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**MAJOR-OXIDE AND TRACE-ELEMENT GEOCHEMICAL DATA  
FROM ROCKS COLLECTED IN 2015 IN THE TOK AREA,  
TANACROSS A-5, A-6, AND PARTS OF ADJACENT QUADRANGLES,  
ALASKA**

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# MAJOR-OXIDE AND TRACE-ELEMENT GEOCHEMICAL DATA FROM ROCKS COLLECTED IN 2015 IN THE TOK AREA, TANACROSS A-5, A-6, AND PARTS OF ADJACENT QUADRANGLES, ALASKA

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## INTRODUCTION

The Tok project 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 structurally controlled gold and antimony mineralization in the Stibnite Creek and White Gold areas (U.S. Geological Survey, 2008). The project area also includes the Noah prospect, an intrusion-related copper prospect (U.S. Geological Survey, 2008). Whereas the Delta mineral belt has been extensively mapped and explored, the detailed mapping does not continue into the 2015 Tok project area. In this area, only reconnaissance mapping has been conducted (Foster, 1970; Nockelburg and others, 2015). The geophysical survey (Emond and others, 2015) conducted prior to the field mapping in 2015 indicates that the VMS-prospective stratigraphic horizons described in the detailed map by Dashevsky and others (2003) could continue to the southeast into the project area. The combination of a lack of detailed mapping, the industry interest in the adjacent areas, and the geophysical data findings prompted the Alaska Division of Geological & Geophysical Surveys (DGGS) mineral resources group to work in this area.

DGGS geologists carried out a geologic reconnaissance mapping project in the Tanacross A-5, A-6, and parts of adjacent quadrangles from June 18 through 28, 2015, following publication of the 2015 Tok geological survey (Emond and others, 2015). Highlights of this project include identification, sampling, and characterization of a broad section of Paleozoic metasedimentary and metavolcanic rocks that could represent potential VMS horizons, as well as Triassic to Tertiary intrusive rocks with potential for porphyry-hosted deposits, skarn, and vein-hosted mineralization. This dataset includes two samples with elevated gold, 1.3 and 14.5 ppm, accompanied with very high arsenic values (both over 10,000 ppm) and antimony values (352 and 97.4 ppm). The sample containing 14.5 ppm Au, 305 ppm Bi and 11.1 ppm Te (15ET026) was collected from sulfide pods in schist adjacent to a granitic intrusion near the Noah prospect, and the sample containing 1.3 ppm Au (15KS007) was collected from quartz veining in a fault zone. Major element chemistry has been obtained on the metamorphic rocks to distinguish between igneous and sedimentary protoliths of the rocks using criteria proposed by Dashevsky and others (2003) and on igneous rocks to characterize and differentiate Mesozoic and Cenozoic igneous deposits in the area. In addition to this reconnaissance mapping, DGGS, in cooperation with the USGS, also reanalyzed 670 archived stream sediment sample pulps from the eastern Alaska Range, including 99 pulps from the Tanacross quadrangle (Werdon, and others, 2015).

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:[10.14509/29517](https://doi.org/10.14509/29517)).

## 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 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 the average of four individual measurements performed on representative surfaces of the sampled rock outcrop.

### SAMPLE PREPARATION

**Rock samples** were processed by ALS Minerals 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 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 values for rock samples were determined by ALS Minerals method ME-ICP61: 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 gram 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 Au were reanalyzed using flux digestion and fire assay and AAS (ALS Minerals procedure Au-AA25).
- 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, In, Re, 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 methods C-IR07 and S-IR08, respectively).

For each sample, data tables either contain 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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