

# Radiometric Data Analysis in Parts of Kurnool District, Andhra Pradesh, India

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## ABSTRACT

The study area Panyam mandal located in Kurnool district, Andhra Pradesh, India. In this study area Radiometric measurements were carried out to identify the radiometric anomalies according to near surface geological formations. In the present study it is explained about the three profiles P1, P2 and P3 which are passess through Nandyal Shale formations in which the radiometric anomalies are different at place to place. Profile-P1 exhibit high values > 6  $\mu\text{R/hr}$  throughout the profile. The profile-P2 shows high anomaly like P1 throughout the area but a low 3  $\mu\text{R/hr}$  is noticed in the middle of the profile and maybe it is due to highly weathered shales. The profile-P3 show very low <2  $\mu\text{R/hr}$  at two places due to soil cover and the remaining area show high anomalies as in the profiles P1 and P2. In all the profiles the anomalies with alternate low and high is observed due to result of moderate to slightly weathered shales.

**KEYWORDS:** Panyam mandal, geological mapping, Nandyal shales, radiometric anomalies and weathered shales

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## 1. INTRODUCTION

The radiometric method is usually carried out for geological mapping, detection of mineral deposits and environmental studies. The disintegration of an atomic nucleus leads to radioactivity. Certain elements potassium, uranium and thorium undergo spontaneous decay with emission of energy in the form of alpha, beta, gamma rays (Bhimasnkaram, 1974). These gamma-rays are the packets of electromagnetic (EM) radiation which can penetrate maximum 0.5 m, through the rocks. So this method is useful for only very near surface. The rocks which hold radioactivity give rise to anomaly compare to the surrounding areas. These are the primarily interesting zones for exploration. The radioactive ore deposits sometimes

covered with soil which is very difficult to identify the anomaly (Bhimasnkaram, 1974; Murali and Patangay, 2006). Potassium is mostly occur in igneous (magmatic), sedimentary and metamorphic rock forms and its secondary products have low intensity. (Venkat Rao, 1977; Labani Roy, 2015).

## 2. Geology of the Study Area

The study area Panyam mandal is located in the Kurnool subbasin, India. The Kurnool group stratigraphy is as follows: which are Nandyal Shale, Koilkuntla Limestone, Panniam Quartzites, Owk Shale, Narji Limestone, Banganapalli Quartzites (Nagaraja Rao et al., 1987).

**Table 1 Stratigraphy of the Kurnool Basin (after Nagaraja Rao et. al., 1987)**

		Thickness	
Upper Proterozoic	Kurnool Group 500 m	Nandyal Shale	50-100m
		Koilkuntla limestone	15-50m
		Panniam Quarzite	10-35m
		-----Regression or Local Disconformity-----	
		Owk Shale	10-15m
		Narji Limestone	100-200m
		Banganapalli Quarzite	10-57m
-----Unconformity-----			
		Srisailam Quarzite 620 m (+)	
<b>Cuddapah Super Group</b>			

### 3. Radiometric Studies

Radiometric studies were conducted using Scintillometer (SM-141) instrument in the study area along few profiles with station interval of 200 m. These profiles were trending in NE-SW and NW-SE directions. In this present paper it is explained about the three profiles P1, P2 and P3 which were conducted in Nandyal shale region shown in the geology map (Figure 1) of the study area.

