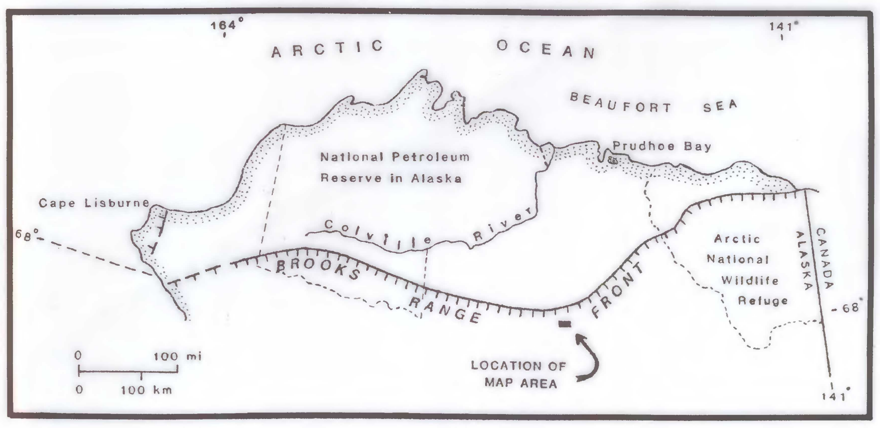
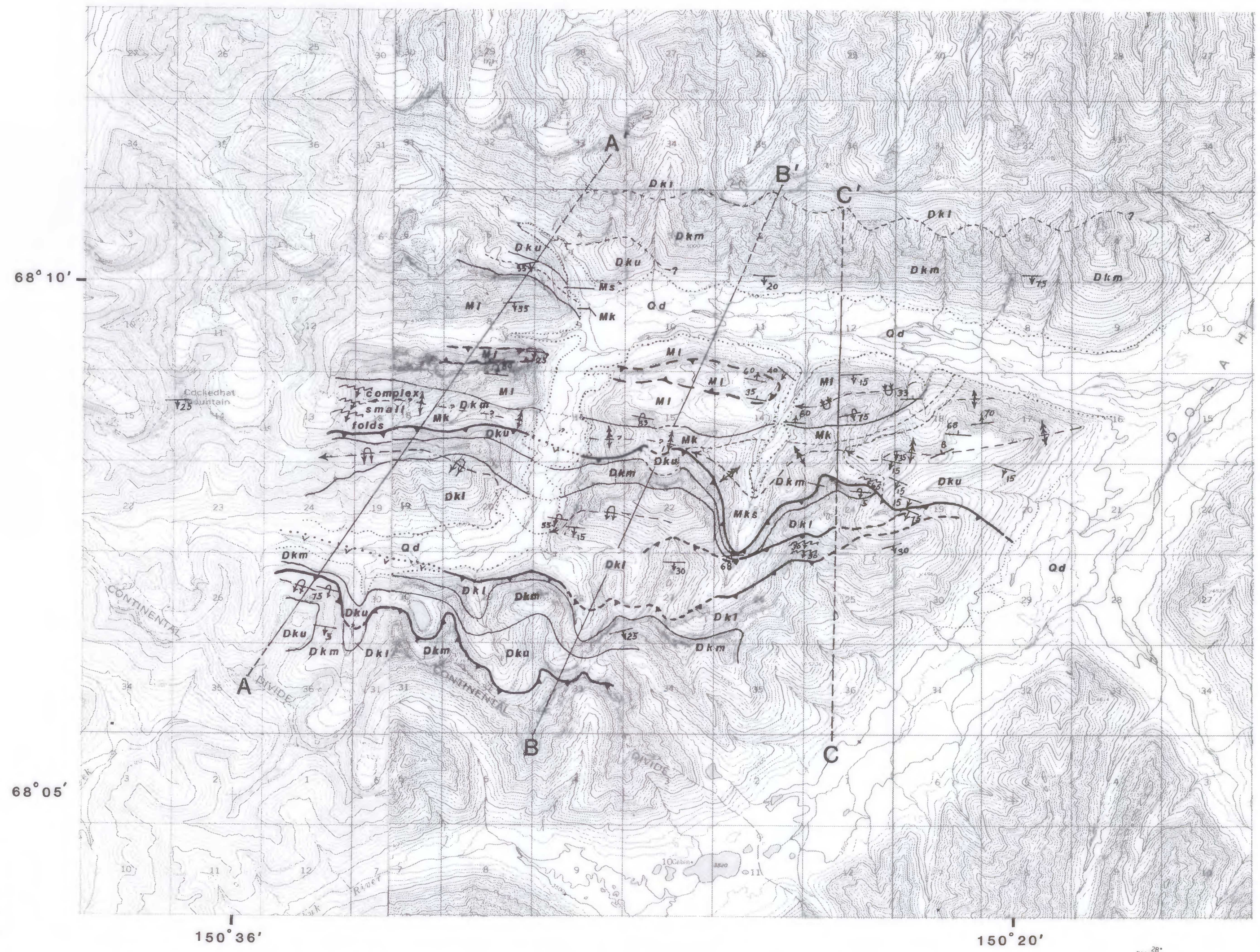
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

