5. У подножия восточного склона Гданьской впадины впервые отмечена вытянутая депрессия рельефа (относительная гл. 1–2 м) с примыкающим пологим клиновидным телом морских (литориновых и постлиториновых) осадков (рисунок 5). Такое сочетание является геоморфологическим признаком контуритовых дрифтов (осадочных тел), распространенных в том числе и в Балтийском море. Здесь они формируются придонными течениями североморских вод. По литодинамическим показателям скорость придонного палеотечения в литориновую стадию была выше, чем в постлиториновую.

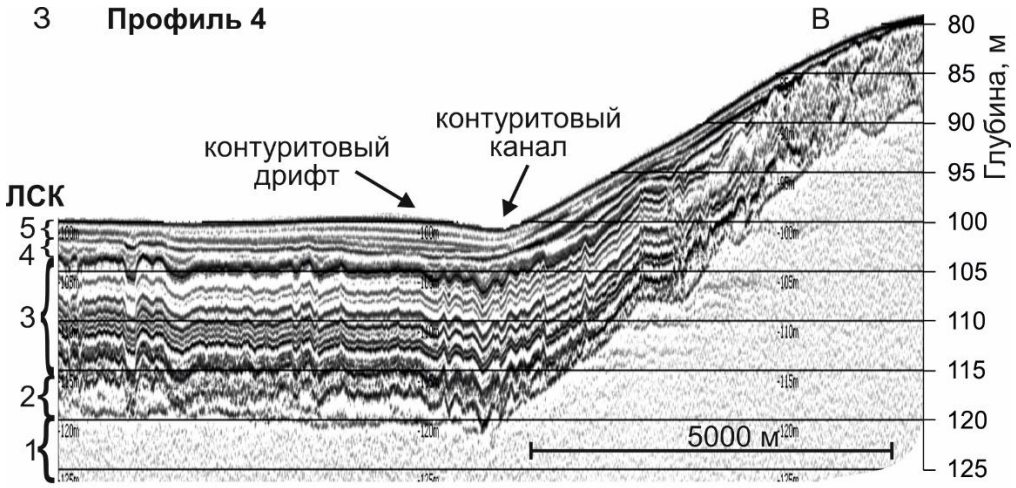

Рисунок 3 – Геоакустический профиль дна (4 кГц) через юго-восточный склон Гданьской впадины. Литостратиграфические комплексы (ЛСК):
1 – дочетвертичные образования, 2 – позднеплейстоценовая морена,
3 – глины Балтийского ледникового озера, 4 – анциловые глины,
5 – литориновые и постлиториновые илы

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GEOLOGICAL, MINERALOGICAL, GEOCHMICAL AND GENETIC CONTROLS OF NIGH (Pb-Zn) ORE-DEPOSIT IN NORTH WEST OF KASHAN (IRAN)

Introduction. The Nigh Pb-Zn ore deposit with (51°, 15', 6/7") EL and (34°, 5', 19/5") NL Located at the northwest of Kashan nearby Moshkan village (figure 1). Its country rocks consisted of highly altered basalts to andesites

intersected by dykes of mafic to acidic composition. Because of penetration of hydrothermal solutions accompanied by these dykes, base metal complexes of (Pb, Zn, Cu, Fe) have been unstable and deposited as sulfides alongside the silicic alteration in fractures. For reaching to the mineral parageneses of this deposit, despite of field observation and rock-sampling, macroscopic-microscopic investigations of rocks and ore-minerals have been also carried out. The ore-paragenesis based on the above data are simple as: pyrite, chalcopyrite, sphalerite and galena. Besides that, for confirming the microscopic investigations, analyses of XRD, XRF and ICP (44 elements) have been carried out on the collected samples and finally the geochemical context of the Nigh Pb-Zn deposit has been determined. With reference to the lithogeochemical diagrams resulted from ICP 44 elements analyses, the tectonomagmatic environment corresponds to a magmatic arc of a continental subduction zone. However, the genetic position of the Nigh Pb-Zn deposit coincides to a mesothermal to epithermal type and formed by the following concept: The intersect network of dykes and related fractures, controlled the ore mineralization in such a way that the hydrothermal solutions are migrated along the fracture pathways and recharged by soluble ion – metal complexes and caused different alteration facies especially silicification and associated Pb-Zn deposit at the Nigh area. This mineralized area is a part of Urmiyeh – Dokhtar magmatic arc of the continental subduction zone.

