DISCUSSION


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Attempting a review of the coal (including lignite) reserve estimates is by no means an easy task. The author deserves sincere compliments for undertaking such a stupendous exercise.

Some essential points that merit introspection are listed hereunder:

1. The re-estimated reserve of 467 bt includes both Gondwana and Tertiary coals (i.e. coal and lignite). This has been compared with the original estimate of 2 13 bt that comprises Gondwana coal only. Including the Tertiary coal, this figure should be 243.89 bt (213+0.89+30.30 bt) and not 213 bt as mentioned in the abstract and elsewhere in the text.

2. According to the prevailing authenticated nomenclature of ore reserve classification, 'Geological Reserve' refers to the in situ reserve, and 'Mineable Reserve' reflects the reserve that can be actually won after providing for safety margins, supports, pit slopes etc. inter alia safeguarding the environmental parameters. It means only a part of the geological (or in situ) reserve is mineable. Against this backdrop of established nomenclature/practices, authors's usage of the terms 'Mineable' and "Unmineable" with 300 m depth factor constituting their dividing line, instills confusion.

3. In Tables 1, 2 and 4 only modified figures of "Geological Reserves" are given. If the corresponding original estimated reserves are incorporated in parenthesis, against the modified figures, it would have lead to a better comparison with the original estimate. Furthermore, area-wise geological parameters considered for extrapolation and enhancement of the reserve figures, if incorporated would have given better credibility to the contribution.

4. "...Since most of our coals are presently being mined by open cast ...." (p.398 under 'Mining'). "... as presently majority of the coals are being mined by open cast methods only" (p.402 under 'Conclusions'). These statements are factually incorrect. Of the 606 operating mines, 204 are open cast and the balance 402 are underground mines (IBM, 2002).

5. The elaborate narrations on UCG and CBM techniques are, no doubt, informative. It may perhaps be relevant to note that a demonstration project entitled "Coal Bed Methane recovery and commercial utilization" is being pursued by BCCL as an S&T Project of the Ministry of Coal with a budgetary grant of 76.86 crore rupees. The five year project was commenced in September 1999 (IBM, 2002).

6. It has not been made clear whether the re-estimated reserve constitutes the residual geological reserve, arrived at by considering only the area-wise, unmined reserve. A sizeable tonnage has been exploited over the past five or six decades. This parameter has to be reconciled in such exercises.

7. The terms "Resources" and "Reserves" are used as synonyms in the descriptive narrations and title of the paper. Both the terms have different identities as per the established nomenclature (GSI, 1981; IBM, 1994).

8. "Fresh estimation" and 'Re-estimation' of reserves are also used as synonyms. There is a subtle difference between them.

Dev Dutt Sharma, Essar Oil Limited, E&P Division, Essar House, Mahalaxmi, Mumbai - 400 034; Email:ddsharma@essar.com, replies:

First of all, the author expresses his sincere thanks to the commentator-for appreciating the study. Further, pointwise clarification to the comments follows:

1. In the abstract as well as elsewhere in the text and Tables 1a and 4 of the paper, the mentioned 213 bt coal reserves are of Gondwana coals as estimated by GSI. The Tertiary coals of North Eastern States estimated by GSI of 0.89 bt are given in Table 2 and of other States as estimated by NLC of 29.36 bt are furnished in Table 2. The estimated Gondwana and Tertiary coals by GSI and NLS, thus make total coal reserves at 243 bt (213+0.89+29.36) as rightly pointed out by the commentator. The author has dealt separately the Gondwana and Tertiary coals. In the first paragraph.
of the abstract of the paper, the author has specifically mentioned 213 bt of coal reserves as estimated by GSI, which are commonly known. The mentioned Tertiary coals of 253 bt in Table 3 include 223 bt of Western Region (Gujarat and Rajasthan) as estimated by GSI and 29.3 bt of lignites as estimated by NLC. Table 4 clearly gives breakup of total reviewed and estimated coal reserves of 467 bt into mineable and unmineable categories and then into Gondwana and Tertiary coals, which are further bifurcated into mineable and unmineable.

2. The main objective of the paper was not to discuss the nomenclature of coal reserves, which was beyond its purview but to present the estimated geological reserves by GSI, NLC etc and fresh estimation of vast deeper Tertiary coals so as to focus on their optimum exploitation strategy with the all available and emerging technologies. The segregation into mineable and unmineable categories is made with respect to their shallow and deeper occurrence while considering the present general mining depth of 300 m, irrespective of their geominining conditions. The detailed field wise and block wise break up into mineable and unmineable coals has to be done by GSI, CIL, NLC and the respective State agencies having the right for their exploration and exploitation. However, the author agrees with the commentator that the mentioned bifurcation may not be precise as the mining includes various other factors like overburden ration, pit slopes, safety and environment etc, besides the detailed analysis of geominining conditions.

3. The “Geological Reserves” as given in Tables 1, 2 and 4 have been modified from mineable (shallow) and unmineable (deeper) point of view only by the author, while retaining the total figures as estimated by GSI and NLC. The scope of the paper being limited to focus on the aggressive mining of shallow coals adopting clean coal technology and exploitation of deeper coals, especially vast Tertiary coals which hitherto were unknown by UCG or CBM, it was difficult to cover the geological parameters of all the areas within the 15 pages given by the Journal, except for discussing the broad parameters of freshly estimated deeper Tertiary coals of Western Region. However, further geological details can be provided by the author to the commentator, separately.

