

# **Data compilation of the 1971 field party, southeast Brooks Range and Fort Yukon, Alaska; Vol 1**

Furer, L.C., Fehlmann, R.H., Taylor, A.M., Self, G.W., and Amoco Oil Co.

GMC DATA REPORT 464

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2019  
State of Alaska  
Department of Natural Resources  
Division of Geological & Geophysical Surveys  
**GEOLOGIC MATERIALS CENTER**





Amoco Production Company  
Denver Division

AREA Northern Alaska

STATE Alaska

COUNTY Brooks Range & Ft. Yukon Basin

JUL 27 1974

CF7 4: 0014

SUBJECT Data Compilation of the 1971 and 1972 Field Work,  
Southeast Brooks Range and Fort Yukon Basin

Denver Division Memo No. 172

Date February, 1974

By L. C. Furer, R. H. Fehlman, A. M. Taylor, G. W. Self

NO. Volume I

ENCLOSURES

SC.

Appendix A	Measured Sections	ALSO VOL I. FILES 1
Appendix B	Paleontology Data	1A, 1B, 1C
Appendix C	Palynology Data	
Appendix D	Source Rock Data	
Appendix E	Geochronology Data	
Appendix F	X-Ray Data	
Appendix G	Sample Lists	
Appendix H	Field Notes	
Appendix I	Photographs	
Appendix J	Porosity-Permeability Data	
Volume II		
Appendix A	Measured Sections with Paleontology	
Appendix B	Paleontology - Megafossils, Conodonts and Forams	
Appendix C	Palynology	
Appendix D	Source Rock Analysis	
Appendix E	Radiometric Dates	
Appendix F	Photographs	
Appendix G	Sample Index	
Appendix H	Field Notes	







Amoco Production Company

February 20, 1974

CF74 0230

Mr. E. E. LaFaye  
Building

Re: Denver Division Memo No. 172

Transmitted herewith is Denver Division Memo No. 172, "Data Compilation of the 1971 and 1972 Field Work, Southeast Brooks Range and Fort Yukon, Alaska" by L. C. Furer et. al.

This memo contains the basic field data collected by Amoco - Union geologists in 1971 and 1972. Copies of basic data has been previously transmitted to Union Oil along with attached written reports. Results of the 1971 and 1972 field work has also been reviewed with the Canadian Division on two occasions.

Since the area of this field work is located south of the Union - Amoco agreement area, Union does not receive Amoco's interpretation. Amoco's interpretation of the two years of field work will be presented in Denver Division Report No. 123.

The stratigraphic information accumulated by these field parties has developed time stratigraphic information essential for analysis of future seismic and drilling operations in the area. Favorable reservoir and source rocks occur on the north, east and south flanks of the basin. Specific recommendation for exploration in the basin will be included in Denver Division Report No. 123.

Very truly yours,

  
Terry Cooper

TC:CLC:prb

cc of report: District  
G. O.  
U. D.

Approved for transmittal:

  
E. E. LaFaye

FEBRUARY, 1974

Denver Division Geological  
Memorandum No. 172  
"Data Compilation of the 1971  
and 1972 Field Work, Southeast  
Brooks Range and Fort Yukon Basin"

Authors: L. C. Furer  
R. H. Fehlman  
A. M. Taylor  
G. W. Self

Special Assistance by:  
A. R. Ormiston  
H. R. Lane

### INTRODUCTION

This memo contains two volumes of basic field data, one collected in 1971 and the other in 1972. An interpretation and discussion of this data is contained in Denver Division Report No. 123. The data has been transmitted to Union Oil Co. of California along with written reports included as Attachments 1 and 2. Personnel for each field party is listed in the Attachments along with a brief discussion of methods and results of the field work.

