

Ref: BCCL/CMC/Corrig./SOR-2025/ 242

दिनांक: 05.08.2025

To,  
The General Manager All Areas/Washeries,  
BCCL Dhanbad

**Subject:- Corrigendum to Schedule of rates (SOR-2025) approved for Coal transportation and Hiring of HEMM for removal of OB, extraction and transportation of Coal including allied jobs and drilling, prepared by National Productivity Council, Patna.**

As per competent approval, SOR-2025 was communicated by undersigned vide office order BCCL/CMC/SOR-2025/193 dated 10.07.2025.

Rounding off errors in some of the element of the composite rates for 'Extraction & transportation of coal' have been corrected. The same have been approved by CFD's of BCCL in their meeting held on 29.07.2025 vide item number PoT-4.

Revised 'Extracts of SOR-2025' submitted by National Productivity Council, Patna is attached for circulation among executing authorities for needful actions at their end.

Approved SOR-2025 will be effective for a period of 03 (three) years w.e.f 1<sup>st</sup> July 2025.

Yours Faithfully



5/8/25  
GM(CMC)

Copy To:

1. D(T)OP/ D(T) P&P /D(F)/ CVO, BCCL
2. TS to CMD – for information to CMD
3. GM (Fin.)I/c /GM (M&S)/GM (IA)/GM (IE)/GM(P&P)/GM(Excv.)/GM(E&M)/GM(Envir.)/GM(Civil)/GM(MM)/HoD(C&B).
4. Sri R.K. Choubey, Sr.DEO/ Sri Bholanath Banerjee, Jr.DEO CMC Dept. - to upload it on BCCL Website.

पंजीकृत कार्यालय : संविदा प्रबंधन प्रकोष्ठ, पाँचवा तल, कोयला भवन, कोयला नगर, बीसीसीएल टाउनशिप, धनबाद, झारखंड -826005,

**Registered Office:** Contract Management Cell, Level-V, Koyla Bhawan, Koyla Nagar, BCCL Township, Dhanbad, Jharkhand-826005

फोन / Phone: 0326-2236000, ई मेल/E-Mail : [gmcml.bcl@coalindia.in](mailto:gmcml.bcl@coalindia.in), वेबसाइट/ Website: [www.bcclweb.in](http://www.bcclweb.in), CIN-U10101JH1972GOI000918

Ref: BCCL/CMC/SOR-2025/193

दिनांक: 10.07.2025

To,  
The General Manager All Areas/Washeries,  
BCCL Dhanbad

**Subject:- Implementation of Schedule of rates (SOR-2025) for Coal transportation and Hiring of HEMM for removal of OB, extraction and transportation of Coal including allied jobs and drilling, prepared by National Productivity Council, Patna.**

This is to communicate the approval of subject matter by CFD's of BCCL in their meeting held on 09.07.2025 vide item number 10A.

Extracts of SOR-2025 submitted by National Productivity Council, Patna is attached for circulation among executing authorities for needful actions at their end.

Approved SOR-2025 will be effective for a period of 03 (three) years w.e.f 1<sup>st</sup> July 2025.

This will supersede earlier approved SOR and its modalities, if any.

Yours Faithfully

  
10/7/25  
GM(CMC)  
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Copy To:

1. D(T)OP/ D(T) P&P /D(F)/ CVO, BCCL
2. TS to CMD – for information to CMD
3. GM (Fin.)I/c /GM (M&S)/GM (IA)/GM (IE)/GM(P&P)/GM(Excv.)/GM(E&M)/GM(Envir.)/GM(Civil)/GM(MM)/HoD(C&B).

पंजीकृत कार्यालय : संविदा प्रबंधन प्रकोष्ठ, पाँचवा तल, कोयला भवन, कोयला नगर, बीसीसीएल टाउनशिप, धनबाद, झारखंड -826005,

**Registered Office:** Contract Management Cell, Level-V, Koyla Bhawan, Koyla Nagar, BCCL Township, Dhanbad, Jharkhand-826005

फोन / Phone: 0326-2236000, ई मेल/E-Mail : [gmcmmc.bccl@coalindia.in](mailto:gmcmmc.bccl@coalindia.in) , वेबसाइट / Website: [www.bcclweb.in](http://www.bcclweb.in), CIN-U10101JH1972GOI000918

Report

# **SCHEDULE OF RATES**

For

**Hiring of HEMM for removal  
of OB and  
Extraction and transportation of coal  
including allied jobs**



CONTRACT MANAGEMENT CELL

**BHARAT COKING COAL LTD.**

**DHANBAD**

*Prepared by*



**National Productivity Council**

**Boring Road Crossing, Patna 800 001**

**☎ 0612-2558311**

**E-Mail: [patna@npcindia.gov.in](mailto:patna@npcindia.gov.in)**

**url: [www.npcindia.gov.in](http://www.npcindia.gov.in)**

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**SOR is based on the following considerations:**

