PETROGRAPHIC OBSERVATIONS OF ROCKS COLLECTED IN THE BONNIFIELD MINING DISTRICT, FAIRBANKS A-1, FAIRBANKS A-2, HEALY D-1, AND HEALY D-2 QUADRANGLES, ALASKA

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PETROGRAPHIC OBSERVATIONS OF ROCKS COLLECTED IN THE BONNIFIELD MINING DISTRICT, FAIRBANKS A-1, FAIRBANKS A-2, HEALY D-1, AND HEALY D-2 QUADRANGLES, ALASKA

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INTRODUCTION

Mineral Resources Section personnel from the Alaska Division of Geological & Geophysical Surveys (DGGS) carried out a geologic field mapping survey in the eastern part of the Bonnifield mining district in the Fairbanks A-1 and A-2 and the Healy D-1 and D-2 quadrangles. The map area contains several significant polymetallic sulfide prospects and transects three metamorphic assemblages, which include the Healy Schist, Keevy Peak Formation, and the Totatlanika Schist (Wahrhaftig, 1968, 1970a, b; Gilbert, 1977; Freeman and Schaefer 2001; Stevens, 2001). The fieldwork (June 16 through July 18, 2008) augments publically available information critical to building an understanding of Alaska's geology and is part of an integrated program of airborne geophysical surveys followed by geologic mapping. Specifically, this mapping provides geologic context for geophysical surveys conducted in 2006 (Burns and others, 2016). In conjunction with geologic mapping, project staff collected igneous and metamorphic samples from roughly 2,400 rock exposures (approximately 4,000 samples) throughout the map area. Samples were collected to generally represent outcrop lithology and to target significant lithologic features for subsequent investigation.

This raw data release provides petrographic thin section observations of 264 samples from the East Bonnifield Project rock collection. Project staff examined thin sections to better distinguish rock units, assist with evaluating the structural and stratigraphic relationships among the various lithologies, and to determine suitability for lithogeochemical and geochronological analysis. Observations in the data tables include lithologic classification, texture, mineral crystal structure, and mineral components.

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/10.14509/30171).

The thin sections 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 Geologic Materials Center in Anchorage. Related rock samples, geochemistry, and thin section photomicrographs can be accessed via the Alaska Geochemistry, Geologic Materials Center Inventory, and Geologic Photos of Alaska databases.

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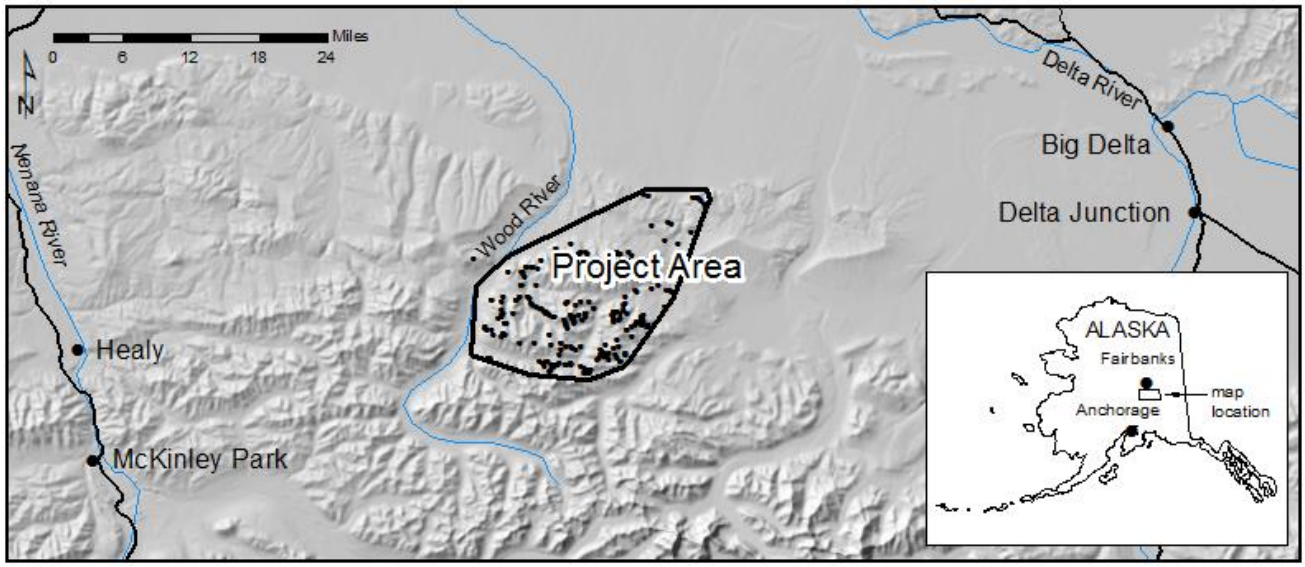

Figure 1. Location map showing the Bonnifield project area and thin section sample locations.

DOCUMENTATION OF METHODS

The samples selected for petrographic observation either generally represent outcrop lithology or contain significant lithologic features.

Location coordinates were collected using hand-held GPS units (no differential correction was applied). Estimated position errors calculated by the GPS units were a minimum of 3 meters. At many locations the horizon was limited by steep topography, resulting in positional errors of more than 100 meters. Waypoints were downloaded from the GPS units into the project database, merged with related information, and converted from UTM (Universal Transverse Mercator) to geographic coordinates. Location coordinates are based on the NAD27 datum (North American Datum of 1927).

Thin section billets were cut using a diamond-blade tile saw; foliated and lineated rocks were cut so that the examination surface is perpendicular the rock fabric. Many of the rocks were fragile and required either significant gluing or vacuum impregnation to prepare billets. The billets were used to create standard petrographic thin-sections. Thin section billets were mounted on glass slides, hand ground to 30 microns, and finished with a 600 mesh grit. A few thin sections of mineralized rocks were left uncovered and polished for use in reflected light ore microscopy.

Using basic polarized light microscopy, project staff examined thin sections to identify mineral content, investigate textural relationships, and determine suitability for further geochemical and geochronological analysis. A polarizing reflected light microscope was used on the polished thin sections containing sulfide minerals.

OBSERVATIONS AND UNCERTAINTIES

Observations in the data tables include lithologic classification, texture, mineral crystal structure and development sequence, and mineral components. Mineral and component modal percentages are visual estimates. The primary focus of this work was to aid in distinguishing igneous, volcaniclastic metasedimentary rocks, and volcaniclastic metavolcanic rocks, consequently the level of detail varies from cursory to comprehensive. Although the classifications and descriptions have been lightly edited for spelling and consistency, the descriptions are typically freeform text written to note key features and highlight uncertainties that may warrant subsequent investigation.

Users may notice sample numbering discrepancies throughout various Bonnifield Project publications. DGGS staff have completed significant work over the duration of the project to assimilate data from various sources into comprehensive division-wide databases. In conjunction with loading the Bonnifield data into the Geologic Materials Center Inventory and Alaska Geochemistry databases, staff identified and, when possible, corrected sample labeling inconsistencies. Error correction required certain assumptions, and it is possible, particularly in cases where multiple lithologies were collected from a single outcrop, that published geochemical results and thin section observations tied to a given sample number may not correspond to the same rock. The data tables in this publication list both the sample numbers written on each thin section and the standardized numbers used by the division databases.

ACKNOWLEDGMENTS

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