

GEOLOGICAL SETTING AND MINERALIZATION

The following description of the geological setting for the Project is largely excerpted and modified from the technical report prepared by Linebarger (2014).

Regional Geology

Oceanic plate subduction under the continental margin has dominated the Alaska geologic landscape for the last 150 million years, creating various metamorphic terranes. Many of the Middle Cretaceous and younger mineralized systems in southern Alaska are related to volcanic accretion and hydrothermal activity (Goldfarb, 1997). This includes the mesothermal veins in the Willow Creek mining district.

The Willow Creek mining district is located in the southern Peninsular terrane and the Alaskan part of the Wrangellia composite terrane at the southern end of the Talkeetna Mountains batholith (Goldfarb, 1997). The Jurassic Peninsular terrane consists of a well-stratified sequence of variably metamorphosed Paleozoic and Mesozoic volcanic and sedimentary rocks and a Jurassic granite batholith (Detterman and Reed, 1980; Jones and others, 1987; Nokleberg and others, in Plafker, G. and Berg, 1994). The Peninsular terrane occurs south of the Wrangellia terrane, north of the Chugach terrane, and is bounded by the Talkeetna thrust and West Fork fault to the north and by the Border Ranges fault to the south. See Figure 7-1. (Clift et al., 2005, after Trop et al., 2002).

An island-arc chain greater than 2,000 km long formed in the Jurassic period above a north-dipping subduction zone. This arc is represented by volcanic rocks of a distinct geochemical signature within the Peninsular terrane around the Anchorage area (Barker and Grantz, 1982). During the Late Jurassic to Early Cretaceous, the Talkeetna arc was subsequently accreted to southern Wrangellia and Alaska (Clift et al., 2005).

The Talkeetna arc is the tectonic feature defining the character of the Peninsular terrane. Defining lithologies of the Peninsular terrane are deep-level ultramafic-mafic assemblages of the Border Ranges, the Late Triassic and Early Jurassic Talkeetna Formation, and the Middle Jurassic part of the Alaska-Aleutian Range Batholith. The arc extends for over 1,500 km along the Alaska Peninsula and northeastward to the eastern Copper River basin (Plafker, 1994). Reverse faulting of older structures resulted from the accretion of the Talkeetna arc.

The Chugach terrane, an accretionary complex comprised of ultramafic oceanic crustal fragments and pelitic sediments, lies south of the Peninsular terrane and is bounded to the north by the Border Ranges fault margin. Reactivation of the Border Ranges fault by strike-slip movement affected the rocks on either side, developing a regional shear zone.

Local structures hosting gold bearing quartz veins in the Willow Creek area are synchronous with the high angle, dextral strike-slip movement of the Border Ranges fault (Cooley, 2006; Goldfarb, 1997).

During a brief period of extension in the middle-late Cretaceous the Willow Creek quartz diorite-tonalite body intruded along a shallow north-dipping crustal break. The intrusion provided gold-bearing fluids to occupy similar smaller scale north-dipping reverse fault zones within the intrusive.

The Kluane magmatic belt is an arc of late Cretaceous and early Paleogene magmatism (75-56 Ma) extending from southwestern to southeastern Alaska. Cretaceous plutons of the Kluane arc may have provided fluids and metals for the 66.9 to 65.6 Ma gold-bearing veins in the Willow Creek mining district (Harlen et al., 2003).

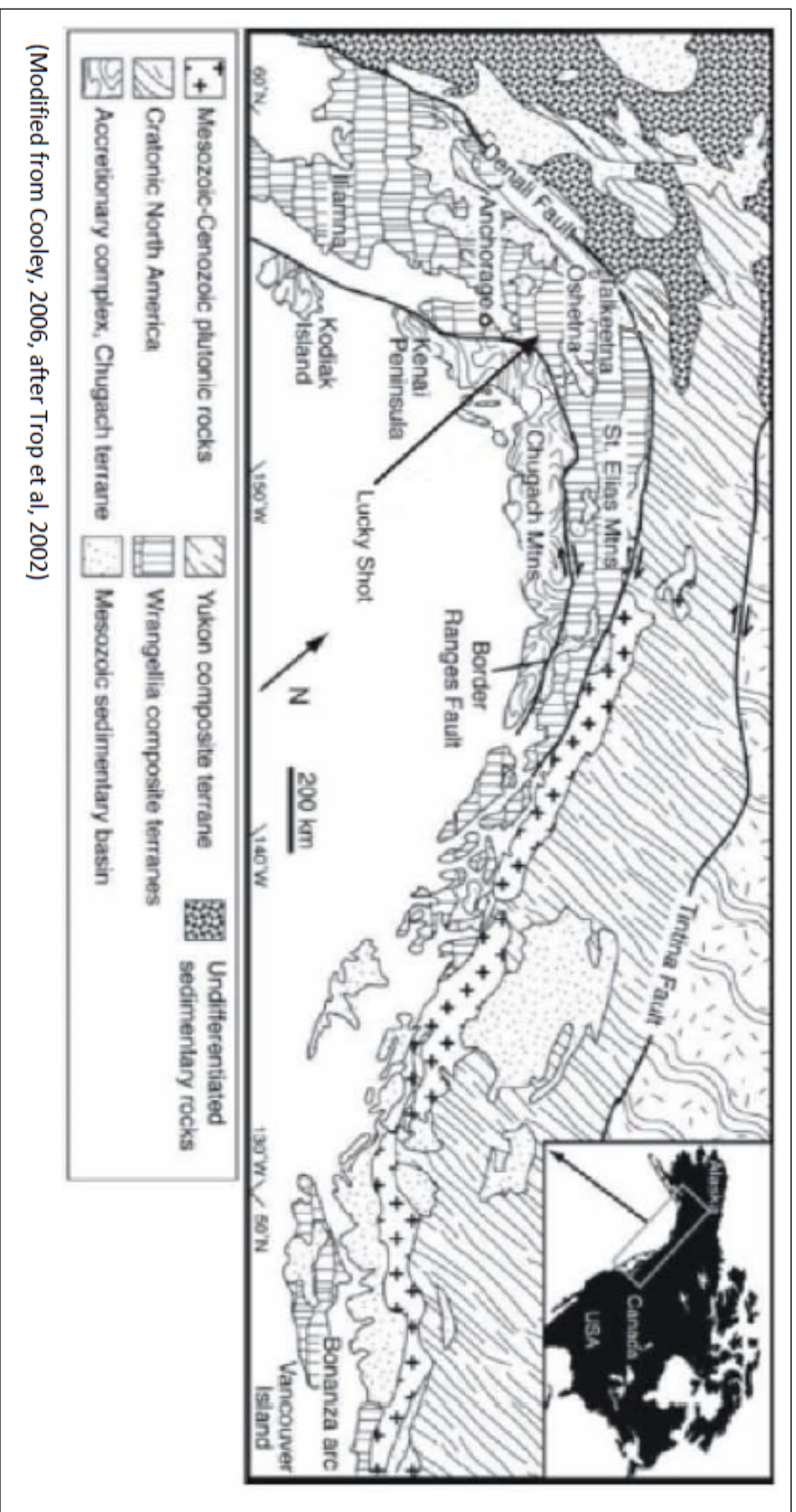


Figure 7-1 Regional Geology (Reprinted from Linebarger, 2014)

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