Geology and Mineralization of the Ozbak-Kuh Mine and the Genesis of the East Iran Pb–Zn Deposits

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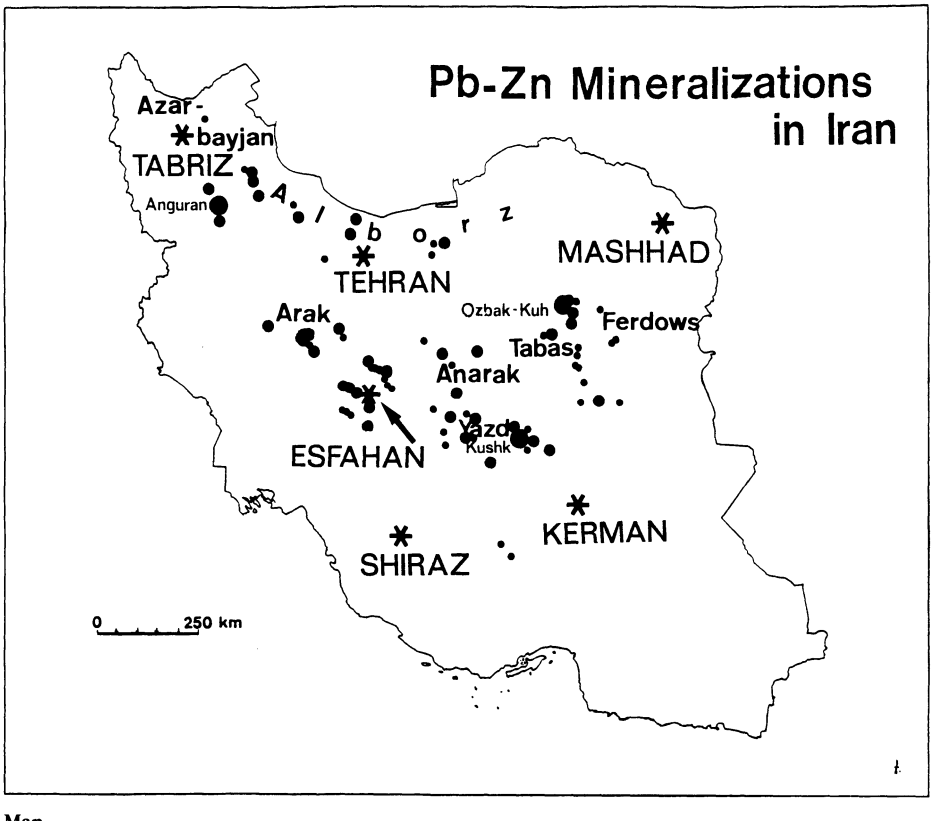
Abstract

Former investigations in Iranian Pb–Zn and Cu deposits led to the interpretation whereby they formed as products of Mesozoic-Tertiary metallogenetic processes. Recent research work suggests, at least for the Pb–Zn deposits of eastern Iran, an origin by Paleozoic sedimentary ore mineral formation.



Map

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Syngenesis and Epigenesis in the Formation of Mineral Deposits
(eds. A. Wauschkuhn et al.)

In Iran, Pb–Zn deposits occur in four different areas (see Map):

a) in Azarbayjan and in the Alborz chain,
b) in the region of Esfahan and Arak,
c) near Anarak and Yazd, and
d) in the east, between Ferdows, Tabas, and Kerman (Bariand et al. 1965; Burnol 1968).

For many of these deposits, especially for those mentioned under d, an epigenetic hydrothermal-metasomatic formation has been supposed. However, for one of the most important mineralizations, Ozbak-Kuh, near Tabas, an Upper Devonian, syngenetic, sedimentary formation, followed by a younger hydrothermal mobilization in different stages has been proven. By this, the Pb–Zn deposits in Upper Paleozoic and Mesozoic strata in eastern Iran can be defined as transmitted or traced ore deposits (*Vererbungslagerstätten* or *durchgepauste Lagerstätten*, respectively).

These Pb–Zn deposits are either hydrothermal deposits with important and variable gangue (e.g., Shurab in the Jurassic Shemshak Formation, Galeh Chah) or galena-sphalerite deposits, in which one of these minerals predominates, and with rare or missing gangue (Ozbak-Kuh in the Upper Devonian Sibzar Dolomite; Garredu in the Upper Permian Jamal and in the Middle Triassic Shotori Formations; Chah Sorb in the Upper Jurassic; Abdulabad, Taj-Kuh, Tars). Accordingly, these deposits can be assigned to the types IIa and III of Burnol (1968).

Apart from these more important ore deposits, there are some less significant mineralizations in Paleozoic-Triassic rocks (Chiruk, Godar-e-Sorkh, Pa-ye-Kuh) and in Jurassic-Cretaceous formations (Raqqeh, Boghuz).

Thus, the slopes of the ranges, which bound the Great Salt Desert (Kavir) in the east, contain a number of lead-zinc deposits, some of which were already worked in prehistoric times (Friedrich 1960). The most important of these ore deposits is Ozbak-Kuh, situated by road about 240 km south of Sabzevar, 60 km SSW of Doroneh, on the road to Tabas. In less well-known times, this deposit was worked down to the groundwater table. In 1333 (1954 A.D.), Ozbak-Kuh came again into action, together with some other deposits in its neighborhood. Until 1968, the deposit was opened down to a depth of 400 m below the surface. To give a superficial impression about the size of this mineralization, it should be mentioned that between 1954 and 1968, 72,395 metric tons of ore concentrate containing about 60% Pb were recovered, i.e., at least 40,000 m.t. of metal. During the first years of operation in our century, the ore contained ca. 15% Pb or 13% Pb and 2%–3% Zn; in 1968, less than 4.7% Pb and 3.6% Zn. The metal content of the Ozbak-Kuh veins was about 450 kg/m^2 of the vein plane, on an average. In 1968, the mine was abandoned.

As to the metallogenetic literature, the Ozbak-Kuh deposit remained nearly hitherto unknown. Therefore, a brief synopsis should be given.

According to Flügel (1962), Flügel and Ruttner (1962), Ruttner (1961a,b), and Stöcklin et al. (1964) the rocks in the close neighborhood of the deposit belong, with the exception of the volcanic rocks, to the Paleozoic, namely to

1. the Gushkamar Group, especially to the Padeha Formation (Lower Devonian/Upper Silurian), and to
2. the Ozbak-Kuh Group with its three formations: