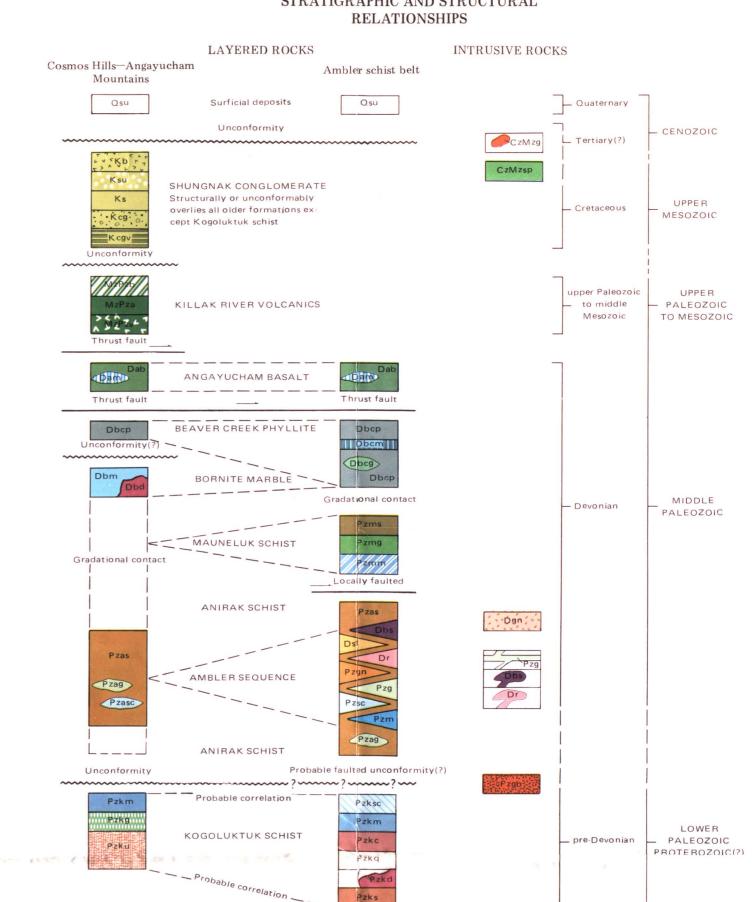
GEOLOGIC REPORT 75 PLATE 1 OF 2

STRATIGRAPHIC AND STRUCTURAL



DESCRIPTION OF MAP UNITS

SURFICIAL DEPOSITS Osu SURFICIAL DEPOSITS — Undifferentiated; represent several ages of glacial deposits, including till (which forms terminal, lateral, and medial present in most valleys, with alpine alluvial fans and aprons common along walls of larger valleys; numerous alluvial terraces locally preserved. Small lacustrine fan deltas occur where streams enter large lakes. n higher terrain, talus cones, landslide lobes, rock glaciers, and soliflud tion debris form discontinuous cover over most sidehills and valleys;

> greenish-gray, locally amygdaloidal; includes medium-grained diabase and porphyritic basalt characterized by altered plagioclase phenocrysts. Much less metamorphosed than greenstones of Devonian age; contains no associated limestone lenses. Underlies 1- to 2-mi2 area east of

exposed; not mapped in detail. Dark-gray slate or phyllite similar to Ks abundant along south side of Angayucham Mountains, east of metagraywacke horizons. Includes subordinate, interbedded, weakly metamorphosed andesitic to basaltic lava flows. Ks SLATE AND PHYLLITE - Medium-gray, with subordinate beds of gray or greenish-gray metagraywacke and light-gray cherty and micaceous limestone east of Selby Lake. Stratigraphic position uncertain apparently confined to uppermost thrust plate east of Selby Lake.

