ECHOOKA FORMATION MEASURED SECTIONS
ARCTIC NATIONAL WILDLIFE REFUGE, NORTHEASTERN ALASKA

BY

GREGG A. HAKKILA
1986

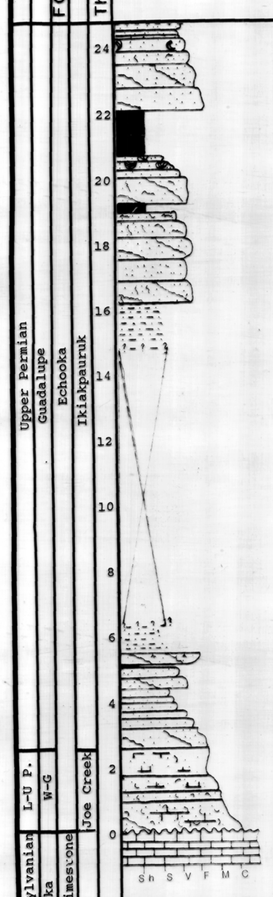
EAST OF KATAKTURUK CANYON
86GH01
STRATIGRAPHIC SECTION
69°35'44"N Latitude
145°34'33"W Longitude

EXPLANATION

Crossbeds, Zoophycos, Channelization, Limestone, Calcareous Conglomerate, Shale, Chert, Vertical Burrows, Fossils, Disconformable Contact, Breccia, Sandstone, Siltstone, Covered Interval, Randomly Oriented Burrows, Root Casts, Contact Obscured, Conglomerate, Calcareous Sandstone, Possible Siltstone

Mt. Michelson (C-3) Quadrangle
NE¼, NE¼, SEC 30, T3N R27E

1 : 25,000
= Measured Section



Graphic Column

Lithologic Description

Top Contact mantled by rubble of the ledge sandstone.

Quartz arenite: Fine to very fine grain size. Irregular bedding thins upward as grain size decreases. Upper beds zoophycally laminated. Cut and fill structure in basal beds. Bioturbated zones contain locally abundant hematite and glauconite. Gray-green, weathers red.

Shale: Extremely rubbly outcrop of this recessive unit.. Clay minerals and glauconite with approximately 10 % detrital quartz. Fissile and friable. Green (fresh and weathered).

Quartz arenite: Three distinct upward fining and thinning sequences of fine to very fine grained medium to thin beds. Bedding irregular, particularly along erosional cut and fill surfaces at the bases of the sequences. Heavily bioturbated.Abundant hematite. Top of unit marked by abundant trace fossil zoophycos. Gray, weathers red.

Covered interval. Float indicates possible red siltstone as seen in tailings from rodent burrows.

Quartz arenite: Fine sand to shale in a graded package of medium to thin upward fining beds. Basal cut and fill sedimentary structure. Abundant disseminated organic material throughout. Root casts near top of unit. Silica and hematite cement. Dark gray.

Calcareous sandstone: Coarse to medium grains. Quartz and detrital calcite .Medium to thinly bedded upward fining and thinning unit. Basal beds appear to be channelized. Stringers of fossil fragments include abundant brachiopod fragments and common bryozoan fragments. Calcite cement. Fresh gray.Weathers orange.

Contact appears erosional with 1-5 m relief.
Oolitic and bioclastic grainstone.

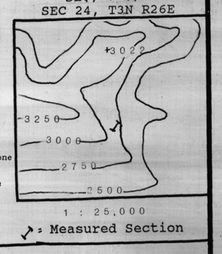
N75°W 40°SW

WEST OF KATAKTURUK CANYON
86GH02
STRATIGRAPHIC SECTION
69°35'46"N Latitude
145°37'16"W Longitude

EXPLANATION

Crossbeds, Zoophycos, Channelization, Limestone, Calcareous Conglomerate, Shale, Chert, Vertical Burrows, Fossils, Disconformable Contact, Breccia, Sandstone, Siltstone, Covered Interval, Randomly Oriented Burrows, Root Casts, Contact Obscured, Conglomerate, Calcareous Sandstone, Possible Siltstone

Mt. Michelson (C-3) Quadrangle
SE¼, SE¼, SEC 24, T3N R26E



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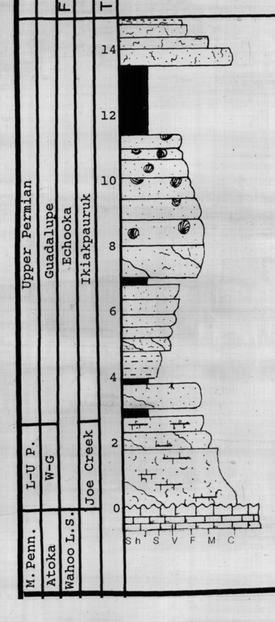


Graphic Column

Lithologic Description

Top contact mantled by rubble from Ivishak.

