Appendix H: Field notes, in Furer, L.C., Fehlmann, R.H., Taylor, A.M., Self, G.W., and Amoco Oil Co., Data compilation of the 1971 field party, southeast Brooks Range and Fort Yukon, Alaska; Vol 1

Furer, L.C., and Amoco Oil Co.

GMC DATA REPORT 464H

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Department of Natural Resources
Division of Geological & Geophysical Surveys
GEOLOGIC MATERIALS CENTER

Amoco 1971 Field Party - Ft. Yukon Basin - North eastern Alaska
by Lloyd Furer

The first ~~section~~ 104 stas. is concerned with the Porcupine River Area

Camp was established and set up at Old Camp, Wed. Jul.7

On the first days traverse Rich Lane took notes

The following are supplementary notes only:

Sta. 1 - Old Crow Granite - HRL1 Geochron

Sta 2 - Old Crow Granite - No sample

Sta 3 - Old Crow Granite - A traverse was made from the granite northward crossing an east west band of black shale grading upward to calcareous dk gry siltstn grading upward to sdy limestn (Lisburne)? with more granite on the N. side of this sedimentary band. Samples HRL2P, HRL3CL and HRL4CL were taken in what is thought to be the Kayak-Lisburne sequence

Sta 4 - Called Pre-Cambrian Quartzite by USGS-is brn, f-g and silty sandstone and quartzite. This might be the Noatak-Kanayut equivalent. HRL5L

Sta 5 - See Rich Lanes Notes - HRL6L, Ltg. tan brn, silic. cemented ss. (Noatak?)

Sta 6 - See Rich Lanes Notes (Old Crow Granite)

Sta 7 - Lisburne? - No cht. or fossils, could be Skajit-HRL7C

Sta 8 - Lisburne - Corals (same as one of Fehlmann's stops) lgt gry limestone contains ferr. silty zones that are fossiliferous (brachs) and also zones of coarse, poorly sorted angular ferr. quartz sandstone - HRL8FL

Sta 9 - See Rich Lanes Notes, Quartzitic s.s.

Sta 10 - Rhyolite Dike? in black shale, dk brn-gry silt w/limestone lenses-HRL9f HRL10P

Sta 10A - Lisburne Limestone w/large brachs, solitary corals solicified trilobites bryozoan - HRL11F and 12F - Same as Fehlmann locality 7082. Covered interval below the Lisburne could be Kayak shale - no outcrop. Kanayut sandstone outcrops below covered interval.

Sta 10B - Along Porcupine River in Canada. Thin bedded siliceous limestone, dk cht. in lenses, pods and layers - no sample.

Sta 10C - Thin laminated blk shale and silt. Appears to be an angular unconformity above the sequence, could be Tertiary_Quaternary volcanics.

Need to measure and sample this section - Comment: this was never done.

Sta 10D - Amyg. basalt 300' thick - LCF 19.

End of notes for July 7 - Wednesday

Thursday - July 8

George Self took notes. The following are supplementary notes only.

Sta. 11 - Interbedded dk shale and brn-gry siltstn. Large ironstone concretions Could be Ivishak according to Fred Hankinson. Later found to be Permian in age.

Sta. 12 - Medium gry siltstn. Limy siltstn and silty limestone. The lime layers contain brachs. and trilobites - GWS1F.

Sta 11 & 12 were later included in the South Old Camp section.

Sta. 13 - Ochre (brn-yellow) weathering siliceous laminated dolomite with bedded chert and chert nodules (DE Unit of USGS)

Sta 14 - Sandstn white lgt gry fine grained well sorted clean quartzose, siliceous quartzitic in part - GWS2P and 3L. Section is not metamorphosed as evidenced thin dk gry silty shale units and silt layers in base of outcrop near River level. This may be late Devonian. Could be a fair reservoir rock. 800' + by Conrad

Sta 15 - Call Silurian by Conrad. Thin bedded micrite, dolomitic lgt brn gry, silty, tite, black chert lenses and nodules, worm burrows mud cracks? no other fossils evident - GWS 4C

Sta. 16- GWS5C GWS6L - Called Miss. by Conrad. Fault zone at base cliff w/fault gouge and breccia. Secondary mineralization - rock is med. to coarse-grained well sorted sub-rounded quartzitic sandstone. Siliceous and ferr. cement-where cementing is poor the poro. and perm. is good. There are lenses of lgt gry argil siltstn interbedded - GWS7P from fault gouge? zone. The temperature at 445 is 102°.

Comments along traverse: So-called Permo-Triassic near Graphite Lake is few lousey outcrops in the trees.

Sta 17 - Med. gry limestn - GWS8C

End of traverse for July 8th.

Friday - July 9

Fred, George and I will recon. along Salmontrout River to Black River. First eight miles east of Old Camp there are carbonate outcrops in Steep Canyon. Next few miles are dark shale and carbonate in lowlands with some good outcrops in River. George Self took notes rest of this day. The following notes supplement those taken by George.

Sta. 18 - Lgt. gry. coarse crystalline limestn (re-crystallized) nothing very characteristic about this limestone. Called Cambro-Ordovician by USGS - GWS9fC

Sta 19 - Dk gry dolomitic micrite. Hard recrystallized - GWS10Cf

Sta 20 - GWS11fC - Walked section SE to NW - at SE section starts in dk gry sugary dolo. good porosity - GWS12F, 13F, 14FC, 15FC, 16F. Grades through some rock that looks like faint algal mats to unit that is full of colonial corals, stromotop. solitary corals, few brachs and gastropods - GWS14F, 15F, 16F - Biostromo, possibly even reefal.

Sta 21 - Med. gry limestn full of corals, Stromatop. crinoids, brachs - Biohermo.

Stas. 20 & 21 were later included in the Linear Ridge Section. - GWS17FC

Sta 22 - Dense micritic limestn. no fossils, tite, no samples.

Sta 23 - GWS18FC - Crinoidal packstn. brachs and crinoids - sample taken near top of section. This locality later included in Salmon Village Section.

Sta 24 - Cream-brn dolomite and limestn, weathers w/porosity, recrystallized, coarse crystalline - GWS19C -fairly good outcrop but no contact with units above or below. Nelson Bluff looks like good outcrop, couldn't land - high wind. Fred checked later.

Sta 25 - Same as Sta 16, yesterday. Mineralized red weathering quartzite. This maybe related to a north-south fault zone as is Sta 16. Both of these outcrops are along the western edge of the Paleozoic outcrops. End of notes for Friday, July 9th.

Saturday - July 10th

Fred and I will recon. SE of Old Camp, high overcast, cool, very hungry mosquitoes.

Sta. 26 - Sample LCF1fC - Highly recrystallized limestn. lt gry, coarse crystalline Silurian of USGS

Sta 27 - Good section to measure Ordovician-Devonian? Limestn. dk gry micritic, sedimentary breccia, contains solitary corals, bryozoans and stromat.? Parts of the sec. contain abundant silicified stromatoporoids, corals and few brachs. Algal heads, biostromal. LCF2FC, 3FC, 4FC. Sketch 1 - This sta. later included in Fort Creek Section.

Sta 28 - Dk grn-gry quartzite, thinly laminated or foliated. Devonian carbonate appears to dip off its flanks - LCF5L. This quartzite looks more like Pre-Cambrian than any we've seen to date.

Sta 29 - Lt gry recrystallized limestn - LCF6C - Appears to lie directly on Pre-Cambrian? quartzite. Can't see actual contact in saddle but can throw rock across it.

Sta 30 - Brn weathering - f-med. grained sandstn. Cross bedded thin layers dk fissile shale - LCF7P, Thin bedded some well sorted clean sandstn. some silty non-calcareous quartzitic.

Sta 31 - Lt gry highly recrystallized v-coarse crystalline limestone - LCF8C

Sta 32 - Splittery dk gry shale w/thin interbeds dk gry argil. limestn - LCF9FC, 10P, 11Sr 12F, possibly a contact on east end. Fair section to measure about 500' thick.

Sta 33 - Pa Unit of USGS. Permian? sandstn. LCF13L (Porosity plug) Very clean white sandstone very fine to fine-grained good poro. and perm. excellent reservoir rock. Cross-bedded? rippled? Probably beach sandstone. Verticle dip, slight salmon weathering tint (probably Miss. or Permian.) Not Metamorphosed.

Sta 34 - Alternating zones of lt and dk gry hard tite dense siliceous dolomite w/few lenses blk chert. About 500' thick, faint ghosts of fossil debris toward top of section. Excellent exposures. Later included in Amoco J Section.

Sta 35 - Blk. carbonaceous shale. 20' overlain by a v. coarse-grained conglomeratic sandstone (35'). Reddish brn fair sorting sub-angular mostly quartz, cross bedded, some blk cht, iron cement, fair porosity and perm. Sandstone overlain by sequence thin kaol. shale, cream color very carb. overlain by shale and

Sta. 35 (Continued) - siltstn w/ironstn concretions. Thin beds of calc. f-g Ss and dk silty limestn overlain by lignite to coaly shale. LCF14F, 15P, 16L(Sketch 2 -) This is a nearshore to non-marine sequence. Thin sdy limy units at top contain brachs. LCF17PSr, LCF18P

Sta 36 - (Sketch 3)- Faulted sequence, carbonaceous sdy material w/faint fossil debris is faulted over blk carbonaceous calcareous shale, probably Pcl unit of USGS.

End of Notes for Saturday - July 10th

Sunday - July 11th

Rained all morning wind blowing 20-25 knots at noon. Worked maps, samples, etc. raining again. No field work.

Monday - July 12th

George, Fred and I started measuring Amoco J Section along S. side Porcupine River Start Section one mile west of Confluence w/Rat River. Dip bottom section is SE at 15-18°. Covered below this point w/next outcrop to SW, dipping west. Start of measured section is near the crest of an anticline. A. Ormsiton arrived in camp. End of notes for July 12th.

Tuesday - July 13th

Allen, Fred, George and I finished measuring Amoco J Section

Sta 37 - One mile S of Burnt Rw ~~the~~ east side of river. Dip N60E @25°. AR01F in bottom of section. Gry dolo. w/stick stromotop. and layers of boundstn. much breccia at base of exposure. Section is extremely sheared and many minor faults. Abundant chertified stromat, (picture by Allen) We are in the Supratidal environment

Moved to S. Old Camp area and started measuring S. Old Camp Section - AO-1-71 on S. side Porcupine River first outcrop downstream from Old Camp. Very fossiliferous Penn. cannonball limestn grading up to Permian limestn, siltstn and shale. See measured section. End of notes for Tuesday, July 13th.

Wednesday - July 14

Windy, cloudy, cool.

Sta. 38 - acrossed River from Old Camp - Dk beds at the N end of the outcrop are Dev. blk limestn & shales and chert, very silty that are probably overlain up the hill by the USGS DD' Unit. AR02C & 3Sr from the dk Dev. shales. (See Sketch 4.) There is a fault in the valley and highly folded Dev. silts and shales on the S. side of the fault. These shales are coaly and lignitic. These beds contain Mid. Dev. two-hole crinoids. Some of the beds contain both crinoids and plant frags. These limy beds are marine but very near shore and grade upward to low grade coal. Samples AR04Sr, 5P, 6CfF were taken in this interval. AR07F & 8FC were taken in the southerly end of the exposed dk beds just north of where DD' is faulted over these dk coaly silty limy beds. These beds are probably Miss. in age. AR09FC taken just south of a high angle fault in DD' Unit which is here a med to dk gry limy dolo. finely crystalline in places, wackestone, containing amphipora. About 200' of the amphipora bearing dolo. is exposed. ~~At~~ The top this unit is full of algal mats and heads - AR010CF at top of DD'. Top of DD' is an unconformity w/low relief on top. Poss. karst ~~photo~~topography. The DD' Unit is overlain unconformibly by plant bearing blk sh. w/limestn. lenses - AR011P, which in turn is overlain by quartz sandstn med-g w/carbonaceous patches and frags. The limestn. in the sh. contains ostracods. The shale, sandstn, limestn unit grades up to a limestn med-gry micritic finely crys. w/gastropods, ostracods and mud cracks AR012F - The top of the limestn unit becomes very cherty w/bedded chert and triplitic chert containing Penn. brachs. AR013F - The top of this unit is on strike and lithologically similar to the base of the South Old Camp Sec. It has been included w/that measured section. Sketch 4 demonstrates the geology of this section.

Thursday - July 15

Allen, Fred and George measuring Fort Creek Section - cold, freezing day.

I gave Denver visitors, Phil Garrison, Ben Baldwin and Union representative (George Pheister) a tour of the area. Visited Salmontrout Type section, section across the River from Old Camp, section at mouth Coleen River and Ft. Creek Section.

End of notes for Thurs., July 15.

Friday - July 16

Took pictures ~~from~~ of section across from Old Camp.

Sta 39 - LCF19 Geochron, Tertiary-Quaternary basalt.

Sta 40 - LCF20 & 21P, LCF22 Geochron. This is a very structurally complex area w/diorite intruded into dolo., overlain by blk limestn and limy shales w/coaly layers from which samples 20&21 were taken, in turn overlain by dolo. which are overlain by dk shales and shaley limestn. with SS on top of the hill. (See Sketch 5)

Sta 41 - Locality where USGS claims to have ~~pCL~~ on top of ~~pCg~~ The sequence here is med. gry recrystallized dolo. ~~DC~~? overlain unconformally(?) by blk carb. shale, blk silty carb. limestn., which is overlain by brn weathering f-med. grained well sorted quartzitic sandstone. (See Sketch 6)- LCF23C,24PSr, 25PSr.

Sta 42 - At bottom of hill ~~where~~ below Sta 41. ~~is located~~ LCF26CF taken in stream in base of carbonate unit. ~~DC~~? There is a quartzite at river level stratigraphically below LCF26. It is med gry f-grained. The dolo. is med. gry, contains stick stroms and possible algal laminated structure. Picture 6 (LF)

Sta 43 - S side of river across from Sta 42. Quartzite very fine to fine grained white clean possible ripple marks, scour-fill? Picture 7 taken from here looking N to NW at Sta 41. LCF27L. ~~End of notes for Friday July 16~~

Sta 44 - Pzd Unit of USGS near fault contact w/Pzl, Collected Pzd Unit Med. gry dolo. w/thin beds of blk shale - LCF28C & 29P. Not certain if samples are in Pzd or Base of Pzl.

Sta 45 -(Sketch 7) LCF30Pf - N side of river, looks like a conformable sequence of quartzite to dolo. w/an unconformity in top of the dolo. which is in turn overlain by blk shale and shaley limestn. This looks very similar to the sequence at the Amoco J Section, and was here called Silurian by Conrad as was the Amoco J Sec.

Sta 46 - Sequence grades from ?hyllitic shale to metalimestone w/some unmetamorphosed limestone then to fine quartzitic sandstone. Sequence intruded by numerous small green fine crystalline basic stocks. LCF31LC. Further North we crossed brn-gry dolomitic limestn. interbedded w/dk shale and silt. This sequence obviously is one of shale w/interbedded limestn. grading upward to silty limestone to fine silty sandstone which has been intruded by small stocks and silts. The metamorphism increases toward each individual stock-(contact metamorphism).

Sta 47 - LCF32FC & 33FC - med gry packstn. abundant crinoids, bryozoan many brachs, tite.

Sta 48 - Sequence of dk bedded chert at base grading up to med. gry-grn limy sandstone up to red shale. Fred tells me it looks like Siksikpuk. LCF34LfC

Sta 49 - Shublik, chert and blk shale about 500' thick, contains Monotois.

Later measured - Colèen River Section.

End of notes Friday, July 16.

Saturday - July 17

Fred and George to measure section of Shublik along Coleen River.

Allen and I will look at Dev. Reef Trend in Arctic Villege Area.

Sta 50 - Possibly Siksikpuk brick red siliceous shale and gry chert. Sequence is intruded or interlayered w/green fine crystalline igneous rocks near top of hill.

Sta 51 - (Same as Fehlmann Locality 7060) AR071F - Ormiston says this outcrop is loaded w/stromotop. Also many large colonial corals. Some crinoids. Part of sequence is grainstone, bedding is Curva-linear. The hills nearby are Kanayut w/pebbles of vein quarts up to 1" diameter. One hill is phyllitic (Hunt Fork) dk shale w/interbeds of fine-med. grained brn sandstn. AR072F in beds that surround the reef which are limy shale and thin limestns.

Sta 52 - Fehlmann's Crows Nest Section - Unusual limestn conglomerate in this section. Large cobbles 6 to 8" dia. Many are ellipsoidal (possibly stretched by metamorphism) pebbles are dk limestn and algal matted limestns and light gry limestn. The typical Skajit below the conglomerate is med-gry recrystallized limestn w/faint ghosts of corals? brachs?, dense tite. The limestn congl. contains thin beds of blk limy shale. AR073F taken 23 feet above base of conglomerate. Many of the pebbles are tabular w/angular edges, many others are rounded.

Sta 53 - Angry Bumble Bee Creek Section of Fehlmann - Near base massive limestn in Hunt Fork Shale - AR074F - contains Late Dev. corals brachs. The massive limestn contains colonial solitary corals recrystallized, fossils are faint. A very massive buildup w/bedded carbonate and shaley carbonate below. Transitional w/underlying Hunt Fork. The massive limestn is overlain by thin bedded limestn. Picture 10 of Reefs in Hunt Fork shale East of Angry Bumble Bee Creek. Fred and George finished measuring Coleen River Section. Picture 10 shows numerous faults in section.

Sta 54 - AR075L - White fine grain, very clean, well sorted and rounded quartzite. End of notes Saturday, July 17th.

Sunday - July 18

Temp 86°- High clouds - Fred, George and I will look at shales along the Salmontrout River. Allen looking at Salmontrout Type Locality.

Sta 55 - USGS ~~Big~~ JPs - LCF35F - Brachs and corals, probably Permian, 25' blk silty shale and dk gry argil. limestn, probably equiv. to upper part of S. Old Camp Section - LCF36Sr and 37P.

Sta 56 - Dk gry fossiliferous limestn. possible unconformity or disharmonic folding. (Picture by George.) Might be a bedding plain fault. Unit below this break is dk gry dense limestn w/occasional blk chert nods. many brachs. LCF38FC - beds above are thin bedded alternating layers of blk silty shale and blk chert (or siliceous shale) grading upward to dk argil. limestn about 200' thick - LCF39CF - Top of sec. is full of large solitary corals, productids, brachs and crinoids. Unusual blk carbaceous circular structures, some long worm burrows - LCF40F (Sketch 8).

Sta 57 - 150' of dk blk shale w/few dk argil. dolomitic layers, finely laminated some interbeds slightly silty - LCF41PSr, 42PSr, 43fP (Sketch 9)

Sta 58 - LCF44PSr - Blk shale as at last locality some dolomitic concretions LCF45P.

Sta 59 - LCF46F - Dk gry dense dolo. w/brachs, very few solitary corals, blk chert lenses, bottom of section continuous w/top of Sta 56 (Sketch 10)

Sta 60 - Blk dolo. shale w/in terbeds of shaley blk dolo. as at Sta 57, about 100' thick.

Sta 61 - Lithologically like Sta 60, but w/a very few scattered brachs possibly some worm burrows? LCF47CF, The entire sequence from stop 57 above the disharmonic folding appears to grade upward from dk dolo. to shaley dolo. to dolomitic shale w/dolo. interbeds to units that are nearly all dolomitic blk shale. The abundance of fossils decreases upward until ~~the~~ in the

shaley units at the top there are none.

Sta 62 - USGS Pcl Unit - LCF48F - Brachs in interbedded sdy limestn and SS, fine grained brn quartzitic. Below this sdy unit, rocks are lt gry micritic limestn and dolomitic limestn interbedded w/thick layers of brn chert. Found a brach in this unit - LCF49FCL - Limestn "balls" on bedding planes. (Sketch 11) The rocks examined in Stas 55-62 are included on the Salmontrout River measured section.

End of Notes - Sunday, July 18th.

Monday - July 18.

Allen & George measuring Salmontrout River Section, from bedded chert outcrop at head of canyon to junction of Porcupine River and Salmontrout River. Fred and I will look AT Section along Porcupine River toward Ft. Yukon

Sta 63 - Triassic of Conrad. This section was mislocated on the 1960 maps. Rock outcropping here are Salmon color gry weathering banded cherts. Age unknown.

Sta 64 - LCF51FC - Slatey dk gry dolomitic shale w/thin interbeds of dk gry dolomitic ironstone. Some red iron staining. The sequence contains scattered poorly preserved brachs and coral fragments, probably a somewhat metamorphosed ~~Permian~~ Carboniferous (Prob. Late Miss or Penn) sequence in or near a fault zone.

Sta 65 - Gas leak, bubbles in river near N. bank at either Silurian or Devonian carbonate outcrops, causes a large patch of emulsion on river. (Picture) Sample LCF52 taken for analysis. The nature of the emulsion suggests that either condensate or light oil is alsoseeping here. Some breccia in a vertical zone on the face of the outcrop suggests faulting in this area and leak is probably along faults. Fred Hankinson has picture. There is evidence of several fault zones west of this outcrop to the edge of the Yukon Flats.

Sta 66 - Called COS1 by USGS. Interbedded med. & dk gry recrystallized limestn. laminations suggestive of algal structure. Breccia in places. Laminites? LCF53CF. End of Notes for Monday, July 19. Ord.(?)

Tuesday - July 20

Allen and I will finish Salmontrout River Section, Fred and George will measure Canalaska Mtn. Section. Weather clear - 70 degrees.

Sta 67 - Very contorted, faulted and folded blk sooty carbonaceous shale. FCH779PSr

Sta 68 - FCH780 & 781S - in KJs Unit. Sandstn. f-grained med. gry to brn and mottled. Abundant worm burrows, clams locally abundant, wood fragments occasionally. Occasional chert grains, poorly sorted, porous, argil. slabby weathering habit, very thin bedded.

Sta 69 - Sandstn, porous to very porous grained, quarts w/probable weathered K. feld. Fair sorting sub-angular-subrounded, matrix badly weathered-maybe from feld. Css Unit of USGS. Thin bedded one to two feet FCH782L.

Sta 70 - FCH783F - FCH784PSr - Limestn. shale and sandstn. Limestn dk arrenaceous argil. w/occasional chert pebbles up to ½". Abundant brachs and solitary corals, very dirty limestn. Thick bedded and interbedded w/blk sooty shale. Shale beds up to 1' thick. Sandstn coarse to v. coarse grained w/abundant chert grains. Sequence is probably Permian and very similar to ss and sh. at Rat Creek. The SS at this locality is very similar to blk Pcs SS at Rat Creek and much like that at location 69 where it is arkosic. We need to determine the relationship of Pcl, Pcs, Psc, and Css.

End of notes for Tuesday, July 20.

Wednesday - July 21

George working on strip logs. Allen, Fred and I checking Ordovician on Porcupine River for Contact w/Silurian Graptolitic shales. Raining, miserable weather. Ceiling 1500', visibility 6 to 8 miles.

Sta 71 - LCF54Ff - Recrystallized limy dolomite and limestn. Med. gry essentially unfossiliferous. (Sketch 12 LCF55FC. Gastropods, brachs, nautiloids, tetratium? Mottled lgt med gry limestn possibly worm burrowed recrystallized poorly preserved fossils. Beds from which LCF55 came appear to dip steeply to east and are contorted and brecciated. Minor faults with gouge within individual outcrop. Just west of LCF55 outcrop is a well-exposed mega-breccia in a fault zone (100' wide).

In the fault breccia is a large block of [illegible] limestn.

Sta. 72 - Top of Hill. Lgt gy highly weathered [illegible] fossilites and large crinoids. Few poorly preserved [illegible]. This rock was very fossiliferous before weathered so deeply. The [illegible] may indicate initial permeability. [illegible]. LCF56C. This is defineately a coral biohern. Weathering [illegible] identification possible. There are some pentagonal [illegible]. Probably stromotop. but from weathered character of rock, most of this [illegible] is colonial coral. LCF57F. About 200' of rock is exposed here. [illegible] limestn.

Sta. 73 - Med. grained dolomites. Abundant [illegible]. Probably Silurian could be Late Ordovician. LCF58L. Just East of the above [illegible] at same station is a Late Ordovician med. gy [illegible] w/[illegible] fossilites. Other corals abundant gastropods, possibly [illegible]. LCF59F. These carbonates directly overlain by blk sh w/some brnish blk [illegible] of late Silurian age. (Road River) w/graptolites, Monograptus [illegible]. LCF60F also Monograptus dubious. LCF61F slightly higher stratigraphically than LCF60F contains graptolites also. Here is a major unconformity. Must not be any Silurian carbonate in this area. Proceeding eastward [illegible] LCF62FC in carbonate slightly higher than LCF59F, [illegible] to be relief on the carbonate below the unconformity. Proceeding eastward. The carbonate below the unconformity definetely has relief on it here. Contains brachs, gastropods, corals, bryozoans, abundant stick corals. All this rock weathers with a mottled banding light and medium gray. Med. bedded scattered colonial coral heads but mostly individual critters w/mud matrix. Probably not a reef. 100 yds. east of last outcrop, there is a fault zone w/megabreccia many erratic and steep dips calcite veins and pods ½" across. (See sketch 13)

Sta. 74 - Hill Tommy - LCF63L - Chert pebble conglomerate mostly blk & gy cht Very little red cht. Average pebble size ½" largest at least 3". Subrounded few gry siltstone clasts matrix small amount of [illegible], could be

Kanayut or Nation River equivalent.

Sta. 75 - LCF64C - Lgt brn gry sugary dolomite.

Sta 76 - LCF65C - Med. gry recrystallized limestone, dense hard micritic. Dip North 45 West at 5°. Unfossiliferous. Looks like Devonian Dd Unit. Return to Sta. 16 - LCF66P - Megaplants, Calemites and other Mississippian ~~mostly~~ looking megaflora in thin bedded blk shale interbedded w/sandstone, sandstone is clean looks like USGS Unit Pq, blk shale occurs above the SS in this outcrop.

Sta. 77 - SS, white lgt gry very fine to fine grained well sorted clean, slightly micaceous in place abundant crinoids, some clams in gastropods. Some brachs. LCF67FL - Siliceous cement quartzitic, weathers w/red color. Mineralized, proably same interval as at Sta. 16 - The brachs are probably Mississippian.

Sta. 78 - LCF68PC - USGS Pzl Unit. Dk gry blk shaley hard limestone. Thin bedded rhythemically bedded.

Thursday - July 22

George ~~Looking~~ working on logs, Fred Allen and I will check Dls Unit in Spike Mtn. vicinity also will check on Pzq fossils, 8000' overcast, cool.

Sta 79 - LCF69C - Limestn. lgt gry rextallized non-descript.

Sta 80 - Med. and dk gry rextallized limestn crude can't believe anyone found a fossil in this mess. LCF70C also some lgt gry med. crystalline limestn.

Sta 81 - Dk gry limestn. Crinoidal packstn in places. Many brachs - LCF71FC Few solitary corals. Slightly younger Devonian than Salmontrout - LCF72FC ~~Dls~~ Dlc Unit of USGS. Two-hole "crinoid", Late ~~Emsian~~ m or slightly younger.

Sta 82 - Shale, dk gry blk weathers splittery w/interbedds brn gry silty SS. Hunt Fork overlain? by rocks on Spike Mtn. that are quartzite (Noatak) LCF73PSr - In Valley shale as above outcrops and some dense hard dk gry siltstone. Next to outcrop of granite.

Sta 83 - Next ridge over from Sta 82 - Some crinoidal debris and one ammomite? in dk sedimentary volcanic rock. LCF74F - Proceeding to ~~Choke~~ Joe Creek Area. Heavy rain and low clouds. Can't make it. Turning south. Back to Old Camp area to measure Permian Section on North side of Porcupine River. This will

be a continuation of South Old Camp section. The interval between the top of the South Old Camp Section and the base of the Permian Shales across the River is covered and estimated to be 250' thick. There might be structural complications between the two.

Friday - July 23

Sunny day - Allen and I will measure section at Sta. 23 - Fred and George will check rocks at Nelson Bluff and go to Ft. Yukon.

Sta 84 - Med. gry f-xytaline limestn. w/stacks? amphiphora? LCF82FC - Dd Unit of the USGS. Med to thick bedded about 100' exposed. Allen and I measured Salmon Villege Section.

Saturday - July 24

Allen, Fred and I to Eagle to recon. and check on lodge. George working on logs.

Sta 85 - along the Yukon River, Sample AR0113C - Interbedded dk gry limestn and calcareous dk gry shale. Sil. or Early Dev. (?)

Sta 86 - Sample AR0114PSr - Blk shale and very dirty dk gry finegrained SS. Cret or Miss (?)

Sunday - July 25

Allen and George to measure Section at Sta. 21. Fred and I will check Pq Unit and outcrops along Salmontrout River. Weather - High clouds and humid.

Sta. 87 - LCF99CL - Dolomite med dk gry, med to coarse crystalline, laminites, vuggy porosity. Recrystallized and weathered difficult to see original fabric but suggestion of organic shales, Fetid odor, Medium bedded,

Sta 88 - Poor exposure, recrystallized limestone.

Sta 89 - Recrystallized lgt gry to white limestone. Coarse crystalline, massive bedding in ledges. Recrystallization and weathering makes it difficult to see any organisms or structure. LCF100C. This entire ledge Stas. 87,88 and 89 by dip relations should be age equivalent to the rocks seen at Sta. 72.

Sta. 90 - LCF101LC - Med gry recrystallized dolomite. Stacks? Occasional laminites. At this stop we should be stratigraphically 100' above the graptolitic Late Silurian shale that outcrops in the River.

Sta 91 - Pq Unit - Some very clean white finegrained sandstone w/few blk rounded chert grains as seen at Sta. 33 - the sandstone outcrops on the Hills and Miss. carbonate as at Sta. 24 in stream valley. The sandstone is probably by superposition either Miss. or Permian. LCF102L

Sta 92 - Same as Sta. 91. Clean white sandstone, well sorted, well rounded few scattered round dk cht grains.

Sta. 93 - LCF103L - Sandstone white to salmon color, fine to med. grained, subrounded slightly more chert and iron cement than Stas. to the west. Cross bedded.

Sta 94 - Same Sandstone as at Sta. 93

Sta 95 - Dip N50°W at 32° - Blk silty shale. LCF104P Overlies Mid. ?Devonian as at Sta. 84 - and underlies themapped Pq Unit - Contains ~~weakly~~ wiggly small worm trails on bedding surfaces.

Sta. 96 - LCF105L - Very fine almost microcrystalline quartzite, buff color, weathers reddish, This might be Late Devonian quartzite and shale or else there is a major unconformity at the top of the Middle Devonian carbonate w/Miss. or Permian shale and quartzite above the unconformity at this outcrop. There is a suggestion that the quartzite coarsens upward.

Monday - July 26

High clouds, humid, river is rising. Allen and Fred to check Upper Salmontrout River Section. George and I work on logs and Samples.

Sta 97 - Just upstream from Coleen River Sec. Outcrop of highly contorted blk coaly shale, limey shale and shaley limestone. Much marcsite and pyrite? The rocks here have an unknown relationship to ~~sublik~~ Shublik but are probaly Permian and possibly unconformable below the next outcrop downstream. LCF106P. Looked at reported Dd relationship to quartzite at mouth of Coleen River. It is likely that the blk unfossiliferous unit overlies the quartzite but relationship of either to the Dd unit is not clear. Possible faulting in the area as seen in the River at Loc. 36 where Dd? is thrust over a black unfossiliferous unit. Paleo in these rocks as in the Kanalaska Section will help clarify the age of the quartzite.

Tuesday - July 27

We have accomplished about all that needs to be done in the Porcupine River Area, Fred, Allen and George will recon. east of the Ft. Creek section into Canada then north to Old Crow area and back along the Porcupine River in Canada.

Sta 99 - Limestn. dk gry crinoidal wackestn. GWS72LF. This outcrop dips to South and apparently the unit flanks the Pre-Cambrian to the north and east. Carbonate is ~~oliglibie~~ Ogilvie (Mid. Devonian) apparently a thin carbonate unit approx. 2,000' of section over the valley floor (Salmon Fork & Black River) of probable Pre-Cambrian. Alveolites (Two holers) unidentifiable tetracorals.

Sta 100 -(See Sketch 14)- GWS 73F - Trilobite (Silurian or Devonian) Dip S20W at 30° - Limestone, micrite med. bedded med to dk gry Cybele probable Ordovician Sample occurs in Knife Ridge approx 70' stratigraphically below point of prominent ridge. Below sample limestn apparently grades to a good medium grain vuggy porous dolomite. Rocks very unfossiliferous in next valley to the west. A brn buffweathering rock, possible Gossage occurs in saddle.

Sta 101 - GWS74LC - Limestn med brn gry fine-crystalline unfossiliferous.

Loc. 102 - On Porcupine River in Canada. Limestn stromatolitic, GWS75F and approx. 20' stratigraphically below stromatolitic limestn is 1½' bed black shale GWS76P - Sandstone pisolitic weathers dk gry. GWS77LC - dolomite tan-buff good porosity in some beds. Some detritus w/dolomite roams. (Secondary overgrowth) Section overturned. Sandstone, pisolitic - base of section. Dolomites thinly interbedded, buff to Salmon, algal limestn and dolomite w/interbeds of shale, GWS76P - GWS78F in float at mouth of Oolite Creek w/paleozoic clams. Plant frags. in shale in algal matted unit no older than Devonian probably Miss. SS brn, maroon lgt gry interbeds, fine to v. cre grain. abundant red jasper, quartz w/a grn argill. matrix. Tite no porosity or permeability. Some then shale outcrops. GWS80L 15' below GWS79L. See Sketch 15.

Sta 103 - GWS81P - Stopped at quartzite unit. Same quarts. as in Canalaska Section has a basal unit of ss and siltstn and shaley siltstn which is dk brn

thickly bedded with ripple marks. Very minor ~~main~~ vein quartz.

Wednesday - July 28

High wind, rain, overcast. Fred returned to Anchorage. Tents barely standing.

Thursday - July 29

Scattered high and low clouds, light wind. Good day to cross the border and measure section at Sta. 100. Called Repition Ridge. Measured through unfossiliferous carbonate section from Pre-Cambrian contact in river valley to saddle where fault brings in slices of Mid. Dev. rocks w/two hole crinoids. Above crinoidal section there are more shales and carbonates which are probably Pre Devonian and are thrust over Mid. Devonian.

Friday - July 30

Moved camp to the barge. Also put samples on barge for shipment.

Saturday - July 31

Flew to Ft. Yukon for move to Eagle.

Sunday - August 1

Camp is set up in Eagle. Discussed geology of Porcupine River Area. Drank beer in Dawson-Arminston insisted! Wheeler drank coke and water".

Monday - August 2

Chuck Harrison replaced Fred Hankinson for Union Oil, Chuck, Allen, George and I examining Funnel Creek through Road River formations on ~~the~~ McCann Hill. Waiting for Bob's arrival-he didn't show up. Measured section on McCann Hill. Thicknesses are estimated. Significant petroliferous odor in many of the rocks of the Funnel Crk Formation also many vugs and oomoldic porosity filled with bitumen. The Adams argillite does not outcrop here. The Hillard Limestn is a flat pebble conglomerate Moved to the top of McCann Hill (Mon 105) and came down through section to the Nation River Formation and the McCann Hill chert. (See Sketch 16). Could not observe the Road River, McCann Hill contact.

Tuesday - August 3

Allen, Chuck and George to look at Early Paleozoic in Adams Peak Area. I'll recon. for the Devonian to the NW, low broken clouds.

Sta 106 - Adams argillite in contact w/Hilliard. George has notes for measured section. Also, measured section on Limestn Hogback. George took notes.

Sta 107 - Contact between dense quartzite on top of hill overlying a carbonate unit. The carbonate is lgt gry, microcrystalline limey dolomite, unfossiliferous LCF200LC -Thick zone of quickstain material made contact of carbonate & quartzite.

Sta 108 - Dolo. lgt gry fine crystallined, thin laminated and cross laminated some bitumen in vugs and along bedding plains - LCF201L

Wednesday - August 4

Low overcast and raining. Bob arrived. Busy taking pictures!!

Sta. 109 - Looking at Permian shales South of Yukon River. Limestn, silty shaley limestn and limey shale w/abundant Permian brachs. crinoids, bryozoan. GWS225, 226, 227. Probably an angular unconformity near top of hill w/gentle dipping Cretaceous on nearly vertical Permian. Possibly some faulting also.

Sta 110 - Nation River Formation - Conglomerate and SS at base w/pebbles of cht. SS and reworked conglomerate boulders. Mostly silt w/thin SS layers at top. George took notes. GWS228,229,230,231,232. Called Cabin Section. Measured section of Tahkandit limestn. at type section near the mouth of ~~Mission~~ Nation River on Southwest side of the Yukon. George took notes. GWS233-246. Called Nation Section.

Thursday - August 5

Sta 111 - Adams Argillite - base covered. Interbedded calcareous siltstn lgt gry weathers lgt grnish brn burrowed sandstn, dk gry, dolomitic limestn, slightly bedded w/med. bedded sandstone. Section weathers dk gry, unfossiliferous. Sandstn looks like that of Section 3 Brabb, 1967 overlain by Hilliard blk pebble conglomerate. Lgt gry edgewise grading up to limestone w/Oncolites? and some laminated beds med to thick bedded. Limestone with archeocythids, possible glauconites on thin bedding plain partings - LCF202F, some dk cht clasts, 40' of limestn above, the upper limestn does not contain flat pebble cgl. as at the McCann Hill locality.

Some good, vuggy & incercrystalline porosity. Some vugs contain gillsonite or bitumen. Some flat pebble cgl in upper part that has been dolomitized. An excellent trilobite collection was made further downstream in the Road River formation just above its contact with the Hilliard. George took notes.

Sta 112 - Glenn Shale, blk very carbonaceous shale (coaly), w/large (3-4') ellipsoidal dk limey concretions. Concretions contain fossils, Buchia LCF203F, 80' below top of outcrop. LCF204PSr - 5' below LCF203F. LCF206F 15' below LCF205F and LCF207PSr just below 206F (See Sketch 17) Top of outcrop appears to be shale w/a few minor siltstn interbeds, some clean finegrained ss in float along river. The SS float in gullies going uphill. It probably outcrops in trees on hill above. LCF209L (SS float) might be Keenen Quartzite.

Sta 113 - Triassic, dk gry calcareous hard shale and dk gry argill. limestn. Limestn layers contain abundant pelecypods (Monotis) and brachs. and gastropods? Some are pyritized, the shales contain various sizes of concretions. Mostly small disk shaped and globular. LCF210F, two bags - LCF211PSr, LCF212Sr, a argillaceous limestn sample. LCF213F in Tahkandit Limestn. Crinoidal grainstone with brachs clams, and fuslinids?? The Tahkandit appears to dip north which contrary to the south dip in the Triassic and Jurassic that is further to the north and dipping north (See Sketch 18).

Sta. 114 - Nation River shale w/conglomerate lenses.

Friday - August 6

Broken clouds, good visibility, Allen Chuck and I looking at Dev. to the NW.

Sta. 115 - Keenan Quartzite, fine grained quartzitic ss.

Sta 116 - LCF214L - conglomerate, chert pebbles up to 1" diameter. Light green to light gry cht. matrix is med. to crse sand, lgt cht and quartz sandstn. Subangular to subrounded, poorly sorted, mapped as Step cgl. by USGS. - could be Nation River formation. Sandstn is as much as 50% quartz in places. Pebbles are all chert.

Sta 117 - Limestn - med. brn to dk gry. weathers lgt gry, thin to med. bedded, micritic some recrystallized, fine crystalline - LCF215 &216C.

LCF 216 30' below 215. [illegible]oms. in float between two rid[illegible]. Laminated bedding and thin discontinuous bedding, laminites. Argill. plainly dk gry limestn w/calcareous shale breaks between. Two brn gry limestone benches, LCF217C 100' below LCF216.

