

229
100

Modification No-1

Area: Western Part of Gopalprasad West – 664.71 Ha
Utkal-A - 480.19 Ha
Total - 1144.90 Ha


**Applicant: GENERAL MANAGER, SUBHADRA AREA
MAHANADI COALFIELDS LIMITED
NEAR BIJU MAIDAN, ANGUL
ODISHA - 759122
Email - gmsubhadraarea@gmail.com
gm-subhadra.mcl@coalindia.in**

(a) Rated capacity: 25.00 Million Tonne per Annum

(b) Peak capacity: Peak and rated capacities are same

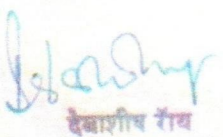
Plot - E, 4; At - Samantapuri, P.O. - RRL; Bhubaneswar - 751013

22
Propet Officer
CL. Subhadra



प्रकल्प अधिकारी
Project Officer
MCL, Subhadra Area
एम. सि. एल. सभद्रा क्षेत्र

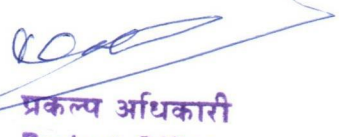
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हेमराजीय राव
महाप्रबंधक (उत्खनन)
सी.एच.सी.डी.आई.एल., क्षेत्रीय संस्था

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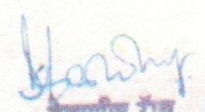

18/1/22
प्रकल्प अधिकारी
Project Officer
MCL, Subhadra Area
एम. सि. एल. सुभद्रा क्षेत्र


प्रकल्प अधिकारी
Project Officer
MCL, Subhadra Area
एम. सि. एल. सुभद्रा क्षेत्र

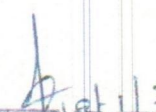
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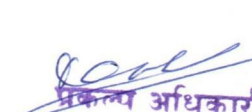
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सहायक (उत्खनन)
जी.एस.पी.डी.आई.एल., क्षेत्रीय संस्तर

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प्रकल्प अधिकारी
Project Officer
MCL, Subhadra Area
एम. सि. एल. सुभद्रा क्षेत्र


प्रकल्प अधिकारी
Project Officer
MCL, Subhadra Area
एम. सि. एल. सुभद्रा क्षेत्र

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Modification-1, February 2021



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Score

प्रकल्प अधिकारी
Project Officer
MCL, Subhadra Area
एम. सि. एल. सुभद्रा क्षेत्र

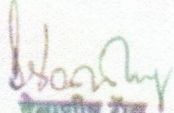
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12/01/22
वैकाशीय रीय
महाप्रबंधक (उत्खनन)
सी.एम.पी.डी.आई.एल., क्षेत्रीय संस्थान-7


Mining Plan & Mine Closure Plan – Subhadra OCP
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Mty, MTY	-	Million metric tonne per year
MVA	-	Mega Volt Ampere
MW	-	Megawatt
MCL	-	Mahanadi Coalfields Limited
OC	-	Open Cast
OMC	-	Odisha Mining Corporation
P&M	-	Plant & Machinery
PR	-	Project Report
RF	-	Reduction Factor
RH	-	Relative Humidity
RITES	-	A Government of India Public limited Consulting Company
ROM	-	Run off Mines
SH	-	State Highway
t	-	Metric tonne
tph	-	tonne per hour
T	-	US TON
TAMDA	-	Talcher Angul Meramandali Development Authority
TCF	-	Talcher Coal Field
Yr	-	Year
UG	-	Under Ground
UHV	-	Useful Heat Value
V.M.%	-	Volatile Matter percentage


प्रशासकीय अधिकारी
महाप्रबंधक (उत्खनन)
सी.एम.पी.डी.आई.एल., क्षेत्रीय संस्करण-7


19/11/22
प्रकल्प अधिकारी
Project Officer
MCL, Subhadra Area
एम. सि. एल. सुभद्रा क्षेत्र


प्रकल्प अधिकारी
Project Officer
MCL, Subhadra Area
एम. सि. एल. सुभद्रा क्षेत्र

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Mining Plan & Mine Closure Plan – Subhadra OCP
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LIST OF ABBREVIATIONS

A%	-	Ash percentage
CESCO	-	Central Electric Supply Company
cum	-	cubic meter
CMPDI	-	Central Mine Planning & Design Institute Limited
CMP	-	Comprehensive Master Plan
CPP	-	Captive Power Plant
CV	-	Calorific Value
dmmf	-	dry mineral matter free
E&M	-	Electrical & Mechanical
GCV	-	Gross Calorific Value
GR	-	Geological Report
Ha/HA	-	Hectares
HEMM	-	Heavy Earth Moving Machinery
HFL	-	High Flood Level
IDCO	-	Odisha Industrial Infrastructure Development Corporation
M%	-	Moisture percentage
m	-	Meter
Mcum	-	Million cubic meter
MECL	-	Mineral Exploration Corporation Limited
Max	-	Maximum
Min	-	Minimum
Mld	-	Million liter per day
MoC	-	Ministry of Coal
MoEF	-	Ministry of Environment & Forest
Mt	-	Million metric tonne

प्रकल्प अधिकारी
Project Officer

MCL, Subhadra Area
एम. सि. एल. सुभद्रा क्षेत्र

List of Abbreviations

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19/1/22
प्रकल्प अधिकारी

Project Officer

MCL, Subhadra Area
एम. सि. एल. सुभद्रा क्षेत्र

डी.एन.डी.डी.आर.एल., क्षेत्रीय संस्करण-7

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Mining Plan & Mine Closure Plan – Subhadra OCP
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Plate GEN-1	Location Plan	✓
Plate GEN-2	Plan certified by Qualified Person/Accredited Mining Plan Preparing Agency, if project area is confined within the vested / allotted block boundary	✓
Plate GEN-3	Plan certified by Qualified Person/Accredited Mining Plan Preparing Agency with plan showing cardinal coordinates duly certified by Mines & Geology Department of State Government	✓
Plate GEN-4	KML Boundary of proposed Mining Lease superimposed on dated satellite image, duly certified by accredited agency	✓
Plate GEN-5	Cadastral Plan showing approved block boundary vis-à-vis proposed Mining Lease and mine boundary, showing land use and infrastructure	✓
Plate GEO-1	Geological Plan showing all drilled boreholes and boreholes to be drilled with allotted block boundary and required mining lease	✓
Plate GEO-2	Representative Graphic Litholog	✓
Plate GEO-3	Surface Plan showing drainage system, contours (2.5m intervals), location of bore holes	✓
Plate GEN-6	Conceptual Plan showing infrastructure facilities including colony, boundary of mining area, mine entries, roads and road diversion alignments etc	✓
Plate GEN-7	Tentative Land Use Plan showing land types (Government, Forest, Tenancy) with its data source	✓
Plates GEO-4 to GEO-45	Floor Contour Plans, Seam Folio Plans with Iso-Grade lines	✓
Plate GEO-46	Cross-sections	✓
Plate GEN-8	Plan showing existing & proposed surface layouts	Not required as no work has started
Plate GEO-47	Plan showing total coal thickness, total overburden thickness and stripping ratio	✓
Plate MIN-1	Final Stage Quarry Plan showing haul road alignment	✓
Plate MIN-2	Post Mining Land Use plan	✓
Plate MIN-3	Progressive Mine Closure Plan / Stage Plan – 1 st Year	✓
Plate MIN-4	Progressive Mine Closure Plan / Stage Plan – 3 rd Year	✓
Plate MIN-5	Progressive Mine Closure Plan / Stage Plan – 5 th Year	✓
Plate MIN-6	Reclamation Plan	✓

Checklist

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प्रकल्प अधिकारी
Project Officer

MCL, Subhadra Area
एम. सि. एल. सुभद्रा क्षेत्र

18/01/22
महाप्रबंधक (उत्खनन)
सी.एच.पी.डी.आई.एल., क्षेत्रीय संस्करण-7

प्रकल्प अधिकारी
Project Officer
MCL, Subhadra Area
एम. सि. एल. सुभद्रा क्षेत्र

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CHECKLIST

Details		(✓/X)
Chapter-1	Project Information	✓
Chapter-2	Exploration, Geology, Seam Sequence, Coal Quality & Reserve	✓
Chapter-3	Mining	✓
Chapter-4	Safety Management	✓
Chapter-5	Infrastructure Facilities Proposed & Their Location	✓
Chapter-6	Land Requirement	✓
Chapter-7	Environment Management	✓
Chapter-8	Progressive & Final Mine Closure Plan	✓
Annexure-I	Copy of Allotment Order / Vesting Order	✓
Annexure-II	Certificate of Qualified Person/Accredited Mining Plan Preparing Agency, whether project area is confined within the vested / allotted block boundary	✓
Annexure-III	Certificate by Mines & Geology Department of State Government- (a) Intent of the State Government for grant of lease beyond the vested geological boundary (b) Non-existence of coal in the area beyond vested /allotted geological block boundary to rule out the issue of encroachment and use of coal bearing area beyond the vested geological boundary	Not required as proposed lease falls within block boundary
Annexure-IV	Approval of the Company Board	✓
Annexure-V	Copy of earlier approval of Mining plan	✓
Annexure-VI	Commitment of the Company to adhere to the conditions regarding clearances from MoEF&CC	✓
Annexure-VII	Plan / Chart showing schedule of implementation of mine closure activities (progressive & final closure) with duration of important activities	✓
Annexure-VIII	Change of name of mine by owner	✓
Annexure-IX	Cardinal points of Block Boundary and Mining Lease	✓
Annexure-X	Rehabilitation and Re-settlement Scheme	✓
Annexure-XI	Allotment Agreement	✓
Annexure-XII	KML file: ML on satellite image	✓

Checklist

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महाराष्ट्र सरकार (उत्खनन)
जी.एस.पी.ओ.आर.एन., क्षेत्रीय संस्थान-7

प्रकल्प अधिकारी
Project Officer
MCL, Subhadra Area
एम. सि. एल. सुभद्रा क्षेत्र

प्रकल्प अधिकारी
Project Officer
MCL, Subhadra Area
एम. सि. एल. सुभद्रा क्षेत्र

Chapter – 1: Project Information

	Parameters	Details
1.1	INTRODUCTION	
1.1.1	Name of Coal Block	1) Western part of Gopalprasad West 2) Utkal-A
1.1.2	Name of the Coalfield	Talcher Coalfield
1.1.3	Base date of Mining Plan	31 st August, 2020
1.1.4	Linked End Use Plant	Basket linkage to consumers all over India
1.1.5	Distance of the end use plant from pit head of the project in "km"	No single end user, so not estimated
1.1.6	Mode of coal transport	Conveyor system-890m, rest rail
1.2	Location, Topography & Communication	
1.2.1	Location of coal deposit (District & State)	District Angul of Odisha State
1.2.2	Communication: PWD roads, railways, Air	<ul style="list-style-type: none"> • Rengail-Chhendipada-Angul metal road at south-west boundary • National Highway No.55 (Cuttack to Sambalpur) at 13km towards south-east • Angul rail station at 22km south of block on Talcher-Cuttack section of East Coast Railways
1.2.3	Availability of power supply, water	Power distribution system exists for domestic use. Sources of water are bore wells, dug wells, ponds and Singhada Jhor stream along north boundary.
1.2.4	Prominent physiographic features, drainage pattern, natural water courses, rainfall data, highest flood level	<p>Surface topography is gently undulating, highest at south-west (maximum 167.50m AMSL) and lowest at north-east (107.50m AMSL). Average surface gradient is 1:120. Drainage of coal field is Brahmani River, 20km east of the block. Drainage of the block is to Singhada Jhor perennial stream at northern boundary, feeding to Brahmani River. One seasonal stream named Ghurudia traverses across the block. The mean annual precipitation is 1277mm of which 70% occurs during rainy season. HFL has been interpolated from actual readings at two sites, one at 2.1km upstream and the other at 2.2km downstream. HFL lies between 125.04m and 111.16m within the stretch of the mining lease. Embankment has been designed accordingly with top 3.0m above HFL.</p>
1.2.5	Important surface features within the project area and major diversion & shifting involved	<p>Mostly agricultural land interspersed by forest plots, grazing land and habitations, scattered all over. Two PWD roads connect habituated areas. Cart roads are spread throughout the block. 1710m southern meandering part of Singhada Jhor River will be straightened for 1080m. Ghurudia stream of about 8.9km will be diverted by south and east of quarry for about 5.4km. About 1425 families need to be shifted. No other infrastructure runs across the property.</p>
1.3	Details of the allotment agreement	Copy of Allotment Agreement is shown in Annexure-11
1.3.1	Name of allottee	Mahanadi Coalfields Limited
1.3.2	Details of allotment/vesting order	Copy of Allotment Order is shown in Annexure-1
1.3.3	Name and address of the applicant	<p>GENERAL MANAGER, SUBHADRA AREA MAHANADI COALFIELDS LIMITED Near Biju Maidan, Angul Angul – 759116 (ODISHA) Email - gmsubhadraarea@gmail.com gm-subhadra.mcl@coalindia.in</p>
1.3.4	Name of the previous allottee of the block	MJSJ Limited
1.3.5	Starting date of the mine as per CMDPA	As per approved Mining Plan January 2022

