NORTH EASTERN COALFIELDS

COAL INDIA LIMITED

A PRESENTATION ON MINING OF STEEP & THICK COAL SEAMS OF NORTH EASTERN REGION OF INDIA

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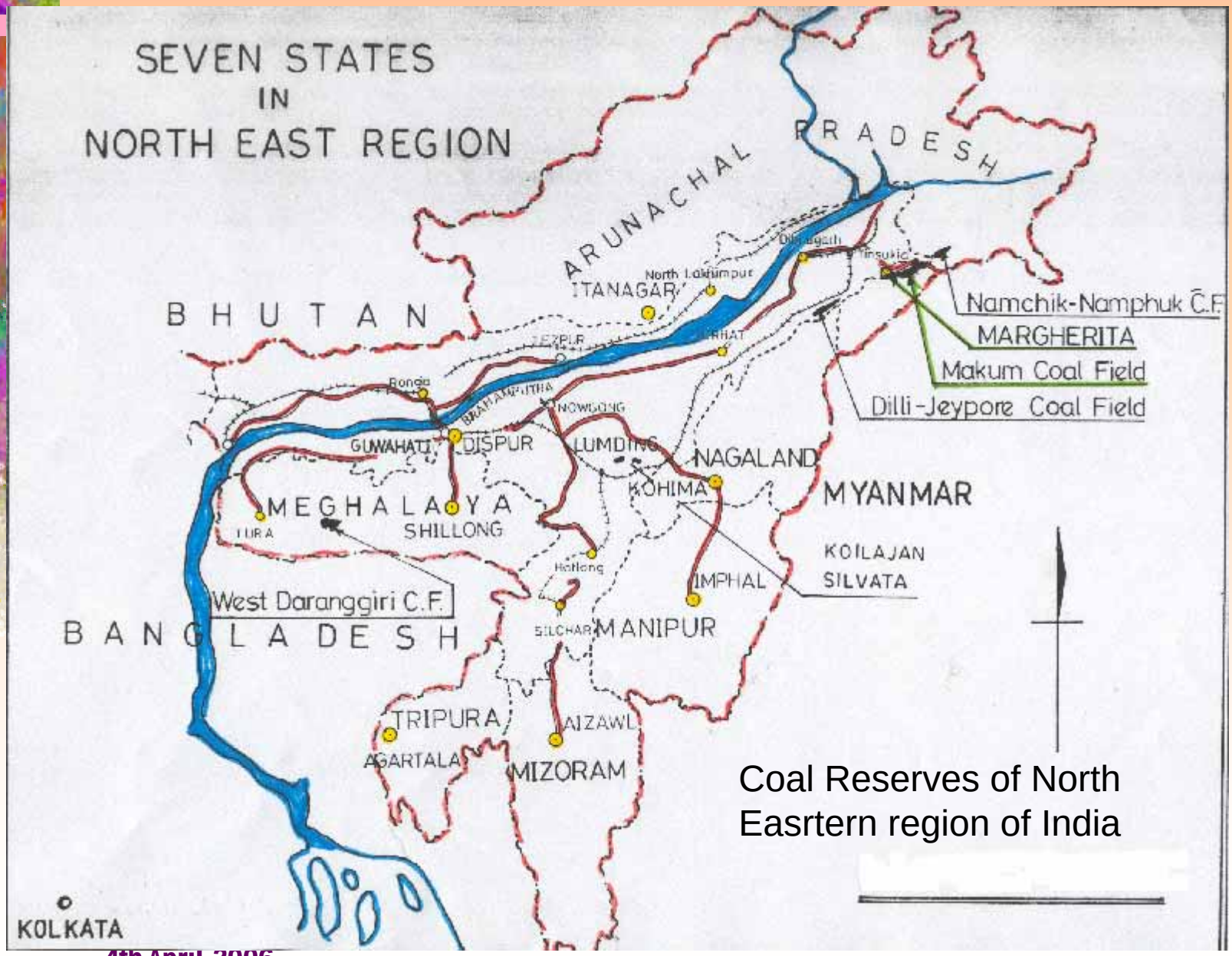
INTRODUCTION

At present, there two areas, one at Margherita of Assam, looking after the coal mining activities in the states of Assam and the other is at Meghalaya, consisting of Simsang exploratory mine & Tura's 8th Regional Institute of CMPDIL, both of which are non-functioning.