Sta 118 - Arkosic conglomerate, LCFP218L -

Sta 119 - Ps Unit of USGS. LCF219L. SS, fine grained, clean, porous.

Sta 120 - quartzite, fine grained, lgt gry LCF220L

Sta 121 - LCF221PSr, LCF222FC interbedded blk shale and dk gry argil. limestn. w/abundant brachs some corals, bryozoan, crinoids, one huge unidentifiable gastropod. Dip N40W, nearly vertical.

Sta 122 - Dolomite, med gry siliceous, chertified, stromatolites, algal heads, laminated LCF223LC. Dip N52W at 65°. Abundant stroms. Limestn breccia just above Sample 223 LCF224LC, vuggy porosity in the breccia.

Sta 123 - Chert pebble conglomerate same as at Sta. 116

Sta 124 - Dolomite, med brn gry fine crystalline, hard, dense, tite - LCF225LC

Sta 125 - Sandstn, med gry, fine grained, carbonaceous, plant frags, brachs, good porosity, skelemoldic and intergranular. LCF226F - interbedded, silty, dk gry shale w/worm burrows, LCF227P, 228L - Dip S10W @28°, probably a nearshore deposit

Saturday - August 7

Light rain - Allen, George and Chuck looking at Step cgl. at Type section on Step Mtn. Bob and I working on sections and notes. Allen, George and LChuck measured section at Step Mtn. Allen recollected at Tacoma Bluff (Sta. 125).

Sunday - August 8

Low stratus - high, broken. Chuck, Bob and I will look at Glenn Shale at Type Section.

Sta 126 - Glenn Shale, LCF229PSr, fissile, blk shale w/pyrite bleb[illegible]s, dip N15W @85° carbonaceous, LCF230F

Sta 127 - Dip N15W @ 75°. Shale, blk very carbonaceous, LCF231PSr.

Sta 128 - Dk gry very finegrained silty sandstn. Very dirty. Quartzitic. dk shale above and below. Dip N15W @ 20°. Grades up to a dk gry argil. siltstn, up to a slightly silty blk shale, worm burrows. No evidence of metamorphism. The shales

have higher dip than the sandstn. LCF232PSr. Grades up to thin bedded interbedded dk argil. siltstone and slightly silty shale. The sequence is sheared where the beds are overturned, and this high degree of folding has given a metamorphic appeara to a part of the outcrop. LCF233F - in siltstone just above the previously describe sandstone unit, peleypods, paly sample LCF232 is about 200' stratigraphically above LCF233F - LCF233 probably in Biderman Argillite 50-100' above the quartzite. LCF234A in Keenan quartzite.

Sta 129 - LCF234L - Megaflora - either float from top Biderman or Base Kuthul - LCF235PSr in blk shale interbedded w/dk gry siltstn 30' below massive Kuthul sandstone. The lowest massive sandstone has sharp contact with shale below. The sand fines upwards and there are shales above in Kuthul. The sandstone is fine to med. grained, dk grn gry, poorly sorted, grn grains are chlorite? and serpentine? LCF236PSr 30' above base of first massive SS. LCF237PSr about 100' above LCF236.

Monday - August 9

Sta. 130 - McCann Hill Chert - fat breccia w/bedding plain faults at base. Dk gry crinoidal packstn layers in breccia w/brachs., corals and clams. LCF238F at base in breccia. Solitary and colonial corals. Unit overlain by bedded chert and siliceous shale. This is a good exposure. The USGS reports 895' of section here. Darker shale and chert in lower 1/3rd of section w/some very carbonaceous to coaly shale. Upper 2/3rds is lighter in color but still chert and siliceous shale.

Sta 131 - Sandstn, quartzitic, med. gry weathers brn to dk gry, very fine grained silty, beds 1"-3' interbedded with dk med gry shale, silty and highly worm burrowed. Siliceous concretaions in shale. None calcareous. Adams Argillite worm tubes on bedding plains. LCF239L

Sta 132 - Keenan Quartzite - Quartzose, lgt gry to white, very fine grained, siliceous cmt, some suggestion of cross bedding, probably med. bedded, clean, subrounded? LCF240L - one very questionable fossil.

Sta 133 - Nation River conglomerate - LCF241L - Chert pebble cgl. some coarse conglomerati Sandstone.

Sta 134 - Ford Lake shale, shale med to dk gry, siliceous (porcellanitic), weathers to lgt gry, plant frags, LCF242F - Thin laminated and interbedded w/ss, red to brn, very fine grained, angular, red clay, weathers red-brn. LCF243P - no more than 50-100' of section below unconformity between Step conglomerate and Ford Lake shale (No limestn seen in Step cgl. here). LCF244F in ss at top Ford Lake shale. Covered interval of 100 - 150' blk shale below. LCF245P. Thin about 50-100' covered between this outcrop and top of Nation River formation.

Tuesday - August 10

Fourteen straight days of rain and the same today with fog. Fog lifting enough to measure Calico Bluff Section. George, Allen, Chuck, Bob and I measuring Calico Bluff. George took notes. 550' vertical relief by aircraft altimeter.

We measured 688' of section here which seems to be more accurate than the 1300' reported by Conrad. Sequence is mostly shale, many crinoidal packstns at base, several thin crinoidal packstns interbedded w/the shale and silt throughout the section. Many of the shales are very silty, have worm traces and burrows on bedding. Bob and I will finish the base of this section by boat on the river.

Wednesday - August 11

Broken clouds, 4,000' - will measure Jones Ridge Section

Sta 135 - North side Jones Ridge - here the carbonates of the Jones Ridge are in contact w/PreCambrian volcanic rocks (see measured section). The rest of the section will be measured to the east.

Sta 136 - Dip S@60°. Will measure remainder of Jones Ridge Fm. and part of McCann Hill at this spot, and composite w/Sta. 135.

Thursday - August 12th,

John Borge at Eagle Lodge has a piece of Devonian? coral reef rock that was given to him. It's float from the Tatondak River-probably came down from Canadian side. Large corals up to 4-5", Chuck left camp by auto. George and Allen left on Ft. Yukon Air Service to Fairbanks; released the helicopter at 1:00 o'clock today.

Friday - August 13th

Bob and I will go by boat with Sarge Waller to finish measuring the Calico Bluff section. Rain, will have to do this tomarrow.

Saturday - August 14

Finished measuring Calico Bluff Section, started in the Ford Lake Shale and base and measured up to previously measured point (See Calico Bluff Section)

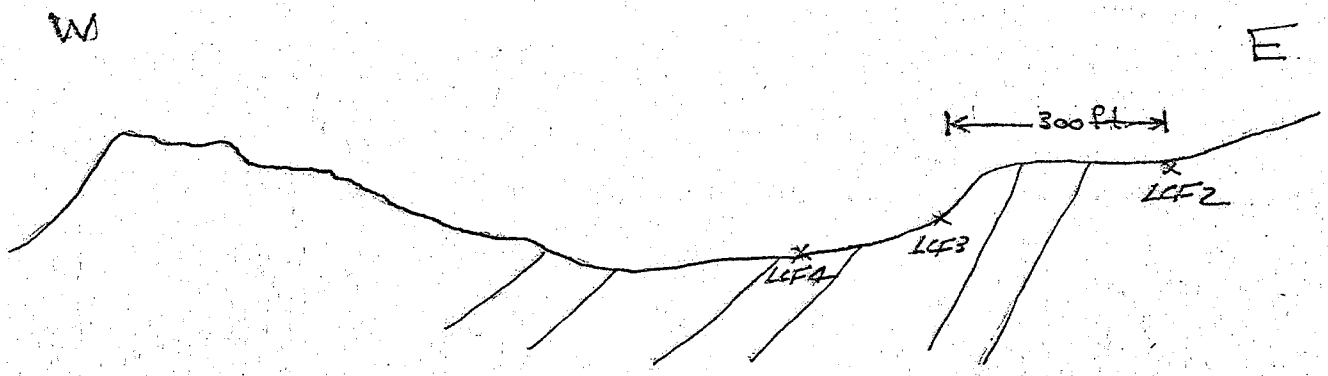
Sunday - August 15

Bill and Bud will arrive today for the grand tour.

Post note:

John McKeever returned to the oil seep in the Porcupine River on Sept. 24th. The boatman reports other seeps in the area. Will check on this next year.

End of notes for Amoco Field Party - Summer 1971, by L. C. Furer



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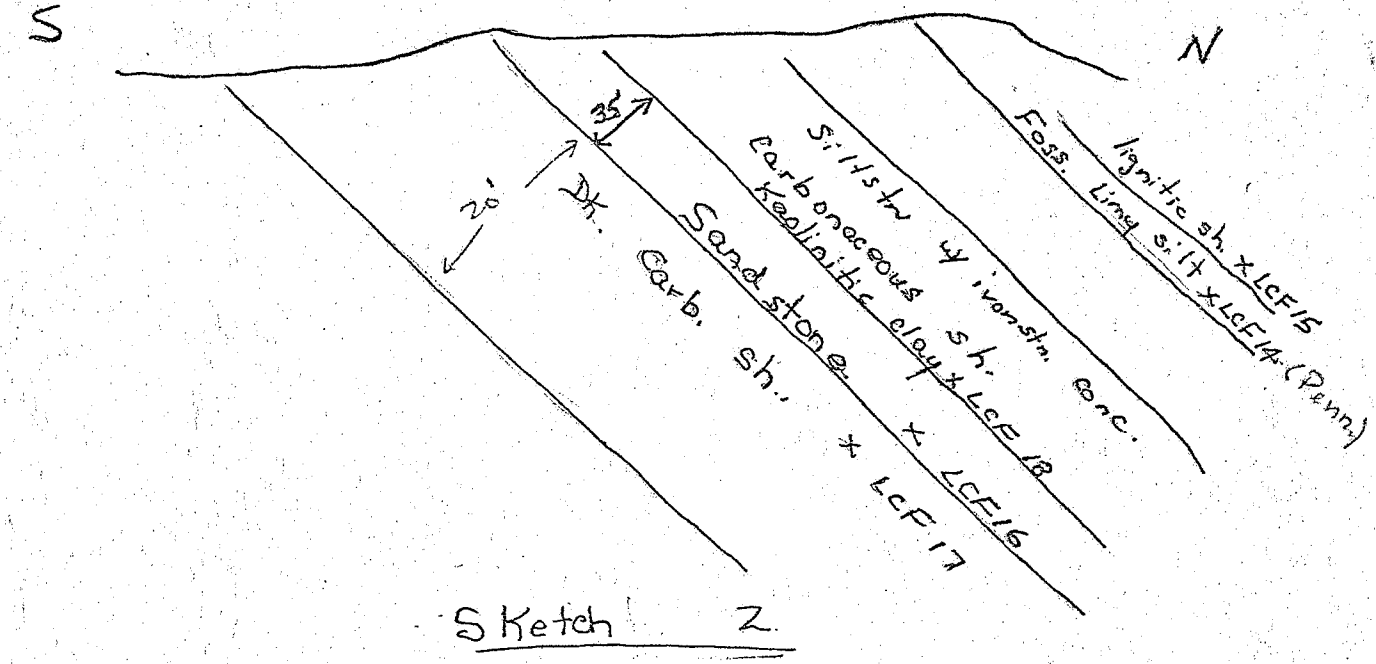

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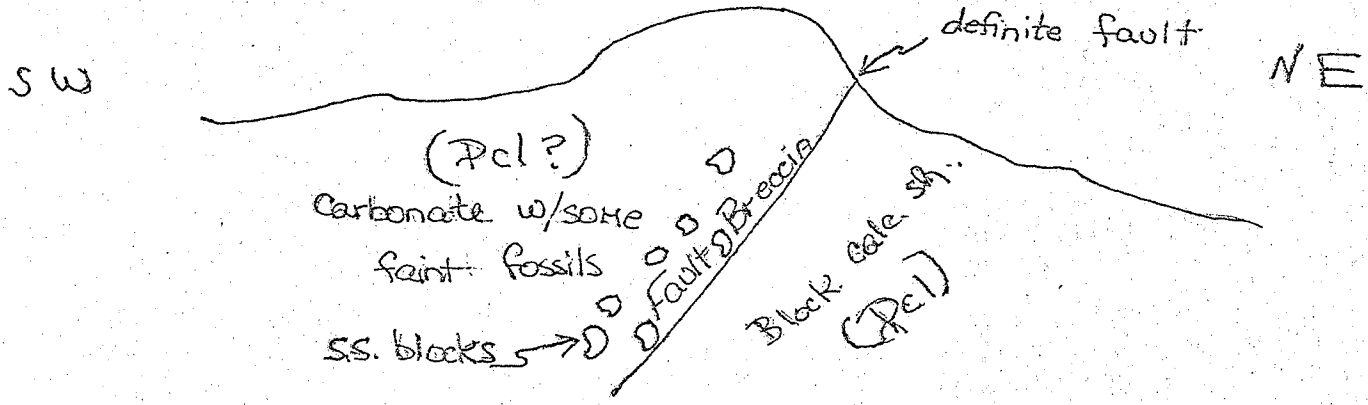
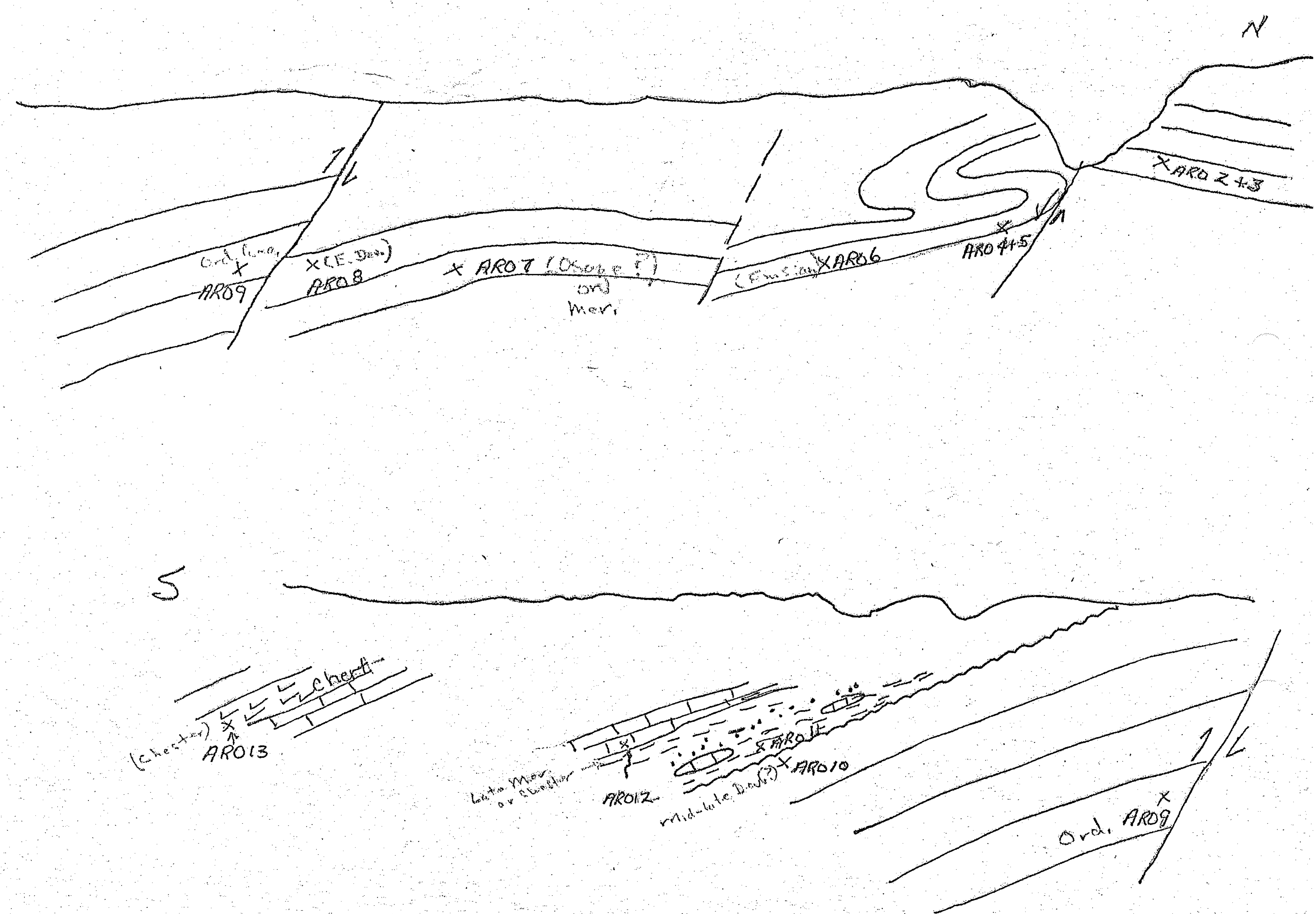


Sketch 3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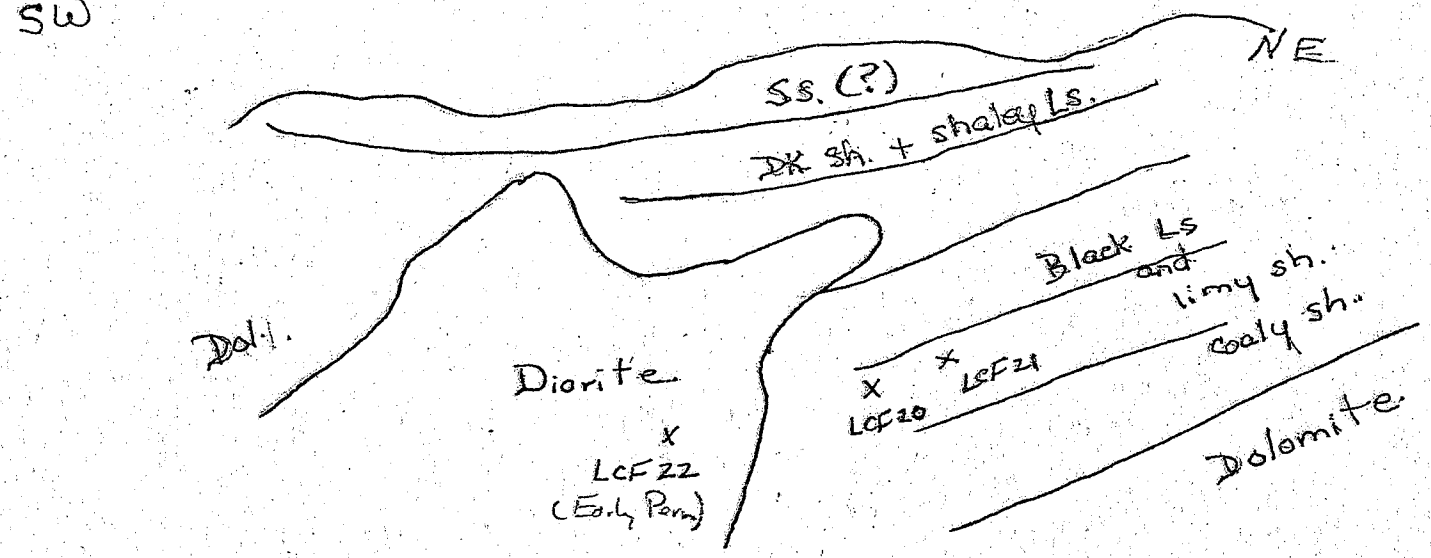
X ARO 2+3
ARO 4+5
X ARO6
(Fusian)
+ ARO7 (Osage ?) or Meri
X (E. Dev.)
ARO 8
Ord. (ma.)
ARO9
S
Chert
(Chester)
ARO13
ARO12
X ARO 11
X ARO10
Mid-late Dev.(?)
Ord. ARO9

Sketch 4



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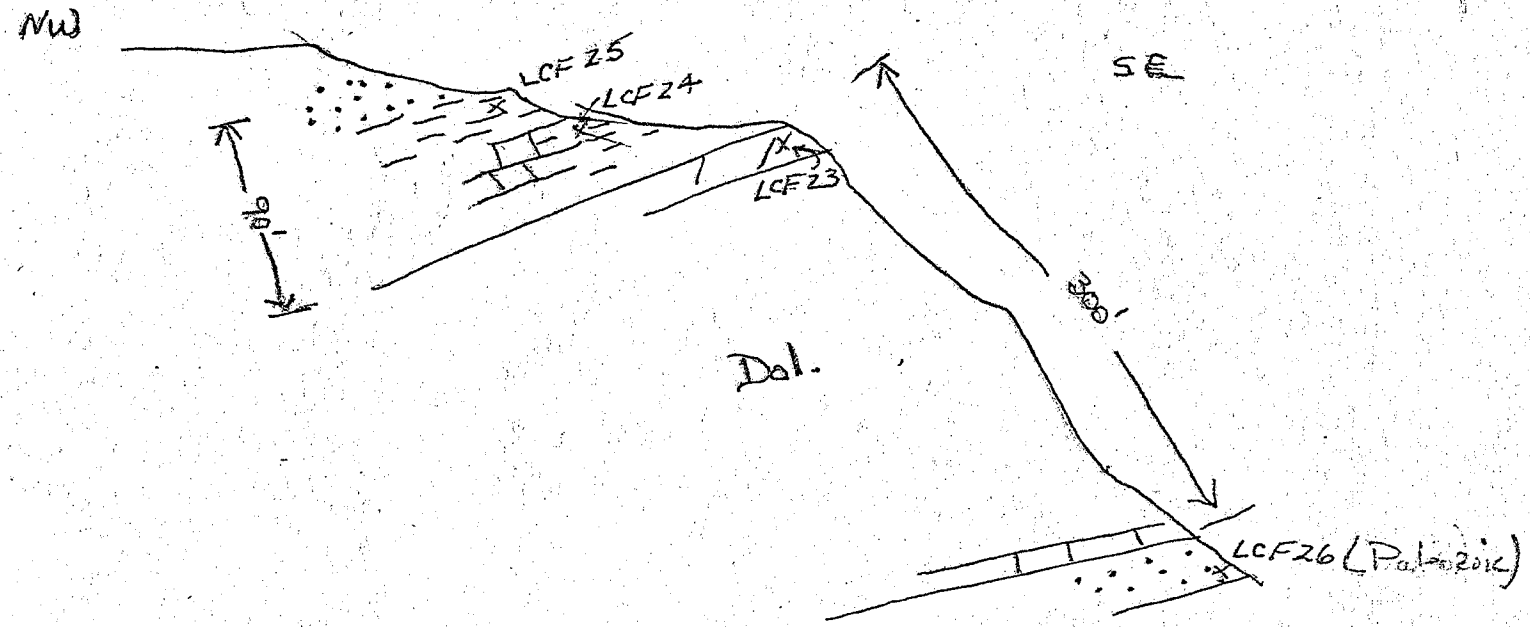

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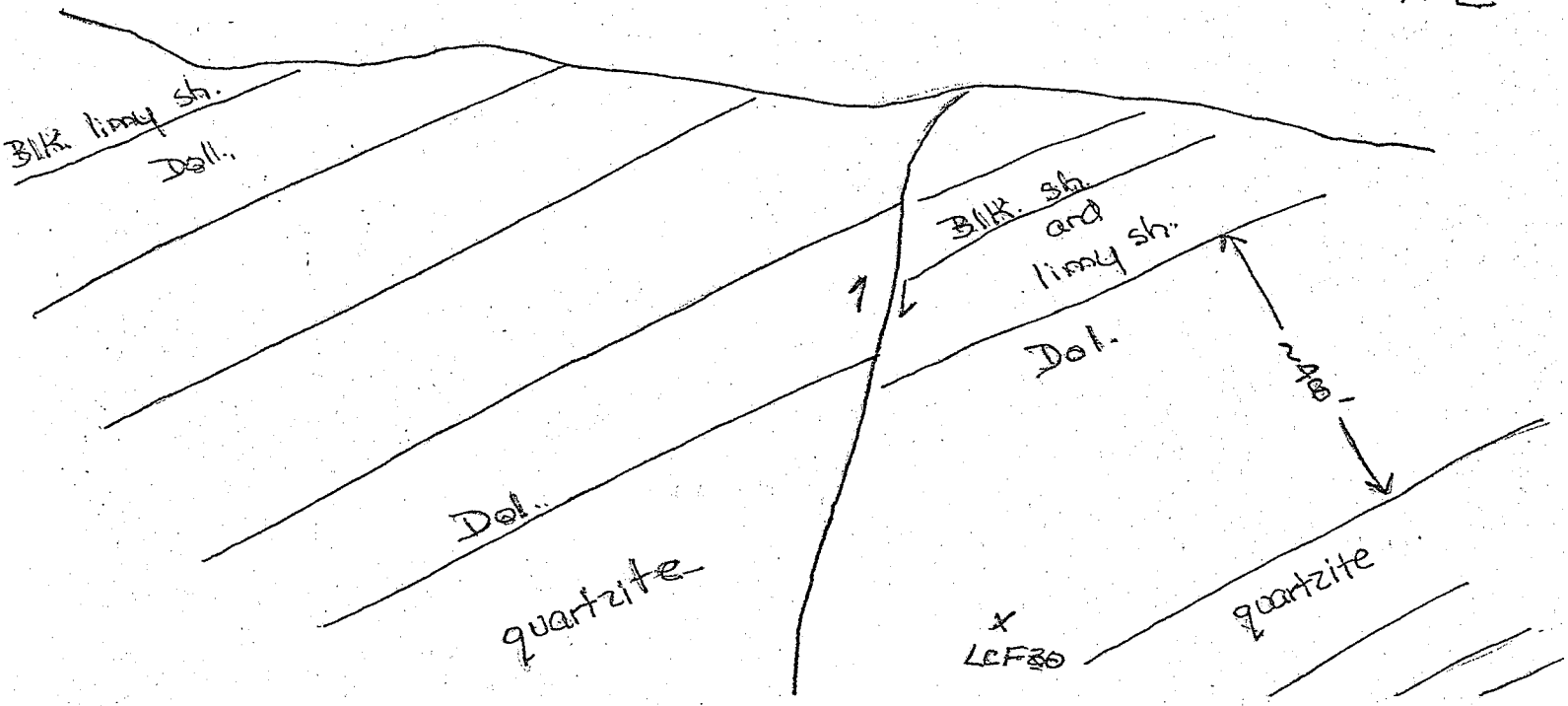
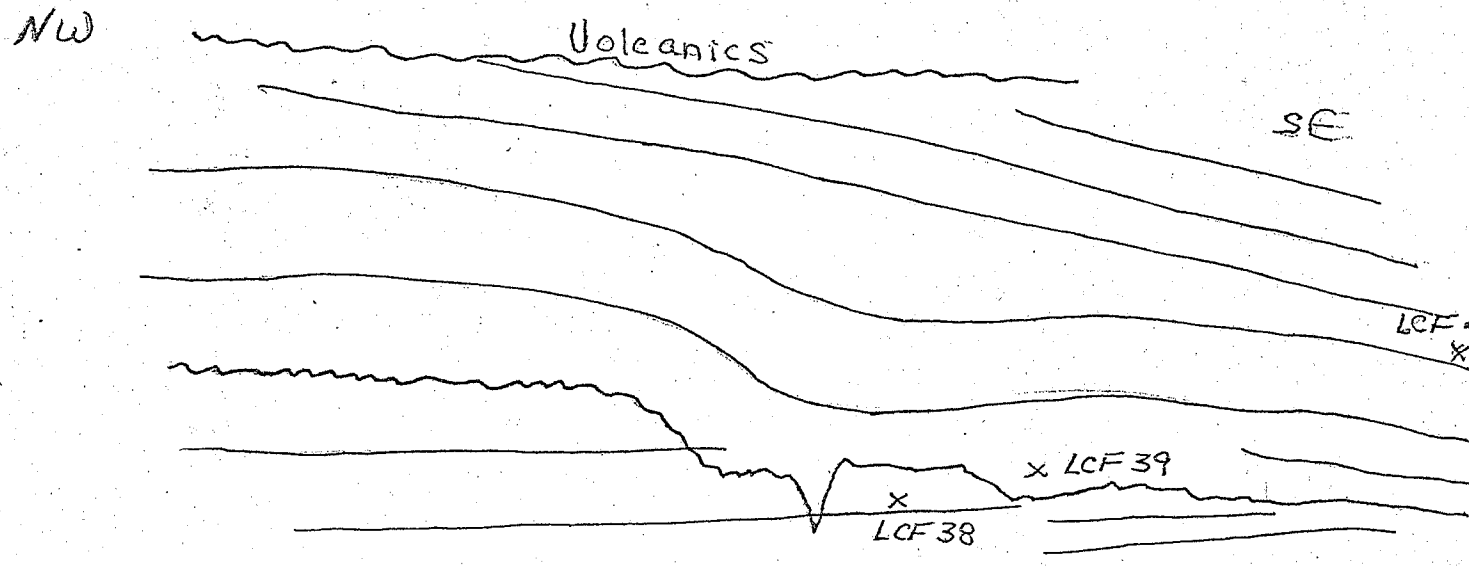


Sketch. 7



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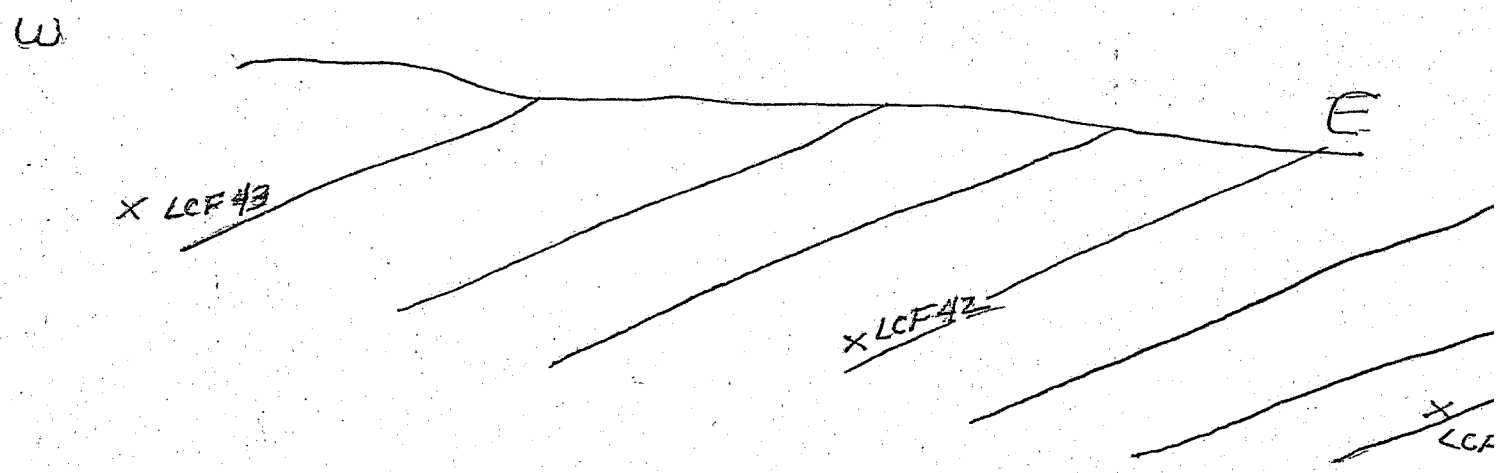

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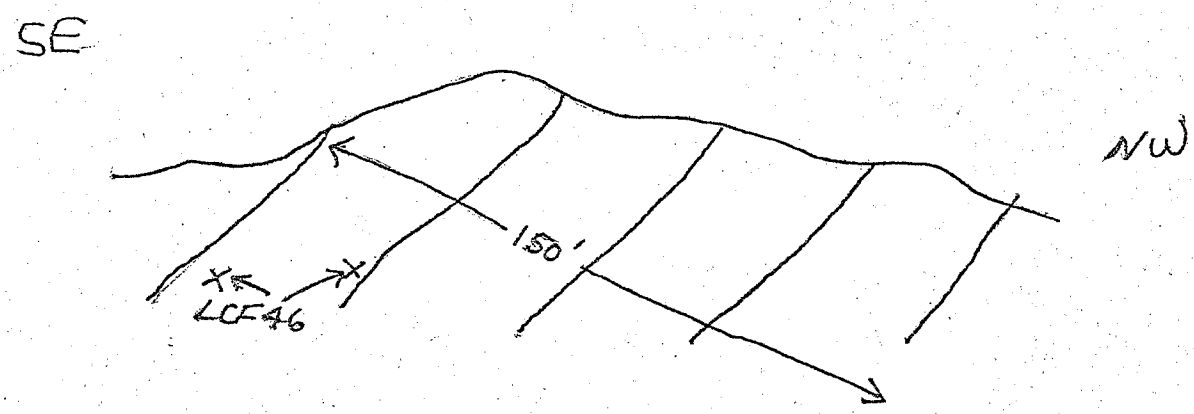

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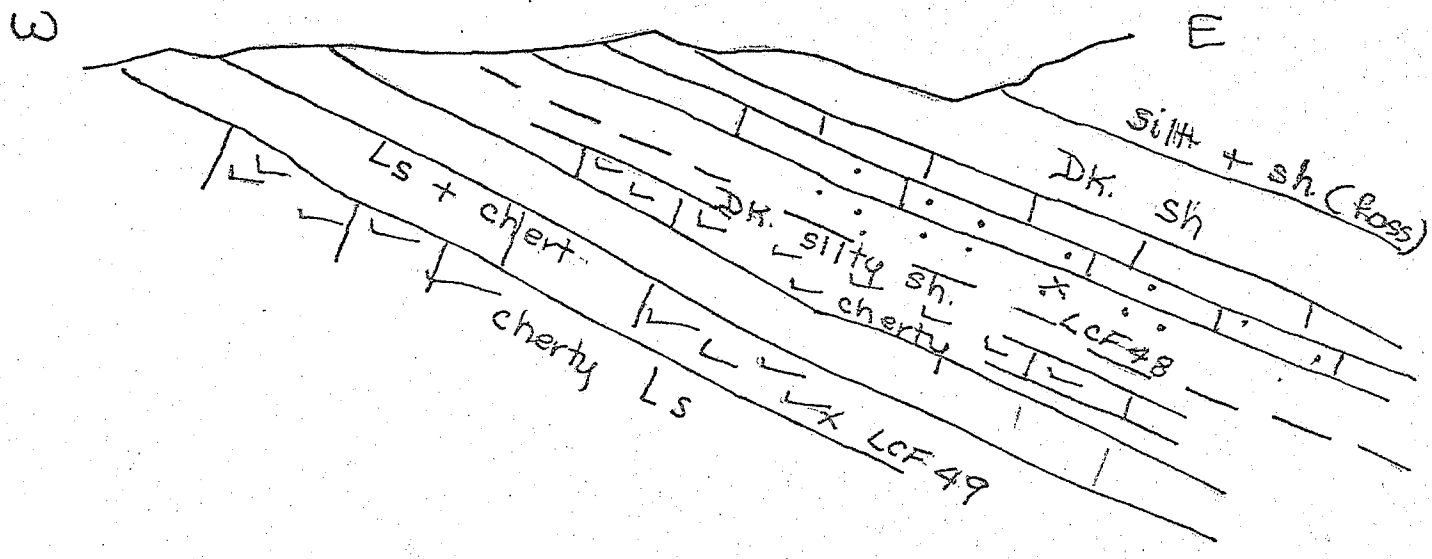
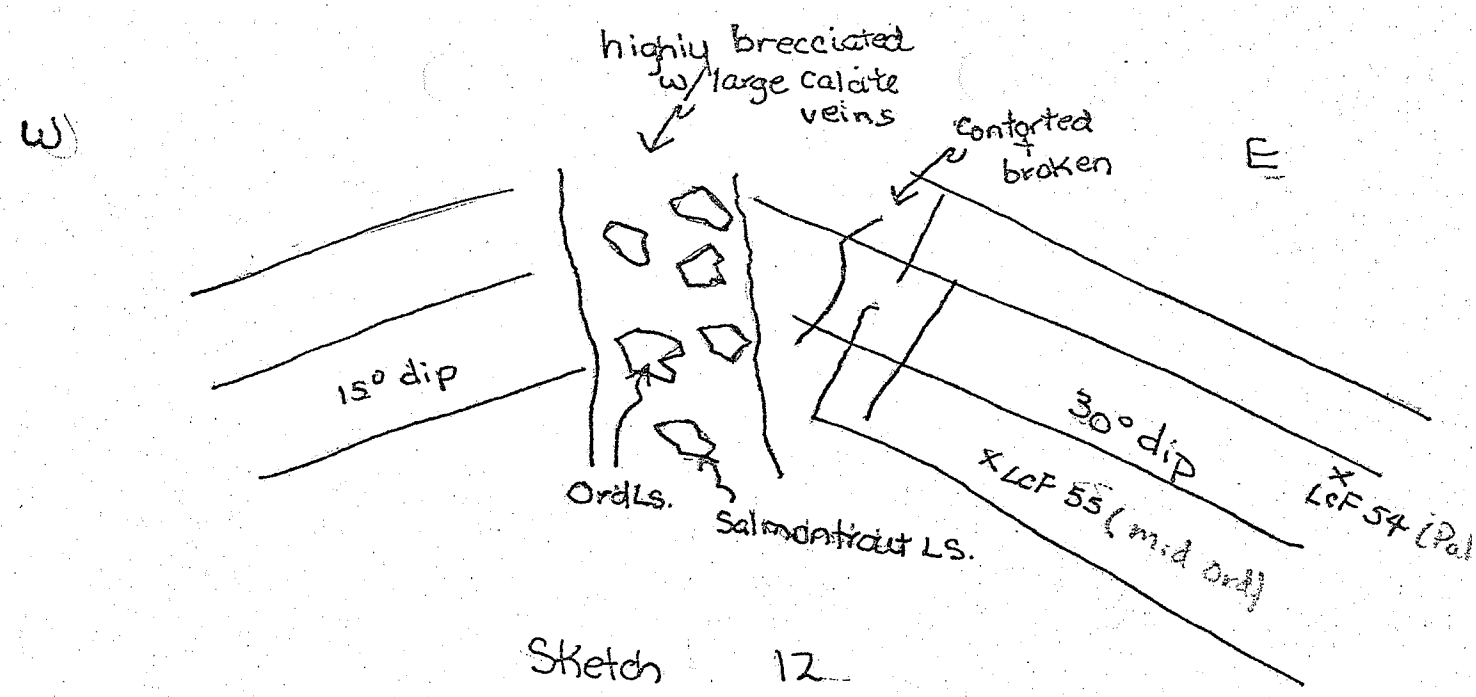


Sketch 11



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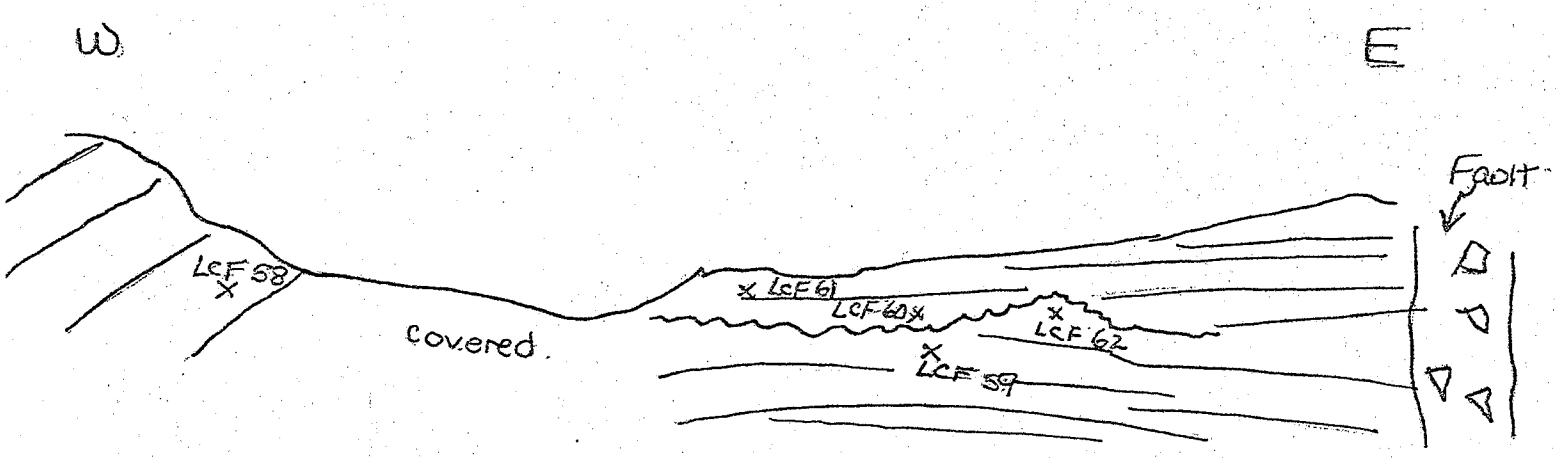
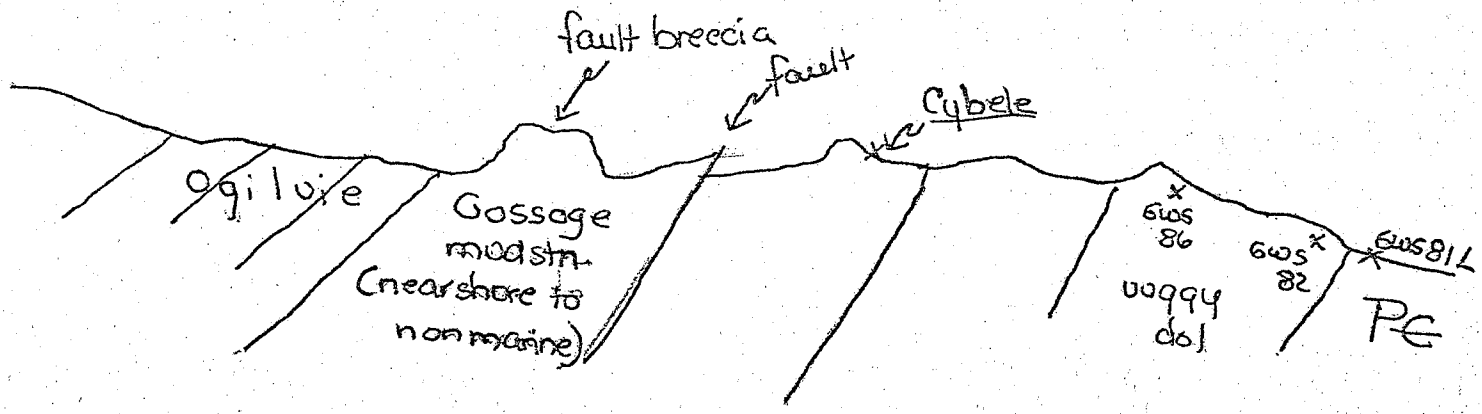
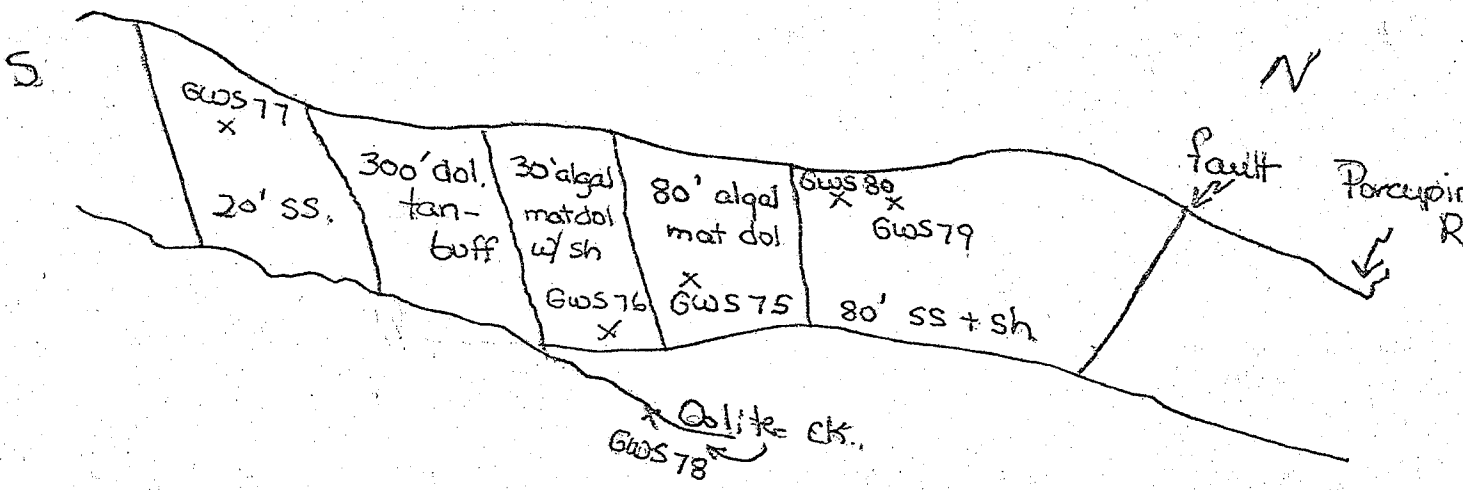


LCF 62 - mid-Late Ord.
LCF 60 - Late Sil (Ludlow)
LCF 61 - E. Dev. (Lochkovian)
LCF 59 - Ord.