Forms more rugged topography than areas underlain by Ksu. CKC9 . QUARTZ-PEBBLE AND QUARTZ-COBBLE CONGLOMERATE aracterized by subrounded clasts of white quartz and gray phyllite chips; interbedded metasandstone, slate, and metavolcanic conglomerate locally abundant. Sandy to silty phyllitic matrix commonly contains secondary muscovite, biotite(?), and chlorite of metamorphic origin. Strongly sheared near thrust faults with clasts typically stretched VOLCANIC METACONGLOMERATE - Characterized by abundant

pebbles and cobbles of green metavolcanic rock and white chert fragments in reddish or greenish matrix; locally contains minor beds of slate, metasiltstone, metasandstone, and quartz-pebble conglome ate Matrix locally contains abundant metamorphic epidote and chlorite. especially near thrust faults where shearing, stretched greenschist clasts, and red hematitic staining are common. Most volcanic fragments contain less unaltered augite than underlying Dab, MzPzb, and MzPzv.

BASALT — Medium-to fine-grained, dark-gray to dark greenish gray, weakly metamorphosed, locally amygdaloidal, with macroscopic epidote and numerous quartz-epidote veins; includes subordinate 15-to 60-ft-thick slate and phyllite lenses. Confined to thrust sheet west and

MPHIBOLITE — Medium-to fine grained, dark greenish-gray, foliāted and lineated; dominantly actinolite, plagioclase, epidote, and chlorite with accessory sphene, magnetite, and calcite. Contains interbedded, recrystallized, greenish-gray chert beds from a few to tens of feet thick

PILLOW BASALT SEQUENCE — Dominantly augite and plagioglase th subsidiary olivine, magnetite, and iron sulfides; secondary minerals such as epidote, pumpellyite, and chlorite less abundant than in MzPzb. Well-developed pillow structure common with individual pillows to several feet in diameter; grayish green on fresh surfaces, dull reddish brown on weathered surfaces. Interstitial 1- to 3-in.-thick beds of gray to grayish-red radiolarian(?) chert common. Thrust surfaces marked by mylonite zones, Exposed along crest of Angayucham Mountains; age not determined in map area but similar chert-bearing rocks along trend to east yield radiolaria of Late Triassic age (Plafker and others, 1977)

RECRYSTALLIZED LIMESTONE - Gray, thin-bedded; 3- to 15-ft-RECRYSTALLIZED LIMESTONE — Gray, time-bedged, but thick lenses; locally contains crinoids, rugose corals, gastropods, and thick lenses; locally contains crinoids, rugose corals, gastropods, and other invertebrate fossils of Devonian age (Fritts, 1972; fossil localities

> ETAMORPHOSED PILLOW BASALT - Dominantly saussurite, orite, actinolite, fine-grained intergrowths of epidote-group minetals, calcite, and minor quartz recrystallized from ophitic augite, plagioclase, and accessory magnetite, sphene, and pyrite; subordinate interheds of marble, chert, metagraywacke, slate, greenschist, and phyllite most common in northern and lower part of formation. Thin beds of depositional breccia containing pillow and limestone fragments and scoria-Pillows to 3 ft locally well preserved. Coarse-grained basalt with pheno crysts of plagioclase and augite present locally in northern part of unit surfaces and brown to brick red on weathered surfaces.

BEAVER CREEK PHYLLITE Dbcp PHYLLITE - Fine-grained, medium-to dark-gray, primarily muscovite fine- to medium-grained metasiltstone and metagraywacke, Includes

subordinate green phyllite; siliceous variants crosscut by numerous white quartz veinlets. Bedding planes at high angles to metamorphic foliation; folded or crenulated phyllitic surfaces imply at least two folding events. Lower part of unit gradational through zone of pelitic CHERTY MARBLE - Discontinuous; exposed on Shungnak spur,

REENSCHIST AND GREENSTONE - Weakly metamorphosed, fine. grained, greenish-gray; occurs in pods or lenses. Probably represents mafic igneous rocks lithologically equivalent to Pzmg. BORNITE MARBLE

Dbm CALCITIC AND DOLOMITIC MARBLE - Thin-bedded, locally fossiliferous, light-gray, fine-to medium-grained, with local breccia facies and minor quartz and graphite. Contains several thin micaceous beds that probably represent rhyolitic air-fall tuffs; diagenetic dolomite zone of interlayered phyllitic marble, thin-bedded marble, and pelitic semischist to underlying Pzas. Rapid facies change to interbedded graphitic marbles (lagoonal deposits), phyllitic marbles (muddy lime stones), and diagenetic dolomite (biohermal carbonate) along northern edge of Cosmos Hills; brachiopods, coral, gastropods, and crinoids are Middle Devonian in age (fossil localities F1-8).

