DISCUSSION

"Lithiophorite and Chalcophanite as Secondary Mn-Oxides in Chromite Ores of Sukinda, Orissa, India" by S.K. Das, R.K. Sahoo, A.K. Paul and G. Friedrich. Jour. Geol. Soc. India, vol.48, November 1996, pp. 583-587.

P.V. Ramesh Kumar, B.V.K. Raju and K.K.V.S. Raju comment:

We have found inconsistent X-ray data for minerals lithiophorite and chalcophanite. The Electron Probe Analyses distributed between two minerals do not correlate with the X-ray data given by the authors. Neither the cell parameters nor the density of the minerals by X-ray data are provided in the article. The X-ray diffractogram (Fig. 4) shows 15 reflection points for both the minerals together of which seven reflections relate to minerals like chromite, goethite and hematite. Ni-chalcophanite identified by Gorshkov et al. 1994 (American Mineralogist, v.79, pp.388-389) gives the following X-ray data and analysis approved by International Mineralogical Commission on New Minerals.

SiO_2, Al_2O_3, Fe_2O_3, CaO - Nil; MnO_2- 65.28-65.02; Co_2O_3-0.03-1.48; NiO-9.88-10.63; CuO - 2.98-1.00; BaO - 2.44-2.14; K_2O - 0.41- 0.34; CeO_2 - 0.35-0.82; H_2O (assumed) 18.34-18.57 Wt%.

X-Ray Data: Symmetry is inferred to be Rhombohedral; Cell Parameters **a** = 7.53 Å and **c**=20.88 Å; the strongest lines are - 6.91 (003, strong); 4.06 (014, medium); 3.46 (006, medium to weak); 3.29 (113, weak); 2.77 (204, weak); 2.24 (124, medium); 1.89 (220, weak); 1.605 (402, medium to weak) and 1.430, weak).

Further the X-ray data provided by the authors do not reflect the JCPDS file data 15-807 (Chalcophanite) and 12-647 (Lithiophorite). The intensity reflections are very weak; their respective strong peak reflections (I/Io=100) are not shown in the X-ray reflections. Hence, we request the authors to obtain diamond scrapped mineral grain powders originally used for EPMA and subject to XRD for further detailed X-ray data. From the probe analysis we feel that the minerals may be new ones slightly different from lithiophorite and chalcophanite.

S.K. Das, R.K. Sahoo, A.K. Paul and G. Friedrich reply:

We are thankful to P.V. Ramesh Kumar and co-workers for thorough reading of our paper and furnish a brief reply to the points raised by them.

1. The cell parameters and density of lithiophorite and chalcophanite could not be provided as XRD of the pure extract of these minerals was not carried out. Physical separation of these minerals (lithiophorite and chalcophanite) was not possible because of their minor incidence in chromite ores and intimate intergrowth with goethite (mentioned in the paper). The interfering nature of some of the X-ray lines/peaks and the comparatively higher scanning rate (2° 2q—/ min^{-1}) also precluded the authors to find out the cell parameters.

2. The 100 (I/Io) intensity peak of chalcophanite (7.0529Å) is almost same to the value (7.05Å) given by Ostwald 1988, (Ore Geology Reviews, v.4, p.27). Similarly, the 100 (I/Io) intensity peak of lithiophorite (4.6707Å) is close to the value (4.70Å) given by Ostwald (1988, p.32). Moreover, detailed ore microscopic studies were also carried out to substantiate identification of the minerals. Chemistry of the minerals also indicate their composition.

3. The suggestion on X-ray diffraction studies of the diamond scrapped mineral powder of the analysed grains is welcome and will be taken up in due course.

His published work relating to historical evidences for the occurrence of diamond, in association with Smt. S. Sakuntlala, his wife, has received wide attention. His interpretation of the gravity map of Bangla Desh has resulted in the discovery of coal deposits in that country. He published more than 70 research articles in reputed national and international journals including the Proceedings of the Royal Society and Bulletin of the Geological Society of America. On the mineral exploration front, he contributed significantly towards geophysical exploration of the Khetri Copper belt, Rajasthan and the iron-ore deposits of Kudremukh, Karnataka.

He was a Fellow of the Geological Society of India and the Indian Geophysical Union; Life Member of the Association of Exploration Geophysicists, the Institute of Asian Studies, Hyderabad, Andhra Pradesh History Congress; Corporate Member of the Institution of Geoscientists, Hyderabad, and Founder Member of Centre for Lithosphere Studies, New Delhi. He was also an Adjunct Professor for Geology and Geophysics Departments of the Indian Institute of Technology, Kharagpur.

As a person, Dr. Krishna Brahmam was very helpful, and affectionate, making even small gatherings lively by his ready wit. As a scientist he would be remembered for his hard work, meticulousness, precision, and clarity of expression. He leaves behind his wife, son and daughter. His son, Sri. Chalapathy Rao, a geologist, now at the Cambridge University, U.K. working on Kimberlites and, his wife, working on the history of diamond occurrences and exploration, were greatly inspired by him.

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ANNOUNCEMENTS

INTERNATIONAL CONFERENCE ON HYDRO-POWER DEVELOPMENT IN HIMALAYAS: 20-23 April 1998, SHIMLA-171001 (H.P): The conference will address the following Themes and objectives which have been chosen for an international audience of engineers and scientist interested in hydro-power development and in the protection of the Himalayan mountain environment. Themes: 1. Investigation of Hydro-power Projects - (a) Engineering Geological Investigations (b) Rock Stresses (c) Ground Water in Rock Masses. 2. Planning of Hydro-power Projects. 3.Environmental Impact Assessment - (a) Mountain Environmental Management (b) Natural Hazard Reduction Programmes. 4. Rock Engineering Design - (a) Rock Tunnelling (b) Underground Power House Caverns, (c) Modern Tunnel Support Techniques. 5. Dam Foundation Rock Problems for (a) Rock fill Dams (b) Concrete Dams. 6. Construction Management - (a) Modern Construction Planning Techniques, (b) Contract Management. 7. Underground Construction - (a) Conventional Tunnelling (b) Use of TBM (c) Large Caverns. 8. Economic and Financial Aspects of Hydro-power Projects including Power Purchase Agreements with Private Sector. 9. Operation and Performance Monitoring. 10. Case Studies of Major Hydro-power Projects in Himalayas: For further particulars contact Prof. V.D. Choubey, Organising Secretary, Dept. of Civil Engineering, Regional Engineering College, Hamirpur - 177 005 (H.P), India.