THE ORIGIN OF THE SUBSURFACE IGNEOUS CLASTICS ACCUMULATION IN AL-TINIF VICINITY, WEST IRAQ, A NEW CONCEPT

DISCUSSION

Jassim M. Al-Bdaiwi*

Sir,

I would like to discuss Mr. Sissakian argument published in the Iraqi Bulletin of Geology and Mining (Vol.3, No.1, 2007) concerning the problem of Al-Waleed (Al-Tinif) anomalous rock body (**Ring Dyke**) as a body formed by the action of some sort of thermal activities taken place at depth.

Mr. Sissakian treated this problem without reviewing all the relevant constituents of our interpretation documented in (Al-Bdaiwi *et al.*, 2005) which was ignored by Mr. Sissakian. We introduce the main points that were taken into consideration in our interpretation:

1- The very high percent of the exotic fragments of black shale that characterize only the core of BH.T1 (located in the middle of the area), needs special concern. The black shale fragments are well mixed with the other constituents of the rock body. The fragments, sometimes reach the dimension of one inch and surprisingly with sharp edges, sometimes show concave – convex microscopic structures along splitting surfaces resembling those mentioned by (Al-Kwaizi, 1997) for the Silurian black shale. (Al-Bassam *et al.*, 1990) described Cretaceous and Paleocene black shales in the area of Akashat. No black shale exposure is present around Al-Waleed locality. The host rock of the anomalous rock body is of Eocene age.

   The lower part of the sequence in BH.Ts (located in the south) is characterized by brownish well welded, highly brecciated pyroclastic rocks, shows only scattered pale brown (probably due to heating) shale fragments. BH.Tn (located in the north), which is rich in pyroclastic rock fragments is also very poor in black shale contents, a situation that could be explained by limited zone of fluidization and/ or explosion action, which was responsible for transporting the black shale to shallow depths within the area of BH.T1. The upper parts (about 30 m below the surface) in the drilled boreholes do not show any black shale. This could imply that the thermo-mechanical processes have ceased before the depositional period of this 30 m cover.

2- The Ordovician, Silurian and Carboniferous flora are claimed by Sissakian (2007) as "could be reworked", this contradicts INOC specialists identification i.e. they are not reworked. INOC specialists were puzzled by what they had found in the samples. For us these findings are expected since we believe in a deep fluidization process as a process shared in the formation of this anomalous rock body.

* Chief Geologist (Retired), State Co. of Geological Survey and Mining, P.O. 968, Baghdad, Iraq

3- The presence of orthoquartzite blocks (example BH.T1, depth 133 m) rich in muscovite and biotite with the micas strongly interlocked between the angular quartz particles referring to a high degree of compaction (old formation). Some of the quartz particles show wavy extinction. The rock, in general, resembles the Ordovician quartzite formation described by Al-Kwaizi (1997). No orthoquartzite rocks are exposed in the area.

4- Deep-seated intrusive igneous fragments were found in appreciable amount at the lower parts of BH.T1, rich in large fresh green and smoky pyroxene crystals, bytonite feldspars are also present (Al-Bdaiwi *et al.*, 2005, p. 28).

5- Most of the positive magnetic anomalies are associated with residual positive gravity anomalies.

6- The six sedimentation cycles mentioned by Esko in Yakta *et al.* (2002) and the 75% cementing materials are false interpretation (Mr. Yakta agreed with our opinion about Esko interpretation). The constituents of the core samples are intensively decomposed, of course, the processes of preparation of the samples for study by Mr. Esko converted most of the large fragments to sizes less than 2 mm and even to fraction of a millimeter. Our experience with these samples is fairly good, when putting an individual definite rock fragment of more than one inch in dimension from these samples in water, it disintegrates to less than 30% of its original size after only one hour of time, although, the fluidization process, introduced by us as one of the processes that are responsible for the formation of these anomalous rock bodies in the area, is expected to form textural features resembling sedimentation cycles.

7- The rounded and subrounded shape of the basaltic and carbonate pebbles of different sizes and the fine fraction of the constituents, are all characteristic features of fluidization processes (Ollier, 1979).