1. Coal transportation tipper considered in SOR is with net carrying capacity of **20 tonnes** per trip for surface to surface coal transportation and that of face to surface is **20 tonnes** per trip.
2. **Diesel Base Price** : Rs. 92.60 per Liter (May-2024)
3. **High power committee wages** of CIL for contractors workers engaged in mining activities (High Power Wage Committee report: Notification No: CIL/C-5B/JBCCI/JC/VDA/194 dated: 23.04.2024)

<u>Details of Wage element</u>	<u>Unskilled</u>	<u>Supervisory/ semi skilled</u>	<u>Skilled</u>	<u>Highly Skilled</u>
Basic Rate of Wages	1176	1206	1236	1266
V.D.A.	66	68	69	71
Rate of Wages including VDA.	1242	1274	1305	1337
PF 12 % & 7% pension benefit and bonus wherever applicable as per bonus act *	235.98	242.06	247.95	254.03
Total Rs.	1477.98	1516.06	1552.95	1591.03

4. **Minimum wage as notified by govt. of Jharkhand** for the contract workers engaged in activities other than mining.
5. **Minimum wage as notified by govt. of India** for the contract workers engaged in civil works vide notification no. :

( Office of chief labour comissioner ( C), Ministry of Labour & Employment, Governement of India : Notification No: 1/7(1)/ 2024-LS-II dated: 01/04/2024)

For C-Class city

For per day hiring of fog cannon and mechanical sweeper (Skilled employee)

<u>Details of Wage element</u>	<u>Unskilled</u>	<u>Supervisory/ semi skilled</u>	<u>Skilled</u>	<u>Highly Skilled</u>
Minimum Wages	350	410	<b>494</b>	579
D.A.	172	200	<b>240</b>	283
Basic minimum wage	522	610	<b>734</b>	862
PF 12 % & 7% pension benefit and bonus wherever applicable as per bonus act *	99.18	115.9	<b>139.46</b>	163.78
Total Rs.	621.18	725.90	<b>873.46</b>	1025.78

**\*Note:- Bonus Amount have not been added wherever salary or wage of employee exceeded Rs. 21,000 per month, as per bonus act.**

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**Payment of Toll and any other Govt. Taxes/ Levies/ Charges:**

➤ Payment of toll taxes are applicable on coal transportation routes having toll plazas. Since this is not prevalent in majority of routes, it has not been considered while formulating SOR for coal transportation. Payment of such charges as Toll charge and any other govt. taxes/ Levies/ Charges may be done on actual basis on routes where such charges are applicable.

➤ Further, it has been assumed that presence of Toll plazas in coal transportation route may not have any impact on the travel time of the tipper, as a dedicated route can be finalized in consultation with Toll plaza authorities for allowing unhindered movement of coal transporting tippers. The payment of toll charges can be either done through auto debit system with RFID tags of the vehicle, or it can be finalized on monthly /annual lumpsum amount for such vehicles, as deemed fit.

**SCHEDULE OF RATES FOR COAL TRANSPORTATION AND HIRING OF HEMM FOR REMOVAL OF OB,  
EXTRACTION AND TRANSPORTATION OF COAL INCLUDING ALLIED JOBS AND DRILLING.**

**A. Transportation of coal**

Item No.	Description	Lead (km)	Rate (Rs./Te.)
A.1	Transportation of coal (surface to surface-S2S): Transportation of coal by contractor's tipping trucks from ..... To ..... including weighment at one end, security check & challan generation and receiving at both ends as per direction of Engineer in charge.	0-1 km	20.70
		1-2 km	33.40
		2-3 km	45.04
		3-4 km	55.78
		4-5 km	66.20
		5-6 km	76.26
		6-7 km	86.14
		7-8 km	95.67
		8-9 km	105.15
		9-10 km	114.47
		10-11 km	123.65
		11-12 km	132.69
		12-13 km	141.67
		13-14 km	150.54
		14-15 km	159.36
		15-16 km	168.08
		16-17 km	176.65
		17-18 km	185.23
		18-19 km	193.74
		19-20 km	202.22
		20-21 km	210.66
		21-22 km	219.02
		22-23 km	227.34
		23-24 km	235.62
		24-25 km	243.86

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		25-26 km	252.05
		26-27 km	260.22
		27-28 km	268.34
		28-29 km	276.44
		29-30 km	284.47
		30-31 km	292.51
		31-32 km	300.58
		32-33 km	308.47
		33-34 km	316.49
		34-35 km	324.31
		35-36 km	332.28
		36-37 km	340.13
		37-38 km	347.97
		38-39 km	355.79
		39-40 km	363.58
A.1.1	Rate of weighment per occasion	Rs./tonne	0.72
A.1.2	Extrapolation equation to derive the coal transportation rates for the leads above 40 kms. Y is the surface to surface coal transportation rate (Rs./tonne) at the required lead X (mid point of lead Slab in kms.) not greater than 50 kms. $Y = 7.89 X + 51.92; X \leq 50 \text{ kms.}$		

