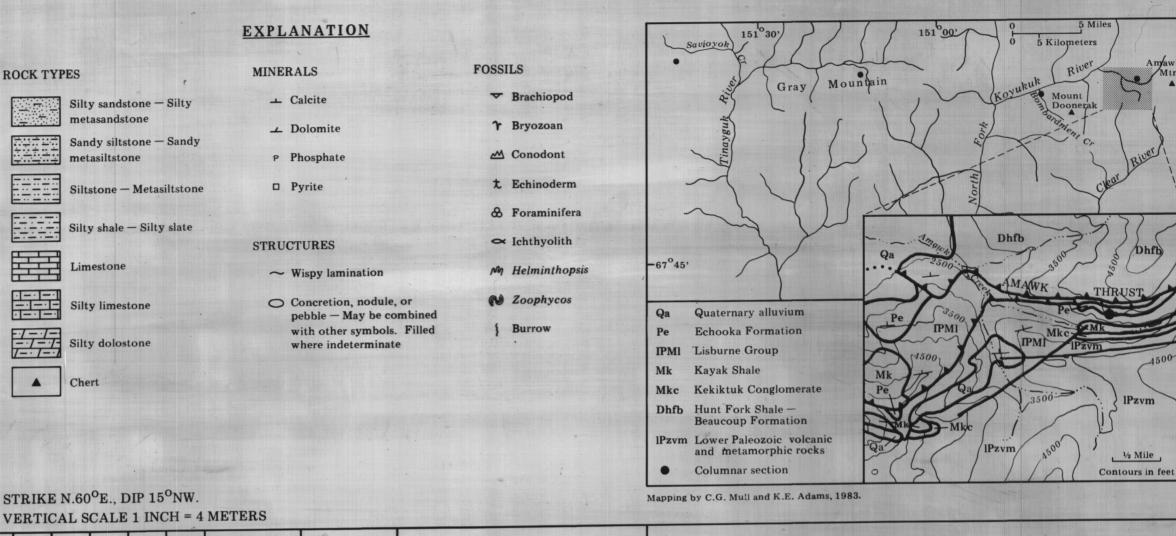
COLUMNAR SECTION OF THE ECHOOKA FORMATION, AMAWK CREEK, WISEMAN (D-1) QUADRANGLE, NORTHCENTRAL BROOKS RANGE, ALASKA

LAT 67°56'15" N., LONG 150°26'48" W.



THICKNESS, IN METERS INFORMAL LITHO-STRATIGRAPHIC UNI FORMATION LITHOLOGY SAMPLE **FOSSILS** SERIES STAGE GROUP 84AKA19-15 Leonardian(?) 84AKA19-14 Lower Permian(?) 84AKA19-13 84AKA19-12 \mathbf{B}_1 Anidanthus sp., Martinia? sp. (large), and Orulgania? sp. 84AKA19-11 Sadlerochit Echooka -----84AKA19-10b 84AKA19-10a and Martinioid? Wolfcampian ----Lower Permian 84AKA19-7 8 84AKA19-6 A 84AKA19-5 Martinioid? (float) Declinognathodus noduliferus (Graves and Ellison), Idiogna – thoides sp. or Idiognathodus sp., Rhachistognathus muricatus (Dunn), Rhachistognathus sp. 到到水下、到水瓜 Pennsylvanian 84AKA19-1 Adetognathus sp. Limestone Morrowan Lisburne Wahoo Lower