Coal Reserves of North Easrtern region of India

Mines of NEC

Existing

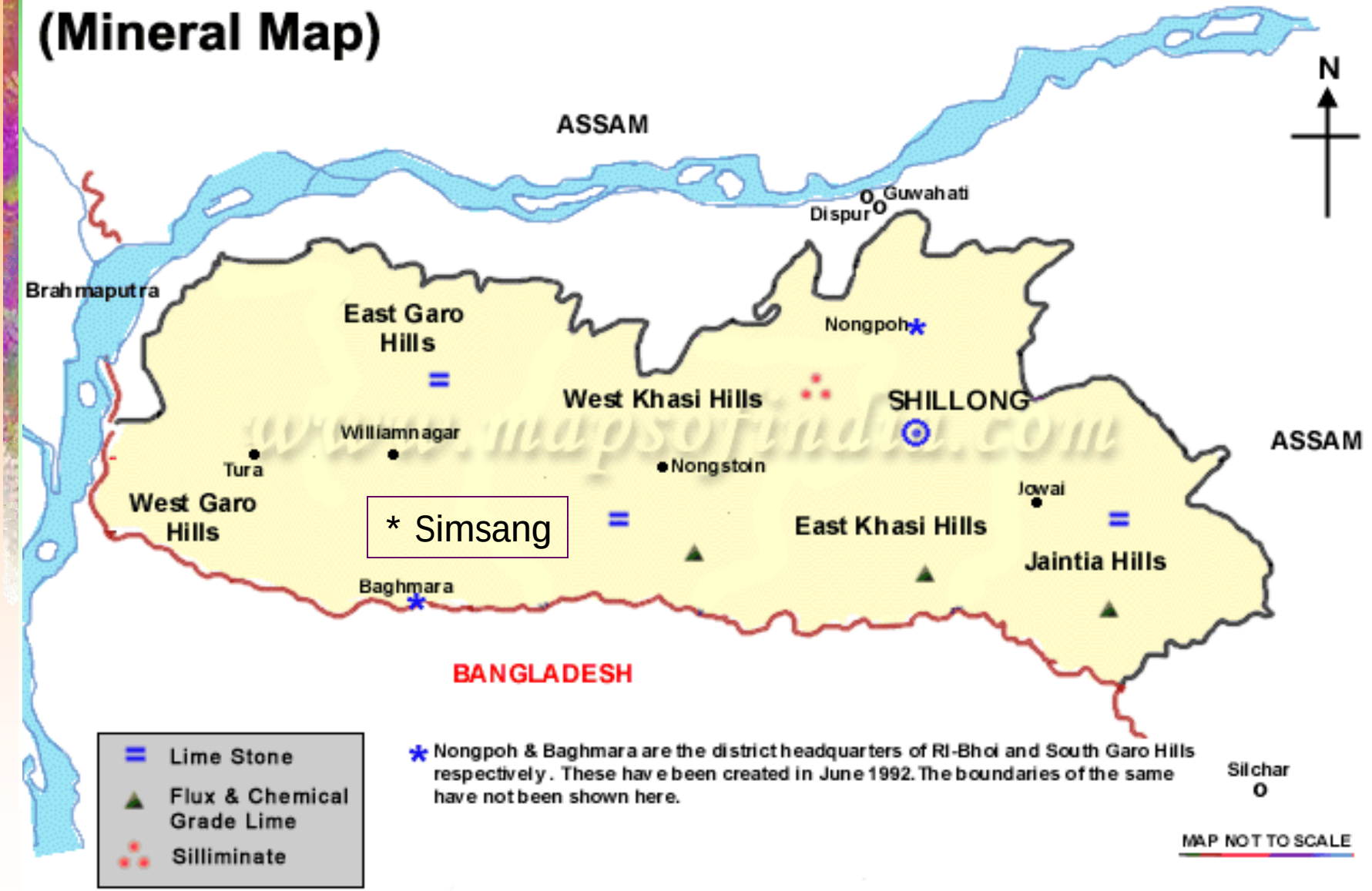
1. TIPONG U/G
2. LEDO U/G
3. BARAGOLAI U/G
4. TIRAP O/C
5. TIKAK O/C

New

1. LEDO O/C
2. TIKAK EXTN. O/C

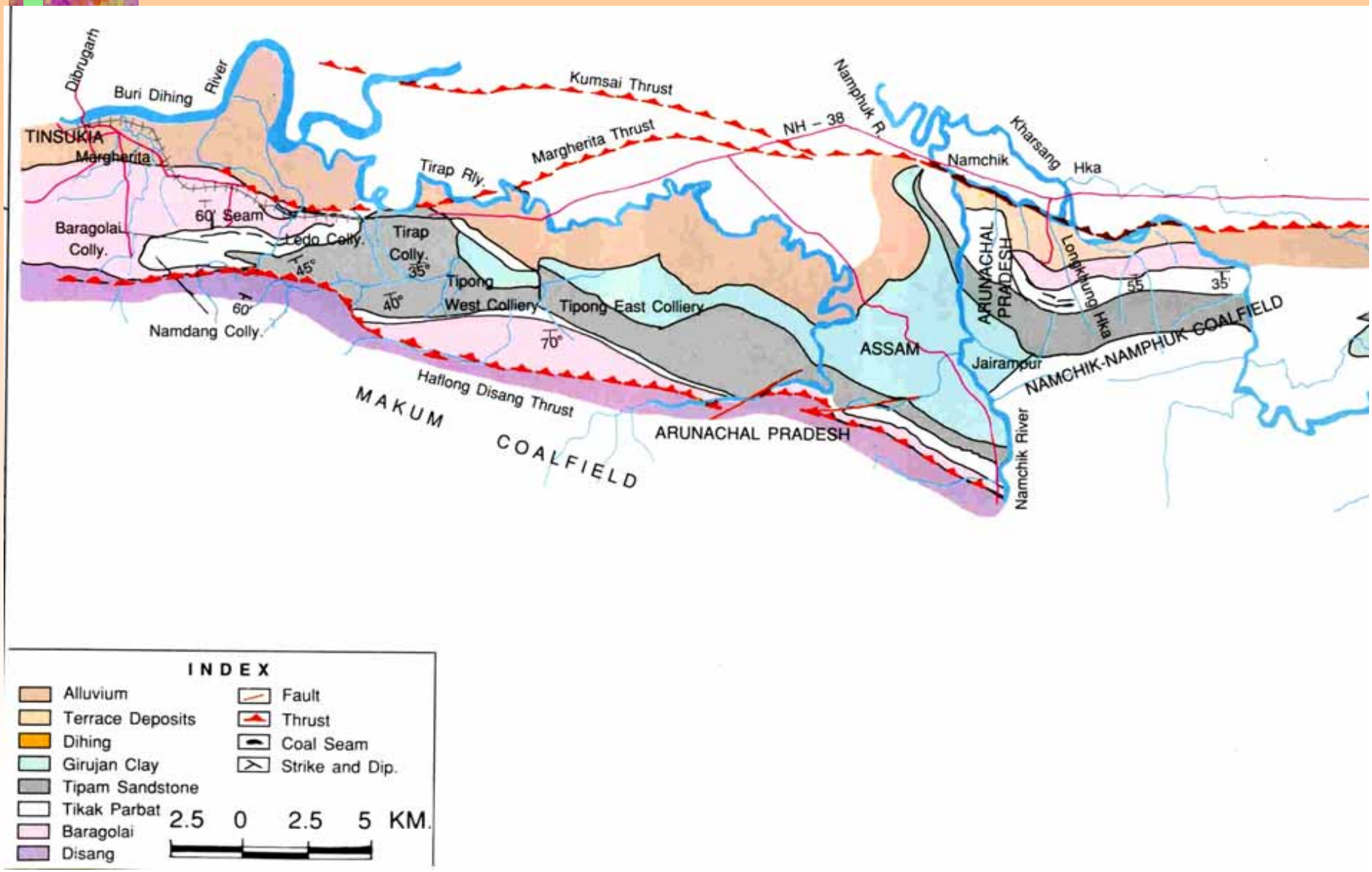
Sl. No.	New mines to open	Reserves(Mt)	Remarks
	Mines to be opened		
1	Ledo OC	6.00	Built up Area
2	Tikak Extn. OC	4.00	Forest Area
3	Lekhapani OC	7.00	Forest Area
4	Tipong OC	29.00	Forest Area
N.B. :	Total forest area to be diverted for non-forest purpose for these projects will be around 400 hects. within a span of 15 years.		