Item No.	Description	Lead (km)	Rate (Rs./Te.)
A.2	<b>Transportation of coal (Face to surface-F2S):</b> Transportation of coal by contractor's tipping trucks from ..... To ..... including weighment at one end, security check & challan generation and receiving at both ends as per direction of Engineer in charge.	0-1 km	31.80
		1-2 km	38.72
		2-3 km	49.31
		3-4 km	59.59
		4-5 km	69.37
		5-6 km	78.88
		6-7 km	88.09
		7-8 km	97.15
		8-9 km	106.03
		9-10 km	114.66

Contractual Loading of Coal by contractor's payloaders into contractors tipping trucks at different loading points

Item No.	Description	Rate (Rs.)
A.3.1	Cost of loading of coal into Tippers at stock yard by Payloader per tonne of coal	9.22
A.3.2	Cost of loading of coal into wagons by Payloader per tonne of coal	10.72

Loading of coal into tippers at face by excavator

Item No.	Description	Rate (Rs./Te.)
A.4	Cost of loading of coal into tippers at face by excavator per tonne of coal	14.97

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Loading of washery products (slurry, tailings from ponds) by excavator

Item No.	Description	Rate (Rs./Te.)
A.5	Cost of loading of washery product into tippers by excavator per tonne of coal	14.40

Unloading of coal (mechanical unloading and manual cleaning of wagons with allied jobs such as opening/ closing of wagon doors, cleaning of tracks etc.) from rake of BOXN wagons within railway free time

Item No.	Description	Rate (Rs./Te.)
A.6	Cost of mechanical unloading of coal from wagons with allied jobs	18.22

Picking of extraneous materials from coal

Item No.	Description	Rate (Rs./Te.)
A.7	Cost of picking of extraneous materials from coal per tonne of coal	31.68

Contractual Crushing of Coal into specified size ( less than 100 mm/200 mm) by contractor's Crusher

Item No.	Description	Rate (Rs./Te.)
A.8	Cost of Crushing of ROM coal by Electric mobile crusher into less than 100 mm / 200 mm sizes (Rs./Te)	12.25

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**B. Removal of Over burden and transportation**

Item No.	Description	Lead (km)	Rate (Rs./cu.m)
B.1	<b>In-situ Soft OB:</b>  Hiring of HEMM for soft OB for all kinds of soil/ rocks (consisting of top soil, alluvium soil, blast rock, etc) including excavation of OB , loading & transportation of excavated OB, dumping in dump yard, dozing, grading, levelling at dump sites including face & other specified places, preparation & maintenance of haul roads, water sprinkling on haul road as per instruction of the Engineer-in-charge	0-1 km	80.21
		1-2 km	91.69
		2-3 km	107.66
		3-4 km	122.86
		4-5 km	137.33
		5-6 km	151.39
		6-7 km	164.96
		7-8 km	178.26
		8-9 km	191.27
		9-10 km	204.09

B.2	<b>In-situ Hard OB (With drilling):</b>  Hiring of HEMM for removal of OB for hard strata requiring blasting including, drilling, excavation of OB strata, loading & transportation of excavated OB, dumping in dump yard, dozing, grading, levelling at dump sites including face & other specified places, preparation & maintenance of haul roads & water sprinkling on haul road as per instruction of the Engineer-in-charge.	0-1 km	101.82
		1-2 km	122.59
		2-3 km	143.25
		3-4 km	162.90
		4-5 km	181.59
		5-6 km	199.79
		6-7 km	217.37
		7-8 km	234.62
		8-9 km	251.49
		9-10 km	268.11
		10-11 km	284.47
		11-12 km	300.59
		12-13 km	316.55
		13-14 km	332.31
		14-15 km	347.88

B.3	<b>Re- Handling of OB:</b>  Hiring of HEMM for re-handling of OB for all kinds of soil/ rocks (consisting of top soil, alluvium soil, blast rock, etc) including excavation of OB , loading & transportation of excavated OB, dumping in dump yard, dozing, grading, levelling at dump sites including face & other specified places, preparation & maintenance of haul roads, water sprinkling on haul road as per instruction of the Engineer-in-charge	0-1 km	58.34
		1-2 km	74.67
		2-3 km	91.15
		3-4 km	107.15
		4-5 km	122.73
		5-6 km	138.06
		6-7 km	153.07
		7-8 km	167.97
		8-9 km	182.67
		9-10 km	197.26

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B.2.1	<b>In-situ Hard OB using vertical ripper:</b>  Hiring of HEMM for removal of OB for hard strata requiring ripper including, excavation of OB strata, loading & transportation of excavated OB, dumping in dump yard, dozing, grading, levelling at dump sites including face & other specified places, preparation & maintenance of haul roads & water sprinkling on haul road as per instruction of the Engineer-in-charge	0-1 km	143.57
		1-2 km	164.34
		2-3 km	185.00
		3-4 km	204.65
		4-5 km	223.34
		5-6 km	241.54
		6-7 km	259.12
		7-8 km	276.37
		8-9 km	293.24
		9-10 km	309.86

#### Extraction of coal and transportation

B.4	<b>Extraction &amp; transportation of coal (with drilling):</b>  Hiring of HEMM for extraction of coal including drilling, transportation to coal stock, dozing, grading, levelling at stock sites including face & other specified places, preparation & maintenance of haul roads, water sprinkling on haul road as per instruction of the Engineer-in-charge	0-1 km	66.02
		1-2 km	72.94
		2-3 km	83.53
		3-4 km	93.81
		4-5 km	103.59
		5-6 km	113.1
		6-7 km	122.31
		7-8 km	131.37
		8-9 km	140.25
		9-10 km	148.88