SLIGHTLY METAMORPHOSED SILTY SHALE PUNCTUATED BY SILTY CARBONATE AND DOLOMITIC SILTSTONE. Silty shale is light to dark gray and weathers blue gray to dark brown gray at base, mostly tan brown and red brown in lower half of unit, and green gray to black and red brown in upper half. Shale is dolomitic and (or) ankeritic and cherty throughout, phosphatic at base, and sideritic and slightly calcareous toward top; contains pyrite nodules to 10 cm diam and rare radiolarian chert pebble or concretion to 3 cm diam. Bedding obscured by slaty cleavage, but oblique and horizontal burrows, ranging from 0.25 to 0.75 cm diam, wispy lamination, and the trace fossil Helminthopsis(?) are preserved. Rare foraminifera were observed in thin section. Shale is partly pitted and cut by carbonate veins and weathers to hackly flags and plates. Vitrinite reflectance (R_O) values for shale average 4.2 at base and 1.92 toward top, and thermal alteration index (TAI) ranges from 4 at base to 3.7 toward top (Chevron U.S.A. Inc., written commun., 1985), suggesting rocks reached lower limit of metamorphism. Contacts with coarser beds are sharp and, in some cases, exhibit flame structures(?).

DESCRIPTION

Coarser beds consist of silty limestone, concentrated in middle of unit; lesser dolomitic siltstone, situated toward base; and silty calcareous dolostone, present near top. Carbonate and siltstone beds are medium gray and weather tan and orange brown to red brown. Limestone is cherty and slightly dolomitic and, at base of one bed and in middle of another, contains pebbles, one of which is phosphate. Pyrite can be found throughout coarser beds as nodules to 7 cm diam. Beds average 30 to 50 cm thick (mode = 30 cm), appearing to thicken upsection; are wispy laminated and horizontally burrowed; and exhibit mound-and-swale morphology on upper surface. An Early Permian brachiopod assemblage can be found in carbonate intervals. Coarser beds have been reworked by producer(s) of trace fossil Zoophycos; in addition, producer(s) of Helminthopsis(?) have modified top of at least one silty limestone bed. Planolites(?) traces, associated with both Zoophycos and Helminthopsis(?), were found in float probably weathered from unit B1. Coarser beds are cleaved and break with hackly fracture into slabby talus. Top of unit B1 is recumbently folded

SLIGHTLY METAMORPHOSED SANDY SILTSTONE, SILTY VERY FINE GRAINED SANDSTONE, AND SILTY CALCAREOUS DOLOSTONE, medium- to dark-gray, tan- and orange-brown-weathering. Siltstone and sandstone are calcareous, dolomitic, and cherty. Entire unit is pyritic, containing framboids and nodules to 10 cm diam. Few medium to coarse grains of detrital chert, phosphate, and carbonate are concentrated toward base of unit, along with 7-mm-diam pebbles, which are probably phosphatic. Bottom of unit is floored by 5-cm-thick horizon of red clay. Beds are 2 to 8 cm thick and form base of 30- to 50-cm-thick fining-upward packages. Unit is obliquely and horizontally burrowed, exhibiting forms to 2 cm thick, and wispy laminated. Contains trace fossil Zoophycos, disarticulated brachiopods, and rare conodonts. Cleavage is well developed. Coarser beds are partly pitted on weathered surface and form hackly, slabby talus. Contact with overlying unit B1 is gradational

BRYOZOAN-BRACHIOPOD-ECHINODERM GRAINSTONE (BIOSPARITE), medium- to dark-gray, light-gray-brown- to orange-brown-weathering, and pyritic. Composed mostly of echinoderms, probably crinoid columnals, with lesser brachiopods and bryozoans and scattered foraminifera, pelecypods(?), and algae(?). Beds are 15 to 20 cm thick and pitted. Top bed yielded incompatible conodont assemblage, suggesting that some or all elements had been redeposited; thus age of host rock is no older than late Early Pennsylvanian (late Morrowan), age of youngest element in collection. Lower bed yielded ichthyoliths, as well as conodont fragments. Condont alteration index (CAI), determined from recovered conodonts, equals 4.5 to 5, indicating host rock reached metamorphic temperatures of 250 to 300 °C. (See A.G. Harris, written commun., 1985.) Contact with overlying Echooka Formation is sharp and undulatory

Section measured with Jacob's staff by K.E. Adams and E.E. Harris, August 1984. Due to thrust faulting, section is probably incomplete.