The Ruth Mine is a base-metal vein deposit near the eastern margin of a reported porphyry copper deposit in the Western Cascade Range in Oregon. Uplift of the Western Cascade Range has resulted in a deeply dissected terrain in which more than a kilometer of the stratigraphy overlying the porphyry-style mineralization is preserved and exposed. The stratigraphic units, which are middle Tertiary in age, have been given arbitrary letter designations beginning with the lowest unit (Unit A) through the uppermost unit (Unit D).

Unit A is composed of fragmental rocks of andesitic composition. Overlying and interlayered with Unit A are a sequence of light gray
porphyritic andesite flows designated as Unit B. Unit C is a sequence composed primarily of tuffs with compositions ranging from hornblende andesites to dacites and includes a finely laminated volcanioclastic sediment. Unit D is composed of dark brown to black porphyritic andesite flows deposited locally in an intracanyon relationship to the tuffs of Unit C. Base-metal veins in the area are hosted in the tuffs of Unit A and the flows of Unit B.

Equigranular and porphyritic diorite intrusions crop out as northwest-trending dikes which were emplaced along faults with a N. 30-40° W. trend. The last intrusions emplaced were a set of leucocratic quartz-feldspar porphyry dikes and sills. These latter intrusions were not controlled strongly by structure and, although they have not been dated, may have been emplaced as part of 11.8-11.0 m.y. B.P. volcanic activity previously reported on French Creek Ridge to the south. Units C and D include deposits from this volcanic center and cap the stratigraphic sequence in the mining area.

Folds with a N. 70-80° E. trending axis result in southeast dips on units in the area. These folds appear to have been developing throughout the deposition of Units A through D.

Propylitic alteration is widespread and is of two types. 1) Pervasive replacement of groundmass and phenocryst phases by chlorite, epidote, calcite, and albite is intense low in the section and decreases with increasing stratigraphic position. This alteration reflects isochemical recrystallization resulting from burial and elevated geothermal gradients; 2) Quartz-epidote veinlets low and calcite-chlorite veinlets higher in the section were precipitated from
warming descending fluids in a geothermal system. These veins are best developed on fractures, within vesicles, and along margins of diorite intrusions. Phyllic alteration, characterized by quartz-sericite replacement of primary minerals, is localized along northwest trending faults, major fractures, and margins of intrusions. It is well developed in open-space "crackle" breccias in the quartz-feldspar porphyry intrusion. These breccias are cemented with quartz, sphalerite and galena and are related to base-metal veins in the Ruth Mine. Calcite deposition in veins terminated or postdated main stage mineralization. Argillic alteration characterized by kaolinization of hanging-wall breccias and accompanied by the precipitation of fine grained gypsum is the last major alteration noted. It may have developed in response to changes in the groundwater hydrologic system late in or following volcanic activity.

Fluid inclusions in quartz from base-metal veins exhibit low salinities typical of a meteoric origin and homogenization temperatures from 220-295° C. Inclusions in quartz-epidote veinlets also have low salinities and display homogenization temperatures near the upper end of the range of the base-metal veins. Near the eastern margin of the mineralized area, a vein containing chalcedony deposited alternately with quartz is believed to be within the zone of mixing of hydrothermal solutions and cold groundwater. Homogenization temperatures are consistent with a paleosurface located within those units erupted from the developing volcanic center on French Creek Ridge.