Quartz arenite: Medium to very fine grained graded unit. Heavily bioturbated, contains abundant randomly oriented burrows and disseminated organic material. Medium to thin bedded upward thinning beds. Pyrite and glauconite present in irregular patches. Silica and hematite cement. Beds appear to be part of larger channelized unit. Bioturbation and hematite content decrease upsection. Gray-green, weathers red.

Shale: Extremely glauconitic with abundant organic material disseminated in a clay mineral matrix. Approximately 10-20% detrital quartz. Recessive unit. Green.

Quartz arenite: Fine to very fine grained. Thinly bedded near top, medium downsection with obvious cut and fill structure at base of unit. Contains abundant disseminated organic material and burrows. Carbon films on bedding planes. Rare plant fragments. Extremely abundant trace fossil zoophycos.Highly glauconitic. Green.

Shale: Some silt sized quartz grains in a highly organic fissile black shale.

Quartz arenite: Very fine to fine inverse graded. Cut and fill structure at base. Extremely heavily bioturbated with randomly oriented burrows. Irregular laminated surfaces with trace fossil zoophycos. Medium bedded. Possible root casts near top. Gray, weathers orange.

Siltstone: Silt particles predominantly quartz. Very fine sand size quartz approximately 10%. Some ironstone nodules. Hematite cement. Red.

Shale: Clay minerals and abundant disseminated organic material. Black.

Quartz arenite: Medium bedded, fine grained containing abundant disseminated organic material. Possible plant fragments near top. Gray.

Shale: As indicated by slickensides this surface is a fault plane.

Calcareous sandstone: Coarse to medium grained upward fining. Beds medium at base, thin upsection. 50-60% quartz. Contains abraded calcitic clasts and brachiopod fragments. Locally extremely pyritic. Calcite cement. Gray. Weathers red.

Contact appears to have two to three meters of erosional relief.

Oolitic to (bryozoan) bioclastic grainstone.

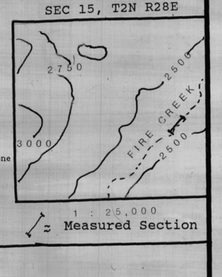
N75°W 40°SW

FIRE CREEK
86GH04
STRATIGRAPHIC SECTION
69° 31' 51"N Latitude
145° 12' 44"W Longitude

EXPLANATION

Crossbeds, Zoophycos, Channelization, Limestone, Calcareous Conglomerate, Shale, Chert, Vertical Burrows, Fossils, Disconformable Contact, Breccia, Sandstone, Siltstone, Covered Interval, Randomly Oriented Burrows, Root Casts, Contact Obscured, Conglomerate, Calcareous Sandstone, Possible Siltstone

Mt. Michelson (C-3) Quadrangle
SE¼, NE¼, SEC 15, T2N R28E



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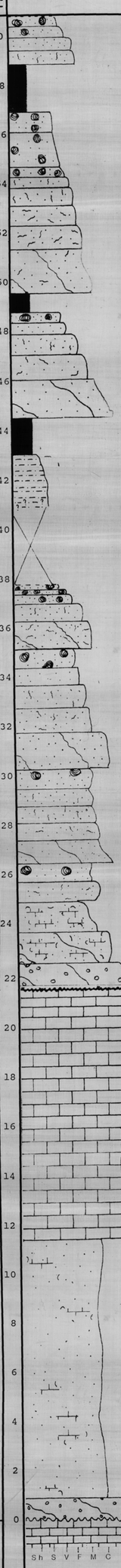


Graphic Column

Lithologic Description

Contact appears gradational into Kavik Shale.

Quartz arenite: Fine to very fine grained. Highly glauconitic. Graded. Vertical burrows near base and abundant zoophycos near top.

Shale: Very fissile highly glauconitic shale containing organic detritus. Green.