### ENCLOSURES (Volume I - 1971)

Figure 1 - Control Index Map (topographic)  
Figure 1A - Control Index Map (topographic)  
Figure 1B - Control Index Map (topographic)  
Figure 1C - Control Index Map (topographic)  
Appendix

A.\* Measured Sections (yellow circles = barren, red circles = data) (Southeast Brooks Range)

1. Angry Bee Creek
2. Aspen Creek
3. Crow Nest Creek
4. Flat Rock Creek
5. Joe Creek
6. East Red Sheep Creek
7. North Red Sheep Creek
8. South Red Sheep Creek
9. Smoke Creek
10. Upper Coleen River
11. Upper Firth River
12. Wind River

\*Sample Log Symbol Index: F is megafossil, C is conodont, f is foram, L is lithology, P is palynology, Sr is source rock, G is Geochron.



Porcupine River Area

13. Amoco J
14. Canalaska Mountain
15. Coleen River
16. Composite Mississippian (Rock Slough)
17. Fort Creek
18. Linear Ridge
19. Oolite Creek
20. Repetition Ridge
21. Salmontrout River
22. Type Salmontrout
23. Salmon Village
24. South Old Camp

Yukon River Area

25. Cabin Creek
26. Calico Bluff
27. Hardluck
28. Jones Ridge Composite
29. Limestone Hogback
30. McCann Hill
31. Mouth Tindir Creek
32. Nation
33. Step Mountain
34. Sta. 106
35. Sta. 134

- B. Paleontology Data
- C. Palynology Data
- D. Source Rock Data
- E. Geochronology Data
- F. X-ray Data
- G. Sample Lists
- H. Field Notes
- I. Photographs
- J. Porosity-Permeability Data

ENCLOSURES (Volume II - 1972)

Figure 1 - Control Index Map (topographic)  
Figure 1A - Control Index Map (topographic)  
Figure 1B - Control Index Map (topographic)  
Figure 1C - Control Index Map (topographic)  
Appendix

- A. Measured Sections with Paleontology.  
(Southeast Brooks Range)

1. Angry Bee Creek
2. July Ninth
3. Mississippian on Neruokpuk
4. Nichenthuran Mountain
5. Old John Lake
6. Savinkviayak River
7. Total Eclipse
8. Upper Wind River
9. West Wind River
10. Your Creek

(Porcupine - Yukon Rivers)

11. Biederman Bluff
12. Deacon Rock
13. Deacon Rock West
14. John Herbert Village
15. Keenan Quartzite
16. Mouth Coleen River
17. Nelsen Bluff
18. North Salmon Village
19. Rock Slough (Sta. 16)
20. Steamboat Mountain
21. Tacoma Bluff
22. Triassic Oil
23. Woodchopper Limestone

(South of Ft. Yukon Basin)

24. East Crazy Mountain
25. Fossil Mountain
26. North Schwatka
27. West Crazy Mountain
28. Windy Gap North
29. Windy Gap South

B. Paleontology - Megafossils, Conodonts and Forams

C. Palynology

D. Source Rock Analysis

E. Radiometric Dates

F. Photographs

G. Sample Index

H. Field Notes





Attachment 1

Amoco Production Company  
Denver Division

AREA SE BROOKS RANGE & FT. YUKON BASIN

STATE ALASKA

COUNTY \_\_\_\_\_

SUBJECT DATA COMPILATION OF THE 1971 FIELD PARTY

\_\_\_\_\_ No. \_\_\_\_\_

Date JANUARY, 1973

By L. C. FURER AND R. H. FEHLMANN

<u>NO.</u>	<u>Special assistance by: A. Ormiston</u> <u>ENCLOSURES</u> <u>H. R. Lane, G. Self</u>	<u>SCALE</u>
1	CONTROL INDEX MAP (TOPOGRAPHIC) PARTS A & B	
2	NOMENCLATURE CHART (STRATIGRAPHY)	
	FIGURES	
1	FIGURE 1 - INDEX MAP	
	APPENDIX	
A	SAMPLE LOGS WITH PALEONTOLOGY DATA	
B	PALEONTOLOGY DATA	
C	PALYNOLOGY DATA	
D	SOURCE ROCK DATA	
E	GEOCHRONOLOGY DATA	
F	X-RAY DATA	
G	SAMPLE LISTS	
H	FIELD NOTES	
I	PHOTOGRAPHS	





**Amoco Production Company**

Security Life Building  
Denver, Colorado 80202

January 16, 1973

Mr. Bob Saunders  
Union Oil Company of California  
909 West 9th Avenue  
Anchorage, Alaska 99501

Dear Mr. Saunders:

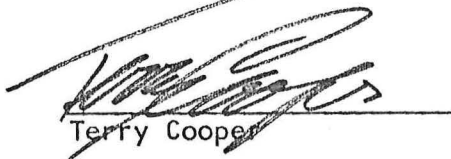
Attached is one copy of a geological report entitled, "Data Compilation of the 1971 Field Party - Southeast Brooks Range and Fort Yukon Basin, Alaska," based on field work done by the 1971 joint Amoco-Union field party.

