MAJOR-OXIDE AND TRACE-ELEMENT GEOCHEMICAL DATA FROM ROCKS COLLECTED IN 2018 FOR THE NORTHEAST TANACROSS PROJECT, TANACROSS C-1, C-2, D-1, AND D-2 QUADRANGLES, ALASKA

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MAJOR-OXIDE AND TRACE-ELEMENT GEOCHEMICAL DATA FROM ROCKS COLLECTED IN 2018 FOR THE NORTHEAST TANACROSS PROJECT, TANACROSS C-1, C-2, D-1, AND D-2 QUADRANGLES

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INTRODUCTION

From June 19 through July 15, 2018, geologists from the Alaska Division of Geological & Geophysical Surveys (DGGS) carried out a geologic mapping and geochemical sampling project in the Northeast Tanacross map area, Tanacross D-1 and parts of C-1 and D-2 quadrangles. This area lies in the Yukon-Tanana terrane on the boundary between the Fortymile and Lake George Assemblages (Dusel-Bacon and others, 2006). It encompasses well-documented porphyry Cu-Mo-Au deposits including Taurus (Harrington, 2010), Fishhook (otherwise known as SW Pika), and Pika Canyon (U.S. Geological Survey, 2008), and is adjacent to the Fortymile Mining District (Yeend, 1996). Previously available geologic maps include a 1:250,000 scale reconnaissance geologic map (Foster, 1970) and a slightly modified map published by the USGS (Wilson and others, 2015). New DGGS mapping will provide detailed geologic context for the known porphyry systems in the map area and links to mineral occurrences elsewhere in the region, including structural detail linking the porphyries to mineral occurrences in western Yukon, Canada (Sánchez and others, 2014). Much more geologic complexity is documented in geologic maps of the adjacent Eagle A-1 and A-2 quadrangles (Szumigala and others, 2002; Werdon and others, 2001), as well as in DGGS geophysical surveys (Burns and others, 2011), leading DGGS to conduct detailed mapping and geochemical sampling efforts in this area. DGGS was further prompted to work in the area by historical and current industry interest in the mineralized areas.

Highlights of this DGGS Northeast Tanacross geochemical report include identification, sampling, and characterization of the Taurus and Bluff prospects. This dataset has 20 samples with gold in excess of 0.1 ppm in several different locations, including a sample with 2.67 parts per million (ppm) Au (18MBW082) collected north of Taurus West, a sample with 1.2 ppm Au (18RN373) in drill core from the Bluff prospect, and 17 samples with 0.1 to 0.327 ppm Au (highest value reported for 18RN276) in drill cores from the Taurus prospect. Additionally, two samples with over 50 ppm Ag (18ET102 and 18ET307) were collected between the Pika Canyon and Fishhook Prospects. The DGGS map area includes a section of Mississippian to Devonian metasedimentary and metavolcanic rocks as well as Jurassic(?) to Tertiary intrusive and volcanic rocks. Major- and trace-element geochemistry was analyzed for metamorphic rocks to distinguish between

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igneous and sedimentary protoliths, and for igneous rocks to characterize and differentiate Mesozoic and Cenozoic magmatic events in the area. The analytical data tables associated with this report are available in digital format as comma-separated value (CSV) files. Additional details about the organization of information are noted in the accompanying metadata file. All files can be downloaded from the DGGS website (http://doi.org/10.14509/30113).

All the samples collected during this project, as well as laboratory sample rejects and pulps, will be stored at DGGS for the duration of the project and will be available for public viewing upon request. Once the project concludes, the samples and the pulps will be turned over to DGGS' Geological Materials Center in Anchorage.

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 metaigneous 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 collected for their overall representation of the outcrop. However, a few samples are 'select' samples, which were more deliberately collected from a specific feature, as noted in the sample field description.

Location data were collected using GPS-enabled tablets (2017 Samsung Galaxy Tab A) running the ESRI Collector App. Data were merged into an ArcGIS geodatabase. The devices have a reported error of about 10 m. Latitude and longitude are reported in the WGS84 datum.

Magnetic susceptibility measurements were collected using Terraplus KT 5, 6, 9, and 10 model handheld magnetic susceptibility meters. The values reported here are for individual measurements performed on representative surfaces of the sampled rock outcrop.

Sample preparation

Rock samples were processed by ALS Geochemistry using their PREP-31 package. The samples were crushed to greater than 70 percent passing 2 mm, and a 250 g split was pulverized to greater 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 Geochemistry' accredited (ISO/IEC 17025–2005) internal quality-control program, DGGS monitored analysis quality with at least one standard reference material per batch of 20 analyses.

Major- and trace-element values for rock samples were determined by ALS Geochemistry method ME-MS61: Four-acid digestion followed by inductively-coupled plasma–atomic emission spectrometry (ICP-AES) and inductively-coupled plasma–mass spectroscopy (ICP-MS); Au values were analyzed using flux digestion and fire assay and ICP-AES (ALS Geochemistry method Au-ICP21).

Samples that exceeded detection limits for elements of interest were reanalyzed using specific elemental tests. Over-limit values for Pb were analyzed using four-acid digestion followed by inductively-coupled plasma–atomic emission spectrometry (ALS Geochemistry method ME-OG62).

Selected samples were analyzed for were Pt, Pd, and Au using lead oxide fire assay with ICP-AES finish (ALS Geochemistry method PGM-ICP23).

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

For each sample, data tables contain either assay values or coded-value placeholders (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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