Sketch 13



Sketch . 14



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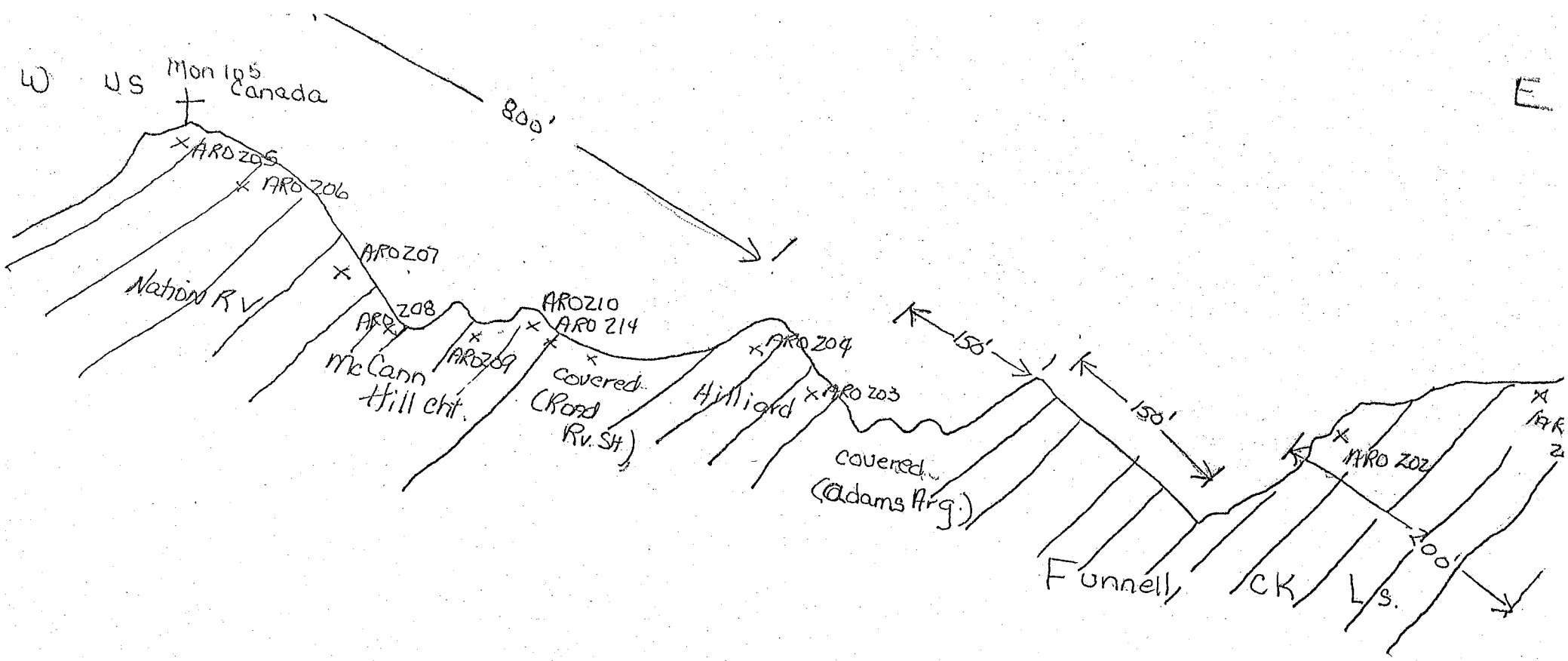
W
US
Mon 195
Canada
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800'
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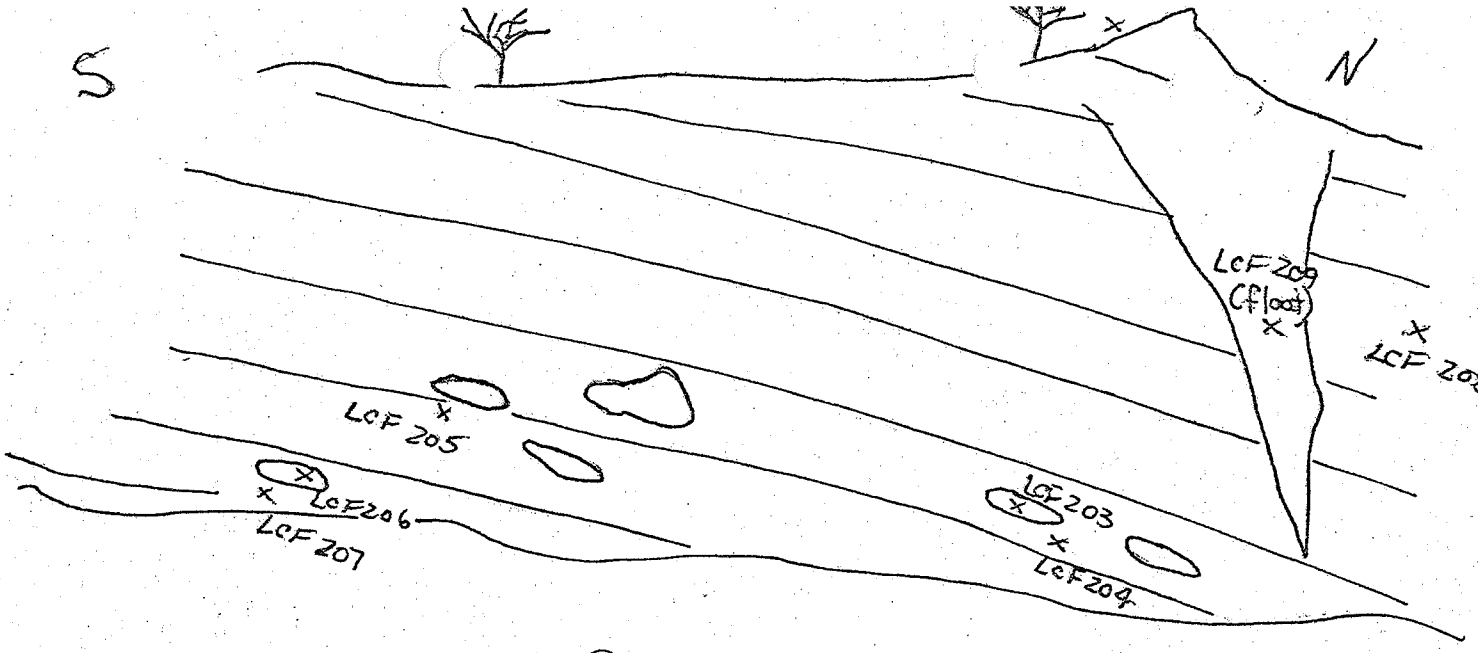
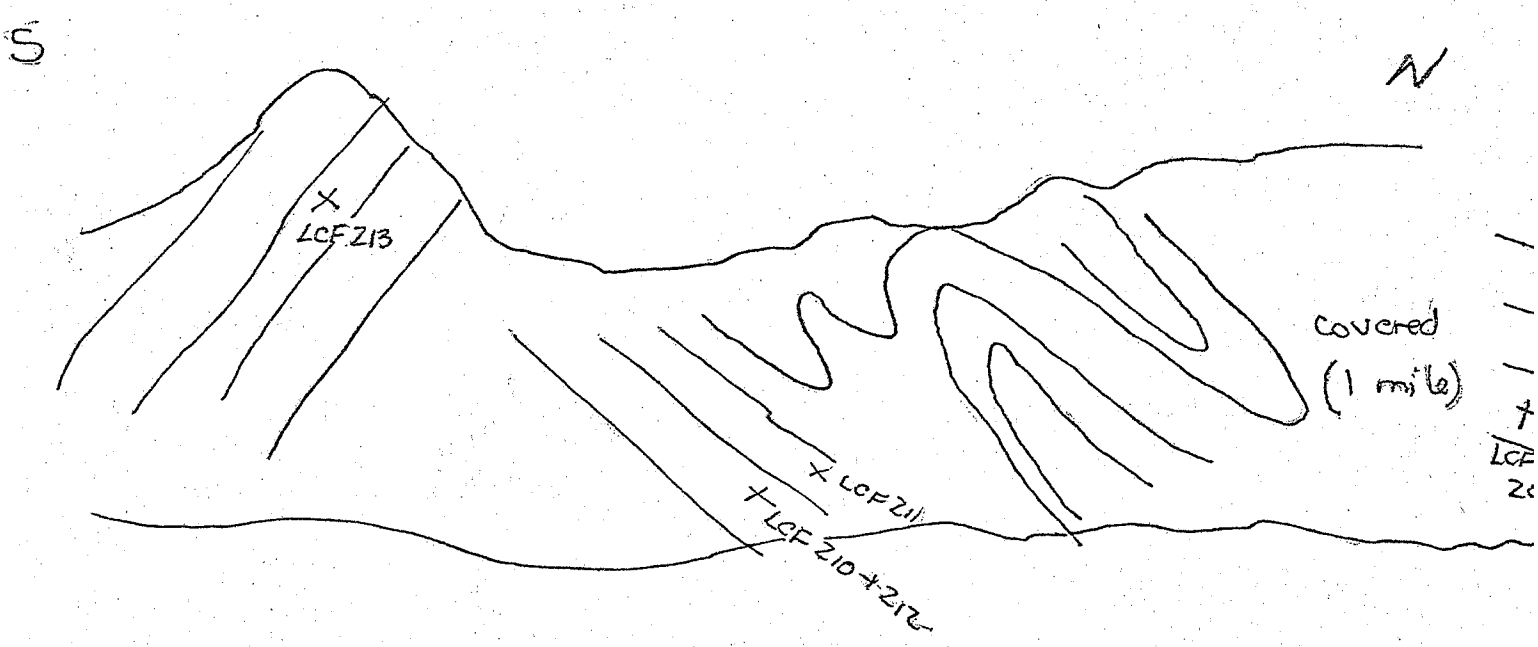
ARO 206
ARO 207
Nation RV
ARO 208
McCann
Hill Cht.
ARO 209
ARO 210
ARO 214
covered
CRoad
Rv. St.)
ARO 204
Hilliard
ARO 203
150'
150'
covered
(Adams Arg.)
Funnell
CK
L's.
ARO 202
700'

Sketch 16



Sketch 17



Sketch 18

FURER

ORMIST 1971 FIELD NOTES

July 12th

Arrived camp 6:30 P.M. Rich has already measured Salmontrout section but will go through again for graptolites and trilobites.

July 13th

Went to finish measuring USGS J section of Dd which had been begun before my arrival. Walked through lower part of section, a few thin shale interbeds contain plant frags which look post-Silurian. Upper part of section contains beds of stromatolites (LLH) some Amphipora and Stachyodes - must be Devonian. Notes by Furer.

Check another section of same unit about 2 miles upstream (just below burnt paw). Lower part of this section has good Stachyodes and one specimen of new? thick walled stick strom. Sample here labelled AO-1. Rest of this section much altered and recrystallized.

Began section of Penn. - Perm. just south of Old Camp on east side of Procupine. Section is AO-1-71.

Bed 1. Thickness 2.5 feet. Dark gray, med. xstalline, brachiopodal limestone, med. bedded, highly fossil. contains Syringothyris, Dictyoclostus, Cancrinella, "Spirifers" - good silicified block collected. Bed is probably Penn., possibly Perm. - saw no fusulines. 2.5

Bed 2. Thickness 5'. Ls., med. gry., med. xstalline, packstone abundant blk. chert nodules and lenses cannonball concretions circ. to elliptical; concentric ring structure chert crinoid ls. Ls. thin to thick bedded abundant brach., Dictyoclostus, Cancrinella, Subansina, Syringothyris, Brachythis, Ditomopyge, and spirifers, clams, ostracodes. Penn. or Perm. cumulative 7.5

Bed 3. (7') ls. drk. gray packestone, very abundant cannonball chert cone up to 1' diameter, bedded black chert with ellipsoidal structure fossil collection near top, Cancrinella, Subansina, productids, Licharewia?. Cumulative 14.5.

Bed 4. Dark gry. ls., packstone lenses and siluzers black chert, conodont sample and foram sample at base. Megafossil sample 3' up - chonetids probably Neochonetes.

Megafossil sample at top bed 4. Bed thickness 9'. Cumulative 23.5.

Bed 5. Pebbly sandy, calcarenite with chert pebbles. Thick bedded, lt. gry, one layer of small chert nodules. Abundantly fossiliferous - bed is 14' thick. Fossil collection at 4' up. Probolium?, Jeresania?, clam, bryozoa, etc. Fossil collection at 12' up. Cumulative 37.5.

Bed 6. 9' thick, basal foot is blocky gry. calc. sandstone, fossil - collection, above this are interbedded buff siltstone and shale. Thin chert layer above ss. Probolium + Neochonetes, Waagenoconcha?. Cumulative 46.5.

Bed 7. Cherty calc. mudstone, blocky, gry. with stringers of calcarenite (brachs.) at 10' up - fossil collection bed thickness 17.5 feet. Cumulative 64'. Streptorhynchus big productid - Kochiproductus?.

Bed 8. Black shale interbedded with blocky black mudstone + siltstone. Palyn. sample at base 34' thick. Cumulative 98'.

Bed 9. Dark gry. Calcisiltile, blocky med. bedded., scattered chert stringers and blobs. Rare brachs. 52' thick. Cumulative 150.

Bed 10. Pebbly calcarenite with cross bedding, thick bedded, gray, brachs and clams, fossil collection at base. 11' thick. Cumulative 161.

Bed 11. Block fissile shale some mudstone beds. Palyn. sample at base. Fossil sample at 10' up. Aviculopecten + Neochonetes. 140' thick. Cumulative 301'.

Bed 12. Shale, med. gray, fissile, base of unit marked by limestones weathering clay - poor exposures. At 40' up siltstone beds show large Zooplycltus markings. Total thickness 110'. Cumulative 411'.

Bed 13. Dark shale interbedded with dark gry. , med. bedded calcisiltites, weathering gray. Thickness 83'. Cumulative 496'.

Bed 14. Base marked by resistant buff weathering calcisiltites, resistant. 30' thick at base of first of two large exposures. Overlain by interbedded shale and thin calcisiltites. Palyn. sample 35' up - in shales. Fossil sample at top calcisiltites Straparallus, etc. At 90' up - fossil collection Caninia and productid. Total 105'. Cumulative 601'.

Bed 15. Dark fissile shales with calcareous concretions, small up to 3" diameter. Palyn. sample at base - float nautiloids - unidentifiable. Fossil collection - float - Liosetollea, Licharewia - bed 15. Total thickness about 130'. Cumulative 730'.

Cover - 50'

Bed 16. Fissile gry. shale with infrequent siltstone beds, fossil collection at base - Martinia - Permian palyn. sample at 60' up.

At 60' fossils - Licharewia - Permian. At 70' concretions with cornularids - collection. Shale at 80'. Total thickness 135'. Top of section. Cumulative 915'.

July 14th

Section on west side of Porcupine across from Old Camp (diagram).

Black micritic ls. with 2 holers and Styliolina - ARO-2 sample also ARO-2 for conodont. ARO-3 source rock interbedded with black carbonaceous beds Grades up into carb.-sooty shales and interbedded lignitic beds (canol coal?). ARO-4 - SR. ARO-5 - Palyn. About 150' of carbonaceous section exposed - contains Gasterocoma bicaula in ls. beds. Middle Devonian - these beds must overlie Salmontrout ls. across river - relation to Dd not clear because of faulting. ARO-6 - C + F - two holers. ARO-7 in higher section fossils in siltstone look Miss., collection includes Eumetina, Aulopora, Michelinia (or Pleurodictyon). Higher in section ls. beds reappear - these lack two holers - fragmenting brachs. are indet. - made conodont collection ARO-8 - Miss.? cross fault. Dd. ARO-9 has Amphipora in dolomites, med. gry. finely xstalline, about 200' of these beds, algal ~~not~~ at top of unit - ARO-10. Unconformity with relief on top of unit. Overlain by shales, ARO-11 palyn. sample - ostracodal and gastropodal ls. - ARO-12 overlie shale with poor brachs. probably L. carboniferum - also ARO-12 F.

About 50' more section exposed consists of chert, and tripolites chert with Kochiproductus?, productids, and Neochonetes - must be Penn. ARO-13 F. This strikes just beneath section ARO-1-71 across river - about 50-75' of covered interval probably. This part of section can thus be combined with ARO-1-71 section.

July 15

Returned to Salmontrout section to collect megafossils - tying into HRL section; bear chased me off in A.M., returned with rifle P.M.

ARO-57 15' above base of Silurian shales (in HRL unit 2) graptolites - M. cf. dubius and Linograptus.

ARO-58 calc. shale 5' above 57. Small collection brachs and graptolites.

ARO-59 - ls. = HRL 17. Brachiopods and graps from shale just above.

ARO-60 - dirty ls. - fossil sample taken but more seen = HRL 18.

ARO-61 - graptolites in shales M. cf. hercynicus? at 44 to 45' up section of Lane.

ARO-62 F - crinoidal wackestone 1' thick = HRL 21 at 53', reached for Warburgella here and in HRL 20 without luck - found only Coenites, Salopina and other brachs, very sparse.

ARO-63 F - ls. crinoidal wackestone 1' thick poor brachiopods. No Warburgella - there is poor grap float below this ls. (faulted ls. of HRL) use HRL collection = HRL 24 at 65'.

ARO-64 F - concretionary ls. in shale with Leptaena, brachs., ostracods and gastros, at 86' up in Lane section.

ARO-65 - concretionary (large up to 1') ls. with some brachs. at 115' up.

ARO-66 - dense micritic ls. = HRL 32 at 153'; shales above simitimzed but no graps.

ARO-67 - Salmontrout ls. 5' above base rich in brachs., Proetus cf. sp. , Acrospirifer, etc., large blocks.

ARO-68 - tentacs. at 189' up collection.

ARO-69 - tentaculitids at 204' up.

ARO-70 - at 230' up tentacs. - collection.

July 15 Fort Creek Section- notes by GWS

July 17

Reconn. to north with Furer. Stopped at reef east of Old John Lake.

ARO-71 - fossil collection = 7060 stroms., Hexagonaria, 3 other colonials, Atrypids, good buildup 75' with curvilinear bedding, strom. up to 2' across, sits in shale.

ARO-72 - crinoid bearing shale surrounds reef (fossil sample) whole mass underlies congl. which is presumably Kanayut.

Visited Crows Nest Section of Fehlmann party. The sequence here is unusual not at all comparable to other Skajit localities. A thick ls. cobble congl. rests on presumed Skajit (diagram).

ARO-73 F - Sample from bedded ls. 23' above base of congl. Contains poor brach. looks like Cyrtospirifer also for conodonts.

Angry Bumblebee Creek - Climbed up section to massive coralline

buildup which rests on Hunt Fork shales.

ARO-74 F - in Hunt Fork near base massive ls. coralline buildup. 74 F contains Phillipsastraea, Atrypids, Alveolites, many brachs - Frasnian; buildup contains Tabulophyllum?, Thamnopora, Alveolites.

July 18

On south bank of Salmontrout River 1/3 mile up from mouth. Beds overlying top of Salmontrout Ls. are exposed.

Siltstone and shale purplish brown weathering reddish brown. Bedding planes with tentaculitids interbedded with silty ls., contact with Salmontrout Ls. is conformable.

Sample of shale and siltstone for tentacs. and palyn. - 4' above Salmontrout ARO-76 F.

Limestone bed (dips 26° S) at 7' (equald Churkin's sample 933) sampled for conodonts and fossils - ARO-77 F.

ARO-78 F + C - good ls. bed at 10' up contains brachiopods Leiorhynchus?, other rhynchs., atrypid, - saw no two - holers - sample for conodonts and fossils.

ARO-79 F,C - at 33' up good packstone, crinoidal ls., medium bedded, gray, weathers gray; probably equivalent to Churkin's sample 972.

Roll 2 - photo 7 is picture looking downsection with sample bags on beds 78 and 77 and a small bush on top of Salmontrout Ls. beds dip toward viewer.

ARO-80 F - Interbedded ls. (crinoidal packstone) and darker shale (float only) interval poorly exposed - much cover - Ls. sampled 80 F at 45' up. At 75' up float consists of dark, siliceous shale, and dark calcisiltite. Same at 90'. Covered interval 90'-122'.

ARO-81 P+C - at 122' up brown calc. siltstone - palyn. sample and gry. veined crinoidal limestone - conodont sample.

ARO-82 C+F - at 130' up - ls., crinoidal packstone - two-holer, button stroms. and hexagonaria. From 130 to 155' largely covered with black shale float only. Section is faulted here and slice of Salmontrout is present as drawn on Churkin's map (see on map).

Above Salmontrout there is 30 foot exposure of black shale

ARO-83 - Palyn. sample 30' above base of shale exposure overlying fault. How much section is omitted or repeated is not certain.

ARO-84 L - 15' above shale sample the dolomite unit Dd rests with apparent conformity on slightly crumpled shales - dolomites include dark gray and very lt. colored (biege) finely crystalline dolomites with little or no porosity. Unit certainly resembles Dd of J section - lith sample at base. About 40' of dolomite is exposed.

END SECTION

July 18 - P.M.

Returned to Salmontrout Ls. section.

ARO-85 F - 280' above base HRL section (between HRL 37 and 38) - Fossil sample for brachiopods.

Photo of unbedded buildup at 780' in HRL section, roll 2, photo 16.

ARO-86 F - At 940' up for tentacs but don't really see any. Only tentacs were in fault slice of Salmontrout seen this A.M. - N. acuaria.

July 19

Flew the Klepper 5 miles up the Salmontrout to begin Permian section in brown cherts which form one of Furer's stations of July 18.

Section runs down section stratigraphically, beds dip about 30° to the S.E.

ARO-87 - Ls. wackestone.

July 20

Finished Salmontrout River - Furer kept notes.

ARO-112 F - sample at top of Salmontrout beneath Dss - check for tentacs.

July 21

Worked USGS locs. D + E on Porcupine. Found U. Ord. with Silurian black shales unconformably on top. Also deeply weathered ls. on top of ridge that looks like Salmontrout.

LCF-59 F - Upper Ordovician - gastros., Paleofavosites, nautiloids.

LCF-60 F - Silurian black shale - M. priodon n. sp., M. dubius?.

LCF-61 F - about 20' higher M. fritschi alaskaensis, others.

LCF-58? F - deeply weathered ls. with crinoids pentagonal (star) axis, Favosites, brachs., tetracorals and stromatoporoids. Very probably Salmontrout.

July 22

D ls. outcrop - Ls., recrystallized, coarse grey, no obvious fossils - LCF-69 C.

Checked USGS fossil loc. 14 on Coleen Quad. from which a Cambrian? trilobite was reported - pounded for 30 minutes, found nothing.

LCF-70 + 71 - D ls. unit - a dark ls. with two holers, one coral - Gypidula, Spingerina, Atrypa, Dalepina, nautiloids, strophs - probably late Emsian.

July 23

Salmon Village Section. Lower Devonian - interbedded red and green shales - porcellaneous dolomites.

LCF-83 - Devonian fish = W-2-70 section. Siegenian.

LCF-84 - below 83 - clams and ostracodes - still Devonian.

LCF-85 F - ostracodes like W-2-70 section - 3' above 83.

LCF-91 F - tentaculitids, Nowakia parabarrandei.

LCF-93 F - two-holers crinoidal wackestone.

LCF-94 F - trilobites, Delthyis - Gypidula, Eifelian?

Next sample from flight down section.

LCF-95 F - Lepidocyclus and Isotelus silicified.

July 24

Measured Linear Ridge Section with Self - his notes.

Sequence is:

Ord. - gastros.

U. Ord. - corals

Silurian with Coenites

Silurian shales and ls. with Kirkidium.

Lower Dev. shales.

Salmontrout Ls. 480' thick - no two holers seen. Faulted.

July 25

Checked out upper reaches of Salmontrout River with FCH to estimate thickness above section measured by boat.

ARO-115 P+116F - are from the same shaly horizon 80' above LCF-48 F - Neochonetes - rich ss. beds. 116F has Neochonetes, Antiquatonia. Total thickness above chert is 130'.

+100'

+40' cover

+50'

+80' to "unconformity" - really disharmonious folds.

Collection 117 F,C - contains Lophophyllidium, Leorhynchoides - immediately below disharmonious break - equals LCF-38 F,C, loc. 56.

60' of rocks in cliff

30'

40'

100'

20'

cover 60'

55'

cover 40'

50'

120'

-120'

+120'

+130' - last outcrop on 1100+'

fault

Plotted section in A.M.

July 26 P.M.

Returned to Salmontrout Ls. section. Brachiopod collection at ca. 400' up. ARO-117 F contains Cyrtina, Quadrithyris, Karpinskia?, atrypid, stroph., rhynchs, etc. Spingerina - Siegenian.

Renumber ARO-118 F.

July 27

Reconn. in Canada just north of 66° 30'. At about 66° 36' N., 140° 25' W., long section from Tindir to Ogilvie is exposed.

Loc. 99 - sample GWS-72 - Alveolites, two-holers, indet. tetracoral Ogilvie Fm.

Loc. 100 - Middle of section - Ls. with few fossils - collected Cybele Ordovician - GWS-73.

P.M. measured Oolite Creek section - notes by Self

Higher in section are reddish weathering gray mudstones and siltstones beneath Ogilvie (roll 3 - photo 3). This unit looks like Lower Devonian at Salmon Village section and defines another Siegenian shoreline.

Sta 7
170'

August 4

Takhandit section - on Michigan Creek anticline - measured down from top Takhandit.

GWS-233 - top 1' - Mégousia

Pterospirifer

24' base of Takhandit is glauconitic pebble congl. with horridonids and Kochiproductus.

August 10

Measured upper part of Calico Bluff section (notes by GWS) sampling all decent limestones for C, F, and f. Lower section will be gotten by boat by Fehlmann and Furer.

August 11

Measured section of James Ridge ls. in two parts - lower section from Precambrian to M. Cambrian archeocyathid bearing beds (GWS-263 F) and upper section about 2 miles east on ridge from Cambrian? through trilobite bearing Ordovician (GWS-304 F) to U. Emsian, two-holer bearing grainstones. Some Silurian (crinoidal columnals with pentagonal axial corals) is possibly present.

July 29 Measured Repitition Ridge Section 66 37 N, 140 20 W (Yukon) with LCF and GWS, notes by GWS. Tindir to Ogilvie with repitition of Ord. in upper part of section. Good marginal marine Gossage Fm. in this section.

August 2 Measured McCann Hill (monument 105) section- ARO sample designations, notes by Furer, transitional sedimentation between McCann Hill Fm. and Nation River Fm. Lousy exposure makes lower part of section (Cambrian-Silurian) of little value.

August 3 Limestone Hogback Section - notes by GWS, 3 trilobite collections from Hilliard Fm.

August 4 Cabin & Nation sections- notes by GWS

August 5 Hard Luck Creek Section- notes by LCF (lower part) and GWS (upper) Fehlmann blows mind and opens trilobite quarry GWS 247F
Isolated exposure GWS 254C between Road River Fm. and Nation River may represent McCann Hill Ls.

August 7 Step Mtn. Section - measured Step Congl. with GWS and CH , notes by GWS.

①

14/June/71 Clr, Scatt clds, rain shwrs. Temp ≈ 38-40°

Fehlmann, Rich Lane, George Self, and Hankinson departed Anchorage on Wein Flt. #001 at 7:00 AM Arrived in FAI 9:50 AM. Interior was supposed to have Charter loaded + ready to go but they didn't know anything, Amoco's expeditor, USI, was contacted and did get things straight. We met Andy (the cook) + Joe Silva, the Bull cook, and had lunch. $2.95 Fred Branch helped get the ball rolling for us. We departed FAI at 2:07 PM in a heavy otter and had a DC 3 follow us with the remainder of supplies. Arrived Arctic Village 330 PM to find a new snow covering all the Mtns and our camp location (1 foot thick). Set up camp on South end of runway. Radio does not receive; changed antenna position 3 times. No work. Hit the sack at 12:30 AM. Cold, USI leaves a lot to be desired in furnishing equip.

15 June

9AM awoke, drizzly, cldy, cont w/ setting up camp. Pilot Glenn wheeler + Mechanic Carl arrived with an H-1100.

Talked to Nichelsons at Arctic Village and got message through for resupply + odds + ends USI freight. At 7 PM Ft Yukon Flying Serv pilots arrived with message from McKeever who was concerned. Sent mail + messages out w/ plane, Finally got through on radio (poorly) on 3411 to Ft. Yukon. Snow leaving the valleys fast but still heavy on Mtns to the south too. Clr + cool at 11 PM.

16 June 71

8AM, Still snow on hills, Commo w/ Ft. Yuk Took off at 11 AM, Looked at DL + Dsk unit ad Location #1 where Dl is a fault zone underlying Dsk. So far geol. is complex structure to the southwest. Flew to Ft. Yukon - Return 4 PM. Saw Horace Black there.

0014

Spot location #1 6/16/74

Walked Dl and Dsk contact zone along major Fault zone. Dl? unit extremely fltd & folded. Picture #2 Rich Lake. Opposite Smoke Mtn. Base? of Dsk recryst. lms. Dl is brn & grey cale silst + ss, with ≈100' interval of rusty brn, v-c gr greywacke ss. (Distinctly different)

Spot location #2 6/17/74 Isolated Dk – mostly rubble

FCH 635 Dk = ss, v.f.-md. gr,

Spot location #3 FCH 636 – Dsg unit.

– V. dk gy silified ss. qtz – v.f. and grn. md gr gry chert grns. rubble semi-insitu.

Spot Loc. #4, JM, – FCH 638 Geo – outcrop bdded but igneous.

Spot loc. #5 JPC – FCH 639. dk gy thinly lam ch. – isolated outcrop. I think on map JPC & JM are reversed.

Spot loc #6 FCH 640 M_L

Lisburne? Lms dolomitic, recryst. H_2S odor. Chert. md gy. Location is mostly rubble.

*(omitted sample FCH 637)

2

We flew into Canada – to check M. Hougen's fuel cache of 14 bbls. Not there or we couldn't find site.

Spot loc. #7 FCH 641 (possible bugs) in Dl lms.

Lms is mostly rubble, brn, v-finger. sl. meta w/ qtz stringers. FCH 643 is Ds, meta for metamorphic grade analysis.

Observed scatt pieces of breccia (very much like fault breccia) near contact)

SP. Loc. #8 FCH 643. Dsk where it appears to be the top of the strata. Md gy lms. recryst. with scattered lenses of chert cong. clasts are average 1/8" – up to 1/4" angular to rnded. FCH 644 Ss, v.f. gr, (Ds) md gy, immediately overlying Dsk. It appears that Ds = Dk? Ds may just be a finer grn facies of such. Located a good M_L – Mk – Dpf – Dsk section on Wind River – will work tomorrow.

18 June 71

- Rain, low clds; Took off @ 2:30 PM to look at some southern exposures. when weather permits ~~Wx perm~~

Sample [8001] LF Reg. - Bk chert finely lam. nich!

" [8002] P+Sr. in Blk shaley slate of Ps location. unit.

SP Loc #10. Dk gy ss + gwacke + med brn ss + sltst, dk gy shaly sltst. [8003] L in Dgw unit.

SP Loc #11. [8004] ~~Grader~~ Dk gry + grn, f-gr + aphanitic pillow lava (Definite pillow structures are abd. Bdg indistinct in Pzv unit.

SP Loc #12. [8005] - grn ign?, seute or sil. ss

- also - altered bedd chert, def. bdg planes.

SP. Loc. #13 Dsg unit - med gy ss w/ arg + graywke looks, vf-med grn. [8006]

Loc #14 [8007] - Ds unit. Congl. highly metamorphosed, Blk cht clasts stretched - possible Dr equiv?

19 June 71: Fehlman, Self, Lane, Harrison, Clr, 50°

Section: Wind River.

Top = Quartzite, chert, f-med gr. silic cmt. v.f. lam. down section is alternating beds ss (f-med gr. cxt well sorted, well rounded, and w/ abd. brachiopods, gastropods, pelecypods.) occ interbedded congl. with clasty ironstone + bl. chert. - with ... bl. shale. Probably Kayak. Then abd ... with shale, overlying dark grey (single corals up to ½") biostromal carbonate buildups which are surrounded by bl. shale. Is this carbonate buildups in lower Hunt Fork or in the Skajit. Below this slope with carbonate and bl. sh. to a vy th lms (Skajit)?

West Ridge cont. Samples 6031 — 60052

Abbreviated Stratigraphic Discussion

(separate yellow page) for general description

[illegible] Creek Section

Kenyah + Grand Mc

Wealth - Hashman, Self, Lane. high overcast

temp. 55° - Feldmann recovered all day.

Very similar section to E-24 last yr. ≈ 650M.

- lith indicates slightly basinward from

northern exposures. Very little sandstone

6/21/71 Crow Nest Creek Section

High overcast, cool. DOMAS, FOHLMANN & HANKINSON off & SW to check Skajit Section in Crows Nest Creek area. SW¼ R25E, T16S ARCTIC QUAD

Total Thickness 2500'

- 4 main units

60' - Kanayut - Cobble Congl.

590' - Kanayut & Acut Fork interbedded

246' - Limestone Congl. - 8" Lmst clasts max

1680' - Skajit.

General Discussion:

Airborne 7:30 AM
6/22/71 Clr, cool -(45-50°) sl. hazy.
Henkinson, Fehlmann to Red Sheep Creek
SP Loc #15 [FCN 645] K.P. supposedly in
P_3 unit. Bl. ch - nizhu & silicified so
much it looks like chert.

Started South Red Sheep Creek Section
R. Fehlmann + Henkinson
Started 90' on top of Lisburne below
KB. Top of Lisburne has abd fauna
with Dictyoclostus (Pennsylvania). A covered
bl silty shale interval overlies Mz & grades
up section. Section for PTK is very
similar to Shublik Mtns. PTK interval
of slty sh, shly silts, occ calcisiltite
similar to Joe's Ivishak @ Flood Creek.
Abd biogtic calcisiltite concretion with
Ceratite brachiopods.

6/22/71.
Henkinson & Fehlmann returned to the Red
Sheep Creek and south toward
Tetsyeh Mt. in an effort to find a good
Hunt Fork shale & Kanayut section.
To the north in the Sheep Creek section and
south, (Tetsyeh Mt) very distinct green, and purplish
maroon shales, and mudstones characterize
the ~~Kn~~ Hunt Fork. There does not appear
to be an interfingering of Dk & Hf
in these areas. The Dk distinctly caps
the DHf and at location #19 Cobble
Conglomerate (chert) is present with
f-med gr qtzite in Dk. When
comparing the Hunt Fork to the north
with the Hf in section ① to the southwest
the section to the southwest is black shale
with carbonate. To the north is red +
green shale - (Is the basin to the
north? (or) is this shallow water???
terrigenous material from an nearby
emergent area.