Mining Plan & Mine Closure Plan – Subhadra OCP
Modification-1, January 2022



1.3.6	Rated capacity as per CMDPA	As per approved Mining Plan January 2022																																																																																																																																																						
1.3.7	Production schedule as per opening permission (meeting provisions of CMDPA, if any)	As per approved Mining Plan January 2022																																																																																																																																																						
1.3.8	End use of coal as per allotment order, if any	As per approved Mining Plan January 2022																																																																																																																																																						
1.3.9	Cardinal points coordinates of the block boundary	<p>Western part of Gopalprasad West</p> <table> <tr> <th>Pt. ID</th><th>Longitude</th><th>Latitude</th></tr> <tr><td>1</td><td>84°59'45.97773"</td><td>20°56'07.35854"</td></tr> <tr><td>2</td><td>84°59'44.77323"</td><td>20°56'07.34808"</td></tr> <tr><td>3</td><td>84°59'42.32978"</td><td>20°56'07.26703"</td></tr> <tr><td>4</td><td>84°59'37.04815"</td><td>20°56'07.17002"</td></tr> <tr><td>5</td><td>84°59'35.56352"</td><td>20°56'07.16083"</td></tr> <tr><td>6</td><td>84°59'33.84832"</td><td>20°56'07.11122"</td></tr> <tr><td>7</td><td>84°59'30.03986"</td><td>20°56'07.04121"</td></tr> <tr><td>8</td><td>84°59'26.23140"</td><td>20°56'06.97118"</td></tr> <tr><td>9</td><td>84°59'22.42294"</td><td>20°56'06.90112"</td></tr> <tr><td>10</td><td>84°59'22.03397"</td><td>20°56'30.62465"</td></tr> <tr><td>11</td><td>84°59'20.28097"</td><td>20°57'50.14109"</td></tr> <tr><td>12</td><td>84°59'19.61211"</td><td>20°58'22.37236"</td></tr> <tr><td>13</td><td>84°59'19.32597"</td><td>20°58'46.57703"</td></tr> <tr><td>14</td><td>84°59'20.08403"</td><td>20°58'45.91809"</td></tr> <tr><td>15</td><td>84°59'21.02025"</td><td>20°58'45.76024"</td></tr> <tr><td>16</td><td>84°59'21.46952"</td><td>20°58'45.64536"</td></tr> <tr><td>17</td><td>84°59'21.86138"</td><td>20°58'45.63678"</td></tr> <tr><td>18</td><td>84°59'22.17017"</td><td>20°58'45.59083"</td></tr> <tr><td>19</td><td>84°59'22.56688"</td><td>20°58'45.54650"</td></tr> <tr><td>20</td><td>84°59'22.96337"</td><td>20°58'45.51250"</td></tr> <tr><td>21</td><td>84°59'23.28294"</td><td>20°58'45.47707"</td></tr> <tr><td>22</td><td>84°59'23.61584"</td><td>20°58'45.49340"</td></tr> <tr><td>23</td><td>84°59'24.01925"</td><td>20°58'45.49061"</td></tr> <tr><td>24</td><td>84°59'24.41575"</td><td>20°58'45.45660"</td></tr> <tr><td>25</td><td>84°59'24.70234"</td><td>20°58'45.42057"</td></tr> <tr><td>26</td><td>84°59'25.05956"</td><td>20°58'45.38833"</td></tr> <tr><td>27</td><td>84°59'25.57038"</td><td>20°58'45.36183"</td></tr> <tr><td>28</td><td>84°59'25.60501"</td><td>20°58'45.36489"</td></tr> <tr><td>29</td><td>84°59'25.67073"</td><td>20°58'45.37642"</td></tr> <tr><td>30</td><td>84°59'25.88018"</td><td>20°58'45.34930"</td></tr> <tr><td>31</td><td>84°59'26.22065"</td><td>20°58'45.36589"</td></tr> <tr><td>32</td><td>84°59'26.62899"</td><td>20°58'45.29079"</td></tr> <tr><td>33</td><td>84°59'26.84943"</td><td>20°58'45.26386"</td></tr> <tr><td>34</td><td>84°59'27.60169"</td><td>20°58'45.21970"</td></tr> <tr><td>35</td><td>84°59'27.92198"</td><td>20°58'45.15380"</td></tr> <tr><td>36</td><td>84°59'28.28103"</td><td>20°58'45.06468"</td></tr> <tr><td>37</td><td>84°59'28.62633"</td><td>20°58'45.02317"</td></tr> <tr><td>38</td><td>84°59'28.90737"</td><td>20°58'45.00440"</td></tr> <tr><td>39</td><td>84°59'29.20679"</td><td>20°58'45.02187"</td></tr> <tr><td>40</td><td>84°59'29.57610"</td><td>20°58'45.05259"</td></tr> <tr><td>41</td><td>84°59'30.02217"</td><td>20°58'45.07276"</td></tr> <tr><td>42</td><td>84°59'30.39198"</td><td>20°58'45.07955"</td></tr> <tr><td>43</td><td>84°59'30.86505"</td><td>20°58'45.02842"</td></tr> <tr><td>44</td><td>84°59'31.03082"</td><td>20°58'45.03147"</td></tr> <tr><td>45</td><td>84°59'31.14211"</td><td>20°58'45.02268"</td></tr> <tr><td>46</td><td>84°59'31.55066"</td><td>20°58'44.93726"</td></tr> <tr><td>47</td><td>84°59'31.92711"</td><td>20°58'44.80995"</td></tr> <tr><td>48</td><td>84°59'32.11566"</td><td>20°58'44.73081"</td></tr> <tr><td>49</td><td>84°59'32.19302"</td><td>20°58'44.71158"</td></tr> </table>	Pt. ID	Longitude	Latitude	1	84°59'45.97773"	20°56'07.35854"	2	84°59'44.77323"	20°56'07.34808"	3	84°59'42.32978"	20°56'07.26703"	4	84°59'37.04815"	20°56'07.17002"	5	84°59'35.56352"	20°56'07.16083"	6	84°59'33.84832"	20°56'07.11122"	7	84°59'30.03986"	20°56'07.04121"	8	84°59'26.23140"	20°56'06.97118"	9	84°59'22.42294"	20°56'06.90112"	10	84°59'22.03397"	20°56'30.62465"	11	84°59'20.28097"	20°57'50.14109"	12	84°59'19.61211"	20°58'22.37236"	13	84°59'19.32597"	20°58'46.57703"	14	84°59'20.08403"	20°58'45.91809"	15	84°59'21.02025"	20°58'45.76024"	16	84°59'21.46952"	20°58'45.64536"	17	84°59'21.86138"	20°58'45.63678"	18	84°59'22.17017"	20°58'45.59083"	19	84°59'22.56688"	20°58'45.54650"	20	84°59'22.96337"	20°58'45.51250"	21	84°59'23.28294"	20°58'45.47707"	22	84°59'23.61584"	20°58'45.49340"	23	84°59'24.01925"	20°58'45.49061"	24	84°59'24.41575"	20°58'45.45660"	25	84°59'24.70234"	20°58'45.42057"	26	84°59'25.05956"	20°58'45.38833"	27	84°59'25.57038"	20°58'45.36183"	28	84°59'25.60501"	20°58'45.36489"	29	84°59'25.67073"	20°58'45.37642"	30	84°59'25.88018"	20°58'45.34930"	31	84°59'26.22065"	20°58'45.36589"	32	84°59'26.62899"	20°58'45.29079"	33	84°59'26.84943"	20°58'45.26386"	34	84°59'27.60169"	20°58'45.21970"	35	84°59'27.92198"	20°58'45.15380"	36	84°59'28.28103"	20°58'45.06468"	37	84°59'28.62633"	20°58'45.02317"	38	84°59'28.90737"	20°58'45.00440"	39	84°59'29.20679"	20°58'45.02187"	40	84°59'29.57610"	20°58'45.05259"	41	84°59'30.02217"	20°58'45.07276"	42	84°59'30.39198"	20°58'45.07955"	43	84°59'30.86505"	20°58'45.02842"	44	84°59'31.03082"	20°58'45.03147"	45	84°59'31.14211"	20°58'45.02268"	46	84°59'31.55066"	20°58'44.93726"	47	84°59'31.92711"	20°58'44.80995"	48	84°59'32.11566"	20°58'44.73081"	49	84°59'32.19302"	20°58'44.71158"
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[Signature]
प्रकल्प अधिकारी
Project Officer
MCL, Subhadra Area
एम. सि. एल. सुभद्रा क्षेत्र

Chapter - I Project Information

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देवाशीव रोड
महाप्रबंधक (उत्खनन)
एम. पी. डी. आइ. एल., क्षेत्रीय संस्करण-7

[Signature]
प्रकल्प अधिकारी
Project Officer
MCL, Subhadra Area
एम. सि. एल. सुभद्रा क्षेत्र

Mining Plan & Mine Closure Plan – Subhadra OCP
Modification-1, January 2022



50	84°59'32.28158"	20°58'44.68223"
51	84°59'32.71620"	20°58'44.40110"
52	84°59'32.92952"	20°58'44.18818"
53	84°59'32.99718"	20°58'44.10682"
54	84°59'33.17820"	20°58'43.84103"
55	84°59'33.35170"	20°58'43.47329"
56	84°59'33.43651"	20°58'43.07202"
57	84°59'33.48175"	20°58'43.01090"
58	84°59'33.55221"	20°58'42.79536"
59	84°59'33.56492"	20°58'42.71299"
60	84°59'33.68129"	20°58'42.34864"
61	84°59'33.83103"	20°58'41.89672"
62	84°59'34.00229"	20°58'41.63663"
63	84°59'34.10878"	20°58'41.42322"
64	84°59'34.21538"	20°58'41.04189"
65	84°59'34.33345"	20°58'40.65169"
66	84°59'34.47307"	20°58'40.28253"
67	84°59'34.47457"	20°58'40.21028"
68	84°59'34.48707"	20°58'40.13823"
69	84°59'34.51055"	20°58'40.06639"
70	84°59'34.57259"	20°58'39.72678"
71	84°59'34.59844"	20°58'39.54140"
72	84°59'34.62214"	20°58'39.45923"
73	84°59'34.63592"	20°58'39.32525"
74	84°59'34.67276"	20°58'39.14007"
75	84°59'34.68762"	20°58'38.95449"
76	84°59'34.69990"	20°58'38.89276"
77	84°59'34.71798"	20°58'38.55235"
78	84°59'34.73671"	20°58'38.18098"
79	84°59'34.69856"	20°58'37.90149"
80	84°59'34.69165"	20°58'37.70518"
81	84°59'34.58044"	20°58'37.23849"
82	84°59'34.54919"	20°58'37.15531"
83	84°59'34.47743"	20°58'37.01041"
84	84°59'34.28088"	20°58'36.64784"
85	84°59'34.09633"	20°58'36.32139"
86	84°59'33.96179"	20°58'36.04372"
87	84°59'33.85275"	20°58'35.76652"
88	84°59'33.78098"	20°58'35.53786"
89	84°59'33.64494"	20°58'35.17685"
90	84°59'33.52037"	20°58'34.82349"
91	84°59'33.40722"	20°58'34.44970"
92	84°59'33.25670"	20°58'34.01326"
93	84°59'33.18667"	20°58'33.70088"
94	84°59'33.09238"	20°58'33.32823"
95	84°59'33.01089"	20°58'32.89359"
96	84°59'33.01239"	20°58'32.82134"
97	84°59'32.99428"	20°58'32.63515"
98	84°59'32.95419"	20°58'32.44855"
99	84°59'32.95180"	20°58'32.03549"
100	84°59'32.92442"	20°58'31.76653"
101	84°59'32.87722"	20°58'31.39394"
102	84°59'32.87397"	20°58'31.02216"
103	84°59'32.83753"	20°58'30.66010"
104	84°59'32.85777"	20°58'30.21648"
105	84°59'32.82005"	20°58'29.91634"
106	84°59'32.88295"	20°58'29.53546"

