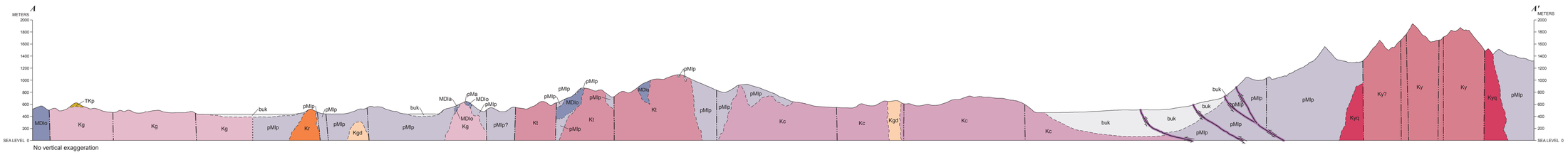
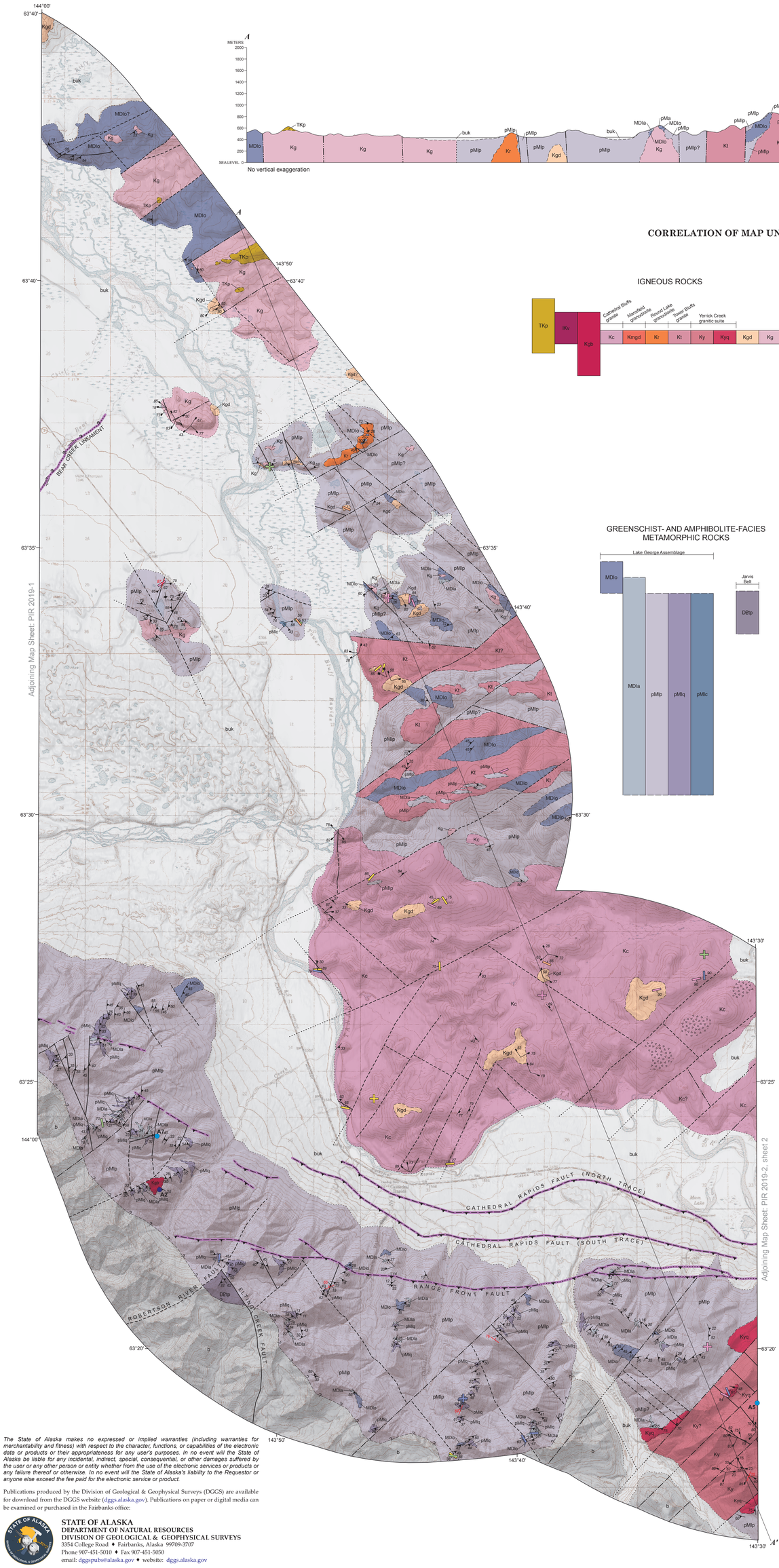
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

