

Economic Geology of “Black Shale” Hosted Vanadium Mineralization in Xiushui County Jiangxi Province, South Eastern China

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Xiushui County in Jiangxi Province is located in the center of a large vanadium region that encompasses much of east-central China. Within this region, most of the vanadium deposits are stratiform and occur in gently dipping to steeply folded, strongly reduced, marine sediments.

The Xiushui mineralization is hosted in Lower Cambrian carbonaceous marine sediments within a local, E-W-trending syncline on the margin of a NE-trending, regionally extensive Cretaceous graben filled with red-bed clastic sediments. Vanadium occurs in highly carbonaceous siltstone-mudstone-shale units and dolomitic siltstone sections immediately above the contact with Proterozoic-age marine sediments. The free carbon content of these rocks can exceed 15% and they are locally referred to as “stone coal.” There appears to be some structural influence to the distribution of these deposits but it is also likely that regional variances in the geochemical evolution of subbasins within the lower Cambrian sequence has led to variable vanadium pentoxide contents from 0.3 to 1.5% over stratigraphic thicknesses of 5 to 25 m. There is also significant anomalous base and precious metal mineralization directly associated with the vanadium-rich units.

Based on limited government data, individual vanadium deposits in the region range in size from 50,000 to 2 Mt of contained V_2O_5 with an average around 250,000 t. Average regional grades range from 0.7 to 0.8% V_2O_5 .

Sparton Resources’ subsidiary company, VanSpar Mining Inc., has evaluated three advanced stage deposits in the Xushui area. Average grades may exceed 0.9% over 10 to 25 m true thicknesses and all are flat lying and potentially amenable to open pit mining with relatively low stripping ratios. Oxidized (surface weathering) sections of the vanadium-rich units can have grades of 2% V_2O_5 and are locally extensive. With a database of over 110 drill holes, these three deposits contain a V_2O_5 endowment exceeding 500,000 t, with locally significant base and precious metal contents.

Historically, vanadium production from these deposits has utilized a “salt roast” process that has created environmental problems. VanSpar has developed and received China patents for clean, efficient multistage wet leach processing technology that eliminates the environmental problems associated with the older recovery techniques. The presentation reviews local and regional geology, mineralization, mineralogy, and extractive metallurgy of these important deposits.