

## **Geology and Geochemical features of the mineralizing fluids of Es Souabaa Ba-F Pb-Zn prospect (Mellegue Mounts, NE Algeria)**

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This sector is located 18 km northwest of El Aouinet, in the core of the Es-Souabaa (Damous) anticline. The stratigraphic succession of this area may reach a thickness of ~1000 m, consisting dominantly of marls and shales with marly limestones. It extends in age from Cenomanian to Turonian. Structurally, the study area appears as asymmetrical anticline trending NE-SW, with flanks dipping between 15° to 35°. It is crosscut by several diagonal and transverse faults, leading to a tilted block structure. These faults are mostly NW-SE directed and of wrench fault type. Numerous small-scale faults cross-cut the anticline. They are NS and EW trending and are characterized by calcite cements.

The mineralization occurs mainly as veins, veinlets, lenses and infrequent disseminations usually in the rocks near the faults and around the veins.

All sulfide veins are closely associated with calcite veins. Some of them are typical multistage open-fracture fillings. They are characterized by a paragenesis of pyrite, galena, sphalerite, chalcopyrite, tetrahedrite. Traces of oil are associated with this paragenesis. Galena is the most important sulfide mineral. It normally occurs intergrown with calcite and barite or as well-defined single crystals.

The study of the fluid inclusions of fluorite crystals of the sector of Es Souabaa shows that there are three types of inclusions: two-phase aqueous, two-phase to hydrocarbon, three-phase hydrocarbon and aqueous. The hydrocarbon phase is yellow liquid well differentiated from the aqueous and vapor phases. The diagram makes it possible to locate the aqueous phase of these three-phase hydrocarbon inclusions. This phase has the same homogenization temperatures (60°C to 115°C) and ice melting of the aqueous phase between -5°C to -10°C. This suggests that it would be a fluid with an average salinity of the order of 12% eq. NaCl.

The diagram of the Th vs. Tfg for both types of two-phase aqueous and three-phase hydrocarbon inclusions clearly shows that it is the same basinal fluid that would be responsible for these types of inclusions. It would be a hot and salty fluid that remobilized during its journey the organic matter contained in the Bahloul facies of the lower Turonian which enriched it in hydrocarbon.

**Keywords:** Cenomanian, Turonian, Bahloul facies, sulfide mineralization, fluids inclusions, Es Souabaa