SHORT COMMUNICATION

Proterozoic Unconformity-related Uranium Occurrence Around Rallavagu Tanda, Palnadu Sub-Basin, Andhra Pradesh

P. NAGESWARA RAO, ANJAN SOM, T. PERUMAL, P. B. MAITHANI, V. P. SAXENA and R. M. SINHA
Atomic Minerals Directorate for Exploration and Research,
Department of Atomic Energy, Begumpet, Hyderabad – 500 016

Abstract: Recent investigations have brought out significant uranium occurrences (up to 0 65% U_3O_8) spread over as discontinuous zones (up to 300 m x 280 m x 1-3 m) over an area of about 7 km x 2 km along the northern part of Palnadu sub-basin The radioactive zones are exposed along the Upper Proterozoic unconformity contact between the basement granite and the Banganapalle quartzite near Lavur Tanda, Jaitram Tanda, Boligutta Tanda, Rallavagu Tanda and Gandhi Nagar villages in Nalgonda district, Andhra Pradesh These findings are reported in this note along with some features of mineralisation

Keywords: Uranium occurrence, Proterozoic, Palnadu sub-basin, Andhra Pradesh

Introduction

Unconformity-related deposits are the most promising high-grade, low cost uranium resources in the world The deposits associated with Lower-Middle Proterozoic unconformity overlain by the Middle Proterozoic rocks in Athabasca Basin, Saskatchewan, Canada (Fogwill, 1981; Sibbald, 1986,1988) and the Pine Creek Geosyncline, Australia (Needham and Roarty, 1980, Needham et al 1988) are among the richest and the largest uranium deposits in the world In India, uranium deposits in Lower Proterozoic basement granite below the unconformity of Srisailam quartzite (Bisht et al 2001, Sinha et al 1995, 1996) and in the Banganapalle Quartzite (Jayagopal et al 1996) around Koppunuru-Dwarakapuri area in the western part of Palnadu sub-basin have indicated enormous potential for such resources

Geological Setting

The area exposes Lower Proterozoic basement granite nonconformably overlain by Upper Proterozoic Kurnool Group of rocks (Fig 1) in the northeastern part of crescent-shaped Cuddapah Basin (Nagaraja Rao et al 1987) In the Palnadu basin of Kurnool Group rocks, Banganapalle quartzite is the oldest and Narji limestone is the youngest litho-unit Along the southern margin of the Palnadu basin, Cumbum Formation is exposed and along the northern margin the basement granites The basement granite is grey to light greenish, coarse grained, and generally porphyritic It is essentially composed of quartz and plagioclase-alkali feldspars along with biotite, apatite, monazite, and allanite as accessories Basic dykes (width <1 m-60 m) trending mostly N-S, E-W & NW-SE and quartz veins (width up to 40 m) trending N-S traverse the basement granite A lensoid body of cobble pebble conglomerate (0 1 m-1 0 m thick) overlies the basement granite, followed by medium to coarse-grained feldspathic quartzite, which consists of a framework of moderately sorted, sub angular to sub rounded clasts (quartz, feldspars, lithic fragments of granite) cemented by quartz overgrowth This unit is, in turn, overlain by a sequence of alternating purple/grey shale/siltstone and fine brown colored ferruginous quartzite The quartzite is sub horizontal and dips of 2°-10° towards southeast The major NNE-SSW Gottimukala-Botalapalem fault zone (G B F) and the N-S Musi fault zone (M S F), besides a few smaller faults trending NE-SW, NW-SE, are the chief fault zones Associated with these zones occur fault breccia and quartz veins (Fig 1)

Uranium Mineralisation

Uranium mineralization is seen (Fig 1) all along the nonconformable basement-cover rock contact, hosted by three rock types viz basement granite, basic dykes (restricted to 1-3 0 m below the nonconformity) and sub lithic arenite (1-1 5 m above the nonconformity) The radioactivity recorded in the cobble-pebble-conglomerate/pebbly quartzite is due to thorium Field observations indicate that the major faults /fracture zones at the basement-cover rock interface, facilitated the migrations of mineralizing