B.4.1	<b>Extraction &amp; transportation of coal without drilling:</b>  Hiring of HEMM for extraction of coal without drilling, transportation to coal stock, dozing, grading, levelling at stock sites including face & other specified places, preparation & maintenance of haul roads, water sprinkling on haul road as per instruction of the Engineer-in-charge	0-1 km	58.47
		1-2 km	65.39
		2-3 km	75.98
		3-4 km	86.26
		4-5 km	96.04
		5-6 km	105.55
		6-7 km	114.76
		7-8 km	123.82
		8-9 km	132.7
		9-10 km	141.33

B.4.2	<b>Extraction &amp; transportation of coal using vertical ripper:</b>  Hiring of HEMM for extraction of coal, transportation to coal stock, dozing, grading, levelling at stock sites including face & other specified places, preparation & maintenance of haul roads, water sprinkling on haul road as per instruction of the Engineer-in-charge	0-1 km	91.5
		1-2 km	98.42
		2-3 km	109.01
		3-4 km	119.29
		4-5 km	129.07
		5-6 km	138.58
		6-7 km	147.79
		7-8 km	156.85
		8-9 km	165.73
		9-10 km	174.36

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**Cost of drilling in OB/ Coal by crawler mounted drill (150 mm dia) to be used for stand alone contracts**

B.4.2	Cost of drilling per meter in OB or coal (Rs./meter)	Rs./meter	139.55
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**Extraction of OB & Coal by vertical ripper or equivalent**

Item No.	Description	Rs.
B.5.1	Cost of extraction of per cu.m OB (Rs./cu.m)	53.38
B.5.2	Cost of extraction of per tonne coal (Rs./tonne)	33.03

**Dealing of fire in OB & Coal**

Item No.	Description	Rate
B.6.1	Cost of fire fighting Rs. per Cu.m. of OB	1.08
B.6.2	Cost of fire fighting Rs. per Te of Coal	0.70

**Pumping for dewatering in quarry with electric pump**

Item No.	Description	Rate
B.7.1	Cost of dewatering Rs. Per cu.m of OB	1.38
B.7.2	Cost of dewatering Rs. Per Te of coal	0.97
B.7.3	Cost of dewatering Rs. Per 100 UK gallons of water pumped	2.03

**Pumping for dewatering in quarry with diesel pump**

Item No.	Description	Rate
B.7.4	Cost of dewatering Rs. Per cu.m of OB	6.66
B.7.5	Cost of dewatering Rs. Per Te of coal	4.27
B.7.6	Cost of dewatering Rs. Per 100 UK gallons of water pumped	9.79

**Quarry lighting**

Item No.	Description	Rate
B.8.1	Cost of lighting Rs. Per cu.m of OB	2.63
B.8.2	Cost of lighting Rs. Per Te of Coal	1.30

**Hiring of equipment on daily basis**

Item No.	Description	Rate (Rs./day)	Diesel cost (to be paid additionally)
B.9.1	Cost of per day hiring of fog cannon	7826.57	+ diesel cost @ 2 km/ltr of truck+ diesel cost @ 5 ltr/hr for dust suppression sysytem
B.9.2	Cost of per day hiring of mechanical road sweeper	4873.52	+ diesel cost @ 1.43 km/ltr

**Note:**

For conversion of drilling meterage into in-situ Cu.M. Of Hard OB, the following relation may be used if the case arises

$$1 \text{ Meter} = 12 \text{ Cu.M}$$



<b>Hiring of HEMM for removal of Over Burden ( OB) including excavating, loading and transportation- of Soft OB</b>											
Sl	Description	0-1 Km	1-2 Km	2-3 Km	3-4 Km	4-5 Km	5-6 Km	6-7 Km	7-8 Km	8-9 Km	9-10 Km
1	Cost of excavation of OB per Cum	17.71	17.71	17.71	17.71	17.71	17.71	17.71	17.71	17.71	17.71
2	Cost of Dozing of OB per Cum	7.96	7.96	7.96	7.96	7.96	7.96	7.96	7.96	7.96	7.96
3	Cost of Transportation of OB per Cum	45.72	57.20	73.17	88.37	102.84	116.90	130.47	143.77	156.78	169.60
4	Cost of Fog cannon per Cum	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83
5	Cost of Grading of roads per Cum Of OB	3.99	3.99	3.99	3.99	3.99	3.99	3.99	3.99	3.99	3.99
<b>Total SOR</b>		<b>80.21</b>	<b>91.69</b>	<b>107.66</b>	<b>122.86</b>	<b>137.33</b>	<b>151.39</b>	<b>164.96</b>	<b>178.26</b>	<b>191.27</b>	<b>204.09</b>

