyd. backhoe	0.1405 Mm ³ /hr

22.4 ANNUAL WORK LOAD FOR EXTERNAL AGENCY

The annual workload for external agency would be about 8.45 M m³ for Top OB removal as per the proposed calendar programme of excavation.

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22.5 OUTSOURCING RATES

As described earlier, the Top OB will be excavated by hiring/outsourcing of equipment. The cost of OB removal and coal extraction by hiring/outsourcing of equipment depends on type of strata and lead/lift. In the proposed mine, the strata under consideration is medium hard strata.

The rates for OB by hiring/outsourcing of equipment for the proposed mine have been estimated on the basis of work awarded for nearby Gauri-II OCM, Ballarpur Area, WCL (Refer Annexure-V). The rates of above contract are updated with change in price of diesel for March, 2009 and change in lead and lift. Accordingly, rates for excavation for hiring/ outsourcing of HEMM is being adopted in this report for planning purpose and economic evaluation of the project. These rates may vary at the time of actual implementation. The rates include excavation, transport, drilling, dozing at face & dumps, haul road construction & maintenance, water spraying. Rate for land reclamation has been estimated and provided in addition to hiring rates while working out economics. Moreover, 10% extra provision (over & above the escalated hiring rates) has been considered for planning purpose. In addition to above, a provision of 10.30% has been included to account for Service tax including education cess. It is also suggested here that before awarding the work to hiring agency, geological structure should be further confirmed by drilling additional boreholes.

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Product (Mm ³)
0.74 Mm ³
0.1405 Mm ³

Lead for OB, bench-wise, horizon-wise has been calculated for each cut on weighted average basis keeping into account the OB dumping programme. Lifts are calculated on the basis of bench levels vis-à-vis surface RL & dump RL. These are the two main variables while estimating cost of excavation. The average rate (Rs./m³) for excavation of OB has been shown at Table no. 22.3.

15 M n³ for Top

Table 22.3: Outsourcing rates

Year	Annual Top OB Quantity	OB removal rate (Rs /m ³)
III	3.81	53.91
IV	7.14	58.68
V	8.15	62.96
VI	8.16	68.20
VII	8.16	73.24
VIII	8.16	74.10
IX	8.15	83.68
X	8.14	67.35
XI	8.14	59.94
XII	8.14	60.73
XIII	8.15	59.76
XIV	8.15	61.61
XV	8.15	61.11
XVI	8.17	57.91
XVII	8.18	63.72
XVIII	8.23	62.02
XIX	8.20	77.90
XX	8.11	82.97
XXI	6.65	103.31
XXII	3.45	57.49
XXIII	0.07	57.49

Weighted Average Rate (including service tax @10.30%, Rs./m³) for hiring of HEMM arrived at as explained above are being adopted for purpose of economic evaluation of the project during planning stage.

22.5(A) SAFETY ASPECTS FOR OUTSOURCING OF HEMM

Safety aspects for outsourcing of HEMM have been deliberated in Safety chapter (Chapter-XV).

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22.6 PROJECT ECONOMICS

22.6.1 EXISTING CAPITAL AND ADDITIONAL CAPITAL WITH PIASING

The total estimated capital investment for the proposed Pauni-IIIOC project, having an annual capacity of 1.25 Mt of coal and 8.45 Mm³y of Peak OB works out to Rs.173.5652 crores or specific investment of Rs.1388.52/t of annual target production and the specific investment/m³ of excavation considering both coal & OB is Rs. 193.92. The headwise provisions are shown in Appendix-A. The summarised form of Appendix-A is given in Table below.

Table 7 - Initial Capital Investment

A/c Head	Particulars	(Amt. in Rs. '000)
		PR Provisions
01	Land	63.4258
02	Civil Structure	15.7273
03	Plant & Machinery	54.0761
04	Furniture & Fittings	0.2500
05	Railway Siding	-
06	Vehicles	0.3558
07	Prospecting & Boring	0.2000
08	Mine Development	35.2738
09	Revenue Expnd. Capitalised	4.2564
	Total	173.5652

22.6.2 BASIS OF PRICE OF P&M, CIVIL WORKS & HIRING RATE

The pricing of P&M is based on the standard price list of November 2008 (updated upto March, 2009) circulated by the specialist cell of CMPDI, Ranchi. The cost of civil works has been estimated on the basis of Cost Index of 360 at Maharashtra as on 1 half of the year 2009 with a base of 100 in Delhi as on 1.1.1992.

The other cost indices taken in costing of the project are as under:-

- AICPI - 3370 for Non-Executives
- WPI - 227.30 (Provisional as on 21.03.09)
- Diesel Cost - Rs. 34.08/lit. (March, 2009)
- Electricity Cost (Rs/kWh) - 5.14

22.6.3 FOREIGN CAPITAL

No foreign capital is involved in the PR.

22.6.4 ADDITIONAL CAPITAL UPTO TARGET YEAR, CAPITAL REQUIREMENT BEYOND TARGET YEAR, SPECIFIC INVESTMENT RS./t, SPECIFIC INVESTMENT FOR P&M RS./t

The capital involved in the PR is Rs. 166.8211 crores upto target year and Rs. 6.7441 crores after target year. The specific investment for the project is Rs. 1388.52/t while the specific investment for the P&M is Rs. 432.61/t.

22.7 OPENING OF REVENUE ACCOUNT

The revenue account is opened in the III year. Revenue expenditure has been capitalised upto II year. The mine would be commercially ready in the III year.

22.8 REPLACEMENT CAPITAL

Yearwise replacement capital is indicated in cash flow statement (Appd.-D)

22.9 SOURCES OF FINANCE: INTERNAL RESOURCES OR LOAN

The source of finance will be through internal resources.