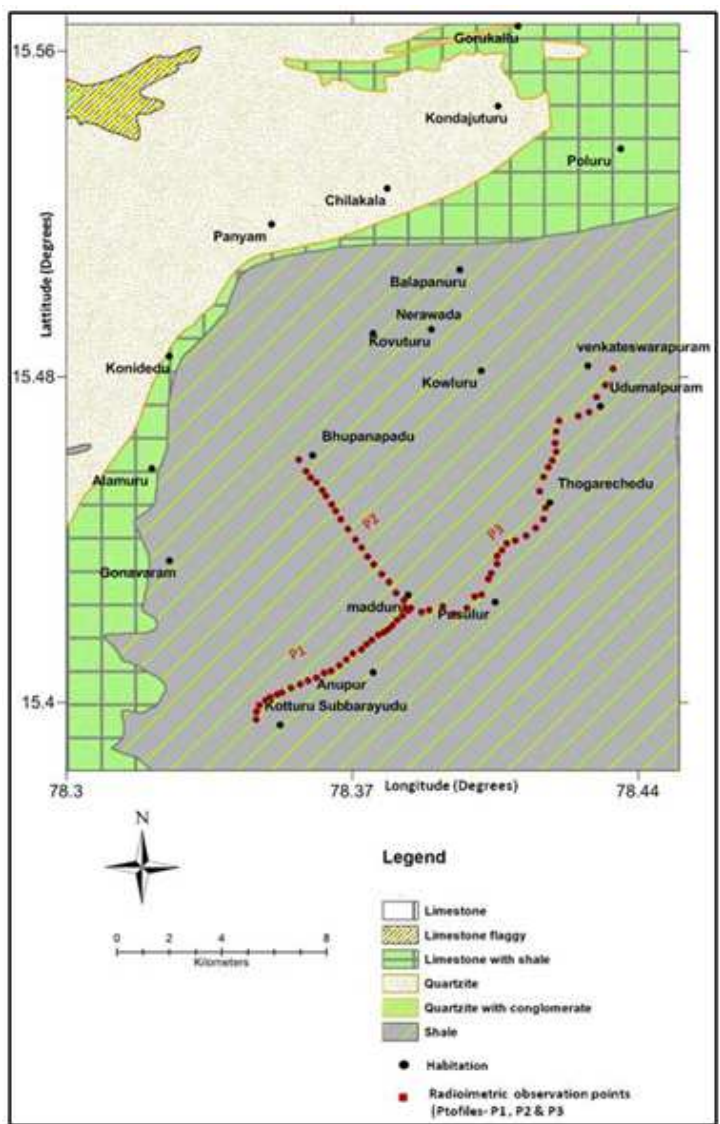


Figure1 Geological map of the Panyam mandal along with three radiometric profiles (after GSI, 2005)

### 4. Qualitative Analysis and Results

The three profiles P1, P2 and P3 were plotted distance (meter) Vs radiometric readings ( $\mu\text{R/hr}$ ) and interpreted qualitatively shown in Figures 2 to 4. The surface geology also shown for better understanding in these profiles.

#### A. Profile-P1: Kotturusubbarayadu to Madduru

This profile from Kotturusubbarayadu to Madduru exist in southern side of the study area. Its length is 5 km and is oriented in NE-SW direction. This area is totally surrounded by Nandyal shales (Figure 2 (b)) and exhibit high values (Figure 2 (a))  $> 6 \mu\text{R/hr}$  throughout the profile. It is clearly noticed that the anomaly is alternate low and high undulations which indicates the presence of shales are moderate to slightly weathered.

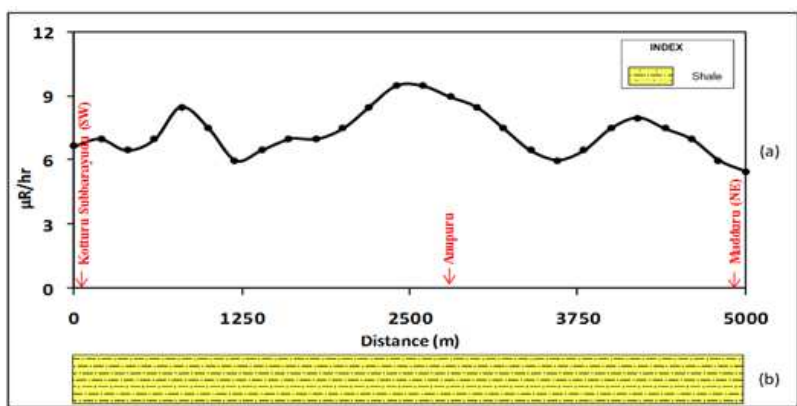


Figure 2 (a) Radiometric anomaly and (b) surface geology, along the profile-P1.

**B. Profile-P2: Bhupannapadu to Madduru**

This profile from Bhupannapadu to Madduru present in southern side and its length is 4.4 km. It is oriented in NW-SE direction. This area is also covered with Nandyal shales (Figure 3 (b)) and exhibit high anomalies > 5  $\mu\text{R/hr}$  (Figure 3 (a)) as in the profiles P1 with alternate lows and highs due to moderate to slightly weathered shales. But in the middle of the profile low = 3  $\mu\text{R/hr}$  is observed due to highly weathered shales.