Hiring of HEMM for removal of Over Burden ( OB) including excavating, loading and transportation-Hard OB																
SI	Description	0-1 Km	1-2 Km	2-3 Km	3-4 Km	4-5 Km	5-6 Km	6-7 Km	7-8 Km	8-9 Km	9-10 Km	10-11 Km	11-12 Km	12-13 Km	13-14 Km	14-15 Km
1	Cost of drilling of OB per cu.m	11.63	11.63	11.63	11.63	11.63	11.63	11.63	11.63	11.63	11.63	11.63	11.63	11.63	11.63	11.63
2	Cost of excavation of OB per Cu.m	27.64	27.64	27.64	27.64	27.64	27.64	27.64	27.64	27.64	27.64	27.64	27.64	27.64	27.64	27.64
3	Cost of Dozing of OB per Cu.m	8.64	8.64	8.64	8.64	8.64	8.64	8.64	8.64	8.64	8.64	8.64	8.64	8.64	8.64	8.64
4	Cost of Transportation of OB per Cu.m	44.32	65.09	85.75	105.40	124.09	142.29	159.87	177.12	193.99	210.61	226.97	243.09	259.05	274.81	290.38
5	Cost of Fog cannon per Cu.m	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25
6	Cost of Grading of roads per Cu.m Of OB	4.34	4.34	4.34	4.34	4.34	4.34	4.34	4.34	4.34	4.34	4.34	4.34	4.34	4.34	4.34
Total SOR		101.82	122.59	143.25	162.90	181.59	199.79	217.37	234.62	251.49	268.11	284.47	300.59	316.55	332.31	347.88

Hiring of HEMM for removal of Over Burden (OB) including excavating, loading and transportation-Loose OB											
Sl	Description	0-1 Km	1-2 Km	2-3 Km	3-4 Km	4-5 Km	5-6 Km	6-7 Km	7-8 Km	8-9 Km	9-10 Km
1	Cost of excavation of OB per Cum	16.24	16.24	16.24	16.24	16.24	16.24	16.24	16.24	16.24	16.24
2	Cost of Dozing of OB per Cum	7.30	7.30	7.30	7.30	7.30	7.30	7.30	7.30	7.30	7.30
3	Cost of Transportation of OB per Cum	26.71	43.04	59.52	75.52	91.10	106.43	121.44	136.34	151.04	165.63
4	Cost of Fog cannon per Cum	4.43	4.43	4.43	4.43	4.43	4.43	4.43	4.43	4.43	4.43
5	Cost of Grading of roads per Cum Of OB	3.66	3.66	3.66	3.66	3.66	3.66	3.66	3.66	3.66	3.66
Total SOR		58.34	74.67	91.15	107.15	122.73	138.06	153.07	167.97	182.67	197.26

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Hiring of HEMM for excavation and transportation of Coal with drilling											
Sl	Description	0-1 Km	1-2 Km	2-3 Km	3-4 Km	4-5 Km	5-6 Km	6-7 Km	7-8 Km	8-9 Km	9-10 Km
1	Cost of drilling of coal per tonne	7.55	7.55	7.55	7.55	7.55	7.55	7.55	7.55	7.55	7.55
2	Cost of excavation of coal per tonne	14.97	14.97	14.97	14.97	14.97	14.97	14.97	14.97	14.97	14.97
3	Cost of Dozing per tonne of coal	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54
4	Cost of Transportation of coal per tonne (Including weighment at one end @ Rs 0.72/Te)	31.80	38.72	49.31	59.59	69.37	78.88	88.09	97.15	106.03	114.66
5	Cost of Fog cannon per tonne of coal	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38
6	Cost of Grading of roads per tonne of coal	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78
<b>Total SOR</b>		<b>66.02</b>	<b>72.94</b>	<b>83.53</b>	<b>93.81</b>	<b>103.59</b>	<b>113.10</b>	<b>122.31</b>	<b>131.37</b>	<b>140.25</b>	<b>148.88</b>

Hiring of HEMM for excavation and transportation of Coal without drilling											
Sl	Description	0-1 Km	1-2 Km	2-3 Km	3-4 Km	4-5 Km	5-6 Km	6-7 Km	7-8 Km	8-9 Km	9-10 Km
1	Cost of excavation of coal per tonne	14.97	14.97	14.97	14.97	14.97	14.97	14.97	14.97	14.97	14.97
2	Cost of Dozing per tonne of coal	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54
3	Cost of Transportation of coal per tonne (Including weighment at one end @ Rs 0.72/Te)	31.80	38.72	49.31	59.59	69.37	78.88	88.09	97.15	106.03	114.66
4	Cost of Fog cannon per tonne of coal	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38
5	Cost of Grading of roads per tonne of coal	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78
<b>Total SOR</b>		<b>58.47</b>	<b>65.39</b>	<b>75.98</b>	<b>86.26</b>	<b>96.04</b>	<b>105.55</b>	<b>114.76</b>	<b>123.82</b>	<b>132.70</b>	<b>141.33</b>

