

# IDENTIFICATION OF RADIOMETRIC ANOMALY VARIATIONS IN PARTS OF KURNOOL BASIN, INDIA

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## ABSTRACT

The radiometric studies were carried out in the study area Panyam mandal, which comes under Kurnool Basin, India to delineate the different radiometric anomalies according to different geological formations. In the present paper it is described about the three profiles P1, P2 and P3 in which the variations of anomalies clearly indicates the characteristic of the present formation. From the interpretation of profile P1 the Nandyal shales showed high anomalies from 5  $\mu\text{R/hr}$  to 7  $\mu\text{R/hr}$  except one place where highly weathered shales are present. Panyam quartzites in profiles-P2 and P3, showed a low anomaly  $<3 \mu\text{R/hr}$ . Observations from the two profiles-P1 and P3, in the Koilakuntla Limestone with Nandyal Shale region a low anomaly  $<2 \mu\text{R/hr}$  is noticed and it indicates that this region is covered with limestones and profile-P2 shows a high  $>3 \mu\text{R/hr}$  which infers that this area is covered with Shales only.

**Keywords:** Panyam mandal, radiometric anomalies, Nandyal Shales, Koilakuntla Limestones, Panyam Quartzites

## 1. INTRODUCTION

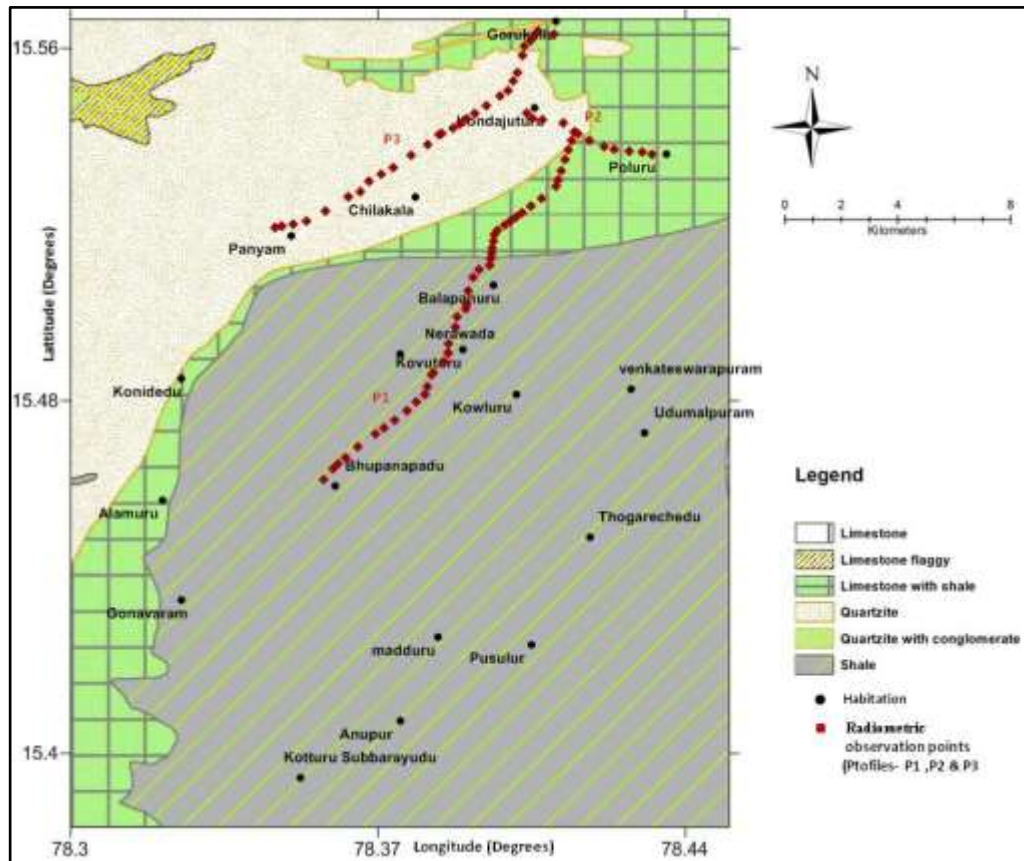
Maximum all rocks are radioactive, because radio elements present even though to a minute extent. Generally uranium is predominant and are easily detected. Potassium is mostly occur in igneous (magmatic), sedimentary and metamorphic rock forms and its secondary products have low intensity (Venkat Rao, 1977; Bhimasnkaram, 1974). Among these rocks specially in shale, clays and saline deposits show high radiometric values due to large amounts of radio elements like in granites. Sandstones show medium radiometric. Rock salt, limestones, gypsum, anthracite, dolomites, coals, pure quartz sands, shows low values due to very low radioactive elements. In the Metamorphic rocks gneisses and schist show high values and Marbles and quartzites show low values. The radiometric method is usually carried out for geological mapping, only very near surface investigations maximum 0.5 m depth (Bhimasnkaram, 1974; Murali and Patangay, 2006).