HYDROTHERMAL DOLOMITE — Cosmos Hills; primarily buil to eddish-gray, massive, dense, unfoliated, medium-grained dolomite and ferroan dolomite with minor siderite and anthraxolite and local concentrations of pyrite and base-metal sulfides.

MAUNELUK SCHIST ORPHYROBLASTIC PELITIC SCHIST - Dark-brown to gtay, rimarily albite-chlorite-muscovite-quartz schist with graphitic zones and numerous tan to white beds of granoblastic micaceous quartaites epidote, sphene, garnet, actinolite, and pyrite common accessory minerals. Compositionally similar to Pzas with fewer quartz-segregation layers and abundant albite porphyroblasts to about 5mm diameter. Appears to be in conformable contact with Pzas in western Ampler district, but is thrust over underlying rocks in eastern Ambler district. PORPHYROBLASTIC GREENSTONE AND GREENSCHIST — Gigen grayish green, dominantly albite, actinolite, and chlorite, with minor or accessory hornblende, pale-blue amphibole, epidote, muscovite, sphene, garnet, calcite, and clinozoisite; generally fine-grained ground-mass. Massive to well foliated; weathering of calcite clots and albite

aartz schist with graphitic and highly siliceous variants; light-colored 'bleached' variety contains more muscovite than chlorite; albite, epidote, garnet, sphene, actinolite, clinozoisite, and pyrite common accessory minerals. Characterized by prominent segregation layers of milky-white quartz; albite porphyroblasts occur locally, Polymetamorphic fabric common, with strong crenulation or crenulation cleavage of earlier schistose texture; protolith probably siliceous siltstone and graywacke. Underlies most of Ambler schist belt. Informally referred to as 'country rock schist'; (g) indicates highly graphitic variant.

GREENSTONE AND GREENSCHIST — Massive to foliated; lithogically equivalent to Pzg in Ambler sequence. Pzasc CALC-SCHIST — Micaceous and chloritic; lithologically equivalent to Pzsc of Ambler sequence, Locally gradational to banded or micaceous The Ambler sequence, exposed along the length of the Ambler district, is dominated by submarine volcanogenic lithologies recrystallized from mafic flows and felsic of volcanic debris. Calcareous, pelitic, and carbonaceous schists are interbedded with volcanically derived lithologies. Recrystallization is variable; locally volcanic texture are well preserved in the more competent rocks. U/Pb and Pb/Pb analyses of zircon and galena yield Devonian and middle Paleozoic ages respectively, for the sequen Megafossils from a marble interbed suggest a Middle Devonian to Early Mississippian age (Smith and others, 1978; Dillon and others, 1980). Base-metal massive-sulfide deposits in the district are hosted by various lithologies of the Ambler sequence (Smith and others, 1977, 1979; Hitzman and others, 1982).

AMBLER SEQUENCE

quartz present in some units. Wisps and lenses of fine-grained material spherical perlitic fracturing in groundmass. Massive domes present locally, but unit generally appears to represent ash flows and ignimbrites that grade into or interdigitate with Pzsc, Dsf, or Pzas. One Dbs bed extends from Arctic Camp to the Mauneluk River. FELSIC SCHIST - Light-gray to white, mainly albite, chlorite, yellowish or pale-green muscovite, and quartz with numerous thin, tan to white, laminated quartzite horizons interpreted to be siliceous exhalites, Locally associated with Dbs and Dr or interbedded with graphiti