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Hiring of HEMM for excavation and transportation of Hard OB using vertical ripper											
Sl	Description	0-1 Km	1-2 Km	2-3 Km	3-4 Km	4-5 Km	5-6 Km	6-7 Km	7-8 Km	8-9 Km	9-10 Km
1	Cost of ripper for hard OB per cu.m	53.38	53.38	53.38	53.38	53.38	53.38	53.38	53.38	53.38	53.38
2	Cost of excavation of OB per Cu.m	27.64	27.64	27.64	27.64	27.64	27.64	27.64	27.64	27.64	27.64
3	Cost of Dozing of OB per Cu.m	8.64	8.64	8.64	8.64	8.64	8.64	8.64	8.64	8.64	8.64
4	Cost of Transportation of OB per Cu.m	44.32	65.09	85.75	105.40	124.09	142.29	159.87	177.12	193.99	210.61
5	Cost of Fog cannon per Cu.m	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25
6	Cost of Grading of roads per Cu.m Of OB	4.34	4.34	4.34	4.34	4.34	4.34	4.34	4.34	4.34	4.34
<b>Total SOR</b>		<b>143.57</b>	<b>164.34</b>	<b>185.00</b>	<b>204.65</b>	<b>223.34</b>	<b>241.54</b>	<b>259.12</b>	<b>276.37</b>	<b>293.24</b>	<b>309.86</b>

Hiring of HEMM for excavation and transportation of Coal using vertical ripper											
Sl	Description	0-1 Km	1-2 Km	2-3 Km	3-4 Km	4-5 Km	5-6 Km	6-7 Km	7-8 Km	8-9 Km	9-10 Km
1	Cost of vertical ripper for coal per tonne	33.03	33.03	33.03	33.03	33.03	33.03	33.03	33.03	33.03	33.03
2	Cost of excavation of coal per tonne	14.97	14.97	14.97	14.97	14.97	14.97	14.97	14.97	14.97	14.97
3	Cost of Dozing per tonne of coal	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54
4	Cost of Transportation of coal per tonne (Including weighment at one end @ Rs 0.72/Te)	31.80	38.72	49.31	59.59	69.37	78.88	88.09	97.15	106.03	114.66
5	Cost of Fog cannon per tonne of coal	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38	3.38
6	Cost of Grading of roads per tonne of coal	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78
<b>Total SOR</b>		<b>91.50</b>	<b>98.42</b>	<b>109.01</b>	<b>119.29</b>	<b>129.07</b>	<b>138.58</b>	<b>147.79</b>	<b>156.85</b>	<b>165.73</b>	<b>174.36</b>

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Formula for calculation of fleet/Machine output:

Assumed quantity handled: 30000 cu.m per day of in-situ Hard/soft OB & Re-handling of OB(Compact volume in case of re-handling of OB)					
S.No.	Equipment	Make/model	Capacity	UOM	No. of equipment
1	Drill	Sandvik Pantera 1500 Dpi	350 (150 mm)	HP	3
2	Excavator	Volvo EC480DL	3.1	cu.m	8
3	Dozer	Komatsu D85	200	HP	5
4	Grader	Cat 140K	190	HP	2
5	Fog cannon	Tata LPT 2518	12	KL	4
6	Tipper	Volvo FMX 440/Scania G440XT	19.5	cu.m	
	OB	Lead	Nos.	Lead	Nos.
		0-1 km	21	8-9 km	76
		1-2 km	29	9-10 km	82
		2-3 km	37	10-11km	88
		3-4 km	44	11-12 km	94
		4-5 km	51	12-13 km	99
		5-6 km	57	13-14 km	105
		6-7 km	64	14-15 km	111
		7-8 km	70		

HEMM Coal (F2S)

Assumed quantity handled: 40000 TPD of coal (HEMM)					
S.No.	Equipment	Make/model	Capacity	UOM	No. of equipment F2S
1	Drill	Sandvik Pantera 1500 Dpi	350 (150 mm)	HP	3
2	Excavator	Volvo EC480DL	3.1	cu.m	7
3	Dozer	Komatsu D85	200	HP	4
4	Grader	Cat 140K	190	HP	2
5	Fog cannon	Tata LPT 2518	12	KL	4
6	Tipper	Volvo FMX 440/Scania G440XT/ Bharat Benz 3128/ Bharat Benz 3528	20	tonnes	F2S Coal
				Lead	Nos.
				0-1 km	24
				1-2 km	35
				2-3 km	46
				3-4 km	55
				4-5 km	65
				5-6 km	74
				6-7 km	83
				7-8 km	91
				8-9 km	99
				9-10 km	108

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## Transportation of coal (S2S)