SP Location #16

Kanayut - Qtzite - v-f. cr grn, silica cmts

- similar to Du way south to Arctic

FCH 647

SP Locatn #17

Maroonish Purple & Green Shale of

Hunt Fork, FCH 648

SP Loc. #18 FCH: 649. MK. Bl. shale.

SP Loc #19 FCH 650 _ Cobble

Cong. Chert, Kanayut !!!

SP Loc #20, meta shale. of

Hunt Fork FCH 651

NORTH RED SHEEP CREEK

4/23/71 26°C, Clr, St, hr 39.

Airborne 7:30 AM. Fehlmann & Hankinson to Red Sheep Creek to measure Kanayut. Measured Kanayut & Hunt Fork (1380') including 680' Kanayut.

Lower 1/2 interval is conglomeratic – varicolored chert cobbles up to 5" commonly to 1-2". Abd qtz pebbles & cobbles. Large & small scale X-bedding, & multidirectional channelling. Congl thickly interbd. with ss & occ thin silty shales. Below 680' of Dk there is 700 of D_{hf} which is dominantly green & red shales. (Color is probably from metamorphism?) The lower 80' of Dk is optically metamorphic & resembles a shale at a distance. A fault zone is interpreted to be responsible for this appearance.

Wherever we observe Dk as a prominent capping rock it is a f-gr qtzite with ch. congl. lower section grading down into bl, sh & sltst of Dhf.

To date, the following summary of contacts and section is made.

1. Hunt Fork – Skajit Wind River
2. Kayak – Lisburne Smoke Creek
3. Crown Point Creek - Skajit - Hunt Fork - Kanayut
4. South Red Sheep Creek Tcls – Lisburne
5. North Red Sheep Creek Dk, Dhf
6. E. Red Sheep Creek Ml – Mk, Dk

Today G. Salt & R. Lane collected xx in Ml at Sheep Creek section.

— Flew to Ft. Yukon in P.M. Called Tina @ 9 PM. No answer! Drat.

6/24/71 Clr - 70°

Hankinson, Self, Laird

South Fork Flat Rock Creek Section

Location: NW 1/4 T10S, R29E

Began measuring Ml from highest peak - Crinoidal ls, thin with interbedded chert lenses, nodules, lenses, Total thickness ≈ 1100'. Lower 1/3 of Ml becoming darker over ≈ 200 in lower part & oil saturated. dk gray, pkstn, fine grn.

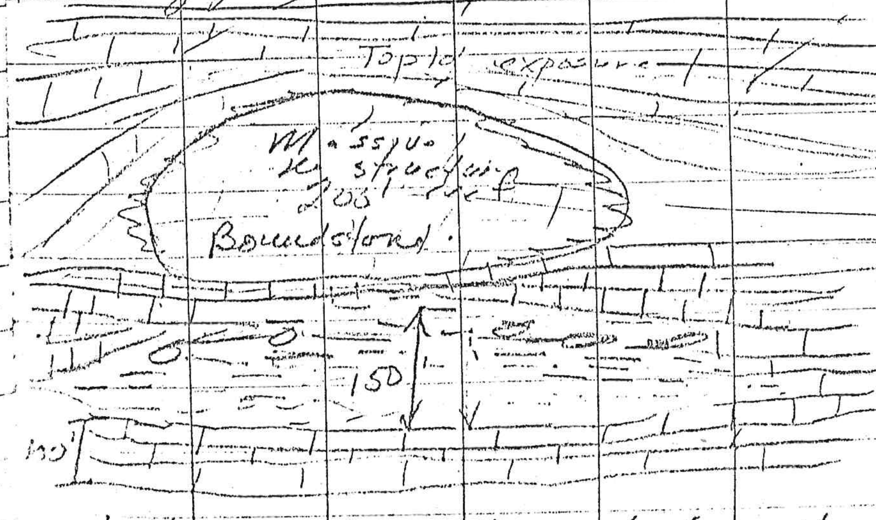
Measured 150' below. All shale.

Ml & Mk contact abrupt - not gradational as usual.

Thoughts - is Neruokpuk = Hunt Fork - at least in part. (or at least, it appears that the U.S.G.S mapped several units below the Mk as Nk if it was meta to any extent.

6/25/71 Clr. 69° (18°c) (ptly cldy - high)
Feldman, Hankinson, Lane, off @ 7:15 AM
to the west for recon and strat sections.
Spot Location #21 in Dif unit.
FCH 652 L, C, 653 C, 654 L, C.
This is probably Skagit ??
Spot location #22, FCH 655-660 L, C, f
in Dif unit - prob - Skagit - med dk gy,
recryst. ls.
Spot loc. #23 FCH 662 Conf. Dk. meta.
+ FCH 663 L - Red phyllite (Dhf) found
in Dsc unit probably = Dc + Dhf.
Spot Loc #24 FCH 664-669. in Dhf unit
(Skagit) - appears thin- to thick bedded, some is
boundstone w/ abd bryozoans, corals, stromatolites,
sol. corals, brachiopods, V. possible reef mass
Spot loc #25 FCH 670-674
Stromatoporoid - whole reef is made up of
this fauna - very recrystalline, vy hd to
distinguish - Colonial corals up to 1/4" rare.

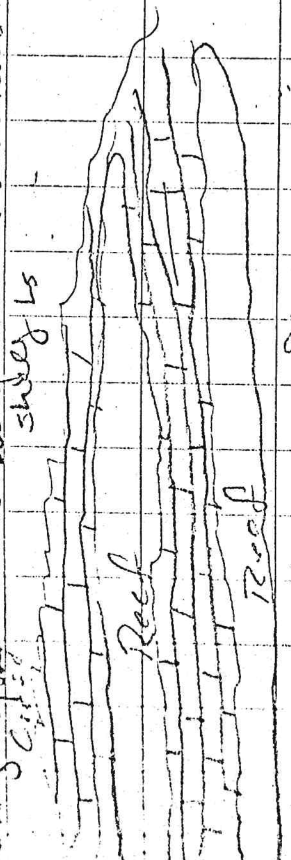
small outcrops of med gy fissile shale
outcrop near "reef" cores.
FCH 675-94 Angry Bull Bear Cr. Trail
Sp loc. #26 - also a strat section
part of section is the typical reef core, below is
dk gy. fine gr limestone with petroliferous odor.
Beds below "core" are 1' to 3' with abd
syringoporoid? coral, thin shaly lms
are intercalated throughout - Outcrop is
highly fractured w/ qtz crystals growing everywhere
The smell of petroleum is very present on outcrop.



O-clasts in sh + mdst. are Ls (orange brn weathering. fresh - dk gy w/ abd fossils + are prob reef debris

there is a vy good possibility that what has been called Skagit Ls actually Hunt fork reefs + Ls bedded in the lower part.

Directly across the valley are reef exposures;
Reefs make sheer wall cliffs.



* The Skagit bioherms & patch reefs outcrop in an ESE — WNW trend, & appear to thicken to the south. This is because in Hunt fork along your creek there were be [illegible]

Alveolites are abundant & are they are found often times growing on stones.

No question that the Skagit is Frasnian reefs in the lower Hunt fork.

SP loc. #28

Patch reefs similar to Sp loc 27. FCH 695-96 Stromatoporoids & Alveolites

Sp location #29 - northeast across small stream from SP loc. #28. Interbd D_s + D_{rp} immediately above Skagit biostroms. Also in this valley, it is quite evident that there are abd. patch reefs (500' wide) as well as large Skagit ones. FCH (697-698) in Shales + Ss.
- Also some small chert lenses in Skagit.

Sp loc. #30 FCH 700 - in Dsk - it's MARBLE. Forget it charlie brown.

Sp loc #31 FCH 701 - marble - (Dsk)

Sp loc #32 FCH 702 marble

Sp loc #33 FCH 703 marble!

6/26/71 High ptly cldy, 60°F.
Another good day.
Fehlmann, Haskinson, Self - off at
7:15 to the east.
SPOT LOCATION 34
FCH 704 - Kanayut - Ss, v.f.-c grn,
Spot Location #35. [FCH 705]. Dk - Ss + Congl.
Ss. well sorted, f-cr, no silt, Cong-
well pebbly, qtz + chert. Excellent
reservoir w/o (without) silica matrix.
Sp loc #36 [FCH 706] Kanayut - f-grnd.
well rndd + clean w/ silica cement.
[FCH 707P] - Ss Sh.
Sp loc #37 [FCH 708 Geo] - f-md gn grn
mafic,
~~Spot location #38~~

Aspen ~~North Igoo Creek~~ Section.
FCH 709 - 725 - Basal Lisburne and
Top of Kayak.
368' Lisburne -
205' Kayak
contact not really disturbed ~~[illegible]~~ 125'
of bedded chert. Chert is gradational
from ls to dominantly chert ~~[illegible]~~ with few
limestone nodules ~~[illegible]~~ to all chert. Then
down section with chert + shale to
shale in Kayak.
Kanayut below Kayak + on opposite
side of stream (FCH 726) - md-cr grn,
well sorted, dominantly qtz.
Lisburne in this section is dominantly ~~[illegible]~~ a H-~~[illegible]~~
qtz crinoidal ~~[illegible]~~ pkst at top grading down section ~~[illegible]~~ to
dk gy crinoidal pkst - that is very fetid. ~~[illegible]~~
(Just north 1/4 mile from section, just beneath the
lies Dhf w/ purple + green colors interbedded w/
Dk. Looks similar to shale at Clarence River in
N. Fk Demarc area. Could Nk be Dhf ??

~~Joe Creek Section~~

~~Top of Lisburne & ?K?~~

~~1055' - really only ~ 500' of Echooka lithology, cherty Ls, silt [illegible] interbedded w/ [illegible] fauna of brachiopods, Zoophycos chert.~~

JOE CREEK SECTION:

Location:

FEHLMANN; SELF; H

SAMPLES: Feh 727-742.

Began measuring at top of Lisburne covered sec: - in situ - shales & silts with occ intbd Ls vf gn-dk,

top section are abd Ls & Ss with abd fauna of brachiopods, Chert [illegible] also present. "Top 4" or last part of section contains Zoophycos. Whole thickness is ≈ 500-600! Upper part is faulted & twisted.

Fehlmann says it is very similar to Atchillik R. section. What I have seen does not agree with what Bonny told me was there & namely 1000-2000' of chert. No Ivishak Ss as such was observed.

Note: Between the headwaters of the Chandalar and the Kongakut, the Lisburne is extremely darker, v.y thin to v.y thk bdded, and appear to be v.y thick. It resembles spaghetti.

3?

6/27/71 Clear 18°C Vy pretty day.
Haukinson, Lane, Fahlmann, off @
7:15 to recon and spot sample the
south + east Brooks Range.

Spot Location #38 - Contact of Dgw & Dk units
(actually in Dgw unit.) ~~F.S. 7055L~~ 7055L
ss, qtz, well sorted, ~~f-md gr.~~ f-md gn. silic cmt, hd.
occ pyritic weathering to limonite.

Spot location #39 in Dgw ~~unit~~ unit really
Dk? granular ss & scattered pb cangl
in ss. 7056 L

Note: [The more I observe of the f-md
gn well sorted ss of the Dk, it is extremely
similar to ss of the Nk in the Sadlerochit
Mtns. Along with and the similarity of the
Dhf to units in the Nk, we could
well be looking @ Dhf & Dk and calling
it Nk]

SP. Loc # 40
· PDes unit · chert, + splintery "shaly"
slst. - probably Dhf.

Spot location #41 — 7060-7066 Eifelian str
(M. Dev)
* - Ls, (skjit) - beautiful isolated bioherms
nearly all made up of stromatoporoids, Alveolites,
brachiopods, crinoidal hash. Strom occur
as large 2'  and also Alveolites.
Single sol. corals also. Extremely fossiliferous.
Bioherm ~~underlain~~ underlain or surrounded by dk gy
pkst which is crinoidal. This is the last
easterly outcrops; Ls in bioherm is lt-md gy
f- cr gn & xtal. On geol. map, this unit is
marked as Dlf.

Spotloc #42 Ml 7067, 68, 69 F, 7070 C+F
Lisburne md gy-lt gy, f-cr gn crinoidal hash,
brachiopods (Productids) Gastropods, Lithostrotion, Horn coral
Abd chert beds + nodules, it is blk, fetid and has
a petroliferous odor

Spot loc. #43

Dk - whitish vf-v.c. ss (graded) & cobble congl with ang-rounded clasts up to 3", Many clasts are limestone md gy-vf-md gr. w/ crinoids & oolites. - Also, a volcanic dacite has been intruded in Dk. Clasts are qtz, chert, Ls, Fe stone.

Spot loc #44 7075-76

- Qtz conglomerate & graded ss, with maroon granulite - (resembles rhyolite), Could this congl. be Kekekteks? Could the Kekekteks granite be confused with the Dk.

Spot loc. #45

- Ls & chert - very thinly laminated - md gy & dk gy. not typical ML possibly meta. ???

Spot loc #46 - H gy Qtzite. vy clean. f-md gr - located where granite is indicated on Table Mtn geol. map

6/28.

Fehlmann, Self, Lane - took off at 7:15 - Examined Mc & Dk contact just west of Ammonia Mtn. (Mc, MDc units)

Ammonia Mtn is qtzite (Dk) altered highly meta. (gneissic) not granite (Yes, in part it is granite) FCH

Hankerson stayed in camp & caught up on records, thoughts, & maps.

6/29/71 - Snow, cold 35°, cloudy. Stayed in camp whole crew

6/30/71 Some snow still on mountains. 8000 partly cldy. PC, Fehlmann, Hankinson, Lane took off @ 7:30 am to try Joe Creek area. At 142° 40' & 68° 04' (approx) we discovered an archeological site. There are 6-8 circular outlines of rock w/ few scattered stakes sticking up inside perimeter. The diameter is ≈ 8'. Several scattered animal bones are present.

At Joe Creek section we measured from the top of the Mc (at KPs contact) down. Top of Mc is a crinoidal packst. w/ abd brachiopods - grading down section, brachiopods are less abundant. Pkst is v-f to v-c gn. w/ crinoids ranging in size to 1/2". Several calyx plates were ~~[illegible]~~ observed.

~ Mc measures 420'. Down section, Mc becomes thin & thk bedded w/ decreasing mega fossils but abd bryozoans. Some Mc is very dark w/ increasing chert down section. Faulted in creek bottom at end of 420'.

Spot loc # 47 6149'

Siltstone = ~~[illegible]~~ - Tr Shublik.

Spot loc # 48 Mc & Mk contact. Mk is black fissile shale. Base of Mc is 40° black bedded chert enclosing f-med gr dolomite. samples 6150, 6151

6/30/71 Hankinson, Fehlmann, Lane

Section: Upper Firth River Section

Location, Table Mtn. Quad.

Begin section in top of Kanayut which is f-med gn qtzite, well sorted & well rounded. It gg. this is immediately overlain ~~[illegible]~~ by a ss weathering buff & very similar except has abd limonite which has leached out producing vuggy porosity.

over

The "Tuff ss ~~is~~ unit is ≈ 10-15' thick + the overlying the Ss is ≈ 400' of Kayak shale some sltylighty... In the upper 1/3 of the Kayak section are two thin 3-5' beds of Ls (separated by ≈ 50' of shale) Ls weathers orange brown is f-cr gr & contains abd crinoid (+ crinoid plates), brachiopods, corals, bryozoans. A [illegible] sharp contact is above with the ~~ML~~ ML which is a lt gy crinoid plat. v-f xtln, with ≈ 20% cht nodules. All ML is very [illegible] & ≈ 100' of the basal ML was measured & sampled. Note the Mk has the typical "rust red" concretions scattered throughout. & part of the Kayak is st. folded. There is a fair section here. + should be quite typical of Mk thickness & [illegible]. Again, this observation of Dk like rocks ~~[illegible]~~ seems to [illegible] that many of the Nk clastics are indeed Dk or Pff facies or at least Dev.

7/1/71 Clds - high broken 10°C
Fehlmann, Henderson, ~~Lame~~ S.I.f. Airborne
at 7:30
'Section: Upper Blick Creek Sect.:
Location';

Begin in TRPs, & pro - load section.
meas. 420' ML dip - down,
ML is crinoidal plst w/ ≈ 20% chert
occ. thd. fussuren
Bad Section!!

18

Spot Location: # 49
ML + TRPs overturned + folded. Sampled
top of overturned ML + Ivishak. Rare
occurrences of TRB in area. Trying to
obtain youngest ML deposited

Spot Loc. # 50
landed on TRPs & ML contact in rubble
- ML is crinoidal Plst. TRPs in
silstone Ivishak. Also location is
an archeological site having one
hut (only sticks sticking out of
ground remain.

Returned to U. Fork River section & continued up M_L — from end of previous section. M_L Ls. appears to be overlain by ≈ 50' of M_K shale which is overlain by ≈ 200 of black chert (which has obviously replaced thinly laminated M_L Ls.) above bl. chert is ≈ 65' of evenly thinly lam. Ls.

7/~/11. Clr – w/ high cirrus. 19°C
Harkinson, Feldman, Lane off @ 7:15

Spot loc #51. Ls, dk gy to lt gy. recrystallized micrite – no fossils 6216 C (2 bags). Looks like M_L but not known for sure.

Spot loc #52. Hvy nodules, small outcrop 6217 L of bedded chert & Ss (med gray well sorted, [illegible]) Possibly Kaybab Ss, w/ chertified M_L or possibly all TPs

Spot loc #53. Basic intrusion. This area is mapped wrong. (6218 Geo) No M_L

Spot loc #54 6219 C, 6220 F

Ls, med-cr gy crinoidal pkst. partly recryst. w/ abd dk gy chert nodules & lenses M_L

Spot loc #55 6221 L

D_K – md-cr gy qtzite, well rounded, well sorted. sil cmt secondary?

Spot loc #56 6222 L. D_K abd lunule qtz = meta – f-v.crgn Ss & granular congl. similar to Coconino Ss at Amsterdam Mtn.

Spot loc #57 — Ls, med - crs gr recxtln.
6223C some meta. no fossils
obvious. Similar to spot loc #51

Spot loc #58 Ls, v-f - cr gr.
6224F, 6225+6C, 6227F, 6228L
SS w/calc.
near contact with G. of meta. Corals
lithostrotionella, lesbaum, Ls w/ abs angd crs gn gls grs.

Spot loc. #59 6229 Geo+L
Dk ? metamorphosed - its a schist -
in Pzg unit. It looks like metamorphic rock &
probably is similar to some of the earlier
samples taken south of Bob's Village in
Christian Quad. In the Dgw unit

Spot loc #60 6230C Ls, med gy,
crsly xtln. st. crinoidal.

Spot location #61. 6231L. Slst, sl. sdy
w/ v-f. gr. lt tan brown, TrPs unit

Spot loc #62 6232F, 33C
Ls, med gy, recxtln, in pt crinoidal pkst w/
& gy dk gy (blk) chert thin-thk bedded

Spot location 63 — ML + TrPs
contact - poor but lithology present.
Ls is med gy recxstln, abd brachiopods
(Dictyoclostus) + sol. corals (2" in dia).
TrPs is slst - weathers red brown ~~and~~
lt gy. Sltst. is blocky fracture w/ some concretions
Sample 6234, -6236. 33-35F 36E+C, 37E+C, 38L This ML sample
~~that~~ may be good for a youngest date!

Spot loc #64 Mk 6239 P+Sr.
Typical black Kayak sh. (Mapped as
TrPs by U.S.G.S.)

Spot loc #65 6240 L+P, Black sil
shale (prob. Mk), poor outcrop, - stopped
because we thought it may be Lower Mc
chert.

Spot loc #66 - landed in saddle between ML &
Dk. Dk is f-cr gr (salt+pepper) orthoqtzite.
thick. Ls is dk gy crinoidal pkst w/
occ corals (colonial). 6241L, 6242 CF

7/3/91 High, scat & broken. 10°C
Feldman, Self, Harrison off @
5:30 to the west. At my suggestion
we are going to fly the Dar ref.
trend to Wiseman. My back is
starting to be painful from this chopper
- the last 4 mornings - awoke with much
pain. We put in over 100 hrs flying in
2 weeks.

Spot loc #67 - Skj - xlln, cave-former also -
see pictures; Skj is thin bdd. 6244 C&L

Spot location #68 Skj. Bioherm
?, meta, no fossils, overlying thin
bdd ls. area faulted. 6245 C&L

Spot loc #69. 6246 & 47. Skj bioherma
buildup which is marble overlying schist (
metamorphosed hornfels. dk gy & brn banded.

Spot loc #70 6248, 49 Skj. meta marble
+ metamorphic crinoidal pkst with dk gy fine gr
xlln ls. - complex area possible faulting,
dolomite folding. Skj. similar reef like buildup

Spot loc #71 meta Ds & Ds 6250, 51
meta - schist, qtz.

Spot loc #72 6252 L v.f. xlln
meta Ls. marble in Dl lay
volcanics.

Spot loc #73 - ~~Porphry~~ Porphyritic volcanic -
6253 Geo.

Spot location #74 6254 - It to tan brown
dolomite (Ds unit) with scattered
Ss. float (which resembles salt + pepper Dk)
Ss - v.f. med gnd (poss. glacial debris)

Spot locat #75 6257. marble Skj.

7/4/71

Golf

-Chandalar Mining & Milling Co.

Chandalar

7/5/71

Moved to Ft Yukon

7/6/71

Moved to Old Rampart

7-7-71 Clr, warm, humid 80°
Furer, Hanlanna, Lane - off at 8 AM
Start sequence of tts and:

Sp #1 qtz-syntte-granite. HRL-1 Ca
Sp #2 " No samples
Sp #3 HRL-2,3,4/GL All rubble, rock appears to be on M_K + M_L contact interval. HRL 4 below HRL 3

M_L is dk gy arg w/ abd well rnded md - cr gn qtz gns qtz. Shale is intercalated.

M_K is gradational w/ ss + slst + poss vy gradational w/ M_L. Appears to be near the basin edge.

Sp #4 HRL-5L Qtzite, f-gn + slty. sli mole? Dk? in Jgss unit

Sp #5 HRL-6L It tan v-f gn qtzite

Sp #6. Granite - crs gn porphry - No sample. Took pictures.

(margin: ? the Noatak)

Sp loc 7. M_L? prob M_L - Ls, It's mdgy, recrystln - gn spread suggesting of an original gn stone - poss oolites? HRL-7C

Sp loc 8 - same HRL 8 E L w/ RF.

Sp loc 9 - ss Cqtzite just E of

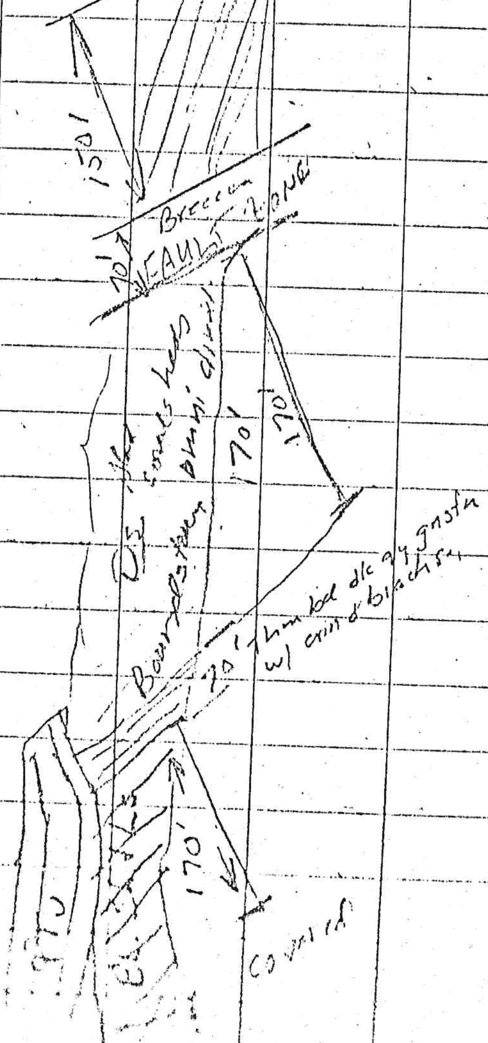
Stop 8 (Sp loc # 8, looks like Noatak according to Lyell, HRL-8 RL

Spot loc # 10 - stopped on Volcanic silt - similar to Dack? where we found Ls clasts in Dk. Also Ls, + slst nearby. Slst w/ Ls interbeds. HRL 9f, 10P.

Note; stopped @ mineralization local # I just east of Bear Mtn. looked @ D_K + M_L. M_p, if present is vy thin (100-200') + poss faulted out. D_K is a v-f-f gn qtz w/ well rnd + sorted qtz gns. Lyell says it is very similar to Noatak Fm, and also that the Hunt Fork + Noatak are gradational.

7/3/71 - Clr, humid & hot
Begin @ 8:00 am near camp looking @ Ds unit.
Ds unit - Ls, boundstone, abd coral heads up to 2', abd crinoids, sol. corals and many brachiopods. Many corals in growth position, and adj to growth position corals are coral heads in every conceivable position. Reef breccia present and illustrates dipping to the south. Reef thins appears E-W. & possibly thickening to the north dipping & straight in that direction. Ls is thickly bedded. Observed no reef hump reef or mass. Mostly bioclastic.
Bl. sh & Ls below Ds N80°E 32°S
≈ 170' thk.

Loc 10A HRL-11F5125 = Mc - Same as Sds 7082 - mineralization zone
Loc 10B = Covered - Ls, sil. etc chert in pods & lenses poss - Dd or older
Loc 10C
Loc 10D = Basalt - amygdaloidal 300'
7/7/71



Ps unit @ Heading Dog looks
like typical Ivishak ?? Fluvial
w/ large conv. location

Loc 12 gy-tan bed Ls & Sh.
w/ brach., ostracods, shrub-like?
GWS-1F - unit is correlable
with Loc 11.

Loc 13, on P.R. Dd unit,
- vy thinly bded, lt gy d tan dolomite
w/ cloud. Chs nodules have
growth rings & are circular, & up to
2' in dia. NO sample

Loc 14 stopped in PzL unit. Its
≈ 750' Ss, v-f-gn, vy clean, some
vy friable thin bded, some X strat
w/ occ intercalations of sh & slty dk gy
GWS-3, 3L. Not meta.
Possibly Devonian (like 7) ???????

25

Loc 15 Ls, lithographic, finely lam &
thin bded, no fossils, occ small
lenticles of breccia Ls. Tan-gy brn
GWS-4C in Dd unit; occ
blk chert along bdg planes. Could be
a true Micrite, Temp 4:50 PM is
102°F.

Loc 16 Ss, sl. sil, lt gy-wh. md-crgn. vy
clean, 5-15% porosity, exc. reservoir rx.
- outcrop is really faulted. Interbedded
sdy & slty clystn. Faulting w/ abnt iron oxide
coating of beautiful reds, blues, & greens
Course of Aurora was said to have colored
the Miss. (B.S.) outcrop ≈ 200'.

Loc 17. Ls, md gy, vy small rubble
outcrop GWS-8C

6WS - 5C, 6L, 7P } Loc @ 16

26

7/9/71 Clr - hot (80°),

Loc 18 Ls, lt gy, vy crsly xlln, w/ dolomitic
diverse fossils. Supposedly, EOL GWS-9F,C

Loc 19 - Ls, (Pcs unit) dk brngy,
rexlln micrite - sparite, no lumps
possibly Mz equiv.? GWS-10f,c

Loc 20 Dolo, lt-med brngy, fine-m gy,
poor por, saccroydal txt, + good
reservoir, GWS-11f,C 12F, 13F, 14F,C, 15F,C - 16F

- Walked up section EOL-S + D,
Entire section is Dolomite with
increasing fauna up ? section, and
diversified corals, at top. At bottom, dolo
in middle, thin lam ..., suggesting
algal mats, . this section reminds
me of the Kokeblows + N...

Loc 21 Ls, micrite + Pksd w/
algal fossils. Some beds/lime
with bed corals, etc, vy similar
to D; @ camp. GWS-17F,C.

Loc 22 - Ls, lt gy recryst. looks
like Crow Nest Section Skj. M2 S

Loc 23 - Ls, crinoidal pksd w/
solitary corals, brachs, looks like Mz
supposedly - U.S.G.S. has McDon.
L B P, brach ... GWS - 18F, C

Loc 24 Nelson Bluffs Ls, dolomitic poor exp.
some faulting, occ mega coral.
GWS-19 C,F. (Conrad thought
1000' Miss here)

Loc 25 Qtzite, + peacock coloring
oxides, same as Loc. #16. Vy interesting
to have N-S qtzite trend on west side
of all good exposures. No sample.

Thoughts for today:

The Old Crow Mtns, dated w/ R ...
at 313 + 340, puts it in Early Miss.
This could be a source for the qtz in
the Mz which rim the western
border of the Old Crow Mtns The Pzg ...

would appear to be late Dev. ;
and there may be an angular unconformity
between M_L + Dk bordering the
Del Gran Mtn. Taking the Colorea Quad
as a whole, the structural trends
NE-SW with older rocks COS in the
SE conf. with L. Dev, U. Dev. carbonates
next to the NW. The next logical
sequence of EX would be late Dev or
the U.S.G.S. PZg unit. Miss shales
to the south (Glenn shale) with
Mc carbonates to the north and
even further north w/ q/s would
be logical. Lloyd says the Canadians
report conf. w/ the Miss across the
border. [The PCb unit relationships
with Dd.]?

Sat 7-10-71 High overcast
Loc 26 dense mosquitos
Ls, crsly recxlln wht to lt gy.
LCF-1, f.c. (Sil?)

Loc 27 COS, D section, excellent to
LCF-2, 3, 4 C,F
measure, abd fauna, Algal heads,
corals, brachiopods, branching stromatoporoids.
all Ls, micrite, w/ bl. chertified corals,
at bot of section - sol corals w/ random
orientation & a depositional breccia with
lt & dk micrite & sol. corals scattered throughout.

Loc 28 - Ss, qtzite, sl dirty - org. wt.
v.f. - md gn. also pyr. which is leaching
PCp unit - prob correct. is
surrounded to the w, sw, NE by L. Pal. carb.
- PCp is a big "wedge" to the SE,
brn-gy - f lam - lam. cov w/ bl.
lichen LCF-5L

Loc 29, Ls, crsly recxlln, lt gy
in contact w/ PCp unit.
LCF-6C

Loc 30, Ss, f-med gr. lt brn + tan w/ maroon splotches - KJ.? unit, could
NO → be Kaiman qtzite acc thin intercalate
.bl. bd sh. KCF-7P. Resting on
P2p.

Loc 31 KCF-8a Ls, crsly recrystln
D&L unit very small outcrop
- how they mapped this ???
name (Brown)

Loc 32 Ls, Sh, interbed med-dk gy. Ls
contain small brachs & flat gastrop
Ls = f gr micrite, some weath
elongate Ls bds = 2"-12" thk.
≅ 500' thk. - suggestive of
syncline nearby, LCF-9/10C/10P/11SY/12F

Loc 33 Ss, f-med gr - mostly fine,
very clean sd. exc. reservoir.
Pg unit. qtz, lt pinkish banding
looks like Casper - 10-15%
porosity. Vertical outcrop - thin bedded,
possible x-bed, poss good clean beach
sand. NO Pg not dated as such but
v. poss a facies of Pos. LCF-13L

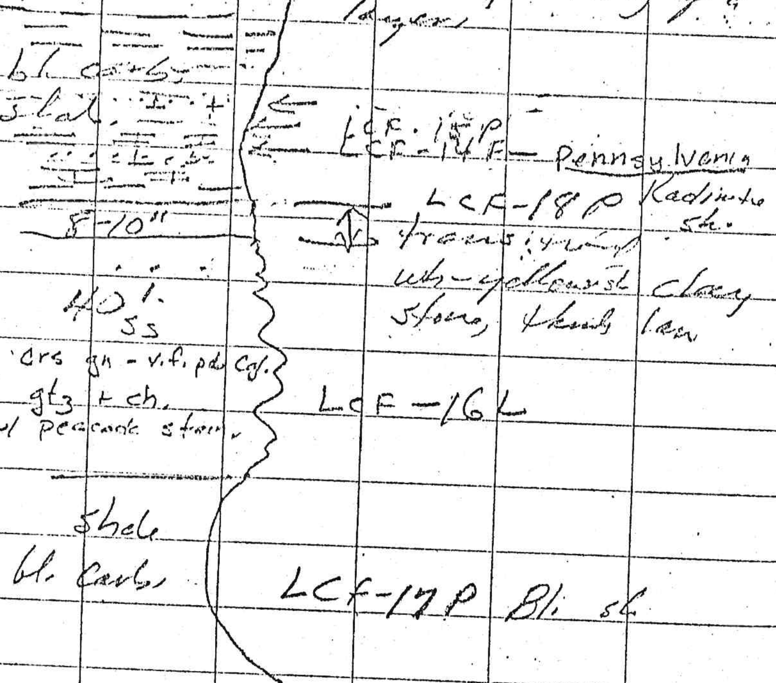
Loc 34 - Dolomite + siliceous ls plug point
thin bdded, traces of fossils, recrystlzn
diagenetic. ≅ 400-500'. Dk gy,
occ fin gr w/ vuggy porosity on
surface. No sample.

Loc 35 LCF-14F,15P
Thin interbds, Sh, Ls, dol, + Ss (calc)
Sh is carbonaceous w/ few brachiop.
the carb? unit ~ 4.5-6.5
overlying a 40' Ss. Ss vy distinct,
vy crs grn lt v.f. pebble qtz congl,
w/ ≅ 25-30% chert grns, well sorted
clean, + friable in spots. Shale, lt
carbonaceous underlies Ss. May be
continental or vy. near shore. Brachs
in Sh + Ls above Ss.
over.

Loc 35

vy suggestive of a marginal non-marine transitional zone.

Int'bd ss & sh contain ironstone conc in layers — nearly making up ? layers



Ss have xbdg & poss channeling

Loc 36 — PCL & Ps contact on Rib.

thrust & faulted.

7/11/71 — Rain — stayed in camp worked on maps, literature, & samples — played cribbage too.

7/12/71 Temp 55°F, 800 ⊙, 2000 ⊙, sl. rain. Furey, Scott, Hawkinson off @ 8:30. for Rat Creek section

Amoco J section = 895' ✓

Os rx. Dolomite, ss & slst interbedded — dominantly (65-70% dolomite — all are micrite with some algal heads, oolites (in float), ss is really qtzite well sorted v.f.-med grn, well rounded. siliceous — See Amoco detailed section for alternating lithology — Stromatolites (pictures of) (JWS - 20 - 30)

This sequence of rx indicates a very shallow, + poss mud flat, nearshore marine environment. tidal ...

Ss is gradational w/ carbonates.

Section was measured on S. side of R.R. just west of Rat River junction. Occ. worm burrows, poss. Pl. fossils in upper 3rd, poss. fish scales.

Rain in P.M. & wait chopper to pick up AR Ormiston. R. Lane returns to Tulsa today.

Amoco J — Thin interbeds of dolomite w/ ss & slst may be primary dep. only a few dolo bds are sl. slty.

7/13/71 WARM (63°) scat sand @ 3000'. Ormiston, Furch, Self & Hankinson off to Rat Creek area.

continued upstream on N side Rat Cr. alternating lt & dk gy Dolo & buff. w/ strom. @ base. A. Ormiston says this looks like "Skajit" on St. Lawrence Is. Much of section contains Amphipora stachyodes (stick stroms). Most of this section appears Middle Dev.

Samples GWS-44 for Amoco J section

Loc 37. M. Dev. section just upstream from Amoco J. section ≈ 1800–2000 of Dolo & Ls. w/ beautiful algal head stro– very sim lithotype to Nanook in Shublik Mtns.

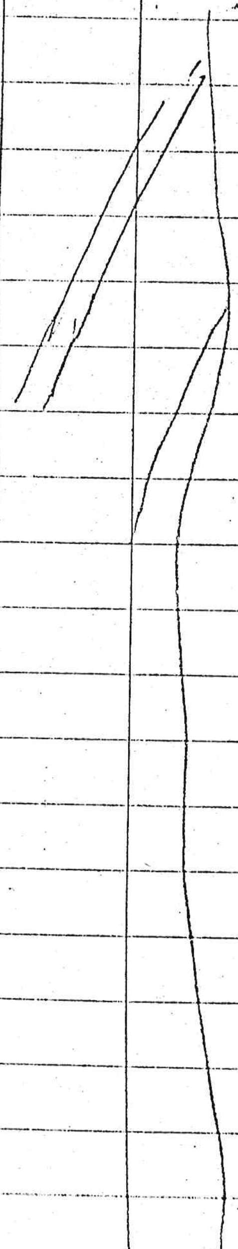
This area (2000') places the J section ≈ 3000' M. Dev. nodes which represent very shallow H_2O, intertidal, supratidal dep.! ARO-1 stachyodes bdstn

Peruvian + Ornnis for
AO-1-71 ~~Formation~~ Formation located
south side P.R. 1st outcrop downstream
from Old Camp.
Begin section in cosly xlln dk gy - red gy
Bed 1
Ls. w/ Dictyoclostus, "Spirifer"
Torinyfer, Syringothyris, brachythy-
ris. ~~Thysanophyllum in float~~
~~[illegible]~~
Ls, dk-red gy, med xlln, sl irregular
bedding - 2½' thk bed
Bed 2. Ls, red gy, med xlln, w/ abd
ch nodules + lenses w/ cannonball
concretions w/ abd which are circular to
ellipsoidal and have concentric rings.
Composition are Ls + ch. - dom ch.
Ls thin to thk bedded. Abd brachiopods
5'. Ditomophyre (Penn-Perm), Spirifer
clams - ostracods
Bed 3.
(South Old Camp section)

7-14-71 - Cool, 45°F Sl. wnr 1500' 31/0
Loc 38 - PCL unit
Tentaculites (Styliolina) Dev-Miss
Gasteroc[o]ma - bicaula - two
holes crinoid (M. Dev). - PCL unit
just upstream from Dol unit in
P.R. opposite Old Camp in
folded + faulted bl ch + dk gy
crinoided (two-hole) Ls. + Sh.
very fetid + poss petroliferous stinks.
Sulfurous odor. ARO - 2,3,4,5,6
- bl. + dk gy thinly bedded M. Dev sh + Ls.
in fault contact with early Miss. in fault
contact w/ Dol which is abd w/ Amphipora.
Dol [Ord] overlain by unconformably (w/
vy poss karst top) by bl shales w/
abd plant frags. It appears to be
a normal sequence Saturdhoul across
the river overlain by Ds - a mid Dev
unit of bl shale + Ls which is overlain

ky Dd as Amphipora with LS & Dolomite.

[illegible] map across from Old camp PCL? Ds



? PCL ?

Dd

Dss

Salmontrout Ds

7-15-71 Cold - freezing + cloudy
- Fort Creek Strat section
- Ord-Sil - poss late Mid Dev.
Excellent section - All Annas noted. Here, the L. Dev. is rythmic ls + dols. - suggestion of poss backreef of the Solomon front. Fm + the overlying M. Dev. appears to be basinward of the Ord unit really - so ignore. The late + poss Ord Sil now dolomite is dolo + also appears to be shallow water deposition.

7/16/71. Calm, sunny (58°). High cirrus. Lucey, Self, Hutchinson - off @ 8:10 AM
Loc 39 - LCF-19 Geo + K. in Otr box
Loc 40 - Think we are confused of PzL & Pzg
LCF - 20 - 22 Geo
Loc 40 - Definite PzL overlying Pzg location - However, Bl. sooty shaly Ls, thinly bedded overlies (poss unconformity) red qz. wr. go below. [- Not PzL on Pzg LCF - 23-24-25
U.S.G.S are dead wrong]
Because they thought PzL @ Camb-Ord unit, they put Pz φ in PE for the whole Quad.
We will try to check more contacts. - Oh, like everything, the Do/o is apparently a lower unit no U.S.G.S PzL + it does overly qtzite. And, the lower dolomite contains (stacks) + idiotomed Amphipora -

this sequence looking ~~very much~~ like Amoco J section & the unit (Cs ?) until the qtzite is probably M. Dev). Dolo- vrythinly lam, vy poss. stromatolites. v.f. gr dolo. Poss. disconformity between dolomite + qtzite?? qtz unit contains ripple marks (Amplitude 1-2", (mod currents) & low angle channeling; scour(fill) in v.f. gr clean qtzite.

