Coalmine Methane

Under Indian Mining Scenario

CMM under Indian Mining Scenario

- In India coal is a reliable energy resource due to limited availability of petroleum and natural gas.

- Coal based non-conventional energy is poised to play a major role in India as :

  - ✓ It would bridge the gap between demand and availability of conventional energy source

  - ✓ International trading scenario in energy sector has been stormy

  - ✓ Environmental concerns has given impetus to clean coal technologies.

- Under the scenario, Coalbed Methane (CBM) and its subsets like Coal Mine Methane (CMM) and Abandoned Mine Methane (AMM) may find important place in Indian Energy scenario in coming years.

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Development of CBM in India

- Out of different sub-sets of Coalbed Methane (CBM), CBM from the deep lying coal deposits (VCBM) has been pursued.

- So far 16 Coalbed Methane (VCBM) blocks have been allotted under CBM policy of GoI covering an area of 7807 sq. km and prognosticated CBM resource of 825 BCM.

- 10 more blocks have been opened for global bidding.

- Several core wells/pilot wells have been drilled in the allotted blocks and are giving encouraging results.

- Few operators are planning commercial production from 2007-08.

- The total production potentiality in the allotted blocks is 23 MMSCMD, which is about 10% of the existing Natural Gas demand.

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Coal Mine Methane and Abandoned Mine Methane

- Coal Mine Methane (CMM)/ Abandoned Mine Methane (AMM) also subset of CBM is related to mining activities and as per MOU between MoC and MoP&NG, coal producing companies have right of CBM exploitation in their working mines including pre and post mining operations.

- CMPDI and BCCL took up a mine related demonstration project for production and utilisation of CBM under UNDP/GEF/GoI funding in Moonidih and Sudamdih mines, BCCL. The aim of the project is to:

  - Acquire exposure in CBM production from virgin area and working mines by drilling from surface and underground

  - Acquire exposure in utilisation technique of extracted CBM.

- Drilling of first well in this project has started.

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- Going by industry practice, CMM is recovered from high producing underground mines with fast moving faces.

- However, in India focus is on large capacity opencast mines.

- Only 15% of the total production of 400mt is from underground mines.

- The underground production is coming from B&P mines with limited production capacity.

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- In Indian condition, due to century old mining particularly in Damodar Valley Coalfields, the seams occurring at shallower depth have mostly been mined/being mined

- Due to above, there is existence of large number of operative/disused/abandoned mines in the coalfields.

- Below these mining areas, the coal reserves in virgin coal seams at depth are yet to be mined and are prime potential source of methane.

- Recovery of methane from virgin coal seams (some of which are de-stressed) below the worked out seams require comprehensive approach for safe and economic operation.

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Coal seam profile with special reference to Damodar Valley Coalfields

- Coalfields are having limited spatial extent but large number of closely placed coal seams occur.

- In some cases there are over 25 coal seams with cumulative thickness exceeding over 100m.

- Coals are largely High Volatile Bituminous B/C to Low Volatile Bituminous as per ASTM classification.

- Such high rank coals are located in Raniganj, Jharia, E.Bokaro, W. Bokaro and S. Karanpura coalfields of Damodar valley.

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Coal Rank and Gas content in Damodar Valley CF

- The gas content of coal seams in Damodar Valley CFs is ranging largely between 6-15 m3/t in the depth range of 400 to 1000m. Higher value of gas content even up to 26 m3 per tonne has also been reported.

- The linear regression of increase of methane content in Parbatpur in Jharia coalfield indicate an increase of 1.3 M^3 /tonne per 100 M depth.