PRELIMINARY INTERPRETIVE REPORT 2019-2
Werdon and others, 2019
SHEET 1 OF 2
Explanatory text accompanies map
http://doi.org/10.14509/30037





CORRELATION OF MAP UNITS

DESCRIPTION OF GEOLOGIC MAP UNITS

(All map units may not appear on this sheet)

The accompanying map shows the distribution of bedrock units exposed at or near the surface in the corridor along the Alaska Highway in parts of the Tanacross A-4, B-4, B-5, B-6, and C-6 quadrangles. Sheets 1 and 2 comprise two of five bedrock-geologic maps along the Alaska Highway corridor (Werdon and others, 2019; Solie and others, 2019), and are part of a multi-year project conducted by the Alaska Division of Geological & Geophysical Surveys (DGGS) between 2006 and 2013. Bedrock units were mapped and structural elements were measured in the field; where bedrock units are covered by surficial units and vegetation, units were interpreted using airborne magnetic and electromagnetic surveys published by the Alaska Division of Geological & Geophysical Surveys (Burns and others, 2006). Rock names were assigned based on field and petrographic observations, modal-mineral percentages, and interpretations of geochemical data (Werdon and others, 2014). Surficial-geologic map units are shown in Reger and others (2011). Active faults in the map area are described in Carver and others (2010). Ages correlate with International Commission on Stratigraphy Chart (2018). An accompanying text provides detailed map unit descriptions, acknowledgments and references cited.

BEDROCK MAP UNITS

buk — BEDROCK, UNKNOWN (Tertiary and older)

b — UNMAPPED BEDROCK (Tertiary and older)

IGNEOUS DIKES

GRANITE DIKES (Tertiary to Cretaceous)
- Showing strike and dip
- Showing trend
- Unoriented

GRANITE PORPHYRY DIKES (Tertiary to Cretaceous)
- Showing strike and dip
- Showing trend
- Unoriented

APLITE DIKES (Tertiary to Cretaceous)
- Showing strike and dip
- Showing trend
- Unoriented

GRANODIORITE DIKES (Tertiary to Cretaceous)
- Showing strike and dip
- Showing trend
- Unoriented

MAFIC SILLS AND DIKES (Late Cretaceous)
- Showing strike and dip
- Showing trend
- Unoriented

IGNEOUS MAP UNITS

TKp — FELSIC PORPHYRY (Tertiary to Cretaceous)

IKv — INTERMEDIATE VOLCANIC ROCKS (Late Cretaceous)

Cathedral Bluffs Granite

Kc — CATHEDRAL BLUFFS MONZOGRANITE (Cretaceous)

Mansfield Granodiorite

Kmgd — MANSFIELD GRANODIORITE (Cretaceous)

Round Lake Granodiorite

Kr — ROUND LAKE GRANODIORITE (Cretaceous)

Tower Bluffs Granite

Kt — TOWER BLUFFS MONZOGRANITE (Cretaceous)

Yerrick Creek Granitic Suite

Ky — YERRICK CREEK PORPHYRITIC MONZOGRANITE (Cretaceous)

Kyq — YERRICK CREEK PORPHYRITIC QUARTZ MONZONITE (Cretaceous)

Other Igneous Rocks

Kgd — GRANODIORITE (Cretaceous)

Kg — GRANITE (Cretaceous)

Kgb — BIOTITE GABBRO, CLINOPYROXENITE, AND WEHRLITE (Cretaceous)

eKm — MUSCOVITE GRANITE (Early Cretaceous)

METAMORPHIC MAP UNITS

Amphibolite-Facies Metaigneous and Metasedimentary Rocks—Lake George assemblage of Parautochthonous North America

MDlo — UNDIFFERENTIATED ORTHOGNEISS (Mississippian to Devonian)

pMlp — PARAGNEISS AND SCHIST (pre-Mississippian)

pMlq — QUARTZITE (pre-Mississippian)

MDla — AMPHIBOLITE (pre-Mississippian)

pMlc — CALC-SILCATE AND MARBLE (pre-Mississippian)

Greenschist-Facies Metaigneous and Metasedimentary Rocks: Jarvis belt

DEtp — TUSHTENA PASS SCHIST, QUARTZITE, AND CARBONATE (Devonian or older)

