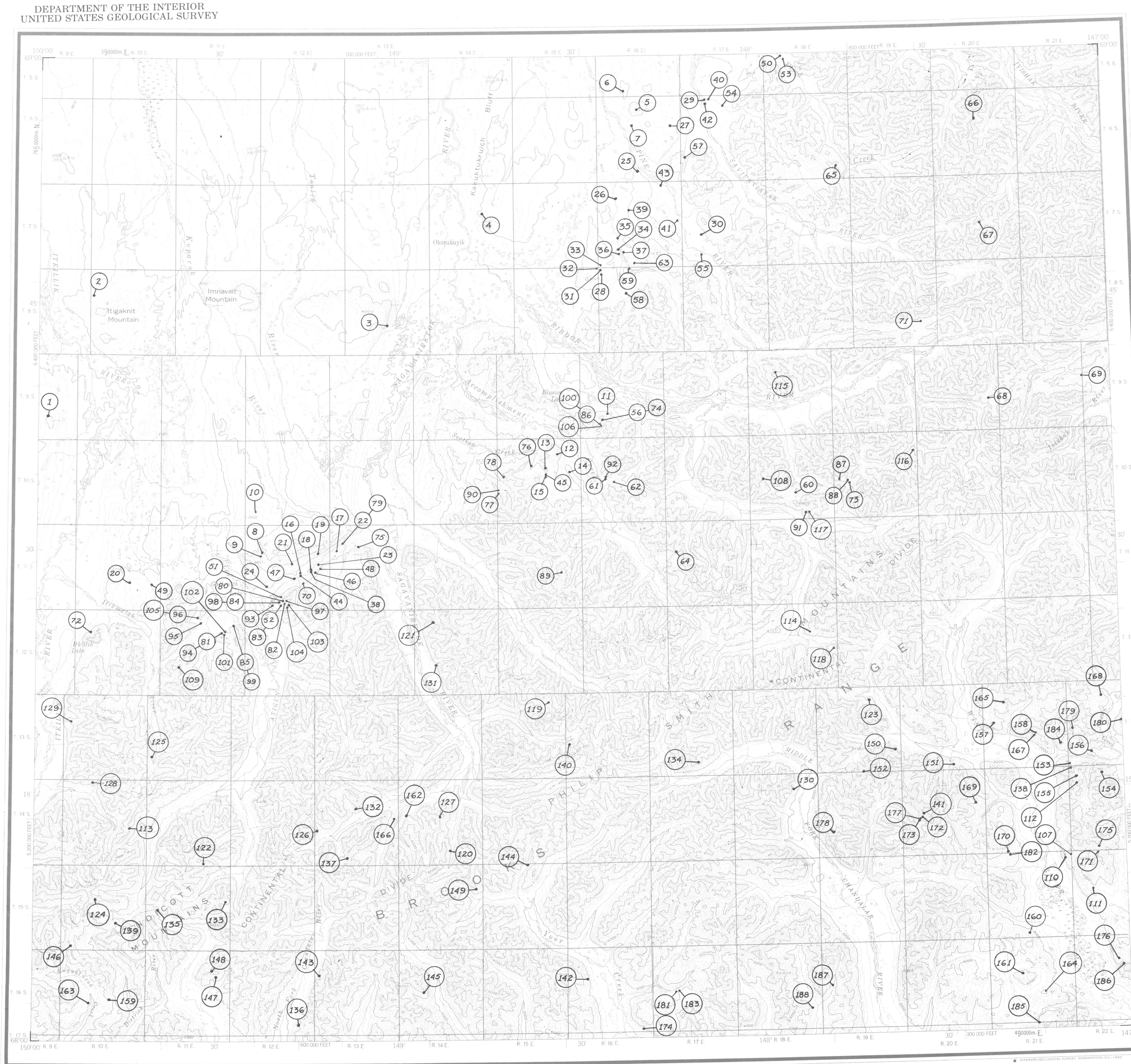
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY



Base from U.S. Geological Survey, 1956

SCALE 1:250 000

CONTOUR INTERVAL 200 FEET
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Geology by: A.L. Bowsher, J.T. Dutro Jr., 1949; W.P. Brosge', H.N. Reiser, 1950, 1952, 1960; A.S. Keller, R.L. Detterman, 1951; W.P. Brosge', H.N. Reiser, C.L. Whittington, 1958; I.L. Tailleur, 1965; R.L. Detterman, 1969, 1972; H.N. Reiser, J.T. Dutro Jr., 1974; H.N. Reiser, W.P. Brosge', J.T. Dutro Jr., R.L. Detterman, 1975, 1976; N. J. Silberling, 1976.