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Target area for CMM Development

- Damodar Valley coalfields are the prime target area for CMM development:

  - Occurrence of high rank coals
  - Size of resource
  - History of gassiness

- The following coalfields of Damodar Valley coalfields may be potential area for CMM development

  - Raniganj coalfields
  - Jharia coalfields
  - East & West Bokaro Coalfields
  - South Karanpura Coalfileds

Coalfields of India
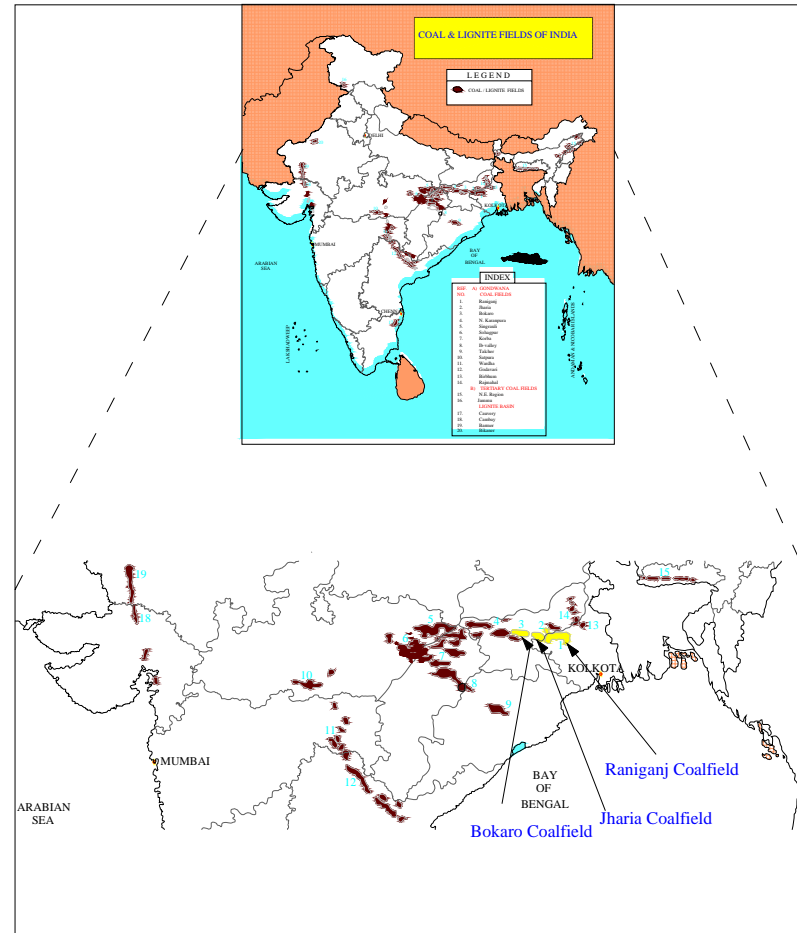
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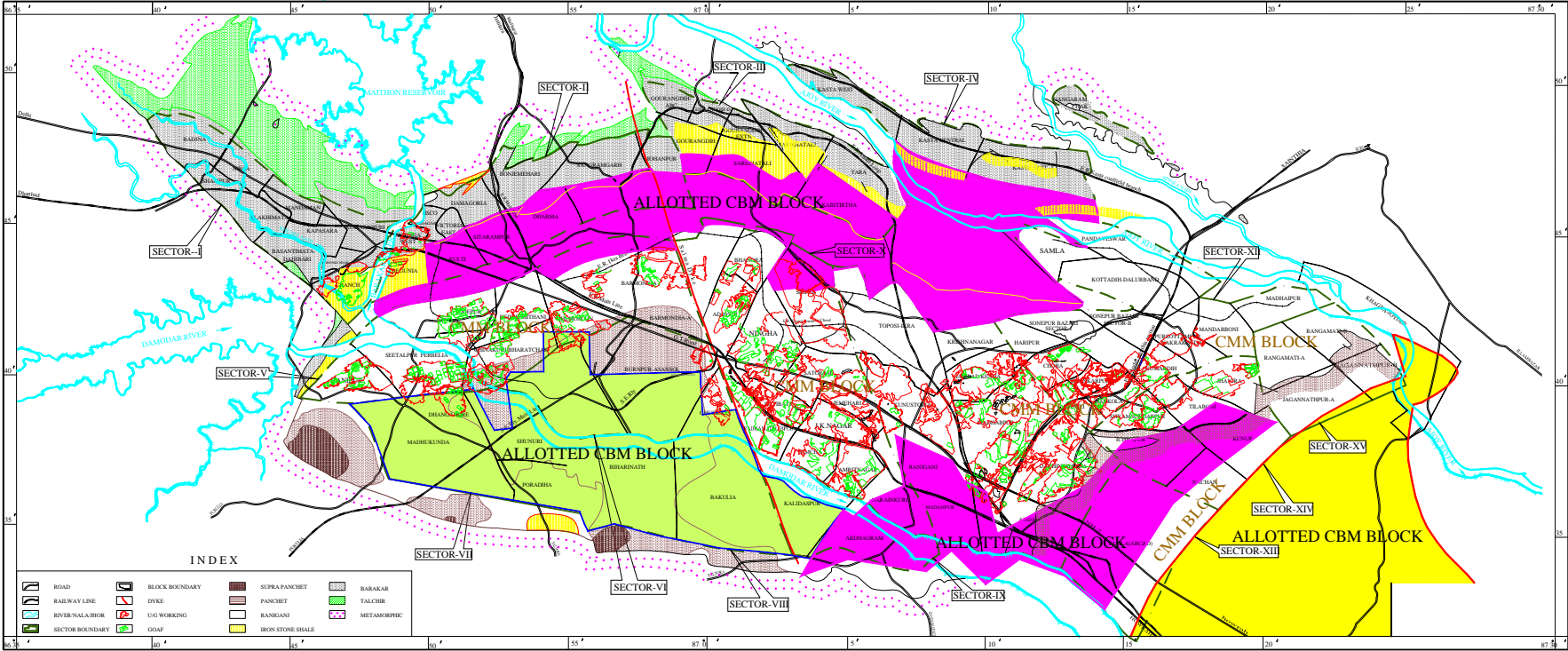## Raniganj Coalfield : Salient features