OPEN-FILE REPORT
84-555
SHEET 1 OF 1





Base from U.S. Geological Survey, 1971
Chandler Lake A-1 and A-2 quadrangles.

SCALE 1:63360

CONTOUR INTERVAL 100 FEET
DATUM IS MEAN SEA LEVEL

Geology by: J.S. Kelley, W.P. Brosgé, and W.H. Nelson, 1983.

CORRELATION OF MAP UNITS

- QUATERNARY: Qd
- Unconformity
- MISSISSIPPIAN: Ml, Mk, Ms, Mks
- DEVONIAN: Dku, Dkm, Dkl

DESCRIPTION OF MAP UNITS

Qd QUATERNARY DEPOSITS (Pleistocene and Holocene)--Unconsolidated detrital material, mostly gravel, sand, silt, clay, and humic debris. Includes sorted and semi-sorted deposits in active, mostly braided stream systems, flood plains, terraces, alluvial fans, and solifluction surfaces. Includes glacial deposits including rock glacial deposits, till, and moraines.

Ml LISBURNE GROUP (Lower and Upper Mississippian)--Dominantly medium to light-gray-weathering limestone. The limestone is mostly light-brownish-gray packstones and wackestones composed of bioclastic framework clasts and interstitial lime mud. The limestones are abundantly fossiliferous locally and include brachiopods, foraminifers, echinoderms, corals, bryozoans, and gastropods. In most places, the clastic character of the limestone is apparent but, locally, dolomitization obscures the grain fabric. Bedding ranges from thin to massive and locally includes cross bedding and cross lamination. Dark-gray carbonaceous limestone, shaly limestone, and limy shale occur locally. Dark-gray to light-medium-gray chert occurs as nodules and nodularform beds. Ferruginous-weathering and especially fossiliferous beds occur near the base of the unit where the limestone grades by interfingering into the underlying Kayak Shale. The Lisburne Group is 3,340 ft. (1018 m.) or thicker based on measurements in the Itkillik Lake area (Armstrong and Mamet, 1977), about 20 mi. (32 km.) northeast of the map area. Cryptic structural imbrication of the Lisburne Group, compounded by subsequent folding and faulting, obscures the true thickness of the unit in many places.

Mk KAYAK SHALE (Mississippian)--Predominately dark-gray to grayish-black shale with interbedded bioclastic limestone and impure limestone. Shale is carbonaceous, generally micaceous and fissile, clayey to very silty, and soft to brittle. The shale is negative weathering in comparison to nonshale interbeds, overlying rocks of the Lisburne Group and underlying Devonian siliciclastic rocks. The shale grades to mudstone and siltstone and includes thin quartz-rich sandstone beds near the base of the formation. Bioclastic limestone beds are generally less than about 2 ft. (0.61 m.) thick. Reddish- and yellowish-brown-weathering accumulations of megafossil hash including abundant crinoid parts together with smaller amounts of brachiopod, bryozoan, and coral debris make up the bioclastic limestone beds which typically are irregular and lenticular and mostly occur in the upper part of the formation. Impure limestone consists of fine-grained crystalline limestone that is dark-gray to grayish-black, very argillaceous, carbonaceous, and generally positive weathering. The formation is between about 270 and 870 ft. (82-265 m.) thick according to estimates based on mapping. Such a large range in thickness probably is due to structural complication rather than variation in depositional thickness; where the formation is best exposed and least disturbed it is about 560 ft. (171 m.) thick. The gradational and indistinct lower contact between the Kayak Shale and an underlying unnamed shale unit comprising dark-gray shale and sandstone compounds the problem of accurately estimating the precise thickness of the Kayak Shale.