LOCATIONS OF FOSSIL COLLECTIONS, PHILIP SMITH MOUNTAINS QUADRANGLE

NUMBERS REFER TO TABLE 1

BEDROCK GEOLOGIC MAP OF THE PHILIP SMITH MOUNTAINS QUADRANGLE, ALASKA

BY

W.P. BROSGE', H.N. REISER, J.T. DUTRO JR., AND R.L. DETTERMAN

1979

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FOLIO OF THE PHILIP SMITH MOUNTAINS QUADRANGLE, ALASKA
MISCELLANEOUS FIELD STUDIES
MAP MF–879B
SHEET 2 OF 2
BROSGE' AND OTHERS—BEDROCK GEOLOGY

Table 1. Megafossil collections from Philip Smith Mountains quadrangle, Alaska

Map number	Locality number	Field sample number	Section	Township (South)	Range (East)	Fossils	Age of diagnostic fossils	Identified by 1/
CRETACEOUS ROCKS, Nanushuk Group, Chandler Formation (Knc)								
1		50AKe 2	26	9	9	pelecypods	Late Cretaceous (Cenomanian)	A
1		50AKe 5	26	9	9	pelecypods	Late Cretaceous (Cenomanian)	A
2	M 6721	75ARr39	7	8	10	chaetopods	Early Cretaceous (Albian)	B
CRETACEOUS ROCKS, Nanushuk Group, Tuktu Formation (Knt)								
3	22755	51ADt178	27	8	13	pelecypods	Early Cretaceous (Albian)	C
4	M 6701	75ADt 29	15	7	14	pelecypod, cephalopods	Early Cretaceous (Albian)	B
5	M 6703	75ADt 44	4	6	16	pelecypod	Cretaceous(?)	B
6	M 6704	75ADt 46	33	5	16	pelecypod	Early Cretaceous (Albian)	B
CRETACEOUS ROCKS, Torok Formation (Kt)								
7	M 6706	75ADt 45	16	6	16	bivalve	indeterminate	B
CRETACEOUS ROCKS, Fortress Mountain Formation (Kfm)								
8	M 6707}	75ADt 12 A,F	8	11	12	pelecypods	Early Cretaceous (Albian)	B
8	M 6708}							
9	M 6709	75ADt 13	17	11	12	indeterminate	indeterminate	B
10	M 6710	75ADt 14	31	10	12	bivalves	indeterminate	B
CRETACEOUS ROCKS, Okpikruak Formation (Ko, Kos)								
11	M 6711	75ADt 11	29	9	16	pelecypod coquina	indeterminate	B
12	M 6712	75ADt 71	11	10	15	pelecypod coquina	Jurassic or Cretaceous	B
13	M 6713	75ADt 72	15	10	15	pelecypod coquina, belemnite	Early Cretaceous (Valanginian)	B
14	M 6716	75ARr 59A	13	10	15	pelecypod coquina	Early Cretaceous (Valanginian)	B
15	M 6698	75ARr 61B	15	10	15 2/	pelecypod coquina	Early Cretaceous (Valanginian)	B
16		75ARr 66	23	11	12	pelecypod coquina	Early Cretaceous(?) (Valanginian?)	D
17	M 6717	75ARr148	7	11	13	pelecypod coquina	Early Cretaceous (Valanginian)	B
18	M 6718	75ARr156A	23	11	12	pelecypod coquina	Early Cretaceous (Valanginian)	B
19	M 6714	75ADt 78	13	11	12	pelecypods	Mesozoic	B
20	M 6725	75ADt 94	27	11	10	bivalve	indeterminate	B
21	M 6726	75ADt 97	15	11	12	bivalve	indeterminate	B
22	M 6670	75ARr146C	7	11	13	pelecypod	Jurassic or Cretaceous	B
23	M 6722	75ARr 199F	24	11	12	pelecypod	indeterminate	H
23	M 6723	75ARr 199G	24	11	12	pelecypod	indeterminate	H
24	M 6719	75A 0 3	29*	11	12 2/	pelecypod	indeterminate	H
				* (location uncertain)				
CRETACEOUS ROCKS, Kongakut Formation (Kk)								
25	22765	51AKe128	33	6	16	pelecypods	Early Cretaceous (Neocomian)	E
26	22767	51AKe139	5	7	16	pelecypods	Early Cretaceous (Berriasian)	F
27	M 6699	75ARr 56	13	6	16	pelecypods	Early Cretaceous (Valanginian)	B
28	M 6696}	75ABe 37 B,C	6	8	16	pelecypods	Early Cretaceous (Valanginian)	B
28	M 6697}							
JURASSIC ROCKS, Kingak Shale (Jk)								
29	22745	51ADt134	5	6	17	ammonites	Middle Jurassic(Callovian)	E
30	22746	51ADt136	20	7	17	pelecypods	Late Jurassic	E
31	22749	51ADt149	6	8	16	pelecypods	Late Jurassic	E
32	22750	51ADt151	1	8	15	pelecypods	Late Jurassic	E