Loc 42 - base of PZL & Pzq at contact LCF 26 F, C

Loc 43 - across P.R. in Pzq LCF 27L.

Loc 44 - Pzd unit in fault contact w/ Pzl unit. Collected Ltry dolomite LCF-28 & Lmy Sh. LCF-29.

Loc 45 LCF 30 P,f - shaly zone of dolo - in Pzq & Pzl unit - on W. side P.R. a sequence of ≈ 1000-1500' of qtzite unconformably overlain by ≈ 400' of dolomite & grading upward into the bl silty shy Ls unit - Again this appears to be similar to Amoco J section.

Loc 46 - walked 2 miles across Pza, PzP units. They are maroon & green phyllites (slate & qtz schist, & occ Od. - It looks like Hunt Fork and/or Dx equivalent LCF-31 f, C in Ls dolo. This unit (Lyod says) Benny calls this meta unit or lime mile unit. A few isolated stocks occur & do impart some degree of meta - but 100 to 200' away, the seds return to near normal!

Loc 47 Mz "outlier" red gy f-med gn crinoidal pkst & [illegible] brachiopods, bryozoans fairly lam - poss algal mats??

LCF 32-33 Ef

Loc 48 PSC unit - maroon & green oolitic shpst or dk gy thinly bdd cherts. Looks like Siksikpuk - most definitely. (Brosgé agrees w/ me F.C.R. 8/21/72) Occ red gn & green thin bedded bay ss.

LCF 34 Lf

Lloyd says may be Shublik (poss Mz)

Loc 49 Tr Shublik shale w/ monotis. good section to measure its 5:30 PM - will return

35

7-17-71 Alto Cumulus High Cirrus - 80°

Pucci, Henderson, Ormiston, Self - off @ 6:45 - 1/2 hr to Tr Shublik outcrop - Colville River section - the only Shublik outcrop which has been measured in the Colville River. George Self & Henderson measure - Ormiston & Feaver flew off to Arctic Village to see rocks, etc - We started @ base of cliff at water line where lith is dk gray slst, hd & dense & somewhat disturbed. then overlain by an alternating sequence of [illegible] gn ss & slst & v. thin shl (dk gy-bl) - grading to the 10' v.f. gn ss. & 125' - then 1st lms & poss paleosol. paleosol. then 67' of interbedded [illegible] & slst w/ intercalation of v. thin shales. (w/ abd monotis & pseudo-monotis, & 100' interbedded slst & ss (v dk gy)

then very
40' of thin bedded sltst which
is buff to lt gy in color.
- underlying this unit are thick 35'
[illegible] & Probable thickness
is 500-600': No top or
bottom. FC18 743.
Note: Barrow, Loney Creek (~ ½ km)
& the above sh/slts may define
the [illegible] sea border among
Allen Ormiston - definitely puts the
[illegible] @ Bundle Bee Creek section -
Frasnian & that @ Loc 41 is
Eifelian !! ALO is indeed
a very competent (excellent)
paleontologist as well as a
field geologist. - It is very
probable that the PR. area
defines a Devonian carbonate-shale
hinge line E-W.
Loc 54 P29 - 9/4/

7-18-71 High scatt. 86' [illegible]
Turner, Self, Hankinson off @ 9:00 AM
Loc 55. dk sltst & sh bounded by top & bottom
dk gy ls w/ abnt brachiopods - similar ident
to Permian lith at Smith Old Camp
section, ≈ 25' LCF 35, 36.
Loc 56 ** Zoophycos present or Spirophyton-like whorls just upstream on the Sadlerochit (Disharmonic folding - thought disconformity)
R. from Loc 55. The interval is ≈ 200'
of dk gy calcisiltite-beds 2"-2' intercalated
w/ v. thin beds of dk gy shale. see brachiopods -
prob. productids. This unit looks very
similar to the Flood Creek Siksikpuk
interval. Also solitary corals - VERY
MUCH like SIKSIKPUK @ FLOOD CR.
LCF - 37 (2 bags) LCF, 38, LCF 39, 40
Loc 57 LCF - 41 - 43. Bl slty sh or
shly sltst w/ abnt v. thin beds of [illegible]
- in JR? - very similar to some
TR & JR shales up north - no
ammonoids.

Loc 58 5-A - Loc 57. LCF 44-45

Loc 59. just upstream from Loc 56 - dk gy - red gy Ls & dolo - thinly interbed, w/ brachs & sil. cmds. [pink shell in Permian] LCF 46 F

Loc 60 + 61 - along Salmon trout R. between 66 & 58. - Ls ell a gradational upward basinward facies in the Permian - looks like much of the Twisted @ Flood G. Traces of "marine worm"? in these beds of siltstone. Entire JP's unit is very likely long - a basinward facies.

Loc 62

- this interval is a gradational sequence from bedded Solid chert w/ Ls balls on bedding planes, upward through thin interbedded Ls & Ss & sandy Ls w/ shell brachs (LCF-48) (mid prod) into dk gy sandy silty shale shaly sltst. - this whole unit is ≈ 150-200' and grades up into Mtn of Loc 55 talcose. - the chert may be Miss & = Nd Mc Conn Hill ?? - at smaller Dc PCL contact. We will revisit this section & determine what is below the underlying chert.

7-19-71

Pretty day, hot & humid. - At 8:20, dropped Self, + Ormiston w/ Kayak at headwaters of Salmontrout, Carl, Hawkinson, Fuller, off to Dan section on P.R. R.

[Loc 63] LCF-50 L,F, Chert - poor rubble exp. (Conner have called to ??? - Anyway, its lt gy, prob. then bedded + is thinly lam., - Highly fractured.

[Loc 64] LCF 51 C, F, Interbed (thin) dk gy fgr ls w/ scatt patches of brachs + sol. corals. + ~~shaly~~ dk gy to blk silst w/ some ls also, very similar to P @ Loc 55. worm burrow tracks.

[Loc 65] - Dd, + on stream there is a brown scum w/ occ bubbles rising collected LCF-52 gas.

Talked To Tina - good to hear my true love. Made arrangements for her + Angela to come to Engl. Aug 1 - 15th. Called Chancel and told him of our plans. JPC informed me I would probably go to Calgary to the TE symposium.

Loc 66 - Ls, th lam w/ [illegible] broken + redeps. - med gy, very [illegible] bedding - looks like the [illegible] in part of the Amoco J section - could be Siltst. [illegible] similar to that @ Fort Creek section - Have to determine this.

LCF-53 C

7-20-71 Clr, vy light cirrus scat'd 63°. Furer & Ormiston off @ 8:15 to complete Sadlerochit R. w/ kayak. Self & Hutchinson off to measure Pzq near Leonardi - Canning Mtn Section 1490 - FCH 760 - 778. 1190' of qtzite overlain by 280-290 - Pzc carbonate & blk sooty slty Ls

Loc 67 - vy contorted faulted & folded Blk sooty carbonaceous Ls. FCH 779 Pd Sr

Loc 68 FCH 780, 781 F - in KJs unit Ss, vf-f gn, med gy & brn mottled abd worm burrows, clams locally abd wood frags occ, occ chert gns, poorly sorted, porous argillaceous. Slabby weathering habit, vy thin bedded, lichen covered.

Loc 69 Ss, crs to vy crs gn qtz Ss w/ apparent weathered K feldspar fairly well sorted & subangular to subround, ? matrix badly weathered - maybe from feldspar, in Css unit. Thin to thick bedded 1° - 2° FCH 782 L Css unit

Loc 70 FCH 783 F, FCH 784 P+Sr

Ls + Sh, Ss. interbedded

Ls, dk, arenaceous, argillous w/ xc chert pebbles to ½", abd brachiopods and solitary corals. Very dirty Ls. thk bed + interbedded with black silty shale - shale beds up to 1'

Ss is crs to vy crs gn w/ abd chert grs - sequence is prob P + very similar to Ss + Sh on Rat Creek (PCs). The Ss @ this loc is v. similar to the PCs Ss @ Rat Creek. but unlike that @ loc 69 where it is arkosic !!

So, we have to determine the relationship of - PCL, PCs, PSC, + Css.

Wed 7-21-70 - Overcast + Rain 55°.

Ormiston, Furer, Hankinson off @ 8:40 to look @ SOEL and PSL - Pzg down P.R. Self stayed in camp + worked on strip logs.

Location 71.

- 2 outcrops downstream from Amisco J. on the P.R. We looked for Ordo. infrastructure to no avail, the rock is Ls + dolo Ls + Dolo. - lt gy to md gy. v.f. gn to xtln. thin to thk bedding with thin laminae - some very wavy lamin - suggestive of algal mats. Some Ls breccia present. weathers lt gy to buff. Highly fractured + faulted. Not very diagnostic, rocks dip to west + supposedly underlie Amisco J. Devonian.

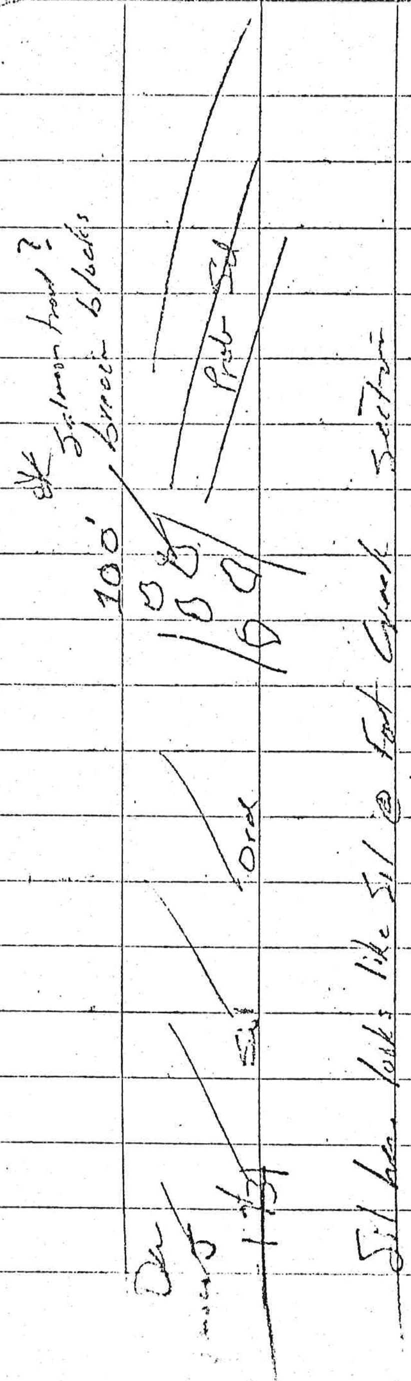
—— - there is an outcrop of Ord that is fossiliferous + adjacent thus to a fault block of Ord + Salmontrout?

LCF-54 Ff, 55 Fc
Sil Ord.

Loc 72 — LCF 56, 57C

- Ls, knobbly weathering 150-200'
- Favosites, lge crinoids, brachiopods, stromatoporoids - all knobbly weath.
- prob Salmontrout Ls. - across the river and in the "second" ledge or terr. Outcrops even weather like reefs similar to Skajit up north.
- Between river terraces was prob the Sil-Dev shale to cause the staircase effect!!? (Excellent + very significant idea + ties into the Arrowsn J river section area)?

Loc 73 — Ls, dolomitic. Algal mat structure. - prob Silurian similar to Loc 71. LCF 58



Poor outcrop on south side of R.R.
but highly significant.
location of Upper Ord with
paleo [illegible], gastropods, bryozoans
in contact with upper Silurian
black shales w/ [illegible] graptolites.
LCF 59 C - [illegible] top of Upper
Ordovician
(monograptus fritchi & dubious closkeusi)
[illegible] graptol.
The Upper Ord here has similar
fauna to Upper Ord @ loc 71.
— ? where the Ls @ loc. 73
— much of the Sil is gone.
LCF 60-61 F graptolites
LCF 62 C, F are Upper Ord Ls +
possibly some Sil rx. —
also stick corals & bryozoans,
nautiloids.

extremely well bedded [illegible]
matrix w/ [illegible] coral [illegible]
[illegible]. The Ls has very
irregularly [illegible] [illegible]
gy and [illegible] gy — mottled — suggests
of much organic reworking.
— Very poss major unconf w/ poss karst
topogr. developed on Upper Ord Ls. There is
also boxwork & "leaching below ~~Sil shale~~ Sil. shale &
~~Ord~~ Ord Ls.

Loc 74 Hill Tommy LCF 63 L
Congl. – vy crs pebble congl. cht cobble + pebble cong.
– dk grey round chert – bas...
sub rounded – average gr size ≈ 1/2"
occ red chert – most all lt & dk
gy – lge pebble up to 2". Occ
siltst clasts, some qtz sand matrix.
≈ P gs. unit, HA
– subrounded to rounded a deeper
margin fr. Kanayut.

Loc 75 – LCF 64 C. @ loc where
BP collected #66. Dolomite, lt gy
+ grn md gy. – vy poor outcrop.

Loc 76 – LCF 65 C. Ls, md gy.
vf.–f. gr. – no bugs. – appears to
middle cyl. @ "Tommy".

16 stop @ 16 again
Loc 76 LCF 66 P
SS, – vf – crs gr qtz ≈ ss +
sh – wy ... fringes + plant
debris. – Prob Miss.

Loc 77 – Rock Slough ...
LCF 67 E, L
SS. – vf.–f. gr qtz, micaceous,
w/ abd crinoids – yes, ... of clams
– w/ typical peacock mineralization.
Sand looks like Pg @ 33, but is
prob Miss according to BKO – contains
thin laser of the whitish-yellow clayst!

Loc 78 LCF 68 P, C
Ls, thinly bedded, dk gy, Pzl

7/22/71 - High overcast 57°.
Furey, Ormiston, Hankinson off @ 8:25
to check out Dls units. Self in
camp again to work on logs.

Loc 79 — LCF 69F. Dd unit; Ls,
and gy, f and xlln, thn bedd & lam
non descript, badly weathered.

Loc 80 — LCF 70C,
Ls + Dol, lt gy f crs gn xlln.
No trilobites as reported @ loc 14 by
U.S.G.S. & identified by Ross
as Cambrian (?) ...

* Loc 81 — Ls, dk gy - in pt crinoidal
- platy - vf to vc gn, very fossiliferous -
- latest Lower Dev. or earliest M. Dev. -
probably latest Salmontrout or equiv.
to shaly unit above Salmontrout.
LCF 71, 72 Kgc - two holes, brachiopods,
nautiloids, corals, crinoids.

Loc 82 — Jq's & Hss undiff
- volcanic? dk gy w/ vesicules,
ds lst & vy dirty Ls.
vf gr with prob goniatites &
some crinoids & bryozoa. Very poor
outcrops & extremely sparse fossils.
- the surveys loc 11 - they must have
pulled Jq age out of their ass.
LCF 73F.

Loc 83 - same as Bob's loc 59.
- qtzite & schist PЄ???.
- prob Dk. From here we headed
north to refuel in Canada and go to
Joe Creek - much to my surprise —
we have no maps of the area & the
weather is marginal. We refueled
@ 1:05 PM and went on a rough
heading of 330° from the Canadian
fuel cache. It is socked in @
2000 feet but we continue to go

- continuation of South Old Camp section on N. side of R.R. [illegible]
- the section is dk. silty sh. with the siltstone concretions (avg 4" + are [illegible] to aphanitic + vy hd)
- the interval ≈ 130' and has occ bryozoan + productids + [illegible]. Overlying this 130' is a covered interval. The next outcrop is ≈ 50' of Ls, med-lt gy v.f. gr. and interbedded calcareous + arenaceous sh. The Ls + Sh contains abundant brachiopods + gastropods (straparollus alaskaensis), Bolivinales? the Ls beds are 1'-2' thk.
- Note, there is a very thk. P section in these parts. Some lith. Ls vy similar to Tuishak slstone (graded?) I have observed on Flood Creek LCF 74-77 F + P.

7/23/71 High Cirrus, 50°, Sunny - [illegible] Elmer, Ormiston, Self, Hawkinson of [illegible] @ 8:15 for Black River Quarry area.

Loc 84 - LCF 82 F, C. Dd Ls, f gr xlln dk gy, [illegible]-like bedded ≈ 100' exposed. Amphipora?, Stachyodes?

Lakeview Village section — See Amoco section + paleo notes
- Red (Maroon) + Green argillite interbedded w/ lithographic lt buff-gy dolomite - (poss equiv to the Delorme Fm in Canada + possibly a shoreward facies) ostracods, poss fish bones.
- red bedded - vy evenly bedded
- took 3 photos. 2' blocks of resin color travertine in float.
- abd fish plates + occ fish bones + ostracodes (pick Sagemian) prob fresh H_2O deposit grading up section to marine.

[illegible]

Ostracods & [illegible] in [illegible] ss w/
congl [illegible], carbonate &
argillite.

– at this section [illegible] M. Dev & Lower Dev
– the M. Dev contains (is a crinoidal [illegible])
[illegible] & [illegible] & tentaculites) – [illegible]
similar to Ogilvie [illegible] L. Dev – [illegible]
shoreward facies of the L. Dev at
Fort Creek & similar to Ogilvie
– further south – M. Ord w/ [illegible]
[illegible], brachiopods, sol. corals,
& [illegible], [illegible] begin losing
the [illegible] of [illegible]. The Ls –
dk gy, v.f. gr to aphanitic
– further down section – Ls, lt gy
sl. dolomitic, v.f. gr to aphanitic
– phos [illegible], – lower Ordovician.

7/24/71 – High overcast, 46°
Ormiston, Furer, Hutchinson left @
8:10 AM for Eagle – Arrived Eagle
@ 10:20. Talked to John Borg
of Borg's Lodge – No ROOM – nothing
to stay in [illegible] wife or child.
– Loc 85 – Takoma Bluff – on
Yukon R. T6N, R?E. Ls, thinly
bedded dk gy – in pt shaly. Ls
Conrad had called [illegible] ??
Loc 86 in KB?, unit @ T?N, R?E
on Yukon R (Charley R. Quad): Ss, dk brown to
[illegible] v gr ss w/ [illegible], [illegible], [illegible]
"graywacke" – [illegible] KC – [illegible]
of [illegible] Miss on the [illegible] w/
bugs!!
Circle city stop – Frank Warren – lodge
& [illegible] 973

7/25/97 High Cirrus - 65° Pretty. - Ormiston & Self - off @ 8:20 to reconnoiter Pakogue Carbonate in headwaters of Salmontrout -

Furer & Hankinson - off @ 9 AM to check out Salmontrout Fm downstream on P.R. ss (Dk + Ps) in Pg unit south of P.R. !!!

Loc 87 Dolomite, H'tured & dk gy f-crs gn xlln. 5-10% vuggy porosity, thick well bedded. True laminites. Is this a lateral facies of the Salmontrout ??

LCF 99C, L.

Loc 88 Ls, crsly recxlln, highly weathered, ~~ well gy

Loc 89 Ls, badly weathered, poss ?? Salmontrout ??? Massive structure suggestive of organic buildup.

LCF-100C,

Loc 90 LCF 101C,

Dolomite. vuggy. finely xlln. Some poss "stromatolites" & laminites.

Loc 91 LCF 102 L.

Ss silicious, v-f gr w/ trace of v.f.g. clst. extremely well sorted & well rounded grns in Pg unit.

Loc 92 Ss, v.f. gr, extremely well sorted & well rounded, as well as v.f. gr clst. Beautiful ss. same as 91

Loc 93 Ss, similar to 92 & 91, but f-med gr w/ sl. more clst & subrounded. Seems the source is to E & N? thinly bedded.

Loc 94 Same as 93

Loc 95 LCF 104 L.P. Sh, clayey concretionary, thinly bedded. poss worm burrow - bioturbation. Looks like Pelcmin on P.R. & Salmontrout

Loc 96 LCF 105 L.

Ajite microcrystalline, not tuff weathers reddish brown - float [illegible] bed sh of Loc 95. - may be same SS as Pg on previous stops if so, we may have a regional unconformity ?? Pg above these outcrops is not exposed even any rubble can be seen in traces.

— Armstrong self-measured & samples ≅ 3900 @ Lisburne Ridge Section - ≅ 2000' ordovician through Lower Devonian. Here we found an upper Silurian patch reef surrounded by silty ls (w/ graptolites). This seq is overlain by Salmontrout Bdsh "grading" upward to crinoidal wackestone.

7/26/91 high cumulus strata 67°F

Armstrong + Hopkinson - off @ 8:15 to check out section on Salmontrout R. ARO-115 + 116 - 80' above chondrites bearing ss. Section above chert ≅ 130' - to tack on to top of Salmontrout section.

Lithy of sandstone is dk gy to bl. sooty, thinly bedded with alternating thick beds of lgt dk gy ls.

- stopped @ loc 56 - ARO-117 C No Disconformity

thickness from loc 56 - upstream

50 exp	90 cov	1335'
50 cov	200 exp	1135'
100 exp	200 exp (opposite dip)	+ 500
150 cov	40 exp	
50 exp	200 exp	
75 cov	Total estimate of Penn-Perm	
[illegible] exp	Section present ≅ 1500'	

on top of Salmontrout section

They ... Ss of Pg unit may well be a Ss unit underlying the Msc black unit opposite ... Camp on the Pk.

Loc 97 — Psc just N of Caller Rockin Tr section, all [illegible] ... folding ... secondary ... shale, pl. (sooty) silty, shaly Sld. LCF 106 P

Loc 98

Ls, bl sooty, thin bedded. unfossiliferous - same as upper Psc unit.

7-31-11 High stratus, 65°
Hankinson, Ormiston, Sely off @ 8:25 to recon into Canada.

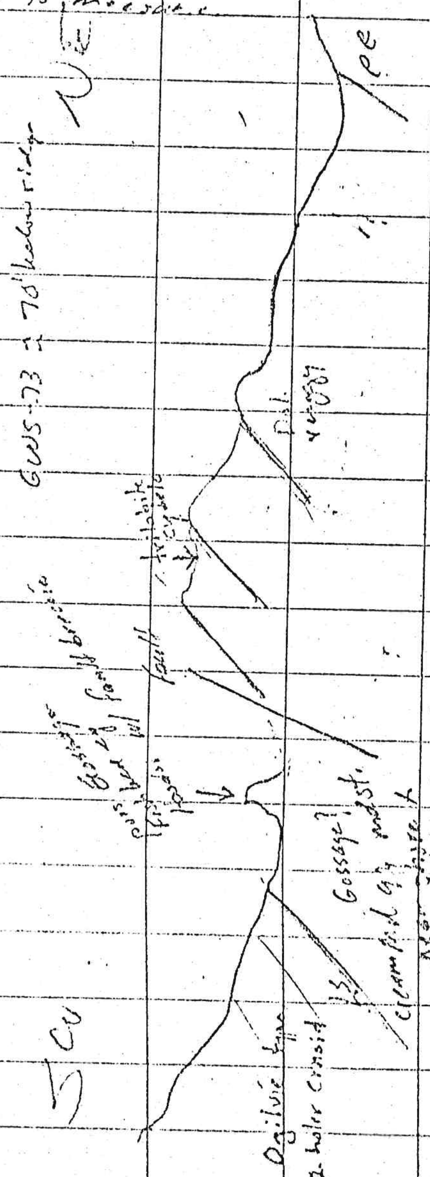
Loc 99

Ls, dk gy, crinoidal wkst,

GWS-72 L,F This outcrop dips to south, and apparently the unit flanks the PE to the north. Eastern (mid Dev) Carbonate is Ogilvie Fm - apparent a thin carbonate unit ≈ 200' of section over the valley floor of prob PE. (Salmon Fork Black River)
Algaelike, few-[illegible], crinoids [illegible].

Loc 100 GWS-73F Trilobite. Strike 290° Sil or Dev dip 85° SW
Ls micritic ls, red bleed and dk. cyclic - prob Ord. Sample occurs on a knife ridge ≈ 70' stratigraphically below western pt lo prominent ridge. Below sample, Ls apparently grades to a good sed ... vuggy porous dolomite. Rx very unfossiliferous. in next valley to west, a brown-buff weathering Ls (post Gossage - ARO) occurs

This may very well be an excellent section to measure.



[Loc 101] GWS-74 L,C

Ls, md brn gy - finely xlln - unfossiliferous

[Loc 102]

on PR in Canada.

Ls. stromatolites GWS-75 F

+ ≈ 20' above stromatolite Ls ≈ 1½' bed

lt. Sh. (GWS-76 P)

Ss, pisolitic, weathers dk gy, (GWS-77 L,C

dolomitic tan buff. looks like

Smackover according to Self. Good

porosity in some beds. some dolomite rhombs w/ secondary growth detritus

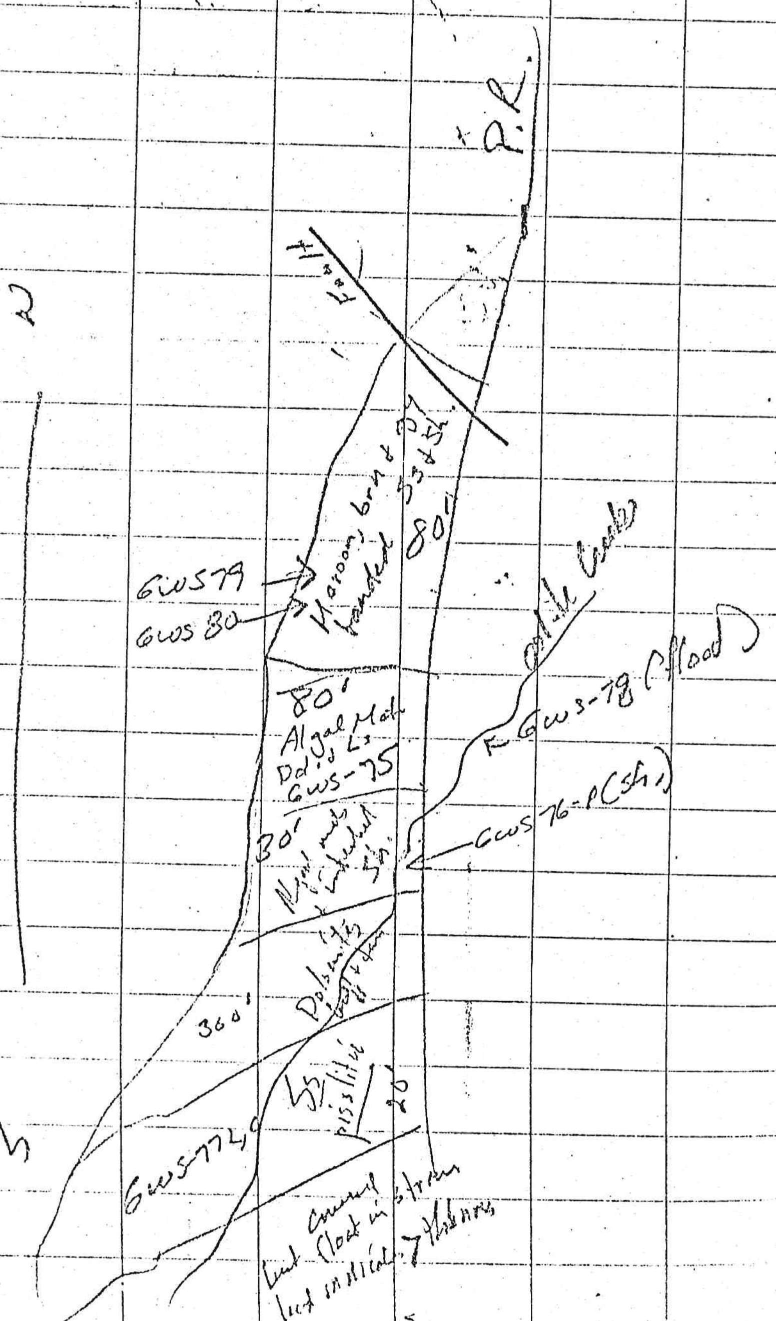
Section accentuated.

Ss, pisolitic - base of section.

Dolomites - thinly, [illegible] buff to silicious.

Algal/mass dolom w/ interbedded Sh (GWS-76P)

[GWS-78 F] - in float @ mouth of "Oolite" Creek → {Paleozoic clams (?)



51

Plant Frags in Shale in Algal Mat unit
- No [illegible] Dev, prob Miss.

Ss, - brown, maroon, lt gy interbeds
- f. v.f. gr ss, abd red jasper,
qtz [illegible] a green argillaceous matrix
- [illegible], No [illegible] - Same [illegible] sh.
outcrop
6WS-80 ≈ 15' below 6WS-79.

Loc 103 6WS-81 P
- stopped @ Qtzite unit, Same
qtzite as in [illegible] section - has
a basal unit of Ss & slst, + shaly slst.
which is dk brown - thinly bedded w/
ripple marks.

C O N T E N T S

1971 SE BROOKS RANGE FIELD NOTES
(Arctic Village, Union Oil, Eagle)

Page #	D e s c r i p t i o n
2.	Grab Samples - FCH641-43 and 8001-04. FCH635-36
3.	Grab Samples - 8005 to 8007 and 6058 to 6063.
4.	Grab Section - Lower Hunt Fork - Samples 6061-6066; Grab Samples 6067-68, 6053-57.
5.	Grab Samples 6069-70; Wind River Section-6001-6052.
8.	Grab Samples FCH645.
9.	South Red Sheep Creek Section - 6072-6095 and 8008-8029; 8036-8046.
12.	Grab Samples FCH645-653 and 8001-8007.
13.	Smoke Creek Section 7001-7024.
14.	Crow Nest Creek Section 7025-7054.
16.	Upper Coleen River Section 6174-6177 and 6184-6199.
18.	Upper Firth River Section 6152-6173 and 6200-6210.
19.	Grab Samples 6211-6217.
20.	Grab Samples 6218-6243.
21.	North Red Sheep Creek Section 6100-6120.
22.	Grab Samples 6096-6099 and 6121-6125.
23.	Grab Samples 6126-6128; East Red Sheep Creek Section 8047-8058.
24.	Flat Rock Creek Section 8059-8068.
25.	Grab Samples FCH652-674; Angry Bee Creek Section FCH675-694.
26.	Grab Samples FCH695-705.
27.	Grab Samples FCH706-708; Grab Samples 7055-7072.
28.	Grab Samples 7073-7081; Aspen Creek Section FCH709-725.
29.	Joe Creek Section FCH727-742 and 6129-6148.
30.	Indian Archaeological Site.
31.	Grab Samples 7082-92.
32.	Grab Samples 6149-51; Grab Samples 6244-54.
33.	Grab Samples 6255-57; Mineral Deposit (McKibben); Start of chronological diary, Union Field Party on Noatak River.
37.	Start of chronological diary, Union Field Party, Ambler.
39.	Start of chronological diary, Union Field Party, Sagwon.
40.	Start of chronological diary, Amoco Field Party, Eagle.
42.	General observations for Arctic Village Area.

* * *

June 14, 1971

Departed Anchorage at 7:00 a.m. via Wein Airlines. Arrived Fairbanks 7:50 a.m. Arranged charters for camp and personnel to Arctic Village by Interior Airlines. Camp weighed about 7,500 lbs., so we had to use the DC-3 and Twin Otter for the move.

Interior wasn't ready for us. They didn't even know they had our gear in their warehouse.

Roy Brown (cook) didn't show. We have, instead, Andy Bristo (cook) and Joe Silva (bull Cook).

Departed Fairbanks at 2:00 p.m. for Arctic Village. Arrived Arctic Village at 3:30 p.m. There was 12" of new snow there. Weather was cloudy with intermittent rain and snow.

Commenced setting up camp and discovered camp gear had not been checked ~~on~~ by Universal Services. IE: We had ~~11~~ eleven cots and only six end-stretcher pieces; only about ½ the air mattresses didn't have holes; drinking water cans had gasoline in them; sleeping bags had no snaps for liners; only six tent side poles for each tent instead of the full number requested.

Set up radio but couldn't talk to anyone. Will try again tomarrow.

Chopper didn't arrive.

June 15, 1971

Continued setting up camp in the A.M.; weather partly cloudy all day, with isolated rain showers. Temp.-50's.

Chopper and Glenn Wheeler (pilot) with mechanic, Carl Montgomery, arrived at 11:58 a.m.

In the late p.m., we took the chopper along mtns. N & W of Arctic Village to check snow there. It should melt in about 3 days.

On the evening, we went to Arctic Village and used the school teacher's radio for supplies (Marian & Ray Nickelson). McKeever sent Ft. Yukon Flying Service to see about our radio problem. We arranged to talk to Ft. Yukon Flying Service on 3411 Channel #2 at 8:00-8:30 and 4:30-5:00 pm.

June 16, 1971

11:00 a.m. - Flew to outcrops SE of Smoke Mtn. along West side of Chandalar River. The Dl Unit there is a metamorphosed, calcareous, shale, siltstone and sandstone. Slightly coarser and a higher percentage of sandstone occurs just below base of Skajit on west side of mountain. The Skajit is apparently in fault contact with the Dl unit. Skajit is massively bedded highly recrystallized limestone, light gray.

Fiddled with radio until 10:00 a.m.. Finally have good communication with Ft. Yukon Air Service. Crew was getting very tired of moving the antennas around.

June 17, 1971

Weather partly overcast - Temperature about 60°. Did recon. traverse south of Wildlife refuge and checked Canadian fuel cache. Could not find fuel!

At FCH 635-36, the Dk unit may be equivalent to the Dsq unit which is similar lithologically but is darker colored. No contacts are visable and exposures are poor.

In the p.m., took second recon. traverse west to Chandalar Lake. There was fuel there. Checked outcrops to NE of Chandalar Lake.

1. T35N-R2W - Chandalar Quad.

   FCH 642=Ds) The conglomerate shown here on the USGS map may be a fault breccia
   FCH 641=DL) instead. Both units are metamorphosed.

2. T36N-R2E

   FCH 643-4 The Skajit and the overlying silt? or fine SS are both moderately metamorphosed.

Flew over 8 hrs. in the chopper today!

8:00 p.m. - Overcast and raining steadily.

June 18, 1971

Still overcast and raining at 6:00 a.m. Ft. Yukon is clear on the radio this morning. Looks like a down day due to the fog, low clouds and rain. Temperature in low 50's or high 40's. Drafted maps up this morning. Too bad we have no sections measured yet to draft on.

Clouds broke about 2:30 p.m., rain stopped. Clearing to south.

Recon. tour S & E of Arctic Village. 8001-8002 on Ds Unit, strike at 8002, N15°E dip 45°E. Normal, black, fissile Hunt Fork shale, with Fe concretions and veinlets. Chert = bedded? deep H_2O radiolorian?

8003 = Dgw Unit = graywacke, some med. bedded, some very thin bedded, finer grained, very micaceous

8005 = Meta chert?, green, poorly bedded Pyrite?

8006 = Gray silty meta sandstone & phyllites

8007 = Meta cgl. pebbles include qtz. brown and dk. gry to blk. chert, all pebbles are "stretched" or flattened. Could be Kanayut equivalent. All ~~rx.~~ rocks South of Arctic Village are metamorphosed with the degree increasing toward the south. Ds Unit has fine to medium-grained sandstone, dark gray, metamorphosed. These are probably same as slate sandstone unit to NE. They are thin bedded and have interbedded argillaceous streaks. No fossils anywhere.

June 19, 1971

Measured Ds & Dsl Unit down to Dsk contact on the Wind River. Weather good, partly cloudy and about 50°. Whole crew on this first section to break them in and get started right. Two ~~major~~ mafic intrusives occur near the base of the section. They have baked the shales and caused contact metamorphism of the shales to a distance of several 10's of feet.

June 20, 1971

Weather party cloudy, Temperature at 60°. Good working day. Hankinson, Lane, Self to Smoke Creek for section across Lisburne/Kayak contact in A.M. Recon. traverse W. of Arctic Village. Good Skajit/Dsl contact on Crow's Nest Creek (A good section to measure).

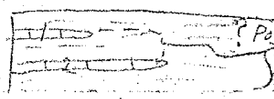
Grab Samples:

6058C = Skajit dense fine grained light to medium gray limestone. No fossils, slightly to moderately metamorphosed.

6059C = Limestone, medium to dark gray, fine grained, dense to medium grained; some darker gray and crystalline. This unit is within the Dsl Unit near its base. Amphipora noted in float, no other fossils. It is probably equivalent to the limestone in the basal Wind River Section. There are two small isolated streaks of these limestones in the valley bottom.

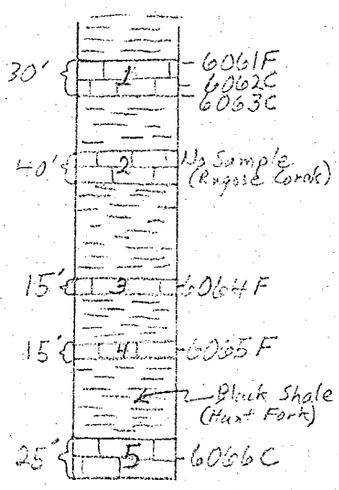
6060P = Dark (Kanayut) 500' from section base. Sandstone, very fine grained, light to medium gray, quartzite, 70% quartz, 30% dark chert, ~~multiple~~ multi; directional cross laminations. Some interbedded red and medium gray micaceous siltstones. Outcrop weathering brown due to limonite specks in sandstone and siltstone. Looks like top of Wind River section. No conglomerate, moderately well sorted.

Grab Section of DHf along Your Creek



6061F) Upper Ls Unit - Biostrome, very fossiliferous, a coquina of
6062C) Bryozoan, rugose corals, brachiopods, oncolites, amphipora, etc.

Grab Section



6064F = 3rd Unit from top (No sample from 2nd limestone)

6065F = 4th Unit from top

6066C = 5th Unit from top

The limestone Biostromes are interbedded with black shales like those measured and collected at Wind River Section contact between Dsl and Dsk unit. Appears to be conformable and totally gradational w/ Limestone simply increases in abundance downward in the basal Hunt Fork

Red Sheep Creek Traverse in P.M.

6067L (Meta rx)- Highly metamorphosed rocks with abundant quartz and pyrite which oxidizes Red.

6068L (Meta. rx)= Highly metamorphosed rocks. Source of metamorphism unknown. These green, siliceous, metamorphic rocks resemble metamorphosed rocks in black shales seen on Wind River Section. These were also interbedded with black micaceous shales.

Recon. flight up to Red Sheep Creek area. There is a good Kayak section including part of the Kanayut and part of the Lisburne. Other scouting is necessary to find other sections in the Devonian, Lisburne and Permo-Triassic.

June 21, 1971

Weather overcast and cool (low 50's). 7:00 a.m.=Hankinson and I flew to Crow Nest Creek to look at Dsk/Dsc contact for possible section. Looked good so set crew on Crow Nest Creek section for measuring and collecting. Chandalar River has been in flood since June 18th (Friday night). It is high enough to reach the foot bridge at Arctic Village. It is about 10 feet above normal and has flooded many of the lakes in the valley, including our drinking water lake.

Reconnaissance traverse to Wind River area and to retrieve Rich Lane's pack.

6053L&Geo = Mafic intrusive in Devonian Dsl or Dsk Unit. Light green with dark phenocrysts, some lithology as Wind River Section siltstones?

Late miss — 6054L&C = Looks like Lisburne but is mapped as Dsq. Limestone, medium gray, finely to coarsely recrystallized with abundant dark to light gray chert in thin beds and lenses (up to 8" thick). This section questionably underlies Dk Unit.

