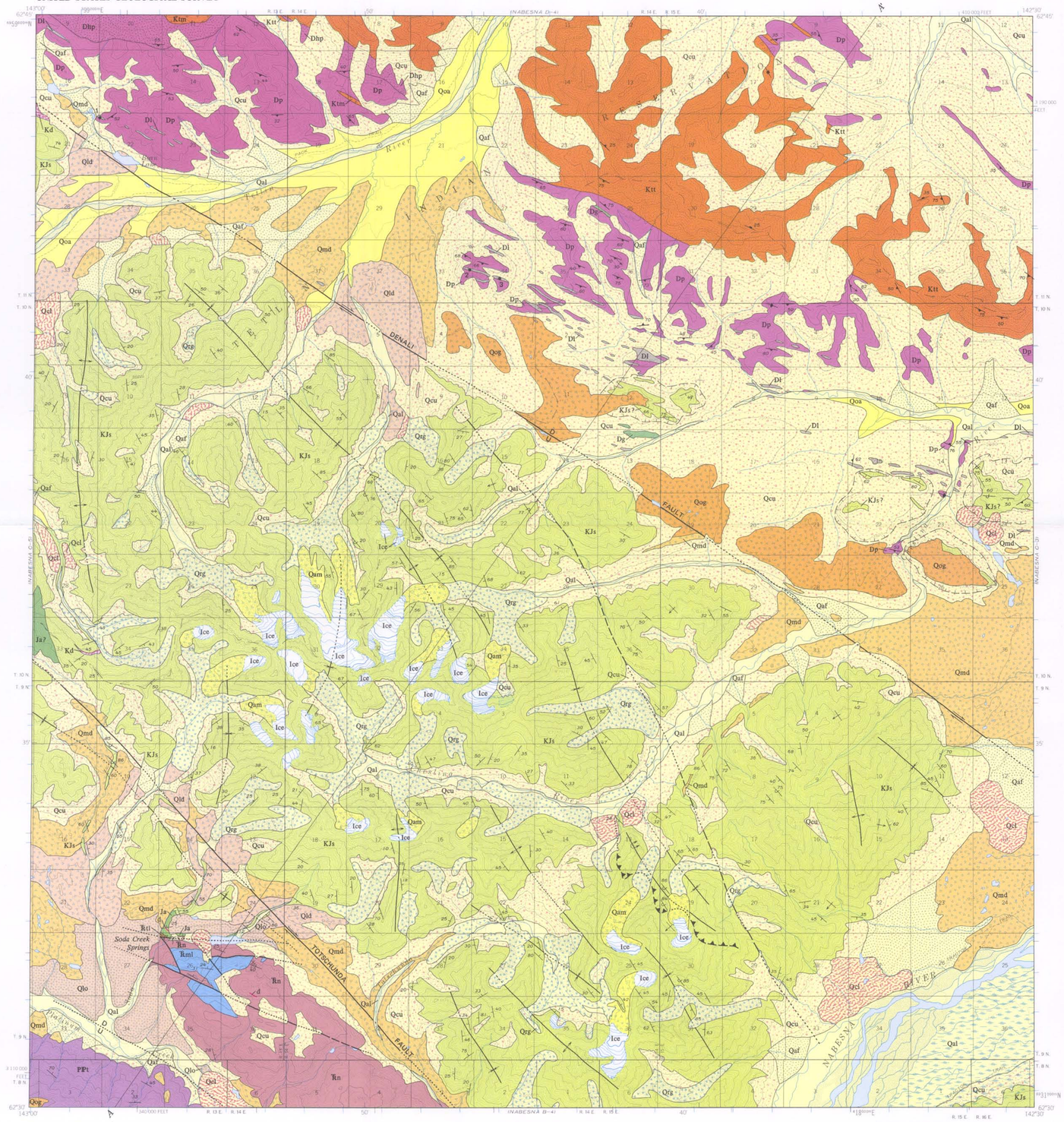
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