RHYOLITE PORPHYRY - Large subrounded or broken gray blasto-

phenocrysts of microcline and recrystallized bluish- to white-quartz

eyes in fine-grained groundmass of quartz, white mica, and albite with

accessory biotite, sphene, pyrite, and zircon; informally named 'button

schist.' Quartz- and microcline-megacryst content varies; dipyramidal

schist; locally contains calc-schist lenses. Fresh rocks often contain up to 3 percent pyrite; tan or reddish on limonite-stained weathered surfaces. Most abundant lithology in Ambler sequence; protoliths probably submarine felsic tuffs and reworked tuffaceous debris, SPARSELY PORPHYRITIC RHYOLITE — Dense gray to white, aphanitic, with gray quartz megacrysts and small albite porphyroblasts. Groundmass is fine mosaic of quartz and alkali feldspar with about 5 percent muscovite; pyrite present locally to about 2 percent. Fine banding and flattened lenses reminiscent of ignimbrites preserved locally, but metamorphic foliation poorly developed. Outcrops massive and

heavily jointed; disintegrate to coarse blocky rubble. BANDED CALC-SILICATE SCHIST — Dark-green to reddish-brown to white, typically in alternate bands. Garnet-actinolite-epidote-quartz rocks; muscovite, pyrite, pyrrhotite, sphene, clinozoisite, and apatite generally present as accessories. Informally called 'gnurgle gneiss Garnet texture indicates dynamothermal metamorphism. Grades into o interlayered with calcareous variants; interpreted as regional calc-silicate

beds or reaction skarn recrystallized from dolomitic sediments and ferruginous chert. GREENSTONE AND METABASITE — Massive to foliated pods, lenses, and beds; interior of massive bodies consists mainly of actinolite, albite, and garnet, with local glaucophane, calcite, or quartz; schistose rims contain chlorite, actinolite, garnet, sphene, and clinozoisite, with minor albite, calcite, and biotite. Glaucophane in cataclastic greenstone commonly replaced by actinolite, clinozoisite, and muscovite. Occur as rounded pods or lenses clustered along stratigraphic horizons or as more continuous beds within section; pillow structures or pillow breccias common. Field relations and whole-rock chemistry suggest these metabasites are recrystallized from dismembered tholeiitic lavas, dikes,

sills, and basaltic tuffs. Laminated beds near Arctic Camp contain angular breccia fragments of rhyolite and massive greenstone. PZSC MICACEOUS CALC-SCHIST — Brownish-to greenish-gray; dominantly calcite, quartz, muscovite, and chlorite, with minor tremolite, pyrite, and pyrrhotite in lower part of Ambler sequence, Differentially weathered surfaces commonly fluted; complex internal folding preserved.

Locally intercalated with Dsf, Dr, Dbs, and Pzm, MASSIVE TO BANDED MARBLE — Medium to pale blue gray; dominantly calcite with minor dolomite, muscovite, chlorite, tremolite or actinolite, quartz, pyrite, and graphite; accessory minerals include biotite, zoisite, sphene, garnet, zircon, and opaques. Platy fracture; complex internal folding. Locally includes layers and boudins of Pzgr ichnofossils, and a brachiopod of inferred middle Paleozoic age found in dolomitic marble in central part of district (Smith and others, 1978; fossil locality F9). KOGOLUKTUK SCHIST

The Kogoluktuk schist consists of interlayered pelitic schist, micaceous quartzite, feldspathic grit, greenstone, chlorite schist, chloritic dolomite, and marble and is distinguished from overlying lithologies by its coarse texture, relict epidote-amphib lite metamorphic assemblages, and more complex structural fabric. Field relations suggest the unit is separated from overlying rocks by a locally faulted unconformit referred to as the Walker fault or lineament in the northern part of the map area,

Pzkm COARSELY CRYSTALLINE GRAY MARBLE - Beds and disntinuous lenses; outcrop pattern suggests small isoclinal folds within Kogoluktuk schist. Lenses in northwest corner of map area contain stromatolites that indicate tops of beds face south (fossil localities Pzkg METABASITE - Locally schistose, composed of hornblende-plagio-

PZKU KOGOLUKTUK SCHIST, UNDIFFERENTIATED - Cosmos Hills; muscovite-plagioclase-quartz schist with subsidiary biotite, hornblende actinolite, epidote, and garnet; detrital tourmaline, apatite, and rutile to Pzkq and Pzkm. Most high-grade minerals show disequilibrium Pzksc WHITE MICA-CHLORITE-QUARTZ CALC-SCHIST.

retrograded to clinozoisite, actinolite, white mica, and albite.