MEGHALAYA
(Mineral Map)



GEOLOGY & COAL RESERVES

NORTH EASTERN COALFIELDS



Coal reserve of the North Eastern Region upto a depth of 600 metres, as assessed by GSI as on 01.01.2006 is 945.03 million tonnes only, which is just 0.37% of the national reserves.

The major coalfields of NER

a) Assam : i) Makum Coalfields
ii) Dilli-Jeypore Coalfields

b) Meghalaya : i) West Darangiri Coalfields
ii) Balphakram-Pendenguru
iii) Siju Coalfields
iv) Langrin Coalfields
v) Bapung Coalfields

c) Arunachal : i) Namchik Coalfield

d) Nagaland : i) Borjan & Tuensang

COAL RESERVES IN NORTH EASTERN REGION AS ON 01.01.2006.

Figs. in mill.tes.

States	Coalfields	Depth (metres)	Proved (million tonnes)	Indicated (million tonnes)	Inferred (million tonnes)	Total (million tonnes)	%age of the total of region
Assam	Singrimari	0-300	0.00	2.79	0.00	2.79	0.30
	Makum	0-300	161.28	0.00	0.00	161.28	17.07
		300-600	143.59	9.85	1.19	154.63	16.36
		Total	304.87	9.85	1.19	315.91	33.43
	Dilli-Jeypore	0-300	9.03	14.19	30.80	54.02	5.72
	Mikir Hills	0-300	0.69	0.00	2.02	2.71	0.29
	Total	0-300	171.00	16.98	32.82	220.80	23.36
		300-600	143.59	9.85	1.19	154.63	16.36
		Total	314.59	26.83	34.01	375.43	39.73
Arunachal Pradesh	Namchik	0-300	31.23	40.11	18.89	90.23	9.55
Meghalaya	West Darranggiri	0-300	93.31	33.69	0.00	127.00	13.44
	Balphakram-Pendengu	0-300	0.00	0.00	107.03	107.03	11.33
	Siju	0-300	0.00	0.00	125.00	125.00	13.23
	Langrin	0-300	11.34	7.20	31.46	50.00	5.29
	Mawlong Shella	0-300	2.17	0.00	3.83	6.00	0.63
	Khasi Hills	0-300	0.00	0.00	7.09	7.09	0.75
	Bapung	0-300	11.01	0.00	22.65	33.66	3.56
	Jayantia Hills	0-300	0.00	0.00	3.65	3.65	0.39
	Total	0-300	117.83	40.89	300.71	459.43	48.62
Nagaland	Borjan	0-300	3.43	1.35	5.22	10.00	1.06
	Jhanzi-Disai	0-300	0.00	0.00	2.08	2.08	0.22
	Tien Sang	0-300	0.00	0.00	1.26	1.26	0.13
	Tiru Valley	0-300	0.00	0.00	6.60	6.60	0.70
	Total	0-300	3.43	1.35	15.16	19.94	2.11
Total of NER		0-300	323.49	99.33	367.58	790.40	83.64
		300-600	143.59	9.85	1.19	154.63	16.36
		Total	467.08	109.18	368.77	945.03	100.00