Ms UNNAMED SHALE (Mississippian?)--Principally grayish-black to dark-gray shale. The shale is carbonaceous and includes locally abundant but generally scattered carbonized small plant debris on cleavage surfaces. Reddish-brown-weathering shales and local ironstones occur in exposures of dark-gray strata. Partings of siltstone and very fine grained quartzose sandstone are common. Dark-gray, commonly carbonaceous, and shaly quartz sandstone beds occur as positive-weathering tabular bodies within the predominately shale section. The formation is about 490 ft. (149 m.) thick where best exposed and little disturbed. Approximately 8 mi. (13 km.) along strike and west of the area mapped, in the headwaters of Alapah Creek, the unnamed shale is about twice as thick as mapped in this study and S. H. Mamay and F. M. Hueber (January 19, 1983, written comm.) report Mississippian(?) plant fossils.

Mks KAYAK SHALE AND UNNAMED SHALE UNDIFFERENTIATED (Mississippian and Mississippian?)--Structural complication, a lack of abundant distinguishing characteristics, and an obscure contact between the two units thwart discrimination of the two units in much of the area mapped. Exposures of the undifferentiated unit occur in the crest of an anticline comprising concentrically folded and predominately competent rocks. Most of the structural complication of this undifferentiated unit results from structural thinning and transport of incompetent beds from the south limb of the anticline up dip to the crest of the anticline, presumably by drag beneath a major thrust fault that parallels the south limb of the anticline. Most of the thinning and structural transport has taken place in the Kayak Shale, perhaps eliminating the Kayak Shale from the south limb of the anticline and producing strongly asymmetric folds with a strong sense of northward vergence in the undifferentiated shales in the apex of the anticline. Small scale faulting in addition to the infolding of the Kayak Shale and unnamed shale homogenizes the two units. In contrast, the undifferentiated shale mapped on the north limb of the anticline is probably mostly, if not exclusively, the unnamed shale unit. A predominance of similar rock types in both units, grayish-black shale, together with a gradational and imprecise contact between the two units make discrimination of the Kayak Shale and unnamed Mississippian(?) shale very difficult except in good exposures of undisrupted section.

Dku KANAYUT CONGLOMERATE Upper Member (Upper Devonian)--The upper member of the Kanayut Conglomerate is negative weathering relative to the underlying middle member but positive weathering relative to the overlying unnamed shale. The upper member consists of alternating resistant- and less resistant-weathering beds which produce a weathering profile that contrasts with the massive-weathering profile of the middle member. The relative abundance of resistant strata in the upper member produces the contrast in weathering profile with the overlying unnamed shale. The upper member principally consists of dark-gray to grayish-black shale and siltstone with interbedded and positive-weathering quartz sandstone. Shale is micaceous, very silty, sandy, and grades to sandy siltstone and silty sandstone. Although most of the finer grained sediments are carbonaceous and various shades of darker gray, brownish-gray and greenish-gray finer grained sediments occur in the member. Most of the rocks in the member are iron-stained to varying degrees. Sandstone ranges from very fine grained to very coarse grained and conglomeratic. The sandstone is quartz-rich and ranges from orthoquartzite to quartz sandstones composed principally of very light gray quartz, chert, and siliceous rock fragments. Beds of sandstone range up to about 3 ft. (1 m.) thick and commonly occur as elements of thinning upward cycles in conjunction with the finer grained sediments. Cross bedding is common. The upper member includes conglomerate consisting of granules and small pebbles of chert, quartz, and siliceous rocks in a matrix of quartz sandstone. A complete section is not exposed within the limited map area but the depositional thickness of the member probably ranges between about 820 ft. (250 m.) and 985 ft. (300 m.) (Brosgé, Reiser, Dutro, and Nilsen, 1979) The wide range in thickness of the member reflects abrupt facies changes and interfingering with the underlying middle member. If not the same unit, the upper member probably includes the Stuver Member (Bowsher and Dutro, 1957; Porter, 1966; Brosgé, Reiser, Dutro, and Detterman, 1979; and Brosgé, Reiser, Dutro, and Nilsen, 1979). Collections of abundant plant fossils include Upper Devonian forms in the Shainin Lake area (Bowsher and Dutro, 1957) and Anaktuvuk Pass area (Porter, 1966), about 18 mi. (29 km.) northwest and about 27 mi. (43 km.) west respectively of the area mapped.