GEOLOGIC QUADRANGLE MAP
NABESNA C-4 QUADRANGLE, ALASKA
GQ-1303



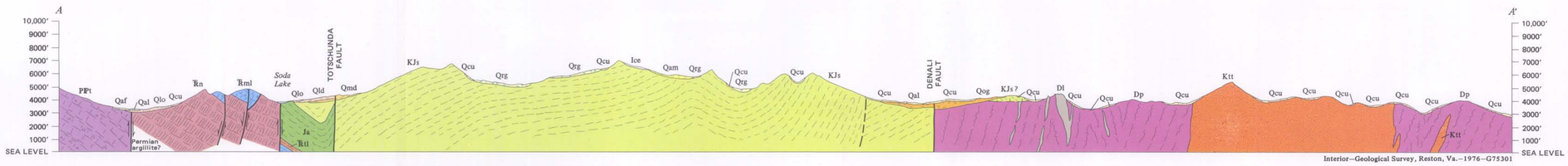
Base from U.S. Geological Survey, 1960
Universal Transverse Mercator projection, 1927 North American datum
10,000-foot grid based on Alaska coordinate system, zone 2
1000-metre Universal Transverse Mercator grid tick,
zone 7, shown in blue

APPROXIMATE MEAN DECLINATION, 1976

SCALE 1:63 360

CONTOUR INTERVAL 100 FEET
DATUM IS MEAN SEA LEVEL

Bedrock geology by D. H. Richter, 1965–71 and N. A. Matson, Jr., 1967–71; assisted by P. C. Lowe, 1969–71 and R. A. Lamarre, 1970–71.
Surficial geology by H. R. Schmoll and D. H. Richter principally by aerial photograph interpretation



CORRELATION OF MAP UNITS

SURFICIAL DEPOSITS

Alluvial	Glacial	Colluvial		
Qal, Qaf	Qam	Qrg, Qsl	Qcu	Holocene
Qoa	Qlo, Qld, Qmd, Qog			Pleistocene
				QUATERNARY

SEDIMENTARY AND VOLCANIC ROCKS

KJs	Lower Cretaceous and Upper Jurassic	CRETACEOUS AND JURASSIC
Gradational contact		
Ja	Upper Jurassic	JURASSIC
Disconformity		
Rtl	Upper Triassic	TRIASSIC
Fault		
Rml	Upper Triassic	TRIASSIC
Disconformity(?)		
Rn	Upper and (or) Middle Triassic	TRIASSIC
Fault (?)		
PPt		PERMIAN AND PENNSYLVANIAN

INTRUSIVE ROCKS

Hypabyssal rocks

d		TERTIARY OR CRETACEOUS

Plutonic rocks

Kd		CRETACEOUS(?)
Ktm, Ktt		CRETACEOUS

METAMORPHIC ROCKS

Dhp, Dp, Dl, Dg		DEVONIAN AND OLDER(?)

DESCRIPTION OF MAP UNITS

SURFICIAL DEPOSITS

YOUNGER ALLUVIUM

Qal Alluvium on active flood plains and on lowest terraces of major streams. Chiefly boulders, gravel, and sand

Qaf Alluvial fans and cones. Chiefly boulders, gravel, and sand. Only larger, better defined cones differentiated from unit Qcu

Qam DRIFT OF THE ALASKAN GLACIATION – End moraines of the younger stade of the Alaskan Glaciation left after recession of presently existing glaciers. Chiefly rubble and diamicton

Qrg ROCK GLACIER DEPOSITS – Active and recently active rock glaciers with pronounced tongue-shaped and lobate forms. Chiefly rubble and diamicton

COLLUVIAL DEPOSITS

Qsl Young landslide deposits. Chiefly debris avalanches. Older landslide deposits included in unit Qcu

Qcu Undifferentiated colluvium on valley walls and hill slopes. In areas of steep slopes, chiefly talus and other slope debris but includes alluvium of numerous minor streams and locally glacial, rock glacier, and mass-wasting deposits. In areas of gentle slopes especially north of the Denali fault, chiefly mixed colluvium and alluvium with reworked glacial deposits and eolian material. Solifluction common on moderately sloping surfaces. Chiefly rubble, gravel, sand, silt, and diamicton; typically poorly sorted

Qoa OLDER ALLUVIUM – Deposits in higher terraces along major streams and in old dissected alluvial fans; terraces and fans partly concealed beneath colluvium from adjacent slopes. Chiefly boulders, gravel, and sand. Uppermost terraces in the Tetlin River valley may represent outwash from the older stade of the Alaskan Glaciation

DRIFT OF LATE WISCONSIN AGE

Qlo Well-defined outwash fan. Chiefly gravel and sand

Qld Ground moraine, chiefly diamicton. Includes minor fluvioglacial deposits of gravel and sand and scattered pond and fine-grained alluvial deposits of sand, silt, and clay

