

2024 ARCTIC STRATEGIC TRANSPORTATION AND RESOURCES (ASTAR) PROJECT FIELD STATION LOCATION DATA AND SAMPLE DESCRIPTIONS: ANAKTUVUK PASS REGION, NORTH SLOPE, ALASKA

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Raw Data File 2026-7



Geologists Nick E. Crawford and Angie V. Diaz examine the composition and physical characteristics of geologic materials along an exposed bank of the Chandler River.

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

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2024 ARCTIC STRATEGIC TRANSPORTATION AND RESOURCES (ASTAR) PROJECT FIELD STATION LOCATION DATA AND SAMPLE DESCRIPTIONS: ANAKTUVUK PASS REGION, NORTH SLOPE, ALASKA

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INTRODUCTION

This report presents field station locations, observations, sediment sample descriptions, grain-size analyses, and links to field station and sample photographs collected in June and July 2024 across an approximately 24,479 km² area in the Umiat, Sagavanirktok, Killik River, Chandler Lake, and Phillip Smith Mountains 1:250,000-scale quadrangles near Anaktuvuk Pass, Alaska (fig. 1). Geologists from the Alaska Division of Geological & Geophysical Surveys (DGGS), supported by ASRC Consulting & Environmental Services, LLC (ACES), documented the character and distribution of surficial deposits, sedimentary facies, and geomorphic features to better understand glacial, fluvial, and periglacial processes shaping the region. Field crews collected sediment samples to investigate landforms and the distribution of rock and sediment in the shallow subsurface. Because information on local construction material resources is limited, these field observations provide useful insights into the distribution and characteristics of surface materials for community planning and land management decisions. This work was completed in support of a sand and gravel resource assessment for the Arctic Strategic Transportation and Resources (ASTAR) project.

These data are provided as a Raw Data File under an open end-user license and are available on the DGGS website at <https://doi.org/10.14509/32060>. In addition to field station and geologic material descriptions, this data release includes links to photographs taken during fieldwork and analytical sample images, which have been added to the DGGS photo database ([https://maps.dggs.alaska.gov/photodb/#search="rdf 2026-7"](https://maps.dggs.alaska.gov/photodb/#search=), Athey and others, 2017).

BACKGROUND

The ASTAR project is a collaborative initiative led by the Alaska Department of Natural Resources (DNR) in partnership with the North Slope Borough. The project aims to identify, evaluate, and advance opportunities that enhance quality of life and economic resilience in North Slope communities through responsible infrastructure development. Working with communities and regional stakeholders, ASTAR prioritizes projects that strengthen cultural and community connectivity, increase regional support, reduce the cost of living, improve safety, and promote sustainable development.

