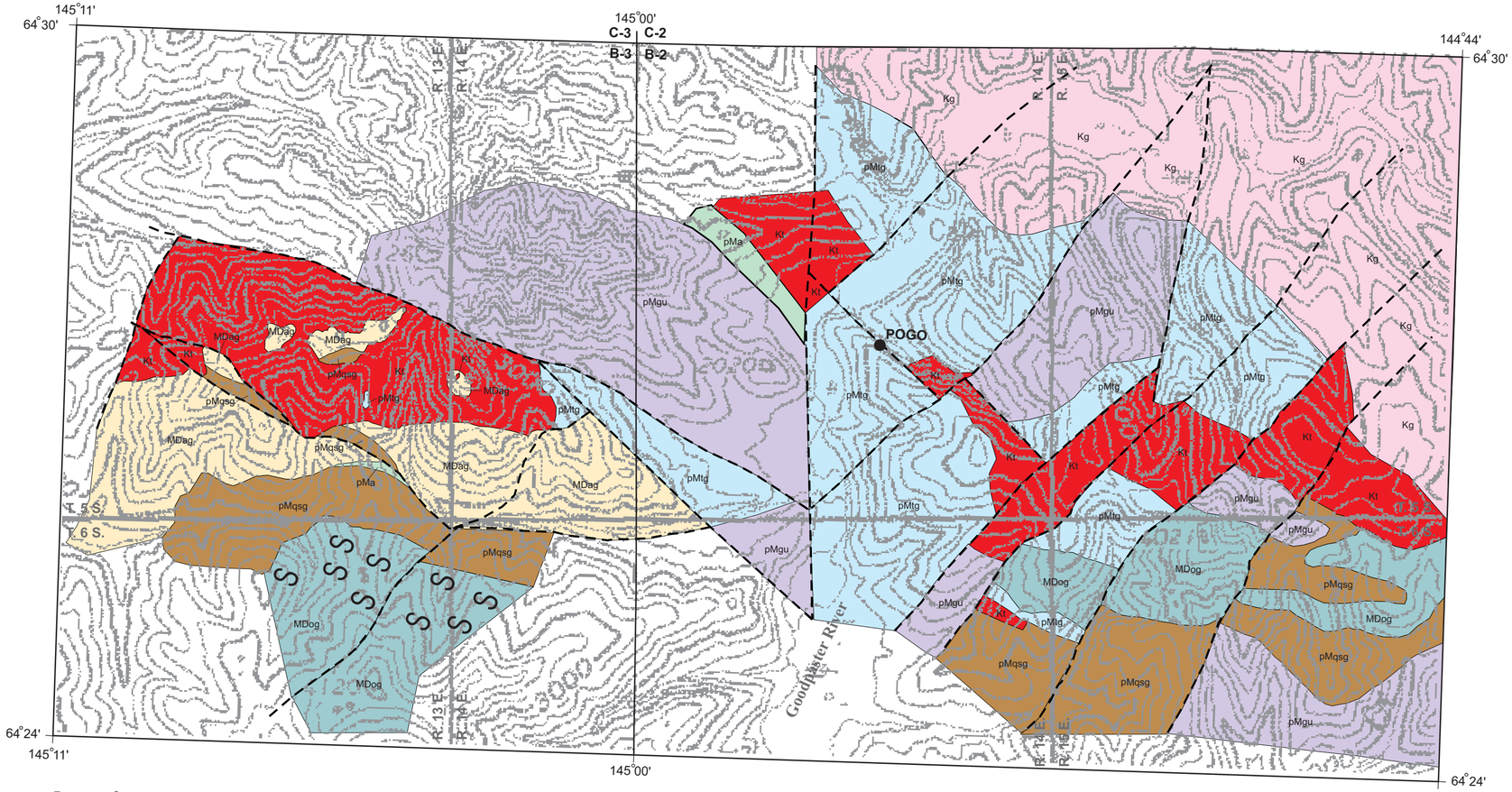
ALASKA DIVISION OF GEOLOGICAL &
GEOPHYSICAL SURVEYS

PRELIMINARY INTERPRETIVE REPORT 2001-5
Werdon and others (2001)

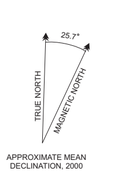


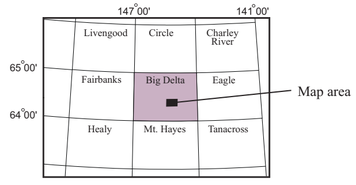
Base map from:
Big Delta 1:250,000-scale quadrangle, U.S. Geological Survey digital raster graphic image, 1996.
Geologic map produced in:
Clark 1866 datum, NAD27, UTM zone 6 projection.

SCALE 1:63,360

1 1/2 0 1 2 3 4 MILES
3000 0 3000 6000 9000 12000 15000 18000 21000 FEET
1 .5 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM IS MEAN SEA LEVEL





Maps Showing Location of Study Area

RECONNAISSANCE BEDROCK GEOLOGY OF THE POGO AREA, BIG DELTA B-2 AND B-3 QUADRANGLES, ALASKA

by
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2001

Bedrock geologic field investigations by:
M.B. Werdon (2000), R.J. Newberry (2000), D.J. Szumigala (2000), J.C. Grady (2000)
Technical review by:
K.H. Clautice
Electronic digital cartography by:
M.B. Werdon

MAP SYMBOLS

Mylonitized

High-angle fault - Dashed where approximately located or inferred. Faults were mapped in the field and interpreted from aeromagnetic data.

