URANIUM MINERALISATION IN KURNOOL SUB-BASIN, CUDDAPAH BASIN, ANDHRA PRADESH

P. NAGESWAR RAO, PRAKHAR KUMAR, S.K. SRIVASTAVA and R.M. SINHA
Atomic Minerals Directorate for Exploration and Research, Department of Atomic Energy, Begumpet,, Hyderabad - 500 016

INTRODUCTION

Recent investigations by the Atomic Minerals Directorate for Exploration and Research have brought into focus the presence of uranium mineralisation hosted by granite in its fracture zones, close to the unconformity in the Srisailam outliers in Lambapur (Sinha et al. 1995, 1996), Peddagattu and Chitrial areas in the northern part of Cuddapah basin. Investigations further east of the Srisailam sub-basin have revealed good uranium mineralisation, both at the unconformity and in the overlying sediments of Banganapalle Formation of Kurnool Group in the Palnad sub-basin, around Koppunuru-Dwarakapuri (Jeyagopal et al. 1996). Further investigations southwest of these areas in the Kurnool sub-basin, have revealed significant uranium mineralisation in the Banganapalle Quartzite, intruded by vein quartz, close to the Gani-Kalva fault. We report here this uranium discovery in the Kurnool sub-basin and some of its salient features, which have enhanced the uranium potentiality of the sub-basin as well as along the Gani-Kalva fault zone (55 km length and 2 km width).

GEOLOGY

Banganapalle Quartzite is the oldest lithounit of the Kurnool sub-basin in the western part of the crescent-shaped Cuddapah basin (Nagaraja Rao et al. 1987). Gani-Kalva fault has affected the complete sequence of the Cuddapah Supergroup as well as the Kurnool Group. Cuddapah Supergroup represented by the Papaghni Group (Gulcheru Quartzite and Vempalle Dolomite) and the Nallamalai Group (Bairenkonda Quartzite and Cumbum Shale/Phyllite) are exposed mainly on the southern side of this fault. Rocks of the Kurnool Group represented by the Banganapalle Quartzite, Narji Limestone, Owk Shale, Paniam Quartzite and Nandyal Shale occur on both sides of this fault zone. The mineralised Banganapalle Quartzite to the south unconformably overlies Vempalle Formation in the western part and the basement granite in the eastern part of this fault zone. This quartzite is exposed near the Sarparajapuram village (Survey of India Toposheet No.57 I/2; lat. 15°30'41"N: long. 78°02'38"E), Kurnool District, Andhra Pradesh (Fig.1). Preliminary field data indicates that the

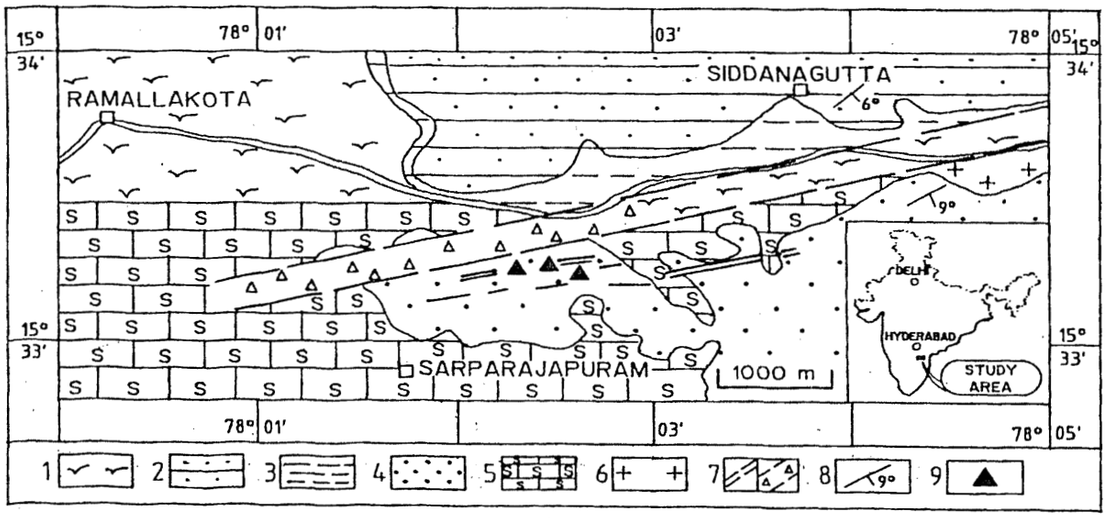

Fig.1. Geological Map Sarparajapuram Radioactive Anomaly, Gani-Kalva Area, Kurnool District, Andhra Pradesh (Toposheet No.57 I/2). 1-Recent Alluvium, 2-Paniam quartzite, 3-Owk shale, 4-Banganapalle Formation, 5-Vempalle Formation, 6-Basement granite, 7-Fault zone/Fault breccia (hematitic), 8-Strike and dip, 9-Radioactive anomaly.