## 2. GEOLOGICAL SUCCESSION

The study area is part of the Kurnool system, and is surrounded by Archaeans and Cuddapah group of rocks. The Kurnool group of rocks is purely sediments and are devoid of any igneous activity. These rocks rests unconfirmably over the Cuddapah super group. This mandal covered different geological formations (Figure1) viz., Nandyal Shale, Koilkuntla Limestone and Panyam Quartzites (after Nagaraja Rao et al., 1987).

### 3. RADIOMETRIC DATA ACQUISITION ALONG THE PROFILES

The present study area Panyam mandal comes under Kurnool District of Andhra Pradesh, India. Radiometric measurements were acquired using the instrument Scintillometer (SM-141), along the three profiles P1 to P3 (Figure 1) with station interval of 200 m in the study area. These readings were measured very carefully. These profiles are maximum oriented in NE-SW and E-W directions. In the field survey it is easily noticed that the variations of radiometric readings are corresponding to very shallow surface geology.



**Fig-1:** Layout map of the Radiometric survey, overlaid on the geology map of the study area (modified after GSI, 2006).

## 4. DATA INTERPRETATION

### 4.1 Profile-P1: Bhupannapadu to Kondajutturu

This profile from Bhupannapadu to Kondajutturu present in the middle of the study area and its length is 10 km. This profile mostly covered by shales (Figure 2 (b)) up to 6800 m which reveal high anomaly above  $3 \mu\text{R/hr}$  (Figure 2 (a)). But at 1800 m to 2300 m, the low anomaly  $=3.5 \mu\text{R/hr}$  is noticed due to highly weathered shales. From 6800 m to 10000 m the area is comprised by limestone with shale formations which shows low anomaly  $< 1.5 \mu\text{R/hr}$  due to limestone.

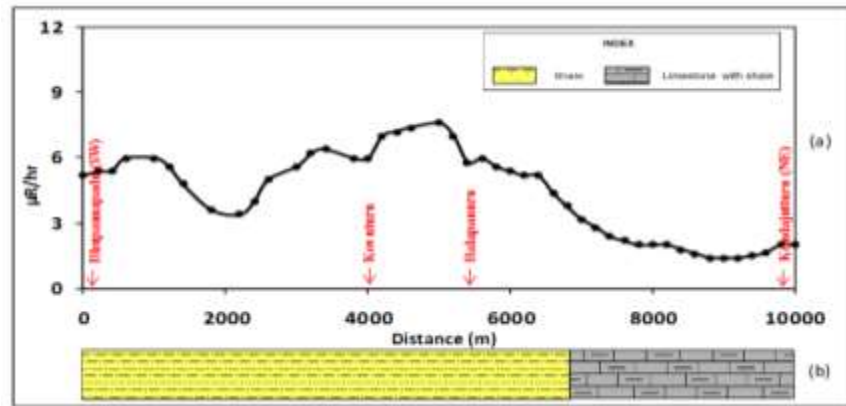


Fig-2: (a) Radiometric anomaly and (b) surface geology, along the profile-P1.