- Area   :   1550 Sq Km
- No. of seams   ;   Raniganj Formation - 10
  - Cumulative Thk- 30-40 m
  - Barakar Formation – 7
  - Cumulative Thk- 30-120 m
- VRo%   :   Raniganj Formation – 0.6-0.88
  - Barakar Formation – 0.95-1.2
- ASTM rank   :   Raniganj coal- High Vol Bit A-C
  - Barakar coal-High Vol Bit-A to Med Vol Bit
- Gas content (m3/t)   :   Raniganj coal – 5-7
  - Barakar coal – 0.5-10 (Erratic due to pyrolitisation)
- Coal reserve likely to be available for CMM :   8.2 Billion Tonnes
- Prognosticated CBM resource   :   40 BCM (on a conservative estimate)

  Note: 1. Considering coal seams are not de-stressed.
  2. CBM resource in abandoned mine not accounted.

Raniganj Coalfield

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Jharia Coalfield : Salient features

- Area   :   450 Sq Km
- No. of seams   ;   Raniganj Formation - 24

                                             Cumulative Thk- 8-35 m

                                             Barakar Formation – 18

                                             Cumulative Thk- >100 m

- VRo%   :   Raniganj Formation – 0.86-0.9

                                             Barakar Formation – 0.9-1.3

- ASTM rank   :   Raniganj coal- High Vol Bit A

                                             Barakar coal-Medium to low Vol Bit

- Gas content(m3/t)   :   Barakar coal – 7-26
- Coal reserve likely to be available for CMM :   7.4 Billion Tonnes
- Prognosticated CBM resource   :   50 BCM (conservative estimate)

  Note: 1. Considering coal seams are not de-stressed.