This report contains all of the basic data available at this time and a brief review of the stratigraphy of the area. Any additional data that becomes available will be forwarded as a supplement to this report.

In addition, a report will be furnished on the 1972 Field Season as soon as the data is processed. That report will summarize all work done in the Fort Yukon area.

I believe that the time - stratigraphic information obtained by these field parties has developed a paleontologic bank of information that will be extremely valuable in analyzing subsurface information from any future seismic or drilling operation. The occurrence of reefal rocks on at least three flanks of the Fort Yukon Basin should increase exploration interest in this basin.

Sincerely yours,  
AMOCO PRODUCTION COMPANY



Terry Cooper

TC:jm  
Attachment



JANUARY, 1973

Data Compilation of the  
1971 Field Party  
Southeast Brooks Range and  
Ft. Yukon Basin, Alaska

INTRODUCTION

LIST OF ENCLOSURES

FIGURES

APPENDIX

STRATIGRAPHY

SUMMARY

Authors:

L. C. Furer

R. H. Fehlman

Special Assistance By:

A. R. Ormiston

H. R. Lane

G. Self

## INTRODUCTION

This report encompasses a preliminary evaluation of all data available at this time in the Southeastern Brooks Range, Ft. Yukon Basin, and Kandik Basin of northern Alaska. It is primarily based on field work done by Amoco in 1971. Since Amoco and Union are not leasing partners south of 68 degrees North latitude, this report will include only basic raw data and a short section on descriptive stratigraphy. A similar additional report will be furnished after the 1972 field work has been processed.

The 1971 Amoco field party was comprised of the following personnel:

Lloyd Furer - Party Chief  
Bob Fehlmann - Party Chief  
Allen Ormiston - Paleontologist  
H. Richard Lane - Paleontologist  
George Self - Geologist  
Fred Hankinson - Union Geologist  
Chuck Harrison - Union Geologist  
Glenn Wheeler - Pilot (Arctic Air Service)  
Carl Montgomery - Mechanic  
Andy Bristo - Cook (Universal Services)  
Joe Silva - Bull Cook

The party worked from a Fairchild Hillar FH-1100. The first three weeks were spent in the southeastern Brooks Range where twelve sections (Devonian-Triassic) were measured (18,400' section). A total of 542 samples were collected from these sections and 182 spot locations (Encl. 1A).

The remaining seven weeks were spent in the Porcupine River and Eagle, Alaska, areas where 21 sections (Precambrian-Jurassic) were measured (36,220' section). A total of 665 samples were collected from these sections and 136 spot locations. (Encl. 1A and 1B).

The megafossils were studied by A. R. Ormiston of Amoco, Tulsa Research Lab. Microfossil studies were made by H. R. Lane (conodonts),



D. F. Toomey (forams) and G. A. Sanderson (fusulinids), all of the Amoco Research Lab. Palynologic determinations were made by D. W. Engelhardt of Amoco, Denver. Mesozoic forams were studied by Jim Watkins and Jim Parks, Amoco, Denver.

The few remaining paleontologic samples will be processed when time and priority allow. They will be added to this report at a later date. All rock processing with the exception of thin-section petrology has been completed. Thin-sections are available on request.

The purpose of this memo is to relate the relatively well-known stratigraphy of the southeastern Brooks Range to that of the Ft. Yukon Basin (Encl. 2). This time-stratigraphic approach allows construction of regional paleogeographic maps which demonstrate the manner in which favorable sedimentary facies underlie the Ft. Yukon Basin. The rocks on the margin of the Ft. Yukon Basin are fossiliferous and a good time-stratigraphic sequence has been developed, and related to the Brooks Range and northern Yukon.