प्रकल्प अधिकारी
Project Officer

MCL, Subhadra Area
एम. सि. एल. सुभद्रा क्षेत्र

Chapter-1 Project Information

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देवाशीर्वाच 18/01/22
महाराष्ट्र (उत्तरांचल)
सी.एम.सी.डी.आई.एल., क्षेत्रीय संस्करण-7

18/01/22
प्रकल्प अधिकारी
Project Officer
MCL, Subhadra Area
एम. सि. एल. सुभद्रा क्षेत्र

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Mining Plan & Mine Closure Plan – Subhadra OCP
Modification-1, January 2022



107	84°59'32.90880"	20°58'29.35008"
108	84°59'32.96783"	20°58'29.15497"
109	84°59'33.00467"	20°58'28.96979"
110	84°59'33.17811"	20°58'28.55996"
111	84°59'33.28347"	20°58'28.25213"
112	84°59'33.44355"	20°58'27.95564"
113	84°59'33.56371"	20°58'27.65903"
114	84°59'33.73495"	20°58'27.39894"
115	84°59'33.82671"	20°58'27.28098"
116	84°59'33.92338"	20°58'27.08679"
117	84°59'34.12785"	20°58'26.77045"
118	84°59'34.17289"	20°58'26.71965"
119	84°59'34.24119"	20°58'26.60733"
120	84°59'34.45579"	20°58'26.33248"
121	84°59'34.56783"	20°58'26.23129"
122	84°59'34.79106"	20°58'26.07018"
123	84°59'34.98583"	20°58'25.69172"
124	84°59'35.22499"	20°58'25.29342"
125	84°59'35.56628"	20°58'24.74211"
126	84°59'35.66841"	20°58'24.58910"
127	84°59'35.75825"	20°58'24.49783"
128	84°59'35.98427"	20°58'24.20254"
129	94°59'36.31027"	20°58'23.85746"
130	84°59'36.47876"	20°58'23.68503"
131	84°59'36.60180"	20°58'23.58403"
132	84°59'36.66859"	20°58'23.54396"
133	84°59'36.85734"	20°58'23.45449"
134	84°59'37.01227"	20°58'23.40571"
135	84°59'37.40939"	20°58'23.34073"
136	84°59'37.64102"	20°58'23.30368"
137	84°59'38.20159"	20°58'23.33791"
138	84°59'38.52037"	20°58'23.34376"
139	84°59'38.71690"	20°58'23.37507"
140	84°59'39.22262"	20°58'23.37403"
141	84°59'39.44305"	20°58'23.34710"
142	84°59'39.65574"	20°58'23.34068"
143	84°59'40.02678"	20°58'23.28767"
144	84°59'40.38407"	20°58'23.28226"
145	84°59'40.65060"	20°58'23.34699"
146	84°59'41.02529"	20°58'23.38648"
147	84°59'41.15652"	20°58'23.41987"
148	84°59'41.55106"	20°58'23.47874"
149	84°59'41.94538"	20°58'23.54793"
150	84°59'42.11001"	20°58'23.56128"
151	84°59'42.45089"	20°58'23.55721"
152	84°59'42.64891"	20°58'23.55052"
153	94°59'42.85749"	20°58'23.56468"
154	84°59'43.05401"	20°58'23.63024"
155	84°59'43.33995"	20°58'23.62516"
156	84°59'43.60541"	20°58'23.54743"
157	84°59'43.99326"	20°58'23.39967"
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159	84°59'44.63098"	20°58'23.24993"
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163	84°59'45.81186"	20°58'23.17491"

प्रकल्प अधिकारी
Project Officer
MCL, Subhadra Area
एम. सि. एल. सुभद्रा क्षेत्र

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Mining Plan & Mine Closure Plan – Subhadra OCP
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164	84°59'46.23160"	20°58'23.07936"
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172	84°59'48.46607"	20°58'22.94483"
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174	84°59'49.76374"	20°58'22.91768"
175	84°59'50.97944"	20°58'22.89199"
176	84°59'51.81742"	20°58'22.88281"
177	84°59'52.22935"	20°58'22.88432"
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179	84°59'53.42826"	20°58'22.86467"
180	84°59'54.59330"	20°58'22.86197"
181	84°59'56.03520"	20°58'22.82859"
182	84°59'57.73272"	20°58'22.81147"
183	84°59'59.22972"	20°58'22.79092"
184	85°00'00.79736"	20°58'22.77177"
185	85°00'02.03045"	20°58'22.74619"
186	85°00'03.41599"	20°58'22.73549"
187	85°00'05.09548"	20°58'22.70615"
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189	85°00'08.26699"	20°58'22.65615"
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191	85°00'11.58494"	20°58'22.62084"
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198	85°00'23.17896"	20°58'22.49678"
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प्रकल्प अधिकारी
Project Officer
MCL, Subhadra Area
एम. सि. एल. सुभद्रा क्षेत्र

Chapter-1 Project Information

देवाशीष राय 18/01/22

महाप्रबंधक (उत्खनन)

सा.एम.पी.डी.आई.एल., क्षेत्रीय संस्थान-7

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Project Officer

MCL, Subhadra Area

एम. सि. एल. सुभद्रा क्षेत्र

Mining Plan & Mine Closure Plan – Subhadra OCP
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221	85°00'31.37352"	20°58'24.00925"
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प्रकल्प अधिकारी
Project Officer
MCL, Subhadra Area
एम. वि. एल. सुभद्रा क्षेत्र

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महाप्रबंधक (उत्खनन)
सी.एम.पी.डी.आई.एम., क्षेत्रीय कार्यालय-7

19/1/22
प्रकल्प अधिकारी
Project Officer
MCL, Subhadra Area
एम. वि. एल. सुभद्रा क्षेत्र

Mining Plan & Mine Closure Plan – Subhadra OCP
Modification-1, January 2022

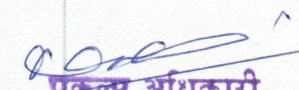


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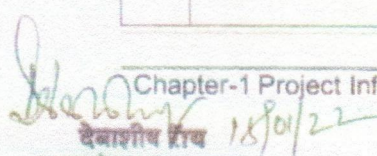
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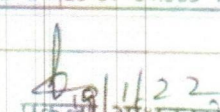
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3	84°59'20.281" E	20°57'50.141" N
4	84°59'22.034" E	20°56'30.625" N
5	84°59'22.423" E	20°56'6.901" N
6	84°59'22.491" E	20°56'3.464" N
7	84°59'22.559" E	20°56'0.027" N
8	84°59'22.627" E	20°55'56.590" N
9	84°59'18.661" E	20°55'56.517" N
10	84°59'14.694" E	20°55'56.444" N
11	84°59'10.728" E	20°55'56.371" N
12	84°59'6.762" E	20°55'56.298" N
13	84°59'2.796" E	20°55'56.225" N
14	84°59'1.619" E	20°56'10.082" N
15	84°58'58.433" E	20°56'14.783" N
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22	84°58'44.528" E	20°56'51.077" N
23	84°58'44.537" E	20°56'52.404" N
24	84°58'44.542" E	20°56'52.861" N
25	84°58'44.464" E	20°56'56.548" N
26	84°58'44.328" E	20°57'0.608" N
27	84°58'44.201" E	20°57'2.748" N
28	84°58'44.135" E	20°57'7.299" N
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30	84°58'44.016" E	20°57'12.525" N
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Project Officer
MCL, Subhadra Area
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सा.एम.पी.डी.आई.एल., क्षेत्रीय संस्करण-7

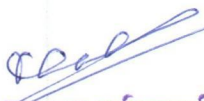

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Project Officer
MCL, Subhadra Area
एम. सि. एल. सुभद्रा क्षेत्र

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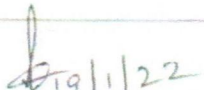
Mining Plan & Mine Closure Plan – Subhadra OCP
Modification-1, January 2022



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34	84°58' 43.786" E	20°57' 23.706" N
35	84°58' 43.716" E	20°57' 26.801" N
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37	84°58' 43.630" E	20°57' 30.528" N
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49	84°58' 42.844" E	20°58' 4.347" N
50	84°58' 42.761" E	20°58' 7.250" N
51	84°58' 42.717" E	20°58' 10.936" N
52	84°58' 42.668" E	20°58' 13.448" N
53	84°58' 42.607" E	20°58' 16.733" N
54	84°58' 42.547" E	20°58' 18.587" N
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57	84°58' 42.437" E	20°58' 24.998" N
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59	84°58' 42.383" E	20°58' 28.001" N
60	84°58' 42.392" E	20°58' 28.784" N
61	84°58' 42.440" E	20°58' 28.767" N
62	84°58' 44.544" E	20°58' 29.693" N
63	84°58' 47.389" E	20°58' 30.656" N
64	84°58' 49.790" E	20°58' 31.923" N
65	84°58' 51.923" E	20°58' 32.723" N
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74	84°59' 9.602" E	20°58' 29.835" N
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83	84°59' 11.433" E	20°58' 40.799" N


प्रकल्प अधिकारी
Project Officer
MCL, Subhadra Area
एम. सि. एल. सुभद्रा क्षेत्र

देवाशीष राय
महाप्रबंधक (उत्खनन)
एम. पी. डी. आई. एल., क्षेत्रीय कार्यालय-7


प्रकल्प अधिकारी
Project Officer
MCL, Subhadra Area
एम. सि. एल. सुभद्रा क्षेत्र

Mining Plan & Mine Closure Plan – Subhadra OCP
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			84	84°59' 12.725" E	20°58' 42.329" N																				
			85	84°59' 14.837" E	20°58' 44.540" N																				
			86	84°59' 16.222" E	20°58' 45.919" N																				
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			88	84°59' 17.961" E	20°58' 47.180" N																				
			89	84°59' 19.267" E	20°58' 47.344" N																				
1.4 DETAILS OF THE PREVIOUS APPROVAL OF MINING PLAN																									
1.4.1	Date of approval	23 rd April, 2009																							
1.4.2	Conditions, if any	i) The mining company should take all necessary precautions regarding safety of mine workings, persons deployed therein. ii) Approval of the mining plan is without prejudice to the requirement of approvals from competent/prescribed authority under relevant rules/regulations etc.																							
1.4.3	Scheduled year of start of production	OB removal from Yr-2 and coal production from Yr-3																							
1.4.4	Proposed year of achieving the targeted production	Yr-7 including construction period of 2 years																							
1.4.5	Date of actual commencement of mining operations, if operations already started	Mining operation has not commenced																							
1.4.6	Likely date of mining operations, if operations not yet started and reasons for non-commencement of operations	Blocks de-allocated, Allottee modified, Capacity increased, previously approved mining plan is no more followed.																							
1.4.7	Planned production and actual levels achieved in last 3 years (coal-Mt, OB-Mcum, S.R.-cum/t)	Assuming coal production would have started from 2018-19, Planned production would be- Yr-1 2018-19 3.00 Mt Yr-2 2019-20 6.00 Mt Yr-3 2020-21 9.00 Mt Mining operation has not commenced																							
1.4.8	Statutory obligations vis-à-vis compliance status in a tabular form	<table><tr><th>Sl. No.</th><th>Statutory Obligation</th><th>Compliance Required</th><th>Status</th></tr><tr><td>01</td><td>Commencement Plan</td><td>Commencement plan was required to be prepared within one month of issuance of allotment order i.e. 8.11.2021</td><td>Prepared and submitted to the Nominated Authority, MoC, on Dtd.17.12.2021.</td></tr><tr><td>02</td><td>Upfront Amount</td><td>Submission of first instalment i.e. Rs 82,49,063.28.50 prior to issue of allotment order.</td><td>Required Amount deposited on Dtd. 09.07.2021, Vide: MGET Transaction ID: KICR22021070900010151, Payment reference no. CMS2018128971.</td></tr><tr><td>03</td><td>Performance security</td><td>Deposition of BG for Rs 554,40,00,000 prior to issue of allotment order.</td><td>Deposited vide BG No.07749218G0000008 on Dtd. 09.07.2021.</td></tr><tr><td>04</td><td>Deposition of Fixed amount</td><td>Deposited with MoC for Rs 24,33,20,236 prior to issue of allotment order.</td><td>Amount deposited on Dtd. 22.07.2021, Vide: MGET Transaction ID: KICR22021072200009659, Payment Reference No. CMS 2037654335.</td></tr></table>				Sl. No.	Statutory Obligation	Compliance Required	Status	01	Commencement Plan	Commencement plan was required to be prepared within one month of issuance of allotment order i.e. 8.11.2021	Prepared and submitted to the Nominated Authority, MoC, on Dtd.17.12.2021.	02	Upfront Amount	Submission of first instalment i.e. Rs 82,49,063.28.50 prior to issue of allotment order.	Required Amount deposited on Dtd. 09.07.2021, Vide: MGET Transaction ID: KICR22021070900010151, Payment reference no. CMS2018128971.	03	Performance security	Deposition of BG for Rs 554,40,00,000 prior to issue of allotment order.	Deposited vide BG No.07749218G0000008 on Dtd. 09.07.2021.	04	Deposition of Fixed amount	Deposited with MoC for Rs 24,33,20,236 prior to issue of allotment order.	Amount deposited on Dtd. 22.07.2021, Vide: MGET Transaction ID: KICR22021072200009659, Payment Reference No. CMS 2037654335.
Sl. No.	Statutory Obligation	Compliance Required	Status																						
01	Commencement Plan	Commencement plan was required to be prepared within one month of issuance of allotment order i.e. 8.11.2021	Prepared and submitted to the Nominated Authority, MoC, on Dtd.17.12.2021.																						
02	Upfront Amount	Submission of first instalment i.e. Rs 82,49,063.28.50 prior to issue of allotment order.	Required Amount deposited on Dtd. 09.07.2021, Vide: MGET Transaction ID: KICR22021070900010151, Payment reference no. CMS2018128971.																						
03	Performance security	Deposition of BG for Rs 554,40,00,000 prior to issue of allotment order.	Deposited vide BG No.07749218G0000008 on Dtd. 09.07.2021.																						
04	Deposition of Fixed amount	Deposited with MoC for Rs 24,33,20,236 prior to issue of allotment order.	Amount deposited on Dtd. 22.07.2021, Vide: MGET Transaction ID: KICR22021072200009659, Payment Reference No. CMS 2037654335.																						
1.4.9	Reasons for difference in planned and actual production levels	Mining operation has not commenced																							
1.5 PARAMETERS OF APPROVED MINING PLAN vis-a-vis PROPOSED MINING PLAN																									
		Approved Mining plan		Proposed Mining Plan																					
1.5.1	Block area in "ha"	1140.66		1144.90																					
1.5.2	Block area projectized "ha"	1016.08		1111.85																					
1.5.3	Lease area "ha"	1025.93		1111.85																					
1.5.4	Project area "ha"	1289.93		1111.85																					