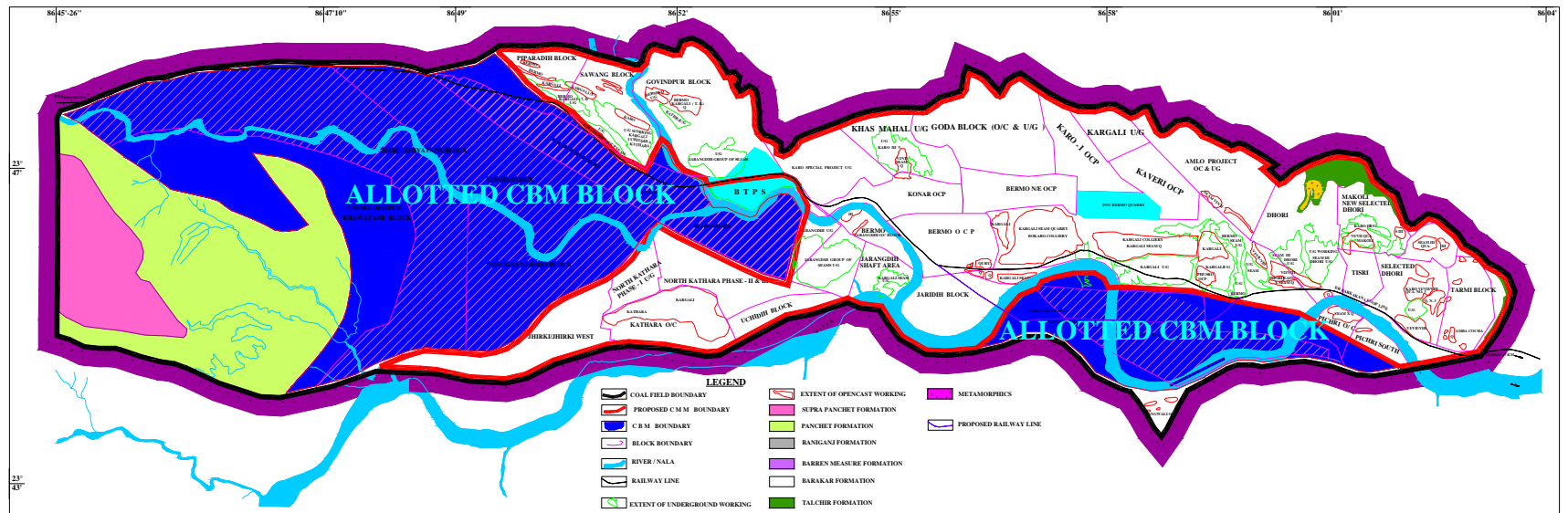   2. CBM resource in abandoned mine not accounted.