8- Sissakian (2007) mentioned "The present drainage is towards NW, which means from the studied site towards the existing lava flows in Syria and Jordan. This contradicts the assumption of filling the trough by weathering products of the lava flows in Syria and Jordan. But, this could be explained by, the drainage before (at least) more than 4000 years was in reverse direction, from NW towards SE and was changed gradually. The dense set of lineaments may be an indication for a tectonic unrest, which shared in reversing the gradient direction." We must remember that the area is part of the Arabian Stable Shelf and slope reversal of this magnitude (regional scale) within such a period of time is not realistic. It is worth mentioning that there is no single valley crossing the locality which could have had facilitated any process of fluvial transportation. A very restricted subsidence has taken place within the location of the anomalies (magnetic, gravity and lithologic anomalies location). It is accompanied by the deposition of poor pyroclastic non-shale alluvium (the upper 30 m cover) and leaving at a distance a crescent shape relatively high rim arounds the locality, which is opned only from the southern side. The outline of this geomorphologic feature is in good matching with the outline of the igneous chamber believed to be present at 2.5 Km, below the surface. This phenomenon could indicate genetic relationship of the depression to the igneous chamber.

9- We agree with Sissakian (2007) only about the absence of alteration or fusion within the bored carbonate rocks (BH.T2 and BH.T3), but the core of these boreholes show brecciated basaltic rock bodies without a sign of fluidization processes.

10- Al-Waleed anomalous locality is not unique in the area of the Western Desert, we refer only to those which were verified gravimetrically (Wadi Al-Waledge locality, Al-Bdaiwi *et al.*, 2005 and north Kharga locality, Al-Bdaiwi *et al.*, 2007). At both localities, prominent positive gravity anomalies are associated with aeromagnetic local anomalies.

The above mentioned facts seem to be enough to show that the conclusion of Sissakian (2007) about the origin of the anomalous rock bodies at Al-Waleed (Al-Tinif) area is rather weak. According to us the common presence of black shale and quartzitic blocks is not controversial. Both could have been derived. from deeper formations, present within the sedimentary column beneath the locality. Otherwise we ask Mr. Sissakian to explain to us the sources of these components.

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REPLY

Varoujan K. Sissakian*

Sir,

Herewith is a point-by-point reply to the discussion of Mr. Jassim M. Al-Bdaiwi concerning the aforementioned published article:

1- The published article (Sissakian, 2007) does not mention the black shale. The black shale, however, is one of the main constituents of Akashat Formation that underlies the Ratga Formation, which is the country rock in the studied area.

2- The identified flora "could have been reworked" (Sissakian, 2007), as mentioned in the article.

3- "orthoqurtzite blocks" as mentioned by Al-Bdaiwi *et al.* (2005) how could blocks be recognized in a drilled core of 111 mm??, moreover, this was not discussed in the article.

4- According to Yakta *et al.* (2002), the lower part of the mentioned borehole consists of breccia rich in black shale.

5- The large difference in the lithology of the parent rocks (mainly carbonates) and the encountered clastics of different types in the boreholes, beside the existence of a large trough (Sissakian, 2007), may give such difference in anomalies due to difference in density.

6- The six sedimentary cycles are mentioned in a documented report in GEOSURV`s library (Yakta *et al.*, 2002). Al-Bdaiwi *et al.* (2005) considered them as false interpretation. Moreover, Mr. Sabah Y. Yacoub and my self have observed them in the extracted cores in 2002.

7- The rounded and subrounded basaltic and carbonate pebbles of different sizes (Yakta *et al.*, 2002) are good indication for transported materials.

8- The reversed direction of the drainage is considered as one of the weak points in the published article (Sissakian, 2007). However, a possible explanation is given, "the drainage before (at least) more than 4000 years was in reverse direction, from NW towards SE and was changed gradually. The dense set of lineaments may be an indication for a tectonic unrest, which shared in reversing the gradient direction".

* Expert, State Company of Geological Survey and Mining, P.O.Box 986, Baghdad, Iraq
e-mail: varoujan49@yahoo.com

9- No comment.

10- The concerned area in the published article (Sissakian, 2007) is a part of the area studied by Al-Bdaiwi *et al.* (2005). We are not concerned with other recognized anomalies.

The published article, however, did not ignore the possibility of the presence of a deeper igneous body.

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