Division of Geological & Geophysical Surveys

RAW-DATA FILE 2014-22

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$2.00

October 2014

Released by

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
Division of Geological & Geophysical Surveys
3354 College Road
Fairbanks, Alaska 99709-3707

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INTRODUCTION

Late Triassic mafic to ultramafic intrusions in the Wrangellia terrane have been linked to magmatic sulfide mineralization with elevated concentrations of nickel, copper, cobalt, and platinum-group elements (PGEs) (for example, Greene and others, 2005, 2010). The mafic intrusions of the Yukon Territory's Kluane ranges (Hulbert, 1997) were extensively studied and explored, resulting in discovery of the Wellgreen deposit (Tetra Tech Wardrop, 2012) and several prospects in the Mount Hayes Quadrangle in the eastern Alaska Range (Bittenbender and others, 2007; Barker, 1988). Mapping in the Talkeetna Mountains B-4 Quadrangle (Werdon and others, 2002; Schmidt and others, 2003) and geophysical interpretation (Glen and others, 2007) indicate that these mafic–ultramafic intrusions and their extrusive equivalent, the Nikolai Greenstone, continue at least 60 km to the southwest of the previously-mapped extent shown by Csejtey and others (1978). This observation opens up geologic potential for Late Triassic magmatic Ni–Cu–Co–PGE deposits to occur in the Talkeetna Mountains.

The mineral-resources group from the Alaska Division of Geological & Geophysical Surveys (DGGS) carried out a geologic mapping project in the Talkeetna Mountains C-4, C-3, and B-4 quadrangles from July 23 through August 3, 2014. This project is part of a multi-year effort focusing on improving the publicly-available geological and geochemical data and assessing the mineral potential of the less-explored extension of the western Wrangellia terrane. This program of geologic mapping and rock sampling was conducted as part of the U.S. Geological Survey National Cooperative Geologic Mapping Program (STATEMAP grant G14AC00167) and the State of Alaska's *Strategic Minerals Assessment* project, an initiative designed to evaluate Alaska's potential for rare-earth elements, PGEs, and other similarly supply-challenged resources. DGGS has completed two airborne geophysical surveys in the area including the 2008 Iron Creek (DGGS Staff and others, 1998a, b, c) and the 2013 Wrangellia (Burns and others, 2014) surveys.

Highlights of this project include identification, sampling, and characterization of a broad section of Wrangellia stratigraphy, including Late Triassic rocks of the Ni–Cu–Co–PGE- and Cu–Ag-mineralized Wrangellia large igneous province, as well as modern geochemical characterizations of skarn, vein, and basalt-hosted Cu mineralization. This data set includes four samples with elevated gold, ranging from 0.522

to 0.875 ppm, with one of these samples also containing elevated Cu (1.18 percent). Twelve samples have elevated copper, ranging from 1000 to 7900 parts per million, and two samples contain a significant copper spike (13.50 and 19.65 percent) and elevated silver (42 and 48 parts per million).

The analytical data tables associated with this report are being released in digital format as comma-delimited text (CSV) files. Additional details about the sampling project can be found in the metadata file associated with the digital version of this report, which is available from the DGGS website (doi:10.14509/29140) at no charge.

DOCUMENTATION OF METHODS

SAMPLE COLLECTION

Rock samples were collected for two different purposes. First, samples of visibly mineralized or altered rock were preferentially collected and analyzed for trace-element geochemistry. Second, igneous and meta-igneous rocks showing little alteration or weathering were collected for whole-rock major-oxide, minor-oxide, and trace-element analyses to aid in classification and study of petrogenesis and tectonic setting. Most samples are 'grab' samples, which were randomly collected at a location. However, a few samples are 'select' samples, which were deliberately collected from a specific feature, as noted in the sample field description.

Location data were collected using Trimble Juno T41/5 WAAS-enabled GPS devices running ArcGIS for Windows Mobile. Data were merged into an ArcGIS geodatabase. WAAS-enabled GPS devices have a reported error of about 1 m. Latitude and longitude are reported in the WGS84 datum. Location of samples 14AW001 and 14AW002 were estimated from topographic map features, and position error is approximately 100 meters.

Magnetic susceptibility measurements were collected using Terraplus Handheld Magnetic Susceptibility KT 5, 6, 9, and 10 Meters. The measurements were performed 3 to 10 times on random surfaces of a rock to obtain maximum, minimum, and representative average value for the rock.

SAMPLE PREPARATION

Rock samples were processed by ALS Minerals using their PREP-31 package. The samples were crushed to better than 70 percent passing 2 mm, and a 250 g split was pulverized to better than 85 percent passing 75 microns. Prior to crushing, samples for whole-rock analysis were trimmed by DGGS staff to remove weathering, and cut surfaces were sanded to remove any saw metal.

ANALYTICAL METHODS

Samples were analyzed for a variety of suites of major and trace elements depending on the sample type. In addition to ALS Minerals' accredited (ISO/IEC 17025–2005) internal quality-control program, DGGS monitored analysis quality with one standard reference material per batch of 20 analyses.

a. Major- and trace-element including rare-earth element compositions for rock samples were determined by ALS Minerals method ME-ICP61r: Four-acid digestion followed by inductively-coupled plasma–

atomic emission spectrometry (ICP-AES) and inductively coupled plasma–mass spectroscopy (ICP-MS).

b. Platinum, palladium, and gold values were analyzed by 30 g fire assay with ICP-MS finish (ALS Minerals method PGM-MS23).

c. Samples that exceeded detection limits for elements of interest were reanalyzed using specific elemental tests. Over-limit values for Cu and Ni were reanalyzed using four-acid digestion and ICP-AES (ALS Minerals procedure ME-OG62.

d. For whole-rock geochemistry samples, major and minor oxides were analyzed by lithium metaborate fusion digestion and ICP-AES (ALS Minerals method ME-ICP06). Trace elements, including rare-earth elements, were determined using lithium metaborate fusion digestion and ICP-MS (ALS Minerals method ME-MS81). Ag, Cd, Co, Cu, Li, Mo, Ni, Pb, Sc, and Zn were determined by four-acid digestion and ICP-AES (ALS Minerals method ME-4ACD81); and As, Bi, Hg, Sb, Se, Te, and Tl were determined by aqua regia digestion followed by ICP-MS (ALS Minerals method ME-MS42). Total C and S were analyzed by Leco furnace (ALS Minerals method C-IR07 and S-IR08, respectively).

For each sample, data tables either contain assay values or they contain coded-value place holders (null = not analyzed; -1 = the element's assay result is less than the lower detection limit for the method; -2 = the element's assay result is greater than the upper detection limit for the method). Detection limits for each of the reported elemental values obtained by the various methods are documented in the metadata file.

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