GEOLOGY OF THE LEAD-ZINC-SILVER DEPOSITS OF SILVER PLUME AREA, CLEAR CREEK COUNTY, COLORADO

by

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ABSTRACT

The Silver Plume area lies in the central portion of the Front Range, Colorado, in a Precambrian terrain characterized by high-grade metamorphic rocks and granite. The present work consists of an area about 2.3 square miles northwest of Silver Plume. The veins have produced about $15,000,000 in lead, zinc, and silver since 1868.

The oldest Precambrain structure recognized in the metamorphic rocks consists of a large isoclinal fold with limbs oriented at about 130^{o}-75^{o} N and a fold axis plunging at about 60^{o}-70^{o} E. The core of the fold consists of micaceous quartz gneiss with a wider, outer band of sillimanitic biotite-quartz gneiss. This fold was disrupted by the intrusion of Silver Plume Granite (1.4 b.y.) which forms small stocks and dike-like masses scattered intimately through the area. Two phases of the granite can be distinguished: a light-gray, medium-grained seriate variety which forms a relatively continuous stock in the southwest one-third of the area, and a light-gray, medium-grained porphyritic granite with a primary flow structure which forms small irregular bodies in the northeastern portion of the area as a border phase of the seriate variety. Thin, persistent Tertiary quartz monzonite and Oligocene alaskite dikes scattered through the area are probably related to a high level surface developed at an elevation of approximately 12,000 feet. This surface (surfaces?) has been greatly modified by Pleistocene glaciation.

Faulting that ranges in age from Precambrian to Oligocene has

been recognized in the area. The most prominent fault, the Pelican-Bismark vein and its associated alaskite dike (110^{o}-70^{o} N), represents a major fracture that extends into adjacent areas and is probably the main ore channel in the area. Another set of faults strikes about 30^{o} to 60^{o} with steep to vertical dips. Many of these faults are mineralized and especially those that extend outward from the Pelican-Bismark vein. They represent major veins but do not have associated dikes or show signs of major movement.

Sulfide mineralization consists of vertical or near-vertical veins less than 5 feet thick that are generally persistent along strike. However, the vein structures show many irregularities, and the sulfides usually occur as variable size pods and lenses that consist mainly of sphalerite, galena, and pyrite, with minor gangue quartz and carbonates. Silver in the ore is present mainly in the galena as tiny inclusions of polybasite, tetrahedrite, and pyrargyrite. In the southwest portion of the area, sulfosalts may reach 1 cm in diameter as masses intergrown with the sphalerite and galena. Southwest of the Pelican-Bismark vein (along a plane at an elevation of about 9,200 feet), the sulfosalts show a marked zonation. The sulfosalts change from tetrahedrite in and near the Pelican-Bismark vein, to a mixture of polybasite and tetrahedrite, to a zone marked by polybasite and pyrargyrite in the southwest corner of the area. Trace elements in the galena and vein sulfides (particularly Sb, As, and Ag) do not show significant changes comparable to the mineralogical zoning. Alteration associated with the mineralization consists of a single zone usually less than 20 feet wide characterized by the development of sericite, kaolinite, and siderite.

T-1202

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

ILLUSTRATIONS

ILLUSTRATIONS (Continued)

ILLUSTRATIONS

TABLES