PETROGRAPHY AND GEOCHEMISTRY OF ORGANIC MATTER FROM LEAD-ZINC BEARING CARBONIFEROUS SEQUENCES OF SALMON RIVER BASIN, NOVA SCOTIA, CANADA

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This paper reports preliminary results from an investigation of organic matter (O.M.) from the Carboniferous coarse to fine grained clastic sequences of the Salmon River Basin, Nova Scotia, Canada. The study focusses on the lead-zinc bearing fluviatile sandstone of the Yava ore deposit and its purpose is to explore how the metalliferous fluids might have modified the O.M. near the ore body for different lithologies.

Previous researches have shown that vitrinite reflectance (Ro-vi) of organic matter in sandstone increases with depth and regionally toward the Yava area. This lead previous investigators to conclude that the Ro-vi was due to thermal effects of mineralizing fluids. On the other hand, thermal alteration index (TAI), based on spores from interbedded shales, reveals itself to be quite homogeneous throughout the area and with values too low to fit with the maturation rank based on Ro-vi. In the latter case the present authors argue that oxidizing effects of metalliferous fluids are responsible for higher and increasing Ro-vi in the more porous and permeable sandstone.

Organic matter petrography, reflectance, fluorescence, color estimation, pyrolysis, ultimate analysis and scanning electron microscopy techniques were used to study 159 samples from 69 boreholes and hand specimens. O.M. petrography proved to be the most conclusive technique while reflectance and color evaluation support their results.

The bulk of O.M. occurs as dispersed coaly fragments and thinly bedded coal in sandstone units. Rather undeformed and well preserved tree parts from sandstone and finer clastic rock show distinct morphology. Rare fractures filled with solid bitumen occur throughout the sequence.

Macerals are mainly composed of vitrinite which exhibits increasing galena-sphalerite "petrification" toward the ore zone as shown by scanning electron microscopy microanalysis. Amongst secondary macerals, small trilete spores prevail.

Alteration features such as rims, bireflectance or anisotropy, hydrogenation or etching of vegetal textures, dessication cracks and cavities are regionally developed on vitrinite, inertinite and solid bitumen. In the ore zone, degasification features are preferentially developed on textinite while decreasing Ro-vi values, accompanied by anisotropy, are best seen on collinite. The increasing anisotropy toward sulfide accumulation exceeds 50% for Ro-vi values as low as 0.86%. These features, along with the fact that the lowest TAI values (2-) are observed toward the ore deposit, support the hypothesis of chemical alteration of O.M. rather than thermal processes.