Qmd DRIFT OF MAIN WISCONSIN AGE – Ground moraine, chiefly diamicton. May include minor fluvioglacial deposits of gravel and sand and small postglacial pond and alluvial deposits of sand, silt, and clay

Qog DRIFT OF OLDER GLACIATIONS – Glacial deposits with subdued geomorphic expression beyond (and above) limit of Wisconsin moraines. Probably of Illinoian age. Chiefly diamicton and boulder deposits

SEDIMENTARY AND VOLCANIC ROCKS

MARINE SEDIMENTARY ROCKS – A thick flyschlike series of shallow to deep marine sedimentary rocks ranging from argillite to conglomerate that have been informally named the Nutzotin Mountains sequence (Berg and others, 1972)

KJs Graded sedimentary rocks and conglomerate. Chiefly dark-gray to gray argillite grading to siltstone to graywacke in beds less than 1 cm to as much as 25 cm thick with interbedded massive, fine- to coarse-grained graywacke, locally pebble to boulder bearing, and pebble to boulder conglomerate in beds as much as 40 m thick. Clasts are chiefly extraformational and consist mostly of dense volcanic rock, chert, jasper, quartz, crystalline rocks, and limestone. Nonfossiliferous, but similar strata in the Nabesna A–2 and A–3 quadrangles contain locally abundant *Buchia* assemblages ranging in age from Late Jurassic to Early Cretaceous (Richter and Jones, 1973). North of the Denali fault outcrops questionably assigned to this unit consist chiefly of beds of graywacke and argillite grading to graywacke. These strata contrast sharply with underlying metamorphic rocks and are suggested to be remnants of massive gravity slide plates off mountain front south of fault

Ja Argillite. Dark shaly argillite in poorly defined beds with abundant thin beds and lenses of dense dark-gray iron-carbonate-bearing mudstone and siltstone, weathering a conspicuous reddish brown, and minor interbeds of gray calcareous siltstone and sandstone. Rocks exposed near Soda Creek in southwest corner of quadrangle contain abundant gypsum and anhydrite along shale partings, and in fractures and veinlets. Nonfossiliferous, but similar strata in the adjacent Nabesna C–5 quadrangle contain *Buchia* of Late Jurassic age (Richter and Schmoll, 1973)

Rtl THIN-BEDDED LIMESTONE – Dark-gray fine-grained limestone in beds 5 cm to 25 cm thick with thin interbeds of dark carbonaceous shale. Exposed in one restricted locality on the north fork of Soda Creek. Nonfossiliferous, but similar strata in the adjacent Nabesna C–5 quadrangle contain *Monotis subcircularis* Gabb

Rml MASSIVE LIMESTONE – Gray to dark-gray fine-grained massive limestone with lenses and nodules of black and gray chert and irregular patchworks of disseminated fine-grained quartz. Chiefly micrite and microsparite, locally recrystallized and dolomitized. Commonly strongly brecciated and veined by coarsely crystalline calcite. Weathers light gray to buff. Nonfossiliferous

Rn NIKOLAI GREENSTONE (Upper and (or) Middle Triassic) – Dark-green, dark-brown, reddish-brown, and maroon amygdaloidal basalt flows separated locally by thin reddish-brown volcaniclastic beds. Intermixed aa and pahoehoe flows with individual flow units ranging from less than a metre to more than 20 m thick. Amygdules consist of quartz, calcite, chlorite, epidote, pumpellyite, prehnite, and some zeolite minerals. Native copper locally occurs in flow tops, fracture zones, and amygdules

PPt TETELNA VOLCANICS (Permian and Pennsylvanian) – Interbedded dark-green to gray-green volcanic flows, volcanic mud and debris avalanches, lapilli-pumice tuffs, volcanic mudstone to coarse-grained volcanic sandstone, and volcanic pebble conglomerates, all intruded by gabbro dikes and sills. Volcanic flows and fragmental rocks are characteristically massive; volcaniclastic rocks are thin bedded and locally graded. Volcanic rocks chiefly andesite and dacite in composition. Upper part of Tetelna Volcanics in adjacent Nabesna C–5 quadrangle contains Permian brachiopods and cephalopods (Richter and Schmoll, 1973). Lower part is considered Pennsylvanian by correlation with this formation in general area of its type section 75 km to northwest (Richter and Dutro, 1975)