Assumed quantity handled: 20000 TPD of coal (HEMM)					
S.No.	Equipment	Make/Model	Capacity	UOM	No. of equipment
1	Payloader	CAT950 (4.5 cu.m bucket)	168	KW	4
2	Crusher	Mobile crusher (400 TPH)	400	TPH	4
3	Tipper	Bharat Benz 3128/ Tata Signa 3530	20	tonnes	As below
Lead Slab		No. of equipment (S2S)	Lead Slab	No. of equipment (S2S)	
0-1 km		18	25-26 km	149	
1-2 km		26	26-27 km	153	
2-3 km		32	27-28 km	158	
3-4 km		39	28-29 km	162	
4-5 km		45	29-30 km	167	
5-6 km		51	30-31 km	171	
6-7 km		56	31-32 km	175	
7-8 km		62	32-33 km	180	
8-9 km		67	33-34 km	184	
9-10 km		72	34-35 km	189	
10-11 km		77	35-36 km	193	
11-12 km		83	36-37 km	197	
12-13 km		88	37-38 km	201	
13-14 km		93	38-39 km	206	
14-15 km		97	39-40 km	210	
15-16 km		102	40-41 km	214	
16-17 km		107	41-42 km	218	
17-18 km		112	42-43 km	223	
18-19 km		117	43-44 km	227	
19-20 km		121	44-45 km	231	
20-21 km		126	45-46 km	235	
21-22 km		131	46-47 km	239	
22-23 km		135	47-48 km	244	
23-24 km		140	48-49 km	248	
24-25 km		144	49-50 km	252	

### Daily handling capacity of vertical ripper

Location	Daily Qty handled per equipment	UOM
hard OB in-situ	1998	Cu.m
Coal	1297	tonnes

- Calculation of factors to be multiplied with the above fleet for a given target of OB/ Coal:

$f = V_1/V_0$ ;  $V_1$  = The target quantity to be handled on daily basis,  $V_0$  = The above assumed handled quantity on daily basis

- Calculation of nos. of excavator required for mechanical cum manual unloading of coal from the rake of BOXN Wagons within railway free time, is given below:-

Excavator(1.7 Cu.M) required	03 nos. (For 01 Rake, 59 Wagons of 69.79 Te capacity for each)
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### **Conversion factor to determine in-situ volume. / compact volume (loose dumped OB)**

For the purpose of determining In-situ Volume of different categories of OB, the following conversion factors (reciprocal of swell factor) have been used:

SI	Category of OB	Swell Factor	Conversion factor to determine in-situ volume. / compact volume (loose dumped OB)
1	In-situ Hard OB	1.3	0.769
2	In-situ Soft OB	1.2	0.833
3	Re-handling of OB	1.1	0.909

**Conversion factor of coal from Tone to Cu.M has been taken as 1 Te = 0.65 CuM**

Separate studies were carried out to determine various factors of OB removal and transportation for each category of OB.

In the case of dumped OB the swell factor indicates the ratio of loaded volume in dumper to the compact dumped volume.

### **Impact of changes in rate of Diesel and Wage on SOR:**

The SOR worked out in this report is based on the current diesel price and wages rates along with other costs prevailing at the time of preparation of the report. However, these costs are subjected to price variation with time. The change in price will result in increase or decrease in SOR as the case may be. Hence it is necessary to calculate the impact of changes in diesel price and wages on current SOR.

The impact on SOR because of changes in diesel and wage rates may be worked out as below:

Fractional change in HEMM hiring rates is proportional to fractional change in diesel rates:

$$\Delta R / R \propto \Delta D / D \text{ ----- (1)}$$

Fractional change in HEMM hiring rates is proportional to fractional change in wage rates:

$$\Delta R / R_0 \propto \Delta W / W_0 \text{ ----- (2)}$$

The new SOR can be updated with formula derived by combining relations 1 & 2:

$$(R/R_0) \times 100 = a(D/D_0) + b(W/W_0) + c \text{ ----- (3)}$$

Where

**R** : Revised / Updated Rate applicable for item under consideration

**D** : The new Price of Diesel

**W** : New wage rates

**R<sub>0</sub>** : Rate as per SOR

**D<sub>0</sub>** : Diesel Rate as considered in SOR

**W<sub>0</sub>** : Wage Rate as per SOR

**a, b, c** are arbitrary constants.

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The values of a, b, c dependent upon the lead distance and hence they change for different leads. A ready reckoner for these constants has been developed which may be referred from the table provided in detailed report, while calculating the Impact on price changes.:

**Note:**

1. For updation of SOR on account of wages, W and  $W_0$  has been considered as New and Old wages (Basic +V.D.A) for unskilled category, respectively.
2. As the SOR for 'Face to surface' & 'Surface to Surface' coal transportation includes rate for weighment of coal at one end. As such SOR for these items shall be updated (to calculate the impact of changes in diesel price and wages) after deducting rate of weighment @ Rs 0.72/te and then it shall be added back into the updated rates.

**Price updation arbitrary constants**

**A. F-2-S coal transportation:**

Lead	a	b	c
0-1km	49.74	12.53	37.73
1-2km	43.13	15.02	41.85
2-3km	42.97	15.42	41.61
3-4km	43.30	15.57	41.13
4-5km	43.47	15.68	40.85
5-6km	43.82	15.62	40.56
6-7km	43.77	15.78	40.45
7-8km	43.96	15.68	40.36
8-9km	43.94	15.70	40.36
9-10km	43.91	15.72	40.37