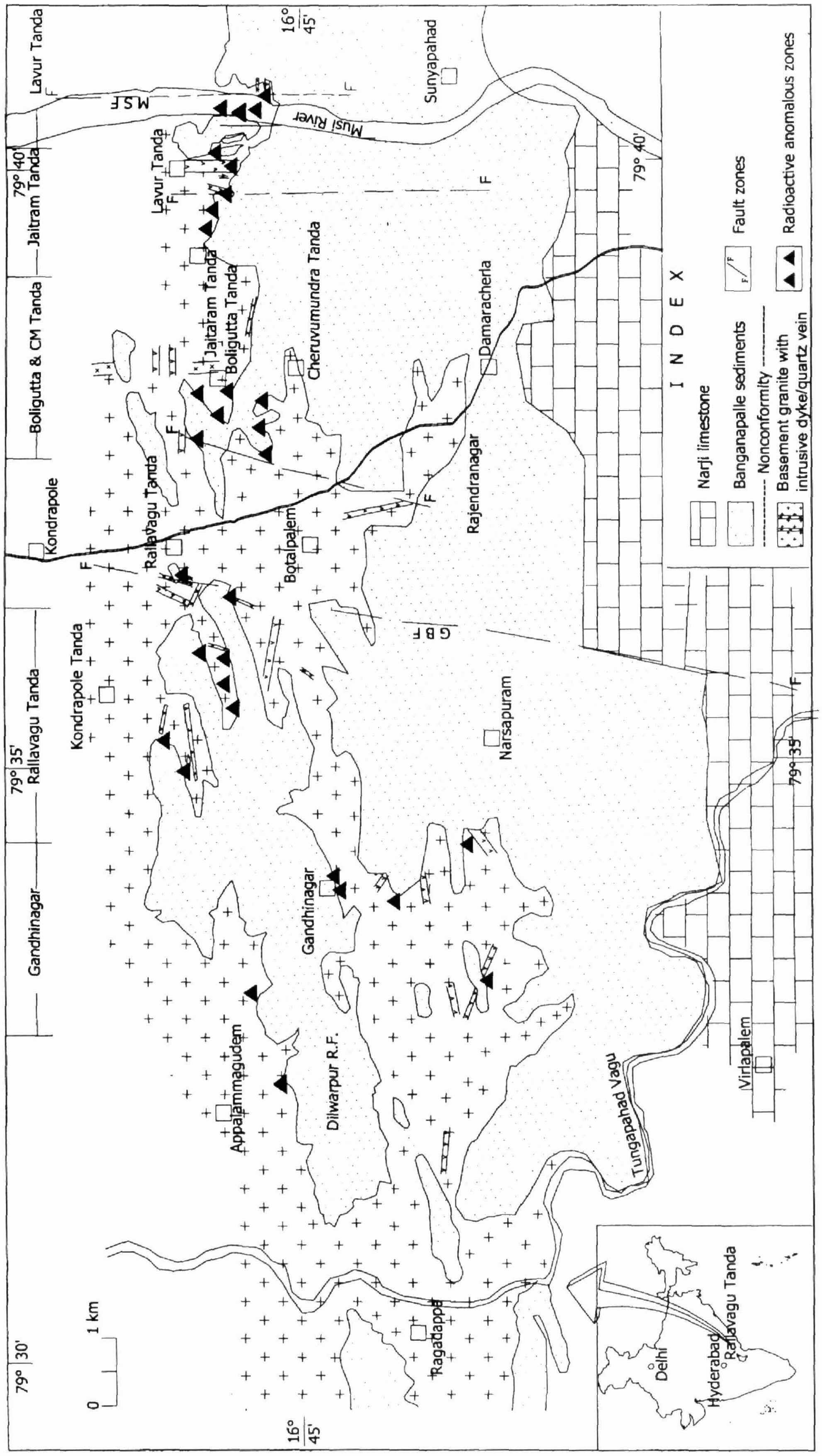

Fig.1. Geological map of Rallavagu Tanda-Damaracherla area.

Table 1. Assay results of grab samples from R V Tanda-Damarcherla Area, Nalgonda district, A.P

Location/ Zone	Rock Type	No. of Sample	U-mineralisation $\%U_3O_8$ (β/γ) Average	Disequilibrium %	Remarks
SE of Lavur	Granite	6	0.029	+20	Uraniferous
Tanda	Basic Dyke	3	0.050	+41.5	Uraniferous
	Quartzite	5	0.082	-24	Uraniferous
SE of Jaitram	Basic Dykes	6	0.032	+28.8	Uraniferous
Tanda	Granite	5	0.031	+35.8	Mixed U-Th (Av. 0.020% of ThO_2)
	Conglomerate	2	-	-	Thoriferous (Av. 0.075% of ThO_2)
NW of Cheruvu-mundra Tanda	Granite	12	0.028	+42	Mixed U-Th (Av. 0.013% of ThO_2)
	Basic dyke	3	0.024	+28	Uraniferous
SW of Rallavagu Tanda	Granite	8	0.027		Mixed U-Th (Av. 0.013% of ThO_2)
	Granite	4	0.230		Uraniferous
	Basic Dykes	7	0.027	+36	Uraniferous
	Quartzite	4	0.047	+54	Uraniferous

(hydrothermal) fluids (Bisht et al. 2001), a process typical of unconformity related deposits in the Srisailam sub-basin (Sinha et al. 1995).