The nature of the outcrop distribution surrounding the Ft. Yukon Basin precludes a good structural evaluation of the basin. Geophoto and geophysical work will be necessary for a structural evaluation of the area.

#### LIST OF ENCLOSURES

1. Control index map (topographic) (Parts A & B)
2. Nomenclature chart (stratigraphy)

#### FIGURES

1. Figure 1 - Index Map

## APPENDIX

- A. Sample Log Symbol Index: F if <sup>S</sup> megafossil, C is conodont,  
f is foram, L is lithology, P  
is palynology, Sr is source rock,  
G is Geochron.

Measured Sections (yellow circles=barren, red circles=data)

### SOUTHEAST BROOKS RANGE SECTIONS

1. Angry Bee Creek
2. Aspen Creek
3. Crow Nest Creek
4. Flat Rock Creek
5. Joe Creek
6. East Red Sheep Creek
7. North Red Sheep Creek
8. South Red Sheep Creek
9. Smoke Creek
10. Upper Coleen River
11. Upper Firth River
12. Wind River

### PORCUPINE RIVER AREA SECTIONS

13. Amoco J
14. Canalaska Mt.
15. Coleen River
16. Composite Mississippian (Rock Slough)
17. Fort Creek
18. Linear Ridge
19. Oolite Creek
20. Repetition Ridge
21. Salmontrout River
22. Type Salmontrout



23. Salmon Village

24. South Old Camp

YUKON RIVER AREA SECTIONS

25. Cabin Creek

26. Calico Bluff

27. Hardluck

28. Jones Ridge Composite

29. Limestone Hogback

30. McCann Hill

31. Mouth Tindir Creek

32. Nation

33. Step Mt.

34. Sta. 106

35. Sta. 134

B. Paleontology Data

C. Palynology Data

D. Source Rock Data

E. Geochronology Data

F. X-ray Data

G. Sample lists

H. Field Notes

I. Photographs

STRATIGRAPHY

Precambrian - Rocks thought to be PreCambrian were briefly examined in two areas. In the eastern portion of the Black River Quadrangle, several exposures of dark green-gray foliated quartzites underlie early Paleozoic carbonates. These quartzites are also present in adjoining areas of Northwest Canada. North

of Eagle, along the international boundary, the Tindir Group is dominantly carbonates. These carbonates are probably younger than the quartzites discussed above. No attempt was made to critically examine the PreCambrian rocks.

Cambrian - Type sections of all Cambrian formations were studied just north of Eagle, Alaska. They include in ascending order the Funnel Creek Limestone, Adams Argillite and Hillard limestone. These formations correlate with the Jones Ridge Limestone. The major differences between the two rock groups is the lack of flat-pebble conglomerate (Hillard) and the quartz sandstones (Adams Argillite) in the Jones Ridge Section.

Nearly all the Cambrian rocks in this area contain indicators of shallow water origin e.g. oolites, pisolites, quartz sandstone, and archaeocyathids. The Funnel Creek Limestone contains spotty porosity, deal<sup>d</sup> oil stain and should be considered a potential reservoir if found in the subsurface.

Ordovician - Ordovician rocks are exposed in scattered outcrops from Arctic Village to Eagle. In the southeast Brooks Range, some dark carbonates included in the D1 unit by the U.S.G.S. contain Ordovician conodonts.

Along the Porcupine River and in the Black River Quad the Ordovician is basically limestone and dolomite. In places, it contains quartz sandstones and biohermal limestones. No formational name has been applied. In the Eagle area, the Ordovician is carbonate<sup>is</sup> overlain by Road River basinal shale.

Silurian - No Silurian rocks have been definitely established in the southeast Brooks Range, however, they most likely occur in the Ds unit of the U. S. Geological Survey.

Along the Porcupine River and in the Black River Quad most of the Silurian is limestone and dolomite. In places (eg. Linear Ridge) there are basinal shales and small biohermal buildups near

the top of the Silurian. In the Eagle area, the entire Silurian is Road River basinal shale.