Mining Plan & Mine Closure Plan – Subhadra OCP
Modification-1, January 2022



1.5.5	Life of the project "yrs"	52	36
1.5.6	Minimum and Maximum depths of working "m"	23 215	23 215
1.5.7	Net Geological Block "Ha"		
1.5.8	Production target "MTPA"	15.00	25.00
1.5.9	Seams available as per G.R.	22	22
1.5.10	Seams not considered for mining with reasons	Seams I Top, I Middle, IIA, IIB, IIC, VIB I Top, I Middle, IIB & VIB were not considered in GR due to thinness and insignificant quantities. Seams IIA & IIC were not considered for mining due to thinness and irregular occurrences. Mineable thickness is attained near north boundary which is below final slope.	Seams I Top, I Middle, IIA, IIB, IIC, VIB I Top, I Middle, IIB & VIB were not considered in GR due to thinness and insignificant quantities. Seams IIA & IIC were not considered for mining due to thinness and irregular occurrences. Mineable thickness is attained near north boundary which is below final slope.
1.5.11	Gross Geological Reserve "Mt"	1096.19 Deduced by adding 10% loss considered in G.R.	1142.67 As computed for new block boundary with GCV
1.5.12	Net Geological Reserve "Mt"	986.57	1108.39
1.5.13	Blocked Reserve "Mt"	271.45	317.35
1.5.14	Mineable Reserve "Mt"	715.12	791.04
1.5.15	Extractable Reserve "Mt"	673.09	768.83
1.5.16	% of extraction/recovery	94.12	97.19
1.5.17	Reserve depleted (till base date) "Mt"	NIL	NIL
1.5.18	Balance Extractable Reserve "Mt"	673.09	768.83
1.5.19	Average Grade	<u>UHV based</u> Grades-C, D & E 4.5% Grade-F 30.7% Grade-G 64.8% Wt. Av. G-13	<u>GCV based</u> Up to G-11 17.2% G-12 25.5% G-13 34.3% G-14 & below 23% Wt. Av. G-13
1.5.20	OB in Mcum	In-situ: 644.28 Re-handling: 110.73 Total: 755.01	In-situ: 613.18 Re-handling: 103.72 Total: 716.90
1.5.21	Stripping ratio (cum/t)	Only In-situ: 0.96 With Re-handling: 1.12	Only In-situ: 0.80 With Re-handling: 0.93
1.5.22	Mining Technology	Open cast technology Coal-Surface Miner OB-Shovel & Dumper	Open cast technology Coal-Surface Miner OB-Shovel & Dumper
1.5.23	Coal beneficiation envisaged	NO	NO
1.5.24	Handling of Rejects	Not applicable	Not applicable
1.5.25	Land use pattern "Ha"		
1	Excavation area	908.12	881.28
2	Top soil dump	Not available	8.97
3	External dump	Nil	Nil
4	Safety zone	Not available	11.79
5	Other use	57.19 incl. barriers, nala diversion, embankment & roads	Road: 15.72 Nala Diversion: 6.40 Embankment: 11.19 River/nala diversion: 10.18 Explosive magazine: 5.58 Coal Stockyard: 9.76 Settling pond: 1.52 Total: 60.35
6	Infrastructure area	60.52	102.44
7	Green belt	Not available	53.12
	Total	1025.93	1111.85

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Mining Plan & Mine Closure Plan – Subhadra OCP
Modification-1, January 2022



1.5.26	Reasons for Revision		<ol style="list-style-type: none"> 1. Change in annual target 2. Change in lease boundary 3. Change in ownership 4. Change in extractable reserve
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Chapter-1 Project Information

देवाशीष रौय

प्रबंधक (उत्खनन)

एम्. एल. सी. आई. एल., क्षेत्रीय संस्करण-7

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19/1/22

प्रकल्प अधिकारी
Project Officer

MCL, Subhadra Area
एम्. सि. एल. सुभद्रा क्षेत्र

[Signature]
प्रकल्प अधिकारी
Project Officer


MCL, Subhadra Area
एम्. सि. एल. सुभद्रा क्षेत्र

Chapter – 2

EXPLORATION, GEOLOGY, SEAM SEQUENCE, COAL QUALITY AND RESERVE

2.1 DETAILS OF THE BLOCK

	Parameters	Details																					
2.1.1	Particulars of adjacent blocks: North, South, East, West	North: Balabhara; Balabhadra West Extension South: None East: Gopalprasad East & Eastern part of Gopalprasad west West: Utkal-B1; Utkal-C																					
2.1.2	Location of the Block District/State	District Angul of Odisha State																					
2.1.3	Area of the Block "Ha"	1144.90																					
2.1.4	Area of the geological block projectized "in Ha" (Area of the geological block considered for liquidation of coal reserve)	879.12																					
2.1.5	Balance area yet to be projectized "Ha"	29.30 (North meandering Singhada Jhor)																					
2.1.6	Likely Reserve in the area yet to be projectized "Mte"	73.42																					
2.1.7	Cardinal Point Co-ordinates of the non-coal/lignite bearing area/existing mining lease outside the allotted Geological Coal/Lignite block (Duly certified in line with para 1.9 of the Guideline, if fresh mining lease required) <u>Cardinal points Co-ordinates of the proposed area outside the non-coal bearing area outside the allotted Geological Coal/Lignite block</u>	Not applicable as proposed lease Boundary is contained within Block Boundary																					
2.1.8	Certificate of Qualified person/Accredited Mining Plan preparing agency (MPPA) if the project area is confined within the vested/ allotted block boundary/ existing mining lease Project area is same as Lease area. Mining Lease Area: 1111.85 Ha Geological Block Area: 1144.90 Ha	Project boundary does not extend beyond the allotted geological block boundary. <u>Cardinal points Co-ordinates of the proposed Lease Area considered in the Mining Plan</u> Mining Lease is inside Block Boundary towards south. At all other places, lease boundary is same as block boundary. Boundary of Mining Lease which is not same as Block Boundary is shown in Annexure-9 and coordinates of those ML points are given below <table border="1"> <thead> <tr> <th>ID</th><th>Latitude</th><th>Longitude</th></tr> </thead> <tbody> <tr> <td>ML-1</td><td>84° 58' 47.537" E</td><td>20° 56' 31.420" N</td></tr> <tr> <td>ML-2</td><td>84° 58' 49.638" E</td><td>20° 56' 31.423" N</td></tr> <tr> <td>ML-3</td><td>84° 58' 49.813" E</td><td>20° 56' 29.780" N</td></tr> <tr> <td>ML-4</td><td>84° 58' 52.893" E</td><td>20° 56' 27.104" N</td></tr> <tr> <td>ML-5</td><td>84° 58' 56.917" E</td><td>20° 56' 23.252" N</td></tr> <tr> <td>ML-6</td><td>84° 59' 3.553" E</td><td>20° 56' 17.414" N</td></tr> </tbody> </table>	ID	Latitude	Longitude	ML-1	84° 58' 47.537" E	20° 56' 31.420" N	ML-2	84° 58' 49.638" E	20° 56' 31.423" N	ML-3	84° 58' 49.813" E	20° 56' 29.780" N	ML-4	84° 58' 52.893" E	20° 56' 27.104" N	ML-5	84° 58' 56.917" E	20° 56' 23.252" N	ML-6	84° 59' 3.553" E	20° 56' 17.414" N
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प्रकल्प अधिकारी
Project Officer

MCL, Subhadra Area

एम. सि. एल. सुभद्रा क्षेत्र

Chapter-2 Geology

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देवाशोक राय

महाप्रबंधक (उत्खनन)

पो.डो.आइ.एल., क्षेत्रीय कार्यालय-7


प्रकल्प अधिकारी

Project Officer

MCL, Subhadra Area

एम. सि. एल. सुभद्रा क्षेत्र

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		ML-7	84° 59' 11.112" E	20° 56' 9.060" N
		ML-8	84° 59' 13.183" E	20° 56' 5.796" N
		ML-9	84° 59' 13.301" E	20° 56' 4.648" N
		ML-10	84° 59' 13.303" E	20° 56' 0.886" N
		ML-11	84° 59' 17.827" E	20° 55' 58.933" N
		ML-12	84° 59' 18.245" E	20° 55' 59.281" N
		ML-13	84° 59' 19.876" E	20° 56' 0.065" N
		ML-14	84° 59' 22.539" E	20° 56' 1.023" N
		ML-15	84° 59' 22.423" E	20° 56' 6.901" N
		ML-16	84° 59' 26.618" E	20° 56' 6.978" N
		ML-17	84° 59' 27.059" E	20° 56' 7.957" N
		ML-18	84° 59' 29.355" E	20° 56' 10.012" N
		ML-19	84° 59' 32.649" E	20° 56' 13.335" N
		ML-20	84° 59' 34.199" E	20° 56' 14.626" N
		ML-21	84° 59' 36.935" E	20° 56' 16.516" N
		ML-22	84° 59' 38.331" E	20° 56' 17.305" N
		ML-23	84° 59' 38.486" E	20° 56' 17.523" N
		ML-24	84° 59' 46.681" E	20° 56' 16.637" N
2.1.9	KML file of the proposed lease area, project Area and geological block	Note: Printed copy of the KML file superimposed in the recent (not older than one year from the base date) dated satellite image duly certified by Accredited Agency should also be attached. Shown in Annexure-XII Note: The soft copy of the KML file shall also be part of the Soft copy of the mining plan		
2.1.10	Whether the proposed project area is confined within the allotted block boundary, if not, the reason for deviation from allotted block boundary, may be given.	Yes.		
2.1.11	If the project area extends outside the allotted block boundary/ <u>existing mining lease</u> , confirmation about non-occurrence of coal/lignite in the area under reference needs to be furnished.	Project area lies within block boundary		
2.1.12	Type of the project (Operating/under Implementation) and year of starting	Under implementation. Probable year of starting is 2022		

2.2 EXOPLORATION, GEOLOGY AND ASSESSMENT OF RESERVE

2.2.1 Regional geological set up of the area, local geology, structure, stratigraphic sequence, characteristics of the litho-logical units (coal seams /parting/ overburden)

Utkal-A & West of Gopalprasad West block is located in south-central part of the Talcher coalfield. The coalfield forms the south-easternmost part of the Lower Gondwana basins restricted within northwest-southeast trending Son-Mahanadi master basin belt. The coalfield spans over an area of about 1800 sq.km with coal bearing area of about 1000 sq.km. The basin is almost rectangular in shape,

[Signature]
Chapter-2 Geology

[Signature]
19/1/22
प्रकल्प अधिकारी

Project Officer
MCL, Subhadra Area
एम. सि. एल. सुभद्रा क्षेत्र

[Signature]
प्रकल्प अधिकारी

Project Officer
MCL, Subhadra Area
एम. सि. एल. सुभद्रा क्षेत्र

देवाशीष राय
गोहाप्रबन्धक (उत्खनन)
एम. सि. एल. सुभद्रा क्षेत्र-7

measuring almost 80 km along the strike length (East-West) and about 26 km along the dip direction (North-South). The sedimentary strata of Talcher coalfield comprises of Talchir, Karharbari, Barakar, Barren Measures and Kamthi Formations. There is extensive mining activity of Karharbari as well as Barakar coal seams in south-eastern part of the coalfield.

