**Division of Geological & Geophysical Surveys**

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# GEOCHEMICAL TRACE-ELEMENT AND RARE-EARTH ELEMENT DATA FROM STREAM-SEDIMENT AND PAN-CONCENTRATE SAMPLES COLLECTED IN 2011 IN THE MELOZITNA MINING DISTRICT, TANANA AND MELOZITNA QUADRANGLES, INTERIOR ALASKA

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# GEOCHEMICAL TRACE-ELEMENT AND RARE-EARTH ELEMENT DATA FROM STREAM-SEDIMENT AND PAN-CONCENTRATE SAMPLES COLLECTED IN 2011 IN THE MELOZITNA MINING DISTRICT, TANANA AND MELOZITNA QUADRANGLES, INTERIOR ALASKA

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## INTRODUCTION

Anomalous concentrations of rare-earth elements (REEs) and uranium were discovered in the Melozitna mining district of Interior Alaska in the 1970s as part of the National Uranium Resource Evaluation (NURE) Hydrogeochemical and Stream Sediment Reconnaissance (HSSR) program; these historic datasets are currently archived in the National Geochemical Database (Smith, 2006). To obtain modern, quantitative geochemical analyses to characterize select watersheds, mineral-resources personnel from the Alaska Division of Geological & Geophysical Surveys (DGGS) carried out a helicopter-supported, reconnaissance sampling project in the Melozitna and Tanana quadrangles, July 25–August 13, 2011. Stream-sediment and pan-concentrate sampling was conducted as part of the State's *Rare Earth Elements and Strategic Minerals Assessment* project, which is designed to evaluate Alaska's potential for these resources. Highlights of this sampling project include documenting new gold-bearing drainages and identifying several samples with high REE values. Ongoing DGGS scientific work in this region is providing additional insights into the geology and mineral-resource potential of Melozitna mining district (Freeman and others, 2011; Griesel and others, 2012a,b).

The text, and analytical data and tables associated with this report, are being released in digital format as PDF files and .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 (http://dggs.alaska.gov/pubs/id/23683) at no charge.

## DOCUMENTATION OF METHODS

### SAMPLE COLLECTION

For this project, 32 stream-sediment and 28 pan-concentrate samples were collected for geochemical analysis (rdf2012-3-geochemical-data.csv). Location coordinates were obtained using hand-held GPS units. Coordinates are presented in latitude and longitude in decimal degrees (based on the NAD 27 Alaska datum). Additionally, one heavy-mineral concentrate sample, collected by U.S. Bureau of Mines from a channel sample of bench gravels directly above bedrock on a bench north of Tozimoran Creek, was analyzed and included in this report; location coordinates were extracted in ArcGIS from a georegistered sketch map from Barker and Warner (1985).

For the DGGS study, major and minor watersheds (stream drainage basins) were selected for sampling prior to field work based on geographic criteria and stream-sediment geochemical anomalies in NURE data. In the field, specific sample sites were selected by visual inspection from the helicopter, and were based on the availability of sample media and a suitable landing zone. Sites along streams/rivers were then selected, in order of preference from highest to lowest, as follows: gravel/cobble-armored riffles, gravel/cobble-armored point bars, log/boulder/plunge-pool eddies, point bars, overbank flood deposits, and moss mats. Where practical, sediment was collected over a 50-meter-long stretch of watercourse and combined into a composite sample.

Stream-sediment samples were collected with a shovel. Cobbles and larger pebbles were manually screened out by hand, and the remaining material was placed into a permeable cloth sample bag. In order to obtain a sufficient volume of fine sediment, 7-inch-wide by 12-inch-long sample bags were filled to capacity.

For pan-concentrate samples, sediment was collected with a shovel and then screened using a "Garrett's Combination Sifter" with a 0.483-inch, square-hole mesh. The resulting undersize material was collected in a 14-inch-diameter "Garrett's Gold Trap" gold pan. Sediments were screened until the gold pan was level-full with -0.483-inch material. Using alternating shaking and washing motions, the sediment was reduced to visible heavy minerals or a volume of approximately 30 ml. This concentrate was then washed into Nasco Whirl-pak plastic sample bags.

## SAMPLE PREPARATION

Pan-concentrate samples were dried at DGGS using a hot plate and glass petri dishes, which were washed after each use to prevent cross-contamination. Dried samples were split manually into two, equal-size, homogenous portions using a razor, which was washed after each use.

Samples were submitted to ALS Chemex, where the sediment and pan-concentrate samples were logged, air-dried at low temperature, and weighed. The samples were then sieved to a particle size of -180 microns (80 mesh). Both fractions were retained, and the -80-mesh fraction was used for analysis.

## ANALYTICAL METHODS

All samples were analyzed for ore-related trace elements and the full suite of rare earth elements. In addition to the internal quality-control program at ALS Chemex, DGGS monitored analysis quality by inserting igneous-rock and ore-geochemical-pulp standards with known compositions into the sample roster for every sample batch.

Trace-element compositions were determined using inductively coupled plasma, atomic emission spectroscopy (ICP-AES) following a four-acid digestion process. Rare-earth- and additional trace-element compositions were determined using inductively coupled plasma, mass spectroscopy (ICP-MS). ICP-MS samples were dissolved in acid following lithium borate fusion. Platinum, palladium, and gold values were obtained from a 30-gram sample using inductively coupled plasma – atomic emission spectroscopy (ICP-AES) following fire assay. Sample 11RM23232P was outside the range for gold for this method, and was re-analyzed using gravimetry. 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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