22.10 COMPLETION COST:

The completion cost for the project works out to Rs. 232.8827 crores.

22.11 METHOD OF ESTIMATION OF CAPITAL COST:**A) LAND**

The rate for tenancy & government land has been considered as Rs. 2.50 lakh/ha for economic evaluation of the project. Payment of compensation for land losers has been estimated as per compensation package of R&R policy of CIL. One time monetary compensation in lieu of employment is proposed to be paid to the land losers. The details about capital cost for land has been given in Appendix- A.1.

B) CIVIL CON

The capital as Rs. 15.7273 cr given in Appendix to 360 (Maharash

C) P&M

The capital detailed capital co

22.12 COST OF PRODUCE**A) SALARIES**

The detail estimated wages is worked out as F

B) STORES C

Stores cos maintenance, PO cost has been wo

C) POWER C

Estimated supply. The power of coal production operation respect

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B) CIVIL CONSTRUCTION (ALONG WITH COST INDEX)

The capital provision for civil construction (buildings only) has been estimated as Rs. 15.7273 crores. The details about capital cost for civil construction has been given in Appendix- A.2. The civil cost index for the I half of the year 2009 works out to 360 (Maharashtra).

C) P&M

The capital provision for P&M has been estimated as Rs. 54.0761 crores. The detailed capital cost for P&M has been given in Appendix- A.3.

22.12 COST OF PRODUCTION AT DIFFERENT LEVEL OF PRODUCTION:

A) SALARIES & WAGES COST:

The detail of category-wise /scale-wise manpower requirement and year-wise estimated wages cost is given in appendix-B.1. The estimated salaries & wages cost is worked out as Rs 97.25/t.

B) STORES COST:

Stores cost has been estimated taking into account provision for repair & maintenance, POL, explosive, and miscellaneous stores cost. The estimated stores cost has been worked out to Rs 135.20/t.

C) POWER COST:

Estimated energy consumption is given in the relevant chapter for power supply. The power cost detailed in Chapter-XIII. The average power cost per tonne of coal production works out to Rs 17.62 and Rs. 19.72 at 100% and 85% level of operation respectively.

D) MISC. EXPENDITURE:

This cost has been estimated to cover expenditure on printing & stationary, postage, telephone, repair & maintenance of assets other than P&M, workshop workshop debit, ins. & taxes for vehicles and other repairs and a further provision has been made for deterioration of coal stock. The miscellaneous cost per tonne of coal production works out to Rs 35.41 at 100% level of operation.

E) ADMINISTRATIVE CHARGES:

A provision has been made in total revenue cost estimate for administrative charges based on the adm. Cost per tonne of coal production was communicated by WCL. Total adm. Cost has been calculated at 100% level and treated as fixed cost. The adm. Cost works out to Rs 66.90/t.

F) OUTSOURCING COST - YEAR WISE WITH LEAD DISTANCE.

The average outsourcing cost cost per tonne of coal production works out to Rs 427.29 at 100% level of operation.

G) INTEREST ON WORKING CAPITAL:

Interest on working capital has been calculated on the basis of 4 months operating expenditure. Interest on working capital works out to Rs. 38.17/t. Rate of interest is taken as 14.50%.

H) DEPRECIATION:

Straight line method of depreciation has been provided to arrive at depreciation cost per tonne of coal production. The depreciation cost works out to Rs. 94.39/t.

I) INTEREST ON LOAN CAPITAL:

Interest @ 11.50% on loan capital has been computed based on given debt equity mix. Interest on loan capital works out to Rs 23.00 /t.

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Sub- Total (3.)						2002	1592	1110	815	1377	2.165
						2352	1942	1355	1065	1723	3.378
TOTAL (1.+ 2.+ 3.)											

PARTIAL HIRING OPTION										COAL PRODUCTION				MTY	
Sl. No.	EQUIPMENT / INSTALLATION	UNIT LOAD	INSTALLED QUANTITY	WORKING QUANTITY	ANNUAL WORKING HOURS	CONNECTED LOAD	TOTAL LOAD IN OPERATION	DEMAND FACTOR	POWER FACTOR	ACTIVE POWER (KW)	REACTIVE POWER (KVAR)	APPARENT POWER (KVA)	ANNUAL ENERGY CONSUMPTION (MKWH)		
Taking Diversity Factor as		1.25								1084	852	1378			
At Improved Power Factor of 0.96									0.96	1084	316	1129			
Capacitor Bank Required											536				
Capacitor Bank Provided											600				
System Losses (@ 5%)													0.169		
MINE'S SUB-TOTAL						2352	1942			1084	252	1112	3.547		
TRANSFORMER SELECTED FOR MINE						2000 KVA, 11 KV / 3.4 KV -- 2 Nos., 100 KVA, 11 KV / 230 V (L - L) -- 1 No.									
TOWNSHIP ELECTRICITY LOAD															
1 QUARTERS ALL TYPE INCLUDING ALL MISC. LOAD				174		383	383	0.9	0.9	345	167	383	0.476		
Taking Diversity Factor as		1.6								215	104	239			
At Improved Power Factor of 0.96									0.96	215	63	224			
Capacitor Bank Required											42				
Capacitor Bank Provided											75				
System Losses (@ 5%)													0.024		
TOWNSHIP'S SUB-TOTAL						383	383			215	29	217	0.500		
PROJECT OVERALL TOTAL						2735	2325			1299	281	1329	4.047		
TRANSFORMER SELECTED FOR TOWNSHIP						160 KVA, 11 KV / 415 V -- 2 Nos.,									