**B. S-2-S coal transportation:**

Lead	a	b	c
0-1km	25.46	26.38	48.16
1-2km	37.71	22.97	39.32
2-3km	41.90	21.76	36.34
3-4km	44.68	21.04	34.28
4-5km	46.58	20.41	33.01
5-6km	47.76	20.16	32.08
6-7km	48.38	19.83	31.79
7-8km	49.38	19.55	31.07
8-9km	50.02	19.33	30.65
9-10km	50.51	19.19	30.30

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Lead	a	b	c
10-11km	50.91	19.05	30.04
11-12km	51.28	18.97	29.75
12-13km	51.67	18.80	29.53
13-14km	51.89	18.71	29.40
14-15km	52.05	18.64	29.31
15-16km	52.28	18.54	29.18
16-17km	52.53	18.47	29.00
17-18km	52.74	18.39	28.87
18-19km	52.77	18.36	28.87
19-20km	52.98	18.29	28.73
20-21km	53.12	18.23	28.65
21-22km	53.21	18.18	28.61
22-23km	53.41	18.13	28.46
23-24km	53.52	18.11	28.37
24-25km	53.58	18.04	28.38
25-26km	53.69	18.01	28.30
26-27km	53.77	17.96	28.27
27-28km	53.88	17.95	28.17
28-29km	53.99	17.91	28.10
29-30km	54.00	17.88	28.12
30-31km	54.05	17.85	28.10
31-32km	54.14	17.83	28.03
32-33km	54.21	17.80	27.99
33-34km	54.24	17.78	27.98
34-35km	54.25	17.75	28.00
35-36km	54.37	17.73	27.90
36-37km	54.43	17.72	27.85
37-38km	54.44	17.69	27.87
38-39km	54.45	17.68	27.87
39-40km	54.55	17.65	27.80

Note: For leads beyond 40 Km, the updation constants of 40 Km shall be used while updating SOR rates.

**C. F-2-S Hard OB/Soft OB/ loosed dumped OB transportation:**

Lead	a	b	c
0-1 km	55.47	9.75	34.78
1-2 km	58.66	9.38	31.96
2-3 km	60.84	9.02	30.14
3-4 km	62.31	8.88	28.81
4-5 km	63.01	8.74	28.25
5-6 km	63.72	8.54	27.74
6-7 km	64.12	8.51	27.37
7-8 km	64.43	8.43	27.14
8-9 km	64.73	8.41	26.86
9-10 km	64.97	8.28	26.75
10-11 km	65.16	8.28	26.56
11-12 km	65.27	8.25	26.48
12-13 km	65.43	8.20	26.37
13-14 km	65.47	8.18	26.35
14-15 km	65.60	8.15	26.25

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**E. Payloaders : Loading of Coal by Payloaders**

Position	a	b	c
stockpile	59.72	11.93	28.35
Wagon Loading	36.13	19.69	44.18

**F. Mobile Crusher**

Position	a	b	c
Electric Crusher	0.00	13.79	86.21

**G. Drill:**

Position	a	b	c
Diesel drill 150mm	49.39	10.83	39.78

**H. Vertical ripper :**

Position	a	b	c
Hard OB	63.50	6.08	30.42
Coal	61.74	6.35	31.91

**I. Dozer:**

Position	a	b	c
OB	49.29	11.88	38.83
Coal	50.07	12.13	37.80

**J. Grader:**

Position	a	b	c
OB	50.65	9.86	39.49
Coal	50.51	10.83	38.66

**K. Fog Cannon:**

Position	a	b	c
OB	56.73	15.60	27.67
Coal	57.00	15.67	27.33
Per day hiring	0.00	36.00	64.00

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L. Excavator:

Position	a	b	c
Hard OB/Soft OB/ Loose OB	66.11	6.05	27.84
Coal HEMM/ mechanical unloading of coal at siding	59.81	7.16	33.03

M. Quarry lighting:

Position	a	b	c
OB/coal	38.28	8.09	53.63

N. Dewatering:

Position	a	b	c
Electric Pump	0.00	31.66	68.34
DG Pump	79.21	6.50	14.29

O. Picking of extraneous materials:

Position	a	b	c
Coal	0.00	79.52	20.48

P. Mechanical Road Sweeper:

Position	a	b	c
Per day hiring	0.00	33.70	66.30

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**Extrapolation/Interpolation equation for Awarded Rate with respect to SOR :**

SOR is used for preparation of estimates of rates for specific jobs at specified lead based on which bids are invited. In most of the cases, the awarded rate are either lower or higher than the estimated rate. In case there is a variation in lead during the contract period, the awarded rates are required to be revised for the new lead.

The extrapolation formula given above, derives new SOR at a new lead. Since the awarded rate and estimated rates (SOR) are different, it is required to determine new rates with respect to awarded rate. For such situations, the formula for arriving at new rate of award will be as follows:

**Formulae for extrapolation of awarded rate:**

(i) 
$$R_2 = R_1 + \left[ \text{SOR rate at } D_2 - \text{SOR rate at } D_1 \right] \times \frac{(\text{Awarded rate at } D_1)}{\text{SOR at } D_1}$$

Where  $R_1$  = Awarded Rate  
 $D_1$  = Awarded Lead  
 $D_2$  = New Lead  
 $R_2$  = Desired awarded rate at New lead  $D_2$

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