Generalized Stratigraphic succession of Talcher Coalfield

Group	Age	Formation	Thickness (m)		Lithology
			From	To	
	Quaternary	Quaternary deposits	-	40+	Colluvial fills, sand, silt deposits and clay of older alluvium, older and younger floodplain deposits, channel fills etc.
	Cenozoic	Laterite	-	-	Laterites, lateritised detrital pebble bed.
GONDWANA SUPER GROUP	Upper Permian to Lower Triassic	Undifferentiated Kamthi Formation	-	575+	Fine to medium grained light grey to reddish sandstone and shale at the base and pale greenish sandstone with rare shale and pink clay bands, ferruginous coarse grained to pebbly sandstone at top.
	Unconformity				
	Upper Permian	Barren Measures	-	50+	Greenish grey to buff coloured pebbly, coarse to medium grained highly ferruginous sandstone with variable proportions of fresh K-feldspar.
	Lower Permian	Barakar Formation	-	500+	Medium to coarse grained greyish feldspathic sandstone, grey to dark grey shale and coal seams.
	Lower Permian	Karharbari Formation	-	270+	Pale brownish yellow coloured massive medium to coarse grained sandstone containing clasts of Talchir shale and coal seams.
	Upper Carboniferous to Lower Permian	Talchir Formation	-	110+	Diamictite, sandstone, needle shale, turbidite, rhythmites and varves.
Unconformity					
	Archae-an(?) to Lower Protero-zoic	Pre-Cambrian Metamorphics			Granites, gneisses and associated supracrustals.

2.2.2 Local geology, Structure, Stratigraphic sequence, Characteristics of the litho-logical units (coal seams partings/ overburden)

GEOLOGICAL SUCCESSION OF THE BLOCK

Considering the information available through sub-surface exploration and the information collected from neighboring blocks including geological mapping to

Chapter-2 Geology

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देवाशीष रॉय

महाप्रबंधक (उत्खनन)

एन.पी.सी.आई.एल., क्षेत्रीय संस्थान-१

प्रकल्प अधिकारी
Project Officer

MCL, Subhadra Area
एम. सि. एल. सुभद्रा क्षेत्र

प्रकल्प अधिकारी
Project Officer

MCL, Subhadra Area
एम. सि. एल. सुभद्रा क्षेत्र

the extent possible, it is confirmed that all the formations established to occur in south-central part of the Talcher coalfield are preserved in referenced block area.

STRIKE AND DIP

Within the Utkal-A & West of Gopalprasad West block the strike is generally East-West varying to ENE-WSW. The beds have low northerly dip which varies from 3° to 8° within the block. Local variations in dip and strike have been observed at places.

DESCRIPTION OF FAULTS

Twelve faults have been interpreted within the block as per nature of stratum contours or direct intersection in boreholes. The faults are generally trending east-west with both northerly and southerly dips. Details of faults are given below.

Details of faults

Fault No.	Extent	Trend	Throw	
			Direction	Amount (m)
F1A-F1A	1400 meters continues from Utkal-B1	NW-SE	South-west	0-7
F1-F1	1150 meters continues in the east	WNW-ESE	North-East	0-10
F4-F4	1200 meters continues in the east	SW-NE swings to E-W	South	0-42
F17-F17	650 meters abuts with F4-F4 in the west & continues in the east	ESE-WNW	South	0-5
F17A-F17A	1350 meters continues in the west & dies out at the south-central part.	E-W	North	0-20
F4A-F4A	1109 meters continues from Utkal-B1	E-W	South	0-8
F8-F8	1000 meters continues from eastern part of Gopalprasad West	E-W	North	0-28
F15-F15	2500 meters continues from Utkal-B1 & abuts with F8-F8.	WNW-ESE	South	12-16
F13-F13	1400 meters continues from Gopalprasad West	WNW-ESE	North	0-4
F16-F16	1000 meters continues from Gopalprasad West and abuts with F13-F13.	SW-NE	South	5-10
F10-F10	3300 meters continues both in Gopalprasad West & Utkal B1	E-W	South	5-25
F12-F12	2800 meters continues from Gopalprasad West	ENE-WSW	South	0-25

COAL SEAMS

In Utkal-A & West of Gopalprasad West block, Barakar Formations contains seams II A to XI in different splits. Altogether, 20 nos. of seams / split seams are reported in Barakar Formation in this block. Among these, seam IX is the most potential coal horizon in this block.

SEQUENCE OF COAL SEAMS

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The sequence of coal seams, their thicknesses and intervening parting in descending order as intersected in the boreholes drilled within the block is given below.

Sequence of coal seams with full thickness and parting intersected in boreholes

Seams / Parting	ROOF DEPTH		FLOOR DEPTH		THICKNESS		RRL		FRL		Nos. of Bh
	MIN (M)	MAX (M)	MIN (M)	MAX (M)	MIN (M)	MAX (M)	MIN (M)	MAX (M)	MIN (M)	MAX (M)	
SOIL	0	0	0	17	0	17					139
	CMTU-029	CMTU-029	CMTU-075	CMTU-036	CMTU-075	CMTU-036					
WM	0	17	2.3	29.35	0	20.55					139
	CMTU-075	CMTU-036	DMTU-032	CMTU-166	CMTU-187	CMTU-177					
OS ABOVE XI	0	0	3	75.9	3	75.9					19
	CMTU-099	CMTU-099	DMTU-178	DMTU-202	DMTU-178	DMTU-202					
XI	9.71	75.9	25.94	92.49	12.97	16.76	114.3	45.91	99.39	29.32	13
	DMTU-179	DMTU-202	DMTU-179	DMTU-202	DMTU-032	DMTU-210	CMTU-105	DMTU-202	CMTU-105	DMTU-202	
PARTING	8.92	92.49	12.06	101.6	2.24	9.11					18
	DMTU-178	DMTU-202	DMTU-178	DMTU-202	CMTU-188	DMTU-202					
X	9.61	101.6	14.88	108.64	2.64	7.52	119.06	20.21	115.05	13.17	21
	DMTU-028	DMTU-202	CMTU-167	DMTU-202	DMTU-035	DMTU-210	CMTU-167	DMTU-202	CMTU-167	DMTU-202	
PARTING	7.77	108.64	15.91	109.28	0.64	25.86					23
	DMTU-177	DMTU-202	DMTU-177	DMTU-202	DMTU-202	CMTU-184					
VIII+IX	31.71	79.3	75.94	126.02	42.3	46.72	102.21	44.9	57.98	-1.82	9
	UT-009	UT-015	UT-009	UT-015	CMTU-054	UT-015	UT-009	UT-015	UT-009	UT-015	
IX	8.89	109.28	39.54	142.4	20.47	35.26	116.05	12.53	89.05	-20.59	26
	DMTU-100	DMTU-202	DMTU-031	DMTU-202	DMTU-031	DMTU-210	CMTU-177	DMTU-202	CMTU-177	DMTU-202	
PARTING	7.51	142.4	13.21	144.26	0.38	7.19					57
	DMTU-069	DMTU-202	DMTU-069	DMTU-202	DMTU-196	DMTU-027					
VIII	5.37	144.26	15.54	156.71	4.36	14.36	115.09	-22.45	110.02	-34.9	59
	DMTU-180	DMTU-202	DMTU-180	DMTU-202	CMTU-121	DMTU-179	CMTU-191	DMTU-202	CMTU-121	DMTU-202	
PARTING	5.57	156.71	26.65	160.04	3.33	30.03					72
	DMTU-121	DMTU-202	CMTU-185	DMTU-202	DMTU-202	DMTU-182					
VII B	13.56	160.04	14.21	166.51	0.28	7.03	117.49	-38.23	115.57	-44.7	81
	DMTU-212	DMTU-202	DMTU-092	DMTU-202	DMTU-092	DMTU-212	DMTU-173	DMTU-202	DMTU-173	DMTU-202	
PARTING	14.21	166.51	26.61	174.35	7	16.59					76
	DMTU-092	DMTU-202	DMTU-092	DMTU-202	UT-008	DMTU-121					
VII A	10.78	174.35	11.17	175.53	0.25	4.6	120.75	-52.54	120.37	-53.72	85
	DMTU-151	DMTU-202	DMTU-151	DMTU-202	DMTU-044	UT-004	DMTU-209	DMTU-202	DMTU-209	DMTU-202	
PARTING	11.17	175.53	14.8	181.29	1.24	17.87					83
	DMTU-151	DMTU-202	DMTU-151	DMTU-202	DMTU-121	DMTU-209					
VI B	13.15	181.29	13.6	181.98	0.13	5.15	120.29	-59.48	119.84	-50.17	91
	CMTU-210	DMTU-202	CMTU-210	DMTU-202	CMTU-003	CMTU-180	CMTU-210	DMTU-202	CMTU-210	DMTU-202	
PARTING	13.6	181.98	21.96	187.11	1.49	13.65					91
	CMTU-210	DMTU-202	CMTU-190	DMTU-202	DMTU-114	DMTU-014					
V (A+B)	68.76	147.03	77.45	156.11	7.21	12.51	57.21	-17.56	48.52	-26.64	10
	DMTU-175	CMTU-102	DMTU-175	CMTU-102	DMTU-027	DMTU-063	DMTU-175	CMTU-102	DMTU-175	CMTU-102	
VB	21.96	187.11	25.08	193.81	0.49	7.29	120.03	-65.3	118.91	-72	76
	CMTU-190	DMTU-202	DMTU-132	DMTU-202	CMTU-124	DMTU-214	DMTU-132	DMTU-202	DMTU-132	DMTU-202	
PARTING	13.15	193.81	20.09	195.45	0.69	8.08					78
	CMTU-029	DMTU-202	CMTU-029	DMTU-202	DMTU-129	DMTU-025					
VA	10.81	195.45	12.11	196.95	0.49	4.84	129.77	-73.54	126.47	-75.14	79
	DMTU-126	DMTU-202	DMTU-126	DMTU-202	CMTU-125	DMTU-072	DMTU-126	DMTU-202	DMTU-126	DMTU-202	
PARTING	9.77	196.95	14	201.53	1.4	10.09					99
	CMTU-201	DMTU-202	CMTU-201	DMTU-202	DMTU-212	DMTU-208					
IV B	10.68	201.53	11.74	207.68	0.95	8.62	126.5	-79.72	124.5	-85.87	103
	DMTU-105	DMTU-202	DMTU-105	DMTU-202	DMTU-031	DMTU-179	CMTU-206	DMTU-202	CMTU-206	DMTU-202	
PARTING	8.5	207.68	14.22	213.81	2.14	15.18					105
	CMTU-205	DMTU-202	CMTU-205	DMTU-202	UT-009	DMTU-206					
III (A+D+E)	92.46	213.81	113.25	241.42	16.49	27.61	33.49	-92	12.72	-119.51	21
	DMTU-175	DMTU-202	DMTU-175	DMTU-202	CMTU-173	DMTU-202	DMTU-175	DMTU-202	DMTU-175	DMTU-202	

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सहायक (उत्खनन)
सो. एम. पी. डी. आर्. एन., क्षेत्रीय संस्कार-7