Mineralisation is noticed in the form of several anomalous E-W trending zones (up to 300 m x 2 80 m x 1-3 m), over an area of more than 7 km x 2 km along the northern margin of the Palnadu sub basin. Uranium concentration ($\%U_3O_8$) in granite samples (n=48) ranges between <0.010-0.65, in basic dykes (n=21) between 0.011-0.072 and in quartzite (n=9) between 0.014 - 0.30. The most significant concentration of U_3O_8 was observed in the samples of Musi fault (M.S.F). The average values of U_3O_8 in each rock type of different areas are shown in Table 1.

The mineralisation is mainly due to primary uranium minerals *viz.*, uraninite ($UO_{2.39}$, a_o=5.4272±0.0012Å, V=159.86 Å), (Unpublished Report, AMD-XRD Lab.

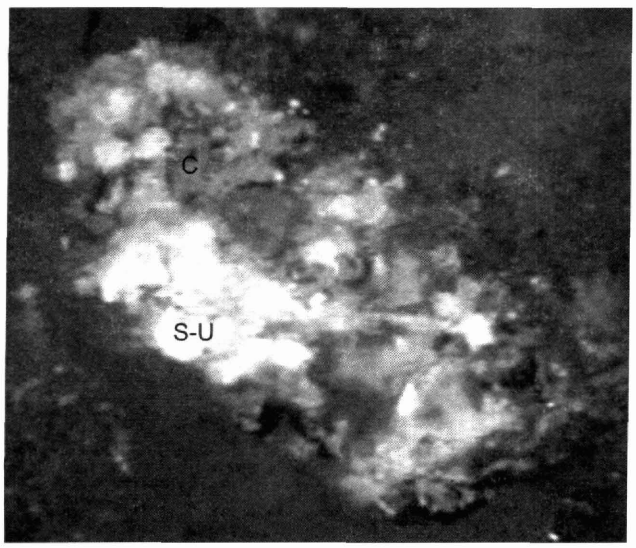

Fig.2. Coffinitised pitchblende (C) garlanded by secondary uranyl mineral I S-UI-RL in oil-Scale 1 cm = 44 micron.

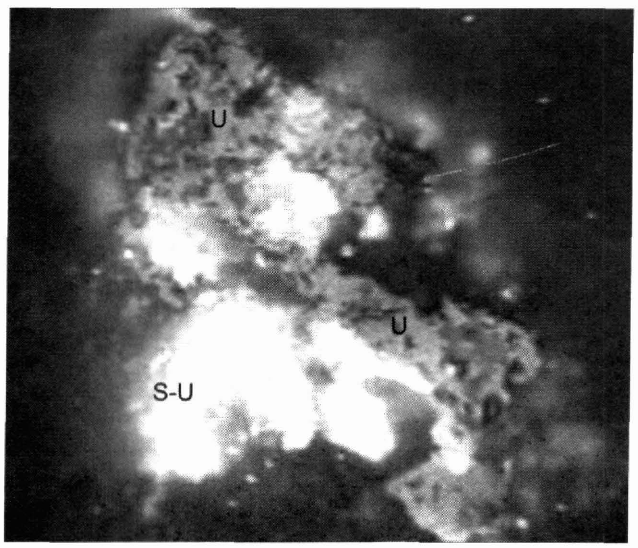

Fig.3. Pitchblende (U) garlanded by secondary uranyl mineral I S-UI-RL in oil-Scale 1 cm = 44 micron.

2002), pitchblende (UO_2-UO_3) and coffinite (U $(SiO_4)_{1\ x}$ $(OH)_{4x}$) and the secondary uranium mineral viz , Uranophane (Ca $(UO_2)_2$ (SiO_3OH) $_2$ $6H_2O$, Figs 2 and 3) Some granite samples (Table 1) have shown mixed uranium/thorium values indicating the presence of refractory minerals such as monazite, zircon and allanite Computation of the analytical results shows that disequilibrium factor (U_3O_8/ eU_3O_8) is about +34% in granite, +33% in basic dykes and +10% in quartzite in favour of parent (uranium)

Conclusions

Uranium occurrence discovered along the Upper Proterozoic nonconformity between basement granite and Banganapalle sediments, over an area of more than 7 km x 2 km around RallavaguTanda, Damaracherla area, Nalgonda district, A P, along the northern margin of Palnadu sub basin form potential target area for uranium exploration

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