33	22751	51ADt152	31	7	16	pelecypods	Late Jurassic	E
34	22766	51AKe135	29	7	16	pelecypods	Late Jurassic	E
35	22768	51AKe153	20	7	16	pelecypods	Late Jurassic	E
36	22769	51AKe154	32	7	16	pelecypods	Late Jurassic	E
37	M 6695	75ADt 24	29	7	16	pelecypods, ammonites	Late Jurassic (Kimmeridgian)	B
CRETACEOUS AND JURASSIC ROCKS, Okpikruak Formation, Kongakut Formation and Kingak Shale, undivided (KJok)								
38	29285	65ATr159.2	23	11	12	pelecypods	Early Jurassic	G
39	M 6729	75ABe105N	9	7	16	pelecypods	Late Jurassic	B
38		76AS 221	23	11	12	pelecypods	Jurassic(?)	H
39	M 6730	75ABe105S	9	7	16	pelecypods	Early Cretaceous(?)	B
TRIASSIC ROCKS, Shublik Formation (₮s)								
40	23589	51AKe111	4	6	17	pelecypods, ammonites	Late Triassic (Karnian)	I
41	23590	51AKe126	13	7	16 2/	pelecypods and ammonites	Late Triassic	I
42	23596	51ADt124	5	6	17	pelecypods, brachiopods	Late Triassic	J
43	22747	51ADt144	2	7	16	ammonite	Middle or Late Triassic	K
44		75ADt 98	28	11	12	pelecypods, mixed collection	Early Triassic (Smithian?) and Middle Triassic (Ladinian)	D
45		75ARr 61B,C	15	10	15	pelecypods	Early Triassic (Smithian?)	D
44		75ARr 66	23	11	12	pelecypods	Late Triassic (Norian?)	D
44		75ARr 66	23	11	12	pelecypods	Early Triassic (Smithian?)	D
46		75ARr157A,B	24	11	12	pelecypods	Early Triassic (Smithian?)	D
47		75ARr158C	22	11	12	pelecypods	Late Triassic (mid Norian)	D
48		75ARr199E	24	11	12	pelecypods	Early(?) Triassic	D
49	M 6724	75ADu 4	25	11	10	bivalve	indeterminate	B
TRIASSIC ROCKS, Sadlerochit Group (₮Ps)								
50		51AKe104A	20	5	18	ammonite, pelecypods	Early Triassic	I
PERMIAN ROCKS, Sadlerochit Group (₮Ps)								
51		50ABe200	33	11	12	brachiopods	Early Permian	P
51		50ABe201	33	11	12	brachiopods	Early Permian	P
51		50ABe202	33	11	12	brachiopods	Early Permian	P
52		50ARr 23	33	11	12	brachiopods	Early Permian	P
51		50ARr 24	33	11	12	brachiopods	Early Permian	P
51		50ARr 25	33	11	12	brachiopods	Early Permian	P
51		50ARr 26	33	11	12	brachiopods	Early Permian	P
53	15814	51AKe104	20	5	18	corals, brachiopods	Permian	L
54	15815	51AKe106	4	6	17	coral	Permian(?)	L
55	15816	51AKe123	32	7	17 2/	brachiopod	indeterminate	M
56	15817	51AKe162	29	9	16	brachiopods, pelecypods	indeterminate	M
57	15811	51ADt126	30	6	17	cephalopod, brachiopods	Permian	N
58	15812	51ADt146	8	8	16	cephalopod, gastropod	indeterminate	N
59	15813	51ADt147	4	8	16	brachiopods, gastropod	indeterminate	M
60		75ADt 5A,B	27	10	18	brachiopods	Early Permian	O
61		75ADt 6A	17	10	16	brachiopods	Early Permian	O
62		75ADt 7C,E	21	10	16	brachiopods	Early Permian	O
63		75ADt 22A	33	7	16	brachiopods	Early Permian	O
64		75ADt 25A	18	11	17	brachiopods	Early Permian	O
54		75ADt 55A	5	6	17	brachiopods	early Late Permian	O
65		75ADt 79,-2,-3	36	6	18	brachiopods	Early Permian	O
66		75ADt 81-2	15	6	20	brachiopods	Early Permian	O
67		75ADt 82	22	7	20	brachiopods	Early Permian	O
68		75ADt 84	24	9	20	brachiopods	Early Permian	O
69		75ADt 86	13	9	21	brachiopods	Early Permian	O
70		75ADt 96	26	11	12	brachiopods	Early Permian	O
71		75ADt102	26	8	19	brachiopods	Early Permian	O
72		75ADt109	8	12	10	brachiopods	Early Permian	O
73		75ARr 12	21	10	19	brachiopods	Early Permian	O
74		75ARr 22	29	9	16	brachiopods	Early Permian	O
75		75ARr 25	9	11	13	brachiopods	Early Permian	O