Jharia Coalfield
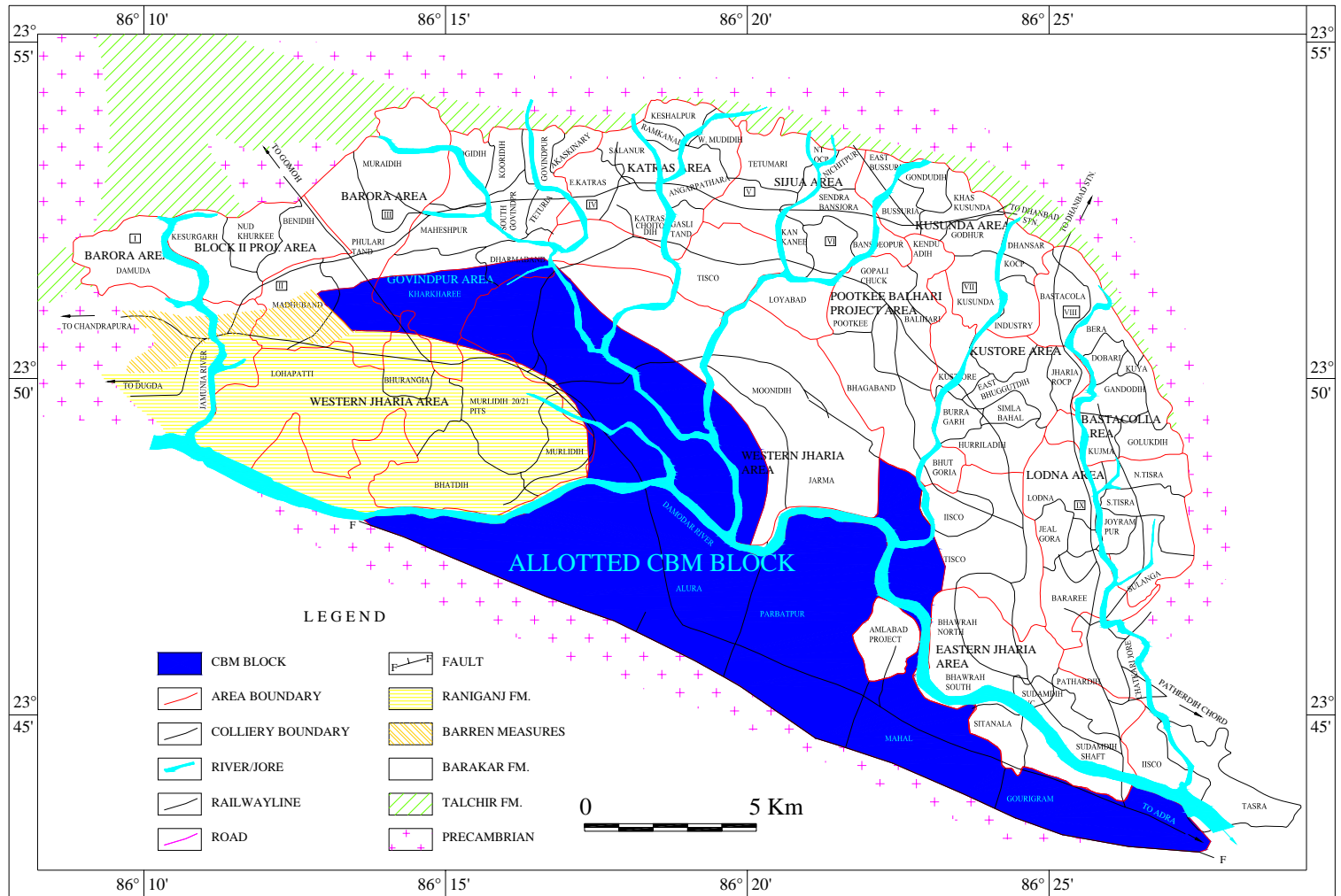
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East Bokaro Coalfield : Salient features

- Area : 237 Sq Km
- No. of seams ; Barakar Formation – 22
  Cumulative Thk- >100 m
- VRo% : 0.8-1.69
- ASTM rank : High Vol Bit-A to Low Vol Bit
- Gas content(m3/t) : 10-22
- Coal reserve likely to be available for CMM : 3 Billion Tonnes
- Prognosticated CBM resource : 30 BCM (conservative estimate)

Note: 1. Considering coal seams are not de-stressed.
      2. CBM resource in abandoned mine not accounted.

