GEOCHEMICAL DATA FROM SAMPLES COLLECTED IN 2024 FOR THE CHENA AND STEESE PROJECTS, BIG DELTA, CIRCLE, FAIRBANKS, AND LIVENGOOD QUADRANGLES, ALASKA

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This report has not been reviewed for technical content or for conformity to the editorial standards of DGGS.

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INTRODUCTION

During the 2024 field season, geologists from the Alaska Division of Geological & Geophysical Surveys (DGGS) conducted 1:100,000-scale bedrock geologic mapping of a 9,635 km^2 (~3,720 mi^2) area of the Yukon-Tanana Uplands of eastern Interior Alaska, including parts of the Big Delta, Circle, Fairbanks, and Livengood quadrangles. Samples were collected to support the Steese and Chena projects, both funded by the U.S. Geological Survey (USGS) Earth Mapping Resource Initiative (Earth MRI) program, to aid in updating and modernizing geologic mapping of the region and to promote mineral resource exploration in Interior Alaska (Buchanan and others, 2024; Moshrefzadeh and others, 2025).

This report provides major oxide and trace element geochemistry of igneous, metamorphic, and potentially mineralized rocks from the Steese and Chena projects. Sampling locations are shown in figure 1. Station locations, field rock descriptions, and sample magnetic susceptibility measurements are provided by Moshrefzadeh and others (2025). The major oxide and trace element geochemical data accompanying this report are available as comma-separated value (.csv) files from https://doi.org/10.14509/31692. All samples collected during this project and associated geologic materials will be stored in the short term at the DGGS office in Fairbanks. After the project's completion, all materials will be archived at the Geological Materials Center in Anchorage and available for viewing upon request.

SAMPLE COLLECTION METHODS

Following the methodology described in Buchanan and others (2024), the samples collected and analyzed for this report can be separated into two groups: those collected for whole-rock major-oxide, minor-oxide, and trace-element analyses (MOX), and those collected for trace-element geochemistry (GX) based on the presence of visible mineralization or alteration. MOX samples are igneous, metaigneous, or metasedimentary rocks that show little alteration or weathering. Analyzing MOX samples helps to determine rock types and petrogenesis, protoliths of metamorphic rocks, and tectonic settings. Conversely, GX samples are specifically collected based on the presence of mineralization and/or alterations, as these will help determine and characterize the potential mineral resources of the mapping areas. Field descriptions of the samples accompany the analytical data; however, these descriptions have not been reviewed for consistency with the geochemical results.

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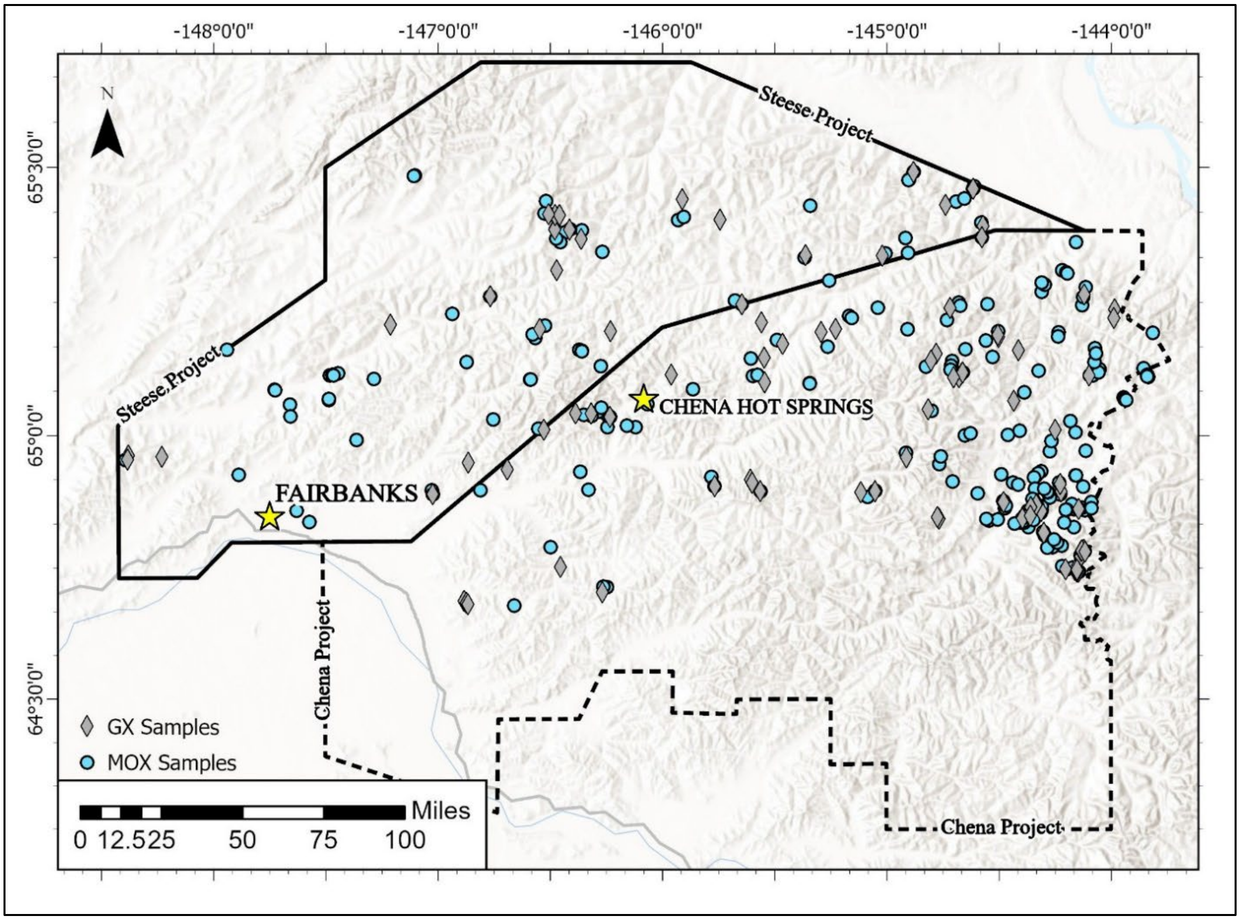