76		75ARr 62	9	10	15	brachiopods	Early Permian	O
77		75ARr 72F	19	10	15	brachiopods	Early Permian	O
78		75ARr 73	18	10	15	brachiopods	Early Permian	O
79		75ARr146A	7	11	13 2/	brachiopods	Early Permian	O
64		75ABe 16	18	11	17	brachiopods	Early Permian	O
70		75ABe 19	26	11	12	brachiopods	Early Permian	O
80		76ABe400F	33	11	12	brachiopods	Early(?) Permian	O
PERMIAN(?) AND PENNSYLVANIAN ROCKS, upper part of Lisburne Group (PMlu)								
81	13264-PC	50ABe 20	11	12	11	brachiopods	Early Permian(?)	P
82	13267-PC	50ABe103	33	11	12	brachiopods	Early Permian(?)	P
80		50ABe108	33	11	12	brachiopods	Early Permian(?)	P
83	14039-PC	50ARr 22	33	11	12	brachiopods	Early Permian(?)	P
84	14040-PC	50ARr 27	33	11	12	brachiopods	Early Permian(?)	P
85	14044-PC	50ARr 31	12	12	11	brachiopods	Early Permian(?)	P
86		52ABe 65	29	9	16	brachiopods	Early Pennsylvanian(?)	P
87		75ARr 11	19	10	19	brachiopods	Pennsylvanian	O
88		75ARr 12A	17	10	19	brachiopods	Pennsylvanian	O
89		75ARr 34	23	11	15	brachiopods	Pennsylvanian	O
90		75ARr 72A	24	10	14	brachiopods	Early Pennsylvanian(?)	O
91		75ABe 7	35	10	18	brachiopods, bryozoans	Pennsylvanian(?)	O
92		75ABe 12A	17	10	16	brachiopods	Pennsylvanian	O
MISSISSIPPIAN ROCKS, upper part of Lisburne Group (PMlu)								
93	13263-PC	50ABe 13	32	11	12	corals	Late Mississippian	P
94	11789-PC	50ABe 21	11	12	11	brachiopods	Late Mississippian	P
94	14984-PC	50ABe 22	11	12	11	corals	Late Mississippian	P
95	13265-PC	50ABe 23	9	12	11	corals	Late Mississippian	P
96	11775-PC	50ABe 24	4	12	11	corals	Late Mississippian	P
93	14987-PC	50ABe100	32	11	12	brachiopods	Late Mississippian	P
93	13295-PC	50ABe101	32	11	12	corals	Late Mississippian	P
97	13268-PC	50ABe104	33	11	12	brachiopods	Late Mississippian	P
97	14046-PC	50ABe105	33	11	12	brachiopods	Late Mississippian	P
97		50ABe106	33	11	12	gastropods	Late Mississippian	P
97	12354-PC	50ABe111	33	11	12	pelecypods	Late Mississippian	P
97	12355-PC	50ABe112	33	11	12	gastropods	Late Mississippian	P
98	14041-PC	50ARr 28	33	11	12	corals	Late Mississippian	P
98		50ARr 29	33	11	12	brachiopods	Late Mississippian	P
99	14045-PC	50ARr 32	12	12	11	corals, brachiopods, bryozoans	Late Mississippian	P
100		52ABe 66	32	9	16	corals	Late Mississippian	P
100		52ABe 67	32	9	16	corals	Late Mississippian	P
100		52ABe 68	32	9	16	corals	Late Mississippian	P
100		52ABe 69	32	9	16	brachiopods, corals	Late Mississippian	P
100		52ABe 70	32	9	16	brachiopods	Late Mississippian	P
101		76ABe403(300)	11	12	11	corals, brachiopods	Late Mississippian	O
101		76ABe403(400)	11	12	11	corals	Late Mississippian	O
102		76ABe403(1300)	11	12	11	corals	Late Mississippian	O
MISSISSIPPIAN ROCKS, lower part of Lisburne Group (Mll)								
103		50ABe 15	34	11	12	corals	Late Mississippian	P
103	11779-PC	50ABe 16	34	11	12	brachiopods	Late Mississippian	P
104		50ABe 17	34	11	12	coral	Late Mississippian	P
105		50ABe 27	4	12	11	corals	Late Mississippian	P
106		52ABe 72	32	9	16	corals	Late Mississippian	P
106		52ABe 73	32	9	16	brachiopods, corals	Late Mississippian	P
107		60ARr797	1	15	22 2/	brachiopods	Early Mississippian	Q
108		75ARr 14A	18	10	18	brachiopods	Early(?) Mississippian	O
109		75ARr102	29	12	11	brachiopods	Early Mississippian	O
MISSISSIPPIAN ROCKS, Lisburne Group undivided (PMl)								
110		75ARr135B	1	15	21	corals, brachiopods	Early Mississippian	O