East Bokaro Coalfield

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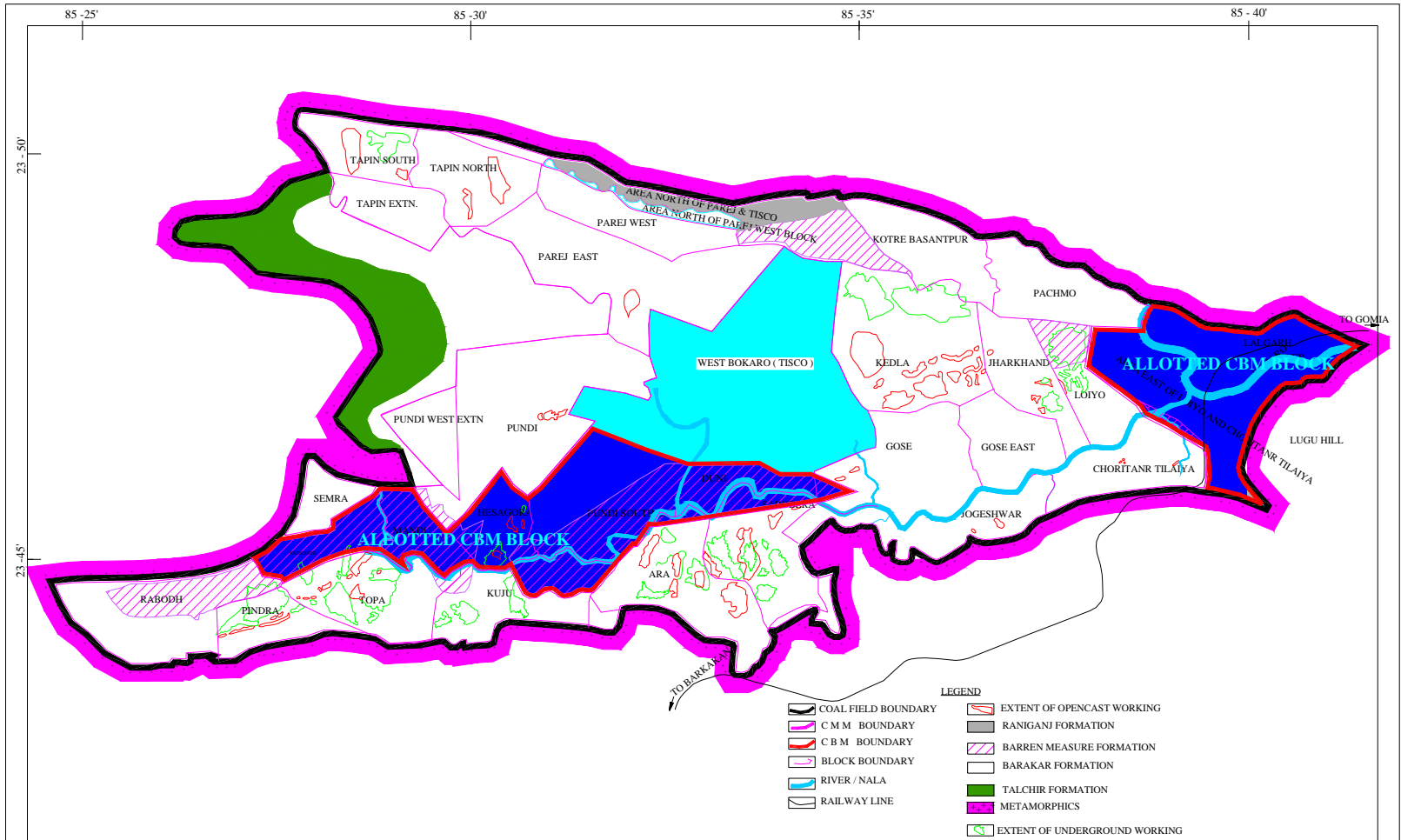## West Bokaro Coalfield : Salient features

- Area   :   207 Sq Km
- No. of seams   ;   Barakar Formation – 13

    Cumulative Thk- >40 m

- VRo%   :   0.8-1.25
- ASTM rank   :   High Vol Bit-A to Med Vol Bit
- Gas content(m3/t)   :   6-10
- Coal reserve likely to be available for CMM :   1.6 Billion Tonnes
- Prognosticated CBM resource   :   10 BCM (conservative estimate)

    Note: 1. Considering coal seams are not de-stressed.

           2. CBM resource in abandoned mine not accounted.

West Bokaro Coalfield

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South Karanpura Coalfield : Salient features

- Area   :   194 Sq Km
- No. of seams   ;   Barakar Formation – 42

                                     Cumulative Thk- >100 m
- VRo%   :   0.6-0.9
- ASTM rank   :   High Vol Bit-A-B
- Gas content(m3/t)   :   5-10
- Coal reserve likely to be available for CMM :   3.7 Billion Tonnes
- Prognosticated CBM resource   :   20 BCM (conservative estimate)

Note: 1. Considering coal seams are not de-stressed.
         2. CBM resource in abandoned mine not accounted.