6055L = Green metamorphosed sandstone with limonite specks. Dk

6056PSr = Black, micaceous metamorphosed shale (slate) Fissile. Devonian Hunt Fork.

6057L = Dark sandstone (quartzite) with 20% dark chert. Looks like sandstone at top of Wind River Section.

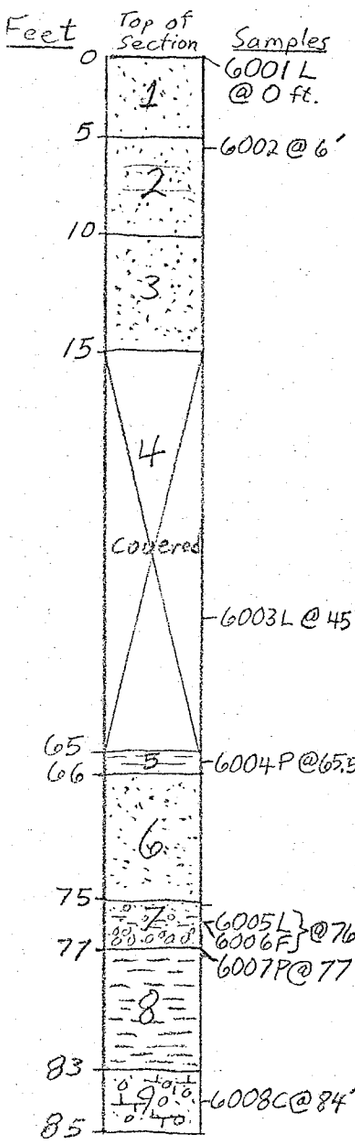
6069Geo = Mafic intrusive in Devonian shales (Ds), green, 6055 may be same lithology.

6070C = Skajit ? Possible Section. Moderately metamorphosed, thin to massive bedded. U.S.G.S. found Bivalves but 15 minute examination disclosed no fossils. Sample is taken in top 100 feet of Skajit.

Evening - sent troops to Old John Lake fishing. Has been mostly sunny and hot in p.m.

Wind River Section

Devonian sandstones and shales (Dsl & Ds) (Hunt Fork, Kanayut)



Unit 1-5' thick-quartzite, medium gray, 70%/30% quartz/chert, fine to medium grained, well sorted, well rounded, thinly bedded to laminated, quartz veins perpendicular to bedding. Some ironstained zones. 6001L at top.

Unit 2 - 5' thick sandstone as above except calcareous cement and brown ironstain. 6002LC at 6'.

Unit 3 - 5' thick, same as Unit 1.

Unit 4 - 50' thick, covered, mostly rubble, same as Unit I; minor fissile, black micaceous shale float containing plant fossils, also limonitic, fine grained, sandy conglomerate w/clasts of dense, maroon siltstone (maybe hematite vein). 6003L at 45' (contains maroon conglomerate).

Unit 5 - 1' thick, black shale as above, probable lingulas on bedding plane. 6004P at unit center.

Unit 6 - 9' thick, sandstone as Unit I.

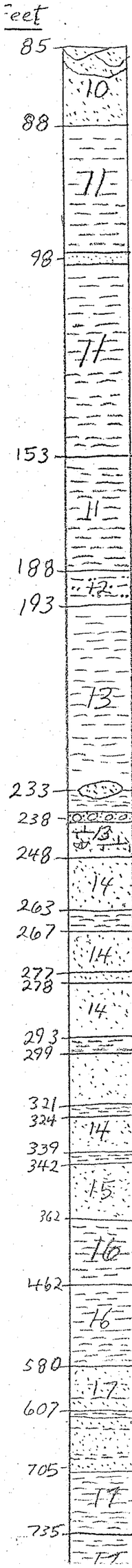
Unit 7 - 2' thick, sandstone-conglomerate, poorly sorted sand, fine-grained quartz and chert, dominately quartz, conglomerate pebbles of siltstone-maroon and black. Entire rock brown due to limonite staining; calcareous cement, very fossiliferous, abundant brachiopods.

6005L)
6006P) at center of unit.
6007P at 77 feet.

Unit graded upward into fine-grained sandstone with possible channeling. Unit also appeared to be lensoidal with thin bedding and cross laminations.

Unit 8 - 5' thick, black shale, same as above. 6007P at top of unit.

Unit 9 - 2' thick, same as limonitic unit above, but more calcareous. 6008C at center of unit.



Unit 10 - 3' thick sandstone, same as Unit 1. Sandstone units above appear to be lensoidal, possibly channel fillings.

Unit 11 - 100' thick, black shale as above grading downward ~~in~~ to slightly more silty, color changing to brown down section. Jointing ~~one~~ 1 to bedding. 6009 @ 153'.

Unit 12 - 5' thick, siltstone, dark gray, weathers splintery with brown iron staining especially on weathered surfaces. 6010P at center.

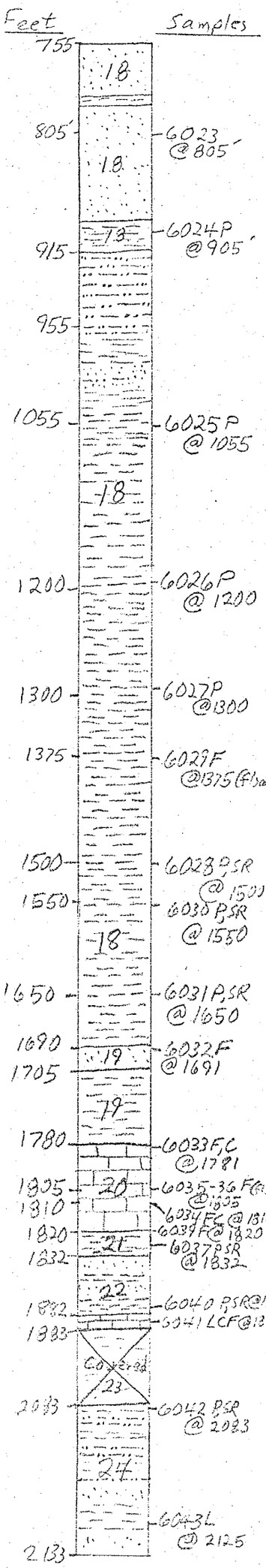
Unit 13 - 55' thick, black micaceous shale as above, except slightly more silty. Sandstone concretion at 233, cherty conglomerate bed at 238'.

Unit 14 - Interbedded gray and brown sandstone, occasionally calcareous, fine grained, well sorted, well rounded quartz with minor dark chert. Contains crinoids and poorly preserved brachiopods. 6011LF at top of unit. Interbedded black fissile shale as above. 6012LF - 1' thick @ 277', brown weathering, limonitic sandstone and conglomerate, slightly calcareous, contains stromatotoporoids, brachiopods, pelecypods and gastropods - porosity ±10%, clasts and pebbles are black chert, red ironstone with some reddish-brown siltstone. ~~6012LF.~~ - 6' black fissile shale same as above. 6013F @ 301'. N70°E strike; 20°E dip at 301 feet. Some sandstones are very well sorted and have porosity which may be due to weathering at 321'. Abundant plant fragments in sandstone, which resemble those seen in basal Kayak sandstone in Shublik Mountains. 6014P at 321' (top of shale) 3' silty black shale at 321', same as above, 3' ~~shale~~ at 339; black, fissile, micaceous, same as above. 6015P top of shale, sandstone, same as above, contacts between units are undulatory and thicknesses of units vary laterally.

Unit 15 - 15' thick, sandstone, fine grained quartz, well sorted, purple siliceous matrix, interbedded with quartzite which is green-gray. Contains abundant vuggy quartz-lined fractures (hairline to 1 inch). 6016L At base of Unit 15.

Unit 16 - Black fissile shale and siltstone. Abundant plant fragments. 6917P at 377'; 6018P at 462'-shale as above.

Unit 17 - 6020L at top of Unit 17 - (quartzite) sandstone, fine to medium grained, purplish to reddish gray, weathers brown, well sorted, dominately quartz, minor dark chert(?) abundant limonite specks. 6021F at 604'; Interbedded shale with the sandstone as above at 605'; Shales with interbedded sandstone at 607'-705'; black fissile shale, same as above at 705'-735'; 6022P at 735'; black, fissile shale, same



Unit 18 = Sandstone (quartzite) with interbedded shale, same as above; lens-shaped sand bodies; 6023F at 805'; possible fault at 900 feet; 6024P at 905' (in black shale); 40' thick siltstone and silty shale, same as above - 915-955'; Interbedded, fine grained sandstone and siltstone at 955', cross bedding in sandstone; Interbedded shale, siltstone and sandstone at 955'-1055'; 6025P at 1055' in black shale; There is a possible fault or change in strike and dip at 1055'; black shale (same as above) 1055-1200'; 6026P at 1200'; black shale, same as above at 1200-1300'; 6027P at 1300'; 6029F at 1375' (float); strikes and dips very due to incompletence of shales and siltstones as they weather. The conglomerate appears metamorphosed (pebbles are "stretched"). 6028 PSr at 1500' - lithology as above. 6030 PSr at 1550'; 6031 PSr at 1,650'.

Unit 19 - 15' thick, quartzite, sandstone, fine to very fine grained, poorly sorted with occasional larger grains (not pebbles) of black chert and quartz. Contains calcareous fossil grains probably brachiopods 6032F at top of Unit 19; 6033FC top of Unit 20.

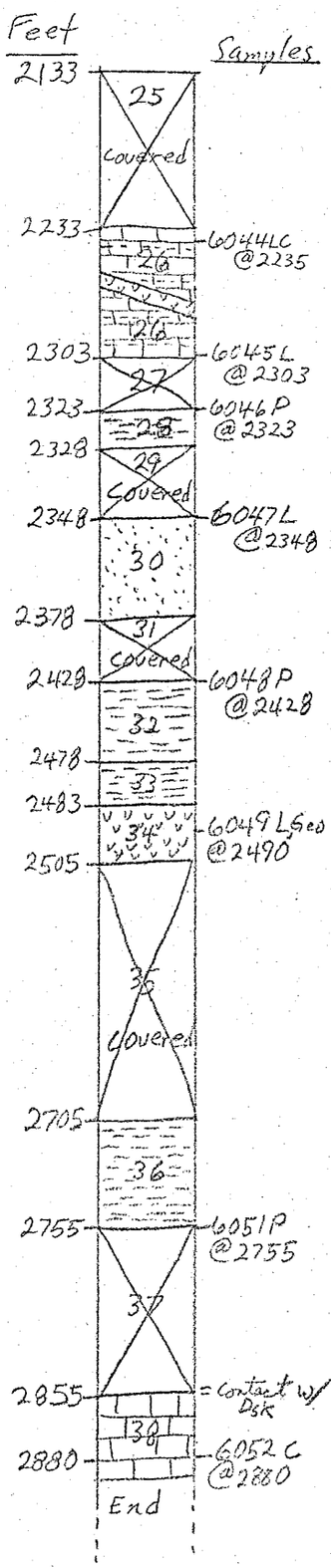
Unit 20 - 1780-1820' - Limestone and black shale as above, interbedded, limestones are black, fetid, medium-finely crystalline and are fossiliferous. Fossils includes abundant coral boundstone with some brachiopods and crinoids. Limestone appears to be discontinuous lenses and beds & are definitely small biostromes. 6035F at 1805 (Float, semi-in-situ~~[illegible]~~ (Amphipora?); 6034FC at 1810'; 6036F at 1805', bryozoan.

Unit 21 - 12' thick, black, silty, shale same as above. 6037PSr at center of shale.

Unit 22 - Quartzite, sandstone, lenticular and discontinuous, multi-directional, cross laminations, gray-green, fine-grained, well-sorted. 6038L at center of unit; 6039F at center of shale (float) (stromatoporoid comes from base of sandstone as above; 1832-1882' - Interbedded sandstone and shale, sandstone contains limonite specks; 6040PSr at 1882'; 6041 LCF at 1883 in one foot limestone bed.

Unit 23 - Covered 200' (siltstone as above?)

Unit 24 - 50' thick, 6042 PSR at 2083; 6043L at 2125'; shale and siltstone, ~~and~~ dark gray-black, multi-directional cross beds. Basal portion contains very fine grained sandstone lenses and layers = 6043L.



Unit 25 - 100' covered, probably same as Unit 24.

Unit 26 - Highly metamorphosed, shale and carbonates?

6044LC at 2235' - green, very dense.

Does not fit in section---possibly alteration by igneous intrusion which is absent to S. & N.; 6045L at 2303, metamorphosed?

Unit 27 - Covered - 20' thick.

Unit 28 - 6046P at 2323, black fissile shale, metamorphosed? 5' thick.

Unit 29 - Covered, 20' thick; 6047L at top of unit 30, black very fine grained quartzite, metamorphosed? 30' thick.

Unit 31 - Covered, 50' thick.

Unit 32 - Black fissile shale, same as above, slightly metamorphosed? 6048P @ 2428'.

Unit 33 - Highly metamorphosed shale, as above; 6049I&Geo (contains both metamorphosed shale and igneous rock).

Unit 34 - Mafic igneous sill.

Unit 35 - Covered.

6050 PSr at top of Unit 36.

Unit 36 - Black and green fissile shale, as above, weathers green-brown - 50' thick.

6051P at 2755' - Same as above.

Unit 37 - Covered. 100' thick, contact with Skajit within 5-10 feet of base of covered zones.

Unit 38 - 6052C is 25 feet from top of Skajit. Skajit is metmorphosed, slightly (marble/) massively bedded limestone, medium gray, no visable fossils, thickness unknown, poor outcrop.

END - WIND RIVER SECTION

June 22, 1971

Mostly overcast - Temperature at 50°. Thin broken clouds. Headed for Red Sheep Creek:

Grab Samples

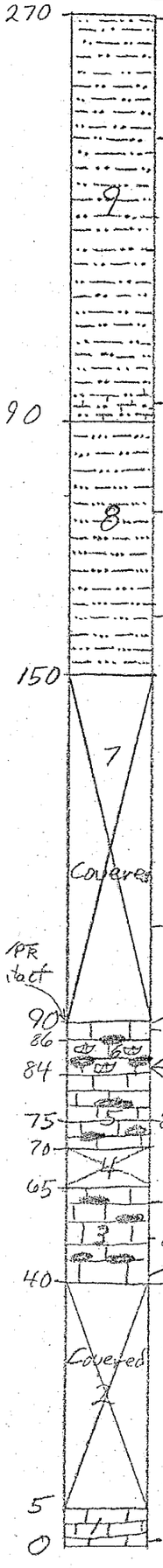
FCH645LP - Siksikpuk according to map. Is black shales and minor (?) chert. Looks like Kayak, pyrite cubes. Some of the shale has been metamorphosed and silicified till it looks like chert. Others are only slightly metamorphosed, black micaceous shales.

Fehlmann & Hankinson at 7:00 a.m. to South Red Sheep Creek on Permo-Triassic. Lane and Self will follow to measure section at South Red Sheep Creek.

South Red Sheep Creek Section

At section, weather partly cloudy, high, thin clouds, mostly sunny, Temperature at 55°. Fehlmann & Hankinson on South Red Sheep Creek - Permo/Triassic Section. Fehlmann is recorder. Near top of section is probably fault contact of Kayak and Permo-Triassic. Additional samples collected in top of Lisburne at South Red Sheep Creek, by Lane & Self are numbered in the 8000's, below.

South Red Sheep Creek Section



Samples

8035LCF at 160'

8034LCF at 90'

8033LCF at 75'

8032LCF at 60'

8031LCF at 50'

8030LCF at 40'

Unit 1 - 6071LC - Limestone, medium gray, medium grained, bryozoan packstone to wackestone. Rugose corals? abundant black chert nodules; 6072F - limestone as above.

Unit 2 - 35' Covered

Unit 3 - Limestone (dolomitic?) dark gray, finely crystalline 15% medium gray-brown chert lenses, beds, and nodules, fine multi-directional cross laminations in limestone and cherts - 25' thick. 6073LC at 42 feet.

Unit 4 - Covered - 5' thick.

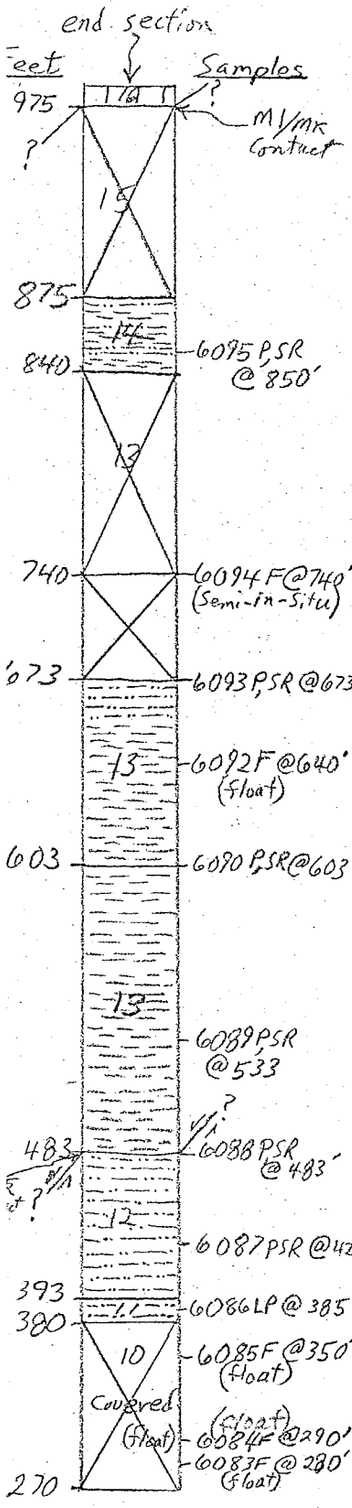
Unit 5 - 14' thick; limestone as Unit 3 above.

Unit 6 - 2' thick; limestone, medium gray, brown, coarse grained, crinoidal bryozoan brachiopodal (Dictyoclostus) lime packstone weathering lighter gray. 6074F, 6075F, 6076LC in center Unit 6 at 84-85 ft.; 6077F - brachiopods (Spirifers)

Unit 7 - Covered?, black shale, fissile with small limestone stringers and siltstone layers; semi-in-situ - 6078P at 115'.

Unit 8 - (Ivishak?) 40' thick - siltstone dark gray thick bedded but finely laminated, moderately metamorphosed. 6079L, abundant pyrite which causes it to weather orange-brown.

Unit 9 - 80' thick, siltstone as above, but interbedded with light gray brown and tan weathering more massive, slightly calcareous siltstone and mudstone. 6080L at 195'. The lower brown siltstone grades upward into medium to light gray splintery siltstone. [redacted]; 6081 PSr at 230'; 6082L at 270'.



Unit 10 - 110 ft. thick. Siltstone to mudstone, medium to light gray-brown, tan weathering, weathering platy (fissile). Abundant fossils: Ceratites, Conularids?, brachiopods, etc. in calcareous nodules. 6083F at 280' float sample; 6084F at 290' float sample; 6085F at 350' covered mostly.

Unit 11 - Siltstone, slightly calcareous, dark gray weathers platy, slabby and with brown patches and streaks. 6086LP at 385'.. Top 3' is paper thin brown shale.

Unit 12 - Unit 11 grades into Unit 12. 40' thick, dips vary, possibly a fault zone. Siltstone gets shalier than above 423' 6087PSr at 423'; silstone black, sooty (oil stained?) weathers platy at top. No brown shaly zones as in Unit 11 and basal portion of Unit 12; 6088PSr at 483'. Dips vary greatly. Fault at top# of Unit 12?

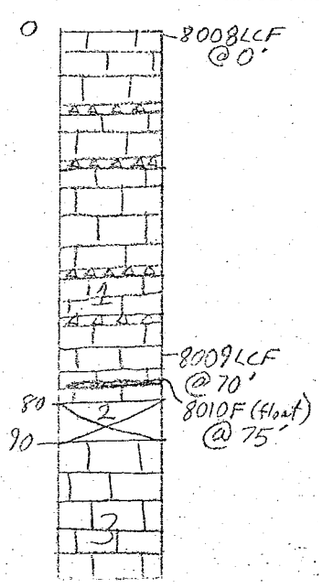
Unit 13 - Black, fissile, shale, weathers platy (slightly metamorphosed?) to paper-thin; 6089PSr at 533'; 6090 PSr at 603'. 6091-Void number; 6092F (float at 640'; 6093PSR at 673' taken in a slightly siltier zone; 6094F (float) ammonite with shell ornament from black shale and siltstone slopes.

Unit 14 - 6095PSr - Siltstone and shale, light gray to greenish tan, weathers brown. Paper-thin platy weathering contains calcareous siltstone concretions which contain ammonites, baculites, gastropods and sharks teeth - 35' thick; 6095PSr at 850'

END SOUTH RED SHEEP CREEK SECTION (PERMO-TRIASSIC)

South Red Sheep Creek (Lisburne) Section

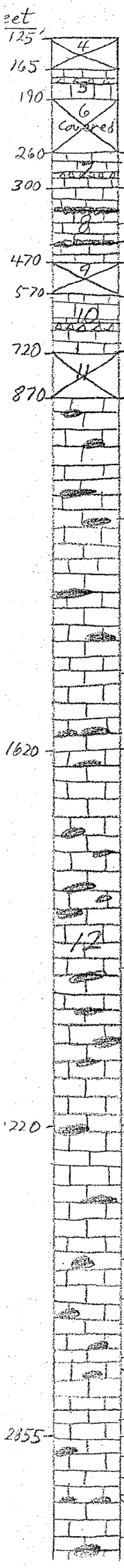
Rich Lane and George Self. Weather: Partly cloudy, 55° (Lisburne); 35' of covered interval above section top (in Permo-Triassic).



Unit 1 - Medium-dark gray limestone, recrystallized packstone with brachiopods, crinoids, bryozoans present; weathers to light gray chert nodules (dark gray) up to 12 inches in diameter; 8008LCF at 0'. Fractures and calcite veins abundant, medium bedded with dip of about 30°; black-dark gray chert beds and lenses up to 2' thick; 8009LCF at 70' limestone, same as above, but more crystalline; 8010F at 80' limestone, as above, (float); must have come from within 20' of present position.

Unit 2 - Covered, 15' thick

Unit 3 - Recrystallized, as Unit 1, crinoids, brachiopods, bryozoans



Unit 4 - 40' thick; covered.

Unit 5 - 25' thick, recrystallized limestone as above, no fossils evident; coarsely crystalline.

Unit 6 - 70' thick, rubble covered.

Unit 7 - Recrystallized limestone, as above, crinoids present. 8012LCF at 260', red staining along some bedding planes; 8013F at 300', recrystallized limestone, as above.

Unit 8 - Jointing abundant, chert nodules very abundant (30%); dark gray, fine-grained limestone-wackestone with occasional sparry calcite crystals, abundant crinoids, thin bedded, abundant chert nodules (30%); weathers medium gray 8014LCF at 400' bryozoans abundant; 8015F at 440' - Packstone, as above, but thicker bedded (intermediate bedding) and less chert (5-10%). 8016LCF - Packstone, as above, but slightly coarser grained, crinoids and brachiopods present. Bedding becomes thinner downward.

Unit 9 - 100' rubble covered.

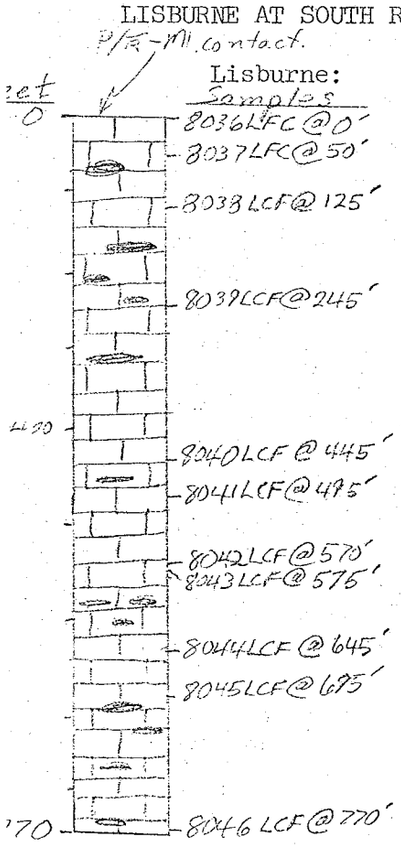
Unit 10 - Medium gray, finely crytalline, medium gray limestone, abundant chert (30-35%), no fossils evident, 8017LC at 570' intermediately bedded; 8018LC at 720'-limestone, as above.

Unit 11 - Covered, 150' thick.

Unit 12 - Medium gary limestone, as above, crinoids present. 8019LCF at 870'; 8020LFC at 1170'-limestone, as above, crinoids abundant (packstone?); 8021LFC at 1470'-limestone, as above; 8022LC at 1620'-limestone, as above, color varies from medium to dark gray; jointing ~~one~~ 1 to beddings, gentle folds and calcite veins abundant; 8023LCF at 1920'-limestone, as above; 8024LFC at 2220'-limestone, as above, crinoids present, varies from finely crystalline re-crystallized mudstone to recrystallized crinoidal packstones; 8025LFC at 2520-limestone as above; 8036LFC at 2610'-8037LFC at 2660'-strong fetid odor; 8026LC at 2720'-limestone, as above, but thick bedded; lithostrotionell[illegible] heads Giganto productus?; 8027F at 2720'=lithostrotions; 8038LFC at 2735'; 8028LFC at 2820'-corals, brachiopods, gastropods, bryozoans-fossil[illegible] look silicified; limestone, as above; 8039LCF at 2855'; 8040LCF at 3055'; 8041LCF at 3105'; 8042LCF at 3180'; 8043F at 3185'(lithostrotion~~ella~~ella): 8044LC at 3255'; 8045LFC at 3305';

REVISITED:

LISBURNE AT SOUTH RED SHEEP CREEK SECTION (Collected by Lane& Self). Top of Lisburne:



Recrystallized limestone, medium gray, varies from wackestone to mudstone (recrystallized)-coarse to fine-grained, sparry calcite crystals; bryozoans, crinoids present; bedding thickness and amount of chert varies considerably; 8036LFC @ 0'-Jointing abundant; 8037LFC @ 50'-Fetid odor, dark gray limestone, as above; 8038LCF @ 125' - Limestone, as above; 8039LFC @ 245'-Limestone as above, crinoids abundant, almost a packstone; 8040LFC @ 445'-Limestone, crinoid and bryozoan wackestone, as above; 8041LFC @ 495' - Limestone, as above; 8042LFC @ 570'-Limestone, as above; 8043F @ 575'-Lithostrotionella head - 1 ft. across; 8044LC @ 645'-Limestone, as above; 8045LFC @ 695'-Limestone, as above; 8046LFC @ 770'- as above, Lithostrotionella.

Grab Samples Traverse N. & W. of Red Sheep Creek and W. of Chandalar River toward Arctic Village:

FCH 645PSr - Ps Unit - Shale, black, probably Devonian, slightly metamorphosed.

FCH646L - Kanayut - like Dk on Your Creek, etc. Has chert pebble conglomerate up to 2" in diameter.

FCH 647P - Maroon shale (Ds Unit) at headwaters, Red Sheep Creek.

FCH648P - Green Shale (Ds Unit)

FCH649P - Kayak shale, black, slightly metamorphosed, fissile to lumpy.

FCH650L - (Dk) Coarse conglomerate and interbedded fine-grained sandstone, chert clasts up to 2" across.

FCH 651LP - Metamorphosed silicious shale, green. (Permo-Triassic, Dcs Unit) It is lithologically identical to the Dcs Unit along Red Sheep Creek. It is probably Dcs not Permo-Triassic. Some red (maroon) shale are also present.

FCH652PSr -Black sooty shale, may be Kayak or may be Devonian.

FCH653L - Siltstone, black, micaceous, weathers gray, also sandstone, very fine-grained, brown, slightly calcareous, Kayak/Devonian.

8001L - Black chert, bedded, ~~light-Radiolanaris~~ Radiolarians(?) - Hunt Fork, iron stained box- ~~with~~ work, quartz veins (Ds)

8002PSr - Black shale, fissile, Hunt Fork, looks slightly metamorphosed (Ds)

8003L - Dark gray quartzite (graywacke) thin to intermediate bedded, quartz veins - Dgw.

8004Geo - Fine grained "pillow" basalts, pillow-like structures, quartz veins.

8005L - Gray-green, siliceous sandstone? highly metamorphosed, (possibly igneous), quartz and calcite veins.

8006L - Gray, dirty sandstone, more shaley portions highly contorted; quartz veins.

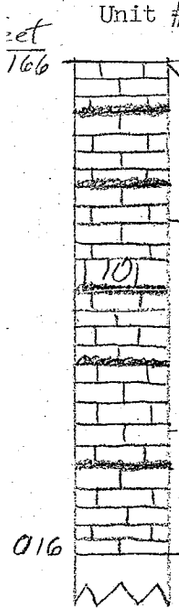
8007L - Metamorphosed conglomerate; pebbles are flat, chert and rock fragments; matrix is phyllite.

SMOKE CREEK SECTION (KAYAK, LISBURNE)

Fred Hankinson, Rich Lane, George Self. Weather: high, overcast, 55°.

NOTE: Measuring from top down section to cliff top for Unit 10, cliff is

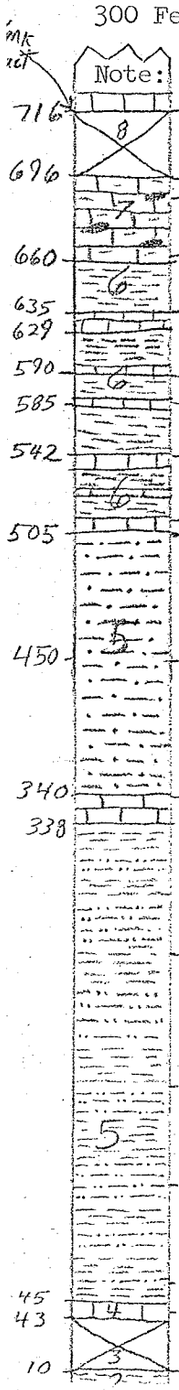
Unit #9:



Unit 10 - 7001C @ 1066' - Limestone, medium-gray, recrystallized sparry calcite, thick bedded, fetid odor; 7002LC - Light gray to dark gray chert, beds vary from 2 inches to 1 foot and are lenticular; 7003LFC @ 1016' - Limestone, medium gray recrystallized sparry calcite, thick bedded w/interbedded chert, occasional solitary corals; 7004LFC at 966' - Limestone w/interbedded chert, medium gray to dark gray, recrystallized sparry calcite and crinoidal hash; 7005LFC @ 916' - Limestone with interbedded chert, medium-dark gray, recrystallized sparry calcite, rare crinoids.

300 Feet of section missing due to inaccessable terrain (cliff) from 716' to 616'.

Note: Stopped measuring up section at cliff base (Unit 9):



Unit 9 - (Lisburne) 7024LCF - in bottom of Lisburne, light to medium gray, fine-cocuse grained crinoidal hash with occasional chert, (black) nodules which are very fossiliferous; occasional brachiopods and gastropods. Only base examined; is a cliff.

Unit 8 - Covered.

Unit 7 - 7023LCF - Black limestone, thin-bedded, same as below; 7022LCF @ 592' - 3' thick bed of limestone, same as below; 7021LCF @ 561' in bottom of dark gray-black wackestone, thin bedded, abundant black chert nodules in stringers, very fossiliferous, thin shale partings throughout.

Unit 6 - 7020FCL @ 535' - in top of 6' thick limestone bed, same as below; 7019PSr @ 590' - shale, same as below; 7018FLC @585' - limestone, same as below; 7017LCF @ 542' - limestone, same as below; limestone, lenticular, 2 inch to 3 feet thick, brown-dark gray, crinoidal hash with abundant sparry calcite and iron-stone concretions with interbedded shale, black, fissile; 7016LCF @ 506'-Limestone, very fetid odor.

Unit 5 - 7015PSr @ 505' - Black shale, same as below with thin interbedded limestone lenses and beds; 7014PSR @ 450' - Black fissile shale, abundant hematitic siltstone stringers and hematite/limonite concretions.

See previous page for diagramatic Section Strip.

Unit 5 (Con't) - 7013LC-Maroon to brown limestone, crystalline iron stained with fossil fragments weathers orange brown; is fractured; 7012P @ 275'-Silty shale, same as below; 7011PSr @ 195'-Shale and siltstone, black, silty, fissile with brown and black thin calcareous laminations in the shale; 7010PSr @ 135'-Black silty fissile shale, varies from shale to siltstone, brown and black alternations in color; 7009P @ 55'-Black, fissile shale with ironstone concretions scattered throughout.

Unit 4 - 7008LCF @ 44'-Dark brown limestone 2' thick, semi-in-situ, arenaceous and ironstained.

Unit 3 - Covered

Unit 2 - 7007L-Silty shale, slightly metamorphosed; thin laminations, alternating brown and black layers.

Unit 1 - 7006L @ 0' - Quartzite (metamorphosed?) possibly top of Kanayut or basal Kayak sandstones.

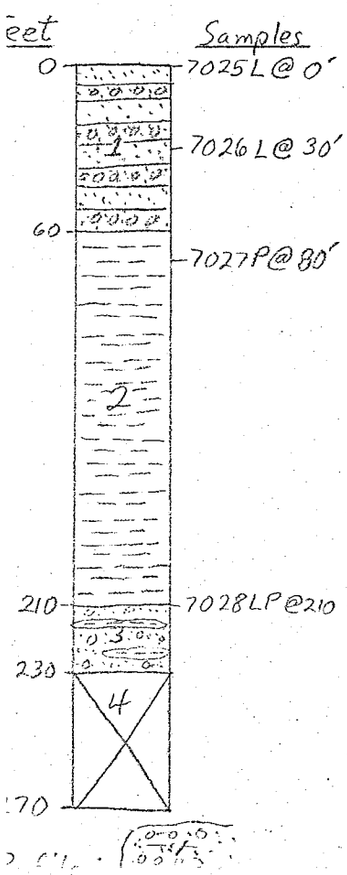
END SMOKE CREEK SECTION

June 21, 1971

Weather overcast and cool (low 50's). 7:00 A.M.-Hankinson and Fehlmann fly to Crow Nest Creek, look at Dsk/Dsc contact for possible section. Looked good so set crew on Crow Nest Creek Section for measuring and collecting.

CROW NEST CREEK SECTION

Measured by Fred Hankinson, Rich Lane, George Self, weather: high, overcast; 50°F.

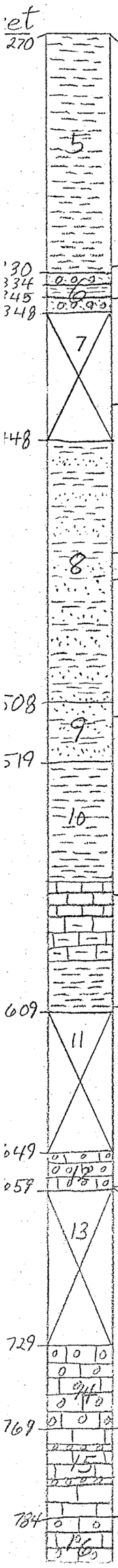


Unit 1 - 7025L-Gray fine-coarse grained sandstone and very fine-grained conglomerate; siliceous cement and slightly calcareous. Slightly metamorphosed, shale clasts, black cherty clasts common. Pebbles and cobbles are "stretched" and are up to 1" in diameter, cross bedding and channelling present. Bedding varies from 1 inch to 2 feet; 7026L @ 30'=Plant fragments abundant on bedding planes; fine sands are thinly laminated conglomerate grades downward into shale.

Unit 2 - Black shale, argillaceous, platy, fissile - 7027P @ 80'.

Unit 3 - 7028LP @ 210'-Fine to medium-grained sandstone with occasional clasts, slightly calcareous, same as Unit 1, but finer grained and has interbedded shales, all beds are lenticular. Conglomerate grades, downward into shale.

Unit 4 - Covered, 40' thick.



Unit 5 - Light to medium gray shale, fissile, platy, abundant plant gragments on 7029P @ 270', bedding planes grading into conglomerate at bottom of Unit 5; 7030P @ 329' in shale.

Unit 6 - Conglomerate with interbedded shale, same as Unit 3, clasts up to 2" in diameter with abundant plant fragments, 2-3' lenses(?) of conglomerate and shale, highly fractured; 7031 @ 345' in sandstone conglomerate.

Unit 7 - Covered, 100' thick rubble covered slope, with some dark gray to black shale and limestone float (Hunt Fork?),

Unit 8 - Change in lithology, weathers light gray to greenish gray. Interbedded quartz sandstone, shale, siltstone, claystone, finely laminated, highly calcareous, limestone nodules, paper-thin partings of claystone 7033P @ 478'; 7034C @ 473'.

Unit 9 - Fine to medium grained argillaceous sandstone, weathers light gray-greenish gray, 10 inch diameter calcareous concretions, scattered lenses of fine to medium grained conglomerate. Interbedded shales, 7035P @ 510' in shale.

Unit 10 - Light gray to greenish gray claystone, grades downward into more calcareous rock into an arenaceous limestone @ 569'. Highly folded and metamorphosed (mudstone almost becomes a phyllite/purple/just ~~about~~ above limestone) more metamorphism downward, 7036C @ 569'-limestone; 7037L @ 609' in highly calcareous shale, metamorphosed quartz veins.

Unit 11 - 40' thick, covered with grass.

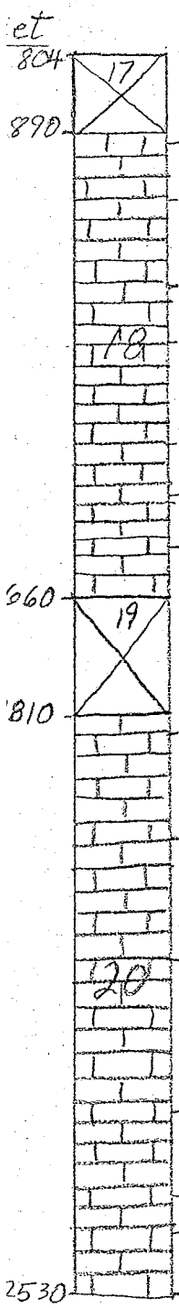
Unit 12 - Limestone conglomerate with argillaceous, calcareous matrix and cement, limestone clasts are rounded to angular - 7038L & 7039C @ 659'-metamorphosed, quartz veins.

Unit 13 - 70' grass covered.

Unit 14 - 40' thick, limestone conglomerate, clasts of limestone, chert and sandstone, up to 8 inches in diameter, stretched, metamorphosed, quartz veins.

Unit 15 - Medium to dark micritic and recrystallized limestone, finely laminated 7040LC @ 769'; thin lenses of limestone conglomerate, metamorphosed quartz veins.

Unit 16 - 20' thick, limestone conglomerate, same as Unit 14 (stretched clasts) 7041LC @ 784'-metamorphosed quartz veins.



Samples

Unit 17 - 90' Covered

Unit 18 - Medium gray recrystallized limestone, indistinct bedding (Skajit); 7042LC @898'; Shear zones indicated by fractures and massive clusters of calcite crystals; 7043LC @988' Abundant calcite crystals; 7044LC @1190' - Recrystallized limestone, same as above; 7045LC @ 1290'-Recrystallized limestone, same as above, spall weathering, entire outcrop appears to be possibly a huge bioherm (lithology indicates possibly a reef core?); 7046LCF @ 1540'- Limestone, same as above, except possible corals; 7047LC @ 1600'-Limestone, same as above, but slightly darker gray in color, slightly finer-grained.

Unit 19 - 150' thick, rubble covered limestone.

Unit 20 - Light to medium gray recrystallized limestone, same as unit 18; 7048LC @ 1830'; 7049LC @ 1930'-Limestone same as above; 7050LC @ 2080'-limestone, same as above, except more coarsely crystalline and has a slightly tan gray color; 7051LC @ 2280'; 7052LC @ 2380'-limestone, same as above; 7053LC @2430'-Limestone, same as above; 7054LC @ 2530'-Limestone, same as above, but ~~thin~~ tan-gray in color.