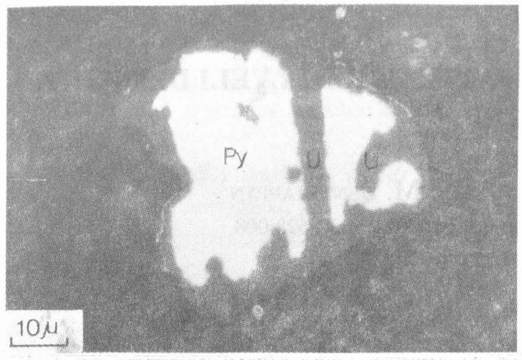

Fig.2. U - Phases (U - Pitchblende/Uraninite) along the margins/ fractures in pyrite (Py). Reflected Light, in oil, 1 N.

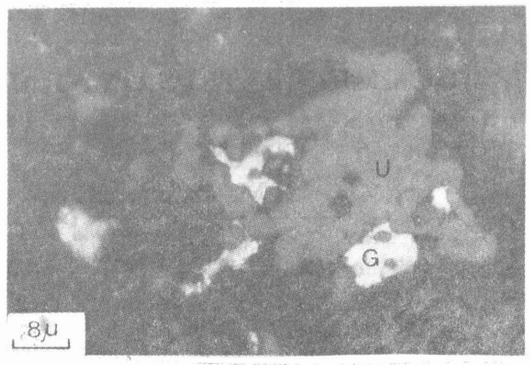

Fig.3. Uraninite (U) with inclusions of Galena (G). Reflected Light, in oil, 1 N.

mineralisation has been influenced by major faults/ fractures that facilitated the migration of (hydrothermal ?) mineralising fluids. The main uranium minerals in this rock are uraninite and pitchblende, associated with sulphides of lead and iron. The entire meta-sedimentary sequence in the area is highly tectonised along this fault zone, resulting in brecciation, haematitisation and silicification.

Petrographically, the radioactive quartzite of this area is fine grained, hard, compact and massive with variegated colours of buff, red and brown. Intrusive vein quartz and sulphides occur along microfractures within the clastic quartz. The relict texture of quartzite indicates it as originally a quartz arenite that was subjected to intense crushing and quartz veining. Fracturing, granulation and cataclasis have caused the (i) formation of matrix component, (ii) flowage of quartz by plastic deformation, (iii) recrystallization of quartz under high differential stress and (iv) orientation of second generation quartz in veins.

URANIUM MINERALIZATION

Mineralisation occurs in two main patches, disposed sub-parallel to the main fault zone. Uranium content, ranges from 0.005 to 0.048% U_3O_8 with negligible thorium. Petrographic and X-ray diffraction studies indicate that the mineralisation is marked by primary uranium minerals - uraninite and pitchblende. While uraninite occurs as euhedral grains, pitchblende is characterised by colloform texture. Pitchblende mostly rims pyrite and is also present along its fractures (Fig.2). Euhedral uraninite with close association of galena (Fig.3) represents an early phase of mineralisation. Pitchblende, with colloform texture, probably represents a later phase of uranium mineralisation and is later than pyrite. The associated ore minerals are pyrite, galena, chalcopyrite, covellite, goethite, limonite and anatase.

CONCLUSION

In view of the favourable geological setting, similar to that of Koppunuru-Dwarakapuri area in the Palnad sub-basin (Jeyagopal et al. 1996), and the presence of uranium in association with sulphides in the Banganapalle Quartzite, this uranium find near Sarparajapuram opens up the entire Kurnool sub-basin as a potential target for uranium exploration.

Acknowledgement: We thank D.C. Banerjee, Director, Atomic Minerals Directorate for Exploration and Research for encouragement, help and permission to publish this note. We also thank our colleagues in Physics and X-ray Diffraction Laboratories at AMD, Hyderabad for analysis and identification of minerals.

References

JEYAGOPAL, A.V., PRAKHAR KUMAR and SINHA, R.M. (1996) Uranium mineralisation in the Palnad sub-basin, Cuddapah basin, Andhra Pradesh, India. Curr. Sci. v.71, no.12, pp.957-959.

NAGARAJA RAO, B.K., RAJURKAR, S.T., RAMALINGASWAMY, G. and RAVINDRA BABU, B. (1987) Stratigraphy, structure and evolution of the Cuddapah basin, *In:* Mem. Geol. Soc. India, no.6, pp.33-86.

SINHA, R.M., SHRIVASTAVA, V.K., SARMA, G.V.G. and PARTHASARATHY, T.N. (1995) Geological favourability for unconformity-related uranium deposits in northern parts of the Cuddapah basin: Evidences from Lambapur uranium occurrence, Andhra Pradesh, India. Explor. Res. Atomic Min., v.8, pp.111-126.

SINHA, R.M., PARTHASARATHY, T.N. and DWIVEDY, K.K. (1996) On the possibility of identifying low cost, medium grade uranium deposits close to the Proterozoic unconformity in Cuddapah basin, Andhra Pradesh, India. IAEA-TECDOC-868, pp.35-55.