South Karanpura Coalfield

Schematic Log Section of Different CF
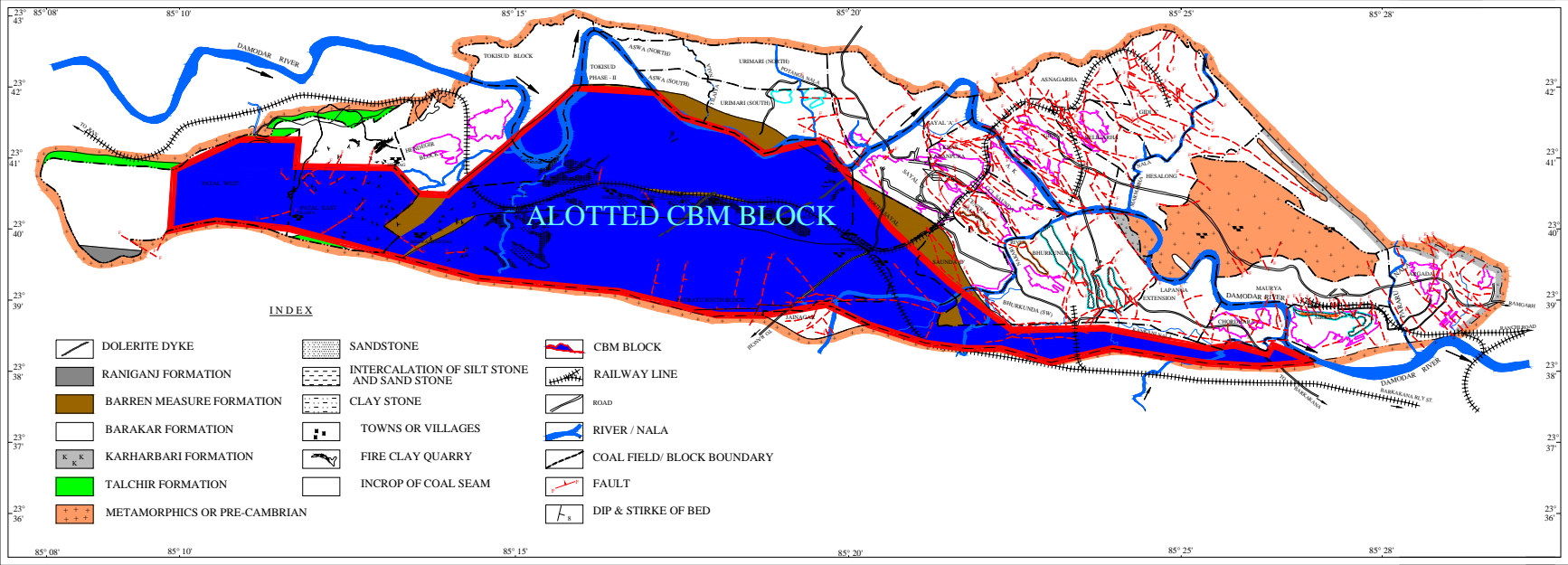
SCHEMATIC LOG SECTION OF DIFFERENT COALFIELDS
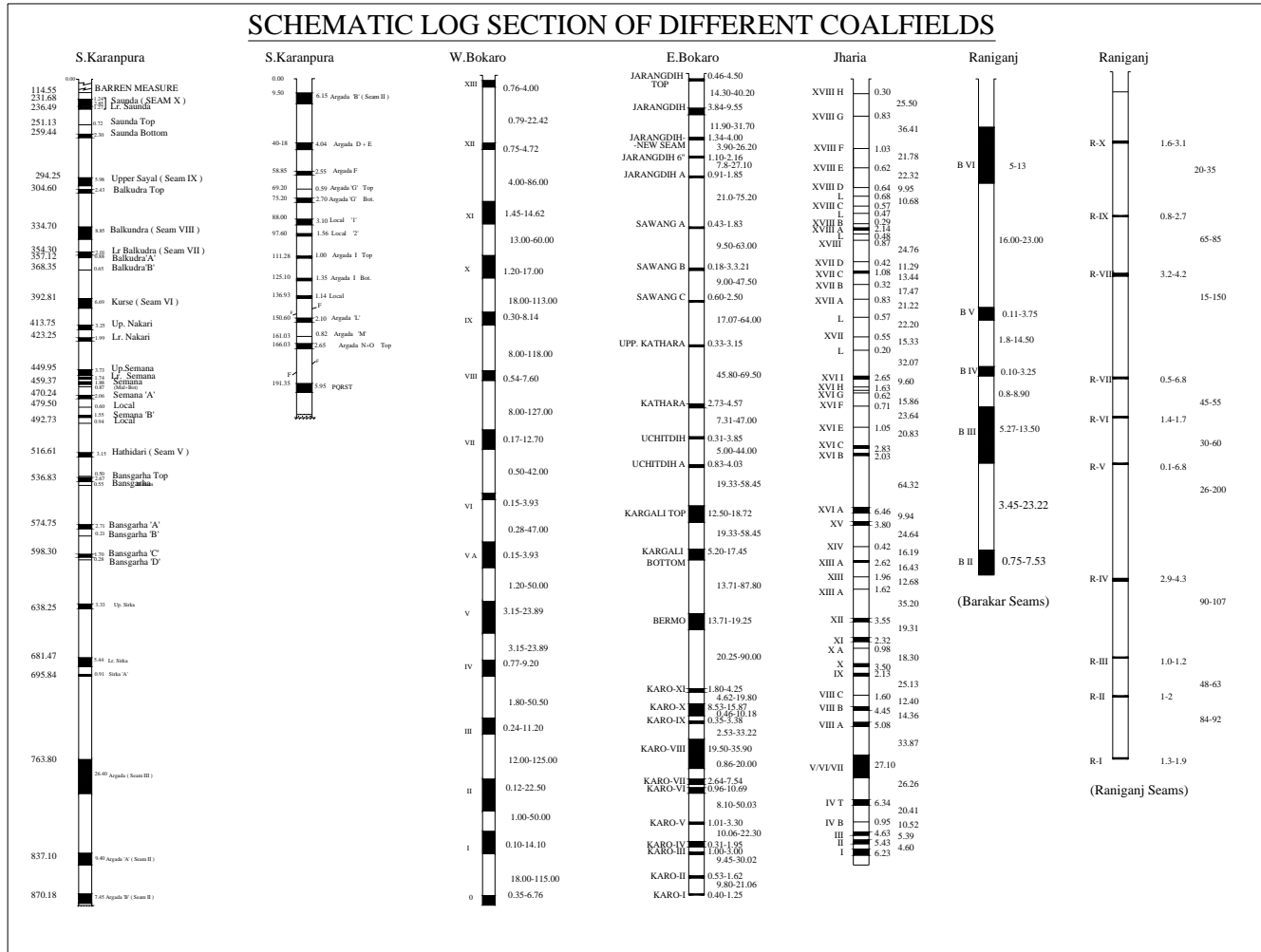
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Summary of Broad Assessment of Coal and CBM Resource in Potential CMM Areas of Various Coalfields

Coalfield	Area of the Coalfield (Sq Km)	No of coal seams	Cumulative Thickness (m)	Gas content (m³/t)	Coal reserves likely to be available for CMM (BT)	Prog. CBM resource (BCM)*
Raniganj	1550	17	30-40	5-7	8.2	40
Jharia	450	42	Up to 100	7-26	7.4	50
E Bokaro	237	22	>100	10-22	3.0	30
W Bokaro	207	13	>40	6-10	1.6	10
S Karanpura	194	42	>100	5-10	3.7	20
Total					23.9	150

* Note: 1. Considering coal seams are not de-stressed.
    2. CBM resource in abandoned mine not accounted.

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Issues to be addressed for development of CMM

- ➢ Resource modeling of coal seams under de-stressed condition
- ➢ Legal/safety frame work for development of CMM and ownership issue
- ➢ Infrastructure for cost effective transportation
- ➢ Utilization of recovered methane.
- ➢ Working out the economics of CMM exploitation

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Assistance and Collaboration Area

➢ Resource modeling of coal seams under de-stressed condition.

➢ Development of a model project in one or two coalfields of Damodar valley (Jharia, Raniganj CF) with well defined functional areas of each stake holders

➢ Economic analysis of the project conceived

Thank You