Quartz arenite: Two cycles of coarse sand to shale. Each cycle has basal cut and fill structure and fines upward. Both have medium beds near the base and middle of the cycle which become thinner upsection. For each cycle the randomly oriented burrows of the lower part become vertically oriented burrows upsection and are replaced by exceedingly abundant zoophycos as the quartz sand gives way to silt and finally clay minerals upsection. This interval is extremely glauconitic and has about 40% sulfide content. Green, weathers orange.

Shale: High content of disseminated organic material and carbon films on laminations. Very fissile.Black (fresh and weathered).

Covered interval: Red soil and a thin (10cm) section of in-place red siltstone. Primarily quartz silt grains in a hematitic matrix. Some disseminated organic material.

Quartz arenite: Medium to very fine grained. Thinly bedded with abundant zoophycos near top. Highly bioturbated with random burrows giving way to vertical burrows which in turn give way to zoophycos. Extremely abundant pyrite and other unidentified sulfide minerals, probably products of hydrothermal alteration. Gray, weathers red.

Calcareous sandstone: Coarse to medium grained. Three upward fining cycles. Medium bedded. Each cycle has basal cut and fill structure and zoophycos near top. Approximately 50% quartz and 20% detrital calcite. Gray. Weathers red.

Chert conglomerate: Hydrothermally altered, grain supported with clasts about 1cm in diameter. Basally this unit cuts into the Wahoo on the order of 2m. Gray.

Limestone: Bryozoan and crinoid fragment grainstone. Medium to thin bedded and highly altered. White to gray.

Sandstone: Medium sand grains with some pebble sized chert clasts. Scarce bryozoan fragments. Bedding not apparent as entire section has obviously been subjected to intense hydrothermal alteration. Sulfide content estimated at 40%. Top of this interval shows slickensides, indicating that limestone upsection from this is probably a repeated section of Wahoo Limestone.

Chert conglomerate: Chert clasts approximately 1cm in grain supported, silica cemented gray conglomerate. Basal cut and fill structure.

Contact shows about 2m of erosional relief.

Bryozoan and crinoid fragment grainstone.

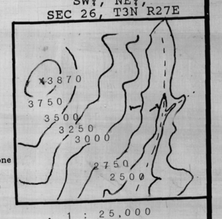
N40°W 30°NE

NORTH OF SYNCLINAL KEMIK "THE SHOVEL"
86GH03
STRATIGRAPHIC SECTION
69°35'28"N Latitude
145°25'28"W Longitude

EXPLANATION

Crossbeds, Zoophycos, Channelization, Limestone, Calcareous Conglomerate, Shale, Chert, Vertical Burrows, Fossils, Disconformable Contact, Breccia, Sandstone, Siltstone, Covered Interval, Randomly Oriented Burrows, Root Casts, Contact Obscured, Conglomerate, Calcareous Sandstone, Possible Siltstone

Mt. Michelson (C-3) Quadrangle
SW¼, NE¼, SEC 26, T3N R27E



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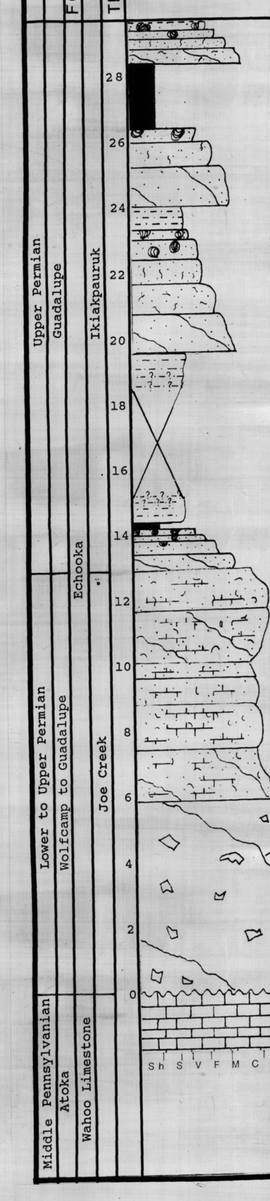


Graphic Column

Lithologic Description

Top contact covered

Quartz arenite: Medium to fine grained graded unit. Medium bedded to thinly bedded upsection. Abundant burrows give way to zoophycos upsection. Basal cut and fill structure. Contains some disseminated organic material. Dark gray.

