NEUTRON ACTIVATION ANALYSIS
OF TURKISH COALS

III. RELATION BETWEEN COMPOSITIONS OF COAL
AND LOCAL EARTH CRUST

S. F. AYANOĞLU, G. GÜNDÜZ

Kimya Mühendisliği Bölümü Orta Doğu Teknik Üniversitesi (Middle East
Technical University), Ankara (Turkey)

(Received July 22, 1977)

The relative enrichments of some of the elements in coals taken from different zones
were compared qualitatively with the chemical composition of the local earth crust. It was
found that the enrichment of an element in soil also shows up in coal.

Effect of the soil composition

In Part I, the enrichments of Na, K, Ca, Fe, As, Sr and Ba in all the coals studied were related to the biological accumulation of these elements in plants. However these and other elements show some relative enrichments in different coals.

It is possible to explain the relative enrichments in relation to the local soil composition, which actually shows the abundant elements. In fact, the soil composition is reflected by the local mines. Fig. 1 shows the distribution of some mineral occurrences in Turkey. The zones the coal samples were taken from, are also shown on the figure. It is seen from Table 1 in Part I, that Zone 3 coal is very rich in sodium. It is a Central Anatolian coal close to the Salt Lake, which is believed to be descending from an old sea covering the central part of Turkey in very early geological periods.

The amounts of chromium, iron and cobalt in Zone 4 lignite are very high when compared with those in other lignites. This is in line with the existence of chromium, iron and cobalt mine reserves in that zone. Since Zone 3 is relatively close to chromium mines, the lignite of this region is richer in chromium than the other three lignites.

The barium content is also the highest in Zone 4 coal. This can again be explained by the presence of barytes (consisting mainly of barium sulfate) nearby Zone 4.
Zone 5 lignite is relatively richer in antimony than Zone 3, 2 and 4 lignites. Actually, these regions are close to antimony mines.

Zone 4 coal is also rich in lanthanides. However, the exploration of lanthanides has not yet been accomplished in Turkey. But since Zone 4 is very rich in many elements, it may also be rich in lanthanides.

Since uranium and thorium are the heaviest naturally occurring elements in the periodic system, they must have formed via nuclear fusion in the latest periods in the center of the earth. Uranium and thorium then came out and spread on the existing earth crust by geological and volcanic eruptions. In fact, uranium ores in Turkey are found in layers covering solid stone particles in a heterogeneous form. Therefore, both uranium and thorium may exist in geologically recent regions. So it is not surprising that six of the seven uranium deposits are in the western part of the country, which is the geologically youngest part of Turkey. The thorium beds are also found in a relatively young region. It is a fact that the parts of Turkey where uranium and thorium deposits are found are still geologically very unstable zones with earthquakes taking place all too often.

According to Table 1, in Part 1 uranium appears to be the highest in Zone 5 coal and thorium in Zone 4 coal. Both zones are close to uranium and thorium mines, respectively.