Pzkc METASANDSTONE AND METACONGLOMERATE - Varies from nearly pure, coarse-grained orthoquartzite to impure micaceous quartzite to chlorite-muscovite-albite-quartz rock with disseminated, bright metallic octahedra of magnetite and minor biotite and hornblende. Contains local quartz-pebble-conglomerate beds, greenstone pods, and chlorite-rich layers. Blocks and slabby talus form mottled-gray slopes reminiscent of intrusive terrain; weathered surfaces typically lichen covered, Magnetite-rich rocks of Pzkc form pronounced linear high on regional aeromagnetic maps (Hackett, 1917).

Pzkq QUARTZITE — White or tan, thin-bedded, locally finely laminated, sparsely micaceous; typically interbedded with Pzkd. Thickens and compositionally grades into Pzkc in eastern part of district. Pzkd DOLOMITE, MARBLE, AND CHLORITIC DOLOMITE - Gray or brown on fresh surface; ferroan dolomite weathers orange brown. Forms beds and pods intimately associated with Pzkm.

PELITIC SCHIST - Dominantly muscovite, chlorite, and quartz. Interbedded with Kogoluktuk sequence; grades locally to strongly chloritic facies with variable dolomite content; locally includes plagioclase. Compositionally similar to Pzas. CzMzg GABBRO PLUGS - Small, steep-sided, unmetamorphosed gabbro plugs

exposed in northern Cosmos Hills and core of Kalurivik Arch near Shungnak River. Dominantly augite and plagioclase (from An₅₅ cores Weakly altered with irregular chlorite veinlets and saussuritized plagic clase. Age undetermined, but postdate last metamorphic event, suggesting Late Cretaceous or Tertiary emplacement. SERPENTINITE SERPENTINITE - Primarily very fine grained antigorite with disseminated magnetite; chromite and pyrite common accessories with le

common fuchsite, talc, brucite, and dolomite. Greenish gray, yellowish green, olive green, or greenish black: local anhedral carbonate and antigorite crystals 3 to 5mm in diameter give porphyritic appearan Generally tabular bodies, 100 ft to 5 mi long and 10 to 400 ft thick: highly sheared, locally brecciated. Spatially associated with regional thrust faults in Cosmos Hills. Probable source of chrysotile, asbesto and asbestiform tremolite in veins or veinlets and nephrite boulders in Dahl Creek (Fritts, 1970). Emplaced in strata of Middle Devonian to

Late Cretaceous age. GRANITE GNEISS

GRANITIC GNEISS — Massive to well foliated, exposed along Kogoluktuk River in Cosmos Hills and near headwaters of Kalurivik Creek, northwestern Ambler district. Cataclastic variety in Cosmos Hills composed of albite, microcline, quartz, muscovite, and biotite with subsidiary sphene, calcite, zircon, and fluorite; potassium feldspar more abundant in northern pluton; both occurrences cut by minor aplite dikes and sills. Recessive weathering is characteristic. Age un determined, but probably Middle Devonian based on comparison with other granitic gneiss in southern Brooks Range (Dillon and others,

METAGABBRO AND METADIABASE - Dominantly hornblende, plagioclase, garnet, epidote, and white mica, with subsidiary biotite and quartz. Higher grade mineral assemblages partially retrograded to clinozoisite, actinolite, white mica, and albite. Blocky to slabby weathering habit; characterized by stubby black hornblende megacrysts. Associated with Kogoluktuk schist in Cosmos Hills.

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