

**Paleoenvironmental conditions
during sulfide deposition in the lower
Upper Dark Limestone overlying the
Navan Irish-type Zn-Pb deposit,
Ireland**

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Seafloor exhalative sulfide deposition accompanied formation of some Irish-type carbonate replacement Zn-Pb deposits. The basal Upper Dark Limestone (UDL), overlying part of the giant Irish-type Navan Zn-Pb deposit, contains large amounts of framboidal pyrite hosted in black shales with subordinate sphalerite, galena, chalcopyrite, marcasite, stibnite and Ni-sulfosalts.

As the location of the redox chemocline above, below or at the water-sediment interface determines the mechanism of sulfide deposition, the evaluation of paleoenvironmental conditions may be crucial to locating exploration targets. We present geochemical analyses of mineralised black shales to unravel the influence of paleoenvironmental conditions on sulfide deposition.

Geological record, detailed petrographic analysis and common inorganic proxies (i.e., $V/(V+Ni)$, V/Cr , $U_{(EF)}$, $Mo_{(EF)}$) for black shales in the basal UDL suggest a rising environmental stress from strongly anoxic to euxinic conditions. First, laminated framboidal pyrite was generated by sulfate-reducing bacteria within soft sediments during early diagenesis, close to the seawater-sediment interface under strongly anoxic, but not euxinic, conditions. Second, high $U_{(EF)}$, $Mo_{(EF)}$ and high degrees of pyritization indicate that this was followed by a period of euxinic conditions. Finally, anomalous values of chalcophile elements (As, Hg, Sb, Co, Ni, Pb and Cu), petrographically linked to hydrothermal cherts and replacive sulfide textures, suggest distal hydrothermal exhalation via both sub-vertical fault pathways for ascending fluids bearing silica, Zn, Pb, Cu, Ni and Sb, and circulation through the sedimentary pile during early-mid diagenesis.