Devonian - The oldest known Devonian rocks in the southeast Brooks Range is the massive Skajit Limestone of Middle Devonian age. In places, it becomes reefal e.g. Crow Nest Creek and Old John Lake. The middle-late Devonian Huntfork shale overlies the Skajit. West of the Arctic Village, the Huntfork contains reefal rocks, in places nearly 1000 feet thick. These buildups are Late Devonian (Frasnian) and time-equivalent with the shales in which they are enclosed. It is misleading to refer these carbonates to the Skajit, thus Amoco chooses to name them the Smoke Creek member of the Huntfork.

The Huntfork is overlain in the southeast Brooks Range by marine sandstone and shale (e.g. Wind River and Your Creek sections). The dominance of marine sandstone in this interval suggests that it is more like the Noatak sandstone of the Western Brooks Range than any other established formation in northern Alaska. This marine sandstone is then overlain by the regressive, nonmarine, Kanayut Conglomerate.

Along the Porcupine River and in the Black River Quad the early Devonian is graptolitic black shale (Road River Fm.) overlain by the Salmontrout reefal limestone which is then overlain by shelf carbonate similar to the Ogilvie Formation of the northwest Yukon. At one locality (Fort Creek) a dolomite of Late Devonian age overlies the Middle Devonian carbonates (Ogilvie). The upper part of the Late Devonian in this area is not clearly established. It may consist of dark shale and sandstone as seen at stations 95 and 96.

In the Eagle area, the Early-Middle Devonian rocks are dark shales of the McCann Hill "Chert". The McCann Hill appears to grade upward into the Late Devonian Nation River Formation which



is, in part, nonmarine sandstone and conglomerate. The Nation River is conformable with the overlying Ford Lake Shale the lower part being Late Devonian, also. Very little paleontologic evidence of Famennian has been found, however, no unconformity is evident at the top of the Devonian portion of the Ford Lake Shale (Calico Bluff Section). Our information, to date, suggests that the Nation River Formation (Frasnian) is slightly older than the Kanayut Conglomerate.

Mississippian - In the southeast Brooks Range, the Mississippian is composed of the Kayak Shale overlain by the Lisburne Limestone. At Smoke Creek and East Red Sheep Creek, as at Carter Pass, the entire Kayak and lower part of the Lisburne are Early Mississippian. There is no known Kayak of Late Mississippian age south of 69 degrees north latitude. Here, the entire Late Mississippian is Lisburne Limestone, substantiating the previous ideas of northeasterly transgression across the eastern Brooks Range in Mississippian time.

Along the Porcupine River and in the Black River Quad, the Early Mississippian is predominantly nearshore marine sandstone and shale to the west, and is missing to the east. Late Mississippian, nearshore, sandstones and carbonates to the east (Salmontrout River Sect.) unconformably overlies rocks as old as Ordovician.

In the Eagle area, the Mississippian is composed of the upper part of the Ford Lake Shale and the Calico Bluff Formation. The Calico Bluff contains an unusual mixture of sedimentary structures, lithologies and fossils that suggest current transportation of shallow water sediments to deeper water depositional environments.

Pennsylvanian - A thin veneer of Early Pennsylvanian Lisburne Limestone is present over much of the Southeastern Brooks Range. It is typical open shelf Lisburne Limestone. Most

likely, the upper Lisburne has been stripped from this area by pre-Permian erosion.

Along the Porcupine River, the Pennsylvanian is mostly dark shales and siltstones with interbedded carbonates near the base (South Old Camp section).

North of Eagle, at Step Mountain, there is 700 feet of limestone, sandy limestone and conglomeratic sandstone of Pennsylvanian age. This sequence of rock is similar to the Ettrain Formation of the nearby northwest Yukon.

Permian - The Echooka in the southeast Brooks Range is dark gray siltstone and shale. Paleontologic evidence from the Joe Creek section suggests that only the Early Permian is present. Younger Permian may be present south of Joe Creek.

Early Permian shales and siltstones are also present along the Porcupine River. As yet, younger Permian rocks cannot be confirmed in the area.

