1. Introduction

The gold-silver mineralization at the Kitami metallogenic province, located at the northeastern Hokkaido, Japan (Figure 1) is occurred in the Neogene Tertiary age. The gold-silver deposits in this district were one of the valuable mining districts in Japan. Epithermal ore deposits of the gold-silver mines in this district present similarities in mineral compositions, vein features, and also their host rocks.

2. Regional Geological Setting

Gold, silver, copper and mercury hydrothermal mineralization of the Kitami region at northeastern Hokkaido is related to Middle to Late Miocene back-arc volcanism of the Kuril arc (Watanabe, 1995, Figure 2). The mineralization is mostly in the form of vein but minor disseminated and Kuroko-type deposits were also identified in the Kitami region. Vein-type mineralization strikes mainly in the E-W or NE-SW direction. Strike uniformity in the Kitami region resulted by the existence of constant stress fields prevailing during mineralization (Horikoshi, 1993). Based on paired E-W to ENE-WSW right-lateral and NW-ENE left-lateral strike-slip shear fractures in the Kitami region, Watanabe (1996) suggested that the region had experienced an E-W trending compressive stress.

The basement rocks of Cretaceous age in this area are the Hidaka group comprising chiefly sandstone and shale, intercalated with conglomerate, acidic tuff, chert, and limestone. The Neogene Tertiary system is composed principally of the middle Miocene Konosumoto, middle to late Miocene Tomsuka and Shangafuchi (or Shakanizawa) and Quaternary Sawaki Formation in ascending order. Table 1 shows the general geological formations in Central Kitami.

3. Kitami Metallogenic Province

The Kitami metallogenic province is divided into seven sub-provinces (Urashima, 1961) i.e. the western Kitami, Daitsuetsu Basement, Spinal Kitami, Kitami-Takachi, Central Kitami, Abashiri, and Shiretsuko mining districts. The province had produced gold, silver, copper, lead, zinc, mercury etc., and especially is known as a gold field (Table 3).

4. Ore Mineralogy

Identified gold-silver minerals from the Horipi and Juji-i veins of Sannu mine with ore microscope and electron probe microanalyzer are, among the others, sulfides such as galena, acanthite, aguilarite, naumannite, pearceite (Ag, CuS), pyrite, marcasite, pyrrhotite, and stephanite with some secondary minerals of hematite, limonite and covellite (Figure 6). The mineralization ages of epithermal gold-silver vein-type deposits in the Kitami metallogenic province, Hokkaido, Japan (modified after Maeda, 1990) and Watanabe (1996), based on the K-Ar dating of the vein adularia and quartz mixtures as described in Table 2.

5. Physicochemical Condition of Ore Deposition

Phase relation between temperature, sulfides and selenides proposed by Simon and Essense (1996) is applied to estimate the variations of the physicochemical conditions for the precipitation of selenides and Se-bearing minerals from the Sannu deposit.

6. Fluid Inclusion Study

Fluid inclusion study of quartz samples from Sannu deposit from -30ML, -60ML, -120ML, -150ML and -270ML concluded the homogenization temperature are in the ranges of 253° - 331°C from the shallower to the deeper part (Figure 9). While, the temperatures required for the formation of the quartz of the Konomai mine based on fluid inclusions study are slightly lower comparing to Sannu, in the ranges of 132°C - 267°C from the early to later stage (Takashima, 1954).

7. Conclusions

The selenides minerals are dominated in the mostly epithermal deposits in the Kitami metallogenic province. The electrum, aguilarite and naumannite are the main Au-Sb minerals in the Sannu and the Konomi mines. No minerals which contain tellurium as main compositions of the minerals have been found at the most of mines in Kitami metallogenic province including in Sannu and Konomi samples, though such minerals often found in the ore deposits of southwestern Hokkaido. Geological setting, intrusions and host rocks might be affected to the ore mineralization in this area.

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