MISSISSIPPIAN ROCKS, Kayak Shale (Mk)								
111		60ARr796	17	15	22 2/	brachiopods	Early Mississippian	Q
112		60ABe682	7	14	22	brachiopods	indeterminate	Q
113		74ARr104	23	14	10	plants	Early Mississippian(?)	R
114		75ARr 6.1	10	12	18	brachiopods, bryozoans	Early Mississippian	O
115		75ARr 21	8	9	18	brachiopods	Early Mississippian	O
116		75ARr168	12	10	19	brachiopods	Early Mississippian	O
117		75ABe 7.8	35	10	18	bryozoans, brachiopods	Early Mississippian	O
MISSISSIPPIAN ROCKS, shale and sandstone member of Kayak Shale (Mks)								
118		75ARr 4	24	12	18	bryozoans, brachiopods, cephalopods, gastropods	Early Mississippian	O
119		75ABe 68	2	13	15	plants	Mississippian(?)	O
DEVONIAN ROCKS, middle conglomerate member of Kanayut Conglomerate (Dkm)								
120		75ABe 75	34	14	14	brachiopods	Late Devonian (Famennian)	O
DEVONIAN ROCKS, lower shale member of Kanayut Conglomerate (Dkls)								
121		75ABe130	5	12	14	pelecypods	Late Devonian(?)	O
DEVONIAN ROCKS, sandstone member of Kanayut Conglomerate (Dkss)								
122		75ABe140	35	14	11	brachiopods, ostracods	Late Devonian (Frasnian)	O
123		76ABe448	10	13	19	brachiopods	Late Devonian (Famennian)	O
124		76ABe455	16	15	10	brachiopods	Late Devonian (Famennian)	O
DEVONIAN ROCKS, wacke member of Hunt Fork Shale (Dhw)								
125		75ARr101	30	13	11	brachiopods, pelecypods	Late Devonian (Famennian)	O
126		75ABe 71	19	14	13	brachiopods	Late Devonian (Famennian)	O
127		75ABe 74	15	14	14	brachiopods, pelecypods	Late Devonian (Famennian)	O
128		75ABe 95A,B	4	14	10	brachiopods	Late Devonian (Famennian)	O
129		75ABe 96	7	13	10	brachiopods	Late Devonian (Famennian)	O
130		75ABe114	10	14	18	brachiopods	Late Devonian (Famennian)	O
131		75ABe125	20	12	14	brachiopods, pelecypods	Late Devonian (Famennian?)	
132		75ABe135	9	14	13	brachiopods	Late Devonian (Famennian)	O
133		76ABe453	13	15	11	brachiopods	Late Devonian (Famennian)	O
134		76ABe469	34	13	17	brachiopods	Late Devonian (Famennian)	O
DEVONIAN ROCKS, shale member of Hunt Fork Shale (Dhs)								
135	9371-SD	74ARr103	19	15	11	corals	Late Devonian (Frasnian)	S
136		75ARr152A	35	16	12	corals, molluscs	Late Devonian (Frasnian)	O
137		75ABe131A,B	33	14	13	corals, brachiopods	Late Devonian (Frasnian)	O
138		76ABe424A,B	6	14	22	brachiopods, corals	Late Devonian (Frasnian)	O
139		76ABe456	16	15	10	corals	Late Devonian (Frasnian)	O
140		76ABe460	19	13	16	brachiopods	Late Devonian (Frasnian)	O
141		76ADu 2 (640)	17	14	20	brachiopods	Late Devonian (Frasnian)	O
141		76ADu 2 (680)	17	14	20	brachiopods, corals	Late Devonian (Frasnian)	O
DEVONIAN ROCKS, limestone member of Hunt Fork Shale (Dhl)								
142		58ABe120	17	16	16	brachiopods	Late(?) Devonian	T
143	6409-SD	60ARr420	7	16	13	corals	Middle Devonian or Late Devonian (Frasnian)	U
144	6410-SD	60ARr451	3	15	15	corals, brachiopods	Late Devonian (Frasnian)	U
145	6420-SD	60ABe390	17	16	14	corals	Late Devonian (Frasnian?)	U
146	9372-SD	74ARr 96	31	15	10	corals, pelecypods, plants	Late Devonian (Frasnian)	S
147		75ARr149A,C	11	16	11	brachiopods, corals	Late Devonian (Frasnian)	O
148		75ARr150	11	16	11	corals	Late Devonian (Frasnian)	O
149		75ABe112	12	15	14	brachiopods, corals	Late Devonian (Frasnian)	O
DEVONIAN ROCKS, calcareous sandstone member of Hunt Fork Shale (Dhc)								