EXPLANATION OF MAP SYMBOLS

SMALL, MINOR JOINTS

SMALL,MINOR INCLINED JOINT—Showing strike and dip

SMALL, MINOR VERTICAL OR NEAR-VERTICAL JOINT—Showing strike

SMALL,MINOR INCLINED (DIP DIRECTION TO RIGHT) JOINT, FOR MULTIPLE OBSERVATIONS AT ONE LOCALITY—Showing strike and dip

SMALL,MINOR VERTICAL OR NEAR-VERTICAL JOINT, FOR MULTIPLE OBSERVATIONS AT ONE LOCALITY—Showing strike

FOLIATION

INCLINED METAMORPHIC OR TECTONIC FOLIATION—Showing strike and dip

VERTICAL METAMORPHIC OR TECTONIC FOLIATION—Showing strike

INCLINED (DIP DIRECTION TO RIGHT) METAMORPHIC OF TECTONIC FOLIATION, FOR MULTIPLE OBSERVATIONS AT ONE LOCALITY—Showing strike and dip

INCLINED (DIP DIRECTION TO RIGHT) MYLONITIC FOLIATION, FOR MULTIPLE OBSERVATIONS AT ONE LOCALITY—Showing strike and dip

VEINS

SMALL,MINOR INCLINED VEIN—Showing strike and dip

CONTACTS

CONTACT—Identity and existence certain, location inferred

CONTACT—Identity and existence certain, location concealed

CONTACT—Identity and existence questionable, location inferred

FAULTS

FAULT—Identity and existence certain, location accurate

FAULT—Identity and existence certain, location inferred

FAULT—Identity and existence certain, location concealed

STRIKE-SLIP FAULT, RIGHT-LATERAL OFFSET—Identity or existence questionable, location concealed. Arrows show relative motion. Fault showing displacement during Quaternary time (undifferentiated)

THRUST FAULT—Identity and existence certain, location approximate. Fault showing displacement during Quaternary time (undifferentiated)

THRUST FAULT—Identity and existence certain, location concealed. Fault showing displacement during Quaternary time (undifferentiated)

THRUST FAULT—Identity or existence questionable, location concealed. Fault showing displacement during Quaternary time (undifferentiated)

FAULT LOCATED BY GEOPHYSICAL SURVEY

MISCELLANEOUS MAP SYMBOLS

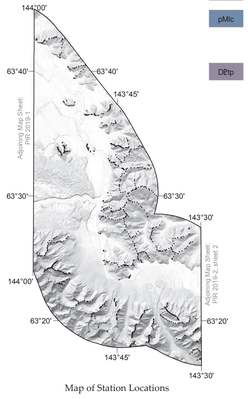
A1 — $^{40}Ar/^{39}Ar$ AGE LOCALITY—Showing map number referenced in table 1

A2 — K/Ar AGE LOCALITY—Showing map number referenced in table 1

A—A' — CROSS SECTION LINE AND LABEL

CATACLASITE ZONE

View looking north down Cathedral Rapids Creeks No. 1 and No. 2, across Alaska Highway and Tanana River at hill of Cathedral Bluffs monzogranite (unit Kc) on north side of river (photograph taken 07/21/2008 by D.N. Solie).



Map of Station Locations

Table 1. $^{40}Ar/^{39}Ar$ and K/Ar age data (data from samples on Sheets 1 and 2).

Map Number	Sample	Mineral Analyzed	Map Unit	Lithology	Integrated Age (Ma)	Plateau Age (Ma)	Plateau Information	Isochron Age (Ma)	Isochron Information
A1	08MBW708B*	biotite	IKv	Trachyandesite dike within volcanic unit	68.9 ± 0.6	**68.8 ± 0.6**	10 of 12 fractions; 95% ^{39}Ar release; MSWD = 0.45	69.3 ± 0.4	12 of 12 fractions; $^{40}Ar/^{36}Ar_i$ = 309 ± 8; MSWD = 0.21
A2	08RN645A*	biotite	Kgb	Biotite clinopyroxenite	67.8 ± 0.3	**68.1 ± 0.3**	6 of 8 fractions; 98% ^{39}Ar release; MSWD = 1.27	68.1 ± 0.3	7 of 8 fractions; $^{40}Ar/^{36}Ar_i$ = 294 ± 4; MSWD = 1.49
A3	08RN679A*	muscovite	eKm	Garnet-muscovite-biotite granite	102.8 ± 0.4	**102.9 ± 0.4**	8 of 10 fractions; 99% ^{39}Ar release; MSWD = 0.16	103.2 ± 0.5	10 of 10 fractions; $^{40}Ar/^{36}Ar_i$ = 286 ± 5; MSWD = 0.17
A4	08RN785A*	biotite	Kgb	Biotite gabbro	69.6 ± 0.3	**70.0 ± 0.3**	6 of 8 fractions; 96% ^{39}Ar release; MSWD = 0.20	70.1 ± 0.4	6 of 8 fractions; $^{40}Ar/^{36}Ar_i$ = 291 ± 16; MSWD = 0.23
A5	74ASj139	biotite	Ky	Biotite quartz monzonite	**88 ± 3****	-	-	-	-
A6	HFoster3	hornblende	Kgb	Gabbro within Kg	**133 ± 4****	-	-	-	-
A7	74ASj140	biotite	Kgb	Olivine gabbro within pMp	**65 ± 2****	-	-	-	-