Dkm KANAYUT CONGLOMERATE Middle Member (Upper Devonian)--The positive-weathering middle member contrasts sharply with the relatively recessive-weathering upper and lower members of the Kanyut Conglomerate. The differential-weathering character of the shale and sandstone making up the upper and lower members also contrasts with the massive-weathering character of the middle member. The middle member consists principally of conglomerate and sandstone. Conglomerate ranges from a minor constituent to approximately half of the member. The conglomerates are predominately framework-supported with framework modes comprising generally well rounded pebbles and cobbles of principally chert and quartz together with smaller amounts of quartzite clasts. Matrix of the conglomerates consists of quartz- and chert-rich sandstone and granules similar to those in the framework mode. The conglomerates occur in hard and resistant intervals up to about 15 ft. (4.5 m.) thick. The rocks are typically cemented with silica, calcite, and iron-oxides. Sandstone is hard, resistant, and cemented to varying degrees with silica, calcite, and iron-oxides. The sandstone ranges from orthoquartzite to quartz-rich sandstone. The framework composition consists principally of quartz, chert, and silicified rock fragments. Sandstone beds are typically thinner bedded than the conglomerates and commonly are cross bedded. The sandstones are moderately to poorly sorted, conglomeratic in part, and include pebble trains. Much of the conglomerate and sandstone is organized into recognizable thinning and fining upward sequences. The middle member includes reddish-brown, greenish-gray, and dark-gray to grayish-black silty sandy shale, siltstone, and argillaceous sandstone in varying minor amounts. The contact with the underlying lower member is gradational; the conglomerates and sandstones wedge-out abruptly and interfinger with the predominately finer grained clastics of the lower member. Thickness of the middle member ranges greatly. Thickness estimates from mapping range from about 650 ft. (198 m.) to 1560 ft. (475 m.) whereas Brosgé ,Reiser, Dutro, and Nilsen, (1979), report a thickness range between 300 m. (985 ft.) and 500 m. (1648 ft.) over a much larger area. Thickness changes are both radical and abrupt; minimum and maximum values can differ by about 2.5 fold within a map distance of about 1.5 mi. (2.4 km.). The middle member as mapped is probably the same as the middle conglomerate member of Bowsher and Dutro (1957), Brosgé, Reiser, Dutro, and Detterman (1979), Brosgé, Reiser, Dutro, and Nilsen (1979), the Shainin Member of Nilsen and Moore (in press), and equivalent to the upper part of conglomerate member of Porter (1966).

Dkl KANAYUT CONGLOMERATE Lower Member (Upper Devonian)--At a distance, the negative-weathering character of the lower member relative to the overlying middle member together with the greater degree of differential weathering within the lower member serve to distinguish the lower member from the middle member. The lower member principally consists of shale, siltstone, sandstone, and conglomerate. Shale is reddish-brown, grayish-green, brownish-gray, and grayish-black. The shale is typically very silty and micaceous and grades to siltstone. Sandstone is quartz-rich and includes orthoquartzites and quartz-rich sandstones with varying amounts of silica, carbonate, and iron-oxide cements. Sandstones are granule to pebble conglomeratic in part and grade to conglomerate. Cross bedding is much more common in sandstone beds than in conglomerate beds. Conglomerates are typically framework supported with framework modes consisting of pebbles and cobbles of quartz and chert. Sand-size grains of principally quartz and chert make up the matrix in the conglomerates. The principal rock-types of the lower member typically are organized into thinning and fining upward sequences with conglomerate or massive sandstone at the base grading upward to finer grained and thinner bedded strata. The depositional thickness of the lower member is not known as the lower contact is not exposed, but Brosgé, Reiser, Dutro, and Nilsen, (1979) report a general thickness between 300 m. (984 ft.) and 500 m. (1640 ft.) but only about 150 m. (492 ft.) on the upper Itkillik River, presumably either within or near the area mapped. The lower member mapped here is probably equivalent to the Ear Peak Member of Nilsen and Moore (in press).

MAP SYMBOLS

- 30 — measured strike and dip of bedding
- 30 — estimated strike and dip of bedding
- 60 — measured strike and dip of overturned beds
- 50 — estimated strike and dip of overturned beds
- small anticline
- 35 — strongly asymmetric anticline showing: (1) trace of axial plane; (2) direction and magnitude of dip of the axial surface; (3) plunge of axis; (4) sense of vergence with double arrow; (5) queried where projected; (6) direction of plunge; and (7) direction and amount of dip of axial plane
- overturned anticline showing trace of axial plane and plunge of axis, dotted where concealed
- strongly asymmetric syncline showing trace of axial plane and sense of vergence with double arrows
- overturned syncline showing trace of axial plane and plunge of axis
- 15 — family of mostly north-vergent asymmetric folds, arrow shows projected dip direction of axial surfaces, magnitude of dip estimated where indicated
- depositional contact, dashed where approximate, dotted where concealed
- thrust fault, teeth on upper plate, dashed where approximate, dotted where concealed