150		75ARr110	25	13	19	corals	Late Devonian (Frasnian)	O
151		75ARr117	34	13	20	brachiopods	Late Devonian (Frasnian)	O
152		75ARr118	34	13	19	corals, brachiopods	Late Devonian (Frasnian)	O
153		76ABe424C	6	15	22	brachiopods	Late Devonian (Frasnian)	O
154		76ABe425C	4	14	22	brachiopods	Late Devonian (Frasnian)	O
155		76ABe426	6	14	22	brachiopods	Late Devonian (Frasnian)	O
DEVONIAN ROCKS, wacke member of unnamed brown calcareous clastic rocks (Dbw)								
156	6436-SD	60ABe683	29	13	22	corals, brachiopods	Late Devonian (Frasnian)	U
157		75ABe 86	18	13	21	corals	Late Devonian (Frasnian)	O
158		75ABe 88C	22	13	21	coral	Late Devonian (Frasnian)	O
DEVONIAN ROCKS, brown shale member of unnamed brown calcareous clastic rocks (Dbs)								
159		74ARr 93	22	16	10	corals, brachiopods	Late Devonian (Frasnian?)	O
160		76ABe417	33	15	21	brachiopods	Late Devonian (Frasnian)	O
161		76ABe422	16	16	21	brachiopods	Late Devonian (Frasnian)	O
DEVONIAN ROCKS, limestone member of unnamed brown calcareous clastic rocks (Dbl)								
162	6423-SD	60ARr449	18	14	14	brachiopods, corals	Late Devonian	U
163	9376-SD	74ARr 94	20	16	10	corals	Late Devonian (Frasnian)	S
164		75ARr130C	22	16	21	corals, brachiopods	Late Devonian (Frasnian)	O
165		75ABe 27D	6	13	21	brachiopods	Late Devonian (Frasnian)	O
166		75ABe 70C	13	14	13	corals	Late Devonian (Frasnian)	O
167		75ABe 88F,G	22	13	21	corals, brachiopods	Late Devonian (Frasnian)	O
168		75ABe 90A,B,D,E	4	13	22	corals	Late Devonian (Frasnian)	O
169		75ABe115B,E	13	14	20	corals	Late Devonian (Frasnian)	O
170		75ABe116	5	14	21	corals	Silurian or Devonian	O
171		76ABe452	4	15	22	corals	Late Devonian (Frasnian)	O
172		76ADu 1A,B	20	14	20	corals	Late Devonian (Frasnian)	O
172		76ADu 1C	20	14	20	stromatoporoid	Late Devonian (Frasnian)	O
172		76ADu 1D	20	14	20	brachiopods	Late Devonian (Frasnian)	O
172		76ADu 2(2255)	17	14	20	brachiopods	Late Devonian (Frasnian)	O
173		76ADu 1R	20	14	20	stromatoporoids	Late Devonian (Frasnian)	O
DEVONIAN ROCKS, brown sandstone, shale and limestone member of unnamed brown calcareous clastic rocks (Db)								
174		60ARr442	36	16	16	gastropod	Devonian(?)	Q
175	6438-SD	60ABe681	32	14	22	brachiopods, corals	Late Devonian (Frasnian?)	U
176		75ARr138B	10	16	22	brachiopods	Late Devonian (Frasnian?)	O
177		76ADu 1I	20	14	20	brachiopods	Late Devonian (Frasnian)	O
DEVONIAN ROCKS, conglomerate member of unnamed brown calcareous clastic rocks (Dbc)								
178		75ARr134	29	14	19	brachiopods	Late Devonian (Frasnian)	Q
DEVONIAN ROCKS, wacke member of Hunt Fork Shale and wacke member of unnamed brown calcareous clastic rocks, undivided (Dhbw)								
179		75ABe 89	19	13	22	brachiopods	Late Devonian (Frasnian)	O
180		76ABe423	15	13	22	brachiopods	Late Devonian (Famennian)	O
DEVONIAN AND SILURIAN ROCKS, Skajit Limestone (DSs)								
181		60ARr444	20	16	17	pelecypods	Middle(?) Devonian	Q
182	6429-SD	60ARr798	5	15	21	pelecypods, corals	Middle(?) Devonian	Q,U
183	6412-SD	60ABe404	20	16	17	corals	Silurian or Devonian	U
184	6439-SD	60ABe684	25	13	21	corals, trilobite	Middle Devonian or Late Devonian (Frasnian)	Q,U
185		75ARr129	34	16	21 3/	brachiopods	Late(?) Silurian	O
186		75ARr137	10	16	22	corals	Silurian(?)	O
187		76ARr 46	18	16	19	corals	Middle(?) Devonian	O
188		76ARr 47	25	16	18	corals	Middle(?) Devonian	O

