DISCUSSION

"VERNADITE IN GORIAJHOR MANGANESE ORES, GANGPUR GROUP, INDIA" by Mohapatra, B.K., Nayak, B.R. and Sahoo, R.K., Jour.Geol.Soc.India, 1997, v.49, pp. 331-336.

Rajesh K. Vishwakarma, Geology Department, Benaras Hindu University, Varanasi, writes:

New report on vernadite and its genetic appraisal by Mohapatra et al. (1997) are significant and praiseworthy. It can be a quite important reference document for future study in India and abroad. But I feel, the following points need to be clarified.

1. The authors have not dated any of the Gangpur Group rocks. Hence, their opinion for 946 to 846 Ma age is wrong on the following ground. The Gangpur Group sediments were laid down probably between c. 2000 to 1700 Ma ago (Sarkar, 1980). And by taking into consideration a recent study (Vishwakarma and Ulabhaje, 1991) the age of the upper Gangpur Group of rocks (i.e. 1665 Ma) exposed in Sargipali locality (near to the authors' studied area) is indicative of similar age for the deposition of Mn-bearing upper Gangpur Group mica schist and phyllite in Goriajhor.

2. The readers may feel confused by authors' suggestion that the 'secondary origin of vernadite mineralisation is well revealed from its textural peculiarities'.

3. The proximal hydrothermal sedex (sedimentary exhalative) activity in Sargipali (Vishwakarma, 1996) has contributed Mn distally to Goriajhor area, preferably in response to increasing Eh, pH and low temperature conditions of the solution. Particularly the low Fe/Mn ratios, as reported in Goriajhor vernadite (Mohapatra et al. 1997) are similar to those of the submarine hydrothermal Mn deposits (Choi and Hariya, 1992). As a result, the observed high Mn/Fe ratio in Goriajhor vernadite, as deduced from Roy (1992), may be consistent with the low-temperature solution having low flow rate. Under such condition well ordered crystallinity and ooids as shown by Mohapatra et al. (1997) can be expected. The curved and crenulated fibrils of the ooids of vernadite are, however, attributable to metamorphism.

Other evidences for the sedex origin are: (i) vernadite of sedex origin is known, and its occurrence in such condition is characterised by spreading region of lithosphere. Since in Goriajhor area vernadite is intimately associated with jacobsite and braunite, the possibility of above hydrothermal origin gets impetus. Note that the latter two minerals are dominantly of hydrothermal origin (Nicholson, 1992a). Spessartine garnet present with Goriajhor vernadite further attests to sedex origin and (ii) the high concentration of Ba in Goriajhor vernadite could also be in tune with the sedex type of deposits (Nicholson, 1992b).

Lastly, the authors' own statement, 'the high cation adsorption properties of Goriajhor vernadite is in contrast to the terrestrial vernadite' is another note in proof. Therefore, the Mn-ores in Goriajhor may be interpreted as hydrothermal sedex type, which are sulphide ore-equivalent facies of Sargipali.

References

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B.K. Mohapatra, B.R. Nayak and R.K. Sahoo, reply:

We welcome the comments made by Vishwakarma on our paper. With reference to Vishwakarma's numbered comments:

1. We would like to say that dating of Gangpur rocks does not come under the purview of this paper. We have only cited the age indicating the closing of events/latest metamorphic episode of Gangpur rocks following Roy (1981, pp. 222-223 & p. 325) and not the age of sedimentation in the Gangpur Group.

2. The nature of vernadite mineral has been elucidated in Plate.1-1.2 to 1.6 (p. 333) of our paper. These electron micrographs clearly demonstrate the cryptocrystalline/colloidal nature of this mineral. Such textures shown by an oxy-hydroxide manganese mineral clearly reveal its formation by low temperature supergene enrichment process.

In general, the Gangpur Group constitutes a folded sequence of Mn-rich rocks where manganese ore pockets, rich in tetravalent Mn-oxides (Mohapatra et al. 1995), occur within the structurally favourable sites. The confinement of vernadite within supergene Mn-ore pockets in Goriajhor region, its above mentioned textural characteristics alongwith ~18% H_2O in its composition together support the secondary nature of this mineral. The relict nature of jacobsite, braunite and spessartine in a vernadite base (Plate1-1.1, p. 333) and from the mutual contact relation, the latter phase undoubtedly appears secondary.

It would not be out of place to mention that the source of Mn may be originally hydrothermal in nature but minerals like jacobsite, braunite and spessartine garnet appear to be the result of metamorphism.

3. It is well known that the genesis of any mineral deposit is established taking several factors into account. Considering the distinctive nature of 27 Mn-bearing minerals recorded from the area, alongwith several other factors like mode of occurrence, nature of mineralization, geochemistry, etc., the genesis of Mn-deposits in Gangpur Group have been interpreted by Nayak (1997) as hydrothermal sedex type. This is in agreement with the genetic model proposed by Vishwakarma in his comments on this paper.

Thus, the authors feel that it would be incorrect to decipher the genesis of a mineral deposit from a single mineral as has been ventured by Vishwakarma in his comments. The genesis of vernadite mineral suggested by the authors in their paper does not sound unscientific.

References

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