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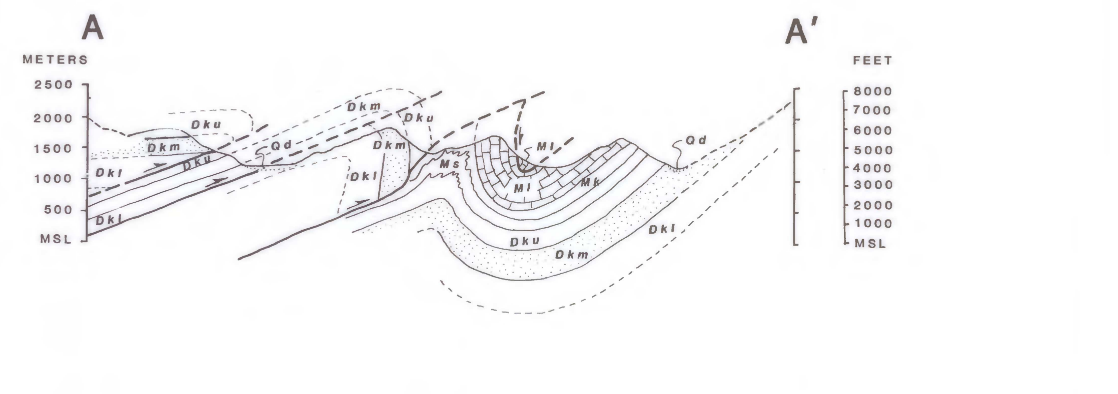

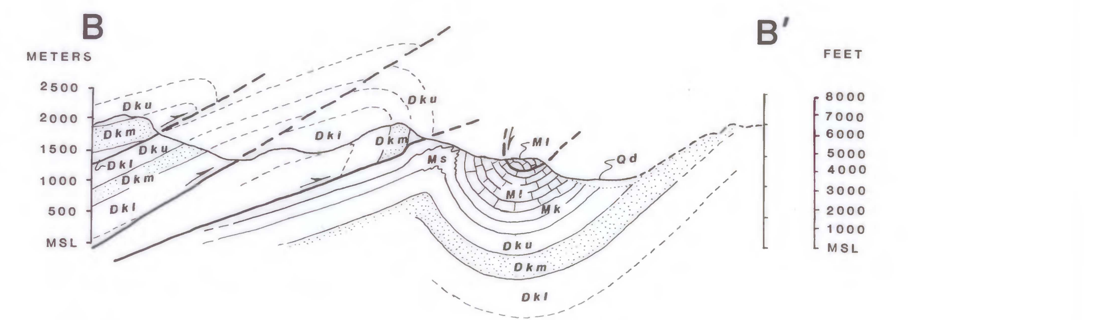

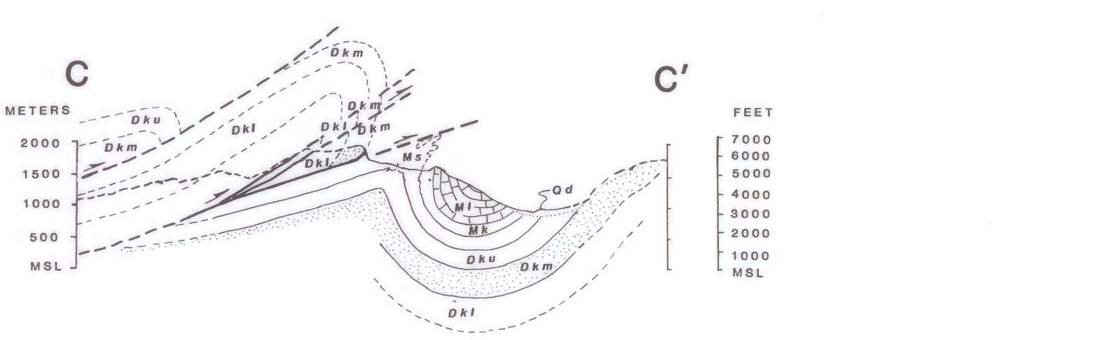

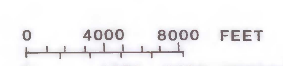

SCALE: Horizontal and vertical scales are equal.

This geologic map and these geologic sections are preliminary and have not been edited or reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature.

GEOLOGIC MAP AND SECTIONS OF A PORTION OF THE CHANDLER LAKE A-1 AND A-2 QUADRANGLES, ALASKA

by J. S. KELLEY

1984