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MAJOR-OXIDE, MINOR-OXIDE, AND TRACE-ELEMENT GEOCHEMICAL DATA FROM ROCKS COLLECTED IN THE ALASKA HIGHWAY CORRIDOR, MOUNT HAYES, TANACROSS, AND NABESNA QUADRANGLES, ALASKA, IN 2006, 2008, 2009, and 2010

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Note: This report (including all analytical data and tables) is available in digital format from the DGGS website (http://www.dggs.alaska.gov) at no charge. The digital data are available as .PDF files and .CSV spreadsheets.

MAJOR-OXIDE, MINOR-OXIDE, AND TRACE-ELEMENT GEOCHEMICAL DATA FROM ROCKS COLLECTED IN THE ALASKA HIGHWAY CORRIDOR, MOUNT HAYES, TANACROSS, AND NABESNA QUADRANGLES, ALASKA, IN 2006, 2008, 2009, AND 2010

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Melanie B. Werdon[1], Larry K. Freeman[1], David J. Szumigala[1], Rainer J. Newberry[2], Joseph E. Andrew[1], Garrett G. Speeter[1], Diana N. Solie[1], Trent D. Hubbard[1], Gerry A. Griesel[1], and Brent A. Elliott[1]

INTRODUCTION

Geologists from the Alaska Division of Geological & Geophysical Surveys (DGGS) and the University of Alaska Fairbanks (UAF) carried out geologic field surveys, including bedrock mapping and sampling, in the Alaska Highway Corridor from 2006 through 2010. The fieldwork provides basic information critical to building an understanding of Alaska's geology and is part of a broader, integrated program that includes airborne geophysical surveys (Burns and others, 2006), bedrock and surficial mapping, a mineral-resource assessment, a geologic-hazards assessment, and other geological studies. This publication contains descriptive, location, and analytical information for samples collected in the Mount Hayes, Tanacross, and Nabesna quadrangles, Alaska, in the summers of 2006, 2008, 2009, and 2010. Additional analytical data for samples collected in the Mount Hayes Quadrangle in the summers of 2006 and 2007 were published in a separate report (Solie and others, 2008). During the field seasons covered by this report, 172 rock samples were collected for geochemical trace-element analysis, and 244 rock samples were collected for whole-rock (major- and minor-oxide and petrogenetically important trace-element) analyses. Rock sample location coordinates are presented in decimal degree latitude and longitude based on the North American Datum of 1927 (NAD 27) for Alaska. Brief sample descriptions are based principally on field observations with some thin-section details added.

SAMPLE COLLECTION TECHNIQUES

Samples of visibly mineralized rock, or rocks exhibiting features commonly associated with mineralization, were collected by DGGS geologists for geochemical trace-element analyses. Rock samples collected for major oxides, minor oxides, and trace elements include igneous rocks, and metamorphic rocks of possible igneous origin. To facilitate making geologic maps of the area, these analyses are used to determine rock names, and where appropriate, petrogenetically important trace elements were used to help determine original tectonic setting. The rock samples were collected in a random distribution across the study area. Weathered surfaces were either removed in the field with a rock hammer, or later trimmed off with a

[1] Alaska Division of Geological & Geophysical Surveys, 3354 College Rd., Fairbanks, AK 99709-3707
[2] University of Alaska Fairbanks Department of Geology & Geophysics, P.O. Box 755780, Fairbanks AK 99775-5780

rock saw. Location coordinates were recorded using handheld GPS units, with no differential correction. The estimated horizontal error is ±10 m.

ANALYTICAL METHODS

Trace-element geochemical analyses and whole-rock analyses were performed by ALS Chemex/Minerals (ALS) and the Advanced Instrumentation Laboratory at the University of Alaska Fairbanks (UAF). All rock samples were crushed by ALS with a Terminator oscillating jaw crusher with chrome steel alloy plates so that at least 70 percent of the material passed through a -10 mesh (2 mm) screen. Representative aliquots of 250 grams and 30 grams each were taken using a stainless steel riffle splitter. These samples were then pulverized in a chrome steel ring mill so that 85 percent of the sample passed through a -200 mesh (75 micron) screen. All trace-element geochemical analyses and whole rock analyses were performed using representative splits of each 250-gram pulp, except gold, platinum, and palladium analyses, which were performed on a 30-gram representative split. In 2008, a second 250-gram pulp was prepared at ALS for whole-rock analyses at UAF (discussed below). All hand samples and leftover pulps are retained by DGGS, and will be stored at the Geologic Materials Center in Anchorage.

All potentially mineralized samples were assayed for gold by inductively coupled plasma–atomic emission spectroscopy (ICP-AES) following a 30-g fire assay fusion (FA), after four-acid, near-total digestion. Rock samples collected in 2008 and 2009 with the potential for elevated platinum-group-element content were assayed for gold, platinum, and palladium by 30-gram fire assay and inductively coupled plasma–mass spectrometry (ICP-MS) finish after four-acid, near-total digestion in 2008, and by 30-g fire assay and ICP-AES finish after four-acid, near-total digestion in 2009. All other trace-element geochemical analyses, from all years, were performed by ICP-AES methods after four-acid, near-total digestion. This method of digestion is possibly incomplete for some elements and may result in lower analytical results for these elements. Methods and detection limits for each type of analysis are tabulated in the digital data distribution files. To check reported trace-element geochemical assay values, DGGS inserts well-characterized standards in each laboratory batch throughout the sample order. Standards are checked by DGGS to make sure they fall within 2 standard deviations of accepted values, and if not, all samples in the batch are reanalyzed.

For the whole-rock analyses, major- and minor-element oxides were determined by ALS using X-ray fluorescence spectrometry following a lithium borate fusion. Trace-element values (±Ba, Nb, Rb, Sr, Y, and Zr) were determined by X-ray fluorescence spectrometry on a pressed pellet at ALS for samples collected in 2006 and 2009, and by UAF for samples collected in 2008. XRF spectroscopic analyses performed at the Advanced Instrumentation Laboratory at UAF were conducted on pressed pellets using standard Norrish and Hutton (1969) procedures as described in Potts (1987) and as used by Cameron (2000). At UAF, pressed pellets of well-calibrated international standards were used as a check of the trace-element analyses. In order to check reported major- and minor-element oxide and trace-element values, DGGS inserts well-characterized rock standards in each laboratory batch throughout the sample order. Standards are checked by DGGS to make sure they fall within 2 standard deviations of accepted values, and if not, all samples in the batch are reanalyzed.

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