END CROW NEST CREEK SECTION

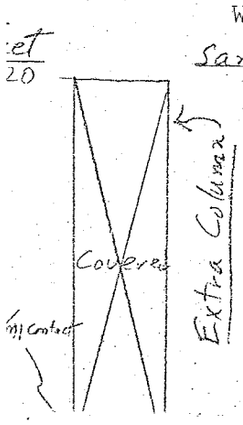
July 1, 1971

Weather: overcast (high) and calm-Temperature 10°C. Self, Hankinson, Fehlmann to Permo-Triassic (Ps) outcrop at NE edge of "Out-of-Bounds-Zone" then to Upper Firth River Section, Joe Creek and Recon. Home by S. route to possibly spot Lisburne section and another Permo/Triassic Section or Kayak Section.

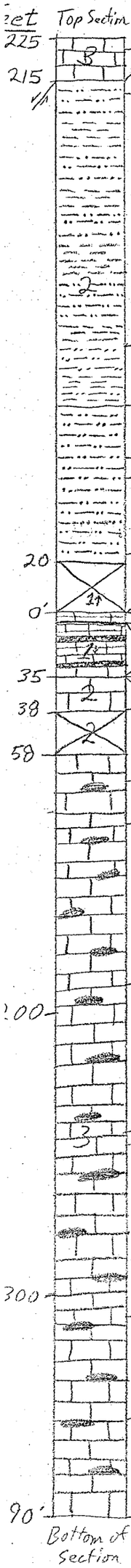
UPPER COLEEN RIVER SECTION

Fehlmann (Recorder), Hankinson & Self; Weather-clear, sunny and cold (5°C).

Start section at top of the Lisburne limestone and measure up section. Lisubrne is limestone, medium gray, fine crystalline, thin-medium bedded. Weathers light gray. Rubble semi-in-situ~~stion~~.



Unit 1 - Contact of Lisburne is abrupt with overlying shale and siltstone of Permo Triassic occurs at base of a steep shale covered slope 20' thick. Abundnat brachiopods and a few crinoids present; 6174CF, 6175F @-2'; 6176F, 6177CF @0'-Limestone, dark gray, coarse to fine crystalline, some conglomerate (Limestone pebbles) looking. More fossiliferous, especially bryozoans,



Unit 2 - 6178LP-Siltstone, brown (limonite) weathers splintery Slightly calcareous; 6178 is at base of the Unit which is 195' thick; 6179F-Fossil bone in a concretion (George Self's) Float sample in light blue-gray, siliceous nodules; 6180LP-Siltstone as 6178; 6181LP-Siltstone as above except darker gray and platy. Calcareous along bedding planes. 6180 is at 110'; 6182LPSr at 140' - Shaley, platy, fissile, weathers black, not brown; 6183LP - Siltstone more brown weathering and less shaly than below.

Unit 3 - 6184LCF-Metamorphosed or fault-altered Lisburne. Contains crinoids weathering brown and gray. Section top is faulted, Lisburne is fault repeated so measurement stopped.

NOTE: Permo-Triassic section measured from Lisburne contact up.

Add

NOTE: Measuring from top of Lisburne at contact down section from here on.

Unit 1 of Lisburne - 6185C-Limestone dark to medium gray, very finely crystalline, dense, Algal laminations? (Could be a metamorphic feature.). Brachiopods are common. Minor black chert nodules within limestone; 6186F & 6187F @ 35'-Much of the black chert appears to be uniformly bedded.

Unit 2 - 6188F, 6189F-Dictyoclostus; 6190C, 6191F-rich crinoidal packstone, dark gray, coarse grained, covered zone at base of unit.

Unit 3 - 6192FC-Pelletal packstone to grainstone. Medium to coarse-grained, medium gray, well sorted. Fetid odor; 6193FC-Pelletal limestone as above. Unit 3 is interbedded pelletal limestone and coarsely recrystallized light gray limestone with bryozoans and crinoids; 6194FC-Pelletal crinoidal and iron specked limestone as above. Also minor, fine-grained, crystalline, black limestone and dark chert; 6195LCF-limestone, finely crystalline, black. Abundant bryozoans and brachiopods around and in chert nodules; 6196F-Brachiopods and bryozoans (Float); 6197FC at 318'-Dense, finely crystalline micrite, light tan to dark gray, tan and dark gray chert nodules have fossil grains present; 6198FC @ 390'-Tan and gray lime wackestone and packstone, crinoidal, recrystalized.

END UPPER COLEEN RIVER SECTION.

June 30, 1971

UPPER FIRTH RIVER SECTION - Measuring from Kanayut up section through Kayak into Lisburne: Hankinson, Fehlmann, Self

Unit 1 - 6152L-Quartzite (Kanayut) medium-grained, very well sorted, dark chert (15%) and quartz (85%). Minor limonite specks cause brown weathering. Sample taken @ 20' into Kanayut. Resembles Neroukpuk seen in Sadlerochit Mtns. (NE end in 1970). Would make excellent reservoir if minus silica cement; 6153L-Brown weathering quartzite, as above, except greater percentage of limonite and hematite grains. May be basal Kayak sandstone, probably top unit of Kanayut.

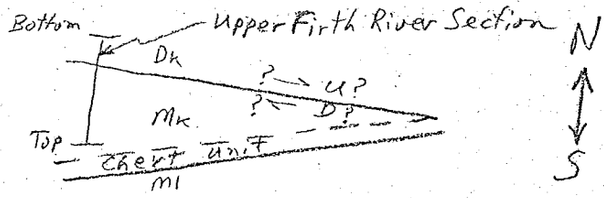
Unit 2 - 6154PSr-Possible fault between Unit 1 and Unit 2? Kayak shale dip=steep to South? Kayak shale=black shale weathers platy and pencil-like, brown from Limonite. Contains ironstone concretions, and quartz filled veins. Basal part silty and weathers brown; 6155PSr @ 140'-black shale, fissile, weathers platy, slightly metamorphosed, some iron staining but not as much as below; 6156PSr-Black, fissile, platy shale, as above; 6157PSr @ 320'-shale, as above, slightly more silty; 6158PSr @ 470'-shale, as above.

Unit 3 - 6159F @ 543' and 6160C at 540'-545' = Small gray, limestone units in black shale, as above. Very fossiliferous bryozoans, brachiopods, corals, crinoids, etc. Weathers limonite brown; 6161F @ 575'-Limestone, as above, except obviously crinoidal packstone. Limestone weathers limonite brown; 6162PSr @ 580'-Black shale, very sooty, fissile and soft.

Unit 4 - 6163C @ 625'-629'=Limestone, very dirty, silty, black, sooty few fossils; 6164FC-Limestone, crinoidal packstone to wackestone. Weathers brown from iron (limonite). Bed is massive and has a few possible forset laminations showing. Fossils include corals, crinoids and brachiopods at 627'. Contains about 30% black chert. 6165FC-Limestone as 6164 but separated by a shale stringer.

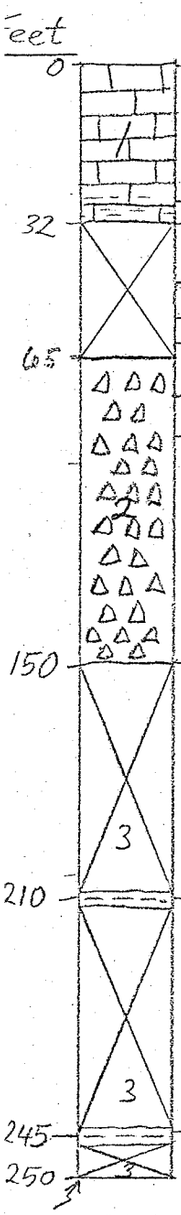
Unit 5 - 6166PSr @ 619-716'=Black limey silstone or black silty limestone which grades up imperceptably into black marine limestone which contains abundant fossils of brachiopods, bryozoans, crinoids, etc. Other shale limestone layers alternate upward in the section; 6167C @ 637'; 6168C @ 642'; 6169CF @ 652'-654'=Crinoidal wackestone, black @ 2' thick; 6170F @ 656'=limestone, massive, black, fossiliferous, with abundant colonial coral heads; 6171C @ 656'; 6172CF @ 681'-Limestone, crinoidal wackestone, black, fetid, finely crystalline; 6173CF @ 713';

Plan View:



July 1, 1971

Continuance of Upper Firth River Section from top down; Hankinson, Self, Fehlmann (Recorder).



Same as 716' on previous page.

Unit 1 (Down) - 6200LCF @ 0'-Top of Section (in Lisburne). Limestone-thinly laminated (like at Bear Mountain grab sample locality Also underlain by black chert). Black, very finely crystalline, fetid odor, light and dark banded-weathers light gray and platy; 6201LC - As above, except banding of laminations more distinct and several small zones of more shaly limestone appear. Weathers into fissile plates; 6202P-From a shaly zone as described above. Some banding looks algal - IE:  → very thin and uniform banding but contrary to gravity; 6203LP - Environment algal?, as above, float at 40'; 6204LPF?-Environment and petrogenetic history=? @ 50' Float; 6205LPF?-Environment algal?

Unit 2 - 6206LF?-Black chert fossils? minor dolomite including and resembling those in Unit 1. Like Unit seen at Aspen Creek lying below Lisburne; 6207F?L-Black chert, as above and limestone (dolomite) nodules not completely silicified, fossil? float; 6208LF?-chert, as above, except abundant quartz filled fractures and veinlets; 6209LP-Chert? Shale? black, sooty forms slope down to carbonate Unit measured on first day; 6210P-Shale, black, fissile, abundant ironstone concretions, good "Kayak" look.

END UPPER FIRTH RIVER SECTION

GRAB SAMPLES - July 1, 1971

6211CF - Crinoidal Packstone to grainstone. Lisburne surrounded by Ivishak/Echooka; 6212F-As above, corals, brachiopods, bryozoans, Lisburne?; 6213PL-Siltstone, black, weathers brown due to limonite platy Ivishak; 6214CF-Crinoidal, packstone, (Lisburne), weathers tan and brown, coarse grained @ 10' below contact with shale and siltstone; 6215LP-Lisburne - Siltstone, brown to dark gray, weathers limonite brown. Ivishak? Just above Lisburne contact at 6214.

July 2, 1971

Weather: clear and sunny. A few high thin clouds. Temperature 22°C: Lane, Hankinson, Fehlmann Recon. to East. George's Day in Camp.

GRAB SAMPLES - 6216C (2 bags) Limestone, D1 Unit of USGS. Dark gray, black, finely crystalline, thin bedded, no chert, no fossils; 6217L-Black and light gray banded chert and brown fine-grained porous limonite

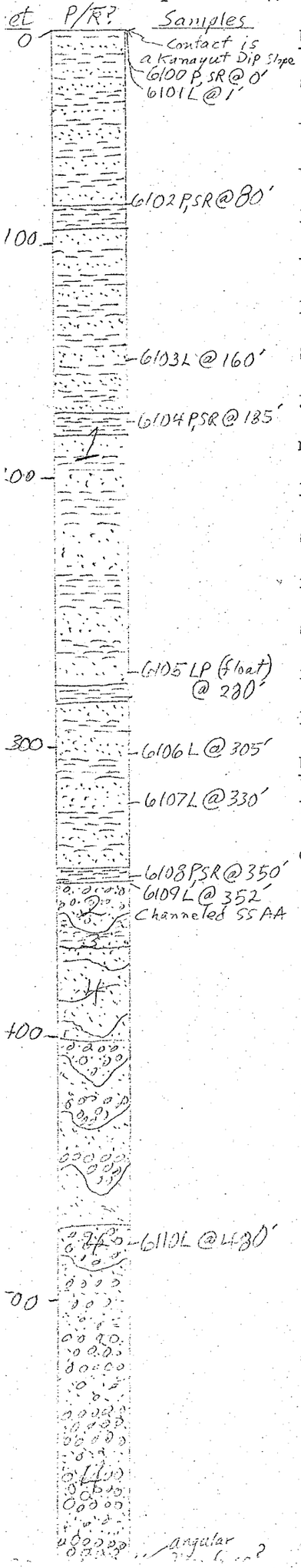
6218Geo.-~~Black?~~ Basalt? Jm Unit intruding Lisburne; 6219C & 6220F-Lisburne dark gray to black crinoidal packstone. Some finely crystalline. Fetid odor, brachiopods and corals; 6221L-Kanayut, sandstone and conglomerate, Quartz pebbles up to $2\frac{1}{2}$" across some limonite and minor dark chert grains; 6222L-Kanayut, conglomerate, metamorphosed, pebbles are stretched rock ~~in genesis~~ is gneissic. Metamorphosed-Geochron date?; 6223L-Lisburne? Medium to coarsely recrystallized (metamorphosed) light tan to gray limestone. No fossils of any sort visable; 6224F, 6225C, 6226C, 6227F.- Limestone, finely crystalline coral (lithostrot~~oms~~ions) black, fetid, minor dark chert nodules; 6228L-Calcite cemented, coarse, poorly sorted and rounded sandstone, weathers pink; 6229Geo.&L- Metamorphosed rocks, Schist Pzq Unit of USGS; 6230CF-Coarsely crystalline crinoidal Lisburne. Medium gray, no other visable fossils; 6231L-Permian on top of Horse Hill. Permian brown, very fine-grained sandstone to coarse siltstone, very hard, dense, silicious; 6232F & 6233C @ 20'-Lisburne, below contact with Permo/Triassic, crinoidal packstones, light gray to tan gray with abundant dark gray, brown and black chert. Brachiopods and bryozoans (Dictyoclostus) most of the chert is black; 6234F, 6235F, 6236C, 6237F-Lisburne @ 10-20' below Permo-Triassic contact. Limestone light tan gray, fine to coarsely recrystallized. Siliceous and fossiliferous with abundant chert (tan to black) nodules and lenses; 6238L-Black platy siltstone, weathers brown, probably Permo-Triassic (fault contact?); 6239PSr-Kayak. Black, platy-fissile shale, minor siltstone lenses, or siltier Shale lenses; 6240PL-Black siliceous siltstone. Kayak, only partially silicified; 6241L-Kanayut, quartzite fine grained, well sorted and clean @ 10% black chert grained; 6242C-Lisburne, limestone, recrystallized, fine grained, dark gray crinoidal limestone. Fetid odor, some crinoidal packstone; 6243F-Float coral heads, Lisburne limestone, as above, ~~in~~ 6242C.

June 23, 1971

Weather, clear & sunny; Temperature @ 75° at 7:00 am! Hot!! Fehlmann & Hankinson to North Red Sheep Creek-Kanayut-Hunt Fork Section. Lane & Self to South Red Sheep Creek Section; second trip to finish it and collect detailed conodont samples of Penn. portion. Later they will move to the Dk/Mk/Ml section to the east.

NORTH RED SHEEP CREEK SECTION

Kanayut/Hunt Fork. Hankinson & Fehlmann---Fehlmann (Recorder); Weather-clear & sunny, Temperature-75°. Measuring down section:

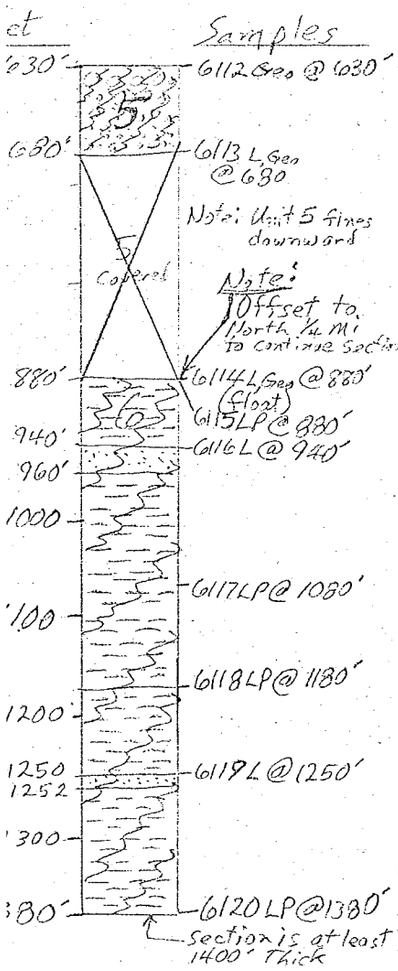


Unit 1 - Kanayut at top of section - 6100PSr at 0'-shale and siltstone; 6101L at 1'-sandstone; 0' is very near the contact with the Kayak section measured June 22. Unit 1 is interbedded gray, very fine to fine silicious quartz sandstone (quartzite) finely laminated. Contains dark chert grains and silstone, black, very thin bedded, weathers platy, slightly micaceous; Dip 17°SE, strike NS to N45°E, abundant cross bedding; Shale % = @ 5%, 95% sandstone; Sandstone is thick bedded, limonite specks and concretions cause yellow-brown to rusty weathering out crop. 6102PSr-Black, sooty, micaceous siltstone and shale; 6103L-Sandstone, quartzite as above, 1"to2" thick with rare zones 2' or 3' thick; 6104PSr-Black micaceous sooty shale, very fissile paper thin 6" thick zone; 6105LP-Float ironstone pebbel conglomerate with plant frags; 6106L @ 305'-sandstone as above; 6107L-at 330'-sandstone, as above except very iron, ?manganese rich. Weathers brown and ~~green~~ gun metal gray; 6108PSr Black fissile shale, as above (overlies conglomerate filled channel).

Unit 2 - 6109L-Conglomerate pebbles up to 3" across include black, brown & green chert as well as quartz. Well rounded, silicified, dense, hard. Also a few ironstone pebbles, massive bed -10' thick Forms ledge and has a sharp contact with fine to medium grained sandstone, as above, which contains abundant channelling (Forest Laminations) Conglomerate is a channel filling cut into underlying cross bedded sandstone, as above. Relief on the channel is about 8'.

Unit 4 - Sandstone and shale, as above, only with abundant lag pebble conglomerate (quartz pebbles up to $\frac{1}{2}$" in diameter). Appears to be rhythmically bedded sandstone marked by a lag pebble conglomerate. Another conglomerate filled channel 40' below first one. Appears to become pulses of conglomerate mostly bedded with fine-grained sandstone, as above; 6110L at 480'. Unit # 4 is dominantly massive channel and bedded conglomerate, as above, unmetamorphosed.

Unit 5 - Conglomerate, as above, except finer grained and metamorphosed Matrix is phyllite and pebbles are stretched. Resembles ~~dark~~ Kanayut conglomerate seen S. & W. of Arctic Village on Big Rock Hill; 6111L at 630'-



6112Geo - Metamorphic Date at 630' - Conglomerate and phyllite; 6113L-Geo - Conglomerate metamorphosed with phyllite; 6114L-Geo.- Mafic intrusive which probably contact metamorphosed the conglomerate and sandstone~~s~~ above. Green with dark specks resembles most of the other intrusives collected thus far in the Devonian.

Unit 6 - 6115LP - Metamorphosed green shale, Hunt Fork. Slate/phyllite 6116L-Metamorphosed ~~dark~~ Kanayut type sandstone, much pyrite present. Finely laminated quartzite; 6117L-Metamorphosed shale, as above, except red- at 1080'. Whole outcrop is mottled red and green shale beds which change color laterally with no lithologic change; 6118L at 1180'- A few sandstones as in Dk above interbedded with the shales; 6119L- Green metamorphosed sandstone at 1250', finely cross-laminated, channele into shales below; 6120LP- Shale, as above, at 1380', except lighter green and less metamorphosed.

END NORTH RED SHEEP CREEK SECTION.

June 24, 1971

Hankinson, Self, Lane to Lisburne Section on Flat Rock Creek at 7:00 a.m. Weather- clear and hot at 80°. Recon. traverse to Junjik Triassic DCS Unit of U.S.G.S.

GRAB SAMPLES:

6096LPSr-Interbedded and mottled red and green shales. Look like Devonian Hunt Fork at Red Sheep Creek, Metamorphosed; 6097LP-Interbedded dark-gray to black silstone, shale and very fine-grained sandstone which contains abundant limonite specks. Finely cross-laminated sandstone; 6098L-Same as 6097 @ 300' Thick - Probably with interbedded siltstone. Abundant quartz-filled veins; 6099LPSr- Dgw Unit of U.S.G.S.- Dark gray to black, fine grained, dirty (silty), limonite-rich siltstones and sandstones with ironstone concretions. Also abundant flute casts in finer grained more shaly zones. Quartz filled veins. Resembles sandstone in units below/It labeled Triassic DCS; 6121PSr-Siksikpuk shale, paper thin, hard metamorphosed? hammer ringing, plates of black shale; 6122L-Siksikpuk metamorphosed brown-gray brown weathering, very siliceous shales; 6123PSr-Kayak? Black, fissile shale, micaceous; 6124LC-Lisburne, light to medium gray limestone, finely crystalline, abundant dark gray chert nodules, Dense non-porous;

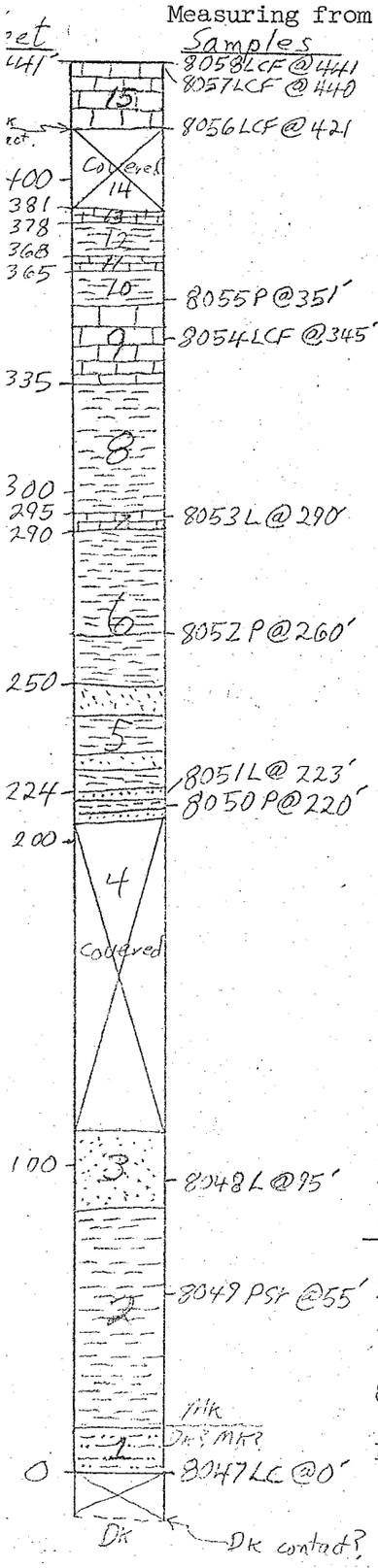
Dev. 6125LP?-Fossiliferous? Representative lithology grab sample of DSC Unit. Most cobbles are limestone, dark gray but brown and gray chert, slate,

etc., also are present. The matrix between cobbles and pebbles is phyllitic and some of them are slightly "stretched". Most cobbles are well rounded; 6126LC-Brown to tan limestone, (Skajit) fine to medium crystalline. Skajit; 6127LC-Medium gray limestone, finely crystalline. Skajit; 6128LC-Medium to light gray fine to medium crystalline lime-stone. Skajit;

After 2:00 p.m., Rest and Recreation for all hands. They are tired and we do not want any accidents.

EAST RED SHEEP CREEK SECTION

Rich Lane and George Self (Recorder) (Lisburne, Kayak) Weather: Partly cloudy, 55°
Measuring from the bottom up section.



Unit 1: 15' Thick, metamorphosed siltstone, dark gray, finely laminated, weathers brownish gray; 8047LC @ 0'.

Unit 2: Black, fissile shale with abundant ironstone concretions and quartz veins - 8049PSr @ 55'.

Unit 3: 15' thick, fine-grained metamorphic quartzite, dark gray, weathers brownish gray - 8048L @ 95'.

Unit 4: Covered - 110' thick.

Unit 5: Thin bedded, alternating dark gray silty shale and tan quartzite. Quartzite weathers orange. Quartzites are discontinuous laterally. - 8050P at 220' (shale), 8051L @ 223' (quartzite).

Unit 6: 40' thick, black silty shale, 8052P @ 260' (shale).

Unit 7: 5' thick, dark gray, limestone bed with thinly laminated black silty shale. Limestone weathers tan to orange, 8053L @ 290'.

Unit 8: 40' thick, dark gray to black silty shale.

Unit 9: Dark gray limestone, wackestone, weathers tan to brown, crinoids and brachiopods present, 8054LFC @ 345'.

Unit 10: Black, silty shale, as Unit 8. 15' thick, 8055P @ 351'.

Unit 11: 3' thick, limestone as Unit 9.

Unit 12: 10' thick shale, as Unit 10.

Unit 13: 3' thick, limestone, as Unit 9.

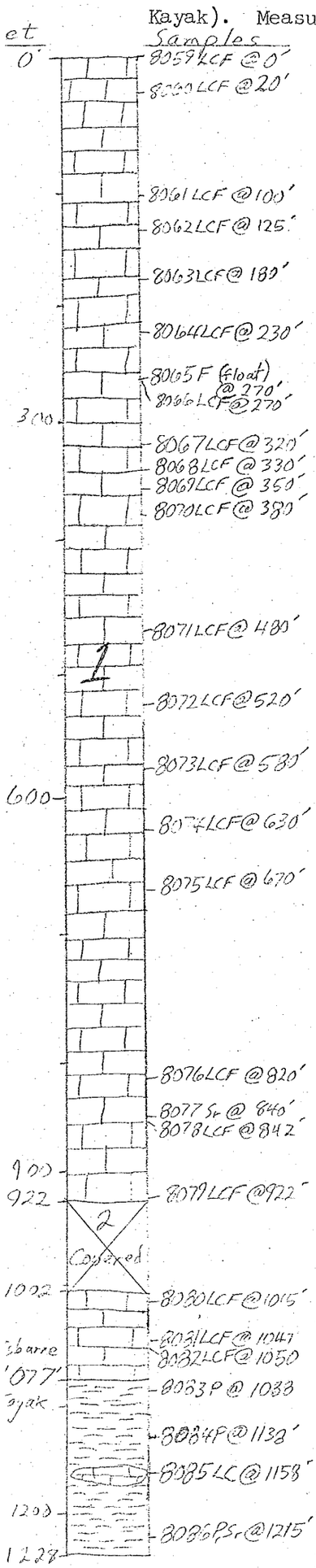
Unit 14: 40' thick, covered.

Unit 15: (Lisburne) Medium to dark gray limestone, medium to thick bedded mudstone to wackestones. 8056LCF @ 421'; 8057LCF @440'; 8058LCF @441'.

END EAST RED SHEEP CREEK SECTION

FLATROCK CREEK SECTION

Fred Hankinson, Rich Lane, George Self. Weather: Partly cloudy, 55°. (Lisburne, Kayak). Measuring from top down section.



Unit 1: Limestone, medium gray, recrystallized (crinoidal hash), wackestone-packstone, abundant sparry calcite (coarse-grained; strong fetid odor). 8059LFC @ 0'-Thin chert beds and nodules are abundant, medium to thickly bedded, jointing abundant; 8060 LFC at 20'; 8061LFC @ 100'-Limestone, as above; 8062LFC @ 125'- Limestone, possibly dolomitic, crinoids, brachiopods, bryozoans, as above; 8063LFC @180' - Strong fetid to almost natural gas odor, limestone, as above; 8064LFC @ 230'-Limestone as above, chert up to 40%; 8065F @ 270'-Float (Coral); 8066LFC @ 270'-Limestone, as above; 8067LFC @ 320'-Limestone, as above, but coarser grained and light gray; 8068LFC @ 330'-Limestone, dark gray, wackestone, as above: 8069LFC at 350'-Limestone, as above; 8070LFC @ 380'-Limestone, as above, coarse grained; 8071LFC @ 480'-Limestone, as above; 8072LFC @ 520' Limestone, as above; 8073LCF @ 580'-Solitary corals frequent in limestone, as above, very dark gray, possible oil stain. H_2S odor, no distinct oil odor but suspecious; 8074LCF @ 630'-Medium gray limestone, as above; 8075LCF @ 670'- Limestone, as above. 8076LCF @ 820'-Limestone, as above, crinoidal hash, medium gray; 8077Sr @ 840'; 8078LCF @ 842'-Limestone, as above, dark gray, oil soaked, slight brown cut with HCl, slight oil odor, very fine-grained; 8079LFC @ 922'-Medium gray limestone, as above.

Unit 2: Covered, 80' thick

Unit 3: 45' thick, limestone, as Unit 1; 8080LFC @ 1015'-Limestone, as above; 8081LCF @ 1047'-Offset laterally $\frac{1}{4}$ mile to get better exposed Lisburne Kayak contact; 8082LCF @ 1050'-Light to medium gray limestone, as above.

NOTE: Recumbant fold in basal Lisburne.

Unit 4: Kayak, black, fissile shale, ironstone concretions. 8083P-at 1088'; 8084P @ 1138'; 8085LC @ 1168'-Limestone, dark gray, fine-grained, recrystallized in a lense 8 inches thick and 4 feet in length; 8086PSr @ 1200'-Black fissile shale as above.

END FLAT ROCK CREEK SECTION.

June 25, 1971

Weather-partly cloudy +18°C. Rained last night for an hour. Fehlmann, Lane, Hankinson to spot sample Skajit Bioherms West of Arctic Village and to locate and measure a Skajit section North and West of Chandalar Lake.

GRAB SAMPLES:

Dev. FCH652A-LC) Medium gray, recrystallized limestone.
FCH653A-F) Skajit. Fossils are ghosts only.
FCH654C)

Late Dev, Frans. FCH655-661F - Medium gray, recrystallized limestone. Skajit, fossiliferous (ghosts); FCH662L-Chert pebble conglomerate (DSC) FCH663L-Red or maroon phyllite (DSC);

mid. Dev. Giv. FCH664F
Frans. or Early Famen → Dev. 665F (2 bags)
Prob. Frans 666F
mid-Late Dev 667F
" 668F
" 669F

DIF

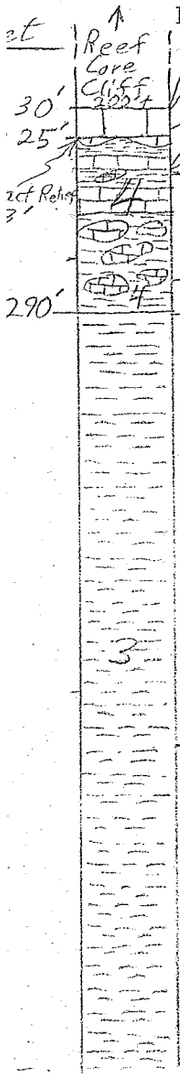
Medium-dark gray fossils, bryozoans, brachiopods corals. Some boundstones, most are packstones. Skajit

Prob. Giv. Ls.
mid-Late Dev FCH670F
671PSr
indet 672F ~~Corals~~
mid-Late Dev 673F
" 674F Corals

Skajit bioherm (Picture in Union's 1970 Report) Limestone, recrystallized as above. Possibly massive Stromatoporoid core?

ANGRY BEE CREEK SECTION

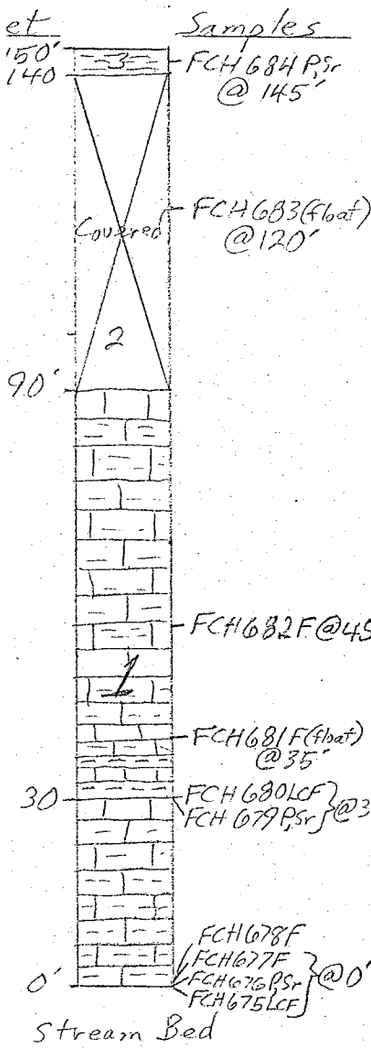
Fehlmann, Lane, Hankinson. Spot Location #26 and short section in Skajit (U.S.G.S. Unit DSK) Location:



Unit 1: Begin at creek bed with limestone, dark gray, thick bedded (1'-4') with occasional 6"-12" shaley limestone intercations. Limestones contain abundant fauna (stromatoporoid, syringopora corals) Petroliferous odor is very strong. Outcrop fractured, jointed with quartz crystals and calcite growing in joints, and fractures. Limestone is crystalline, very "sooty"; FCH675LCF; 676PSr, 677F, 678F-Finely crystalline, very sooty black. Back reef facies?; FCH679PSr-Limestone, shaly, sooty, black, heavy sulfurous odor, porous; FCH680LCF-as above, only more resistant and less dirty; FCH681F(Float)-Yellow brown, very dense lime packstone, fossils include brachiopods, bryozoans, corals, etc. Thin, about 2" thick. FCH682F-Bryozoans; FCH683F(Float)-Lith as above @ 45' (FCH682F).

Unit 2: Covered, 60' brown to gray shale and siltstone rubble.

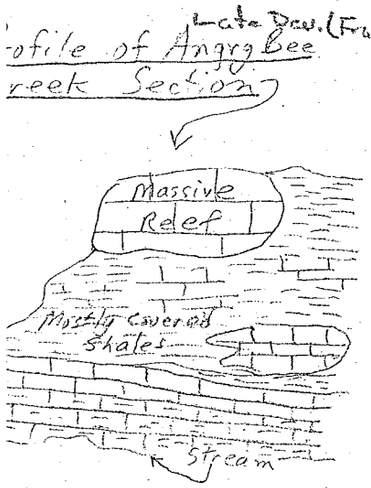
Unit 3: Shale, medium gray to brown, fissile, slightly metamorphosed? some zones silty; FCH684PSr-Possibly a mudstone rather than shale; FCH685A-PSr at 190'-No calcite, shale as above; FCH685B-PSr- at 290' Shale, as above.



Unit 4: Shale, as above plus nodules, calcite, brown to orange weathering (same as float Fossil Samples below) with the abundant fossils. (Picture of "reef" bedded above and below just north of this section). Nodules ~~are of~~ contain brachiopods, corals, bryozoans. Limestone stringers increase upward in size and abundance; FCH686F at 295'. Calcareous Nodules are in siltstones and very fine grained sandstone also. Whole unit is coarser than shale below; FCH687-688F-in Unit 4 includes Alveolites and probably is Frasnian. Stromatoporoids corals (rugose), algal? etc.; FCH689-Limestone is finely crystalline, fetid smelling and dark gray to black boundstone to packstone; FCH690F at 323'; FCH691F (no bag) at 327'-The transition zone from Unit 4 to Unit 5 (reef wall or core) averages about 2' thick but varies greatly in thickness; FCH692C-~~Conodont~~ Formation-Transition zone; FCH694C-~~Forms~~ From Bioherm or reef core at 330'; FCH693F is formation Transition zone to reef core.

END ANGRY BEE CREEK SECTION

GRAB SAMPLES:



Late Dev. (Frasn.) FCH697F-Skajit Bioherm, limestone, medium gray, mostly recrystallized Large, over 1500' thick. Stromatoporoids, corals; FCH696C-as above; FCH697PSr-Dark gray to brown, fissile, slaty shale, micaceous. Hunt Fork? Lies 15 ft. above Skajit limestone. of first two samples; FCH698L-Kanayut, salt and pepper sandstone (quartzite). Quartz=70%, dark chert is 30%. Appears to be interbedded sandstone and shale as seen in top of Kanayut Hunt Fork. Transition Sections; FCH699C-In top of Skajit Bioherm just below shale contact.

Temperature at 4:00 p.m. at Chandalar Lake is 34°C (= 90°+F.!)

Grab Samples Northwest of Chandalar Lake: FCH700L=Marble Skajit, light gray; FCH701LC-Light gray marble, medium to coarse crystalline Skajit; FCH702LCF-Light to medium gray, recrystallized limestone Skajit. Possibly fossiliferous; FCH703CL-Light gray, recrystallized Skajit, very poor shape. Indet.

June 26, 1971

Weather, cool for a change and mostly cloudy. Temperature 13°C. Recon. and section traverse to Joe Creek. Will check Canadian fuel again with new map. Fehlmann, Self and Hankinson.

Grab Samples

FCH704L-Kanayut, quartzite, clean to dirty, fine to coarse grained, mostly quartz, some dark chert; FCH705L-Kanayut at base of same

section as FCH704L. Kanayut coarsens downward to conglomerate at the base; FCH706L-Kanayut, as above, fine grained; FCH707PSr-Kanayut shale stringer, dark gray, biotite grains, slightly metamorphosed, forms saddle; FCH708Geo-Mafic intrusive in Lisburne and Kayak. Olivine and Pyroxene with pyrite, fine grained, green.

June 26, 1971, P.M. - Measured Kayak/Lisburne contact north of Joe Creek (Aspen Creek Section). Also measured from Lisburne through about 500' of Permo-Triassic on Joe Creek Section. Some ~~dark~~ Kanayut North of Joe Creek, also contains red and green shales like those seen in the "Neroukpuk" at Clarence River and in the Hunt Fork at Red Sheep Creek. Left outcrop at 5:45 P.M. Lisburne above Double Mtn. is thick and black. It is tectonically very disturbed and folded (Black facies like at Carter Pass?)

June 27, 1971

Weather-Clear and cold - Temperature 10°C at 7:30 a.m. Recon. traverse to SE of Arctic Village by Fehlmann, Lane, Hankinson.

GRAB SAMPLES:

7055L-Dgw Unit-clean to dirty quartzite. Looks like Dk. Fine to medium grained minor chert; 7056L-Dk Unit-conglomerate some clean some dirty. Mostly quartz pebbles with some dark chert grains; 7057L-Chert, medium gray to green Triassic Dcs Unit of U.S.G.S.; 7058P-Shale nodules, metamorphosed, dark gray, weathers brown - Triassic Dcs Unit; 7059PSr-Shale, black fissile, weathers platy, looks like Kayak or Hunt Fork - Triassic Dcs Unit; 7060F, 7061C, 7062F, 7063F, 7064C, 7065F, 7066CF - Bioherm buildup in Dlf Unit. Almost solid Alveolites, Stromatoporoids, corals, crinoids, brachiopods, etc., etc. Lower beds are black packstone with strong fetid odor. Upper beds (mound) also contains crinoidal packstones. One crinoid caylx (Camerate); 7067C, 7068L, 7069F, 7070CF - Lisburne, typical crinoidal packstones with brachiopods, gastropods and corals (Fugose & Tabulate). Abundant black chert nodules and lenses (irregularly shaped) @ 500' section exposed, no top, no bottom. This looks like the dark, black, fetid facies seen at Carter Pass and other spot localities S and E. of Arctic Village.

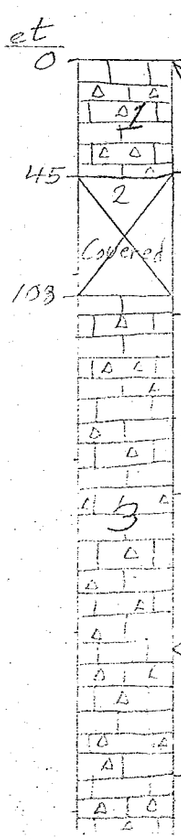
Bear Mtn. - 7071L-Geo-Dike or sill-Basite, Intrudes Dk or? Kekiktuk? ~~Kekituk?~~; 7072-I&Paly.-Brown to dark gray mudstone to very fine grained sandstone, weathering brown.