Figure 1 – Image of the entrance to the Nigh lead and zinc mine (Visit in 2016) [6]

Geology. Considering that the Nigh lead and zinc deposit is located in the northwest of Kashan, in the area of Volcano, Plutonic, Urmia, Dokhtar, which itself includes a part of Central Iran region, Volcanic activity in these areas starts from the Lower Cretaceous with acid lavas and reaches its peak in the Eocene, so that in the Eocene, the initial eruptions were calc-alkaline and submarine (latite, andesite, rhyodacite, tuff, wagnimbrite, which were sometimes alkaline and sometimes calc-alkaline). It prefers alkaline and peralkaline, such as in the south of Nain with the potassic series (Shoshonite analyzed) [1] around Kashan (Abianeh) with the hypersedic series and in the north of Babak city with the potassic series (including It is accompanied by leucite, phenolite, tephrite and basanite [2; 3].

Geology of Nigh field. The oldest rock outcrops of this region are green sandy shales, calcareous dolomites and Ordovician-Silurian volcanic rocks in the Ghahroud mountains, and the Jurassic facies is characterized by an alternation of sandstone and shale, and the Cretaceous with thick limestones with orbitulin layer, the latter alternately on Jurassic shales are placed. The Eocene period is characterized by the facies of igneous rocks and volcanic lavas, and the Oligocene-Lower Miocene periods are characterized by limestone and marl layers (equivalent to the Qom formation). Miocene erosion-evaporite deposits, including red marl and gypsum marl, constitute the youngest geological formation in the region.

Existing formations within the Nigh field: 1 – Upper Eocene lavas; 2 – Lower Red Formation (L.R.F); 3 – Qom Formation (Oligomiocene) (figure 2).

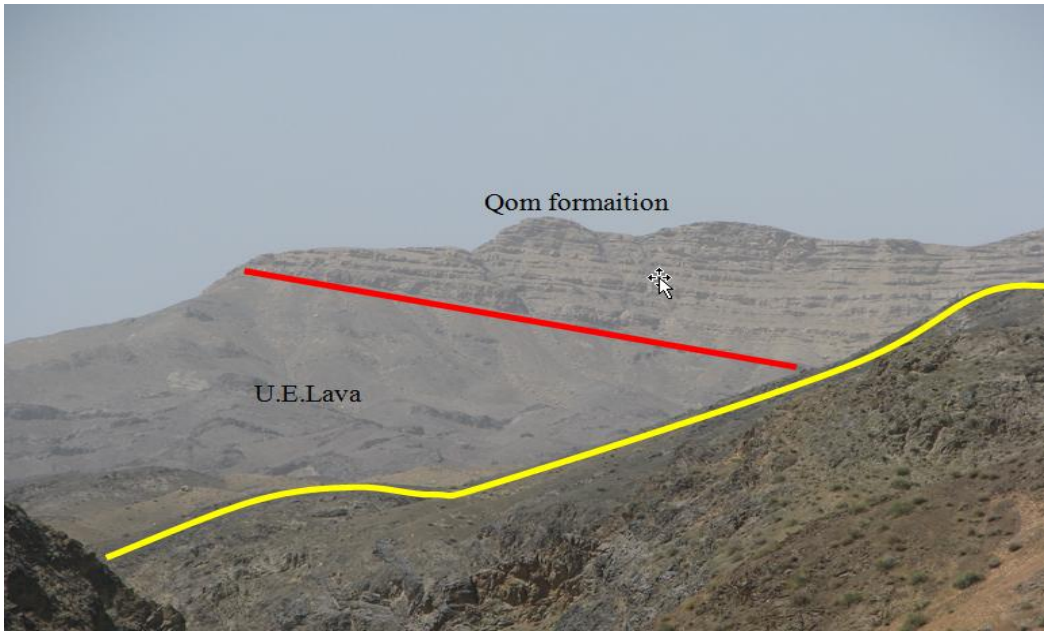

Figure 2 – sequence of formations in the area along with variation – view towards southwest [6]