Figure 1. Station locations corresponding to the samples analyzed in this study as part of the Steese and Chena Projects.

SAMPLE PREPARATION

DGGS staff removed weathering and other heterogeneities from rock samples before sending them for MOX analysis. DGGS did not cut GX samples after collection. Australian Laboratory Services (ALS) Geochemistry processed and analyzed all samples. Samples were crushed to greater than 70 percent passing 2 mm, with a 250 g split pulverized to greater than 85 percent passing 75 microns.

ANALYTICAL METHODS

Whole-rock major- and minor-oxide geochemistry were analyzed by lithium borate fusion digestion and inductively coupled plasma atomic emission spectroscopy (ICP-AES) (ME-ICP06 routine of ALS Geochemistry). Trace and rare-earth elements were analyzed using lithium metaborate fusion digestion and inductively coupled plasma mass spectrometry (ICP-MS) (ME-MS81, ME-MS61L, and MS61L-REE routines of ALS Geochemistry). Ag, Cd, Co, Cu, Li, Mo, Ni, Pb, Sc, and Zn were determined by four-acid digestion and ICP-AES (ME-4ACD81 routine of ALS Geochemistry); and As, Bi, Hg, In, Re, Sb, Se, Te, and Tl were determined by aqua regia digestion followed by ICP-MS (ME-MS42 routine of ALS Geochemistry). Total C and S were analyzed by Leco furnace (C-IR07 and S-

IR08, routines of ALS Geochemistry, respectively). Pt, Pd, and Au were determined by fire assay with ICP-MS finish (Au-ICP21 and PGM-MS23, precious metals routines of ALS Geochemistry). B was analyzed using a sodium peroxide fusion and ICP-MS finish (B-MS82L routine of ALS; Wypych and others, 2022, 2023).

In addition to the internal quality control program of ALS Geochemistry, DGGS submitted one blind reference material standard for every 20 unknown samples for further quality control. The geochemical results of each sample in the data tables accompanying this report either contain analytical values corresponding to the chemical composition of the sample or coded-value placeholders (null = not analyzed; -1 = the element's assay result is below the lower detection limit; -2 = the element's assay result exceeds the upper detection limit).

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REFERENCES

Buchanan, J.W., Wypych, Alicja, Barrera, M.L., Biegel, J.M., Gavel, M.M., Harvey, D.A., Ketcham, R.A., Muller, I.P., Naibert, T.J., Newberry, R.J., Regan, S.P., Szumigala, D.J., Twelker, Evan, and Wildland, A.D., 2025, Geochemical data from samples collected in 2023 for the Chena and Mount Harper projects, Big Delta, Circle, Fairbanks, and Eagle quadrangles, Alaska: Alaska Division of Geological & Geophysical Surveys Raw Data File 2024-2, 5 p. https://doi.org/10.14509/31123

Moshrefzadeh, J.A., Buchanan, J.W., Naibert, T.J., Twelker, Evan, Newberry, R.J., Szumigala, D.J., Barrera, M.L., Norwood, L.P., Acosta, M.D., and Regan, S.P., 2025, Field station locations and magnetic susceptibility data collected in 2024 for the Chena and Steese projects, Yukon-Tanana Uplands, Alaska: Alaska Division of Geological & Geophysical Surveys Raw Data File 2025-5, 5 p. https://doi.org/10.14509/31476

Wypych, Alicja, Twelker, Evan, Naibert, T.J., Gavel, M.M., Newberry, R.J., Szumigala, D.J., Wildland, A.D., Barrera, M.L., Harvey, D.A., Muller, I.P., Fessenden, S.N., and Blackwell, N.J., 2023, Geochemical data from samples collected in 2022 for the Mount Harper geologic mapping project, Big Delta, Mount Hayes, and Eagle quadrangles, Alaska: Alaska Division of Geological & Geophysical Surveys Raw Data File 2023-24, 3 p. https://doi.org/10.14509/31089

Wypych, Alicja, Gavel, M.M., Naibert, T.J., Avirett, D.F., Barrera, M.L., Hubbard, A.K., Newberry, R.J., Regan, S.P., Twelker, Evan, Wildland, A.D., and Wyatt, W.C., 2022, Geochemical data from samples collected in 2021 for the Taylor Mountain project, Tanacross and Eagle quadrangles, Alaska: Alaska Division of Geological & Geophysical Surveys Raw Data File 2022-4, 3 p. https://doi.org/10.14509/30843