4. The idea behind this statement is that majority of Indian coals are being mined by open cast, the number of underground mines may be more. However, the author has not referred to the said paper (IBM, 2002). It would be helpful if a copy is made available by the commentator for further update.

5. The author is fully aware of the UNDP sponsored demonstration project of “Coal Bed Methane Recovery and Commercial Utilization” and has provided necessary CBM industry details to CIL and MOC also in this regard.

6. The quoted figures are from the “Inventory of Geological Coal Reserves” as estimated by GSI, CIL and NLC and published annually, which do not provide any details about how much of these have been mined and how much are the balance recoverable reserves. This is the concern of the coal exploration and mining agencies. However, it would be very nice if along with the geological reserves the exploited and balance reserve figures are also given in the annual inventory. As far as the estimated geological reserves of Tertiary coals of Western Region by the author are concerned, all are available as estimated and none of them have been exploited so far.

7. The author is well aware of the present day international classification of Coal and Oil and Gas resources/reserves by virtue of having worked for both. The Resources and Reserves are classified based on increasing geological knowledge and economic exploitation point of view. The “Resources” mentioned in the paper mainly pertain to the freshly estimated deeper Tertiary coals of Western Region and “Reserves” for the estimated coal and lignite reserves by GSI and NLC.

8. The fresh estimation pertains to the deeper Tertiary coals as estimated by the author and re-estimation is mentioned for the bifurcated mineable and unmineable coals.

It is hoped that the above explanation will answer some of the queries raised. However, if any further information is required pertaining to the study, the author will be pleased to provide the same.

(Comment received on 14 April 2003 and the Reply on 2 September 2003)
GEOCHEMISTRY OF GROUNDWATER IN ULTRABASIC AND PENINSULAR GNEISSIC ROCKS, SALEM DISTRICT, TAMIL NADU


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The authors have tried to assess the geochemistry of soil and groundwater in the parts of Salem District. The variation in the geochemistry of groundwater from summer (May 1997) to winter (December 1997) was explained and the mechanism interpreted. However, the authors' attention is drawn to the following:

1. Based on the geophysical results (Sankaran et al. 1993) it is clear that the groundwater samples collected from the borewells (BW-1 to BW-9) represent both first (up to 50 m) and second (75 to 90 m) aquifer zones. While assessing the quality, it is not possible to pin point whether this represents the first or second zone. Particularly when any one zone is highly polluted, then the sampling methodology lacks in evaluation and recommending suitable measures. Samples from each zone would have solved the problem of identifying the zone of pollution, if any. In the case of water sample from BW-8, showing the alarming values of EC and TDS, it is very difficult to conclude whether the first or second or both zones were contaminated/polluted?

2. In the study it was stated that the groundwater is confined to joints, faults and fractures and moves along these features where some are poorly connected. In Fig 1, the general groundwater flow direction is shown, mostly all along the nala (supported by elevation contours). On what basis were these inferences drawn?

3. It was stated that "in the groundwater, (Ca + Mg) and (Na + K) exhibit no considerable change during both the seasons (Tables 3a and b)". On the contrary (Ca + Mg) show significant variation from summer to winter (Tables 3a and b) i.e. 89 to 140 at BW-2; 71 to 12 at BW-3; 109 to 169 at BW-6; and maximum 61 to 154 at BW-9. Similarly, (Na + K) also show maximum variation from 159 to 3360 at BW-9. The level of K is alarming with very high values during winter at BW-5 (20); BW-8 (48) and BW-9 (30)?

4. While showing the relationship between HCO3 vs. TDS in summer and winter season, only summer data was shown in both the plots of Fig.5b. Thus, the only significant change that occurred during the winter was not properly shown, particularly TDS at BW-8 from 1716 mg/l (summer) to 2826 mg/l (winter)? The best fit between TDS and HCO3 for summer data: HCO3 = 0.0653 TDS + 316.59 with R2 = 0.0254 whereas for the winter data it is: HCO3 = -0.0676 TDS + 550.38 with R2 = 0.0027 just reflects reverse nature to that of the summer one?

5. In spite of recharge after the rainfall i.e., in winter TDS has shown an increasing tendency from summer to winter from 440 to 649 mg/l at BW-3 and from 1716 to 2826 mg/l at BW-8. The corresponding change in EC is 651 to 977 mg/l at BW-3 and 2615 to 4324 mg/l at BW-8? Considering the maximum permissible limit of TDS as 1500 mg/l during summer, the water sample from BW-8 (1716 mg/l) and during winter BW-6 (1494 mg/l); BW-8 (2826 mg/l) and BW-9 (1647 mg/l) show alarming limits? Similarly the NaCl content is significant and varies from 636 to 1312 mg/l at BW-8 and 312 and 3747 mg/l at BW-9 from summer to winter respectively? The total hardness at BW-8 during winter show more than the maximum permissible limit i.e. 746 mg/l? In all the samples, the EC and TDS show increasing tendency from summer to winter?

JOUR.GEOL.SOC.INDIA, VOL.62, NOV. 2003

REFERENCES


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On what basis were these inferences drawn?