1/ Paleontologists are identified by letter symbols as follows:

- A R.W. Imlay (in Patton and Tailleur, 1964).
- B D.L. Jones and J.W. Miller (written comm., 1977).
- C R.W. Imlay (in Imlay, 1961).
- D N.J. Silberling (written comm., 1976).
- E R.W. Imlay (in Keller, Morris and Detterman, 1961).
- F D.L. Jones (in Jones and Grantz, 1964).
- G R.W. Imlay (in Imlay, 1967).
- H R.W. Imlay (written comms., 1976, 1977).
- I Bernhard Kummel (in Keller, Morris and Detterman, 1961).
- J J.B. Reeside (in Keller, Morris and Detterman, 1961).
- K R.W. Imlay (oral comm., 1978).
- L Helen Duncan and J.S. Williams (in Keller, Morris and Detterman, 1961).
- M J.S. Williams (in Keller, Morris and Detterman, 1961).
- N Mackenzie Gordon Jr. (in Keller, Morris and Detterman, 1961).
- O J.T. Dutro Jr. (oral comms., 1976, 1977).
- P J.T. Dutro Jr. (oral comms, 1959, 1978).
- Q J.T. Dutro Jr. (written comm., 1961).
- R S.H Mamay (written comm., 1974).
- S W.A. Oliver Jr. (written comm., 1974).
- T J.T. Dutro Jr. (written comm. 1959).
- U W.A. Oliver Jr. (written comm., 1961; and in Oliver, Merriam and Churkin, 1975).

2/ Outcrop too small to be shown separately on the geologic map.

3/ Fossiliferous boulders in stream.