7073FC-Clasts removed from Dk conglomerate of Ls. Contains one oolite clast; 7074L-Dk conglomerate, contains chert, quartz and limestone pebbles up to 3" across; 7075L&Paly-Conglomerate with a red mudstone matrix and with grains of quartz; 7076L-Dark quartz and chert, dominantly quartz conglomerate; 7077L-Green brown sandstone, fine to medium grained with a piece of almost pure quartz conglomerate; 7075-7077 could be the Kekiktuk conglomerate. Doesn't look like Dk to the west--lacks chert; 7078LC-Finely laminated limestone, slightly metamorphic. Siksikpuk? U.S.G.S. says Lisburne; 7079L-Black chert, bedded; 7080L-Limestone, as above (7078) with "Zebra" markings (metamorphic?)

7081L-Taken from middle of "g" Unit of U.S.G.S. It is not granite. ~~Chert~~ It is a fine to medium grained quartzite. Very clean, almost 100% quartz with minor pyrite that weathers rusty brown. Entire hill weathers rusty brown. This unit appears to be overlying the thinly laminated limestone and black chert units (Sample numbers 7078-7080). The limestone Unit (laminated) is in fault contact with the cherts (See picture roll #5; also picture of banding in Sample 7080 Roll #5).

ASPEN CREEK SECTION

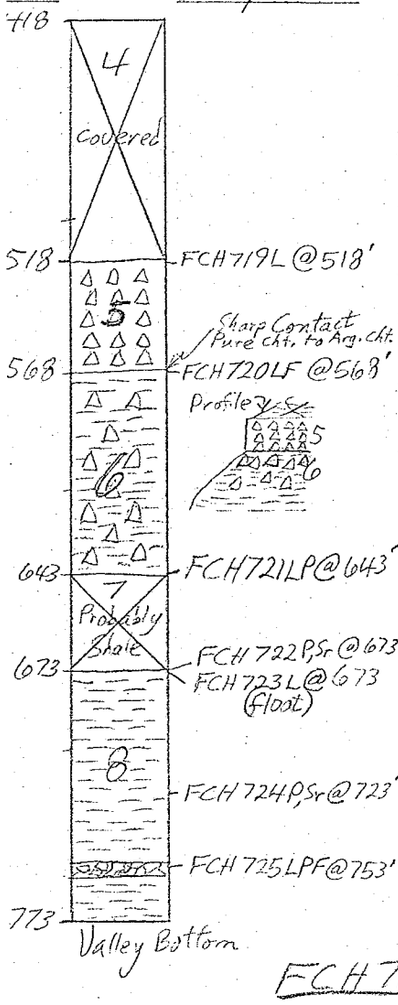
Bob Fehlmann, Fred Hankinson, George Self (Recorder), Weather: Clear, 45°. Measuring from top down section (Lisburne/Kayak).



Unit 1; Limestone, dark gray to black, finely crystallized, sooty, strong fetid odor, abundantly fossiliferous with colonial and rugose corals and crinoids. Appears to give an acid cut. Abundant irregular chert nodules, lenses and bands. FCH709LC @ 0'; FCH710F @ 0'; FCH711F @ 0'; FCH712LFC @ 45'-Limestone, as above, chert up to 50%.

Unit 2: 63' thick, covered.

Unit 3: Limestone as above, but crinoidal packstone abundant; FCH713LCF @118'; FCH714LCF @ 218'-crinoidal packstone, as above, small brachiopods present, chert approximately 25%; FCH715LC & FCH716F @ 318'-Limestone, as above, some zones of lighter gray, dense, packstones (recrystallized, less crinoids), some zones appear to have vuggy porosity; FCH717F @ 383'(Float)-Rugose coral; FCH718LCF @ 418'-Limestone, as above, crinoids, more abundant, chert 40-50%, light gray



finely laminated and medium to coarsely recrystallized.

Unit 4: Covered. Float and isolated outcrops indicate same lithology as above.

Unit 5: Bedded black chert, thin to medium, irregular bedding, minor limestone, as above, forms a ledge - 95% chert, 5% limestone; FCH719L @ 518'.

Unit 6: Thin bedded, shaley, chert at top, forms a slope, grades downward to silicious shale. FCH720LF @ 568'; FCH721LP @643'.

Unit 7: Covered.

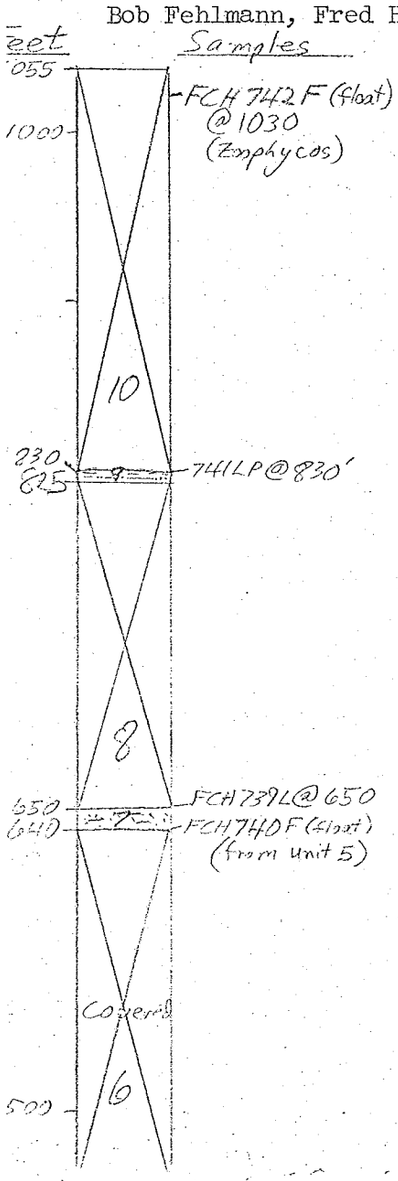
Unit 8: Black, slaty siltstone and shale, fissile with ironstone concretions. FCH722PSr @ 673'; FCH723L @ 673' Float, block showing chert-limestone contacts; FCH724PSr @ 723'-Shale, as above, may be more siliceous; FCH725LPS @ 753'-Tectonic breccia, limestone clasts, shales.

END ASPEN CREEK SECTION

FCH726L = Grab sample of Dk conglomerate NE¼ T5S,R46E Demaration Point

JOE CREEK SECTION 6/26/71 (Permo/Triassic)

Bob Fehlmann, Fred Hankinson, George Self (recorder). Weather: Partly cloudy, 45°F.



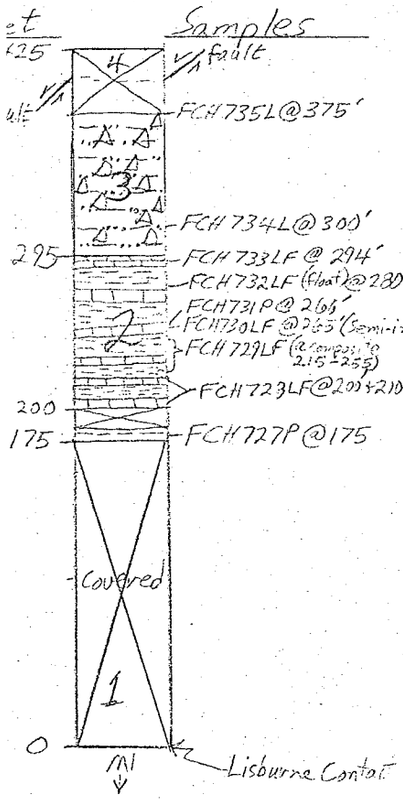
Unit 1: Covered: FCH727P @ 175' (semi-in situ) tan to light brown siltstone and mudstone, weathers platy and scaley.

Unit 2: Shale, as above, with 1' beds of limestone, weathers Orange-brown very finely crystalline, locally abundant brachiopods or pelecypods, slight fetid odor; FCH728LF composite sample @ 200' & 210"; FCH729LF composite of 4th-9th limestone beds; FCH730LF-Semi-in-situ Limestone, as above, @ 265'; FCH731P @ 266'-in siltstone, as above, maroon-brown colored; FCH732LF @ 280'-Float, Limestone as above; FCH733LF @ 294'-Limestone, brown-tan, very fossiliferous with brachiopods, skelomoldic porosity, abundant rounded black limestone nodules.

Unit 3: Chert (may be silicified siltstone) medium gray, conchordal fracture, thick bedding; FCH734L @ 300'-medium gray to green chert; FCH735L @ 375'-Chert, as above. Questionable zoophycos, FAULT.

Unit 4: Covered

Unit 5: Medium gray to dark gray limestone, finely crystalline, argillaceous, abundant limonite specks, extremely fossiliferous along bedding planes, interbedded with coarse grained crinoid & fossil hash, packstones which also contains abundant brachiopods (spirifers,



FCH738F @ 440' - The same Exposure on opposite hills appears to be at least 30' thick.

Unit 6: Covered.

Unit 7: Siltstone to fine grained sandstone, dark gray, micaceous, pyritic. Pyrite weathers to brown-orange (limonite specks), slightly calcareous, thin to medium bedded. FCH739L @ 650'; FCH740F (Float from Unit 5).

Unit 8: Covered

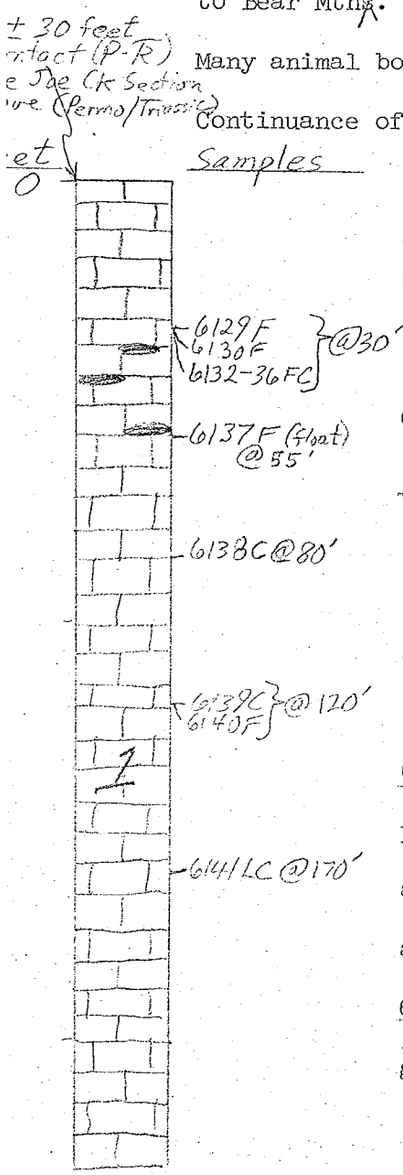
Unit 9: Dark gray siltstone, weathers splintery and brown (Ivishak) FCH741LP @ 830'.

Unit 10: Covered; FCH742F @ 1030' FLoat (Zoophycos)

END JOE CREEK SECTION

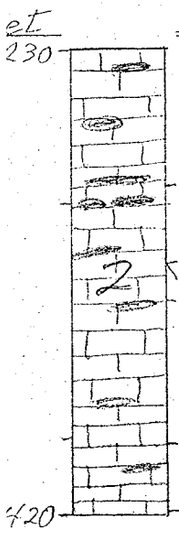
June 30, 1971

Weather: Partly cloudy, temperature 5°C, winds gusty up to 15 mph. Raining and snowing to SE. Recon and section measuring traverse to Joe Creek. Will check snow to see if we can still work in the area-of-need east of the Out of Bounds zone. Self's day to stay in camp. Spotted Inidan archaeological site in saddle on way to Bear Mtn. from Grayling Lake, about 8 ~~horse~~ house outlines made of rocks and sticks. Many animal bones present. IE:



Continuance of Joe Creek Section: Lisburne - Fehlmann Lane, Hankinson. Measuring from Permo/Triassic contact down Lisburne

Unit 1: Strike N60°W, Dip 50°SW. Lisburne contact is within ±30' in the covered zone measured June ~~28th~~ 26th. Limestone, medium gray crinoidal packstone to grainstone. Abundant crinoidal caylx, bryozoans, brachiopods, etc. 6129F, 6130F @30'; 6131? @ 30'; 6132F @30'-Crinoid calices; 6133F @ 30'-Crinoids, bryozons brachiopods; 6134F @ 30'-as above; 6135C @ 30'-as above; 6136F @ 30'- As above, Brachiopods, some interbedded zones of black fetid limestone, fine to medium crystalline, tan to dark chert lenses are also common at 5-10%. Limestone varies from light gray, coarsely crystalline, & crinoidal to finely crystalline, black, & fetid; 6137F @ 80'- As above 6138C @ 55'-As above; 6139C @ 120'-As above, dominantly crinoidal packstone; 6140F @ 120'-Brachiopods; 6141LC @ 170'-Limestone, as above, slightly more common chert nodules (darker gray) and more abundant finely crystalline, medium gray limestone than above; 6142C @ 230'-Limestone, as above, most of this exposure is the finer grained recrystallized variety and medium grained, crinoidal type.



Unit 2: 6143LC @ ?-Limestone, dark gray to black. 10-15% black chert. Finely crystalline, few crinoids. Strong fetid odor; 6144F (Float) @ 330'-Lithostrotion coral in fine crystalline limestone; 6145F - Bryozoan packstone in fine grained micrite, recrystallized; 6146C @ 340', as above (6144); 6147CF @ 400'-Bryozoan-rich finely crystallized black dense limestone, as above; 6148C-Fine crystalline limestone, as above.

END JOE CREEK SECTION (LISBURNE)

June 28, 1971

Recon and section measuring trip to Joe Creek with Fehlmann, Lane and Self. Hankinson's day of rest in camp. He will do section summaries and put his thoughts on paper. Weather: Cloudy and cool, 10°C. Wind @ 7 knots. Weather at Joe Creek "Socked In" (Snowing). Recon toward Ammerman Mtn. and Canada Fuel. 10:00 a.m. Visability toward Joe Creek now zero due to snowfall. Temperature-0°C. Going to check out Old Rampart to S. where weather is better; 7082L-Kanayut quartzite with minor dark chert, fine to coarse grained.

7083F, 7084C, 7085F, 7086F, 7087F, 7088C-Lisburne, medium to dark gray, fetid odor, fossils ~~and~~ are corals, Tabulates and Rugose Bryozoans, Brachiopods. One Blank Bag of minerals, Flororite andManganese. 7090Geo-L-Highly metamorphosed ~~calcitic,~~ calcareous rocks and shales on Ammerman Mtn.; 7089FC-Metamorphic carbonates with some silicious fossils? Look stromatolitic but are probably due to metamorphism. Ammerman Mtn. 7091L-Geo-Metamorph~~osed~~ic rocks; 7092L-Geo-Metamorphosed quartzite. Ammerman Mtn. appears to be highly metamorphosed quartzite conglomerate (Kanayut) shale and carbonates. No granite was found! Check samples 7091 and 7092 for lithology or pethology. Granite must be farther east (Canada)

Flew to Old Rampart because weather socked in with fog and snow in work area east of Wildlife Refuge and "Out of Bounds Zone". Old Camp is a good place to put ~~tents~~. Camp. Float planes will be on shallow water and bars are rocky. No fuel yet at Old Rampart. Also flew to Ft. Yukon to call McKeever. Looked for fuel (large) on Porcupine River. Could not see it. Weather: Low clouds and rain on way back to Arctic Village. Temperature-5°C. Almost couldn't make it back to camp!

June 29, 1971

Down day due to weather. Snowing and cold @ 32°F. since last night. Same storm which kept us out of Joe Creek yesterday. Overcast with intermittent snow and visibility 5 miles to zero all day. Clearing some in evening. Shipped all samples by Ft. Yukon Air Service in Evening (36 bags all to Denver or Tulsa).

GRAB SAMPLES:

6149PL-Ivishak? Triassic Ps Unit-Black, micaceous siltstone with shale laminations. Weathers platy, very thin bedded; ~~6150Cl~~ 6150CL-Black chert and limestone (dolomite). Dolomite=30%; Black Chert=70% part way down into Kayak; 6151LP-Black fissile, slightly metamorphic shale. Weathers platy, Kayak.

July 3, 1971

Self, Hankinson and Fehlmann recon to Skajit south of Smoke Mtn, NW of Chandalar and into Wiseman Quad. Weather: Partly cloudy (high, thin clouds) Temperature: 11°C. Wind, calm.

6244CL-Limestone thinly to massively bedded but laminated, ~~limestone~~. Tan gray to medium gray, recrystallized (On top of a large cave) Dsc Unit, finely crystalline, weathers tan; 6245LC-Dl or Dsk? Recrystallized limestone, black finely crystalline, fetid odor, no fossils; 6246LC-Skajit limestone. Fault brecciated? Marbleized limestone, light tan to dark gray or black. Finely recrystallized No visable fossils; 6247L-Ds Unit-Phyllite and schist, dark gray and brown banded. Hunt Fork-Metamorphosed; 6248LC-Skajit, as above (6246); 6249LC-? Skajit or Dl Unit, black finely crystalline, silty and pyritic limestone, weathers brown because of pyrite. Also metamorphic crinoidal packstones. Black Unit weathers platy and Skajit weathers massive. Much of Skajit was probably originally Bioherm or reefal buildups. Metamorphism has destroyed most texture but the black limestone unit is finely laminated. All units SW of Arctic Village are metamorphosed; 6250Geo-Schist in Ds Unit; 6251LC-Metamorphosed, sandy limestone or limey sandstone (Dl Unit). Float. Brown weathering; 6252L-Limestone, black, finely crystalline, metamorphosed Skajit; 6253L,Geo-Volcanic? looks like a metamorphosed rock; 6254LC?-Tan to white dolomite, very fine to medium crystalline, Skajit.

6255L-Kanayut? gray sandstone, quartzite, dark chert and 70% quartz, minor small dark chert pebbles in float blocks; 6256LGeo-Schist, metamorphic Devonian, Hunt Fork - dark gray; 6257L-Metamorphic limestone, Skajit marbleized. Coarsely recrystallized. Massive outcrops rather isolated in the schists but in a tectonically complex area.

Mineral Deposit:

Harley McKibben, Bettles, Alaska, has 73 claims on a 100-300' wide vein with another associated parallel vein (Stibnite & Galena). Open trenches are 3/4 mile long. He says there are large deposits of 18-64% Antimony ore also. Jim Holbert, a mining engineer in Palmer says it will produce 1,000 tons/day for 25 years. McKibben wants to sell it.

July 4, 1971

R & R-All Hands! Went to Chandalar Mines and panned for gold, had mine tour and a turkey dinner. Birch's are "very nice people". Andy Bristo stayed in camp. Wheeler flew @ 6 hours. On way back to camp, I noticed some thin bedded to medium bedded limestone in the basal portion of Skajit limestones between Smoke Creek and Crow's Nest Creek (Just SW of Smoke Mtn.). These could be a basinal facies or fore reef-back reef ~~or fore reef-back reef~~ facies of the Skajit. Definitely not the normal massive Skajit limestones.

July 5, 1971

Moved camp out of Arctic Village to Ft. Yukon by DC-3. Interior was only 1 hour late. Fehlmann, Hankinson and Lane rode the mail plane out to Ft. Yukon @ 12:00 noon. The rest of the crew (Bristo, Silva, Self) rode DC-3 out to Ft. Yukon with the camp. Montgomery and Wheeler flew to Old Rampart in the chopper and found the fuel barge, was unable to make it. Barge people were ferrying fuel drums up to Old Rampart by skiff. Left Ft. Yukon for Fairbanks at 3:00 p.m. Best to get out of Lloyd's way.

Following is diary for Union Oil part of field season:

July 6, 1971

In Fairbanks for clean up, rest and laundry. Called Judy-5th & 6th; Called McKeever 5th; Called Universal; Called Nelson Walker; Called Knapp.

July 7, 1971

Left Fairbanks via Win and made it to Kotzebue and then Union's camp. Nelson Walker flew me to camp with some groceries. Camp is at Thompson's cabin on the Noatak River.

July 8, 1971

Weather: Overcast with smoke haze, visability-25 miles; Temperature-60°F. Picture #2 Roll #11-Cross bedded Noatak (Kanayut) sandstone and shale, interbeds (Transition zone between Noatak and Hunt Fork).

Recon. tour S.&W. of camp along Noatak River. Saw Noatak sandstone-It looks like (lithologically) and is in the same stratigraphic position as the Kanayut. The metamorphic shales lying below it are red, green and gray black. They are Hunt Fork. Also, saw some coarse sandstone grits (In Utukok? In Noatak?) south of Noatak River. On the north side of the Utukok River overlies the Permo-Triassic (in fault contact) and it grades upward into the Lisburne. Could it all be Utukok?

Most of the metamorphics appear to be Hunt Fork, but there are some slightly higher degree phyllites that may be older rocks. Union feels they are older rocks faulted up to position about equal to the Hunt Fork.

In the "canyon of the Noatak", there are exposed, highly faulted, contorted and metamorphosed sediments. These are varicolored and have ~~the~~ intrusives in contact with them. The Lisburne in the area is a dark, fetid, crinoidal, coral-rich facies with dark chert abundant.

July 9, 1971

Weather: Cloudy, overcast and rainy; Temperature- high to mid 50's; clouds on mountains above 3500'; visability 5 miles in haze and rain; winds strong, gusty and variable. Abrahamson leaves today for a week so he stayed in camp. ~~Berry~~ Benny, Bitgood and Fehlmann recon. traverse to Bastille Mtn. area. Sampled Permo/Triassic-looking dark gray chert with ~~calcite~~ calcareous nodules and overlying red and green varicolored chert. Black splintery and brown weathering shale, siltstone and mudstone are above. (All on NE flank Bastille Mtn.)

10:00 a.m.-Weahter bad so headed south down Trail Creek but visability very poor. Clouds almost on valley floor. Headed home due to weather and arrived at camp about 10:30 a.m. Socked in all day. Dave Abrahamson departed and Bob Rose arrived also Perry Bilyeu (Geophysicist).

July 10, 1971

"Socked in" Raining and foggy all day. Cool, temperature in the middle 50's, Rained all last night.

July 11, 1971

Weather: Overcast and cool, low 50's. A few isolated rain squalls. Clouds are on mountain tops. Recon. traverse to east with Benny, Bitgood, Rose, Fehlmann. There is (?) Cretaceous green graywacke sandstone along SE side of Setting Sun Creek (S. of Nuka Ridge). Also, the valley south of there is all Shublik Cherts, siltstones, etc. Nuka Ridge is tectonically complex. Faults occur in at least two places at or just above the green, coarse-grained sandstones. West of Nuka Ridge, there is Shublik, Noatak (?), Jurassic?, chert and limestone (including Lisburne) which are related in complex tectonic ways. IE: A jumbled mess of Igneous, Lisburne, Permo Triassic and Noatak. Fossils found in one dark shale (East of Bastille Mtn.) include pelecypods. Left field early (4:00 pm) because chopper losing power (only pulling 92% on 3 tries) "wigs" come in tomorrow.

July 12, 1971

Down day due to "Wigs" using chopper. Weather: cloudy, cool and windy with intermittent rain in P.M. (@6). A man and women floating down the Noatak River in a boat (Klepper) stopped in and had dinner. They were Dee B. Crouch (MD) & Sam Crouch (wife), P. O. Box 222, Fairbanks, Alaska.

July 13, 1971

Weather: Cloudy and rainy. Temperature @ 50°. No work due to weather. Magistrate of Kotzebue and Police from Kotzebue came to check on stolen gear from crashed helicopter.

July 14, 1971

Weather: Cloudy, cold (@ 45° to 38°) and rainy. Recon. ~~trou~~ tour east on Noatak River to Nelson Walker's cabin. Saw HF, Dk all along river on North. Some (?) carbonates (weathers orange) in HF. Just west of Walker's cabin. DSK(?) in river running south of Noatak is sheared, faulted, and recrystallized with metamorphic schistosity. Surrounded by black shales (faulted in?). Some of the Dk was coarse conglomerate (angular). Also tried to go NW up Trial Creek but weather too socked in to make it. Saw Hunt Fork and thin bedded calcareous silicious shales, etc. Overlain by Noatak. Much snow in high country, ~~about~~ above 2800'.

July 15, 1971

Weather: Cloudy (high) cold @ 45° and with scattered rain squalls. Wind from South at 15 mph. Unable to reach North Slope and Igloo Mtn. due to fog, rain and snow. Returned to camp. Checked one Lisburne outcrop on West side of Nimiuktuk River. Also saw limestone (Lisburne?) and Hunt Fork along Cotton Wood Creek. There, the Hunt Fork is alternating interbedded layers of hard, silicious, thin-bedded siltstone, etc. (like that seen at mouth of Nimiuktuk) and black, green and red shales, some zones of which weather brown. The brown weathering and hard silicious zones are tectonically "hashed up zones". The Igneous rocks mapped by Knapp on Rabbit Ears Mtns. are not igneous but are brown weathering Hunt Fork silicious shale, etc. There may be one small igneous plug on the western "ear". P.M. - Trail Creek section measured. Limestone with a massive stromatoporoid core "reef". Capped by igneous. Top=gray limestone, Unit 2= Brown weathering limestone, then reef below. Brown and black shales occur between the reef and lower limestone unit. Looks like the sequence on Angry Bee Creek. Also similar looking brachiopods. No corals. If age is same, reef trend could extend from Arctic Village to Trail Ridge.

July 16, 1971

Much snow on mountains. Recon. tour to west around Miskeguk Mountains. Weather: mostly cloudy and cold. Max. Temperature-50°F. Saw possible Utukok/Lisburne transition zone. Chert and limestone below HF/Noatak looking shale and siltstone. Section had to be overturned to allow this relationship. I felt it was probably faulted. Much of the Noatak/Hunt Fork is interbedded and intruded by igneous rocks. South of Bastille Mountain, the Lisburne is overlain by the Hunt Fork. Cretaceous rocks North of Bastille Mtn. consist of dark shale and siltstone interbedded with ~~calcite~~ calcareous graywacke sandstone containing plant fragments. Cretaceous rocks shows ripple marks and compaction features. Bitgood left and Abrahamson arrived.

July 17, 1971

Weather: Partly cloudy and @ 55-60°. No wind. Recon. to Seagull Creek area. The formation (Tupik & Kogruk) on Tupik Mtn. is definitely Utukok. It grades upward into Lisburne which is a siltier, thinner-bedded facies. Utukok here contains many worm trails, brachiopods and weathers orange-brown.

July 18, 1971

Weather: Mostly cloudy but warm @ 60°. No rain, no wind. Moved camp to Ambler finished by 5:00 p.m. Used Interior's Twin Otter. Harold Lie's cabin is large and clean. Sleeps 8 men easily. No shower. There is a Refrigerator, vacuum cleaner, chain saw, two-seater outhouse!

July 19, 1971

AM: Recon tour to NW. Chopper cut off top of tree as we left camp. Metamorphic rocks up Noatak River to the North. Carbonates along south side of Noatak (silicified?) are probably reef buildups or are definitely shoal carbonate breccias and conglomerates. Have fossil sample RRR345 checked immediately for ages. They come from the carbonate buildups described above. Most of the carbonates are moderately to strongly metamorphosed. They are both overlain and underlain by metamorphic clastics including sandstone, shale, siltstone and conglomerates. The carbonates to the south in the Ambler Quad are metamorphosed and appear generally to be surrounded by the metamorphic clastics. Many of these carbonates lie on the metamorphosed clastics and are not covered by them.

July 20, 1971

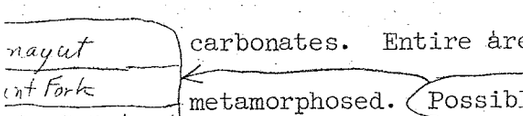
Recon and mapping tour N. & NE of Ambler. All carbonates are highly metamorphosed crystalline, or segregated. Near headwaters Ambler River is coarse conglomerate (Kanayut) and Hunt Fork (Shale) that probably had a sand source off a metamorphic (?) highland. This unit fines to the north. It overlies the Hunt Fork and appears to be faulted into place. Location 156°50' 67°45' (Ambler Quad). Carbonates to south of Nelson Walker's cabin are highly folded, faulted and very thick. They do not resemble the Skajit in the eastern Brooks Range in that they are all recrystllized and have not anywhere associated with unmetamorphosed sediments. They appear to be interbedded with metamorphosed shale, siltstone and sandstone. The metamorphosed sediments may be Hunt Fork/Kanayut or they could be older. Benny says he and Lloyd saw the Silurian carbonates found last year by Amoco lying on the metamophics. A few poorly preserved corals and brachiopods were found in the metamorphic carbonates.

July 21, 1971

Weather: Cloudy and rainy. Mountains all socked in. Went to Kotzebue with supply order.

July 22, 1971

Weather: Partly cloudy, but mostly sunny and cool. Recon. tour to NE Corner Ambler Quad and Survey Pass (NW corner) Quad. To the south along the Ambler River, the carbonates are light gray and massive. To the north, they are orange, brown and black banded and more bedded. There are at least two different types. More shale and other clastic metamorphic sediments are interbedded with the northern carbonates. Entire area is highly folded and faulted. All carbonates appear metamorphosed. Possible sequence of rocks in NE Ambler Quad.; Kanayut; Hunt Fork; Skajit? Carbonates; massive gray, sheared recrystallized shale; black metamorphic carbonates-orange brown weathering; metamorphics with carbonates; & Gneiss core. The carbonates within the metamorphics are light gray and vary greatly in thickness. They are ~~[illegible]~~ fold repeated. The relation of the Hunt Fork shale (slightly metamorphosed) north of the Noatak and the black graphitic metamorphosed shale south of the Noatak and their association with Metamorphic carbonates is not clear. Benny believes there is a large fault in the Noatak Valley and that the carbonates and metamorphosed shale south of the river are much older than the Hunt Fork. If this true, there are no visable carbonates in the basal Hunt Fork in this southern area. Bob Saunders came in in p.m.



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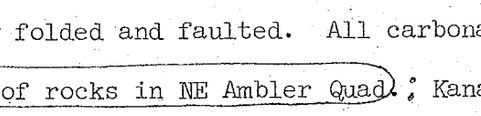

July 23, 1971

Weather: Cloudy to S & SW but clear to North. Wind at 10 knots, from NE. Recon. tour to Mt. Bastille, Tupik Mtn. and Wulik River with Benny, Saunders and Abrahamson. Rose stayed in camp. Saw thinly laminated argillaceous lime mudstones at lowest part of the west end Bastille Mtn.

The core of the Schwatka Mtns. is a gneiss (dominantly quartz, slightly calcareous) This gneiss is overlain by the metamorphics. The mountains ~~This~~ core is not granite but is intensely metamorphosed sediment ~~[illegible]~~ (metamsomic granite). It could fit into the gradual Southward increase in metamorphism postulated by Bill Knapp. Thus, the "Gneiss" would be the most intensely metamorphosed area.

July 24, 1971

Bob Saunders ~~leaving~~ leaves today, weather mostly high overcast, no ~~rain~~ rain, wind 5 knots from NE. Recon tour N. & E. of Walker lake with Benny, Rose and Abrahamson. Cretaceous(?) coarse conglomerate to shales and igneous porphrys occur S. & E. of Ambler. Many of the cobbles and pebbles in the conglomerate appear to have possibly come from the igneous units nearby. Some of the Cretaceous sands are poorly sorted, others well sorted, some have angular and some well rounded grains.

The Skajit/Hunt Fork south of Anaktuvuk Pass grade(?) south into interbedded metamorphics and carbonates. The relation of the recrystallized carbonates to the non-metamorphosed or recrystallized carbonates is not understood. It is still possible that they are the same as Skajit and are just more highly altered to the south. Otherwise, they may be in fault contact with the metamorphosed and recrystallized carbonates and would be thus older than the biohermal Skajit.

July 25, 1971

Weather: Mostly clear, wind from NE @ 5 knots. Recon. tour to SE of Ambler with Rose, Abrahamson and Keith Webster. Checking Cretaceous rocks and possible metamorphic rocks.

Cretaceous igneous pebble conglomerates lie directly on metamorphics. Thus, all units between the metamorphics and cretaceous are absent. Farther to the south in a basin there the Cretaceous would tuncate and seal any reservoirs of paleozoic age. This relation is worth checking in the future. The Cretaceous conglomerate in some places contains numerous very large clasts of metamorphic rocks. At other localities to the west of Rocky Bottom Creek, the conglomerates are mostly igneous rocks again.

July 26, 1971

Down day due to fog and heavy rain.

July 27, 1971

Down day due to fog and rain. Made it late in A.M. to Thompsons' cabin on Noatak & "beheaded" about 25 barrels. Looked for Jade in p.m. where low country was not "socked in".

July 28, 1971

Moved camp out of Ambler to Fairbanks. Ward Gay left camp.

July 29, 1971

Moved from Fairbanks to Sagwon. Interior had trouble with the plane. Took three tries to get to Sagwon.

July 30, 1971

Recon. and sampling tour of Cretaceous South of Sagwon with Bob Rose, Dave Abrahamson and Keith Webster. Samples from Aufeis and Kuparuk Anticlines. Kuparuk Anticline contains abundant razor clams and pelecypods to the west. Also lag pebble conglomerates, ripple marks, ~~and~~ flute casts, plant fragments, wood, leaves, seed pods and coals. Aufeis contains plant fragments, shale-pebble conglomerates, crinoids?, ripple marks and flute casts too. Sands are very fine to medium grained, moderately to very well sorted. Some sandstones are clean and porous, others are dirty and tite grains are dark chert and quartz and are subangular to well rounded. Aufeis anticline is structurally very complex. It has numerous folds and faults with varying strikes and dips exposed where sampled.

July 31, 1971

Socked In! Snowing and foggy! from 3 to 4:30 P.M. went to Kemik and took shale samples from core of the anticline and one from the sandstone? Volcanic layer. Snowing hard all the time. Visability poor to zero.

August 1, 1971

Weather: Cloudy (high) and cool. Collected additional samples of shale and sandstone on the Kemik Anticline. North flank of Shaviovik Anticline just west of Colo. O. & G. Shaviovik well is all Tertiary coals, shale and sandstone with minor conglomerates. Looks like the sediments of Tertiary age measured at Sagwon Bluff, in 1970.

Weather: Overcast and cool. No rain or snow, however. Interior cancelled all Sunday flights from Sagwon to Fairbanks even though they knew we wanted out today (Sun.). We chartered a flight to Deadhorse and caught the evening Wein flight out instead. P.M. In Fairbanks.

August 2, 1971

Unable to leave Fairbanks because Ft. Yukon Air Service Could not fly ~~was unable to fly~~ to Eagle due to weather. Met Bill Jirikowik (Skelly) who was unable to fly to Circle for the same reason. Stayed overnight in Fairbanks.

August 3, 1971

Flew to Eagle. Weather partly cloudy with scattered rain.

August 4, 1971

Worked on Tatonduk Nation River and Permian Outcrops along Yukon River. Rain and Fog.

August 5, 1971

Worked on Road River and Hilliard limestone on Tatonduk River. Got hayfever very bad.

Weather: cloudy with scattered rain.

August 6, 1971

Same weather- rain & fog; stayed in camp to work on logs. No room in chopper.

August 7, 1971

Weather: cloudy with scattered rain. Stayed in camp and drafted logs for $\frac{1}{2}$ day (no room in chopper). Half day to Tatonduk Creek. Still raining in P.M. (10:30)

August 8, 1971

Raining with fog (overcast). Looked at Glenn shale, Keenan quartzite and Biederman argillite and Kathul graywacke.

August 9, 1971

Stayed in camp (rainy & foggy) and plotted logs, no room ~~on~~ *in* chopp~~ed~~*er*.

August 10, 1971

Measured Calico Bluff formation at Calico Bluff. Rainy & foggy.

August 11, 1971

Measured Jones Ridge Section from the top down and the bottom up. ~~Then~~ We will composite logs for a complete section. Rain in a.m., p.m. good weather.

August 12, 1971

Beautiful clear sunny day. Harrison started *to* drive home, but Bridges are washed out in Matanuska Valley. He will *possibly* have to go by way of Valdez. Self and Ormiston left on Ft. Yukon Air Service Plane. Wheeler and Montgomery left in chopper. Lloyd and I broke camp except for our tent.

August 13, 1971

Rain, heavy in A.M. Down day due to rain and fog.

August 14, 1971

"Sarge" Waller took Lloyd and I down river to lower portion of Calico Bluff. Measured Ford Lake Shale up to where we started Calico Bluff Section.

SE BROOKS RANGE - GENERAL OBSERVATIONS

The Skajit is a series of carbonate biostromal and reef type buildups lying within the lower portion of the Devonian Hunt Fork shales. It varies from carbonate units a few feet thick to massive units as much as 2,500' thick.

On the Wind River, there are several locations where the base of these Skajit carbonates are exposed. One section (Angry Bee Creek) was measured. At Angry Bee Creek there are carbonates at the base of the section which are black sooty and silty. These are very fossiliferous and contain abundant corals, bryozoans and stromatoporoids. This lower silty carbonate unit grades upward into a unit of fissile, black shales and siltstones several hundred feet thick. This shale unit then grades upward into massive limestone stromatoporoid and coral "reef-core" boundstone which is about 400 ft. thick. The transition starts with minor small fossiliferous carbonate concretions which increase in size and abundance upward. The base of the massive "reef" core is not planar but is undalutory with relief of about two feet. Other massive Skajit carbonate units are present. They consist of a massive unbedded unit both overlain and underlain by bedded carbonates and shales. Taken as a whole, the Skajit is definitely a reef complex probably defining the edge of a shale basin. This definite reef trend extends from an outcrop 35 miles east of Arctic Village to a point at the headwaters of Your Creek. South of Arctic Village and in the Chandalar and Wiseman Quadrangles, these "Skajit" carbonates are metamorphosed and contain no fossils. They are marbleized and recrystallized. Some of the fossiliferous thin Biostromal type carbonates (15-50') are present interbedded with basal Hunt Fork shales at the headwaters ofYour Creek.

Devonian clastic units named by the U.S.G.S. (IE: Dsc, Ds, Dl, Dsl, etc.) are both repetitive and confusing. They have labeled the same units in different quadrangles with different names rather than ~~begin~~ being consistant. The various units are difficult to trace; contacts are indistinct; and much of the geologic mapping is incorrect. (IE: granite at Bear & Ammerman Mtns. is not really granite but is a metamorphosed quartzite-Kanayut?) One should lump the various Devonian units and not try to split out metamorphosed or slightly different facies. These units are probably all Kanayut or Hunt Fork.

Metamorphism increases to the south until at about the Arctic Village Latitude (in the Devonian units) there are no visable fossils and many depositional textures have been destroyed. The Kanayut south of Arctic Village is a stretched pebble conglomerate (pebbles up to 2" diameter) and phyllite. All the metamorphic rocks in the area look like they could be Devonian but they may be older rocks instead. One has the impression of a gradual Southward increase in degree of metamorphism of the various Devonian facies.

The Hunt Fork and Kanayut at Red Sheep Creek (red & green metamorphosed shale, sandstone and conglomerate) resemble very closely the Neroukpuk Formation lithologies seen in the NE Sadlerochit Mtns. They are stratigraphically equivalent and probably are identical. This does not, however, explain the U.S.G.S. Olenellus Trilobite (L. Cambrian) found in the Neroupuk. The stratigraphic position of these beds should be ascertained. It doesn't explain Silurian graptolites in the North Slope wells. The Neroukpuk probably includes units of many different ages and systems. It is a wastebasket term for metamorphosed rocks lying below recognizable Paleozoic formations.

Some of the carbonates (recrystallized, massive and interbedded with metamorphosed shales) to the south of the fossiliferous Devonian reef trend could be older rocks. The relation of the metamorphic facies to the non-metamorphic facies needs more detailed examination.

The Permo Triassic at Joe Creek is not dominantly chert. It is minor green chert, abundant shale, siltstone and siliceous siltstone with an upper carbonate unit.