प्रकल्प अधिकारी
Project Officer
MCL, Subhadra Area
एम. सि. एल. सुभद्रा क्षेत्र

प्रकल्प अधिकारी
Project Officer
Subhadra Area
एम. सि. एल. सुभद्रा क्षेत्र

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Mining Plan & Mine Closure Plan – Subhadra OCP
Modification-1, January 2022



Seams / Parting	ROOF DEPTH		FLOOR DEPTH		THICKNESS		RRL		FRL		Nos. of Bh
	MIN (M)	MAX (M)	MIN (M)	MAX (M)	MIN (M)	MAX (M)	MIN (M)	MAX (M)	MIN (M)	MAX (M)	
III (D+E)	47.48	104.27	62	118.95	12.35	15.15	87	26.87	72.48	12.19	12
	CMTU-190	CMTU-181	CMTU-190	CMTU-181	DMTU-111	DMTU-212	CMTU-190	CMTU-181	CMTU-190	CMTU-181	
III E	13.8	155.1	15.02	161.86	0.65	10.06	123.87	-37.41	122.65	-47.33	30
	DMTU-134	DMTU-035	DMTU-134	DMTU-035	CMTU-196	DMTU-214	DMTU-134	DMTU-178	DMTU-134	DMTU-178	
III E TOP	14.22	178.07	16.29	181.1	0.32	3.03	124.88	-53.87	122.81	-56.9	42
	CMTU-205	UT-015	CMTU-205	UT-015	CMTU-127	UT-015	CMTU-205	UT-015	CMTU-205	UT-015	
PARTING	9.66	181.1	11.1	182.39	0.45	3.16					44
	CMTU-208	UT-015	CMTU-208	UT-015	CMTU-187	CMTU-206					
III (AT+D+EB)	116.5	182.39	130.95	196	12.85	17.18	12.72	-58.19	-1.93	-73.8	16
	CMTU-180	UT-015	CMTU-180	UT-015	CMTU-112	CMTU-105	CMTU-036	UT-015	CMTU-180	UT-015	
III (D+EB)	24.76	115.55	33.74	127.22	7.43	15.26	114.29	19.38	105.31	6.36	21
	CMTU-206	CMTU-050	CMTU-206	CMTU-050	CMTU-191	CMTU-182	CMTU-206	CMTU-050	CMTU-206	CMTU-182	
III E BOT	11.1	44.82	13.86	47.65	1.54	3.16	93.93	129.29	91.1	126.53	5
	CMTU-208	CMTU-125	CMTU-208	CMTU-125	CMTU-205	CMTU-192	CMTU-125	CMTU-208	CMTU-125	CMTU-208	
PARTING	9.29	161.86	10.6	167.88	0.93	6.14					37
	CMTU-123	DMTU-035	CMTU-123	DMTU-035	DMTU-207	DMTU-135					
III (A+D)	106.11	162.25	119.15	176.53	8.15	16.36	9.9	-49.53	-3.14	-63.81	10
	DMTU-180	DMTU-178	DMTU-180	DMTU-178	DMTU-069	DMTU-072	DMTU-180	DMTU-178	DMTU-180	DMTU-178	
III D	10.6	167.88	12.39	175.03	0.63	8.16	128.02	-49.86	127.21	-57.01	28
	CMTU-123	DMTU-035	DMTU-133	DMTU-035	CMTU-196	DMTU-121	CMTU-122	DMTU-035	DMTU-133	DMTU-035	
PARTING	8.99	175.03	16.57	178.2	0.4	13.51					65
	CMTU-204	DMTU-035	CMTU-204	DMTU-035	CMTU-182	DMTU-134					
III A	20.87	178.2	21.45	180.2	0.28	7.54	123	-60.18	122.55	-62.18	41
	DMTU-133	DMTU-035	DMTU-133	DMTU-035	DMTU-134	DMTU-101	DMTU-130	DMTU-035	DMTU-130	DMTU-035	
III A TOP	14.24	117.6	15.08	118.85	0.15	3.29	128.86	13.17	128.02	11.92	25
	CMTU-197	CMTU-179	CMTU-197	CMTU-179	CMTU-037	CMTU-191	CMTU-197	CMTU-179	CMTU-197	CMTU-179	
PARTING	15.06	118.85	16.82	121.75	0.81	3.4					25
	CMTU-197	CMTU-179	CMTU-197	CMTU-179	CMTU-210	CMTU-037					
III A BOT	12.27	199.63	12.41	203.87	0.13	4.24	132.43	-75.43	132.29	-79.67	44
	CMTU-203	UT-015	CMTU-203	UT-015	CMTU-204	UT-015	CMTU-203	UT-015	CMTU-203	UT-015	
PARTING	12.41	241.42	21.42	253.17	2.73	21.48					116
	CMTU-203	DMTU-202	CMTU-203	DMTU-202	CMTU-208	DMTU-092					
II (D+E)	90.41	253.17	99.03	268.04	2.35	16.14	40.97	-131.36	32.35	-145.23	56
	CMTU-195	DMTU-202	CMTU-195	DMTU-202	DMTU-111	DMTU-195	CMTU-195	DMTU-202	CMTU-195	DMTU-202	
II E	14.45	176.9	14.65	182.23	0.2	7.96	137.61	-48.49	137.41	-54.79	67
	CMTU-077	CMTU-109	CMTU-077	CMTU-109	CMTU-077	DMTU-151	CMTU-077	DMTU-198	CMTU-077	DMTU-198	
PARTING	31.87	182.23	39.15	184.69	0.17	7.7					52
	CMTU-037	CMTU-109	CMTU-037	CMTU-109	CMTU-206	CMTU-123					
II D	39.15	184.69	39.21	188.8	0.06	5.47	107.4	-56.86	107.34	-60.3	52
	CMTU-037	CMTU-109	CMTU-037	CMTU-109	CMTU-037	DMTU-147	CMTU-037	DMTU-198	CMTU-037	CMTU-109	
PARTING	39.21	268.04	57.42	275.08	2.66	29.54					58
	CMTU-037	DMTU-202	DMTU-134	DMTU-202	DMTU-063	CMTU-127					
II C	47.42	275.06	47.04	284.39	0.06	7.89	107.03	-150.27	106.91	-161.15	59
	DMTU-131	DMTU-202	DMTU-131	DMTU-202	CMTU-127	DMTU-202	DMTU-131	DMTU-202	DMTU-131	DMTU-202	
PARTING	47.54	282.96	75.96	293.67	5.89	48.58					55
	DMTU-131	DMTU-202	DMTU-131	DMTU-202	DMTU-179	DMTU-105					
II (A+B)	75.96	293.67	76.56	296.5	0.26	4.46	76.49	-171.86	77.89	-174.69	68
	DMTU-131	DMTU-202	DMTU-131	DMTU-202	DMTU-129	CMTU-001	DMTU-131	DMTU-202	DMTU-131	DMTU-202	
II B	46.6	219.42	46.75	220.5	0.09	1.49	113.53	-90.92	113.36	-92	20
	CMTU-075	CMTU-109	CMTU-075	CMTU-109	CMTU-037	CMTU-029	CMTU-075	CMTU-109	CMTU-075	CMTU-109	
PARTING	21.25	220.5	49.35	221.61	0.86	58.2					21
	CMTU-080	CMTU-109	CMTU-075	CMTU-109	CMTU-035	CMTU-080					
II A	49.35	221.61	49.85	223.1	0.12	2.12	110.78	-93.11	110.28	-94.6	24
	CMTU-075	CMTU-109	CMTU-075	CMTU-109	CMTU-082	CMTU-166	CMTU-075	CMTU-109	CMTU-075	CMTU-109	

2.2.3	Geological Block Area "Ha"	1144.90
2.2.4	Status of Exploration of the block	Fully explored

4/19/11/22

[Signature]

प्रकल्प अधिकारी
Project Officer

100% देशीय रॉय
महाराष्ट्र सरकार (उत्खनन)
जी.एम.सी.डी.आई.एन., क्षेत्रीय संस्करण-7

प्रकल्प अधिकारी
Project Officer
MCL, Subhadra Area
एम. सि. एल. सुभद्रा क्षेत्र

MCL, Subhadra Area

2.2.5	Area covered by 'detailed' exploration within the block (sq.km)	10.83
2.2.6	Whether entire lease area has been covered by 'detailed' exploration	No, by the definition of influence of 200m of bore hole, 1082.57 Ha is covered under "Proved" category
2.2.7	No. of boreholes drilled within the block	140
2.2.8	Whether any further exploration/study is required or suggested and time frame in which it is to be completed	Washability test may be carried out if washing is proposed in future. Time frame is not decided yet.
2.2.9	Year wise future programme of exploration	None
2.2.10	Overall borehole density within the block (no./sq.km) approx.	12.34
2.2.11	No of seams available as per GR (Geological Report)	20, including splits
2.2.12	Seams not considered for Mining with Reasons	VIB, IIC, IIB & IIA VIB, IIC, IIB & IIA are not developed within working area of the quarry, attains >1m thickness only below northern quarry slope and barrier
2.2.13	Dip of seam	3.48° (1 in 16.44) average
2.2.14	Seam wise thickness, depth and reserve	
Parameters		Details

Seam	Thickness Range "m"	Floor Depth range "m"	Net geological Res "Mt"	High well section	Avoid Meandering of Singhada Jhor River	Barrier	Un-economic	Total blocked	Min Res "Mte" UG	OC	Mining losses
Soil	0.00-17.00	0.00-17.00									
W.M.	0.00-20.55	2.30-29.35									
OB	3.00-75.90	3.00-75.90									
Seam XI	12.97-16.76	25.94-92.49	41.09	3.69	9.56	3.94		17.19	-	23.9	0.71
P	2.24-9.11	12.06-101.60									
Seam X	2.64-7.52	14.88-108.64	23.66	2.09	4.25	2.05		8.39	-	15.27	0.45
P	0.64-25.86	15.91-109.28									
Seam VIII+IX	42.30-48.72	75.94-126.02	71.49	16.34	1.57	3.83		21.44	-	50.05	1.5
Seam IX	20.47-35.26	39.54-142.40	188.14	10.91	16.06	7.9		34.87	-	153.27	4.6
P	0.38-7.19	13.21-144.26									
Seam VIII	4.36-14.36	15.54-156.71	95.44	6.39	6.61	3.36		16.39	-	79.05	2.38
P	3.33-30.03	26.65-160.04									
Seam VIB	0.28-7.03	14.21-166.51	44.87	5.29	3.38	1.87		10.54	-	34.33	1.02
P	7.00-18.59	26.61-174.35									
VIA	0.25-4.80	11.17-175.53	6.51	1.07	0.24	0.39		1.7	-	4.81	0.14
P	1.24-17.87	14.80-181.29									
VIS	0.13-5.15	13.60-181.98	0	0	0	0		0	-	0	0
P	1.49-13.65	21.96-187.11									
VIA+B)	7.21-12.51	77.45-156.11	31.44	4.63	0.04	0.75		5.42	-	26.02	0.78
VB	0.49-7.29	25.08-193.31	45.94	5.8	3.23	2.24		11.27	-	34.67	1.03
P	0.69-8.08	20.09-195.45									
VA	0.49-4.94	12.11-196.95	21.51	3.28	1.1	1.08		5.46	-	18.05	0.48
P	1.40-10.09	14.00-204.53									
IVB	0.95-8.62	11.74-207.68	79.08	12.56	3.81	3.59		19.96	-	59.12	1.77
P	2.14-15.18	14.22-213.81									
III(A+D+E)	16.49-27.61	113.25-241.42	81.26	11.5	12.82	1.98		26.3	-	54.96	1.64
III(D+E)	12.35-15.15	62.00-118.95	24.17	0.2	0	0		0.2	-	23.97	0.73
III E	0.65-10.06	15.02-161.86	29.06	6.11	0	2.54	0.16	8.81	-	20.25	0.6
III E TOP	0.32-3.03	16.29-181.10	9.55	1.99	0.04	0.24	0.18	2.45	-	7.1	0.21
P	0.45-3.16	11.10-182.39									
III (ATOP+ D+EBOT)	12.85-17.18	130.95-198.00	38.43	11.58	0.19	1.25		13.42	-	25.01	0.74
III(D+EBOT)	7.43-15.26	33.74-127.22	20.91	1.74	0	0.06		1.82	-	19.09	0.57
III EBOT	1.54-3.16	13.86-47.65	1.66	0.02	0	0		0.02	-	1.54	0.05
P	0.93-6.14	10.60-167.88									
IIIA+D)	8.15-16.36	119.15-176.53	24.92	7.28	0	2.3		9.58	-	15.34	0.45

