

### **Supergene copper enrichment zone**

**Chalcocite**, copper sulfide ( $\text{Cu}_2\text{S}$ ), is an important copper mineral ore. It has been mined for centuries and is one of the most profitable copper ores. The reasons for this is its high copper content (67% atomic ratio and nearly 80% by weight) and the ease at which copper can be separated from sulfur. It is not however the primary ore of copper due to its scarcity.

It is opaque, being colored dark-gray to black with a metallic luster. It occurs as a secondary mineral in many ore bodies in a zone called the *supergene enrichment zone*. Called a *secondary enrichment mineral*, although also a primary mineral as well, chalcocite commonly forms from the alteration of primary copper minerals that are attacked above the water table by oxygen. The oxygenated copper fluids descend to the water table where a reaction with primary ores results in the copper being reduced back to a sulfide, most commonly chalcocite. Ore bodies will have a layer of chalcocite which corresponds to the present or a past water table level and this layer is called a "chalcocite blanket". The chalcocite blanket is richer in copper than the upper oxidized portion of the ore body and usually richer than the primary unaltered ores below. The chalcocite blanket represents a real gold mine, or should that be copper mine, to the copper prospectors.

### **Hypogene Zone**

**Chalcopyrite** (or copper pyrite) ( $\text{CuFeS}_2$ ) is the most important copper ore. The large quantities and widespread distribution of chalcopyrite make it the leading source of copper. Chalcopyrite ore occurs in a variety of ore types, from huge masses as at Timmins, Ontario, to irregular veins and disseminations associated with granitic to dioritic intrusives as in the large porphyry copper deposits of the South American Andes.