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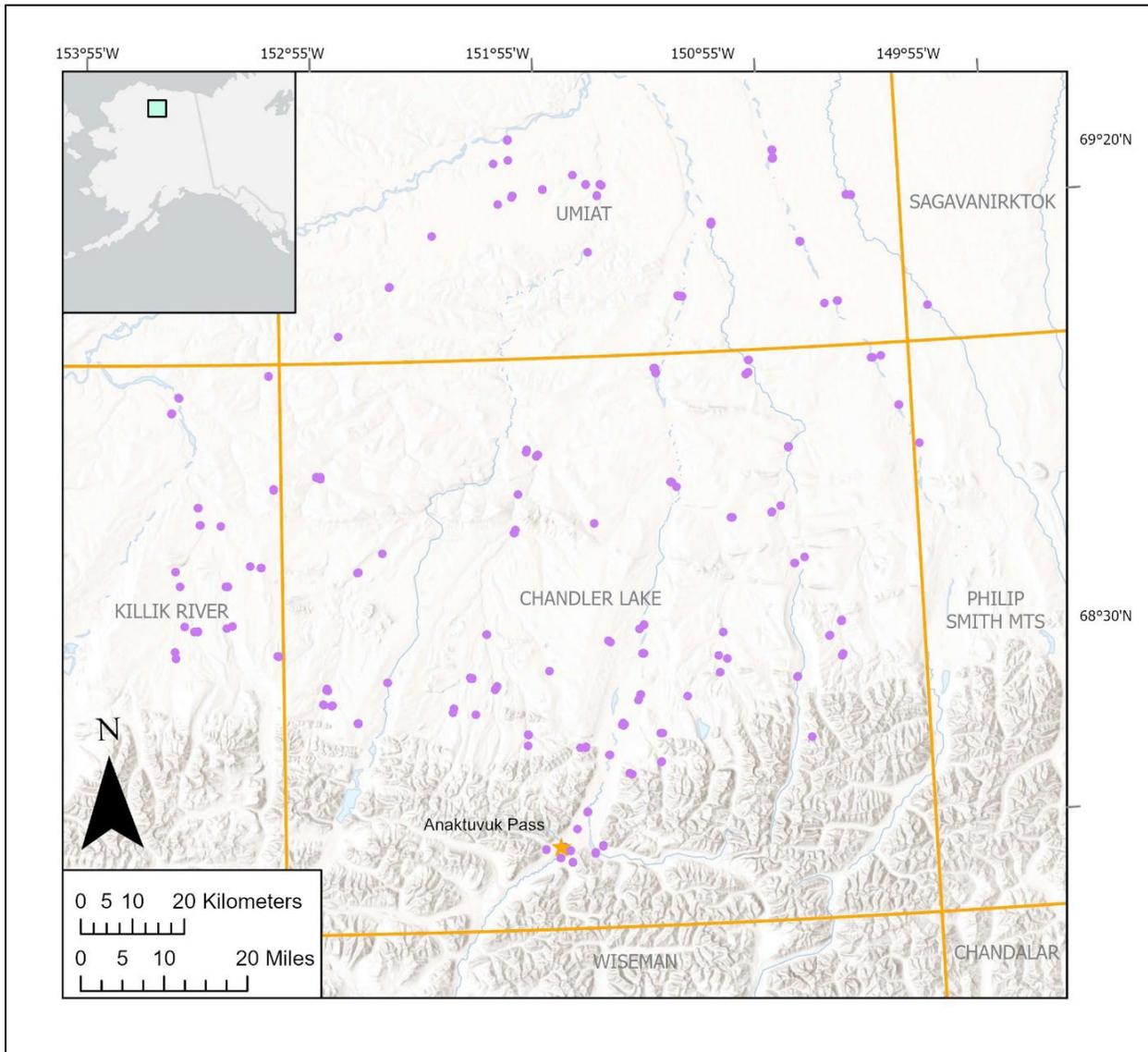


Figure 1. Map showing 2024 field station locations (purple circles).

DATA PRODUCTS

- Field station and interval rock and sediment characterization data
- Sediment sample composition and classification data
- Sieve analysis reports

METHODS

Field Data Collection

Between June 24, 2024, and July 7, 2024, geologists from DGGS and ACES collected geologic data and samples from 287 field sites. Staff used GPS-enabled tablets and smartphones running the ESRI ArcGIS

Survey123 app, achieving a reported mean horizontal accuracy of about 10 m to record locations. Latitude and longitude were reported in the WGS84 datum.

Staff recorded information about the composition, characteristics, and distribution of geologic materials, including unconsolidated sediment and bedrock. Field observations include measurements of probe penetration depth, probe refusal contact, organic material thickness, weather conditions, vegetation, site drainage, and the method used to collect data. Subsurface information is organized by depth intervals, with fields describing interval order, top and bottom depths, interval labels, and the geologic material encountered. Where applicable, a Unified Soil Classification System (USCS) group symbol is included (ASTM, 2000). Sediment characteristics are documented through estimates of percent fines, sand, gravel, and oversized material, along with observations of moisture, thermal condition, plasticity, color, and consistency. Sand-sized fractions are further characterized by grain angularity, frosting, gradation, and dominant grain size. Coarser sediment components include descriptions of angularity, gradation, composition, and maximum clast diameter. Where rock is present, the dataset records rock type, clast size, color, formation, character, competency, and durability. Additional contextual information and clarifications are captured in a miscellaneous field notes field.

When describing materials at a field site, geologists assigned depth values to the top and bottom of each interval, beginning at 0 cm at the surface and increasing with depth. For surface-only observations, both the top and bottom depths were assigned a value of 0 cm. The following subsections summarize the field data collection methods used in this study.

Surface Observations – Field staff identified sites of interest and recorded visible geologic features, including exposed materials and landforms. When appropriate, they collected representative rock and sediment samples using a hand trowel.