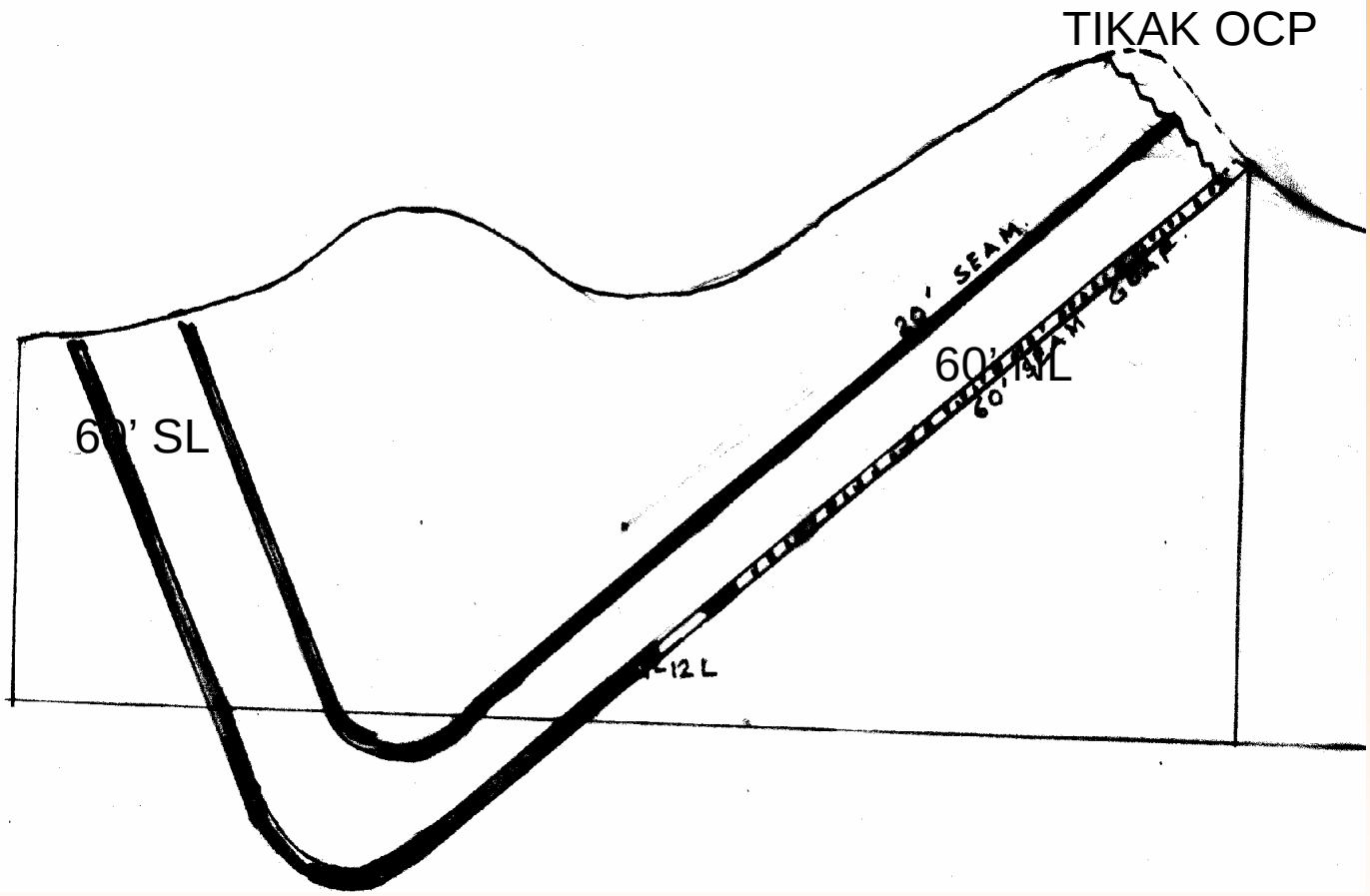
Coal Reserves in the Existing & Future Mines

(Figs. In mill.tes.)