INTRUSIVE ROCKS

Hypabyssal rocks

d DIKES – Greenish-gray to dark-gray dikes of hornblende-feldspar porphyry probably andesite to dacite in composition. Rocks are generally strongly altered and contain small ragged hornblende and saussuritized feldspar phenocrysts in a fine-grained groundmass of altered feldspar, calcite, and quartz. Only larger dikes shown

Plutonic rocks

Kd HORNBLENDE DIORITE – Small stocks, chiefly of hornblende diorite. Rocks are medium-grained, hypidiomorphic granular, and locally weakly foliated. Hornblende largely altered to chlorite

TOK-TETLIN PLUTON – A large (350 km²) composite plutonic body extending both northwest and southeast of the Nabesna C–4 quadrangle. K–Ar dates indicate an emplacement age of 92–94 m.y. (Richter and others, 1975)

Ktm Mineral Cairn phase. Chiefly granodiorite but gradational into diorite and quartz monzonite. Locally porphyritic with phenocrysts of both plagioclase and potassium feldspar, as much as 3 cm long, in a medium-grained hypidiomorphic-granular matrix of plagioclase, quartz, biotite, hornblende, and subordinate clinopyroxene. Rocks are weakly to strongly foliated

Ktt Tetlin phase. Porphyritic quartz monzonite with abundant and conspicuous orthoclase phenocrysts, as much as 6 cm long, in a medium- to coarse-grained hypidiomorphic-granular matrix of plagioclase, quartz, biotite, and hornblende. Forms bold massive outcrops. Rocks are nonfoliated

METAMORPHIC ROCKS

METASEDIMENTARY AND META-IGNEOUS ROCKS – Extensive terrane of interbedded phyllite, schist, recrystallized limestone, and minor greenstone that has been isoclinally folded and subjected to low greenschist facies metamorphism

Dp Chiefly dark-gray phyllite with subordinate brown schistose pebble conglomerate, containing stretched clasts of quartzite, limestone, schist, and phyllite, gray micaceous quartzite, and calcareous quartz-mica schist

Dhp Hornfelsed phyllite. Cordierite- and andalusite-bearing knotty schists peripheral mostly to the Mineral Cairn phase (Kmg) of the Tok-Tetlin pluton

Dl Gray to dark-gray coarse-grained recrystallized limestone; weathers light gray and forms conspicuous walls and castles protruding above the colluvium-covered phyllite surface. Locally fossiliferous

Dg Dark-green massive greenstone, consisting of fine-grained epidote, chlorite, and altered feldspar with segregations of actinolite and occasional small phenocrysts of clinopyroxene. May be intrusive

Contact – Gradational or inferred
Fault – Dashed where approximately located or inferred; dotted where concealed. U, upthrown side; D, downthrown side. Arrows indicate relative lateral movement. Totschunda and Denali faults offset deposits of Holocene age (Richter and Matson, 1971)
Inferred thrust fault – Dotted where concealed. Sawteeth on upper plate
Anticline – Showing trace of axial plane. Dotted where concealed
Overturned anticline – Showing trace of axial plane. Dotted where concealed
Syncline – Showing trace of axial plane. Dotted where concealed
Strike and dip of beds or flows – Arrow indicates direction of tops in vertical beds
Inclined
Vertical
Overturned
Strike and dip of foliation – Showing direction and plunge of minor fold axes
Inclined
Vertical
Strike and dip of major joints
Inclined
Vertical
Fossil locality – Number refers to map number in list of fossils
Native copper occurrence
Mineral spring (Richter and others, 1973)
Inferred sole of gravity slide block – Hachures on slide block

LIST OF FOSSILS

Map No.	U.S.G.S. No.	Identification (W. A. Oliver, Jr.)
1	70–AMn–34	Crinoid(?) stem plates
2	8729–SD	Massive stromatoporoid indet.
		Tabulate corals:
		Alveolites? sp.
		Cladopora sp.
		Favosites? sp.
		Thamnopora sp.
		Rugose corals:
		Acanthophyllum sp.
3	8730–SD	Tabulate corals:
		Favosites sp.
		Thamnopora sp.

Suggested age range based on collections 2 and 3 is upper Early to Late Devonian, most likely Middle Devonian (W. A. Oliver, Jr., written commun., 1971)

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GEOLOGIC MAP OF THE NABESNA C-4 QUADRANGLE, ALASKA

By

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1976

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