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Mining Plan & Mine Closure Plan – Subhadra OCC
Modification-1, January 2022



IID	0.63-8.36	12.39-175.03	16.11	1.4	0	0.73	0.46	2.59	--	13.52	0.4
P	0.40-13.51	16.57-178.20									
IIA	0.28-7.54	21.45-180.20	17.79	2.13	0	0.72	0.05	2.9	--	14.89	0.44
IIATOP	0.15-3.29	15.08-118.85	1.38	0.06	0	0		0.06	--	1.32	0.04
P	0.81-3.40	16.82-121.75									
IIABOT	0.13-4.24	12.41-203.87	4.53	1.72	0.02	0.22		1.96	--	2.57	0.08
P	2.78-21.48	21.42-253.17									
I(D+E)	2.35-16.14	99.03-268.04	98.71	29.88	8.31	3.67		39.86	--	58.85	1.76
IE	0.20-7.96	14.65-182.23	31.26	2.87	0	0.66	0.85	4.38	--	26.9	0.81
P	0.17-7.70	39.15-184.69									
II	0.06-5.47	39.21-188.80	9.34	0.29	0	0.05		0.34	--	9	0.27
P	2.66-29.54	57.42-275.08									
IIIC	0.06-7.88	47.54-282.96	14.35	5.06	2.83	1.21	5.25	14.35	--	0	N.A
P	5.89-46.58	75.96-293.67									
II(A+B)	0.28-4.46	76.56-296.50	33.91	9.02	1.36	1.44	22.09	33.91	--	0	N.A
IIIB	0.09-1.49	46.75-220.50	0	0	0	0		0	--	0	
P	0.86-58.20	49.35-221.61									
IIA	0.12-2.12	49.85-223.10	1.86	0.62	0	0.03	1.21	1.86	--	0	N.A
Total			1106.39	165.62	73.42	48.15	30.25	317.44	--	790.95	23.65

Note: The figure of 790.95 has been arrived by deducting "Blocked Coal" from "Vertical Block boundary" and lower unworkable seams. While working in MINEX software, the reserve was separately estimated for "Quarry" only within mine model where this figure was reported as 792.54 Mt. All estimates are based on 792.54 Mt.

Quantity shown under head "Avoid Meandering of Singhada Jhor River" is for preservation of coal. The area is narrow. Attempt to mine from this project will cause loss of all coal below seam VIIIB (about 32 Mt). Total coal will be attempted from Balat-hadra Block (under MCL) by straightening Singhada Jhor River later.

Seam	Ext. Res Mte			As on base date "Mts"							Reason not considered for mining	
				Depletion of Reserve			Balance Reserve					
	UG	OC	High wall	UG	OC	High wall	UG	OC	High wall	Total		
Seam XI	--	23.60	--	--	--	--	--	23.60	--	--	23.60	
Seam X	--	15.01	--	--	--	--	--	15.01	--	--	15.01	
VIII+IX	--	48.88	--	--	--	--	--	48.88	--	--	48.88	
IX	--	148.89	--	--	--	--	--	148.89	--	--	148.89	
VIII	--	76.88	--	--	--	--	--	76.88	--	--	76.88	
VIIIB	--	33.31	--	--	--	--	--	33.31	--	--	33.31	
VIIA	--	4.66	--	--	--	--	--	4.66	--	--	4.66	
VIB	--	--	--	--	--	--	--	--	--	--	--	No calculable quantity
VB	--	25.29	--	--	--	--	--	25.29	--	--	25.29	
VA	--	33.62	--	--	--	--	--	33.62	--	--	33.62	
IVB	--	15.59	--	--	--	--	--	15.59	--	--	15.59	
III(A+D+E)	--	57.49	--	--	--	--	--	57.49	--	--	57.49	
III(D+E)	--	53.64	--	--	--	--	--	53.64	--	--	53.64	
IIIE	--	23.19	--	--	--	--	--	23.19	--	--	23.19	
IIIE TOP	--	19.69	--	--	--	--	--	19.69	--	--	19.69	
III (ATOP+D+EBOT)	--	6.83	--	--	--	--	--	6.83	--	--	6.83	
III(D+EBOT)	--	18.49	--	--	--	--	--	18.49	--	--	18.49	
III EBOT	--	24.31	--	--	--	--	--	24.31	--	--	24.31	
III(A+D)	--	1.58	--	--	--	--	--	1.58	--	--	1.58	
IID	--	14.93	--	--	--	--	--	14.93	--	--	14.93	
IIA	--	13.12	--	--	--	--	--	13.12	--	--	13.12	
IIATOP	--	14.43	--	--	--	--	--	14.43	--	--	14.43	
II(D+E)	--	57.18	--	--	--	--	--	57.18	--	--	57.18	
II E	--	25.87	--	--	--	--	--	25.87	--	--	25.87	
IID	--	8.61	--	--	--	--	--	8.61	--	--	8.61	
IIIC	--	--	--	--	--	--	--	--	--	--	--	Not developed within working area of the quarry, attains >1m thickness only below northern quarry slope and barrier
II(A+B)	--	--	--	--	--	--	--	--	--	--	--	
IIIB	--	--	--	--	--	--	--	--	--	--	--	No calculable quantity
IIA	--	--	--	--	--	--	--	--	--	--	--	Not developed within working area of the quarry, attains >1m thickness only below northern quarry slope and barrier
TOTAL	--	768.83	--	--	--	--	--	768.83	--	--	768.83	

Note: The above figure of 768.83 has been arrived in MINEX software, when reserve was separately estimated for "Quarry" only within mine model. Applying 3% Mining Loss on "Mineable Reserve" of previous table (790.95), the figure would have been 767.30. All further calculations are based on 768.83 Mt.

Chapter-2 Geology

Page:- 8

सहायक (उत्खनन)
सी.एम.पी.डी.आई.एल., क्षेत्रीय संस्करण-7

19/1/22
प्रकल्प अधिकारी
Project Officer
MCL, Subhadra Area
एम्. सि. एल. सुभद्रा क्षेत्र

प्रकल्प अधिकारी
Project Officer
MCL, Subhadra Area
एम्. सि. एल. सुभद्रा क्षेत्र

2.2.15 Methodology of reserves estimation (also mention if any software package has been used)

Bore hole data were interpreted from proximate analysis (I₁₀₀) and floor/roof of seams were finalized. Coal seams were then correlated. Band thicknesses were deleted from seam thickness to arrive at effective thickness. Both spatial and interpreted seam data were entered into MINEX software database.

With software interface and manual interpretation, deposit structure with faults and incrops were established.

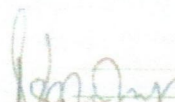
Through MINEX software, volumes of each seam and parting/OB above the seam are found out in tabular form through 'Detailed Resource Reporting' menu. Band volume is added to OB above seam through built-in process.

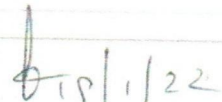
Different specific gravities are assigned to different grades of GCV as below.

GCV WISE AND GRADE/BAND-WISE SPECIFIC GRAVITY OF COAL CONSIDERED			
SL	GCV RANGE/BAND	GRADE NAME	SPECIFIC GRAVITY
1	Exceeding 7000	G-1	1.37
2	Exceeding 6700 and not exceeding 7000	G-2	1.41
3	Exceeding 6400 and not exceeding 6700	G-3	1.43
4	Exceeding 6100 and not exceeding 6400	G-4	1.47
5	Exceeding 5800 and not exceeding 6100	G-5	1.5
6	Exceeding 5500 and not exceeding 5800	G-6	1.53
7	Exceeding 5200 and not exceeding 5500	G-7	1.57
8	Exceeding 4900 and not exceeding 5200	G-8	1.6
9	Exceeding 4600 and not exceeding 4900	G-9	1.62
10	Exceeding 4300 and not exceeding 4600	G-10	1.66
11	Exceeding 4000 and not exceeding 4300	G-11	1.7
12	Exceeding 3700 and not exceeding 4000	G-12	1.72
13	Exceeding 3400 and not exceeding 3700	G-13	1.75
14	Exceeding 3100 and not exceeding 3400	G-14	1.78
15	Exceeding 2800 and not exceeding 3100	G-15	1.82
16	Exceeding 2500 and not exceeding 2800	G-16	1.86
17	Exceeding 2200 and not exceeding 2500	G-17	1.88

The following formula is considered for high moisture non-coking coal, by taking average ash% for each grade: $Sp. Gr. = 1.29 + 0.01 \times Ash\%$

Mining pits (final and stages) were designed through MINEX software. The mining pit is a sub-set of geological model where extractable reserves were found


Chapter-2 Geology
देवाशीव रोय (उत्तरांचल)
महाप्रबंधक (उत्तरांचल)
जी.एम.सी.डी.आई.एन., देवाशीव संस्थान-7
प्रकल्प अधिकारी
Project Officer
MCL, Subhadra Area
एम. सि. एल. सुभद्रा क्षेत्र
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प्रकल्प अधिकारी
Project Officer
MCL, Subhadra Area
एम. सि. एल. सुभद्रा क्षेत्र

out for the stages. A scheduling was also performed with strips and blocks to optimize mine advance and temporary dump formation.

Coal blocked in barriers, batters and for other factors were also estimated similarly in the area concerned.

BASIC ASSUMPTIONS FOR RESOURCE ESTIMATION:

1. Quantitative and qualitative assessment of seam is based on the effective thickness of seam. All dirt bands 1m and above in thickness and thin coal/shaly coal bands sandwiched in thick dirt bands with cumulative thickness of 1m and above have been excluded from the total thickness of coal seams.
2. Since the original Geological report was based on UHV method of grading system, calculated GCV wherever determined GCV is not available has been considered for grade-wise reserve estimation in GCV system.
3. Grade-wise specific gravity has been considered for converting volume of coal into tonnage.
4. Reserve has not been calculated from the areas where seam thickness is less than 1m.
5. A deduction of 3% has been made for unforeseen geological uncertainty to obtain the net geological reserve of the seam.
6. Geovia Minex software has been used for estimation of reserve and overburden as per standard practice.
7. Average Mining Loss considered is 3% over Mineable Reserve within quarry

LIMITATIONS

1. Ash plus Moisture values considered for different categories of coal and other lithotypes are: Coal: (Ash+Moisture) upto 40 %; Shaly coal: (Ash + Moisture) > 40% upto 55 %; Carbonaceous Shale: (Ash + Moisture) > 55 % upto 75 %; Shale: (Ash+ Moisture) above 75%. High Carbonaceous Shale i.e. (Ash+Moisture) >65% upto 75% has not been taken into consideration while preparing this report.
2. Calculated GCV has been considered wherever determined GCV is not available.

3. Original correlation as available in referenced Geological report, has been modified in some cases in order to avoid isolated zone of development with less no. of boreholes and to make proper zone of seam development and for modeling purpose in Minex software.

2.2.16	Average GCV "Kcal/kg"	3690, G-13
2.2.17	Gross Geological Reserve of the block "Mte"	1142.67
2.2.18	Net Geological Reserve of the block "Mte"	1108.46
2.2.19	Mineable Reserve of the block "Mte"	790.95
3.2.20	Blocked Reserve "Mte"	317.51
3.2.21	Corresponding extractable reserve of the block "Mte"	768.83
3.2.22	Percentage of Extraction	67.28 (Extractable upon Gross)
3.2.23	Reserve already depleted (base date of Mining Plan)	Nil
3.2.24	Balance Reserve (as on Base Date)	768.83 Mt


प्रकल्प अधिकारी
Project Officer

MCL, Subhadra Area
एम. सि. एल. सुभद्रा क्षेत्र

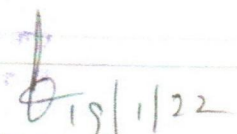

Chapter 2 Geology

18/01/22
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सी.एस.पी.डी.आई.एल., क्षेत्रीय संस्थान-7

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Project Officer

MCL, Subhadra Area
एम. सि. एल. सुभद्रा क्षेत्र

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Chapter - 3

MINING

3.1 MINING METHOD

3.1.1 Existing Method of Mining if the mine is under operation

Mine is not under operation.