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DESCRIPTION OF MAP UNITS

IGNEOUS ROCKS

Kg — GOODPASTER BATHOLITH (Cretaceous) — Predominantly medium-grained, sub-equigranular, hornblende-biotite granodiorite, with prominent, euhedral biotite phenocrysts. Average modal composition approximately 10% biotite, 7% hornblende, 25% quartz, 10% K-feldspar, 45% plagioclase, 2% myrmekite, and 1% accessory minerals, including zircon, apatite, and opaques. Generally little-altered, with minor conversion of biotite to chlorite and dusting of plagioclase by sericite. Age is approximately 93 Ma, based on U-Pb zircon dating (Smith and others, 1999).

Kt — TONALITE (Cretaceous) — Fine-grained; includes lesser fine-grained granodiorite and quartz diorite. Dominantly equigranular with biotite > hornblende > clinopyroxene, although mafic abundances vary throughout the bodies. Also includes rare granite dikes 1-3 m in width. Most likely includes several compositionally zoned plutons of similar age and origins. Typically contains 20-25% mafic minerals, 10-25% quartz, 0-15% K-feldspar, and 50-70% plagioclase. Displays variable degrees of hydrothermal alteration, but mostly little-altered. Similarity in composition and mineralogy to the 'diorite' exposed at depth in drill core at the Pogo mine suggests this ~95 Ma body (Smith and others, 1999) is part of this igneous suite.

METAMORPHIC ROCKS

MDag — AUGEN GNEISS (Mississippian to Devonian) — Granite-composition foliated rock with large K-feldspar porphyroclasts of presumably igneous origin. Medium- to coarse-grained, commonly displays biotite partly altered to a mixture of chlorite and muscovite. K-feldspar 'augen' to 1-4 cm in size are characteristic. Similarity in composition, texture, and mineralogy to dated augen gneiss bodies elsewhere in the Big Delta quadrangle suggest this unit is of Devonian to Mississippian age (Aleinikoff and others, 1986).

MDog — GRANITIC ORTHOGNEISS (Mississippian to Devonian?) — Medium-grained, granite- to granodiorite-composition, foliated rock of igneous origin, lacking large K-feldspar porphyroclasts. Typically contains 5-10% biotite and approximately 30% each of quartz, K-feldspar, and albitic plagioclase. Originally igneous origin is indicated by the granitic bulk composition and by the presence of compositionally zoned plagioclase crystals and trace myrmekite. U-Pb (zircon) dating indicates a mid- to late-Paleozoic age (Aleinikoff and others, 1986). S pattern indicates where this unit is significantly mylonitized.

pMa — AMPHIBOLITE-BEARING GNEISS UNIT (pre-Mississippian) — Medium- to fine-grained amphibolite typically constitutes 20-50% of this unit; the remainder is typically biotite-feldspar gneiss. Amphibolite present as layers 0.3-1 m thick, traceable along strike for tens of meters. Trace element compositions indicate that this unit contains rocks of both 'MORB' and 'within-plate' (alkalic) affinities.

pMtg — QUARTZ-PLAGIOCLASE-RICH GNEISS (pre-Mississippian) — Medium- to fine-grained, dominated by quartz, plagioclase, and biotite. Locally elevated quartz contents (>60%) indicate that some of this gneiss is of sedimentary origin (paragneiss); zoned plagioclase crystals in lower-quartz rocks suggests that the majority is orthogneiss (metamorphosed igneous rock), primarily of tonalite-trondhjemite composition. This unit commonly displays considerable alteration of plagioclase to fine-grained white mica, suggesting relatively calcic plagioclase but also making field identification difficult.

pMgu — UNDIFFERENTIATED GNEISS (pre-Mississippian) — Medium-grained, dominantly biotite-quartz-feldspar gneiss, including paragneiss, tonalitic orthogneiss, and granitic orthogneiss. Proportions are variable and the unit as a whole appears to vary considerably over short distances.

pMqsg — QUARTZITE, SCHIST, AND GNEISS (pre-Mississippian) — Mixed metasedimentary unit, containing quartzite, muscovite-biotite-feldspar-quartz schist, and biotite-feldspar-quartz paragneiss in variable proportions. This medium-grained unit is characterized by the presence of some quartzite, typically as 0.3-2 m thick interlayers, and by the absence of gneissic rocks with obvious igneous protolith.

UNMAPPED

REFERENCES CITED

Aleinikoff, J.N., Dusel-Bacon, Cynthia, and Foster, H.L., 1986, Geochronology of augen gneiss and related rocks, Yukon-Tanana terrane, east-central Alaska: Geological Society of America Bulletin, v. 97, p. 626-637.

Smith, Moira, Thompson, J.F.H., Bressler, Jason, Layer, Paul, Mortensen, J.K., Abe, Ichiro, and Takaoka, Hidetoshi, 1999, Geology of the Liese Zone, Pogo property, east-central Alaska: Society of Economic Geologists July 1999 Newsletter, no. 38, 13 p.