Outcrops/Exposures - To take advantage of naturally exposed materials, field crews collected data from natural vertical and subvertical riverbanks, bluffs, and lake margins. Exposure faces were cleaned to produce fresh surfaces suitable for stratigraphic description, using U.S. Department of Agriculture Natural Resources Conservation Service terminology when appropriate (Schoeneberger, 2012). In some instances, serial bulk samples were collected from documented horizons for description after returning from the field. Sediment was replaced, and the exposure was restored as closely as practicable to its original condition.

Test Pits - In areas lacking natural exposures, personnel excavated small test pits to observe subsurface materials directly. After excavation, pit walls were cleaned with trowels to expose fresh surfaces for stratigraphic description and, if appropriate, sample collection. Once data collection was complete, the sediment and organic mat were replaced to return the site to its prior condition.

Soil Probe Observations – For locations with suspected shallow permafrost and vegetative and geomorphic constraints, geologists sometimes used a frost probe to investigate subsurface materials and assess permafrost conditions. By measuring the depth to which a 1-meter probe could be inserted, crews inferred

refusal depth, refusal type, material type, changes in lithology, relative resistance, organic layer thickness, and active-layer depth. Refusal type was interpreted from resistance, vibration, and sound, along with visual observations of site conditions. Refusal on permafrost was recorded as “frozen,” and refusal due to massive ice was recorded as “ice.” Use of the frost probing resulted in minimal surface disturbance and did not require ground mitigation.

Post-Field Sample Descriptions

During fieldwork, 109 samples were collected from a subset of field stations and then transported to Fairbanks, where they were described and photographed. Geologists collected either rock samples from in situ bedrock or sediment. Sediment samples include surface materials or bulk samples collected to characterize a defined interval. The recorded attribute information varies by sample category. Each record documents the primary geologic material present and includes an internal sample description summarizing texture, structure, and notable physical attributes. Where appropriate, we follow the conventions used in the Alaska Geotechnical Field Manual (Alaska Department of Transportation and Public Facilities [AKDOT&PF], 2007). Sediment classification is supported by both USCS group symbols derived from sieve analysis and visual USCS classifications, along with the corresponding USCS group name (ASTM, 2000). Additional descriptive fields capture coarse sediment abundance, maximum clast diameter, angularity, and composition. Color is recorded using both Munsell color codes and descriptive color names (Munsell Color, 1994). The dataset also includes observations of moisture content, calcium carbonate presence, and organic material content. The data have been evaluated for readability and general logical consistency, but they have not been reviewed for technical content and should be considered preliminary.

Sieve Analysis

A subset of 54 sediment samples was submitted to Alaska Test Labs in Anchorage, Alaska, for grain-size analysis conducted in accordance with ASTM D6913 (ASTM, 2017). Sieve analysis was performed to obtain quantitative grain-size distributions to refine USCS classification, improve engineering interpretations, and provide standardized, reproducible data beyond visual estimates. Complete sieve-analysis results are provided in PDF format, organized by field station and by the depth interval from which each sample was collected.

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REFERENCES

- Alaska Department of Transportation and Public Facilities, 2007, Alaska Geotechnical Procedures Manual: Alaska Department of Transportation and Public Facilities, 187 p., https://dot.alaska.gov/stwddes/desmaterials/assets/pdf/geo_man/geotechmanual_all_07
- American Society for Testing and Materials (ASTM), 2000, Standard practice for classification of soils for engineering purposes (Unified Soil Classification System) (ASTM D2487-00): ASTM International, West Conshohocken, Pa., 12 p., <https://doi.org/10.1520/D2487-00>
- American Society for Testing and Materials, 2017, Standard test methods for particle-size distribution (gradation) of soils using sieve analysis (ASTM D6913/D6913M-17): ASTM International, West Conshohocken, Pa., https://doi.org/10.1520/D6913_D6913M-17
- Athey, J.E., Seitz, S.S., and DGGs Staff, 2017, Geologic photos of Alaska: Alaska Division of Geological & Geophysical Surveys Digital Data Series 14, <https://doi.org/10.14509/29735>
- Munsell Color, 1994, Munsell soil color charts: GretagMacBeth, New Windsor, N.Y.
- Schoeneberger, P.J., Wysocki, D.A., Benham, E.C., and Soil Survey Staff, 2012, Field book for describing and sampling soils, version 3.0: U.S. Department of Agriculture, Natural Resources Conservation Service, National Soil Survey Center, 298 p.