3.1.2 Proposed method of mining with justification on suitability of method of mining

Seams to be worked

Seam Name	Splits	Combinations
XI	None	None
X	None	None
IX	None	With VIII
VIII	None	With IX
VII	VIIB & VIIA	None
V	VB & VA	Combined at some places
IVB	None	None
III	III E Top, III E Bottom, III D, III A Top, III A Bottom	A+D+E, D+E, E, A Top+D+E Bottom, D+E Bottom, A+D
II	IIE & IID	D+E

Choice of Mining Method

Open cast Mining with full mechanization by deploying high capacity shovels, drills, surface miners, loaders and matching dumpers.

Justification for Optimization of targeted capacity

Coal is to be transported by rail/ ship to various power plants all over India as part of overall Coal India Limited. After estimating overall demand from this coalfield, evacuation & carrying capacity of existing and proposed rail infrastructure and technical feasibility of annual face advance of mine working, the rated capacity was decided to be 25 Mt.

Sequence of mining

Considering proper conservation of coal, economy of the project and maximum backfilling, excavation will begin in two quarries. It is observed that thick partings lie between seams V and VIIA, seams VIIA and VIIB to VIII. Other partings in

प्रकल्प अधिकारी
Project Officer
MCL, Subhadra Area
एम. सि. एल. मुम्बई

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महाराष्ट्र
सी. एम. सी. डी. आर्. एल., क्षेत्रीय संस्थान-7

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प्रकल्प अधिकारी
Project Officer
MCL, Subhadra Area
एम. सि. एल. मुम्बई

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selective mining of bands and for wide variations in strata thicknesses from 1 m to more than 30m.

Two sizes of hydraulic excavators have been proposed in OB. 10-11 cum face shovel/backhoe having 900-1000 HP (rated) will work with 100 T rear dumper. 6-7 cum hydraulic shovel will work with 60T rear dumpers. Electrical version is proposed for 10.5cum shovel as electricity is cheaper and causes less pollution. Surface Miner of 2.5-4m wide drum fitted with 220-1000 HP

between lower seams are also thick towards rise side. Attempt to start only from south side will face very high requirement of overburden removal in the beginning and will not be economically optimum. Seams VIII and IX are thick with low stripping ratio. Extraction of only upper seams will surely earn high return but will render lower seams towards rise side uneconomical. Extraction up to lowest workable seam starting near incrop of seam VIII was also studied but backfilling starts very late and requirement of outside dump is very high. If lower and upper seams are extracted in such combination such that stripping ratio can be maintained at sustainable level, the objectives of preservation, economy and maximize backfilling are fulfilled. Extraction of upper seams (named UPPER QUARRY) will start from incrop of seam VIII whereas extraction of lower seams (named MAIN QUARRY) will commence from final southern boundary as proposed.

With improvement in stripping ratio for lower seams towards dip side, production from Main Quarry will be increased with consequent reduction from Upper Quarry, ultimately merging them in Yr. P-9. Coal extracted from Upper Quarry is 47.59 Mt at stripping ratio of 0.55 cum/t. During this period, coal extracted from Main Quarry is 173.52 Mt at stripping ratio of 1.47 cum/t. Main Quarry will continue towards dip direction.

Production scheduling

First two years are proposed for construction activities after getting 'Consent to Establish'. Mine is planned to achieve its target capacity in five years from start of coal production. So, out of 34 years of production, 4 years are built-up, 28 years are for rated production and 2 years are of tapering.

Equipment configuration

For better management and higher capacity utilization, larger size excavators have been proposed. The compressive strength of overburden lies generally within 250-350 kg/cm² which can be easily drilled and blasted. There is no adverse report of boulder formation in neighboring mines. Hydraulic shovels of high capacities are available from various manufacturers. When compared with rope shovels, they are better in maneuverability and have lesser cycle time. Their modular design guarantees higher availability. They are also most useful for

प्रकल्प अधिकारी
Project Officer
MCL, Subhadra Area
एम. सि. एल. सुभद्रा क्षेत्र

Chapter 13 Mining

महाप्रबंधक (उत्खनन)

सी.एस.पी.डी.आई.एल., क्षेत्रीय संस्करण-7

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प्रकल्प अधिकारी
Project Officer

are at 30m vertical intervals matching with levels of internal dump tiers. Dumpers carrying OB will travel along benches towards east to meet the flank roads. Temporary ramps may be required to reach the nearest levels of flank roads.

There is possibility of liquidating the western batter and barrier in consultation with owners of adjacent workings.

selective mining of bands and for wide variations in strata thicknesses from 1 m to more than 30m.

Two sizes of hydraulic excavators have been proposed in OB. 10-11 cum face shovel/backhoe having 900-1000 HP (rated) will work with 100 T rear dumper. 6-7 cum hydraulic shovel will work with 60T rear dumpers. Electrical version is proposed for 10.5cum shovel as electricity is cheaper and causes less pollution. Surface Miner of 3.5-4m wide drum fitted with 900-1000 HP engine in windrowing method is proposed for coal cutting. Loose coal will be heaped and loaded by FELs with bucket size of 6.5-6.7cum onto 60T rear dumpers. Provision has been kept for 5% coal to be drilled and blasted at ramps created by surface miner. Drilled & blasted coal will be handled by FELs.

Two types of drills have been proposed. These are 250 mm and 160 mm categories. 250 mm drills will be deployed for benches of 7-14 m, 160 mm drills are for benches up to 7m. Electric version is proposed for 250mm drill.

Dozers of 850 HP with rippers in two machines and 410 HP have been provided. At places ripping-dozing and loading by front-end-loaders have to done for seams/partings around 1-2 m thick. Other supporting equipment like graders, cranes, tyre-handler etc, of appropriate sizes have been provided.

For "MDO" variant, the mine operator may have some flexibility in selecting equipment configuration and minimum sizes may be prescribed by the mine owner at the time of tendering.

Brief description of all operations

Winning

Surface Miner of 3.5-4m wide drum fitted with 900-1000 HP engine in windrowing method is proposed for coal cutting. Loose coal will be heaped loaded by FELs with bucket size of 6.5-6.7cum onto 60T rear dumpers. Provision has been kept for 5% coal to be drilled and blasted at ramps created by surface miner. Drilled & blasted coal will be handled by FELs.

Transport

The 500 KV DC power line cannot be dismantled or relocated. There is no possibility of liquidating the eastern batter and barrier. So, the eastern quarry slope will be filled progressively as the mine advances towards north. Flank roads are proposed on eastern slope for hauling OB to internal dump. The flank roads

प्रकल्प अधिकारी
Project Officer

MCL, Subhadra Area
एन. सि. एल. क्षेत्र

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सो. एम. पी. जी. आई. एल., क्षेत्र संस्करण-7

18/01/22
प्रकल्प अधिकारी
Project Officer
MCL, Subhadra Area
एन. सि. एल. क्षेत्र

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are at 30m vertical intervals matching with levels of internal dump tiers. Dumpers carrying OB will travel along benches towards east to meet the flank roads. Temporary ramps may be required to reach the nearest levels of flank roads. There is possibility of liquidating the western batter and barrier in consultation with owners of adjacent western blocks. So, floor haul road is proposed along the western floor boundary of the quarry.

Coal will be carried to level roads on western slope by dumpers and to surface through western flank roads, then through floor haul road up to receiving hoppers, near to quarry mouth. From there, series of conveyors will carry coal up to two over-ground bunkers. Another series of conveyors will transport coal to sets of surge bins for loading onto rail wagons. Provision has been kept for Feeder Breaker of 1.25 Mt annual capacity to handle drilled and blasted coal at surface near mine entry.

Due to repeated faulting of the geological structure, the floor haul road will need filling and cutting required to maintain constant gradient of 1 in 16. Major uses floor haul road are transport, installation and maintenance of main pumps at sump.

OB from Upper Quarry will be kept in temporary external dump. Roads are proposed near both east and west boundaries. The eastern road will be used to carry back re-handled dump OB to void of Main Quarry. Part of OB from Main Quarry during initial years will also be kept in temporary external dump towards north. Transport of this OB is proposed by eastern boundary.

Blasting

Soil and 75% of weathered mantle will not require drilling and blasting. Re-handled OB is also not considered for blasting. Hard OB will be drilled for blasting. Thick partings and OB of more than 7m will be drilled by 250mm electric drills and thinner partings of 3-7m height will be drilled by 160 mm diesel drills. Drilling and blasting parameters are to be arrived after conducting a series of trial blasts.

Following blasting pattern is tentatively suggested based on the average powder factors of mines of Talcher Coalfield as 2.46 cum of OB per kg of explosive as in 2017.

प्रकल्प अधिकारी
Project Officer
MCL, Subhadra Area
एच. सि. एल. सुभद्रा क्षेत्र

18/01/22
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सी.एस.सी.डी.आई.एल. क्षेत्रीय संस्करण-7
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18/01/22
प्रकल्प अधिकारी
Project Officer

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एच. सि. एल. सुभद्रा क्षेत्र

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Blasting pattern

Description	Bench height	Blasting pattern
Overburden	13-15m	9.5m x 7.5m
Overburden	11-13m	8.5m x 6.5m
Overburden	9-11m	7.5m x 5.5m
Overburden	3-9m	6.5m x 5m

Sight-mix-slurry explosives will be used for better contact inside blast hole. Explosives may be outsourced but blasting will be done mandatorily under supervision of owner's competent persons.

Overburden removal and disposal

Soil and 75% of weathered mantle will not require drilling and blasting. Re-handled OB is also not considered for blasting. Hard OB will be drilled for blasting. Thick partings and OB of more than 7m will be drilled by 250mm electric drills and thinner partings of 3-7m height will be drilled by 160 mm diesel drills.

Hydraulic shovels of 10-11cum bucket are proposed for thick partings while hydraulic shovels with 6-7cum bucket are proposed for thin partings.

OB from 'Upper Quarry' will be stored at temporary dump on surface within future excavation area, which will run for 9 years. Backfilling in 'Main Quarry' will start in 2nd year of production but can accommodate part of OB removal only. So, simultaneous backfilling with temporary storage on surface will continue till 11th production year.

From 12th production year, OB from temporary dump on surface will be brought back into mine void and simultaneously, all fresh OB removed will also be backfilled completely.

All dumps will be made in tiers of 30m height with 30m berm in between. Overall slope angle will not be more than 28°. Top of dump will be maintained with gentle slope to drain off rain water.

प्रकल्प अधिकारी
Project Officer
MCL, Subhadra Area
एम. सि. एल. सुभद्रा क्षेत्र

Life of the mine furnishing the assumptions made and the detailed computations

Life of the mine: 36 years, including two construction years without coal or OB removal.

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सहायक (उत्खनन)

सी.एस.पी.सी.आई.एन., सेक्टर 7
Chapter-3 Mining

19/1/22

प्रकल्प अधिकारी
Project Officer
MCL, Subhadra Area
एम. सि. एल. सुभद्रा क्षेत्र

महेश्वर प्रसाद
सी.एस.पी.सी.आई.एन.
सेक्टर 7

Assumptions made:

Within two years' of construction period,

- MCRL will lay rail corridor
- CHP and other infrastructure will be complete
- Work order for MDO will be issued
- Consent to operate is obtained. It proceeds approval of Project Report, Mining Plan, EMP, Forest clearance, NPV payment, tree felling etc.
- Required land for year wise operation is under physical possession
- Mine will produce coal as per planned program

Location of Mine Opening

Access trench & selection of site thereof

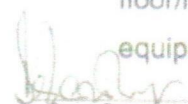
The reasons for two quarries have been explained above. Both the quarries will start simultaneously. They will have separate access trenches. Locations of access trenches were decided based on seam thicknesses, initial depth, alignment of haul road inside mine, planning of internal dump and minimum obstruction from surface features.

Access trench for Main Quarry is proposed towards west, as haul road will be aligned along western boundary. The initial quarry depth is lowest here. Attention has been given to avoid forest land near mine entry as much as possible.

Access trench for Upper Quarry is proposed centrally to strike width. Though eastern side is more suitable because Main Quarry will take longer time to reach this part, but anticipating longer time taken for rehabilitation of displaced village towards east, access near village has been avoided. It is estimated that access trench for Upper Quarry can continue up to Yr.-11 before excavation by Main Quarry merges with Upper Quarry. By this time, link between Upper and Main Quarries can be established by excavating about 12 m of top overburden along western boundary.

Mining system (geometry and bench parameters)

Benchs will be aligned along general strike. Bench floor should follow own seam floor/roof or that of adjacent seam. Main bench parameters for above mentioned equipment are:


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महोपायुक्त (उत्खनन)
सी.एस.पी.डी.आई.एल., क्षेत्रीय संस्करण-7