#### 4.2 Profile-P2: Kondajutturu to Poluru

This profile from Kondajutturu to Poluru exist on the northern side and its length is 3.4 km. Half of the profile upto 1550 m, shows low anomaly < 2 µR/hr (Figure 3 (a)) due to presence of quartzites (Figure 3 (b)). Another half of the profile shows high anomaly from 3 µR/hr to 6 µR/hr due to shales in the limestone with shale formations.

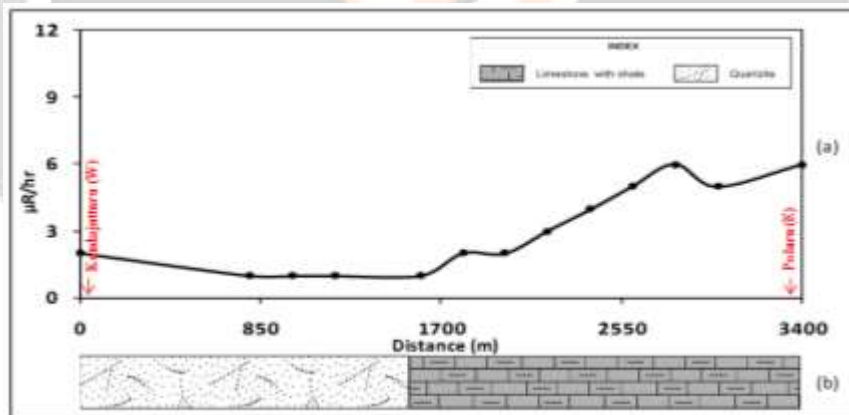
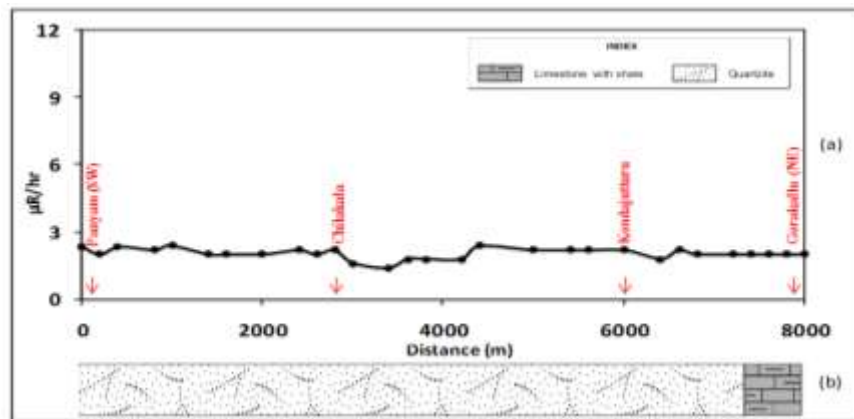


Fig-3: (a) Radiometric anomaly and (b) surface geology, along the profile-P2.

#### 4.3 Profile-P3: Panyam to Gorakallu

This profile from Panyam to Gorakallu exist on the western side and its length is 8 km. This area is mostly surrounded by quartzites, upto the distance of 7300 m except at the end 7300 m to 8000 m covered by limestone with shales (Figure 4(b)). The obtained anomalies are < 3 µR/hr (Figure 4 (a)) due to these quartzites and limestones.



**Fig-4:** (a) Radiometric anomaly and (b) surface geology, along the profile-P3.

## 5. RESULTS AND CONCLUSIONS

From the observations of the three of the profiles it is clearly visible that radiometric anomalies are different in different types of formations which are exist in this area viz., Nandyal Shales, Koilakuntla Limestones and Panyam Quartzites. From the profile-P1, it is clear that Shales exhibit high radiometric anomalies from 5  $\mu\text{R/hr}$  to 7  $\mu\text{R/hr}$ . But at one place the anomaly is low about about 3.5  $\mu\text{R/hr}$  which may be due to highly weathered shales. From the profiles-P1 and P3, it is noticed that in the in the second formation Shales with Limestone the anomalies are low  $< 2 \mu\text{R/hr}$ . It indicates that in this region only limestones are present. But from the profile-P2 the anomalies are high may be due to presence of shales. In the case of quartzites in the profiles-P2 and P3 it is clear that the anomalies are low  $< 3 \mu\text{R/hr}$ .

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