Geology and tectonics. The most important main faults in the region are:

A – Qom-Zefreh fault. In the Sahand-Bazman volcanic belt, especially from the northern heights of Saveh to the Jabal Barez range, there are groups of faults and fractures that sometimes follow each other, sometimes parallel, and sometimes cross. So far, no convincing explanation has been given about how they function and why they are formed [5]. Calls a part of it as the Qom-Zefreh fault, which extends from the mountains south of Qom to the south of Zefreh, and in his opinion, it may be an extension of the Tabriz fault [1].

B – Kashan fault. This fault is stretched from the south of Fin and along the northwest-southeast and it is also named as Fin fault [4].

Semi-deep intrusive masses and dikes. The studied area consists of a series of mafic lavas (andesite and basalt) as well as dykes with an acidic composition (peripheral quartzatite) that are scattered throughout the area in large numbers and the general trend of most of them is northeast-southwest to north-south. As a result of the penetration of these dykes, which often have a mixture of acid and siliceous, the volcanic rocks in the region are affected by the alteration caused by the infiltration of the mineral fluids that these dykes brought with them, and various alterations can occur.

Alteration in Nigh (lead and zinc) deposit. The types of alteration in the volcanic rocks of the studied area are: 1 – Serpentinization, 2 – Sausuritization, 3 – Zeolitization, 4 – Sericitization, 5 – Intermediate argillic alteration, 6 – Carbonatization, 7 – Silicification, 8 – Chloritization, 9 – Propylitic alteration.

Conclusion. 1 – The lead and zinc deposits in the Nigh area are found in Eocene andesite and trachyandesite rocks. 2 – The above-mentioned rocks have been strongly altered due to the injection of hydrothermal fluids, propylitic, kaolinitic, chloritic, sericitic and jaroitic changes have occurred in them. 3 – In general, it can be said that the mineralization related to the mineral parageneses of the studied area is related to the fluids related to siliceous-felsitic dykes, which at first caused the transport of mineralized materials with low PH, and then with a decrease in temperature and an increase PH has caused their deposition. 4 – Sulfide mineralization of basic elements (Zn, Pb, Cu) in this area took place during a phase younger than the mafic outcrop igneous rocks, which phase cut the outcrop igneous rock units, and then replaced them in vein form. 5 – The mineralization of basic elements in the framework of pyrite, chalcopyrite, sphalerite and galena in the studied area is responsible for mineralizing fluids in which silicification occurs. This silicification is in the form of interrupting silicic streaks and veins of sericitization and argillite formation, whose extent is obvious in the region. This mineralized phase affected the igneous rocks of the mafic output, including basalt and andesites of the Eocene, while altering and disintegrating them, it caused silica mineralized

vein and veins, which mineral paragenesis (Pb, Zn, Cu, Fe) is the result of the breakdown of complexes It is the ionization of the above elements and finally their sulfide deposits. 6 – The tectomagmatic environment of the host rocks is a magmatic arc in the active continental margin, which can confirm a part of the Urmia-Dokhtar zone. 7 – In this zone, according to the Harker and Spider diagrams, the phenomenon of magmatic subtraction has occurred, which, in mixing with the upper crust and supergene processes, has been able to control changes, especially jarositization, along with the phenomenon of pure lead and zinc potentials. 8 – Finally, the mineralization type of the region depends on medium to low temperature hydrothermal solutions, that is, mesothermal to epithermal. 9 – The paragenesis sequence in the lead and zinc deposit from old to new includes: pyrite-chalcopyrite-sphalerite-galena-iron hydroxide and gangue.

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