Shale: Highly glauconitic and thinly laminated. Fissile and friable. Green.

Quartz arenite: Medium sand to silt sized quartz in 2 upward fining and thinning cycles. Each cycle shows increased trace fossil zoophycos upsection. Abundant burrows and disseminated organic material. Grades upward into shale. Locally glauconitic or pyritic. Dark gray.

Covered interval: Probable red siltstone.

Dark soil: Probably black shale.

Quartz arenite: Fine to very fine grained and medium to thin bedded upward fining and thinning sequence. Basal channelization with cut and fill structure. Abundant trace fossil zoophycos near top of unit. Dark gray

Calcareous sandstone: Coarse to medium grained. Approximately 50% quartz and 20% detrital calcite grains. Abundant stringers of brachiopod fragments and common bryozoan fragments. Medium to thin bedded with cut and fill structure at base. Upward fining and thinning sequence. Calcite cement. Gray, weathers orange.

Breccia: Chert and limestone clasts up to 2m in diameter but typically 10cm. Obviously channelized with large scale basal cut and fill structure. Silica cement. Black. Weathers gray.

Contact appears erosional with about seven meters erosional relief. Bryozoan and crinoid grainstone.

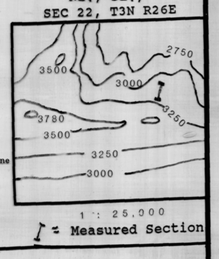
N55°W 30°SW

NE OF IGNEK CREEK
86GH05
STRATIGRAPHIC SECTION
69°36'04"N Latitude
145°41'35"W Longitude

EXPLANATION

Crossbeds, Zoophycos, Channelization, Limestone, Calcareous Conglomerate, Shale, Chert, Vertical Burrows, Fossils, Disconformable Contact, Breccia, Sandstone, Siltstone, Covered Interval, Randomly Oriented Burrows, Root Casts, Contact Obscured, Conglomerate, Calcareous Sandstone, Possible Siltstone

Mt. Michelson (C-3) Quadrangle
NE¼, SE¼, SEC 22, T3N R26E



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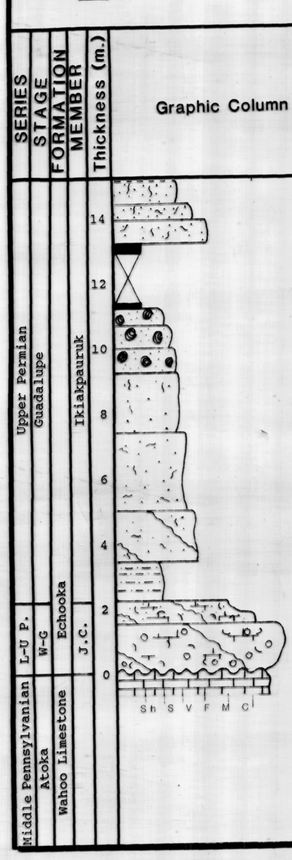

Graphic Column

Lithologic Description

Top contact covered by vegetation.

Quartz arenite: Fine to very fine graded unit. Bedding medium basally to thin upsection. Heavily bioturbated, burrows randomly oriented. Abundant disseminated organic material. Rare glauconite and pyrite. Gray, weathers brown.

Covered interval: Probable glauconitic shale based on tailings from rodent burrows.

Quartz arenite: Fine to very fine grained. Thickly to thinly bedded with basal cut and fill structure. Rare disseminated organic material and glauconite occur in patches. Randomly oriented burrows yield upsection to vertically oriented burrows. Top of unit zoophycally laminated. Gray-green, weathers red.

Siltstone: Thinly bedded quartz siltstone with extremely abundant pyrite, forming individual crystals up to 3 mm across. Common ironstone nodules. Red.

Calcareous sandstone: Coarse to medium and fines upward. Thin bedded. Few brachiopod fragments. Calcite cement. Gray, weathers orange.

Conglomerate: Chert pebbles approximately 40% and fragments of brachiopods as stringers in a quartz and calcite sand matrix. Common lenticular ironstone concretions. Cut and fill structure. Calcite cement. Gray, weathers red.

Contact shows .5m erosional relief.

Limestone: Bryozoan,coral, and crinoid packstone to grainstone.

N80°W 30°SW