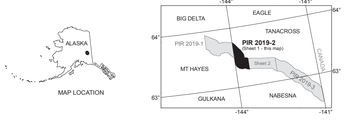
* Note: $^{40}Ar/^{39}Ar$ samples analyzed by University of Alaska Fairbanks Geochronology Laboratory. Details in Solie and others, 2013.

** Note: K/Ar ages from Foster and others (1976). Approximately located based on degree/minute coordinates in the original report.

Bold: Preferred age for each sample ($^{40}Ar/^{39}Ar$ ages reporta at ±1 sigma).

BEDROCK-GEOLOGIC MAP, ALASKA HIGHWAY CORRIDOR, DOT LAKE TO TETLIN JUNCTION, ALASKA; WEST

by
M.B. Werdon[1], D.N. Solie[2], J.E. Andrew[1], L.K. Freeman[1], R.J. Newberry[3], D.J. Szumigala[1], and B.A. Elliott[1]
2019



Location of Map Area

SCALE 1:63360

1 1/2 0 1 2 3 4 5 MILES

3000 0 3000 6000 9000 12000 15000 18000 21000 24000 27000 FEET

1 .5 0 1 2 3 4 5 6 7 KILOMETERS

CONTOUR INTERVAL 100 FEET
SUPPLEMENTAL CONTOUR INTERVAL 50 FEET
TANACROSS B-6 - DATUM IS MEAN SEA LEVEL
TANACROSS C-6 - NATIONAL GEODETIC VERTICAL DATUM OF 1929

True North
19°
APPROXIMATE MEAN DECLINATION, 2017

Affiliation:

[1] Alaska Division of Geological & Geophysical Surveys, 3354 College Road, Fairbanks, AK 99709-3707
[2] Baseline Geoconsulting, LLC, P.O. Box 82293, Fairbanks, AK 99708-2293
[3] Department of Geoscienceess, University of Alaska, P.O. Box 755780, Fairbanks, AK 99775-5780

Topographic base map from:
U.S. Geological Survey topographic maps
Tanacross B-6 (1949)
Tanacross C-6 (1955 - minor revisions 1982)
Projection:
Universal Transverse Mercator Zone 7 North
Datum:
North American Datum of 1927
Geologic field investigations by:
M.B. Werdon (2008), J.E. Andrew (2008), R.J. Newberry (2008), L.K. Freeman (2008), and D.J. Szumigala (2008)
Geologic interpretation by:
J.E. Andrew (2008), M.B. Werdon (2008), R.J. Newberry (2008), L.K. Freeman (2008), D.J. Szumigala (2008), B.A. Elliott (2011), D.N. Solie (2012)
Active faults mapped by:
Carver, G.A., Bemis, S.P., Solie, D.N., and Obermiller, K.E., 2008, Active and potentially active faults in or near the Alaska Highway Corridor, Delta Junction to Dot Lake, Alaska: Alaska Division of Geological & Geophysical Surveys Preliminary Interpretive Report 2008-3D, 32 p. doi: 10.14509/17901
Geologic GIS data layers created by:
J.E. Andrew (2008), B.A. Elliott (2011), D.N. Solie (2013)
Cartography by:
P.E. Gallagher (2014-2017), T.J. Naibert (2016-2017)
Peer review by:
J.V. Jones (2017)

The State of Alaska makes no expressed or implied warranties (including warranties for merchantability and fitness) with respect to the character, functions, or capabilities of the electronic data or products or their appropriateness for any user's purposes. In no event will the State of Alaska be liable for any incidental, indirect, special, consequential, or other damages suffered by the user or any other person or entity whether from the use of the electronic services or products or any failure thereof or otherwise. In no event will the State of Alaska's liability to the Requestor or anyone else exceed the fee paid for the electronic service or product.

Publications produced by the Division of Geological & Geophysical Surveys (DGGS) are available for download from the DGGS website (dggs.alaska.gov). Publications on paper or digital media can be examined or purchased in the Fairbanks office:

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS
3354 College Road ♦ Fairbanks, Alaska 99709-3707
Phone 907-451-5010 ♦ Fax 907-451-5050
email: dggspubs@alaska.gov ♦ website: dggs.alaska.gov