Rapid facies changes occur within the Permian along the Yukon River northwest of Eagle, Alaska. Early Permian near-shore sandstones and shale crop out just north of Takoma Bluff (Sta 125) and at Step Mountain. The Early Permian also consists of marine sandstone and conglomerate (Step Formation). Nonmarine Step Conglomerate may also be present west of Step Mountain.

The Tahkandit Limestone is now known to be Middle Permian, and younger than the coarse clastics referred to above. It is mostly a coarse-grained, bioclastic limestone.

Triassic - Rocks of Triassic age are poorly exposed and incomplete in the southeast Brooks Range. At the Upper Coleen and South Red Sheep Creek sections there may be some partial sections of Triassic siltstone and shale.

Just south of the Brooks Range at the Coleen River section Middle and Late Triassic siltstones and sandstones interbedded with thin limestones are present.

There are no known occurrences of Triassic rocks along the Porcupine River.

Late Triassic dark shale and limestone (Glenn Shale) are present along the Yukon River. This formation, in places, contains oil shale that has been reported by Mertie and other U. S. Geological Survey workers.

Very few exposures of Jurassic or Cretaceous rocks were examined. No Jurassic rocks were found along the Porcupine River. There may be scattered outcrops of Early Cretaceous sandstone in the Black River Quad, (e.g. station 30 and 68).

Along, and north of the Yukon River, there are thick exposures of Jurassic shale (Glenn Shale). In this same area there are thick exposures of Early Cretaceous clastics that were not measured (Kandik Group). The basal member is at least 200 feet of Keenan Quartzite (sandstone) overlain by a very thick sequence of Biederman Argillite (siltstone and shale), that is overlain by a thick sequence of Kathul Graywacke.

#### SUMMARY

1. The Late Devonian sequence west of Arctic Village contains very interesting reefal rocks that could be potential reservoirs where traced to the subsurface.
2. A late Devonian shoreline can be established by the areal distribution of the nonmarine, Late Devonian, Kanayut Conglomerate.
3. The Mississippian-Pennsylvanian sequence in the southeast Brooks Range is very similar to that in the Shublik-Saddleyochit Mountains, but equivalent facies are older.

4. The Permo-Triassic sequence in the southeast Brooks Range is mostly shale-siltstone in contrast to the coarse clastics of the Triassic to the north.
5. The Early Paleozoic sequence along the Porcupine River is mainly marine shelf deposition (carbonate-sandstone) while the Early Paleozoic in the Eagle area is mainly basinal shale. Cambrian in the Eagle area is, however, marine shelf deposition.
6. The Late Paleozoic along the Porcupine River is a transgressive sequence from west to east and does not contain any thick sequences of shelf carbonates. Shoreline sandstones are locally developed in this interval.
7. The Late Paleozoic is poorly exposed along the Yukon River and facies relationships are not known from the data collected in 1971.
8. The Triassic-Jurassic section in both the Porcupine and Yukon River areas is mainly shale. Near Nation, along the Yukon River, it contains nearly 500 feet of oil shale.
9. Further field work is needed to fully understand the Cretaceous rocks of the Ft. Yukon Basin. This work could be combined with a structural mapping study of the area.





Attachment 2

Amoco Production Company  
Denver Division

AREA FT. YUKON BASIN  
STATE ALASKA  
COUNTY \_\_\_\_\_

SUBJECT DATA COMPILATION OF THE 1972 FIELD PARTY - SE  
BROOKS RANGE AND FT. YUKON BASIN

No. \_\_\_\_\_  
Date JANUARY 24, 1974  
By L. C. FURER

<u>NO.</u>	<u>ENCLOSURES</u>	<u>SCALE</u>
FIGURE 1	Topographic Index Maps	
FIGURE 1A	Topographic Index Maps	
FIGURE 1B	Topographic Index Maps	
FIGURE 1C	Topographic Index Maps	
ENCL. A	Measured Sections	
ENCL. B	Paleontology - Megafossils, Conodonts, & Forams	
ENCL. C	Palynology	
ENCL. D	Source Rock Analyses	
ENCL. E	Radiometric Dates	
ENCL. F	Photographs	
ENCL. G	Sample Index	
ENCL. H	Field Notes	