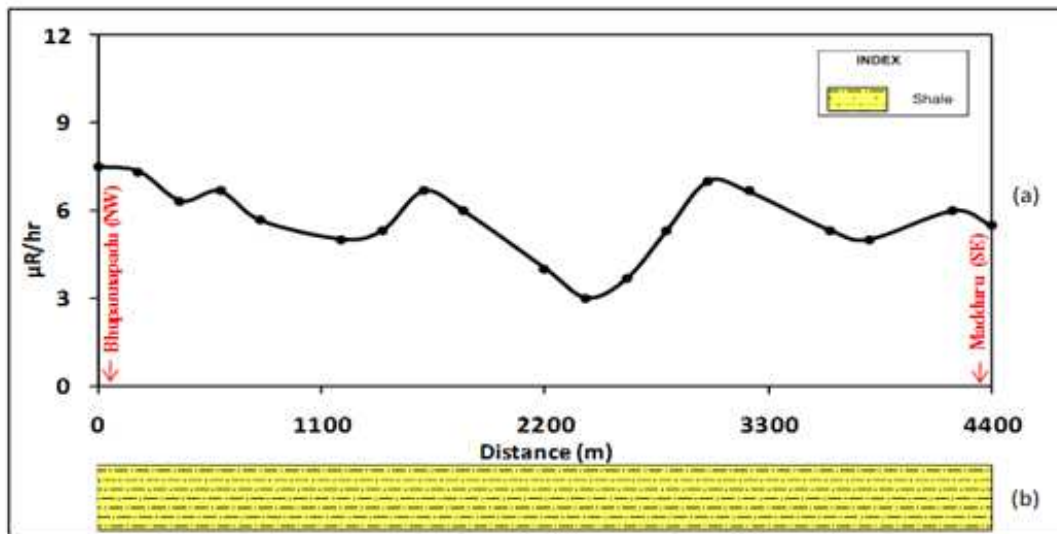


Figure 3 (a) Radiometric anomaly and (b) surface geology, along the profile-P2.

**C. Profile-P3: Madduru to Venkatapuram**

This profile from Madduru to Venkatapuram present in the eastern side and its length is 8 km. It is oriented in NE-SW direction. This profile is also covered only with shales (Figure 4 (b)) and shows the high anomalies same as the profiles-P1 and P2, from 3  $\mu\text{R/hr}$  to 8  $\mu\text{R/hr}$  (Figure 4 (a)) with minor undulations. It can be seen that the anomaly is increased towards Venkatapuram where Nandyal shales are slightly weathered. But at two places at 1000 m and 4000 m, the low anomalies < 2  $\mu\text{R/hr}$  are observed due to soil, result of passing Kunderu river in this area.

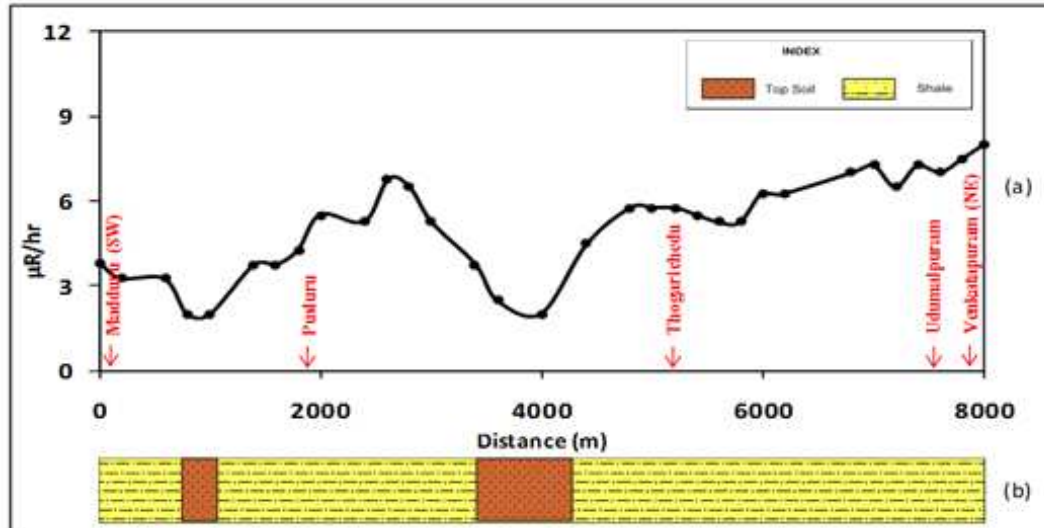


Figure 4 (a) Radiometric anomaly and (b) surface geology, along the profile-P3.

**5. Conclusions**

From the results of the three profiles P1, P2 and P3, it is observed that radiometric anomalies are high > 3  $\mu\text{R/hr}$  throughout the profiles because of Nandyal shale formations in the study area. Even though it is noticed the high anomalies but with alternate low and high undulations are observed due to moderate to slightly weathered shales. But in the profile -P2 at the central part a low 3  $\mu\text{R/hr}$  is observed due to highly weathered shales. The profile P3 shows very low < 2  $\mu\text{R/hr}$  at the two places may be due to soil, result of passing Kunderu River in this area. It is clear that even though the whole area covered with same Nandyal

formations the measured anomalies are different at different places due to degree of weathering of shales and soil cover.

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