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**MAJOR-OXIDE AND TRACE-ELEMENT GEOCHEMICAL DATA
FROM ROCKS COLLECTED IN THE TOK RIVER AREA,
TANACROSS A-5 AND A-6 QUADRANGLES, ALASKA IN 2016**

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STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS
3354 College Road
Fairbanks, Alaska 99709-3707
907-451-5010
dggspubs@alaska.gov
dggs.alaska.gov

MAJOR-OXIDE AND TRACE-ELEMENT GEOCHEMICAL DATA FROM ROCKS COLLECTED IN THE TOK RIVER AREA, TANACROSS A-5 AND A-6 QUADRANGLES, ALASKA IN 2016

by

Alicja Wypych¹, Karri R. Sicard², Robert J. Gillis², Lauren L. Lande^{2,3}, Travis J. Naibert²,
Rainer J. Newberry³, Evan Twelker², Melanie B. Werdon², and Amanda L. Willingham²

INTRODUCTION

In 2016, geologists from the Alaska Division of Geological & Geophysical Surveys (DGGS) and University of Alaska carried out a two-part geologic mapping and geochemical sampling project in the Tok River area of the Tanacross A-5 and A-6 quadrangles (June 12–26 and July 8–26). The Tok River area is adjacent to the Delta mineral belt volcanogenic massive-sulfide (VMS) district (Dashevsky and others, 2003), the Peak gold–silver–copper skarn (Illig and Newberry, 2015), and the structurally controlled gold and antimony mineralization in the Stibnite Creek and White Gold areas (U.S. Geological Survey, 2008). The Tok River project area includes the Noah (also called Hona) prospect, an intrusion-related copper prospect (U.S. Geological Survey, 2008). The recently released DGGS Tok airborne magnetic and electromagnetic geophysical survey (Emond and others, 2015) indicates the VMS-prospective stratigraphic horizons described by Dashevsky and others (2003) in the adjacent Delta VMS district may continue into the map area; however, previous reconnaissance mapping (Foster, 1970; Nogleberg and others, 2015) does not provide detail on the stratigraphy and the area's potential mineral prospects. The combination of insufficient detailed geologic mapping, historical and current industry interest in the adjacent mineralized areas, and the recently published geophysical data prompted the DGGS Mineral Resources section to work in this area.

Highlights of this DGGS Tok River geochemical report include identification, sampling, and characterization of prospects without previously available public data, including the Eagle, Dall, Parton, and Jacqueline prospects. This dataset has 22 samples with gold in excess of 0.5 ppm in several different locations, including a sample with 9.78 ppm Au (16ET254, Shalovsky vein), a sample with 6.25 ppm Au from nearby Hona porphyry (16ET312), a sample containing 1.22 ppm Au from a vein within schist south of Dry Tok Creek (16KS255), and a sample with 1.315 ppm Au from drill hole WG-11-05 (16RN165B, Eagle trend). The DGGS map area includes a section of Devonian metasedimentary and metavolcanic rocks as well as Triassic to Tertiary intrusive rocks. Major- and trace-element geochemical analyses were obtained for the metamorphic rocks to distinguish between igneous and sedimentary protoliths and for igneous rocks to characterize and differentiate Mesozoic and Cenozoic rocks 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/10.14509/29685>).

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 pulps will be stored at the Alaska Geological Materials Center in Anchorage.

¹ Alaska Division of Geological & Geophysical Surveys, 3354 College Road, Fairbanks, Alaska 99709-3707; alicja.wypych@alaska.gov

² Alaska Division of Geological & Geophysical Surveys, 3354 College Road, Fairbanks, Alaska 99709-3707

³ Department of Geology & Geophysics, University of Alaska, P.O. Box 755780, Fairbanks, Alaska 99775-5780

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 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.

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 one standard reference material per batch of 20 analyses.

- a. 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).
- b. Samples that exceeded detection limits for elements of interest were reanalyzed using specific elemental tests. Over-limit values for Ag, Cu, Pb, As, S, and Zn were analyzed using four-acid digestion followed by inductively-coupled plasma–atomic emission spectrometry (ALS Geochemistry method ME-OG62). Over-limit values for Sb were determined using lithium metaborate fusion and X-ray fluorescence (ALS Geochemistry method ME-XRF15c).
- c. 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.

ACKNOWLEDGMENTS

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