Sl. No.	Name of mine	Type	State	Coal Reserve	
				Geological	Mineable
a) Mines in Operation :					
1	Tipong	UG	Assam	46.49	11.09
2	Ledo	UG	Assam	20.08	4.65
3	Baragolai	UG	Assam	57.87	14.45
4	Tirap	OC	Assam	-	1.85
5	Tikak	OC	Assam	-	1.42
6	Tikak Extn.	OC	Assam	-	3.89
b) Future Mines :					
1	Ledo Mech. OCP	OC	Assam	-	5.00
2	Lekhapani OCP	OC	Assam	-	5.19
3	Tipong East	OC	Assam	-	3.16
4	Tipong West	OC	Assam	-	4.93
5	PQ block OCP	OC	Assam	-	1.50
6	Sheelveta/Bimalapur/ Koilajan OCP	OC	Assam	-	0.53
7	Simsang EMS	UG	Meghalaya	28.84	-
8	Namchik OCP	OC	Ar. Pradesh	-	8.07
9	Jagun OCP	OC	Assam	No GR	
10	Dirak OCP	OC	Assam	No GR	

AVERAGE SEAM SECTION OF MAKUM COALFIELD

		Thickness in m		
		From	To	
	V-C	0.33	0.68	
	Parting	3.06	36.27	
	V-B	0.52	0.85	
	Parting	8.26	63.35	
	V-A	0.09	0.6	
	Parting	18.96	34.21	
	V-(8')	1.31	2.63	
	Parting	4.64	10.5	
	IV-(5')	1.36	2.1	
	Parting	37.54	75.08	
	III-(20')	6	6.2	20 ft seam
	Parting	34.9	57.66	
	II-(7')	2.67	3.19	
	Parting	18.87	51.66	
	I-(60' bo	6.3	6.5	
	Parting	0.65	1.98	
	I-(60' mi	6.07	6.14	60 ft seam
	Parting	0.53	3.56	
	I-(60' top	2.95	5.5	



Baragolai Syncline

COAL QUALITY, GRADE & PRICE

a) Ash : 4% to 25%

b) Volatile Matter : 34% to 45%

c) Calonfic Value : 5500 to 7500 K.Cal/Kg

d) Sulphur : 1.5% to 4%
(predominance of organic sulphur)

e) Caking Index : 5 to 31.

Coal of NER was not graded till 14.06.1997. For convenience of marketing, CIL had divided the coal of NEC into three types, based on the ash percentage i.e. 10%, 17% and 25% ash coal. With effect from 15.07.1997, the coal of NER was graded into Gr-A & Gr-B. But due to thinning out of foreign bands in the coal seams, NEC gradually started producing Gr-A coal only.

Pit head Price of NEC coal

Figs. in Rs/tonne

Break-up	Notified		Av. last e-marketing	
	Gr-A+	Gr-A	Gr-A+	Gr-A
Basic price	1888.00	1320.00	3157.10	2221.74
Royalty	165.00	165.00	165.00	165.00
Cess	10.00	10.00	10.00	10.00
Surface transp.	30.00	30.00	30.00	30.00
Sizing	20.00	20.00	20.00	20.00
Land Tax	50.00	50.00	50.00	50.00
CST @ 4%	86.52	63.80	137.28	99.87
Total (by road)	2249.52	1658.80	3569.38	2596.61
Shunting charge	7.00	7.00	7.00	7.00
Total (by rail)	2256.52	1665.80	3576.38	2603.61

The coals produced in the North Eastern Region are at present used by various sectors, like power, cement, paper, brick burning, cookeries, tea gardens and other local industries.

SEARCH FOR UG MINING METHOD

MINING CONSTRAINTS

- The coalfields lie in remote areas.
- Coal deposits occur in difficult hill tracts.
- Inconsistent seam structure.
- Highly pitching seams.
- High degree of gassiness.
- Weak coal and associated strata.
- Acid mine water.
- Coal susceptible to fire.
- High annual rainfall.
- The coal bearing hills are unstable in nature.
- Seams are subjected to high lateral pressure.

- The Chief Inpsector of Mines stated to these coalfields as “being where the worst natural conditions of all the coal mines in India are to be faced”. The seam conditions vary so much that the mining practices in one part of even a particular coalfield cannot be extended to its other parts.

Different methods of underground mining implemented, experimented and proposed at NEC mines so far, are elaborated below :-

1. **Bhaska Method** : Blocks of inclined and thick coal seams are developed on Bord and Pillar system. The junction of a level gallery and a dip-rise gallery is then widened and heightened by drilling and blasting to form a dome-shaped void which is self supported. The dome is kept on widening and heightening till the roof coal starts caving down automatically. In this method, the recovery is very low(about 20%-25%), resulting in gob fire. A lot of skill and ingenuity on the part of the work-persons are required due to steepness and thickness of the seams.

2. Tipong Method : During the period from 1976 to 1980, the Bhaska method was modified by the local mining engineers so that the work-persons need not have to work under unsupported periphery of the void created in the process of depillaring. This method is termed as Tipong method of mining. This method of mining provides more safety and yields higher percentage of extraction to the extent of 30%. In Ledo ug mine where gradient is comparatively less, scrapper assisted Tipong (chamber) method is practiced.

3. <u>Descending Shield Method and Flexible Roofing Method</u> : As percentage of extraction was less in the above methods, NEC introduced Russian Shield Method & Flexible Roofing Method in Tipong & Ledo mines. But the methods were not successful. In case of Shield Method, it used to get stuck up in the raises where seam thickness is not uniform and the shield was to pass through thick stone bands in the seam. So, it had to be abandoned. In case of Flexible Roofing Method, the artificial roofing got punctured every time due to high gradient of the seams thereby deteriorating the quality of coal. Moreover, high production was not achieved by these methods. The quality management also was not possible. As such these methods were discontinued.

4. <u>Hydraulic Mining</u> : The introduction of hydraulic mining in the south limb of Baragolai mine was studied by M/s Parwest, Canada and CMPDIL, Ranchi. It was found to be suitable if associated with a washery. The other conditions imposed were un-interrupted power supply, direct linkage with steel industries & constant rail despatch. The above foreign consultant was given an offer to come for a joint venture with Coal India Limited, which the party never accepted. Due to heavy capital investment, the introduction of this method with own investment was not agreed to by CIL in '80s.

5. <u>Blasting Gallery Method</u> : The application of Blasting Gallery method was taken up under S&T grant, but the technology could not be implemented mainly due to high quantity of explosives, required for blasting which was not permitted by DGMS due to high gassiness of NEC mines.

All the years of long search for experimentation indicate that the main bottlenecks of NEC's u/g mining are high seam gradient & high degree of gassiness. The high seam gradient precludes the use of high volume high OMS machine mining method like Longwall mining. The high degree of gassiness precludes the adoption of high volume high OMS and low mechanised methods like Blasting Gallery Method which requires high explosive charges to be blasted. Though the hydraulic mining method is capable of producing high volume with high OMS, it was also turned down due to estimated heavy investment.

Considering all the aspects, it has therefore been necessary that a suitable ug mining technology be urgently searched for by a group of NEC's mining engineers by visiting the coal mines abroad like Czeck Republic, Hungary (Meczek Coal Basin), Rassia (Donetzk, Novokuznetzk and Northern Ural Coal Basins), France(Lorraine Coal Basin), Spain (Asturian Coal Basin) and Poland etc., where similar coal deposits are reported to be available, so that the methods being implemented in those coalfields can be tried in the u/g mines of NEC.

THANK YOU